THE JOINT ORAL HISTORY PROJECT

BRIGHAM YOUNG UNIVERSITY ARCHIVES BRIGHAM YOUNG UNIVERSITY ALUMNI ASSOCIATION EMERITUS CLUB

H. TRACY HALL

Interviewed

by Alma

Heaton

May 13, 1985

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PREFACE

This is a transcription of a tape recorded interview conducted for The Joint Oral History Program of Brigham Young University Archives and the Brigham Young University Alumni Association Emeritus Club.

In addition to this transcript, the original tape and the results of the intermediate processing stages are available for scholarly use, unless restriced by the interviewee. The original recording has been treated as only the first stage in the creation of this manuscript. A verbatim transcript of the audio tape was made and then edited to conform to the standards of the written language. Unclarity, to a certain extent, false starts and redundancies were removed. A typed transcript of the interview was returned to the interviewee for editing; additions and deletions may have been made. A balance between clarity and flavor of the spoken language was strived for.

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INTERVIEWER: Alma Heaton
DATE: May 13, 1985

AH: This is Alma Heaton interviewing H. Tracy Hall in his home on the 13th day of May, 1985. It's a pleasure to be here and fill this assignment. It's a great priviledge.

TH: Thank you, it looks like a big job.

AH: I'll just pass this mike to you and ask you a few questions. How many years did you teach with BYU?

TH: Twenty-five.

AH: Twenty-five years. When did you start?

TH: The fall of 1955.

AH: Tell us a little bit about your grandparents, what nationality are they?

TH: Well, on my mother's side, pretty much English. I suppose about the same on my father's side, although my father's geneology is rather difficult to trace. We don't know for sure.

AH: Were they converts?

TH: Tracy, that was my mother's maiden name. That's where I get the 'Tracy' in my name. They joined the Church very early. David W. Patten in upper New York State, oh, it must have been two or three years after the Church was organized.

AH: Then are you a third or fourth generation Mormon?

TH: Let's see, I'm a fourth, on my mother's side.

AH: Did they cross the plains with the handcart company?

TH: No, wagons.

AH: Wagons and a team of horses?

TH: Yes.

AH: I see. What we want here, is your life history, to a certain extent, and give us your ideas about Brigham Young University. Where were you born?

TH: I was born in Ogden, Utah on October 20, 1919.

AH: Where did you spend your younger years?

TH: Well, we lived in Cgden City proper for a few years and then we moved to Marriott, Utah, named after the famous Marriotts.

AH: Is that right?

TH: Yes, they didn't live too far from where we lived. This was a little farming community northwest of Ogden, and my growing years were out on the farm.

AH: Was there an elementary school?

TH: Yes, a four room school house. I started in the third grade. Third, fourth and fifth grades were all in the same roam.

AH: Well, did you feel like a pioneer?

TH: Oh, I liked it that way; I think that's a good way to teach school.

AH: Now, where did you spend your junior high?

TH: We moved back into Ogden when I was about fourteen and I went to Lewis Junior High, later to Odgen high school, and then Weber College.

AH: What years were you in Weber College?

TH: Lets see, I graduated from Weber College in '39, my high school in '37.

AH: Two years of school?

TH: Yes, it was.

AH: Tell me what you remember about your younger years.

TH: Oh, I guess the farm years were the most impressionable. I remember the old swimming hole which was on our property at the bottom of our farm.

AH: Was that made by the water coming out of a culvert?

TH: No, this was the old Mill Creek, in Ogden, which in those days was still there. There hadn't been too much ciphoned off for irrigation at that point, so it was a pretty full stream.

AH: Did you go swimming in the nude?

TH: Oh yes, no other way.

AH: Well, we all went through the same. I was in Kanab and we did the same thing. How did you spend your years, besides farming? Did you have a tractor? Or did you have horses?

TH: No, they were depression years. We had a horse and that was all. We had some implements for the horse to pull, but they were very tough years. As kids we would pick beans and stuff like that, or we would hoe. I can remember starting farm work for others when I was about eight years old. They'd pay you 25 cents a day to hoe beets all day long. We were not too

far from the Southern Pacific Railroad. We'd get lots of what you'd call hobos in those days. The trains would stop in the Marriott area in those days. During the depression years you'd get a hobo almost every day asking if he could chop wood for a meal.

AH: We did the same thing. We had a square board around our gatepost, and if they got bread and milk there, they'd notch that to tell all the rest of the hobo's that was a good place to get a bowl of bread and milk. Our gatepost was full of notches. When they'd want something to eat, Mother'd say, "well, there's the wood pile". They'd chop wood for a bowl of bread and milk. Those are days to remember. I guess it went on all over the west. Nowadays, they just steal from you, they don't ask to chop wood, if they want to get something. Were those happy days? You couldn't compare enough to know whether you were rich or poor.

TH: No, we were probably the poorest family around for all of my younger life, up through high school. But you know, it didn't make too much difference. My dad was a convert to the church, we're not related to the other Utah Halls. My Dad joined the Church; but no other members of his family did, nor any of his brother's and sister's descendants. But he used be a socialist. He would get up and preach socialism on a soap box in city hall square. They used to do that in those days, in Ogden. When he joined the church he turned completely around and decided that capitalism was the thing. He told me a few things that I can remember well. He said, "Trace, don't ever envy a rich man. It doesn't matter; there has to be somebody out there that's wealthy enough to invest their money, and to build factories, and this, that, and the other. So don't envy a rich man. There'll be some who will take advantage of being rich and really live it up, but for the most part, they're doing good.

AH: Well, it's like the Fiddler on the Roof. It says, "it's no disgrace to be poor, but it's not an honor either".

TH: But, we were very poor. Another thing I remember him telling me, he said, "Trace, don't ever drink Coca Cola". So I didn't ever drink Coca Cola.

AH: Can't drink coffee, or smoke, or drink.

TH: No, but he specifically mentioned that, and I just remembered that thing.

Early on that farm my brothers and I all learned to work and earn a living. Except for the sewing, that my mother did quite a bit of, I paid for my schooling and most of my clothes and books and earned my way all the way through college and my Ph.D. My parents were just too poor to treat me to anything. You had to make your own way in those days.

AH: Do you feel that you're better off because of that?

TH: Oh, yes. I think most kids ought to work at least part of the way through school.

I had to lay off for a year to earn some money to go back to school. I worked for a photographer in Ogden for a year. I guess it was more than a year because it would have been a summer and then a full year. I earned enough money to go to school at the University of Utah. I went to Utah in 1940. Later I had a little better job working at Sperry Mills, doing analytical chemical work, although I was not yet a full chemist. I was married to Ida Rose Langford on the 24th of September of 1941 in the Salt Lake Temple. We had a three day honeymoon at the state fair, then started school at the University of Utah the next day. That was my final year.

AH: Was she your high school sweetheart?

TH: No, no. She lived in the Ogden ninth ward; I lived in the eighteenth. In those days, mutual was Tuesday nights, so you'd sort of walk around this ward or that ward to see where the prettiest girls were.

AH: Well, did you go to dances during high school? How did you have fun?

TH: I went to ward dances mostly, but it turns out I didn't do too much dancing myself, because in 1936 or 1937 I played the piano. I never had any lessons, but I taught myself to play the piano and organized a dance band. It was called The High Hatters and for a few years it was the most popular dance band in Ogden. We played at all those country wards; Plain City, Wilson Lane, Slaterville, Eden, Liberty, Hopper, and Roy.

AH: Yes, I was with the county recreation department in Ogden for eight years and we used to travel through all those little towns.

TH: So I didn't dance too much. The way I finally got my wife; I had seen her a few times and smiled at her over at that ninth ward, but I was fairly bashfull in those days. But I saw her on the street around 24th Street and Washington, while walking with my friend Lane Compton, who also ended up being a professor over here. We went our independent ways and we ended up at the same place eventually. I said, "see that girl? I don't know her name, but I'm going to find out and ask her for a date". So, I called and asked her for a date and she was going to the show with her sisters. It took me a little while to get up the nerve to call again, but I finally got a date. We went together, on and off, for about a year and a half and finally got married.

AH: Then that was during your college years?

TH: Yes.

AH: How many brothers and sisters do you have?

TH: No sisters, four brothers.

AH: Four brothers. Well, how about your family?

TH: We have seven children, two sons and five daughters. Both of the sons and three of the daughters have been on missions, and then when they were all married, we went on a mission.

AH: Where did you go?

TH: Zimbabwe, Africa.

AH: My wife and I went to India. How did you enjoy a mission in Africa?

TH: Well, we enjoyed it, but there are a lot of frustrations. I think it's going to be a long, long time before the Gospel among the blacks in Africa is very solid.

AH: Yes, well, I don't think that way about India. The people that I baptized have been on missions and they're back there now converting them by the hundreds.

TH: Really?

AH: Yes, and it won't be long until they have a mission there. Indians are, I guess, a little different caliber of a people, but the caste system is a problem.

TH: Oh, yes. We spent a couple of weeks in India, New Delhi. I was installing some equipment for the Indian government and I didn't think India could ever amount to anything on account of that caste system.

AH: Yes, that's terrible, but the Church has the answer to their problems. I don't think they'll really come out of it until the Church gets in there. In the branch, where we held church, it's hard to get a millionaire to sit by a truck driver, or a cab driver, or anyone else. They just wouldn't do it.

TH: The top ones wouldn't work, I found out. They'll push a pencil and paper. But, I'd get a wrench in my hand and work on the machinery, "Oh, Professor Hall, don't do that, you're wrecking our system!" I think the church is having better success with blacks in northern Africa than in the southern part. The latest word that I have about South Africa itself is that twenty-five men have been ordained Elders over a period of about three to four years. And every one of them has been excommunicated, every one of them. Now in Zimbabwee, we had three Elders, and as far as we know two of them are still okay.

AH: Did you enjoy the time there?

TH: Oh, yes.

AH: Quite an experience isn't it?

TH: Oh yes, it really is.

AH: The whites down there are a minority.

TH: It's scary to be down there.

AH: Where did you go to school besides University of Utah?

TH: Well, I got my. Let's see, I got my bachelors degree in 1942. I mentioned I was married. I was the only married student around at that time. I'm sure there were others, but I didn't know of any. In those days, there weren't any married kids going to school. But I lucked out. As soon as the department chairman found out that I was married he gave me a job. It was hard to get a job. I worked in chemistry stock roams and made a little money. Then, when I-graduated, I got a job at the U.S. Bureau of Mines, which was very near the campus. That paid pretty good money. I probably made $100 a month, or something like that. And the Bureau of Mines were rather liberal, as long as I put in eight hours a day there, they let me take classes at the school. So in a year plus a summer, I got my master's degree.

Then the war came along and, let's see, we had a child by the time the draft was getting close to me. When the draft started getting close, I didn't want to be an infantry man, I wanted to do something technical. I had a Master's degree in chemistry. But the only thing technical to get into was the electronics area in the Navy. So we found out which day the Navy was recruiting. I don't know what the reason was, but same days would all be Navy and some days all Army. I got up there with some friends on the day it was all Navy. I got in the Navy and went to the Great Lakes for what they called Boot Training and succeeded in convincing them to send me, because of my education, to Enlisted Man Radar School. Oh, I should tell you something. Anybody who had a college degree was elligible for commission. But the physical requirements for an officer were higher than for enlisted men, and I couldn't pass the test. Otherwise I could have started off as an officer in the Navy. When I got to the Great Lakes and they put me through the psychology and G Test and past all the doctors and everything else and gave me all the shots. The psycologist looked at my record and he said, "You got a master's degree and you're here as an enlisted man?" I said, "Yes, I couldn't pass the physical." He said, "Well, you shouln't be here anyway, you ought to be out working in industry." I guess I should have. So I was all set to go to radar school as an enlisted man, but the psychologist sent me to a doctor to make sure I couldn't pass as a commissioned office. He said, "Maybe they made a mistake you may be okay." My problem was I had high blood pressure. Here I was only twenty-six years old. So this doctor said, "You come and see me once a week, and anytime your blood pressure is around a hundred and twenty, (It was running a hundred and forty) then we'll pass you in. Then you can go to officer's candidates school". So I went in week after week after week, and it never did get any lower, so this medical man sent me up to the top medical man in the organization. He looked at the record and used a few Navy cuss words about the Navy not knowing what they're doing. He scratched out my high blood pressure and put in a normal blood pressure. I wasn't so sure it was a good thing, because then I was sent to Fort

Lauderdale, Florida, to learn how to navigate by the stars and

what not. I ended up on these landing gear things, LST's that were landing on the beaches out in the Pacific Ocean. So that's what we were slated for.

They put us in the Hollywood Beach Hotel. They converted this Hotel into a Navy place. We were getting all our training down there.

But one day, I was rounding a corner, and my eye just happened to catch on the bulletin board, opportunities for radar school, officers for radar school. It said there were three openings for officer training in radar and there would be an examination. So I signed up for the examination along with a couple of friends. I was a chemist and the two other guys were chemical engineers. We went and took this test that lasted three or four hours. It was really a long test. And everyone in there was a graduate electrical engineer, and then a chemist and two chemical engineers. We were the three that passed with the highest scores. But it was just a lucky coincidence. It really wasn't fair to those electrical engineers, with graduate degrees in double E. It was a general science exam, particulary to see how smart you were in physics and mathematics, so they were at a disadvantage.

Anyway, we left Fort Lauderdale, Florida, which is near Miami in December and took the train and two or three days later we were in Brunswick, Maine, where the snow was up to the eaves of the houses, I've never seen so much snow, and it was bitter cold. But this radar school was being held at Bowden College. You have probably heard of Bowden College. We were there for four and a half months and then we were transfered to MIT for five more months of training and part of that was also at Harvard. I really had a rough time. You know these guys already had double E degrees and they assumed that you knew all those electrical engineering principles and boy, it was tough. I managed to get through it. I liked the system, they really worked you. You had four hours of lecture, one after the other from 8:00 a.m. to 12:00 noon and then from 1:00p.m. to 5:00p.m., you had lab. Every day of your life except Sunday for five months. Then you had to go home and study like crazy until midnight and then back the next day. They really poured it on. But it was a good education in electronics. Then they took the guys who were in the higher echelons from those schools and sent us for what they called post graduate training out to Hawaii. Then I had radar for two or three more months in Hawaii. Then they shipped me back to the states to the San Francisco Naval Depot. While I was there and I wasn't doing anything scientific. I was just in charge of electron tubes. You know in those days, all the Navy gear, they were not transistors. I was in charge of all the electron tube storage for all the Pacific Fleet, really boring, and not much to do. I studied my chemistry almost all the time I was there. Most of the guys sat around playing cards, that's the way armies and navies are, just wait, wait, wait. Most of the guys just sit around playing cards and drinking coffee, but I studied all the time. It did me well for finishing out a Ph.D. later on, but one of the most interesting experiences of my life happened at this San Francisco Naval base. The Admiral of the Pacific Fleet was stationed at that base. The war was over by now. The Germans surrendered when we were in Brunswick, Maine, and I think the Japanese surrendered when we were still in Boston, and

Cambridge going to school. Anyway, the war was over, but they were still sort of on alert in case things should flare up again. But in the Navy

system, everybody takes their turn as being officer of the day, even the lowest officer there, which is an ensign, which I was. I don't know how they pick them, but my name came up to be officer of the day. The duty was twelve hours. They don't mind working you on some shifts, you know. It really used to be terrible. If you ever go to sleep on guard duty, they're supposed to shoot you. They would have you on duty for twenty-four hours sometimes. Well, anyway, I was on duty, not just for a shift, I was officer of the day for the entire Pacific Fleet of the U.S. Navy, a twenty-six year old kid. The President of the United States probably didn't know that, or he'd a been a little bit worried. But the top guy himself, the Admiral, appoints his deputy to be the officer of the day, not in fact, but in presence. I was there during the daytime, and there was a civilian crew that pretty well knew what to do. He came on for night duty, and he said, "Hall, it's ten o'clock, I'm going to bed. There is where my bunk is; it's in that roam," and he said, "I don't give a damn, if the war breaks out again, or if Hell freezes over, you're not to disturb me." So all night long, I was in charge of the Pacific Fleet. Now there were two Marine jeeps, and they crashed through the Navy gate. They just didn't call like they were supposed to, they just crashed through the gate and went tearing around the Navy Base. Anyway, the Navy Police caught these guys. They were officers and an officer's automatically a gentleman. You can't put him in jail, no matter what he does. The enlisted man, you can throw him in jail. Well, I had to make the decision, what do you do with these guys. Can't put them in jail, so I decided to put them in sick bay. So they put them in sick bay and tied them in bed. That's the Navy term for hospital, sick bay, so that's the way I handled that one. Just tied them in bed until they sobered up and turned them loose the next morning.

There was another thing. There was a tidal wave out in the Pacific and we had to warn all the ships of this tidal wave. But I thought that was pretty good, having the priviledge of being in charge of the Pacific Fleet of the whole U.S. Navy when I was only twenty-six years old.

AH: Well, that's really something to brag about. How long were you in the Navy then?

TH: Well, a little more than two years. I was finally put on a ship, it was called AGC 14. Attack General Command was what the AGC stood for. In the old days, the Admirals and the big wheels running the show would have been on a battleship, but in World War II, they were on an electronic ship. Our ship had very little protection, we only had some small guns. But we were loaded with radar and communications, and so this is where the admirals were, they were on these kinds of ships. The other ships and the aircraft that were ahead had to protect this ship at all costs. That was my ship, AGC 14. I was scheduled to go in the Orient. They had a point system for getting out of the service, and I was short of points a little bit.

AH: Is this after the war?

TH: The war was over, yes. The commander of this ship had taken kind of a liking to me, he said, "Hall, you've got two months or something.

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we go to the orient we are going to be over there for six months, and you got a wife and a kid at home, (I guess I had two kids by then), I'm just going to let you go now." So I got out of it a little bit earlier than I was supposed to.

AH: After the war did you go back to school?

TH: Yes. In the field of chemistry at the University of Utah, they like to send their people to Purdue, so they lined roe up to go to Purdue. Housing was very short after the war, but Purdue had given roe a teaching fellowship and said they would have housing for my wife and kids. So I went to Purdue and when I goet there, there was no housing for anybody. I could not locate any anywhere, just nothing. At least nothing that I could afford. So I stayed out there six weeks and Hass, was the name of the department chairman, Henry B. Hass. I told him, "I can't stay cut here without my family". "Well, why can't you?" He asked. I said, "Look I've been away from my family two years in the war, I don't want my family to be back in Utah and me be out here". They really needed teaching assistants in those days, so he was determined to keep me, and he threatened me. He said, "I'll blackball you with the American Chemical Society. I'll see you never get a job anyplace." He was an important man in chemistry. But after six weeks I just left and came back to the University of Utah. One of my colleagues said, "Hall, You'd be better off to go back to Utah anyway. Henry Eyring has just gone there, and he's a lot more famous than any physical chemist we've got around Purdue." So I went back to the University of Utah, and there was housing there. So I got my Ph.D. under Henry Eyring. I was his first student to graduate, and a fourth student to receive a Ph.D. from the U of U. They had just gone into their Ph.D. program.

AH: All right, now you're through college. What happened now? You've got a wife and two children?

TH: Now I had three children. As a matter of fact, I had three children before I got my Ph.D., which was fairly unusual at that point too. Now I go looking for a job. I went on a tour of Eastman Kodak, Dupont, in four locations, Union Carbide and General Electric. Now, when I had written to these companies, the usual deal was they would all share the expense, you know. I wanted to work for General Electric. I hd told my fourth grade teacher that when she asked us what we wanted to do when we grew up. I said, "I'm going to be an electrical engineer and work for General Electric." Scientific people were my heros when I was a kid, or at least inventors; Edison, Henry Ford, Franklin, Harvey Firestone, and guys like that.

Going back to the farm, we were so poor that we didn't have any transportation. In the winter time we'd pull a sleigh by hand, five miles along the railroad tracks, which was the shortest way to go, into town. We would get groceries to last a couple of weeks, go to the library and pick up books, and go back home. I'd always pick up scientific books. I was interested in science from about age eight on. I knew what I wanted to do, not exactly, but generally. I was going to be in science and invention and things like that. My goal was to go to G.E. I wrote

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to General Electric and they said they were not interested, they didn't want me. So I went on this trip and I contacted General Electric. I said, "I'm going to be passing through Schenectady. Since I'm there, won't you see me?" They reluctantly said "okay", but they wouldn't pay any of the costs of that stop-off. So I stopped there and I had an interview with the various people. There was a young man there by the name Bill Cass. He was sort of a lower down man compared to the main guys. Bill Cass said, "Hall, I think that the company ought to hire you. You're as good a man as we have seen. But, the Vice President for research, and the head of chemistry don't want you." He said, "I think I can influence them to hire you, but you ought to know that they don't want you." I continued on and I visited all these companies, and I got an offer from everyone of those companies right off, every single one of them. But no offer from G.E. I still wanted to work there, so I waited and waited and the other companies were pressing me for a descision and I just kept holding off. I called General Electric and they still not interested. I was in the U. of U. library and a call had come through to Henry Eyring; he got the call forwarded to the library and it was General Electric making me an offer. It turned out that their offer was higher than any of the other offers, now that they had finally decided to hire me.

So in October of 1948 we set out in an old car I bought from my brother. It was an old 1937 Plymouth that had been in a fire and all the insides of the car was burned out. It has been in a wreck and it leaned to one side. We nursed that car all the way to Schenectady, New York. When we got there, housing again was a problem. G.E. had it fixed so that we could stay with a family for a week while we looked. We couldn't find anything, but we did find some people that we had known in Stadium Village, at the Univerity of Utah. We lived with them for six weeks before we could find housing rental. Finally we built a home in Schenectady a year later. We stayed in Schenectady a total of seven years. Now, I'm quite convinced that there was discrimination against me because I was a Mormon. I was the first Mormon to ever work in the G.E. Research lab, which is the oldest scientific lab in the country, the first one established. I think they didn't want to hire me because I was a Mormon, and some of them didn't like Henry Eyring. I think that was part of it. I don't know what else it was about me that they didn't want.

It was there that they had decided to see if they could make diamonds out of graphite. Chauncy Suits, was the vice-president for research. See, the greatest research lab in the world in those days, was Bell Telephone, and General Electric was second. They had built brand new beautiful labs. Dupont had just finished building a rather huge, elaborate, research laboratory with good facilities. The G.E. lab was one of the better labs. In 1951, Suits and his colleagues decided that they'd like to try and make diamonds. If they could, it would be a feather in their cap, because scientists had been trying for a hundred and seventy-five years. You couldn't really call them scientists a hundred and seventy-five years ago, but man had been trying to make diamonds for that long, including five Nobel Prize winners. So, they took two physicists from the lab and called them to work on this project. It was generally known, from geological circumstances, that you'd need a high pressure and a high temperature, but how much pressure and

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how much temperature was not known. A fellow by the name of Percy Bridgman at Harvard University, had worked on trying to make diamonds from 1904 to 1950, and had not succeeded. He had done a lot of wonderful work in the development of high pressure apparatus, and had got the Nobel Prize for his work in the field of high pressure. Well, they hired these physicists to see if they could improve on Bridgman's apparatus. Bridgman's apparatus could not be heated. You could get a high pressure, but only at room temperature, and to make diamonds you need a lot of fire and heat, and Bridgman could never acheive that. The head of chemistry told Suits he better have a couple of chemists working on that project in addition to those two physicists. There were thirty chemists, most of them relatively new at the lab, and we were all called into a meeting and told that there was going to be this project and one or two volunteers were meeded to work on this. I was the only guy who held up my hand, so I got the job. The other guys had known of the long history of guys trying to make diamonds, and they didn't want to play the one hundred to one shot. They wanted to work on something that had more chance of success. So I got the job. A year later, they hired another chemist fresh out of school from University of Wisconsin. I wasn't totally unequiped. I knew the total history of diamond synthesis and I'd tried to make diamonds when I was at the University of Utah, but I had no access to enough money to ever make any equipment that might be needed. Anyway, I was pretty well interested in that particular problem. I ought to say one thing. I was a little bit worried about going to General Electric, because they were hiring Harvard, Yale, and Princeton; almost all the guys were from those three schools. You know, just top stuff. I thought, "I wonder if I can hack it?" Well, I found out I was at least as smart as any of them. It was good to have that worry behind me. That's probably another reason they were reluctant to hire me. They were hiring from the big name schools, MIT, and here was podunk University of Utah, with only a very few Ph.D.s graduated so far. All we had was the reputation of Henry Eyring, and the three top guys at General Electric didn't like Henry Eyring.

AH: My son graduated from Stanford and he had a chance to go back and teach at Harvard, but he come to BYU. They didn't like that; they wanted to have Stanford represented at Harvard. They didn't like that when he come to BYU instead. He's one of their top students there.

TH: Well, I've learned that those big names aren't necessarily all that great. They've got the reputation, but they aren't any better. They aren't any better than a lot of other schools. Not as good in some cases.

There were two main jobs in this diamond project. There must have been some chemistry that went on in the earth to make diamonds. From geological experience we knew there had to be pressure and temperature. So my assignment was to try and figure out some chemistry. Nobody knows, not even to this day, how diamonds are formed in nature, we don't know the chemistry of it. So that was my job, and the physicist's job was to invent some high pressure, high temperature apparatus. Well, after a year, these physicists still hadn't invented anything, and I was getting ideas. I had an idea that they didn't think was any good, but they

reluctantly let me try it. I had no budget for building high pressure apparatus. They had a hundred and fifty thousand dollar budget for these two physicists, but nothing for me, cause that was not my calling. I wasn't called to design and build high pressure apparatus. But I built a thing that I called a half belt, and later they let me build, what I called, the full belt. But only out of steel and it needed to be built out of tungsten carbide, which is something that couldn't be done at General Electric. My colleagues didn't think it was any good. My top boss didn't think it was any good, but I had a different boss when I went on the diamond project than I had when I was strictly in chemistry. I went to this former boss and I said, "Look I've got a really good thing here and these guys are holding me down. Let me speak at one of your seminars and tell you and your men about it, see what you think." So, I gave this talk and told them about it. I had not given many talks in my life before that, but they all applauded. It was the thrill of my life. Former colleagues were applauding me, and the guy who was in charge. He went to Suits and said, "Look, you're overlooking something." I had an eight ball against me in the first place, because the two physicists worked with Suits at MIT in the radiation laboratory during the war. They were real buddy-buddy, and I was just a farm boy from Marriott, Utah, in their eyes. I hadn't graduated from MIT and same of these other places. Anyway, I got permission to build this thing in tungsten carbide, and was soon generating higher pressures than had ever been know to man, and higher temperatures at the same time. Graphite and diamond are both carbon. Coal is mainly carbon, but you take coal and convert it into graphite and then convert the graphite into diamond. There was not a scientist on this earth, at that time, who would not have said, "you can turn the graphite into diamond, if you've got a machine that will generate these pressures." I thought I was getting two hundred thousand atmospheres. An atmosphere is fifteen pounds per square inch. But we now know that I had only reached about a hundred and forty. Guys would have said, "If you could reach a hundred thousand atmospheres at a thousand degrees centigrade, you could make diamonds." I could reach 3000° C at a hundrend a forty thousand atmospheres. But the graphite wouldn't turn into diamond. So knowing that, what a chemist has to do is see if he can find some catalytic conversion, and I was lucky enough to think of a catalyst that worked. The first diamonds were made on the 16th of December 1954. Men had claimed to have made diamonds before, but nobody was ever able to reproduce their claim. My first job was to have somebody else go through the proceedure and make the diamonds. By this time there was a fellow by the name of Hugh Woodburry, who was also a Mormon. Now two Mormons were in the lab. He'd come from Cal Tech. He was a physicist. I succeeded in making diamond crystals a dozen times before the end of December. Now my colleagues were slow to want to believe that this had all happened. They had spent a hundred a fifty thousand dollars on a high pressure machine that wouldn't work. Mine cost a couple of thousand dollars, and it worked. Things were just against me. I succeeded in making diamonds before friends of the vice-president for research, guys who'd worked with him, ten years older than I am. I'm an upstart and I succeeded in doing it so I left. I had been passed over on raises at G.E. for five years, and I was kind of mad about it. I was making somewhere around $11,000 a year, but I knew

guys in the lab that

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weren't as good a I was, who got $18,000 a year. So I thought, now look, after making diamonds, there's got to be a raise coming, there's really got to be a raise, and it's got to be at least equal to what I know these other guys are getting, $18,000. Well, Abraham Lincoln Marshall, who was over chemistry and some others, came down with the raise, and it was peanuts. I forget what it was, maybe a thousand dollars, and he could see I was really burned inside. I said, "Well, Abe, what's a guy got to do around here to get a descent raise?" And that stupid guy said, "Well, you know if you do something good in future years, we'll give you another raise." So I decided to look for another job. I had had it with those guys. It was my love to go to work for G.E. I do something like this, and they don't reward me for it. I can't understand to this day why they did not reward me. I looked at some companies, I talked to my friend, Henry Eyring, and Henry talked to Harvey Fletcher. Harvey Fletcher was director of research and Dean of Physical Science and Engineering and it was too much for one man. They wanted to split it. So after looking around, I decided to take this job out here. They offered me Dean of the College of Physical Science and Engineering, or Director of Research.

AH: Where was this?

TH: Here at BYU.

AH: At Brigham Young University?

TH: Yes. Now Dean would have been a more prestigious job, but I was more interested in the research end and the school was interested in somebody experienced in that area. So I flew out here during conference time, my first commercial flight on an airline, and the skies were blue. It didn't rain that conference. I looked at that beautiful campus with forty-two hundred students, and I decided I would take the job. I flew back to Schenectady. When I got back to Schenectady where the lab was, Suits and Marshall and Nerad immediately got a hold of me. They knew I'd been looking for another job.

An interesting thing about the diamond synthesis. We were just making some diamonds, you know, just to show the world it had now been done. They hadn't thought of any commercial aspects. Geologists were talking millions of years for diamonds to be made in nature, and that worried us in the lab. If it takes a million years, how are we ever going to run an experiment long enough to see even a speck of diamond. But it turned out that in a minute's time, I could grow a one carat of diamond crystals. Little ones, but you could see them with your naked eye. It immediately became obvious that this was commercially fesible, and actually it only took G.E. two more years to start selling commercial industrial diamonds.

Anyway, G. E. offered me the job of going to Detriot, and being in charge of the whole commercial project for $20,000 a year. Eyring is a pure scientist, you know, industrial stuff, that's out of his line. I was not only like that, but you go back to 1946, 1948, physical chemists and physicists were real ivory tower purists. They wanted us working in universities, not in industries. G. E. and Bell labs maybe. That's okay because they're good labs. But anyway, I had

this purist idea and I

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figured I'd rather be in the University. So I went from a $20,000 offer to $7,500 at BYU. I didn't know how we could live on that, to get started on life.

AH: The year was. . . ?

TH: 1955. When the guys at G. E. wanted to know how much I was going to get paid out here, I just wouldn't tell them. What a dumb guy, here we offer you $20,000 and you go to work for $7,500. I said, "Well, I won't be making as much, but I'm going to do some consulting." They laughed. They said, "You're too young to do any consulting; you're not experienced enough." So, I came out here, and started off on the Director of Research job. I hadn't been here very long when I gave several lectures that I was paid for. In the first year or two that I was here, I gave more lectures all over the place. I could not tell any details about diamond synthesis, because General Electric had kept that as a secret, but I could tell enough to make it interesting. Then I started to get consulting jobs. I said that I was poor when I was young. A dollar was a lot of money and I had no idea of my true worth, financially, really. I was meek and mild and scared of authority when I was young. I would never ask for a raise, I was never brave enough to do anything like that. But after I'd been out here for a while, General Electric Company decided they wanted me to be a consultant for them. At one point, they sent out a vice-president to come here and twist my arm to go back there. So I went back to Detriot where they were establishing this factory to manufacture diamonds and we talked about a number of things. I gave them same ideas, and then eventually you have to came to the point of well, how much are we going to pay you.

Now I didn't tell you too much about this Harvard professor Bridg-man, I need to back track a little. Since General Electric did not want to reveal the secrets of the diamond process, many scientists thought that was kind of unfair. Influential men like Vaniver Bush, who was a scientist, very influential in World War II, called Suits on the phone, as I've heard the story, and said, "Hey, look, you've got a lab that you claim is like a university lab, you claim you've made diamonds, but you haven't told us how you did it. We want to know how you did it. And we think it's unfair for you not to tell us." A little heat came from same other quarters too. So, G. E. got this idea of hiring the world's most famous high pressure worker, Percy W. Bridgman, as a consultant for General Electric. So they contacted Bridgman, found out he was a consultant for Dupont, but when he was told they wanted him to come and see how the diamonds were made he couldn't resist. He cancelled his contract with Dupont, and he came on as a consultant for General Electric. When he came, I showed him how it was done. He was an old-time, European, high-and-mighty kind of untouchable individual. He actually wore tails at Harvard. But anyway, I showed him how the diamonds were made, and he just went around shaking his head. Once you've seen how to do something you can say, "Well, that's easy. I could have thought of that. Why didn't I think of that? I must have been on the verge of that." He was kind of unhappy after seeing how easy it really was, once you knew how. But the only reason they hired Bridgman was to have him write an article for Scientific American which is a rather popular

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universal journal, and say in it that he had seen it done, and knew how it was done, and that General Electric Company really had made diamonds. That's the only reason they hired him. The article in Scientific American didn't say a word about how it was done, but he verified that indeed the General Electric Company synthesized diamonds.

So, now I go back to Detriot and we got to the point where we had to say, "Well, how much are we going to pay Tracy Hall to be our consultant?" Well, they started to talk along that subject and asked me how much I wanted. Normally I would have probably said $50 a day, or something like that, but I just wasn't myself. I like to think that the Lord was with me on this one, because just like that I said, "How much you paying Percy Bridgman?" And of course their mouth's drop and they, ". . .Well, you know we. . . that's confidential information, we never tell anything like that." But I kept pressing them, and that's just not me, not at that period in my life. Finally they said, and maybe they told a lie, I don't know whether they did or not, but they said, "Well, we're paying him $200 a day." And I said, "I'll take $300." Then they really did sort of stumble around. "Oh, no we could never do anything like that." But I held my ground and finally they went up stairs to talk to the top dog, and they came back and said, "Okay, we'll pay you $300 a day." In my early life I was timid, I always got good grades in school, but I was timid and shy, and easily cowed by bullies and superiors. But I held my ground and they said they'd pay $300. Well, we had verbally agreed to a contract that seemed satisfactory. A week later the contract was sent and it wasn't what we had talked about. I showed the contract to Harvey Fletcher and he said, "I would never sign a contract like that." I said, "Well, that's what I thought." So I wrote back and told them, "No, I'm sorry, that wasn't our agreement, and the deal was off." I didn't worry very much. I knew I was worth $300 a day now, so if they didn't want to hire me, maybe somebody else would. They were quite peaved at me for all that, and then not working for them, but their contract was not fair. It was not right. So the next time somebody wanted me to consult, I told them $300 a day, and they paid it. As time went on, I thought, "Well, maybe I'm worth more than $300 a day. I was consulting for General Motors at $300 a day, and U.S. Steel wanted me to consult for them, and they voluntarily offered me $450 a day, I didn't ask for it. I thought I'd done General Motors all the good I could ever do them and I called them and said, "Look, I've been working with you on and off now for quite a while, and I don't think I'm doing any good, another company wants me and I think I can help them." "Oh, no, we still like you. Why are you going over to them?" They wanted to know how much they were paying me. "That's all right, there's no conflict of interest, we'll pay you $450 a day." So, I consulted for both of them at that rate for a while. But I never did like consulting. I'm not that gregarious a person normally. I have to have time to myself, and to try and appear smart eight hours a day, and have your brains picked eight hours a day, just wrings you right out. While doing this consulting business over a period of time I also gave talks. I got up a pretty good speaking fee too, about equal to the consulting fee. I talked at most of the big name schools, Harvard, Yale, etc. I talked at many of the universities in the United States. I kept this up for about ten years, and I just quit it.

But consulting had supplemented my meager BYU salary, and got me a start in life finally.

AH: Can you wind it up a little bit? What happened?

TH: Well, Let's see, to wind it up a little, those were the exciting days of my life, I guess. Another exciting thing we did was establish this Mega-Diamond Company down here, which has been good. It took a long time, but it's now employing a hundred and fifty people.

AH: Where is it?

TH: Right down on the river bridge. That was started by Bill Pope, Duane Horton, and myself, almost twenty years ago. It was a lot of pain and suffering, but it's finally going.

I was director of research at BYU for twelve years, so I got tired of administrative work. They had made me professor of chemistry right from the start, so I just hung on to the professorship. When I guit being director of research, they made me a distinguished professor. They don't make them anymore. I think there were a total of five at one time. So I had that honor from the university. The university has given me many honors and I've got many from other places. So I spent the rest of my total of twenty-five years as Professor of Chemistry. Of course I've built up that high-pressure laboratory, we had the best high-pressure, high-temperature laboratory in the world.

AH: Where's this?

TH: Right at the university. We had a separate building there.

AH: At Brigham Young University?

TH: Yes, over at the coal pile. I taught a lot of other university professors the technigues and at one point we had twelve university professors working in this field. I personally published 95 papers in this field and my colleagues probably published that many themselves. So for a long time, scientists who wanted to learn about high pressure came to Brigham Young University. The first few years, there were a couple of hundred. They would come from Australia, Japan, Russia, France, Belgium, and England, and some of them would stay here for summers. So I guess that sort of winds up that.

AH: When did you retire from Brigham Young University?

TH: Well, I retired early. I retired in 1980. In 1981 we went on a mission to Zimbabwe. That was a year and a half, and we've been back from that for about a year and a half.

AH: Yes, great experience. Well, now, what's happened to your diamonds? Are you making them?

TH: This company, Mega-diamond mates them. General Electric is still the world's major manufacturer. DeBeers makes them. The diamonds we make are better than what nature gives you for industrial purposes. So for industrial use, 95 percent of the diamonds are made in factories.

AH: Well, don't you get a commission?

TH: Well, I never got anything out of good old General Electric, unfortunately. Man, they ought to have paid me a couple of million dollars for what I did for them, but they didn't do anything. No, I have made same money off of this company, but not enough to make me a millionaire. Anybody who makes diamond really should have made enough. Somebody should have presented them with a million dollars at least.

AH: But as long as you were working for General Electric, they had everything you produced.

TH; Yes, sure.

AH: Well, it was the same way with Fletcher wasn't it, about Bell Telephones? Bell got credit, a nobel prize, for something Fletcher did.

TH: Yes, that was really a dirty deal for Fletcher. That was really bad.

AH: Well, it's been a great pleasure to get aquainted and visit with you. This will go in the Archives and you'll be remembered for time and all eternity.

TH: Well, thanks Al.

AH: You bet.