PROBLEM:

To ascertain the most desirable mode of accomplishing chemical and optical processing of the product of Project AQUATONE

DISCUSSION:

¶1 The technical plan for Project AQUATONE calls for the development of new photographic equipment of superior characteristics and, as an interim measure, the modification of existing equipment to improve reliability and optical characteristics in keeping with advanced photographic techniques. ¶2 To these ends our development programs include the design of new and advanced optical systems in intermediate and long focal lengths; the design of an integrated system including advanced [redacted] and techniques for compensating for motion of the image during film exposure and minimizing vibration during the exposure; the development of a lightweight base film; the development of haze penetrating techniques through special high-contrast film [redacted]. ¶3 These development programs have progressed to the point at which the photographic returns which can be expected will far exceed those available from current photographic reconnaissance systems. Improvements in resolution of at least a factor of two and in some systems as much as a factor of four are not considered reasonable for the AQUATONE systems. ¶4 Such improvements, at the scales contemplated, should mean a substantial intelligence "take" from even a minimum number of missions if the resolution, which becomes part of the latent image of each exposure, can be preserved during chemical processing.

¶5 The problem of chemical processing for the AQUATONE product has thus been examined on the basis of a philosophy which prescribes that there be no sacrifice in the quality of the latent image and that, if anything, such improvement as is possible through processing will be accomplished.

¶6 Existing facilities have been studied to the extent possible to determine if they meet the above technical criteria. These facilities include several operated by the U. S. Air Force; and, specifically, visits were made to St. Louis, Missouri; Rome, New York; and the Wright Air Development Center, Dayton, Ohio. ¶At St. Louis, the largest facility of its kind in this country exists and is engaged primarily in mapping. The present installed capacity of the facilities appears to be such that no major extension of the amount of work which could be handled would be possible without expansion. The equipment available for film processing is of standard design and does not provide for anything resembling the processing precision prescribed for the AQUATONE product. Skilled processing personnel are available however, and the plant layout could probably be adjusted to accomodate expansion to handle the volume of work which AQUATONE will provide. ¶At the Air Force base at Rome, New York, the photographic processing facility has not yet been equipped. It is our understanding that it will probably not be equipped in the future. ¶At the Wright Air Development Center, large scale processing is not carried out--the actual processing facilities being approximately sufficient to handle current Air Force requirements. Processing equipment development has been going on for some time at the Development Center, and a special processing machine which permits infrared scanning of partially developed negatives is in the mechanical protype stage. The first unit, if it works, will be delivered in the latter part of this year for use in connection with project [redacted] 25X1A ¶The specifications of the other Air Force installations engaged in film processing such as those of the various reconnaissance organizations and the Lookout Mountain labboratory were studied in Air Force installations literature. All of these installations use processing equipment designed to fulfill the normal reconnaissance needs of the Air Force but do not have in them precision processing features which appear desirable for AQUATONE. In addition, the capacities of these plants have been dictated by normal Air Force requirements, and the addition of AQUATONE requirements would probably result in expansion or at least result in substitution of new equipment for that already installed. ¶10 The next phase of our study of the processing problem involved lengthy discussions with representatives of the Eastman Kodak Company. These representatives have been involved in several projects in recent years looking toward the development of special processing equipment. The most recent project was carried out under Air Force contract and is known in the Eastman Kodak Company as the [redacted] project. The criteria for the processing equipment involved included precision controls to the extent possible within certain high-speed 25X1A

processing requirements. Various pieces of processing equipment were developed under this project, all of which represented significant advances over presently installed equipment at the Air Force installations mentioned above. From our discussion with the Eastman Kodak representatives, it was ascertained that the [redacted] 25X1A equipment, even though advanced in design, did not meet the requirements for precision operation and control which they agreed the AQUATONE product dictates. For example, the photographic and processing 25X1A system contemplated by project [redacted] had as its objective military photographic reconnaissance and high-speed processing of the product of such reconnaissance to permit the earliest possible use of the product for military purposes. Thus, while more processing control 25X1A and precision was introduced into the [redacted] equipment than exists in other available machines, the precision processing of the required to maximize the usefulness of the AQUATONE product, is not available even in this advanced equipment.

It should be noted in connection with the discussion of film processing for AQUATONE that a considerable amount of optical rectification will be required after the film is processed. Furthermore, specialized optical equipment will also have to be developed to aid in photographic interpretation. In fact, if film were to be released prior to rectification and correction, a considerable amount of confusion in interpretation could result. Rectification equipment will be designed by the designers of the special AQUATONE photographic equipment and should be considered as part of a film processing laboratory installation since rectified negatives and prints will have to be processed in the same manner as the original negatives and prints.

CONCLUSIONS:

Conclusion No. 1: The best technical advice available to us is that the AQUATONE product should receive special processing designed to minimize any losses in image quality through processing and to improve the quality wherepossible through special processing techniques. Reasonable processing speeds should be provided which do not sacrifice