

09738-6

6 October 1966

MEMORANDUM FOR THE RECORD

SUBJECT : Security Section "Sign-Off" on the "Crop Yields"
Development Objectives

REFERENCE: Telephone Conversation, 5 October 1966, with [redacted]

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[redacted] of the Logistics Security Staff has read the "Crop Yields" design objective and finds it acceptable. The list of proposed sources has not been checked out and there is a possibility that one or more of them do not have the proper clearances. If so, I have told [redacted] that we would eliminate any which do not have the proper clearance.

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Distribution:

- Original - File
- 1 - Chief, SB/SS
- 2 - DB chronos

Declass Review By NIMA/DOD

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D-R-A-F-T

16 September 1966

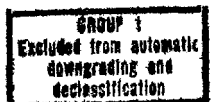
DESIGN OBJECTIVE -

ESTIMATING CROP YIELDS THROUGH AN ANALYSIS OF HIGH ALTITUDE
RECONNAISSANCE PHOTOGRAPHY

1. INTRODUCTION. This research objective describes the requirements for a study effort to determine the feasibility of developing photo interpretation techniques and reference keys which would, ultimately, enable a trained interpreter to estimate wheat and other crop yields in selected areas of the world through a study of aerial photography (either black and white or color) acquired at regular intervals over the croplands during the growing season. It would be desirable to be able to make these crop yield estimates during the growing season. Because this is, of necessity, a research effort into a new area of photo interpretation the exact details of the proposed photo analysis program cannot be itemized very specifically in this design objective.

2. BACKGROUND.

a. When the economy of a foreign nation is being studied, one of the major intelligence problems relating to agriculture is an evaluation of crop prospects and annual production achievements for the major crops. At the present time estimates are based primarily on such sources as current weather information, press reports, and, where possible, observations by US Embassy officials and other travelers. In the case of some countries much that appears in print about crop yields is exaggerated, while for others very little information of any sort is reported in the news, or is available from other sources.



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b. The crop yields of such countries not only play a large part in their internal economies, but determine to a large degree how much assistance they can give to the smaller nations. It is believed, therefore, that for a number of years it will be important to know how successful these countries are in meeting their goals in agriculture.

c. Preliminary conversations with experts in the field of aerial photography suggest that, given adequate R&D support, there may be some potential for developing new photographic interpretation techniques that would be useful in estimating crop types, acreages, and, ultimately, yields. A feasibility study is required to determine if this type of information can ultimately be obtained from high altitude aerial photography.

3. REQUIREMENTS.

a. Results Expected From the Study Effort.

It is anticipated that this study will lead to the development of interpretive techniques whereby photo interpreters can, through an analysis of photographic imagery (either black and white or color) acquired at regular intervals during the growing season, estimate crop types, estimate crop acreages and, ultimately, estimate crop yields. Any such techniques developed must be applicable to the task of analyzing imagery (either black and white or color) comparable to that obtained from state-of-the-art, high resolution, high altitude photo reconnaissance systems even though the study effort itself need not utilize such imagery. The crop yield estimating techniques must be accurate within certain ranges of error and the results obtained must be verifiable.

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The permissible range of error in the yield estimate will depend to a considerable extent on the time that the estimate is made. For example, in the case of winter wheat which is seeded in the fall and harvested the following summer, it would be useful to have an estimate early in the spring to give some measure as to how well the wheat survived the winter -- i.e., percentage of winterkill. At this stage even a qualitative estimate would be useful -- i.e. the stand is good or, alternatively, the stand has been reduced by 30% due to winterkill. In view of the fact that crop prospects must be reported throughout the growing season, crop estimates at various stages of growth during the spring and summer would be useful. An estimate at the critical "heading" period, for example, would be extremely useful. The permissible range of error in the yield estimate at this date, of course, would be somewhat greater than an estimate of the crop made just prior to harvest. A desirable goal would be a range of error of, +5% for an estimate at harvest time and, +15% for an estimate at the "heading" stage. In the initial stages of introducing a new method, a greater range of error would be quite acceptable and would be useful in checking and supplementing other methods of yield estimation.

b. Techniques by Which Desired Results Will Be Obtained.

The details of the proposed feasibility study effort are being left open intentionally. The Government is looking for creative ideas from responding contractors in this matter.

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d. Planned Length of Study Effort.

The Government assumes that this study effort could be carried out within a 9- to 12-month time period.

e. Use of Simulated, High Altitude Photography During the Study Effort. The analysts and researchers assigned to this study effort should be familiar with the quality and nature of the imagery acquired currently by very high altitude aerial photo systems. This stipulation is made even though the bulk of the study might be carried out using photography which would be only a simulation of operational imagery.

Photography used as a simulation of operational imagery should have the following characteristics:



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20 June 1966

DESIGN OBJECTIVE

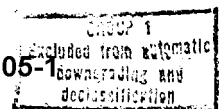
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