
Catalog of Earthquakes Felt in the Eastern U.S. Megalopolis 1850 - 1930

Final Report
April 1981 - April 1982

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Prepared for
U.S. Nuclear Regulatory
Commission

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ABSTRACT AND SUMMARY

The area covered by this catalog is the region east of the Appalachians from the southern border of Virginia to the southeast tip of New York state. For the period 1850-1930 a total of 192 earthquakes were felt in the area. Of these earthquakes 39 were damaging with intensities of V-VI to IX. The vast majority of the historical sources used to construct the description were local newspapers.

TABLE OF CONTENTS

	Page
Introduction	1
Catalog of Felt Earthquakes	3
Discussion	18
References	20
Appendix	25
New Earthquakes	25
Expansions of Listed Earthquakes	26
References for Appendix	27
Corrections	27

INTRODUCTION

The eastern U.S. megalopolis is defined as the region east of the Appalachians from the Virginia-North Carolina Border to the southeast tip of New York state. This area includes Delaware, the District of Columbia, Long Island, Maryland, New Jersey, the southeastern tip of New York State, New York City's five boroughs, eastern Pennsylvania, Virginia, and eastern West Virginia.

The entries of the catalog, as they appear are: date, Greenwich Mean Time, epicenter intensity, epicenter latitude and longitude, intensities for the various geographical sites, notes of unusual geological phenomena or unusual human behaviour, and coded references. Greenwich Mean Time is simply computed by adding five hours to the local time without regard to apparent solar time or daylight savings considerations. Epicenter latitude and longitude are given in degrees north and west, respectively. When epicenters lie outside of the eastern U.S. megalopolis the latitude and longitude is supplemented with a brief geographic designation. All intensities are Modified Mercalli with the exception that the symbol "F" stands for "Felt". Numbers in braces after a geographic site designate the number of shocks felt.

The primary source of indexed materials was the Winkler Collection of seismological catalogs, including well known and obscure publications. Among the most useful obscure listings of earthquakes were those for cities taken from local newspaper issues specified in the references. Another source of indexed sources was the libraries of the Pennsylvania State University. Many historical and popular materials were employed,

especially newspapers. Other repositories within the eastern megalopolis visited for the purposes of searching newspapers include the Library of Congress and its newspaper annexes, the American Antiquarian Society, the New York Public Library and its newspaper annex, the libraries of the University of Virginia, the Public Library of the District of Columbia, and the Public Documents Library of the Nuclear Regulatory Commission.

Certain parts of the catalog were taken from secondary sources. Whenever an earthquake felt in Virginia was well covered in the publications from the Virginia Polytechnic Institute and State University, those works were used. In a number of instances when references for earthquakes were unspecified, the information provided by a secondary source was utilized. Also, epicenter data provided by the National Oceanic and Atmospheric Administration's "Earthquake History of the U.S." and the Nuclear Regulatory Commission's "Preliminary Safety Analysis Report, Dockets 50352 and 50549", were employed in a number of cases.

CATALOG OF FELT EARTHQUAKES

Oct 17, 1850/about 10:45/Ep.V; 37.3,78.4/V: Farmville, Va.

Ref: 62a

Jan 10, 1852/Ep IV;41.2,71.4/F: east tip of Long Is., N.Y.

Ref: 44a

Apr 29, 1852/18:00/Ep V-VI;36.5,79.5; N.C. or Va./V-VI; Washington (5), D.C. Buckingham, Richmond, Scottsville, Staunton, Wytheville, Va. IV-V: Baltimore, Md. IV: Marion, Lynchburg, Va.F: Annapolis, Frederick, Rockville, Md. N.Y.C. Abingdon, Alexandria, Fincastle, Fredericksburg, Petersburg, Va.

Note: Strong sulphu. smell in D.C.

Ref: 11a,16,17a,72

Nov 2, 1852/23:35/Ep VI-VII;37.6,78.6/VI-VII:Buckingham, Va. V-VI: Piedmont, Richmond, between Rockfish and Lovingston, Va. IV Charlottesville, Fredericksburg, Scottsville, Va. F: Alexandria, Danville, Lynchburg, Petersburg, Staunton, Va.

Ref: 44b,72

Mar 18, 1853/Ep III;40.7,74.0/F:N.Y.C., N.Y.

Ref: 36b

Jan 30, 1853/7:00-10:00/Ep IV; 38.8,78.4/IV: Woodstock, Va.

Ref: 25a

May 2, 1853/14:20/Ep V-VI; 39.5,81.0; W.Va. or Ohio/V Lynchburg, Va. IV: Piedmont, Va. F: Washington, D.C., Fredericksburg, Staunton, Va.

Ref: 23C,45,56a,57a,79

July 1853/Ep V-VI; 36.9,81.1/V-VI: Wytheville, Va.

Ref: 56r

Nov 22, 1854/21:00/Ep III; 37.2,81.5/F: Tazewell Co., Va.

Ref: 57b

Feb 2, 1855/8:00/Ep V-VI; 37.5,78.5/V-VI: Charlotte Court House, Charlottesville, Prince Edward, Va. IV-V: Wylliesburg, Va. IV: Clarks-ville, Halifax, Va. F: Farmville, Lynchburg, Petersburg, Va.

Ref: 17b,23c,25b,56b

Feb 7, 1855/2:30/Ep VI; 42.0,74.0/VI: Hudson R. Valley

Ref: 54a

1856/Ep VII-VIII, 40.0,75.0/VII-VIII: Philadelphia, Pa.

Note: Reference simply equates the earthquake of Aug 10, 1884 to this one. This is doubtful.

Ref: 50b

Jan 16, 1856/8:00/Ep IV; 39.2,78.2/IV: Winchester, Va.

Ref: 17c

Mar 13, 1856/Ep IV; 41.4,72.6/IV: eastern Long Is., N.Y.

Ref: 44a

Mar 21, 1856/14:00/Ep IV; 37.8,78.8/IV: Albermarle Co., Amherst Co., Nelson Co., Va.

Ref: 25c,56c

Dec 11, 1857/3:00/Ep III; 37.8,80.4/F: Lewisburg, W. Va.

Note: Landslide?

Ref. 72

Mar 22, 1859/Ep IV; 37.1,81.5/IV: Va.

Ref: 23c

Oct 17, 1860/11:00/Ep VIII-IX; 47.5,70.0; Canada/F: along Atlantic Coast from New England to Newark, N.J.

Refs: 2a,8,20

Mar 5, 1861/17:00/Ep IV-V; 40.8,74.2/IV-V: Bloomfield (2), N.J. IV:
Bellville, Orange, Paterson, N.J. F: Newark (2), N.J.
Refs: 20,44a,48a,54a

August 31, 1861/10:22/Ep VI; 36.2,81.2; N.C./V: Washington (2) D.C. F:
Richmond, Va.
Refs: 11l,17d,23a,27,56j

Feb 3, 1862/Ep IV; 41.5,72.5/IV: eastern Long Is., N.Y.
Ref: 44a

June 25, 1870/Ep III; 40.7,74.0/F: N.Y.C.
Ref: 36b

Oct 12, 1870/Ep III; 39.8,75.5/F: Wilmington, Del.
Ref: 84e

Oct 20, 1870/16:30 to 17:00/Ep IX; 47.4,70.5; Canada/VI-VII: Hudson,
Manhattan (3), N.Y. Scranton, Pa V-VI: Hoboken, Newark, N.J., Brooklyn,
N.Y. Pa V: New Castle, Del. IV: Richmond, Rondout N.Y. F: Philadelphia, Pa.
Note: Two streets cracked in Manhattan
Ref: 2b,5a,13,20,32,36a,37a,38a,48b,48d,56d,76a,76b,76c

Nov 23, 1870/Ep III; 40.6,74.1/F: Staten Is, N.Y.
Ref: 66

Jun 19, 1871/3:05/Ep IV-V; 44.2,73.5/IV-V: Brooklyn, northshore Long Is.,
N.Y. F: Hoboken, Weehawken, N.J. Manhattan, Staten Is., N.Y.
Note: Aftershock on June 21, 1871
Ref: 28a,29b,36s,48c,66

Oct 9, 1871/14:40/Ep VII: 39.7,75.4/VII Wilmington, Del. VI New Castle,
Oxford, Del. IV-V Haddonfield, N.J. IV Salem, N.J. Philadelphia, Pa.
F: Coatsville, Pa.
Refs: 2c,4a,20,36c,39a,75,84b

Mar 1, 1872/evening local time/Ep IV; 36.8,79.3/IV Chatham, Va.
Ref: 56e

Jan 3, 1872/2:30/Ep III-IV; 37.5,77.9/III-IV: Powhatan Co., Va.
Ref: 56i

Jun 5, 1872/3:00-4:00/Ep V; 37.5,77.5/V: Charlottesville, Chesterfield,
Manchester Va. F: Ashland, Richmond, Va.
Refs: 36d,62b

Jul 11, 1872/10:30/Ep V; 40.9,73.8/V New Rochelle, Rye, N.Y. IV-V:
Dobbs Ferry, E. Chester, Glen Cove, Mamaroneck, Mt. Vernon, Pelhamville,
Port Chester, Sands Pt., N.Y. IV: Desoirs, Harrison, N.Y. F: N.J.
Refs: 2e,20,28b,34,36e,37b,39b

Oct 4, 1873/0:45/Ep IV-V; 37.2,78.2/IV-V: Burkeville, Va. IV: Chester-
field, Va. F: Chula, Va.
Refs: 2d,2f,56f,62c

May 14, 1874/8:00-9:00/Ep IV; 36.7,76.8/IV: Carrsville (3), Va. F: Isle
of Wight Co., Southside, Va. Heard: Petersburg, Va.
Refs: 36f,46,62d

Dec 11, 1874/3:25/Ep V-VI, 40.9,73.7/V-VI: E. Chester, New Rochelle, Mamoroneck, Mt. Vernon, Rye, N.Y. V: Chappaqua, Dobbs Ferry, Fordham, Irvington, Katonah, Kenisco, Mt. Hope, Mt. Kisco, Nyack, Peekskill, Pleasantville, Scarboro, Sing Sing, Spuyten, Tarrytown, Tremont, Unionville, Williams Bridge, Yonkers N.Y. IV: Bedford, Bronxville, Duyuil, Greensburg, along Hudson R., Manhattan, Tuckahoe, Scarsdale, Whitestone Westchester, N.Y. F: Bergen Co., Closter, Morristown, Sandy Hook, N.J. Fishkill landing, Flushing, White Plains, N.Y.

Notes: Foreshocks Dec 9/ Flushing, N.Y. Aftershock Dec 12/15:00-16:00 Garrison, N.Y. Cracks in ground at Closter, N.J.

Refs: 2g,2i,20,29a,34,36g,64a

March 10, 1875/17:00/Ep V; 37.5,78.0/V: Goochland Co., Va. F: Issequena, Va.

Refs: 2g,36h,56g

Dec 23, 1875/4:45/Ep VII-VIII; 37.6,77.5/VII-VIII: Richmond (3), Va. VII: Arvonnia, Goochland Co., Manakin, Manchester (2), Powhatan Co., Va. V-VI: Coalfield, Louisa, McRae, Mecklenburg, Petersburg (2), Pittsylvania Court House, Va. V: Annapolis, Baltimore (2), Towsontown, Md. Bedford, Gordonsville, Greenwood, Hanover, Keswick, Lynchburg, Mechum R., Va. IV-V: Alexandria, Bowling Freen (3), Church Hill, Culpeper, Fluvanna (5), Oak Grove, Oregon Hill, Sidney, Staunton, Waynesboro, Va. IV: Washington, D.C. Ashland, Altavista, Chesterfield Co., Farmville (2), Fredericksburg, Nessingford, Norfolk, Williamsburg, Va. F: Sandy Springs, Md. Burkville (3), Ft. Monroe (2), Glen Allen (3), Hanover (3), Liberty, Ruther Glenn, Rockbridge, Salem, Wilson, Va.

Notes: Foreshock Dec 21/15:30/III-IV: Wytheville, Va. Aftershocks Dec 24/4:45/V: Richmond, Va. F: Towsontown, Md. Dec 26/F: Powhatan Co. Jan 3/4:30/IV: Powhatan Co. Richmond reports a) one house down b) lower legs of people paralyzed during earthquake c) bodies tingle as if shocked electrically d) people injured while rushing out. Burning coal smell at Ashland.

Refs: 2i,3a,4b,5a,7a,7b,24b,36i,36j,36l,36m,37c,52,56h,72,81b

1876/Ep V-VI; 37.4,79.1/V-VI: Lynchburg, Va.

Ref: 56n

Jan 3, 1876/2:30/Ep III; 37.6,77.9/III: Va.

Ref: 23c

Jan 30, 1876/2:25/Ep III; 39.0,76.5/F: Annapolis, Md.

Refs: 2i,74

Apr 10, 1876/Ep III; 38.3,76.6/F: St. Mary Co., Md.

Refs: 2i,74

Dec 21, 1876/16:30/Ep III; 36.9,81.1/F: Wytheville, Va.

Ref: 2d

Dec 23, 1876/4:45,8:00/Ep IV; 37.4,77.5/IV: Va.

Ref: 23c

Jan 4, 1877/4:30/Ep V-VI: 39.5,77.3/V-VI: Emmittsburg (2), Frederick (2), Westminster (2), Md.

Ref: 37d

Aug 10, 1877/Ep III; 40.1,74.8/F: Florence, N.J.

Ref: 2j

Sep 1, 1877/4:00/Ep IV-V; 39.2,77.2 V: Laurel, Md. F: Brookville, Latonsville, Sandy Springs, Md.
Ref: 5b,36n,74

Sep 10, 1877/15:00/Ep VI; 40.3,74.9/VI Burlington, N.J. V: Bordentown, Cranberry, Hamilton Sq., Mt. Holly, Pemberton, Trenton, N.J. IV-V: Hulmesville, Philadelphia, Pa. F: Wilmington, Del., Germantown, Pa.
Refs: 2j,15d,20,30,36o,36s,44a,84e

Jan 3, 1878/0:00/Ep IV; 37.8,77.8/IV: Hanover Co., Louisa Co., Va.
Refs: 2k,37e,56k

Feb 5, 1878/16:30/Ep V-VI: 40.7,73.7/V-VI: Flushing, N.Y.
Refs: 2k,28c,29d

Oct 4, 1878/7:40/Ep IV-V; 41.5,74.0/IV-V: Newburgh, N.Y. Along Hudson R. from Marlborough to Peekskill, N.Y.
Refs: 2k,44b,37nn

Dec 25, 1878/Ep III; 44.2,78.8/F: Flushing, N.Y.
Ref: 44a

Mar 25, 1879/12:30/Ep IV-V; 39.2,75.5/IV-V; Along Del. R. from Chester, Pa. to Salem, N.J.
Note: Felt more strongly on east side of river.
Refs: 2l,15b,20

Sep 1, 1879/12:00/Ep III; 36.9,81.1/III: Va.
Ref: 22

Aug 10, 1880/17:15/Ep III; 40.8,74.6/F: Dover, Mendham, Morristown, N.J.
Ref: 2m

Sep 1, 1880/9:45-9:50/Ep III; 40.8,74.5/F: Dover, Morristown, N.J.
Ref: 2m

Feb 4, 1881/9:30/Ep IV-V; 41.6,74.0/IV-V; Marlborough, Milton, Montgomery Poughkeepsie, Roundout, N.Y.
Ref: 36q,44a

Apr 21, 1881/16:30/Ep V-VI; 40.9,73.1/V-VI; Port Jefferson, N.Y.
Refs: 2n, 38b

Apr 2, 1882/evening/Ep V: 38.7,78.7/V: New Market (several), Va.
Ref: 2o

Feb 28, 1883/Ep V; 41.5,71.5; R.I./V: Block Is., R.I.
Ref: 44a

Mar 11, 1883/23.57/Ep V; 39.5,76.5/IV-V: Baltimore, Bel Air, Falston, Forest Hill, Harford, Long Green Valley, Pleasantville, Wilna, Md.
Note: Aftershock Mar 12/5:00-6:00
Ref: 2q,6,36r

Sep 1, 1883/Ep VII; 43.9,74.1/VII: Staten Is., N.Y.
Note: One reference refers to "extensive damage" and the other to "considerable damage".
Ref: 10c,37q

Mar 29, 1884/evening local time/Ep III; 37.8,75.6/F: Accomoc Co., Va.
Ref: 2o

May 31, 1884/Ep V; 40.6,75.5/V: Allentown, Pa.
Ref: 15b

Aug 10, 1884/19:07/Ep VIII; 40.5,74.5 (diffuse)/VIII: Brooklyn, N.Y. VII-VIII: Eatontown, Mattewan, Seabright, N.J. Brighton Beach, Yonkers, N.Y. Philadelphia, Reading, Pa. VII: Burlington (3), Haddonfield (3), Merchantville (3), Moorestown (3), Morristown (3), Mt. Holly (3), Newton, Plainfield (2), Trenton (3), Woodbury, N.J., Brookville, Clifton, Hudson, Long Is. C., Mt. Vernon, New Rochelle, N.Y.C., Rossville, White Plains, N.Y., Chester, Phillipsburg, W. Chester, Wilkes Barre, Pa. VI-VII: Atlantic C., Bordentown, Camden, Jersey C., Long Branch, New Brooklyn, New Market, Perth Amboy, N.J.E. Rockaway, Jamaica, New Brighton, Peekskill (2), Port Chester, Richmond, N.Y. Easton, Macungie, Portland, Pa. VI: Baltimore, Md. Asbury Pk, Atlantic Highlands (2), Bloomfield, Carpenter's Pt., Gloucester, Manosquan, Menlo Pk., N. Plainfield, N.J. Amityville, Coney Is., Mt. Kisco, Tottenville, N.Y. Allentown, Barto Germantown, Lebanon, Media, Phoenixville, Pottstown, Pottsville, Pa. V-VI: Rockville, Westminster, Md. Cottage C., Elizabeth, Hoboken, Mauch Chunk, Orange, Paterson (3), Princeton, Roselle, Spring Lake, N.J. Bay Shore, Fire Is., Governor's Is., Kingston (4-5), Nyack, Oyster Bay, N.Y. Beaver Dam, Bethlehem, Coatesville, Carbondale, Deposit, Hamburg, Hancock, Harrisburg, Lockawaxen, Pittston, Scranton, Susquehanna, Pa. Richmond, Va. V: Wilmington, Del. Cherry Hill, Delawana, Franklin, Sandy Hook, W. Caldwell (2), N.J. Glen Is., Hempstead, Huntingdon, Newburg, Prt. Jervis (2), Poughkeepsie, Shelter Is., N.Y. Waterbury, Pa. Bon Air, Berkeville, Fredericksburg, Va. IV-V: Breakwater, Middletown, Prt. Penn (2), Del. IV: Washington, D.C. Cambridge, Md. Cape May, Key East, Oceanport, Red Bank, White Haven, N.J. Bath, Brooklyn Heights, College Pt., Flushing, Whitestone, N.Y. Columbia (2), Lancaster, Milton, Pa. F: Dover, Newark, Del. Annapolis, Mechanicstown, Md. Belvedere, Bloomsburg, Egg Harbor, Greensport, Hammonton, Keyport, Ocean Grove, Phillipsburg, Pt. Pleasant, Ramapo, Washington, N.J. Avon Beach, Central Park, Marlboro, New Dorp, Stone Ridge, Washington, W. Caldwell, N.Y. Glen Summit, Pa.

Notes: Aftershock Aug 11/14:05/IV: Matawan and Aug 11/17:30/V-VI: Richmond IV-V: Atlantic Highlands, Long Branch, Matawan; Far Rockaway, Hempstead, Rockaway Beach, S. Oyster Bay, Woodbury. Death and injuries at Yonkers. One or more houses collapsed at Eatontown, Mattewan, Brighton Beach, Brooklyn. General damage to houses at New Market, Seabright, Reading and Wilkes Barre. Cracks in ground at Brooklyn, Staten Is., Peekskill and Flat Mt. Sulphurous gas smell at Brooklyn and Ft. Washington. People in Brooklyn experience sensation of electrical shock. Electrical security systems disturbed in Manhattan. Del. R. foamed near Trenton. Whirring and hissing sound at White Plains. Ships in harbor at Philadelphia snap hausers. Sick woman in Plainfield dies. Ship seven miles off coast of Atlantic Highlands experience heavy shock.

Refs: 2r,2s,3b,4c,7c,7e,20,26a,29b,36s,36t,36u,37f,37g,37q,44a,48d,48e,50b,56m,66,63d,68a,76d,78a

Aug 15, 1884/Ep III; 38.0,75.0/F: Off east shore Md & Va.

Ref: 22,74

Sep 19, 1884/19:15/Ep V; 40.7,84.1; Oh./F: Washington, D.C.

Note: Shock also at Beaver Dam, Pa. with intensity VI.

Refs: 2s,7i,38c,48f,50c,64b,78b

Nov 23, 1884/5:30/Ep V-VI; 43.2,71.7; N.H./F: Southeast N.Y.

Ref: 27

Jan 3, 1885/2:16,4:46/Ep V-VI; 39.2,78.0/V-VI: Wadesville, Va. V: Frederick, Md. Chantilly, Va. IV-V: Boonesboro, New Market, Md. between Middleburg and Aldie, Va. IV: Washington, D.C. Vienna to Round Hill, Leesburg, Va. F: Alexandria Fauquier Co., Shenandoah Co., Va.

Note: Aftershock 4:00/F: Alexandria

Refs: 2t,36w,63a,63b,72

Jan 4, 1885/11:06/Ep III-IV; 41.2,73.9/III-IV: Peekskill, Sing Sing, Tarrytown, N.Y.

Refs: 2t,11m

Jan 15, 1885/9:10/Ep III; 40.3,76.3/III: Pa.

Ref: 71

Feb 2, 1885/12:10/Ep IV-V; 36.9,81.1/IV-V: Wytheville, Va.

Note: Also earthquake shock or explosion in Manhattan, N.Y.

Refs: 2t,24b,36x,38d

Mar 8, 1885/Ep IV-V; 40.0,76.3/IV-V: Lancaster, Pa.

Refs: 2t,26b

Oct 10, 1885/4:35 & 5:35/Ep V; 37.3,79.0/V: Dale, Lynchburg (3), Va. IV-V: Lexington (2), Louisa Court House, Staunton (2), Variety Mills (2), Va. F: Washington, D.C., Dale Enterprise, Petersburg (3), Richmond, Rockingham Co., Va.

Refs: 2t,22,26c,36y,56n,72

Jan 25, 1886/Ep IV; 41.6,73.8/IV: Hopewell Jctn., N.Y.

Ref: 44a

Jun 12, 1886/5:05/Ep IV-V; 40.5,74/IV-V: Asbury Pk., Atlantic Highlands, Navevink, Quarantine (3), Sandy Hook (3), N.J. Brighton Beach, Coney Is, Manhattan Beach, N.Y.

Refs: 36z,37h,37i,48g

Aug 31, 1886/14:44/Ep IX-X; 32.9,80.0(S.C.)/VI-VII: Washington (4), D.C. Manhattan (2), N.Y. Richmond, Va. VI: Hackensack (2), N.J. Culpeper, Lynchburg (3), Va. V-VI: Rehoboth Beach, Del. Bowie, Md., Bridgeton, Camden (3), Jersey C., Plainfield, Sewarren (3), N.J. Philadelphia, Pa. Lynchburg, Va. V: Baltimore (3), Md. Newark, N.J. Brooklyn, Coney Is., Kingston, N.Y. Scranton, W. Chester, Williamsport, Pa. Alexandria, Norfolk, Petersburg, Portsmouth, Wytheville, Va. IV-V: Wilmington, Del. Cambridge, Md. Elmer, Woodbury, N.J. F: Breakwater Deandale, Dover, McCellandville, New Castle, Pennsgrove, Port Penn (2), Del. Atlantic C., Cold Spr., Dias Cr., Harrison, N.J. Balmville, Bath Beach, Staten Is., Washingtonville, N.Y. Bethlehem, Pa.

Notes: Aftershock Sep 2/3:00/F: Charlottesville and Sep 4/4:05/V:

Williamsport, Pa. Richmond, Va. IV: Washington, D.C. Scranton, Pa. Lynchburg, Va. F: Trenton, N.J. Philadelphia, Pa. Norfolk, Wytheville, Va. Wilkes-Barre Church tower settles.

Refs: 3c,4d,15a,15d,20,26d,26e,29c,35b,36aa,36bb,36cc,37i,37q,39d,48h,48i,48j,50d,50e,56o,66,68b,68c,71,78c,78d,84a,84b

Sep 21, 1886/5:00/Ep III; 40.8,74.0/F: Manhattan, N.Y.

Ref: 36ggg

Sep 24, 1886/22:56/ and Sep 25, 1886/3:10/Ep III: 36.9,81.1/F: Wytheville, Va.

Ref: 26e

Oct 22, 1886/19:45/Ep VI-VII; 32.9,80.0; S.C./IV-V: Washington, D.C. Fredericksburg, Richmond, Va. F: Danville, Lynchburg, Norfolk, Petersburg, Va.

Refs: 7e,23a,56p,60a,78e

Jan 3, 1887/4:30 & 7:30/Ep V; 39.8,77.0/V: Baltimore, Emmitsburg, Frederick, Hagerstown, Westminster, Md. IV: Middleburg, Taneytown, Union Bridge, Md.

Refs: 36dd,37oo,78f

Mar 2, 1887/21:13/Ep IV-V; 40.6,73.3/IV-V: Seaford, Del. Babylon, N.Y. IV: Far Rockaway, Rockaway Beach, N.Y. F: Baldwin, Breslan, Coney Is., Freeport, Merrick, Montauk, Patchogue, Sayville, S. Oyster Bay, N.Y.

Refs: 36ee,36ff,37k

Mar 8, 1889/24:00/Ep V-VI; 39.7,75.8/V-VI: Newark, Del. V: Baltimore (2), Towsontown, Md. Lancaster, Reading, York, Pa. IV-V: Wilmington, Del. Churchville, Dylesville, Westminster, Md. Liberty, Pa. Emory, Va. Sandyville, W.Va. IV Bel Air, Elkton, Ellicott C., Fowler, Mt. Airy, Woodsboro, Md. Berks Co., Carlisle, Gettysburg, Lancaster Co., Lebanon Co., Pa. Brooklyn, N.Y. Waverly, Va. F: New Castle, Del. Corrolltown, Cecil Co., Clifton, Finksburg, Frederick, Hanover, Harford, Lineboro, Liniwood, Manchester, Union Br., Md. Harrisburg, Lebanon, Philadelphia, Pa. Heard: Emory Grove Jctn., Pineboro, Pa.

Refs: 7f,15b,15c,36gg,37l,37q,44a,63c,84c

Oct 10, 1892/Ep III; 39.8,75.5/F: Wilmington, Del.

Ref: 84e

Mar 8, 1893/17:30/Ep V: 40.6,73.8/V: Astoria, Long Is. C., Manhattan, N.Y. IV-V: Brooklyn, Westchester Co., N.Y. F: Newark, N.J. College Pt., Flushing, Garden City, Jamaica, Richmond Hill, N.Y.

Note: Series of slight shocks experienced by area. Temporary muddy water in faucets at Flushing.

Refs: 20,34,36hh,37m,37q,37jj,38e,40b,42b,66

Mar 14, 1893/20:05/Ep V: 40.7,73.9/V: Brooklyn, N.Y. IV: Glen Cove, Jamaica, N.Y. F: Queens, N.Y.

Ref: 10a

Apr 26, 1893/morning local time/ Ep III; 40.1,76.2/F: Lancaster, Pa.

Ref: 37pp

Nov 27, 1893/few minutes after 5:00/Ep: Canada/IV: Brooklyn, N.Y.

Ref: 37n

Jan 26, 1894/1:40/Ep IV-V: 39.0,76.5/IV-V: Annapolis, Md.

Ref: 10b

Sep 1, 1895/11:10,15:05/Ep VI; 39.9,75.3/VI: Maspeth, Winfield, Woodside, N.Y. W. Chester, Philadelphia, Pa. V-VI: Asbury Pk. Bordentown, Dover, Elizabeth High Bridge, Newark, Plainfield, N.J. Brighton Beach, Brooklyn (3), Coney Is., Far Rockaway, Freeport, Governor's Is., Sea Beach, Sheepshead Bay, Staten Is., Winfield, Woodside, N.Y. Coatesville, Ridgeway Pk., Pa. V: Atlantic Highlands, Burlington, Camden, Englewood, Hillside, Jersey C., Long Branch, Ocean Grove, Sandy Hook, Vineland, N.J. Flushing, Long Is. C., Mt. Vernon, Newton, N. Port, Parkville, Rockaway Beach, Rockville Centre, Tottenville, N.Y. IV-V: Wilmington, Del. New Brunswick (2), Trenton, N.J. Bay Shore, Hempstead, Hicksville, Jamaica, Jericho, Lynbrook, N.Y., Chester, Pa. IV: Hillsdale, Hoboken, Morristown, Mt. Arlington, Paterson, Rahway (2), Union Hill, Weehawken, N.J. Arverne by the Sea,

Brighton Hts., Castleton Hts., Grandsend, Edgemore, Long Beach, N.Y.C.,
Prt. Jefferson, Stapleton, Tomkinsville, White Plains, Yonkers, N.Y.,
Allentown, Easton, Norristown, Pottstown (3), Pa. F: Hackensack, James-
burg, Millstone, S. River, N.J., College Pt., Lynbrook, Manhattan Beach,
Whitestone, N.Y. Wilkes-Barre, Pa. Va.

Notes: Foreshock 7:50/Rahway and 8:00/Philadelphia. Aftershock 19:00/
Tom's R., N.J. Dead crabs and fish found at Sheepshead Bay. Fissure in
Philadelphia.

Refs: 1,10c,15c,15d,22,35c,36ii,37q,39e,44a,49,53a,65,82a

Oct 31, 1895/11:03/Ep IX; 37.0,89.4; Mo./V-VI: Washington, D.C. IV:
Richmond Va.

Refs: 11m,36jj,37r,48k,56q,60b,78g

Nov 20, 1895/8:00/Ep IV; 39.8,75.6/IV: Claymont, Del. Chester, Pa. F:
Wilmington, Del. Linwood, Pa.

Refs: 37s,48l,85a,85b

May 3, 1897/17:18 and 18:00/Ep VII; 37.2,80.4/VII: Radford, Va. VI:
Roanoke, Va. V-VI: Giles Co., Pulaski (2), Va. V: Christiansburg, Wythe-
ville, Va. IV-V: Blacksburg, Fincastle, Salem, Va. IV: Bedford, Va. F:
Framville, Lynchburg, Pearisburg, Va.

Note: Aftershocks May 4 and 5/F: Wytheville (3), Va.

Refs: 10d,37t,72

May 31, 1897/18:58/Ep IX; 37.3,80.8/IX: Narrows, Va. VIII: Bedford, Giles
Co., Va. VII-VIII: Radford, Wytheville, Va. VII: Floyd Crt. Hs., Pearis-
burg, Pulaski (4), Richmond, Roanoke, Va VI: Christianburg, Dublin, Fair-
mont, Houston, Luray, Rocky Mount, Tazewell Co., Va. Charleston, W. Va.
V-VI: Abingdon, Burkeville, Newport News, Norfolk (2), Petersburg,
Smithville, Stuart, Va. V: Baltimore, Hagerstown, Millersville, Roland
Pk., Towson, Md. Alexandria, Big Stone Gap, Crewe, Danville, Falls Church,
Fredericksburg, Gate C., Millboro, Richmond (2), Salem, Staunton, Suffolk,
Va. IV-V: Washington, D.C. Ashland, Chase C., Greenwood, Hot Springs,
Manassas, Manchester, Nottaway Crt. Hs., Parr's Ridge, Warm Sp., Va.
Grafton, Newburg, W. Va. IV: Ellicott C., Md., Bloomsburg, N.J., Bon air,
Chesterfield Co., Dinsviddie Co., Falls Church, Fincastle, Greenburg,
Jarretts, Lester, Lewinsville, Manor, Roslyn, Vienna, Waynesboro, Va.
Wheeling, W. Va., F: Bloomfield, Englewood, N.J. Oak, Pa. Bristol, Carson,
Charlottesville, Elberton, Lynchburg, Petersburg, Staunton, Stony Cr.,
Williamsburg, Winchester, Wytheville, Va. Bluefield, Clarksburg, Hinton,
Huntingdon, Parkersburg (2), W. Va.

Notes: Rumbings May 3 and 31, shocks nightly since May 25 and tremors to
June 6 in Giles Co. Houses down and springs muddy days after in Giles Co.
Ground swells, fissures and landslides in Narrows. Earth movements in
Radford, and ground swells in Pearisburg. Three shocks on eastern Md.,
shore. Train derailed and large rock down at Bluefield. Angel Rest Mt.
reported cracked. Several wells go dry in Williamsport, Pa. Prisoners
attempt to escape at Richmond and militia called. Extensive psycho-
logical disruption throughout Va. Salt wells in Saltville go dry.

Refs: 4f,7g,24b,36kk,37u,48m,68d,72,78h

Jun 8, 1897/0:53/Ep IV; 40.1,74.4, IV: Jackson's Mills (2), N.J.

Ref: 37v

Jun 29, 1897/4:30/Ep V-VI; 37.3,79.5/V-VI: Bedford C., Va. IV-V: Pulaski, Radford (2), Va. IV: Fincastle, Roanoke, Salem, Wytheville, Va. F: Eggleston, Lexington, Lynchburg, Pearisburg, Va.

Note: Very frequent shocks in summer at E. Radford, frequent disturbances in Bedford make people nervous.

Refs: 23c,37w,56s

Sep 3, 1897/12:00-13:00/Ep V; 37.3,80.7/V: Pearisburg, Va.

Notes: Foreshock Sep 1/12:00-13:00/F: Pearisburg. Aftershock Sep 4/11:00/III-IV: Wytheville.

Ref: 55a

Oct 22, 1897/3:20/Ep V-VI; 37.3,80.1/V-VI: Salem, Va. V: Bedford, Va. IV-V: Lynchburg, Va. F: Wytheville, Va.

Note: Foreshock Oct 21/3:20/IV: Lexington, Wytheville, Va.

Refs: 11i,23c,26f,56t,56u

Oct 31, 1897/Ep IV: 40.8,73.4/IV: Huntingdon, N.Y.

Ref: 10e

Nov 27, 1897/20:56/Ep V; 37.7,77.5/V: Ashland, Va.

Refs: 10f,37x,56v

Dec 18, 1897/23:45/Ep V; 37.7,77.5/V; Ashland, Bon Air, Richmond, Oakwood, Va. F: Buckingham, Fredericksburg, Henrico Co., Va.

Refs: 10g,14,23c,37qq,56w,72

Feb 5, 1898/20:00/Ep VI: 37.0,80.7/VI: Pulaski, Va. V-VI: E. Radford, Va. V: Bedford, Wytheville, Va. IV: Lynchburg, Va. F: Lexington, Salem, Va.

Note: Aftershock Feb 6/2:00/F: Dublin, Va.

Refs: 10h,23c,37y,56y

Nov 25, 1898/20:05/Ep V; 37.0,79.5/V: Danville, Fincastle, Lynchburg, Nottoway, Crt. Hs., Roanoke, Va. IV-V: Bedford, Richmond, Va. IV: E. Radford, Va. F: Washington, D.C. Bon Air, Blacksburg, Buckingham, Burkes Garden, Coleman's Fall, Fredericksburg, Lexington, Norfolk (2), Pulaski, Radford, Wytheville, Va.

Refs: 23c,24b,55b,56z

Feb 13, 1899/9:30/Ep V-VI; 37.2,80.6/V-VI: E. Radford, Va. V: Christiansburg, Dublin, Pulaski, Tazewell Co. (2), Wytheville, Va. IV: Danville (3), Lynchburg, Martinsville, Roanoke, Va. F: Abingdon, Fincastle, Floyd, Lexington, Salem (2), Staunton, Va.

Refs: 23c,26b,56aa,72

Mar 3, 1899/Ep IV; 36.9,76.2/IV: Va.

Ref: 23c

May 16, 1899/19:25/Ep V; 44.1,73.9/F:N.Y.C.

Note: Aftershock Long Is. Sound

Refs: 26h,44b

Mar 17, 1900/Ep III; 39.9,75.2/F: Philadelphia, Pa.

Ref: 48s

Apr 29, 1900/0:07/Ep III; 39.9,75.1/F: Camden, N.J., southern N.J., Philadelphia, Pa.

Ref: 37rr

Nov 29, 1900/Ep III; 39.9,75.2/F: Philadelphia, Pa.

Ref: 48s

Apr 29, 1900/0:07/Ep IV-V; 39.9,75.1/IV-V: Camden, Haddonfield, Paulsboro, Woodbury, N.J. IV: Philadelphia, Wissahickon, Pa.

Refs: 37rr,48n

May 17, 1901/6:00/Ep III; 40.8,73.4/F: Huntingdon, N.Y.

Ref: 71

Mar 10, 1902/5:00,10:30/Ep IV: 39.7,77.7/IV: Hagerstown, Md.

Ref: 71

Mar 11, 1902/10:30/Ep III; 39.6,77.2/III Md.

Ref: 22,71

May 15 or 16, 1902/Ep IV; 44.1,73.9/IV:N.Y.C.

Ref: 71

May 18, 1902/4:00/Ep IV-V; 37.3,80.7/IV-V: Pearisburg, Va.

Ref: 56bb

May 29, 1902/about 7:30/Ep V; 35.1,85.3; Tenn./F: Bayonne, Wayne, N.J.

Ref: 36mm,44a

Aug 11, 1902/Ep III; 40.7,74.2/F: Bayonne, Wayne, N.J.

Ref: 44a

Jan 1, 1903/17:30,22:45/Ep III; 39.7,77.7/F: Hagerstown, Md.

Refs: 71,74

Jan 13, 1903/13:55/Ep South Seas/F: Cheltenham Md.

Ref: 71

Apr 29, 1905/Ep IV; 37.3,79.5/IV: Bedford, Va.

Ref: 71

May 8, 1906/17:41/Ep V-VI; 38.7,75.7/V-VI: Seaford, Del. IV: Denton, Hurlock, Md. F: Millsboro, Del.

Refs: 4g,71

May 11, 1906/Ep IV-V; 40.6,73.8/IV-V: Rockaway, N.Y.

Ref: 372

May 28, 1906/22:30/Ep III; 40.2,75.8/III: Pa.

Ref: 22,71

May 29, 1906/evening/Ep IV-V; 40.3,75.9/F: N.Y.C.

Note: Collapse of tank in N.Y.C. associated with Reading, Pa. event.

Ref: 36nn,48o

Summer 1906/Ep III; 37.4,77.8/F: Amelia Co., Chesterfield, Powhatan, Va.

Ref: 58b

Oct 13, 1906/15:00/Ep III; 39.3,76.6/F: Baltimore, Md.

Ref: 74

Dec 5, 1906/16:20-17:30/Ep IV; 38.8,76.1/IV: Cambridge, Easton, Md.

Note: Possibly related to Dec 6/4:35/F: Nyack, N.Y.

Ref: 36oo,37aa

Jan 10, 1907/9:45 (series)/Ep IV; 41.2,77.1 IV: Williamsport, Pa.

Ref: 54a

Feb 11, 1907/13:22,13:26,13:45/Ep VI: 37.6,78.1/VI: Arvonnia, Ashby, Bremono, Buckingham, Columbia, Rock Castle, Va. V: Bellemeade, Richmond, Scottville, Va. IV: Amelia, Charlottesville, Nuckles, Va. F: Barton Hts., Cartersville, Columbia, Crewe, Va.

Notes: Foreshock Feb 11/0:30/F: Scottville, Woollard, Va. Aftershock

Feb 12/0:30/F: Scottville, Va.

Refs: 12,36pp,58a,61a

Feb 5, 1908/8:20,10:05/Ep IV-V/IV-V: Housatonic Valley, N.Y. IV: Nyack, N.Y. F: Manhattan, N.Y.
Note: Cracks and subsidence in Nyack
Ref: 33,37bb,44a,44b

Mar 26, 1908/6:22/ and Mar 27, 1908/3:54/Ep III; 38.8,76.9/F: Washington, D.C. Cheltenham, Md.
Ref: 71

May 31, 1908/17:42/Ep VI-VII; 40.6,75.5/VI-VII: Allentown, Pa.
Note: Possible subterranean collapse
Refs: 15b,36qq,44a

Aug 23, 1908/9:30/ and Aug 24, 1908/1:00/Ep IV-V; 37.5,77.9/IV-V: Chula, Clayville, Moseley's Jctn., Richmond, Skinquarter, Va.
Note: Other shocks Aug 3/7:30/F: Matoak, Va., and Aug 23/18:00, 20:30/F: Powhatan Crt. Hs., Va.
Refs: 44b,58b,73

Jan 18, 1909/Ep III; 40.9,76.7/III: Pa.
Ref: 22

Feb 6, 1909/early morning/Ep III; 40.2,74.7/F: Trenton, N.J.
Ref: 36rr

Apr 2, 1909/7:25/Ep V-VI: 38.5,80.0/V-VI: Winchester (2), Va. V: Williamsport, Md. Martinsburg, W. Va. IV: Harper's Ferry, W. Va. III-IV: Berryville, Boyce, Va. F: Hagerstown, Md. Mercersburg, Pa. Front Royal, Va.
Refs: 15b,36ss,73,76e,82b

Jan 24, 1910/2:20/Ep III; 39.6,77.2/F: Thurmont, Westminster, Md.
Ref: 71

Feb 8, 1910/14:00/Ep IV; 38.7,78.6/IV: New Market, Va. F: Harrisonburg, Mt. Jackson, Orkney, Springs, Woodstock, Va.
Note: Aftershocks 14:05, 14:30/F: Rockingham Co., Va.
Refs: 23c,76f

Apr 23, 1910/9:08/Ep IV-V; 39.3,74.4/IV-V: Atlantic C., N.J. IV: Chelsea, Ventnor, N.J. F: Absecon, N.J.
Notes: Shocks for 6 hours at Atlantic C. Aftershocks 11:50/IV: Snow Hill (3), Md. and Apr 24/2:00/F: Cantonville, Md.
Refs: 4h,20,36tt,37cc,74

Apr 24, 1910/2:00/Ep III; 39.2,76.7/III Md.
Ref: 22,71

May 1, 1910/shortly after 20:00/Ep IV-V; 44.1,73.7/IV-V: E. Williston, Garden, C., Mineola, Roslyn, N.Y. IV: Hempstead, N.Y.
Refs: 31,37dd,44a

May 8, 1910/21:10/Ep IV-V: 37.7,78.3/IV-V: Arvonnia, Cartersville, Carysbrook, Va. F: Charlottesville, Va.
Refs: 44b,73

Feb 10, 1911/10:22/Ep IV; 36.6,79.4/IV: Danville, Va.
Ref: 19a

Feb 10, 1911/18:22/Ep Ontario/F: N.J.
Ref: 71

Apr 8, 1911/1:00,4:11/Ep IV; 38.2,75.4/IV: Snow Hill, Md.
Ref: 71

Mar 23, 1912/4:40/Ep IV; 40.6,74.1/IV: Richmond, Stapleton, N.Y. F: Clifton, N.J. Tompkinsville, Tottenville, W. New Brighton, N.Y.
Refs: 36uu,36vv,37ee

Aug 8, 1912/1100/Ep IV; 37.7,78.2/IV: Arvonias, Va. F: Brems, New Canton, Va.
Refs: 196,61b

Nov 6, 1912/20:30,21:00/Ep V; 39.2,74.4/V: Atlantic C., N.J. F: Pleasantville, N.J.
Note: A series of shocks were experienced.
Refs: 36ww,37ff,71

Jan 1, 1913/18:28/Ep VII-VIII; 34.7,81.7(S.C.)/F: Baltimore, Md. Va.
Refs: 6,24a,61c

Feb 10, 1914/18:34,18:37/Ep VII; 45.0,76.9 (Canada)/V: Trenton, N.J. Brooklyn, N.Y. Philadelphia, Tunkshannock, Woodleigh, Pa. IV: Scranton, Pa. III-IV: Manhattan, Staten Is., N.Y. Allentown, Harrisburg, Pa.
Refs: 11a,15b,15d,36zz,36hhh,47a,48p,66,69a,76g

Mar 6, 1914/evening/Ep IV-V; 40.8,74.1/IV-V: Newark (7), Wayne (6), N.J.
Refs: 40b,41,76h

Mar 25, 1914/7:00/Ep IV-V; 39.2,74.2/IV-V: Five Mile Beach, Ventnor, Wildwood, N.J.
Note: A number of shocks were experienced in this area.
Refs: 36xx,48q

Jan 14, 1915/8:00/Ep III; 36.6,82.1/F: Bristol, Va.
Ref: 9a

Feb 21, 1916/23:45/Ep VII; 35.5,82.5(NC)VI: N. Bristol, Va. V-VI: Bristol, S. Boston, Va. V: Richmond, Va IV: Wilmington, Del. Danville, Independence, Norfolk, Va. III-IV: Fincastle, Houston, Lynchburg, Roanoke, Wytheville, Va. F: W. Pt., Md. W. Va.
Refs: 11b,23a,24a,43a,61d

Jun 8, 1916/21:15/Ep IV-V; 41.0,73.8/IV-V: E. Chester, Mt. Vernon, N.Y.C., Scarsdale, N.Y.
Refs: 26i,34,44a

Apr 19, 1917/Ep III; Southern Appalachians/F: Southwest Va.
Ref: 24c

Oct 19, 1917/Ep III-IV; 39.2,74.4/III-IV: Atlantic C. (4), Northfield, N.J. F: Ocean C., Pleasantville, Somers Pt., N.J.
Refs: 26j,44a

Apr 10, 1918/2:09/Ep VI; 38.7,78.4/VI: Edinburg, Harrisonburg (2), Va. Lyroy (2), Staunton, Winchester, Va. V: Woodstock, Md. Berryville, Clear Spring, Calpeper, Danville, Elkton, Lantz Mills, Lynchburg, New Market, Orange, Richmond, Strasburg, Tenth Legion, Timberville, Va. IV-V: Washington, D.C., Blue Ridge, Charlottesville, Columbia, Farmville, Roanoke, IV: Chewville, Solomons, Md., Alexandria, Cattleman's Ferry, Dale Enterprise, Gordonville, Leesburg, Madison Crt. Hs., Manassas, New Canton, Trevilians, Va. III-IV: Bagley, College Pk., Takoma Pk., Md. Colebrookhandle, Pa. Arvonias, Danville, Fredericksburg, Front Royal, Highland Pk., Lexington, Louisa, Rapidan, Woodberry Forest, Va., Buckhannon, W. Va., F: Baltimore, Md. Bluemont, Brookneal, Chatham, Mineral, New Canton, Palmyra, Purcellville, Riverton, Stafford, Suffolk, White Post, Va. Martinsburg, W. Va.
Note: Aftershocks Apr 10/7:00/F: Luray, Va. and Apr 16/13:00/F: Luray, Va. Chasm reported in mountain near Winchester. Spring opens in Hamburg, Va.
Refs: 11d,61e,71,73

Apr 19, 1918/16:55/Ep III; 36.7,76.5/F: Norfolk (2), Suffolk (2), Va.
Notes: Aftershocks Apr 20/16:26/F: D.C. and Apr 21/15:00/F: Norfolk, Va.
Refs: 11d,23c,26k,43b,71,80

Aug 6, 1919/5:00/Ep III; 39.6,74.2/F: Beach Haven, N.J.
Ref: 71

Sep 6, 1919/2:00,3:00/Ep VII; 38.8,78.2/VII: Arco, Va. VI: Front Royal,
Va. IV LImeton, Riverton, Va., F: Md., Cedarville, Va. W. Va.
Note: Springs muddy and dry at Arco.
Refs: 11e,26l

Jul 25, 1920/early morning/Ep IV-V; 38.7,78.4/IV-V: Luray, Va.
Refs: 26m,59a

Jan 26, 1921/23:45/Ep VI-VII; 40.0,74.8/VI-VII: Camden (4), Merchantville,
Moorestown, Mt. Holly (4), N.J., V-VI: Burlington, Delanco, Edgewater,
Gloucester, Haddon Hts., Pemberton, Riverside, Riverton, Trenton (4),
Vincentown, N.J. F: Atsion, Palymra, N.J. F: Philadelphia
Note: Fissure reported in Burlington.
Refs: 20,26n,36iii,36jjj,40a,42a,44a,69c

Jun 6, 1921/Ep; 40.7,74.2/F: Newark, N.J.
Refs: 40b,42b

Jul 9-15, 1921/Ep VI; 36.8,82.2/VI: Mendota, Va. F: W. Va.
Notes: Ground heaves and sinks. Fissure reported in rock. Events started
Jul 9.
Refs: 96,11f,14

Aug 7, 1921/6:30/Ep V; 37.5,78?V; Arlington, Howardsville, Scottsville,
Va. IV-V: Lovington, New Canton, Va. IV: Charlottesville, VA. F: Bucking-
ham, Columbia, Coesville, Cumberland, Dillwyn, Fluvanna, Warren, Va.
Refs: 23c,26o,59b,59c

Oct 30, 1923/18:00/Ep IV; 39.3,74.5/V: Atlantic C., Cape May, Ventnor (3),
N.J.
Ref: 36yy,44a

Dec 31, 1923/16:40/Ep V; 36.6,79.4/V: Danville, Va. IV-V: Winchester (3),
Va. IV Boyce, Va.
Note: Foreshock Dec 31/10:00
Refs: 11g,18,61f,78i,83

Oct 20, 1924/8:20/Ep V: 35.0,82.6 (S.C.)/F: Bristol, Va.
Note: Frequent disturbances in Bristol area during Oct and Nov. Cistern
damaged at Bristol.
Refs: 9c,61m,73,74

Oct 24, 1924/Ep V: 36.6,82.1/V: Bristol, Va.
Notes: References and note same as Oct 20, 1924 earthquake. Forechock at
Johnson C., Va. earlier in month.

Nov 13, 1924/5:30/Ep IV-V; 36.6,82.1/IV-V: Bristol, Va. F: Johnson C., Va.
Note: References and note same as Oct 20 and Oct 24 earthquakes.
Ref: 24b

Dec 26, 1924/4:30/Ep V; 37.3,79.9/V: Roanoke, Va.
Ref: 69g,61h

Jan 7, 1925/Ep III; 40.7,73.8/F: Queens, N.Y.
Ref: 36kkk

Mar 1, 1925/2:23/Ep VIII; 47.7,70.5; Canada/VI-VII: Passaic Co., Woodbury, N.J. Brooklyn (2), N.Y. V-VI: Newark, Trenton, N.J., Manhattan, Prt. Jervis, N.Y. Philadelphia, Pa. Norfolk, Richmond (2), Va. V: Washington, D.C. Baltimore, Berlin, Md. Bloomfield, Camden, Hackensack, Haddonfield, Jersey C., W. Orange, N.J., Amityville, Babylon, Bronx, Douglaston, Greenport, Kingston, Queens, Riverhead, Springfield, Staten Is., N.Y. IV-V: Pompton Lakes, Short Hills, Summit, N.J. Cedarhurst, Garden C., Jamaica, N.Y. IV: Englewood, Montclair, N.J. Bayville, Centre Moriches, Haverstraw, Mt. Vernon, Westchester Co., N.Y. Scranton, Pa. F: Wilmington, Del. Glassboro, Newark, Paterson, Perth Amboy, Salem, N.J. New Dorp, N.Y. Reading, Wilkes-Barre, Pa.

Notes: Houses razed Passaic Co., N.J. "Big damage" Woodbury, N.J. Radio receiver peculiarities Wilmington. Movie goers stampede at Bloomfield, N.J. Injuries due to falls in Brooklyn.

Refs: 6,7j,10i,15b,36zz,37jj,37ll,40b,42b,51,53b,53c,61i,66,69,76m,77

May 16, 1925/1:30/Ep V; 37.3,77.5/V: Va.

Ref: 23c

Jul 14, 1925/9:00/Ep IV-V; 37.6,77.4/IV-V: W. Richmond, Va.

Refs: 21a,61j

Apr 11, 1926/Ep III: 44.1,73.9/F: N.Y.C.

Note: Humblings heard

Ref: 34

May 12, 1926/4:45/Ep IV-V; 40.9,73.9/IV-V: New Rochelle, N.Y. F: Ardsley, Dobbs Ferry, Elmsford, Harrison, Hartsdale, Irvington, Larchmont, N. Tarrytown, Mamoronek, Chester, Tarrytown, Tuckahoe, Scarsdale, White Plains, N.Y.

Refs: 11h,21c,34,36aaa,37ll,44b

May 22, 1926/Ep III; 41.7,73.9/F: Poughkeepsie, N.Y.

Ref: 44a

Apr 18, 1927/Ep III; 44.1,73.9/F: Manhattan, N.Y.

Note: Possibly explosion.

Ref: 36bbb

Jun 1, 1927/13:23,13:31,13:39/Ep VI-VII; 40.3,74.0/VI-VII: Long Branch, N.J. V-VI: Asbury Pk. V: Atlantic Highlands, Fairview, Jersey C., Keyport, Monmouth, Ocean Grove, Red Bank, N.J. Scarsdale, N.Y. IV: Butler, Farmingdale, Pompton Lakes, Sandy Hook, N.J. White Plains, N.Y. F: Avon, Barnegat Bay, Bradley Beach, Freehold, Ft. Hancock, Neptune, New Brunswick, Tom's R., N.J. Brooklyn, Manhattan, Staten Is., N.Y.

Refs: 11i,36ccc,37ll,42c,47b,66,76i

Jun 10, 1927/7:17/Ep V; 37.5,78/V: Charlottesville, Richmond, Va. IV: Campbell, Va. F: 50 miles west of Richmond

Refs: 11j,23c,36ddd,55c,59e,61k,76j

Oct 24, 1927/11:00/Ep III: 41.7,73.7/F: Dannermora, N.Y.

Ref: 21c

Nov 5, 1927/5:15/Ep III: 39.3,76.6/F: Baltimore, Md.

Note: Possibly explosion

Ref: 7h,21c

Jun 13, 1928/19:50/Ep IV-V; 41.2,71.6/IV-V: Block Is, (2) R.I.

Refs: 44a,44b,70a

Jun 22, 1928/4:07/Ep IV; 40.6, 75.5/IV: Allentown, Pa.

Ref: 70a

Oct 16, 1928/early A.M./Ep IV; 38.3,75.1/IV: Berlin, Ocean C., Md.
Refs: 70a,74,78j

Oct 30, 1928/11:45/Ep IV; 37.6,77.5/IV: Richmond, Va. F: Ashland,
Charlottesville, Va.
Refs: 23c,55e,61l,70a

Nov 3, 1928/4:03/Ep IV-V; 36.0,32.6/IV-V: Abingdon, Bristol, Va. IV:
Wytheville, Va.
Ref: 70a

1929/Ep III; 40.7,74.0/Staten Is., N.Y.
Ref: 66

Aug 12, 1929/12:25/Ep V: 40.9,73.8/V: Yonkers, N.Y. IV: Manhattan, N.Y.
F: Little Valley, Scarsdale, Suffern, N.Y.
Note: Aftershocks Aug 13/Long Is. C., N.Y.
Refs: 11k,36eee,36fff,37mm,48r,70b,76k,78k

Nov 18, 1929/20:32/Ep X; 44,56 (New Foundland)/V: Block Is., N.Y. IV:
Brooklyn, Flushing, Manhattan, N.Y. F: Claymont, Del. Northern Shores of
Long Is., Scarsdale, N.Y.
Note: High Tides experienced and bridge swept away in Douglaston, N.Y.
Refs: 36kkk,37ss,70b,76n

Dec 26, 1929/1:56/Ep VII; 38.1,78.5/VII: Albermarle Co., Va. VI:
Charlottesville, Va. IV: New Canton, Va.
Note: Aftershock Dec 27/7:00
Ref: 11k,59f,55d,70b,76l

DISCUSSION

This catalog contains about 192 earthquakes over the period from 1850-1930. For these statistics foreshock, quickly repeated shocks, and aftershocks are counted as one earthquake. Of the 192 earthquakes 39 are damaging with intensities from V-VI to IX. Of the 39 damaging, 17 occurred in the moderate seismic risk zone of Va. while the remaining 22 in the minor seismic risk zone in the megalopolis from N.Y.C. to Norfolk, Va. Since this moderate risk area is comparable in extent to the minor risk area it suggests that the eastern megalopolis is not as earthquake free as has been previously thought.

This attitude regarding the eastern megalopolis being relatively non-seismic has been perpetuated with a litany of soothing statements by seismologists for over a century. The Aug 10, 1884 earthquake was very extensive in its damage, exhibiting one area of intensity VIII; six areas, VII-VIII; twenty four areas, VII; sixteen areas, VI-VII and twenty one areas, VI. In spite of this extensive damage we find in V28 of the American Journ. of Science and Art that the earthquake of 1884 "nowhere did any damage beyond breaking crockery and occasionally cracking a house wall".

Of the damaging earthquakes in the eastern megalopolis these of Aug 10, 1884 and Mar 1, 1925 involved the destruction of houses. A selected list of cities experiencing damage in general with intensity VI-VII or higher follows:

Long Is., N.Y.

Aug 10, 1884 VII,VI-VII

N.J. Shore

Aug 10, 1884 VII
Jun 1, 1907 VI-VII

N.Y.C.

Oct 20, 1870 VI-VII
Sep 1, 1883 VII
Aug 10, 1884 VII,VII-
VIII,VII
Aug 31, 1886 VI-VII
Mar 1, 1925 VI-VII

N.J. Suburb of N.Y.C.

Aug 10, 1884 VII
Mar 1, 1925 VI-VII

Southeast Tip N.Y.

Oct 20, 1870 VI-VII
Aug 10, 1884 VII,VI-VII

Eastern Pennsylvania

Oct 20, 1870 VI-VII
Aug 10, 1884 VII-VIII,
VII, VI-VII
May 31, 1908 VI-VII

N.J. Suburb of Philadelphia

Aug 10, 1884 VII
Jan 26, 1921 VI-VII
Mar 1, 1925 VI-VII

Richmond, Va.

Dec 23, 1875 VII-VIII
Aug 31, 1886 VI-VII
May 31, 1897 VII

Washington, D.C.

Aug 31, 1886 VI-VII

Wilmington, Del.

Oct 9, 1871 VII

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APPENDIX

The following lists are additions to the catalog generated for the U.S. before 1850 on contract NRC-04-78-208 which later appeared in the Bulletin of the Seismological Society of America (v69p569). The first list constitutes new earthquakes and the second list expansions of already listed earthquakes. This Appendix has an independent set of references listed at the end. Many of these new additions resulted from uncovering mini-catalogs for cities such as: Manhattan Is., N.Y. (Stokes, "Iconography of Manhattan Is."), Staten Is., N.Y. (private communication from the Staten Island Institute of Arts & Sciences, Aug 14, 1981), and Wilmington, Del. (Wilmington Evening Journ., Mar 2, 1925).

New Earthquakes

Mar 8, 1735/Ep III; 35.5,76.7; N.C./F: Bath, N.C.

Ref: 5

Feb 17, 1736/Ep III; 40.7,74.0; N.Y./F: N.Y.C., N.Y.

Ref: 4

Aug 27, 1747/Ep III; 40.7, 74.0; N.Y./F: N.Y.C., N.Y.

Ref: 4

Nov 28, 1755/Ep III; 40.7, 74.0; N.Y./F: N.Y.C., N.Y.

Ref: 4

Nov 1755/Ep III; 33.2,79.2; S.C./F: Georgetown, S.C.

Ref: 5

Nov 27, 1773/Ep III; 40.7,74.0; N.Y./F: N.Y.C., N.Y.

Ref: 4

Jan 2, 1786/Ep III; 39.4,76.7; Md./F: Baltimore, Md.

Ref: 6

May 8, 1804/Ep III; 40.7,74.0; N.Y./F: N.Y.C., N.Y.

Ref: 4

Dec 11, 1817/Ep III; 33.5,82; Ga.-S.C./F: Ga., S.C.

Ref: 5

1825/Ep III; 36.2,81.2; N.C./F: Wilkesboro, N.C.

Ref: 5

Mar 19, 1825/Ep III; 35.6,87.1; Tenn./F: Columbia, Tenn.

Ref: 5

1829/Ep III; 35,84; N.C./F: Cherokee Co., N.C.

Ref: 6

May 7, 1836/Ep III; 36.0,84.0; Tenn./F: Knoxville, Tenn.

Ref: 5

Oct 25, 1845/Ep III; 40.6,74.1/F: Staten Is., N.Y.

Ref: 3

Feb 4, 1846/Ep III; 40.6,74.1/F: Staten Is., N.Y.

Ref: 3

1848/Ep III; 35.7,82.0; N.C./F: McDowell Co., N.C.

Ref: 5

EXPANSIONS OF LISTED EARTHQUAKES

Sep 16, 1732/17:00/Ep IX; 45.5,73.6; St. Lawrence Valley/F: Wilmington, Del.

Ref: 8

Dec 19, 1737/4:50/Ep VIII; 40.7,74.0; N.Y./F: Wilmington, Del.

Ref: 8

Jun 14, 1744/15:15/Ep VI-VII; 42.7,70.6; Cape Ann/F: Long Is., N.Y.

Ref: 4

Nov 18, 1755/9:12/Ep VIII; 42.7,70.6; Cape Ann/F: Wilmington, Del.

Ref: 8

Mar 23, 1758/3:00/Ep IV; Sabine Hill, Va./F: Wilmington, Del.

Ref: 8

Apr 25, 1772/13:00-14:00/Ep IV; Cohantle, N.J./F: Wilmington, Del.

Ref: 8

Feb 22, 1774/6:00/Ep IV; 38.0,78.5; Va./F: Williamsburg, Ky.

Ref: 6

Nov 24, 1783/Ep IV; 41.0,74.5/IV: N.J.

Ref: 7

Nov 30, 1783/6:00/Ep IV; 40.0,75.1; Pa./F: Wilmington, Del. Pompton Lakes, N.J.

Ref: 1,8

Dec 9, 1911/1:00/Ep III; 39.8,75.5; Pa.-Del./F: Wilmington, Del.

Ref: 8

Dec 16, 1811/8:50/Ep XI; 36,90; Mo. Valley/F: Wilmington, Del.

Ref: 8

Feb 7, 1812/4:34/Ep XI-XII; 36.5,89.6; Mo. Valley/F: Wilmington, Del.

Ref: 8

Jan 8, 1817/9:34/Ep V; 37.0,81.0; Carolinas/F: Wilmington, Del.

Note: Aftershock at Philadelphia at 19:10

Ref: 8

Oct 19, 1846/2:00/Ep III-IV; 39.3,78.2; W. Va./F: Lexington, Ky.

Ref: 6

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CORRECTIONS

The foreshocks reported for Dec 5,6 and 14, 1811 relating to the Dec 16, 1811; Jan 23, 1812; Feb 7, 1812 events in the Mo. Valley referenced in the report for contract NRC-04-78-208 and BSSA V69p569 are erroneously reported and are to be deleted. Although the reference listed for the erroneous foreshocks does not include the foreshocks, a secondary reference not mentioned was used which incorrectly attributed the foreshocks to the primary source.

In the above mentioned published works, the last two earthquakes should read Feb 15, 1848 Mass., N.Y. and Oct 8, 1848 Mass. to agree with the last two entries in the earthquakes for the Northeast U.S.

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CATALOG OF EARTHQUAKES FELT IN THE EASTERN U.S. MEGALOPOLIS
1850 - 1930

JULY 1982