# INTRODUCTION

This map is one of a series of seismicity maps produced by the U. S. Geological Survey that show earthquake data of individual states or groups of states at the scale of 1:1,000,000. This map shows only those earthquakes with epicenters located within the boundaries of New Hampshire, even though earthquakes in nearby states or countries may have been felt or may have caused damage in New Hampshire.

The data in table 1 were used to compile the seismicity map; these data are a corrected, expanded, and updated (through 1983) version of the data used by Algermissen (1969) for a study of seismic risk in the United States. The locations and intensities of some earthquakes were revised and intensities were assigned where none had been before. Many earthquakes were added to the original list from new data sources as well as from some old data sources that had not been previously used. The data in table 1 represent best estimates of the location of the epicenter, magnitude, and intensity of each earthquake on the basis of historical and current information. Some of the aftershocks from large earthquakes are listed, but not all, especially for earthquakes that occurred before seismic instruments were universally used.

The latitude and longitude coordinates of each epicenter were rounded to the nearest tenth of a degree and sorted so that all identical locations were grouped and counted. These locations are represented on the map by a triangle. The number of earthquakes at each location is shown on the map by the arabic number to the right of the triangle. A Roman numeral to the left of a triangle is the maximum Modified Mercalli intensity (Wood and Neumann, 1931) of all earthquakes at that geographic location. The absence of an intensity value indicates that no intensities have been assigned to earthquakes at that location. The year shown below each triangle is the latest year for which the maximum intensity was recorded.

## EXPLANATION OF THE TABLES

The data in table 1 are listed chronologically in the following categories: date, origin time in Coordinated Universal Time (UTC), N. latitude, W. longitude, depth, hypocenter quality and reference, magnitude, intensity (Modified Mercalli), and intensity reference. The letter F is recorded in the intensity column if an earthquake was felt but not enough information was available to assign an intensity. Table 1 has some basic limitations in terms of the size (magnitude or intensity) of the earthquakes listed. All felt earthquakes or those with computed magnitudes greater than 2.5 are listed. If no magnitude was computed and the earthquake was felt or an epicenter published, it was included in the earthquake list. The low-magnitude events located in recent years with data from dense seismograph networks have not been included.

## Listed below is an explanation of the symbols and codes used in table 1:

- 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 assigned locations based on felt or damage information and are listed in table l only to the nearest degree or tenth of a degree. 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. An x to the right of the longitude indicates that the event is an explosion, a suspected explosion, a rockburst, or some other nontectonic event; these have not been plotted on the map. A question mark (?) to the right of the longitude indicates that published descriptions of the event are inconclusive and it may or may not be
- 3. The letter code in the HYPOCENTER, QUAL column is defined below: a. Determinations 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°-0.5° D 0.5°-1.0°

E 1.0° or larger

b. Determinations 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:

#### 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 data. They are listed in numerical order in the list of data sources.

5. The magnitudes listed under USGS are mb (modified from Gutenberg and Richter, 1956) or Ms (Bath, 1966) values published in the Preliminary Determination of Epicenters (PDE) by the National Earthquake Information Center, 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 mb (Gutenberg and Richter, 1956), ML (Richter, 1958), Mn (Nuttli, 1973), and Ms (Bath, 1966 or Gutenberg, 1945). Magnitudes computed solely from epicentral intensity have not been included. Moment magnitudes (Mw) are listed by value and source. The value was computed using the formula by Hanks and Kanamori (1979). The source codes are listed below:

BLA - Virginia Polytechnic Institute and State University, Blacksburg, Va. DG - Dewey, J. W., and Gordon, D. W., 1984, U. S. Geological Survey,

Miscellaneous Field Studies Map MF-1699 Phamphlet, 39 p. OTT - Earth Physics Branch, Seismological Service of Canada, Ottawa. ST - Street, R. L., and Turcotte, F. T., 1977, Seismological Society

of America Bulletin, v. 67, no. 3, p.599-614. STR - Street, R. L., 1976, Seismological Society of America Bulletin, v. 66, no. 5, p.1525-1537.

WES - Weston Observatory, Weston, Mass.

### REFERENCES

6. An asterisk (\*) in the INTENSITY, MM column indicates that the intensity was assigned by the compiler on the basis of the available data at the time the catalog

Algermissen, S. T., 1969, Seismic risk studies in the United States: Fourth World Conference on Earthquake Engineering, Santiago, Chile, January 13-18, 1969, Proceedings, v. 1, p. 14-27. Bath, Markus, 1966, Earthquake energy and magnitude, in Physics and chemistry of the Earth, v. 7: New York, Pergamon Press, p. 115-165 Gutenberg, Beno, 1945, Amplitudes of surface waves and magnitudes of shallow

earthquakes: Seismological Society of America Bulletin, v. 35, no. 1, p. 3-12. Gutenberg, Beno, and Richter, C. F., 1956, Magnitude and energy of earthquakes: Annali di Geofisica, v. 9, no. 1, p. 1-15. Hanks, T. C., and Kanamori, Hiroo, 1979, A moment magnitude scale: Journal of Geophysical Research, v. 84, no. B5, p. 2348-2350. Nuttli, O. W., 1973, Seismic wave attenuation and magnitude relations for eastern

Richter, C. F., 1958, Elementary seismology: San Francisco, W. H. Freeman and Co., Wood, H. O., and Neumann, Frank, 1931, Modified Mercalli intensity scale of 1931: Seismological Society of America Bulletin, v. 21, no. 4, p. 277-283.

North America: Journal of Geophysical Research, v. 78, no. 5, p. 876-885.

#### MODIFIED MERCALLI INTENSITY SCALE OF 1931 Adapted from Sieberg's Mercalli-Cancani scale,

- 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. Duration 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. Movements 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 experiences. Vibration like that due to passing of heavy or heavily loaded trucks. Sensation like heavy body striking building or falling of heavy objects inside. Rattling of dishes, windows, doors; glassware and crockery clink and clash. Creaking of walls, frame, expecially in the upper range of this grade. Hanging objects swung, 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--slight excitement, a few ran outdoors. Buildings trembled throughout. Broke dishes, glassware to some extent. Cracked windows--in some cases, but not generally. Overturned vases, small or unstable objects, in many instances, with occasional fall. Hanging objects, doors, swing generally or considerably. Knocked pictures against walls, or swung them out of place. Opened, or closed, doors, shutters, abruptly. 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, rang--church, chapel, school, etc. Damage slight in poorly built buildings. Fall chimneys is some instances. Broke dishes, glassware, in considerable quantity, also some windows. Fall of knick-knacks, books, pictures. Overturned furniture in
- 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. Incaving 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. Broke numerous windows, furniture to some extent. Shook 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
- structures built especially to withstand earthquakes: Threw out of plumb some wood-frame houses built especially to withstand earthquakes; great in substantial (masonry) buildings, some collapse in large part; or wholly shifted frame buildings off foundations, racked frames, serious to reservoirs; underground pipes sometime
- fissures up to a yard in width ran parallel to canal and stream banks. Landslides considerable from river banks and steep coasts. Shifted sand and mud horizontally on beaches and flat land. Changed level of water in wells. Threw water on banks of canals, lakes, rivers, etc. Damage serious to dams, dikes, embankments. Severe to well-built wooden structures and bridges, some destroyed. Developed dangerous cracks in excellent brick walls. Destroyed most masonry and frame structures, also their foundations. Bent railroad rails slightly. Tore apart, or crushed endwise, pipe lines buried in earth. Open cracks and broad wavy folds in cement pavements
- Disturbances in ground great and varied, numerous shearing cracks. Landslides, falls of rock of significant character, slumping of river banks, etc., numerous and extensive. Wrenched loose, tore off, large rock masses. Fault slips in firm rock, with notable horizontal and vertical offset displacements. Water channels, surface and underground, disturbed and modified greatly. Dammed lakes, produced waterfalls, deflected rivers, etc. Waves seen on ground surfaces (actually seen, probably, in some cases). Distorted lines of sight and level. Threw objects upward into the air.

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747	AUG	25			43.2	N.	70.9	W.		H	126								III	76	
751	JUL	21			43.2	N.	70.9	W.		H	126								III	76	
761	NOV	02	01 00		43.1	N.	71.5	W.		H	76								V	76	
766	DEC	17	11 48		43.1	N.	70.8	W.		H	84		• •			• • •			IV	76	
770	4 ***									mark.											
772	AUG	15		• •	44.4	N.	71.1	W.	• •	H	126	• •	• •					• • •	II	126	
777	SEP	14		• •	43.0	N.	71.5	W.		H	126		• •	• •	• •				II	126	
800	DEC	20		• •	43.7	N.	72.3	W.	• •	H	126			• •					IV	126	
801	MAR	01	20 30	• •	43.1	N.	70.8	W.	• •	H	126	• •	• •		• •				IV	126	
807	JAN	14	04 00	• •	43.0	N.	71.1	W.	• •	Н	126	• •	• •	• •	• •	• • •	• •	• • •	IV	126	
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			23 00	• •	44.0	N.	71.0	W.	• •	H	76	• •	• •	• •	• •	• • •	• •	• • •	V	76	
823	JUL	23	11 55	• •	42.9	N.	70.6	W.	• •	H	78	• •	• •		• •	• • •		• • •		126	
829	JAN	01	• • • •	• •	43.1	N.	70.8	W.	• •	H	84		• •			• • •			IV	76	
845	NOV	• •		• •	43.6	N.	72.3	W.	• •	H	126	• •	• •	• •	• •	• • •	• •	• • •	IV	76	
846	JUL	10			42 1	AT	71 2	1.7		***	106								***	71	
			00 00	• •	43.1	N.	71.3	W.	• •	H	126	• •	• •	• •	• •		• •	• • •	III	76	
846	SEP	12	23 30	• •	43.1	N.	71.3	W.	• •	Н	126		• •	• •	• •	• • •		• • •	III	76	
846	OCT	30	02 00	• •	43.1	N.	71.3	W.	• •	Н	126	• •	• •		• •				III	76	
846	OCT	31		• •	43.1	N.	71.3	W.	• •	H	126	• •	• •	• •	• •	• • •			III	76	
846	NOV	13	00 40	• •	43.1	N.	71.3	W.	• •	H	126	• •	• •	• •	• •	• • •	• •	• • •	III	76	
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	FEB	02		• •	43.1	N.	71.3	W.	• •	H	126	• •	• •	• •	• •		• •		III	76	
847					43.1	N.	71.3	W.		H	126			• •					III	76	
847 847	FEB	14		• •				YY		H	126								III	76	
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847 847 847 851 852 852	FEB FEB OCT JUN AUG	21 12 30 11	02 30	•••	43.1 43.1 43.4 43.1	N. N.	71.3 72.3 71.3	W. W.		H G H	126 126		••			•••	•••	•••	III	76 76	

1885 1886 1887 1888 1889

bushes, shaken slightly to moderately. Liquid set in strong motion. Small bells of plaster in small amount. Cracked plaster somewhat, especially fine cracks, many instances. Moved furnishings of moderately heavy kind.

VII. Frightened all--general alarm, all ran outdoors. Some, or many, found it difficult from breaking. Damage considerable to concrete irrigation ditches.

VIII. Fright general--alarm approaches panic. Distrubed persons driving motor cars. Trees shaken strongly--branches, trunks, broken off, especially palm trees. Ejected sand and mud in small amounts. Changes, temporary or permanent: in flow of springs and wells; dry wells renewed flow; in temperature of spring and well waters. Damage slight in structures (brick) built especially to withstand earthquakes. Considerable in ordinary substantial buildings, partial collapse: racked, tumbled 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)

X. Cracked ground, especially when loose and wet, up to widths of several inches; and asphalt road surfaces.

XI. Disturbances in ground many and widespread, varying with ground material. Broad fissures, earth slumps, and land slips in soft, wet ground. Ejected water in large amounts charged with sand and mud. Caused sea-waves ("tidal" waves) of significant magnitude. Damage severe to wood-frame structures, especially near shock centers. Great to dams, dikes, embankments often for long distances. Few, if any (masonry) structures remained standing. Destroyed large well-built bridges by the wrecking of supporting piers, or pillars. Affected yielding wooden bridges less. Bent railroad rails greatly, and thrust them endwise. Put pipe lines buried in earth completely out of service.

XII. Damage total--practically all works of construction damaged greatly or destroyed.

1728	JAN	1 12		••	43.6	N.	71.1	. W.	••	Н	126				(riw)	III	76
1747 1751 1761 1766	JUL	21 02	01 00 11 48	••	43.2 43.2 43.1 43.1	N.	70.9 71.5	W. W.	•••	H H H	126 76	•••	• •			III III V IV	76 76 76 76
1772 1777 1800	AUG SEP	15 14			44.4 43.0 43.7	N. N.	71.1 71.5	W.		H H H	126 126	••	• •		• • • • • • • • • • • • • • • • • • • •	II II IV	126 126 126
1801 1807	MAR JAN	01	20 30 04 00 02 15		43.1 43.0 43.0	N.	70.8 71.1	W. W.	•••	H H	126 126	••	::	•• •• •••		IV IV	126 126 126
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1823 1823 1829 1845	JAN JUL JAN	16 23 01	1, Maine 23 00 11 55		44.0 42.9 43.1 43.6	N. N. N.	71.0 70.6 70.8 72.3	W. W.	•••	H H H	78 84		• • • • • • • • • • • • • • • • • • • •			V V IV IV	76 126 76 76
1846 1846 1846	JUL SEP OCT	10 12 30	23 30 02 00		43.1 43.1 43.1	N. N.	71.3 71.3 71.3	W. W. W.	•••	H H H	126 126 126	::	• • • • • • • • • • • • • • • • • • • •			III	76 76 76
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1847 1847 1847 1851	FEB FEB	14 21	02 30	::	43.1 43.1 43.1 43.1	N. N. N.	71.3 71.3 71.3 71.3	W. W.	••	H H H	126 126	••	•••			III	76 76 76 76
1852 1852 1852 1853 1853	AUG NOV NOV	30 11 28 21 28	04 45	::	43.4 43.1 43.0 43.0 43.0	N. N. N.	72.3 71.3 70.9 71.9 71.9	W. W.		G H G H	126 126 78 126 126					III V III IV	76 76 78 76
1854 1854 1854	OCT OCT DEC	01 25 11	03 00 05 30	••	42.9 42.9 43.0	N. N.	72.3 72.3 70.8	W. W. W.	• •	H H H	126 126 78	•••	••			II IV V	76 126 76 126
1855 1855 1855 1871	JAN	16 17 29 20	23 00 00 20 10 00	•••	44.0 44.0 44.7 43.2	N. N.	71.0 71.0 71.6 71.5		• • • • • • • • • • • • • • • • • • • •	H H H	76 76 126 126					V IV IV	76 76 76 126
1872 1873 1874	NOV OCT JAN	18 05 06	19 00 07 30	••	43.2 43.6 43.6	N. N.	71.6 71.5 71.2	W. W. W.	::	G H H	38 84 84		::			III II	38 76 76
1874 1874 1875 1875 1875	JAN JAN MAY DEC DEC	26 26 06 01 01	07 00 10 00 09 00 11 00	• • • • • • • • • • • • • • • • • • • •	43.0 43.6 42.9 42.9	N. N. N.	71.5 71.5 71.2 72.3 72.3	W. W. W.	•••	H H H H	84 84 126 126	• • • • • • • • • • • • • • • • • • • •				IV III III III	76 76 76 76 76
1876 1877 1878	JAN APR MAR	07 23 12	19 20 16 00		43.3 43.0 42.7	N. N.	71.8 71.3 71.6	W. W. W.		H H H	84 126 126		::			II II	126 76 126
1879 1879 1880 1880	OCT NOV JUL JUL	26 03 13 21	03 30 12 15 04 00 00 00		43.0 43.2 43.2 43.0	N. N.	71.5 71.7 71.6 71.5	W. W. W.		H H H	126 84 84 84	::				IV II III	126 76 76 76
1880 1881 1881	AUG FEB FEB	21 04 12	09 25	::	43.2 43.0 43.0	N. N. N.	71.1 70.8 70.8	W. W. W.	::	H H H	84 126 126	::	::			II	76 76 76
1881 1881 1881 1881	MAY MAY AUG OCT	18 18 13 06	05 20 08 30 05 03		43.2 43.2 43.2 43.2	N. N. N.	71.7 71.7 71.7 71.6	W. W. W.	•••	H H H	84 84 84 126					III III III III	76 76 76 76
1881 1882 1882 1882	OCT APR MAY DEC	31 17 08 19	06 40 19 09 00 22 20	::	43.2 43.2 43.2 43.2	N. N. N.	71.7 71.7 71.6 71.4	W. W. W.	• •	H H H G	84 84 84 38	::	• • • • • • • • • • • • • • • • • • • •			II IV III V	76 76 76 38
1883 1883 1883 1884	FEB OCT JAN	04 04 17 18	20 05 20 15 20 30 07 00	::	43.6 43.2 43.2	N. N. N.	71.2 71.7 71.7	W. : W. : W.	k	H H H G	84 84 84		••			IV II* IV	84 213 76
1884 1884 1884	OCT NOV NOV	27 13 23	01 00 50		43.2 42.8 43.2	N. N.	71.5 71.6 71.7	W. W.	•••	H H G	84 126 38		•••			II IV V	76 126 126
1884 1885 1885 1886	DEC JAN MAR JAN	17 03 18 06	07 00 07 00 17 00 00 10		43.5 43.5 43.2 42.9	N. N. N.	71.5 71.5 71.7 71.5	W. W. W.		H H H	84 84 84 126					III II IV	76 76 76 126
1886 1886 1886 1887 1888	JAN AUG AUG JUL JAN	17 03 03 01 18	22 14  02 00	••	42.8 43.5 44.3 43.2 43.2	N. N. N.	71.4 71.5 71.7 71.5 71.7	W. W. W. W.	••	H H H H	84 126 126 126 126	••	::			IV II IV II	126 126 126 126 126
1889 1889 1889	MAR APR JUL	08 11 08			43.5 43.0 44.6	N. N.	71.6 71.5 71.3	W. W. W.	::	H H H	126 126 126	••	::			IV II II	126 126 126
1890 1891 1891 1892	MAR MAY MAY MAY	29 02 30 01	00 10		43.2 43.2 43.1 43.2	N. N.	71.5 71.6 71.5 71.5	W. W. W.	::	H H H	126 76 76 126		::			II V IV II	126 76 76 126
1892 1892 1892	DEC DEC DEC	11 13 14	16 30		44.3 44.5 44.3	N. N. N.	71.7 71.5 71.7	W. W. W.	::	H H H	126 126 126	::	::			IV II II	126 126 126
1893 1893 1894 1896 1897	JUL JUL SEP OCT JUL	01 02 03 22 01	10 30 09 20		43.1 42.9 43.2 44.3 43.7	N. N. N.	71.9 72.1 72.4 71.8 71.6	W. W. W. W.		H H H H	126 126 126 126 76		••			II II IV IV	126 126 126 126 76
1898 1901 1902 1905	JUL MAR JUL MAR	25 09 19 05	23 00  02 25	::	43.3 43.2 43.6 43.6	N. N. N.	71.6 71.5 71.9 72.3	W. W. W.		H H H	126 126 126 78					II II V	126 126 126 126
1905 1905 1905 1907	AUG AUG AUG JUL	30 30 30 11	22 40 22 42 22 43		43.1 43.1 43.1 43.1	N. N. N.	70.8 70.8 70.8 70.8	W. *		G G G H	84 84 84		• • • • • • • • • • • • • • • • • • • •			IV*	78 78 78
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tombstones were rotated; some walls were cracked; a few pipes were broken; much stucco was thrown

from exterior walls, some walls had light structural damage; plaster fell; some furniture was broken; considerable breakage of glassware, china, and brick-a-brack; clocks stopped; cracks in

the crusty snow and ground; and well water was muddy for several days.

1940 1940	this	area	13 0s:	sipe Thi	45.0 ee, Nev	iquake	08N. shir was	71.28 e. Thi descri	33W. Is is	008 the s	C B secon	51 349 d of t errify	the two	stro	5.5Mn ong shoo closer"	cks wh	ich	 occurr initia	VII VII ed in	126 13
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#### List of data sources

- 1. Heck, N. H., and Bodle, R. R., 1930, United States earthquakes 1928: U. S. Coast and Geodetic Survey , Serial 483, 28 p. 2. Heck, N. H., and Bodle, R. R., 1931, United States earthquakes 1929: U. S. Coast and Geodetic Survey, Serial 511, 55 p.
- 3. Neumann, Frank, and Bodle, R. R., 1932, United States earthquakes 1930: U. S. Coast and Geodetic Survey, Serial 539, 25 p. 11. Neumann, Frank, 1940, United States earthquakes 1938: U. S. Coast and Geodetic Survey, Serial 629, 59 p.
- 13. Neumann, Frank, 1942, United States earthquakes 1940: U. S. Coast and Geodeti. Survey, Serial 647, 74 p. 26. Murphy, L. M., and Cloud, W. K., 1955, United States earthquakes 1953: U. S. Coast and Geodetic Survey, Serial 785, 51 p.
- 31. Brazee, R. J., and Cloud, W. K., 1960, United States earthquakes 1958: U. S. Coast and Geodetic Survey, 76 p. 35. Lander, J. F., and Cloud, W. K., 1964, United States earthquakes 1962: U. S. Coast and Geodetic Survey, 114 p.
- 36. Cloud, W. K., and von Hake, C. A., 1965, United States earthquakes 1963: U. S. Coast and Geodetic Survey, 69 p. 37. von Hake, C. A., and Cloud, W. K., 1966, United States earthquakes 1964: U. S.
- Coast and Geodetic Survey, 91 p. 38. Coffman, J. L., von Hake, C. A., and Stover, C. W., 1982, Earthquake history of the United States: U. S. National Oceanic and Atmospheric Administration and U. S. Geological Survey, Publication No. 41-1(through 1980), 258 p.
- 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, 81 p. 42. von Hake, C. A., and Cloud, W. K., 1971, United States earthquakes 1969: U. S. National Oceanic and Atmospheric Administration, 80 p.
- 43. Coffman, J. L., and von Hake, C. A., 1972, United States earthquakes 1970: U. S. National Oceanic and Atmospheric Administration, 81 p. 46. Coffman, J. L., von Hake, C. A., Spence, W., Carver, D. L., Covington, P. A., Dunphy, G. 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, 112 p. 51. Linehan, Daniel, and Leet, L. D., 1942, Earthquakes of the northeastern United States and eastern Canada, 1938, 1939, 1940: Seismological Society of America
- Bulletin, v. 32, no. 1, p. 11-17. 75. von Hake, C. A., and Cloud, W. K., 1967, United States Earthquakes 1965: U. S. Coast and Geodetic Survey, 91 p. 76. Smith, W. E. T., 1962, Earthquakes of eastern Canada and adjacent areas, 1534-1927:
- Publications of the Dominion Observatory Ottawa, v. 26, no.5, p. 271-301. 77. Smith, W. E. T., 1966, Earthquakes of eastern Canada and adjacent areas, 1928-1959; Publications of the Dominion Observatory Ottawa, v. 32, no. 3, p. 87-121. 78. Weston Geophysical Research, Inc., Weston, Ma., 1976, Historical seismicity of New
- England, for Boston Edison Company, Preliminary Safety Analysis Report, Docket No. 50-471, 641 p. 81. von Hake, C. A., and Cloud, W. K., 1968, United States earthquakes 1966: U. S. Coast and Geodetic Survey, 110 p.

84. Woollard, G. P., 1968, A catalogue of earthquakes in the United States prior to 1925

- based on unpublished data compiled by Harry Fielding Reid and unpublished sources prior to 1930: Hawaii Institute of Geophysics, University of Hawaii, Data Report 126. Chiburis, E. F., 1979, Seismicity, recurrence rates, and the regionalization of the
- northeast United States and adjacent Southeastern Canada: Weston, Mass., Weston Observatory, for the U. S. Nuclear Regulatory Commission, NUREG/CR-2309, 76p. 213. Rockwood, C. G., 1884, Notes on American earthquakes-no. 13: American Journal of Science, v. 27, third series, p. 358-364.
- 240. Stover, C. W., and von Hake, C. A., 1980, United States earthquakes 1978: U. S. Geological Survey and U. S. National Oceanic and Atmospheric Administration, 262. Stover, C. W., and von Hake, C. A., 1981, United States earthquakes 1979: U. S.
- Geological Survey and U. S. National Oceanic and Atmospheric Administration, 300. Stover, C. W., and von Hake, C. A., 1982, United States earthquakes 1980: U. S. Geological Survey and U. S. National Oceanic and Atmospheric Administration,
- 317. Dewey, J. W., and Gordon, D. W., U. S. Geological Survey, unpub. data. 325. Stover, C. W., 1984, United States earthquakes 1981: U. S. Geological Survey Special Publication, 136 p.
- 349. Dewey, J. W., and Gordon, D. W., 1984, Map showing recomputed hypocenters of earthquakes in the eastern and central United States and adjacent Canada. 1925-1980: U. S. Geological Survey, Miscellaneous Field Studies Map MF-1699
- 350. Stover, C. W., 1985, United States earthquakes, 1982: U. S. Geological Survey Bulletin 1655, 142 p. 360. Stover, C. W., 1987, United States earthquakes, 1983: U. S. Geological Survey Bulletin 1698, 197 p.

# SEISMICITY MAP OF THE STATE OF NEW HAMPSHIRE

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