

Portrait of a Chemical Engineer  
(As a Young Man Growing Older)

(From Gilbert Chemistry and Erector Sets to Bhopal and Beyond)



(The Ohio Medical Products maintenance crew, 1971 – author in the middle)

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## INTRODUCTION

It would be total stupidity, arrogance, hubris, and insanity to compare myself to Primo Levi in any way shape or form. Levi was an Italian writer who was often nominated for a Nobel Prize for his sensitive writing about his life, both as a chemist and concentration camp survivor of the Second World War. However, after reading his book, *The Periodic Table*, a clever and intriguing autobiographical tale of his journey as an industrial chemist – each chapter title a reference to an element from the Period Table that had great relevance in his life – I entertained writing a similar book of my experiences as a chemical engineer.

Having spent 38 years rummaging and cavorting through the chemical, pharmaceutical and food industries, not unlike Mr. Levi in many professional respects, I could probably, like Mr. Levi, title each chapter with a chemical that had special meaning in my career. I chose not to do that. While, as a chemical engineer, I certainly worked with hundreds of chemicals and many elements from the Periodic Table, I associate most of my experiences during my career with cities and people. The places I worked and the people I met and called my associates are what stand out as most memorable in my professional and even my non-professional career. And so, some of the chapters in this book are titled accordingly.

I actually read Mr. Levi's book ten years ago. The idea to write my story in a similar vein didn't really take hold until this year when several events occurred. First, my mother passed away last year. You will soon see that she predicted I would become an engineer when I was only 7 years old. The other inspiring event hasn't actually occurred yet, but it is so prevalent in my consciousness that I assume it has – I turn 60 years old next year. Sixty is definitely a milestone – to me anyway. People are always celebrating birthdays like 40 and 50 years of age as indicating a loss of youth. A passage into adulthood. But upon reflection, being 40 or 50 years of age doesn't really feel like that. You can easily convince yourself that being 40 or 50, or even 55, isn't really that old. I don't think that con is possible once you hit 60. Sixty is getting old – period! And so, approaching my 60<sup>th</sup> birthday, and with the suggestion of a friend of over 30 years, Herb Seil, I thought it was appropriate to begin this story.

We spend the majority of our waking hours for over 40 years of our lives immersed in our profession, our job, as it were. Some people are consumed by their jobs. At specific times we all are. Approaching 60, I have become much more introspective. What I have accomplished on a personal level and professional level seem important to me at this stage of my life. I am an orphan at age 59. I attend many more funerals than I ever have. Funerals of family members and friends and contemporaries. I am not immortal. I always knew that, I just never thought about it. Now I do. I suppose I could see a shrink. I suppose I could take up yoga. I suppose I could start taking Prozac. It's just cheaper to tell this story.

## 1. Ideas?

In the movie *The Grass Harp*, Jack Lemmon walks into the barbershop of a small southern town, sits back in the barber's chair and asks for a shave. The barber and local patrons are curious about this stranger to their small town, especially with his Yankee accent and immediately begin to pepper him with questions:

"Whatdaya do?" the barber asks Lemmon as he drapes him with a white barber's apron.

"I'm a chemical engineer," Lemmon replies.

"A chemical engineer? What does a chemical engineer do?" the Walter Matthau character, sitting and waiting for the barber, inquires.

"Ideas!" Lemmon answers.

"Ideas?" questions the barber. "What kind of ideas?"

"Chemical Ideas." Lemmon replies enthusiastically.

I found that scene to be most amusing – for several reasons, and on several levels. First, it's not a bad description of what a chemical engineer does. It is a bit cryptic, and certainly far from any standard textbook definition of chemical engineering. But as I look back on almost 40 years of my chemical engineering career – ideas relating to chemicals and chemical processes defines a good deal of what I did for those 40 years.

I must admit, when Lemmon said he was a chemical engineer, I sat right up in my chair. I certainly wasn't expecting that response. In movies and plays and television series, and even literature, you will seldom find a major or minor character depicted as an engineer, and certainly not a chemical engineer. So I was immediately rooting for Lemmon and his character, even though he turned out to be a rather scurrilous character, to say the least.

*What does a chemical engineer do? And what is chemical engineering?* These are questions that can be answered with such a broad spectrum of definitions that it would be easier and simpler to describe what I have done these past 40 years, and that would cover one narrow area of chemical engineering. (What does a doctor do? And what is medicine?). When in doubt and looking for some authoritative definition, one can always rely on Webster's Dictionary. *Chemical Engineering*: "Engineering dealing with the

industrial application of chemistry.” This is actually quite a good, short, succinct and adequate definition of chemical engineering, and by association, a chemical engineer would then be an individual “dealing with the industrial application of chemistry”. Perhaps not as poetic or as broad a definition as “ideas, chemical ideas” as Mr. Lemmon uttered in the movie, but more precise and accurate as it describes what I have been doing most of my 38 year career. (I still like “chemical ideas” much better.) But let’s not get hung up on the definition of chemical engineering or the chemical engineer.

My journey as a chemical engineer began at age 7. My mother used to like to tell this story, and I do vaguely remember the circumstances. But I leave open the possibility it may be somewhat apocryphal or at least it has been embellished over the years. The story goes as follows: Playing with some tools I took from the basement of our Cleveland Heights home, I was in the backyard hammering a nail into a piece of wood. My mother, who happened to be looking out the kitchen window at the time, called my father over to view this sight and commented, “Look Phil, Benjie’s going to be an engineer.” Now, I suppose she could have said I was going to be a carpenter, which, under the circumstances seemed to be more appropriate. But over the many years she told this story, she insists becoming a carpenter never occurred to her. So I guess my future as an engineer was preordained from the moment I picked up hammer in hand and began to bang away at that two-by-four.

Actually, before I entered the School of Engineering at the University of Pittsburgh, I had visions of many other professions I hoped to conquer – and engineering wasn’t one of them. I actually went down to freshman orientation at the University of Pittsburgh accepted into the School of Liberal Arts. I was planning on getting a degree in chemistry. Why chemistry? Well, I guess because I got an “A” in chemistry in high school. My plans changed quite abruptly just 2 days before classes were to begin.

When I finished taking some language proficiency tests to see if I could get out of first year Spanish, my test scores were so low that my counselor suggested I begin in a remedial Spanish program – for no credit. This was intolerable and unacceptable! I was scared to death of foreign languages. Maybe because I did so poorly in both junior and senior high when taking a foreign language course. I started Latin in eighth grade but

dropped out within weeks. (*Puella est bona*, is all I remember from that episode) Then I started Spanish in tenth grade, got two failing grades during the year but managed to eek out a D. I passed Spanish in 11<sup>th</sup> grade vowing never again to take another foreign language. Señorita Nichols convinced me to take Spanish my senior year, but it was soon mutually agreed by us both – I better stick to English.

I simply could not see myself struggling with three years of a foreign language in college. And two years of a foreign language were required in the School of Liberal Arts. So, I quickly asked the counselor, “Is there any degree at the University where a foreign language isn’t required?” She quickly answered that the School of Engineering required no foreign language credit, but I was accepted in the School of Liberal Arts, not Engineering. This was September 5, 1963. I had one day to get accepted into the School of Engineering and the Department of Chemical Engineering. (I was going to major in chemistry, so the Department of Chemical Engineering seemed logical - right?) I made a mad dash for the School of Engineering and an interview with the Dean. Then, another mad scramble to the Department of Chemical Engineering where I spoke with a delightful chap by the name of E.B. Stewert, chairman of the department. And so, on the bottom of my official transcript at the University of Pittsburgh it states: “Transferred to engineering, 9/7/63”.

So you can see, the path that would eventually lead to a 40-year career as a chemical engineer, began in a somewhat serendipitous fashion. Maybe if Senorita Nichols would have had a bit more patience with me my senior year in high school, I could have followed Primo Levi’s career into chemistry. I do not regret the decision in the least. It has worked out well for me. How my mother could see this coming when I was at the tender age of seven is quite baffling. Evidently the adage, “Mothers are always right” has some truth to it. Or maybe Senorita Nichols deserves the credit. Perhaps a “*Muchas gracias, Senorita!*” would be appropriate at this time.

I went through a four-and-a-half-year engineering program, 9 trimesters instead of the usual 8, for a bachelor’s degree. This was standard for an engineering degree, although some students raced through the program in 8 trimesters. I went through the summer (9<sup>th</sup>) trimester of my senior year to graduate at the end of the summer in 1967. In the Fall

of 1967, I was accepted as a graduate student at The Ohio State University in the Department of Mathematics. I was awarded a teaching assistantship (\$2400, \$800 per quarter, if memory serves), intending to earn a Doctorate in Mathematics and begin a career as a professor of mathematics at some, still to be determined, university of higher education. This requires some explanation, so here goes.

While I did okay in most of my chemical engineering courses, I excelled in all of the mathematics courses one has to take to get an engineering degree. I decided to take all of my electives in Liberal Arts in mathematics courses that weren't required for my engineering degree, but were required for a degree in mathematics. Somehow I got approval from the Engineering Dean and Department Chairman to pull this off. So, while I did take a number of the "standard" liberal arts requirements for engineering - Fine Arts, Music Appreciation, etc. I managed to garner most of those liberal arts requirements as additional mathematics courses. (I never wrote a single term paper in four years of college!)

I did indeed like mathematics, or at least the applied mathematics that engineering required. I decided in my junior year that I would go on to graduate school and pursue an advanced degree in mathematics. I wasn't really enamored of chemical engineering anyhow, and besides, I got into the program by accident, you could even say by default. (At some point in this narrative, I will talk about the undergraduate program in chemical engineering - in great detail, in fact. I have a lot to say about the chemical engineering curriculum and how it does or doesn't prepare one for a career in industry. Some of you may have read some of my exposition on this subject, published in various technical journals over the last 30 years, and already know where I come down on this topic.)

So off I went to Columbus, Ohio in the fall of 1968 to begin what I hoped would be the successful pursuit of an advanced degree in mathematics. Unfortunately, it didn't quite work out for a number of reasons, the main reason being I wasn't smart enough to get an advanced degree in mathematics at The Ohio State University. I soon found out that the theoretical mathematics of the late 1960s - having its tentacles reaching into the mathematics of the elementary schools (New math anyone??) - was not my strong suit. Number Theory and Group Theory and Cardinal Number Theory were a bit much for the

applied mathematical talents I did possess. The results of my efforts after that first quarter produced three “C’s,” which as any graduate student knows, is really three “F’s.” (They don’t give F’s in graduate school, since you must maintain a B average to stay in any graduate program.) The proverbial writing was on the proverbial wall, as the shit was about to hit the proverbial fan. This was 1968. The Viet Nam war was raging, and likewise was the draft. I had received a deferment for graduate school, but to maintain that deferment, you had to maintain the required grades. Any change in your status was immediately reported to your draft board. I quickly dropped the idea of getting an advanced degree in mathematics and transferred to the graduate program in Chemical Engineering, where I was accepted, but I still kept my teaching assistantship in the math department. This too was reported to my draft board.

One month into the graduate program in the Chem E department, and I was ready to quit. I just was not interested in getting a masters or doctorate in chemical engineering, but dropping out of graduate school without an acceptable alternative, i.e. another deferment from the draft, and I would be prime draft material. At this point, the only viable alternative was to get a job as a chemical engineer with a company that could get you a 2-A technical deferment. As a chemical engineer, you could pretty much get a 2-A deferment with almost any chemical company of decent size that would hire you. This was before draft boards started the draft lottery, giving out numbers trying to make the draft more equitable. Since time was of the essence, I placed a phone call to the personnel department of The Standard Oil Company (Ohio), known in the state by their more familiar name, Sohio. Their corporate offices were located in downtown Cleveland.

I called to ask for an application for employment, but when I spoke with the person in the personnel department (the term “Human Resources” was not yet invented), to my surprise, they asked me when I could come in for an interview. I told them I could drive to Cleveland the next day if that wasn’t too soon. They told me to come in the following day. This was either a Wednesday or Thursday. By the following Monday I had a physical and began work that same week. The whole process didn’t even take a full week. I packed up and left my 17<sup>th</sup> Avenue one-room efficiency, never even officially withdrawing from the university, and moved back into my old bedroom with my folks in

South Euclid, Ohio. I would officially be working as a chemical engineer in the chemicals division (Vistron) of the Standard Oil Company (Ohio), at a starting salary of \$680 per month. And yes, I would receive from my draft board a 2-A, technical deferment, compliments of Sohio.

## 2. Cleveland, Ohio – 1968

The Standard Oil Company (Sohio), now defunct, (purchased by British Petroleum and slowly and painfully phased into oblivion), was the original Standard Oil Company started by John D. Rockefeller, himself. After the bust-up of the trust in the early 1900s, John D., pissed at Cleveland years before because of some taxes the city wanted to impose on him and his company, had moved his home and office to New York City. After the breakup of Standard Oil, only the Ohio Corporation was allowed to retain the official name, “The Standard Oil Company.” All the other subsidiaries had to take other names. (Esso, Socony-Mobil, Chevron etc.) So in the spring of 1968, April, I think, I went to work at the offices of Sohio, which were located in downtown Cleveland, behind the venerable Terminal Tower. The three buildings where the offices were located were the Guild Hall, Republic, and Midland building complex. The complex was built back during the depression when the Terminal Tower, and the famous affluent suburb of Shaker Heights were developed by the Van Sweringen brothers. I worked in the engineering offices, located on the 17th floor of either the Midland or Guild Hall buildings. I can’t remember which. What I do remember is the first person I worked for, a wonderful gentleman with whom I have kept a continuing relation with all these years – Einar (Oscar) Kropp.

Oscar began working for Sohio back in the 1930s. He had an incredible historical perspective of the company and even knew some of the folks who worked back in the early 1900s, before the breakup of the monopoly. When I came on board in 1968, Oscar worked for the chemical division of Sohio, which I mentioned before, was known as Vistron. Vistron’s major claim to fame was their Acrylonitrile process, which they developed in the 1950s and very successfully commercialized in the 1960s. The layman would be familiar with all the products made from acrylonitrile-acrylic fibers used in cloths and rugs etc. Oscar can spin the story of the acrylonitrile process development and leave even the most disinterested non-technological technophobe spellbound.

When I came to work that first day at Vistron, I was immediately introduced to Oscar. I liked him right from the get-go. First, he was the spitting image of an uncle whom I adored when I was a child, and who had since passed away. But beyond that emotional

tie, Oscar immediately treated me as a colleague, an equal, as opposed to some wet-nosed, inexperienced, young, chemical engineer, which, in fact, I was. As the first weeks passed, I realized pretty quickly that the field of engineering in general, and chemical engineering specifically, was a profession requiring training and experience, which couldn't be obtained in text books and journal articles, but could only be gained through actual work experience. Oscar gave me my very first work assignment, which was to complete a heat and material balance on a segment of the Acrylonitrile process. Making a heat and material balance for a chemical engineer is about as basic and important an exercise as a doctor taking a patient's temperature and blood pressure. I took this first assignment very seriously and came to work at the downtown offices that first weekend to be sure I completed the assignment on time – which I did. Oscar thanked me for getting the assignment done in a timely manner. When Oscar Kropp thanked you, it was never a perfunctory “thank you.” When Oscar Kropp said “thank you,” he meant it. I never realized how lucky I was to have worked for Oscar, especially as my first boss, until years later. Isn't that usually the case?

First, Oscar was as knowledgeable an engineer as I have ever worked with. And he was a very generous man when it came to sharing and giving credit. He had no ego. He was well-respected by his peers, even idolized in some cases. He was kind to a fault. But he could be firm and held true to certain principles. Perhaps what endeared me to Oscar more than anything else was a story I had heard about him that first year at Sohio, and one Oscar confirmed to me years later over a dinner in Chagrin Falls, Ohio, a kind of a wanna-be New England village, suburb of Cleveland. Oscar was a rising star at Sohio early in his career. His intellect, calm demeanor, and general classy ways were exactly what the old-line, staunchly conservative powers at The Standard Oil Company were always searching for, and believe me, no corporation in America was more straight-laced and conservative than the original Standard Oil Company. By comparison, IBM, a late bloomer compared to Sohio, had a corporate culture somewhere to the left of whoopie. White shirts, conservatively striped ties, and dark (blue or gray) suits, were the uniform of the day. Thank God Sohio was out of town and out of business by the time “casual Fridays” came into vogue. Otherwise, the entire corporation may have had a collective nervous breakdown.

From the text of the story, I would assume Oscar was in his mid to late 30s when he was made the director of the Broadway Laboratory. This was a little more than a feather in one's cap. This was a major step towards the top of the corporation – especially at that young an age, in that conservative organization. The Broadway Laboratory was the major development lab for the corporation and had 250 or so employees. It was located on Broadway just above the original refinery located below in an industrial area known as the Flats, along the infamous Cuyahoga River, (The one that caught on fire years later in 1969).

While Oscar was the lab's director, sometime in the late 50s or early 60s, the powers-that-be decided to downsize the lab and invited an efficiency expert to evaluate the operations of the lab. (I believe the company's name was Proudfoot, or maybe McKenzie.) Of course, the efficiency experts knew what Sohio's true motives were and after their evaluation they recommended that the Lab be downsized almost into oblivion, reducing the workforce by 90%. Oscar was told he would have to let these people go under circumstances that he didn't feel were either fair or honorable, and so he refused to carry out the directions to dismiss these people. Oscar was told that if he wouldn't do it they would find someone who would. And so they did, and Oscar's rising star was no longer rising and he would eventually find himself in the engineering department with the meaningless title – Project Leader. I began working for Oscar several years after that move. My good fortune, Sohio's misfortune. Oscar never told me this story. It was told to me by others at Sohio. I just asked Oscar to confirm it, which, like I said, he did over dinner several years ago – reluctantly. Oscar was not a self-promoter. Oscar was a role model and mentor for myself, and lots of other people at Sohio. I'm afraid, after 40 years in the business of engineering, I fell far short of the mark. I was neither as smart as Oscar, nor as wise - nor as generous. But I did refuse to sign drawings later in my career, when I thought the content of the drawings was less than ethical –using Oscar's example at the Broadway Laboratory when he refused to lay off his associates, as my guiding light. Both actions probably kept Oscar and me from gaining entry into “upper management.” I've never regretted it, and I suspect Oscar feels the same way.

After the brief assignment to complete the heat and material balance for a portion of the Acrylonitrile process, I was soon assigned to an engineer working in Oscar's group

by the name of Frank Purdy. Frank was perhaps a few years younger than Oscar and quite a character in his own right. My assignment under Frank was to follow some of the work being completed at a new Sohio acquisition. Some genius in the management team at Sohio thought Sohio should branch out into other industries. So he convinced Sohio, a petroleum refiner and chemical company, to purchase Oxco Brush. (This was about the same time Mobil bought Montgomery Ward and Exxon, then Esso, bought Reliance Electric, a manufacturer of electric motors.) Oxco Brush, as the name suggests, made, among other things –brushes. Brushes, brooms, push-brooms, and tooth brushes. They also made plastic dishes from a compound known as Melamine. Dishes made of Melamine could be exposed to high dishwasher temperatures. Back in the 60s, this was thought to be a breakthrough.

So I was assigned to work under Frank, examining some of the operations at Oxco Brush. This all seemed very exciting to me since I would have to travel to Cookeville, Tennessee and Northampton, Massachusetts. I was 23 years old, and had traveled by airplane only once in my life. I had never rented a car or stayed by myself in a hotel – none of those “grown-up” things. To that extent, I guess I had lived a “sheltered” life. So I was very excited when Frank informed me I would first have to travel to Northampton.

I flew into Hartford, rented a car (you could rent a car at age 23 back in 1968) and drove north to Northampton. I stayed directly across from Smith College in a motel that looked, architecturally, like an extension of the college – faded red brick covered with ivy. It was fun. I walked around the campus – school was still in session – eyeing all the lovely coeds. At a local hangout for the students, located at the corner of the street where I was staying, I met an English instructor, and she invited me over to the college the next day to visit her in her office and chat. She was maybe a few years older than me and had that 1960s preppy college look about her – long straight blond hair, wire-rimmed glasses, she could have sung with the Mamas and Papas. She was very attractive. Things were looking up. The next day I went to the Oxco toothbrush factory and watched several of their production lines. I thought this was strange work for a chemical engineer, but still took the assignment seriously. I was looking for ways to improve the efficiency. (And for this I received a 2-A technical deferment from the draft??) After visiting the factory I rushed back to the motel, spiffed up a bit, and then headed over to the office in the

English Department to visit the English instructor I had met the previous night. I remember she had a poem by Rod McKuen printed on the chalkboard in her office. I still remember the stanza from the poem all these years later:

*Think of all the men who never knew the answers.  
Think of all of those who never even cared.  
Still there are some who wonder why, who want to know, who dare to try.  
Every now and then we meet that kind of man.  
Here he comes again, and then he's gone.*

I remember thinking the poem was a good description of Oscar Kropp.

I traveled to Northampton several times in the next few months. I had dinner with the English instructor each time. I don't remember her name. We never did more than have dinner and talk about poetry – much to my dismay. Apparently she wasn't too interested in me and my Melamine plastic dishes – nor did she seem to be impressed by the fact that they could stand the higher temperatures of the dishwasher. I bought a couple of Rod McKuen's poetry books back in Cleveland, as she suggested, and I still have them.

Frank seemed to be happy with my trip reports and he decided we had become close enough that he would begin to reveal some of his marital problems. This I really didn't need. Frank was a strange bird indeed. He was a fan of Ayn Rand, make that a devotee, make that almost a cult follower. He tried his best to get me to read her every book, magazine article and utterance. Frank's marital problems had nothing to do with sex, or money, or family problems. Oh no. Frank's marital problems centered around his wife's interpretation of Ayn Rand's philosophy. Frank's wife didn't think Frank totally appreciated or understood Ayn Rand's work, and Frank didn't agree with his wife's interpretations of her work. I kid you not. This was the final basis for their divorce. This was all a bit too much for an impressionable 23-year-old to comprehend. (After recently talking with Oscar to get my facts straight, he informed me that Frank and his wife remarried several years after the divorce. Evidently they agreed on Ayn Rand more than they realized.)

The activities around Oxco Brush were slowing down, so I got assigned to another project and with another seasoned engineer by the name of Stan Arthurs. Stan was several years younger than Oscar, and had started working at Sohio in the early 1940s. I liked Stan immediately, and for the few months I worked with him he never gave any indication that his political philosophies lay somewhere to the right of Genghis Khan. This is something that would be revealed to me 35 years later, but that's another story. Stan was a funny guy – great sense of humor. There was a restaurant near the Sohio offices that was very popular both for lunch and dinner. It was called the Kon Tikki, a Polynesian establishment that Stan absolutely detested. “How can any cuisine concoct so many goddamn ways to cook pineapple.” Was a quote of Stan's any time he was dragged to the Kon Tikki for lunch or dinner.

The project Stan was involved with was a new plant to produce a chemical known as Acrylamide. Acrylamide, was, of course, made from Acrylonitrile and was used extensively in the water purification process as a coagulant. The Acrylamide process Sohio was evaluating was a Mitsubishi Chemical Process. Sohio had been working with several different engineering firms getting some preliminary engineering completed. They summarily fired two of them and the third and present firm was a local Cleveland company, The H.K. Ferguson Company. H.K. Ferguson was an old-line engineering and construction firm started in Cleveland, Ohio back in 1919 by Harold Kingsley Ferguson. It enjoyed a national and international reputation, whose finest hour may just have been their incredible participation in the engineering and construction of the Y-12 and Y-25 plants in Oak Ridge, Tennessee. None other than General Leslie Groves himself, in his published memoirs, singled out the H.K. Ferguson Company's mighty contributions to the success of the Manhattan Project. (Sohio was not as impressed as General Groves and would eventually sue Ferguson after the Acrylamide project was completed, in Lima Ohio. That too is another story.)

My good fortune was to be assigned to this project under Stan, and I began working with the representative from H.K. Ferguson, their newly hired Assistant Director of Chemicals, Larry G. Nault.

The first time I met Larry Nault wasn't long after I was assigned to work with Stan. Stan took me with him over to Ferguson's offices, which were located about half a mile

from Sohio's offices at the corner of 9<sup>th</sup> Street and St. Clair Avenue. It was no more than a 10-minute walk. H.K. Ferguson had just been selected as the new contractor after Sohio dismissed Crawford and Russell. Crawford and Russell had been working on the engineering for over a year. Why they were shit-canned is still a mystery, but Sohio was infamous for removing a contractor from a job for a myriad of inconsequential reasons. The reason for the meeting at Ferguson's office was for everyone on the job to get acquainted, especially for Stan to meet with Larry Nault, who would be heading up Ferguson's efforts to maintain a good relationship with Sohio. I was along just for the ride, so to speak, although I would be working with Larry on various aspects of the job – mostly meeting with vendors who would be supplying equipment for the project.

We met in Ferguson's boardroom. The room was dominated by an immense, oblong, solid walnut table that almost stretched the entire length of the room. That table had to be 12 to 14 feet in length. The kind of structure one would try to hide under during any tornado or potential nuclear attack. Massive leather upholstered chairs surrounded the table. The room, the table, the chairs, the carpet and the general decorum all trumpeted strength. Engineering and construction contractors liked to project this message of strength and *gravitas* to any potential clients. I'm sure Crawford and Russell had a similar room for entertaining potential clients. Perhaps their trumpet didn't ring loud enough for Sohio. (Sohio had a similar conference room where they tried to intimidate potential engineering and construction suitors - even more austere and intimidating than Ferguson's. This conference room was located in the legal department and had full length painted oil portraits of Sohio's scions of industry hanging on the conference room walls. John D. himself may have been hanging there if memory serves.)

Larry Nault was (and still is!) a larger than life character, both figuratively and literally. He was over 6 feet tall, maybe six-three or four, and weighed 240 or 250 pounds - large hands and arms, and large torso. He was not fat. He had a dominating physical presence. His deep baritone voice capped off the picture, perfectly. He did not talk much at that first meeting. Stan and Larry's boss did most of the talking. Larry, like myself, had only recently been hired by Ferguson. What touched off a life-long friendship and admiration of Larry occurred at a restaurant we all went to for lunch after the meeting. Here Larry opened up and talked much more than at the meeting. When I

asked Larry how old he was, his answer both amused and startled me. Pondering the question momentarily, as if to be precise in his answer, he said. “I’m thirty-three-point-eight.” How many people describe their age with decimal accuracy? Not “thirty-three and a half,” or “almost thirty-four,” but, “thirty-three-point-eight.” Here was someone I wanted to get to know better. And I would. (Larry will be 69 later this year. At the writing of this chapter, I would guess Larry is sixty-eight-point-eight-five.)

Soon after our lunch I was informed that I would be traveling with Larry later that week to Carrier Corporation in Louisville, Kentucky to evaluate a fluid bed dryer. (The same Carrier Corporation that makes the more familiar home air conditioning units.) That trip with Larry would prove to be relatively uneventful, compared to the one we would take the following week to Summit, New Jersey. The Louisville trip did provide some interesting information about Larry. Although he was only thirty-three point eight years of age, he and his wife Barbara had recently had their eighth and final child. He was on his fourth or fifth job since receiving his Masters degree in Chemical Engineering from the University of Washington. He had already worked on both the East and West Coasts. He and his wife Barbara, whom he married in his senior year at Michigan Tech, were from Ishpiming, Michigan – Uppers, as they were proud to be known. His wife and kids were still living in Warren, Pennsylvania, site of his most recent job, before coming to Cleveland and H.K. Ferguson.

A week or so after returning from Louisville I was told by Stan that Larry and I would be traveling to Summit, New Jersey to evaluate a piece of equipment, known as a pellitizer. This equipment would take the granular Acrylamide material and compact it into the shape of a charcoal briquette, but smaller in size. It was becoming apparent to me that working as an engineer in the Corporate Engineering Department at Sohio, was more of a project function than a design function. That is, I wouldn’t be making many calculations or designing processes, but rather, I would be following projects and companies who would be doing the actual designing – making calculations and computations. I only mention this because of the formal training engineers receive in four and a half years of college. It’s nothing but calculations in all of the core engineering courses. I wasn’t really concerned, just curious, and besides, all the people I was working with were interesting characters, to say the least.

The three days I would spend in Summit would pretty much define the 35-year friendship I would share with Larry G. Nault.

It was a stormy night when we left on the United Airlines flight to Newark, New Jersey. (I distinctly recall the meal. It was a fillet steak with vegetable and baked potato. It was delicious, and we weren't in first class.) The flight was delayed several hours, and we didn't arrive till after eleven. Larry, in his now familiar rather dominating, boarding on boisterous (but never obnoxious), authoritative voice, let me know that he would take over once we landed in Newark. He had lived in the New York/New Jersey area for several years, and driving in this region took a little experience, which he was afraid I didn't really have. He did. So I could just relax while he would navigate the rental car to Summit. It was still pouring like hell in the region.

After about a half-hour I looked at the map and mentioned the name of a town we were coming to, and noticed it was in the exact opposite direction of Summit, New Jersey. Larry then got off the Interstate headed back towards the other direction and managed to get into Summit after midnight. We stopped at an all-night diner for some nourishment. I needled him gently about how valuable his local experience in the area was, which he took good-naturedly. We both had a good laugh about it, and we were both a little punchy from the long day. Larry quickly found the Suburban Hotel in Summit, where we were booked for the next few days.

The Suburban was a quaint, established, venerable old hotel in Summit. (Well, maybe not so venerable.) The operative words are old and quaint. If ever an establishment in New Jersey could boast "George Washington slept here," and be credible, this was the place. The ambiance could be described in just one word: musty. At this point, it was after one in the morning. It didn't much matter what the rooms looked or smelled like – it had a bed. That was all that was required. We would meet for breakfast in the morning before we visited with the manufacturer's representative of the Hutt pellitizer.

We met the next morning for breakfast in the dining room and then set off to find the representative's office. It took only five or ten minutes to find the establishment – a small Butler-building type edifice, which was actually just a large empty warehouse. Having no industrial experience whatsoever, I had no idea what to expect. But still, it did seem a bit odd to me that the establishment where we were about to test the Hutt

pellitizer was located behind a Shell gas station, in what appeared to be an abandoned warehouse.

We went into the Butler type building where we met the Covey brothers, Bill and Bob, the representatives of the manufacturer of the pellitizer, a German firm called Hutt. I would guess the Coveys were in their mid-fifties, and although not twins, close enough in age to almost look very much like brothers. They were your typical overly-friendly, overly-loquacious salesmen, especially Bill.

Our purpose in Summit was to try and evaluate the compacting pellitizer and the briquettes they would form for structural integrity: i.e., could they be packaged and transported without eventually disintegrating? The test we would perform was called “the drop test,” and not wanting to show my lack of knowledge, I just assumed this was a normal, standard test for materials that probably wasn’t covered in any of my engineering courses. I became a bit more suspicious as we assembled the equipment we would need to perform this “scientific” test. (Named, extemporaneously, by Larry himself.) The equipment consisted of an eight-step folding aluminum ladder and a metal garbage can top, which was inverted to catch the Acrylamide briquettes I would drop from different steps higher up on the aluminum ladder. The data we collected attempted to measure the amount of destruction to the briquettes as they were dropped, by me, from different heights. I remember thinking to myself, as I was dropping the appropriate number of briquettes onto the inverted garbage can top, how primitive the whole setup was. Did I really have to take mathematics through differential equations to appreciate the present “experiment”? I thought that playing with my Erector Set at age ten was a more profound activity than what the four of us were doing in that empty warehouse. Later in my career, however, I would perform even more archaic tests in plants, which made the present activities look like experiments confirming the Laws of Relativity. Engineering is a very practical profession, getting answers by any means, as long as they’re legal, is not only an acceptable activity, but sometimes a necessary one. Often times, the only one. I would perform many “drop tests” in the next 40 years.

After about an hour of the drop test – with Larry taking copious notes and recording the “data,” we left the Covey brothers with an arrangement to meet them in the walnut paneled bar of the Suburban Hotel for drinks later that evening and then head out for

dinner. Larry and I then drove back to the hotel. Larry told me to knock on his door later that evening at about six, and we would head down to the bar to meet the Coveys.

I walked over to Larry's room at about a quarter to six and saw his door was open about six inches. Let me try to describe the sight I saw peering through the six-inch space. Here was a man, six-foot-three, 240 pounds, no shirt, in his under pants. He was standing there, whirling over his head a contraption concocted with his belt and a metal clothes hanger. Attached to the end of the belt through one of the eyes was a wet shirt still on the hanger. He was in the process of whirling the shirt around the room, over his head, when he saw me and told me to come in, still flinging the belt, shirt, and hanger around his head. "Okay, Larry, I give up, what the hell are you doing", was the expression I had on my startled face as I entered the room, ducking away from the swirling belt, hanger and shirt.

Larry was, as anyone with a modicum of intelligence could see, drying his recently washed shirt, utilizing the principal of evaporative drying, as he patiently explained it to me. Larry Nault traveled lightly. He only had one white shirt. It was one of those plastic-type shirts, that was suppose to "travel well". He was in the process of drying it before we met the Coveys in the bar. Larry Nault traveled very lightly indeed. His "luggage" for the trip consisted of a single briefcase he carried with him – a well-worn leather briefcase. The old-fashioned kind with a leather handle and a triangular shape. The kind your doctor used to carry when he made house calls, but a bit larger. He carried everything in that briefcase – clothes, notebooks, documents, pens, pencils, slide-rule, (no calculators yet) – everything. He had no other luggage. He was only going to be gone 3 or 4 days, and said that his trusty leather briefcase could easily handle that. I had known Larry now for only a few weeks, but I could see there would be more surprises to come. This was a character I wanted to get to know. He was obviously very bright, very smart. Knew his way around the industry even at the relatively young age of thirty-three-point-eight. And even after 40 years, I haven't quite figured my friend out. I probably never will, either.

We went down to the dimly lit bar. Lots of walnut and leather in that bar, as I remember it. Larry started the evening off with what became his standard alcoholic beverage – a Budweiser. I had a Coke. Never much liked the taste of alcohol, and

besides I was hungry, not thirsty. Bill Covey was an hour late. Said his brother couldn't make it, and began to drink his first of three martinis - maybe four. I lost count. Larry was matching each martini with a Bud. After Bill's third Martini, he began talking about his impending divorce and wondered who would get the boat. I had begun my professional career only a few months ago, and already I had two people confiding in me about their impending divorces. We were in the bar for maybe 2 hours. I was hungry. I was pissed. And I sure as hell didn't give a shit about Bill Covey's impending divorce. Larry told Covey he also owned a boat that he kept docked in Dunkirk, New York. He said owning a boat was costly and turned to me and commented that if I wanted to know how it felt to own a powerboat, I could go into the shower and tear up 20 dollar bills. Both Bill Covey and Larry were feeling the effects of their drinks. Covey would eventually get philosophical (completely inebriated) and ask Larry what he "expected out of life." Larry answered, "long weekends and blue water." (I wrote that answer down on a card in my wallet and kept that philosophical response for years.)

It was after eight when we left the bar for one of Bill Covey's favorite restaurants, called Rod's, located near Morristown maybe 20 or 25 minutes away. Bill, drunk as the proverbial skunk, insisted on driving. Covey bragged that the prime rib was the best in the area. Boy, did that ever sound good to me. By this time I was famished. We got to Rod's and we were seated in a room resembling an old railway dining car. The first thing Bill Covey did was to order another goddamn martini. (Sorry for the profanity, but even after 35 years I get aggravated just retelling this story.) By the time Covey was ready to eat, it was well after nine in the evening. They were out of Prime rib. I was not a happy camper, and I think Larry could sense that.

The ride back to the Suburban was just downright scary. I was tempted to take a taxi or just refuse to go with Covey. I remember he was driving a big Mercedes. I was scheduled to head back to Cleveland the next morning. Larry stayed another day. On the ride back to the airport, Larry asked me what I thought about the Covey brothers as reputable representatives of the Hutt pellitizer. I said I wouldn't trust them as far as I could throw them. He thought I was being a bit too presumptuous. He attributed it to my youth and inexperience in industry. Within two years, I would be getting ready to leave Bhopal, India and the Peace Corps. Larry and H.K. Ferguson and Sohio and the Covey

brothers would all be entangled in lawsuits. The Coveys especially, never performed, nor did they produce the Hutt pellitizer. Hutt, the German manufacturer, dismissed the Coveys as their U.S. representatives. I have no idea who got Bill Covey's boat. I hope his wife.

For the next couple of weeks in Cleveland, Larry and I kept in contact over the phone or met at either Sohio's or Ferguson's offices. Larry would express his extreme disappointment over the happenings in Viet Nam. He was against the war in the extreme, mostly from a political standpoint. I too was anti-war, but mostly out of fear of being drafted. Larry was a self described "yellow dog democrat." I probably was too, and this was certainly common ground to commiserate over. Besides, two yellow dog democrats in our profession were rather unusual. Most of the engineers in the corporate office at Sohio were republicans, and I would assume the same was true at Ferguson's offices. Larry and I were indeed rarities, which contributed to the further bonding. Larry once commented to me early in the relationship that he would fight, with every fiber in his being, the urge to get more conservative as one grows older. In fact, he said when he really got old, he hoped to still have the spunk to be out there "bombing" Morgan's banks. If the truth be told today, as I speak, he not only doesn't "bomb" Morgan's banks, but he probably has invested in them quite heavily.

I remember that summer, Larry's family were still living in Warren, Pennsylvania. Larry, my mom, and I attended a lecture Eugene McCarthy gave. We went to John Carroll University, where it was televised via closed-circuit TV. My mom met Larry for the first time. I had mentioned him to my parents many times since that first encounter. He provided great topics of discussion at the dinner table. I was still living at home. I guess I would quote and repeat some of his utterances almost to distraction. My parents thought I was hero-worshipping him, which I probably was. (Some of my friends still think I do). But my mom liked him right from the get-go. She recognized his keen wit and intellect, and also his quirkiness. No one was ever ambivalent about Larry Nault. He was much too strong a personality with strong opinions himself, not to have strong opinions about him. Several years later I would work for him at H.K. Ferguson, and often ran into the "anti" Nault folks. I even inherited some of their enmity for Larry, just by our close association. We worked together for only 6 months or so, before his nomadic

streak took hold of him and he left for another job, but we kept in contact continually. He was and is a good, dependable friend. I often consulted him before any important decisions in both my personal life and professional life. And still do. Later in his career he would become a consultant and work for himself. Years later I would follow in that same path. He described working for yourself, as, “living by your wits” and said it was personally very rewarding if you could make a living this way. I couldn’t agree more. As I mentioned, Larry’s opinionated personality attracted as many detractors as it did admirers. But in all the years I’ve known Larry I have never heard him savagely disparage his detractors. Quite the contrary, often times he would find something quite complimentary to say about them. Even though he didn’t like them on a personal level, nor necessarily respect their business acumen, he found something good about them and would say it. “Rod can be a tremendous pain in the ass, but he’s a damn good structural engineer.” I always found this to be a very admirable quality about Larry. Complimenting his adversaries. When my mother passed away last year, he and his wife Barbara were in their car and driving to Cleveland the moment we were off the telephone.

Unfortunately, not long after our Summit, New Jersey trip, I was summoned back to help Frank Purdy with Oxco Brush. This time I was sent to Cookville, Tennessee. I flew to Nashville on an American Airlines flight and then drove the 60 miles to Cookville. I was sent there to evaluate the polyurethane coating the plant was using to coat their wooden push brooms and brushes. Proudfoot, the efficiency experts, were called upon by Sohio’s management just after the purchase of Oxco, so they had been meddling and snooping around all the Oxco sites. They had recently been to Cookville, where the good old boys of the Cookville facility welcomed them with a shotgun blast through their Ramada Inn window. Rumor had it that the Proudfoot folks took off, never to return. I arrived at the Ramada Inn a few weeks after Proudfoot had left.

I attended a meeting that first morning with the plant personnel responsible for coating and finishing the wooden brushes and brooms, along with their present Urethane supplier. It was obvious that the plant people were very satisfied with the present supplier, very, very satisfied. I would say the relationship was inspired by kickbacks. It wasn’t difficult to figure this relationship out, especially after the urethane supplier wanted to take me to

dinner that evening, which I politely turned down. The plant people implored me to go with the supplier that evening, but I steadfastly turned them down. They pretty much told me that no other urethane coating would work in their production, and they had tried them all. I went back to the Ramada Inn that evening wondering if the good old boy welcoming committee would visit that night like they had done with Proudfoot. There were kickbacks going on here. You could feel it. You could smell it. You didn't need 20 years of industrial experience. So I went back to Cleveland and wrote a scathing trip report.

I gave the report to Frank first and went back to my office. Shortly thereafter, Frank came flying into my office, almost hysterical. "You can't send this out. There is no way I can let this go out. You simply can not write a trip report like this." I wondered if this was the way he discussed Ayn Rand with his wife. "Fine," I said. "Do what you want with it." And he did. He buried it in his files. I guess I should be thankful he had the sense to destroy the trip report. It was rather inflammatory with all kinds of accusations that couldn't be proven. Frank had the good sense to keep it from management. But I really wasn't happy with the work I had been doing at Sohio since I started there. There certainly had to be more to the chemical engineering profession than what I had been exposed to for the past six months or so.

I returned late one evening from another trip to Cookville, on the American Airlines flight. I was depressed. An old college flame I had been serious with recently got married, and the Oxco Brush people had completely beaten me down. I boarded the Nashville flight bound for Cleveland, sat near the back of the almost empty plane, and began to write some blank verse poetry. I had been reading Rod McKuen as the Smith College instructor had suggested, and liked his style. (Later, as I got older, I thought his poetry was dated for the 60s generation.)

I was writing something about the tall, attractive stewardess. The plane hadn't yet moved from the gate. I was totally involved in the process when I heard the voice behind me say, "I write poetry too." I turned around and there was the tall, blond stewardess I was writing about, peering over my shoulder at the lines of poetry I was scribbling down. I would have thought she was pretty damn nosey, if she weren't so damn pretty. We spoke briefly and she took off for the front of the plane to finish her chores. Later in the

flight, she sat down in the aisle seat in my row, I was sitting by the window. She handed me a poem she had scribbled down on some American Airlines form. She tore off a corner of the page and wrote the following poem.

*I, a thief, embezzled time.  
And down a blackened silence bled.  
But foolish being that I am,  
It trickled through these clumsy hands,  
And in despair too late I found,  
I loved a thing that was not mine.*

(I still have that torn-off corner of the page and the poem. I recite that poem before I take off on any plane, usually on the tarmac just before the plane revs its engine.) I have ever since that flight landed in Cleveland.) The stewardess's name was Nancy Richey. She declined my offer for a drink after the plane landed. I went to the Sohio offices the next morning with a kinder gentler trip report.

It was already October. I had been at Sohio since April. I distinctly remember I came back from Cookville in a somewhat befuddled state of mind. I had just received my copy of Crane Technical Paper 210: *Flow of Fluids Through Valves, Fittings, and Pipes*. A classical technical publication from Crane (The same folks that make all those home-plumbing fixtures) used by engineers the world over to calculate pressure drops in piping systems. I had ordered a copy and it finally arrived. The price listed on the inside cover was two bucks. Of course now, the entire contents of the pamphlet are on a CD. I have no idea what it costs today. I looked at the orange colored booklet and wondered when I would actually have to use it. Except for the original assignment Oscar gave me to perform the heat and material balance, I hadn't made a single, simple calculation. The closest I came to a legitimate engineering calculation was the yearly cost of the Urethane coating the Cookville plant required for their brushes. And that "calculation" never saw the light of day because it was part of the trip report Frank Purdy was traumatized over and had long ago buried in his files. The only things I looked forward to while working at Sohio were the weekly poker games some of the newly employed college recruits organized. A rite of passage for all newly employed college graduates. The phone suddenly rang and interrupted my reverie.

Nan Harris, from Washington D.C. called to let me know I had been selected for a Peace Corps program that had been organized to utilize professionally trained engineers and business majors with industrial experience. The service would be in India. She wanted to know if I would be interested in joining up. She needed an answer by the end of the week. (I think she called on a Wednesday or Thursday.) Talk about being shocked out of a reverie. This requires some explanation.

My senior year at the University of Pittsburgh, actually that last summer trimester, was a bit unnerving. I had just broken up with my girlfriend and out of sheer frustration, filled out an application to the Peace Corps. I had completely forgotten about that application until Nan Harris called. She called my home number first, and got my office number from my mother. I told Miss Harris I would get back to her later in the week. I needed some time to think about the situation. I was tempted just to tell her to forget about it, I wasn't interested. But the present circumstances and frustrations with my job, coupled with just the uncertainty of the times, told me to give this a bit more thought.

By noon I had decided to join the Peace Corps. I needed a change in my situation. I needed a challenge. I needed an adventure. I thought the Peace Corps might be able to provide all three. After lunch I walked into John Graham's office, he was the Manager of Engineering, and told him of my decision. He thought I was nuts, I'm sure. But of course no one at Sohio talked like that. So he just thought I was making the wrong decision and that as far as my technical training was concerned, I would, in his words: "Be re-inventing the wheel." I thanked him for his time and told him that Friday would be my last day. He wished me well and I headed over to Stan Arthur's office. Stan also wished me well, along with Oscar and Frank Purdy. (I think Frank was somewhat relieved to see me go!) Then I called Larry Nault. He was not that supportive. In fact he thought I was nuts and said so. He thought it would be a setback to my career. Certainly in a technical sense. He too used the same phrase John Graham used, "reinventing the wheel." The only thing left to do was tell my parents of my decision, and sell the new 122S Volvo I had recently purchased.

Neither one was as difficult as I first thought they'd be. My parents didn't try to influence the decision one way or another. They could see I was serious, and understood the present situation. My mother was concerned that I'd be 10,000 miles away in some

country that she only knew about as being, hot, poor, and snake infested. She tried to conceal those concerns when she asked if this is what I really wanted to do. But neither she nor my dad ever tried to convince me not to go. As for the Volvo, Stan bought the car and we transferred titles by Friday, my last day at Sohio – for the time being anyhow. By the middle of the following week, I was ensconced at the Sylvania Hotel in Philadelphia, Pennsylvania with three other roommates, in the middle of orientation, waiting to travel to Lexington, Kentucky. Then off to Lexington for three months of training waiting to be selected to enter the Peace Corps, travel to India, and solve all of India's' chemical industry problems – in two years. Of course, I had absolutely no industrial experience to speak of. I was a chemical engineer in degree only. I felt confident, however, that I was capable of lending a sympathetic ear to any Indian who wanted to talk about his impending divorce.

### 3. Bhopal, India 1969

This should easily be the longest chapter in this book. It will not be. It may well be the shortest. I have already written about my Peace Corps experiences in another book titled: *The Human Race: An Outsider's View*. So I would encourage the reader who finds this chapter interesting but wants a more detailed description of the experience, to read that 216-page book.

The two-and-a-half years I spent in the Peace Corps training, serving, and traveling after the service in India impersonating Ernest Hemingway, were by far the most important and exciting and meaningful experiences in my almost 60 years on this planet. Take a twenty-three-point-five-year-old, middle-class, rather provincial, highly impressionable, college-educated lad with no industrial experience from the suburb of Shaker Heights, Ohio, and plop him down in Bhopal, India, and you should have the makings of a Rudyard Kipling novel. And you did. Except the story of those 30 odd months was not fiction. It was very real.

I feel confident, after 40 years in the business, that I can say now, approaching the age of 60 more rapidly than I care to admit that the Peace Corps experience continues to affect me in positive ways I never thought would be possible. And I overcame the many challenges, while I was serving and surviving the 112 degree temperatures, bouts of dysentery, monsoon rains, malaria, and a technical challenge that refuted both John Graham and Larry Nault's comments about "reinventing the wheel".

Besides the emotional and psychological challenges India and the Peace Corps provided, the technical challenges my project would provide would be greater than any I would face over my entire career. Overcoming all these challenges, especially the technical ones, proved to be very rewarding and satisfying. So this chapter will emphasize the technical aspects and challenges of my Peace Corps experience, remembering, however, what my good friend, whom you will meet in the next chapters, Joe Viola, used to say: "You can't separate the experiment from the experimenter." You can't solve technical problems in a vacuum. Solutions to technical problems are indeed dependent on the environment in which they are to be solved: both the physical environment and the emotional environment. Personalities do matter. They affect any

solution to the problem. In later years, in similar chemical plant operations, I might suggest a less “elegant” solution because the plant’s maintenance people just didn’t have the capabilities to maintain the instrumentation. And with that rather lengthy preamble/qualification/disclaimer, let’s talk about what I did as a chemical engineer for two years in Bhopal, India.

I arrived in New Delhi, India, on February 3, 1969. I had finished my three months of training back in Lexington, Kentucky and made it through the selection process. I was officially a Peace Corps volunteer. The three months of training was mostly a useless exercise. I didn’t know what a Belt-way bandit was back in 1968, but I’m sure the company that got that government training contract would have fit that description perfectly.

The language training was, however, an exception. I was terrified that I was expected to learn Hindi well enough to carry on a simple conversation in those three months. I thought, foolishly, that this could be a reason to be de-selected. My past history with foreign languages wasn’t all that successful. One could reason, in some strange, weird, serendipitous way, it brought me to this present set of circumstances. But I defied the odds. I actually did quite well in the language program during training. The Indian languages were taught by Indians, using a technique known by the acronym: HILT, standing for High Intensive Language Training. Basically it was 8 hours a day of the instructors immediately conversing with you in the language you were going to speak in India. No writing, no reading, just conversation every day, including weekends for the first month, then maybe tapering off to 4 to 6 hours a day for the remaining two months. It was definitely intensive. And I did fairly well on the final State Department test given to all trainees near the end of training.

So in the brilliant mid-afternoon sun I stepped off the Air India jet onto the tarmac of the New Delhi International Airport ready for the challenge and adventure awaiting me. I would not be disappointed. But first, three days of orientation in New Delhi, which included meeting the ambassador, Chester Bows.

There were three groups that trained for different parts of India back in Lexington. Each group had about ten volunteers. One group would be sent to the state of

Maharashtra, where the City of Bombay was the capital. Another group would be going to the State of Madras, now called Tamil Nadu, where Madras was the capital. My group would be going to the state of Mahdya Pradesh, where Bhopal was the capital. After the New Delhi orientation, the groups were sent on to their destinations. My group and the group going to Mahrashtra would have two more weeks of useless, senseless training in Hyderabad.

As I mentioned before, this Peace Corps program was considered unique. Unique in this respect: in the Peace Corps of the 1960s, most people entering the service were considered “generalists.” A “generalist” was defined as a new college graduate in liberal arts with no specific life experiences. Our group, composed of engineers and business majors, also with no life experiences, was considered unique in that we weren’t just liberal arts graduates. (Two engineers in our group were in their 40s and did have some practical experience.) So the Peace Corps really over-sold this concept to the Indian Government.

I made some close acquaintances in the other two groups back in Lexington who, during the course of the next two years in India, would become good friends. When we parted in Delhi and then Hyderabad, I felt a little lonely and insecure, traveling to my final destination and the city that would be my home for two years, Bhopal.

According to a diary I kept for the first nine months of my Peace Corps service. India-76 arrived by train in the Bhopal rail station early on Monday morning February 24<sup>th</sup>. It was a glorious day. Bright, blue, sky and already quite warm. Bhopal had a regional Peace Corps office, so several staff members met us at the train station, along with several volunteers serving in the area. We would be staying with several local businessmen until permanent sites and housing could be located. Myself, along with three other volunteers, would be assigned to the State Industries Department in Bhopal. The other six volunteers in the group were dispersed to other sites in the state.

After several days staying with our respective businessmen, Dev Chopra, the assistant regional Peace Corps director, showed the Bhopal volunteers to our new housing, if you could call it that. It was in an area near the rail station, just about a half mile from the infamous Union Carbide facility. (Almost everyone living in that area perished during the 1984 disaster.) It was simply a hideous section of the city with a communal water tap

and no real plumbing of any kind. We were told, back in training, that this Peace Corps program would provide the volunteers with a higher standard of housing than the Peace Corps was noted for. If what Dev Chopra was showing was this “Higher” standard, God help the other volunteers. I would have rather stayed in a village straw hut than what we were expected to live in for the next two years. I brought with me all my college textbooks, thinking, foolishly, they might be of great help in this assignment. One look at these one-room, dirt-floor, concrete structures, with no plumbing and corrugated asbestos roofs, and I realized there wasn’t even any place to put these books. We had been hoodwinked. One of the volunteers, a mechanical engineer from Michigan, Sheldon Wollberg, just flatly refused to stay there and the rest of us soon joined in the chorus. So Dev backed down, and we were put up at a Catholic Ashram till “suitable” housing could be found – which was about three weeks later.

(Just as a side note: We would later find out from the secretaries at the Peace Corps office that Chopra was just being cheap and trying to save some money thinking new Peace Corps volunteers wouldn’t have the guts to reject the housing. He was wrong. Believe me when I say this area of town was just plain bad. Later in my service I would befriend a volunteer living in a village leading the life most people in the States thought Peace Corps volunteers lived back in the 60s. His domicile for two years was a thatched roof hut and a dirt floor, but it was a clean, livable space compared to that housing Chopra showed us when we first came to Bhopal. (I stayed with him for a weekend to get a sample of village life.)

A couple more weeks trapped in the Catholic Ashram, where the sisters were just marvelous to us, and we were assigned more suitable housing. Indoor plumbing, separate bedrooms for me and my roommate, Jack Willete, a native of Bangor Maine. Simple kitchen, living room and shower room. It was really quite livable, especially compared to that first nightmare we were shown. Of course there weren’t any modern conveniences – no refrigerator, hot-water heater, telephone, TV. (There weren’t any television stations in India at the time, anyway) Electricity was a crapshoot. Water was turned on for two hours in the afternoon, but we did have a concrete storage tank on the roof. All water, for drinking or cooking, was boiled for 40 minutes minimum. When we went out in the city, drinking water was also a crapshoot and rarely tried. Mostly I drank cokes in the city.

Occasionally when traveling, I drank the water. Sometimes I paid for it; sometimes I didn't. Our transportation was a gear-less Indian-government-provided bicycle. All in all, the accommodations were more than adequate and no one was complaining. This was the Peace Corps, after all.

Even though I was assured by an Indian friend of mine at Sohio before I left that I wouldn't see any snakes in Bhopal unless I went out in the country, he was wrong. On several occasions we saw snakes, one supposedly quite deadly, within feet of our front door.

One of Jack's and my great good fortunes was how we obtained our fabulous cook, Nuru. Two volunteers who were getting ready to leave Bhopal asked us if we wanted to try their cook some evening. We took up the offer and Nuru (As far as I know, Nuru only had one name. If he had a last name, we never found out what it was.) cooked us one incredible meal of hamburgers, French fries and a golden brown gravy. For dessert he baked a chocolate cake. Jack and I thought we must have been in a dream. As soon as those volunteers left Bhopal, Nuru came to live with us. It is the single reason why I not only survived in India for two years, I thrived – I even gained ten pounds. There were other reasons and other people who contributed to this, but Nuru was certainly a major reason for making the adventure so memorable. (Every volunteer had a cook in India, even those who lived in the villages. It was a necessity. Buying, cooking, and preparing meals in India was an all day job.)

I was about a week late in moving into our home. The reason for this is that I came down with malaria. The basic reason I came down with malaria was stupidity. I simply never took the prophylactic medicine the Peace Corps gave us, Chloroquine tablets. I was pretty sick, to say the least, and it was the only time in India when I really wanted to go home. It took about 10 days to stem the malaria, but it took months to get my strength and weight back. Approaching the hot season, where daytime temperatures hovered between 105 and 110, just made the recovery that much more difficult.

Jack and I and the other two volunteers living in Bhopal – not even a quarter mile from me and Jack – were assigned to the local State Industries Department. Their offices were located about a mile from the Peace Corps offices and maybe five miles from our home in a section of Bhopal known as Malviya Nagar. I guess you could say we lived in

the Heights. Each morning we would drink 3 glasses of water and get on our trusty Indian bicycles, drive down the hill, through the city and over to the Industries offices. Here we would sit for 8 hours reading over proposals for projects the Industries Department was contemplating either funding or joint venturing with private industry. This was the deal the Peace Corps had cut with the State government of Mahdya Pradesh. The Peace Corps would recruit engineers and business majors, supposedly with years of experience, to work with the engineers and business majors of the State Industries Department. The average age of all four of us was twenty-three point five. We had no experience. We had no idea of what the hell we were doing or what we were supposed to be doing, and neither did our Indian counterparts. It was ridiculous. If anything, our lack of industrial experience made us downright dangerous. Our Indian counterparts had more experience than we had. By the end of that first week, the Indians weren't even coming in to work with us anymore. We just had these piles of project files, bound together with twine, in the old British Raj tradition, just sitting at this large table in this large cavernous room, with a single ceiling fan useless against the oppressive heat of an Indian hot season. There was no way this could continue for two years, although I'm sure the Indians and the Peace Corps wouldn't have objected if we had just sat there and kept our mouths shut. We could barely make it one week, let alone two years.

Jack Willette, my laconic Maine roommate, just blurted out, in that perfect down-east accent. "This is bullshit." Jack was listed in the Peace Corps profile of our group, which had been given to the Industries department – complete with picture – before we came to Bhopal, as having had marketing experience with a large American refiner. This was how Jack, age 23.5, wrote up his summer job at the locale Esso (Exxon) station where he pumped gas.

Jack and I just stopped even going to the Industries' offices after that first week, hoping we could concoct another plan, maybe just going out to the Industrial Estate, located a few miles out of town, where small and medium private industries were located. Maybe we could be of some help to the local businessmen who put us up those first few days in Bhopal. Most had their small business operation located in this industrial area, known as Govinpura. But of course, we both knew we had absolutely nothing to offer

these people in terms of any experience in our respective disciplines – i.e. chemical engineering or marketing. We were both frauds, and we knew it.

Fortunately, I would find meaningful work based on my summer jobs making roof coatings at a plant where my dad worked and was a part owner. Jack would, unfortunately, leave the Peace Corps that August, only 7 months from our arrival in early February.

The first month in Bhopal, after recovering from malaria, but still feeling less than 100%, I took stock of the situation and realized there was no way to stay in the Peace Corps unless I had a meaningful project. The Peace Corps wasn't going to provide one, and it didn't appear the State government would either. Some volunteers who also came to this conclusion began to travel in India to take in as many sites and sounds as they could. This was termed "casual leave" by the Peace Corps and highly against the rules, but everyone did it and the Peace Corps seldom discharged volunteers for leaving their assigned sites and taking "vacation." My roommate Jack and several other volunteers from our group took off for Bombay. They were gone for several weeks. No one missed them at the Peace Corps office. I would have gone with them except I still wasn't feeling well enough to travel. And traveling by third class trains, local state transport buses and an occasional bullock cart was no way to completely recover from the effects of full-blown malaria – especially in the hot season. So I stayed in Bhopal and toured the local sites.

Some volunteers in our group, with no real project, just continued to travel and take casual leave. At first, with everything in the country being so new and unusual, traveling was one adventure after another. But after a while, traveling under these conditions is just one giant pain in the ass. Eventually, you get fed up with traveling and eventually leave the Peace Corps. If you don't have any viable work in India – a job, so to speak – there is no way you will make it for the two-year assignment. Only three of the 10 original volunteers in our group stayed for the two-year assignment. The other seven left by the end of that first year. I saw the writing on the wall very early.

Well aware of the limits of my chemical engineering skills and experience, I thought about trying to entice one of the local businessmen, who befriended us when we first came to Bhopal, into a small production facility for making the aluminum roof coatings I

had helped make during my summer vacations. Here was an area where I at least had some expertise. And, I rationalized: whatever expertise I didn't have I could get from my dad and the people at the plant back in the states. I knew that making the coating only required a mixing apparatus. There were no complicated chemical reactions or processes in the manufacture of the roof coatings. In addition, the aluminum roof coating would reflect the sun's heat much better than the traditional black coatings that it seemed the Indians were using. Now I just had to find a likely candidate who would "buy" into the venture.

I admit, a good deal of my motivation was strictly personal. A project of this nature would keep me busy and occupy the entire time I would spend in India. (Little did I know to what extent!) I suppose you could even say the motivation was selfish. I did not join the Peace Corps to fight the world's poverty. I already admitted my motivation for joining. There was no altruism connected to my joining the Peace Corps. No *noblesse oblige*: the Horwitz family had neither the rank nor the wealth.

After describing my plan to one of the volunteers in Bhopal, Tom Griswold, he thought that it was right on the mark – but perhaps a bit self-serving, which, of course, it was. But he agreed with my objective wholeheartedly. Now all I needed to do was find the right local Indian businessman. Enter Sajjan Lal Jaiswal.

Sajjan Jaiswal was one of the local businessmen in Bhopal who graciously offered his help in getting the newly arrived Peace Corps volunteers accustomed to their new surroundings. He spoke excellent English and showed a genuine interest in our well-being. I would guess he was in his mid-forties and had three young children; the oldest, his son Bunty, was 10. He also lived right behind the bungalow I was living in, which made it very convenient. I had no idea if he would be interested in manufacturing the aluminum roof coating. He was presently manufacturing armatures for the indigenous Indian automobile, the Ambassador. As best I could tell, business was not going that well for him.

One evening I walked behind our bungalow over to Sajjan's and we began talking about the project and wondered if he knew of anyone in the Industrial Estate who might be interested in starting a project like this. He immediately asked me not to go to anyone else, saying that he himself would be interested in starting a roof coating manufacturing

plant. I sort of suspected this would be his answer, but I didn't want to approach him directly. This is why Tom Griswold thought my methods were a bit devious. It worked out well for both and me and Sajjan. I desperately needed this project if I were to stay the course and complete my two years in India. Sajjan Jaiswal would eventually have a successful aluminum roof coating business. It wasn't, however, as easy as I just made it sound.

I immediately wrote home and asked my dad for all the formulations of the various coatings they manufactured. Then I had this brainstorm. In addition, I asked him to ask the president of the company if we could form some type of a technical collaboration with the soon-to-be-formed Indian company. No money would change hands. It would just be a kind gesture on my dad's company's part. I knew it would be greeted with great enthusiasm by Sajjan. Companies in India that could claim a technical collaboration with an American or European or Japanese firm had immediate credibility and respectability. My dad sent the formulations and a letter I composed announcing the technical collaboration between the two companies. The president of my dad's company agreed to the free exchange of technical information. And better yet, we could advertise that collaboration on all labels and printed material. Jaiswal was ecstatic when he was informed of the collaboration and saw the accompanying letter. This really started to move the project along.

I needed a makeshift lab with beakers and weights to check the formulations with the Indian raw materials. We drove into the central market and obtained the necessary glassware and weights and measures. The formulations required a cut-back asphalt which we couldn't obtain locally. A cut-back asphalt is a solid asphalt material reduced to liquid form with mineral spirits. We could obtain the solid asphalt, but not the proper solvent for cutting it back. I decided to do some home experimentation so I melted the solid asphalt on our two-burner gas stove. The vapors caught on fire; and as I panicked I knocked the container of burning asphalt onto the kitchen floor. Dousing it with water of course just exacerbated the situation. Our bungalow was constructed of concrete, but I was trying my damndest to burn it down. Nuru, hearing my panic, eventually came to my rescue and calmly smothered the flames with a wet towel. (Who had his degree in Chemical Engineering?)

The formulations from the states would have to be revised for both the Indian climate and the differences in the raw materials, but after a month of testing we finally came up with a product similar to the samples sent to us from my dad. I'm leaving out some of the local frustration, but you can read the detailed account in my book. Things happen at a slower pace in India. Much slower. For an "A" type personality such as myself, it took some getting used to.

I did most of this work just before the monsoons arrived in late June. Sajjan was trying to get another shed from the state government Industries Department. The same Department we stopped going to after that first week. The Director of the Department, a splendid chap by the name of Verma (pronounced Varma), didn't seem to hold it against us, and was very supportive of this project. We would get the industrial shed during the monsoons and begin making our first batch of aluminum roof coating just after the monsoons ended in September – as soon as we got our mixer.

I just assumed that once I got the specification of the mixer from the states, Jaiswal would have one fabricated. I got the tank, motor and tank internal specifications and priced them for the Indian market and passed those costs on to Jaiswal. This was when I found out Jaiswal wasn't in the best of shape, financially. He said there was no way he could afford those costs right now, and asked me to scale everything down and design a mixer for him.

About this time, I got a new roommate. A volunteer in our original Lexington training group was held back because of draft board problems. Eventually he received permission to go to India and wound up both living and working with me on the roof coating project. His name was Douglas Burns Chaffee, a recent law school graduate of Northwestern and a godsend to the project. Doug took over all the non-technical aspects. He helped Jaiswal with getting loans from the State Bank of India. He helped in the marketing and obtaining manufacturer's representatives. He wrote to the U.S. ambassador imploring him to help this fledgling company get off the ground and secured a huge order that all but put Aluminum Coating Manufacturers of India (ACMI) in the black. Now I could concentrate on designing the equipment necessary to make this material.

I started with the concept of a 55-gallon drum (200 liters in India, or litres, to be more British). I drew up a 55-gallon drum with a heavy-duty two-speed drill mounted on the

top. I copied the two-paddle mixer design I remembered during my summer jobs and also designed some stationary baffles welded to the tank walls to promote good mixing. I had no idea if the 2-horse power drill, which we could obtain locally, was big enough to mix a 45-gallon batch of this highly viscous material. But I rationalized that we could mix the material incrementally, in stages, using some of the solvent to get the solids into solution. Instead of the 100,000 rupees (about \$10,000) the original design called for, the 55-gallon drum mixer could be made for 2,500 rupees (about \$250).

I showed my sketches to Sajjan and he seemed quite pleased. We purchased the heavy-duty drill and I took my sketches to a local fabricator to get the mixer and baffles and tank fabricated. It took several weeks to get the archaic fabrication shop to get the mixer fabricated. I was not too patient, and passed by the dirt-floor shop daily to inquire as to the progress. It would always be ready “tomorrow.”

Finally we received the mixer with its mounted heavy-duty drill. By this time Sajjan had employed Nuru’s brother as a worker in our new shed. We were ready to make the very first batch of aluminum roof coating. The mixer worked flawlessly. We made 8, 5-gallon pails (20 liters) per batch. It took about 45 minutes to make and properly mix a batch. We could make six to eight batches per day – fifty to sixty pails a day – more if we wanted to work an extra shift. For the initial orders, this mixer proved to be more than sufficient. We improved the production by replacing a standard type twist valve used to empty the mixer contents into the 5-gallon pails. Turning the valve on and off was way too time consuming. I needed a one turn quick opening valve, but couldn’t find one in Bhopal, and didn’t want to wait to order one from Bombay. I went back to our friendly fabrication shop, where he miraculously had a precision grinder, with a sketch. I designed a quick opening valve made from two flat steel plates. The grinder precision-milled the surfaces so they wouldn’t leak. The valve also worked flawlessly. “Reinventing the wheel,” well, maybe so, but one can sure gain a lot of confidence “reinventing the wheel.”

Let me end this Peace Corps saga. Aluminum Coating Manufacturers of India is still in business some 35 years later. They have two 500-gallon properly fabricated mixers. I’ve seen them. I went back to visit Sajjan in 1980. (But the original 55-gallon drum mixer was still prominently displayed in the shop. Sajjan said he couldn’t part with it. It

had served us well, he said. Indeed it had!) Sajjan Jaiswal passed away in 2002. His son runs the business now. I was 24 years old when I began working on that project. I doubt, at that age, that I could have started up that business back in the United States, yet alone in a country where I was so unfamiliar with customs and business practices. I doubt, with my 40 years of experience, that I could go back to India and would ever consider fabricating a mixer from a 55-gallon drum. I would most likely insist on a properly fabricated mixer, and would have waited for a quick opening valve from Bombay. Sometimes, under some circumstances, experience can be a double-edged sword.

I left India after two years and completed my Hemingway impersonation, traveling through East Africa on a Honda motorcycle for three months, and returned to the States brimming with confidence. I was eager to begin my professional career as a chemical engineer. Unfortunately the year was 1971. Jobs for engineers, especially chemical engineers, especially chemical engineers returning from the Peace Corps who had probably spent their time “reinventing the wheel,” were nonexistent.

(I would hear about the 1984 tragedy at the Union Carbide chemical plant while I was at my desk working for the H.K. Ferguson Corporation, an engineering and construction contractor. My friend Terry Mackey called me up in the middle of the day asking where I was living in the Peace Corps while in India. When I answered Bhopal, he relayed the information he had heard about the tragedy. Before that day was over I received inquiries from all three major networks asking if I would comment on the happenings in Bhopal. I declined. I didn't have any information, and I was too upset to make any statements. The first thing I wanted to do was to make sure my friends over there were alive and well. They were. The major networks found out by inquiring at the American Institute of Chemical Engineers. I had just written an article for their flagship publication, *Chemical Engineering Progress* (CEP) about my Peace Corps experiences.)

**For the rest of this story, please contact the author.**