Enclosure 2

WWII Experiences
by
Donald P. Ames

Pre December 7, 1941
It is necesary to relate my experiencees before Pearl Harbor so the reader knows when and why future events in my life occurred. .

I graduated from Brooklyn High School in June 1940 as valedictorian of a class of 13. I entered The University Of Wisconsin in September 1940 with a two semester tuition scholarship (the semester tuition was $32) as a chemical engineer. As I had to support myself, I had a National Youth Organization job working as a lab assistant in the Chemical Engineering Department and, in the Wisconsin Union as a dish washer and salad preparation assistant. After the first semester I changed my major to Chemistry because I was a failure at mechanical drawing. The Chemistry Course consisted of prescribed courses for graduation which included Analytical Chemistry, Organic Chemistry (2 courses), Physical Chemistry, Organic Characterization, one or two Physics courses, two languages (German and French), mathematics through Differential Equations and either a Biochemistry or Chemical Engineering course plus some other electives. After third semester I received a job in the Chemistry Department setting up freshman chemistry lectures for several professors. This job paid enough so the other jobs could be stopped and I could open a savings account.

After December 7, 1941
The first semester of 1941 ended in January 1942. The following changes in course presentation, and operation hours ocurred in January:
1) War Time (similar to Daylight SavingTime) was established,
2) Courses were presented from 7:30 am to 5:00 pm and laboratory courses from 7-10 pm,
3) A Speed-Up program for all courses was inaugurated (one year course given in 12 weeks).
Each student was required to register for 3 twelve week courses. Each course covered one year (2 semesters) of a subject (e.g. the entire course in Physical Chemistry in twelve weeks). For males to remain in school required a grade of B- or above; a grade of C meant the student was subject to immediate draft. All those male students attaining acceptable grades were classified as 1AS.I finished the Chemistry Course requirements in December 1943 having attended school continuously from January 1942 for approximately 2 years. My BS degree was awarded in June 1944 because no graduation ceremony was held in January 1944.

I reported the completion of the degree requirements in December 1943 and was told I would be drafted in either March or April 1944. I accepted an interim job with Atlantic Refining Company (ARCO) in Philadelphia in early January and reported immediately. My assignments at ARCO were a) find an additive that would increase the adhesion of asphalt to coral, b) learn to use the rubber mill to mix the vulcanization catalysts with natural rubber, and c) assist a PhD organic chemist with the preparation of synthetic rubber from butadiene and alpha methyl styrene. The addition of a few tenths percent by volume of a zwitter organic ion to asphalt increased the asphalt-coral adhesion. A specific catalyst for the synthetic rubber formation was discovered accidently when the coke bottle reactor blew up puncturing the brick wall next to the oven in which the reactor was heated.

During this job I lived in a house in Moylan, PA which was owned by the head of the FBI in Philadelphia. I rode the Pennsylvannia Railroad to the North Philadelphia Station, then walked several blocks to City Hall, where the subways crossed, to catch the train that ran

to the junction of the Delaware and Schukyill Rivers where ARCO was situated. The owner of the house was a bachelor whose hobby was collecting classical music records. The walls of one room were lined with the records of the time (78 rpm) and any member of the house could play any record if the owner was not there. There were five roomers in the house beside the owner. We could eat breakfast and dinner there provided we paid board. Whoever reached the house first prepared dinner from a menu provided by the owner. Each Sunday dinner was prepared by one of the roomers. I enjoyed my tenure at ARCO and at Moylan, PA.

March -June 1944

Early in March 1944 I received the 'Greetings' letter informing me of my draft date. After resigning from my job and sending my possessions to my parents, I reported to the City Hall in Philadelphia on the day specified. Upon arrival I entered the three abreast line of draftees surrounding three sides of City Hall. I was located about halfway on the second side of City Hall from the main entrance. All draftees were talking with others and not paying much attention to events transpiring near them. The line moved about ten paces in 15 minutes. Some one ahead of me yelled that a GI was proceeding down the line and that he was after some draftee. When he got closer I recognized my name and identified myself. He instructed me to follow him. We entered a room where there were several officers who asked for my personal identification (Driver's license and Social Security number). After perusing these documents, I was sworn into the 'Enlisted Reserve Corps' and presented with a ticket on the Twentieth Century Limited train of the Pennsylvania Railroad to Chicago for that day and some instructions plus trip money. The instructions requested that I call a telephone number upon arrival in Chicago which I did. The recipient of my call instructed me to stay at the YMCA in downtown Chicago that night, and the next morning report to an Armory on Cottage Grove Avenue between 55th and 56th Streets. I was instructed to take the "L" to 53rd Street and then walk south to the Armory. When I arrived at the Armory, a Master Sergeant asked my name and upon learning it he said that a courier would be coming to escort me to the New Chem Building. The courier was a graduate student I had known at Wisconsin, Paul O'Connor. After a short ride, we entered New Chem, a modified Quonset building. My Q security clearance apparently had been obtained because I was briefed on the goals of the Manhattan Project by Dr. John E. Willard, who had been my quiz instructor in Freshman Chemistry (Chem. 4a and 4b) in 1940 and 1941.

I was assigned to the Basic Chemisty group, Dr. Burris B. Cunningham was the group leader, who reported to Dr Glenn T. Seaborg, the Division Director. He introduced me to the known chemistry of plutonium-239 (^{239}Pu) prepared from neutron irradiation of uranium-238. I was instructed to prepare some micro pipettes from capillary glass tubing to be used to deposit plutonium solutions onto platinum plates for counting the alpha radiation (He++) with Cyclotron Specialties parallel plate counters. Approximately eight counters were located in a room which had two air tight doors. To keep from tracking alpha radiation into this counter room, each individual had to place booties over his shoes before entering and had to wear a clean lab coat. One knew that the alpha counters were operational by shouting 'Fore' only when no one was in the room. After accomplishing my first two assignments, Cunningham was promoted and my new group leader was Dr. J. Clark Hindman.

At this time, Seaborg's Division had only 15 micrograms of ^{239}Pu prepared by deuteron irradiation in the cyclotron at Washington University , St. Louis. The nuclear reactions involved are shown below;

$$\frac{238}{92}U + \frac{2}{1}H \rightarrow \frac{239}{92}U + \frac{1}{1}H \qquad 23.5m$$

$$\frac{239}{92}U \rightarrow \frac{239}{93}Np + e^{-}(\beta) \qquad 2.36d$$

$$\frac{239}{93}Np \rightarrow \frac{239}{94}Pu + e^{-}(\beta)$$

$$\frac{239}{94}Pu \rightarrow \frac{235}{92}U + \frac{4}{2}He^{++}(\alpha) \qquad 2.41x10^{4}\ y$$

Cunningham was using the total amount to learn about the valence states of plutonium. When he finished at the end of the day, he placed the solution in a beaker adjacent to the stone sink. The lab had an African-American cleaning crew to polish the floors and perform routine cleaning where instructions were left. One of them misinterpreted the instructions and emptied the plutonim in the sink. The next day Cunningham marshalled a group of chemists (I was one) to dissolve the sink and trap to attempt to recover the plutonium. After about 3 days and evenings we recovered 10 micrograms which were used until we received additional ^{239}Pu from the first production pile located in the Argonne Forest (where Argonne National Laboratory is now). This pile was later transferred to Oak Ridge Tennessee (Site X) where it was enlarged and the power raised. It still exists as X-10 at Oak Ridge.

My first assignment with Clark Hindman was to determine the spectra of the various Pu oxidation states using a recently developed spectrometer (Beckman DU). The lab had 2 spectrometers and some spare parts. This spectrometer used a quartz prism to disperse white light from a tungsten bulb to obtain the wavelengths from 300 to 900 millimicrons (then), now nanometers. The absorption value at each wavelength was read by eye and then was plotted on graph paper by hand. At first, I was using micro cells to contain the plutonium solutions; later one centimeter cells were used. The plutonium concentrations were determined by diluting the solution and by using micro pipets to prepare platinum plates for measuring the alpha emission count. By using the half life and 50% of the specific activity, the Pu concentration could be calculated. Fifty percent of the specific activity was used because the alpha emission of any radioactive emitter is isotropic (meaning uniform in all directions). Later the back scatter of a radioactive alpha emitter was found to add 2% to the measured count rate or 52% of the emissions were counted. The spectra of Pu (III), Pu (IV), and Pu (VI) were determined as a function of 1) acid concentration to determine complex ion formation, 2) the ionic strength to determine the effect of added salts and 3) the effect of various oxidizing and reducing ions. In addition I was able to observe the Pu valence state five at the same time as Dr. Robert Connick at Berkeley. These data are published in the National Nuclear Energy Series, some with me as one author and some with other authors not including me.

The working hours were from 7:45 am to 5:30 pm with 30 minutes for lunch. Since this project was important to the War effort, evening work was expected for all professional employees. I usually worked in the evening from 6:45 to 10:30 pm. Each employee had a badge which had to be displayed at all times especially to the guard during entry and exit from New Chem. Each employee had a government issued pair of shoes to be worn in the laboratory. All employees wore a laboratory coat over their street clothes. All plutonium was manipulated in a vented glove box which had a pair of heavy rubber gloves; employees using these glove boxes put on a pair of surgical gloves prior to using the gloves attached to the glove box. Alpha hand counters and beta hand counters had to be used prior to leaving the laboratory. Contaminated hands were not tolerated by the Health Physics

personnel who were present when hand monitoring was performed. I was paid $125/month which was sufficient to pay room and board at that time. At first, I shared an apartment with two other men but found that I would rather room in the Gamma Alpha (a graduate organization for men) at 5735 South Woodlawn Avenue. At this time, the house was completely occupied so meals were served and the house was heated but not air conditioned. Early in June, Hindman called me to his office and explained that the National Draft Board was requiring that all males less than 22 years of age be inducted into the services. Even those on the this project were subject to induction if they were in the Enlisted Reserve but they would return to the project after Basic Training. So on June 26, 1944 (age 21 years.9 months, 13 days) I entered the Special Engineering Detachment (SED), Corps of Engineers, U. S. Army at Fort Sheridan, Illinois as a Private.

June 1944-June 1945

Following the complete physical examination including four shots, I was issued GI clothes including winter and summer uniforms, jackets and a cumbersome GI overcoat (which I seldom wore because of its bulk). Then I took a GI exam which was easy so I finished early but could not leave until the time had expired. I was quartered in a four story barracks with about 150 other GIs. On the second day of my enlistment one GI was diagnosed with polio so the entire barracks was quarantined and a wire fence was placed around the building. No one entered or exited the building for 10 days. The food was trucked to the barracks and was placed just inside the fence on a long table for the quarantined GIs. No one was allowed to go to the food until all the non quarantined personnel had left. The food was dispensed by ladles into folding trays which had been issued to the incarcerated GIs. Each of us cleaned our own trays in a large sink located on the lower floor which was there for washing clothes. I spent my quarantined time reading technical and history books plus some cards. No more polio cases appeared so the quarantine was lifted, the fence was removed and the GI were sent to various Basic Training Centers. With one other SED GI, I was shipped with special orders by train to Camp Claiborne, Louisana (near Alexandria) via St. Louis. From St. Louis I was on a troop train of about 8 passenger cars. The train backed from Alexandria to Camp Claiborne, the basic training center for the Corps of Engineers. We were assigned to a company that was scheduled to go over seas. As we were new recruits to the company we drew the Kitchen Police (KP) assignment for 3 days. Then we were reassigned to another company, because we had Special Orders, and drew KP for that company for two days. On the second day, we watched for the Master Sergeant to come to the barracks for us. This baracks had two entry doors on one side; one door was at 1/3 the distance from one end of the barracks and the other door was at 2/3 the distance for the end. The Master Sergeant entered the door at 1/3 the distance from the end so we left the barracks at the 2/3 door and proceeded to the 1/3 door quickly. The Master Sergeant searched the barracks for us but was unsuccessful so he left by the 2/3 door. When he left we entered by the 1/3 door so we could say that we were in the barracks while he searched. After 30 minutes we went to the Post Exchange (PX) where I met a former student who was a Lieutenant in the Battalion. He asked me why I was there so I related that we had been moved from company to company because of Special Orders. He went to Headquarters to view the Orders and upon return indicated that we would be shipped back to Chicago in few days. In the meantime, he assigned us as Battalion drivers taking messages around Camp Claiborne. When the Master Sergeant learned about our new assignment, he assigned us to guard the Italian prisoners for the next couple of nights. After a week we were shipped by train,via St. Louis,back to the Project .

Upon arriving in Chicago, I reported to the Master Sergeant in the Cottage Grove Armory where I first reported in April. He took me over to New Chem and I reported to my old supervisor, Clark Hindman, who reasigned me to the spectrophotometric measurements. As a Private assigned to the Special Engineering Detachment, I was give a 100 mile pass and a card with a telephone number for identification. My salary was $21 per month minus

$7.50 for War Bond purchase (dollars in my check were $13.50). Since there was no place for room and board I was given $65 per month for those expenses plus uniform cleaning and pressing. The Gamma Alpha house was almost vacant when I returned from Camp Claiborne so I moved in again. Several other GIs associated with the Project needed rooms so I went to the Gamma Alpha advisor with the request that I be appointed Steward of the house with free rent. After I was authorized as Steward, I allowed the other GIs to move into the house. We shared the house expenses. We drained all water from the bathrooms on the second and third floors and the hot water heating system (there was no air conditioning) leaving water in the kitchen which had a half bath. We heated water on the large gas stove for shaving and sponge baths.This stove was lighted all winter so the kichen was warm. We slept in the third floor dorm or in our rooms. I slept in the dorm in the winter, attired in Doctor Denton pajamas, with woolen socks inside the pajamas, and a stocking cap that covered my head and ears. I slept in a sleeping bag with a heavy comforter over the bag. In other months I modified my attire to fit the temperature. I heated my small third floor room with an electric heater. The temperature was sufficient so that I could read, study or listen to the radio.

We ate cereal and milk with fruit plus coffee for breakfast as there was a large refrigerator in the kitchen. For lunch, we went to the University Commons (when we had money) since the food was inexpensive. If money was scarce, we depended on packed lunches from the USO in the Roosevelt Hotel on Michigan Boulevard. These lunches were given to us on Sunday as we were not required to work. Both the "L" and the Illinois Central (IC) were free so the transportation there was provided. If we no longer had any prepared USO lunch and were short of money, we went to a privately operated bookstore/cafe to obtain hot water. Since Ketchup and crackers were on the table,tomato soup could be prepared easily. It satisfied our hunger. For dinner, a Chinese restaurant was approximately 2 blocks from 5735 and they offered 1/2 price for their meals to GIs. Furthermore, after 7:30 pm the meals to GIs were only 1/4 of the regular price. One Chinese meal with rice could serve at least two people. We often had two meals for four GIs and all were satisfied. The acquisition of food for the month combined with other expenses quickly depleted the $78.50 stipend. Few Project members invited me to dinner but I had a few meals with John Willard or Farrington Daniels, Wisconsin faculty on leave. I was permitted to take at least three passes (2 or 3 days each, during 1944-1946) so I was able to return to Brooklyn, Wisconsin to visit my parents.

To take care of my clothes, I made arrangements with a Chinese operated laundry where they kindly gave me a 50% discount. Their cleaning was never challenged by the many Military Police who picked me up twice for being out of uniform. I began to get promoted after the Trinity shot in July 1945. Within 6 months (December 1945) I had been promoted to Technician -4 where the salary was sufficient to defray all expenses with some money to spare. Early in 1946 I was promoted to Technician-3 which was better than T-4. In July 1946, I was discharged at Fort Sheridan . I returned to the Metallurgical Lab to finish the half life of Radium work as a Junior Chemist at a salary of $ 225/month. Then I went to Graduate School in September 1946 at the University of Wisconsin-Madison as a Wisconsin Alumni Research Fellow working with Dr. John Willard.

Two events that occurred during my Manhattan Project work were unusual. The first involved a plutonium-239 sample (Farmer 2) that was irradiated in one of the Hanford piles for Enrico Fermi. This irradiation of 140 mg of ^{239}Pu was performed to obtain additional isotopes of plutonium to examine various decay products. The sample was sufficiently radioactive so that the Cerenkov radiation was readily visible. By using photographic film, Paul O'Connor and I were able to determine the aluminum container geometry . From this photograph, we designed a fixture to hold the round container so that it could be opened

without dispersing any plutonium. This procedure involved sawing off the end with a hacksaw. By surrounding the container and the holder with lead bricks and placing both in a lead cave we could perform the hand sawing without an exposure to greater than 100 milliroentgen of irradiation if we worked for 30 seconds. We estimated that to completely saw through the end of the container would take 60-90 minutes. Seaborg decided to expose all members of his Division for 30 seconds to open the sample. O'Connor and I were to instruct each person on the procedure they were to perform. The Health Physics Personnel kept records on the personnel exposed and the exposure time. After the container was opened we dissolved the plutonium and I purified it via the bismuth phosphate-lanthanum fluoride procedures to eliminate the fission products. During these purification steps, Fermi visited my laboratory. He sat cross legged on my desk and discussed some of his experiments irradiating uranium with neutrons from a radium-beryllium neutron source. He and his group reported this work in several papers published in Italian Journal 'Nuovo Cimento' as new elements. He said that all these radiations belonged to fission products and that his mistake was not having chemists in the group. This work was performed before the Hahn and Strassman experiments which indicated that uranium fissioned.when exposed to neutrons.

The second event occurred during my initial work with micrograms of radium (^{226}Ra). I had purified the radium from barium by many radium chloride precipitations and needed to remove the two molecules of water of hydration which accompanied radium chloride. To remove these water molecules, a sleeve furnace was assembled wth a HCl gas inlet and an exit tube immersed in concentrated sulfuric acid. The radium chloride placed in a small micro quartz capsule was inserted into the sleeve furnace, a positive HCl pressure was started, and the furnace was heated to 110°C. The reducing valve on the pressurized HCl tank corroded rapidly so it required continuous adjustment during the water removal. A technician had been assigned to me for the radium half life measurement. He was assigned to monitor the HCl gas flow by observing the bubbles in the sulfuric acid. However, he was a smoker and left his post after an hour to have a smoke in a smoking area. When I returned to the lab, I could see the sulfuric acid begining to enter the sleeve furnace. I grabbed a face shield and a pair of rubber gloves, and separated the gas lines from the furnace, but I was not able to prevent some sulfuric acid from entering the furnace. When I opened the furnace I became contaminated with radium. However, the only contaminated body part was my hair. In order to remove the contamination the Health Physics personnel washed my hair with dilute hydrochloric acid several times. To remove all of the radium contamination my head was shaved and my skin was washed with dilute hydrochloric acid. These treatents reduced the radium contamination to background alpha emission and I could leave the lab. This procedure took several hours for decontamination. This technician never worked with me again.

My assignments on the Manhattan Project are provided in Table 1. Table 2 is another list of my Manhattan Project Assignments plus my university affiliation. Table 3 lists the details of my work on Radium-226 (the page reference is taken from 'The Plutonium Story', The Journals of Professor Glenn T. Seaborg 1939-1946, edited and annotated by R. L. Kathren, J. B. Gough, G. T. Benefiel (Battelle Press, Columbus, OH 1994)
Most of my work was published in the Transuranic Elements, National Nuclear Energy Series, Division XIVB, G. T. Seaborg, J. J. Katz and W. M. Manning eds, (McGraw-Hill, New York 1949)

1. Complex Ions of Plutonium (III), p348
2. Emanation Method for Radon, p1206
3. Thermal Neutron Fission Properties of Radium-226, p1383
4. The Specific Activity of Radium-226, p 1675
5. Rapid Method for the Determination of Radium-226, p1708

Special Engineering Detachment
in
Chemistry Division
Metallurgical Laboratories
by
Donald P. Ames

While working for Atlantic Refining Company in Philadelphia, PA, I was drafted in March, 1944. I was sworn into the Enlisted Reserve Corps and sent to the Metallurgical Laboratories at the University of Chicago. After working for 3 months in the Chemistry Division, Glenn T. Seaborg, Director, I was informed that I would be placed immediately in the Special Engineering Detachment, Corps of Engineers, U. S. Army. This status change occurred because a National Draft Board Bulletin directed that members of the Enlisted Reserve Corps on the Manhattan Project under the age of 22 years be placed in uniform. I was 21 years, 9 months of age. At that time this transition occurred by Army induction at Fort Sheridan and a six weeks of basic training at Camp Claiborne, Louisiana with special orders to return to the Chemistry Division, Metallurgical Laboratories. At Camp Claiborne, Engineering Companies were being trained to go overseas, consequently, no company wanted Army members with orders to report elsewhere. Therefore, every 7-10 days I was transferred to another company which meant a daily kitchen police assignment. When I returned to the Chemistry Division, my rank was Private and this rank was not changed until April 1945 when I was promoted to Corporal, then immediately to T/4 and then after December to T/3. During April 1945, a National Draft Bulletin directed that Enlisted Reserve Corps members under age 29 on the Manhattan Project be placed in uniform. However, after these members were inducted into the Army at Fort Sheridan, they were given the rank of T/4 and sent back to the project without any basic training. At the time of my inductiont rhere were several SED members in the Chemistry Division who were T/3s or T/4s; they had been in the Corps of Engineers and had achieved their grade prior to joining the Project.

The 1944 inductees as privates received $21 per month as salary. A $7.50 bond was deduced in response to a General Groves order that all SED members would contribute a bond to the War effort. In addition they were given $65 per month for room and board plus clothing care. Additional clothing could be ordered through the Master Sergeant As an Enlisted Reserve Corps civilian, I was paid a salary of $125 per month. This salary was adequate for the time in the University of Chicago area but the $68.50 monthly stipend was not adequate for the time. Fortunately GIs were allowed to travel free on the elevated trains, the streetcars and the Illinois Central trains. Therefore I could go to the huge USO in the Roosevelt Hotel on Sunday, a non work day, to obtain food. They gave me several lunches and much fruit during each visit which helped with the board. The married Project personnel in the Chemistry Division entertained very little. Periodically my civilian supervisor asked about my financial situation and stated that the project could do nothing because no advancement was available. A Chinese Restaurant two blocks from my room reduced the price of their entrees after 7 PM for certain SED personnel. These personnel also received a 50% discount from a Chinese Laundry for washing and dry-cleaning uniforms.

After becoming a GI, I had to give up living with a roommate in an apartment. Gamma Alpha, a graduate scientific men's organization, had a house that was vacant. As a member, I petitioned the faculty advisor for the Stewardship of the house. He appointed me and agreed to no fee for occupancy by SED members. Along with several other single Project

GIs, we occupied the three story house. We could not afford to heat the house during the winter so we drained all plumbing in the bathrooms except for the half-bath in the kitchen. The house was heated by hot water radiators and they were drained because we could not bear the expense of coal for fuel. The kitchen was heated by the large gas stove on which two large containers of hot water were placed for shaving and sponge baths. Each room was heated with a personal portable electric heater. A sleeping dormitory with double decked single beds existed on the third floor. Several GI occupants slept there and others moved a bed to their room. Showers were taken at the University Men's Gymnasium by courtesy of the University.

The working hours were from 7:45 am to 5:30 PM six days per week with 30 minutes for lunch and one hour for dinner. Since this project was important to the War effort, evening work was expected for all professional employees. I usually worked in the evening from 6:45 to 10:30 PM. Each employee had a badge which had to be displayed at all times especially to the guard during entry and exit from New Chem, the Chemistry Division Building. Each employee had a government issued pair of shoes to be worn in the laboratory. Employees wore a laboratory coat over their street clothes. All plutonium was manipulated in a vented glove box which had a pair of heavy rubber gloves; employees using these glove boxes put on a pair of surgical gloves prior to using the gloves attached to the glove box. Alpha hand counters and beta hand counters had to be used prior to leaving the laboratory. Contaminated hands were not tolerated by the Health Physics personnel who were present when hand monitoring was performed prior to exiting the building. Portable Geiger and alpha particle counters were available to monitor clothing and exposed skin.

My supervisor was always a civilian Ph.D. whose orders superseded any military officer orders during the working day; e.g., I was ordered to report for a one hour physical exercise at 7 AM one morning by the Chicago SED commanding officer. When my supervisor learned about this request he ordered me to report for work at 7 AM. Upon informing the Master Sergeant of this new request the physical exercise order was canceled. Further military orders of this nature were never received during my SED tenure.

The headquarts of the SED at the University of Chicago was in the National Guard Armory located between 53rd and 55the Streets on Cottage Grove Avenue in South Chicago. The headquarters personnel included: a Major (the commanding officer), two Captains, one Lieutenant and one Master Sergeant plus a secretary (see Enclosure 1). They controlled the furloughs when authorized by the work supervisor. A 100 mile pass and a personal pass listing the telephone number of the SED headquarters were issued to SED personnel permiting Chicago travel and identification in case of minor infractions of Army order such as being out of uniform.

Enclosures

1. Photogragh of Chicago SED personnel (From Plutonium Story, R. L. Kathren, J. B. Gough, G. T. Benefiel, Eds, Battelle Press, Columbus, OH 1994 p 796
2. My detailed experiences during WWII
3. Copy of Radium Brief that was published in Chemical and Engineering News, September 8, 2003 [complete paper entitled 'The Specific Activity of Radium-226' , Truman P. Kohman, Donald P. Ames and Jacob Sedlet, published in National Nuclear Energy Series 14B, G. T. Seaborg, J. J. Katz and W. M. Manning, eds., (McGraw-Hill, New York 1949) p 1675]

Table 1

Manhattan Project Timeline
Donald P. Ames

Date	Activity
Dec. 1943	Sufficient credits for graduation
Dec 1943	Draft status 1A March 1944 quota
Dec 1943	Accepted Atlantic Refining offer In Philadelphia
Jan-March 1944	Asphalt adhesion to Coral; Synthetic Rubber from alpha methyl styrene
April 1944	Drafted in Enlisted Reserve
April 1944	Reported to Project in Chicago Assigned to Plutonium Production Division G. T. Seaborg, Director
April 1944	Supervisor: B. B. Cunningham Microchemistry of Plutonium
May 1944- July 1944	Supervisor: J. C. Hindman Wet chemistry of Plutonium, Absorption spectra of Pu, and Np; Decontamination of Pu and U
May 1944	Moved to Gamma Alpha house 5735 Woodlawn Avenue
July 1944	Inducted in U. S. Army Corps of Engineers Special Engineering Detachment
July 1944	Quarantined at Ft. Sheridan, Il Polio
Aug 1944	Basic Training Camp Claiborne, LA
Sep 1944	Returned to Metallurgical Laboratory as Private
Sep 1944- Mar 1945	Supervisor: J. C. Hindman Pu oxidation states, Pu cation complexes
Mar – May1945	^{240}Pu half life from high g/t pile irradiations
June 1945	Report preparation
July 1945	Supervisor; A. H. Jaffey Control Analysis of Radium
Aug 1945-Sep 1945	Supervisor T. P. Kohman Control analysis of Radium Rapid Analysis of Radium
Nov 1945	Transfer Rapid Radium Analysis to

	Mallinckrodt Chem. Co., St. Louis, MO as civilian
Nov 1945	Assigned Determination of Half Life of Radium by Direct Counting
Feb 1946	Radium purified by recrystallization of radium chloride Radium fission measured
Mar 1946	Procedure for Radium half life measurement approved
Mar 46- June 46	Half life measurements using micrograms of radium
June 1946	Discharged at Ft. Sheridan Returned to Met. Lab as Assistant Chemist
June 1946 –Sep 1946	Repeated half life measurements using milligrams of Ra
Sep 1946	Resigned from Metallurgical Laboratory (now Argonne Laboratory)

Table 2

Donald P. Ames
Manhattan Project Assignments

Date	Supervisor	Assignment
April 10, 1944	Burris. Cunningham	Microchemical techniques
April 30, 1944	J. Clark Hindman	Spectrophotometric measurements
July 20, 1944	Terminated Met Labs;	Inducted in Army, Fort Sheridan, Illinois
July 27, 1944	Sent to Camp Claiborne, LA	Basic Training with Special Orders
August 28, 1944	Clark Hindman	Spectrophotometric Measurements
November 22, 1944	Clark Hindman	Purification of Fermi special plutonium
February 1, 1945	Clark Hindman	^{240}Pu half life
April 25, 1945	Clark Hindman	Reported half life 6800 y
May 30, 1945	Clark Hindman	Repeated half life measurement 6880 y
July 1, 1945	Arthur Jaffey	Radium analysis **
July 6, 1945	Truman Kohman	Radium Analysis and radium half life
June 30, 1946	Sent to Fort Sheridan, IL	Honorable Discharge
July 1, 1946	Truman Kohman	Junior Chemist, Radium half life
August 31, 1946	Resigned	
September 18, 1946	John E. Willard	WARF Fellow, Dept. Chemistry, Univ. Wisconsin-Madison

** See other Table entitled Ames Radium Time Line.

Table 3

Radium Time Line
Donald P. Ames

Date	Item	Details
June 4, 1945 p45	Jaffey at Mallinckrodt	Radium analysis problem
June 13. 1945 p61	Jaffey, Martin request	Wants analysis of uranium process solutions
July 1, 1945 p85	Group assignment	DPA in Control Analysis Group
July 5, 1945 p. 94-95	Jaffey-report on need for Ra analyses	Change from purified U to crude ore
July 6, 1945 p97	Analyses report to Butler	Kohman to group leader
July 9, 1945 p100	Analyses objectives	Distribution of Ra, Pa, th, and Ac in wastes
July 10, 1945 p103	Curtiss letter re Ra half life	Seaborg estimate 1686y; Curtiss 1590y average
July 17, 1945 p 115	Curtiss letter	Modified Ra half life 1636y
August 1, 1945 p 135	Seaborg Division chart	Group 2 assignments DPA
August 9, 1945 p 157	Ra analysis report	$BaCl_2$ co-precipitation , direct counting and emanation method
August 31, 1945 p158	Kohman to Curtiss	Ra half life by direct counting
August 22, 1945 p166	Ra Analyses assignments	DPA direct counting of Ra
August 23, 1945 p 168	Mallinckrodt, Butler and Martin	Emanation method rejected, Direct counting to be installed in St. Louis
August 25, 1945 p169	Emanation-direct counting comparison	Little difference between the two methods
August 29, 1945 p 171	Kohman summary	Mallinckrodt-Army meeting August 27 memo
September 7, 1945 p179-180	Mallinckrodt wants direct counting method	Desire rapid method for Ra solution analysis
September 21, 1945 p201	Kohman to Butler	Emanation results since Aug 7
October 1, 1945 p211	Seaborg Division	DPA in Group 2 Control Analysis
November 1, 1945 p251	DPA co-precipitation experiments completed	Control Group disbanded DPA to work on Ra half life
November 4, 1945 p257	St. Louis, Mallinckrodt trip	Kohman, Ames, Schoke
November 6, 1945 p264	Control Group assignments to lab personnel	DPA to Ra half life measurement
November 7, 1945 p266	St. Louis trip return	Actual process solutions analyzed results agreed with emanation method
November 20, 1945 p289	Fast Ra analysis modification	Solutions contain excess Ba^{++} and no SO_4^{--}
November 21, 1945 p291	Kohman memo	Results of 11/20/45
November 21, 1945 p 297	Details of Plant solutions	Analysis details; use of pyrex plates for countmg
November 28, 1945 p 309	Memo to Seaborg	Kohman summary of St Louis trip
January 8, 1946 p 366	Best Method for direct Ra Specific Activity measurement	Pulse height alpha separation and then correct alpha count
January 15, 1946 p 381-2	Seaborg Division	DPA I Group I Heavy Metals
January 20, 1945 p412	Kohman quoting Chang	Resolution of alpha ranges of Ra 226

February 12, 1946 p 434	Recrystallization of $RaCl_2$	<0.02 % Ba by spark spectra yield 8 µg of 15 µg $RaCl_2$
February 21, 1946 p 462	Seaborg Division	DPA in Heavy Isotopes group
February 26, 1946 p 474	First run on half life	1650 y
March 5, 1946 p 478	Two Ra samples	Fission cross section measurement
March 12, 1946 p 508	DPA report	Decay curves of Ra226
March 12, 1946 p 508	Fission cross sections	1.9×10^{-4} barns
March 28, 1946 p 539	Direct counting techniques	1690 y
April 9, 1946 p 559	Ra 226 measurements	No Rn diffusion but loss of Rn by recoil
April 13, 1946 p 565	Rapid Ra Analysis Paper	Seaborg approval
April 22, 1946 p 575	Seaborg Division	DPA in Heavy Isotopes Group
July 1946	Discharged from Army	Hired as Junior Chemist
August 1946	Completed Ra half life measurements on both micro and milligram of $RaCl_2$ (1622y)	Paper written by Kohman in Volume 14B National Nuclear Series
August 1946	Terminated Job at Argonne	Went to graduate school

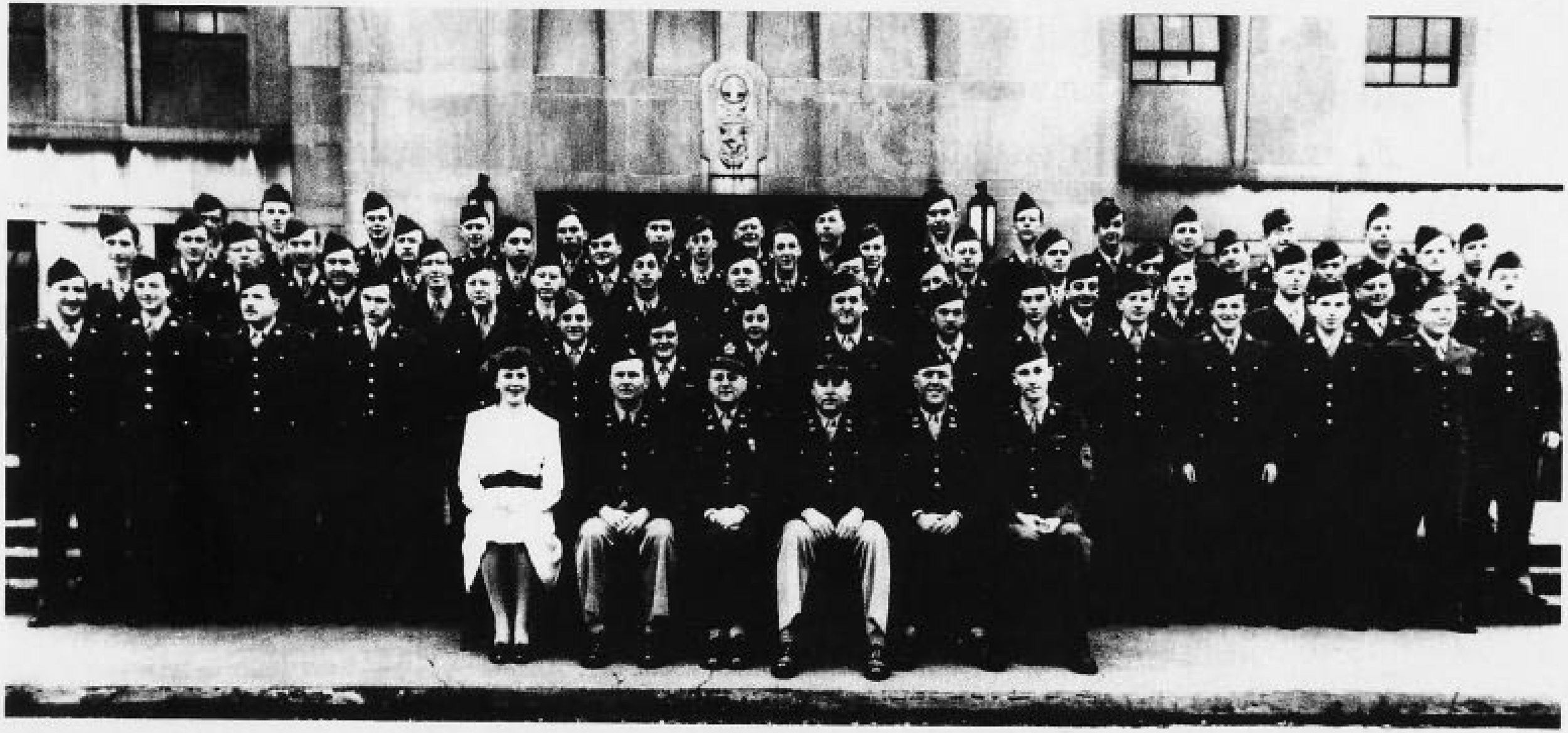

Figure 11-4. SED Group at Met Lab, December 1945. (First row, left to right) Miss Emma Schlak, Maj. John H. McKinley, Capt. Thomas S. Chapman, Capt. Paul Baranowsky, Lt. John H. Mahoney, M/Sgt. Russell E. Bidlack. (Second row, left to right) T/3 Harris H. Levee, T/4 Milton Ader, T/3 Lee V. Lawhead, T/4 Eugene A. Hausman, Pfc. Ernest H. Wakefield, T/4 Renato J. Ferretti, M/Sgt. Dollie E. Henry, Sgt. Marion Gottschall, T/4 Sheldon Himmelstein,, T/3 Solomon H. Turkel, T/5 Herbert Kanner, T/3 George Cressman, T/4 Alonzo C. Rand, Jr., T/4 Theodore H. Garner, T/Sgt. Donald C. Stewart. (Third row, left to right) Pfc. Albert J. Gaydick, T/5 Bernard B. Weissbourd, Pvt. David Revinson, Pfc. John L. Kuranz, Pfc. Alec E. Kelley, T/3 James A. Schoke, T/5 Martin H. Studier, T/4 Norman Pearlman, T/4 Donald P. Ames, T/4 Leonard G. Nierman, T/3 Marvin L. Goldberger, T/4 Phillip Fineman, T/3 Irving Wender, T/3 Herbert H. Anderson. (Fourth row, left to right) Pfc. Wallace C. Koehler, T/4 Robert K. Swank, M/Sgt. James T. Harris, T/5 Abraham Broido, T/4 Stanley W. Crain, T/4 Beverly W. Lewis, T/4 Stewart A. Fox, T/5 Thomas E. Mitchell, M/Sgt. Paul A. Dana, T/3 David R. Hume, T/Sgt. Max B. Rodin, T/3 Clarence L. Wesenberg, T/4 Charles Eggler, T/5 Richard A. Potter. (Fifth Row, left to right) T/3 Walter P. Huebner, T/4 Horace H. Hopkins, Jr., T/4 William C. Redman, T/3 John H. Schraidt, Pfc. Roy G. Post, T/4 Weldon C. Graham, T/3 J.W. Britain, T/3 Manuel H. Holtzman, Pfc. Robert S. Cohen, T/3 Larned Asprey, T/3 Robert T. Best, T/3 Vladimir J. Houska, T/Sgt. Walter M. Stewart, T/3 Robert J. Smith, Pfc. Sholem Postel.