

Secretary Roper today made public the report of the Accident Board of the Bureau of Air Commerce in connection with the fatal air line accident near Kellogg, Idaho, on December 18, 1936. The report is as follows:

REPORT OF THE ACCIDENT BOARD

Statement of probable cause concerning an accident which occurred to an aircraft of Northwest Airlines, Incorporated, near Kellogg, Idaho, on December 18, 1936.

To the Secretary of Commerce:

On December 18, 1936, at approximately 3:23 A. M., Pacific Standard Time, at a point 12 miles southeast of Kellogg, Idaho, an airplane of United States registry, while being flown in scheduled interstate operation carrying mail, met with an accident resulting in death to the crew, consisting of pilot and co-pilot, and the complete destruction of the aircraft. No passengers were aboard.

The pilot, Joe Livermore, held a Federal transport pilot's license and a scheduled air transport rating. The report of his latest physical examination, taken on November 12, 1936, showed him to be in good physical condition. His license and rating were renewed on November 14, 1936. The co-pilot, Arthur A. Haid, held a Federal transport pilot's license. He was in good physical condition at the time of his last examination on August 1, 1936. His license was renewed on September 30, 1936.

The airplane, a Lockheed Electra, model 10-A, was inspected and approved for relicensure by the Bureau of Air Commerce on November 24, 1936, and bore Federal license number NC-14935. It was owned by the Northwest Airlines, Incorporated, of St. Paul, Minnesota, and at the time of the accident was being operated by that corporation on scheduled trip No. 1, Chicago to Seattle with ten intermediate stops. This operation was conducted under a regular Federal Letter of Authority. This trip, Westbound Flight 1, was regularly scheduled to

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leave Missoula, Montana, an intermediate stop, at 5:20 P. M., P.S.T., but due to delayed departure from Chicago and St. Paul and adverse head winds, did not arrive at Missoula until 12:28 A. M., P.S.T.

The company dispatcher at Missoula cleared the flight for Spokane at 12:33 A. M., P.S.T., for contact flying. However, instrument flying was expected over part of the route and arrangements were made for the dispatcher at Spokane to authorize this, if the pilot found instrument flying necessary or preferable. A few minutes later, the flight returned to Missoula, climbed through the overcast at a point southwest of the airport and again proceeded toward Spokane. At 1:24 A. M., the flight reported that it was flying out the west leg of the Missoula radio range, at an altitude of 15,400 feet, which was above the overcast and was receiving a twilight "A" signal. The twilight "A" signal would indicate that the airplane at this time was flying south of the proper instrument course.

At 1:34 and 1:44 A. M., P.S.T., the company radio station at Spokane made routine attempts to contact the flight without results. This, however, was not alarming to the dispatchers as they assumed that the crew was occupied with flight problems. At 1:59 A. M., the flight radioed that it was not receiving range signals, that the airplane was picking up ice and requested the radio personnel at Spokane to listen for the flight over the range station. Spokane replied that they could not hear the flight and that an investigation showed the range to be functioning normally. The next message from the pilot, at 2:02 A. M. stated that the flight was over a large town, as indicated by a large group of lights, and requested Spokane to check his position for him. Spokane then asked the pilot for information as to the last course he had followed, the character of the lights he saw and the direction of the main street of the town, and also requested the flight to remain at that point until it could be located. The pilot replied by requesting that Spokane ascertain if he was over the town of Kalispell, Montana (approximately 93 miles north and slightly west of Missoula).

Spokane replied that this had been done and that the flight was not there. In further radio conversation the pilot stated that he could not stay up much longer on account of ice, that he was receiving a faint "N" signal from the Spokane radio range and that the overcast was high with good visibility underneath.

While company officials at Spokane were endeavoring to locate Flight 1 by telephoning various towns where they thought it might be, the telephone operator at Elk River, Idaho, heard an airplane circling over the town for a protracted period, and believing that it might be in difficulty, communicated this information to the company officials at Spokane by telephone. Spokane immediately identified the airplane as Flight 1 and at 2:57 A. M., P.S.T., Spokane radioed to the pilot that he was over Elk River, Idaho, approximately 25 miles east of Moscow, Idaho. (Elk River is slightly west of the midway distance between Missoula and Spokane and approximately 50 miles south of the airway). At 3:00 A. M., Spokane requested the pilot to fly west until he intercepted the south leg of the Spokane range. At 3:11 P. M., the pilot radioed that the flight was approaching the south leg of the Spokane range and asked what weather was to be expected. The weather was given him and he next requested that other range stations be silenced as he was receiving a multiple. (In this case, considered as meaning interference from another radio range station.) At 3:19 A. M., the pilot stated that he was on course on the south leg of the Spokane range and headed north (toward Spokane).

Nothing further was heard from the flight and an extensive search was instigated. On December 26th the wreckage was located about 400 feet from the top of a mountain known as Cemetery Ridge, which is 5,000 feet above sea level. The general location was 11 miles south and 6 miles east of Kellogg, Idaho. The condition of the wreckage indicated that the airplane had flown into the mountainside in approximately level flight and had caught fire after the impact.

The relative position of broken trees and the wreckage indicated that it was heading in a general easterly direction at the time of impact.

The last United States Weather Bureau reports prior to the start of the flight were as follows:

	Ceiling (feet)	Sky	Visibility (miles)
Missoula - Estimated	3,000	Overcast	10
Haugan "	2,000	Overcast	15
Mullan "	2,500	Overcast	2
Kellogg "	3,500	Sprinkling	6
Spokane "	6,500	Occasional sprinkling	10
	Broken lower clouds		

At the approximate time of the accident, the following weather was reported;

	Ceiling (feet)	Sky	Visibility (miles)
Haugan - Estimated	2,500	Broken clouds	6
Mullan "	1,500	Overcast	1
Kellogg "	2,000	Overcast	3

The regional forecast issued from Portland, Oregon, for the period 7:30 P. M., December 17th to 3:30 A. M., P.S.T., December 18, 1936, predicted light rains at low levels, light snow squalls at intermediate levels over the mountains. The pilot of the eastbound Flight 4, which passed over Missoula at 10:26 P. M., stated that he had encountered icing conditions between Alberton and Missoula at an altitude of approximately 9000 feet. While over Elk River, the pilot of Flight 1 reported icing conditions and a high overcast with good visibility beneath it. With the reported ceilings over the range of the flight averaging 1,500 to 2,000 feet, the higher mountain peaks would be obscured by the overcast. It is also possible that at the scene of the accident there was a light fog condition. Witnesses at Elk River, Bovill, Clarkia and Calder reported light rain, snow and sleet at the time the flight passed over.

An examination of the wreckage and other evidence indicated that there was no structural failure of the aircraft involved. The condition of the propellers indicated that both engines were operating at approximately normal cruising speed at the time of impact. Although the pilot had reported considerable ice earlier in the flight, the manner in which the airplane struck the ground and the absence of concern in the position report four minutes previously, indicate that the airplane was under the pilot's control at the time.

At the time of this accident, the radio range facilities serving this route were a high-powered range at Spokane and a medium-powered radio range at Missoula. A medium-powered range station had been moved from Kellogg to Couer d' Alene, Idaho, at the request of the air line company and was not yet in operation. Additional radio range stations at Superior and Mullan were then under construction. There is no indication however that the lack of these stations had anything to do with the accident since the pilot of the eastbound flight reported good radio range reception throughout the air line distance from Spokane to Missoula. Also the first position report from Flight 1 indicates reception of the Missoula Range at greater than normal distance.

Elk River is a very small town in a sparsely settled mountainous region and more than 50 miles from any radio range course. On this night an old mill was being burned and the flames would cause a bright glow in the overcast which could easily be mistaken for the lights of a big city or town. The actual course flown by the airplane from Elk River, as established by witnesses who heard or saw the airplane in flight, was over Bovill, Clarkia and Calder, Idaho, to Cemetery Ridge, which is 46 miles north and 6 miles east of Elk River.

An analysis of the evidence indicates that this flight was cleared out of Missoula in accordance with existing Department of Commerce regulations. The

ceiling at Spokane was well above the prescribed minimum for an instrument approach and remained so. Icing conditions were known to exist, however, all evidence indicated that the top of the overcast was not higher than 12,000 feet and the flight could have been completed above it. Although the pilot was concerned about ice while circling Elk River waiting to be located, the fact that the airplane flew successfully for a sufficient time to have completed a round trip between Missoula and Spokane and the fact that the pilot expressed no apprehension about ice in his report four minutes prior to the accident is evidence that the icing condition was not hazardous for the short flight involved.

From the first position report at 1:24 a. m., it is apparent that instead of following the (right) edge of the west leg of the Missoula radio range, the pilot had flown to the left (south) of the radio range course. Whether this was accidental or due to intention on the part of the pilot to fly a straight line course to Spokane by dead reckoning is not known. As a result, however, the flight was soon off the course of both radio ranges. It is evident that the flight got sufficiently off course to the left (south) for the pilot to see the glow in the overcast caused by the fire at Elk River; and, believing this glow to be caused by the lights of a large city such as Spokane or Couer d'Alene, he departed from whatever course he was flying and flew toward the glow to identify his position. Failure to identify Elk River from the air left the pilot completely lost without even an approximate idea of his position. This is evidenced by the fact that at 1:59 a. m. he requested the Spokane dispatcher to listen for the sound of his motor overhead and a few minutes later requested a check over Kalispell, 145 miles northeast of Spokane.

The evidence does not indicate why the pilot, when located and given his
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position, flew north out of Elk River instead of west, as directed. It is possible that he was experiencing difficulty with one or more navigational instruments on account of turbulent air but it is hardly conceivable that his magnetic compass would suddenly get out of adjustment sufficiently to account for the erratic course flown without the pilot realizing it and reporting this difficulty to his company. It appears that the pilot, being concerned about ice at the time he was located, elected to take the shortest possible course into Spokane by flying northwest instead of west and intercepting the south leg of the Spokane radio range just south of Spokane instead of 68 miles therefrom; and, starting from a region remote from all radio range courses, again became lost. The fact that he turned to the right, which was east instead of north as he reported, indicates that he believed he was approaching the south leg of the Spokane radio range when in fact he was approaching the east leg. Such belief is further indicated by his flying at an altitude which he undoubtedly knew would be dangerous in the vicinity of Kellogg on the east leg of the Spokane radio range but not dangerous along the south leg. Yet a simple check against the elapsed time of not more than 22 minutes since departure from Elk River would have revealed the improbability that he was approaching the south leg of the Spokane radio range, which at its nearest point is 75 miles from Elk River. The testimony of witnesses along the path of flight from Elk River and the relative altitudes of the ceilings reported at Kellogg and the point of the accident lead to the conclusion that the pilot was attempting to complete the flight from Elk River under the overcast.

In arriving at a conclusion after an analysis of the evidence, it does not appear that the accident was due to weather, mechanical failure of the aircraft, radio aids or communications, or to any failure of the company to comply with prevailing rules and practices. Full cognizance is taken of the

possibility that the magnetic compass may not have been functioning properly during the flight. However, a study of available evidence makes this appear improbable.

It is the opinion of the Accident Board that the probable cause of this accident was faulty navigation in not following the radio range course upon leaving Missoula and failing to ascend to a safe altitude over the course pursued from Elk River.