QUARTERLY PROGRESS REPORT

December, 1974 through February, 1975

HYDROLOGIC SIGNIFICANCE OF LINEAMENTS IN CENTRAL TENNESSEE

(Formerly Hydrologic Significance of Faults in the Great Smoky Mountains National Park)

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Prepared for: Lyndon B. Johnson Space Center

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TITLE: Hydrologic Significance of Lineaments in Central Tennessee (Formerly Hydrologic Significance of Faults in the Great Smoky Mountains National Park).

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OBJECTIVE OF STUDY: To determine the feasibility of mapping lineaments on S-190 photography of central Tennessee and to determine the hydrologic significance of these lineaments, particularly as concerns the occurrence and productivity of ground water.

PROGRESS AND OVERALL STATUS:

The project is approximately on the schedule that was specified in the milestone plan. Data analysis and interpretation is virtually complete and writing of the final report has begun. Test drilling was completed in February. There is good reason to believe that the study can be completed by June 30, 1975.

A report titled "Prospecting for ground water with SKYLAB photography in central Tennessee" by G. K. Moore and E. F. Hollyday has been written and submitted through channels to U.S.G.S. and NASA for approval. This report describes the initial results of this SKYLAB study. The paper will be presented at the fourth annual symposium on Remote Sensing of Earth Resources, March 26-28, 1975, and will be published in the proceedings.

Test drilling was completed during the weeks of February 10 to 21, 1975. All results are not yet available, but two test wells on lineaments produced 5 to 10 times the median yield (0.63 litres per second) of all wells in the study area. Two other wells on lineaments have a yield of less than 0.063 litres per second.

A comparison was completed between lineaments detectable on SKYLAB photographs and lineaments visible on ERTS imagery and high altitude aerial photography. Wells on SKYLAB lineaments (the lineaments detected on SKYLAB photographs) generally have higher yields than wells on ERTS lineaments and aircraft lineaments.

Lineaments have been delineated by composite viewing (by projection) of S190A-red band photographs from SKYLABS 2 and 4. The comparison and analyses of these data have not been completed.

Experiments with machine processing to detect lineaments have included the use of Ronchi rulings and density slicing of film sandwiches. All results have been unsuccessful, although the latter technique produces what seems to be an enchancement of structural grain. At present, the human eye seems to be the only feasible method of detecting and mapping lineaments.

REQUIRED DECISIONS AND ACTIONS: None.

EXPECTED ACCOMPLISHMENTS IN NEXT QUARTER: Completion of a first draft of the final report is planned for the next quarter.

SIGNIFICANT RESULTS: All initial results of this study are included in the report "Prospecting for ground-water with SKYLAB photography in central Tennessee." This paper will be presented at the fourth annual symposium on Remote Sensing of Earth Resources.

SUMMARY OUTLOOK: The investigators plan to complete this study by June 30, 1975, as originally proposed. No additional funds will be requested.

TRAVEL SUMMARY AND PLANS:

A trip to the test site was made during the week of February 10 to supervise test drilling.

A trip to Athens, Georgia was made on January 28-30 to attend the Symposium on Utilization of Remote Sensing Data in the Southeastern United States.

A trip to Tullahoma, Tennessee is planned for the week of March 24 to attend the fourth annual symposium on Remote Sensing of Earth Resources.