



INTRODUCTION									
The earthquake data shown on this map and listed in table 1 are a list of earthquakes that were originally used in preparing the Seismic Risk Studies in the United States (Algermissen, 1969) which have been recompiled and updated through 1979. These data have been reexamined which resulted in some revisions of epicenters and intensities as well as assignment of intensities to earthquakes that previously had none assigned. Only earthquakes located within the boundary of the State are listed in table 1 even though earthquakes in bordering states or countries may have been felt or caused damage in the state. Intensity values were updated from new and additional data sources that were not available at the time of original compilation. Some epicenters were relocated on the basis of new information. The data shown in table 1 are estimates of the most accurate epicenter, magnitude, and intensity of each earthquake, on the basis of historical and current information. Much of the more recent data was taken from a comprehensive study of Oklahoma earthquakes by Lawson (Wood and Neumann, 1991) of all earthquakes located at that geographic position. The absence of an intensity value indicates that no intensities have been assigned to earthquakes at that location. A year shown below a triangle is the latest year for which the maximum intensity was recorded.									
EXPLANATION OF THE TABLES									
The data are listed chronologically in table 1 in the following categories: date, origin time, N, latitude, W, longitude, depth, hypocenter quality and referenced data sources, magnitude, and intensity (Modified Mercalli) and intensity source references. Table 1 has some basic limitations in terms of the size (magnitude or intensity) of the earthquakes listed. Prior to 1965 all recorded felt earthquakes are listed; after 1965 only felt earthquakes or those with magnitudes above the 2.5-3.0 range are listed; the lower magnitude levels apply mostly to the Eastern United States. If no magnitude was computed and the earthquake was felt it was included in the earthquake list. The low magnitude events located in recent years with dense seismograph networks have not been included.									
Listed below is an explanation of the symbols and codes used in the tables:									
1. Leaders (.) indicate information not available.									
2. Latitude and longitude are listed to a hundredth of a degree if they have been published with that degree of accuracy, or greater; however, most historical events have been published only to the nearest degree and tenth of a degree and are therefore listed at this accuracy in table 1. An asterisk (*) to the right of the longitude indicates that the latitude and longitude were not given in the source reference, but were assigned by the compilers of the data file.									
3. The letter code in the HYPOCENTER, QUA, column is defined below:									
a. Determination of instrumental hypocenters are estimated to be accurate within the ranges of latitude and longitude listed below; each range is letter coded as indicated:									
A 0.0°-0.1°									
B 0.1°-0.2°									
C 0.2°-0.3°									
D 0.3°-0.4°									
E 0.4°-0.5°									
F 0.5°-1.0°									
G 1.0° or larger									
b. Determination of noninstrumental epicenters from felt data are estimated to be accurate within the ranges of latitude and longitude listed below; each range is letter coded as indicated:									
F 0.0°-0.5°									
G 0.5°-1.0°									
H 1.0°-2.0°									
I 2.0° or larger									
4. The reference identification numbers in the HYPOCENTER, REF and INTENSITY, REF columns indicate the sources of the hypocenter and intensity. They are listed in numerical order in table 2.									
5. The magnitudes listed under "MAG" are mb values (Gutenberg and Richter, 1956) published in the Preliminary Determination of Epicenters (PDE) by the National Earthquake Information Service, U. S. Geological Survey and predecessor organizations. Associated with the magnitude values listed under "OTHER" are the source code and type. Type is defined by 1 = M. (Richter, 1958), 2 = mbg (Nuttall, 1973), 3 = mbg (Bach, 1968 or Gutenberg, 1955), 4 = mbg (Gutenberg and Richter, 1956), and 5 = mbg modified, 6 = mbg (Evernden, 1967), and 7 = Zöllew, 1973). The source codes are listed below:									
PMS - Geological Laboratory, California Institute of Technology, Pasadena, Calif.									
SLM - St. Louis University, St. Louis, Mo.									
TUL - Oklahoma Geological Survey, Oklahoma Geological Survey, Leonard, Okla.									
6. An asterisk (*) in the INTENSITY, MW column indicates that the intensity was assigned by the compiler on the basis of the available data at the time the catalog was compiled.									
MODIFIED MERCALLI INTENSITY SCALE OF 1931									
I. Not felt - or, except rarely under especially favorable circumstances. Under certain conditions, at and outside the boundary of the area in which a great shock is felt: sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced; sometimes trees, structures, liquids, bodies of water, may sway-doors may swing, very slowly.									
II. Felt indoors by few, especially on upper floors, or by sensitive, or nervous persons. Also, as in grade I, but often more noticeably: sometimes hanging objects may swing, especially when delicately suspended; sometimes trees, structures, liquids, bodies of water, may sway, doors may swing, very slowly; sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced.									
III. Felt indoors by several, motion usually rapid vibration. Sometimes not recognized to be an earthquake at first. Vibration estimated in some cases. Vibration like that due to passing of light, or lightly loaded trucks, or heavy trucks some distance away. Hanging objects may swing slightly. Movement may be appreciable on upper levels of tall structures. Rocked standing motor cars slightly.									
IV. Felt indoors by many, outdoors by few. Awakened few, especially light sleepers. Frightened no one, unless apprehensive from previous experience. Vibration like that due to passing of heavy or heavily loaded trucks. Hanging objects swing, in numerous instances. Cracking of heavy objects inland. Rattling of dishes, windows, doors; glassware and crockery clink and clash. Cracking of walls, frame, especially in the upper range of this grade. Hanging objects swing, in numerous instances. Disturbed liquids in open vessels slightly. Rocked standing motor cars noticeably.									
V. Felt indoors by practically all, outdoors by many or most; outdoors direction estimated. Awakened many or most. Frightened few--night excitement, a few ran outdoors. Buildings trembled throughout. Broken dishes, glassware, to some extent. Cracked window--in some cases, but not generally. Overturned vases, small or unstable objects, in many instances, with occasional fall. Hanging objects, doors, swung generally or considerably. Knocked pictures against wall, or swung then out of place. Opened, or closed, doors. Pendulum clocks stopped, started or ran fast, or slow. Moved small objects, furnishings, the latter to slight extent. Spilled liquids in small amounts from well-filled open containers. Trees, bushes, shaken slightly.									
VI. Felt by all, indoors and outdoors. Frightened many, excitement general, some alarm, many ran outdoors. Awakened all. Persons made to move unsteadily. Trees, bushes, shaken slightly to moderately. Liquid set in strong motion. Small bells rang--church, chapel, school, etc. Damage slight. In poorly built buildings. Fall of plaster in small amount. Cracked plaster somewhat, especially fine cracks chimneys in some instances. Broken dishes, glassware, in considerable quantity, also some windows. Fall of knick-knacks, books, pictures. Overturned furniture in many instances. Moved furnishings of moderately heavy kind.									
VII. Frightened all--general alarm, all ran outdoors. Some, or many, found it difficult to stand. Noticed by persons driving motor cars. Trees and bushes shaken moderately to strongly. Waves on ponds, lakes, and running water. Water turbid from mud stirred up. Invoing to some extent of sand or gravel stream banks. Rang large church bells, etc. Suspended objects made to quiver. Damage negligible in buildings of good design and construction, slight to moderate in well-built ordinary buildings; considerable in poorly built or badly designed buildings; adobe houses, old walls (especially where laid up without mortar), spires, etc. Cracked chimneys to considerable extent, walls to some extent. Fall of plaster in considerable to large amount, also some stucco. Broken numerous windows, furniture to some extent. Shock down loosened brickwork and tiles. Broke weak chimneys at the roof-line. (Sometimes damaging roofs). Fall of cornices from towers and high buildings. Dislodged bricks and stones. Overturned heavy furniture, with damage from breaking. Damage considerable to concrete irrigation ditches.									
VIII. Fright general--alarm approaches panic. Disturbed persons driving motor cars. Trees shaken strongly--branches, trunks, broken off, especially palm trees. Ejected sand and mud in small amounts. Changes: temporary, permanent: in flow of springs and wells; dry wells resumed flow; in temperature of spring and well waters. Damage slight in structures (brick) built especially to withstand earthquakes. Considerable in substantial buildings; partial collapse; cracked, buckled, crumbled down, wooden houses in some cases; threw out panel walls in frame structures, broke off decayed piling. Fall of walls. Cracked, broke, solid stone walls seriously. Wet ground to some extent, also ground on steep slopes. Twisting, fall, of chimneys, columns, monuments, also factory stacks, towers. Moved conspicuously, overturned, very heavy furniture.									
IX. Panic general. Cracked ground conspicuously. Damage considerable in (masonry) structures built especially to withstand earthquakes: Threw out of plumb some wood-frame houses built especially to withstand earthquakes; great in substantial (masonry) buildings in large parts or wholly shifted frame buildings off foundations, cracked frames; serious to reservoirs; underground pipes sometimes broken.									

SEISMICITY MAP OF THE STATE OF OKLAHOMA

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1981

Table 2.--List of data sources

Heck, N. H. and Bodie, R. R., 1931, United States Earthquakes 1929: U. S. Coast and Geodetic Survey, Serial No. 511, p. 1-55.	27. Murphy, L. R. and Cloud, W. K., 1954, United States Earthquakes 1952: U. S. Coast and Geodetic Survey, Serial No. 773, p. 1-12.	42. von Bahr, C. A. and Cloud, W. K., 1971, United States Earthquakes 1969: U. S. National Oceanic and Atmospheric Administration, p. 1-80.	57. Spence, W., Carver, D. L., Covington, P. A., Dunphy, C. J., Irby, W. L., Person, W. J., and Stover, C. W., 1975, United States Earthquakes 1973: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-112.
13. Bodie, R. R., 1941, United States Earthquakes 1939: U. S. Coast and Geodetic Survey, Serial No. 637, p. 1-69.	28. Murphy, L. R. and Cloud, W. K., 1955, United States Earthquakes 1953: U. S. Coast and Geodetic Survey, Serial No. 785, p. 1-31.	43. Coffman, J. L. and Stover, C. W., 1976, United States Earthquakes 1974: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-135.	58. Coffman, J. L. and Stover, C. W., 1977, United States Earthquakes 1975: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-136.
23. Murphy, L. R. and Cloud, W. K., 1954, United States Earthquakes 1952: U. S. Coast and Geodetic Survey, Serial No. 773, p. 1-12.	29. Brance, R. J. and Cloud, W. K., 1958, United States Earthquakes 1956: U. S. Coast and Geodetic Survey, Serial No. 793, p. 1-10.	44. Coffman, J. L. and Stover, C. W., 1978, United States Earthquakes 1976: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	59. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
24. Murphy, L. R. and Cloud, W. K., 1955, United States Earthquakes 1953: U. S. Coast and Geodetic Survey, Serial No. 785, p. 1-31.	30. Eppley, R. A. and Cloud, W. K., 1961, United States Earthquakes 1959: U. S. Coast and Geodetic Survey, p. 1-115.	45. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	60. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
25. Murphy, L. R. and Cloud, W. K., 1955, United States Earthquakes 1953: U. S. Coast and Geodetic Survey, Serial No. 785, p. 1-31.	31. Landry, J. F. and Cloud, W. K., 1963, United States Earthquakes 1961: U. S. Coast and Geodetic Survey, p. 1-106.	46. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	61. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
26. Murphy, L. R. and Cloud, W. K., 1955, United States Earthquakes 1953: U. S. Coast and Geodetic Survey, Serial No. 785, p. 1-31.	32. Coffman, J. L. and von Bahr, C. A., 1973, Earthquake History of the United States: U. S. National Oceanic and Atmospheric Administration, No. 41--(through 1970), p. 1-108.	47. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	62. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
27. Murphy, L. R. and Cloud, W. K., 1955, United States Earthquakes 1953: U. S. Coast and Geodetic Survey, Serial No. 785, p. 1-31.	33. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	48. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	63. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
28. Murphy, L. R. and Cloud, W. K., 1955, United States Earthquakes 1953: U. S. Coast and Geodetic Survey, Serial No. 785, p. 1-31.	34. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	49. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	64. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
29. Brance, R. J. and Cloud, W. K., 1958, United States Earthquakes 1956: U. S. Coast and Geodetic Survey, Serial No. 793, p. 1-10.	35. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	50. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	65. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
30. Eppley, R. A. and Cloud, W. K., 1961, United States Earthquakes 1959: U. S. Coast and Geodetic Survey, p. 1-115.	36. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	51. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	66. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
31. Landry, J. F. and Cloud, W. K., 1963, United States Earthquakes 1961: U. S. Coast and Geodetic Survey, p. 1-106.	37. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	52. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	67. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
32. Coffman, J. L. and von Bahr, C. A., 1973, Earthquake History of the United States: U. S. National Oceanic and Atmospheric Administration, No. 41--(through 1970), p. 1-108.	38. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	53. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	68. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
33. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	39. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	54. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	69. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
34. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	40. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	55. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	70. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
35. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	41. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	56. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	71. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
36. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	42. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	57. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	72. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
37. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	43. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	58. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	73. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
38. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	44. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	59. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	74. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
39. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	45. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	60. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.	75. Coffman, J. L. and Stover, C. W., 1979, United States Earthquakes 1977: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, p. 1-14.
40. Coffman,			