GROUND-TRUTH PROCEDURES

PHOENIX SOIL MOISTURE

March 19-22, 1975

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INTRODUCTION

This report summarizes the general procedures used for collection of ground truth on March 19-22, 1975, in connection with passive gamma and microwave remote-sensing studies west of Phoenix, Arizona.

Personnel from M. W. Bittinger & Associates, Inc., participated with personnel from various universities and Federal agencies in the collection of the ground truth. All soil and vegetative samples are being processed by Dr. Blanchard of the Agricultural Research Service, USDA, of their laboratory at Chickasha, Oklahoma.

It should be noted that this mission was planned and under way prior to the contract date with the firm of M. W. Bittinger & Associates, Inc.

LOCATION

The principal flight lines are located along 91st Avenue west of Phoenix between U. S. Highway 60-70-89 and the Salt River. Flight line L1 is located 1/4 mile west of 91st Avenue. A 5-mile segment of these lines was selected for ground truth between Thomas on the north and Broadway on the south. This is shown in Figure 1.

NOTATION SYSTEM USED FOR GROUND-TRUTH FIELDS

Each field 1/2 mile either side of 91st Avenue was given a number. For the most part each field was 40 acres in size. In the case of 80-acre fields, either bare or in the same crop, they were divided into two 40-acre fields with the same number notation but utilizing "A" and "B" suffixes. The 5-mile segment utilized for ground truth is shown in Figure 2 with each field used in the ground truth numbered.

Figure 1. Flight Lines L-1 and L-2, Phoenix Area, March 17-22, 1975.

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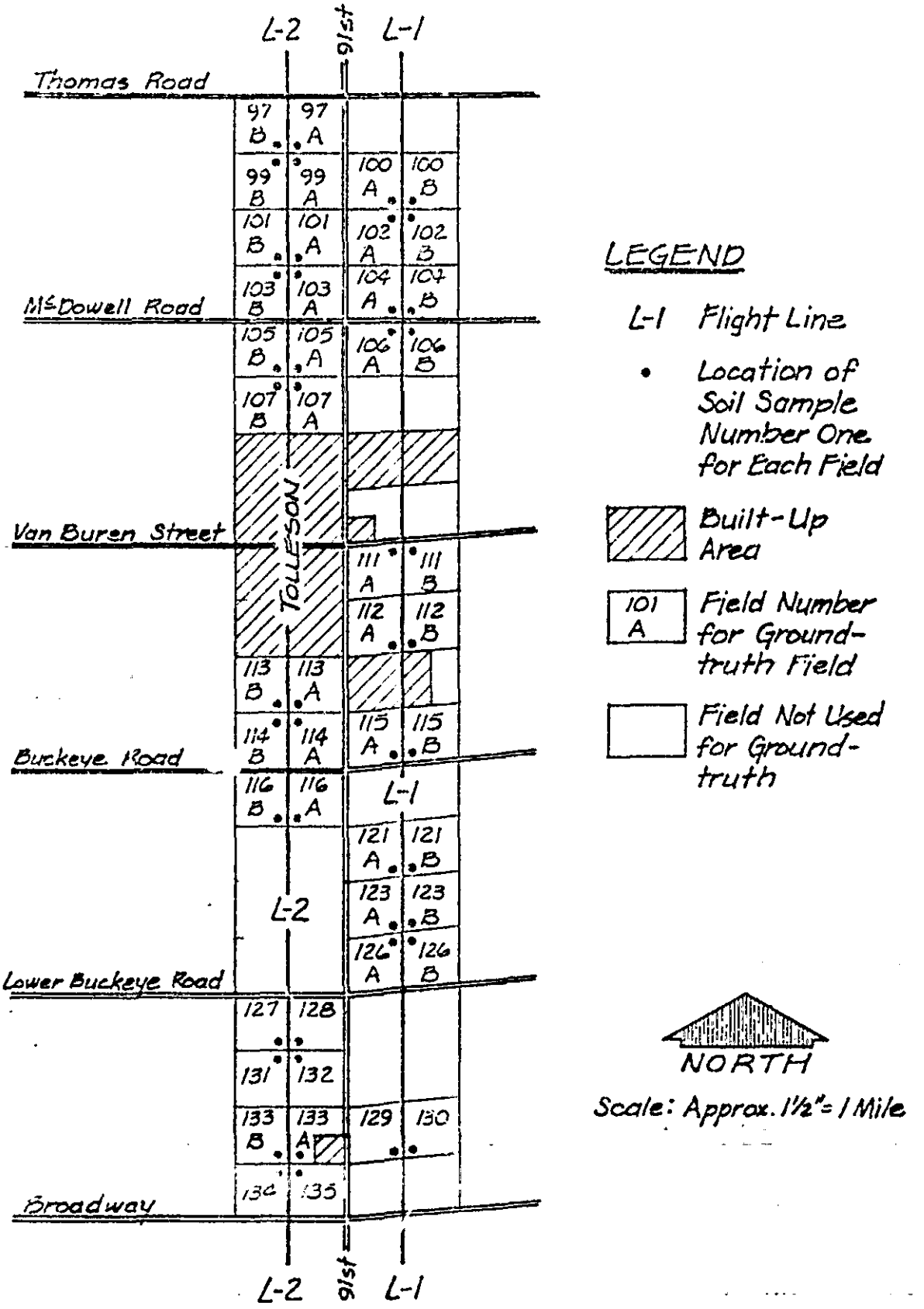

Figure 2. Schematic Flight Line Map

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Sampling Procedures

On each flight date, soil moisture was taken in the bare fields at the time of flights, i.e., approximately 0600 and 1230 hours. Vegetated fields were sampled for soil moisture in the intervening time. Field cover is shown in Table 1.

Four points were sampled in each ground-truth field. The four sample points were located approximately 330 feet from field boundaries. This is illustrated in Figure 3. Each field was sampled in a clockwise direction starting from the number one point (shown in Figure 2).

In the case of bare fields, all of which have ridges and furrows, samples were taken on the ridges as well as in the furrows at the four points.

Five horizons were selected for sampling. These are as follows:

(1) 0-1 cm below the surface
(2) 1-2 cm
(3) 2-5 cm
(4) 5-9 cm
(5) 9-15 cm

Thus with this sampling scheme, a vegetated 40-acre field would yield 20 samples, and if it were bare, 40 samples would be obtained. Therefore on each flight date over 2500 soil samples were taken.

Soil samples were taken with a trowel and ruler so as to accurately sample the pre-selected horizons. For each horizon a soil sample of 100 grams was desired.

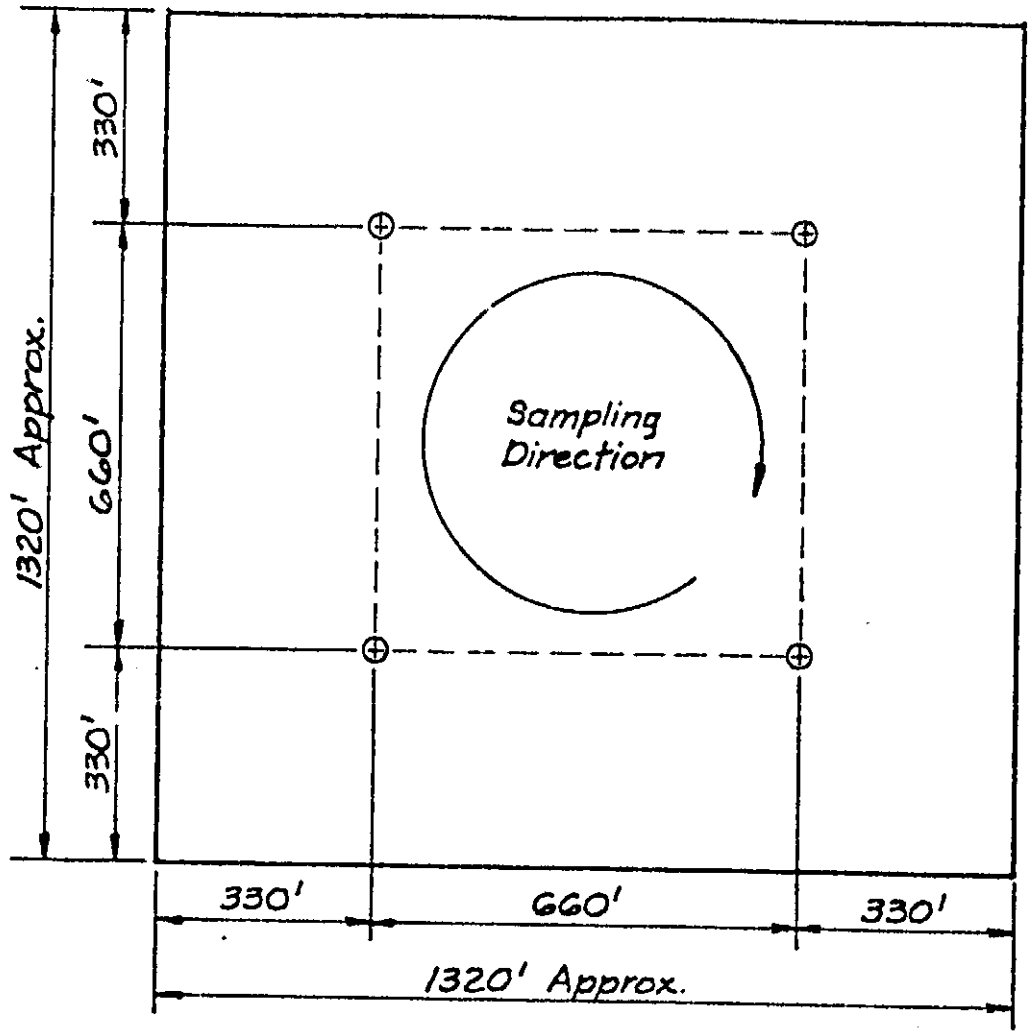
Hot-beverage paper cups were used as soil sample containers. They were sealed by first placing a piece of plastic wrap over the cup and then [illegible] a standard plastic lid on the cup. Soil samples were rapidly transported to the laboratory where they were weighed on precision balances. (Weighing was taking place while field sampling was continuing.) To speed drying of the samples, micro-wave ovens were utilized. This phase of the work, including collect and gravimetric determination of soil moisture was done under the direction of Dr. Bruce Blanchard of the USDA, Agricultural Research Service of Chickasha, Oklahoma.

Table 1.

Summary of Fields Sampled and Vegetative Cover

Field	Cover
97 A & B	Alfalfa
99 A & B	Bare
100 A & B	Spinach
101 A & B	Alfalfa
102 A & B	Bare
103 A & B	Bare
104 A & B	Bare
105 A & B	Bare
106 A & B	Wheat
107 A & B	Bare
111 A & B	Wheat
112 A & B	Wheat
113 A & B	Wheat
114 A & B	Wheat
115 A & B	Wheat
116 A & B	Bare
121 A & B	Bare
123	*
124	*
126 A & B	Bare
127	Bare
128	Bare
129	Alfalfa
130	Alfalfa
131	Bare
132	Bare
133 A & B	Bare
134	Bare
135	Bare

*Mixed or not indicated



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Scale: 1"=300'

Figure 3. Field Sampling Configuration

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Designation of Soil Samples

Each sample was numbered in the following manner:

Field number

Point in field

Location

- T - top or ridge sample
- B - bottom or furrow sample
- F - flat field--in some cases the "F" may have been omitted, but this still indicates a flat field.

Horizon

1	0-1 cm
2	1-2 cm
3	2-5 cm
4	5-9 cm
5	9-15 cm

Thus a sample marked 103A-1-T-3 would be a sample from field 103A taken at Point 1 on a ridge, and the soil horizon would be 2-5 cm.

VEGETATION SAMPLING PROCEDURES

The vegetal density was sampled on March 20 in designated vegetated fields. Three 1-square-foot samples were used for each 40-acre field. In each square foot a ground-surface clipping was made, stem counts were taken, and average height was noted. The clippings for the three samples were composited. Thus a volumetric density could be computed for each field. In addition, vegetation from each field was tightly packed in a container of known volume, so that vegetative densities could be obtained on a volumetric basis.

Photographs were taken at each point with "roughness panels" for height [illegible].

Vegetative densities will no doubt be reported by fields; again, this work was under the supervision of Dr. Blanchard.

GROUND-TRUTH DATA

All ground-truth data taken on this project are being processed by ARS (Chickasha, Oklahoma) and NASA (JSC). It is understood that Dr. Bruce Blanchard of the ARS at Chickasha will be preparing the ground-truth data reports. Copies of this material have not been received as of the date of this report.