GEODETIC SURVEY PARTY IN ARKANSAS

65 Men Will Run 3,000 Miles of Levels in Next Few Months.

Headquarters have been established in Little Rock by the United States Coast and Geodetic Survey for a survey level party composed of 65 men, who will run about 3,000 miles of levels in Arkansas, eastern Oklahoma, and southern Missouri. Dr. George G. Branner, state geologist, said yesterday.

Lient. A. C. Throckmorton, in charge of the party, which is composed of the following men: One casting party that operates in advance of other units and erect concrete monuments and distributes them among the proposed lines; four bench mark parties which set, erect, and describe their locations, and eight levelling parties who determine the precise level elevations of the monuments.

Approximately 3,000 miles of levels will be run in Arkansas and, weather permitting, the work will be completed in about four months. When the work is completed, Lieutenant Throckmorton said, the Coast and Geodetic Survey will have a complete level network which will be valuable to state, county, and local engineers.

GEOLOGICAL HEADS GEOLOGIC SURVEY

Geological heads of the United States Coast and Geodetic Survey work to be done in Arkansas, according to an announcement of the survey by Mr. G. C. Branner, state geologist, last week.

George C. Branner will supervise work for which $98,352 was allotted.

GEODETIC SURVEY NEARLY COMPLETED

Cleveland.—The final public works of the Survey are nearly completed, and the work on the Coast and Geodetic Survey is to be done in Arkansas, with an allotment of $98,352 in federal funds.

The program contemplates that $98,352 from the Federal Emergency Relief Administration will be used to pay survey crews. This sum will be supplemented by an allotment of $30,352 from the Coast and Geodetic Survey.

Positions and elevations determined on traverse and level lines which will be run by the state are of basic importance to engineering work, such as soil conservation, power projects, and pipe line extensions. Elevation, regional planning, and the preparation of public and private boundaries.

The program is designed to survey 25 field parties to run traverse and level lines throughout the state, so that no points in the road will be more than three miles from one of the lines. The maximum distance to such a point will be about 25 miles.

The major portion of the traverse and level work in Arkansas was completed by the Coast and Geodetic Survey during the past three years with funds which $121,000.00 and $121,000.00 were appropriated by Congress in 1931 and 1932. Mr. Branner was instrumental in having allotted to Arkansas 1932.

U. S. Geodeamic Survey Nearl y Completed

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Benefits of Accurate Boundaries

Through the Use of Triangulation, the Need for Astronomical Observations Along State Boundaries Is Eliminated. Several Arcs of Triangulation Have Been Located in and Near Arkansas.

By WILLIAM BOWIE
Chief of the Division of Geodesy of the United States Coast and Geodetic Survey.

Arkansas was admitted to the Union as a state in 1836. The enabling act of Congress described the boundaries of the new state as follows:

"Beginning in the middle of the main channel of the Mississippi river, on the parallel of 36 degrees north latitude, running from thence west, with the said parallel of latitude, to the Ohio Fraternal river; thence up the middle of the main channel of the Ohio river to the parallel of 34 degrees, 30 minutes, north, from thence west to the southern corner of the State of Missouri; thence south on the boundary line of Missouri to the north bank of the Red river, by the line described in the 1st article of the treaty between the United States and the Cherokee Indians, east of the Mississippi, made and concluded at the city of Washington, on the 26th day of May, in the year of our Lord one thousand eight hundred and twenty-eight; and to be bounded on the south side of the Red river by the Mexican boundary line, to the northwest corner of the state of Louisiana; thence west with the Louisiana state line, to the middle of the main channel of the Mississippi river; thence up the middle of the main channel of the said river, to the thirty-sixth degree of north latitude, the point of beginning."

In the state constitutions of 1836, 1854, 1869, and 1874, the boundaries of Arkansas were described, but there were no material changes from the description given in the enabling act of Congress. However, by an act of Congress, approved in 1869, the western boundary of the state near Fort Smith was changed to include a portion of the Indian Territory. This involved only about one-fifth of a square mile.

In 1890, commissioners surveyed and marked a portion of the Arkansas-Mississipi state line which involved none that was in dispute along the river. The Mississippi, which was considered to be the boundary between Arkansas and Mississippi, is not really a very good boundary. It changes its course from time to time as the river cuts across country during high water. Every time such a change in the channel occurs, the question comes up of who owns the land that has been shifted from one side of the river to the other.

The boundary of Arkansas was surveyed in 1821 and was resurveyed by a joint commission of this state and Missouri between 1843 and 1846. The latter survey was started at a point near the Mississippi river, whose latitude from the center of observation was determined at 36 degree 30 minutes, and the marks along the boundary consisted of tree blazes, wooden posts, and mounds of earth and stone. This so-called 1843 line, which differed materially from the previously located northern boundary, was accepted by the legislatures of the two states and ratified by congressional act of February 15, 1844.

The part of the west boundary south of the Arkansas river was surveyed and marked in 1828, and that from old Fort Smith to the southeast corner of Missouri was surveyed and marked in 1831. A resurvey of the west boundary was begun in 1852, but the surveyors had only a small amount of work, and they were directed to return to Fort Smith and retrace the line of the previous survey which had been found to diverge to the west. A resurvey and marking of the entire west boundary of the state was authorized in 1855. This work, which was completed in 1877, showed that the old line from old Fort Smith, both southward and northward, diverged to the west, thereby adding more than 300 square miles to the area of Arkansas. The Cherokee and Choctaw Indians were paid for the land which they had been wrongfully deprived.

The southern boundary of Arkansas, which is the northern boundary of Louisiana, was surveyed in 1869, shortly after the Louisiana Purchase. The survey was primarily of the thirty-three parallel of latitude from the west bank of the Mississippi river to the east bank of the Red river. Most of the marks made by the surveyors were burned trees. This location of the line was accepted in 1861 as the boundary between Louisiana and Arkansas. A part of this line was resurveyed and reestablished in 1861. Other parts of the line have been resurveyed as a part of the regular work of the General Land Office. West of the Red river, the line was surveyed in 1873. The western six miles of the boundary was resurveyed in 1890 and a sonic point was placed on the Texas line to make the northwest corner of Arkansas.

The United States Geological Survey has located certain points on this southern boundary of Arkansas.

It will be seen from the foregoing that some of the boundary lines of Arkansas have not been substantially maintained. It would be to the interest of the state to have new surveys made in order that the limits of the state might be well laid down on the ground and monuments in such a way that any one could tell where he was from the state to any of the adjoining states.

In making a map of a state, the most important thing is to have the boundaries maintain as accurate as to location. Then the state map will be true in form and area. There are many ways of surveying the boundaries of a state. In the early days of this country, before the telegraph, longitude had to be determined by observations of the moon or by transporting chronometers from a point whose longitude was known to the point designated as the state boundary. Such methods of determining longitude were crude and many meridian boundaries were quite inaccurately laid down. The boundary, however, remains as marked on the ground after it has been accepted by the legislatures of the two states.

A most notable case occurred in the Island of Puerto Rico. The old Spanish chart was based upon astronomically determined latitudes at Ponce on the south coast, and at San Juan on the north coast. These two cities are only 32 miles apart in the north and south direction. Yet the distance between them determined from these astronomical latitudes was just one mile in error. At the south station the plumb line had been deflected towards the north by the mass of the island and the deflection of the line in the water of the Caribbean sea, and at the northern station it had been deflected towards the south by the mass of the island and the deflection of the meridian in the waters of the Atlantic ocean.

In Turkey, there is a broad valley running east and west flanked by high mountain ranges. The width of that valley determined by astronomical observations, was found later to be in error by a mile and a half. At the southern station the plumb line had been deflected towards the south and at the northern station it had been deflected to the north.

There have been cases in our state boundary surveys where more than one astronomically determined latitude or longitude has been used in locating the boundary. It has been found that a north and south line run from one of the astronomical stations would not join another part of the boundary extended north and south from a second astronomical station. Even the boundary along the forty-ninth parallel between Canada and the United States has been changed several times as a result of surveys made under these circumstances.

This map prepared by Mr. Bowie shows the different boundaries Arkansas has had.