CHEMICAL HERITAGE FOUNDATION

PETER B. LEDERMAN

Transcript of an interview
Conducted by

David J. Caruso, Jody A. Roberts, and Sarah L. Hunter-Lascoskie

at

The Chemical Heritage Foundation
Philadelphia, Pennsylvania

on

1 and 19 September 2011

(With Subsequent Corrections and Additions)

CHEMICAL HERITAGE FOUNDATION
Oral History Program
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Oral History Program
315 Chestnut Street
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PETER B. LEDERMAN

1931 Born in Weimar, Germany, on 16 November

Education

1953 B.S.E., Chemical Engineering, University of Michigan, Ann Arbor
1957 M.S.E., Chemical Engineering, University of Michigan, Ann Arbor
1961 Ph.D., Chemical Engineering, University of Michigan, Ann Arbor

Professional Experience

Shell Oil Company, Wood River, Illinois
1953 Junior Technologist

U.S. Army Petroleum School, Fort Lee, Virginia
1953-1955 Instructor

General Foods
1956 Technologist

University of Michigan, Ann Arbor, Michigan
1955-1960 Instructor, Department of Chemical Engineering,

Esso Research Laboratories, Baton Rouge, Louisiana
1961-1963 Chemical Engineer

Esso Research and Engineering Company, Florham Park, New Jersey
1963-1966 Senior Process Engineer

Columbia University, New York City, New York
1965-1966 Lecturer

Polytechnic Institute of Brooklyn, Brooklyn, New York
1966-1972 Associate Professor and Administrative Officer of Chemical Engineering

U.S. Environmental Protection Agency
1972-1975 Director, Industrial Waste Treatment Research Laboratory, Edison, New Jersey
1976 Director, Industrial and Extractive Process Division, Office of

Research & Development, Washington, D.C.

Research-Cottrell, Bound Brook, New Jersey

1976-1978 Manager, Technical Development

1978-1980 Vice President and General Manager, Cottrell Environmental Sciences

Roy F. Weston, Inc., West Chester, Pennsylvania and Edison, New Jersey

1980-1993 Vice President, Hazardous/Toxic Substance Management and Vice President/Division General Manager

New Jersey Institute of Technology, Newark, New Jersey

1993-2000 Executive Director, Center for Environmental Engineering and Sciences, Executive Director, Office of Intellectual Property and Research Professor of Chemical Engineering and Environmental Policy

Peter Lederman & Associates

2000-present Consultant

Honors

1976	U.S. Environmental Protection Agency Silver Medal for Superior Service
1987	Lawrence K. Cecil Award of the American Institute of Chemical Engineers for Contributions to the Environment through Chemical Engineering
1992	Stanley E. Kappe Award, American Academy of Environmental Engineers
1995	Gary Leach Award of the American Institute of Chemical Engineers as Chair of the Superfund Task Force
1995	American Institute of Chemical Engineers Environmental Division Service Award
1996	University of Michigan Engineering Alumni Society, Chemical Engineering Award of Merit
2009	National Associate of the National Academies
2009	American Institute of Chemical Engineers, F.J. & Dorothy Van Antwerpen Award for Service
2010	University of Michigan College of Engineering, Distinguished Alumni Service Medal
2011	American Institute of Chemical Engineers, Service to Society Award

ABSTRACT

Peter B. Lederman, an only child, was born in Weimar, Germany. His father was an accountant who spent a week in a concentration camp but was recalled in order to help the state collect taxes. When Peter was seven the family left for the United States, spending about six months in England on the way. They settled in New York City; eventually Lederman chose to attend the Forest Hills High School, where he was inspired in science by his chemistry and biology teacher, Paul Brandwein. Advised by Eric Schatzki, a chief engineer at Republic Aviation, he abandoned his desire to study aeronautical engineering and instead chose as his major chemical engineering when he entered the University of Michigan. Brymer Williams became Lederman's advisor and mentor, and Williams (now deceased), Lederman, and Stuart Churchill have remained friends. Despite a rigorous curriculum with few electives, Lederman found time to teach a qualitative analysis lab during his last two years at Michigan, and during his summers he worked on corrosion studies at BOMARC missile project.

Lederman then accepted a job as processing engineer in lube oils at Shell Oil in Illinois, but he left there to go back to Michigan for a master's degree. He was drafted into the Army Petroleum School, where he taught petroleum technology. After that he became a teaching fellow in the graduate program at Michigan, with Brymer Williams as advisor. His prelim for a PhD, on the liquefaction of natural gas, gave him a presentation that then became a publication. During graduate school he had thirteen publications. He also married a woman from Forest Hills High School; became a fraternity advisor and part of a family-oriented graduate student community; and started a family. His PhD thesis involved using zeolites to separate gases at very low temperatures..

Next Lederman began work on a pilot unit in ethylene-propylene copolymers for Esso Research Laboratories, later moving to Esso's New Jersey laboratories as a process engineer. About to be promoted, he decided to accept an associate professorship at Brooklyn Polytechnic Institute (Poly). While teaching there he worked on a solid waste management program for the garbage committee of New Providence, New Jersey. This interest eventually branched into a general fascination with environmental issues; while at Poly he obtained a National Science Foundation grant to help disadvantaged students study pollution. Believing that America should have a strong technological foundation, Lederman also became more active in the American Institute of Chemical Engineers (AIChE).

Lederman left Poly for the U.S. Environmental Protection Agency, where he attempted to combine fragmented areas of pollution. He worked as the director of the Industrial Waste Treatment Research Laboratory until it was moved to Ohio, at which time Lederman spent a year as head of the program in Washington, D.C., before returning to New Jersey. During this time he wrote for popular technical journals, attempting to inform the public about environmental technology and policy. He asserts that pollution control, which evolved from waste management, began with industry: they had an economic incentive to minimize costly waste, hence began to recycle.

Lederman spent his next four years at Research-Cottrell, developing electrostatic precipitators, negotiating contracts in Japan, and managing crises. Unfortunately, power companies were finding permitting too onerous and were not expanding. Superfund had just been established by statute, and hazardous materials had become a hot issue, so Lederman went to Roy F. Weston, Inc., to consult on hazardous materials. There he was responsible for

government contracts, especially technical assistance for emergency response consulting, and strategic policy regarding hazardous materials.

Wanting to finish his career in academia, Lederman went to the New Jersey Institute of Technology (NJIT) in the Center for Environmental Engineering and Sciences, in the Office of Intellectual Property, and as Research Professor of Chemical Engineering and Environmental Policy. There, in addition to teaching, he was responsible for all aspects of grants; he managed patents and licenses; he negotiated contracts; and he informally mentored students and junior faculty. He also continued to consult pro bono for the National Research Council. His hazardous materials experience, process engineering, and environmental knowledge in general provided expertise for nuclear and chemical weapons disposal work. After eight years Lederman retired, but he is still on the Science Advisory Board of the New Jersey Department of Environmental Protection. He is still active in AIChE, where he has chaired and served on a number of committees including the Government Relations Committee, working to bring technology into political discussions, and he maintains his own consulting firm.

To conclude his interview, Lederman discusses the changes in AIChE and the expansion of chemical engineering into many more areas of endeavor. He maintains that chemical engineering was good preparation for environmental management and engineering, for crisis management, for developing methods of thought that solve problems. He agrees that though he was not formally trained in environmental science, he is most noted and given awards for his environmental work. He feels that cost-benefit analysis is crucial, but life-cycle has not been considered; that we are not economically prepared for life-cycle analysis and perhaps never will be. He is of the opinion that consistency of regulation and enforcement is necessary; that nuclear waste is more dangerous than hazardous materials. His maxim is do the least harm but do not do nothing in order to avoid harm.

INTERVIEWERS

David J. Caruso earned a B.A. in the History of Science, Medicine, and Technology from the Johns Hopkins University in 2001 and a Ph.D. in Science and Technology Studies from Cornell University in 2008. His graduate work focused on the interaction of American military and medical personnel from the Spanish-American War through World War I and the institutional transformations that resulted in the development of American military medicine as a unique form of knowledge and practice. David is currently the Program Manager for Oral History at the CHF. His current research interest focuses on the discipline formation of biomedical science in 20th-century America and the organizational structures that have contributed to such formation. David is currently the president of Oral History in the Mid-Atlantic Region

Jody A. Roberts is the Director for the Center for Contemporary History and Policy and the Manager of the Environmental History and Policy Program at the Chemical Heritage Foundation. Roberts received his Ph.D. and M.S. in Science and Technology Studies from Virginia Tech and holds a B.S. in Chemistry from Saint Vincent College. His research focuses

on the intersections of regulation, innovation, environmental issues, and emerging technologies within the chemical sciences.

Sarah L. Hunter-Lascoskie earned a B.A. in history at the University of Pennsylvania and a M.A. in public history at Temple University. Her research has focused on the ways in which historical narratives are created, shaped, and presented to diverse groups. Before Sarah joined CHF, she was the Peregrine Arts Samuel S. Fels research intern and Hidden City project coordinator. Sarah is currently a Program Associate for the Oral History Program at CHF and leads projects that connect oral history and public history, including the oral history program's online exhibits. She also contributes to CHF's Periodic Tabloid and Distillations.

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Chose to attend Forest Hills High School. Good at math. Liked science. Paul Brandwein, inspiring biology and chemistry teacher. Head of audio-visual squad. Relearned German.. Built crystal radio for honorable mention in Westinghouse Talent Search. Classes. Chess. Parental expectations. Interested in aeronautical engineering, but advised by Eric Schatzki not to study it; chose chemical engineering instead.

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Accepted position with Shell Oil in Illinois. Hugh Guthrie, president of American Institute of Chemical Engineers (AIChE), his boss. Began as process engineer in lube oils department but went back to Michigan for a master's degree. Drafted into U.S. Army and assigned to the Army Petroleum School. Six months at Caven Point, New Jersey; then back to Fort Lee, Virginia, where he taught petroleum technology. Back to Michigan as teaching fellow in chemical engineering and student in graduate program; Williams his friend and mentor. No difficulties being both student and faculty member. Publication on liquefaction of natural gas; gave presentation from preliminary exam to National Petroleum Supply Association.. Thirteen publications. Settled for third idea for PhD dissertation: zeolites. Married woman from Forest Hills High School. Family-oriented community. Football games, concerts. Became fraternity advisor. Looking toward industry. Developed interest in computers; published in journals. Ford Foundation grant. Developed program for liquid-liquid extraction. Claims to have been "in the right place at the right time."

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Finished PhD, began looking for job. Jobs scarce. Shell did not rehire those who

had left. Began work on pilot unit in ethylene-propylene copolymers with Esso Research Laboratories in Baton Rouge, Louisiana. First child born just before he left Michigan. Wife a homemaker at the time . Balancing work and home lives. Analysis by hand as less technology. Kjeldahl method. Extrusion problems. After three years moved to New Jersey to be process engineer in Process Engineering Division of Esso Research and Engineering Company. Worked on hydrocracking; then polypropylene. Promoted to senior process engineer but quit to become associate professor at Brooklyn Polytechnic Institute (Poly). Again "in the right place at the right time," he developed solid waste program while on garbage committee for New Providence, New Jersey. Solid waste interest eventually branched into general interest in environmental issues. Chairman of professional development committee of AIChE. National Science Foundation grant to help disadvantaged students study pollution. Two children. Vietnam War protests at Poly. Increased participation in AIChE to represent profession and to provide general knowledge to public; felt United States should have strong technical underpinning.

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More interested in environmental problems. Up for promotion at Poly but left for U.S. Environmental Protection Agency (EPA). Found pollution areas fragmented; wanted to combine media. Describes work at Industrial Waste Treatment Research Laboratory; early work with oils; politics at Poly and in EPA. IWTRC moved to Cincinnati, Ohio; Lederman became head of program in Washington, D.C. Stayed one year, then headed back to New Jersey. Publications along the way to inform public about technology as well as policy. Shift from waste treatment to pollution control. Industry's economic incentives as impetus for minimization, which yields recycling.

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New Jersey Institute of Technology, Newark, New Jersey: Executive Director, Center for Environmental Engineering and Sciences (NJIT); Executive Director, Office of Intellectual Property; and Research Professor of Chemical Engineering and Environmental Policy. Responsible for all aspects of grants; managed patents and licenses; negotiated contracts; informally mentored students and junior faculty. Still consulting pro bono for National Research Council. Decontamination. Chemical weapons disposal. Hazardous materials experience, process engineering, and environmental knowledge in general provided expertise for nuclear weapons work.

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After eight years at NJIT found replacement and retired. Felt only failure was inability to get chemistry/chemical engineering department to work with civil/environmental department. Now on Science Advisory Board of New Jersey Department of Environmental Protection. Though not formally trained in environmental science, he is remembered for and given awards for his environmental work. Feels cost-benefit analysis crucial, but life-cycle not considered; now not economically prepared for life-cycle analysis, perhaps never. Consistency necessary. Nuclear waste more dangerous than hazardous materials. Do the least harm but do not do nothing in order to avoid harm.

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INTERVIEWER: **David J. Caruso, Jody A. Roberts, and Sarah L. Hunter**

LOCATION: **The Chemical Heritage Foundation Philadelphia, Pennsylvania**

DATE: **1 September 2011**

CARUSO: Today is the 1st of September 2011. This is an interview with Peter B. Lederman at the Chemical Heritage Foundation. My name is David Caruso. I'm here with Jody Roberts and Sarah Hunter. Who are also…who will also be interviewing with me.

As is pretty standard I'd like to start at the beginning. I know that you were born in Weimar, Germany. When were you born?

LEDERMAN: I was born in Weimar on November 16th, 1931.

CARUSO: So you lived there for, I believe, eight years, before you…

LEDERMAN: No.

CARUSO: No.

LEDERMAN: Maybe it would help if I try to give my early history…

CARUSO: Sure.

LEDERMAN: …quickly. I lived in Weimar until 1933. When my father lost his job—my father Ernst Lederman—lost his job due to the [Adolf] Hitler movement that Jews could not be employed by government agencies. My father was the Deputy [Director] of the Audit Department of [the Landbank] in Thüringen. We moved to Amsterdam, [the Netherlands], for six months, and my father could not find a job. So we moved back to Germany, living with my grandmother, Julia Heilbrunn, in Gotha, and my father started his own accounting firm.

We lived in…I lived in Gotha with my parents until 1939. My father left in January for Great Britain. My mother, [Irmgard] and I left in March. Interestingly enough, I had my first commercial flight from Cologne to Croydon via Brussels, [Belgium], on British European Airways in a DC-3. I won't go into my early history, other than I was in school in Germany from April 20th 1938 to November 9th 1938, when Jewish kids were kicked out of school.

CARUSO: So you didn't start school until you were about seven years old.

LEDERMAN: Well, it was standard. You had to be six years old, and then you started school on [Adolf] Hitler's birthday. The Jewish kids were discriminated against. I mean we were, but we went to schools like everybody else. Then, I was in school in Great Britain in [Stonerhouse School], a public school, which here is a private boarding school. I was very fortunate. I left Germany with my parents rather than what was known as a *Kinder,* child transport.

I spent the summer in Great Britain in that public school. It was near the…it was on the Dover coast. I was in second grade there, which was interesting, when I entered in September. When World War II broke out, I was on the coast. My father—I won't go into what my father and mother were doing—but in any case, I was in that school, and that school was evacuated to the Midlands. I went back […] to London where my father's uncle [Ludwig Bruell] lived and stayed there until December.

Interestingly enough the first ship we were…we had visas to the United States all ready, but we had to leave Germany quickly. So we went to England temporarily. That delayed our coming here by about six months.

CARUSO: You—just to interrupt—you mentioned that you weren't going to go into what your father and mother were doing. Is that not something you'd like to talk about <**T: 05 min**> or…?

LEDERMAN: I'm happy to talk about it.

CARUSO: Okay. So, I'd just like to backtrack, a little bit to hear…

LEDERMAN: Sure.

CARUSO: …a little bit more about your time in…

LEDERMAN: Well, maybe you should ask me questions then, because I'm giving you the compressed version.

CARUSO: So you mentioned that your father had this government job, the Deputy of the Audit and lost it…

LEDERMAN: Well it was…the bank was a government bank.

CARUSO: Oh, government bank, sorry. He lost his job, moved briefly. He looked for another job and came back. Your mother, did she work while you were young?

LEDERMAN: No.

CARUSO: No.

LEDERMAN: My father had a Ph.D. in economics, really in business economics. I won't…and was a certified public account in Germany, was also the equivalent of a certified public accountant in England, which was fortunate. So he started his own business when he came back to Germany.

CARUSO: Okay. So, just an accounting business?

LEDERMAN: Yeah.

CARUSO: Had your family always lived in Germany?

LEDERMAN: Yes. My grandfather—I knew one, [but] I did not know the other. One [Kappel Heilbrunn] was a physician, who died in 1923 of stomach cancer from x-ray exposure. At that time, they didn't protect people the way they do now. My grandmother had land, and my grandfather, that physician grandfather, really was revered. My other grandfather [Max Ledermann] owned a lumber business in a neighboring town and was head of the Jewish community in that town until 1943…from 1900 to 1943.

CARUSO: Wow.

LEDERMAN: I can trace some of the family back to the 1500's; others I can't: I haven't done that with yet. I don't know whether that covers it.

CARUSO: Sure. When you came back to Germany, and your father started up his business, you were, I guess, about three or four years old at that point.

LEDERMAN: You know, I guess I was probably three, give or take.

CARUSO: Do you remember much from your early years, while you were there in terms of…do you have any siblings?

LEDERMAN: No.

CARUSO: No. What did you wind up doing before you were in school? Did you stay at home and…?

LEDERMAN: Well, mostly stayed at home. Jewish kids did not…well, other kids did not really play with Jewish kids. So I played at home. We had a very nice house. My parents were certainly…my grandmother was certainly…my parents were upper middle class. My mother was a stay-at-home mom. Yes, I do remember some things. I'm not sure that it is really very germane to this, to go into some kind of details of that. I remember being in Holland, which I mentioned. I remember some of those things.

I certainly remember the time in the late 1930's. I remember going on vacation with my parents. I remember also the night my father went to concentration camp, *Kristallnacht*, which was the [night of the] 9th [to] 10th of November of 1938. I woke up to the second house invasion, if you want to call it that. I remember that time quite vividly. I remember leaving Germany and remember the details quite well. Again, I don't…I'm not sure that that's really germane for this.

CARUSO: Oh, at the time, were you—I know you were quite young—but were you aware of what was going on politically and socially in the country? Is that something your parents sheltered you from?

LEDERMAN: Well, yes and no. Spinach in Dutch is *spinazie*. One day I was in the grocery store and saw spinach and yelled, "*Spinazie*! *Spinazie*!" My mother clamped my mouth shut and said, "You don't say that <**T: 10 min**>." I certainly saw troops marching down the street in front of our house. I got beat up at least once on my way back home from school. So I always knew the difference. There was no question about that. But I did not know all the political intricacies.

Interestingly enough, I read just recently in the—I may have this title a bit wrong—*In the Garden of Beasts* by Ericson, by Larry Ericson…or *Beast in the Garden*, one or the other, which details the American ambassador's existence in Germany in the years '33…I think '32 to '34/'35.[1] You get there a sense of these things. Obviously, I knew it after the war. I was well aware of the situation. But when I was there, did I know all the things? No. In the town I was in, I think it was relatively calm, that is, there were no book burnings and things like that. No stores that I know of that were trashed. Or if there were, I certainly didn't…wasn't aware.

CARUSO: What sort of interests, if any, did you have as a young child while you were in Germany? Were you interested…I know you were at home.

LEDERMAN: You know, I can't say.

CARUSO: Okay.

LEDERMAN: I don't remember.

CARUSO: Okay. So, I guess just to move forward, your father one night was taken away to a concentration camp.

LEDERMAN: Right. He spent only a week there.

CARUSO: Only a week.

LEDERMAN: He was very fortunate, really. The Finance Minister [of the State of] Thüringen needed him to collect taxes from his clients, so he was asked to get out. As a separate story,

[1] Erik Larson, *In the Garden of Beasts: Love, Terror, and an American Family in Hitler's Berlin* (New York: The Crown Publishing Group, 2011).

[my father] wrote letters for people, to get them out of concentration camps. All the Jews actually did get out of concentration camps, but many, of course, returned. There was a recognition of my father writing letters in a little town in Thüringen this May, called Themar, and I'm actually going to do my own little detail…discussion about it.

CARUSO: So do you know why your family decided to leave?

LEDERMAN: Well, they actually decided to leave considerably before. They left the first time because it wasn't comfortable. My grandmother [Julia Heilbrunn], by the way, on my mother's side was not Jewish and stayed in Germany all during the war. They…I think they saw the handwriting on the wall. That doesn't…my father had a good business, but they…so they started looking, I believe, in about 1936—I'm not sure when…

CARUSO: Okay.

LEDERMAN: …for a visa to the United States, which means you had to find somebody who would guarantee that you wouldn't be a burden on the state. Then you had to wait for your number to come up, and that was a process, I believe at the time, about two years.

CARUSO: So, it was something planned, sort of, well ahead of the actual departure.

LEDERMAN: Yes.

CARUSO: Okay. So when you left, you got to go on a commercial plane.

LEDERMAN: Well, the British part was not planned.

CARUSO: Oh, the British part…okay.

LEDERMAN: We planned to leave in July of 1939 from […] Rotterdam for the United States. When things got tight, my father decided he better get out of Dodge, and he actually flew to Britain to get a…to see a client. He had a client in Britain, he had a [transit] visa, and he just went there. My father had an uncle in Britain [Ludwig Bruell], who was vice president of the Eveready [Battery] Company. We got…the Brits weren't anxious to have people come in. I

mean nobody was really anxious to have people <**T: 15 min**>. We got temporary visas to go through Britain with the idea of going to the United States. Then my mother and I followed.

CARUSO: Okay. So shortly? After a couple of months?

LEDERMAN: March.

CARUSO: Okay.

ROBERTS: […] So you were in school while you were in Great Britain. Was that because they thought you might be there for a longer period of time?

LEDERMAN: No, because it was good for kids to go to school. [laughter] No. We were not going to be there a long time. We were scheduled…the paperwork had to be transferred from Germany to England, and bureaucracies take time. There was no Internet, you know. It was all paper.

CARUSO: Paper and carriers, and all that.

LEDERMAN: So, you figured about six months to leave.

CARUSO: Okay. Did your family know where they wanted to go in the United States?

LEDERMAN: Well, we had a sponsor. The sponsor was a…the wife [Nellie Bruell] was a cousin of my father's. The sponsor was Kurt [O.] Friedrichs. Kurt was…had been a professor at Göttingen in mathematics, and came here to the United States with a guy who had been fired from there, Courant, the famous [Richard] Courant from the Courant Institute [of Mathematical Sciences of New York University]. Friedrichs actually became head of the Courant Institute after Courant. Anyway, he was our sponsor. They were in New Rochelle, [New York].

So, we were either going to be in the east coast or the west coast. One of my aunts [Hilda Berg] had already moved to Los Angeles, [California]. But they really didn't want us; they didn't need somebody else hanging on them. Well, that's […] understandable, but…besides New York was a good community for German Jews. So however we landed there, we landed there.

CARUSO: Now, growing up, what languages were you speaking?

LEDERMAN: I started some English in Germany. In boarding school, I either spoke English or I didn't speak, so I learned the King's English very quickly. Came to the United States and I had trouble, because now I had a teacher who came from Brooklyn, [New York]. I failed…well, I had two troubles. My mother decided for a short time I'd go back in to the second grade. I wrote cursive writing. The kids only printed. So the teacher had to grade my papers, and it was just not going to work. But—that was only for a short time—but I spelled the King's English, I spoke the King's English: that didn't work with some of these teachers. So my first half year I was in trouble. But I spoke English.

CARUSO: Okay.

LEDERMAN: During the war I refused to speak German. I lost all my German. […We don't have to go into detail], but it gives you a flavor.

CARUSO: Right. How was it transitioning, otherwise, for you and also for your family coming to the United States?

LEDERMAN: Well, it was…you know it was good and bad. It was obviously a relief to be here and not there. My father didn't have a job for six months. Of course, this was the end of the second recession. He could not practice until he took some courses. He was lucky—he got a lot of credit for his work. So all he had to do was, I think, take a year of U.S. law and things like that. He was admitted to be a CPA [Certified Public Accountant] here, and, basically, all his experience counted. So he could sit for the full exam the first time, so that was pretty good. My mother had a job.

CARUSO: What did she start doing?

LEDERMAN: Well, my mother had been a <**T: 20 min**>…had been trained as a children's nurse, and had been a head nurse in an infirmary in England, which served German/Austrian Jewish men. She worked for a family. It was a connection, again, back [in Germany], as a nurse caretaker, et cetera, housekeeper. You know that paid reasonably well, $1.00 an hour.

CARUSO: Right.

LEDERMAN: I certainly had some adjustments at school. I also had other adjustments, because I never played ball. You asked whether we did things. I mean kids my age would have all played ball. I was always…I was not well equipped for anything like that. At that…so I never really played team sports, even in my older age. School-wise, I had really no difficulty. The other thing is where we lived in Kew Gardens, [Queens, New York], there was a large, German-Jewish community. So, I had friends and got in Cub Scouts [of America], and Boy Scouts [of America] and did things like that, which at that time was then a substitute for team sports.

CARUSO: During this period of time, you're going to the American schools, clearly World War II has also started to rage. Did you…I guess what I'm trying to find out is at what point was it in these early years that you started to develop any sort of interest in science as…?

LEDERMAN: That's an interesting question. You know, I had, probably by seventh and eighth grade, I had some interest in science. I had a very good math teacher [Mrs. Goldberg] and I was good in math, being arithmetic. You guys get stuff now that I didn't get until college. But when I went to high school, I chose not to go to the three academic high schools. Academic is wrong, the premier high schools…

CARUSO: Stuyvesant [High School]…

LEDERMAN: Bronx [High School of] Science, Stuyvesant, and at that time, Brooklyn Tech[nical High School].

CARUSO: Brooklyn Tech.

LEDERMAN: Instead I went to Forest Hills High School, which was my regular, my normal high school, but which was equal to any of those. Ninety-five percent of our graduates went on to college. The competition was…it was the newest high school, too. It opened in 1942 and had a fine staff. There was a [teacher] there by the name of [Dr.] Paul [F.] Brandwein.[2] He was the science [department chair] and taught biology [and chemistry]. He was just tremendous [and an inspiration]. So, sometime during that time I certainly became very interested in science. So, I was also head of the audio/visual squad in that school, […] the teacher [Rae Silver] responsible was the head of the bio lab and science lab.

[2] Deborah C. Fort, *One Legacy of Paul F. Brandwein: Creating Scientists* (London: Springer, 2010).

At that time, I also wanted to be at first an aeronautical engineer. That was, of course, the hot thing. I mean, you know, planes, et cetera. I was good in science and good in math. I was a good student. I decided…and I was told by [Erich Schatzki] who was head of…the chief engineer at Republic [Aviation], not to go there, because people like me weren't welcome in the aircraft industry. Now, things have changed considerably, but this was…so I decided, "Okay, I like chemistry. I'll be <**T: 25 min**> a chemical engineer." So when I went to college, I went for chemical engineering. That was, maybe not hardwired, but certainly semi-hardwired in my brain.

ROBERTS: Can we stop on that real quick and just ask…clarify the time when you were graduating from high school, when you were exploring the aeronautical engineering?

LEDERMAN: What time that was?

ROBERTS: So what year would that have been? Or…?

LEDERMAN: Well, I graduated from high school in February…January of 1950. I probably switched into this thing in—from aeronautical to chemical—probably two years before.

ROBERTS: How did you respond to the suggestion that you might not be welcome in aeronautical engineering?

LEDERMAN: You know, I probably just took it and said, "Well, I got a nice…." I didn't feel in Forest Hills and Kew Gardens…you didn't feel anti-Semitism, if that's what you're asking? I can't answer in a factual way. I don't remember what the reason was. I mean, the man was very well known. That was his advice. I took the advice.

CARUSO: During the time you were in high school…I have two questions. One, I want to hear a little bit more about what the science classes were like. But I also want to know a little bit more about what your…if your family had certain goals for you. You mentioned that your father had a Ph.D., right. My wife's family, academics, so my wife, of course, is going to become an academic. Was that something that was in some ways of expected of you? Were you…?

LEDERMAN: Well, let me answer that question first.

CARUSO: Sure.

LEDERMAN: I think my family was very good. As long…I mean, college was certainly there. But what I wanted to do was up to me. I wasn't pushed one way or the other. I don't think there was any disappointment that I went to engineering rather than accounting. Now the other question was…

CARUSO: I want to hear a little bit more about what your…

LEDERMAN: What the science…

CARUSO: Yeah.

LEDERMAN: Well, at that time, of course, there were no AP [Advanced Placement] courses, really, but there were honors classes. So when you went to high school, your first year you had general science, which covered the spectrum. If I remember correctly no laboratory. But this was required: the second year was biology. And there if you were good, you went to the honors class. There you really studied biological systems. If you ask me, do I remember very much about it? No. But you also had to pass a Regents [High School] Exam[ination]. Remember…are you a New Yorker?

CARUSO: I'm a New Yorker, so I'm quite familiar with Regents Exams.

LEDERMAN: Yeah. This was a very competitive high school. I mean we…there were three groups of people at Forest Hills. There were the people from Forest Hills Gardens, who were at the high end of the economic scale. There were a large number of refugee kids, who were all very much college-bound if at all possible. There was a very small group of people from Corona, [Queens, New York] and so on, who were going to be blue collar, but they didn't predominate. So there was a lot of competition and everybody just was that way. It wasn't cool to slack off.

CARUSO: Okay.

LEDERMAN: And then you took…after that, you took either honors physics <**T: 30 min**> or honors chemistry, and there, there were labs weekly with lab experiments, plus regular classroom.

CARUSO: Regular rudimentary, standard chemistry experiments?

LEDERMAN: Yes. Yeah, and rudimentary physics experiments—falling ball…

CARUSO: Right, right.

LEDERMAN: All those fun things. If you ask me what I actually did, I don't remember. I aced all of them. I mean it was just…that was just the way it was. Math, same thing: you had to take algebra and you had to take geometry. After that, it depended. But the people who were going to go on to college, took trig[onometry] and so on. But there was honors English, too. Everybody had to take economics. Everybody had to take civics. Everybody had to take modern European history and American history. So there was a lot of required…

CARUSO: Right.

LEDERMAN: But…

CARUSO: Were there opportunities, outside of your classroom experience and even some of the labs and the honors courses, were there opportunities for you to do work with your teachers beyond what was in the normal science curricula?

LEDERMAN: Okay. Yes and no. First of all, these were commuter schools, as you can appreciate. We were not…so a school day was fairly boxed in, if you will.

CARUSO: Right.

LEDERMAN: Although all these schools did have teams; and there was after school stuff. But Forest Hills, as Bronx Science and Stuyvesant, participated in what is now…I guess, it's now the Infinity or something, no, Intel Science [Talent Search]…

CARUSO: That's right, the…

LEDERMAN: It was the Westinghouse Science Talent Search…

CARUSO: Right, the Westinghouse then…

LEDERMAN: And we had the opportunity to do that. The year I graduated, we did as well as Bronx Science, which gives you an idea…. […] Bronx Science was…in this area, was the benchmark.

CARUSO: Bronx Science was the top school in…actually, remains…

LEDERMAN: Remains that way…they and Stuyvesant…

CARUSO: …in terms of…for people who wanted to go into a more science-geared…

LEDERMAN: But we were just as good. That's the point I'm making. I participated. I got an honorable mention.

CARUSO: What did you work on for it?

LEDERMAN: Ah, a crystal radio. I grew crystals and then I used it to build a little crystal radio. That's very mundane now. The things that kids do now are so much more advanced, but at that time, that was…it got me an honorable mention. I…

CARUSO: What got you into this…the Westinghouse…this sort of science competition? I mean, what…?

LEDERMAN: I think, if I remember correctly, we were encouraged by the head of the science department, [Dr.] Paul Brandwein, but I couldn't vouch for that.

CARUSO: And what…and do you remember what made you think about growing crystals for a radio? I mean was this just something like, "Hey, you know what? I'm going to…." Or was this something you were interested in?

LEDERMAN: Well, I don't remember, really.

CARUSO: Okay.

LEDERMAN: It may actually have come out of my Boy Scout stuff, I don't…but I don't remember.

CARUSO: During this period of time, I mean you were doing…you went to the Cub Scouts, the Boy Scouts, I'm assuming you got to leave the city a bit with the Boy Scouts, had camping trips.

LEDERMAN: Yep.

CARUSO: I was a Boy Scout as well, so…

LEDERMAN: I was a counselor at Ten Mile River [Scout Camps]. I was the…I had two years on the staff there and went there before as a camper.

CARUSO: During this period of time, you mentioned when you first got to the United States, you didn't grow up doing the things that boys normally did.

LEDERMAN: I tried, but it wasn't…you know, they had a number of years training ahead of me in…experience.

CARUSO: So, during your high school years <**T: 35 min**>, outside of your education, what were you doing with your own time? Were you at home reading? Were you sitting on the stoop with friends chatting? Were you making trouble in the neighborhood?

LEDERMAN: Well first of all, as I said, I was head of audio/visual, which took time and was a very engaging, contributory thing. I had lots of good friends in Kew Garden. You know, we would play stickball, and do other things, certainly went to the movies. But when you say make trouble, I don't think any of us were "making trouble" the way…and you probably weren't either, quite.

CARUSO: No. I don't know if you know Regis High School? It was in New York City itself. I lived on Staten Island. It was a two-hour commute…

LEDERMAN: Okay. Yeah.

CARUSO: …each way for me. So I left at five in the morning, and got home at seven at night. There wasn't much time to do anything.

LEDERMAN: No. But, I had a very happy childhood or teenage years, whatever, early adulthood.

CARUSO: Did you have other interests at the time? Were you an avid reader?

LEDERMAN: I read a lot. I still read a lot.

CARUSO: Novels? Histories?

LEDERMAN: It varies. I read a lot of history. I don't at the moment. Now I read, not trash, but I read a lot of mysteries now. I read some histories. My house has probably three thousand books in it. As a matter of fact we are in the process of weeding books because we can't store anymore. So I read a lot.

CARUSO: Okay, anything else that interested you at the time?

LEDERMAN: Chess. I played chess.

CARUSO: In tournaments or just for fun?

LEDERMAN: Just for fun. As a young kid I did the violin. I gave it up for science when I was thirteen. That's at least…that's what we said. My violin playing was not that great. I just had a lot to do. I had…it was the time I was being bar mitzvah. I had that, plus my science and whatever else. I just…violin went the way of…

ROBERTS: I'm interested in the…being head of the A/V work at high school. Can you talk a little bit about what that involved…

LEDERMAN: Okay.

ROBERTS: …and interest in those sorts of new technologies?

LEDERMAN: We had at that time…well, the technology were movie projectors, slide projectors, audio equipment. If a teacher wanted to show a film, we would make sure that the equipment was there. We would maintain the equipment. When the school had plays, we manned the sound booth, made sure that not only they worked, but the mixing and everything was done.

Now, the equipment was not at the level of the theater, but it was good equipment. It was state of the art for 1942/43. We had 8-millimeter projectors, 16-millimeter projectors, slide projector. It involved day plus…you know during the school day as well as after school. So if there was a play production and they were in rehearsal, we had to be there. So if you ask where my time went, well, it probably went there too. Does that help you?

ROBERTS: Sure.

CARUSO: So near the end of your high school career, you have decided to become a chemical engineer. It was sort of a given <**T: 40 min**>, in some ways, that you were going to go to college. When did you start thinking about colleges and what colleges did you start thinking about?

LEDERMAN: Okay. That's an interesting question. Let me preface it by, when I was in eighth grade, I said, "I'm never going to go to one of these football schools." I ended up at [University of] Michigan, [Ann Arbor]. I applied, if I remember correctly, to NYU [New York University] Engineering, which was around at that time, to City [College of New York], as a safety school or a school. I really didn't need safety schools. I had a 96.3 average in high school. I was the top guy in the class, the number three. I was going to go where I wanted to go. That was not the issue. I looked at MIT [Massachusetts Institute of Technology] and decided not to go there, because at that time it was highly technical. It has changed. I applied to Cornell [University], to Rensselaer [Polytechnic Institute]. Mostly, I did not want to stay at home. Michigan was recommended to me again, by ,[Prof.] Kurt Friedrichs, who had been there for a year [and was later head of the Courant Institute].

The other thing was that I was graduating midyear. And where was I going to go for midyear admission? Well, not to MIT, and not to Rensselaer. NYU would have taken me. City would have taken me. I think those are the schools I applied to. Michigan was, "Peter, you ought to apply there. That's a good school." Well, I got into Michigan and they took me in midyear. I didn't go out and visit and look at the place, as you do now. I went there figuring that if things didn't work out, I had a number of potential backups. I got into Rensselaer. I got a scholarship to Rensselaer, but it was September admission and they said, "You have to take many of your freshman courses." I said, "Uh-uh, I'm already a sophomore." I'm at…I stayed in Ann Arbor for the summer, and I had sophomore standing. I wasn't going to go back and take freshman courses. That was just ridiculous.

CARUSO: Yeah.

LEDERMAN: You know, it's not just…yeah, it's the right place, the right time, but then you got to be lucky. So I stayed in Ann Arbor.

CARUSO: Okay.

ROBERTS: So what was your perception, before you went and started applying for colleges, about what a chemical engineer might be working on?

LEDERMAN: Oh, boy. You know, I don't remember.

ROBERTS: It seems like aeronautical engineering was so clear: you were going to go design things that fly. But I'm trying to figure out what someone in high school is thinking about…

LEDERMAN: Well…

ROBERTS: …when they say, "I'm going to go be a chemical engineer."

LEDERMAN: That's a very good question. I'm not sure that I have a better answer now than I would about what I thought then. I like chemistry. I like the challenge of it. […] I have…still have this problem with the chemists, where chemistry ends, and where engineering starts. You know that's a problem with CHF [Chemical Heritage Foundation]. […] You're laughing, but I deal with this all the time. I wasn't interested in straight chemistry. I didn't want to be stuck in a lab. I wanted to build things. But if you ask me…

CARUSO: So would that be the distinction, then: you saw chemists as people who sit in labs and play with reactions and chemical engineers as people who go out and build things to capitalize on the reactions that chemists do in labs?

LEDERMAN: You asked me if I felt that way when I was eighteen…

CARUSO: Yes. Well, were there…because, I mean, it's interesting to choose chemical *engineering* over just saying <**T: 45 min**> chemistry.

LEDERMAN: That's…it probably is, and I'm sorry I can't help you.

CARUSO: Okay.

LEDERMAN: No, I…it just…

CARUSO: Certainly. So you go to Michigan. Was your family happy that you were headed out? Or were they a little…?

LEDERMAN: I think so. I think so.

CARUSO: Okay.

LEDERMAN: Or if they were unhappy, they sure didn't show it. We all agreed that I would not stay at home.

ROBERTS: Yeah, you had said you didn't want to…your decision factor for applying to schools was primarily based on you didn't want to be at home.

LEDERMAN: No.

ROBERTS: Were there reasons for that?

LEDERMAN: Well…

ROBERTS: Not primarily, but that that was a factor in your decision.

LEDERMAN: Well, I felt I wanted to get out and see other parts of the world. No, you shouldn't imply from that that I had an unhappy home life. I did not.

CARUSO: No. No, I think a lot of…

LEDERMAN: But, but…

CARUSO: I think the assumption, at least for most kids, is at some point they just want to get away from home, and of course, going to…if you live in New York and you go to New York City school, you're probably going to be living at home. Most people do want to get away in the sense…

LEDERMAN: When I left in…I said I would not come back to New York. That I did say.

CARUSO: That's pretty rare for a New Yorker.

LEDERMAN: I did not want to come back to New York.

ROBERTS: Why was that?

LEDERMAN: I just didn't like the city as far as I…this is now, many years ago, it was dirty. It was rushed. Yeah, there were nice things, but I just felt I didn't want to be there.

ROBERTS: So what was it like going from that environment to Ann Arbor?

LEDERMAN: Quite a bit different. I mean Ann Arbor at that time was forty thousand, fifty thousand people. But it had all of the things that New York had in many ways. It didn't have a

good many movies, but it had a good musical program, good theater, not that I was enjoying that, but it was there. No liquor. It was a dry town. Well, and that's a big difference from New York, which was floating in stuff.

ROBERTS: Yes.

LEDERMAN: I found the people friendly. You know, I don't know. I can't give you rhyme or reason…

CARUSO: How is it…I mean, you're moving to Ann Arbor in winter, which probably not the easiest thing to do.

LEDERMAN: Well, it's interesting. First of all, you moved in a different way. You had a steamer trunk, which was about as wide as this table is wide [approximately three feet]. You know, and that was sent ahead by Railway Express, which doesn't exist anymore. Now it's UPS [United Parcel Service]. You got on the train at six o'clock at night, maybe it was seven, at Grand Central [Terminal] and you rode…my parents even got me a sleeper, which was a luxury. I mean my dad was doing well. It wasn't a luxury in that sense, but certainly…and the next morning at seven o'clock, you landed at the train station in Ann Arbor. Dark, cold. You took a cab to the dorm. The housemother was there and you got your room assignment, which was an interesting one for me. That's how you got to school.

CARUSO: Why was the room assignment an interesting one for you?

LEDERMAN: Well, this was a time when the veterans were there. It turned out I was assigned to a room which was normally a single, but now everybody doubled up. My roommate, who wasn't there, was a senior chemical engineer, which I think was an interesting pairing. Jim quit engineering [after graduating]; he ended up as a minister. I got all his chemical engineering books very inexpensively. [The books are] now in Nigeria <**T: 50 min**>.

CARUSO: They're now in Nigeria? I have to ask.

LEDERMAN: You have to ask that.

Well, I had two sets of engineering, or three sets of engineering libraries: the one which I got and then built on when I was in school, and I had that when I was in Baton Rouge, [Louisiana], and had in my basement [in New Jersey]; then I had the more current one, which

held chemical engineering and environmental engineering—well, I know that is still history that we'll get into. It was just too many books. So I was giving a talk at Cooper Union one day about five years ago, and the head of the department, I talked to him. He said, "Well, we're looking for books for Nigeria." The books are worthless here. I mean they weren't of quality to put in the archive [at CHF]. So he came and picked them up, which was great.

CARUSO: Yeah, all right.

LEDERMAN: Now, I kept a couple of them, but that's where most of that particular library resides. Anyway, Jim went to the ministry. He didn't fare well in chemical engineering. I'm not sure he fared well in the ministry, either. […] As an aside, he happened to have a malformed jaw.

CARUSO: Oh.

LEDERMAN: And that's tough as a minister.

ROBERTS: Sure.

CARUSO: How was it…I mean you're coming into Michigan in the middle of what is everyone else's…

LEDERMAN: Winter…

CARUSO: …freshman year. Winter…

LEDERMAN: And everybody's out. There are very few people in the dorms, because it's mid…

CARUSO: It's their break, right…their midyear break. But what was it like coming in as a new freshman half a year behind everyone else?

LEDERMAN: You know I got a full set of classes, because there were…I wasn't the only one. There was a full class. We took English and math and chemistry. Those of us who had been

good chemistry students got the advanced chemistry, a year in six months. And analytic geometry. We had to take mechanical drawing at that time. I just took the classes. I mean if you ask was it tough because I came in midyear? No.

CARUSO: Okay. So everything was sort of set up for larger numbers of students to come in and take the classes…

LEDERMAN: Yeah.

CARUSO: …starting midyear. Okay. How was it transitioning into college life, more generally, for you? Was that…I mean was it just essentially a continuation of high school in a sense? Or…?

LEDERMAN: No. […] I didn't have any problem. We ate in the dorm. We had…we made friends. I lived in the dorm for a year and a half. There were…and I purposefully picked schools like Michigan, because I wanted someplace where I didn't have only engineers. I figured that I could learn…get the other by exposure rather than by learning.

Chemical engineering at Michigan had a very fine undergraduate advisor, or advisors, and one in particular, [Prof. Brymer Williams]. So it was an easy transition.

CARUSO: And the classes themselves were relatively easy for you?

LEDERMAN: Well, it was interesting. I had a U-curve. I mean, I had a very high freshman semester, very high senior year, and the rest was…

Yeah. The freshman classes were easy, because of…. […] The competition was not as tough as it was at Forest Hills.

CARUSO: So that first, I guess, that spring semester and the summer was your freshman year.

LEDERMAN: Yeah.

CARUSO: And so those were relatively easy. In some ways, I guess, kind of repetitive of what you'd…

LEDERMAN: In some ways, yeah.

CARUSO: In some ways <**T: 55 min**>. You were doing various classes. You entered with the idea of being a chemical engineer…

LEDERMAN: Absolutely.

CARUSO: …so I'm assuming you pretty much declared your major from the moment you arrived.

LEDERMAN: Right.

CARUSO: What was the curriculum like at Michigan? Was it very regimented, where every chemical engineer takes all these classes and your schedule's set for the next four years? Or did you have some flexibility to explore…?

LEDERMAN: Very little flexibility. I got some advance credit from, I think, for German, for some course like German—I took German in high school.

CARUSO: Even though you didn't want to speak it when…

LEDERMAN: Well, I…first of all my grandmother came over and I had to relearn it. I recently gave a lecture to high school students in Germany. I didn't know whether I could pull it off, but I did […].

CARUSO: I was just asking you about the regimented structure…

LEDERMAN: The regiment. First of all, engineering required a hundred and forty-four credits.

CARUSO: Instead of the hundred and twenty-four…

LEDERMAN: Twenty-eight.

CARUSO: One twenty-eight, yeah.

LEDERMAN: Yes, it was fairly regimented. I mean you took three classes in drawing. You took a minimum of four courses in math. You took, if you were a chemical engineer, a whole series of required chemistry courses. The chemical engineering courses were required. You took one…you were required to take one electrical engineering course. You were required to take one mechanical engineering course, which repeated a lot of what you already had, but it was there. You had to take an economics course. You had to take an accounting course. You had to take I don't know how many credits in English. They were required. Now, you had a little choice in the English after the basic courses, but there was a block of English. I think that we may have had of that hundred forty-four credits, ten credits or twelve credits where we could choose. They had to be in literature or something.

CARUSO: Right. Humanities.

LEDERMAN: Humanities. So it was a fairly rigorous operation.

ROBERTS: So how did you spend those few credits?

LEDERMAN: Let's see. I took one philosophy course, I think. I don't remember what other I took.

ROBERTS: So you said you had a U-shaped curve. What was happening during your sophomore and junior years? Do you recall whether there were specific sticking points? Was it just that…?

LEDERMAN: Partially social life, I think. Well, I'll tell you: the first chemical engineering course was not easy. You know who my instructor was? You know him. Stu [Stuart W.] Churchill.

CARUSO: Oh.

LEDERMAN: It was his first—I didn't know it at the time—it was the first time he taught chemical engineering. We've since become very good friends. The average on the first test was, I think, ten.

CARUSO: That sounds pretty normal for an engineering class.

LEDERMAN: Mostly our professors were vets [veterans]. They were taking no nonsense. But that was…that's an interesting aside. [Stu and I have] stayed friends for many years.

CARUSO: So what aspects of your social life were taking away from your education?

LEDERMAN: Oh, my God.

CARUSO: Was it just, you know, you were away from home, you had your time, you had your winter, you had your summer, where you invested in your academics, and then you realized, "I'm eighteen, nineteen years old, I'm out on my own, and I can live a life"? Was that pretty much what was going on? Or…?

LEDERMAN: I'm trying to think. I certainly dated. I probably got thrown over a couple of times. I really…<**T: 60 min**> I'm not sure I can make that connection.

CARUSO: Okay. So it just was.

LEDERMAN: Yeah.

CARUSO: Can you tell me a little bit more about what the chemical engineering curriculum was like? Clearly, you're going to a lot of lectures, you're being given a lot of information. Were you working in laboratories?

LEDERMAN: Okay. There were basic courses that were lecture or lecture-recitation. We had…I'm going to separate chemistry and chemical engineering.

CARUSO: Sure.

LEDERMAN: In the chemistry area, we had labs associated with every one of the courses. We took analytical chemistry, quantitative analysis, and the only one that didn't have a lab in it, was physical chemistry, because we had gotten that other places. So […] there were labs there. Then in the engineering school, or engineering, there was a basic laboratory course, which dealt with…in the first course, or one of the first courses, was a materials course. There was lab with that, where we did welding, and cutting, and looked at materials in every form. The book was [by] A.H. White, [*Engineering*] *Materials*,[3] and…I believe that's the title. And we did some…there was a foundry machine, so we did some foundry work…the things that nobody does anymore. Right. Then there was a course in chemical measurements, where we did distillation. I think it was the first time I saw a GC [(gas chromatograph)...], but very rudimentary, which we built. All sorts of those sorts of things.

Then there were three courses which were…then there was the unit operations lab, where we did a lot of pilot-scale things, where the pumps of distillation or heat transfer, crystallization, all sorts of unit operations. The curriculum at that time was a unit operations curriculum. It wasn't until I got to graduate school that we got into the transport phenomena type of thing. Transport phenomena really started…the book *Transport Phenomena* really came out just about when I was a senior, or slightly thereafter.[4] And that was sort of the ultimate lab course […]. Plus, we had design courses. You had an equipment design course; you had a process design course. That was the…sort of the capstone course. That was just very…so there was laboratory connected with…both in chemistry and…oh, and we had to take a physics course, a year of physics. There were…I don't think we had lab with the physics course. I wouldn't swear to it.

CARUSO: So it sounds like the curriculum was such that you did have sort of the theoretical aspects of things, but you also had this practical component, right.

LEDERMAN: Yeah. Today, unit operations would not be considered theoretical.

CARUSO: I was just thinking or reflecting on my own chemical engineering experience, where there really weren't labs. It was just purely…

LEDERMAN: Where did you go to school?

CARUSO: …, "These are the equations…."

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[3] A.H. White, *Engineering Materials* (London: McGraw-Hill Publishing Co., Ltd., 1939).
[4] R.B. Bird, W.E. Stewart, and E.N. Lightfoot, *Transport Phenomena* (New York: John Wiley & Sons, 1960).

Johns Hopkins in the…

LEDERMAN: Okay.

CARUSO: …late '90s. It was really just, "These are the theories. Think…

LEDERMAN: You were…

CARUSO: …about them."

LEDERMAN: You were in the transport phenomena era.

CARUSO: Yes. Yeah.

LEDERMAN: Okay. Well, and there's a great distinction. If you look at the book <**T: 65 min**> *Unit Operations*, which was the classic at that time, written by the people at Michigan, you can see the difference.[5] You probably used the one from [Bird, Stewart and Lightfoot at] Minnesota.[6]

CARUSO: I wouldn't be able to remember at this point. It's so long, so many books previous. I noticed that during your time, I think, as an undergraduate, you worked as a junior technologist at Shell Oil [Company].

LEDERMAN: Well, okay. I worked…that's not "during." I worked while I was at school and I was actually a lab instructor in the chemistry department.

CARUSO: Oh, okay.

LEDERMAN: I taught qualitative analysis lab for two years.

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[5] G.G. Brown and Associates, *Unit Operations* (New York: John Wiley and Sons, 1950).
[6] R. Bryon Bird, Warren E. Stewart, and Edwin N. Lightfoot, *Transport Phenomena* (New York: John Wiley and Sons, 1960).

CARUSO: Starting when you were a sophomore or junior…

LEDERMAN: Junior.

CARUSO: Okay. You were doing that to supplement….or to pay for tuition then?

LEDERMAN: To supplement my income or supplement…or get pocket money or whatever. I graduated with a bachelor's degree in June of 1953 and went to work for Shell Oil in Wood River, Illinois. That was a permanent position, so it was not while I was in school. I had left with the intention of getting a…now you asked about my parents. My father said, "You got to get a graduate degree." "Dad, I'm going to get a graduate degree. I'm going to go to night school in St. Louis, [Missouri]."

I had a couple of offers. Shell was, I think, the best one. I was going to work at the Shell refinery in Wood River, Illinois, which no longer exists, and I did. The first guy I worked for was Hugh [D.] Guthrie (I don't know whether that name means anything to you). Hugh was President of the AIChE, quite a guy. Anyway, I got this job, and the idea was that I was going to go to night school in St. Louis. Well, it turns out they didn't have night school at [Washington University in] St. Louis. So, now the question was, do I continue or not?

[So that was a full-time job, and I was a process engineer in the lube oils department. It was a very good experience. That plant went on strike while I was there. That was also a very interesting story].

I went to the head of the department, chief technologist, […] whose name is Dave [David] St. Clair. I said, "Look. I can either…I owe you a year. You've hired me, and [you] paid for my way down here. I owe you a year. Or I can go back to school, because I can't do what I want." Yeah. Well, he said, "You do what you want, but we certainly understand." So I went back to Michigan that fall.

It turns out that they had asked for my deferment, and my draft board refused deferment, because they needed people—this was the end of the Korean situation. Anyway, I had quickly gotten into Michigan graduate school. Don [Donald L.] Katz was the chairman, department chairman, at that time. I got…I think I got a teaching assistantship, but I'm not sure, but I got into graduate school. Six weeks later, I was in the U.S. Army. So that was a full-time job, and I was a process engineer in the lube oils department. It was a very good experience. That plant went on strike while I was there. That was also a very interesting story.

CARUSO: So I want to talk a little bit more about that.

LEDERMAN: Sure.

CARUSO: Also, of course, I want to talk about your time as an instructor at the U.S. Army Petroleum School.

LEDERMAN: Well, that follows.

CARUSO: Yeah. But just to sort of end off your college years, you mentioned sophomore and junior years, your grades dipped a bit. Senior year they came back up.

LEDERMAN: Back, right.

CARUSO: What was it for you that…?

LEDERMAN: I was going steady with a girl. That was one thing. I enjoyed <**T: 70 min**> the stuff I was doing. I enjoyed process engineering, enjoyed the lab. I don't know, I was…it just worked out that way.

CARUSO: Okay. Were you receiving any advice from the faculty members about what comes next for you? Were you…you mentioned you had opportunities to go to lots of different locations. Were those opportunities that you found on your own or was the faculty…?

LEDERMAN: What do you mean?

CARUSO: You had mentioned you could go to Shell, but there were other…

LEDERMAN: I had some other offers. Well, at that time, and this was the end of the World War II boom, Michigan had a very fine, and still has a very fine, placement service. We'd have, just like you guys probably did, we had companies come in and they'd interview. Then […] you decide whether they were interested in you and you'd go visit them, and you'd get an offer or not. I don't remember how many offers I had, probably three, four.

ROBERTS: I think I heard Dave asking also whether or not there were any specific faculty mentors who might be giving you some advice on where you might go?

LEDERMAN: Yes. I don't think so. I don't think I needed them at that point. Now, I mean we had faculty mentors, but…they were available if you wanted them.

CARUSO: Okay. So you take a job at Shell in lube oils, as you mentioned. What were your responsibilities for that position?

LEDERMAN: We were in really process operations. First of all, it was learning. I mean I was a green kid in many respects. But it was learning the operation, following the operations. We had a shutdown, and we had a turnaround, meaning they shut the unit down to clean it out and stuff. I was involved in that turnaround. Taking measurements, making sure the changes were made properly. Following production, is it quality? I wasn't doing the lab work, but I'd take samples to the lab and make sure that the results came in, keeping track, and things like that, just general operations.

CARUSO: Is that what you saw yourself as doing as a chemical engineer?

LEDERMAN: I thought it was a good first start. Was I going to stay in that position? No. At Shell, you generally didn't. You grew. In a few years, I would have probably been an assistant department head or something like that.

CARUSO: And you wanted to stay in the Midwest area at this point? Or was that just…it was more job opportunity?

LEDERMAN: Job opportunity.

CARUSO: Okay. So you're at Shell, your family sort of chimes in with, "You need to get a graduate degree." St. Louis doesn't work out, and so you wind up back in Michigan.

LEDERMAN: In Ann Arbor.

CARUSO: For a very short period of time.

LEDERMAN: That's right.

CARUSO: You were able to take some master's classes before you got to…

LEDERMAN: I was in a full master's program and six weeks or five weeks, I said, "Thank you, goodbye." I wasn't the only one. I mean this happened to people.

CARUSO: Right. What was that like for you, having to leave the master's program?

LEDERMAN: I was not a happy camper. The university, by the way, tried to get me a deferment. It went all the way up to the National Board. They said, "Well, it's already been decided. Sorry." The Board in Jamaica just was shy of bodies. They took…in the group that I was drafted with, there were four or five of my friends <**T: 75 min**>, my classmates from high school or from grammar school.

CARUSO: Wow.

LEDERMAN: Yeah. This was not a fun time.

CARUSO: So where were you sent to?

LEDERMAN: Okay. Well, by the way, at that time some people went to the Marines. It was, "You and you and you. One step forward, right face, off to Parris Island, [South Carolina]." I was lucky I didn't go to Parris Island. I don't think I would have lasted in the Marines. I was sent to the Medical Replacement Training Center at Camp Pickett, Virginia. There we were told…we met a young lieutenant who said, "You guys who are scientific professionals…." The way they picked that was, if you had a certain number of years of experience, and a technical degree, et cetera, et cetera, you became a scientific professional. Well, I had…they counted my teaching experience, and that I worked for Shell. So, I became scientific professional. This lieutenant called us into, was a scientific professional, and said, "Don't you dare go to OCS [Office Candidate School]."

ROBERTS: Why was that?

LEDERMAN: Well, guys who went to OCS, got their…went through OCS, got their commission and would go out with the troops. As second lieutenants, they weren't…that was not a very inviting career position. There was a high…that was a casualty rate. Actually, the Korean War, well, the fighting had already stopped, there was no…. So it probably wouldn't have been as bad, but neither here nor there.

The other thing about S&P [scientific professional] was we only got eight weeks of training. Then we went off to our jobs. We were somehow protected. I don't have to go into that whole thing. Anyway…oh, I also had some experience…I'm sorry, I'm mentioning it….I forgot a working experience. The summer through my junior and senior year, I worked at the BOMARC research lab in Michigan, working on the BOMARC missile doing corrosion studies, which also counted towards the S&P. Well, you know…

CARUSO: How did that come about? Was that…you saw a job ad? Or…?

LEDERMAN: They were looking for people and I had…in Michigan, you not only took…you took some metallurgy courses. It was the Department of Chemical and Metallurgical Engineering—no longer, but at that time…. I don't remember how I got this job, but I got this job. So I did corrosion studies. It was a very interesting summer. I also learned about computers. They had a computer there, which…and I don't remember the name now, but it worked on a drum that rotated, high speed drum, and mercury delay-line storage. You guys have never seen anything like this. This was as big as this room, and you programmed in hexadecimal. You're laughing, but…

CARUSO: I can just imagine trying to program in hexadecimal.

LEDERMAN: And we used punch cards. Anyway, so I knew about computers at that time and worked with some very fine people. […] I forgot about that, but that was part of the experience. […] So I became an S&P, and my first assignment was to be at the Army [Edgewood] Chemical Center, [Edgewood, Maryland], where they were working on nerve gas. This is kind of interesting, a little later, because I got…came back to nerve gas later in my career. I went there after my eight weeks. Of course, people were very jealous of these S&Ps, because we weren't going out to more training. We were getting a job, and et cetera, et cetera.

So I and another guy drove up to Edgewood Arsenal. I came there and a lieutenant says, "Lederman, you're not going to stay here." "Why <**T: 80 min**>?" "You can't get security clearance." I said, "Sir, I have security clearance." "You what? You're foreign born and you have security clearance?" I said, "Yeah. I have an Air Force secret clearance." So he says, "Son, this is the Army, not the Air Force."

Well, it turns out I knew the rules better than he did. I could get security clearance, and they wanted me because of my corrosion experience. But they'd already asked the adjunct general for a transfer, because S&Ps' transfers had to be…go through Washington, [D.C.]. So I was [at] the post [library] for some months, as the assistant post librarian. That was nice. Then I was transferred to the Army Petroleum School.

CARUSO: Okay. So how you wound up at the Petroleum School, was…okay

LEDERMAN: Yeah. First there was…I almost didn't wind up there, because I got back to Fort Lee, and they said, "You only have eight weeks of training. You need more." But I had…you know Michigan counts. There was a young lieutenant there who had been president of my class, and I knew Jack [Flynn], well. Jack made sure that I was protected. He went to personnel and said, "This guy, he can't do this."

So all of a sudden on Friday I get told, "Can you be out of here by…and be up in New Jersey by Monday?" "Oh, yeah." "Here are your papers. Get them all signed." To clear the base, you had to get…well, and I reported to the Petroleum School up in Caven Point, New Jersey, which was in Jersey City, and lived at home for six months. There was no base, and then we went back to Fort Lee, [Virginia], where I taught [at] the Petroleum School, only officers, and also, wrote the…there was a course for senior officers, the Advanced Quartermaster School Course. [As] part of that, they had just started a course in process industries. They wanted these [officers] to know, guys and gals, to know how the products that they were buying were made, and they needed a chemical engineer. I was the chemical engineer. I was Private Lederman. I wrote this course, and taught it for the first time, captains to colonels. That was very interesting. Yeah. I'm giving you an overview, not details. Go ahead, and…

CARUSO: I was going to ask…so I am curious what your family's response was, given that your father said, "Get your graduate degree," and then you wind up in the Army. Was that problematic for them?

LEDERMAN: No.

CARUSO: Okay.

LEDERMAN: Hey, that's the way life is.

CARUSO: And I guess during this period of time, how were you…were you thinking any differently about what it is that you wanted to do?

LEDERMAN: No.

CARUSO: No.

LEDERMAN: I decided I was going to get my graduate degree, master's degree. I taught petroleum technology, which was mainly lab stuff. Then I became technical advisor to the commanding officer of the school. Since I was the only chemical engineer in this place, I was a private holding a GS-11 spot. I spent my twenty-two months, and then I had…then they offered me a commission if I went to OCS, and I said, "No way." I got my…it wasn't a discharge…separation. I had wanted to go in the U.S. Navy before. I had applied for a commission in the Navy as a petroleum officer. But the Navy wouldn't take me, because I was draftable.

CARUSO: Okay. Why did you want to…?

LEDERMAN: I knew they had a petroleum reserve. I worked in petroleum. I thought that was a good thing for me to do.

ROBERTS: At what point was this, when you wanted to…?

LEDERMAN: Probably just about the end of my…was getting my bachelor's degree and working at Shell. Anyway…

CARUSO: So it was more just a job opportunity than…?

LEDERMAN: Yeah. Well, not job opportunity. It was a way…I know I was draftable, so it was a way to avoid being drafted.

CARUSO: Sure. Better to be on a ship, I guess, at that point.

LEDERMAN: Well, and while I was at Caven Point, we ate on the carrier *Mission Bay*, because <**T: 85 min**> we had no mess hall facilities. So we drove down there all the time. Anyway, I got out of [the Army], separated, and went back to school. I got an early separation so I could go back. Now, I was a teacher. I got a job at Michigan as a teaching fellow. So I taught while I was going to graduate school. Based on my teaching experience, I had…probably had as much teaching experience as many of the junior faculty had.

ROBERTS: So you had mentioned—just quickly—that part of the reason your grade curve was a U and came up in the end was that you were seeing someone rather steadily. You also then, after graduation, move about six times around the country in about two years.

LEDERMAN: Well, oh, you want to know about this girl?

ROBERTS: Well, I'm just wondering, if you had any extra concerns post-graduation besides just the fact that the U.S. government was moving you around the country?

LEDERMAN: No. The young lady broke up with me shortly after I moved to St. Louis.

CARUSO: So you returned to Michigan in '55. I'm assuming there was no problem with you resuming…

LEDERMAN: Absolutely not.

CARUSO: Okay. Were you paying for that education as well? When it was just…when you were starting to pursue the master's degree, was it something that you had to pay for? Or…?

LEDERMAN: (a), I was on the GI Bill [Servicemen's Readjustment Act of 1944]. (b), I was a teaching fellow. Teaching fellows [didn't] pay tuition at that time at Michigan. Now, the salary was not exactly humongous, but I was rich. I had the GI Bill, and I was making sixteen thousand…sixteen hundred bucks a year during the school year as a teaching fellow. So between the two of them, I was in seventh heaven. Seriously…

CARUSO: When you returned to Michigan, did you know any of the people that were also pursuing their master's at the time? Was anyone familiar to you?

LEDERMAN: Yeah, sure.

CARUSO: So there were people that you had done classes with before, and…

LEDERMAN: And I certainly knew the faculty well.

CARUSO: What was it like being both a student and an instructor in the same department at the same time?

LEDERMAN: Didn't bother me at all.

CARUSO: No, didn't make a difference.

LEDERMAN: No, it probably gave me an advantage because I knew the faculty. Some of the faculty were friends of mine. It wasn't just…to give you, the guy who, really, I became very friendly with was [G.] Brymer Williams. He's passed. I mean very friendly to the point where after I left, we continued our relationship, and I would consider him one of my mentors. I felt comfortable enough going to see the department chairman and tell him once he wasn't treating me fairly because he made one guy an instructor, and not me. The guy he made the instructor was Dick [Richard E.] Balzhiser. That name's familiar to you guys […]. He was another friend of mine. But, you know, most graduate students don't feel that comfortable going in to the boss [to complain…].

CARUSO: No. I was just going to ask…I actually…I mean I noticed that you did have publications coming out with Brymer Williams on the liquefaction of natural gas.

LEDERMAN: Right.

CARUSO: So I did want to get a little bit more into…

LEDERMAN: Why did that…

CARUSO: Your work…why you came to liquefaction, but also, I mean clearly at some point you decided not just to pursue your master's, but to get your Ph.D.

LEDERMAN: Okay.

CARUSO: That's what I want to find out.

LEDERMAN: I said I was going to get my master's degree. My father said, "Ph.D." I said, "Master's. One thing at a time." I was going to take a master's degree and then go out and be a process engineer. I was sitting…I was teaching the chemical engineering measurements lab. I was sharing an office with a guy by the name of Alex [Alexander] Weir, [Jr.], who was not yet, I think at that time, an instructor <**T: 90 min**>. He said, "Pete, take the Ph.D. qualifying exam." I said, "I'm not ready for that." "Take it. The first time it's free."

I passed. So it wasn't free in that sense. I squeezed by the practical part, but, anyway, I did that. You know once you did that, you're hooked. So that was the transition to the Ph.D. At Michigan at the time, they required a prelim exam after you passed the qualifying. The prelim exam […] was a consulting problem. You got twenty-one days to write a consulting report. I was given the problem of, "We're Company XYZ and we have some money to invest. We think that liquefied natural gas [(LNG)] is a good thing. Tell us whether we should go into it. If we should, at what level? If we should, where should we get the gas, and where should we sell it?" In twenty-one days.

That's a…and they're all in that sort of thing, very complex. I think very, at that time, a very good thing. Well, the one thing I knew nothing about was shipping this stuff. I mean, I'm a chemical engineer. I'm not a ship guy. Well, fortunately, there was a report had been done on shipping natural…LNG. Well, on top of that, Stu Churchill had been consulting for Shell on LNG. Don [Donald L.] Katz, who was the head of the department, had been…who was head of the Coast Guard Advisory Committee on Safety, and they looked at shipping LNG in barges up the Mississippi [River].

So, okay, Lederman gets this problem, and twenty-one days later he has to produce a report, which I did. Normally these reports were then graded, and then put away, and somebody else would get the same problem. Well, in this case, somebody approached…I don't remember if it was Stu Churchill first or Don Katz first. There was the American National Gasoline Producers Association, was having their annual meeting in Houston, [Texas]. This was in 1957. They needed a paper and wanted somebody to talk about LNG, as a keynoter. I mean, crazy. Remember, I'm a graduate student. Admittedly, I'm a more experienced graduate student than many graduate students, but I'm a graduate student. Well, Don says, "I can't do this." Stu says, "I can't do this, but what about Lederman?" So Lederman gets the job to go down and give this paper. I had been planning a party for my now wife—not even engaged—for her birthday. I had to cancel all that. No, no, that was separate.

But anyway, I went down there to Houston and I gave the paper. The guy from Parsons Brinckerhoff came up to me and said, "You stole some of our data." I said, "It's just plain thermodynamics, and then costing. But if I'm that close, I must be pretty good." He walked right away. Hence, my first thirteen publications. I mean talk about luck. Does that answer the…?

ROBERTS: Yeah. So did they not want to do that presentation? Or did they not feel like they could do that presentation?

LEDERMAN: Well, they felt they would have conflicts <**T: 95 min**>. Shell was […] studying this…

ROBERTS: Sure. Sure.

LEDERMAN: And they felt they would have conflicts in doing it.

CARUSO: I noticed that…I mean with Brymer Williams, you have those publications on natural gas. I notice…well, I'll come to it I guess when…at your time at Esso Research, you also do have an article coming out about computers and chemical engineering education…

LEDERMAN: Yes. Okay.

CARUSO: I'll get back to that. What I'm actually more interested in right now is, how you came about your thesis for graduate school.

LEDERMAN: Okay. I'd be happy to do that. The first thesis subject I wanted to do was to study the chemical industry in Michigan, and see where it was going and what it needed […]. That was obviously not a normal chemical engineering dissertation at that time, non-experimental, business. The business school said, "This is great. We don't have the expertise to do it, no matter what you do." The faculty voted 50/50, right down the middle, that I could do it or couldn't do it. So Katz called me and said, "Peter, we'll support this if you also get a Ph.D. in business." I said, "Uh-uh, one is more than enough."

So that went down the tubes. My thesis advisor was going to Brymer Williams. I mean that was preordained. I then suggested a topic to do with LNG, with the physical…when you freeze, or not freeze, but liquefy, you have some heavy ends. Do you know what heavy ends are?

HUNTER: No.

LEDERMAN: Okay. Heavy…liquefied natural gas is mainly natural gas, which is methane, but you have some materials in there which are heavier hydrocarbons. You even have, in most natural gas, a little bit of benzene on it. When you cool this down, they freeze. What do you do with it? Now, my paper didn't address that, but and I was going to do a study on the freezing and removing of stuff, at which point a […professor at the University of Kansas] called me up and said, "Peter, if you do this, you're going to force me to publish." Well, that's the death knell. You don't do that.

So, I said, "Well, try Number Three." Zeolites were just coming out at that time. It was *the* new thing. I said, "Well, when I look at zeolites and how they…nitrogen, methane, you can enrich methane. Can you…what do you do with the zeolites? How do they act?" So we got it by default.

CARUSO: So I'm curious, your first idea for a dissertation was not experimental.

LEDERMAN: That's right.

CARUSO: Why? I mean what was it about the business model, in a sense, that interested you more than…?

LEDERMAN: The experimental one?

CARUSO: Mm-hmm.

LEDERMAN: Well, I was already…remember, I had been in industry. I felt that this was an area we hadn't looked at. I saw it. I was interested. And I guess this comes back maybe to my gene pool. My father had been in business, certainly. So it's sort of a…I don't know whether it was a connection, but I just felt this was an important thing. Brymer Williams felt it was important, too <**T: 100 min**>, and industry thought it was important. It was not something that I just…because they weren't looking at the future as much as they do now.

CARUSO: I was kind of curious whether or not you were…if you had a preference for or…some of the scientists that I've spoken with love being in lab, they loved doing experiments,

they loved working with their hands. Some of them feel that lab work is necessary, but they kind of like thinking about bigger problems. I was wondering if you enjoyed being in lab and doing lab work, or if you actually preferred thinking about the consequences of that lab work more? That's where my question was coming from.

LEDERMAN: Well, I did not particularly enjoy doing lab work. I mean it was necessary. It was there. I was looking at…I was really process oriented. Now, this was the next step, obviously. But if you asked me was this willful? Probably not, it was…it just came.

CARUSO: Okay. Can you tell me a little bit about…since you wound up having to do lab work, can you tell me what it was like pursuing the research for your thesis in terms of…I'm even curious down to the 'what you were doing on a daily basis' sort of thing.

LEDERMAN: Okay. Well, my day was really split between teaching…and I ended up teaching every chemical engineering course except thermo during my time. My day was split. I had built a piece of equipment with the help of our mechanics, where I could do low-temperature work. My day would be I'd go in in the morning, start the experiment, let it go to equilibrium, and then take readings. Or a tech would come in and take readings, and do that on a routine, regular basis, that after I debugged the equipment.

Michigan had had a couple of accidents, and so safety became a fairly important thing. I was working at high pressures, low temperature, so this machine had to be safety inspected. So it was not just…there was no glassware involved in this thing. It had a fairly heavy shielding on top. I needed the liquid nitrogen for cooling—dry ice. So there was a lot of repetitive routine work.

CARUSO: What sort of days…how long was each day for you? I mean were you getting in at five in the morning, and leaving at seven at night? Was it a normal, average work day, nine to five?

LEDERMAN: I don't even remember.

CARUSO: I'm guessing, though, probably you weren't pulling all-nighters on a regular basis.

LEDERMAN: No.

CARUSO: In your time…the time that you spent in lab when you weren't teaching, were you with other graduate students? Or…?

LEDERMAN: No. I had a lab. I had an office. They were down the hall from each other.

CARUSO: So in a certain way you were acting…well, I guess I should start with, were other graduate students working in labs together on projects? Or did…was the setup such that once you were a graduate student, you got your lab, you did your work, and you were…

LEDERMAN: It varied.

CARUSO: It varied.

LEDERMAN: It varied. Some people worked on grant…my research was not supported except by the department. If you won a grant or an industry-supported…a lot of industry supported [work]. For example, Wolverine [Tube, Inc.] supported a lot of research on heat transfer. With finned tubes, the guys who did that kind of work <**T: 105 min**>, all in one room, large room, were doing heat transfer experiments. On the other hand, somebody did some work on the constant volume, specific heat of propylene or something, and he worked by himself. It just varied.

ROBERTS: It seems like the projects you had were very solitary projects. Can you talk about the broader…?

LEDERMAN: Not, not…that I had, or that were generally had.

ROBERTS: That you had.

LEDERMAN: I had…yeah, I had a project that I…

ROBERTS: It was just you.

LEDERMAN: Yeah, that was me.

ROBERTS: Can you talk about the…your experiences with the broader graduate community while you were at Michigan?

LEDERMAN: I was part of that community.

ROBERTS: What was it like?

LEDERMAN: We…well, first of all, we had seminars and stuff. We were all in that, involved in that. We gave seminars. We had parties, not always. In my case, after two years I was married, and so I was not part of the single community. I was part of the married community. A number of my colleagues, chemical engineers, were married, and we would play bridge. We'd have dinners together. So it was not the type of thing that you might imagine then. It was a much more family, if you will, family-oriented situation than 'we're all graduate students.'

ROBERTS: Do you want to talk at all about where you met your wife, or what was going on with her?

LEDERMAN: Happy to do that. I met my wife at Michigan. She happens to be a graduate of Forest Hills High School, but not in my time. When I came back to Ann Arbor, I knew a number of people still from my days when I was an undergraduate. They were very junior, and I was senior. I went to one sorority house, where I also parked my car. I was lucky. I had a car. At Michigan, you couldn't have a car until you were twenty-six, except if you were a teaching fellow, then you could have a car. So I parked the car at the Sigma Delta Tau house. I knew the housemother. Anyway, I was there after a football game, and a woman who I knew, who was dating a former friend of mine, said, "Oh, here's Number One." Not Number One, but she kept introducing me to people from Forest Hills High School. It turned out there were five or six women in that house from Forest Hills High School. Sue was the last one. We dated and we didn't date. I mean we were sort of on and off for about a year and a half, and then we got serious. So that's how I met her. I married her between her junior and senior year.

CARUSO: What was she studying at Michigan?

LEDERMAN: Political science. Ask me more.

ROBERTS: Oh, I was just curious about…I was just trying to figure out what else was happening outside of the lab is all. I was trying to add a little context…

LEDERMAN: Oh…

CARUSO: Yeah, that's what I was going to ask as well. I mean asking about graduate student life, you also mentioned that you were also close to faculty members. I'm assuming you were spending…did you spend time with them outside of…?

LEDERMAN: Oh, yeah.

CARUSO: Okay. Just…

LEDERMAN: And, you know, Ann Arbor football. So on football weekends…and I had enough seniority that I had seats with the faculty on the 45 yard line. No, the way you got football tickets was as you gain seniority, you moved down the line. Since I had…and four years was maximum and since I had that, I could go in with the <**T: 110 min**> faculty and get my tickets.

ROBERTS: Nice.

CARUSO: Were you doing anything else outside…I mean, okay. So you were working on your dissertation. You were teaching, so you had grading to do. You're going to football games. Were there any other things that you were pursuing…?

LEDERMAN: I attended concerts. I had friends from my undergraduate days, who I visited in Detroit, and we're still friends. I had a very pleasant life. Do I…can I…and I had my own apartment for a while. Then, I became the fraternity advisor and moved into the fraternity house, and that was kind of an interesting disaster. Well, you know, here I am twenty-four, twenty-five, twenty-six. I stayed there for a while, and then I got my old apartment back, different apartment. I knew people in town, too, whose kids had been with me in class. I'd go up and visit them.

CARUSO: Okay. During your…while getting your Ph.D., I mean in some ways it was…you hadn't intended to get it, but you were getting it anyway.

LEDERMAN: Well, by the time that came around there was…I mean, and so I said, once I passed the prelim…and I don't know whether I hadn't intended to, I just said I would do one after the other…

CARUSO: Right. But what did you see yourself doing? What did you want to do with that degree?

LEDERMAN: After I got my Ph.D.?

CARUSO: Yeah.

LEDERMAN: Go back into industry, into process engineering or something.

CARUSO: So you definitely didn't want to stay in academia and teach, and…

LEDERMAN: At that time…

CARUSO: …experiment?

LEDERMAN: No.

CARUSO: No. Why?

LEDERMAN: Well, I felt that I needed industrial experience. I was not a researcher. I did not want to spend my life in a lab. When we talk about my future teaching, you'll see why. Anyway, I…so I wanted to go back into industry. I did not consider academic jobs when I got my degree.

CARUSO: Did you receive any advice or feedback from the faculty members you'd spent so much time with?

LEDERMAN: You know, I'm really not…I'm sure Brymer and I talked about it, but whether…I can't recall that I really, you know…

CARUSO: Okay. You know, in some ways I'm always curious to know, in some contemporary scientific cultures, those who go to industry are seen as those who are going to the dark side of science, right.

LEDERMAN: Yeah.

CARUSO: I was wondering if that sort of culture or that perception existed…

LEDERMAN: No.

CARUSO: No. So it was acceptable for you to be moving…

LEDERMAN: I don't know what percentage of my colleagues went into academia versus into industry. I've never given that any thought. But I will tell you that there are a number who went into industry and stayed in industry. There are a number who went into academia and stayed in academia. And then there are people like me.

ROBERTS: So I'm curious a little bit about, you've got this interesting relationship with the other faculty members, where you're a colleague, you're a student. Maybe they're formally and informally mentoring you. Was that unique to you? Or was that representative somehow of the community of that graduate program at Michigan at the time?

LEDERMAN: Well, there were a number of teaching fellows, and there were a number of instructors. We ended up…I ended up as an instructor, as did two others. By the way, one of those stayed at Michigan and went into academia, and then went into government, then went into industry and that's Dick Balzhiser. The other instructor went into industry, stayed in industry. I think Bob is dead now. Then there's myself. We were the three instructors at that time. I'm sorry, there was a fourth in metallurgy, and he went into academia. So, there was no set pattern <**T: 115 min**>…

ROBERTS: But I mean in terms of the relationship that you had with the other faculty members at Michigan, do you think that those people you just mentioned had that same, more complicated, but also friendlier, relationship with the other faculty? Or was that something about your experiences and your relationship with that faculty?

LEDERMAN: Well, we were each different. Balzhiser had been a football star, and his relationship, I think, was similar to mine with other people. I think the others…we all had relationships with at least one faulty [member], good relationship with at least one faculty. Now was that true of every graduate student? They all had a mentor, if you will, maybe not to the extent that we had. I mean I could go to Williams's house for dinner, even when I was in the Army. When I came back, I stayed at his house. I mean you can't make…it's difficult to make those kinds of comparisons. I'm not even sure I knew them.

CARUSO: It just sounds, like to a certain degree, you were more of a colleague when you were a graduate student and less of a student. So the distinction between the faculty and the graduate students, which we normally think of today, didn't necessarily…

LEDERMAN: Didn't apply to me.

CARUSO: …exist here. Yeah.

LEDERMAN: I don't think so.

CARUSO: Okay. I also noticed while you were a graduate student, you did do some work with R.L. Norman…

LEDERMAN: Bob [Robert] Norman.

CARUSO: …on the production of ethanolamines,[7] is that…because I remember seeing a publication on your list about it.

LEDERMAN: You know, I don't even remember that.

CARUSO: Okay. So, it wasn't that significant a point, a part of your graduate career. When you were finishing your Ph.D.…and you're married, at this point…

[7] Peter B. Lederman and Robert L. Norman, "Production of Ethanolamines. A Process Design Problem," *AIChE Process and Plant Design Problems* AIChE, 1961.

LEDERMAN: Oh, but you want to talk about the computer work.

CARUSO: Well, I noticed the publication came out in '63, right, you know the "Computers in Chemical Engineering Education" publication…[8]

LEDERMAN: Right.

CARUSO: …that came in '63. So that was at your time while you were at Esso. So I wasn't sure where it would be best to…

LEDERMAN: Well, it fits into the graduate…

CARUSO: Okay.

LEDERMAN: That's why I returned to that.

CARUSO: Sure.

LEDERMAN: Don Katz got a grant from, I believe it was Ford [Foundation], for computers and engineering education. That grant probably started in '56, maybe. I'm not sure. He then looked at that or had people in each discipline look at that. Bob Norman, R. L. Norman, who was the other teaching fellow who became an instructor, was also on the computer [grant]. The other people who benefit from that, you'll know the name Larry [Lawrence B.] Evans. Larry was a couple years behind us, and there were others. I can drop the names if you want.

In any case, we did work in computer…how computers fit in with chemical engineering. I developed a program for liquid-liquid extraction. Why that? It was a simple one, […] as part of that project, and gave a paper on it at the time. And that may have only come out in '63, but that work was done while I was…and I was part of that team and got one publication.

[8] Peter B. Lederman, B. Carnahan, and G. Brymer Williams, "Computers in Chemical Engineering Education," Chemical Engineering Education 2(1) (March 1963): 1.

CARUSO: Was this something that was assigned to you? Or was it something that you volunteered for? Was it a topic that interested you, generally?

LEDERMAN: We were certainly…because this was a big grant, we were encouraged to participate. We didn't have to. I was teaching, I think, unit operations at the time, so this was a natural thing to do. I had worked with <**T: 120 min**> card readers when I was at Shell. So, it just worked, you know. When you ask specifics like that, I have to answer, "Right place at the right time, and you just do it." I know that may not be a good answer, but that's the way it is.

CARUSO: It's also, you know, doing an oral history interview, we have the ability to see what happens later on, and so we always try to reflect back to see where something may have started from. Of course, you know…

LEDERMAN: Certainly, it started there. I mean my computer work that I did or have done, started there.

CARUSO: […] All right. So you're finishing your Ph.D. You're married. You're going back into industry. Where do you want to go?

LEDERMAN: You mean location wise?

CARUSO: Location wise. You have this…you have an interest in process…

LEDERMAN: Well, I…first of all, I came out at a time when jobs were not that easy to get. I don't know how many interviews I had. Shell was not going to hire me back. Although, I think they would [have], but the rule in Shell was if you left Shell, you left. So I interviewed petroleum companies and chemical companies. The question is, "Where am I going to get a job?" Not location wise. I got, I think in the end, two offers, one from Pure Oil, which no longer exists (in the Chicago area), and one from Esso in Baton Rouge, [Louisiana]. I had interviewed Esso in New Jersey. They didn't make me an offer, but Baton Rouge did. One of the questions…and so, between those two offers, we felt that Baton Rouge, even though it was an area we had never been in, it was the best deal.

ROBERTS: Why was that? Can you tell us a little bit about the conversations you were having at home?

LEDERMAN: Yes. I'll tell you. […We were concerned about moving into the South because in the late '50s and early '60s segregation was still a big issue and school integration was a major concern. We went to visit and found the people very friendly. It looked like a good place to start a family. There were lots of folks like us, displaced Yankees there].

ROBERTS: Did you have any discussions with any of your faculty colleagues about the job offer, moving to Baton Rouge versus going somewhere else?

LEDERMAN: I don't remember.

ROBERTS: And did you have any children at the time <**T: 125 min**>?

LEDERMAN: We had one on the way. It was a race between my Ph.D. and his being born.

CARUSO: Which won?

LEDERMAN: I won. [Stuart] was late.

CARUSO: So you decide to take the position at Esso in Baton Rouge. You have a son. Well, where was your son born, in Michigan or in…?

LEDERMAN: In Michigan.

CARUSO: In Michigan. So you…

LEDERMAN: He was born in Michigan, and five days later, I was on the road driving to Baton Rouge. My wife flew down later with him.

CARUSO: Okay, so a very young family starting life in Baton Rouge. What…I know that you were working at Esso Research Laboratories as a chemical engineer. What were you hired to do as a chemical engineer there?

LEDERMAN: That's an interesting question. I was hired as a process engineer.

CARUSO: Okay.

LEDERMAN: Without specific assignment to start off with. You know, that is, I got the job. I had the job probably a year and a half before I went down there. When I came down there, I got an assignment to work in polymers, ethylene-propylene copolymer, as the assistant project leader working for a [Jim Ross], who had a Ph.D. There was lab work being done and we were building a pilot unit.

CARUSO: So your job, essentially, was to oversee the development of the pilot unit? Were you running experiments?

LEDERMAN: Oversee the operation of the pilot unit. Oversee the data analysis. We had a […] chemical engineer, but was a data clerk, and had been with the company a long time, make sure that things [were running smoothly and the data was being properly handled]. They had operators running the pilot plant.

CARUSO: What was your work schedule like? Was it relatively standard hours?

LEDERMAN: Well, it was and it wasn't. I mean, yeah, we had standard hours, but you're a professional: you work what's necessary. That's number one. Number two…and you remember the pilot plant was operating twenty-hours a day, seven days a week, and I had training too. We went to refinery safety training, fire training, and all those sorts of things, which is important.

Anyway, and then this unit went from a ten gallon butyl reactor, that's a type of reactor, to a sixteen hundred gallon commercial size. In the startup we were working twelve on, twelve off, because we were providing technical advice to the operating people. So, and you know, if the operator called me at midnight, he called me at midnight. I'm talking also about the pilot plant.

CARUSO: How is it balancing this position with your new family, or your new expanded family?

LEDERMAN: Not a problem.

CARUSO: Not a problem.

LEDERMAN: My wife, at that time, was a stay-at-home.

CARUSO: Stay at home.

LEDERMAN: She was a…she taught at a Michigan high school. At that time, if a woman was pregnant, they got kicked out of school or out of their jobs. So the last nine months or six months, she was not working. When we came to Baton Rouge, she really wasn't working.

CARUSO: Okay. So while working on the pilot plant, scaling up these reactors, what…did you encounter any problems with the project that you were given, other than general, "Okay, something's not working here. It needs to be tweaked," or…

LEDERMAN: Well there were a couple of interesting problems. One, this was a [Ziegler]-Natta catalyst and very sensitive to water. We <**T: 130 min**> could tell when the [polymerization]—this is the commercial unit […] —wasn't going well…because we measured water by how the polymerization was going, not by analysis. Then we used to have to [do water] analysis and find out what the problems were, because we recycled solvent, not the way you would do in full-scale commercial plant.

That was kind of an interesting challenge, after you get the water analysis. Well, first of all, you didn't have mass spec [or] GCs the way you do now, and analysis is much easier. We used Kjeldahl method to find out what the water was.

ROBERTS: What's that?

LEDERMAN: You take a bomb, a sample bomb, and make sure that you get a good sample, which is tough. Then you take it to the lab and use a Kjeldahl method—if you ask me right now what that is, I don't know—to get down to the parts per million of water. In 1961, getting a part per million was a real bear. Now it's, you know, [like] falling off a log. That was one, so the whole recycle situation [was a continuing challenge]..

I remember…you know, […] on holidays like Christmas Eve. We had problems with the extrusion, because ethylene-propylene copolymer, you've got the solid, put it through a filter, and then took it through an extruder. If it isn't properly, adequately, polymerized, you get sort of soup out of this extruder. It isn't very pretty. The plant was going nuts. So we were

going nuts trying to figure out what the problem was. Anyway, those were the two major problems.

CARUSO: How did you troubleshoot a problem like that? I'm just looking for a general…

LEDERMAN: Well, you'd look at what the…take it back to the lab. You take the material and put it through a column and see what the distribution was. You'd see where the…you'd analyze for left catalyst, if the catalyst was properly used. You looked at the solvent to see what the solvent problem was. So you did a real, you know, process analysis. But…and sometimes it could correct itself. This is the maddening part. You know, it corrects itself and you don't know what's going on.

One of the real problems was that we were not adequately drawing the solid, because the system didn't allow for that. When we were in the pilot plant, we didn't have that problem because we used one solution solvent. It resolved itself. Esso chemical was making, or engineering, […] the polymer, quite well. I don't know where it stands now.

CARUSO: So you're…

LEDERMAN: I spent a year and a half on that, and then transferred into the petroleum side.

CARUSO: So I was going to ask two things, because you were in Baton Rouge. You went up to…

LEDERMAN: Almost three years in Baton Rouge.

CARUSO: Right. Then you wound up, headed up to Florham Park…

LEDERMAN: Right.

CARUSO: …New Jersey.

LEDERMAN: And in my case, that was a voluntary transfer. It was requested.

CARUSO: Okay. I was going to ask…

LEDERMAN: But I was in the petroleum side in the lab still.

CARUSO: Okay. I was going to ask whether or not, again <**T: 135 min**>, in your graduate school days you had this interest in the business side of things, whether or not you were satisfied with just working on this process engineering or if you had an interest in sort of returning to more of the business side?

LEDERMAN: Strategic side.

CARUSO: Right.

LEDERMAN: Not at first…not at that time. I mean I thought this was very good […]: get to know the company; get to know people. It was an important first step.

CARUSO: Okay. Then how is it…how did your move from Baton Rouge to Jersey take place […]?

[END OF AUDIO, FILE 1.1]

CARUSO: All right. So you wound up headed back to New Jersey. You'd requested a transfer for personal reasons. You wind up as the senior process engineer at Esso Research and Engineering. What were your responsibilities in that position?

LEDERMAN: Okay. I actually worked on a number of projects. The first one I worked on was the one I had worked on at the lab, which was hydro cracking, which was an upgrading of petroleum, and from there I worked on a process which had been developed in the lab to get butadiene out of a butane/butylene/butadiene stream using a fluid-bed extraction method with cuperous chloride.

There I looked at the…I had several people working for me. The work was being done; the pilot plant was being built in Baton Rouge—big pilot plant. The work had been done by somebody at basic research in Linden, [New Jersey]. I was sort of coordinating this and looking at the various problems. And there were many problems. My boss and I finally told them it wouldn't work, and that was not good news for them, for [my] boss. It cost my boss a

demotion; it cost me a promotion for a while. I learned very early: bad news, you don't tell anybody [unless you are certain]. You know, the politics of bad news.

ROBERTS: How long did you work on the project before you had to break this bad news?

LEDERMAN: Probably a year, six months to a year. It was a matter that when you adsorb the butadiene on cuprous chloride, and when you did that, the cuprous chloride softened and agglomerated so you couldn't do it in a fluid bed. In the lab you could, because it was smaller, but when you use fluid bed, just didn't work. A fair amount of money had gone down the tubes as a result. It happens.

I mean, but…and you asked me whether at that point…how I felt. I already was looking at becoming a research advisor, which was a strategic position. That was sort of my end goal within Esso.

CARUSO: Okay.

LEDERMAN: Of course I was told I wasn't doing that well. I had been doing very well in Baton Rouge, and all of a sudden I wasn't doing well. Bad news, you know, carries its price—but neither here nor there. And then I went into low-cost, high-quality polypropylene. It's a long story with Esso and polypropylene. That was being…I was the process engineer responsible for looking at the economics and looking at whether this would work, et cetera, et cetera. So now I had a much broader view than just being…than handling data. I didn't handle any data.

CARUSO: Right.

LEDERMAN: But I was still the senior process engineer. Actually, I wasn't the senior process engineer. I was still a process engineer. My final position was senior process engineer, which…and my resignation and promotion were announced in the same letter […]. It's a very interesting thing that happened.

CARUSO: And…

ROBERTS: Do you want to tell us what that was?

LEDERMAN: […] I was going to go back to teaching <**T: 05 min**>. And I walk in and I—there was a requirement of sixty days' notice—I walked into my boss and I said, "H, I'm going to resign effective such-and-such. I'm going on vacation. I've got to tell you now, but I'm going back to teaching." He said, "Well, I wish you'd think about that." And then…I had, the year before, I had refused a job at Lummus. I had told them that unless things changed, I was going to be looking for a job. Anyway the assistant division director Norm [Hochgraf] calls me up and says, "Pete, I'm in New York. Can you stay? I want to talk to you […]." "Sure, I'll stay." I mean I didn't work an eight to five or a nine to five job […].

He says, "You know, you're getting promoted. I wish you'd think…." "And you didn't tell me." "I told you, you should tell me before you do anything drastic." I said, "Norm, I told you a year ago." He said, "Well, you're getting promoted. Here's the raise." The raise was considerable, hundred bucks a month on a fourteen thousand dollar a year salary. It was […] a [very good] raise. I said, "No, I'm not going to change my mind."

So I went to the division director, a very nice guy. […] I said, "Look. I know you can't give me the promotion. It wouldn't look good. But, you ought to…it would be nice if you gave me the raise, and it'll cost you a hundred bucks more a month." You know, we were friends. He said, "No decision has been made." He was a nice guy. […] I went off on vacation. I come back and a good friend of mine walks in, who was a senior guy, he said, "Congratulations, Pete." I said, "Why are you congratulating me?" I hadn't told him that I had finally been told I was getting promoted, but I couldn't say anything, because it was so unusual. I said, "Bob, what's going on?" He said, "Well, you've been promoted. Congratulations. You deserve it." I said, "Well then, you also know I'm leaving." "No, didn't know that." The announcement hadn't been made. It had been made inadvertently, but the Friday before […] by his stand-in. Anyway, that afternoon the announcement came out. "We are pleased to announce that Dr. Lederman, blah, blah. We regret to announce that Dr. Lederman blah, blah." I was going to teaching, so it didn't really [cause a stir], and I was a consultant for them for a while after that. But I had six good years in. It was a wonderful thing. I'm…and that's really digressing, but [I had a great learning experience at Esso].

CARUSO: I noticed…I was actually going to ask about this, because based on your resume, it seems to indicate that you were at Esso in 1966, but you were a lecturer at Columbia [University] from 1965 to 1966. How did that work?

LEDERMAN: I was asked to teach process economics at Columbia at night. We could teach evening. I mean they didn't object to that. The company cleared it. I mean you'd go in and say…and they'd say, "Fine." So I taught process economics at Columbia.

CARUSO: Was that something that you pursued? Did someone come from Columbia to pursue you?

LEDERMAN: I don't remember how it happened, but Elmer [L.] Gaden asked me to do it. I had the Esso experience on process economics and process design, so I could bring the current thinking on process evaluation there.

CARUSO: Okay. And so…I mean you indicated that you wanted to return to teaching.

LEDERMAN: Right.

CARUSO: Was this lectureship what brought you to that point? Or, was there something else that made you think…?

LEDERMAN: I don't remember. No. The lectureship wasn't [it]. I mean, I had taught all the time…well, not all the time. For example, I taught the course thermodynamics at the Baton Rouge refinery, which we didn't go into, but that's fine. I taught <**T: 10 min**> for the Navy at Reserve School in Baton Rouge. I taught oceanography.

CARUSO: Oh.

LEDERMAN: I learned oceanography along with the students. They needed a guy, a person with a master's degree or better in science. Well, I qualified. I was senior enough, so I was an instructor.

ROBERTS: And you sought that out.

LEDERMAN: What?

ROBERTS: Had you sought that out or did they seek you out?

LEDERMAN: In that case, they were looking for somebody to do it. I said, "I'll do it." It's not that formal.

CARUSO: So after leaving Esso, you wind up coming…let me ask this. Did you have a teaching position in line or at least the beginnings of a teaching position in line before you left

Esso? Or was this a, "I'm going to become an instructor again. I don't want to be at Esso. I'm just going to move on"?

LEDERMAN: I looked for teaching jobs. I had two teaching offers, actually three, NYU [New York University], Brooklyn Poly[technic Institute], and NJIT [New Jersey Institute of Technology], and I decided to go to…so I had the job in hand, signed, sealed, and delivered before I resigned.

CARUSO: Okay. Why did you wind up choosing the Polytechnic Institute?

LEDERMAN: I liked the stuff. I liked the program. [One of my Michigan colleagues, Irv Miller was there]. They wanted me to come in and do a process engineering capstone course—ten credits in two semesters—and offered me the associate professorship. NYU had offered me the assistant professorship and upgraded it to associate. It just seemed like a good situation.

CARUSO: What were you going to…what were your responsibilities? Was it purely just teaching? Did you also have to do research where you're expected to bring in grants?

LEDERMAN: At that time, it wasn't quite that way. I was expected to do some research or [have] graduate students. I was expected to teach. I was…my first job was to develop this capstone course, which for ten credits is a fair…and teach it, and teach other things too.

CARUSO: Okay. Now, during this period of time, while you're at Polytechnic, I had to take note that you served on the garbage committee of New Providence in Jersey, from 1968 to 1970, to develop a solid-waste management policy, which, of course, based on what you do later, it did seem quite interesting. So, I'd like to hear a little bit about how you became involved in that. But I also noticed during this period of time, you wind up having a lot of publications on computers in research and development, trends in engineering education. You have one publication on confidentiality, another one on job mobility, and also one on pollution technology and the public.[9]

[9] See, for example, Peter B. Lederman, "Job Mobility - What are the Professional Obligations?," *Chemical Engineering Progress* 64(6) (June 1968): 30; Peter B. Lederman, "Computers in Process Design," *Chemical Engineering* 75(21) (26 September 1968): 226; Peter B. Lederman, "Equipment Design by Computers," *Chemical Engineering* 75(23) (21 October 1968): 151; Peter B. Lederman, "Computers in R&D," *Chemical Engineering* 75 (16 December 1968): 151; Peter B. Lederman, "A Review of Computer Process Control in Modeling and Optimization," *Chemical Engineering* 76 (2 June 1969): 226; and Peter B. Lederman, "How Confidential Should a Confidentiality Clause Be?," *Chemical Engineering Progress* 66(7) (July 1970): 23.

LEDERMAN: All…I had things all over the map.

CARUSO: Yes. So, I'm wondering what it is that you saw yourself as doing? Where you saw yourself, your career, your interests going?

LEDERMAN: I don't think this had to do very much with my career.

CARUSO: Okay.

LEDERMAN: Again, right place, right time, where a hole needed to be filled. The garbage committee, I don't remember exactly how I got on it. But we were having a problem in New Providence with whether the garbage should be collected or not, and how it should be collected, and a lot of other things. Somehow, I got appointed to that. I was the engineer, pretty much, of record. As you noticed, I was a professional engineer, which didn't hurt things.

CARUSO: Right.

LEDERMAN: It was one of those civic things, you know. Do something. I had been in…had gotten involved in the town very early, because I had a problem with the house we bought. Anyway, I got in that, and the paper on confidentiality and mobility…remember, because I became chairman of the professional development committee of the AIChE [American Institute of Chemical Engineers] at that time, '72. It was '70 to '72. Computers was part of my teaching, in a sense. I extended that from my teaching. What else was there?

ROBERTS: Pollution, technology, and the public.

LEDERMAN: Well, it was interesting. I started getting interested at various times in pollution. I wrote this thing on solid-waste management, which was part of the encyclopedia, which got started because of the garbage. I had students who were looking at various kinds of pollution. I was also an advisor to the New York—and that isn't in there—the New York City Department of Environmental Protection.

CARUSO: Oh, okay.

LEDERMAN: That was a minor thing, but…. So we…there were sort of…those were the hot areas at the time. I really got backed into the whole environmental pollution area through this garbage committee, and then students…I had students who…oh, and I did one other thing. Maybe the reason for the pollution and the public was I, at Poly, got a grant from NSF [National Science Foundation] to take—I don't want to use "disadvantaged"; maybe that's the right word—students into a summer program to study environment. I had that for, I think, two or three years. That led to, then, again, to the pollution issue. I'd have to look at that paper to see really what the genesis was.

CARUSO: Okay.

LEDERMAN: But I also thought at the time that pollution was not a single media operation, that it was multimedia. At that time everybody looked at [it as] water is water, air is air, solid waste is solid waste, [and] land was free, still. I looked at it and said, "Gee, you know, you've got to look at all three things at once. I wanted to establish a program that did that at Poly. I thought that was…and there was a guy in civil engineering, very senior, Paul Demarco, who—I think that last name's—who called me up and said, "Peter, if you do this, I'll have you by the 'blank.'" So I didn't do it, number one. Two, I had put in for an application for a grant, and it was almost an impossible grant to get, because it had to go through three federal agencies because it was multimedia. Now, today that would not be a problem. Everybody understands that. But I thought it was important to train people in multimedia.

Anyway, so that didn't quite work out, but that's all right. I mean things…by that time I was the associate department chair. So that may be the genesis of that paper. I just don't know for sure.

CARUSO: So during your time at Polytechnic, what…did you see yourself, once you got there, did you see yourself remaining in academia?

LEDERMAN: Yeah. I figured I'd stay at Poly <**T: 20 min**> and become department chair or something.

CARUSO: Okay. So you were quite happy being there and just…

LEDERMAN: Yeah.

CARUSO: …working with the students and teaching…

LEDERMAN: Yeah. And doing some consulting…

CARUSO: Doing some consulting. Were you consulting for anyone other than Esso, I mean formally or I guess informally, as well?

LEDERMAN: You know, I don't really recall at this point.

CARUSO: Okay. In terms of your family, had it grown in size?

LEDERMAN: Yes. We had a daughter, [Ellen].

CARUSO: Okay, so two kids. Was your wife still stay-at-home?

LEDERMAN: My wife stayed at…basically, stayed at home, did a lot of volunteer work until 1972. She did some…took some courses, but not very much. When our daughter went into kindergarten, she [started full time graduate studies].

CARUSO: Right, once the kids are in school, you have a bit more time.

LEDERMAN: We also managed to put her into full-time kindergarten.

CARUSO: Okay. Is there anything else during this period of time in your career or in your life that you found significant that you wanted to discuss?

LEDERMAN: Well, there is a…this, of course, was the Vietnam era, and Poly was no different than many other schools. We had a major sit-in. We had a flag burning and the ROTC [Reserve Officers' Training Corps] program there. And Lieutenant Commander Lederman became chairman of the ROTC Evaluation Committee, which was…I mean some people looked at me and said, "You're a military officer. How can you do this?" You're laughing, but this was dead serious.

So I had gotten myself named in the faculty to be able to do that. I mean, this was not…and that took a fair amount of time. I was very active in the AIChE at the time or fairly active. I was in the program side of things, having started as chairman of the pilot plant

subcommittee or committee and became chairman of what was then the unit operations of process engineering division of the program.

ROBERTS: Had you been involved with AIChE throughout this whole career, from when you started graduate school? Undergraduate?

LEDERMAN: Well, I've been a member of AIChE since 1953. I became active when I was in Baton Rouge already, in this pilot plant work and stuff. So I was active in those areas. I don't remember when I was chairman of the New Jersey section. I think it was later, but I was chairman of a national committee in '70 to '73, which was fairly…another one of those things that just happened. Then I stopped for a while and came became active again. But I've certainly been very active.

CARUSO: What drew you into active service for that organization? Was it simply that you felt that it was a professional duty that you become involved? Did you want to contribute to something overall for…?

LEDERMAN: Well, (a) it was a networking opportunity; (b) it was a chance to give back. And while at Michigan, I mean, Michigan's senior faculty at the time was very active AIChE-wise, nationally. So it was almost a natural, as compared to today, when it's not that way.

How I got involved in professional development, I don't remember exactly. I was vice chairman when the chairman died, so I became chairman. But, it was…it starts out as networking and meeting people. Then it sort of grows on itself.

CARUSO: What is it that…I mean did you…I know you were involved in various committees and you had various positions. But is there something that you felt needed <**T: 25 min**> to be achieved in the United States with this organization? Was there something that you saw this organization as doing?

LEDERMAN: Well, I think it was an important organization in two ways. One, it represented our profession. No other organization really did that. So, I was a member of my profession. That's probably most important. As such, representing the profession it's important that we provide information—that came later—to the public in a way that is—"neutral" is the wrong word—but neutral in what we do on important issues, where we can contribute where we have knowledge, and, hopefully, be listened to.

It also comes that my wife was very active in the League of Women Voters at one time, was president of the League, nationally. So it's part of the family genes also. [laughter] No, seriously.

CARUSO: So I mean there's this interest in serving your profession, since your profession's also serving you, right. There's this inherent value to it, but also this component where you're trying to bring…I know "neutral," maybe unbiased? Or…?

LEDERMAN: Unbiased is probably right.

CARUSO: This sort of responsibility to the broader public to bring knowledge which they can't necessarily understand on their own, and bring it to them in a way that they can…

LEDERMAN: Yeah.

CARUSO: …wind up understanding. Do you think…you know, you raise the fact that there's the Vietnam period. You know, clearly you went through also Sputnik, the space race. Did you see greater national scientific issues becoming a part of your work? Was it something that you felt a responsibility more generally to science to contribute in some way? Or was it more about the profession itself?

LEDERMAN: Well, I obviously saw that science needed to make a contribution. Now, you asked me did I make those contributions. Obviously, I didn't work in many of those areas. But I think it was important for this country that we do have a strong, not just science, but technological underpinning and *Gestalt*.

CARUSO: I asked that…in some ways, I think—in many interviews that I've done—once someone has children and those children are in school, science education usually becomes an interesting topic during an oral history interview because there are a lot of thoughts about science education in the United States. I would imagine that during the '60s and '70s with the rise of a more scientific nation, right, the commitment to the space race and whatnot, education was one way. Then, later on, education changed.

LEDERMAN: That's interesting. I'm not…I never had thought of it that way.

CARUSO: Okay.

LEDERMAN: My kids are both non-scientists. One is a lawyer and was a lawyer from the get-go. The other, very good in math, very good in economics, and is a banker. So science is not…it was never a focal point for us, interestingly.

CARUSO: Okay.

LEDERMAN: You know, "Dad was the engineer. He handled the technical things." No, I…

CARUSO: Yeah, yeah. Is there anything else from this period of time while you were at Polytechnic that sort of stands out as something <**T: 30 min**> you'd like to discuss? Or is there anything that we've sort of missed that…?

LEDERMAN: Well, I obviously became involved in the environmental area, very much so. Felt very strongly about the contribution I made in the process engineer education area. Interestingly enough, I almost left Poly the year before to go to the EPA [U.S. Environmental Protection Agency], and was offered a job in Cincinnati, [Ohio], that I didn't take. When the next period came along, and I was offered…that job came to me, I didn't look for it. I surprised my colleagues when I…I was up for a promotion and resigned.

CARUSO: So that's twice where you're getting a promotion and then…

LEDERMAN: Well…

CARUSO: I know you didn't necessarily know about it at Esso to begin with. But…

LEDERMAN: Yeah. Well, here I knew I was in for a promotion. I knew the dean had pushed it and then decided no, because I hadn't gotten enough grants. But the provost was ready to put it through anyway. The promotions tenure committee came to interview me about another guy, I said, "Well, I'm up for promotion, but I'm leaving." But, again, I didn't look for that job. It came to me.

CARUSO: I was actually thinking given the time, this might be a good point to stop, since we're at another transition period […].

[END OF AUDIO, FILE 1.2]

[END OF INTERVIEW]

INTERVIEWEE: **Peter B. Lederman**

INTERVIEWER: **David J. Caruso, Jody A. Roberts, and Sarah L. Hunter**

LOCATION: **The Chemical Heritage Foundation Philadelphia, Pennsylvania**

DATE: **19 September 2011**

CARUSO: So today is the 19th of September. This is our second interview with Peter Lederman to record his oral history. Present here at the Chemical Heritage Foundation are David Caruso, Jody Roberts, and Sarah Hunter, and as I mentioned, I'm going to turn it over to Jody to start off today.

ROBERTS: All right. So I just, I want to take us back to where we were closing the…after the first day of interviewing with you. What struck me in looking at my notes, there were a couple of things that, I think maybe because of time, we started to rush through, but I want to give you a chance to explore a little bit more. There's a couple of different things that happened that you mentioned and I want to see how they're connected. So maybe they're not, and you can tell me if they're not connected, but I'm going to list a couple of things and you can either talk about them individually or tell me if they might or might not be connected. You spent a little bit of time talking about—so this is after you transferred back to Brooklyn Polytechnic—you talked a little bit about the change of being now back in academe, you mentioned the politics of the Vietnam era, but there were also several other things that were happening that you were involved with that I think maybe you could have more discussion.

One of those is increasing student interest in pollution controls. And this I think you mentioned in response to the question about your involvement with the garbage committee in New Providence. You also became the advisor to New York EPA. You were involved on the solid waste and garbage committee, as I just mentioned. You also mentioned interest in putting together an NSF grant for underrepresented students for an environmental program. I think the last piece that you also mentioned was an interest in trying to build a program within your engineering department to…for the students to look at the environment as a system.

I wonder if you can…maybe that's too many things all at once. But I'm interested in…there's a couple of…there are a couple of very student- and environment-focused pieces. There's some that have to do with your extra…your activities outside of your job. Then, also, the broader cultural context, I think. You know, the politics of Vietnam, but there was also the politics of environmental concern and things like that.

LEDERMAN: The politics of Vietnam were really separate. I mean I was a Naval Reserve officer. I wasn't called up. I was, at Poly, asked to head the ROTC Evaluation Committee, because on most campuses…and that was a real issue: do we have ROTC or don't we have ROTC? There had been some demonstrations at Poly. Poly is an urban campus, and very compact at that time. There was a flag burning at the ROTC offices.

Anyway, there was this whole thing, and I don't know how I got involved in that particular thing, but I did, and I chaired that committee. So that's an issue that has nothing to do with anything of one of my academic responsibilities, if you will.

The others certainly were connected. Now, whether they were overtly connected or not is, at this point in my life, hard to say. When I came to Poly, I had been doing some work in toxic materials as a side issue to my work at Esso. I mean it was part of my job, but it was not the main part. It was just an important thing.

When I came to Poly, I, like any professor—and I came as an associate professor—needed to find an area that one could call one's own, to do research or to do whatever. So, I mentioned my main focus was on process design, and that was an area of expertise, but that isn't where you could do much research, at least at that time. It seemed to me that—this was 1967—that environment started to become an important issue.

What I saw was that it was very fragmented. So, I <**T: 05 min**> tried to pull something together. There was another man there, Ed [Edward N.] Ziegler, assistant professor, who was really in air, but I wanted to do something that was holistic, if you will. Innocence, young innocence abroad, in a sense.

ROBERTS: Why do you say that? Why do you think that was just innocence?

LEDERMAN: Well, because at that time, as I had mentioned, they were very fragmented at the federal, state, and local levels. You had the sewage people with the sewage people, the garbage people with the garbage people. Air started becoming important, but it was the air people, and not quite 'never the twain shall meet,' but they were segregated. At the federal level, there were different statutes, different agencies reporting in different departments. So, right away…and solid waste was not a federal issue, really, at that point. So that was the whole thing of bifurcation or trifurcation.

I'm not sure how I got involved in the NSF grant. But we were, at Poly, interested in the…under, what do we call now…I don't want to use the word "disadvantaged." I can't think of the word right now…underrepresented students. This was a place where I felt there was a hot topic, and one could get NSF summer grants for certain things like that. I needed to have a summer job. I couldn't just live on my regular salary. So it worked out well. I had a great deal of fun doing it. I think the students benefited from it.

So there was this confluence. Then in the design area, I had a couple of students who started looking at solid waste. Why? Well, they were interested…they were from areas where the garbage was just dumped. I had a couple of them look at what happened. We got some senior projects out of it. There was a confluence, but it was more serendipitous rather than knowing. The EPA, New Jersey Environmental…New York Department of Environmental Protection, I'm not sure…. I think they were looking for somebody, an engineer, as one of their advisors. I'm not sure whether I was volunteered or what, but it worked out that way. So it worked well. It got me into an area that was of interest. It certainly led to the rest of my career. But it was not, I would say, a planned, overt move.

ROBERTS: But that's what seems so amazing to me, was that for as little attention as we gave it in the first interview, towards the end there, pretty much everything that follows in your career afterwards…

LEDERMAN: Is based on that.

ROBERTS: Has a pretty solid root in your experiences…

LEDERMAN: Well…

ROBERTS: …with solid waste.

LEDERMAN: You know…and it goes to 'you've got to be at the right place at the right time,' and be lucky. I never used my Ph.D. thesis, except towards the end of my career. It wasn't really that I didn't use liquefied natural gas, but my adsorption studies I did, while other people would take their research and go right into that area and stay there the rest of their lives. Different strokes for different people. I'm not sorry it happened the way it happened. I'm not sure I can really give you more meat for that.

ROBERTS: Can you talk at all about the types of work that the students were doing, if you remember?

LEDERMAN: Well, let's see. I had one student who did a study on converting bagasse to ethanol <**T: 10 min**>, which is what the Brazilians do now (which is much better than doing corn to ethanol, by the way). That was a master's thesis. I had one student who looked at the nature of the garbage that was collected from "affluent" versus "non-affluent" areas in New York and were there differences. I don't remember what the results were of that. I don't

remember…I frankly don't remember many of the theses, but those two I do remember. They sort of stuck out. Again, they were…and I had some people that did work in polymers. I had one person who did work in polyvinyl chloride, which had some problems with it, and were there substitutes. Of course, I had done work in polymers when I was at Esso, but it was more general.

I only had only [one] Ph.D. student, and he never got his Ph.D. I was a process economics guy. This was a man who was in industry, he was working for Allied Chemical [Corporation]. He was interested in the economics of predicting what would happen economically to various processes. He did a study with…a fairly extensive study, and I think it was a good one. But one of our professors said, "Until you show me that it really happened, it's not worth the Ph.D." Today, that would probably [have been accepted], but then it [wasn't]. Like many, just voted it down. By that time I was already at the EPA, so I couldn't…didn't have much faculty muscle. I felt sorry for the guy, but I could do what I could do, and not do what I could not do.

ROBERTS: So at the same time you gave…around this time you gave a lecture titled "Pollution Technology and the Public." I'm just kind of curious about your…the approach that you're developing during this time towards pollution, especially solid waste pollution, and this attached piece of the public. I mean is this…what role do you see for the public in thinking about these types of topics?

LEDERMAN: Well, you know and I haven't looked up that paper.

ROBERTS: Sure.

LEDERMAN: And probably should, because it would make it a little easier for me to answer. You know, when I was in the garbage committee in New Providence, it was obvious that recycling was something we were doing already (the Boy Scouts [of America] were doing it). It required the public to do things. We had problems with the public in terms of the incineration already at that point. A good incinerator is great. A bad incinerator is horrible […].

So it was important that the public get involved and decide what should be done in terms of the control of pollution. Certainly, we weren't going to litter the streets with our garbage. We had garbage collection. But then what do you do with it? At that time already in New Jersey, one landfill was closed because it was polluting the Great Swamp [National Wildlife Refuge]. This was in the early '70s. So we already felt those things. Of course, Rachel [L.] Carson had been there. But I will try to look up that paper, if I can find it to see what I said.

ROBERTS: Well, maybe we can find it better. I had a hard time locating it, but I think it's because it was a talk that you gave. I don't know if it was published.

LEDERMAN: It probably wasn't.

ROBERTS: So why don't you take us, then, into your move to government in '72, taking up time in the EPA at the office in New Jersey.

LEDERMAN: Okay. Well, it was kind of interesting. The year before I had been…one of my colleagues at Esso—who I really didn't know at Esso—had gone to the EPA in Cincinnati, and approached me [about] whether or not I would join the EPA as the head of the Hazardous Materials Research Section in Cincinnati. I <**T: 15 min**> interviewed, and went there, and looked at it. In the end, decided not to take it for personal reasons and for professional reasons too, because I was going to be working for two bosses, one in Washington, and one in Cincinnati, in different departments. Boy that…that just doesn't…I don't think that works. So, I decided we weren't going to move to Cincinnati.

A year later, Lou called me and said, "The lab and directorship in Edison, [New Jersey], is opening up." It was the Industrial Waste Treatment Research Laboratory. "Are you interested?" "Yes." There was something going on at Poly. Poly was being…was in some financial difficulty, not unusual, but it was. We were going to absorb NYU Engineering. This is in '72. I was up for full professor, but there was a fight whether I was going to get it or not. So I went and interviewed for this job; had all of half an hour interview with the director. Two days later, I get called and said, "If you want the job, you've got to decide, because we're going to have a hiring freeze." I said, "But I can't go until the end of the semester." But it sounded interesting. It was now one agency handling all media and this was a director's job.

Well, I went in as a GS-15, if you know anything…that was the most senior, at that time, was the most senior non-political appointee. There were 16, 17, 18 super grades, but they were special. You didn't normally get those. This was one or two grades higher than I had been offered before. It was in New Jersey, which means I didn't have to move. I could see there were problems at Poly, so I jumped at it, and the rest was history.

But, no, I…but seriously, it was that sort of thing. It was the right…I was in the right place, at the right time, the right person, and made the right impression. Andy [Andrew W.] Breidenbach who was the director of the center in Cincinnati, who I reported to, wanted somebody who had a PE [Licensed Professional Engineer] and Ph.D. for this job. The guy who was acting didn't have a Ph.D. That, by the way, made it interesting getting into the job…

ROBERTS: How's that?

LEDERMAN: He, by the way, ended up getting a Ph.D. at night, an aside. So I went into that job. Most of the areas I knew nothing about. I had Storm Water Overflow; Small Sewage Treatment Devices in Mobile Homes [and] Small Boats; Hazardous Materials Spills; Oil Spills; and Industrial […] Waste [and Mining Wastes]. I didn't have [all the industrial wastes]. It was kind of spread out. That's a pretty broad spectrum of things.

I knew nothing about government service. But I'm a chemical engineer. "A chemical engineer can do anything." I learned on the job. I mean I knew enough to keep my head above water. I had a very good staff. I really did. Very hard working. Some of them are still friends of mine. So I spent three years at that.

ROBERTS: Well, talk about…the agency's two years old at this point.

LEDERMAN: It wasn't even two years old. It was a year old.

ROBERTS: Still a lot of organizing going on. There's still a lot of consolidation of duties and different departments, and…

LEDERMAN: Well, the laboratories were…

ROBERTS: …other labs from other…

LEDERMAN: Okay. The air work was principally done in Research Triangle Park, [North Carolina]. We did a little bit, but it was primarily there. The water work was headquartered in Cincinnati, the Robert [A.] Taft [Sanitary Engineering] Center, which had done sewage work for a long time. They also had some public health work for drinking water <**T: 20 min**>. Then things filled into there. I don't know how oil spills got down to Edison, but they did.

So we picked up some other stuff. And other industrial work was being, research work, was being done in Oregon in Corvallis, in Duluth, Minnesota, and Ada, Oklahoma. But we were started…we had the title, better word, and I had a very good boss. There had already been a gathering of the air work, which had been under the Air Program, the water solid waste work had been under the Interior or Public Health, and that had already been done. The formation was there. I reported to the director of the Robert Taft Center, later became Andrew [W.] Breidenbach Center. I was the only lab director outside of Cincinnati. The others were in Cincinnati. I also had the broadest program. We had a program on waste water. We had a program on analytical […The program under my leadership] was sort of the broadest. It covered a lot of sins. We actually tried to reorganize the industrial program two years later, and

would have happened, but the Speaker of the House [Carl B. Albert] at that time, didn't want Ada, Oklahoma to be shortchanged. So that's what happened. You know politics ruled the day, and that's fine. But we still continued with our work.

ROBERTS: What were some of the big challenges you faced when you took the position?

LEDERMAN: Well, there were a couple of big challenges. One, we were building a facility to test oil spill equipment in New Jersey, Colts Neck. I came in when this had already been granted and was in the construction stages. There were some interesting problems. This is a swimming pool, 660 feet long by 60 foot wide by 12 foot deep, and had a wave maker at one end. That was designed by a marine engineer, and he used a motor which wasn't going to work. Fortunately, I had one degree…one course in electrical engineering and I learned to ask a stupid question which was, "What happens to a DC [direct current] motor when you're at low power," which is when you're [at] low rates. Well, you don't get much power then [to the wave maker]. So we changed the controls, fortunately in time, so that we didn't waste too much money. That was one.

We developed a program to identify oils, spilled oils, fingerprint them. I obviously had to work with a budget.

I had another interesting problem where the Equal Opportunity Officer came in and said, "Did you hire a black?" I said, "I don't have black chemical engineers." I was at Poly, which was right next to Bedford-Stuyvesant, [Brooklyn, New York], and the black students we had were foreign, and they wouldn't qualify. So we ended up, I said, "I will give you two weeks' notice of any opening I have and I will promise you, I will interview everybody." He never came up with somebody. Then I had a woman that applied, and they wanted to give her a lower grade than she was entitled to. I had to fight that one on that person. I had…you know as a lab director, I did more than just the technical work. But I had fun with the technical work, and as I say, I had a good staff.

The other one was, we did some research. We funded some research on cleaning up riverbeds, and then we were going to do a demonstration. We had to go to the lowest bidder, and that didn't <**T: 25 min**> work out very well. Then they came into my office wanting twice as much money in addition to what they originally bid. I said, "I don't have it. It's not a research project anymore." "Well, we can't do it." "Well, I don't have that," so they cut their bid in half right at the table. I said, "So you obviously can't do…don't know very much about doing cost estimates." Then I had to go to Milwaukee, [Wisconsin], to explain why I wasn't funding this project. So, you know a lot of the things which were not technical…

ROBERTS: Yeah. What was it like being in the broader service of government, so having to transition from industry to academe to moving into government? How did you find that different?

LEDERMAN: You know they all have their different problems. They all have politics. I had politics in academia. I had politics at Esso. I had different politics. I don't know. I guess I lived with them and managed through them. I had a very understanding boss.

ROBERTS: What was it…may be my last question on those couple years at EPA, at that research office. But what was it…how do you think you've viewed your relationships, since you were running one of the research labs in the midst of all those other kind of…I don't know, all the other fervor around the other environmental statutes, around enforcement, and regulation? How do you…do you think you were outside of a lot of that larger, kind of public, debate? Because you…

LEDERMAN: Well…

ROBERTS: …just running a research lab or…

LEDERMAN: I was out…to a great extent, I was out of the debate. But there were times when we, for instance, had to go and we did work on a spill into the Potomac [River]. Obviously, we started getting into all that. I still…I meant the other day, when we mentioned Diamond Shamrock [Chemical Company] in New Jersey, my people were there. You know, I'd take questions, and do the best you can. We didn't have all the answers.

When I was in Washington, [D.C.], I got even warned for that sort of thing. But you handle it the best you could. You could always say, "But I'm doing the research. I'm not the regulator. I'm here to help you." Sometimes it works and sometimes it doesn't. But on the whole, we were somewhat insulated from the regulatory thing.

ROBERTS: So when did you end up deciding to leave…?

LEDERMAN: […] I went to Washington. I went to Washington not voluntarily. Now, we're going through another reorganization and the Industrial Waste Treatment Research Lab is now going to move to Cincinnati. If I stayed in New Jersey, the person who was my counterpart in the region, who is the person I had replaced in the first place, was not a veteran, and he would have been downgraded, and I would have gotten his job. The regional administrator couldn't…just didn't want that. I could have then gone to Cincinnati, but they wanted to move somebody else to Cincinnati to get them out of Washington. This is the politics.

So I was offered a job in a GS-16, a super grade, in Washington. I either took it or I would have been out of a job. So I took it and went to Washington. Frankly, as director of the total industrial program, the problem was that as a director of the program, I [had] less authority than I did as a lab director […]. I had oversight responsibility, but not direct responsibility. I spent a lot of time on Congressional responses and things, and planning, but just didn't enjoy that.

So I decided to look for a job. My wife hadn't moved down here, because my kids were in school. It was a very good experience in the end, in terms of getting to know another side of government and policy. So I stayed a year down <**T: 30 min**> there on temporary assignment for six months, and then permanent. I resigned, and went back into industry.

CARUSO: You did receive the Agency's silver medal […] for superior service. What was that?

LEDERMAN: Well, initially…now, I'm not sure I deserved that…that's another thing. But I was part of a group. The Agency was to specify under the Water Pollution Control Act hazardous substances and had failed to do so, well didn't do like many things. This was a result of the studies done by some guys on the Mississippi [River] in New Orleans, [Louisiana], where there was a fair amount of damage done there. That was a key…a really key study that was done. So a group was charged with determining what…a list of substances that would be controlled, and I was one of the members of that group. We picked hundred thirty-two substances. Those were the first ones that were in the water area that were going to be regulated, and the group got the silver medal for it. So I got a silver medal.

CARUSO: During this time you're also, again, I think publishing. It's hard to know whether or not they were publications or if they were…

LEDERMAN: Well, let me just clarify a few things.

CARUSO: Sure.

LEDERMAN: I had very few peer-reviewed publications, but I did a fair amount of publishing in the…not the popular presses, but the popular technical presses, so […] it depends.

CARUSO: Well, so I noticed there was the, "EPA Research and Waste Treatment for Water Craft," the "Waste Oil Management," "Treatment of Industrial Chemical Wastes to Meet the

1974 Law," Pollution Abatement in the Pharmaceutical Industry," "Physical and Chemical Methods"…[10]

LEDERMAN: Now, they were…probably many of them, and I have to look at the list, but many were presentations and they may have been written papers also—that one made as a result of work that laboratory did or you know…

CARUSO: Were these presentations or these papers…you mentioned that they weren't in the popular press necessarily, but…

LEDERMAN: Well, for example, I would give a paper at the AIChE meeting or ACS [American Chemical Society] meeting, [or] before some public body, or I would publish in *Chemical Engineering*, or in—well, I didn't publish in *CEP*—in the *Journal for Hazardous Waste Materials*. That sort of thing.

CARUSO: I'm just trying to understand what it is that you were trying to accomplish with these sorts of publications. You're saying that…I mean some of it was…

LEDERMAN: Well…

CARUSO: …based on research, right. So you're presenting some findings. But you're also…

LEDERMAN: Well…

CARUSO: …in some ways commenting on…

[10] Peter B. Lederman and W.J. Librizzi, "EPA Research in Waste Treatment for Watercraft" Intersociety Conference on Environmental Systems, San Diego, California, July 1973; Peter B. Lederman and K. Jakobson, "Waste Oil Management - The Environmental Protection Agency's Role" *Proceedings of International Conference on Waste Oil Recovery and Reuse*, 12-14 February 1974, Washington, D.C.; Peter B. Lederman and R.B. Tabakin, "The Treatment of Industrial Chemical Wastes to Meet the 1974 Law -- An Overview with Case Studies," Presentation at 65th Annual Conference of the Chemical Division of the Special Libraries Association, 9-14 June 1974, Toronto, Canada; Peter B. Lederman, H. Skovronek, and P. Des Rosiers, "Pollution Abatement in the Pharmaceutical Industry," Presentation at the Pharmaceutical Symposium of the American Institute of Chemical Engineers, 1-5 December 1974, Washington, D.C.; and Peter B. Lederman, "Physical and Chemical Methods, A Decade of Water Pollution Control," *Chemical Engineering* 84(17): 135.

LEDERMAN: Right. Well, remember: I'm a lab director. Then when I was at my next job, I was technical director and vice president. They're not really sales articles in the sense that we know. But they are perspectives on policy, on things that are happening, which are important for the public to know. If I was talking about research, I'd be talking about research that my people did, not necessarily that I did. They were developments that were important. It's different than an academic paper in that sense.

ROBERTS: Right.

CARUSO: I mean I just wanted to get the sense…

LEDERMAN: And was there rhyme or reason to them? No. They were what was, you know, important at that point.

CARUSO: Right. It just seems to me that at least up to this point in your career, part of what you tried to do was take the knowledge being generated in this engineering community, in the scientific community, and take that and give it to the public so that way they could better understand the…

LEDERMAN: That's probably correct.

CARUSO: …relevancy.

LEDERMAN: That's probably correct.

CARUSO: Okay <**T: 35 min**>.

LEDERMAN: That's probably correct. The public being…can be anywhere from the engineering community to the non-technical.

CARUSO: Right. I mean I even remember the paper we were talking about computers and chemical engineering…

LEDERMAN: Yeah. Well, that was for the educational community, really. It was, "Here's some work that we did in that area that you guys ought to know about." This was early…today, that would…that paper wouldn't fly at all. It's kindergarten stuff, but at that point, it was important for my fellow engineers to know that this piece of equipment existed and you can do things with it.

ROBERTS: And I was wondering too, just on those publications as well, because I understand their role, especially as a lab director, a lot of times you're writing in EPA newsletters, those sorts of things. I mean you're giving updates on what's happening. I think one of the things that stands out to me is the shift, perhaps, in topic between some of the papers. Now, I wonder if they stand in for something else.

It would seem that in some of the earlier publications that the emphasis was on waste treatment and towards the end it's a lot more on pollution controls. I wonder if during your time there, there was a shift in…

LEDERMAN: There was…

ROBERTS: …the types of…

LEDERMAN: There was a total shift. There was a paper I gave in St. Louis, a regional meeting, which started talking about pollution control, or pollution minimization, somewhere in my list. Remember, when we…when EPA started out, or even before EPA, everyone was talking about end of pipe. Sewage treatment was end of pipe, you know. You collected the sewage and you treated it. That was the whole phenomenon.

You had power plants or incinerators, you incinerated the material. You made sure that you weren't putting noxious gases up, or you should not put noxious gases up the stack. You know there were already studies. At that time there was a study in Brooklyn, Long Island University, about asthma as a result of SO_2 [sulfur dioxide] emissions, right, so SO_x emissions, the increase in asthma and lung diseases because of that. So that was the thing. What did we do in terms of solid waste? Well, we collected it, we burned it, we buried it, but it was an end of pipe solution.

Then in the early '80s or late '70s, we started talking about minimization. Minimize what you put out. And that started the recycling movement. Which, by the way, and I'm sure I talked about it in some article, we did in World War II. We collected tin cans. We recycled newspapers. And then everything went out. And then we started collecting. So that was the next…in my article on solid waste management, which was published in '72, which was a fairly lengthy one, I already talked about recycling and waste separation and things like that. But…

ROBERTS: Can you…oh…

LEDERMAN: …there was this change at that point.

ROBERTS: Can you talk about what was responsible for that change? Maybe it was…was this a response to new statutes? Was this a response to…

LEDERMAN: I think it…

ROBERTS: …new technologies?

LEDERMAN: I think that it was a response to the fact that we needed, particularly in industry, it was economically advantageous not to do end of pipe treatment, to minimize the waste you generated, and that started…. You know, now we call it—first it was pollution prevention, waste minimization—now we call it sustainability. But by…really, the idea is minimize the amount of waste you have to treat, because it costs you money to treat it.

ROBERTS: So did you have in any of this? Because this would be seen…

LEDERMAN: I'm sorry?

ROBERTS: Did you have a hand in much of this? This would seem to be very much in line with your own…

LEDERMAN: Did I have a hand…

ROBERTS: …scholarly interests back when you were still a student, in terms of thinking about the economics of process and design.

LEDERMAN: Yeah. I was now past my research career, totally. So <**T: 40 min**> whatever I had, and I was…when this really got started, I was at Roy F. Weston, [Inc.], handling other things. So did I have a hand in it? Yes and no. I certainly didn't do research in it, but some of

my people certainly worked in that area. That may not be a satisfactory answer, but that's about as far as I can go…

ROBERTS: All right. So then […] you leave.

LEDERMAN: Oh, I leave EPA and I…well, I'm already past that part.

ROBERTS: Yeah.

LEDERMAN: I found a job at Research-Cottrell as Director of Technical Development. Now, this was really the air gate, Research-Cottrell at that time was the premier air pollution control company in the country, probably built more precipitators than anybody else at that time. Let me say, electrostatic precipitators. I took that job. It was a challenging job. It was…air now, was my sort of third act in solid, air, water/air. It was in New Jersey, and I was pretty well geared to staying in New Jersey. My kids were in school at that time. It sounded like a good opportunity, and it was. So I spent four years there, three years as technical director, and I was vice president of Cottrell Environmental Sciences, which was the research arm, really worrying about technical developments in air pollution control. Probably my most interesting achievement was that we had a precipitator in Wisconsin that was not working properly. The reason it wasn't working properly, it got coal from Montana and the coal didn't have enough sodium in it. If you're doing electrostatic precipitation, you need sodium ions so you can collect them.

I was told…I was on the job, I think, two months. I was told, "We've got to fix this. If we don't fix this, our business is dead." We found a way to add sodium, sodium carbonate, into the flue gas, spraying it in. So we were able to operate the precipitators well. I mean one trouble we didn't think about…and we did this in six months. I mean this was…and I was castigated for spending two million bucks. I said, "Look how much money you saved." You know, we really went at this brute force. It was one of those things you either…you've got to take a chance and try to do it.

But they used the fly ash to make cinder blocks. The only trouble is now it had sodium carbonate in it. What happened? That meant it wasn't structurally sound with water. We finally…they finally got that solved, but it…at least they were able to generate power and make…and keep the air within the required emission limits. I had a very interesting negotiation with the Japanese during that time.

ROBERTS: About what?

LEDERMAN: Well, at that time, the country was going to go into NO_x control and we needed technology to handle NO_x. Japanese had that technology. Everybody…the two primary technologies had already been licensed to our competitor. So I went to the third one, and we were not number one in the <**T: 45 min**> list of people they were willing to talk to. We finally got to talk to them, and I got that negotiation. So we were going to be the licensee and had everything signed.

They were going to come over Labor Day and sign the agreement they'd wanted. We cut down the initial fee, and it was a good deal, except our president decided we weren't going to do this. He made the right decision, by the way, because we're still dealing with this NO_x control business. But I had the glorious task of telling the Japanese the week before they were coming over that we weren't going to go. That's very embarrassing, let me tell you, especially after you've had the successful negotiation. So that was another interesting point in my career. Nothing technical really, but I had to know the technology. I got two nice trips to Japan.

ROBERTS: But you found yourself in these situations, often it seems, through your career that you had a very strong technical background, but you often find yourself in positions of trying to manage a way through a crisis.

LEDERMAN: Well, you know anybody who gets in from the management area is in that position, I think. That's not unusual. If you talk to any senior executive, they aren't paid to do technology. They're paid to know and know when it's wrong, but to handle the crisis. I used to tell my people when I was at Weston, "I don't want to hear the good news. I want to hear the bad news before it gets out. Maybe we can do something about it. The good news I'll get anyway." I think most managers may not say it in that way, but they certainly, I think, feel that way, if they're any good.

ROBERTS: Do you think there was anything in particular that prepared you for that?

LEDERMAN: You know, I think about that. I didn't have an MBA [Master of Business Administration], obviously. I learned on the job, or I lucked out. I can't tell you…but I generally landed on my feet.

ROBERTS: Yeah.

CARUSO: One thing that I was curious about, and I don't know if you mentioned it specifically, you started your career with an interest in being a process engineer. You, in some ways, get sort of pushed in an environmental direction somewhat by graduate students.

LEDERMAN: Well, myself.

CARUSO: And yourself.

LEDERMAN: And "pushed" is not…

CARUSO: Well, you had mentioned that graduate student started coming to you with these issues, and you were thinking about things in those directions. So you…there's this shift towards the environmental, right. When you went to Cottrell, did you…was that a conscious decision that you wanted to stay dealing with environmental issues? Or was it more just, "This is what I've been working on for some time. I probably couldn't get back into process stuff."

LEDERMAN: Well, let me say two things. I think throughout my career, process has been there. No. I didn't necessarily do process design, but I certainly used process thinking or system…now we call it systems…

CARUSO: Systems.

LEDERMAN: But it's in that. When I left Washington, I left because I didn't want to be a paper-pusher. I felt that was my job at that time. It happened that this was a job that came up in the environmental area. At that time, I did use a headhunter, or executive search agent, because I was already at a level where finding a job by myself was not necessarily the easiest thing in the world. I was trying to trade on my management experience as well as my technical experience.

Going to a large petroleum company probably wouldn't have worked, because they have enough people coming up the line that they…unless there was a niche there for somebody with environmental experience that they needed, you know, couldn't fill. So <**T: 50 min**>, and this just came up. It was not a conscious decision to go after that particular job. I didn't even know it existed.

CARUSO: Okay. To what degree were you, and was your company also, sort of responding to what was happening in the environmental arena in government at this time? Or was the company geared towards, or was it capitalizing on, a lot of the acts and statutes that were coming out?

LEDERMAN: Well remember, Research-Cottrell started as an electrostatic precipitator manufacturer. The statutes at that time were very much…the air statutes were pollution control, particulate, and SO_x primarily. This was Cottrell's [field]. So in a sense, yeah, they were responding to the demands of the regulations. But they didn't do research, in a sense, with developing those regulations.

CARUSO: Yeah. I guess I was just curious whether or not they, at any point, tried to be a part of the discussion about regulation as well. If it was just they…

LEDERMAN: I don't know. I don't know.

CARUSO: Okay.

LEDERMAN: And by 1976, the air regulations were pretty firm. Now, they took another drop of particulate and other emissions later on, but certainly they were there.

ROBERTS: But how much of that was a response to the ability by companies like Cottrell to demonstrate that tighter controls were actually possible? You know, so how much was the ability to amend things like Clean Air…

LEDERMAN: Well, the…

ROBERTS: …a response to that technology?

LEDERMAN: …particulate and SO_x regulations really emanated from smog in California. I mean that's where it started. I think the companies then developed technologies to do that. There were studies about the effect of particulate on health. There were certainly studies I mentioned in SO_x on health. I think…and we were looking at, for example, at bag houses. We hadn't done bag houses, because the precipitator might not be able to handle the next lower level. But I think they were reactive rather than proactive in that sense.

ROBERTS: Okay. So then you leave Cottrell…

LEDERMAN: I left Cottrell because…well, there were two things that happened. Cottrell was really not doing well. That was in part because nobody was building power plants anymore, big

business power plants. We had other business too, but that was my focus and certainly the major business for Cottrell. Power plant…and if you looked at the projections in the mid '70s, power plant construction was…demand for electricity and power plants was to rise 6 percent per year. Well, by 1976/'77, it was down 4 percent, and it was going down.

Two reasons. Now, you know you have this argument today about regulation. Well, certainly then, regulation was one of the things that caused power plants not to be built. Three reasons. One, pollution control cost a lot of money. People were very much NIMBY [not in my backyard]-related, so to get a permit for a power plant probably took ten years. Well…and then there was nuclear that came in. But the permitting was really the problem. It just took too long to get permits. So business dried up. That was one reason.

And I felt my career there was probably somewhat limited. It was a good career. We were making good money, and I had a good group to work with. And my <**T: 55 min**> former boss at EPA approached me. They needed somebody at Weston to handle the hazardous material consulting firm. So I met with Roy Weston, who was the owner. It was a publically traded, privately controlled company. He was the founder. I met with him, and they decided to offer me a job. So, I went over there.

ROBERTS: So what was interesting about that job?

LEDERMAN: Well one, I was interested…hazardous materials are obviously significant to chemical engineering. Again, I thought it…and Superfund [Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980] was just passed. I mean this was the time, so it was the hot issue. I got the job in the fall. I was also interviewing for a job as the assistant commissioner for science and technology at the New Jersey DEP [Department of Environmental Protection].

This job came through first, and I took it. Then the other job came through, and I had a very mad commissioner because I said, "No." We're still friends, Jerry Fitzgerald English. It just sounded like it would be interesting. I could make a contribution. I wasn't working for my former EPA boss. I was working [Jim Dougherty, a division general manager]. Anyway, so I made that change.

ROBERTS: So what was the tie-in to the passing of CERCLA and were there other things that had changed also? I'm trying to think of other mile markers along the way. You know with RCRA [Resource Conservation and Recovery Act] being passed, right as you are doing a lot of the…but at that point…

LEDERMAN: RCRA and Superfund…

ROBERTS: …what you were doing…

LEDERMAN: […] Hazardous materials became a very key issue. I remember Roy called me into the office and saying, "You worked for EPA. What do you think is going to happen?" [President Ronald W.] Reagan had just come [into office]. I said, "Well, every thing's going to go down the tubes, except hazardous materials. It's just not an issue. I was wrong. It went down too. But for two years, and then it changed, because Reagan politically saw that he couldn't sustain this.

ROBERTS: Right.

LEDERMAN: He wasn't going to get rid of the EPA, and that's when Anne [M.] Gorsuch left. Anyway, so it just felt right.

CARUSO: To what degree did you find that the very public disasters of the late '70s and early '80s influenced the work that you wound up doing and focusing on? I'm thinking of Love Canal, [Niagara Falls, New York], in '78; the Valley of the Drums, [Bullitt County, Kentucky]; Bhopal, [India], which I know is not, you know, is a big one too. I mean, how are those situations playing into, if at all, your responsibility at Weston, Inc.?

LEDERMAN: Oh. Well, that's interesting. I was quoted in the *Wall Street Journal* on Love Canal.

CARUSO: Oh, okay. I'd love to hear more about that, too.

LEDERMAN: Well, I was asked what I thought about Love Canal. I said, "Well, the company did…worked with the regulations the way they were when they did this. So, I don't think they're responsible." I didn't think…you know the RCRA law is one of the interesting laws in that's post facto. Just because you did it before '76, the law still applies, and you're it, which is not really according to the Constitution, but be that is as it may.

But certainly that increased the awareness of everybody of these problems and meant that that was going to be a lightning rod, whether it was in New Jersey or wherever. There were…Valley of the Drums was not the only "Valley of the Drums." There were others around. So it certainly made for a good <**T: 60 min**> business opportunity, if you will.

CARUSO: So what it is that you wound up doing in your position?

LEDERMAN: I did two things. I headed the hazardous material consulting operation, which had been part of solid waste, solid and hazardous waste, and we separated that. I had a colleague who then took much of that over, but I still provided leadership. I also handled…Weston had not done much government contracting. They'd been embroiled in the '70s in providing consulting to EPA on some industrial pollution standards. There was a decision made, "we'll never get into the regulatory arena again."

But there was a major contract to provide technical assistance to the EPA for emergency response. We bid on that, and I was responsible for that, and then responsible pretty well for all the government contracting we did. At the time, Weston was a sixteen-million-dollar-a-year company and that contract was worth eight million.

So I really, at that point, was a manager or executive in every sense. I mean I had lots of people working for me, but not direct technical…I had technical responsibility, but not the…or technical oversight, but not technical day-to-day responsibility. But I still did some…continued to do some consulting in the hazardous materials area, because I wanted to do that. Personally, I didn't want to just do high level management.

ROBERTS: So that other consulting you were doing on the side, that was your own.

LEDERMAN: No. Uh-uh. Uh-uh. No. I did that through Weston, and I had a small staff that helped me with that. Weston was a matrix organization, so technical work was done wherever that expertise was…and I had a couple of project managers who worked with me. But I had…you know, I had a national name in that area, so I could spend some time doing that. I didn't charge EPA for that work. I charged my clients.

CARUSO: Who were some of your clients?

LEDERMAN: I'm not sure I'm at liberty to say. EPA certainly was my major client. That lasted for about nine years. Then I took over the New Jersey office, and I had management…because I didn't want to commute to Pennsylvania.

CARUSO: West Chester, [Pennsylvania]. So when you were doing your—I know you can't mention who you were working for as a consultant—but what were some of the types of…what was the type of work you were called on…?

LEDERMAN: Okay, sure. I had one client who had a legal problem, and had pushed and prodded, you know, hazardous materials problem. The lawyer in that case was the former commissioner of the New Jersey DEP. She called me in, and I provided very senior technical advice to that firm, and sat with them when they sat with New Jersey DEP in negotiating solutions to their problem, and then called in my people to look at various things. So, it was…I don't want to use the word "policy consulting," but it was certainly not…it was strategic rather than tactical. Had another client, same sort of thing, but it was all hazardous materials.

CARUSO: So you were essentially trying to, if I'm understanding this correctly, solve the problems that were coming up in various industries in terms of the pollution that was coming out of that, trying to look for technical solutions to prevent…so <**T: 65 min**> I guess for the upstream solutions or the beginning of the pipe solutions, instead of end of the pipe…

LEDERMAN: Yeah.

CARUSO: …solutions. Okay.

LEDERMAN: But, no, in this case, it was things that had already happened, and trying to clean them up.

CARUSO: Okay. So, it's cleaning up the mistakes, but were you also advising on ways in the future not to make…?

LEDERMAN: Yeah.

CARUSO: Okay.

LEDERMAN: I was doing some of that. But, again, strategic, not tactical.

CARUSO: Right.

ROBERTS: So I'm curious how that felt different than some of the work you did at EPA. You said you left EPA because you were afraid you were going to become a paper-pusher. It doesn't sound like you were pushing paper here, but there was so much organizational management that you were doing…

LEDERMAN: There were two parts to my EPA. I was a lab director. I was the…

ROBERTS: I'm sorry. The…so where you were when you left the Washington office.

LEDERMAN: Yeah, I was a paper-pusher in Washington…

ROBERTS: So what was the difference…?

LEDERMAN: Fifteen people working for me, doing two types of things. Oversight of the whole industrial and mining program, that is meeting with people, are they following their budgets, are they meeting deadlines, negotiating with them on goals, which were then approved by higher management. That was really oversight, then reporting to the deputy assistant administrator who would have the control. Or, spending a lot of time answering congressionals. I had a staff of GS-15s who [dealt with] congressionals. Who…you know, you got a complaint in from the senator or congressman or somebody else in the government, and you had to have somebody ferret out the answers and then write a nice letter saying why you didn't do what you should have done or maybe you should have done anyway…or you shouldn't have done it. I consider that paper-pushing…

ROBERTS: So rather than…so even though you weren't doing a lot of the technical work, do you think your draw back to the career you ended up having, the late '70s into the early '90s, was really because there were problems that you could solve.

LEDERMAN: That's right.

ROBERTS: And you like to go in and do problem solving. Do you think that was part of your attraction?

LEDERMAN: Maybe. I've never thought of it that way, but that may be true, Jody. I never gave it a thought.

ROBERTS: Most of us don't, right, so we just kind of end up where we are. I'm curious, too, about what other thing…you know, we've covered now, I think, a decade and a half pretty quickly. So much of what happened in your earlier life that put you in this direction, happened

outside of your career. You know it was these extra things you were doing for your local municipality. It was being a consultant to NY…to New York State EP, EPA…

LEDERMAN: New York City.

ROBERTS: New York City EPA. You know what were the other things that you were involved with besides just going to work every day?

LEDERMAN: Well, I was active in my temple, member of the board. I was active in Boy Scouts, because my son was, and I had been a Boy Scout. Played tennis. But I had a very full time. I mean full…by today's standards not full. When I see my kids and how they're busy, I wasn't busy. But I figured I was very busy.

CARUSO: What about continuing your commitment to the profession more broadly. You had spoken quite a bit about involvement in the AIChE in the earlier part of your career. Were you still contributing in the same way during this period?

LEDERMAN: […] In the…

CARUSO: In the…

LEDERMAN: …middle to late '70s?

CARUSO: …'80s to '90s.

LEDERMAN: Yes.

CARUSO: Okay.

LEDERMAN: In the mid '70s, I wasn't.

CARUSO: Okay. Is there a reason why you stopped? Was it just you were too busy with other stuff?

LEDERMAN: Well, I ran for the board of directors, what was then the council, twice and got defeated and decided I would take a vacation. And then got active again in the ‘80s, and have been really very active since then.

CARUSO: So what is it that you started to do when you became re-active in the ‘80s? Were you still just participating generally in the AIChE? Or…?

LEDERMAN: No. Before <**T: 70 min**>…in the ‘70s, my last real commitment was chairman of Professional Development Committee, which oversaw things like professional licensing at that time, courses, all sorts of odds and ends. When I became active again, I joined…and I had been active also in some environmental things. I became active in the Environmental Division of AIChE, and eventually became its chair. I had been chair of the New Jersey section back in the ‘70s, but that was local. Let’s see, I became very active in our government relations efforts.

ROBERTS: For what reason?

LEDERMAN: I guess two reasons. One, I think it’s important for a profession to be heard, to have its technical sensor. I was active from a Weston point of view. I was with the National Association of Manufacturers [NAM]. I was chair of the Solid Waste or Hazardous Waste Subcommittee of the Environmental Committee of the [NAM]. I was active in the Environmental Committee of the Chamber of Commerce, U.S. Chamber of Commerce. So I was in this milieu from a number of sensors and I felt that it was important that engineers and scientists have their voices heard. They’re heard little enough or not enough. So I got involved in government relations through the Environmental Division at that point.

ROBERTS: So what did that entail, like what would it mean to be…

LEDERMAN: Well…

ROBERTS: …getting involved? Who…who in the government would you interact with?

LEDERMAN: Legislator and executive departments. We pretty well limited ourselves at that time to the national scene. Then I…from there, I became one of the chairs of the American Association of Engineering Societies’ [Engineers Public] Policy Council. I think that’s the

whole name. But I was doing it anyway as a Weston employee, and I felt it was important for our societies to be heard.

What did it entail? Well, when I was chair, it was ten meetings a year in Washington or New York. It's much lower now for a number of reasons, but…

ROBERTS: What sorts of things did you discuss? Or who did you meet with?

LEDERMAN: Well, we discussed anything that…well, it went from pensions, and I was active in that area, when I was on the Professional Development Committee. As a matter of fact, I wrote a pamphlet on, not pensions, but benefits. So we discussed regulations, new statutes, improved funding for science and engineering. We wrote a piece to be added to the third Superfund bill which never passed, which [never] got adopted, by the way.

We'd interact with Congressional staffs, and we'd make…we'd have briefings for Congressional staffs, not only with AIChE, but the founder societies and ACS worked together sometimes. So it was a broad spectrum.

ROBERTS: So were you looking to lend your expertise on certain topics or was this just about promotion of the profession generally?

LEDERMAN: No. It was subject related. Promotion of a profession, if it rode along, that's fine, but that's <**T: 75 min**> not it. We weren't…we would put out technical papers. There's one on biofuel, for example […]. .

ROBERTS: So how did you decide what topics to do?

LEDERMAN: Well, that's a good question. That's…our current board of directors argue how we do that. Really two ways. One, we would see what was going on in the government and see what we could lend expertise to. Also, our members would come and say, "This is an important issue for us. Should we write something on it?" Because the government relations committee itself did not write the papers. They were written by experts within the organization and then vetted.

CARUSO: I was wondering, you were involved with the AIChE for quite some time. Again, I'm just sticking to the period '80 to '93. By this point, would you say or would you be able to characterize the ways in which, if any, the AIChE had changed over the time when you first

became involved with it, up to the early '90s? Was it pretty much a static organization in terms of what it was trying…

LEDERMAN: No. Well…

ROBERTS: …to pursue?

LEDERMAN: There were…I think there were two things. One, when I first became involved there was an executive director, and he was really it, F.J. Van Antwerpen, and a volunteer organization and the staff were all…it was like Arnold Thackray, you know. This place [the Chemical Heritage Foundation] was Arnold Thackray, right. The AIChE was F.J. Van Antwerpen After he retired, that changed, and I think we got more volunteer involvement and direction.

The other thing that I think that happened was, when I joined, companies would send people. There was a general feeling, one meeting a year. If you want to do more than that, you had to write papers or do something. So when I became active in the '60s, I went up to my boss and said, "Look. I'm going to need some secretarial time. I've got to go to at least two meetings a year. I'm on the program committee." "No problem." You couldn't do that today. Most people, I think, it comes out of their hides and their pocketbooks. So the organization is much slimmer than it was in those days. We have fewer members. I think that's true…I don't… have you ever seen the book *Bowling Alone*?[11]

CARUSO: Uh-uh.

LEDERMAN: Well, it's a book about non-for-profit organizations. I started reading it because my wife [was president of the League of Women Voters] in the United States. They were having membership [problems]…and it's just the time. So there's a different…there is that difference. But we still carry on. […AIChE] used to have four meetings a year. We have two now.

A lot more on e-learning, webinars, and things like that, because people don't come to meetings. Local sections used to be very active and they're not now. It's mostly people my age or even older, and that's not true of all, but certainly…you know.

[11] Robert D. Putnam, *Bowling Alone: The Collapse and Revival of American Community* (New York: Simon & Schuster, 2000).

CARUSO: Right.

LEDERMAN: And getting the young people involved is very, very difficult, because they just don't have the time or they have other things. The other thing that happened is, when I joined, there were two main routes…well, three main routes, but two main ones and one for chemical engineers. There was the chemical industry and the petroleum industry, and a combination of petrochemical industry, but that's the same, and academia for some, right.

When one of my guys at Esso went to Wall Street, and this was in 1963, I couldn't understand. One of my classmates at Michigan was going to go to med school. That was an oddball. I mean that just didn't happen, you know. Today, chemical engineers are in such diverse <**T: 80 min**> fields that there's not that focus. So, the other question is, how do we serve our profession with that widespread thing? It was much easier then than it is now.

CARUSO: I guess in some ways it's harder now to define what the profession actually is, since people go into…

LEDERMAN: Well, that's another way to put it.

CARUSO: Okay.

LEDERMAN: We certainly don't serve *you* in that sense […]. But seriously, I mean, you know, it's just the way it is.

CARUSO: Now during the time that you were at Weston, you also did receive two awards. I was wondering if you could tell me a little bit about why you received them, what they were about, specifically the Cecil Award…

LEDERMAN: All right. Larry K. Cecil was probably the premier chemical engineer in water treatment. He was a professor at the University of Arizona and an award was named for him for contributions, technical contributions, in the environmental field. I received it late, but I received it for my contributions in the oil and hazardous material area of research there. It's given every year, and still given, to somebody who has made technical contributions in the area.

CARUSO: So what were the technical contributions that you were…?

LEDERMAN: If I remember correctly, it was my work in oil and hazardous spill research.

CARUSO: Okay, so it was the research on…

LEDERMAN: Yeah.

CARUSO: …the things coming out.

LEDERMAN: The development.

CARUSO: Oh, okay.

LEDERMAN: Research is a pretty loose term there.

CARUSO: You also received the Stanley Kappe Award from the AAEE…

LEDERMAN: Yeah.

CARUSO: …in 1992.

LEDERMAN: That's the American Association of Environmental Engineers. I was on their board. I was the AIChE representative on their board like I am here [at CHF]. I'm not sure why I received it. I'll be very honest with you. I don't remember the…I was surprised that I got it. I think it was for general contributions in the area of hazardous materials.

CARUSO: Okay.

ROBERTS: Can you talk about how you straddled these two worlds of getting awards for being a chemical engineer, but also getting awards for being an environmental engineer?

CARUSO: I was going to ask, it looks like that…at least now, the Kappe Award is for…

LEDERMAN: It's for environmental.

CARUSO: Well, it's for board-certified environmental engineers. I was going to ask you, if you actually received board certification…

LEDERMAN: I am a diplomat, and I still use the old term, in environmental engineering.

CARUSO: Okay.

LEDERMAN: That's a post-professional engineering certification. It's not called "board certified," they are equivalent. It's by examination. I actually got it by eminence from…the AIChE was able to nominate some people. So, yes, I qualify.

CARUSO: Okay.

LEDERMAN: But you know, I have to say, and maybe this is part of the problem, I'm still a chemical engineer. I practice environmental management, environmental engineering. My background is extremely well suited to that. Remember, when we look at the history of environmental engineering, it started out as a sanitary engineer who dealt with sewage, and that was an area that chemical engineers thought was beneath them. I mean they were in petroleum and [other] things and sewage was not…garbage was not for them. But the…I think that changed. First of all, environment became a hot issue. But on top of that, our expertise is very much needed on service. It's a wonderful background to handle most environmental problems.

ROBERTS: Why is that?

LEDERMAN: Because they're chemical, because of their process. I mean a power plant, which mechanical engineers do, or an incinerator, is really a chemical plant in a way. It's combustion. A sewage treatment plant is a chemical plant. I mean, you're treating sewage <**T: 85 min**> with chemicals. You're dealing with water flow and solid handling and all of the things that chemical engineers do. So, chemical engineers, I think, are extremely well suited to work in this field. It's just one of the many fields.

What are we doing in pharmaceuticals, in drug companies? Well, should it be pharmacists or pharmacologists? No. They're chemical processes. Chemical engineers work in

steel plants, because they're also chemical in that. Metallurgical engineers work there too, but am I…

ROBERTS: But do you think that gave you a different perspective on dealing with the sorts of environmental issues that you would have versus someone who was trained explicitly in environmental engineering?

LEDERMAN: Well, of course, when I was around, people weren't specifically trained in environmental engineering.

ROBERTS: So what…so that's another question. When those started to show up in AIChE and things like that?

LEDERMAN: Well, environmental engineering programs really started in the '70s. Before that they were sanitary engineering programs. There wasn't the air pollution control program. It was usually handled by chemical engineers, because it dealt with fluid flow and particles. The civils [civil engineers] did sanitary engineering. Now that was a special field and they needed to get some chemical engineering-type courses: heat transfer, mass transfer, fluid flow. If you were a standard civil engineer, loads or structures, you didn't know anything about that.

By the way, it's one of the anomalies in the California appeal, civil have to design process flow diagrams. But so, when you…I don't know whether I've really given you an answer, but what it says is, is that the only thing that chemical engineers don't have…didn't have that dealt with the environment was the biological aspect or the human health aspect or toxicological aspect. Most environmental engineers don't have it either […]. So you pick some of this up.

ROBERTS: So you're watching…not to jump too far ahead, but you're looking back now as someone who's been involved with AIChE for a very long time…

LEDERMAN: Fifty-plus years.

ROBERTS: …very long time. You're talking about the drop kind of overall in chemical engineers. Have you seen…has there been a rise of…you know there was a moment there when you were discussing the overlap between the chemical engineers, environmental engineers. The environmental engineers were really starting to take off in the '70s, but they were doing things that were previously left, likely, to chemical engineers. Is that…

LEDERMAN: Or they weren't around.

ROBERTS: …was there a disciplinary shift?

LEDERMAN: Or they weren't used. When I started in chemical engineering, we just dumped stuff into the river, you know. You don't dare do that now. I interrupted you…

ROBERTS: No, no. I guess I'm thinking too about the differences in the training and how much of this comes back to some of your thinking, where we started today's conversation around how one manages thinking about different media. And how one thinks about systems and how that gets played out by these different professions. And what makes you, in your personal history coming in through some of these different projects, able to put some of those pieces together perhaps in ways that maybe you didn't see other pieces of…

LEDERMAN: I think that depends partly on maturity. I think a young chemical engineer or young environmental engineer comes out into the field [and] will look at a problem one way, while somebody who has been around for ten years looks at it as a much broader thing. This is tactical versus strategic in the process or systems point of view. Most of us, when we were educated, were not educated in systems.

Chemical engineers to a certain degree were, because they looked at the whole process. You know. Most engineers in those days were not. Now, environmental engineers <**T: 90 min**> equally have to look at systems and the interaction of those. So, the question is do they have a difference in education? Maybe. But not in thought process if they're good.

CARUSO: So…

LEDERMAN: That has very little to do with my history.

CARUSO: I have one question that has to do with, I guess, reflections on…you'd mentioned Reagan in 1980. Things changing a little bit in 1982, when Reagan realized, well, he can't do exactly what he wanted. You were working for Weston throughout the Reagan years, and [President George H.W.] Bush Number One years. Did you see any major transformations in governmental policies that had an impact on Weston during this period of time?

LEDERMAN: Certainly. The beginning of the Reagan years did have an impact. We went down in employees, and type of work. In 1982, Reagan didn't quite flip, but he…there was a different process going on, and there was a lot of public pressure to have continued in environmental regulations from a health point of view. Weston grew as a result.

ROBERTS: Where do you think that public pressure was coming from? Was it things like Love Canal and…?

LEDERMAN: Well, Love Canal, of course, by that time was already…had been done. But, there were incidents, whether they were air incidents, health incidents, or oil spills. Every time you'd have an incident, you get public pressure. And there was enough money to do things. On top of that, industry decided rather than fight, they were going to join. I remember once in an National Association of Manufacturers meeting, where I was sitting in. We were talking about self-audit, industry was going to audit itself. A guy from a major oil company looked at me and said, "You consultants, it's just the consultants [that] benefit over all the time we [spend]." I had to sort of keep my mouth shut, because here I am, a consultant at the National Association of Manufacturers. That wouldn't happen today. There was a change. I think industry felt that it was better to do what they could rather than fight. That really happened in the '80s.

ROBERTS: Was that a response to anything?

LEDERMAN: Pardon?

ROBERTS: Or what do you think that was in response to?

LEDERMAN: I think we found that economically it was…it was economically advantageous to do some of these things. It was to make process an economic sense, to treat and to prevent rather than treat at the end. It made economic sense as long as the regulations were reasonable. Now, you know, you can over-regulate anything. I'm not…but as long as they were within reason, and achievable, it was easier to do that than to fight.

Now, not everybody…small industries had a real problem with this, because they'd be one man or one woman shows. They had to do everything on their own—manufacturing, sales—and that was tough. But for large industries, it just made good sense […].

[END OF AUDIO, FILE 2.1]

CARUSO: So I think before we move into your transition back to academia, one thing I want to make sure of is, is there anything during the period when you were at Cottrell or Weston that you'd like to talk about that we haven't asked about?

LEDERMAN: That we…Cottrell, I think we've covered pretty well. Weston was a very interesting thing, because for a long time I worked directly for Roy Weston as one of the division managers. Then when I decided I didn't want to commute anymore, and took another tack, I was working for somebody who was a regional manager yet I was his senior. That made a very interesting situation. He pretty well left me alone. We had a very fine, good office.

But originally Roy never wanted to do consulting. He figured he could do all the consulting out of Pennsylvania for New Jersey. I said, "You can't do that. New Jersey is New Jersey, and you just…I'm not going to do it." It took him a long time to figure that out, and then somebody finally said, "I'm not going to come into Pennsylvania. I'm going to…," so they established—they wanted this person—and they established a New Jersey office for him. He left and then I took over.

But human relations are so important in this whole thing. You can have all the science in the world, and all the technology in the world, but the bottom line is you've got to handle the human equation.

CARUSO: So, I think…sorry.

ROBERTS: I was just going to say, if I had to guess, you're leaving Weston and you're going to New Jersey Institute of Technology, and if the past is any predictor, you were probably up for some promotion. And there was trouble in the Institution and you got out right in the nick of time.

LEDERMAN: Wrong.

ROBERTS: That happens in almost every one of your changes. So why was that different this time?

LEDERMAN: I had decided that…the year before I left I went to see the president. I said…and there were things in every organization that aren't to your liking. There was going to be a northeast region manager change. I certainly was eligible enough for that; whether I wanted to be that or not was another question. I had always thought about ending my career in academia.

Anyway a number of years before, I had been asked whether I was interested in being a director of the Center for Environmental Engineering and Science at NJIT, and was offered the job, but without tenure. I said, "I'm not taking that job without tenure." I had tenure at Brooklyn Poly. It just was not a job that you want to take without tenure. I told Bill [William J.] Marrazzo, who is now president of WHYY, as a matter of fact, that I would tell him when I was ready to leave and that I would leave.

I thought about it and decided it was time for me to go back to academia. I was sixty and I still had some career. I approached NJIT, whether they were interested, and they were. So I surprised Bill and said, "I'm leaving." He said, "Why?" I said, "Because I'm going back to academia." But, no, I could have stayed at Weston for another…without any trouble, both from my point of view, and from their point of view, making money for the corporation every quarter, which was important.

CARUSO: Why did you see yourself as finishing your career in academia?

LEDERMAN: Well, you know it's interesting. Even in my industrial jobs, I was really in many ways a mentor and teacher, not a doer in that sense. Probably for the same reason I went to academia when I went to Brooklyn Poly. I mean I could <**T: 05 min**> have stayed at Esso and had a very good career. As it turned out, I just decided that it was time for me to do something new. But I still have a relationship with Weston and still keep a relationship with some people there. So, no, it wasn't that the organization was in trouble.

CARUSO: So when you went to the Institute of Technology, you were the Executive Director of the Center for Environmental Science and Engineering.

LEDERMAN: Started as Director and then became Executive Director.

CARUSO: Okay. And also, you were, I have listed the Executive Director of the Office of Intellectual Property.

LEDERMAN: Intellectual Property. Right.

CARUSO: Was that from the outside, as well? Or is that something…?

LEDERMAN: No, a year…year round.

CARUSO: Year round. You were also a research professor of chemical engineering…

LEDERMAN: Well, that's…

CARUSO: and mechanical, that's…

LEDERMAN: …sort of a…

CARUSO: Okay. So, I'm just wondering, what were your responsibilities in these various roles?

LEDERMAN: All right. In the Center, we were one of the EPA Centers for, NSF Centers, for hazardous materials research…Center for Hazardous Materials and…well, yeah, the Hazardous Materials Research. The Institute had built a Center for Environmental Science and Engineering, a separate building. In it were located both people from the chemistry, chemical engineering and the civil/environmental departments doing research on environmental problems. My job was—and much of that was funded by EPA, and then there were other grants—my job was to really oversee that program, along with Dick [Richard S.] Magee, who was the executive director for a while. I actually worked for him and there was always the question of "who worked for whom," because I was more senior in age. We worked well together. We had a small staff that really administered the research program, selected grants, worked for grants, selected grantees. We had money to grant.

I also taught a course in environmental policy in the environmental management program, and counseled students, graduate students, and mentored young professors in their work. We did…obviously had some intellectual property. The school did have an intellectual property officer, who was unfortunately not successful in that job. I handled the intellectual property for the Center. So after a year, it became evident that we either took this over in a way, or didn't. It was whether we took…whether I took it or it went to the law department. The law department was not the right place for it for a number of reasons. So, I became the Director of the Office of Intellectual Property, and really dealt with the intellectual property throughout the Institute—that's patent, licensing, and things like that. I negotiated the work with patent attorneys we hired to develop the patents. Then I would try to negotiate the licenses.

I was also involved when we sent students to someplace like AT&T, the contractual relationship for those students, because AT&T wanted to keep all its property, intellectual property. We didn't want it to keep it all. You know, it's…and so I did a lot of negotiation there and encouraged professors to patent rather than just do research.

CARUSO: In terms of…

LEDERMAN: So that was a new area for me, sort of.

CARUSO: So how did you…I guess I should start off with, how did you learn what to do in this new area <**T: 10 min**>? Was it just trial by fire, figuring it out? Or did you have a general sense from your previous positions what it is…?

LEDERMAN: I knew something about intellectual property and patenting. First of all, I had been at Esso. We dealt with patents all the time. At Cottrell, I dealt with patents and intellectual property, because we had a lot of it. At Weston, we didn't have much, but I dealt with a little bit of it. So I knew a fair amount. I didn't know the details of patenting. I also had negotiated a lot of contracts. The negotiating part was fine. The marketing part was fine, because I had done marketing in many of my other jobs. In fact, I remember when Roy hired me, he said, "What do you want to do?" I said, "Everything but sales." He looked at me like this and he said, "Everybody sells," and he's right. No, you laugh, but it was an interesting…

ROBERTS: […] Not everybody has that in their title, though.

LEDERMAN: That's right. But…

ROBERTS: But everybody sells.

LEDERMAN: Everybody sells. So, it wasn't really trial by fire.

CARUSO: Okay. You also mentioned that you were acting as an advisor to graduate students.

LEDERMAN: Well, in an informal way, not in…I didn't have any thesis students.

CARUSO: Right. So, what is it that you were doing for…?

LEDERMAN: Well, for example, they would come in and say, "I'm trying to do this. (a) Do we have the equipment? (b) Can I get the equipment?" (c)…." You know, that sort of thing.

CARUSO: Okay. So it wasn't necessarily professional advice about people…I mean, you had such a varied career, I could imagine a lot of students going to you and saying, "Hey, look. I'm interested in going into the government. What are my…"

LEDERMAN: Oh, I would…I got some of that, too.

CARUSO: Okay.

LEDERMAN: But no. I mean it was on…it was an open door. You know.

CARUSO: Okay.

ROBERTS: What was the state of the Center in when you got there? Was it new? Had it been in existence for very long?

LEDERMAN: Was…it had actually been organized in 19…about four years before, four or five years before when I had been offered the job as director and we never came to terms. I had sort of an arm's length relationship with NJIT over the years.

ROBERTS: So what was the state of things when you got there?

LEDERMAN: Oh, I think they were pretty good. The one problem we had was, we gave out money, and we didn't force people to get their own money. We shared, some things like that. But that was the policy and I wasn't about to be able to change that.

CARUSO: Did you have other roles? Or other…you'd been doing consulting for a bit. When you were at the New Jersey Institute for Technology, were you continuing with that consulting?

LEDERMAN: I did some outside consulting, yes.

CARUSO: Because I noticed that you…I think you participated in the evaluation of that Bloomington, Indiana, PCB [polychlorinated biphenyl]…

LEDERMAN: Yeah. That was…

CARUSO: …site, maybe.

LEDERMAN: That was not…I did two types of consulting: pro bono consulting and consulting for a fee.

CARUSO: Right.

LEDERMAN: I did fee consulting as an expert witness or on environmental problems for various people. Then I did some pro bono work: the National Research Council. Well, I had done some with Weston. I was on the board, advisory board, or oversight board, of the National Bureau of Standards, Office of Recycling Materials. I was on the National Research Council board, and that was certainly pro bono. All the NRC committees I've ever done have been pro bono. That one was pro bono also.

CARUSO: How did you…did people come to you? For example, with the Bloomington, Indiana PCB, did people come to you? Or did you see this as…

LEDERMAN: Most of the time, no. No. This was all over the transom, as they say. I never really advertised for a consulting job.

CARUSO: So can you tell me a little bit about what you did as a participant in the evaluation of that?

LEDERMAN: Well, we met for several days. We got a report and we met for several days <**T: 15 min**> in Bloomington—it was a GE [General Electric] facility—and heard people talk about the report and how they felt. We were a peer review board, really, to see…we asked probing questions, obviously, to determine whether or not their recommendations were valid or not. There was a big PCB spill there. If I remember correctly, we determined that they were, but don't quote me on that. I just don't remember.

But those sorts of things came up. Then we'd come up with…that was one, the NRC were others. The [Chemical Weapons] Restoration Advisory Board is another one that I still participate in, where we hear what they're doing and we question whether it's sound or not.

Each one is a different technical level. The [Restoration] Advisory Board is not that technical. So in there I'm sort of the old man with the history. Now, it…seriously, I'm at that point now.

CARUSO: Why were you participating in these sorts of activities, at least the pro bono ones? I mean you'd done a lot for your profession over the years….

LEDERMAN: I think it's…maybe it's in my blood. I believe that I…wrong word. It's not that I owe it to the community. But I think it's important that people who are knowledgeable, when they can, provide their knowledge. Now, it's nice if we get paid, but sometimes we can't get paid. It's just part of my ethos, if you will.

CARUSO: So a commitment to public service…

LEDERMAN: Yeah.

CARUSO: Okay.

ROBERTS: So what were some of the different NRC review committees you were on during this time?

LEDERMAN: Well, they started again in the late '90s, '99. Well, I had one, and I don't remember how I got on it, that dealt with decontamination and this…not destruction of the nuclear sites, the three plants that, you know, the concentration plants.

ROBERTS: And when was this?

LEDERMAN: This was in the '90s, '92 or '[9]4 to '[9]6. That was a big committee. We were looking at Oak Ridge [National Laboratory], Paducah [Gaseous Diffusion Plant], and Portsmouth [Gaseous Diffusion Plant], and what they should do with those. It was a big…they had just made a cost assessment of thirty million dollars to clean those three sites up. They were the U_{235} concentration sites. We looked at it. Did they do the right thing? What should they do? That was one.

Then in '99, I got onto the Chemical Weapons Disposal…Stockpile Disposal Program. I was a member from '99 to…well, '98 to '99, and then became chair from '99 to 2004, when that

committee was disbanded. That committee actually wrote reports. We wrote reports on numerous things. So my name would go on all those reports, even if I wasn't the prime author.

ROBERTS: How did you become the chair of that? I mean that wasn't an area you'd worked in previously.

LEDERMAN: Good question and I don't know. I was a member for a year, and I was asked to be chair by…the staff of the National Research Council picks the chairs, not the committee. So it wasn't an election. It was, "Dr. Lederman, would you do this for us, yes or no?" Then the next one, [next] committee, they disbanded that committee and formed a new one which had a broader perspective.

Actually, the staff wanted me to be chair, but the head of the office wanted a politician, a person with a technical background but experience in the political arena. But I became a member of that committee <**T: 20 min**>. Usually you can only serve six years and then you're timed out. I timed out on that in 2010. In the meantime, that committee did not write reports, but I chaired six or seven reports on that one. I think I have a total of fourteen or fifteen reports in that area. They are publications, but not listed, because I didn't think that was…anyway.

I had a good time, and I think the Army felt I made a contribution and that's what it's all about.

ROBERTS: What was the expertise you thought you were bringing to the nuclear weapons…

LEDERMAN: Three things, hazardous materials. I mean that's the big one.

ROBERTS: They are hazardous.

LEDERMAN: Well, yeah. But I didn't have that particular…

ROBERTS: Right.

LEDERMAN: But, generally, hazardous materials, process engineering. I think those are the two big ones. Environmental in general…I mean was there an environmental problem? Most of these plants are…the Army used the word "incinerator." Wrong word…combustion units. Could never sell that. Well, you laugh, but "incinerator" is a red flag word. "Combustion unit"

isn't quite as bad, and you get into NIMBY. Anyway, no, I still keep in touch with those people.

ROBERTS: So you had seven years at NJIT…

LEDERMAN: Eight.

ROBERTS: Eight. Depends on when exactly you started…exactly when you ended…

LEDERMAN: That's all right.

ROBERTS: But you leave in 2000.

LEDERMAN: Yes. Why?

ROBERTS: So well, before we get there, before "why," because I am curious why, because you said you wanted to end your career, you wanted to retire as an academic, but you have this…I have this thing on my notes that says, you have "2000 to present," and you left NJIT. So we will get there. But was there…I mean was there anything really notable about being at NJIT and doing that work? It seems like most of the things you've talked about are just kind of structural, organizational, or the committees you were serving on outside of…

LEDERMAN: No. I think I decided that year that it was time for me…well, what did happen and it had nothing to do with me. I took over as Executive Director, because of something that happened, not to me but to the executive director. I took the job on the basis that I would find a replacement. I had actually expected to retire the year before. I said, "Time for younger people to take over." But I said, "I will find my replacement, and then I'll retire." I did that. So it was, if you will, a planned move.

I think I made the contributions I could. The one thing I regret that we could never do, we could never get the two key departments—chemistry…chemical engineering and chemistry were one department, civil and environmental were the other—we could never get them to work together, so that there was no long range plan. I tried in the year and a half that I was Executive Director to get that, and it just wasn't going to fly. It was not quite as bad as Palestine and Israel, but it was…you know…

CARUSO: They didn't get along.

LEDERMAN: That's right. Individual people did, but…

CARUSO: But as a…or as a group…

LEDERMAN: Territorial…

CARUSO: Right. That people like boundaries and they don't like crossing…or organizations, groups don't like taking down their boundaries…

LEDERMAN: Yeah.

CARUSO: Individuals are comfortable with moving…

LEDERMAN: That's right, anyway…

CARUSO: …between different groups.

LEDERMAN: So I failed on that, but it…

CARUSO: Or they failed.

LEDERMAN: All right. Anyway, so I decided to retire.

ROBERTS: You retired to be a consultant.

LEDERMAN: And I do consulting, again, over the transom. I do a lot of…essentially, I lost my last client this last year, an eighty-seven year old man, and that was really strategic. I didn't do the tactical work. It had to do with some work in New Jersey, remediation work <**T: 25 min**>.

Anyway, and I did some consulting. I kept myself…I keep myself very busy. I have the privilege of saying no when I want to say no. I still do…I do a fair amount of pro bono. Last year I was asked to serve on the New Jersey Science Advisory Board in New Jersey Department of Environmental Protection. I've been reappointed for three years. That'll make me almost…no, that'll make me eighty-three. Then, it'll probably really be time. I don't know whether that answers your question.

ROBERTS: Of course it does…of course.

CARUSO: It does also seem that, even though in terms of being trained specifically in environmental engineering, you…

LEDERMAN: I have to correct you. I was never trained…

CARUSO: Right, right.

LEDERMAN: …specifically in environmental…

CARUSO: You weren't trained specifically in environmental engineering, but I mean looking over even the last part of your career, it was the Gary Leach Award for the Superfund Task Force.

LEDERMAN: Right.

CARUSO: The Environmental Division Service Award in '95, the chairs of National Academies, the [F.J. &] Dorothy Van Antwerpen Award for Service…

LEDERMAN: Now, that's not environmental.

CARUSO: Oh, that's right, that's Chemical Engineering for Outstanding Contributions to the Institute. But for the most part it seems like, in terms of your career, people really remember you…

LEDERMAN: In the environmental field.

CARUSO: In the environmental field.

LEDERMAN: That's right. Oh, yeah, no doubt about it. You know, when you spend, professionally, from 1972, at least, to now in that field, that's forty years. If one is going to leave a mark, that's where…it's going to be there.

CARUSO: So now that you're doing pro bono consulting for the most part, in some ways you're allowed to take a much broader perspective on general issues related to the environment. I was wondering if you have any thoughts or comments on recent issues that have been coming up with regard to environmental policy, with regard to changes in statutes, and where you think either we are going in the United States or should be going in terms of dealing with hazardous materials?

LEDERMAN: Okay. It's a very difficult question.

CARUSO: That's why it's one of the last questions we like to ask.

LEDERMAN: No, no. That's fine. This is one person's opinion. I think that our work in the environmental area has been important. I think it has gone through ups and downs and is now…but we were very fortunate in that, from an economic point of view, we were able to absorb that and show at least some benefits. The question is, what the cost-benefit really should be, and that's a very tough one, because how do you value life? How do you value a person who is sick for a long time? I mean you can put some value on it, but that's always an argument.

The pollution prevention area, I think you can do a very good cost-benefit analysis. But we don't do much life cycle analysis, which is really what you ought to do if you want to prevent. Now are we mentally…maybe "mentally" is the wrong word, but from a policy perspective, "ready" as a people to look at those life-cycle costs versus benefits? I'm not sure we are. We aren't trained….

[…] So this is, are we ready to look at it that way? Or we're past the point where we're fighting, which is what we did in the '70s. Are we economically prepared to do some of the things that may be necessary? At the moment, I don't think so. I think that's an important thing. On the other hand, to say that <**T: 30 min**> regulations costs us jobs…there are plenty of examples where jobs were created because of regulations. So we're going to use this political football any way we can, depending on which side we're on, and that's not good. The one thing that we need is consistency. I think there, the business people are absolutely right. They have

to know one thing. We can't keep changing the playing field. But do I think that we need to look at things further? Absolutely.

On the other hand, I think we need to sure that we aren't living by the precautionary principle, which says, "If you don't know, be cautious," because there are always risks in life. We can't shut down the engines because of things we don't know. You can never achieve zero. So the question is, what do you do? Well, you want to do the least harm, but no harm is always a big question mark.

In terms of hazardous materials, I think it's important that we minimize where we can the use of hazardous materials. Certainly, in areas where we're exposing children, for example, we should be careful. But to make a big deal…for example, the PCB question, you know, it's terrible now. It isn't so terrible, but it's still terrible. The question is, are the things that we're using as substitutes as safe as PCBs were in terms of fire retardants or are we inviting fires? Now, do we need to contain them? Yes. Do we need to make sure that we don't spread them? Yes. So there are those kinds of things. But using scare tactics isn't going to help us. I think we have to…and there are places we also have to find ways to handle hazardous materials, because we aren't going to…first of all, they're all around us in some ways. If we…to collect them, we slap them somewhere and they aren't going to go away. I think, frankly, the nuclear…what we do with nuclear waste is a much greater problem in many ways than hazardous materials.

Do we need to continue to do toxicological studies? Absolutely. Do we have to wait for a regulation to look at the final answer? No. But we should not, as I say, just cut everything out because we don't know. I mean going back, the bubonic plague and all those plagues: lousy sewage. We don't want to go back to those days either. So it's a balancing act. It needs intelligence. I'm afraid sometimes we don't have the intelligence to do that.

CARUSO: Do either of you have…then the last question that we tend to ask is, is there anything that you want to talk about that we haven't covered? The answer, of course, can be "no." There's no pressure, I just always like to make sure that…

LEDERMAN: No, I understand. You know, I can't think of anything right now […].

CARUSO: All right. So, I think I just want to thank you…

LEDERMAN: I thank you guys. You've had a lot of patience.

CARUSO: It's been a pleasure.

ROBERTS: It has been a pleasure.

CARUSO: All right, thank you. I guess that's all […].

[END OF AUDIO, FILE 2.2]

[END OF INTERVIEW]

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