Regent Reed and Dean Davis, thank you for your welcoming remarks and once again I would like to welcome everyone to our celebration of the 100 anniversary of the Department of Chemistry. I doubt that any of us have the patience to review the contributions of 180 faculty, a similar number of staff and nearly 3,000 alumni at the undergraduate, graduate and postdoctoral levels. So, with the help of some of my colleagues, we will present a completely subjective selection of our favorite highlights. One note before starting. The resources used to prepare this include reminiscences, obituaries, autobiographies, and, especially, an excellent written history prepared by Professor Lillian Cohen. In 1913, Professor Cohen was the first woman to obtain a PhD in chemistry from the University of Minnesota. She joined our faculty in 1919 and stayed until she retired in 1946. I also need to acknowledge the incredible effort of Stephanie Stathopoulos for putting in many extra hours assembling these resources and for helping me prepare for this presentation.

All of us recognize the background of major events that have shaped our world in this period: two world wars, a great depression, the nuclear age, the birth and death of communism, the revolution in materials involving polymers, cracking the genetic code and many advances in medicine that have improved health, longevity and the quality of life. The research conducted in our department and the chemists who have graduated from our program have played important roles in many aspects in these developments.

How did it all begin?

Even the earliest territorial government recognized the importance of higher education to supply the talent needed for economic and cultural development. So it was that in 1851, seven years before Minnesota statehood (picture of St. Paul in 1851), that a charter was drawn for the University of Minnesota. Unfortunately, the economic panic of 1857, the civil war and conflicts with the native peoples delayed the start of college classes for 18 years. During this time some buildings were constructed and

college preparatory classes were offered, but a regular faculty and the first univ. president, William Folwell, were not appointed until 1869. Edward Twinning, one of the original faculty members, was the first to teach chemistry (as well as French). His annual salary was $1500. Adjusting this number for inflation corresponds to $19,800 in today's value. In comparison, the salaries offered assistant professors today are approx. $60,000 for nine months. As it turns out, Twinning was lucky. The salaries for starting instructors dropped quickly following the first decade and a number of wage cuts were enacted during the great depression. The first resulted from voluntary action of the faculty and the proceeds were directed to scholarship funds. Subsequent cuts were mandatory and were needed to keep the University afloat.

During the earliest years chemistry was part of the agricultural division and was housed in the ag building, constructed in 1875. This building was destroyed by fire on Dec. 3, 1888, and a new Science building, currently Nicolson Hall, was built for the monstrous

sum of $81,500 and occupied by chemistry and physics in 1890 (3 photos of Nicolson). Nicolson himself was a member of the chemistry faculty and later become Dean of Students. He is one of four chemists honored by the University with the name of a building.

The faculty, curriculum and number of students expanded significantly during this period. Courses in physiological chemistry and toxicology were taught along with courses in analytical chemistry as part of the education of medical students. Chemistry was taught to students primarily from two colleges; College of Science, Literature and the Arts and the College of Engineering, Metallurgy and the Mechanical Arts. As more colleges developed within the University there was a trend to have the faculty of each college teach all courses for their students. With respect to Chemistry courses this was especially true for the Medical School and the College of Agriculture, both of which constructed chemistry buildings by the early 1890's. This did not, however, decrease the growth in number of students taking chemistry courses, which

eventually required the separation of Physics from Chemistry in 1902. Physics moved to a new building and Nicolson Hall was renovated to accommodate additional chemistry labs.

In 1893, George B. Frankforter was hired to head chemistry (photo of Frankforter). Originally from Ohio, the Frankforter family moved to Nebraska and it was at the University of Nebraska that George studied for his bachelor's and master's degree. At the time the center for chemistry, especially the rapidly developing field of organic chemistry, was Germany and many of the leaders in the US did graduate work there. Frankforter received his PhD in Berlin studying with A. W. von Hofmann and returned to the University of Nebraska to teach chemistry and music. Upon arrival in Minnesota, he immediately started the long process of building a first rate program, by increasing the number of classes offered in chemistry, increasing the size of the faculty, building a chemistry library, promoting research and, ultimately, launching the graduate program in chemistry. The first PhD graduate was Paul Glasoe in 1902, who

was mentored by Prof. Frankforter as were the next several graduates. Frankforter's research involved primarily organic chemistry and appeared as publications in the J. Am. Chem. Soc. and other prominent journals of the day.

Frankforter's vision was to bring all chemistry at the University of Minnesota into one School of Chemistry. The culmination of his efforts came on May 17, 1904 when the Board of Regents officially separated the School of Chemistry from the College of Science, Literature and the Arts and appointed Prof. Frankforter as Dean. It is the centennial of this action that we are celebrating today. I don't know if Dean Frankforter would agree that this is the best event to celebrate, but I am confident that he would be very proud of the legacy of excellence in teaching, research and service that he helped to create.

In 1904, two degree paths were initially offered; one for those interested in becoming "teachers, analysts and general scientists" and a second for those interested in "engineering chemistry". The

tuition was $10 per semester. By the end of the first decade of the new century, so many students were enrolled in chemistry classes that it was clear a larger faculty (1910 faculty photo) and facility was needed. Plans (photo of blueprints) were drawn and an appropriation was approved for a new building. Construction took two years and consumed more money than was allocated (photo of initial construction). Thus, Smith Hall, was built without a complete west section and was missing the planned 4th floor.(smith hall photo). Eventually, funds were allocated to complete the building as we recognize it now (car photo and aerial photo). But before it was completed, the space problem (photos of Smith) caused Dean Frankforter to write "some of the students in the main laboratory have no regular laboratory locker desks and have been compelled to use small boxes for their apparatus, chemicals and problems". I found this fascinating because record enrollments in the last two years have caused us to take exactly this approach to accommodate the students

In 1917, following the declaration of war, at the age of 57 Frankforter stepped down as Dean and served as a major in the army. After his return in 1920 he continued research and teaching until 1925 when he moved to Stanford University to oversee their program in general chemistry. During this period a number of reorganizations took place including the establishment of five formal and largely independent divisions: analytical, general and inorganic, organic, physical and technological chemistry. (Photo of faculty) In the period from 1919 to 1935 the university moved to establish the Institute of Technology. Most of the students graduating from the technological division received the chemical engineering degree. In 1949, the faculty in technological chemistry comprised the new Department of Chemical Engineering headed by Professor Charles Mann. As Dean Davis noted in his welcoming remarks, the connection between chemistry and chemical engineering remains strong to the current day when we find many collaborative research projects in existence.

Professor of Chemistry Samuel C. Lind, who had been serving as the "Director" in chemistry since 1926, was appointed as the first Dean of the Institute of Technology in 1935. Lind was an important figure in chemistry, especially in his field of ion-molecule reactions and radiochemistry (photo of Lind). He did postdoctoral work with Marie Curie in Paris and at the Radium Institute in Vienna and published extensively on the interaction of radiation with gas molecules. During his stay at Minnesota from 1926 – 1945, he was elected President of the American Electrochemical Society (1927), President of the American Chemical Society (1940) and a member of the National Academy of Sciences in 1930. In 1952, after his retirement, he became the first chemistry faculty member to receive the Priestley Medal, the most prestigious award granted by the ACS.

Lind helped to attract many outstanding faculty members to Minnesota, including Robert Livingston, George Glockler and Bryce Crawford in physical chemistry, Fred Koelsch and

Dick Arnold in organic chemistry, and Ernest Sandell in analytical chemistry. Professor Crawford's (photo of Crawford) early pioneering work in vibrational spectroscopy demonstrated that force constants were useful bond properties that could be transferred from one molecule to another. In addition to many other scientific contributions, he served as the Head of Chemistry from 1955 – 1960 and as Dean of the Graduate School. He was elected to the National Academy of Sciences where he served for many years as the home secretary. He was the second U of M faculty member to receive the Priestley Medal.

Richard Arnold was a pioneer in the field of physical organic chemistry and went on to lead the organic division and become dep. Head in 1953 (photo of Arnold). Fred Koelsch (photo of Koelsch) was one of the first recipients of the ACS Award in Pure Chemistry. His research covered a broad spectrum of organic chemistry, but he is perhaps most famous for synthesizing the first stable free radical. This paper was rejected by JACS upon first

submission because everyone knew that free radicals are unstable. Some twenty years later with the help of Professor John Wertz (photo of John Wertz), the resubmitted paper with ESR proof was accepted with a special editor's note commenting on the date of original submission.

Early on in Lind's time at Minnesota he moved to hire a rising star from the University of Utrecht.

Pete Carr (photo of Carr) has the story

I've already noted that Frankforter got organic chemistry off to an early start. In 1920, a fresh PhD from Harvard, Lee Irvin Smith, arrived. His research and leadership propelled him to the forefront of organic chemistry and he was recognized as one of the scientists that helped to move the center of organic chemistry to the United States. One of our current colleagues, Wayland Noland (photo of

Noland) started his career at Minnesota during the time that Smith was the head of organic chemistry. He has some thoughts.

Way Noland

At graduation two years ago, the Board of Regents recognized Professor Noland for 50 years of service. He is our own “Everyready bunny”. Much to our delight and benefit, he just keeps on going!

The ability to determine detailed structures of molecules was required for progress in inorganic chemistry. Doyle Britton (shown in this photo with Rufus Lumry in the stern and Nobel Laureate Manfred Eigen) started in 1955 and has comments.

Britton

The incredible growth in size of the University of Minnesota following World War II continued until it become the largest campus

in the country. We almost lost Smith Hall to a fire in 1959 (photo of fire) that started in the basement when a student was transferring benzene to smaller vessels. Fortunately, the damage to the student was not serious, however, the building need a lot of work. The number of students taking courses in chemistry continued to stretch resources and eventually led to the construction of a second building – Kolthoff Hall (photo of Kolthoff construction). This was completed in 1970, and because of its location on the mall beside Washington Ave. it appeared in many of the photographs of the student demonstrations and riots in the early '70s (photo of the riots). If you look carefully on the top wall on the south side of the building you can still see the faint outline of a peach sign painted during this period.

I interviewed for the position of Assistant Professor in November of 1977. The leadership of the department was now in the hands of Professor Paul Gassman (whose specialty was physical organic chemistry. He was elected to the National Academy of

Sciences and who served as President of the ACS) (photos of Gassman), who had moved to Minnesota from Ohio State in 1974. He assumed the position of Chair in 1975 and held this until the fall of 1979. Paul brought incredible energy and vision to our department and sparked a hiring surge in anticipation of a number of impending retirements. At the time I was a graduate student at Penn State focused on an academic career and was hoping to head to Caltech for a postdoc. My thesis advisor, Greg Geoffroy, stopped by my desk (photo of wlg) with the advertisement from Minnesota and suggested that I apply. I quickly threw together the required documents, which included two typed pages describing my proposed research projects. I emphasize the word "two" because our more recent hires now include documents that are nearly complete NSF-level proposals. Many times, those of us hired in this period look upon these applications and are glad that we didn't have to compete with them. Despite the rush, I was invited to interview and traveled to Minnesota for the first time. The energy, excitement and

enthusiasm came from all with whom I spoke, consequently, I had no reservations in accepting the offer despite this being the only application I sent. My salary offer was $14,500, which still put me ahead of Edward Twinnings inflation-adjusted salary although not by much. I was much more interested in the amount of start up funds - $25,000. I tried to negotiate a higher value, but me dealing with Professor Gassman on financial matters was a little like pitting David vs. Goliath. This time Goliath won. Paul did agree to allow me to delay my start date for a year so that I could do postdoctoral studies with Harry Gray at Caltech.

During this growth period, current Professors Pete Carr, Larry Miller, Tom Hoye, Kent Mann, and I joined the faculty. By 1985, we were joined by George Barany, Paul Barbara, Tim Lodge, Peggy Etter, Larry Que, Ben Liu, Marian Stankovich, Essie Miller and Jan Almlof. As we worked our way through the ‘80’s the hiring surge slowed. Space resources mandated this in part because from 1984 – 1987 Smith hall was gutted and fully renovated at a cost of $22,500,000. As

difficult as it was to work through this renovation, we were fortunate to have access to Appleby Hall for swing space. Frictions stemming in part from the divisional structure of the Department rose to a high point. The years from 1987 – 1990 were pivotal. Under the leadership of Lou Pignolet (pictures of Lou) we created a system that recognizes that the value of all areas in contributions to the department.

In the mid-nineties we lost five active and dear colleagues,(photo of five) Paul Gassman, Peggy Etter, Al Moscowits, Jan Almlof and Eddie Leete. We still miss them. These transitions, coupled with a number of retirements during the same period fuelled a turnover in the faculty that has rejuvenated the department. Between 1990 and 2001 we hired 24 new faculty members. This change was expensive: both to the college and the department who share the cost of set-up packages which now reach above $500,000 per person, but our new colleagues have brought a wealth of excitement and enthusiasm that renews our momentum.

And the money thing: all of these faculty members have been successful in bringing in major grants propelling our departmental research budget to nearly $11 million in 2003. The renewal extends to teaching where this group is reaching out to students in innovative ways.

This brings up to today. Final slides.

(AFTER TEACING SLIDE) Once again we are pushing the limits of space and are hopeful that the State of Minnesota will approve a capital request that includes funding to renovate Kolthoff Hall.

Final comments: For the alumni in the audience, I hope our remarks have sparked some good memories. For the current students in the audience, this a small glimpse of the legacy you have joined. We are confident that after you complete your studies all of us will benefit from your contributions to society.

For the faculty and staff, this is our home and our family history. It helps to reflect on our past, as we continue to plan and work toward a bright future.

Thank you.

LAST SLIDE