

The following is a transcription of a document by William Roy Bandy. The original, a typewritten carbon copy on onion-skin paper, was found in the materials sent to Glenn Borkenhagen by Bandy's grandson Dirk Reith during August 2019. Since this version mentions the Bureau of Land Management, it was written in 1946 or later.

THE SURVEY OF THE NORTH BOUNDARY OF WYOMING

A Study of the Field Notes of the Original Survey and an Account of Recent Retracement

By WILLIAM R. BANDY

The original survey of the Boundary Line between the States of Wyoming and Montana was made in the years 1879 and 1880. The survey was executed by Mr. Rollin I. Reeves, Surveyor and Astronomer under instructions issued him by the Commissioner of the General Land Office dated April 18, 1879. The instructions provided for the initiation of the survey at the northwest corner of Wyoming Territory which had been established by a previous survey in 1873. The line was to be produced east along the 45th parallel of latitude with corners established every mile. The instructions also specified that the surveyors should make an astronomical observation for the accurate determination of the true latitude at intervals not to exceed 27 miles.

The initial point for the survey was in the rough mountains some 60 miles south of the present town of Bozeman, Montana. It was high up on the mountains near the headwaters of the West Gallatin River. The lack of roads, passable trails, and supply stations in the locality at that early date made the transportation of equipment and supplies a serious problem for the surveyors. The difficulties in reaching the place of beginning and then producing the line eastward over some of the roughest sections of the Rocky Mountains are described by Mr. Reeves in the official field notes of the survey which are on file in the Public Survey Offices of the Bureau of Land Management in Billings and Cheyenne. Copies may also be found in the Washington offices of this bureau.

Fortunately Mr. Reeves kept a detailed account of the more important day to day happenings which make most interesting reading. This daily record of the trip was made by him while the great hardships suffered by members of the party were fresh in his mind. They are written in clear and often colorful language resulting in a most interesting narrative. He so vividly describes the vexing problems confronting the surveyor in that kind of country that numerous quotations from the field are given herein as the best means of describing them. The writer retraced some twenty-two miles of this State line through the roughest part of the country in the Cooke City area a few years ago and can vouch for the roughness of the terrain. This retrace was made in conjunction with his work for the General Land Office in tying in the section lines and mineral surveys to the State Line monuments. On this retrace work elevations of 10,300 feet above sea level were attained. One day the party ate lunch on a ridge north of Index Peak that was 10,300 feet high. The boys enjoyed viewing the surrounding country with the transit during the lunch period.

The Survey party was organized in Green River City, Wyoming in July 1879 by Mr. Rollin I. Reeves who was the chief surveyor and astronomer. Mr. H.P. Tuttle accompanied the party as astronomer, and they had an average of 16 assistants including packers, chainmen, axmen, and other helpers. Mr. Reeves states he had "about 50 head of horses, mules, and jackasses for transportation." They left Green River City on the Union Pacific Railroad on July 28, 1879 and traveled up Green River to Big Sandy Creek, Little Sandy and Dry Sandy creeks, through South Pass and on to Fort Washakie, Wyoming. They were joined by a company of soldiers at Fort Washakie who acted as a military escort to protect them from the Indians. Thence they moved up Big Wind River to its source thence up Pacific Creek through Two Ocean Pass. They then followed down the headwaters of the Yellowstone River to Yellowstone Lake and around the lake on the south and west shores. The difficulties encountered in the area are described in the field notes as follows:

"From the time we left the headwaters of the Big Wind River about 100 miles from Fort Washakie we tried to follow the trail made in 1873 by Lieut. James, U.S. Engineer, but which was obliterated in many places. From that point until we again struck a good trail near the lower end of the lake the route was through dense timber all the way. The grades were frequently very stony, steep, and prolonged. The trail frequently could not be found at all, and we had no guide with us. In many places the down timber and undergrowth were matted so closely and firmly we could not get through it. Swamps were numerous, and the ground was miry and deceptive. Altogether it was unqualifiedly the most laborious, long march I ever made. We were lost for several days at a time. Notwithstanding these trials we enjoyed many features of the journey. No sickness, loss, or accidents were suffered, and no fights fought, though bickering, back-biting, and grumbling were indulged in as they always will be on expeditions of this kind."

From the lower end of the lake the main party went down the river via Sulphur Mountain, Mud Volcano, the Falls and canyon of the Yellowstone to Baronet's Bridge and then to Mammoth Hot Springs, according to the field notes. They reached Mammoth Hot Springs on September 2, over a month after they left Green River City. Some of the party who had become separated from the others while coming around the lake continued on to Mammoth by way of Norris Junction, being guided by the scout Yellowstone Kelly.

While in Mammoth they replenished their food supply by sending parties to Fort Ellis. They then went westward across the Park to the initial point of the survey being guided by a Mr. Page who had worked on the survey of the West Boundary of Wyoming Territory.

In projecting the line eastward the tangent method of determining the true latitudinal curve was employed. By this method a true meridian is established at the point of beginning by astronomical observations from which a deflection angle of 90° [is] turned to the east. This line was carried eastward until a suitable place for another astronomical observation was reached but never to exceed 27 miles. As the measurements were completed along this line for each corner point proper offsets were made north from the tangent to the true parallel of latitude upon which line the corners were established. In projecting this line through the rougher areas where deep impassable canyons were encountered the general practice was to flag the line from ridge to ridge and [then] triangulate across the canyons. Afterwards they would measure out from the triangulation stations and establish such intermediate mile corners as were found to be accessible.

ORIGINAL SURVEY WELL DONE CONSIDERING HANDICAPS

Although errors in alignment and measurement have been found the survey as a whole was well executed, taking into consideration the adverse conditions under which it was made. This is especially true of the construction of corner monuments. In almost every instance these have been found to have been constructed in strict conformity with the instructions. Unfortunately the instructions specified the use of wood for corner posts instead of more durable material. The more notable errors in alignment are usually found in the last mile leading into a new astronomical station. The accumulated error being thrown into this mile.

FIELD NOTES SHOW GREAT HARDSHIPS ENCOUNTERED

The following quotations from the field notes show the great hardships encountered by the party while projecting the line through the rougher sections of the mountains. In the vicinity of Electric Peak he has this to say:

"In crossing this barrier our hardships were peculiarly severe. On the evening of September 6th quitting work on line our party started down the mountain to find camp. We divided into five smaller companies. The camp was not found until noon of the next day, all hands having lain out

without shelter or food since the morning of the 5th. I walked fully twenty miles trying to find the pack train and I think others travelled as far."

They quit work for the season of 1879 a few miles east of the present town of Cooke City, Montana which he refers to as the Clark's Fork Mines. Of the last few days of the season the surveyor has this to say:

"On the morning of October 6th a light snow was falling On the morning of the 9th while it was still snowing, a part of our number went out on line and brought in the instruments and tools that had been left on line the evening of the 5th. Although this point was not two miles from camp, it was the hardest day's work experienced by several members of the party during the survey. The surface is covered with fallen timber, dense undergrowth, and vast quantities of boulders and broken stones.

"The snow was wet and heavy. As it fell from the trees it drenched the men through and through. It required nearly all day to bring in the instruments. Accordingly the camp was disbanded, some going to Yellowstone Park, some to Bozeman, some to Crow Agency, and others to Fort Washakie. During the season our camp was constantly supplied with fish and fresh meat. Elk, deer, and antelope were as numerous as dogs in an Indian camp. As to Buffalo, we saw hundreds and killed several, seven in one afternoon."

The last corner established in the fall of 1879 was set at 60 miles plus 31.12 chains and was designated the witness corner to the 60-mile corner. This is the first corner established east of the high ridge extending north from Index and Pilot peaks. It is about 4000 feet below where the line crosses the ridge and the distance was determined by a complicated set of triangulations in which an error was made causing the calculated distance to be 49.10 chains less than the actual distance. This error was discovered by me when the retracement of this line was made in 1936. It caused us to lose several days time searching for the witness corner. In fact we were unable to find it until we had extended the search three miles east to the 63 miles corner which was the remains of a wooden post set in a mound of stone. By retracing the line back west we were able to find this witness corner which was marked by some chisel marks on the flat surface of a large granite outcropping 60 by 20 feet. The marks could barely be distinguished even after we were reasonably sure we have found evidence of the corner.

The original surveyor calculated the distance to this witness corner to the 60-mile corner by a triangulation as follows: As he approached the high ridge north of Index and Pilot peaks mentioned above he read bearings from points along the line to the top of Index Peak which is about 1½ miles south of the line. Then from the flag established on the high ridge he determined the bearing to Index Peak and calculated the distance to the peak which he found to be 120.77 chains. He then went down in the lower country east of the high ridge and picked up the line by sighting back at the flag. To determine the distance to this point he states he read a bearing to Index Peak. He must have either sighted at the wrong peak or misread the bearing for he made an error of 49.10 chains in the distance between the two points.

A MEMBER OF THE ORIGINAL SURVEY PARTY IS LOST

The survey was continued eastward in August 1880. It was about 10 miles east of here that the original survey party lost one of their men. This man's name was Hopkins and he was listed as a cook. The incident is described in the field notes as follows:

"From the 73rd mile eastward the entire region is almost impassable. We lost one man (Mr. Hopkins) in the 75th mile and it is supposed he must have fallen down one of the numerous horrible canyons which are notorious in that region. His horse and coat were found but not himself though vigorous search was made for him along the streams and along the lower levels."

On account of the deep canyons and rough impassable nature of the region no corners were established for eight miles from the 73rd to the 81st mile corners, and again from the 85th to the 88th mile corners. The line leaves the rough mountains on the 91st mile and passes over grassy bench lands to the Clark's Fork River where another astronomical observation for latitude was made.

JOG IN STATE LINE IS FOUND

The astronomical observation to determine the true position of the 45th degree of latitude was made near the 98th mile corner, on the Clark's River. The 97th mile corner is on the edge of the bench overlooking the Clarks Fork valley and the line is fairly straight to this corner. However, from the 97th mile corner to the 98th mile corner the line runs S. $66^{\circ} 17'$ E., for a distance of 86.00 chains. Evidently, as a result of their astronomical observation they arbitrarily moved nearly one-half mile south and continued on east. However, there is nothing in the field notes to indicate any jog in the line at this point.

BAD LANDS EAST OF CLARK'S FORK DESCRIBED

Of the region between Clark's Fork and Big Horn rivers Mr. Reeves has this to say:

“The section is destitute of large timber. The mile posts are carried many miles. They were cut 7 feet long by 5 inches square and had to be packed. It being entirely impossible to haul an empty wagon over or near the line. The horses or mules would not carry the posts. So the donkeys had to do it! When it is remembered how heavy the posts are, how hard to get, and the size of the pits, post holes and mounds, a faint idea may be conceived of the work involved in marking the corners, one each mile. It is hard to conceive of any useful purpose to which this “bad land” surface may be applied.”

After they crossed the Big Horn River where they waited three days for log rafts to be constructed to make the crossing the next real barrier encountered was Devil's Canyon an impassable gorge leading into the Big Horn River from the east, out of the Big Horn Mountains. They arrived at the west side of the canyon on the 145th mile. The canyon is described as being about one-quarter mile wide at right angles, but about a mile across on line. Their trip around the head of this canyon is described in the field notes as follows:

“All hands left the line taking their tools with them and started in a southeast direction to follow the pack train which had gone ahead to cross the canyon at the nearest passing point. We followed up the south west side of this great canyon all day and went into camp just before dark 20 miles above where we had left off work. Have been climbing the Big Horn Mountains all day and ascended about 2000 feet above the witness corner. This is Friday night the 27th of August. Saturday August 28, marched all day and about 3 p.m. found a crossing at head of canyon, returned down the other side of the canyon, camping that night at an elevation of about 10,000 feet about 5 miles south and 7 miles east of the objective point on the west edge of the Big Horn Mountains. Have traveled about 18 miles.

“August 30, 1880: It rained all day today, and we spent a miserable day in camp.

“August 31, 1880: It being impossible to take the pack animals farther west on line on account of the steep rocky character of the western slopes of the mountains, the party with the necessary tools are now taken down the mountains to a point on the east side of the canyon opposite the 145-mile corner. The distance across the canyon is taken by triangulation, and the party go into camp without blankets and without supper.”

He reports that the line from the 145-mile corner to the astronomical station established on line on a white cliff on the east side of the canyon crossed a bend in the impassible canyon that could not be crossed so they triangulated all the way to the white cliff a distance of 11 miles and 8.01 chains; thus no corners were established along this portion of the line for a distance of over 11 miles.

He reports that when they reached the valley of the Little Big Horn River several settlers were waiting to see where the State line would fall so they could "Squat" on the land on the Wyoming side which would be off the Crow Indian Reservation and open for settlement by whites. Mr. Reeves described this valley as the best agricultural land he had seen in Wyoming Territory. As they crossed the plains east of the Big Horn Mountains he reports seeing many herds of buffalo which are described as "gentle, grazing and sleeping all around us while we worked."

The next big jog in the State line is found in the 256th mile. This is on the west side of Powder River where astronomical observations were made to determine the true latitude. From the 255-mile corner to the astronomical station on the west bank of Powder River the bearing is N. 57° 38' E., for a distance of 69.74 chains. It is noted that the jog north here is about the same amount of northing as there was in southing at the jog on Clark's Fork.

The line was carried on eastward across the plains to an intersection with the West Boundary of the state of South Dakota where the Northeast corner was established on October 23, 1880. Near the 332nd mile they reported: "Great heards of antelope were seen which were being killed for their skins." On October 21st a prairie fire burned their camp with a reported loss "of 25 saddles, blankets and riggings, all clothing, 500 rations, much bedding and some tools. I lost between \$400 and \$500 worth of equipment in this fire."

In summing up his experiences Mr. Reeves mentions the difficulties in keeping the survey recruited to full strength as follows:

"Wages of \$50 to \$100 per month and board were paid. Any man had a right to demand his pay in cash at any time. I carried constantly on my person from \$900 to \$1700 in currency and every man was paid in cash on demand. These mountaineers are a very independent class and you cannot enlist them for a longer period than they want to stay."