FORT BEND COUNTY HISTORICAL COMMISSION

ORAL HISTORY COMMITTEE

Interviewees: **Lester Cleve Arnwine**

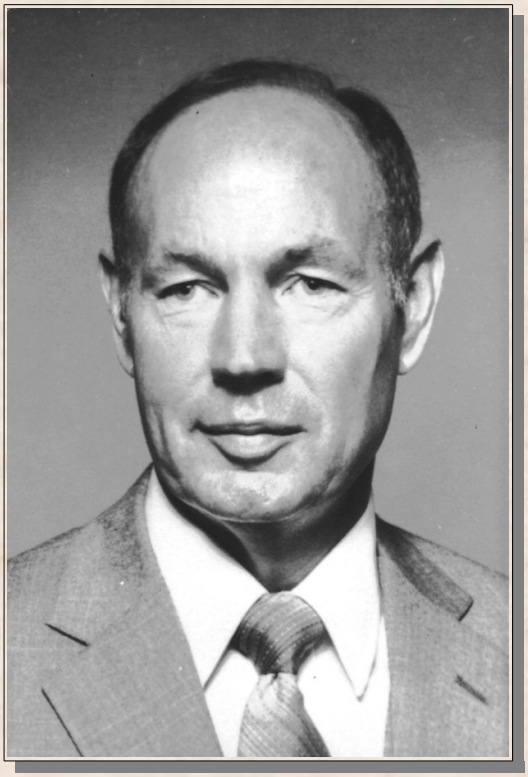
Interview Date: 01/12/2016

Interviewer: Jane Goodsill

Transcriber: Marsha Smith

Project / Group: Oilfield related history

22 Pages



Transcript

GOODSILL: Where were you born and when?

ARNWINE: I was born in Tonkawa, Oklahoma, on June 20, 1931. Tonkawa was a town of about 3,000 people then, and is located 14 miles west of Ponca City and about 25 miles south of the Kansas border. My father was raised on a farm in Texas and was working at an oilfield gas processing plant near the town. My mother was raised on a farm in Kansas and was attending Northern Oklahoma Junior College. They met in Tonkawa and married in 1929. There was no hospital in Tonkawa so I was born at home with a doctor's assistance.

GOODSILL: What were your father's and mother's names?

ARNWINE: Lester Fred Arnwine and Evalee (Loper) Arnwine. Our Arnwine ancestor immigrated from what is now the East part of The Netherlands, made a stop in England for a period of time, married Hannah Kendall there, and arrived in American Colonies in about 1725. The family settled in Pennsylvania initially and then over the years moved to Virginia and later to Tennessee. My grandparents were born in Tennessee and migrated to Fannin County Texas in 1890. My mother's ancestors emigrated from the area which is now Germany.

GOODSILL: What was your father's job?

ARNWINE: My father was an operator in a gas processing plant. The gas produced with the oil is rich in liquids and those like ethane, butane and propane are removed in the plant. This type plant is often called a gasoline plant because the heavier carbon compounds are akin to gasoline but require further processing at a refinery to use in the high compression engines of the cars today. In 1932 he was transferred to the gas processing section of the Conoco refinery in Ponca City. In 1938 he was promoted to foreman of a gas processing plant South of Electra, Texas. In 1943 he was made superintendent of plant 7 miles South of Billings, Oklahoma and in 1952 he supervised the construction of a plant 40 miles North of Casper, Wyoming and stayed on as Superintendent of the plant until he retired in 1965. I cite these moves because my history is naturally tied to these moves except for the one to Wyoming. He retired with 40 years of Conoco service.

GOODSILL: Do you have siblings?

ARNWINE: I have one, a brother, Don Lee Arnwine, born 15 months after me in Ponca City. We grew up almost like twins. It was great to have a playmate so near to my age. As we will discuss later I worked in the oil industry. Don chose a different career field. After an undergraduate degree, he earned a masters degree in hospital administration at Northwestern University in Chicago. Within 3 years of graduation, he was the director of the Colorado General Hospital in Denver, then president of the Charleston, West Virginia area medical center and was the driving force behind the development of Volunteer Hospitals of America (VHA) as CEO. He is an expert in health care organization mergers and governance of hospital facilities. He has been a consultant to hospital organizations since retiring from VHA and still has clients who retain his services. Needless to say, I am quite proud of my brother.

GOODSILL: You moved several times in your younger years, what was your early education like?

I attended first grade in Ponca City, second in Valley View Texas, third through seventh at Eagle Bend Elementary near Kadane Corner, Texas. Eagle Bend school was located in the midst of mesquite trees on a country road. The school had wood stoves for heat and outdoor toilet facilities. Obviously, a behind the times school but I believe the education was good. Prior to 1943, the Texas school system consisted of 11 grades. In 1943, students in the system were advanced two grades in one year by presenting the material for one grade in the fall semester of 1942 and one grade in the spring semester of 1943. This resulted in a generation of students who graduated high school at 17 years of age. We moved back to Oklahoma in the summer of 1943 and I entered the 8th grade a year younger than my classmates at Billings. This was a small town. Billings had 650 people and the high school had 90 students, with 16 nearly all farm kids in my graduating class. When I gave the valedictory address at the graduation ceremony in 1948, I was only 16 but was 17 the next month. The fact that I was valedictorian of the class didn't mean I was an Einstein! I probably took education more seriously and worked hard at it. I intended to go to college and I am not sure any of my classmates did.

GOODSILL: I know you have a degree in Petroleum Engineering, how did that happen?

ARNWINE: The Billings high school senior class trip was to an oil show in Tulsa, I knew a few things about gas plants but I didn't know much about drilling and production and the other activities which go with the upstream part of the oil business. I wandered around the exhibits at the show and found out there was something called petroleum engineering. It interested me, so investigated the colleges which had that course of study.

I decided that the program at the University of Oklahoma (OU) looked to the best all things considered. I was accepted at OU and enrolled there in the fall of 1948. I discovered that a degree in petroleum engineering was basically a 5 year course requiring 160-170 credit hours. It was a difficult transition from a small high school to a large university but I put in the time and effort to survive and pass the courses.

OU was a land grant school and the students were required to take at least 2 years of Reserve Officer Training (ROTC) in one of the military branches. I chose Army Ordnance Corps, although at the time I did not know the mission of that branch of service. It turned out to be a good selection. Army Ordnance is a non combat branch tasked to design, develop, test, manufacture and maintain armament and vehicles. I stayed in ROTC for 4 years. In July 1950, the North Koreans invaded South Korea and the conflict was ongoing in 1952. This was 4 years at university for me and my ordnance classmates. We had about 140 hours of class credits but no degree. The army was short of ordnance officers in Korea and asked us to accept commissions as second lieutenants and go on active duty. The entire class of 30 accepted and we had a pause in our education. I reported to active duty on November 1 and missed the fall 1952 semester and returned from active duty October 30, 1954 so was not able to return to OU until the spring semester 1955. I received a BS degree in petroleum engineering May 1956.

GOODSILL: What about your time in the military?

ARNWINE: Several of the older boys in Billings belonged to a 45th Division Oklahoma National Guard infantry unit at an armory in Perry and wanted me to join in the summer of 1947. I was 16 and found out years later on documents that whoever signed me up put my birth year 1929. I went to weekly drills and summer camp at Ft. Sill for 2 weeks. I learned infantry soldiering and qualified as an expert marksman on the M1 rifle. I resigned from the National Guard when I enrolled at OU and became an ROTC student.

In November 1952, I reported to Aberdeen Proving Grounds the Ordnance Corps headquarters. I attended two training schools there and obtained a Military Occupation Specials (MOS) of an armament officer. In periods between programs I was assigned to a Military Police unit where my primary duty was to inspect the stockades and make sure all prisoners were accounted for and a to a basic training unit to teach map reading and other courses to new draftees. My next assignment was a headquarters Ordnance unit for the Fourth Army at Fort Sam Houston in San Antonio. My assignment there required a top secret clearance and two FBI agents went to Billings as part of the investigation.

You can imagine that created a stir in the small town when they went around asking about me and my family. I received the clearance so the answers must have been satisfactory. After a hot summer in San Antonio, I received orders to report to Camp Stoneman in San Francisco early January 1954 for transport to Korea.

I boarded a MATS (Military Air Transport) four engine Constellation and was flown to Tokyo with stops in Honolulu and Wake Island for refueling. We had lunch at a Pan Am Pacific station on Wake Island and had an opportunity to walk down the coral beach and see WWII landing craft, tanks and other equipment still there after WWII. After a short stay at Camp Drake in Tokyo I went by train to Yokohama for a new Far East supply training. Then it was time to travel to Korea by train to Sasebo on the South coast of Japan and by ship across to Pusan, South Korea. A 12 hour train trip in a train with wooden park-like benches for seats and no lights allowed in a Korea January was not a pleasant welcome to the country. I was assigned to an Ordnance Direct Support company located in the middle of a rice field.

I was assigned a number of duties including a vehicle repair bay and the mechanics which went with it and as the company Instructor & Inspection (I&I) leader. The I&I leader position required me and a team to visit the units our company supported to determine if the motor pool personnel needed assistance to keep the vehicles in good running condition and were keeping the required records properly. Our company supported 30 army units and one marine battalion. I saw a good bit of Korea up to the 38th parallel where the armistice signed in July 1953 set the boundary between North and South Korea. We quartered in a tent with shower and latrine outside and it was uncomfortably cold until March. I was promoted to the First Lieutenant rank in Korea. I finished my duty and left Korea the middle of October and traveled by train to Pusan to board the Marine Serpent troop ship for a rough 16 day cruise across the Pacific to Fort Lewis near Seattle.

I was finished with active duty but had 6 years of reserve obligation remaining. I went back to OU and joined the 700th Ordnance battalion of the Oklahoma National Guard which was located in Norman. My experience in Korea and performance a summer camp at Fort Hood earned me a promotion to captain in 1955. After I started my working career in New Orleans, I joined a Quartermaster unit with the mission of taking over and running the port of Houston in a national emergency. I completed my reserve obligation and became permanently separated from the military in 1962.

GOODSILL: What about family?

ARNWINE: I met my future wife, Wanda Sue Mack, in the summer of 1955 on a blind date set up by my brother and her sister's husband. Sue was an attractive young woman, five years younger. She was a student at Oklahoma A&M seeking an elementary education degree. We continued dating that summer. I met her family and liked them and apparently they thought I was a suitable companion for their daughter because they let her transfer to OU in the fall. At some point it was a mutual agreement we would marry when we finished college. The problem was she had another year to finish when I obtained my degree in May 1956. I decided the thing to do was to pursue a graduate degree. I still had the GI Bill available of $105 a month and earned $50 a month from my position in the National Guard. I was paid to teach a petroleum engineering laboratory class and graded course papers for the head of the department. That was plenty of money in the mid 1950's. I completed the required 26 hours of graduate courses, Sue obtained her degree in May 1957 and we were married in June. I had been offered and accepted the job I wanted with Conoco. Sue fulfilled her wish to teach in elementary schools in Kenner. LA, Houston before children and later during our time in Dubai.

In March 1964, we had a daughter, Angela Sue and in March 1966 a son, Andrew Lester. We both came from a family of two children so we were happy with these two. In June of 2016, we will have been married for 59 years and hope for a few more. I will talk more about family during a discussion of our move to Fort Bend County.

GOODSILL: There were many choices to live in the Houston area, why did you select Fort Bend?

ARNWINE: I will talk about career moves later in the interview but in August 1976, we were looking for a place to locate and house to purchase. Our requirements were good schools for our 10 and 12 year old children, a club to play tennis, sports facilities for the children, and reasonably commute distance from the Conoco office in Greenway Plaza. A real estate agent took us to a number of developments with tennis clubs, swimming pools and so forth. Quail Valley in Missouri City met all the requirements so we bought a house and settled in Fort Bend County nearly 40 years ago and plan to stay here. The children attended middle school in Missouri City and Dulles High School. They received a good high school education at Dulles and both have college degrees, Angela from Texas A&M and Andrew from Sam Houston. Andrew was on the Dulles baseball team for 4 years and Angela had opportunities to intern with Shell Oil and summer job with Conoco.

Sue's mother won the girls state tennis championships in 1922 and 1923. Sue apparently inherited the tennis genes because after the children reached school age, she went back to tennis in Lake Charles and was the best woman player in Dubai and has quite a number of trophies from the annual Dubai Open tournament for the Gulf area to prove it. She and a lady we knew in Dubai were the "A" level doubles players for the Quail Valley tennis team for a number of years which competed in the Houston Ladies Tennis Association. We like Missouri City and Fort Bend, have had a happy life here. The growth in Fort Bend has been phenomenal. We could have never imagined this in our wildest dreams when this area was basically out in the country.

When we first moved to Fort Bend, I noticed the pumping jacks for oil wells and the salt recovery plant near FM 2234 on the way toward Pearland. Those indicated hydrocarbon reservoirs against a piercement salt dome oil like are present in most onshore and offshore oil fields in the Gulf Coast. Research revealed that this was the Blue Ridge field. Gulf Oil drilled the discovery well in the field in 1919 which produced 1,200 barrels of oil per day. Further development found many reservoirs on the flank of the dome and development continued intermittently for many years. Further drilling and workover of old wells were observed when the price of oil reached high prices. There were a number of oil fields in Fort Bend in the 1920's and 1930's and later. Thompsons field near Sienna Plantation, Fulshear, Sugar Land field, Big Creek just to name a few. There is still oil to be found in Fort Bend but the price of oil will have to be high enough to support the development. Stay tuned.

GOODSILL: Tell us about your career with Conoco.

ARNWINE: I had a wonderful 35 year career with Conoco. The stories I could tell about my work experiences, the interesting people I met along the way and the opportunities the company gave me would take much too long for an interview of this type.

I started with Conoco as an Engineer Trainee and ended my career in what was considered the top engineering position in the Upstream (Exploration-Production) part of the company. It may be more interesting for me to talk about the jobs I had along that path and for me speculate what I may have done to earn the promotions on that path.

GOODSILL: That sounds good to me.

ARNWINE: Conoco provided a year of orientation for engineers to expose them to drilling and production operations. The Engineer Trainee spent time working and observing drilling operations, production operations, test engineering function, gasoline plant operation, orientation at production research facilities, classes on well logging, reservoir engineering and writing programs using Fortran language for the big IBM computer. This program was fantastic training and an excellent means for the trainee to become acquainted with a broad spectrum of Conoco people.

Conoco had an 8-level professional engineer career ladder. Engineers who exhibited leadership and proficiency could be promoted to a supervisor position which could lead to higher level positions. Some engineers preferred to leave engineering and transfer to operations and the promotions available in drilling and production field and office positions. Those could ultimately lead to operations management and even executive positions in the company.

After a year the engineer received an assignment in a Division drilling and production office. I was assigned to New Orleans which was the operations office for a partnership of four companies, Conoco, Atlantic Richfield, Tidewater (later Getty), Cities Service and was commonly known as CATC, later CAGC.

My job assignment in New Orleans was as the reservoir engineer. The advanced reservoir engineering courses I took in the OU graduate school gave me good background to do this work. This work included: determination of oil and gas reserves, evaluation of well down hole logs, selection of zones to perforate, providing production streams, determining present dollar value of each project to justify the proposed wells for budget purposes. I was also assigned one offshore field to support operations for any engineering requirements. This required me to be in the field to oversee operations like sand consolidation procedures and assist in well completions.

Personnel transport to and from offshore in the 1950's was mostly by crew boat and getting off and on the boat in rough seas was a dangerous proposition. The transfer was made by swinging on a rope from the boat to a landing on the platform about 10 feet above the water level. In high waves getting between the platform and a heaving boat was significantly more dangerous. You had to time the swing when the boat deck was level with the platform landing and not worry about hitting the wheelhouse or something else on the boat; swing off and let go, breathe a sigh of relief and never mind the banged up shins.

Getting off on a jack up rig was done with the use of a personnel basket lowered on a crane line. That was not all that safe either because of the large steel ball above the basket to provide weight. You were at the mercy of the crane operator's skill.

At that time, many field development platforms were large enough to accommodate a drilling rig and production equipment. As soon as a well was completed it was put on oil and gas production status. There were normally five or six reservoirs along the flank of a piercement salt dome which allowed multiple completions of zones in each well bore. The state set an allowable production amount for each well. Multiple completions made the return on investment for each drilled hole more profitable.

The downside was having oil and gas production on the same platform with the drilling rig. In 1959, a welder preparing the surface casing for the next well and a producing well leaking gas created a disaster. The West Delta Block 45 E platform exploded in flames and 7 men lost their lives. There were already 28 wells producing from 7 completed holes on that platform. Each tubing string was supposed to have a safety feature in the tubing string down hole called a storm choke. It is designed to shut off when unrestricted flow and a pressure drop occurs across the choke, for example, what happens if a valve in the flow stream at the surface is knocked off. In this instance the storm chokes in a number of wells had been removed because of constantly plugging with sand. The platform quickly lost structural integrity due to intense heat. When it collapsed it knocked most of the wellheads off and the flames became more widespread. There was no way to control the flowing oil/gas from the surface so three drilling rigs were moved in to drill relief holes targeting the reservoir source of highest volume wells. When the relief hole has been drilled close to the target, heavy fluids are pumped through the reservoir to the flowing well and a hydrostatic head of fluid will overcome the formation pressure and stop the flow. The combination of successful relief hole drilling and many tubing strings being plugged with sand resulted in total control of the fire. This allowed the wells to be secured with cement from the surface.

After the jumbled platform wreckage was removed from the Gulf floor and the well casings straightened and tied back to the surface, new wellheads were installed. Two platforms with a bridge between replaced the original; one for living quarters and production equipment and the other for a workover rig over the wellheads. Small individual platforms were installed over the three relief holes. The ten cased holes provided many reservoir options available for completion.

I was assigned the daunting task of recommending where to complete this array of wells and in which order. Another engineer and I alternated providing onsite engineering assistance on a 7 days on, 7 days off schedule until all wells had been reworked and completed. This was high profile work and recognized as such by region management.

GOODSILL: Wow, big job! You were offshore for quite some time. How did you get back to office work?

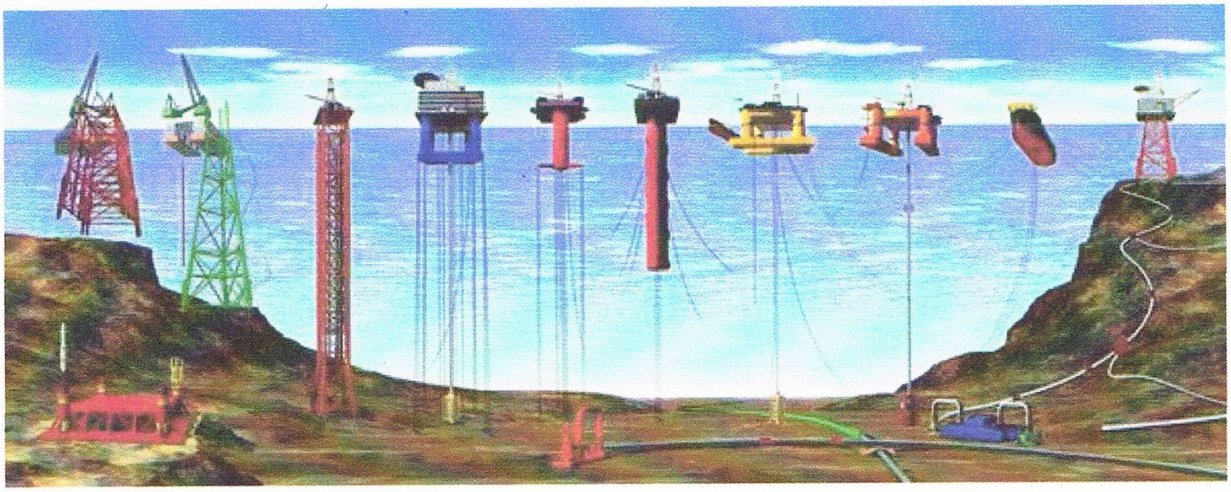
ARNWINE: During my time offshore the Division Manager brought the Regional Production Manager from Houston to observe the operation. I was asked to explain what was going on and the schedule for the work remaining. Shortly after the offshore work was completed I was notified of a transfer to the region office in Houston. This was early 1960; I had been in New Orleans less than 2 years.

GOODSILL: What were your thoughts about the transfer?

ARNWINE: Well, it was a surprise and I was pleased but apprehensive because of my relatively short experience level. The job required reservoir engineering knowledge and experience in offshore field development. The Regional Manager of Production chaired the CATC partnership meetings and made proposals on field developments which included platform and well locations. These proposals were often complicated and he needed a reservoir engineer who could provide the engineering knowledge to support them. I had the right background for the job but it was still quite stressful to have that responsibility.

A senior engineer at Conoco headquarters was excellent at mapping structures and I learned quite a bit from him. I was in contact with the ATC engineers several times a week and we often agreed on action before the meetings. I liked the geologists down the hall and joined them for lunch nearly every day. I reported to the Regional Engineer who told me in a performance evaluation that my work was fine but "I was too friendly with the geologists." If that was a negative, I certainly was guilty but I continued my fruitful relationship with the group who could provide maps based on seismic information. I never understood the attitude of some older employees who viewed engineering and exploration geologists as competitors. Although the two groups did have different missions and viewed newly discovered reserves differently it was best to work as part of a team.

After 3 ½ years in the region office, the Division Engineer in the Lake Charles CATC office reported they were adding rigs to develop two new oil fields. He requested that I be transferred there to do the reservoir engineering work. It was a good move for me: I needed more experience at the division level. We bought a house two miles from town on one of the lakes and both our children were born there. I was the only reservoir engineer in that office for 5 years and worked day and many nights. I liked supporting the drilling operations and analyzing the producing wells performance. The subsurface formations offshore in the Lake Charles area are high pressure which made it imperative that casing be set at an appropriate depth and mud weights be sufficient to control the pore pressures. I developed empirical charts based on the resistivity of pure shale zones which could be used to predict the expected pressures to be encountered in exploratory wells. I went home many nights worried that one of the drilling rigs would call in and report a well out of control. Thank goodness that never happened.



Modern offshore structures include (from left to right): 1 and 2 are conventional fixed platforms; 3 is a compliant tower; 4 and 5 are vertically moored tension leg and mini-tension leg platforms; 6 is a spar platform; 7 and 8 are semi-submersibles; 9 is a floating production and offloading facility; 10) sub-sea completion and tie-back to host facility.

After 11 years of work, 6 in New Orleans/Houston and 5 in Lake Charles, I had received promotions up the professional engineering ladder. In 1968, I was promoted to Supervising Reservoir Engineer and 4 engineers from the Conoco North America operations were transferred as my staff. These were experienced engineers but they were not familiar with offshore structures and reservoirs.

I produced a manual of the different elements they needed to know and conducted classes to give them the knowledge they needed to do offshore reservoir engineering work. My job changed; I assigned work, reviewed studies and evaluated performances. I still provided drilling operations support but had fewer night runs to evaluate well log runs.

Two years later, the Division Manager thought I should broaden my experience and moved me to the Supervising Production Engineer position. This was a whole new world to me; separators, water treatment, corrosion control of platforms, retrofitting drip pans under the offshore equipment on platforms, designing and supervising the construction of a shore base for one of the offshore oil fields and much more. I had a staff of engineers to supervise while learning production engineering. Good experience which came in handy later in my career.

GOODSILL: I know you worked in Dubai, how did that come about?

ARNWINE: In March 1972, my wife and I were asked to travel to Houston and meet with the Dubai Petroleum Company (DPC) Manager of Engineering and Construction and his wife. He outlined the job responsibilities and offered me the Chief Reservoir Engineer position in DPC. His wife informed us about living in Dubai. I did not know that Conoco management had been searching the company ranks for an engineer with the right experience to fill this position. I was overlooked in original searches because of the Supervising Production Engineer title. The Conoco Director of Computer Modeling and I had met in graduate school at OU and he brought up my name in discussion of candidates. My 15 years of experience in offshore reservoir development, time working with partners, supervisory positions, performance made me a likely candidate.

GOODSILL: Was it a difficult decision to accept this transfer?

ARNWINE: We liked living in Lake Charles but had been there 9 years and were ready to consider a move. The company was expanding at a rapid rate overseas and I thought eventually many are going to be asked to take international jobs. Our children were 6 and 8 years old and a better age to uproot them than later when they were in middle school or high school. The job was a great career opportunity. Sue did not know what we were getting into but agreed, so I accepted the transfer to Dubai.

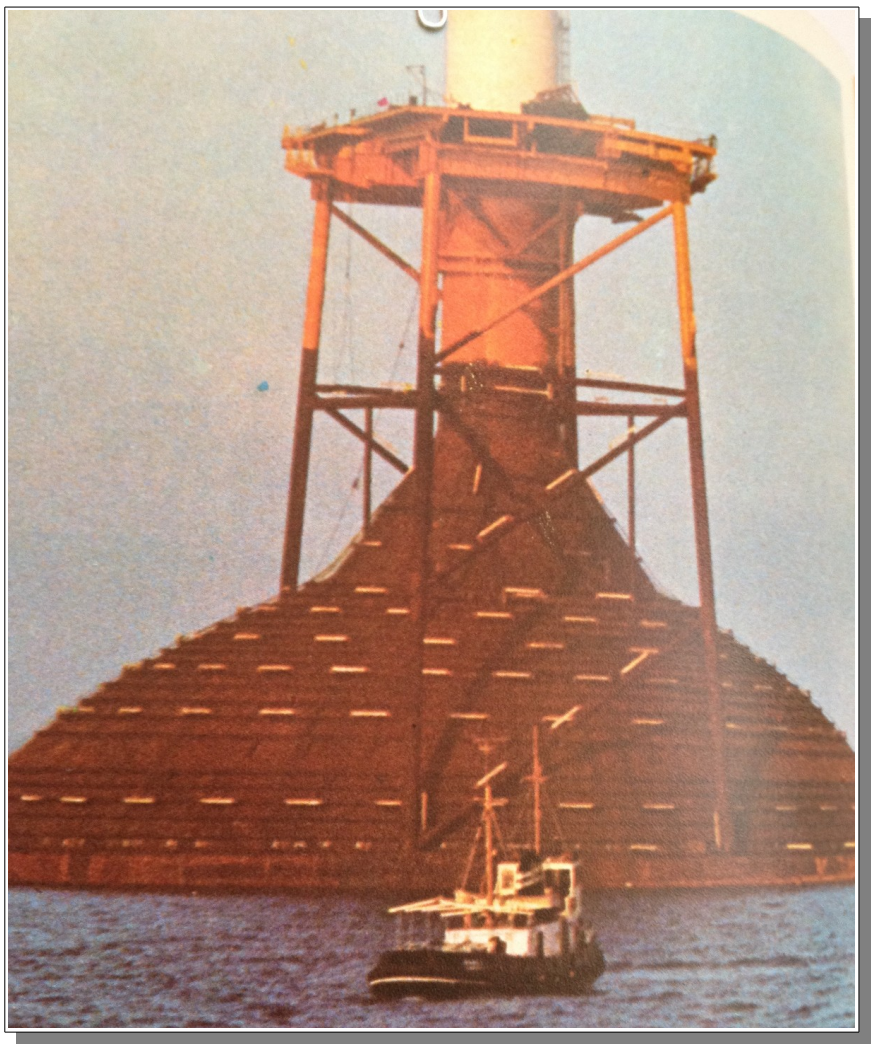
GOODSILL: How did you go about making a major move to an international location?

ARNWINE: We were told to sell or lease our house, put our household items in storage, box up the things we would like to have in Dubai and pack suitcases as for a vacation trip. We did those things and then started our journey by air to Dubai in late May 1972 via London and Amsterdam with quick stop in Baghdad. We arrived at the Dubai Airport 2 AM June 2. The temperature was over 90 degrees and the humidity high. Welcome to Dubai. We found the normal summer temperatures to be 110 deg. F and 120 if the wind shifted and came over the desert. It would take a book to relate what it was like living in Dubai at that time, and since we are talking about my career, I will concentrate on my work experience.

The Manager of Engineering and Construction for Dubai Petroleum Company (DPC) had briefed me during the interview that Conoco was the operator of the Dubai Offshore concession with 30 pct ownership. The partner companies were Compagnie Francaise des Petroles (CFP) and Hispanoil (Spanish) with 25 pct. each, two German companies, Deutsche Texaco 10 pct. and Wintershall 5 pct. and one American company Dubai Sun Oil Company 5 pct. I had one engineer reporting to me to assist in the normal reservoir engineering support to the operating departments. My primary assignment was to determine the company positions and chair a committee made up of representatives of the partner companies to get a consensus for future field developments and then present those to the Management Operating Committee for approval. My experience had been in highly faulted reservoirs with wells producing from sandstone. The normal allowable for these wells was 200 to 300 bbls./day. The reservoirs in Dubai were reworked offshore limestone reefs and the wells each produced 15,000 or more bbls./day. I quickly became familiar with this totally different reservoir world. These were easier to engineer and reservoir models were developed to assist with the projection of production from each well and for the entire reservoir. The problem for me was the reservoir models were only available in Houston which meant I had to travel there to work up the proposals for each quarterly meeting.

GOODSILL: You showed me a picture of an interesting oil storage tank used in Dubai. Tell me about it.

ARNWINE: The Dubai fields were located near the center of the Arabian Gulf 60 miles offshore. The water depth was only about 130 ft. and the coastal waters too shallow for the draft of large tankers. A unique solution was devised to store oil in 500,000 capacity submerged storage units named Khazzans (Arabic word for storage) in the field area and load tankers from a mooring point.



The Khazzans were constructed onshore of steel, filled with air and floated to the offshore position and sank in a designated position. These are shaped like an inverted champagne glass and open on the bottom. They are pinned in position with piling. About 40 ft. of the neck is above the water. The oil is flowed into the Khazzan and water is forced out the bottom. When oil is pumped from the Khazzan to the tanker, the seawater rises and follows the floating oil. Surprisingly, this system does not even result in a sheen of oil on the outside of the Gulf seawater. DPC employed 3 Khazzans connected by bridges. I arrived in time to observe the towing and sinking of the second Khazzan. Khazzan storage is an interesting concept and an amazing sight to see something that large floating. I thought this one of a kind solution to a difficult problem was worth mentioning.

GOODSILL: The Chairmanship of the Dubai partner technical committee must have been a satisfying responsibility. What other work were you assigned in Dubai?

ARNWINE: Conoco had allowed DPC to submit simple annual operating budget since inception of the subsidiary but in 1972, the company insisted on their regular format with project sheets justifying the expenditure economically. This created a bit of panic because no one there was familiar with that requirement. I admitted to considerable experience with that type of budget and promptly had budget preparation added to my duties.

A quarterly technical meeting was coming soon in Hamburg, Germany so I had the agenda and backup justification for Conoco recommendations to prepare. I had a busy and interesting start to my four and half years in Dubai. The DPC companies took turns in hosting the technical committee and the Management Operating meetings so every quarter after a trip to Houston; I was off to 2 trips to locations around Europe or Houston again. A flight to most locations in Europe was 7 hours and another 12 hours from Paris or Amsterdam to Houston.

We were in the U.S. on annual vacation in July 1973, when I received a call for me to return to Dubai immediately. A completed well was out of control and a relief hole was going to be required to kill the flowing well. My role in the control effort was to select the location of the rig employed to drill the relief hole and analyze the directional drilling surveys to determine the target and design a hole to hit that target. This was a completed well with perforated casing in the reservoir flowing the oil and gas. I kept a plot of the relief hole as it was being drilled compared to a trace of the wild well. A company from Austin had developed a tool consisting of several magnetometers and used it to find a Russian submarine which sank off the coast of Hawaii. This President of this company contacted DPC to see if they could use their tool in our situation to see it would locate the distance and direction of the casing from the relief hole. The disturbance the casing would make in the earth's magnetic field was involved in the calculation from the magnetometer readings. Schlumberger was given permission to test the ULSEL tool to see if this deep investigating electrical log normally used to determine a distance to a salt dome could locate the casing. To shorten the story in 52 days the relief hole reached the target and the flowing well was brought under control. The magnetometer tool showed promise. The ULSEL tool did not for this application.

GOODSILL: Very interesting technical difficulties! Those assignments must have had an impact on your career. Any other career highlights in Dubai?

ARNWINE: Yes, there were 3 which were important to my career. In the summer of 1975 another blowout occurred during the drilling of a well in the middle Fateh Field. A gas bearing formation at about 4,000 feet was always a concern and great care taken to drill the hole through it and get it behind casing before proceeding deeper to the target oil reservoirs. A summer replacement drilling supervisor mismanaged the mud weights and the result was a blowout with high gas volumes at the surface.

After a short period, the gas ignited and the platform and drilling rig collapsed and what remained was a large fire on top of the water. I was assigned the leadership position of the technical team assembled to determine how to get the blowout under control. The team was confronted with a difficult task because of the high gas volume and shallow depth of the formation. I will not go into detail, but will say the control effort took 220 days and 5 relief holes before the gas flow was controlled and the hole abandoned. I wrote a daily report to DPC management on the team recommendations and made numerous presentations to Conoco and Partner management on the control plans. This was certainly a high interest activity and I was in a valued position as team leader. A few months into this assignment, I was promoted to the DPC Manager of Engineering and Construction position. This gave me considerably broader responsibilities and allowed me to cut back on the travel required as the Chief Reservoir Engineer.

Shortly after the promotion to Manager, the DPC Vice President of Operations explained to me that the company was in a quandary of how to staff large projects around the world with technical people and then return them to meaningful jobs when the project was completed. He was going to attend the annual Conoco management meeting in the fall of 1976 and this problem was on the agenda. He noted that I had worked in both North America operations and now International and wondered if I had any ideas how this problem could be handled. At the time, I was preparing comprehensive kill attempt plans for the blowout and had been using flow charts to make sure nothing was being overlooked. I thought about the staffing problem and made a proposal using a flow chart to help explain an idea I had. My proposal was read at the meeting and I was told that the managers thought it was an idea which could work.

The major Dubai Fields were nearly completely developed and production goals reached. Although schooling in Dubai was good, we wanted to get our children back in the U.S. and this prompted my request for repatriation. My new assignment was a promotion to Chief Petroleum Engineer Conoco International headquarters located in Houston. My job description was brief. Put the plan I had outlined for managing engineer movements into to practice.

GOODSILL: What was the solution to the staffing problem?

ARNWINE: Conoco had a decent individual performance appraisal system and a merit based salary compensation program. This was basically administered, with guidelines provided by headquarters Human Resources, by 9 North America Division office managers and the presidents of 5 international subsidiaries. Although there were headquarters reviews, it appeared to me considerably more information was needed at one focal point to solve the problem. A data base of major skills and sub skills of each engineer and knowledge of their interest in an international assignment was critical. Also, career development had to be an important part of the overall plan.

The first action I took was to make up a survey form to collect information. The time was late 1976 and desk top computers had not yet appeared for individual use. The company had about 900 engineers and technical people scattered around the world although not all were candidates for the program. Organization of the data was a challenge but it was managed. I am not going to mention all the details of the workings of the system but it was successful and I received a nice cash bonus for my initiative.

There was a stack of film canisters on my desk when I arrived in Houston. These contained film of each of the five kill operations taken from a helicopter. I had written a final report of the second fire. The narrative and the attachments were in 7 volumes and resided in the Production Engineering Services library for historical and training purposes. Management wanted a documentary video of the control operation to give to partners and to use for training drilling engineers. I was the logical choice to produce this documentary movie so was given that assignment. The film was of the equipment located on barges at the surface. I collaborated with a movie making company to tie the surface operation with the procedure in progress with graphics of the subsurface. I selected the scenes to use, wrote the descriptions and hired a narrator. It was an interesting experience and the documentary was widely shown within the company and the partners expressed appreciation for having it to show their employees.

GOODSILL: Wow! You did such diverse things in your job! You started this in 1976. I met you in 1981. Were you still doing this in 1981?

ARNWINE: In mid 1981, a manager in International was promoted to Vice President of Exploration and Production North America (EPNA) Department. He offered me a headquarters position to manage five functions: administration, partner operations, automation, human resources and technical training. Each of these functions had a Director who reported to me. It was a nice promotion and I accepted. The Chief Petroleum Engineer for North America was transferred to replace me in International. He had been the Division Engineer in Lake Charles before I left there and we were and are good friends. He did well in carrying on the staffing system.

My new title was Manager of Administrative Planning and Services. A recently appointed CEO wanted much more financial and operating information than had traditionally been provided that office. The administrative group had to be expanded rapidly and trained. I attended a 6 week "Management Program for Executives" at the University of Pittsburgh to learn more about the corporate fiscal functions of a company and other higher level management skills. To the chagrin of the administrative people, an engineer had always filled this position because of the automation and technical training responsibilities. I believe that after the Directors found out that I was there to help and easy to work with, they warmed up to me and collectively we did a fine job of supporting operating management. This job gave me the opportunity to become acquainted with the North America people. My only other domestic assignment had been in Gulf of Mexico operations.

GOODSILL: Did you like this assignment?

ARNWINE: I did enjoy this job and the opportunity to upgrade the Directors and other positions in my group and develop credibility with the North America managers. It was also rewarding financially. To answer your question, I liked engineering work and felt some ownership for the previous job. I had not thought about the job comparison preference because I liked challenges and this job was a challenge. However, I probably like the previous job a bit better.

GOODSILL: So is this what you did the rest of your career?

ARNWINE: Well no, in late 1984 the Vice President of Production Technology (PT) was given additional responsibility of managing Production Research located in Ponca City. The combined groups had about 200 engineers and scientists with quite a number of support people. He asked me to transfer to Production Technology and manage the staffing and career development of these technical people. I was familiar with many of the engineers in PT because they were often candidates in the staffing of overseas projects and the organization was a good fit for many engineers returning from overseas assignments. During my time in the EPNA headquarters, the administrative section had been fully staffed and functioning well, I had been able to talk a highly competent automation engineer, whose work I admired in Lake Charles, to leave Midland and transfer to the lead position in EPNA headquarters to manage an automation upgrade study. Previous and ongoing attempts to complete this work failed. He successfully completed the planning and implementation of this important function. Technical Training, Partner Operations and Human Resources were well managed and required little from me other than to be involved in personnel decisions. The CEO had requested a study of how Conoco did long range planning and I was given the responsibility for that assignment. With input from appropriate people, I produced a report, using flow charts of course, and presented at a large meeting of managers called by the CEO. My work was done in EPNA and I accepted the new assignment in Production Technology. My title was Manager Engineering Staffing and Development. I was happy to return to the work, which I had indicated earlier, I liked best.

GOODSILL: I am curious, what is automated in the oil field?

ARNWINE: The ability to monitor and control well production remotely is simply another step to modernize the flow of oil and gas from fields. It is particularly critical to have automation for offshore platforms threatened by hurricanes. Personnel have to be removed from the offshore facilities well in advance of the hurricane arrival. Sometimes days in advance, and the ability to shut in the wells and production at a later time is financially desirable and can be a safety factor. The evolution of computer technology has continually improved the automation function.

GOODSILL: After managing sections with large groups of people, what was it like going back to a job where you were essentially a one man operation.

ARNWINE: I had the same pay grade and received a salary boost for the transfer, so had no problem from a financial standpoint. The pay grade also indicated the value put on this new position by the company. Besides, I preferred creating rather than reviewing others work. All I needed to do my new job was a secretary and a competent computer person. This was the mid 80's and computers used DOS operating system. DOS is not nearly as friendly as Microsoft Windows for the untrained user. Fortunately, I was able to hire a member of Mensa PhD who was a skilled computer operator. He produced a creative data base and could access the skills and overseas interest information from the survey mentioned before in the interview.

Production Technology was source of technical assistance for Exploration and Production operations worldwide for reservoir, production, drilling, marine and project engineering. Marine engineering included the design of offshore fixed and floating structures. The engineers in PT were experienced and many were leaders in their particular fields. The reservoir section produced the official company reserves which are reported to the SEC annually. Production Research provided tests and studies to support the operation branches.

As Conoco expanded overseas and was involved in special developments like heavy oil, the demand for people and technical assistance increased dramatically. This demand prompted the hiring a relatively large number engineers from outside the company which was part of my responsibility. Needless to say, I was quite popular with the personnel recruiting firms.

Before long, it became obvious that the engineer staffing and development business had no organizational boundaries. Production Technology, North America and International Exploration and Production personnel were all in the mix to fill technical positions around the world and needed to be managed consistently. The Chief Petroleum Engineer positions in North America and International were eliminated. The Chief Petroleum Engineer International was transferred to my location and the two of us divided the North America divisions and International subsidiaries responsibilities for staffing and development. I retained the Production Technology responsibility. I am remembering there were a total of 900 technical people involved, including British, Norwegian, Dutch and Indonesia engineers hired in to work in the subsidiary companies.

GOODSILL: That seemed to be a revolutionary change. Did that work as well as expected?

ARNWINE: This organizational arrangement worked better than expected. Perhaps partly because we had a long and friendly history and the interface communication was excellent. We had the engineering professional ladder enhanced by comprehensive descriptions of what skills and abilities the engineer needed to possess to be in each position. Our proposal to add two positions at the top of the ladder at salary grades equal to a first level manager was approved. The guidelines to reach those positions were stringent. We did have several engineers qualify for those positions by the time I retired. The engineer development program was so successful that geologists, geophysicists and administrative employees requested a position like ours. This led to the formulation of a committee which met periodically to discuss best practices in doing the staffing and development work.

GOODSILL: When did you retire and why?

ARNWINE: I retired December 31, 1992. I had not considered retirement except a fleeting thought about maybe retiring after my birthday in 1993. I came home from a trip to the UK in late November 1992. A contract company had been in the process of studying for months how Conoco was organized. The trend at the time was to have teams of different disciplines assigned to areas or studies and eliminate the individual departments like administrative, exploration, engineering and so forth. It appeared that Conoco was going that route. I had no idea how the company would handle the staffing, mentoring and development of young engineers in the new organization. The company was offering a benefits package for those employees in leadership positions effected by the new organization. I could receive full pay for 18 months plus other benefits, if I qualified for the retirement program. I would be offered a new position if I did not retire. I did qualify for the program. Although I was half way through age 61, I had 35 years of service and did not want to go to a job out of engineering. With the generous salary benefits, it was essentially like retiring at 63 financially.

I had a career at Conoco which exceeded my expectations. I did not retire as an executive of the company which is the target of most successful people. However, to start as an engineer trainee and retire with the top job in the discipline I loved and to have assisted many with achieving their career goals is success to me. I believe the only criticism of my performance was in the review which complained that I was too friendly with the geologists during my early assignment in the Houston CATC office.

GOODSILL: Rather funny in a way that the fact that you were 'too friendly' turned out to be one of the salient features of your personality which helped you get where you were in your career.

What did you find to do after retirement?

ARNWINE: It turned out to be a good decision to retire. I have been retired 23 years (2016) and took advantage of the time at a relative young age to enjoy several athletic activities: senior softball, charity runs, racquetball, Senior Olympic competition. I joined the Korean War Veterans organization. I have been active in two Conoco retiree organizations. I was Conoco retiree team captain for the Houston Heart Association Heart Walk for 13 years. Conquering Microsoft Windows and making use of the computer has been a valuable contribution to my retirement satisfaction. I can't begin to relate all the things which have made for a successful retirement.

GOODSILL: And know I want to tease you a little bit. Will you please tell us what position in the government you think you should be appointed to? Or what position you think there should be.

ARNWINE: I think there should be a position of Common Sense in the cabinet. I would love to be in that position.

GOODSILL: The Secretary of Common Sense!

ARNWINE: I think the proposed rules, laws and regulations should have to pass a Common Sense Test.

GOODSILL: I wish that would happen.

Interview Ends