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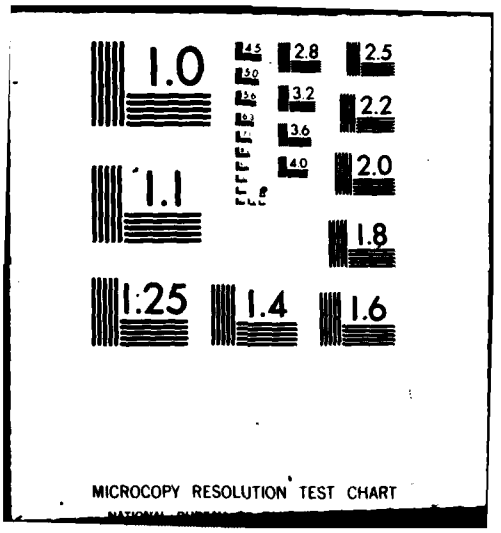
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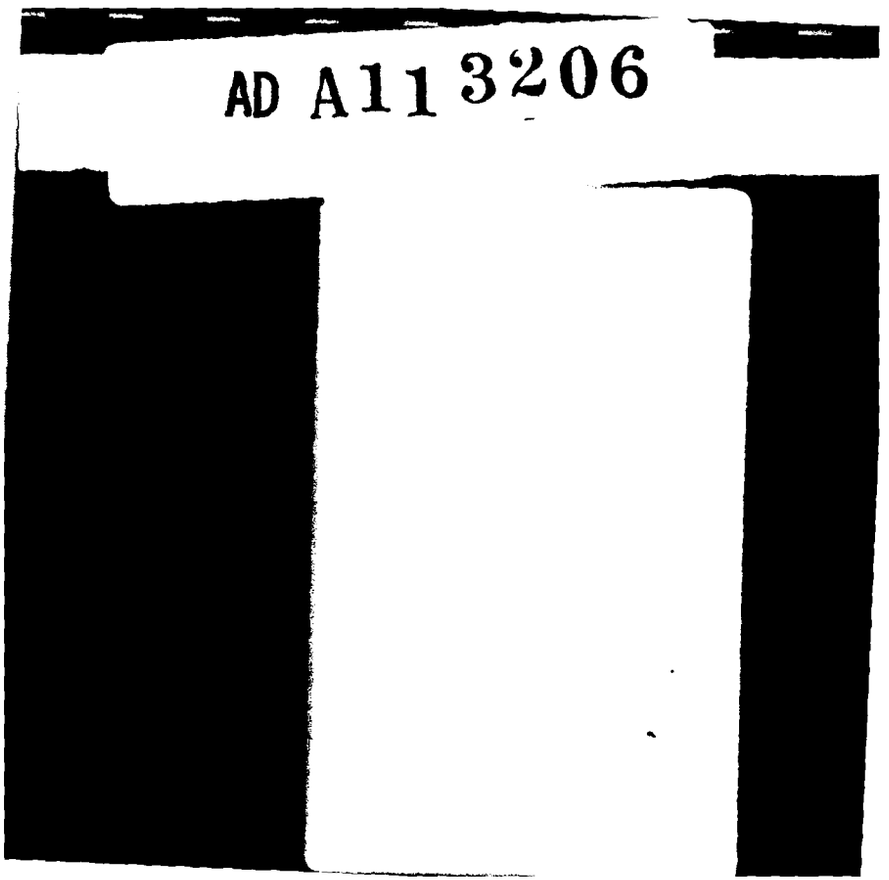
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GEOTECHNICAL INVESTIGATION

MISERS BLUFF TEST PROGRAM

PLANET RANCH, ARIZONA:

PROGRAM PLAN

Prepared For:

U. S. Department of the Air Force
Space and Missile Systems Organization
Norton Air Force Base, California 92409

Prepared By:

Fugro National, Inc.
3777 Long Beach Boulevard
Long Beach, California 90807

23 September 1977

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REPORT DOCUMENTATION PAGE

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Geologic Mapping, Seismic, Trenching, Drilling, Lab testing
Program plan

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Program plan for geotechnical study at Misers Test Site, Planet Ranch, Arizona for the U.S. Air Force recommends additional data be collected. The work plan schedule suggests an eight to 10 weeks study will be required to complete the final report.

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INTRODUCTION

Presented herewith is a program plan to provide additional geotechnical information at the Misers Bluff Test Site, Planet Ranch, Arizona. The additional data are needed by SAMSO, DMA, and AFWL in order to complete tests at the site.

Studies that have already been completed at the site consist of nine borings (maximum depth 125 feet) and four shallow refraction survey lines. A subcontractor for AFWL drilled four borings in January 1977. WES drilled five more borings in March and in the same month, shallow refraction surveys were made in the north and west portions of the site. In April WES performed CIST 19. A review of the boring data and refraction survey data was made in preparation of this program plan.

In preparing the program plan, Fugro National, Inc. was directed to treat the site area as a miniature valley and to perform a scaled-down study comparable to the "characterization" studies in progress in Nevada except as those studies relate specifically to construction. In addition, specific items have been added to provide information needed directly for DMA/AFWL to evaluate multi-burst test results. The scope and nature of these activities were discussed and agreed to at a meeting of program participants from SAMSO, TRW, AFWL, WES, and Fugro National, Inc. on 16 September 1977.

SCOPE OF WORK

General

It is proposed that the geotechnical study consist of the following activities, the location of which are on Figure 1:

- o Geologic mapping
- o Refraction seismic surveys
- o Crosshole seismic surveys
- o Downhole seismic and velocity survey
- o Trenching
- o Drilling and sampling
- o Laboratory testing

Upon completion of the field work, a final report will be prepared presenting the results of the study. Details of the various activities are included in the following section.

Geologic Mapping

Geologic mapping will begin with a field reconnaissance of the site area. This will be followed by studies of available existing aerial photographs and photogeologic mapping of major basin-fill materials and bedrock immediately around the Valley. Field checks will be made to verify photogeologic interpretations and to examine surficial features. Data will be plotted on the 1" = 200' scale topographic maps. It is assumed that photographs and maps will be supplied by SAMSO or AFWL.

Seismic Surveys

It is proposed that refraction surveys be performed along seven survey lines as shown on the attached drawing. Three of the lines will be oriented in an east-west direction and four lines

will be oriented in a north-south direction. The longest line will be about 5000 feet long, the shortest line will be about 2000 feet and the total length of lines will be about 24,000 feet. Offsets will be shot on selected spreads. Most of the lines will consist of 600-foot spreads using 24 geophones spaced 25 feet apart yeilding data to depths of approximately 200 feet. Along the longest and most easterly north-south lines, it is proposed to also record 1800-foot spread with the geophones at 100 feet spacings, which should yield data to approximately 600 feet.

At the intersection of two of the refraction lines, as shown on the attached drawing, it is proposed to perform one cross hole velocity survey. An engineering boring will be drilled at the intersection point and 3-inch PVC will be grouted into this hole. A second hole will be drilled about 20 feet to the west and PVC will also be grouted into this hole. A third hole will be drilled about 20 feet to the east of the first hole and as drilling proceeds, the cross hole survey will be performed. Compressional (P) and shear (S) wave readings will be taken in the two grouted holes at approximately five foot intervals; the energy source will consist of a sledge hammer striking the top of the drill stem used to drill the hole. The verticality of each of the three holes will be determined.

It is also proposed that a downhole velocity survey be performed in the same boring as the crosshole survey so that a comparison can be made of the P and S waves from the two methods.

Trenching

It is proposed to excavate five trenches at the locations shown on the attached figure. Three of the trenches will be located adjacent to the mountains where a high percentage of gravel is expected. It is planned to use a standard rubber-tire backhoe and excavate to depths of ten to 15 feet. The trenches will be shored or cut back in order to comply with OSHA requirements so that personnel can enter the trench. The trenches will be logged and bulk samples will be obtained. Sand cone tests may be performed at several different depths to determine in situ unit weights. In addition, hand carved samples may be obtained in selected trenches for laboratory testing. Trenches will be backfilled immediately following the necessary in situ testing and sampling.

Drilling and Sampling

It is proposed to drill eight rotary wash borings at the locations shown on the attached figure. All borings will penetrate through the alluvial deposits and into the underlying sedimentary unit. At least four of the borings will penetrate into basement rock and in at least two borings drilling will continue until fresh rock is encountered. Continuous coring will be attempted in all material competent enough to be cored.

Pitcher samples will be obtained in alluvial deposits and soft sedimentary rock. In four of the borings, continuous samples will be obtained to a depth of 50 feet (if possible), at five foot intervals between 50 and 100 feet, and at ten foot intervals below 100 feet. In the other four borings, samples will

be taken at five foot intervals in the upper 50 feet and at ten foot intervals below 50 feet. In addition, it is planned to drill eight borings to a depth of 50 feet using a hollow stem auger drilling rig. Fugro drive samples and SPT samples will be obtained, alternating at three-foot intervals. The proposed location of the borings is shown on the attached figure. Slotted three-inch PVC casing will be installed in all borings so that water levels can be monitored.

Laboratory Testing

Laboratory tests will be performed on samples obtained from the borings and trenches. The types of tests and approximate quantities are listed below:

Types of Tests	Number of Tests
Moisture Content	All Undisturbed Samples
Unit Weight	All Undisturbed Samples
Sieve Analysis	1/3 to 1/2 of Samples
Specific Gravity	8
Compaction	5
Triaxial, CD and CU	15
Relative Density	3

REPORT PRESENTATION

After all field activities and laboratory tests have been completed, the data will be analyzed and evaluated, and a brief final report will be prepared. The major headings within the text will be:

- o Introduction
- o Geologic Conditions
- o Valley Shape
- o Major Lithologic Units
- o Engineering Properties of Lithologic Units

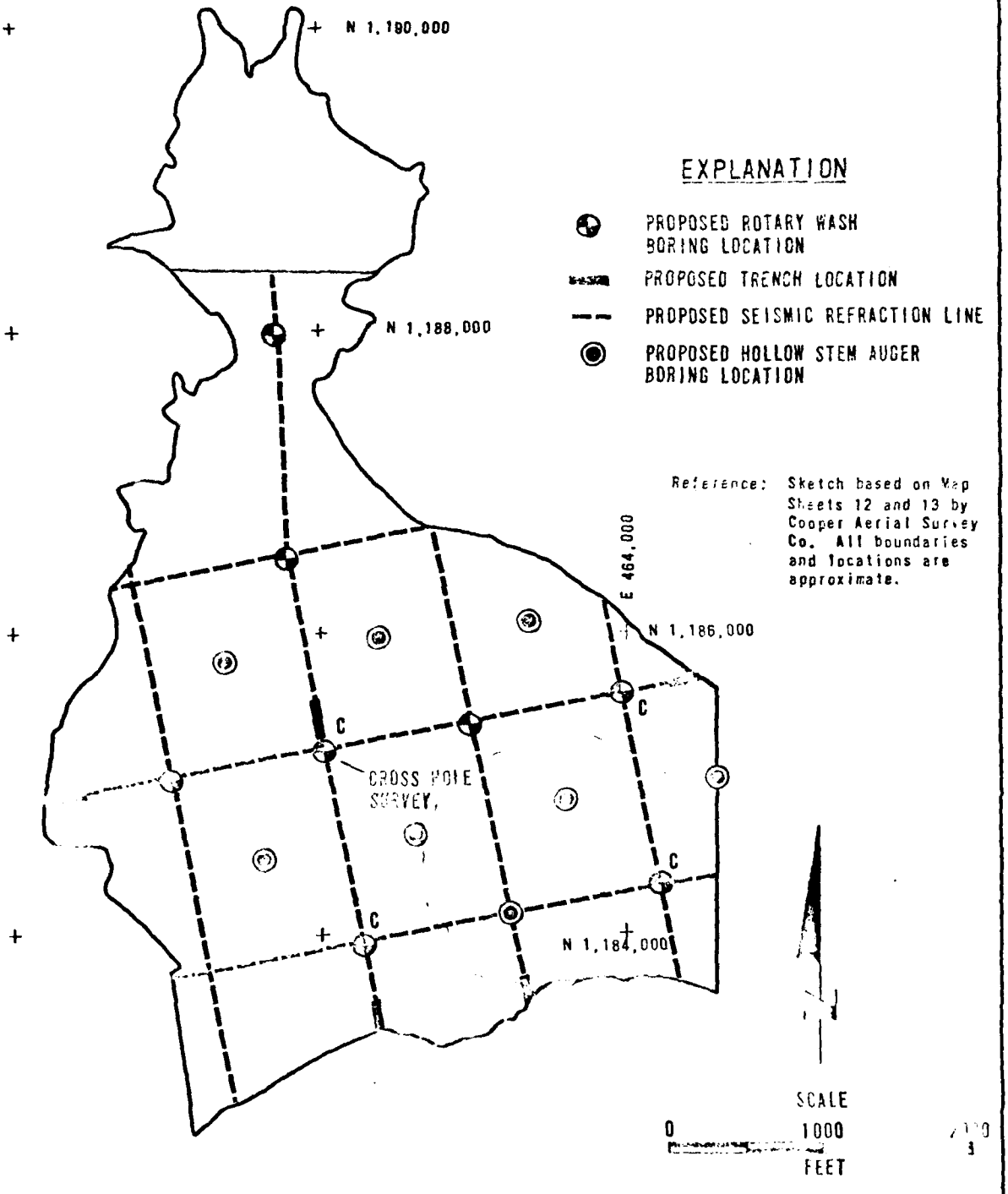
Included in the Appendices will be a geological map of the site, a bedrock and water-table contour map, seismic velocity profiles, crosshole velocity profiles, logs of boring and trenches, and laboratory test results.

SCHEDULE

It is planned to start the field studies in early November. It should be possible to complete the field work in a period of 20 to 25 working days. Laboratory testing should be completed within 20 working days after completion of drilling. Another four to six weeks will be required to evaluate the data and prepare a final report.

The following tentative schedule is proposed:

Start of Field Work	1 November 1977
Start of Laboratory Testing	15 November
Completion of Field Work	2 December
Completion of Laboratory Testing	6 January 1978
Submittal of Draft Report	3 February
Complete Review of Draft Report	17 February
Submittal of Final Report	3 March



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DEPARTMENT OF THE AIR FORCE - SAMSO

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