PROFILES OF SWE PIONEERS

ORAL HISTORY PROJECT

Lois Graham Interview

June 3, 2003

Edwards, New York

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Lois Graham

Lois Graham was the first woman to graduate in engineering from Rensselaer Polytechnic Institute (RPI) in 1945, the first to receive an master's degree in mechanical engineering from the Illinois Institute of Technology (IIT), and the first to receive a Ph.D. in mechanical engineering in the United States. Upon graduating from RPI, Graham worked for the Carrier Corporation as a test engineer. She returned to academia after 18 months, and worked as a graduate assistant at IIT, where she would spend her entire teaching career. Graham became the first woman faculty member in the engineering department at IIT when she became an instructor in 1949, and was one of the few women to hold the rank of full professor, which she achieved in 1975. She was appointed assistant director for engineering and science in 1974 and program director of the Education and Experience in Engineering Program in 1977. Graham was a Fellow and national president (1955-1956) of the Society of Women Engineers, and a member of the American Society of Mechanical Engineers, the American Society of Heating, Refrigeration and Air Conditioning Engineers, and the American Society for Engineering Education. Graham passed away in 2013.

In her 2003 Profiles of SWE Pioneers Oral History Project interview, Graham discussed her early education and working in industry; her return to school to earn her masters and Ph.D. in mechanical engineering; her contributions as an instructor at the Illinois Institute of Technology; and her involvement in SWE.

- July 2016

INTERVIEW WITH LOIS GRAHAM, JUNE 6, 2003

LAUREN KATA: It's Friday, June 6, 2003. This is an interview with Dr. Lois Graham, past president of the Society of Women Engineers for the SWE Oral History Project. The interviewer is Lauren Kata, and we are in Edwards, New York.

And first, I'd like to say thank you for participating in the project.

LOIS GRAHAM: Very welcome.

LK: Can you begin by describing your background, your early childhood and your family?

LG: Okay. I'll try to do that. I was born and brought up in Troy, New York. And my father was a member of the physical education department at Rensselaer Polytechnic Institute. And I have an older sister; she was five years older than I, and a brother who's nine years younger.

Until my brother was born, I was the boy in the family.

(Laughter)

LG: As a matter of fact, they had planned on a boy, and planned to name me after my father. But when I turned out to be a girl, they didn't even have a name for me, so my mother said to the nurses, "What are they naming girls this year?"

(Laughter)

LG: And they said, "Lois," and so Lois it was.

LK: Oh, interesting. That's funny.

LG: And my name was Lois Graham without a middle name because they said, "Well, you'll probably get married, and then you'll have a middle name, so it doesn't matter." Well, it turned out a little differently, so I'm just a two-named person.

(Laughter)

LG: But anyhow, I was a tomboy, there's no question about it. And I had, at one point, at Christmas I had asked for a tool set, so it ended up that I had the best tools in the house. I also had an electric train one Christmas. And so you could see I sort of had these tendencies.

But as a child, what I really wanted to be was a doctor, a medical doctor. And my sister, being older than I, went through college, and that was really all the family could afford at that time. So when it came time for me to go to college, we had to make other arrangements.

I had, in the meantime, gone through a series of thoughts. I was a great admirer of Amelia Earhart, and I thought flying would be just wonderful. But how does a woman make a living out of flying? Well, you really couldn't in those days. And so I thought, well, I wanted to go into the medical profession, and I would like to fly. And to be a stewardess at that time you had to be a registered nurse, not over five-foot-three, and not weigh

more than 125 pounds. Well, unfortunately, I outgrew that career.

(Laughter)

LG: So that didn't work. But the idea of aviation did interest me, and we did talk a bit about the possibility of my going into aeronautical engineering. But, again, as I said, the finances weren't there.

LK: Who is "we," you and your family?

LG: My parents, yeah, my father and my mother. Yeah, it was a family thing. I mean, it certainly wasn't the counselors at school, because the counselor at school said -- the other part I should have said is that I was very good at math, physics, and the sciences in general. But from the counselor's -- at school -- point of view, there was only one thing I could do, and that was teach. And despite the career I followed, the last thing I wanted to do was teach.

(Laughter)

LG: So I arranged to go to a state teachers college in Albany. And I was going to either minor in physics or math or major in physics or math. I don't remember really what the combination was, but I was going to do that. And the one obligation you had when you went to teachers college was that you would have to teach for one year, upon graduation. So I was set to do that.

Well, let's see, I graduated from high school in '42. I think that would be right. And the war was coming up. And so Rensselaer Polytechnic Institute, or RPI, as I'll call it, decided that for the summer they would let women take summer school courses. And any employee of the school, children -- of course up to this time, male -- could go to school for free. So I said, well, sure, why not go and take some courses. So I took engineering graphics and a math course. And of course, the math course I had no trouble in. But in the engineering graphics, I am the world's worst draftsman.

(Laughter)

LG: I think the only way I passed that course was the fact that on every exam I got a hundred. Nowadays, of course, they use computers instead, and you don't have to have that ability. But it was an experience I had not had before, which was close to failure. So anyway, the weekend before I was to start school at Albany, we were at the dinner table, and my father got a phone call. And he came back and he said, "They've decided to accept women at RPI. Do you want to go?" And I said, "Well, I'm not sure, I mean, because I failed." But I could see that my father would really like me to go, so I said, "Okay, fine." So instead of going to the freshmen tea at Albany, I went to the freshmen tea at RPI.

(Laughter)

LG: And the president's wife, when she heard I was going to be studying engineering -- well, actually at this point we had made a decision that it would be wiser, perhaps for me to take a broader field of engineering than to specialize in the aeronautical, and that I would take mechanical engineering, and then if I did want to specialize later I still could do it. So when she heard I was going to study mechanical engineering, she said, "Oh, good, you can come fix my plumbing."

(Laughter)

LK: That's good to be respected.

LG: But so anyhow, I started at RPI. And it was sort of a strange situation. Because my father was on the faculty, I knew a number of the faculty members. And I wanted to not rely on my friendship with anybody in order to succeed. And the other was that I was told when I was enrolled that the future of whether or not they accepted other women would depend on my performance, which is quite a bit of pressure.

And so anyhow, I started. And it went quite well, I think, on the whole. I had another drafting course to take, which I managed to get through. And then the third drawing course was descriptive geometry drawing, and that I just had a ball in. I did so well that the professor actually asked to keep my drawings.

So I had progressed.

LK: Were you the only woman in these classes?

LG: Well, there were four women admitted at the time I was admitted. Cluett -- I don't remember her first name, but she studied architecture. Then there was another woman who was taking pre-med. And then there was Mary Ellen Rathbun, who was taking metallurgical engineering, and myself. So there were four girls. And as we said, I think there was about 1,000 men -- that the odds were really good, (laughs) they were in our favor.

One of the things is that -- Trent Cluett -- I don't know if you know the name Cluett, but her father was Sanford Cluett, and he's the one that the word Sanforized is named after. The Cluett family made shirts, and shirts were a big thing. And the Arrow shirt was the Cluett and Peabody shirt.

LK: How do you spell Cluett?

LG: C-l-u-e-t-t.

LK: Okay. That's how I thought.

LG: Yeah, yeah. And it was really because Trent wanted to go to RPI that her father, who was on the board of trustees, (laughs) kind of encouraged them to consider it. So that's how we all got there.

Well, I was the only girl in my class because I was the only one taking mechanical engineering. Before we graduated, Mary

Ellen and I did arrange to take one course together so that we would at least have that much. But basically, because she was in metallurgy, her courses were all different, so we didn't get together.

At that time, RPI had a system of -- I think it was eight weeks, and then another eight weeks, and so on. And after the first eight weeks during which I had a ball -- I'll tell you -- but after that, the students who had opted to go into the Army R.O.T.C., they were all drafted. And actually, that group ended up in the Battle of the Bulge, and so I lost a lot of my classmates at that time.

The ones who had decided to go into the Navy stayed at RPI, and then they brought in the V-12, so that the whole school went over, essentially, to Navy. And the only ones who were not in the Navy were the four girls, and two boys who were 4-F. So everybody else was Navy. And as part of the change, we had to go to a semester system. So we had this funny eight weeks that we had completed in the front. When the Navy came in, we went over on to a speed-up program, which meant we went to school every day of the week -- every day of the year -- well, Saturday and Sunday out. The boys had all their drilling, and so on, on the weekends.

LK: It was an accelerated program.

LG: It was an accelerated program. We got Christmas Day

off, New Year's Day off. And the only way you could get a vacation was that they had a week where you had exams in every course every day. And if you got a 3.5 average out of a 4.0 average on those exams, you didn't have to take the final exams. So by working very hard, I managed to get my week vacation in that way.

I did have to take a couple finals, but on the whole that was how it worked. Let's see, now, the first eight weeks -- one of the courses that I was taking the first eight weeks was shop. And the shop included woodworking, machine shop and forge. Now, these courses were primarily taught by men who did not have degrees, but had been in the field for years and years and years. And they weren't too happy when they saw a woman show up in their classes. (Laughs) But on the whole, they were very patient with me.

And I did have a partner in the machine shop part who was a tennis player, and so he said, "Well, you do the work, and then I'll come in once in a while." Well, the one day he came in, he broke off the bit in the piece, the work. And he said to me, "Well, you tell the teacher you did it, because you're a girl and they won't be so hard on you." (laughs)

LK: What!

LG: So anyhow, the other one, though, was fun, in forge -- oh, we had foundry also. But in forge, the guy in charge, he

said, "Well, now, you won't be able to make the things that the boys make, so I want you to make these things." Well, I had so much fun, you know, getting the metal real red hot and then pounding on it and so on, that I ended up not [only] doing the things that he gave me to do, but also what the rest of them were doing.

So I had a great time in that. On the whole, going through was good. I mean, my father said to me, "Well, you're not in the Navy. You don't have to go the accelerated program if you don't want to. You can take a semester off and then come back." And I said, "No, I'd rather stay with the people I know." I mean, once you get accepted into a group, you're not really anxious to have to go through it again. And so I stayed with my group. And because of that funny eight weeks, we finished up with another eight weeks at the end. And this meant that we graduated in April '45.

Now, I was just twenty years old. And of course, because all of these men were going into the Navy, I had a lot of job interviews. The ones that stick most in my mind were -- I had an interview with GE [General Electric], and they said, "Well, now, we can't pay you what we would pay a man, but you can make it up by working overtime."

LK: Oh, nice.

LG: So no matter how interesting the job was, there was no way I was going to accept that.

I interviewed [with] one of the oil companies, and they said, "Well, now, the way we start our new engineers is that we put them in the field, and they have to go into the big tanks and take samples of what's on the wall, and things of this sort. And it's a pretty dirty job." And I said, "Well, it wouldn't bother me any." Well, he was so impressed that when he went back -- and of course they decided to -- the higher-ups decided that they didn't want a woman engineer. And this guy tried awful hard to get a job for me, but that didn't work out.

Well, one of the companies I did interview [with] was Carrier Corporation in Syracuse. And that just seemed to be up my alley. I mean, they were perfectly fair, and same arrangements, and so on, so that I was hired to go into the development department. And so I went into there in Syracuse, and I was in the testing department. And I had a pretty good time there.

When we had tested some freezers, and when they went up onto the production line to be produced, they were having some trouble with them, and so I would have to walk from our test facility up to the manufacturing floor, and you'd have to walk through the main manufacturing part. And I couldn't possibly do it nowadays. I don't know how I did it then. But the guys would deliberately

drop something right next to me, and I never jumped. I knew they were waiting for me to jump (laughs) and I never did. I know I couldn't do it now.

LK: Because you were, again, the only woman?

LG: Yeah. Well, Margaret Eller was a woman engineer. She was employed by Carrier, but she was in the -- well, she wrote the specifications for things and this type of -- she wrote things that went out to the client and that sort of stuff.

LK: So she wasn't really dealing with the workers.

LG: No, no. And the other thing that was interesting was that I had to have a piece manufactured in the development department shop. We had our own shop with our own people. And, oh, whenever you had something you wanted to have made up, you had to take the drawing down to the guy that was in charge of the shop, and then he would basically tell you when it would be ready, and so on.

LK: Would that be another engineer?

LG: No. This was, again, the shop level people. And so I went down with this piece of work. Now, one of the difficulties that men have had when I've been around is swearing -- do they or don't they, you see. And at RPI I had one professor who couldn't talk without swearing every other word. And he apologized to me, and I said, "Don't bother. I mean, you're used to doing this. It

won't bother me one bit. Just forget it." But anyway, when I went down to the shop that day, the foreman, who normally would cuss out the person, didn't say anything to me. And walked anyway.

LK: Oh, like he ignored you?

LG: Yeah. So I followed him. And I followed him around the shop probably for an hour. And he finally turned around and looked at me and said, "I'll have it for you tomorrow." Well, when I came back upstairs and the other engineers heard that I was getting my work in a day, they said, "Oh, you're not going down there again until we have emergencies." (laughs) So from then on, when anything had to really be done in the hurry, I was the one that took it down to the shop because I got instant work. Yeah, he was going to get rid of me. (Laughs)

LK: That's funny. Can I ask you a question?

LG: Sure.

LK: Did you know before you started or maybe on your first day of work at Carrier what exactly it is engineers did when they were on the job?

LG: Of course not. I think that it's ridiculous to have people thinking they know what they're going to be doing, because they don't. The whole point of the engineering education, it seems to me, is to prepare you, to give you your fundamentals, and

then you adjust them to any particular situation. This has been one of my concerns when I was teaching, when we started using computers and started using programs that were written by somebody else. You never know if the company you're going into will be using that same program. So you really have to have a flexibility. And I think that's one of the things that you can get from your education, so that when you go in, whatever the situation is, you're flexible enough to adapt to it.

Actually, the first thing they had me do when I went to Carrier was to climb up on top of all the test rooms and copy out what the electrical wiring was, because they, I guess, had been patching it up now and then so often they didn't even know what they had anymore. And you would think, well, gee, I'm a mechanical engineer, what am I doing up here with the electrical wiring? But of course, we were trained, and you could still do that. I mean, there's nothing difficult about that. So you have to be adaptable. No, I didn't know what I was going to be doing. (Laughter)

LG: A situation did develop, though, in the department. As I say, I was a test engineer in the test group. And we did work with the designers. And the usual thing was for the engineers to meet with the designers and give them results of the tests and this sort of thing. Well, the head of the design group would not

allow me into the meetings, so that I always had to brief one of my colleagues, and then I myself didn't go.

LK: Was this person your supervisor, or did you have a different supervisor?

LG: Well, I had a different supervisor myself. My own supervisor was fine. I had no problems as far as he was concerned. But it was just that this particular individual just didn't want me in the meetings. Well, that was -- you know, you put up with it. But about -- I don't know, I was at Carrier for a year and a half, and I think after about a year I was starting to get bored. I didn't feel I had enough responsibility. And so I talked to my immediate boss and told him that. And he said, "Well, you're too young." Too young? (Laughs) Well, I don't know whether that was the real reason or not, but in any case, I figured, all right, I'm going to go back to school and get older. (Laughter)

LG: Because I'll admit, I was twenty-one.

LK: But I mean, were your male coworkers, some of them, the same age?

LG: Not in the beginning. Once the men started coming back from the war, then there were some younger people. But until then, no, I was the youngest one in the department. And then so I decided to start looking for schools.

LK: And you had been the first female to graduate with a mechanical engineering degree from RPI?

LG: Yeah. Actually, Mary Ellen and I were the two that graduated. The woman studying bio-med -- pre-med, she just finished her two years or whatever it was and went on over to Albany Medical College. And I shouldn't say it on camera, I guess, but Trent managed to flunk out--

(Laughter)

LG: -- but got back in, and eventually graduated, but not with us. So actually, Mary Ellen and I were the first to graduate, she in metallurgy and me in the mechanical. Mary Ellen got married and worked for a year. And then she told me the person she was working with she liked very much, but he was transferring somewhere else. So she kind of decided, well, it was a good time for her to quit, so she quit and raised a family instead.

LK: You were talking about how you decided it was time to go back to school, leave industry and go and get your masters degree.

LG: Right.

LK: What was that process like?

LG: Well, I'll tell you.

(Laughter)

LG: Remember, I've been out of school a year and a half. I

wrote to MIT [Massachusetts Institute of Technology], because after all, everybody would like to go MIT. And they sent me back the application forms. And they wanted to know every single textbook I had used when I was in college and every portion of that textbook I had covered.

LK: What!

LG: After a year and a half, there was no way I could fill out the form. Maybe if I were freshly graduating, I would have a way of doing it or looking it up or finding out, that sort of thing. But there was no way I could do it. So that was goodbye to MIT. So then I wrote to CalTech [California Institute of Technology.

And this is something I've always regretted, I did not keep the postcard they sent me back.

LK: What did the postcard say?

LG: But they sent me a postcard that was a form postcard. And they'd crossed out everything on the postcard and simply written in by hand, "We do not accept women."

So it wasn't until some years later that they started accepting women.

LK: How did you feel when you received that postcard?

LG: (Laughs) That's probably why I don't have it. I mean, I can laugh about it now. (Laughs) And I've always thought it was

the funniest thing that happened. But I really should have saved it.

Anyway, because I'd been working at Carrier, I had gotten interested in air conditioning and in thermodynamics and heat transfer and this sort of thing. And at Illinois Institute of Technology in Chicago, they had two extremely good people, Dr. Max Jakob, in heat transfer, and Mr. William Goodman in air conditioning. And so I thought, well, I'll apply to them. I think I also applied to the University of Illinois. But the University of Illinois simply said, "We're having too much problem with housing that we cannot accept out-of-state students at this time."

LK: Why Illinois? Why that state?

LG: I wanted to move cross the country. I wanted to see the world.

(Laughter)

LK: That's great.

LG: And so Illinois Tech not only accepted me, but they offered me assistantship, so that I got the money to go.

And so that's how I ended up in Chicago. After I got there, of course, they didn't [have] any housing on campus, and I had to live off campus. And I was fairly fortunate being able to find housing, but I moved around a lot. I lived for most of the time

around the University of Chicago because there was a lot of student housing there.

LK: Right. Were there other women in the program when you started?

LG: No. (Laughs) Again, I was the only woman in the department. And I think really at that time I was the only woman studying engineering at the school. They had to build me a washroom.

(Laughter)

LK: How did they do that?

LG: They took a closet where the cleaning equipment was kept, and they put in a toilet and a sink, and that was for me. And of course, the secretary was happy, too, because now she had a place to go.

LK: Where did she go before that?

LG: Probably across the street to the union.

LK: Oh, my gosh.

LG: So that was fun. I worked in the laboratories to start with. I was teaching assistant in the labs. And, again, we had a shop type person in charge that -- I mean, who was in charge of the equipment, to keep it going and this sort of thing. But I guess I was the only one who made certain that they could start, stop and run all of the equipment that was used in the laboratory

program. And because of that, the guy that ran the lab took a liking to me, and so things went very smoothly in the laboratory.

And unfortunately, in a way, the so-called automotive laboratory, when I went over there to work, the professor in charge discovered that I could type in a fashion. And I say "in a fashion," because I wasn't a typist. I took a short course in typing once just so that when I needed it I might be able to do it. And he just thought I made an excellent secretary.

LK: Oh, no.

LG: (laughs) And the thing was that he was -- I don't want to say he was crazy, but he was approaching it. He was really very peculiar. He didn't want anybody touching the equipment. He was just a very peculiar guy. So I worked in that lab for a semester. And when I went to the head of the department asking if I couldn't get on a research project, particularly I wanted to be on a research project with Dr. Jakob, which was one of the reasons I went there, he said, "No. We need you in the automotive lab." He says, "That's the first time that lab's been run properly, and we just can't afford to move you." So what would happen is, on the days when he didn't feel well, I would teach the classes. (Laughs) Not that on some of them I was qualified, (laughs) but anyhow, you learn quickly. And so that was more or less the way it went while I was working on my masters degree.

And when I got my masters degree, they asked me if I would be an instructor and start teaching, and so I said yes. And of course, though I wasn't really at that time set on going ahead for a Ph.D., I did, obviously, start taking classes and this sort of thing.

LK: That was in 1949?

LG: Well, I went to -- yeah, '49, yeah. And then I -- well, let's see -- yes, I was teaching thermodynamics as one of my first classes. And now, you've got to picture this: remember, even though I've been there now a couple years, I'm not that old. And all of these guys are coming back from the war on the GI Bill, with a large number of them being substantially older than I am. The only experience I had recently in classes, of course, had been those I myself had had in the graduate courses. And you teach a graduate course quite differently than you teach an undergraduate course. But I didn't think of that when I started teaching. And I was sort of teaching as though they were graduate students.

LK: That was a little bit of a hard time?

LG: And I gave my first exam, and they didn't do well on it at all. And I was telling them how disappointed I was, and then they tore into me, "You're a lousy teacher." (Laughs) This is not very easy to take. And it is one of the problems with college education, I think, university education, is that the young

research and teaching assistants aren't really trained to do some of the things they're asked to do.

And so of course what I did, I went home, and I said, "Okay. What have I got to do?" So I sat down and I outlined the entire course, made up a schedule so that I could hand them out a schedule and say, "This is what we're talking about this day, these are the problems that are due that day," and so on. And I just laid it out for the entire semester. And it took a lot of guts to go back into that classroom, but I did. And from then on things went very well, and I guess I ended up being a good teacher.

LK: You enjoyed it?

LG: Oh, yes, yeah.

LK: What was the area that you were doing your research in?

LG: Combustion. Well, my masters degree was in air conditioning, actually a heat transfer problem that I did there, and then my Ph.D. ended up being in combustion.

LK: And you remained at Illinois Institute of Technology?

LG: Yes. I stayed there -- well, (laughs) once I was on the faculty, even as an instructor, I fairly quickly ended up as the chairman's assistant. And basically this meant that I did all the scheduling of classes, and hired all the part-time people, hired the student help, did most of the student counseling, this sort of

thing.

And then as I advanced up in rank, my duties advanced until I basically would do the budget and then the chairman would make whatever changes he wanted. But I would do the initial recommendations and this type of thing. And so for -- well, I became the assistant chairman at some point, but for a good part of my time I had administrative duties. And of course, I liked those too.

When the professor who was the chairman of the department changed and the new chairman didn't want me as an assistant, I tried to look for other things that I could do that would be of interest. And one of the things that I got involved in was what we called the E^3 Program. Dr. Torda had gotten a grant from NSF [National Science Foundation] for this program. And it was a project-based curriculum with self-paced learning.

LK: What do the three Es stand for, that are cubed? Engineering--

LG: No, something about engineering education. I've forgotten, and I really should remember.

LK: We can verify that later.

LG: Yeah, something of that sort. But I think we were the first group to use the E^3. It's been used by other people since. Experience, Education and Engineering, yeah. When Dr. Torda

retired, I did take over the program. But because the funding had run out, and typically, the school decided it did not want to continue the program. My job was really in terms of phasing out the program and getting the people who were in it finished up and out.

Then at the same time we were developing programs to increase the number of minorities in the school. In Chicago you have a great supply of minorities. And one of the things that we found out was not that there weren't people capable of doing the college level work, but that they weren't trained, they didn't have the pre-work.

So the Introduction Program, particularly, that we worked up for the blacks, we worked with the high schools. And they would have, basically, courses in the mathematics and the sciences that would bring them up to an entry level into the school. Once admitted into the school, then they were followed through as a group, given additional help all the way, so that their success rate would be pretty high. And it was a program that worked out quite a bit. As part of the program, we would bring the students in on Saturdays. And they would have a number of different experiences to get the idea of what engineering is like. So I worked Saturdays with that group.

And the school then decided that we really should be doing

something similar for women, and so I took over that program. And a peculiar thing in Chicago, the women were trained. I mean, you didn't have to worry about them not having the background. But the girls who turned out to be most interested in engineering seemed to come from the Catholic schools.

LK: Really?

LG: So we set up some programs specifically for the women, again, Saturday programs, summer programs, and the women would come in. And hopefully we were getting them interested in the engineering as a possible subject. Actually, we tried to make it a little broader than that. It was engineering and science, and to let them know what was available and what they could do. And so that was an effort that I took part in.

LK: Well, can we shift gears for a minute and talk about how you first heard of the Society of Women Engineers? It's a little bit related to what you were talking about.

LG: All right. In Chicago there is an organization, which is called the Western Society of Engineers. And women have always been allowed to be full members of the Western Society of Engineers. But they had, just because they wanted to, formed a little group, which they called the Women's Council, and these were the women members of Western Society of Engineers.

And I was invited to join the Western Society by one of the

women members, and that was Dot Merrill, so I did join. And of course, it was nice, because it was the first time, probably, when I had actually been with a group of women engineers. (Laughs) I had been with the men all my life, and this was a different experience.

And I can't remember how soon after I joined the council that Dot heard about the Society of Women Engineers. And the centennial for the civil engineers was coming up. And we thought it would be really great if we could take part in that celebration.

LK: The group in Chicago?

LG: In Chicago. And so first of all, we wanted to get a Chicago section of the Society of Women Engineers going. So Dot and I went to a meeting of SWE in Nahant in Massachusetts. At that time, I think Lillian Murad was president.

LK: Uh-huh, 1951, '52.

LG: Yeah. I may have -- I hope I have my timing right. And we met the people. And so Dot and I came back and said, "Yeah, let's join." And we had planted the idea about SWE taking part in the centennial. And, really, basically, the Women's Council of the Chicago section did most of the work, but the other people helped. And of course the outstanding thing was that we got Lillian Gilbreth to be one of our main speakers. And of course,

the civil engineers were delighted with this since she got a lot of publicity.

One of the nice things about the Western Society of Engineers is that they own their own building, and so they have the meetings rooms and everything right there. So we could hold our part of the program right in the Western Society buildings, which was really nice. I don't think it exists anymore. I think it's one of the things that got torn down. But that was very good.

So about that time, then, oh, I don't know, I think probably I was the first whatever they called them at that time, section rep, or whatever, to the board of SWE. And that's how I started getting involved at the national level.

LK: Would you travel to meetings?

LG: Yeah, yeah. And frequently Dot would go with me. Dot spent a lot of time trying to get new sections going.

LK: Why was that important?

LG: Well, if you believe in the concept of women engineers -- and of course, the whole characteristic has begun to change, because our original thing that we were working for was to let women know that engineering existed as a career, and to get young women to consider it and get enrolled, and then to provide some support for these young women. We were not looking at it as something to help us in our careers, because, well, most of the

women were established and didn't really need that networking at that level, so our networking was being done within more or less traditional lines at that time. So that was really what we were interested in.

And of course, the more sections you have, the more people you have involved, the better voice you have. And the larger your group is, the more you get recognized by other societies as the people who know what's happening with women engineers.

So it made a lot of sense to expand and get people involved.

LK: Did it seem like other engineering societies were receptive to SWE?

LG: As far as I know, very, because certainly, the civil engineers gave us very great cooperation when we suggested we would like to take part in their centennial, because all the engineering societies were. And we were fully accepted there. And my impression was, yes, that the other societies were accepting us.

LK: What other societies were you a member of?

LG: Well, ASME, American Society of Mechanical Engineers, and then ASHRAE, which is, you know, American Society of Refrigerating and Heating, and Air Conditioning -- whatever. And then I was a member of American Association of University Professors, and of course, the Western Society.

LK: American Society of Engineering Educators?

LG: Yes, ASEE, definitely, yes, and fairly active in that. And what else? I don't know. (Laughs)

LK: How, if at all, was SWE different than those other organizations, other than the obvious?

LG: I think when you're talking about a career oriented professional organization, that is, Mechanical Engineers, the Mechanical Engineers are very proud of their work in building up standards which are accepted--

LK: Across industry?

LG: Yeah, across industry, including worldwide, I guess is what I'm trying to say. It's a worldwide acceptance of these standards. And the same thing -- time, it gives a place for people to publish what they're doing, their research, the new findings and things of this sort.

LK: It's really focused on the technical?

LG: Yes. So it's really a focus on what people are doing. And actually, you find that within a given organization like that you'll have frequently split up into other groups, divisions. Like there's the Power Division. I was a member of the Power Division. And I was a member of the -- what else? Oh, the Heat Transfer Division and the Mechanics Division. So you have that kind of thing. I also was in on the solar end of things. That

was one of their great thrusts.

ASHRAE also does standards, but they had started a very substantial funding of research that would help the air conditioning or refrigeration industry. And so they fund research, which is very good. And so each organization had a little bit, perhaps, different focus, but they were focused on their industry.

LK: And SWE?

LG: Well, because you don't have a single industry to focus on, I guess you have to say they focus on women, which is appropriate.

And I'm not fully aware of how the real focus might be going now. But for instance, a lot of the things that they do for the women, I think, "Boy, wouldn't that have been great if they had done those things for us at that time." But somebody had to start it, I guess. But I'm thinking in terms of these seminars on finances and know how to plan your future type thing, and all of that thing, actually to the point where I think that's probably why some of the men wanted to belong to SWE, because they said, "Why didn't somebody do this for us? We need it, too."

LK: Yeah. Well, we're coming to the end of the tape. Did you want to take a break?

LG: Okay.

(INTERRUPTION IN RECORDING)

LK: -- two for our interview with Dr. Lois Graham. We ended tape one talking about the earlier SWE. And can you talk about what the atmosphere was like in terms of career guidance?

LG: Well, I'm not positive, but I have a feeling I was one of the first career guidance committee chairmen.

LK: Yeah, I think you were.

LG: And one of the things that we did do was come up with a booklet based on that centennial program. And Pat Brown actually did the editor's job on it, whereas I got everything all together, and then she actually did the editing. That was, I think, our first publication that we had as Career Guidance Committee.

LK: Women in Engineering was the title?

LG: I think something like that -- or, no -- yeah, I think we used that. We may have -- I was just wondering whether we used Margaret--

LK: Ingels?

LG: -- Ingels' title of Petticoats and Slide Rules. But I don't think so; I think we used Women in Engineering.

That was one of the first things we did. I'm not so sure how much more we actually accomplished while I was chairman. In my own job at IIT, I did go out to the different schools as a recruiter. And as a recruiter, I would be talking to the guidance

counselors. And I did use that opportunity to talk about women in engineering -- I mean engineering as a career for women. Because, really, a guidance counselor, when they see a young woman who does like math and science, tends to think of teaching. The fact that there are lots of things a person can do with that kind of background just doesn't seem to come up. Of course, I talk engineering, but really, it includes science. I mean, women should be in the scientific end of things.

I never felt that to get women interested we had to push the so-called, I don't know, feminine side of engineering. I don't see -- I mean, we have -- I've talked with a lot of girls in mechanical engineering, and they were all interested in mechanical engineering, not something else because it's something a woman might be willing to do. I know that a lot of women who went into engineering went into chemical engineering first, because to people who are guidance counselors, it was a more logical step -- "well, women have been in chemistry, so okay, maybe going into engineering wouldn't make a difference."

Even recently I read an article which talked about the fact that, well, women will go into bioengineering or something like this in preference because that's something that they think a woman can do.

LK: It's like a softer science?

LG: Yeah. But I think a woman can do anything if she wants to. I don't think she has to go into a softer science. It's simply a question of wanting to use your brains on this type of problem.

LK: Can you give an example of how someone would promote the feminine side of mechanical engineering?

LG: Well, let's see which kind -- they would talk about getting into the ethical aspects of it, which I think is important for all engineers. But they would talk about the concept of, oh, Erin Brockovich, (laughs) you know, that sort of thing -- companies polluting and then not cleaning up the waste, and that, well, okay, a woman can be a mechanical engineer and get involved into the cleaning up the waste and making the world better for people, and talking about that aspect of engineering, that you should be making the world better for people.

LK: Like industrial hygiene, even, or--

LG: Yeah, even that. But it seems to me that you're getting artificial when you're trying to find something specifically that will attract the women. I think that the women will find their own niche once they've had the education. And if that's the kind of thing they want to go into, fine, but...

LK: Yeah. It reminds me of those films from Rosie the Riveter where they would show a woman like scouring and then

riveting, and trying to make like a connection with that. Is that similar to it?

LG: It's similar, yeah, yeah. But the Rosie the Riveters were actually the women that kind of opened things up for other women to do so-called "men's jobs." And in that sense, I think we've opened up an awful lot of fields. The police -- I mean, how many women policemen did you used to know, that kind of thing.

And so a lot of areas. Of course, we do run into a slight problem if you take a woman's field, once they start getting decent salaries, it then starts becoming a men's field, which is why you see men go into nursing these days.

LK: Right, right. Do you feel that you're somewhat of a Rosie the Riveter? I mean, not maybe in the factory aspect of it, but because you started doing some of your work during the war?

LG: The war gave me my opportunity. If there hadn't been a war, I would not have been able to go to RPI, and I would have gone on to teachers college. I would have taught my year. Whether I would be able to get into industry such as I had wanted to after that year, I don't know. I don't know whether I'd have been able to go in the directions I was kind of thinking of. But certainly, the war gave me my opportunity.

LK: Right, right. So, you continue to stay active within SWE?

LG: I haven't been active in SWE lately, primarily because I think the younger people really are the ones that should be active, because they know really what's needed more than I do now. Actually, I feel obsolete. I feel obsolete in my own field, and I'm sure I feel obsolete in terms of what's happening in industry these days.

LK: Right, right. Well, you paid your dues, right?

LG: (laughs) Yes.

LK: You were national president from 1955 to '56?

LG: Right.

LK: What were some of the major issues within SWE at that time while you were president?

LG: Well, I'll tell you the issue I remember, because it's the issue that caused me to hand in my resignation. SWE was trying very hard to be -- or at least there were members in SWE who felt that it was important that SWE be recognized by other engineering societies. And to do that, there were some of the members who felt we should have tougher requirements to become members. And if they had gotten their way on the issue, Lillian Gilbreth wouldn't have been a member, because they wanted a person to have a degree in engineering. And an awful lot of our members would not have been members, because women get into engineering through back doors. Katharine Stinson [corrected to Catherine

Eiden], for instance, that we were looking at a little while ago, she came in through mathematics. And this is a very logical way. Actually, if you look at the women who have been getting the highest honor we give--

LK: The Achievement Award?

LG: Yeah. A lot of them don't have engineering degrees. They have science degrees. And this is really the way a lot of women get into engineering. And I really felt strongly that our membership regulations should not be any stricter than anybody else's.

They should be as strict, but they didn't have to be stricter. And of course, I had a somewhat personal stake in this, in that my friend Dot Merrill did not have a degree. But she had full membership in ASME, she had full membership in the Western Society of Engineers.

LK: She owned her own business, too, right?

LG: Yes. And I felt that this was adequate for her to be a member of our organization. And as I say, there were a lot of people that would not have been members if they had gone in the direction they went. Unfortunately, I think there just was a lot of tension going on. And I felt that I simply was not being effective anymore. It was hard to get the things going in a different direction, and until this issue was either settled or

somebody else could come in, I really felt that I couldn't -- wasn't the one to be doing it. And the vice president, Mickey [Miriam] Gerla, had a good head on her shoulders and had the respect of people, and I felt that perhaps she could pull people together better than I was doing. So that's why I resigned.

LK: Do you feel that there really was legitimate pressure from the rest of the professions, for SWE to--

LG: No, no. The rest of the profession didn't care. They would be looking at what we were doing, and that's how they would judge the organization. And I think it's what SWE does and has accomplished that has given it equal status, as far as I know. Because, I mean, the fact that they get grants and that they take part in conferences, I mean, all of this indicates that they're a well-accepted organization at this point.

LK: So does a person need an engineering degree to be an engineer?

LG: No. But they need experience, and that's what they have to get. And if you come in without the engineering degree, obviously you don't start at the same level as somebody who has the engineering degree, but certainly no reason why a person can't.

At one point -- I've forgotten what it was, the space program, I think -- the question was: Could we teach engineers

the physics they need fast enough for the program, or is it easier to teach the physicist the science than, you know, the physicist to teach them the engineering? (Laughs) And for a while that was actually a debate as to which way they should go.

LK: Really? Were you involved in that?

LG: No.

LK: So, can you talk a little bit about what you feel are your major contributions to your field? I mean, I know you've been involved in solar energy research.

LG: Yeah. Well, my research is the smallest part of what I've done. I was never too good at writing proposals and promising something which I wasn't sure I could deliver. (Laughter)

LG: And so I preferred to do other things. And I think my two abilities were basically as an administrator and as a teacher. And I've always been proud of my teaching. If you walk over there--

LK: You want me to get something?

LG: Yes. You will see a semi-circular piece of glass.

LK: Is this it?

LG: That's it.

LK: May I bring it over?

LG: Yes. And this is one of the things that I treasure,

because this says, "Lois Graham is hereby recognized as a Person of the Millennium, for their contributions to Illinois Institute of Technology for their embodiment of a visionary, and for their lasting impression into the next Millennium." And this was the 8th of December 1999.

And this was given me by students at Illinois Institute of Technology long after I had retired, and they had not even been in my classes. So teaching was one of the things that I really enjoyed.

LK: Would you let me put that back?

LG: Well, we can just stick it up here. It's okay.

LK: Are you sure?

LG: Yeah. So that, I think -- the teaching was a big part of it, and then, as I say, administrative work. Actually, it's surprising that I flunked so badly in SWE, because in my work at IIT, whenever there was a problem I was always the person brought in to solve it. (Laughs) And if there was a sticky thing to handle, I handled it, and this sort of thing. So maybe I learned from the SWE experience, I don't know.

LK: Right, right. Well, it seems to be a debate that is still alive today whether you need a degree in order to be a valid or credible engineer.

LG: No, you don't. I'm convinced of it.

LK: That's interesting, since you teach engineering.

LG: (laughs) Yeah. No, I -- obviously, taking the engineering courses and so on gets you into the field faster and with a broader background. But there's no reason why somebody who's been trained in the sciences can't learn engineering.

LK: What about if their background is business?

LG: That's harder, because you see, then they don't have the mathematics and they don't have the science. And depending on what they get into in engineering, I think you need that. I think you do.

LK: Do you think that the public understands what engineering is?

LG: No. (Laughs) Most of the time when you say you're an engineer they think it's somebody who runs a train or is the superintendent for the building, what-have-you. No, it's a very difficult concept to get across.

LK: Well, there's so many disciplines.

LG: Yeah, well, that's it. It's very across the board. I used to be asked and even when I came here they asked me at the Edwards Knox [Central] School and [to] talk about engineering as a career -- and the very first thing I would do is write down the list of all the different basic engineering forms, and then point out that there's always something new coming up. But I try to get

it in a simple term, like saying, "Well, every time you throw the switch on for the light to come on, you're starting a whole trend of events, which without engineers we never would have had."

LK: Right. That's a good way to visualize it.

LG: Yeah, yeah.

LK: You were the first woman in the United States to receive a Ph.D. in mechanical engineering.

LG: As far as I know, yes.

LK: What does it mean to be a woman first, or a female first?

LG: It means lots of publicity.

(Laughter)

LG: The thing was, it seemed to me that in my career I was first for a lot of times, because I had the first from RPI. When I got my masters at IIT, it was the first masters in mechanical engineering they had given to a woman, and just a lot of things that were firsts. And it was good publicity. Actually, for quite a few years, I used this a lot as a thing to get young women interested in engineering, and then I got kind of tired of it and took some time off, because you get stale after a while. But it does make a difference if you want to get other people's attention.

LK: As you look back on your career, is there anything that

you might have done differently?

LG: I'm not sure. I think it's worked out very well on the whole. If I were giving advice to someone else, I would have done some things differently. For instance, I worked the whole time on the faculty while I was earning my Ph.D. Consequently, it took me a long time to get my Ph.D. And I think it would have been a lot smarter if I had borrowed some money and just gotten the Ph.D. and then gone on with my career from there. And if I were talking to somebody, I would say do this. But I don't regret what I did. I mean, it worked out fine for me.

LK: Right, right. And are there any thoughts, final thoughts about the profession or the Society of Women Engineers that you might have?

LG: I'm happy to see the Society is doing as well as it is. I like to see more women coming into engineering. That's good. We've got a long way to go. When we first started the Chicago section -- and as I say, our focus was, primarily, getting more women into engineering sort of thing -- we would talk about, "Well, we will have accomplished our goal the day that we dissolve, when there's no longer a need for the Society of Women Engineers." But it seems that the need still exists, and that function of the organization has been able to adjust to other needs, which exist, which we hadn't even identified when we

started the whole thing.

LK: Do you have any final thoughts?

LG: No, that's probably it.

LK: Okay. Well, I want to thank you very much.

LG: Well, you're very welcome. It's been a pleasure.

END OF INTERVIEW