

Denise Feirstein

Reflective Essay

AP Chemistry

6/6/06

It is hard to imagine that on Friday May, 26, I met and spoke with an engineer as influential as Roy E. Anderson. This man, even after he retired, worked well into his 70s developing and advancing satellite communications and geographical positioning technology. When Anderson first began his work developing GPS he had no idea it would become what it is today. The only hopes he and his peers had at the time was to develop some sort of technology which would cost thousands of dollars and be anything but handheld. Today, you can buy a portable GPS from a catalogue and have it delivered in the mail. Looking at Anderson's experience only makes me itch to see what future technologies are in store for the next generation. His story also shows that you never know what your contributions might lead to.

Although Roy E. Anderson had an amazing life story it would not have been nearly as inspiring if it hadn't been done in an oral history form. Talking face to face with him about his life was nothing like reading about his accomplishments from a book. He talked about what interested him. Although the inner workings of a satellite don't often interest me, when Anderson was passionately describing his work I couldn't help but be captivated.

I also got to meet the person behind the scientist. I will never forget the story he told which showed even those working in an intense laboratory set up like to slack off and have fun too. As he told it, one day his coworkers and he decided to take a long lunch break to go sledding, so they threw a bunch of their children's sleds in the back of a car

and drove off to a nearby hill to sled down, and when he returned to work late, he got yelled at by his boss. Even those who invent technologies as advanced and influential as GPS are allowed to slack off once in a while. Another story Roy E. Anderson shared which showed his human side was when he began talking about other scientists, especially those in the field of nuclear science. He wasn't ashamed to admit that the subject went way over his head. While it was comforting to know that even those as smart as Anderson don't understand everything, it is unsettling to know there is still so much to know beyond us.

I was a little disappointed Roy E. Anderson didn't have any real dirt on the Dudley curse. Although he did describe his involvement with the Dudley Observatory as "turbulent," he didn't have much to say about the curse besides a story which involved flirting of some sort. I guess the mystery of the Dudley Curse will never be totally revealed.

All in all, I believe this oral history project was an excellent way at looking at science from a different point of view- the past. I believe there is only one way to prepare for the future, and that is from knowing our past. By learning from the experiences of Roy E. Anderson and others who want to share their life's story, we can be better prepared for what is to come in the future. I also hope our work will benefit the Dudley Observatory's Archives for those who want to learn of the people behind the scientists for generations to come. Even if the Dudley Observatory is no longer a functioning observatory it can still leave a lasting impact on society like it has on our Chemistry class.

Emily Caracandas  
AP Chemistry  
6/6/06

When our AP Chemistry class was first informed about a field trip to the Dudley Observatory to learn about an oral history project, I have to admit that I was a bit confused. I had heard of oral history projects in the past, but I never really knew exactly what they were, what qualified as an oral history project, or what the process of completing this sort of project entailed. However, I was definitely intrigued at the prospect of a new sort of research project. When my class and I arrived at the observatory for our field trip, all of the information was overwhelming at first. I found myself wondering how I was going to sort all of the information out and come out with a product that would be beneficial to the project, no matter how small of a part of the whole that it may eventually become.

The whole process, to me, was fascinating and rewarding. Besides the fact that I was participating in the start of a project that would be continued by many people in the future, I was looking forward to the opportunity that my group and I was going to have to interview a scientist, Roy E. Anderson, who did many great things during his career. The interview wasn't what I had expected, meaning that I thought we were going to discuss the Dudley Observatory in more depth, but I really enjoyed hearing about the accomplishments in his career that Mr. Anderson was most proud of and passionate about. He also provided some funny anecdotes about people and events during his career that I thought definitely added an extra something to the interview. Although I had hoped that we would hear some more details about the "Dudley Curse" that we had heard only a

little about during our field trip, I understood that it was probably an area that isn't necessarily the most comfortable for a former member of the observatory to discuss.

Overall, I would have to say that my experience working on a part of an oral history project was not only an interesting learning experience, but a rewarding one as well. I don't know if many high schoolers across the country participate in oral history projects, but I certainly felt like this was something that added a unique flair to my list of high school accomplishments. I think it will be fun to see where this project goes within the next couple of years, and all of the information that will be shared by numerous people who all have one thing in common: at some point, they knew someone who was or were themselves affiliated with the Dudley Observatory, no matter how big or small that affiliation may have been. I think of it as an honor to have been involved in the beginnings of this oral history project, and also as a great way to end my high school career.

Matt Baboulis

AP Chem/Reed/1

6/6/06

How would you like to somehow interview Albert Einstein, Isaac Newton, or Louis de Broglie? How about Marie Curie, Mendeleev, or Rutherford? What about Roy E. Anderson? I must admit, when I heard that we were going to interview a scientist in his eighties that I had never heard of, I was not exactly excited. I figured there really wasn't much I could learn from him. Surely, I'd find out he did something relatively interesting, and then we'd go our separate ways and I wouldn't really care too much. It turns out that I was wrong. The one word that comes to my mind when I think of Roy is not "old" or "boring" but, surprisingly, it's "cool".

Our group came to find out that Roy helped in the invention of the GPS system. This is not what makes him such a great guy to interview, though. The way he carries himself with a soft, unassuming voice despite his great accomplishments is a representation of the person he really is. When I think of big time inventors and scientists I think of people that devote their entire life to science. They don't need worldly pleasures and all they do is sit in the laboratory with smoking beakers shunning the world around them. Roy turned out to be anything but a hermit. He was very smart, but also quite comical and worldly. He was able to put things in terms that a high school student could understand. This is quite a feat since I don't understand what my grandmother is saying when she is talking about everyday things. Roy was able to put a very complex invention in a combined intelligent and layman way.

The stories that Roy told about the process of inventing something as monumental as a GPS system showed that he was a very hard-working man. There is no doubt that scientists who do big things have to have an extremely good work ethic. They also have to be patient, as they will fail over and over and over again. If we think back to historical experiments, we realize the determination and meticulous nature of the true scientist. Rutherford's gold foil experiment, for example, had thousands of particles go straight through for every couple that were deflected. It takes keen observation to notice something as seemingly insignificant as that. Chemistry in high school is interesting and fun, but the answers are there for us to learn, not to discover. We do experiments with some kind of knowledge of what the answer will be. It's a great way to learn, but doing experiments without an answer key is a whole new ballgame. Roy was able to accentuate my belief in this by telling stories that had specific unforeseen problems. An example of this is the problem they had with the craters on the moon making it hard for a ray to bounce off and be received clearly.

Roy showed us that science is a very difficult field to be successful in. It takes lots of work and it isn't all fun and glory that we read about in textbooks or *Crucibles*. This is what makes science so rewarding. Only a few succeed in finding something important or instrumental and only after an incredible amount of resources, time, and effort are put into it. The only way that it is possible to succeed is to have a deep love of learning and discovery. Judging from the healthy form that Roy is in, and his fun-loving nature, I'm pretty sure that Roy Anderson loved every minute he spent working in his lab.

Robert Hoffman  
AP Chemistry Period 1  
6/7/06

Reflective Essay  
Roy E. Anderson

During my hour and a half spent with Roy E. Anderson the image that stands out most clearly is the idea of Mr. Anderson and a coworker, a fellow scientist, skipping off work at his lunch break to go sledding, and then returning late, sheepishly explaining to his boss where he had been. The twinkle in his eye as he told this story was, in my opinion, the entire reason behind doing the interview, as it was one of the few things that we could never have found on the internet or read about in a text book.

It was interesting to me, however, that it actually took quite a while to get Mr. Anderson to open up and share stories such as this. At the beginning of the interview, for example, when he was asked about his early in life in hopes that he would share some interesting anecdotes from childhood, he said only a few words and then immediately launched into a seemingly pre-prepared which glossed over his early life and his college experiences and immediately focused on his career (and particularly his work at GE). Upon further prying, however, we did manage to get him to feel more comfortable answering question in a more personal manner.

Another highlight of the interview, for me, was when we discussed the atmosphere in his lab upon the launch of the Soviet satellite Sputnik. It was fascinating to hear a firsthand account of what would have gone through a competing scientists mind during the cold war. He seemed, from what he said, that he managed to be to be simultaneously happy at the scientific feat of successfully launching a satellite, enticed by the potential implications of the satellite, and jealous that his people had not succeeded first. This was interesting when contrasted against learning about Sputnik's launch in history class which primarily looked at the launch from the point of view of the Soviet Union's winning part of the space race whereas, from Roy's standpoint, it was more an achievement for the scientific community as a whole than for simply the USSR.

Another notable quality about Roy was that he was extremely humble about his accomplishments. This was exemplified when he discussed awards such as being an ION Fellow, and IEEE Fellow, and numerous other such awards, which he acknowledged he received. He would, however, not dwell on them. When discussing his work he frequently stated that while his work was cutting edge at its time, it is now, for the most part, it only scratched the surface of the potential of satellite technology. This was exemplified when he discussed the dinner conversations he would have with his son in law, a physicist, who, according to Roy, knew way more than he did. It was nice to see such humility in such a well-accomplished scientist.

It was also interesting to hear Roy speak on his experiences on the board of the Dudley Observatory. The observatory was, clearly, something that had been and still was very important to him as showcased by his long tenure on the board of directors. He laughed when asked about the Dudley Curse, and, while he was unaware of his origins

(he had no idea what we were talking about when we asked about the director being thrown in to the snow), he did acknowledge that there had always been tension between the board of directors and the owners. He stated with a gleam in his eye (that showed us that he wasn't telling us all of the details that he knew), that there was frequently tension surrounding the lab.

Roy appeared most passionate when discussing both his work at GE and his own satellite telephone company that he helped to start. It left me, and most likely all of the students, slightly awestruck when he began discussing his early work in satellites and we began to piece together how integral those original ideas and inspirations are now to our current way of life. Satellite technology has become omnipresent – it exists in our cell phones, in our cars, our televisions, and innumerable other technologies. His current satellite phone company, though it is currently being out competed by larger multi-national corporations, was an innovator in satellite phones. The entire time Roy was reliving his work, he seemed to smile in remembering the thought process that went into bringing his ideas to fruition.

As I stated before, however, the highlight of the interview, for me, was near the conclusion when I asked him to tell us more about the non-technical aspects of working in his field. He made us laugh with the story about sledding and another about canned corn (which I can't seem to remember fully). He made it seem that, though he was working, he had truly had fun over his career. The interview was, overall, an excellent mix of the technical aspects of his work and the human side. It was funny when, in closing, we asked him whether there was anything else he wished to say and he responded along the lines of, "I've rambled on long enough." What he saw as ramblings were, to those of us who weren't world-renowned scientists, fascinating insights into the world of scientific research. It was a great experience that I believe future classes should try to experience as well.

Rebecca Kolakoski

AP Chemistry

Tuesday, June 06, 2006

When I first heard about this project, I was skeptical. Not a soul in Mr. Reed's Advanced Placement (AP) chemistry class seemed to have a clue as to what was going on. There were rumors going around that it involved us interviewing the elderly. Mr. Reed himself only really mentioned that the project was designed for physics and American history students, neither of which we were. All of this confusion was only followed by an obscure field trip to a home for the elderly, which left me with even more questions. I only slightly understood that I would be interviewing an important person in science for an oral history to be put into archives. However, I still had many questions.

Roy E. Anderson would soon be able to answer all of these questions for me. After randomly being put into a group of seven, we decided that Mr. Anderson would be the most interesting scientist to talk to, mainly because of his work with GPS (thus, we dubbed ourselves "Team GPS" or sometimes called "The Greater Person Society"). After this, the project slowly began to take form. I was to be the official photographer. I took pictures of Team GPS working together and planning as we starting researching Mr. Anderson's history and accomplishments. We slowly formed even more questions that we wondered about Mr. Anderson, such as his history in the military as well as his influence with the "Dudley Curse". All in all, the group came together and finally prepared ourselves for when he was to come to our high school and we would have an official interview.

When Roy E. Anderson visited Bethlehem Central High School, I was shocked. He turned out to be a genuinely nice man who cared about his scientific work. For some reason, I was half expecting a bitter scientist who was mad at what the world had come to; I encountered quite the opposite. Mr. Anderson was quite joyful and friendly, especially considering that it was very early in the morning. He seemed a bit shy at first, but the more we talked the more he seemed to become himself. He told intriguing stories of working on developing satellite communications in the military. He told us how he was assigned to this job in the first place in order to help out the war effort for World

War II. After this, we all learned how Mr. Anderson worked to develop satellite phone and how he could see it as the most likely form of communications (and how he thought that 'cellular phones' would never take off). We even found out about the time that he skipped work to go sledding, and then didn't rat out his friends when his boss caught him, as well as a few scandals. The only thing that disappointed me was that he didn't know too much about the "Dudley Curse". This was supposedly a curse in which people who worked at Dudley Observatory seemed to leave in an angry huff. Perhaps he didn't know much about this because he never seemed to get into an angry huff—or that's what it seemed like since he was such a nice man.

Overall, I was thoroughly surprised by this project. From what I thought would be an iffy, illegitimate assignment, I actually found myself enjoying it. I learned a whole lot from the entire process of going through an interview, as well as from actually interviewing Mr. Anderson. I realized the importance of preparation—I could not imagine having such a good interview if we had not been so well prepared. I also learned a lot from Mr. Anderson's work ethics. From how he talked about his history, he always seemed to try new things and keep trying harder until he reached his final goal. And yet, he never seemed too cocky to try and just discover new things for more money. He is a modest man who cares about his work. This is a highly important human characteristic that should be held by all scientists in today's world. This has truly been an interesting experience and I hope that future generations will be able to learn from it as I did.

Jacob Abolafia  
June 6, 2006

AP Chem  
Essay

### Reflective Essay

It is a rare opportunity for a child of the Internet age to sit down and reflect upon a time when short-wave radio was the most high tech of pursuits, the heavens were still distant and seemingly unreachable and a computer with less processing power than an iPod took up a floor of ground space. That is precisely the opportunity my oral history interview with Roy E. Anderson afforded my classmates and me.

Mr. Anderson was a willing and talkative interview subject, giving us an insight into what doing science in the mid and latter half of the 20<sup>th</sup> century was like. His experiences of doing research in all different environments (for the military, government, or corporate interests) revealed the incredible diversity of the scientific community. Also interesting was the way he fell into different areas of research almost by accident. The army and radar lent him the expertise he would later need during the madness and excitement that followed Sputnik, while his work with satellites later served him well in the world of business. There was an important lesson to be found in this. When and where one's learning will come in handy can never be predicted ahead of time. Indeed the life of a scientist may follow as many turns as the research provides, starting in one area but ending up in an entirely new, yet still exciting place.

One of the most interesting parts of talking to Mr. Anderson was the feeling he provided of the ambience at GE during the space race. Americans my age cannot fully comprehend what it meant to enter the space age during the

cold war. The importance placed on a math and science education as well as the popular (and media) obsession with astronomy, satellites and space in general seems to have worn off. It was a valuable experience to be able to hear about a time when reporters called about every new space probe and funding for science education was on the upswing as a matter of national pride.

It was interesting to learn just how many practical applications Mr. Anderson's work had. His scientific research was of the eminently applicable sort. From finding airplanes over the ocean to developing a satellite phone system, Mr. Anderson did work that led to many of the technologies we take for granted today. By his own admission, not many of his actual designs are in use today, but he explained that that is a fundamental truth of applied research. To build a new technology is to be on the cutting edge for only an instant, but to serve far more permanently as a foundation for future research. The GPS in cars today may not bare a patent with Roy E. Anderson's name on it, but the work he did on satellite systems led to it nonetheless.

In short, speaking with Mr. Anderson was a two-fold opportunity. We as students were able to learn about what science and engineering were like "back then", but we also were exposed to some valuable truths about just what it means to be a applied scientist. Through Mr. Anderson, the excitement, trials, successes and failures of a lifetime of science on the edge of technological innovation were brought right into our high school lives. For everyone present, it was a valuable and enriching interaction.

Liz Casline  
Reed- AP Chemistry  
The Dudley Observatory and Roy Anderson  
June 6, 2006

The interview with Roy Anderson really meant a lot to me personally, because I was able to see the product of a successful liberal arts education. I chose Bates College and the liberal arts education because I knew it would give me a well rounded education. I've always had interests in a wide variety of subjects and while I know I love science, I wanted there to be the opportunity for me to discover something else. Whether I leave college as I came, a biochem major, or on the complete other side of the spectrum as an English major, I know I'm going to love my career. My only hesitation is that my studies may not be as respected as if I had come from a major university. Unfortunately there is only a distinct circle of people who have heard of Bates, and my worry is that when applying for graduate school or a job, my education will not be seen for its value. When my group, of which I'm the only one not attending a well known university, found out Mr. Anderson had attended a liberal arts school the immediate question was how had this affected his approach to engineering. This information really captured my interest in Mr. Anderson and his accomplishments, but I was too hesitant to add questions to our outline because I felt they wouldn't work with the university based mind set of my group.

When I first met Mr. Anderson I was nervous because he sat so softly, yet his presence was almost humbling. Here I was a teenage girl still unsure of her point in life, sitting with a man whose life is so significant that her life will be better having met him. I essentially froze up. As he began to explain his life's accomplishments, I completely lost all my nerve to ask him questions. Even Jacob, my group's official interviewer, had a quiver in his voice. The interview did not follow our plan and I wondered if Jacob would even have time to mention Mr. Anderson's education. When we eventually came it to it, I almost leaped from my chair and squeezed Mr. Anderson. His answer completely revamped my enthusiasm for the liberal arts education. Mr. Anderson explained to us that at a university studies are focused on one particular subject, while at a liberal arts college studies are focused on a broad range of topics, where you learn to write and think creatively. He spoke so fondly of his education that I instantly fell in love with him (But of course only to the extent with which one falls in love with someone upon just meeting them). I wanted to know more, but Jacob quickly moved on.

As the interview moved on I kept rethinking over and over again how best I could interject and ask Mr. Anderson more about his education. Finally towards the end I was bold enough to make my move. While my speech was not as glamorous as it had been in my head, I managed to tell Mr. Anderson that I was attending Bates and ask if he had ever found any stigma against his liberal arts education. He said that he hadn't, but it was what he followed up with that interested me most. He said that if one was unsure of what profession they wished to pursue to attend a liberal arts college, but if one was positive then to attend a university. There I had it, the answer to all my fears of making the best decision in choosing a college. I can now head off to Bates in the fall knowing that this

education will benefit me in whatever field of study I choose, and that I can be a successful and useful part of society.

Another part of the interview that I found interesting was when we were discussing the atmosphere in which the discoveries of Mr. Anderson's time were made. As a generation on whole, most of my peers go through day to day life unappreciative of the science behind things like our handheld technology. It seems like everyday a new product comes out which uses satellite technology and because it's so common place now there is no real buzz. I'd never really noticed this until Mr. Anderson began describing the excitement around all these new advancements. To be involved in such discoveries really adds enthusiasm to my future in research and what sort of things they may lead to. Mr. Anderson said they couldn't even dream of the application to be made because everything was so new. It only makes me hope that I too can one day be involved in such an environment or even teach the next generation to do so themselves.