



Surface to sub-surface: an innovative journey

- *Ajay Kumar Dwivedi**



Mr. Ajay Kumar Dwivedi is a well-known name in the Indian oil industry who has had a distinguished career, holding key exploration-related assignments at different work centres of ONGC. He not only managed ONGC's prime exploration portfolio well, formed a long-term exploration policy, but worked towards enhancing the working of the business processes within the organization for greater efficiency. As he joined the organization as a geophysicist and rose the ladder to the top position within the exploration wing, he understood well the stumbling blocks to exploration activities including those of the associated workforce. He was well-liked by ONGC employees as he believed in taking people along while discharging his role.

Mr. Dwivedi graciously agreed to my request for writing his memoir for this issue of GEOHORIZONS and has quite enthusiastically furnished details of his career spanning close to four decades.

- *Satinder Chopra*

Prologue

Starting my professional journey in the hydrocarbon industry in year 1980 as Geophysicist (Surface) with Oil and Natural Gas Corporation Ltd (ONGC), a premier National Oil Company of India, and continuing till year 2019, has been full of excitement for me. Recalling various experiences and learnings through this long journey led to nostalgia within me and filled me with a deep sense of gratitude to my mentors who included many of my senior and junior colleagues.

I completed my post-graduation in Physics from a relatively not so well-known Kanpur University in North India. After a very brief stint at solar observatory of the Indian Institute of Astrophysics at Kodaikanal, starting my career with ONGC as a geophysicist, was a major turning point in my life. For me, my complete journey from the Bombay Offshore Project to the ONGC corporate office in New Delhi, has been of evolution throughout, which turned me from an immature, ill-tempered and egoistic young man to a person with more maturity, reasonable wisdom, and human values. This evolution was possible through various opportunities given to me by the organisation and mentoring by the senior colleagues and friends, who really shaped my career. I have tried to capture this journey covering each of the three decades, in addition to the last leg spanning through eight years and eleven months which included my responsibility as Board member of ONGC for nearly

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four and half years. My learnings from failures and the success stories have been elaborated with extra details in the following write up.

Decade I (1980-1990): Journey through the unknown

When I joined ONGC as Geophysicist (Surface) in Bombay on 1st September, 1980, I had no idea about the role and challenges associated with the job. The news about my appointment in ONGC was sent through a telegram which I received at Kodaikanal, a hill station in the southern state of Tamil Nadu, where I was working in the solar observatory of the Indian Institute of Astrophysics with its headquarter at Bangalore. While I was so happy to learn about the offer, it was a challenge for me to reach Bombay by train without any prior reservation. But my friends helped me with making it possible.

I was the youngest in the Graduate Trainee (GT) batch of ONGC, which consisted of geoscientists and engineers from across the country. Soon I realised that ONGC as an organisation was a manifestation of a mini-India. My posting in offshore seismic data acquisition group was based on three days' sea worthiness trial sailing on Marine Vessel (MV) Anweshak, an ONGC owned survey vessel, engaged for 2-D seismic data acquisition in the East and West coasts of India. Later, I came to know that Anweshk had to its credit the data acquisition over the area which led to the discovery of giant Bombay High field. The initial period was tough for me in the offshore, though the work centre was known for induction and adoption of advanced technology. I was fortunate to come across my first role model in ONGC, Mr. K. N. Bhave, the then Chief Geophysicist, whose room in the office was next to the common room of newly joined employees. Mr. Bhave's down-to-earth personality and graceful appearance was an inspiration for each one of us.



(MV Anweshak at Cochin in 1986)

Anweshak used to sail for fourteen days in one voyage, and the monsoon period was off-season when the ship used to be at the port for repair and maintenance. An orientation program designed by seniors was quite useful to each member of our batch and helped with our first offshore data acquisition trip onboard M V Anweshak. While on voyage, the crew members were engaged starting

from the back deck of the ship, where the entire seismic streamer cable with hydrophones encased within it, had to be put into the sea, a process known as pay out. Once the cable was balanced at a suitable depth below the sea surface, action used to shift to the instrument room where the recording equipment, satellite navigation system, gravity meter, magnetometer and fathometer were installed for specific measurements throughout the recording period. Air guns being the source of energy in the offshore, were tuned and towed behind the ship with an array design for ensuring optimum energy penetration below the seabed. Senior employees working as shift in-charge and party chief commanded respect from the crew members and took care of the crew while imparting knowledge on various aspects of data acquisition. Discussion with the team members and guidance from experienced crew members also helped us in improving our learnings. The experience we gained on each voyage taught us the importance of team working and collaboration for obtaining the solutions, especially during crisis time. Recording of the seismic data on nine-inch magnetic tapes and using the satellite navigation system for positioning of the ship was an experience by itself. The sound of each shot from the air guns, the response of hydrophones while recording the reflected energy from the various sedimentary layers of earth, and the same being displayed in analogue form captured through a monitor record, was the first step towards unfolding the mystery inside the earth. It was an enlightening experience.



(Engaged in payout of streamer cable in February 1986)

After gaining hands-on experience in offshore data acquisition, we were sent to the ONGC training centre at Dehradun for a formal induction training program. This training module was heavily loaded with topics related to drilling and honestly, I did not find it so interesting. However, I could

meet with so many new GTs from many disciplines and develop friendship, which remained long lasting. Later, it also made me realise the strength of networking in one's career.

In 1984, the ONGC management decided to upgrade the various types of equipment of M V Anweshak related to seismic data acquisition. This initiative gave us an opportunity to undergo training for three weeks in USA, and I was part of the team sent to SECO Inc., a company based at Dallas, Texas. The training included the understanding of various aspects of seismic streamer cable, its depth control system, and hydrophones along with an equipment called Digital Signal Synthesizer (DSS), which was an interface unit between the cable and DFS V, the recording unit. Once the ship got the new facilities, it resulted in improved efficiency and the quality of imaging improved significantly as the acquisition was now being done with a 96-channel streamer, ensuring noise attenuation in the recorded data.

During that time, while I was part of field operations group, I used to visit my colleagues in the seismic data interpretation group and saw them working on seismic sections spread over big tables and preparing various maps manually. The seniors in the interpretation group were more friendly to their juniors and there used to be more open discussions as compared to the atmosphere in the operation group. I also heard the names of some of the inspirational figures like Late Mr. B. Gunturi and Mr N. C. Nanda who were highly knowledgeable and known for sound mentoring of the younger geophysicists. My interaction with my friends in the interpretation group generated a lot of interest in me for being part of this team, but it was not so easy to get this opportunity for a beginner like me.



(MV Sagar Sandhani)

The year 1986 was eventful for me on both the personal and professional fronts. I got married in the month of April, and later in the year, ONGC inducted a new seismic survey vessel by the name Sagar Sandhani, mainly driven by the need of equipping itself with the capability of 3-D seismic data acquisition in offshore, as the technology had already been inducted in the onland operations. The

new ship was much better by way of technical capabilities and the overall facilities including a Helipad for landing of a helicopter in case of any emergency. The ship arrived in India from Singapore where it was designed and built.

After my marriage, I came to Bombay from Kanpur with my wife and went to office to report for duty. Contrary to my expectation of being in the office for a few weeks, I was instructed to leave the next day for Tuticorin, a port city in the state of Tamil Nadu. The reason for this emergency was to rectify several technical snags developed in the new ship during its first sailing to the East coast. I was supposed to be with the crew to address the issues related to cable balancing and making the ship operational at the earliest. I was finding it hard to tell my wife about leaving her alone in Bombay, a city new to her and to attend the duty at Tuticorin so early after marriage. But to my pleasant surprise when I disclosed the news, without showing any anxiety she assured me of managing her stay in Bombay during my absence. I realised that I had a partner for life, who will stand by me in every situation.

After reaching Tuticorin, we were straightaway taken to the ship at the port and the previous crew briefed us about the technical problems faced during the voyage. It took us about 10 days to rectify the faults while attending the duty at the port before the sailing could begin. During the sail, again many problems were faced in various instruments, but the entire crew was determined to ensure the redressal of each issue and begin recording of the seismic data over the designated area. The total stay for the crew was almost double than the normal voyage period, but each of the crew members felt satisfied as the instruments became operational and the seismic data could be recorded to the desired level of satisfaction. This voyage in the new ship taught me the importance of perseverance and further strengthened my belief in teamwork.

At the beginning of 1987, I was transferred to seismic data interpretation group in Bombay, which brought a major shift in my career in ONGC. My first interpretation project was data covering the Deep Continental Shelf (DCS) area of Bombay offshore. There were stalwarts in the interpretation group like Mr. Ajay Saran with a towering personality and considered to be highly knowledgeable in exploration. Though, I did not work directly under him, but I greatly benefitted through his discussions with the senior members of our group.

In April 1987, we were blessed with a son and my responsibilities increased manifold at the domestic front. I also got my first promotion to the post of Senior Geophysicist under merit interviews during my posting in Bombay.

I was transferred to Dehradun in year 1988 with my posting at the Geophysics division of Keshva Deva Malviya institute of Petroleum Exploration (KDMIPE). Here I was assigned the job of interpretation of Deep Seismic Sounding data which was acquired by National Geophysical Research Institute (NGRI), Hyderabad. The data was acquired through seismic refraction survey and the objective was to understand the basin architecture through its interpretation. I was guided in the study by Mr. B. K. Verma, who not only taught me seismic refraction data interpretation, but also

many fundamental aspects related to gravity and magnetic data study. My posting under him helped me with developing new insights into the hydrocarbon exploration.

Decade 2 (1991-2000): Journey of learning through successes and failures

We were blessed with a daughter in February 1991, bringing joy and pleasure to our family. It also added to our responsibilities as parents. In the same year I was transferred to the Basin Studies Division (BSD) of KDMIPE from Geophysics Division. BSD was known for its studies at basin scale level for various sedimentary basins of India through integrated interpretation of geology and geophysics (G & G) data. Mr P. L. Zutshi and Mr. N. K. Lal were the experienced geologists heading the section. I was fortunate to work under both geoscientists who gave me ample opportunities and challenges to work on. Fine details of correlation on seismic data were taught by Mr. Ajay Saran who I had known from Bombay. My inclusion in the task force constituted by the then Director (Exploration) for standardisation of lithostratigraphy in Bombay Offshore Basin, helped me understand the geology of different sub basins and develop the skill of integration of entire G&G data including the inputs from the lab studies. After this study, I was given the project to identify wedge out prospects in the Tapti Daman area of western offshore by interpretation of 2-D seismic data. Based on the study, three exploratory locations were agreed by the management for drilling but none of them turned out to be hydrocarbon bearing. My first learning through this failure was not to work out stratigraphic prospects using 2-D seismic data, as the entrapment model was the biggest risk factor, and it could be only addressed through the study of 3-D seismic data. Regional studies in the area covering East of Bombay High and in Murud Depression with my colleague, Mr. R. K. Thakur, were appreciated by many seniors in exploration department. We also participated in Regional Exploration Board (REXB) meetings held at Mumbai to consider the proposals for exploratory drilling based on very detailed discussions by several senior level geoscientists. This forum gave a very good opportunity to the young geoscientists for getting the recognition based on the quality of technical work which was presented before experienced geoscientists. I was greatly encouraged through my participation in these meetings while representing KDMIPE. During my posting in BSD, I got the opportunity to carry out the first Sequence Stratigraphy project in Kutch offshore basin along with my team and the study in deep offshore area of Kutch Offshore. The study of petroleum system and the play concepts helped me develop the skills in basin analysis during my posting at KDMIPE. My promotion to Chief Geophysicist position in the year 1996, brought new responsibility to me as the project leader of interpretation projects which were finalised through the annual program of the Institute. This was also the time when Interactive Interpretation workstations were being inducted in the institute while moving away from the manual interpretation through the paper seismic sections.

There was a need felt by the geoscientists in ONGC for creating a forum with an objective of sharing the knowledge across the different disciplines engaged in petroleum exploration. Driven by this need, the Society of Petroleum Geophysicists (SPG) was formed in 1992, under Late Mr. M. R. Rao as its first president, and I was nominated as the Secretary of SPG. There were other geophysicists in

the executive body of SPG namely Mr. S. K. Das, Dr. D. V. R. Murty, Mr. G. C. Katiyar, Mr. D. M. Nathaniel and Mr. Satinder Chopra. With a modest beginning, later SPG grew to attain international recognition through its tie up with societies like SEG and EAGE.

In 1997, the Govt. of India announced its New Exploration Licensing Policy (NELP) which opened exploration to private companies in the country. In the same year, ONGC initiated a major restructuring project named Organisation Transformation Project (OTP) in consultation with McKinsey and Company, with an objective of moving to asset-based structure from the business group structure. A multi-disciplinary team (MDT) was selected by ONGC to work with the consultants for redesigning of organisational structure along with key business processes. I was chosen from exploration business group, and other team members coming from other business groups. It was a very different experience as it involved understanding of entire exploration and production (E&P) value chain and learn from the consultants about the global practices followed in the oil and gas industry. During the project, I experienced the practical MDT working approach in the E&P industry. While the project gave me exposure to learn about the various business processes, it also helped in developing the overall managerial skills for undertaking senior roles within the organisation. Each member of the team was benefitted during project. It also gave us opportunity to interact and communicate with a larger section of the workforce, and the collectives within the organisation at various work centres. Producing oil field Neelam in Bombay offshore was identified as the pilot project for implementing the asset-based model under OTP. It offered the practical challenges for implementing the asset-based structure and the learnings from the pilot project gave the much-needed confidence to the management for taking forward the restructuring of ONGC. The proposed new structure was based on the principle of Empowerment with Accountability for the key managers. In a big organisation like ONGC, the prevailing culture was of collective accountability, while empowerment was linked with entitlement. While the systems and processes could be redesigned easily, the most difficult part was to change the people's mindset. My association in OTP taught me many lessons in finding solutions to complex problems by engaging with each stakeholder to understand the core issues. This learning turned out to be very useful in my career later when I was given higher responsibilities.

While it was easier to implement the new structure in the pilot project in the offshore, its implementation in onshore fields was met with stiff resistance. However later, under the leadership of new Chairman and Managing Director, Mr. Subir Raha, a hybrid model of the existing business group structure and the proposed asset-based structure was accepted for implementation. Having been part of OTP for nearly three years, my acceptability in my parent department of exploration was getting reduced whereas I wanted to be back to the interpretation group.

Decade 3 (Year 2001-2010): Journey of new responsibilities at new locations

In 2001, I was transferred to Chennai which was known as the regional office of ONGC in the southern part of the country. Both our children were studying in 9th and 5th standards in one of the well-recognised schools of Dehradun. In Chennai, getting them admitted to any good school was very

challenging as the academic session had already started there. After lot of effort and with the help of some friends from the office, both the children could be admitted in a school which was not very far from ONGC colony, where I had got the residential accomodation. Initial days were tough for us as communication with the local people was difficult, our family not being familiar with the Tamil language. But soon we could overcome this hurdle with the help of some of our close friends whom I knew since my initial days in Mumbai.

During the initial period of a few months in the Chennai office, I could sense the reluctance within the team for getting complete acceptance as team member, but as time passed, there was more acceptability for me. My experience of working in the past as part of MDT was very useful in this regard. The new organisation model was being rolled out across the work centres of ONGC, and the structure in the Regional Office of Chennai also got replaced with the new structure where it was named as Basin Office under the control of Basin Manager. I remain thankful to Mr. V. Rangachari who as Block manager of Block II under the new structure, included me in his team of Cauvery Basin. In the meantime, I got my promotion to Deputy General Manager position at Chennai.

I was given the interpretation project in Mattur-Pundi area for identifying hydrocarbon prospects based on 2-D seismic data interpretation. This area was known for hydrocarbon production from fractured basement rocks. My team could identify a prospect with likely fractures in the basement using innovative method of estimating the interval velocities of the basement section from sonic logs of existing wells in the area along with seismic velocities. The contour map of the interval velocities brought out the areas of lower interval velocities helping in identification of the prospect. Another study in Cauvery Basin through application of seismic inversion as a tool for reservoir characterisation using 3-D seismic data along with well log data was done for the first time in ONGC by our team in 2003. There was an area between the hydrocarbon producing fields of Nannilam and Kamlapuram in Cauvery basin. Based on the previous studies, Kamlapuram Formation in this area between the two fields was considered to be devoid of reservoir facies. Our integrated study through seismic inversion and well logs, identified the prospective area with likely presence of reservoir facies within Kamlapuram formation between the two fields through calibration of seismic impedance with well log impedance. Since this methodology was being used for the first time in ONGC, there was resistance in accepting the results of the study by the higher management. However, our team could convince the management and succeeded in getting the proposal approved for drilling of the exploratory well over the identified prospect. The drilling of the well as Kamlapuram-35, led to the discovery of oil with initial production testing rate of 700 bbls of oil. Later the study was published in the July 2006 issue of 'The Leading Edge'. This success demonstrated the true potential of MDT working, as our team consisted of geophysicists, petrophysicist and geologists, and the team members worked by breaking down their functional silos.

In 2004, I was given the responsibility of the Block Manager, and it gave me the opportunity to manage the most prospective exploration acreage of Cauvery Basin, known as Tanjore-Nagapattinam block. I was also selected for management training conducted at Indian School of Business (ISB), Hyderabad, under the Executive Development Management program of ONGC. The

training gave me exposure and learning in the management of overall upstream hydrocarbon industry. It also gave me a great opportunity to develop my network with key managers of ONGC, as many of them were undergoing the training with me.



(In his office with the visiting group)

While I was in Chennai, Mr. D. K. Pande, Director (Exploration) with other senior level managers in Exploration department, decided to initiate a Project on Petroleum System and Sequence Stratigraphy (PS Cube) for all the sedimentary basins of India in consultation with an international expert on the subject, namely Dr. Octavian Catuneanu, a Professor in the Department of Earth and Atmospheric Sciences at the University of Alberta. A steering committee consisting of four Geoscientists was formed by the management, and I was nominated as the head of this committee. The responsibility for us included to get the study completed through work association of geoscientists of ONGC with the expert, and ultimately using sequence stratigraphy as a tool across the basins for deriving benefits through its application. Many young geoscientists were imparted the training in sequence stratigraphy with specific objective of its use in petroleum exploration through understanding of the depositional system and relating it with sea level changes. While the study was carried out at various work centres of ONGC, it strengthened my skills in project management by designing suitable monitoring mechanism for the performance of the various teams. The experience gained through this responsibility proved very useful later in my career. It also helped in developing friendship with Dr. Octavian which continues.

During my posting at Chennai, I was fortunate to work under Mr. V. C. Ramaiah, Mr. P. S. N. Kutty and Dr. C. S. Jain who as Basin Managers of Cauvery basin, helped me in improving my technical as well as administrative skills.

I got my next promotion to the post of General Manager in 2007, and was transferred to Jorhat, Assam in the north-eastern part of India. Leaving my family at Chennai, I left for Jorhat to join as Block Manager of North Assam Shelf Block in the Assam and Assam-Arakan Basin. Basin Manager, Mr. Satyajit Chowdhary, an experienced geologist, was heading the work center of Jorhat. I was greatly impressed by his simplicity. He had deep knowledge about the geology of the two basins. He believed in delegating responsibility to his juniors which helped me in discharging my role with greater freedom. With my team, several integrated studies were also carried out and, we restudied certain explored areas establishing the additional prospectivity in the fields of Banmali, Lakwa, Geleki and Rudrasagar for deeper plays. In 2009, I was given additional responsibility of South Assam Shelf area as Block Manager. Managing two Exploration Blocks with six acreage teams and operational groups, had its own challenges. My experience in OTP was very useful in this regard. Interpretation of the reprocessed 3-D seismic data during this period resulted in new discoveries later through drilling, namely Suphayam and Dayalpur in the South Assam Shelf. Exploratory drilling in North and South Assam shelf was increased during this time by engaging with each stakeholder within ONGC. Experience gained through my tenure at Jorhat gave me confidence for undertaking much higher responsibilities in ONGC.

I was transferred to Western Onland Basin, Vadodara in 2010, where I took charge as Block Manager of Mehsana-Patan and Rajasthan exploration blocks.

Journey through higher responsibilities and bigger challenges (2011-July 2019)

While working at Vadodara, I had to interact frequently with the Mehsana Asset to ensure that there was a complimentary role played between the business units of exploration and production. There was reasonable success ratio in exploratory wells drilled and in a mature basin we made a few notable new discoveries. In the meantime, the Basin Manager at Kolkata, holding the charge of Mahanadi-Bengal-Andaman (MBA) exploration business unit was retiring, and I was moved to take over from him in 2012. The three basins included deep offshore basins of Mahanadi and Andaman along with onland exploration in Bengal basin. There was no remarkable exploratory success made in the past and the people management was another challenge in Kolkata. Reducing expenditure through increasing operational efficiency was a priority here, for which involvement of the workforce was extremely important. By creating a system for recognition of "Performer of the month" and "Performing team of the month", the workforce could be motivated, which also helped in improving the yearly ranking of the Business unit in ONGC., I was promoted to the position of Group General Manager during my posting at Kolkata.

In 2013, I was transferred to Western Offshore Basin, Mumbai (Bombay got renamed as Mumbai in 1995) to take over charge of Basin Manager from Dr. P. K. Bhowmick who was due for retirement. Having started the journey in year 1980 and now coming back to Mumbai to head the exploration

business unit filled me with feelings of joy and pride. The team here largely consisted of many bright young geoscientists. Engaging them with challenging assignments was my priority. I also worked on making changes in drilling plan of exploratory wells by reassessing the prospectivity of each location planned for drilling. Moving the drilling rig during monsoon by negotiating with different departments and convincing them, to protect the commercial interest of ONGC while following all the safety norms, demonstrated the effectiveness of MDT working once again. We added very good volume of initial in-place reserves (more than 700 million bbls) in 2014, through exploratory drilling. Completing the interpretation projects with quality work was another praiseworthy effort by the teams. First broadband 3-D seismic survey was also completed in the offshore, which enhanced the prospectivity of the basin after data processing and interpretation. Due to the splendid performance of our basin team, CMD's trophy for the best performing basin was awarded to our business unit. I was enjoying my assignment as it involved lot of technical work. Also, I got my promotion to the position of Executive Director at Mumbai.



(Receiving CMD's trophy for the best performing basin in 2014)

The middle of 2014 was also the time when Director (Exploration), Mr. N. K. Varma moved to ONGC Videsh Limited (OVL) as its Managing Director and position of Director (Exploration) in ONGC was advertised. It was the common belief that this position can be only filled by someone from geology background, as this trend had prevailed in the past in ONGC. With my background of a geophysicist, I was reluctant to apply for the post. When I spoke to Mr. S. V. Rao, who had retired as Director (Exploration) from ONGC some years ago and always inspired me to take new challenges in my

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career, he encouraged me to apply and asked me to focus on preparing well for the interview. As advised by him, I applied for the position and started the preparation for my interview. Finally, when the result of the interview came, I got selected as Director (Exploration) reversing the past trend. I joined this new position at Board level of ONGC at New Delhi in March 2015. Without any previous experience of working in the corporate office, there was apprehension in my mind about the future. But soon these apprehensions were laid to rest with the help of colleagues in the Board and CMD, ONGC.



(In his office on joining as Director (Exploration) at ONGC corporate office in New Delhi in March 2015)



(With co-speakers at the Asia Pacific Oil and Gas Conference and Exposition held in Australia)

To set the future direction for exploration in ONGC, I planned to hold an Exploration Strategy meeting with specific agenda points, and the same was later attended by senior level exploration managers and youngsters. During the concluding session, the outcome was shared with other Directors and CMD, ONGC to ensure that each of the defined goals, is achieved through overall cooperation amongst the various departments. Some of the strategic goals were possible to be achieved through change in the prevailing work practices and approach. Priorities defined included adopting play-based exploration, opening one new basin for production through extensive exploration in less explored basins, adopting Petroleum Resource Management System (PRMS) instead of prevailing hybrid system for hydrocarbon reserves estimation, building new capabilities in seismic data acquisition, processing, and interpretation, and using reservoir characterisation as an essential tool for studies in the relatively mature basins. Broadly I had prioritised, People, Processes and Technology as the focus areas and during the strategy meet, issues discussed were around these three areas. Most of the identified goals could be achieved through the collaborative approach between various departments and teams. Instead of celebrating an individual's excellence, we started celebrating islands of excellence. A discovery named Ashok Nagar in Bengal Basin brought new hopes for exploration in the basin. Success of Mesozoic Play in Kutch Offshore basin gave momentum for new basins to be put on the production map. Area in the West of Mumbai High was opened for consideration of development through new discoveries made using reservoir characterisation for prospectivity assessment. Before my superannuation, PRMS system was adopted in ONGC after detailed deliberation in the board meeting.



(Interacting with the poster presenters at the 2017 Jaipur SPG Conference)

There were two initiatives planned by Government of India which were to be undertaken by ONGC alongwith Oil India Ltd. (OIL), another national oil company (NOC) of India. The first initiative was the study of Hydrocarbon Resource Ressment of Indian sedimentary basins. Instead of getting the

study done through contractors, as planned earlier by the management, I proposed before the ministry to undertake the study through in-house efforts by ONGC and OIL. It was agreed by the Secretary in the ministry with committed timeline for the completion of study. While the study could be completed by the geoscientists of both the NOCs before the scheduled timeline, it also helped in creating a large pool of basin analysts in both the organisations through the training and practical experience of the younger workforce on the project. My experience of project PS cube was beneficial in completing this initiative. Second initiative of National Seismic Program (NSP) to acquire, process and interpret 2-D seismic data in unexplored basins of India could also be completed through meticulous planning, execution, and monitoring by experienced geophysicists of ONGC under the leadership of Mr. Chaman Singh, Mr. U.S.D. Pande and Mr. D. K. Rawat, who were heading the project at different stages.

I must admit that during my entire professional journey, the most challenging and most satisfying part was my tenure as Director (Exploration) in ONGC. The support of my wife, Savita, played a significant role in completing this long journey through ONGC successfully. During the most stressful period of this journey in the last leg, Django, our pet, helped me in de-stressing, and always brought the smile back on my face while at home, after each strenuous day in the office. I was fortunate to have many role models during this long journey of nearly 39 years. I express my sincere thanks to everyone who helped me complete this journey which has been full of excitement and learnings.

Lastly, I express my thanks to Mr. Satinder Chopra, Editor of "GEOHORIZONS", Journal of Society of Petroleum Geophysicists, India, for encouraging me to relive this long journey through this write-up. 

Did you know?

1 barrel of crude oil is equivalent to 42 US gallons

1 gallon is exactly 3.7854 litres

1 barrel is exactly 158.9873 litres

Why is crude oil sold in barrels?

Interestingly, no one actually measures oil in barrels, and it is not even transported in barrels. When oil was first struck in Pennsylvania in 1859, and its production started, explorers were looking for a way to transport it. At the time whisky was being transported in barrels with a standard size of 40 gallons, and thus the inspiration came from the whisky industry. The oil explorers adopted 40-gallon barrels as a standard measure, to which they would add another 2 gallons to cover spillages during transportation to their destinations. Oil was being transported in barrels in those days but would not be efficient or economical today. These days, it is generally pumped into tankers or cargo ships, but the term barrel has stuck till today.