

Long Beach to Anchorage

It was Good Friday in Anchorage and most of the citizens of the metropolis of Alaska had scurried home for their evening meals. Suddenly, and without warning, a disastrous earthquake struck, leveling much of metropolitan Anchorage in shattered ruins. It happened just a few seconds before 5:36 p.m. on March 27, 1964, a day that will be long remembered by all Americans as well as by Alaskans. The Alaska earthquake, which was both devastating and terrifying, demolished buildings, buckled streets and highways, crumpled bridges, destroyed 546 homes, damaged 1,246 others, and directly affected 3,319 families. In Anchorage alone, 215 homes were destroyed, and 157 commercial buildings were rendered unuseable.

It was not only Anchorage that was struck on this grim and tragic day. Other Alaska communities, such as Valdez, Seward, Cordova, Kodiak, and Kenai, were hard hit by this cataclysm which was described by many seismologists as "the most powerful quake ever to strike North America." The tidal waves that followed the Alaska quake caused death and destruction at points as far distant as Siberia, Japan, the Midway Islands, Hawaii, and the North American coast from British

Columbia to southern California. The Alaska earthquake had a magnitude of at least 8.4 on the Richter scale, compared to 8.25 for the devastating San Francisco earthquake of 1906.

Stunned by the appalling destruction (which Governor William E. Egan described as "a calamity such as no state has suffered since the Civil War"), Alaskans set resolutely to work to rebuild their homes and cities. President Johnson declared Alaska a major disaster area and appointed a former Iowan, Edward A. McDermott of Dubuque, then Director of the Office of Emergency Planning, to supervise the rebuilding of Alaska. It was a Herculean task since the property damage was estimated at \$750,000,000.

The Alaska earthquake was recorded on seismographs throughout the world. Fortunately for students of seismology, the first seismograph station in Iowa had been placed in operation on the Loras College campus at Dubuque late in June of 1961, making it possible to detect earthquake tremors. A Loras News Bureau dispatch of July 3, 1961 declared:

Six seismometers are housed in the underground vault, along with two photographic tracers. The equipment was installed by John Whitmore, director of seismograph stations for St. Louis University, and Tom McEvilly, research assistant from St. Louis. The Loras station is one of a new midwest network surrounding the principal station at St. Louis University. Others are at Kansas State University,

the University of Indiana, and Missouri School of Mines.

Reverend Donald R. Hutchinson, Ph.D., chairman of the physics department at Loras, will supervise the new station. Readings will be taken daily. Records of the Loras station will be the property of the United States Government.

The Loras College seismograph station is a valuable addition to this State's scientific apparatus and henceforth will play an important role in recording all tremors, many of which could not otherwise be detected in Iowa. In the case of the Alaska earthquake, the original shock was so great that it knocked one of the six Loras seismometers out of commission at the start of that violent convulsion.

The Alaska earthquake may bear comparison with two California quakes — Santa Barbara in 1925 and Long Beach in 1933. These are especially interesting because they were in an earthquake center and because both of them took place in a heavily populated urban area with many commercial and industrial buildings. Of the Santa Barbara earthquake, Professor K. F. Mather, Harvard University seismologist, wrote:

A moderately severe earthquake destroyed or damaged a number of poorly constructed buildings in Santa Barbara and startled southern California at 6:44 a.m., June 29. Because of the emptiness of the business district at that early hour, only 12 or 13 lives were lost. Switches were pulled and gas mains closed by the engineers on duty in the power house so that no fire added to the seismic de-

struction reported as more than seven million dollars. . . . Aftershocks were numerous and continued for several days.

The Long Beach and Los Angeles earthquake, on the other hand, was far more destructive, both in lives and property. L. D. Leet, seismologist in charge of the Harvard Seismology Station, reported approximately 130 killed, 5,000 injured, and property damaged to the extent of about \$50,000,000 in the vicinity of Long Beach and Los Angeles by an earthquake that occurred about 5:55 p.m. on March 10th. The origin of the quake was placed a short distance off the coast between the towns of Huntington Beach and Newport Beach. The Seismological Laboratories at Pasadena reported as follows:

Damage was most extensive at Long Beach, which happened to be the largest center of population near the origin. Apparently stronger shaking at certain points where considerable destruction occurred was very probably due to the water-soaked alluvial character of the ground. At all points, spectacular damage was confined almost wholly to bad or improperly designed construction.

From the above three earthquakes one can readily see that damage to property and loss of life is in large measure governed by the intensity of the shock, the nature of the soil cushion, the presence of buildings and dwellings, and the density of settlement. The following statistics prove that not only Iowa, but the Nation as well, has been singularly fortunate in the relatively small losses of life

and property resulting from earthquake disturbances.

SOME MAJOR EARTHQUAKES SINCE 1811

From: United States Coast and Geodetic Survey

Year	Place	Deaths	Year	Place	Deaths
1811 Dec. 16	New Madrid, Mo.	—	1950 Aug. 15	India, Assam	1,500
1819 June 16	India, Cutch	1,543	1951 May 6	El Salvador	400
1822 Sept. 5	Asia Minor, Aleppo	22,000	1953 Feb. 12	Turud, Iran	530
1828 Dec. 28	Japan, Echigo	30,000	1953 Mar. 18	NW Turkey	1,201
1868 Aug. 13+	Peru and Ecuador	25,000	1954 Sept. 9-12	North Algeria	1,657
1875 May 16	Venezuela-Colombia	16,000	1955 Apr. 1	Philippines	435
1897 June 12	India, Assam	1,542	1956 June 10-17	North Afghanistan	2,000
1898 June 15	Japan, sea wave	22,000	1957 July 2	Northern Iran	2,500
1906 Aug. 16	Valparaiso, Chile	1,500	1957 Dec. 13	Western Iran	1,062
1906 April 18	San Francisco	452	1957 Dec. 13	Outer Mongolia	1,200
1907 Jan. 14	Kingston, Jamaica	1,402	1960 March 1	Agadir, Morocco	12,000
1908 Dec. 28	Italy, Messina	75,000	1960 May 21-30	Southern Chile	5,700
1915 Jan. 13	Italy, Avezzano	29,970	1962 Sept. 1	NW Iran	10,000
1920 Dec. 16	China, Kansu	180,008	1963 Feb. 21	Barce, Libya	300
1923 Sept. 1	Japan, Tokyo	143,006	1963 July 26	Yugoslavia	2,000
1932 Dec. 26	China, Kansu	70,000	1964 Jan. 18	Taiwan, Formosa	107
1935 May 31	India, Quetta	60,000	1964 Mar. 28	Alaska	114
1939 Dec. 27	Turkey, Erzingan	23,020			

The loss of life sustained in other parts of the world is truly appalling. Earthquakes, frequently accompanied by fires or tidal waves, have exacted a heavy toll. The slight tremors experienced in Iowa illustrate how fortunate citizens are who live in the Hawkeye State.

On November 12, 1934, a front page headline in the *Davenport Democrat* read: "Tri-Cities Shaken by Earthquake." The quake occurred about 8:44 on Monday morning. The *Democrat* reported in part as follows:

The quake was distinctly felt in all parts of the Tri-cities, and also at points as far south as Monmouth, Aledo, Alexis and Roseville, Ill., apparently extending over a larger area in Illinois than in Iowa. Buildings shook very perceptibly but there were no reports of any serious damage. . . . The offices of The Democrat and other Tri-city newspapers were swamped with telephone calls immediately after the shock. . . . In Davenport and Rock Island homes and buildings shook, dishes and windows rattled and there was much excitement. . . . Mrs. R. S. McKenzie, Rock Island, a former resident of Santa Barbara, Cal., said that the shock was as distinct as any she had experienced in California. . . . The disturbance today was the first that has been felt in this section since Jan. 2, 1912. A previous shock was felt on May 26, 1909, but there was no damage on either occasion.

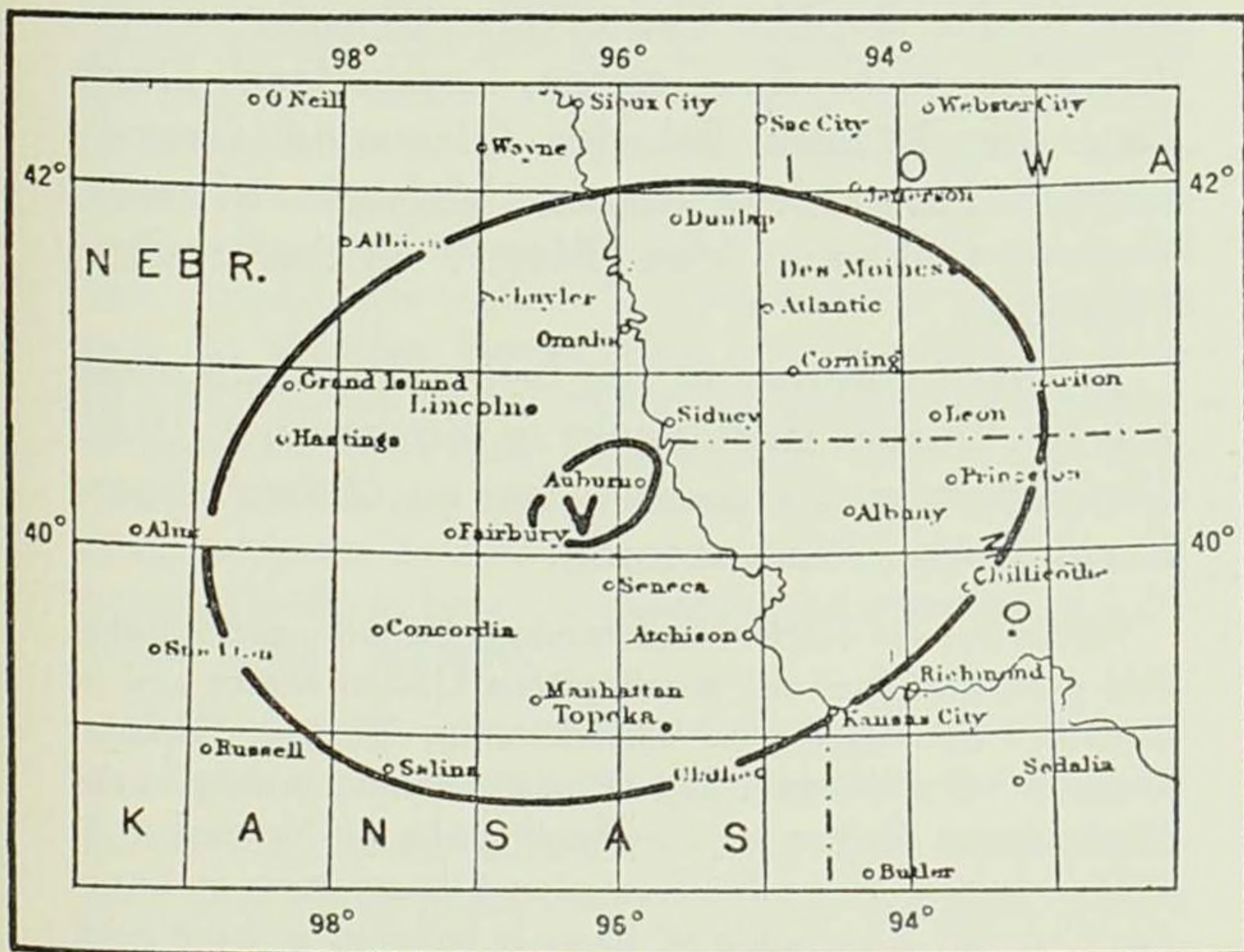
The earthquake was recorded on the seismograph at St. Louis University at 45 minutes and 33 seconds after 8 a.m. It was described as a "very mild quake" by Father James E. McElwane, who had charge of the St. Louis station.

Four earthquakes were felt in Iowa in 1935. On January 5 two distinct shocks were felt in Davenport and its sister cities across the Mississippi. Dishes rattled in the kitchen cupboard and windows shook, but no damage was done. The following month, on February 26 at 8:15 a.m., two "abrupt trembling shocks" were felt at Burlington. They were accompanied by rattling of dishes but no damage was reported.

A third shock had its center in southeastern Nebraska and was felt throughout southwestern

Iowa. The official Coast and Geodetic Survey report, *United States Earthquakes, 1935*, reads:

March 1: 5:00 Nebraska. Intensity VI. See map on this page. Two shocks, 4 minutes apart, the first strong, the second weak. Felt in Nebraska, Kansas, Iowa, and Missouri. The point of maximum intensity was near Tecumseh, Nebr., where chimneys were cracked and a few collapsed. A few windows were broken, and cracks appeared in plaster and stone walls. Several other places reported intensity V as indicated by the smaller ring on the map. The epicenter was at approximately $40^{\circ} 20'$ north, $96^{\circ} 12'$ west, and the area affected close to 50,000 square



United States Earthquakes, 1935

miles. The shock was recorded on seismographs at St. Louis, Florissant, Ann Arbor, Chicago, and Des Moines,

Iowa. This earthquake is attributed to a slight slip along the old fault which delimits the east side of the buried Nemaha mountains.

According to *United States Earthquakes, 1935*, an intensity of V was recorded in Riverton where all felt the shock. Deep cemented wells were cracked causing water to leak out. An intensity of IV was recorded in Clarinda, Emerson, Keosauqua, Mt. Ayr, Tabor, and Thurman.

The following Iowa towns recorded an intensity of III: Albion, Anita, Atlantic, Bedford, Carroll, Cedar Rapids, Centerville, Chariton, Corydon, Council Bluffs, Creston, Cumberland, Davis City, Des Moines, Elkader, Glenwood, Grundy Center, Hawarden, Logan, Melrose, Missouri Valley, Oakland, Van Meter, Webster City, Winterset.

In sharp contrast to the Nebraska Earthquake was the Quebec Earthquake of November 1, 1935. The Coast and Geodetic Survey *United States Earthquakes, 1935*, records:

November 1: 1:04. Timiskaming, Canada, earthquake. Felt generally over the northeastern United States and in Canada. Epicenter near Timiskaming, Quebec, Canada, at about $46^{\circ} 47'$ north, and $79^{\circ} 04'$ west, according to the "Preliminary Report of the Earthquake of November 1, 1935," published by the Dominion Observatory at Ottawa, Canada. The depth of focus is believed to have been normal or very slightly greater.

The earthquake was felt over an area of nearly 1,000,000 square miles in the United States and Canada.

. . . In the epicentral region the damage was relatively slight, largely because of the sparsity of population. Cracks were found in gravel, sand, and soft earth, but none in bedrock.

An intensity of III was recorded at Dubuque according to the Geodetic Survey report. The *Telegraph-Herald* of November 5, 1935, carried the following brief notice for additional information:

The Local Weather Bureau office has received several reports of the recent earthquake disturbances being observed in Dubuque. Some of the disturbances being reported included the swinging of mirrors and pictures and the rocking of chairs, and quivering or shaking sensation of individuals. Anyone who had such experience in this locality at about the time reported for the recent severe earthquakes in Montana [October 11 and 18] and in the east [Quebec, November 1], is requested to communicate with the Weather Bureau office, and to furnish as much information as to time of occurrence, and general evidences of earthquake vibrations. Apparently there was no local damage, but if any was observed, it should be reported along with the date and time, nature of damage, movements of walls or house furnishings, and sensation of individual making the report.

This search for widespread confirmation of a quake at the time it occurred has always been important in determining the extent of an earthquake. Not that earthquakes were readily forgotten! On November 6, the *Telegraph-Herald* carried the following dispatch from Cedar Falls:

The wave of earthquakes over the northern United

States today brought to the minds of old timers the fact that a quake rocked Cedar Falls about 40 years ago.

Roger Leavitt said he didn't remember the exact date [it was October 31, 1895] but that it "gave everybody a good idea of what a quake was."

It did little more than to make pictures on the wall "dance tangoes," and to "give everybody a good scare," he said.

On November 23, 1939, an earthquake that had its epicenter in the southern Illinois area, a short distance south of St. Louis, was sufficiently strong to cover an area of 150,000 square miles. It occurred at 9:15 a.m. and was reported in six states — Indiana, Illinois, Missouri, Iowa, Wisconsin, and Kansas. At Keokuk several persons phoned the *Gate City* to report the tremors. Iowa City felt the tremors, the latter apparently being the northernmost point in Iowa. At any rate the *Davenport Democrat* referred to the quake in Keokuk and Iowa City but made no mention of local detection, even though Davenport is credited with an earthquake the following day at 1:45 p.m.

The *Iowa City Press-Citizen* of November 23, 1939, records:

Employees on the sixth floor of the Iowa State Bank and Trust Co. building were alternately frightened and amazed at 9:20 o'clock this morning as pictures rattled on the wall and office equipment quivered in response to what apparently was the first earthquake ever felt in Iowa City as such. . . . Miss Mona Newkirk, secretary for the law firm of Hart, Dunlap and Carson, was alone in her sixth

floor office when the quaking occurred. "I was so frightened I just froze!" she declared later. When she realized that the picture hanging against the west wall of the room was actually rattling, Miss Newkirk says she barely subdued an impulse to run out into the hall. Just then she noticed persons emerging from other offices on the same floor all of them astonished and curious as to what it was all about.

The tremors lasted for about 30 seconds and the bulk of the reports came from those occupying the fifth and sixth floor of the Iowa State Bank Building.

Among those reporting the tremors were Dan Dutcher, R. G. Popham, H. W. Vestermarck, and Hal Stewart. University authorities were quoted as saying that "probably the last important earthquake felt in this part of the country" was in 1811 but Prof. C. C. Wylie cautioned "there is not a region in the United States immune" from earthquakes. Both the St. Louis University and Marquette University seismographs recorded the earthquake although the latter indicated it as a "mere tremor" probably caused "by the fall of huge rocks in caverns deep in the earth."

Possibly one of the weakest and in some respects the most mysterious earthquakes occurred at Iowa City on April 19, 1948. On that balmy spring day Dr. J. W. Wells of the College of Dentistry at the University of Iowa decided to have a quarter-mile-long ditch dynamited on his 80-acre farm a few miles south of Iowa City. Some 800

sticks of dynamite were placed in soggy ground, each stick being set about one foot apart. The dynamite was touched off with deafening results, throwing a solid sheet of mud and water over two hundred feet into the air. The desired results were obtained — Dr. Wells had his drainage ditch but hundreds of Iowa Citians, unaware of the blast, were scared out of their wits and began deluging the police department and other centers of information with telephone inquiries. It was some time before the exact cause of the detonation and tremors was satisfactorily explained.

The following day word was received from Reverend Henry F. Birkenhauer of the John Carroll University staff at Cleveland that at exactly 16 minutes and 51 seconds after 8 o'clock on Monday night (Central Standard Time) the University seismograph recorded an earth disturbance centered in the vicinity of Iowa City. The 8:16 tremor was so weak it went undetected by Iowa Citians, who one hour earlier had been thoroughly alarmed by Dr. Wells' man-made earthquake. The *Iowa City Press-Citizen* of April 20, 1948 wisely concluded: "Even if the tremor had stopped for a half-hour rest in Chicago on its way to Cleveland, it couldn't be the same that shook houses here at 7:10 p.m." Although *United States Earthquakes* sets the date as April 20 both the dynamite blast and the actual earthquake recorded at 8:16 p.m. in Cleveland occurred on April 19.

On April 9, 1952, southwestern Iowa was visited by an earthquake that centered in Oklahoma. It was described by Dr. Ross Heinrich, professor of geophysics at St. Louis University, as "one of the strongest shocks ever recorded in the mid-west." The U.S. Coast and Geodetic Survey in its *United States Earthquakes, 1952*, records:

April 9: 10:29:15. Epicenter 35.4° north, 97.8° west, 5 miles southwest of Oklahoma City, Okla., W. Felt over a 140,000-square-mile area, including Oklahoma, except the panhandle section, eastern half of Kansas, southeastern tip of Nebraska, northern and central section of Texas, and throughout the western section of Iowa, Missouri, and Arkansas. Slippage along the Nemaha Fault was effected by slight displacement of the buried granitic ridge beneath. The felt data conforms to the known trace of the fault, i. e., the strike is northeasterly from Oklahoma City toward Kansas City and Des Moines, an echelon faulting at the hinge point in the Oklahoma City region, then a southerly strike toward Austin, Tex. (See Pix insert.) Damage was not extensive. Portions of chimneys fell in El Reno and Ponca City. Bricks loosened from a building wall and tile facing of commercial buildings bulged at Oklahoma City. Maximum intensity VII. Magnitude 5.5.

The magnitude of the 1952 earthquake is revealed by the map showing that from Webster City on the north to Austin, Texas, in the south, citizens described the tremors. Points in southwestern Iowa were especially numerous. For example, the *Red Oak Express* of April 10, 1952, recorded the reactions of numerous citizens who had felt and witnessed the tremors. Those report-

ing were invariably on the second or third stories of buildings. Charles Reese, whose office was in the Enquist Building, said the building "seemed to weave as if in a high wind and that he could see the walls of his second floor office move. He estimated the length of the tremor at 30 seconds. Tom Lomas, who has an office across the hall from Reese, also felt the shock."

People on the second and third floors of the Montgomery County courthouse experienced the shock but those on the first floor did not detect it. An artist at the Thomas D. Murphy Company plant said "his drawing board shook and light fixtures trembled." Another Red Oak office employee experienced "a rocking sensation leaving an effect of being slightly ill."

In Shenandoah, venetian blinds "rattled" and some observers saw buildings "sway slightly." In Des Moines, James L. Cooper, who had been in a Seattle earthquake a few years previously, declared: "It felt about the same as my Seattle experience, but not quite so violent. My chair swayed a little. It was kind of a sinking feeling."

Occupants of numerous tall buildings in Des Moines experienced the tremors. In the new State Office Building women employees said "the shock made them feel dizzy and faint." Several grabbed filing cabinets to keep from falling. Desks and chairs rattled and swayed, and light fixtures swung like clock pendulums.

At Webster City, the northernmost point in Iowa reporting the earthquake of 1952, Mr. and Mrs. A. C. Schuneman, who lived in an apartment above the Isis theater, reported that "plaques fell off the apartment walls and a bridge lamp swayed back and forth about three inches at about 10:30 a.m. today."

The most recent earthquake recorded in Iowa was felt in eight Midwestern states on October 20, 1965. An Associated Press dispatch from St. Louis declared:

It started at 8:01 p.m., C.S.T., and lasted for 14 minutes on the seismograph at St. Louis University. However, residents of Kansas, Missouri, Arkansas, Nebraska, Iowa, Illinois, Kentucky and Tennessee felt it only for a few seconds.

Dr. Carl Kisslinger, chairman of the university's geophysics department, said the quake was recorded at between 4.5 and 5 on the Richter scale. The disastrous Alaskan quake of 1964 hit 8.4 on the scale. "There's no doubt about it," said Kisslinger, "it was an earthquake, and it was a significant earthquake for this part of the world. If the center had been under a city, there would have been a lot of damage."

Dr. Otto Nuttli, another St. Louis University geophysics professor, declared it was the "most widely-felt quake in the Midwest since 1917." He placed the center of the quake in Reynolds County in the Ozark Mountains about 100 miles southwest of St. Louis.

Although the tremors were not sufficient to make

many Iowans aware of it, the quake was nevertheless reported at points as widely separated as Des Moines, Ottumwa, and Burlington. An Associated Press dispatch indicated the tremors were felt in St. Joseph's Hospital in Ottumwa, particularly by those patients and nurses on the fourth floor. Several reports were made in Burlington, where one man, who had been in an earthquake before, said a building he was in shook, "and it wasn't just the building." The operator of the control tower at the Des Moines Municipal Airport said there was a rumble as if a big jet was taking off, only there was no jet. Three firemen in Des Moines also reported evidences of the quake.

The earthquake of 1965 may have made newspaper headlines but it did little else. The vast majority of Iowans were totally unaware of the tremors which were actually felt by relatively few citizens in the affected area.