CHEMICAL HERITAGE FOUNDATION

HOWARD S. TURNER

Transcript of an Interview
Conducted by

Arnold Thackray

at

Dunwoody, Newtown Square, Pennsylvania

on

9 September 2002

(With Subsequent Corrections and Additions)

CHEMICAL HERITAGE FOUNDATION
Oral History Program
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Howard S. Turner

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Chemical Heritage Foundation
Oral History Program
315 Chestnut Street
Philadelphia, Pennsylvania 19106

HOWARD S. TURNER

1911 Born in Jenkintown, Pennsylvania on 27 November

Education

1933 A.B., chemistry, Swarthmore College
1936 Ph.D., chemistry with a minor in chemical engineering, Massachusetts Institute of Technology

Employment

1936-1947 Researcher, E. I. DuPont de Nemours and Company
1947-1954 Director, Research and Development, Pittsburgh Consolidated Coal Company
1954-1965 Vice-President, Research and Development, Jones & Laughlin Steel Corporation

Turner Construction Company
1965-1970 President
1971-1978 Chairman of the Board

Professional Affiliations

1942-1944 Advisor to Q. M. General on Research
1944-1947 Member, Swarthmore Borough Council
1952-1964 Board of Managers, Swarthmore College
1962-1965 Advisor, Office Industrial Application, NASA
1962-1965 Member, Visiting Committee, Department of Chemical Engineering, Carnegie Institute of Technology
1963-1967 Member, Technical Advisory Board, Dept. of Commerce
1965-1970 Director, Jones & Laughlin Steel Corporation
1966 Member, Vietnam Task Force HEW
1967-1968 Member, Research and Engineering Advisory Council, P.O. Department
1967-1971 Executive Committee, NRC
1969-1970 Director, GAF
1969-1983 Director, Ingersoll-Rand
1970-1980 Director, TIAA
1971 Member, President’s Advisory Committee
1971-1981 Director, Asarco
1973-1975 Member, Advisory Board, Center for Building Technology, National Bureau of Standards

1973-1983	Director, Dime Savings Bank of New York
1974-1977	Member, Visiting Committee, Department of Civil Engineering, Massachusetts Institute of Technology
1978-1987	Trustee, American Academy Education Development
1979-1983	Trustee, CF Kettering Foundation
1979-1984	Member, Council, Rockefeller University
1980-present	Director, Instar Institute for Biological Research
1983-1989	Board of Visitors, Governor, Washington College

ABSTRACT

Howard S. Turner begins the interview with a discussion of his childhood and his early interest in chemistry. After attending the George School for two years, he attended Swarthmore College and received a bachelor's in chemistry. Shortly after graduating from Swarthmore in 1933, Turner was accepted as a Ph.D. candidate at Massachusetts Institute of Technology [MIT]. In 1936, Turner received his Ph.D. in chemistry with a minor in chemical engineering from MIT. Turner started his career with E. I. DuPont de Nemours and Company working in the Experimental Station in Wilmington, Delaware. While at DuPont, Turner researched new uses for polymer 66 and nylon, in addition to developing and testing Corfam. In 1947, after eleven years with DuPont, Turner left the company to become the director of research and development for the Pittsburgh Consolidated Coal Company. In 1954, Turner left Pittsburgh Consolidated to become the vice president of research and development for Jones & Laughlin Steel Company [J&L]. At J&L, Turner reorganized and focused the company's research and development program. In 1965, Turner left J&L to become president of Turner Construction Company, in New York. The company, started in 1902 by his uncle, was among the top construction firms in the country. Turner became chairman of the board in 1971, and remained so until his retirement in 1978. Turner concludes the interview by describing his affiliations with other companies and a short reflection on his career.

INTERVIEWER

Arnold Thackray is President of the Chemical Heritage Foundation. He majored in the physical sciences before turning to the history of science, receiving a Ph.D. from Cambridge University in 1966. He has held appointments at Oxford, Cambridge, Harvard, the Institute for Advanced Study, the Center for Advanced Study in the Behavioral Sciences, and the Hebrew University of Jerusalem. In 1983 he received the Dexter Award from the American Chemical Society for outstanding contributions to the history of chemistry. He served on the faculty of the University of Pennsylvania for more than a quarter of a century. There, he was the founding chairman of the Department of History and Sociology of Science, where he is the Joseph Priestley Professor Emeritus.

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INTERVIEWER: Arnold Thackray

LOCATION: Dunwoody, Newtown Square, Pennsylvania

DATE: 9 September 2002

THACKRAY: Howard, please tell me about your family background.

TURNER: I was born in Jenkintown, Pennsylvania. Soon after my birth, my parents moved to Swarthmore. My parents had three children: my older brother, my younger brother, and me. My father and his older brother operated a construction company in Philadelphia, which later became the Philadelphia division of the Turner Construction Company. The company was founded in New York in 1902, and has just celebrated its one hundredth anniversary.

THACKRAY: Turner Construction was founded by your relatives?

TURNER: The construction company was founded by one of my uncles. There were actually six brothers in the East Maryland Turner family. The oldest remained to operate the local business, farms, and so forth, while the second oldest, Henry [Turner], was the founder of the Turner Construction Company. The next in line was William [Turner], and then there was my father, the youngest, J. [Joseph] Archer [Turner]. Henry and Archer started separate construction businesses; one in New York, the other in Philadelphia. Around 1919, the Philadelphia company became an office for the New York company. Turner Construction has always been a well run and successful company. Even in the [Great] Depression, the company only lost money for a couple of years. The company has provided my family with a decent livelihood and afforded my parents a fine home.

It was probably through school that I became interested in chemistry. Like so many other children at that time, I had a Chemcraft [Chemistry] Set. I might have been eight-years old at that time. I progressed up through different forms of Chemcraft Sets. I am quite sure there are aspects of the sets that today would never be allowed. Later on, when I probably was in the tenth grade, my father built a laboratory for me. He had a carpenter build a bench and a ventilating hood. I had quite a lot of equipment and other things that I utilized for fractional distillation, and the like.

I remember that somehow I got a hold of a Kipp generator; I wanted to see how the generator worked, so I put carbide in it. Unfortunately, I set the apparatus up in the master bathroom, and hooked the generator up with a Bunsen burner. When it first started, it worked

very well; the burner had a nice blue flame. When the gas flow from the generator slowed down, I had to progressively close the air opening in the burner or the flame would flash back. I started getting pieces of soot as big as quarters spreading out over the face cloths, towels, and everything else in the bathroom. That was a calamity. The only other calamity arose from my interest in producing crystalline urea. That consisted of collecting a few gallons of urine, from various contributors, in a Sterno can, boiling off most of the water, and producing beautiful crystals of urea. Such experiments were fun and interesting to me, but not my mother.

I went away to the George School for my last two years of high school, graduated, and then came back to the Philadelphia area to attend college. I entered Swarthmore College just as the stock market collapsed in September of 1929. I was very much looking forward to my chemistry courses. Thinking back, a man named Samuel Cone asked our chemistry teacher, Professor Creighton, if he could audit our freshman course. Cone was accepted and attended regularly. I would guess he was fifty-five or sixty, very pleasant, and wished to be called doctor, though the source of his degree was never revealed. Part way through the year, he promised a summer job to the student who got the best marks for the year. I ended the year with the highest marks in the class, and was lucky enough to have a job during the first summer of the Great Depression.

Cone ran a paint laboratory for Sinclair Oil [and Refining Corporation]. At that time period, Sinclair made paint for their service stations and refineries. Cone was not a research man, though he seemed to know the basics of paint. I was glad to have a job in his one-room laboratory of the Marcus Hook refinery, especially since I was paid one hundred and twenty-five dollars a month; much more than most of my classmates who had jobs. My work in the Cone "research" laboratory was essentially that of a technician making different batches of paint and cleaning up. I was pleased to have the job again the next summer, at a slightly reduced rate that reflected the continuing Depression. During breaks, I managed to slip out occasionally to visit with employees in the refinery. That type of technology became a long-term interest of mine.

In 1933, I graduated with honors in chemistry and a special interest in organic chemistry. My hopes were realized when I was accepted by MIT [Massachusetts Institute of Technology] as a doctoral candidate based on my interview.

THACKRAY: Why did you wish to attend MIT?

TURNER: My aim was to have a career in industrial research, not academia, so that shaped my graduate school plans. MIT was exactly what I was looking for: strong, industry related, with chemistry and chemical engineering professors actively consulting with the laboratories of various chemical and petroleum companies.

There was a flourishing group in organic chemistry at MIT that included the then "boy wonder," Bob [Robert B.] Woodward, who was seventeen or eighteen, and phenomenal. In

June 1936, three members of the group accepted offers from [E. I.] DuPont [de Nemours and Company]. Two of the three, Fred Watson and I, went to the Experimental Station, i.e. the central research laboratory of the company, and worked under director Arthur [P.] Tanberg. It was a gem of an opportunity, since, at that time, the Experimental Station and the labs of GE [General Electric Company] and Bell [Telephone Laboratories, Incorporated] were considered to be the best in the country for basic industrial research.

The starting salary was two hundred and fifty dollars a month, but that had been reduced progressively in the Depression by two 10 percent cuts. Even so, it was a great living wage for the time. Work was luxurious. There were two Ph.D.'s to a lab, and each shared a technician. There was also a glassblower, and an available library.

THACKRAY: What was your MIT thesis about?

TURNER: I wrote on an interest of my thesis advisor, Professor James Norris. My thesis was an outgrowth of his interest in the Friedel-Crafts reaction. Professor Norris observed that there was some rearrangement of benzene derivatives in the presence of aluminum chloride. He thought that it would be interesting to learn of the mechanism and its extent. Essentially, I was taking derivatives of toluene, subjecting them to select conditions with aluminum chloride, and then analyzing the mixture and rearrangements.

THACKRAY: How did you analyze the rearrangements?

TURNER: You put your finger exactly on the toughest problem! It took me two years in what with today's tools could be accomplished in two months; perhaps an exaggeration, but that is a measure of how much faster research can be processed today. The researcher today also has to think faster to keep up. Simply stated, illustratively, isomer A heated with aluminum chloride and MCl would produce an isomer mix of AB + C. The analytical problem was to analyze the mix quantitatively. Two methods were finally selected, both of which were time consuming; one involved freezing points and the other vapor temperatures. Anyway, that was my thesis subject, and I chose, fortunately, to minor in chemical engineering, which turned out to be extremely valuable later in life. So I had organic chemistry and chemical engineering. I entered graduate school in 1933, and, by working through steadily, I received my degree in May 1936.

THACKRAY: How did you support your education?

TURNER: That's a good question. In my first year, MIT had just completed a brand new graduate dormitory right next to the president's house on Memorial Drive. My parents supported me through college. My father wanted the best for me while in college, so I was

housed in the new graduate dormitory. I roomed with a bright, though not particularly communicative roommate from India. In any case, college was expensive. Tuition was five-hundred dollars that year.

The next year, a fellow doctoral candidate, Bernard Sturgis, and I, found a room to share in an apartment on Massachusetts Avenue, near the Necco [New England Confectionary Company] factory. We paid five dollars apiece for the combined study, and bed and breakfast. I received a fellowship that provided half tuition my second year, and full tuition the last year.

THACKRAY: When did you meet your wife?

TURNER: I met Kay [Katharine S. Turner] on a blind date on 11 July 1935, and I was smitten. Suddenly it was different. At the same time, I was coming up against the major exams that I had to pass seven months before graduation. So, I was worrying about all that, but MIT also required a reading knowledge of scientific materials in French and German. German was fine for me, but I had never studied French. Kay was very good at French, and we must have spent a significant portion of our dating time, the summer and fall of 1935, reviewing French words. We were engaged in November 1935, and married soon after I received my degree in 1936.

THACKRAY: What is Kay's background?

TURNER: Her father was an MIT professor in chemical engineering and machine design. By the time I received my degree, he had reduced his teaching load, but he had been appointed to an honorary position as secretary of the faculty. As such, he was the one that put the hoods on the degree recipients. In front of an enormous crowd, Kay's father put the hood over my head and whispered, "The only reason you're getting this is because you're marrying my daughter."

Kay attended Vassar [College] and graduated the same year I did. She had been working at Filenes Department Store training sales people. She told me she wasn't very good at selling.

THACKRAY: As you thought about employment opportunities, what happened?

TURNER: I fulfilled a dream, amazingly. Early on, I wanted to go to MIT, and then thought I would like to work for DuPont; all those things eventually came true. I applied to DuPont, and in relatively short order, got an acceptance letter from Arthur Tanberg, director of the Experimental Station. So I knew by the early spring that that was all locked up.

I had the choice of going there or to the Jackson Laboratory at the Deepwater Plant on the Jersey side of the Delaware River. There was a broader focus at Jackson, though more fundamental at the Experimental Station. My roommate went to Jackson Laboratory, and over the years, he made significant contributions in the field of rubber chemicals. In August, I started with the Experimental Station. We lived in Swarthmore and I commuted to work.

My first project was typical for DuPont. In the manufacture of camphor, an intermediate is camphene. Engineers wanted to find other uses for camphene or its derivatives, to increase production profitability and correspondingly make raw materials cheaper to make camphor. I worked on the project with Julian Hill, who was a long time fixture and a very close friend of Wallace [H.] Carothers. Wallace Carothers was at DuPont when I arrived, and though I remember seeing him once in the library, I never knew him.

THACKRAY: How large was the Ph.D. group?

TURNER: I think there may have been fifty or sixty Ph.D.'s, very small by today's standards, and with a very informal atmosphere.

THACKRAY: Were you in an open area with a bench, or were you in your own lab?

TURNER: We were in the new building, which generally provided for two people to a lab and a technician, but the nature of the research and equipment required larger labs. A separate departmental group conducted high-pressure work in an oil-powered mill along the Brandywine River, which was originally designed with the roof and wall adjacent to the river. However, an explosion inside was "relieved" into the river, at the expense of one wall and half the roof.

There were some notable people in that lab. It had been several years since Carothers first produced condensation polymers, and he died soon after I arrived, but Paul [J.] Flory had yet to publish his work on the statistical theory of polymer formation. At some point, Bob Woodward received offers from DuPont.

THACKRAY: Please describe Bob Woodward.

TURNER: Woodward was only seventeen or eighteen years old when he arrived as a doctoral candidate. We had journal meetings once a week, in which each one of us was asked to pick a journal article, critique it, and examine the authors' past works. The professors who often knew more than we did would notice things we hadn't thought of, or criticize what we had done. When Woodward had an article to report on, the scope of his knowledge was stunning. He

knew and had done so much more reading and thinking than any of those professors had, and there was really nothing they could do but sit back and listen to him. He was phenomenal.

At one point, Woodward was earning his way by identifying all the old ingredients in coffee for a coffee foundation. Remember, Woodward was a practical jokester. As a group, we went fishing in the ocean one day, and Woodward came back with fish. Nearby there was a fairly new building that had a conduit above the ceilings for running lines between laboratories. Evidently, Woodward hid one of his fish up there. There are a lot of odors in an organic laboratory at any given time, but on a hot summer day, the stench was overwhelming. Juices began to run down the side of the lab. No one enjoyed it. I can't say that I was really close to him. It is quite interesting how he grew to become, arguably, the greatest synthetic-organic chemist of all time.

THACKRAY: Morale must have been high at DuPont with the development of neoprene and nylon.

TURNER: I was given the job of looking for new uses of polymer 66, beyond its use in fibers. That led to work on bearings and bristles, which had been developed by others. Even very early, we had some sketchy economic prospects for nylon fibers. We set a very high standard, and got a forty-percent return, which certainly discouraged some ideas. I examined nylon fibers for special purposes, since it could be stretched to micro thicknesses and developed for special optical properties. I visited Edwin Lard to discuss two possibilities for the fibers: as aircraft gun sights, or to replace mica as covers for a Wilson cloud chamber.

From what I understand, the idea of using polyamide coating on fabric to replace leather was attributed to Elmer Bolton, then the general manager of the chemical department, and Arthur Tanberg's boss. I was given that project to explore the use of different polymers that, for reasons of cost, led to the use of the same polymer 66 as in the fiber. However, plasticizers were required to secure the desired leather-like quality, which meant another study had to be done. Special testing equipment for determining the abrasion resistance and flex life required long exposure to room and low temperatures. Also, the resulting product had to be compared with leather to match the texture. Hence, the subsequent testing took a long time.

Shoe uppers were the target market. After the material was pilot tested for shoe fabrication, we made enough for a large trial using the DuPont plant in Newburgh, New York. Meanwhile, I had contacted a shoe company down in Baltimore; I think it was the Muskin Shoe Company, owned by Hyman Muskin. He made thousands of lower priced shoes, and he could personally operate any machine in his plant. With a strong interest in experimentation, Muskin was a great man to work with.

Concurrently, I had to make arrangements for subjects to test wear the shoes. A large number of women worked in the DuPont rayon plant in Virginia, so in due course I went down there with all a bunch of prototype shoes, maybe one or two hundred in different sizes, and had

those young women try them out. I tested their feet perspiration levels while wearing the shoes by placing their feet on absorbent paper. I also got their comments as to the comfort and quality of the shoes. In addition, I had some shoes made by an outfit in New York, and had some other people try them out. I didn't think those tests were too successful at that time, and I was always worried that our testing process wasn't economically sound because we were competing with leather, which is a waste product.

THACKRAY: Did you personally do the testing?

TURNER: Yes. Lab scale tests had suggested a pilot size production of coated fabric based on use of a long-chain ester as plasticizer. To prep the plasticizer, we needed to put several liters of it through a distillation column that was larger than our lab could accommodate. Therefore, we had to set the column up down the hill towards Brandywine. Then, we measured the distillate purity by refractive index in my lab building. We had to distill the plasticizer for ten days twenty-four hours each day. My helper stayed by the still, while I took the samples up the hill to the lab for index tests. We had to make a tremendous amount of plasticizer to match the projected plant production of nylon coated at the DuPont plant in Newburgh. Consequently, I went up and down that hill so many times during the distillation process that after we were finished, I had to stay home a couple of days to recover from leg cramps!

THACKRAY: Was it customary to have the chemist go though all those steps?

TURNER: I think it depends on the chemist. I can think of some that preferred to continue to do work in the laboratory while others did the testing. Several chemists followed through in to the works operation to produce polymer 66; but others did not. I suppose I should have realized the direction of my future career by then. At that point, I was a little discouraged because I had not been promoted and a couple of my friends had. Further, my superior was a nice guy, but I wasn't terribly fond of him. I think Ernest Benger, the assistant director, must have sensed that because he told me there was an opening for me in the development section of the rayon department. The rayon department was still in existence back then, and thanks to its oversight of nylon fibers, it seemed to have a future, that is, until the creation of a new department. Therefore, I went to work in the rayon department.

As I recall another chemist, Graham, improved rayon's "breathability," and carried corfam through to the point where the department made the decision to commercialize it. I was not involved in that. That's why I never made shoes for Speed [Carl] Marvel.

I moved to the rayon department in the Nemours Building downtown. I worked with a group of five or six experienced marketing people who worked with customers, and dealt with their concerns about improvements in existing products. My task was to determine if there was a market for nylon film. It was a challenge because we knew the film was expensive. DuPont

cellophane dominated the wrapping film market. Essentially, I was told, "Turner, you need to find enough uses for nylon film to justify the production costs." It was obvious that the cellophane technicians didn't want me impinging on their market with nylon film. Regardless, I had a lot of fun traveling to all the different manufacturing facilities.

My father died suddenly in November of 1946. He had been president of Turner Construction Company, and was just about to be elected chairman. The shock of his death was probably what caused me to reexamine my future. In January of 1947, I decided to leave DuPont. I went to Ernest Benger, the assistant director of the division, and told him that I wanted a change, and that I would consider an alternate position at DuPont. Actually, I was interested in a supervisory position.

I had friends and contacts in various places, and in the space of a week, I had sent out thirteen letters. MIT looked great on my resume, as did DuPont. I quickly got some very encouraging answers and invitations to visit various companies. I visited two or three potential employers, and I was nearly guaranteed a senior position in the research laboratory of a paper company in Wisconsin. The vice president in charge was a delightful man who was about sixty-two or sixty-three. That gentleman told me, "I want you here because I don't have anyone who can take my place."

I had another invitation from the research arm of Stanolin [Natural Gas Company]; a subsidiary of Standard [Oil Company] of Indiana, in Tulsa. I went to Tulsa by way of Pittsburgh, leaving Kay there with friends. The husband, a college friend of mine, had done very well at Dravo [Corporation], the company well known for building towboats used on all navigable rivers.

THACKRAY: This was on the way to Tulsa?

TURNER: Yes. After I left, Pittsburgh newspapers reported that a recently formed coal company, Pittsburgh Consolidated Coal Company, was creating a research program to explore the potential of converting coal in to pipeline gas and liquid fuels. They planned to build a laboratory in the Pittsburgh area with advisory participation by the research arm of the Standard Oil Development Company of New Jersey [SOD]. They were known for their work in oil-cracking catalysis, and for their development of the fluidized bed to facilitate gas and solid reactions. SOD engineers thought coal could be pulverized to a specified particle size, reacted with oxygen and steam to produce synthesis gas, and then converted to hydrocarbon liquids. Their plan was to have Pittsburgh Consolidated test the gasification in a laboratory before the pilot plant was built.

THACKRAY: People are still working on it. [laughter]

TURNER: People have always been encouraged to do that type of work because of the high cost of crude gasoline. Consolidated had planned to use two of their employees to work in the new organization, but one of my friends in Pennsylvania went to the chairman of his company and told him the I was looking for a job. Then, the chairman called George Love, the president of Consolidated, and told him to speak with me before he filled the new position. During that period, I was still in Tulsa looking for a job when Joseph Purseglove had been designated vice president of research for Consolidated's new facility. Joe had come into the company because the Purseglove Mining Company had been bought by Consolidated. Joe was a marvelous guy. He was very conscious of his limitations, even though he had received a civil engineering degree from Cornell [University]. He had years of mining management experience, but none in research management and organization.

The day after I came back from Tulsa, I interviewed with Joe. He was very straightforward with me. He said, "I don't know anything about organizing research, and I need someone who can take that on." In response, I told him I had a background in research, and I thought I could be helpful. Two days later, I received a job offer from Joe, which I accepted.

There was a personal risk in moving to Pittsburgh with my wife and two children for that new job. I had to hire all kinds of people. I received a lot of help from some of my chemical engineering friends at MIT, who had a lot of contacts and knew some potential candidates. I managed to get two excellent chemists who were dissatisfied with their jobs at Mobil Oil, in Texas. Similarly, I hired a couple of bright chemical engineers who were unhappy with their jobs at oil companies. After a while, word spread and my workforce grew and grew. Meanwhile, I had a lot of work to do. I had hired a patent expert, a lawyer, and a Ph.D. physical chemist, but I still needed an accountant.

We were housed in a private home in Library, a small coal-mining town about 6 miles south of Pittsburgh that also housed the headquarters of a big unit of Consolidated. They showed me the site where they were building the pilot plant, and we had to get busy designing the set up with help from SOD and Consolidated's engineers. We were in business.

Within a year, I realized that my right hand man on the operating side wasn't strong enough for his position. Luckily, something fell out of the sky and in to my lap. I received a letter from a research employee of Standard Oil of California, in which he implied an interest in our coal-to-gas program. He sent us a complete flow sheet that he had drawn up, visualized from newspaper articles. Having immediately recognized his skill, I invited him to come and visit. Soon after, I made him an employment offer and he accepted. He was an Austrian engineer who had come to Pennsylvania with his wife and her family in 1934 or 1935. He had the equivalent of a master's degree from a technical school in Vienna. He was a good manager, and brilliant in every respect. In fact, he's my best personal friend today.

As for my new job, I was very concerned that oil prices would drop and the whole project would collapse. Just in case, we were working on the chemistry of coal with the Bureau of Mines on one hand, and on products that we got out of the coal tar on the other. In addition to our SOD advisors, we had research contracts with other institutions. We also had a chemical

engineer who, from working at a plant that transported crushed phosphate rock, came up with an idea for transporting coal. He wondered if it was possible to pump coal long distances in a water-slurry mixture. We undertook that idea and advanced it through all the stages. We had to figure out which pumps we could use, how to deal with corrosion and erosion, and the particle size versus range and pipe diameter. It was a challenging chemical-engineering problem. We worked right through all of them while continuing with the other programs.

I also made several appearances in state legislatures because we wanted to run a pipeline from coal mines in southern Ohio to a power station on Lake Erie. Property owners and railroads didn't want us to pipe coal, so we were sandwiched between the coal and railroad unions. However, we did get a bill passed giving a coal pipeline eminent domain. A line was constructed eventually, but it was soon shut down because the railroad cut its rate on coal.

It was around that time period that I experienced another sudden change in my life. Jones and Laughlin Steel Corporation [J&L] was seeking a new vice president of research and development. Their current vice president was in his mid-sixties or so, and becoming feeble. Unbeknownst to me, the director of J&L and president of Carnegie Tech [Carnegie Institute of Technology], Jake [John C.] Warner, who was also a friend of mine, had recommended me to Jones and Laughlin's management. While I was away on a business trip with my boss, Jones and Laughlin's chairman called and requested a meeting with me upon my return. So bang-o! [laughter] All of that happened in two week's time. Overnight I had become a vice president, a senior officer, and the supervisor of research and technical assistance at the mill, mines, and supporting sales.

[END OF TAPE, SIDE 1]

TURNER: My initial job, besides establishing myself, was to shake up the research group that had lost contact with the operating company. Some members were released and others transferred to other divisions, so I couldn't win a popularity contest that first year. Fortunately, I persuaded the assistant manager of metallurgical research at Ford [Motor Company] to join us. I made him director of research, and he, in turn, brought some very bright guys from England and elsewhere to the company.

THACKRAY: Those were good days for the steel industry weren't they?

TURNER: Yes. We had one down period after I was in there, but by and large, those were good days for the steel industry.

Back in 1952 when I was still with Pittsburgh Consolidated, my cousin was the president of the Turner Construction Company. He occasionally came out to Pittsburgh to inspect the U.S. Steel [Corporation] building they were constructing, and to have dinner with us. I hadn't

known him very well, but we eventually became good friends. Then, one day he invited me to become a director of the company. Joe Purseglove at Consolidated encouraged me to take the position. There we no outside directors. When I joined Turner, they had offices in Boston, Chicago, Philadelphia, and New York.

THACKRAY: Was Turner a private company?

TURNER: In a sense, yes. It was not entirely owned by Henry Turner's descendants, but they had control. Early on, the founder wisely made stock available to key employees. That was my first contact with the Turner Construction Company. Along the way, I'd been involved with many other things in Washington. After I had been a director at Turner for about thirteen years, a situation arose. We needed to find someone of an age or maturity to succeed my cousin, who was in his sixties. I never visualized myself being that person, but I was conscious of the succession problem. At lunch after a board meeting one day, my cousin said, "We have given it a lot of thought, and we decided that you're it." That absolutely knocked me off my feet. So that's how I became the president of Turner Construction. After all, I had been a director for thirteen years, so I was not a stranger in reputation or knowledge.

THACKRAY: How big was Turner when you were made president?

TURNER: It was among the ten largest building construction companies in the country. When I retired, we were in the top five, and now we are the largest. We have a large amount of foreign business, mainly in the Middle East. When I retired, there were offices in two places in California, offices in Columbus and Cleveland, and so forth, plus the original four offices. We also had offices in Hong Kong and Singapore.

At various times I was the director of Ingersoll-Rand [Company Limited], Dime Savings Bank, the second largest bank in New York, the Teachers Insurance and Annuity Fund, GAF [Materials Corporation], and American Smelting and Refining [Company]. So I gained a lot of board experience from a variety of businesses. I also served on the Swarthmore College Board for thirteen years. All and all, I had a very enjoyable business career. I retired from my last board position when I was seventy.

[END OF TAPE, SIDE 2]

[END OF INTERVIEW]

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