Mom's (Ida-Rose Langford Hall) Account of Diamond Discovery

On Dec 16, 1954, a great event happened which has and has had since a great impact upon our lives. Our husband and father, Dr. H. Tracy Hall made the first, historic run in his high-pressure, high-temperature apparatus called "The Belt", which produced the first "man-made diamonds." To leave an account of this out of our family history would be like leaving yeast out of bread, and to fully understand this "event," one must understand the nature of the "man behind the event".

I often wish that God had given me the ability of expressing my thoughts in words so that I could put the personality of my wonderful husband on paper so that his memory would live on for those to come who have not had the privilege of knowing him personally.

The making of diamonds requires a special blend of scientific ability which is rarely combined in one individual. Dr. Percy W. Bridgeman spent fifty years working in the field of high pressure, eventually being awarded a Nobel Prize for his work, and he had the field largely to himself during this time. Why? It is not an "easy" field. The requirements are rigid and cannot be met by many. In the first place, one must have a love for and understanding of the "mechanical." He must know the basic fundamentals of physics, chemistry, and math, and be able to use these principles as tools to advance new frontiers and search into the unknown. He must be dedicated to his work, persistent to the point of "bull-headedness," and be able, above all else, to do independent and original thinking. There is not a university in the U.S. which can graduate such a scientist. Much of it has to be "inherent" in the individual and it is rare indeed to find all the necessary qualifications in one package. Tracy has all these qualifications to a marked degree, besides which he possesses a deep and abiding faith in our Heavenly Father; the master-scientist of all. Dr. Henry Eyring, world famous for his rate-process theories, has described Tracy as "tops" among his some 75 graduate students. "A man of his accomplishments and promise is rarely encountered," he wrote in a letter recommending Tracy for the Impetieff Prize which is given every three years to the outstanding man in the field of high-pressure or catalysis chemistry.

Tracy knew what he wanted to be at an early age. In the 4th grade he told his teacher he wanted to be an engineer and work for the General Electric Company. While his interests changed this from "engineer" to "physical chemist" he really fulfilled his boyhood ambition when he went to work for the General Electric Research Laboratories in Schenectady, New York, in 1948.

Tracy's favorite boyhood haunt was the city dump. Here he found a great variety of "neat junk"—wire, motors, batteries, etc. These parts scrounged from here and there, and added to by careful spending of limited funds, were used to make radios, electrical circuits, *etc*. Through his interest in "radio" came a unique knowledge of electronics—before electronics was ever taught in the universities of the land. He has an inborn, at least I suppose it is inborn, ability to understand the "mechanical". It is quite taken for granted around our house that Daddy can fix anything. (An ability which I have appreciated from a completely practical point of view.)

Perhaps most important of all, is his "stick-to-it-iveness," or his persistence. If he feels a scientific project can be logically accomplished, and he will not give up until it is accomplished. This accounts for much of his success—if he thinks there is a solution he will go doggedly on, long after everyone else has thrown in the sponge. For instance,

when he was working toward his PhD, the project he had decided to pursue had been his own idea. Much of his equipment had been built by himself out of improbable materials. Dr. Eyring became worried that he would not find his solution in time and urged him to switch his interest to something with a more probable solution. But Tracy knew the solution was there and he persevered. He solved the problem too, and even completed his work sooner than he had expected. When he was working on the diamond project, one day his division manager came in as he was working on some experiments. Dr. Marshall said; "Oh, you guys will never find diamonds." The probability was so low and so many good men had worked on this problem that sometimes I wondered if they were not butting their heads against a brick wall. "Do you think you will really be able to make diamonds?" Tracy said to him, "I know it can be done. The thing that worries me is that G.E. will lose interest before I can do it." And they almost did, too. Some months before Tracy synthesized the diamond, his manager came in and said: "write up any papers which you may have hanging in the fire. We might as well get something out of this project." The fact that the management was even thinking of publishing the work which had been done was a very good indication that they thought that was all that would be gotten out of it—otherwise a tight secrecy would have been maintained. However, before the papers were published, Tracy synthesized the "diamonds" and that put a tight clamp back on publications.

To be a successful scientist, a man needs to have a great and unshakable confidence in his own ideas and abilities. Most scientists, indeed most people, have this to a marked degree—sometimes unjustifiable, but it is somewhat surprising to find it in such a modest and self-effacing man as Tracy. People have been known to misinterpret this characteristic as "meekness" and lack of self confidence. Some have even tried to take advantage of his easy-going nature and quiet personality only to find them selves up against a "brick wall," so to speak. He never thunders, roars or parades his sentiments—but people who know him will always come to place great value upon his opinion and ideas.

When Tracy went to work at the G.E. Lab in 1948, he did so only after making a tour of several large industrial labs. He felt that the G.E. policies in research came as close to "academic-type freedom" than any other industrial research laboratory. This was very important to him. He had worked hard to reach the PhD level of education so that he could do research. He knew what he wanted, and he was willing to sacrifice "financially" if necessary to achieve it. He felt that at G.E. he could do this type of research and publish his findings and still receive adequate financial compensation for so doing. Later, when he felt his raises were inadequate or too slow in coming through, he would say; "Oh, well, I can't complain. Not many men get paid so well for doing what they love to do." One policy of G.E.'s research lab which turned out to be a boon to Tracy, and to the Laboratory too, as we shall see, was their policy of letting each scientist spend up to a certain amount without permission from anyone, as long as it was in pursuit of their problem.

Tracy soon found this philosophy to be more fiction than fact, especially in the Chemistry section, with which he was affiliated. The metallurgy section and the physics section were much more liberal in this respect and encouraged publication of findings as far as possible.

When Tracy first went to the laboratory, he wanted to continue investigating the chromium complexities upon which he had worked while getting his PhD, but the lab wasn't interested. There was no visible dollar sign on the project, so after about three

months they persuaded him to do some work with poly-tri-fluro-chloro-ethylene. In particular, to try to determine the molecular weight of the material. In connection with this he built some light scattering equipment, which was a lengthy procedure, because up until that time light scattering had been done only at room temperature. He had to build equipment to withstand temperatures of 140 degrees C. While working with this same high polymer, he did some viscosity studies, which led to an interest in the theory of viscosities. He also did some solubility work with high polymers, making a theoretical study of the solubility relationship of polymers. He published several papers while doing this work. After this, he made some insulation cut-through studies on wire. Sometime in 1951 the company became interested in making a last-ditch attempt to bring the "diamond" under laboratory submission. They had previously worked on this problem during the war in conjunction with several other companies, but with no success. The Mechanical Investigation section, under Mr. Anthony C. Nerad was given this assignment. Dr.'s Strong and Bundy were asked to make some preliminary plans and studies. In 1952 the company decided they should have a chemist in on the project too, and Tracy, who had always been interested in the diamond project, volunteered his services. When he first went into the section he was on loan from the Chemistry section, but he later transferred to the mechanical investigation section. The tentative plan was to have Dr.'s Strong and Bundy's design the equipment, and Tracy try to figure out the chemistry involved. Shortly after, another chemist, Dr. Robert Wentorff, was hired to work on the "super-pressure program", too.

Although the four men were working toward a common goal, they all worked freely and independently, having conferences occasionally to keep abreast of what each member was doing. Dr. Francis Bundy devised a piece of equipment which was called the "saucer" which was an adaptation of Bridgeman's "flat anvil" apparatus with the important difference that Bundy was able to get heat into his apparatus. This equipment gave 35,000 atmospheres of pressure. The working chamber of this apparatus was extremely small, however, which was a disadvantage. At this point Tracy hoped to be able to get into Bundy's equipment to try some ideas which he had, but when Dr. Strong and Bundy weren't calibrating the equipment, they were trying ideas of their own.

There was only one press available—a leaky old Watson-Stillman water press. The problem of too many people to too few equipment is obvious. The little time which Tracy was able to get into Dr. Bundy's equipment convinced him that the equipment did not produce the necessary heat and pressure required to make the transformation they were seeking. Dr's Bundy and Strong decided that what they needed was a double ending press which might increase the pressure in the equipment enough to get the necessary pressure. The laboratory sought and obtained permission from the president of the company and the Board of Directors to purchase an elaborate 1,000 ton press which had a double-ending/acting principle and many other elaborate features. But this would not be available for a year. Tracy had already wasted enough time. He was anxious to do something and since necessity is often the mother of invention—in his frustration he turned his attention to the design of high pressure equipment—which he had hitherto left up to Dr. Strong and Bundy. He drew up plans for the "belt", as he called it, a design for high-pressure, high-temperature apparatus with which he hoped to get the higher pressures and temperatures which he needed. He realized the limitations of the material with which they worked, and designed the "belt" to bypass these limitations by clever design.

The following description of some of the features of the "Belt" that I have taken directly from a description of the apparatus and its features, which Tracy described in a letter to Dr. C. Guy Suits, Vice President in charge of Research on January 10, 1955. "The three basic principles of the "Belt" are: 1) the all-important "sandwich" gasket of pyrophyllite and metal. 2) Conical pistons and chamber. 3) "double-ending" to increase symmetry and eliminate stress concentration points. Items 1 and 2 are clearly my inventions. Item 3 is an obvious extension of a principle used by Bridgeman. Without the 'sandwich gasket' we would be limited to a top pressure near 40,000 atmospheres and to very small size reaction chambers. This gasket allows increased relative motion between piston and chamber, giving larger sized reaction chambers and the attainment of higher pressures. This 'sandwich gasket' also provides, particularly in combination with the conical piston and chamber, a multi-staging effect which more than doubles the load that can be placed on the carboloy and also eliminates the necessity for a double-acting press. The conical piston, with 60 degree angle as used in 'the Belt' makes it possible to double the thickness of the pyrophyllite gasket over that which can be used between flat-faced surfaces. I have given a detailed discussion of these principles in Research Laboratory Report #1064."

The belt was invented in 1952, two years before Tracy finally synthesized the "diamond." When he submitted the drawings to Mr. Nerad for approval to have it made up, Dr.'s Bundy and Strong said that it would not work, and advised Mr. Nerad not to have it built. After six months Tracy decided to have it made up on his own budget privileges and so submitted it to the shop. How well it did work is now proven, of course. It was first made up in steel, and in this material it achieved pressures up to 53,000 atmospheres of pressure and temperatures to over 3,000 degrees C. The sandwich gasket allows relative motion between piston and chamber giving larger sized reaction chambers and the attainment of higher pressure. This "sandwich gasket" also provides, particularly in combination with the conical piston and chamber, a multi-staging effect which more than doubles the load that can be placed on the carbaloy and also eliminated the necessity for a double-ending press. The conical piston as used in the "Belt" makes it possible to double the thickness of the pyrophyllite gasket over that which can be used between flat-faced surfaces. He finally persuaded Mr. Nerad to have it made up in Carbaloy after about 6 months. In carbaloy the proven pressures by the time the "diamond" was discovered was 100,000 atmospheres pressures and the temperatures that could be held simultaneously with this pressure, for as long as the experimenter desired, was 5,000 degrees C; the temperature on the surface of the sun.

If Tracy could have published his work or the same as that on the surface he would have made a name for himself. The "Belt" brought pressures and temperatures heretofore unobtainable in high pressure equipment. It opened a vast new area to research. "The Belt" brought into the realm of investigations an area as great as that five times that which high pressure-high temperature scientists had been able to explore before. After the press release many scientific writers commented on the fact that "while the synthesis of diamond is exciting, the really significant thing is the devising of equipment enabling man to reach these great extremes in pressure and temperature" the same as to be found 240 miles under the surface of the earth. Before Tracy left the laboratory in August 1955, he had proven that the belt would produce over 200,000 atmospheres of pressure. These pressures were later found to actually be lower than this.

If this work could have been published it would have established Tracy's reputation in the field of high-pressure, high temperature, for the 'Belt" opened to

scientific investigation regions five times greater than had been available to high-pressure, high temperature research up until invention of the "Belt." No one had even dreamed that such tremendous pressures could be generated simultaneously with the application of heat in the laboratory. Tracy always felt that while his synthesizing the diamond was exciting beyond description—still, the most important single contribution was the devising of the Belt which made the synthesis possible. This was concurred in the opinion of many other scientists.

About this time Dr. Bundy was transferred temporarily to another project. This "temporary" assignment lasted until after the synthesis of "diamond" in 1954. For some reason the mechanical investigation section did not realize what an important thing they had. This had to be brought to their attention by other department managers after Tracy had given a talk before the whole research lab on his "belt". There was one man who did realize its significance, however, and he spent the next two years trying to steal the credit for the apparatus. This man was Dr. Strong. What gets into an otherwise fine person and causes them to do things like this we will never know. His dependability in the past put him above suspicion by the management, and it finally took drastic action in the form of a letter (which I have quoted from already) to the Vice President himself to clear things up. (more of this later). There is no reason why Dr. Strong could not have used Tracy's equipment. Dr. Robert Wentorff and Tracy never used anything else in their research from that point on. But Dr. Strong, little by little, brought his equipment around, closer and closer to the belt, all the time talking about "this feature" of "my" apparatus, and "that feature" of "my apparatus" until with a few minor changes he would have the "Belt." He even went so far as to have an expensive model made up in the shop so that he could more clearly show the features of "his" apparatus which he lost no opportunity to do. At the time of the discovery of diamond, he was still working in steel and at pressures of 53,000 atmospheres pressure, but with minor changes and the devise made up in carboloy, the equipment would be "the belt" with minor changes. This was all right with Tracy—what caused him so much anxiety was the fact that Dr. Strong claimed all the features were "original" with himself. When other members of the group would call the similarities to his attention he would deny the similarities and claim he used these ideas for "different" reasons than Tracy had used. I think one of the basic problems was that Mr. Nerad didn't know what was going on, partly from the fact that his training did not give him the ability to realize what was going on, and partly from the fact that he trusted Dr. Strong. Even Tracy did not realize the extent to which Dr. Strong intended to take the deception until a patent lawyer told Tracy that Dr. Strong had an application in for a patent on a device that was just like the "sandwich gasket." When asked to produce his journal for dates, he was very insulted and angry.

One of the reasons the new 1,000 ton press was so expensive was that it was designed to have double-acting features. Tracy's "belt" eliminated a need for this feature, and the Lab would have done well to have canceled the order for the press and bought a standard press which would have cost $15,000 instead of $100,000. Tracy visited the place where the press was being built for Mr. Nerad and reported that the automatic features and the double-acting features would probably not work—and it was his prediction that if the lab used the press, they would by-pass these features and use the press as a standard press.

In order to tell just what pressures he was generating in the "belt", Tracy had to devise new means of measuring the pressure. This work resulted in his paper "The Melting Point of Germanium to 100,000 Atmospheres."

On the morning of December 16, 1954 he took the chamber out of the "belt" and there flashing in the morning sun which was falling through the windows, were little triangular facets—microscopic but still apparent to Tracy's trained eye. One moment his had was steady, the next, it was shaking, and he had to sit down. This was "it"—he was sure of it even before he had examined it under the microscope or made some of the other simple tests which would prove his sample to be exactly what it was. But he had been fooled before—so he set about applying all the tests so that his synthesis would be "certain" before he reported it. The day was Friday. (Dec 16, 1954 was a Thursday). He spent the next day, Saturday, making more runs to get more material to work with. He submitted a sample to the x-ray department and applied all the laboratory tests he could. That afternoon he called Mr. A.J. Nerad and gave him the good news. Monday the final and exacting proof—the x-ray defraction pattern came back - positive. The impossible had been achieved. Diamond had finally been made in the laboratory!

It was a difficult situation for the management too, no doubt, for of four men on the project, one Tracy Hall had both designed the equipment getting the required temperatures and pressures, and had "synthesized the diamond" as well.

There was an unfortunate incident connected with Tracy's discovering the diamond at that particular time, however. On the 15th, Dr. Strong announced that he had made "diamonds"' He had been working in a steel chamber with a top pressure of 53,000, which fact alone placed doubt on its probability. Then, too, the sample which he had been working with had sat on his desk for a week or so unexamined. The method he had used was one of "seeding" in which chips of natural diamond were put in the sample to try to make the whole sample turn to diamond. He claimed that he had recovered all his "seeds" and that what he had left (he claimed there were three but only ended up with one.) had been made. If Tracy had not discovered diamonds the next day the incident would soon have been laughed off and forgotten. Between Dec 16 and Feb. 15 when the "diamond" was announced to the world, Dr. Strong and his associates worked almost around the clock to duplicate their results. Over 200 runs—and failure. Meanwhile, Tracy had the field to himself for a while. For 20 days he was the only to make diamond, then Bob Wentorff, who had been on vacation, using the same technique and neighboring compounds in the periodic table made them using Tracy's instructions.

On Tuesday, Jan 11, 1955, a manager's meeting was called at the Knoll's Lab. Purpose – to discuss what they had and what they should do with it. The four participants of the program were asked to tell their contributions. When everyone was finished the managers asked questions and discussed it. One manager in particular, Dr. Lawson, head of Electron Physics, proved to be a sharp cross-examiner. After much discussion he finally said; "well, it seems to me that scientifically speaking, we have really, only one process—Tracy Hall's—is that right?' Then he went around the whole group of manager's for their individual opinion. Every one of them said "yes."

"Even though Herb (Dr. Strong) claims to have found the first, "he said," we are not justified in talking about Herb's synthesis until he has established by duplication—after all, we don't know what happened. He said, jokingly, "It could have fallen out of his cuff."

Bob Wentorff's synthesis were only variations of Tracy's process. The managers then recommended that Dick Oriani or the Metallurgy section and Dr. Hugh Woodbury,

of the Physics section, duplicate Tracy's work, working from his journal, but using independently procured chemicals from Albany to establish G.E,'s claim for patent purposes and without doubt." Many scientists in the past had claimed to make diamonds. The main obstacle to their claims was that no other scientist could reproduce their results and neither could the scientist himself.

In spite of this, because Dr. Strong's "chip" was larger to the naked eyes than the man-made diamonds, and because it would, they thought, impress the layman more, the G.E. people on Feb 15 in an elaborate ceremony presented, over Tracy's strongest objections, Dr. Strong's diamond to the president of the G.E. Company, president Coordiner, as "the first Man-made Diamond." To this day Dr. Strong has not reproduced, although he claims that since a system similar to the one he was working with at Tracy's temperature and pressure, and under Tracy's conditions has produced them, that this means that through some "freak" accident he produced them. By this same argument, so have all the other scientist working on the problem since time began.

Before Tracy had discovered the diamonds, the big 1,000 ton press had arrived and as Tracy had predicted all the elaborate controls and the so called "double-acting" features were by passed and the press was operated as a standard press. Tracy had been for some time trying to get the lab to buy him a small $1800 press, but they had refused because of the large expense involved in the large press. When Dr. Suits came down to see Tracy's diamonds, Tracy hit him up personally for the press. "We've already spent too much for presses", he said.

One of the reasons the new 1,000 ton press which had been ordered earlier by the laboratory was so expensive, was that it was designed to have double-acting features which were designed to increase pressure. Tracy's belt eliminated a need for these features and the lab would have done well to have spent $15,000 instead of $150,000. Tracy later made a trip to the manufacturer of the new press at the request of A.J. Nerad. He reported that the automatic features and the double-acting features of the press were not what they should be and that he would predict that if the press were delivered all these features would be by passed and the press would be used as a standard press, and that was just what happened.

During this time the old leaky press had been free and Tracy and Bob Wentorff had been working in it, alternately. Tracy was the only one working at the higher pressures, however. Tracy made thousands of runs using different combinations of conditions and chemicals, all of which he kept careful record of. His research journals are always very detailed and accurate—he had it instilled into him while at school that a good scientist keeps an accurate daily record of his work. The various conditions that had to be met were so many and varied that it was a miracle that he ever found it. Some of the conditions which had to be met were right pressure, temperature, catalyst, geometrical arrangements of materials, etc. The project was not without its humorous moments. Once Tracy thought he had found diamonds, but when the photographer was cleaning it with alcohol, it dissolved.

On February 15, (and David's eighth birthday -- he was not paid much attention, poor boy!) the company held the largest press release in their history at the Knolls Research Lab. They invited representatives of all the news bureaus and the local press and famous correspondents, etc. Many were flown from N.Y. on a chartered plane. When the plane had taken off from N.Y., all the press representatives were handed

special packets which had been prepared by G.E.'s publicity department, giving copies of the talks that were to be given by the various scientists, and stating just what the "big" news was. You can imagine the rush for the one telephone at the Albany airport when they landed. All the secrecy was for naught however, because somehow the British Broadcasting Service had announced the big news that morning. No one knows how the news leaked. The speeches and the presentation of the plaque to the President with "Herb's" first diamond took place in the morning. The afternoon was largely a cocktail party without the presence of the scientists. The laboratory had told each of the scientists what they could say and what they couldn't say. When the reporters wanted to know just which one had discovered the "diamond" that information wasn't given. From the first G.E. treated the discovery as a "group" project perhaps to placate the other members of the project, but probably because it is the policy of industry in general to treat all discoveries as 'company" discoveries. G.E.'s stock went up as the news was on the front page of almost every paper in the country. G.E. got more "free" publicity than it had cost them for the diamond project.

The only ones who really get any publicity out of the project were the managers. None of the members of the Super-pressure project were allowed to go to any scientific meetings the rest of that year—but the managers were there. Many of the large monthly and weekly news magazines objected to G.E.'s packet as "thought control", and insisted on writing their own script and taking their own pictures. But the news hit the front page of most of the nation's daily newspapers, with pictures. Many of the accounts were garbled but it was an exciting day for all of us. I was kept busy buying papers and clipping articles for a scrap book all day and for several days thereafter more reports came in and friends kept sending in more newspaper accounts from all over the country.

Tracy came home in the afternoon and went to bed—finally succumbing to the flu which he and Dr. Mayer had been fighting off for a week or more. He stayed in bed for a few days after that, recuperating.

The rise in G.E. Stock, according to one newspaper account, was greater in value than that of the whole DeBeers Company. DeBeers holds the monopoly on the world's natural diamond production and distribution.

Letters of praise and criticism came in from all over—the company had to hire several clerks just to handle the extra mail. Letters came from Belgium pleading with the company to tell them just what this meant to the "diamond" industry because as soon as the announcement was made all the diamond cutters closed up business. They did not dare buy until they knew what the situation was. The company hastened to assure them that the "man-made diamonds" were neither gem quality nor size. People doing research for the government in the field of high pressure wrote begging for details of the equipment which achieved these temperatures and pressures, because now all their work was "obsolete".

G.E. by now fully realized, however, that the key to the whole event was the equipment and a tight secrecy had been put upon the papers. When Tracy asked when they would publish they said "Oh, probably in a year or so." Tracy knew better, he had seen the policy in other projects which had been successful, and which the company, understandably did not want to release for general knowledge.

As I have mentioned before, for some reason Dr. A.L. Marshall had taken a dislike to Tracy and had time and time again turned down recommended raises for him. The only reason Tracy had stayed with the lab was because of his all-consuming interest in the "diamond" project. He was consumed by it—he ate, breathed and thought of it constantly. I worried about this thinking it might affect his health adversely but far from it, it seemed to have an exhilarating affect. We decided that we would see what the lab would do in the way of a raise when he discovered the "diamond". Then we could decide whether to leave the research laboratory or not. When the raise came through it was a 20% raise, substantial, perhaps, but not in the light of the past, this only brought Tracy's salary up to what he thought it should be anyway. Then the lab started breathing rumors of "group papers" eventually. These factors and the obvious fact that the research at G.E. would for some time be developmental work on the "diamond" made Tracy decide that he would begin looking around for a position outside the company—preferable at a University.

As I have said before, during the project each man had been free to pursue his studies as he himself wanted to—but after the press release the company treated the "diamond" as a group accomplishment—perhaps to placate other members of the group, but more probably because it is the tendency of American industry to treat discoveries of this type as "company" discoveries—the only ones, really, who get any publicity out of such a discovery are the sections and division managers. After the Press release, none of the scientists were even allowed to go to any technical meetings for fear they would 'talk". The managers were there, though, and talking about "our" discovery.

Many of Tracy's friends thought the Tracy would get "royalties" from the diamond patent. We are always explaining that when a scientist goes to work at a company he signs away any rights to discoveries of this type. Industrial research is expensive, and it is not often a project comes through the will pay off like the "diamond" will. It is the law that a company pays the inventor something, however. Most companies give some type of royalty. G.E. did not.

Although Mr. Nerad made much of what Tracy's "future" was with the company, this was the sign we had been waiting for. Only his intense interest in the "Diamond' had kept him at the laboratory up to this point. The indications were that research in the high-pressure field from there on out would be largely "developmental" and Tracy was vitally interested in exploring the vast new regions his "belt" had opened up. Then when the management started talking about "group" papers, that was the end—from that moment on Tracy determined that the best thing for him to do would be to leave the company.

Most companies give inventors a standard fee of $1.00, but G.E. is more generous than that. They give the scientists in their research laboratories $25. Plus enough, I believe to pay the income tax on said payment. They pay their engineers more than that, I believe, their reasoning being that, after all, that is what the "scientist" is hired for. And, as Tracy has often said, "it isn't often a man can be paid so well for doing that which he loves to do." It is when a scientist's accomplishments must remain secret because of its monetary value, and he can't publish his findings, that this situation irritates him—because most scientists have a great deal of "professional pride", and they have cut their teeth on the advantages of "scientific publication." It is through such publications that a man's merit hinges--not by how much money he has made for the company. That is how he achieves scientific status. For this reason, Tracy determined that if he did leave the lab, this new position must afford him absolute

freedom in choice of research and in freedom to publish his findings. He also realized that by the time G.E. got around to publishing his work at the lab it would probably be all obsolete—such is usually the case. Science does not stand still—and great discoveries do not usually come singly but simultaneously throughout the world.

Dr. Henry Eyring wrote congratulating Tracy on his accomplishments and asking him to come and teach next fall. More in a joking vein than not. Tracy wrote back: "Let's get serious about this job business."

Soon after the press release Dr. Phillip Abelson, director of the Carnegie Institute's Geophysical Laboratory in Washington D.C. called Tracy on the phone and asked him to come and give a talk at the laboratory. Tracy asked him why he called "him" and Dr. Abelson said he had it from reliable sources that Tracy was the man behind the Diamond. Tracy told him that he couldn't tell him anything anyway, but he insisted that Tracy visit the lab and Tracy finally consented. He said he would come down the latter part of March, because he hoped that Washington would be green by that time, and he thought it would be a good idea to take me and perhaps the older children to give them a chance to see their nation's capitol.

We had been planning to take a vacation in the summer months and The University of Utah had written Tracy to come and give them a talk. When he showed it to Nerad, Nerard forbad him to even go near Salt Lake when he was on vacation. Tracy told him he planned to spend half his time there. It turned out that we did not take the vacation, however. (The rest of this story I will tell in its natural sequence as it happened in our lives.)

Friday March the 18th, we were all packed and ready to go to Washington D.C. I had arranged with our friend Manita Fowler to take Charlotte and Virginia and Elizabeth while we were gone. That morning Sherlene ran a fever of 102 degrees so Tracy took the train to D.C. alone. Sherlene felt terrible—and kept insisting that we go without her. One of the neighbors offered to take Sherlene in and take care of her—but I felt that if she was sick I should stay home—and it was just as well I did. She had a bad case of tonsillitis and was quite ill that weekend. We assured the children that we would go again some other time. Tracy's reception at the Geophysical lab was good for him—they greeted him with open arms. Dr. Abelson told him if he ever got discontented at the Lab that he would love to have him join his staff at the geophysical lab.

In the mail on Tuesday, March 22, came the letter which seemed to be the answer to our prayers. Tracy brought it home when he came home from the lab. It was from Dr. Harvey Fletcher, Dean of the school of Physical Science and Engineering and Director of Research at the BYU, saying that they were filling two important positions at the B.Y.U. both of which he held, (he had been trying to retire to do research and travel) and he wanted to know if he could consider either of them. Tracy said, "I must be mistaken—read this, they aren't really asking me to consider those two positions, are they?" I could tell he was excited. I reread the letter. "He certainly is," I said, "there is no mention of any other positions." "Oh, Tracy," I said. "This is just what we have been waiting for." "Now don't get excited", he said. "They probably are considering half a dozen men for the position, and besides, it may not be at all what I want."

After careful consideration, Tracy wrote Dr. Fletcher that he would be very interested in the position as director of research. That same night—as it we had not had enough excitement already, Dr. Abelson said that he wanted to come up the next

day and talk to Tracy. "Why don't you just write me a letter?" Tracy said. "No," said Dr. Abelson, "I want to talk to you face to face—I'm a rash man and when I make up my mind to do something, I act fast." So Tracy invited him to the house the next night for dinner—and I prepared to have him overnight. The next day Dr. Phillip Abelson arrived at the airport and Tracy met the plane and brought him home. He had reservations on the plane back to D.C. the next morning. Dr. Abelson, as we had suspected wanted Tracy to come and join his staff in D.C. He made a tentative offer of $11,000 a year which was less than Tracy was making at the research lab—but it offered the advantages of freedom, etc, which the lab could never offer. Tracy told him he had heard from the BYU, wanting to know if he would be interest in becoming Director of Research. Dr. Abelson pointed out all the disadvantageous of such a position—which had already occurred to Tracy, of course, and at that time Tracy did not even know what salary the "Y" could offer, although he was quite certain it would not be as good as the Geophysical lab or the Research lab could pay him.

I had put the children to bed and gone to the Relief Society meeting at the chapel, and when I got back home, both Dr. Abelson and Tracy had gone to bed.

The next morning after breakfast Tracy took Dr. Abelson to the plane. We were very impressed by him—he seemed like an awfully nice man. Tracy told me all about his visit and it did complicate things even more—decisions of this kind are never easy to make and there were still reservations in both our minds as to whether Tracy should leave the laboratory at this time. When I had taken Tracy to the lab and returned home, I went in to clean up the room. I found a stack of missionary tracts on the bedside table, with the following note pinned on them. "In case you are interested about Mormonism, here are a few books of church literature you may find interesting." Signed Sherlene. I just about died. It was funny, but I could not help wondering what had been Dr. Abelson's impressions of a Mormon family. I later found out that the branch teachers had come that evening while I was gone, and he had heard a typical lesson by the branch teachers, which had let to a discussion of religion. It turned out that part of his boyhood had been spent in Utah and he knew quite a bit about the Mormons. Tracy said that as near as he could tell, he wasn't interested particularly in any religion. We had a laugh about this, but I told Sherlene to let us do our own proselyting from now on and to confine hers to her friends. She was always an avid little missionary among her friends, and did not hesitate to tell them about their bad habits, *etc.;* she got away with it, too. She was the most popular girl in all her classes.

On Thursday, March 24th Tracy called Dr. Fletcher to tell him the application was on the way. He found out that the salary would probably be about $7,000 a year which was much lower than Tracy had expected, but Dr. Fletcher felt that Tracy could pick up another third of his salary doing summer research, and that he could also pick up some money doing consulting work.

Tracy told us that the lab had received a letter from the Smithsonian Institute asking G.E. for their "first diamond" or the plaque which was presented to the president of the company. Tracy says if they send it, he'll write the institute a letter even if it means losing his job. No one every asked Tracy if he still had the "first" diamond. He had saved it thinking someone would want it—himself if no one else did. We still have it.

Even at the cost of 40% of our salary the job at the Y still looked like the one we wanted. The University of Utah wrote offering him an associate professorship at $5,000

which Tracy promptly turned down. At this time the Bureau of Standards, through the influence of John Hoffman a friend of ours who worked there, indicated that they would be very interested in giving Tracy a job, too. They invited Tracy to come down to D.C. the weekend of April the 1st. So once again the family made plans to go to Washington D.C., and I mended and ironed and packed in readiness, but Tuesday, the "Y" called and asked Tracy to come out for a personal look at the situation at BYU the weekend of the first. We talked about going to D.C. and then bringing Tracy back to catch the plan in N.Y., but decided it would be too much for one weekend, so Tracy cancelled his talk at the Bureau of Standards, and we cancelled our D.C. trip—again!

On the 30th of March, a write up on Tracy and his "diamond" appeared in the church news. I was beginning to feel certain that we would go home, so much so that I sent all my home-canned goods into the bake sale at the church instead of baked goods. These usually sold well at the bake sales, and I realized we could not ship it home. Tracy got reservations for Thursday for the plane and told Mr. Nerad that he was taking off a few days to investigate a position as Director of Research at the BYU. Tony spent the next day, Thursday, trying to tell Tracy what a mistake he would make if he took the job. Dr. Marshall came in and told Tracy they were going to send someone out to Detroit to get the diamond project started—that it could lead to big things—manager of the diamond industry at G.E. Was he interested? Tracy said he would think it over. Meanwhile the Geophysical laboratory told Tracy that if he came, he could write his own ticket. John Hoffman called and asked Tracy to make a new date for an appearance at the Bureau of Standards. Things were beginning to snowball. Thursday, March 31st at 8 o'clock, Tracy caught the plane at the Albany airport. It was his first airplane ride and we were all wondering, him included, how he would like it. We took the children to the airport, and then I took the children home, and then David and I went into the chapel for David's interview with Branch President Burnett for his baptism which was scheduled for the following Saturday.

On the 2nd day of April 1955 our son David Richard Hall was baptized by Edwin Lawrence Caulford, Priest in the Schenectady. Branch Baptismal font.

While Tracy was in Utah, his sister-in-law Joyce Hall held an open house for him so that all his old friends and neighbors could come and see the "diamond maker." He was interviewed by the Ogden Standard Examiner, and the Salt Lake Tribune. He gave a talk at the University of Utah on high pressure, at which he said he could generate little interest. At the "Y" he went to the devotional assembly on Tuesday and Joyce Nichol Woodbury one of our good friends in Schenectady, took Tracy around the campus and was very kind to him. He had dinner at their house. Dr. Nichols at the time was head of the Chemistry Department.

Dr. Fletcher was out of town at the time of his visit. He talked to President Wilkinson. In this visit, he told President Wilkinson that his greatest concern in considering the job had been that he would be so snowed under by administrative and paper work that he would have to give up his research. This he was reluctant to do. President Wilkinson assured him that was the furthest from their hopes—that they wanted him to have a least a third of his time to do research. He found out that the only "personnel" problem, so to speak, would be that of hiring his secretary. He liked BYU very much and the atmosphere a great deal. He felt the challenge of the position—and faced the realization of how much of a sacrifice it would entail financially. The salary was $7500 a year—40% less than his present salary his at G.E. and considerably less than the future promised him—but it meant "freedom"; freedom to do his research

as he saw fit and publish his findings freely. It meant a restoration of his dignity as an individual. Leaving the lab had been inevitable—few really independent thinkers can thrive in the atmosphere of an industrial laboratory. They seek the sanctuary of the University where the atmosphere is conducive to their best work. It had been so at the Research laboratory—the top scientists very often left the lab. G.E., and many other industrial laboratories are not set up to really reward their best scientist in the field where their services are really the most valuable—research. Almost invariably they have to put them into administrative positions where they are often unsuited to the position and where they are not the happiest. Tracy is a good administrator—but he did not want administration—he wanted to do research. For this reason—he did not ever seriously consider the position that Dr. Marshall made him in relation to the diamond industry in Detroit.

As soon as he returned to the Lab, everyone wanted to know what the score was. Tracy had to tell them he was "still considering", which was true, because he felt he could make no definite decision until the "Y" came through with a concrete offer. For some reason the "Y"'s offer did not come through until April 26th and then only because Tracy called the "Y" to find out what had happened. What had happened was that the contract was lying buried on President Wilkinson's desk and he had not found it. Meanwhile, he had been deluged with questions as to what his decision was to be.

On May 2nd the official offer came through and Tracy accepted it. The die was cast; we had now burned our bridges behind us—all that was left was the mopping up, which was considerable, because it meant selling our house, and moving our belongings West. The "Y"'s contract began on the 1st of Sept, so we decided to take the three weeks vacation that was coming to us at the Research lab and leave for Utah the last of August. This, we hoped, would give us time to find and buy a home in Provo before the school year started. On the 24th of April, 1955, David Richard Hall was confirmed a member of the Church of Jesus Christ of Latter-Day Saints by his father, Elder H. Tracy Hall, at the Schenectady branch, Albany-Hudson District.

I had been trying for some time to get Tracy to have our floors sanded because I felt they needed it so badly, but Tracy could not see that it needed it. Now, with the sale of our house ahead of us, he suddenly could see the things that I had been telling him about for quite a while. We painted all the rooms and put new wallpaper in the hall. Tracy worked hard to finish the garage which he had started the summer before behind the house. Out intention had been to build a family room in the present garage and move our new garage to the back, in line with the basement, using the top of it for a patio for a while, and then later perhaps putting another wing of the house out over it. While Tracy was working on this garage, which was constructed of concrete blocks, he hurt his back and has had trouble with it ever since. For this reason the finishing of this structure was hard on him. But finally the concrete top was poured and the floor and a railing put around it. Most of the interior decorating was done. At last came the final touch—the floor refinishing job which was extensive, because most of our floors were hardwood and not carpeted. Tracy rented a sander and Irvin Christensen, who had worked his way through college behind a floor sander and who had directed the job of the floor sanding and finishing in our chapel, came out and helped Tracy a bit. One night in May, I came home from a mutual party and Tracy had just finished putting a coat of finish on the living room. I thought it was the smell of the finish which made me feel ill, but about 2 o'clock in the morning we had to call the Dr. I was sicker than I had ever been in my life—Dr. Mayer came out and diagnosed the difficulty as cystitis, or inflammation of the bladder, and gave me some pills to take and a shot of morphine. I

have been bothered with this periodically ever since, but have learned to recognize the early symptoms, so that it can be stopped before it gets as bad as it was that first time.

By June the 1st we had the house ready to put on the market. We decided to sell it ourselves because we could advertise in all three cities. Albany, Troy and Schenectady as we were on the telephone exchange which could be reached from all these points. One of the hardest things for me was keeping the house "inspection-clean" at all times, especially in the summer when the children were bringing in the sand, but the children were all very cooperative, especially Sherlene who would help me bustle around and get the house in extra spic and span order for inspection by a prospective customer. We listed the house at $21,000. G.E. at that time was decentralizing their operations and real estate just wasn't moving at all. We had friends who were transferred who never did sell their homes, but had to sell them at a loss to the G. E. Realty who made up the loss to them somewhat. But we were not being transferred—we could not depend upon any help from the company at all. It seemed as if our house was on the market forever. But on July 10th a young woman, Ruth Waltermeyer, came to see our house and seemed to really like it—the next morning she called and said that she was bringing her to-be-husband, Angus Lighthouse to look at the house. They loved it—and we signed an agreement between us for the sale of the house. The final selling price of $18,000 was less than we had wanted but we felt very fortunate to have sold it for that under the market conditions at that time. We were very fortunate, too, that our buyers were able to pay a substantial down payment on the house ($10,000) so that we did not have to worry about secondary mortgages, or something like that.

After selling our house we decided that we would finally make our trip to Washington D.C. This trip was interesting to us all, but especially thrilling for the children who had never stayed in a hotel before—especially one with Television. We were afraid that D.C. would be terribly hot while we were there, but there was a cold spell and the weather was mild all the time we were there. The children, Sherlene, Tracy Jr., David and Elizabeth especially thought it was a treat to eat breakfast at the hotel. They still talk about it sometimes. This month we bought a new 1955 Ford Station Wagon.

During the month of August we also went to New York, this time taking all the children and went to the Statue of Liberty and through Central Park—but not the zoo—and drove around the city. We parked the car and took all the children on a subway ride which they thought was quite an event.

While we were in Washington D. C., Tracy visited the National Science Foundation who were very interested in the proposed high-temperature high pressure research which he wants to do while he was at the "Y".

On Wednesday May 18, Tracy had officially notified the Research Laboratory that he was accepting the position as director of Research at the BYU.

The G.E. Laboratory, however, had different ideas about Tracy doing any research in the high-temperature, high pressure field. In order to stop him, they went to Washington and working through the commerce department, had the air force clamp a secrecy order on the whole diamond process. This served several purposes. For one thing scientists both in and out of government had been clamoring for G.E. to release the papers for the equipment used to develop the diamond. The lab was in the position of pretending to encourage free publication and at the same time refusing to do so. And after they got

their secrecy order they wrote answers to this letter saying “we regret that the government of the U.S. has put a secrecy order on the apparatus and process and so now we will be unable to publish.” And before Tracy left they told him that he could no longer work in the high temperature, high pressure field. Tracy was not completely convinced—but he felt that even if this were true, there were many other things in which…

We were getting worried as our departure date came closer that we were not going to have the closing on our house, but the day before we left, August 18, at the Schenectady Trust Company, in Schenectady, we held the closing.

On August 19, 1955 we drove out our back, wooded drive and onto Vly road for the last time, pulling a trailer of household goods. As we drove around the bend, Tracy said, “I feel kind of sad leaving our home and Schenectady—how about you?” I was in tears—I tried to joke about it. “If anyone would have told me I would cry because I was going back to Utah, I would have thought he was crazy,” I said.

We had planned to leave early that morning to be able to reach Syracuse, N.Y. the same day before five o’clock, but we were delayed and when we finally got to Syracuse it was after five. We had planned to pick up some Syracuse China to take home with us on our way, since we had wanted to get some for years, but had delayed it. We found out, to our dismay, that since it was summer months the china shop was not open on Saturday, and this was Friday, so we climbed back in our car and drove on.

We had routed our way home out of the direct way, so that the children could see Niagara Falls. When we returned from walking over the bridge and into Canada, we found our parakeet, Pipinella, almost suffocated from the heat of the car. We gave her a cool drink and after a while she seemed to recover somewhat.

We were at Niagara on Saturday, and Saturday evening quite late—about nine o’clock we were about to try to find accommodations for the night when the children noticed that the trailer had broken loose. We were on a slight downgrade, and the trailer had rolled up on top of the car and was resting on the back. Tracy gradually eased the trailer over onto the shoulder of the road. We then go out and took our flashlights and tried to direct traffic around the car. Although we were on the shoulder we were on a main highway and the traffic came roaring around the bend. We were afraid someone would follow our parking lights right up onto the shoulder. The people living right off the highway phoned for the highway police and a tow truck for us.

Just then Sherlene began to cry and we found out the Pipinella had died from her earlier heat exposure. These same people lent us a shovel and garden space and we buried Pipinella. When the Highway police came they put up flares and the tow truck towed the trailer into a garage for the night. It was then quite late so we drove into the garage ourselves and getting as comfortable as we could, we stayed there for the night in the car.

The next day was Sunday, but the garage man fixed our trailer hitch and we started on our way again. When we arrived in Ogden we drove into a coal yard to see just how much our trailer did weigh. Over 3,000 lbs. If we had known that it weighed that much, we would really have been worried. In fact, we wouldn’t have pulled it so far.

We stayed at my parent's home at 3292 Orchard Avenue, and mother and Sherlene watched the children while Tracy and I spent most of our time in Provo looking for a home for us. We had hoped to find a large, well built home about 20 or 30 years old, but these were non-existent. New houses were very expensive, to our way of thinking $3,000 or $4,000 out of line with what they should cost. And none of them really suited our family's needs. With all the large Mormon Families, there were none of the new homes which adequate dining facilities for a large family or the dining facilities were part of the living room and over carpets. I became more and more convinced that we would have to build our own house to get what we wanted. Tracy was determined not to build because our experience with building a house in Schenectady had been so trying.

We finally in late September found a small three bedroom block house on 460 N. 12th West which the owner had been unable to sell and which he was willing to rent us for the next year. We moved our furniture in. Most of it we had sold in Schenectady, bringing only a dining room set and our beds and two chairs. We were glad that we had not brought more, because it would never have fit into the house. We registered Sherlene at Lincoln Jr. High School and Tracy and David at Geneva School, and Elizabeth at the Union School. We had a beautiful view of the Geneva Steel plant, being just above it-and it really was an interesting view unless the wind blew from the West or Northwest and then—it stank.

(When we moved poisoning episode, also knots, tell church jobs here.) Tracy Jr. touring the hose or base?)

In October Tracy made a trip to Washington D.C. and held a conference with the lawyers of the air-force who had placed the secrecy order on the Diamond project, in order to get a clarification of the Secrecy order pertaining to his future work at the Y. They told him that it had never been their intention to sew up the field. He would not be able to divulge any information concerning his work at the Lab, but if he could devise new equipment in which to work, he could publish freely and without restriction from them at all.

He visited the Geophysical Lab while he was there and talked with Dr. Abelson, and also discussed school business with the National Science Foundation. The National Science Foundation suggested that he submit a proposal for funds to try to develop new equipment. At this time such a task seemed almost impossible, for he would have to out-think himself, and he was afraid he wouldn't be able to work around the patented ideas of the "belt". When he came back to Utah, he submitted a proposal to the National Science Foundation and settled down to see what he could do about "design." He had no funds to work with and so was afraid to go ahead and order any equipment, and the delay was frustrating him. Finally Dr. Abelson called and asked him how he was coming, and when Tracy told him of the delay, Dr. Abelson called a special board meeting at Carnegie Institute and the next day called and told Tracy that the board had voted him $10,000 with no strings attached to it whatsoever, so that he could get started immediately. Tracy was very grateful to them and always flattered, because the Carnegie Institute does not make a practice of this, but used the proceeds of their endowment to further Institute sponsored research in their own laboratories. Dr. Abelson has been a wonderful friend to Tracy—far from being perturbed that Tracy did not accept a position with the institute, he has repeatedly gone out of his way to do all he could to encourage Tracy's work. On the strength of this grant, Tracy ordered laboratory equipment and a press.

Meanwhile, I had turned my attention to designing a house and arranging the plans to be drawn up for us. We had found a lovely lot a mile north of the Science building in the Beesley Subdivision, called Hillridge Heights.

The lot was on a hillside and I planned the house so that we could walk in the South basement door directly off a patio, but that the carport over the entrance and the first floor of the house on the north would only be one level. We contracted with La Dell Peterson and Ted Clegg to build the house on a cost-plus basis. They were to have it finished by the 1st of July. They began construction on the last day of Feb. and we moved in on July 1. They did a beautiful job of building it and we were very pleased with its outcome. As always, it cost us more than we anticipated, even with us doing all our own interior decorating. Our furniture money went into the house and all our summer salary for that year, but we at least had our home, adequate for our needs and much nicer than anything which we had seen while looking.

In New York the natives—and we soon got to be natives—let nature take care of the lawns. Nature does not often do the right kind of a job, but it doesn't seem to bother the people, they just let their lawns get dry and then they get green when the autumn rains fall. But this was not New York and people in general are much more landscape conscious here than there. We could not see ourselves watering a big lawn with the hose, so Tracy spent August putting in a sprinkling system and planting a lawn. We had sand in Schenectady—here we had clay and rocks. And I do mean rocks. We carted off trailer after trailer loads of rocks which we picked out of our soil. I had the children helping us with this work, and when Elizabeth went to school that fall the teacher asked her to draw a picture of what she had done that summer and Elizabeth drew a girl pulling a wagon and putting rocks into it. We did stop long enough to make a hike to Timpanogos—but when the fall came we had the lawn seeded and I spent my time keeping it watered. Since we were on a slope we could use the sprinkling system only a short while or it would wash. Since we were still in Utah county at that time instead of in Provo City, Sherlene still took the bus to Lincoln school, and Tracy and David went to Edgemont school.

That fall I registered for a landscaping class at the Y so I could landscape our yard, and also took an adolescent psychology course. I was pleased to get good grades in both courses, after all my intellectual inactivity.

Just before we moved into our house, we finally called Dr. Scott P. Wallace, who had acted as our family Dr. ever since I had met him at the hospital when he had treated Virginia and Charlotte after they had swallowed those pills. Tracy had had attacks of what seemed to be "flu". He would get over it and then it would recur. Each recurrence getting worse—than the previous one. Dr. Wallace sent a blood sample into the State lab and the results confirmed his suspicion. He had thought perhaps it might be undulant fever—but it was a Rickettsial infection called "St. Louis Fever". He had probably picked it up in D.C. because it is not native to this area.

He prescribed Chloromycetin, which had a very bad reaction on Tracy and he had to discontinue it and switch to other drugs, but Tracy finally got over it.

Hand written—June—Berkeley Symposium Tracy attends.

In July the grant from the National Science Foundation for $25,000 came through. This grant was for the purpose of developing new equipment. Tracy also received a grant

from the Army for high temperature work. This was so that in case he was not able to devise new high pressure-high temperature equipment, he could do some studies in high temperature work.

October 20, 1956 Tracy Jr., graduated from Primary in the Pleasant View ward which is the ward we had moved into. Tracy Sr. had been given a job as Jr. M-Man leader for the ward.

In June 1956 Tracy was invited to give a talk at the Berkeley Conference on High Temperature at the University of California, Berkeley. His talk, which was just general, telling what he thought could be achieved in the field of high temperature-high pressure, received nation wide attention. It appeared in the science section of Newsweek. It is surprising the many talks which Tracy has given about diamonds and about high pressure methods since he has come to Utah. The chairman of the Berkeley symposium was very impressed with Tracy's talk and has recommended him as a high temperature-high pressure speaker to many companies. Soon after he came here, G.E. asked him to do consulting, but his price of $300/day was too high, and they wanted him to sign the same restrictive contract which he had left G.E. to get away from. Tracy has done some consulting for DuPont who was so impressed with him that they donated $5,000 to his project with no strings attached. He has consulted for Union Carbide and Carbon and General Motors. Several invitations were withdrawn when they were told his fees—but he has had to set them high, or he would be so deluged with speaking engagements, that he would never get any work accomplished. Many of his visits turned out to be attempts to hire him away from the Y, but he has consistently told them he was not interested. With Tracy's summer salary, and his regular salary we have managed quite well. In 1957 we were able to put down a carpet, do a little landscaping, and buy draperies for one bedroom and the living room and buy a two piece section couch. We are beginning to look quite "settled." On Tracy's regular salary we could make ends meet—but it would be very difficult to finish our basement, or to meet the extra expenses which have a way of cropping up. Tracy has also been deluged by offers of money from the Navy, Army, Air force and private industry. All offers he has turned away. He prefers to get his backing from the National Science foundation which allows him to operate under the greatest freedom. And he has only a limited amount of time away from his administrative duties to devote to research. Since he has left G.E. his reputation in the high-pressure, high-temperature field has been recognized everywhere. He took the attitude after leaving G.E. that he would do no complaining about the rough time G. E. had given him—he would prove his worth through his work—and that is what he has done. He has been surprised at the scientists who know that he is the man behind the "diamond."

In June 1957 he attended a Carbon Conference in Buffalo, N.Y. where he told for the first time outside of small groups in Utah, the story of Man-made diamonds. He could give no technical details, however, but he could tell the story in general…

On the 23 of June 1957 Elizabeth was baptized in the Sharon Stakehouse Baptismal font by her father, elder H. Tracy Hall, and confirmed Sunday 30 of June 1957 in sacrament meeting at the Pleasant View Ward, East Sharon Stake, Provo, Utah by her Father, Elder H. Tracy Hall.

In 1957 Hillridge Heights and our home on 1711 North Lambert Lane was annexed into Provo City, so Sherlene transferred to Lincoln Jr. High for the ninth grade and Tracy went to the same school, entering the 7th grade. David, Elizabeth and Virginia entered

Wasatch Elementary school on Ninth East in Provo, David in the fifth grade, Elizabeth in the third grade and Virginia in the kindergarten.

In September I accepted a call from the Primary in the Pleasant View Ward to teach the Blazer class, Tracy was made Stake M-Man leader for the stake, still retaining his ward job, as well. He is a ward teacher, and I am a visiting teacher for the Relief Society.

In the Spring of 1957 I put a lot of seed in to grow some perennials. I had grown my own in Schenectady with such success and at such a financial savings that I wanted to try my hand at it here, as well. Things grow very well in our clay. Better than they did in the Schenectady's sand. Our lawn was better the first year than our lawn in Schenectady had been after three years of loving care. Tracy made a little consulting money in the spring, which enabled us to put in some young shrubs. The roses were just beautiful that year—every one of them bloomed and bloomed. Tracy says I have a green thumb, but it is still yellow by my mother's standards, but once spring comes I have a hard time staying in the house until I can get my housework done—the garden is like a magnet. But from scrounging from Mr. John Beesley, our neighbor who has a lovely garden, and from my seeds, I have chrysanthemums, delphiniums, carnations, daisies, gypsophila, daylilies and columbines, besides many other perennials. We missed our trees so much that Tracy moved a 15 food Colorado Blue Spruce from Mother's home in Ogden, and also a large apricot, but I could not bring myself to prune the apricot drastically enough, and when it blossomed it was so beautiful I did not remove the blossoms—all in all it was too much for the roots to support and it died. But the Colorado Blue Spruce is living and gives us a very established look. In an attempt to get larger than nursery sized trees, I looked around the countryside and found a cherry and a peach on some orchard land that was being subdivided. These I paid some horticulture students to move and the trees died. Perhaps because they had not been cared for properly for some time, before removing. BYU was tearing out some young fruit trees near us to put in a married students housing project, and I obtained permission to move an apple and a cherry tree. The apple was quite large, and we just dug it up and brought it home minus any dirt and planted it. It is doing nicely. My family was pretty tired of moving trees, by now, so I went over and dug up a small cherry and brought it home in my coat not expecting it to live. It, too, is doing nicely.

In the fall of 1957 Tracy went to the Sagamoor Research conference on High-temperature where he gave a talk. Also the A.C.S(American Chemical Society) where he gave a talk, and also visited the Carnegie institute in Washington D.C. where he described for the first time his Tetrahedral anvil high pressure equipment, This is the apparatus which he had designed successfully to do his high-pressure high temperature work. At the Y he has designed several other apparatus, too, whose merits are not fully tested as yet. But his tetrahedral anvil design has been tested to 100,000 atmospheres and temperatures equal to the belt.

December 8, 1957 Howard Hall and his wife Florence Almina Tracy Hall, Tracy's parents were given a missionary farewell at the Ogden 18th Ward Chapel. They were called to the Western State Mission, and their first assignment upon arriving in Colorado was to labor at Ouray, Colorado and act as Branch President and Relief Society President there. Tracy's mother was very ill last year—we thought she was going to die, but she recovered her health. Because of her health and their age, they were called to a six month mission. This will be extended if their health permits. She had had one scare since she went on her mission, but recovered rapidly. They are enjoying their mission very much.

On November 11, 1957 Tracy went on a speaking tour. He visited the Frankford Arsenal. Tuesday the 12th of November he gave a high pressure talk. Tuesday evening he gave a talk at the Franklin institute in Philadelphia on high pressure work. The 13th he went to the Watertown arsenal, near Philadelphia. Thursday the 14th he gave a talk to Dupont on high pressure research. Then he went to Washington D.C. where he did some consulting for the Navy. The government only pays $50 a day for consulting, but Tracy feels that he should consult for the government whenever possible. He called this his "good-will trip" because he did not expect to collect anything for the talks which he was giving. Dupont, however, gave him a $150 honorarium, so he did make a little money on the trip. After he returned home Dupont called him long distance and asked him if he would consent to having one of their scientists do post doctoral research under him. After talking to the President and Vice President Crockett, they made arrangements and in May 1958 Dr. Maurice Hall is coming out. Dupont is going to pay him his salary and pay $500 a month to the high pressure research account. This will pay for equipment breakage and etc.

In September 1958 I resigned from the Primary because I found I was expecting our seventh child and I did not think I could keep up with 14 lively Trekkers at the same time.

Tracy submitted a paper on his tetrahedral anvil apparatus to The Review of Scientific Instruments. It will be published in the April issue. He will give the paper at the A.C.S. meeting on April 13, 1958 in San Francisco, California. This talk will be the culmination of his efforts to devise new high pressure equipment. The Research Corporation is going to patent it and Tracy will get royalties if it is ever used industrially. This apparatus will open the field of high-pressure, high temperature to the scientific world. When Tracy first left the G.E. company there was little interest in the field, but now everyone wants to go into it. His biggest problem with this apparatus had been the inability to get quality machine work done at the BYU. He has sent some parts to General Motors who are interested into going into the high-pressure business, and who have an excellent machine shop and have agreed to do his machine work at cost. Their cost is quite high, but it will be worth it if precision machine work can be obtained. If their preliminary work shows that they can meet his specifications, Tracy is considering having them build his new 1,000 ton tetrahedral anvil apparatus. This press was actually later built by Fred Childs and two other machinists at Dad's shed on Columbia Lane in Provo.

Soon after we came to Provo, Carbide and Carbon Corporation wanted him to do some consulting. They offered him $5,000 a year and $300 a day for time spent actually consulting. But when the contract came, it was as binding as G.E.'s. He could not even publish without their permission. He refused to sin, or course, even if that regular additional money was a temptation. But then, we gave up just about as much to come to BYU to gain freedom. He has signed an agreement with General Motors to do consulting but there are no strings attached. They do not even insist that he consult exclusively with them. And it is a short term contract.

On March 6, 1958 Tracy received a letter from Dr. Eyring saying that he was going to recommend him for the Ipatieff prize which is given every three years to the scientist who has done the most outstanding work in the field of high pressure and high temperature, or in the field of Catalyst Chemistry. He desired some biographical material. It is an honor even to be nominated. The scientist must be under the age of

40 and the prize is going to be awarded this year. It would be wonderful for Tracy to receive the prize which amounts to $3,000. but even to be nominated means that he is becoming recognized in his field. (He didn't get this prize, however