FRIDAY MORNING SESSION

JANUARY 18, 1946

COL. FITZGERALD: Mr. Abrams has the distinction of being the first and only American civilian representing industry interested solely in the science of Photogrammetry to visit Europe during the summer and fall of 1945.

He was originally set up on a Navy Technical Mission; later proceeded as a civilian into the neutral countries of Europe, working through the American Embassies and served in Germany and the Low Countries with the assimilated rank of Colonel on the Technical Industrial Intelligence Committee of the Joint Chiefs of Staff of the U. S. Army.

Targets investigated included not only Aerial Surveying and Photo Interpretation, but all kinds of measurements made from photography, including those made with the Electron Microscopes, the Optical Microscopes, the use of photography in crime detection and measurements made with Stereoscopic X-Ray. Mr. Abrams will present his paper on "Commercial and Private Photogrammetry in Europe."

MR. TALBERT ABRAMS: It is a pleasure to pass on to the members of the American Society of Photogrammetry some of the information gathered from targets in the captured, occupied and neutral countries of Europe immediately following the surrender of Germany and Italy, and while the war was still going on in Japan.

Europe today is down and not at all like the Europe of 1938 when we attended the International Congress of Photogrammetry in Rome. While this 1938 Congress was in progress the Munich conferences ended; war started with Germany moving into Czechoslovakia, and plans were rushed for better cameras and equipment to run a war. The German influence at Rome was predominant.

The best information on what has happened in Germany and Italy comes from neutral and occupied countries where no longer does the myth exist that German scientists could possibly have been the smartest in all the world. The German superiority, which only existed in sales propaganda, is not a fact when technically analyzed; this is now understood by all Europe, outside of Germany.

The intrigue within Germany and the suspicion which one German held for another was responsible for many of their later photogrammetric developments, Zeiss cameras and equipment remaining about the same through the war with only minor developments, the newer developments coming from a special laboratory set up by Goering with an independent group of technicians.

Sweden and Switzerland hold the spotlight with an effort to become self sufficient if ever again they should be cut off from their source of supply, and with this in mind, they have developed new aerial cameras, new plotting equipment and planes of their own design for aerial survey.

A few of their more outstanding developments consist of a camera of 12 foot focal length, taking a picture on a 9-inch infra red negative. These are mounted in lighthouses to scan the ocean in misty weather, and they have the advantage over radar of taking a photograph beyond the line of visibility without being detected, as would happen in a radar beam. They also developed submarine cameras mounted on universal heads for under-water photography, and also 1500 power optical microscopes and 100,000 power electron microscopes that open up an entire new realm of biological and metallurgical research possibilities.

Lens designed to compensate for the flat glass pressure plates used in some cameras and the optical plates used in the port holes of pressurized planes were also developed.

They were also developing radar recording cameras without shutters and electrically-operated shutters with a very thin cross-section for use in the wide angle lens.

The British have assembled a most complete display of captured German equipment available to all technical people of Allied Nations. This is arranged at the Farnborough establishment of the British Air Ministry. Included in this display is the 148-degree, wide angle lens and rectifier of the Luftwaffe with Louver type shutter and known as the Pleon type lens.

Another very interesting development is the British curved glass printer with canvas pressure back.

British Aerial Survey operators look to an international business with all services included; from exploration, geological studies and reports, and the final development of a project, including the transportation of materials in and out in wild areas.

In France, portrait photographers were making portraits in three dimensions, and the French Geographical Institute were developing new stero-plotters to add to their already very complete photogrammetric mapping system; Engineer Poulliers has been active in the field for many years.

People from our own governmental agencies have made a very complete study in Germany of existing photogrammetric mapping equipment and methods of map-making and aerial photo interpretation, and you have already heard, or will hear, from these people on this program, so I will touch very lightly on these subjects.

The targets of opportunity that were of more interest to me included not only aerial photography, but all kinds of photography, and more especially the measurements that can be made from photographs and their interpretation. This led me to investigate and interrogate people in factories, government agencies, laboratories, hospitals and police stations and here, under many names, Photogrammetry is being exploited in many ways.

In factories, optical comparators were being used extensively in production inspection, tool-making and design; photography was being used to loft aircraft and plot the curves of new designs, to full scale drawings, saving thousands of hours in detail work; X-Ray was being used in metallurgical testing and measurements.

Micro Photography, or what is more commonly known as the V-Mail letter, moved itself into what is known as Big Business with the copying of soldier mail, but long before this American use gave the idea general recognition, the Germans were destroying original information after copying on Micro film, and it is now questionable if some of the most wanted information will ever be recovered because it has been so well concealed and the concealer is no more, or refuses to give out with information.

Photographs made through the optical microscopes, of course, are not new, but stereoscopic microscopes and their photographs were very extensively used in industrial laboratories on metals, dyes, fabrics and all commercial subjects.

Here also in industry the Electron Microscope, with its stereoscopic photos, was used, and a new Electron Microscope in Switzerland, which its manufacturers claim will give up to 100,000 to 150,000 diameters of magnification and allow the taking of stereoscopic pairs, opens up an entirely new field of microscopic study with great possibilities.

In Neheim, Germany, one of my targets was a company that had developed a stereoscopic X-Ray machine with which it was possible at the time of an operation to view the subject stereoscopically for examination before an opera-

tion and during an operation. The body can be seen in the Fluroscope stereoscopically, and work can be performed in three dimensions without actually looking at the patient. This has many advantages over our present system of making two X-Ray photographs and then viewing these stereoscopically at some later time. Information and equipment on this new development in the art of Photogrammetry was liberated and returned to the United States without delay. Information on the location of this new development was furnished by America's friends in Sweden.

In police stations, where I went to investigate Button Hole or miniature cameras used in crime detection, we found very complete departments set up to photograph stereoscopically scenes of accident and crime. There were very elaborate arrangements with completely equipped trucks to quickly proceed to the location, tripods with stereoscopic cameras, and devices for marking particular points of interest. In the Central Station, laboratories were set up to develop the film, and stereoscopic plotting machines were available to accurately make a map of the location to the desired scale. They claimed many advantages for their systems, such as speed and cost, and a more complete record for trials.

A most interesting physiological reaction to the war was voiced by people in both Sweden and Switzerland. Nobody seemed to be particularly sorry that Germany and Italy had been forced to their knees. Both were interested to know if the Allies intended to let them again enter the world market with manufactured products. People in both Sweden and Switzerland claimed a first-hand knowledge of all German and Italian methods and science, and both would like to take Germany's and Italy's place in supplying such items as had formerly been made in the conquered countries. This is a real problem that should be given economic thought.

I was somewhat disturbed in Germany to see the occupying armies opening up German camera factories to supply German cameras to the Army PX's, when undoubtedly American manufacturers would have been pleased to supply cameras to the G.I.'s that wanted to take pictures.

Another rather disturbing activity was the engineering and development work being given by our armies to German engineers to perform. With this engineering and development work comes a certain know-how to the individuals, and they also get a certain amount of information from our officers on requirements that they might not ever obtain if they did not have the project on which to work. Talking to these men afterwards, you find they have become somewhat of an authority on the subject, and you know their information from the records was not so before they worked on the project. This should always be given consideration because it develops competition around the world that might not have developed otherwise and can seriously restrict our own industrial activity.

The education of people in Photogrammetry in Europe is generally carried on in Technical High Schools comparable to our Technical Colleges, and the professors and instructors have generally come from civil engineering departments. They are generally well trained in mathematics, physics and surveying; well read on European developments, but with very little knowledge of what is happening in other parts of the world. However, they express a great interest.

Combined Investigation is probably the most descriptive explanation of Photogrammetry in Europe in 1945, for, even while the wars went on and after the shooting stopped, everybody was trying to find out what had happened.

The Germans and Italians could not bring themselves to believe that Allied photo interpretation could be so extensive and so accurate. Allied Photogram-

metry in all its ramifications was a new tool of warfare, used by technicians and the non-technical for the first time on a scale heretofore unheard of.

The neutral countries and the occupied countries, from a position of being on the outside looking in, were all amazed, and planning on methods and equipment that would make them less dependent on others and more self sufficient within themselves.

Navy Technical Missions and Army Technical Missions, Industrial Technical Missions, all controlled by war's requirements, all trying for that last bit of information that would aid America in peace and war, were the order of the day.

In every country, I was propositioned by people who wanted to come to the United States, and they all had about the same story. Would I tell the American authorities that I would give them a job? If I would, then they could come, but they would not expect me to keep them in a job, because as soon as they were here, they would find a way to provide a job for themselves. This desire to come to America is both a compliment to us and a danger not to be overlooked. If we do not permit immigration, and I am not saying that we should, then these people with an urge to move out of Europe to other points to try their fortune and this exodus should be considered from an economic standpoint because it is fraught with many dangers.

The photogrammetrist and manufacturer in Europe and England look to international markets for their products, and until we can adjust our thinking to these conditions we operate under considerable handicap. World-mapping deserves the best thinking of the American Society of Photogrammetry and all its members. It's not a job for somebody else; it's your job. Fit yourself into the international scheme of mapping and measurements from photographs. The science and art is much bigger than you think.

At the conclusion of his formal paper Mr. Abrams displayed some small European cameras that he had brought back with him. One was the size of a package of cigaretts, the other about as large as a package of gum. Both cameras were exceedingly interesting, having built-in range finders, light meters and other attachments which are usually found only on larger cameras.

Mr. Virgil Kauffman, of Aero Service Corporation, and one of our best known members, was then introduced.

(Mr. Kauffman's paper is not available at this time. It will be published in a later edition of PHOTOGRAMMETRIC ENGINEERING).

At the conclusion of Mr. Kauffman's paper there was a lively discussion from the floor on the subjects of film, paper and lenses.

Dr. Clark of the Eastman Kodak Company, was interested in ascertaining whether intense research was advisable on film distortion. Cmdr. Reading, Mr. Chipman, Mr. Bean, Mr. Davey and Mr. Whitmore emphasized that a paper that had very low distortion would save a great deal of time and money in compilation, probably more than enough to pay for the increased cost.

Mr. Ott joined the discussion as resolving power was discussed. It was pointed out that although both lens and film might be capable of high resolution individually, when combined in actual operations the results were often far lower than would be expected.

Then next speaker was to have been Dr. Frank A. Melton, speaking on the subject of "Aerial Photography Applied to Geology."[1] Col. FitzGerald regretfully announced that Dr. Melton was unable to appear before the Society be-

[1] The paper referred to can be found on page 124 of this publication, under the title of "Preliminary Observations on Geological Use of Aerial Photographs."

cause of illness and since there was time left on the program called upon Mr. Pierce, U.S.G.S., Mr. Jack Amman, Ensign Robert Thurrel, USNR., and Prof. H. T. U. Smith to discuss the subject.

Mr. Pierce discussed the use of aerial photographs by geologists in the field. Rather than using a compilation previously prepared he said that geologic contacts were usually spotted on the actual photograph by identification of features and that compilations of both topographic and geologic maps were made later in the office. One of the main difficulties is that of obtaining vertical control. The geologist frequently depends on the aneroid for this or the reading of vertical angles from known points. The computation of key elevations is accomplished in the office after the field work and compilation are performed.

Mr. Amman stated that in his experience aid in location of land lines had been of great benefit. He pointed out that in the southwest where many of his operations are performed, the titles are derived from the old Spanish Land Grants, which are usually for a stated acreage with very poor descriptions of the boundary lines. Oil companies have difficulty with "title busters" who find small discrepancies in the titles and hold up development. As a specific example he mentioned an incident where with the wells down, title trouble developed and since some of the heirs were in Germany and could not be contacted because of the war, there was a complete stoppage in the development program.

His method is to compile mosaics first, then trace land lines on them from deed descriptions. He also stated that vacancies between holdings are as important as overlaps.

Oil companies prefer to use the following procedure. First a study of drainage patterns on photo-indexes, study of stero-pairs, followed by preparation of photo-geologic maps. Tracings are then taken direct from the photographs to localize anomalies.

Geophysical prospecting also ties in with mosaics. The locations of shots must be plotted accurately to be of value. A location traverse can be run prior to the shooting but many times the Engineer accompanying the party feels that results indicate the advisability of a deviation from the planned program. If a controlled mosaic is available, the locations of such shots can be plotted, accurately and quickly.

H. T. U. Smith stated that aerial photographs are a great aid in both theoretical and applied geology. They are valuable in interpretation and compilation of geologic data. The first of these, interpretation, can be done in either field or office.

Additional value lies in the ability to plan the field attack, to eliminate areas, and interpolate between mapped areas. Reconnaissance is accomplished on the photographs rather than on the ground. A great time saver is the ability to locate isolated outcrops.

Ens. Thurrell discussed the advantage of obliques in the study of physiographic patterns which do not appear on the larger scale vertical photographs. He re-emphasized the advantages of being able to select areas for study and also the tremendous possibilities of interpolation and correlation between small mapped areas in a partially mapped continent such as central Africa.

He mentioned the Navy use of trained geologists studying photographs to plan cuts and fills for projected airfields in areas still held by the enemy. Valuable information as to available materials for such airports was also obtained from photographs. In beach studies the footing, gradient and exits were explored from reconnaissance pictures.

At the close of discussion Col. FitzGerald adjourned the meeting.