We shall not cease from exploration. . .

- Dr. P. Chandrasekaran*

Dr. P. Chandrasekaran is among the few who hold the distinction of working with both the national oil companies of India: Oil and Natural Gas Corporation Ltd. (ONGC), and Oil India Ltd (OIL).

He earned a postgraduate degree in geology from Madras Presidency College, and a Ph.D. from IIT Roorkee on “Petroleum Prospect and Risk Evaluation”. He began his career with ONGC as an operations geologist at Mumbai in 1984. In the initial stages of his career, he was associated with the reserves estimation of Bombay High and was also closely associated with many hydrocarbon discoveries in the Krishna Godavari (KG) Basin like Pasarlapudi, Mandapeta, Lingala, and Ravva fields. During 1994-2002, he was involved in the evaluation of overseas blocks that were on offer to ONGC Videsh Limited (OVL) in various countries/areas like Iraq, Vietnam, Iran, Kazakhstan, and the Caspian Sea. He was also a member of the first ONGC team that was involved in the evaluation and bidding process for blocks that were on offer under NELP (New Exploration Licensing Policy). During his stint at the Assam and Assam- Arakan Basin, he was involved in interpretation at the fold belt area and the management of all the NELP Blocks of the Basin. After a crucial posting at E & D Directorate, Dehradun he took over as Basin Manager, KG Basin. During his two-year tenure at this post, the Basin was adjudged the best performing basin in both years.

In April 2017, Dr Chandrasekaran took over as Director (Exploration and Development) of OIL. He was instrumental in achieving a quantum leap in OIL’s exploration acreage portfolio, fast tracking appraisal and development schemes and invigorating the EOR processes for production enhancement, with “e² – exploration and EOR” as mantra. He superannuated from OIL in June 2021 after completing over 37 years of service in the industry.

After initial hesitation, Dr. Chandrasekaran agreed to our request for writing his memoir, which is gratefully appreciated.

- Satinder Chopra
Prologue

I was pleasantly surprised when I received a mail from Mr. Satinder Chopra, asking me to write a memoir for GEOHORIZONS. I was hesitant, as I believe there are many stalwarts who have contributed much more than I have, and their experiences would be more interesting. I must also concede that I am not among the most adept writers who can hold the interest of readers, especially youngsters in this age of cryptic social media messages. Anything over two sentences is simply forwarded (TLDR?). However, Mr. Chopra persisted and convinced me to attempt one, by allowing me enough time. Here is the resultant attempt. I sincerely thank him and SPG for giving me this opportunity. A timeframe of over 37 years will obviously have a lot of memories, having worked in both the NOCs of India. Like everyone else, I have had my share of interesting episodes, learnings, sweet and not-so-sweet memories. Above all, I was very fortunate to have worked under many stalwarts, mentors, and gurus. I have named a few but couldn’t name all.

The beginning of the journey

April 1984. Like any Indian boy who sets out of home to join his dream job, I prostrated at the feet of my parents, got their blessings, and boarded the Dadar Express at Madras (now Chennai) bound for Bombay (now Mumbai), the dream city. Though I had been to Bombay earlier, the city never stops fascinating me. When I got down at Dadar, I looked at the city’s imperial buildings with amazement, just like how a rural hero in a yesteryear Tamil movie looks with awe at the Madras Central Station and LIC building on Mount Road. Joining ONGC as a geologist at Maker Towers office in Cuffe Parade was a dream come true. My batchmates and senior officers were speaking convent English and chaste Hindi. Though I was an English-medium schoolboy and Hindi was my second language at the university, I confess I got a slight inferiority complex, but that soon went away. During the late seventies and eighties, activities at Bombay High were in a frenzy, while work at the eastern offshore were picking up pace. So, our batch was denied the traditional three-month training at Dehradun, and we were packed off to offshore after an orientation programme at Khandala (which was great and memorable in so many ways, including the big sermons from Mr. Mahindroo and Dr. Ramanathan!).

After the initial excitement, I started duty as an offshore operations geologist on a 14 days on-off pattern. I worked mostly at Bombay High, Heera Field and sometimes at the KG offshore. It was a splendid phase of my life. Everything was new. There was a lot to learn. It would get very busy in a 12-hour shift from 6 pm to 6 am (new recruits would always be assigned the night shifts!). Sometimes it would be 24 hours, if the second geologist would not arrive, or if one is on duty at development wells. It was great fun trying to master the online mudlogging unit (MLU), getting wet with mud, getting abused by the tool pusher upon asking for a core, and desperately trying to get some vegetarian food on an all-expat crew ship! Once you got off the rig, the 14-day off period would be heaven with friends at the hometown. Operations geologists hardly knew anyone in the office, nor did they know the company hierarchy. We would simply collect our manifest, go to the rig, do hard duty, and go home during the off period. Life was set into a good routine, till one day, I had the lifetime opportunity of meeting ONGC Chairman, Col. S. P. Wahi, onboard rig Sagar Ratna.

As mentioned earlier, operations geologists would go to the office to only collect the chopper manifest prior to their 14-day duty. Once, out of curiosity, I entered the room of a geophysicist after collecting my manifest. There, I saw long 2D seismic lines stuck on the wall. I saw there was a new domain called interpretation, though we had been introduced to terms like seismic data acquisition, processing, and interpretation in the
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The next day I landed at Sagar Ratna, drilling water injection wells from a Water Injection (WI) platform. At WI platform rigs, only one geologist would be posted and had to work round-the-clock. One morning, the rig got word that the Chairman, some Members (Directors were Members then) and a few senior officers were taking rounds of the Bombay High Field and might randomly choose any rig to visit and review. As a young geologist, I was neither concerned nor excited. I knew the names of the Chairman and Members but was hardly aware of the awe around them or the fear quotient they commanded. After it was confirmed that Col. Wahi would visit our rig, I remained unruffled, even though I was the lone geologist on board. Even in my wildest dreams, I never imagined that of all the officers on board, I would have a rendezvous with the Chairman.

Col. Wahi landed on the rig and first met with the senior officers. He then called for the young geologist onboard, and I was summoned from my MLU. After the formal introduction, he asked me to appraise him about the progress in the wells. Final production logging had just been completed the previous night. I had all the data — like the tops and thicknesses of all major zones, namely, L-III, L-II, S-1, L-I in various wells that had been drilled — at the tip of my fingers. I excitedly reported to him and other senior officers (I recall Mr. L. L. Bhandari, Mr. Anjaneyan, Dr. Reena Ramachandran were present) about the thicknesses, net pay, etc. Col. Wahi would glance at Mr. Bhandari for concurrence and get convinced when Mr. Bhandari would make a subtle eye gesture and nod in approval. Just when I thought everything was going smoothly, Col. Wahi stopped me and asked me to recount the net pay thicknesses at various wells. Thinking that he was testing me, I opened the logs and started reiterating. He stopped me abruptly. I could feel he was displeased with what I was trying to communicate with a child’s excitement. He looked at me and said in a raised tone, “You geologists are keeping the management in the dark when we are in for more oil”. The entire conference room went into a huddle, and I went into a state of shock. He perhaps did not expect me to tell him that we indeed had thick oil columns in WI wells. However, my youthful zest helped me compose myself within 40-50 seconds. The visit to the geophysicist’s room the previous day and some discussions with the production engineers onboard helped me formulate some
ideas immediately. I gave many ideas and convinced him that geologists were not so bad after all! At the end of 40 gruelling minutes, he patted me on the back and looked pleased.

Col. Wahi then wished to visit my MLU. After seeing a brand new Samega online MLU, he asked me if I could operate the unit. “Yes sir, I am learning,” I said. “What, you have not been trained?,” he said. He turned to a senior officer and said, “This boy should be in Paris next month for training”. To say that I was in seventh heaven would be an understatement. After my 14-day off, I returned to the office, expecting that there would be an order for me to go to Paris. Instead, there was another order, and I was informed that Dr S. Ramanathan, General Manager (Exploration) wanted to see me. I stood outside his room on the sixth floor of the Priyadarshini Building. I had heard Dr Ramanathan was no-nonsense, very strict and a very technical man to the core. My heart thumped with nervousness as I continued waiting. After a while, I was ushered inside.

Though he had been appraised by Mr. S. Ganapathi and Mr. P.G. Natu, (seniors in operations geology section) about my tryst with Col. Wahi, he wanted to know directly from me about what had happened. I recounted it to him verbatim. After listening to me attentively, he advised that operations personnel should be fully aware of the objectives of the operations he/she is attending. An operations geologist should be completely conversant with the objectives of the well; a field geophysicist should be fully aware of the geological objectives of the campaign, etc. After this appraisal, I received the order from his office. I was posted with a task force assigned to study Bombay High Field in detail and estimate the in-place hydrocarbons and reserves. I was crestfallen, not because I didn’t get an order to go to Paris for training, but because I was transferred from the operations geology section and would no longer be part of the active offshore rig life and there would be no more 14 days off! But little did I realise then that the next six months would be one of most memorable periods of my professional life.

I had the opportunity of working in a great team under Mr. Y.B. Sinha, one of the most renowned development geologists of ONGC. Those six months were very demanding, but I learnt the whole gamut of development geology and reserves estimation from a stalwart. At the same time, I also had to endure comments at many instances, whether in office while seeking data from various departments, during informal discussions or while standing in a queue at the Bank of Maharashtra to withdraw some cash (no ATM or Paytm those days!). I would hear things like, “Oh, you are that smart geologist who told Col. Wahi we have more oil to produce!”. At times, such comments did hurt, and I would often feel like retorting. But I would never have time to do so, as Mr. Y. B. and Dr Ramanathan would always keep me on my toes. Notwithstanding all this, at the end of the project I realised it was a very rewarding experience for me in terms of learnings.

After the task force report was submitted, I was fortunate enough to be granted a brief vacation and headed home. I was a little perturbed and not in the best phase of my mental well-being. My father, who was a teacher, could read my face and understand that. After his nudging, I narrated the entire episode and told him about the comments some colleagues had made which disturbed me. After listening to me patiently, he initiated a conversation, which endowed me with some lifelong lessons that helped me conduct myself with humility throughout my entire career. I will Recapitulate that conversation towards the end of this chronicle.

Learnings continue....

I was subsequently transferred to Chennai and posted in the office of Mr. S. Venkataraman, Deputy General Manager (DGM), (Geology). I was assisting the Offshore Operations Geology group as well as the Development Geology group, which was in a fledgling state at the time. Both the KG and Cauvery basins were
in an infant stage of exploration. A series of successes were being made and the atmosphere was always charged. The Cauvery basin had just been established as a Category-I basin. Mr. M. R. Ramachandra was handling the Andaman Offshore exploration. I also had the opportunity of occasionally visiting the room of Regional Director Mr. V.C. Mohan, who was a technologically savvy geophysicist. I was among the younger lot in the office, and he sent me to a training course on Fortran conducted by the National Institute of Information Technology (NIIT). I wondered what good it would do for me to learn Fortran. But I loved the opportunity as I was basically interested in mathematics. It was an intense course and regular tests were conducted.

I was surprised to know I had stood first in the class. I never realised that NIIT would go and appraise Mr. Mohan. He called and appreciated me and asked me what I wanted. For a minute, I didn’t know how to respond. I told him I wanted to be posted with the interpretation section. I had come from Bombay after working and learning the nuances of development geology from Mr. Y.B. Sinha and was keen on learning some interpretation techniques. Mr. Mohan was kind enough and transferred me to the KG interpretation section, located at Sire Mansion, Chennai. He asked me to take his PC along with me (Those days, the PC–AT 386 was a very prized possession and would only be in the GGM / RD’s office) to Sire Mansion, which was a great honour. The PC was, of course, kept in the DGM’s (Head of the interpretation group) office and I always had access!

I was among the fortunate geoscientists who had the privilege of working in the KG interpretation group at Chennai during the late eighties and early nineties, when many significant hydrocarbon discoveries like Ravva, Tatipaka, Pasralpudi, Lingala, and others were made. Stalwarts and dedicated geoscientists like Mr. M. K. Rangaraju, Mr. Venkatarangan, Mr. V.C. Ramaiah, Dr D. Ray, Mr. V. Rangachari and many others were leading the interpretation and prospect generation efforts.

I reported to Mr. M. Subramanyam, and he directed me to Mr. Venkatarangan. The subsequent years of my professional life were phenomenal. With hectic activity at the KG Basin, there would always be pressure on the interpretation teams. We would invariably leave office around 9-9.30 pm. I still remember the Pasarlupudi well log correlation which would be hung on threads and nailed to the wall. Long regional seismic sections...
were pasted on the walls. Every day was a new learning experience. Mr. Rangan gave me Douglas Waples’ AAPG papers to read, motivated me to prepare 1D subsidence history models and apply petroleum system concepts as part of proposals for locations. Today, we have advanced petroleum systems modelling (PSM) software like ‘3D Petromod’, and PSM is carried out for resource estimation and basin modelling on a routine basis. But using graph papers to do subsidence history and drawing petroleum systems events chart was real fun and gave me immense insights.

I was also associated in the preparation of lithostratigraphy of the KG Basin with Dr Ray, Mr. Rangan and others and they were kind enough to acknowledge the contribution of juniors like me and Dr K. S. Bhushan in one of the published papers.

Working with stalwarts like Dr Ray and Mr. Ramaiah was a great experience. They were true mentors. Mr. Ramaiah was one of the chief contributors to successes in the KG Basin, especially KG offshore. I recall it was in his room on the 11th floor of the MMDA Building that the GS-16 field was christened as “Ravva” (precious stone/diamond in Telugu). He was presumably explaining to a senior officer in Delhi that the GS-16 is a diamond field of the eastern offshore, like the Heera, Panna, and Neelam fields in the western offshore. Many geophysicists in ONGC are known as millisecond geophysicists. Mr. Ramaiah would also never compromise on correlation/ mis-ties and had a keen eye for finer details. He was a very strict boss, but with a lot of compassion. I think he is the one who popularised the word “Mastaru” (A combination of the words “master” and “garu”, which means sir in Telugu) in G and G circles of ONGC, even among the non-Telugu geoscientists.

The drawing section of Chennai needs special mention. The draftsmen are so involved in technical work, that each of them knows the lithostratigraphy of the KG and Cauvery basins by heart. It was a pleasure working with people like Mr. Govindarajan, Mr. Dhanasekaran, Mr. Rajan Babu and Mr. Md. Basha. They would even know the position of major unconformity surfaces in different sub-basins. I left Chennai in 1994 and when I returned as Basin Manager of KG Basin in 2015, I could see they had technologically evolved and were operating drawing workstations. They had kept themselves relevant notwithstanding the advancements in interpretation workstation technology, which required the least reliance on draftsmen.

Changing gears....

After fantastic opportunities of working under some of the best geoscientists of ONGC at Bombay and Madras, with exposure to operations, development geology, and interpretation, I thought I had picked up some interpretation skills reasonably well.

While many of my batchmates from various places like Bombay and Madras were transferred to Assam, I was transferred to Dehradun. I also wanted to go to Assam, so that I could be in the company of colleagues and friends whom I already knew. I was told I was spotted at many REXB meetings by E & D bosses as a guy with potential, and hence I was being sent to Dehradun. I thought I could be transferred either to GEOPIC or E & D Directorate. But the order said Keshava Deva Malaviya Institute of Petroleum Exploration (KDMIPE). At KDMIPE also, I was not posted with the BSD (Basin Studies Division) but in PEFA (Petroleum Economics and Foreign Appraisal). I felt shattered. I didn’t even know what PEFA stood for! I was very tense. As soon as I landed in Dehradun, I mustered up the courage and sought an appointment with Mr. V. Sankaran, Head E & D, and met him. I pleaded with him for a posting at either GEOPIC or BSD. He patiently listened. His response is one I can never forget: “I am posting you in a group that is doing excellent work in an interesting and
upcoming branch. You will definitely enjoy learning this. More than anything else, I am posting you under one of the brightest geologists this company has. You are getting a lifetime opportunity of working under a great guy who seamlessly blends geology, geochemistry, petroleum system, economics, acreage appraisal and management techniques”. Honestly, I didn’t understand many of these terms. He continued, “I will give you six months’ time. Come back and tell me if you still feel you should be posted in BSD. If yes, I’ll try and recommend you, though I cannot guarantee”. Dejected, I came out of his room and joined the PEFA Division with a heavy heart. I reported to Mr. Joeman Thomas, who, as Mr. Sankaran had told me, was a fine geologist with an in-depth knowledge in so many allied disciplines and eventually retired as MD, OVL.

Within 20 days, a truck with my household things arrived from Madras and waited outside the KDMIPE gate. I was busy with a project appraisal of a block in Egypt. It was quite late in the evening. I was engrossed in my work, and the truck had to wait a long time for me to guide the driver to my new house in Dehradun. Work with PEFA had become so busy that I never got time to go back to Mr. Sankaran with a request for a transfer.

Within a very short span of time, I can humbly say I could get a firm grip on the evaluation methodologies, the available software, and participate in high-level meetings. Mr. Joe, as he is fondly known, was very technologically savvy and encouraged all his colleagues to read, share, collaborate, and be up-to-date on software, technology, and trends in the subject, etc. I learnt a lot during the various block evaluations which were carried out for OVL during that period. I was part of block evaluation teams, which gave an opportunity to get a peek at the geology of various foreign basins. These learnings also provided me with a lot of experience and strength, which were of immense help to me in subsequent years. It was also a transition period for India, from a nomination regime to competitive regime under the New Exploration Licensing Policy (NELP). I was a member of the first-ever technical core group that was constituted for evaluation of NELP blocks that were under offer. I again got an opportunity to work directly under Mr. Y. B. Sinha, who was the Head E & D Dte. then.

One of the most interesting episodes of my life is how I came to pursue my Ph.D. We were carrying out the evaluation of blocks that were on offer under NELP. Evaluation of deepwater blocks was particularly difficult, as we did not have any knowledge of deepwater field development then. I also recall that the oil price was at one of its lowest levels when NELP-I was announced. Somehow, we did a good job with the help of Petroconsultants, UK (now IHS). One Saturday afternoon, I was called to E & D Dte. to appraise Mr. D. R. Ghosh, Dr Ray and Mr. Rangan. The discussions got very intense and hovered around the geology of the blocks, deepwater processes, stratigraphic traps, probability of success, quantification of geological risk, Expected Monetary Value (EMV) etc.

The three stalwarts started provoking me in a way which I didn’t realise was intentional (it was their way of making youngsters speak out). I could argue reasonably well with them (which, of course, they allowed), thanks to training by Mr. Joe. I got carried away and continued speaking. They prodded me to pursue my
interests in the subject with a Ph.D. degree. Dr Ray, who always was a mentor, kindly consented to guide me along with Prof. Awasthi of IIT Roorkee. My father-in-law, the late Dr M.S. Srinivasan, an internationally renowned micropaleontology professor in his own right, would also encourage me to continue studying and acquire knowledge and skills. I consider myself very lucky that I had opportunities to work with such mentors, be challenged by them, and learn from them. The Ph.D. thesis related to the quantification of geological risk, which is a very interesting and intriguing subject. Being a part-time student and balancing professional pressure with academic requirements was a huge challenge. The defence of the thesis was particularly tough, as the concepts are based on review of extant methodologies. Prof. Awasthi, with his vast experience both in the industry and academia, mentored me well. I was finally awarded the Ph.D. in 2009.

With the explosion of technology in seismic data acquisition, processing, and interpretation techniques, as well as improvements in PSM and Play Based Exploration (PBE) techniques, quantification of geological risk has become a more robust process. Notwithstanding such advancements, quantification of geological risk still remains enigmatic and is always constrained by data availability, quality of data and the interpretation thereof. This subject is an area which, in my view, requires continuous study and there can perhaps be no generalisation across basins and plays. This entire process and application of such learnings in the subsequent years of my career led to my firm belief in a very famous verse by an ancient Tamil poetess, Avvaiyar, which goes like this.

“What we have learned is like a handful of earth;  
What we have yet to learn is like the whole world.”

To Assam – the cradle of the Indian hydrocarbon industry....

I was transferred to Jorhat, Assam in 2002. Little did I realise then that I would end my career in Assam two decades later in OIL, which works predominantly in that state. The Corporate Rejuvenation Campaign was in full swing at ONGC, and the Basin-Asset structure had just been rolled out. Mr. S. K. Majumdar was the first Basin Manager of the A and AA Basin. I had earlier worked with him in Chennai and again had many interactions with him when he was working at the office of the Director (Exploration) in Delhi. He was a thorough taskmaster with a very gentle heart. When one of our colleagues, Mr. N. Ganesh, was critically injured in a road accident, he personally ensured that utmost care was given. This is one of the most humane aspects of both ONGC and OIL—all employees are provided with the best possible medical care and senior officers personally ensure that proper treatment is provided to officers and staff. I was also fortunate to have received such kindness from both ONGC and OIL.

I had the fantastic opportunity of working with Mr. Satyajit Choudhury, a passionate geologist. We were working in the Assam Arakan Fold Belt. The Cachar and Tripura areas offered some great challenges in interpretation, with the seismic data quality not being up to the desired levels at the crestal part of anticlines. Thanks to Mr. Choudhury, I was exposed to concepts of structural restoration, balancing, etc. for the first time. Today we have sophisticated software like ‘2D/3D Move’ for such endeavours, but it was a curious learning experience then to cut xerox copies of seismo-geological sections and come out with various possibilities with a lot of assumptions in trying to recreate the geological past. The Assam Arakan Fold Belt has a lot more to offer, the exploration being largely constrained by logistics and environment, and also perhaps due to risk-reward perception emanating out of poor imaging and lack of data in many areas to holistically build a basin.
model. There are more Badarpurs, Digbois, Adamtilas and Agartala Domes, Konabans and Gojalias (fields in A and AA basin) that remain to be discovered.

**Back to Dehradun**

I had applied for a transfer to Mumbai or Baroda from Jorhat in 2005, with a fond hope that after such a stint in the west, I could request a transfer to Chennai towards the end of my career and retire happily. I was surprised— rather upset— when I was transferred back to Dehradun (this time to E&D Dte.) on a U-turn. A U-turn during Mr. Subir Raha’s tenure (former CMD, ONGC), was considered to be a bad word, especially to Dehradun and Delhi. Well, I finally joined E&D Dte. and reported to Mr. S. V. Rao, who had just taken over as Chief E&D Dte. I had met Mr. Rao during my earlier stint at Chennai. But my regular interactions with him were at Dehradun during the NELP deepwater block evaluations.

At E&D Dte., Mr. Rao rechristened many of us – Pandit (there are many of them), Doggie, Doc, Mad, Taklu, Hanuman and many more. I was always known as Chandru, Chandu, Shekar, Chandra, Chandy, pcran by my friends and colleagues, for who would call me by a typical, long South Indian name like Chandrasekaran? Mr. Rao started addressing me as PC, and that name has stuck ever since. I am mostly known as PC at ONGC.

Mr. Rao’s hallmarks were his in-depth geological and geophysical knowledge, incisive technical questioning, and decision-making prowess. He was considered to be a very tough boss. But all of us, who have worked closely with him, know that he was a boss with a “melting heart”.

Working at E & D Dte., which is considered the nerve centre of exploration in ONGC, is a unique experience. Exposure to various facets of exploration and development is truly exhilarating and quite stressful at the same time. There were no weekends, no public holidays including Republic Day and Independence Day, except perhaps Holi. After the parade in Dr B. R. Ambedkar Stadium on I-Day or R-Day, the Director would walk into Anveshan Bhawan, and the reviews would begin. In the evening, we would stand in attention to appraise other Directors or the CMD whenever the requirement arose. I remember appraising the then CMD Mr. Saraf on one such occasion around midnight.

To represent E & D Dte. in an REXB or Asset Development Board (ADB) meeting, where proposals for release of exploratory and development locations are discussed, is a huge responsibility. The preparations at E & D Dte. that go prior to the meeting, can be compared to those that are done at the proposing agency itself. The way the proposals are reviewed, and decisions are arrived at from all points of view – geology, geophysics, reservoir, economics, strategy, etc., etc – is something that can be experienced perhaps only at E & D Dte.
views of E & D Dte. would be given prime importance, and recommendations on locations were mostly governed by E & D’s analysis. Hence, representing E & D Dte. at such forums obviously comes with a huge responsibility. You must put up your views and observations to an erudite and experienced team of senior officers like basin managers, asset managers, block managers, and sub-surface managers and convince the working-level teams who would have worked relentlessly to firm up proposals for exploratory or development locations. When one is young and inexperienced, there is a tendency to demonstrate their knowledge in geology, geophysics, and reservoir domains and take the discussions to an argumentative level, sometimes bordering on rudeness. Humility is the most important virtue which needs to be nurtured and is perhaps one of the most important qualities that would help an oilman to work in teams, since E&P is all about working in close-knit teams. Notwithstanding my supposedly modest nature, one of my close friends did not talk to me for a few months when I was not inclined to recommend some locations proposed by his team in a REXB meeting. That is the level of emotional attachment geoscientists have with their work. Dr Biswajit Roy, who was my colleague on OIL Board as Director (HR & BD) would advise me to practise “detached attachment” during some intense discussions on exploration projects.

My first experience of heading the E&D team in a REXB was quite jittery. It was the Cauvery Basin REXB meeting around 2007. On the day of the REXB meeting, we were waiting for Mr. Rao outside the conference room on the 11th floor of the MMDA Building in Chennai. Around 9.15 – 9.20 am, we got word that he would not be attending the meeting as he was indisposed. If memory serves right, he spoke to us and wished us to do well in the meeting. That gave me a booster. I had a tough time in arguing against two locations in Ramnad Sub-basin. I felt like Abhimanyu, the cornered warrior, in that meeting. But somehow, I came out unscathed because of the confidence E & Dians get through thorough grilling.

I was also given wonderful opportunities like heading Group-III (KG-Cauvery group), being part of core teams like Sequence Stratigraphy project with Octavian Catuneanu (Petroleum System – Sequence Stratigraphy: PS3), Perspective Plan 2030 (PP 2030), coordinating deepwaters, NELP core team etc.
When Mr. N. K. Verma became Director (E), ONGC, he constituted the Exploration Portfolio Management Board (EPMB), which was an excellent concept and provided a forum for young geoscientists to be part of the location release process. I served as the first Secretary to EPMB, which was an enriching experience.

**The ladder…..**

All these opportunities and the experiences I derived from them perhaps led to my being made the Basin Manager of the KG Basin in 2015, one of the most challenging and interesting basins of India. There is an interesting story behind this. Sometime during 2014, I was attending the Advanced Management Programme conducted by the International Management Institute (IMI), Delhi for senior ONGC officers. One day, I received a phone call to rush to Alibaug where a key executives meet was underway to assist them in various round table discussions. Eventually, I was asked to make a presentation on behalf of one syndicate. I did not expect this, nor was I prepared. It was well past midnight and the presentation had to be made in the morning. E & D Dte. prepares us for all such crises and I could make an excellent, to-the-point presentation on behalf of the syndicate. The CMD Mr. Saraf appreciated it, saying my presentation was one of the best and that he would give me a prize. At the meet’s concluding session, I waited like an eager schoolboy for the CMD to call out my name, but it did not happen. But he made a comment that he remembered what he had said during the technical session. When I got the order several months later, I came to know that Mr. Saraf and Mr. A.K. Dwivedi, Director (E) in consultation with the Chief E & D Dte. Mr. Anand Sahu decided to make me the Basin Manager of KG Basin, notwithstanding the fact that I was quite junior.

The two-year period (July 2015- March 2017) as Basin Manager was a scintillating experience. I was again fortunate to have a wonderful team – block managers, acreage managers, forward base manager and the entire team of technical and support officers and staff. The rapport with the assets was at an all-time high. However, there were several challenges. The gas balancing/unitisation issue in the KG-DWN-98/2 block with the adjoining block was at its peak. Onshore oil production was declining, and there was an enormous expectation from the basin teams.

Shortly after my taking over as Basin Manager, the Hon’ble Minister for Petroleum and Natural Gas, Shri. Dharmendra Pradhan took a review of KG Basin at Rajahmundry. I gave a holistic view of the basin and explained to the dignitaries about its potential. The Hon’ble Minister appreciated the presentation and called for me during lunchtime. He asked me to sit next to him and took a keen interest in knowing about various ongoing exploration projects. The Asset Manager, Mr. Debashish Sanyal, joined a little later. There was a S-profile well with a substantial horizontal drift under drilling, nearing its target depth (TD). The well had achieved one of the geological objectives and had encountered more than 25 metres of oil-bearing sands. The asset team was requesting me to terminate drilling so that the well could be brought on production immediately. We were expecting a few more sands and I was not keen to terminate the well before reaching TD and fulfilling its exploration objectives. Mr. Sanyal told the Hon’ble Minister that if the Basin Manager could stop further drilling of the well, the asset can enhance production by immediately bringing it on production. The Hon’ble Minister could grasp the whole story within 30 seconds.

He told the Asset Manager, “Dada, allow the basin manager to do his job, i.e., exploration! The well will eventually be yours”. When it subsequently came on production, the well turned around the Rajahmundry asset that year. The asset’s production reached a four-figure tonnes per day mark. Mr. Sanyal and I were very good colleagues but became very good friends post that incident. The tussles between exploration and
drilling, exploration and production are not new. While the production team is right from their perspective, the value of information, like completing the objective of a well, getting that important core, or recording bottom hole pressures regularly, etc. go a long way in reducing risks and uncertainties in the long term.

The most rewarding aspect of my stint as Basin Manager was that the KG Basin was adjudged the “Best Performing Basin” during both the years, 2015-16 and 2016-17. This was possible only due to the hard work put in by all the geoscientists and officers and staff from all disciplines of the basin, and I perhaps could live up to the expectations of the management that posted me as Basin Manager!

Adieu ONGC and a new home – OIL

Mr. Anand Sahu has always been a well-wisher, and he prodded me to apply for the position of Director (E&D) at OIL. I was unsure if I should apply. After all, I was doing well in ONGC. I knew the basins, people, systems and processes well. Presuming that I got selected, I was apprehensive if I would be able to adjust in the new environment, notwithstanding the fact that I had the experience, confidence, and zeal to work as an exploration manager. With such thoughts crossing mind, I finally applied and got selected. When I talk to many youngsters, they wonder how most of our generation people could stick to a single company? For our generation, leaving a company like ONGC was unthinkable. It was with a heavy heart that I bid adieu to ONGC on March 31, 2017.

Looking back now, I feel blessed. It was a seamless transition. I still remember April 1, 2017 the day I joined OIL. The warm welcome I received from the CMD Mr. Utpal Bora, the Directors, and the officers and staff on my first day at OIL will always be etched in my memory. I felt truly at home. Not a single moment did I feel out of place. I also believe I was instantly embraced and accepted as part of the OIL family. The four years and three months I spent at OIL as Director (E&D) were phenomenal.

Northeast India is a beautiful place. I come from Tamil Nadu, which shares certain commonalities and sentiments with Assam, a picturesque state very rich in culture. The Magh Bihu is celebrated with the same fervour as Pongal in Tamil Nadu, while Bohag Bihu coincides with the Tamil New Year’s Day. My family is attached to Assam, as my daughter started her schooling at Jorhat when I was working at ONGC. The love and affection OIL Indians have bestowed upon me, and my family is heart-warming. I will be grateful for this forever.

The systems and processes at OIL are robust, which is evident from the fact that the company has been able to maintain a production level of over 3 MMT (Million Metric Tonnes)/year, year after year for several decades, notwithstanding the fact that almost the entire production comes from a single basin and that most producing fields are mature. I endeavoured to strengthen those systems and processes through many initiatives.
A company progresses if it keeps pace with advancements in technology. While OIL had been regularly inducting technologies, it felt prudent to further strengthen the existing process of technology induction. Technothon was created with the intent of fast-tracking the process and a dedicated webpage was created, wherein technology providers could pitch their products. Technothon has been providing a platform for the induction of fit-for-purpose technologies on a fast track.

For a long time, OIL had been making many efforts to bring Baghewala, a heavy and very high viscosity field in Rajasthan on production, which was discovered in 1991. Cyclic Steam Stimulation (CSS) was attempted in 2006 but could not be successfully completed due to technological challenges. The field was finally put on cold production in 2016. Many efforts were made during 2015-17 by Mr. Sudhakar Mahapatra and Mr. Utpal Bora to implement CSS, in association with the late Dr. Belgrave from Canada. After I joined OIL, I had close interactions with Dr. Belgrave and the efforts were taken forward. CSS was successfully implemented in November 2018 under the stewardship of Mr. Bora and skilful execution by Mr. S. C. Mishra, who went on to succeed Mr. Bora as CMD, OIL. We never realised that we were setting a world record as Baghewala CSS is the world’s deepest CSS at over 1000 m.

Two of the strategic goals of the “Perspective Plan 2030” (PP 2030) prepared by OIL in 2015 were (i) to reimagine the main producing area (MPA) in Assam Shelf for enhancement of production and (ii) to step up E&D activities in select Indian sedimentary basins. Soon after PP 2030 was formulated by OIL, the Government of India announced the Open Acreage Licensing Policy (OALP) for award of exploration acreages. OIL seized the opportunity and there was exponential growth in its acreage position. The strategy, as a follow-up of PP-2030 of OIL, was to (i) strengthen the position of OIL as a leading operator in the northeast, and Rajasthan (ii) explore Category-II and III basins where large tracts of exploratory acreages were available and (iii) intensify appraisal, development and EOR schemes for enhancing production in MPA. The Centre of Excellence for Energy Studies (COEES), an R&D institute of OIL focussed on EOR studies at Guwahati, was strengthened. It has now been recognised by the Government as a ‘designated institute’ for EOR screening studies. With all these initiatives $e^2$ (exponential increase in eor and exploration) has become a mantra for OIL.

OIL has been consistently producing 3 MMT of oil every year notwithstanding the fact that the fields are quite mature, with the decline rate from such brown reservoirs exceeding 8-10%. Thus, OIL has come to be known as an efficient brown field operator and a ‘3 MMT company’. All factors, such as the number of petroleum systems, number of plays, the Yet-To-Find (YTF) potential, production history, etc. give credence to the fact that the Assam Shelf Basin holds much promise. Considering all these factors, and after identifying certain appraisal and development opportunities in five fields, OIL embarked on a mission to enhance its production to 4 MMT levels and Mission 4.0+ was borne out of this conviction. I was instrumental in drawing elaborate plans for implementation of Mission 4.0+.

Many people have asked me, “How is OIL able to maintain a production of 3+ MMT of oil per year continuously?” Well, there can be no single answer. I summarise the answer under three points as follows.

One, its people. The people are dedicated and work as a large family. Thus, operational decisions are taken faster. Regular operational standing meetings are conducted, where no one sits down, including the bosses, of course.

Two, the geology. The producing acreages of OIL are very close to provenance. The thickness and quality of the reservoirs are in general good to very good, and hence the per well productivity is good. In fact, the
potential of certain areas like those beneath the Brahmaputra River Bed (BRB) and Dibru Saikhowa National Park (DSNP) are yet to be assessed, which has not been possible till now due to various reasons.

Three, the organisational setup. In most E&P companies, we know of G&G teams (Geology and Geophysics). OIL’s core team is called G&R (Geology & Reservoir) department, which works under the Basin Manager and Director (E&D). Geologists and reservoir engineers work together in a seamless manner. In managing mature fields, with the rapid advancement of geophysical techniques, the role of reservoir geophysicists is of paramount importance. When development geologists, reservoir geophysicists, and reservoir engineers work together as a team, the uncertainties in reservoir model building, model maintenance, planning and execution of field development plans and workover operations get substantially reduced and yield better results. The asset-basin structure could still be fine, with the asset being entrusted with all operational issues and the basin taking care of all the sub-surface related issues.

Not everything was a smooth sail. The most unfortunate and undesirable events in the upstream petroleum industry would be blowouts and accidents in installations, leading to loss of life, resources, money, and loss of image for a company. Immediately after the beginning of the COVID-19 onslaught, OIL had to endure the blowout at Baghjan#5. The entire company stood up together, faced the emergency and eventually overcame one of the most challenging and unfortunate events in the history of OIL.

The love for the company in times of adversity, such as a blowout, was seen in every OIL individual. The top management, led by the CMD Mr. S. C. Mishra, and the functional directors, remained at ground zero and worked relentlessly towards killing the well. Managing the crisis, especially at the peak of the COVID pandemic, was a huge challenge. The entire industry and the Government stood by OIL in overcoming the disaster.

It always feels good to be recognised for the good work a company does, and OIL was adjudged as the “Oil and Gas Exploration Company of the Year” in 2020.

My daughter, a neuro psychology student, while doing an academic project, talked to many ONGCians and OIL Indians on various aspects of their work such as work culture, work environment in the field versus office
etc. At the end of the project, she aptly summarised their nature to me in one sentence: “You OIL men are very passionate about your work and love your companies immensely”.

I consider myself very fortunate to have worked for both the NOCs of India. This is the best a petroleum geologist can aspire for. I believe I have contributed to the growth of both ONGC and OIL in my own humble way. This has been possible only because of the support and encouragement of all ONGCians and Oil Indians. While I was on the Board of OIL, I enjoyed the wonderful support of CMDs, all functional directors, independent directors, and Govt. nominees on the Board. I also received tremendous support from Directorate General of Hydrocarbons (DGH) and Ministry of Petroleum and Natural Gas (MOPNG), when several proposals of OIL were considered favourably. My family has been very supportive of me as well. I would like to take this opportunity to thank each and every one from the bottom of my heart.

I had promised to recapitulate the conversation I had with my father way back in 1986, which considerably shaped my outlook. I will now recount it, and I am sure it will be interesting to many youngsters:

(Receiving the “Oil & Gas – Exploration Company of the Year 2020” award)

After submitting the task force report on Bombay High, I went home on a brief holiday. I narrated the entire episode with Col. Wahi to my father, an ordinary schoolteacher. I also told him about the taunting comments made by some senior colleagues, which had disturbed me. The conversation which ensued is something like this:

“Who does your boss report to?” my father asked.

“Who does the GM report to?”
“Member of the Board”.
“And the Member?”
“The Chairman”
“And the Chairman?”.
“The Chairman reports to the Minister and the Minister reports to the Prime Minister.”
“And the PM?”
“The PM and the cabinet are responsible to the Parliament.”
“And the Parliament?”. 

My father paused for some time and continued, “The People of India. So be true to the common man on the road, the people of this country, in whatever you do. Inculcate and nurture the trait of humility. Because no solution can be achieved through confrontation. Always think that it is your earnest duty to convince your colleagues, boss, and management that what you think is right is indeed right. You will have no problems. God bless you.” I would remind myself of this conversation, which has given me strength during stressful times.

Epilogue....

A very harsh statement is attributed to the Late Shri Subir Raha, former CMD, ONGC. I was hesitant to broach this particular aspect because I was not present in the meeting when he presumably said it, nor is it reported in any authentic manner. Nevertheless, I felt there is a relevance to what he said. He purportedly said that a company’s flag must fly half-mast whenever a well goes dry. Many geoscientists, including me, were upset. The exploration business is a business of risk and uncertainty after all! But when I grew up in my career and did a lot of work in uncertainty and risk analysis, I slowly realised that geoscientists have the onus of steering exploration programmes in a pragmatic manner, as successful exploration programmes create value for an E&P company. This does not mean that dry wells will not be drilled. But we are still content with a 30% exploratory success rate and 90% development well success rate. Post-drill analysis routinely carried out by companies indicate that uncertainties in three main factors, namely, depth to the top of the objective level, prediction of reservoir facies, and prediction of fluid, lead to wells going dry. I have been part of proposals where the predicted well depth has gone off by a huge number and all of us are aware that it hurts. The domain of geophysics has a lot to offer in addressing these core issues. With incredible advancements in seismic imaging, data processing, and advancements in AI-ML technology, I am confident that we would be able to significantly improve the success rate and find more oil and gas reserves in the near future.

It is often said that in the quest to establish new reserves, the most promising reserves for today and tomorrow are found in areas that have long been productive. Around 80% of the YTF (yet-to-find) resources in Indian sedimentary basins are estimated to be in Category I Basins. And around 11.77 billion tonnes or 50% of the YTF resources of Category I basins are envisaged to be present in various plays of two basins, namely Assam Shelf and KG basin. PBE approach and advanced reservoir geophysics techniques would enable the unlocking a major part of those YTF resources. It is heartening to see that the current generation of geologists,
geophysicists, and reservoir engineers are technologically very savvy and are exposed to new technology, advanced interpretation techniques, and emerging AI-ML techniques as well. In the endeavours to find new oil and gas reserves, we must constantly be reminded that technology does not replace good geology and geophysics – it pre-supposes it. It still takes imaginative explorers to find a giant field.

(Thrust faulted anticline on a road cut Barail Coal Shale section from Dimapur to Kohima)

To conclude, let me quote a famous verse by T.S. Eliot, which I feel is apt for all geoscientists.

"We shall not cease from exploration
And the end of all our exploring
Will be to arrive where we started
And know the place for the first time".

Thank You.

Jai Hind. 🇮🇳

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