

EARTHQUAKE EPICENTERS IN OHIO AND ADJACENT AREAS

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MAPPING CONVENTIONS
This map depicts the approximate locations of earthquakes that have felt in Ohio or near the state border that had instrumental magnitudes of 2.0 or greater. For purposes of graphic display, some events are not plotted exactly at their true coordinates (two causes: a) using a right-angled coordinate system, and b) rounding of coordinates). Noninstrumental earthquake locations and magnitudes have been calculated from historical accounts, including newspaper articles, scientific publications, published and unpublished government reports, and records, and a variety of other sources. Because of the paucity of original reports for some earthquakes, these locations and magnitudes may be less precise than for some other events. Instrumental events are listed in kilometers. Two earthquake-center events, in 1776 and 1779, are not plotted on the map because they are known only from single felt reports recorded by Missouri statisticians in California County. These earthquakes may have had epicenters beyond Ohio borders. This map includes most of the small-to-moderate (2.0 magnitude or greater) earthquakes that were beyond the state border but were, or may have been, felt in Ohio.

Instrumental recording of earthquakes in Ohio began about 1800 at St. Ignace College (now John Carroll University) in Cleveland. In 1927, Xavier University in Cincinnati established a seismic station that operated until 1960. Bowling Green State University operated a seismic station during the 1970s through the mid-1980s. The University of Toledo established a seismic station in the early 1980s. Despite this history of instrumental recording in Ohio, there were never sufficient numbers of stations to precisely locate small earthquakes occurring within the state. Therefore, instrumental locations of small earthquakes in Ohio during this period probably have no greater precision than events located on the basis of felt reports. From 1977 to 1992, the University of Michigan operated a microseismic seismic network in the Basin area of western Ohio and probably located a number of events in this region. In 1996, John Carroll University established a microseismic seismic network in northeastern Ohio and located a number of small earthquakes in this area; this network ceased operation in 1992.

From 1992 until establishment of the Ohio Seismic Network in 1999, Ohio lacked in-state capability to locate earthquakes. During this period, some small events were detected and instrumentally located by seismological networks, including the University of Kentucky and the Geological Survey of Canada. However, some instrumental locations are imprecise because of station-database and distribution that group many individual earthquakes. Seismological agencies that use several stations for calculating the error ellipse for an event. Some poorly recorded events may have error ellipses with axes of tens of kilometers (km), whereas others may have error ellipses of less than one km. The interpretation of locations of instrumental and noninstrumental earthquakes is well known to seismologists, geologists, and others who work with earthquake data. However, such information is not the type of data that individuals and organizations are aware that the placement on a map of a specific depicting an earthquake location is a graphic representation of an approximate location based upon available data. Therefore, incorrect decisions should be based on the quality of the original data for a specific earthquake.

The complete database of Ohio and border-region earthquakes is available online at <http://www.geological-survey.gov/earthquake/ohio/earthquake.html>. The database includes a listing of some larger earthquakes that were felt or caused damage in Ohio but are beyond the border region as well as a list of doubtful or uncertain events that were reported as earthquakes but were probably of nonseismic origin. Although derived from previous compilations by academic researchers and governmental institutions, the database has depended heavily on the report and coding by Seneca and Ambrose (1963), with additions by John G. Ambrose. Many older events are poorly known and require additional research of newspaper accounts for complete documentation. Editorial research occasionally reveals earthquakes that have not been noted on previous lists. The GDSR Division of Geological Survey welcomes such new information.

ACKNOWLEDGMENTS

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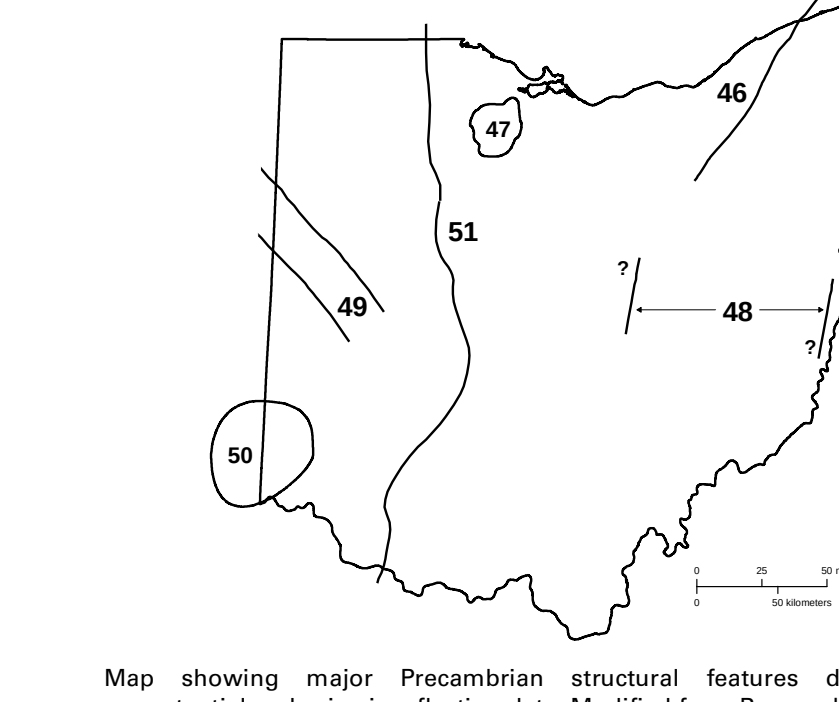
OHIO SEISMIC NETWORK STATIONS

Station Code	Station Host
ACSO	Ashtabula EMA
ACSD	Ashtabula EMA
BCSO	Bloom-Carroll High School
BGFO	Bowling Green State University - Firelands
BGSU	Bowling Green State University - Firelands
BHSO	Bokins High School
BTCO	Baltimore College
CLEO	Cleveland Museum of Natural History
COWO	College of Wooster
CSKO	Clark State Community College
EDCO	Edison Community College
OPCO	Geological Survey District Observatory
KSTO	Kent State University - Tuscarawas
KSUO	Kent State University
LCCO	Lakeland Community College
LECO	Lake Erie College
MACO	Marietta College
MCSO	Mohican School
MUCO	Mount Union College
OGSO	Ohio Geological Survey - Columbus
OSLO	Ohio State University - Lima
OSMO	Ohio State University - Mansfield
OSUO	Ohio State University
OUAO	Ohio University
SUOO	Shawnee State University
UCOO	University of Cincinnati
WSCO	Wright State University - Celina
USOO	Wright State University - Dayton
YSOO	Youngstown State University

FAULTS & STRUCTURAL FEATURES¹

Map No.	Structural Feature
1	Unnamed fault (Lake Co.)
2	Rome Trough Fault System
3	Cambridge Cross-Strike Structural Discontinuity
4	Unnamed fault (Belmont Co.)
5	W. Hickman Creek-Bryan Station Fault
6	Burning Springs Fault System
7	Ohio River Fault
8	Bowling Green Fault System
9	Unnamed faults (Delaware Co.)
10	Middleburg Fault
11	Pittsburgh-Washington Cross-Strike Structural Discontinuity
12	Unnamed fault (Sandusky Co.)
13	Unnamed faults (Washington Co.)
14	Unnamed faults (Madison Co.)
15	Unnamed fault (Scioto Co.)
16	Serpent Mound Impact Structure
17	Unnamed fault (Montgomery, Warren Co.)
18	Unnamed fault (Hancock Co.)
19	Tiffin Fault
20	Unnamed faults (Fayette, Pickaway, Ross Co.)
21	Harlem Fault
22	Unnamed faults (Fayette Co.)
23	Unnamed fault (Seneca Co.)
24	Star Fault System
25	Unnamed faults along COCORP seismic lines
26	Unnamed fault (Highland Co.)
27	Unron Fault
28	Smith Township Fault
29	Highlandtown Fault
30	Anna-Champagne Fault
31	Logan Fault
32	Auglaize Fault
33	Crawford Faults
34	Kentucky River Fault System
35	Kilbuck Dome
36	Marion Fault
37	Maumee Fault
38	Quail Fault
39	Pellum Run Quarry Fault
40	Bellefontaine Outlier Faults
41	Unnamed faults (Adams Co.)
42	Unnamed fault (Wayne Co.)
43	Unnamed fault (Austabula Co.)
44	Unnamed fault (Austabula Co.)
45	Unnamed fault (Austabula Co.)
46	Ashtabula Magnetic Boundary
47	Seneca Anomaly
48	Crookston Zone
49	Fort Wayne Rift
50	Southeastern Ohio Anomaly
51	Grenville Front Tectonic Zone
52	Ulica Mountain Fault
53	Ulica Mountain Structure

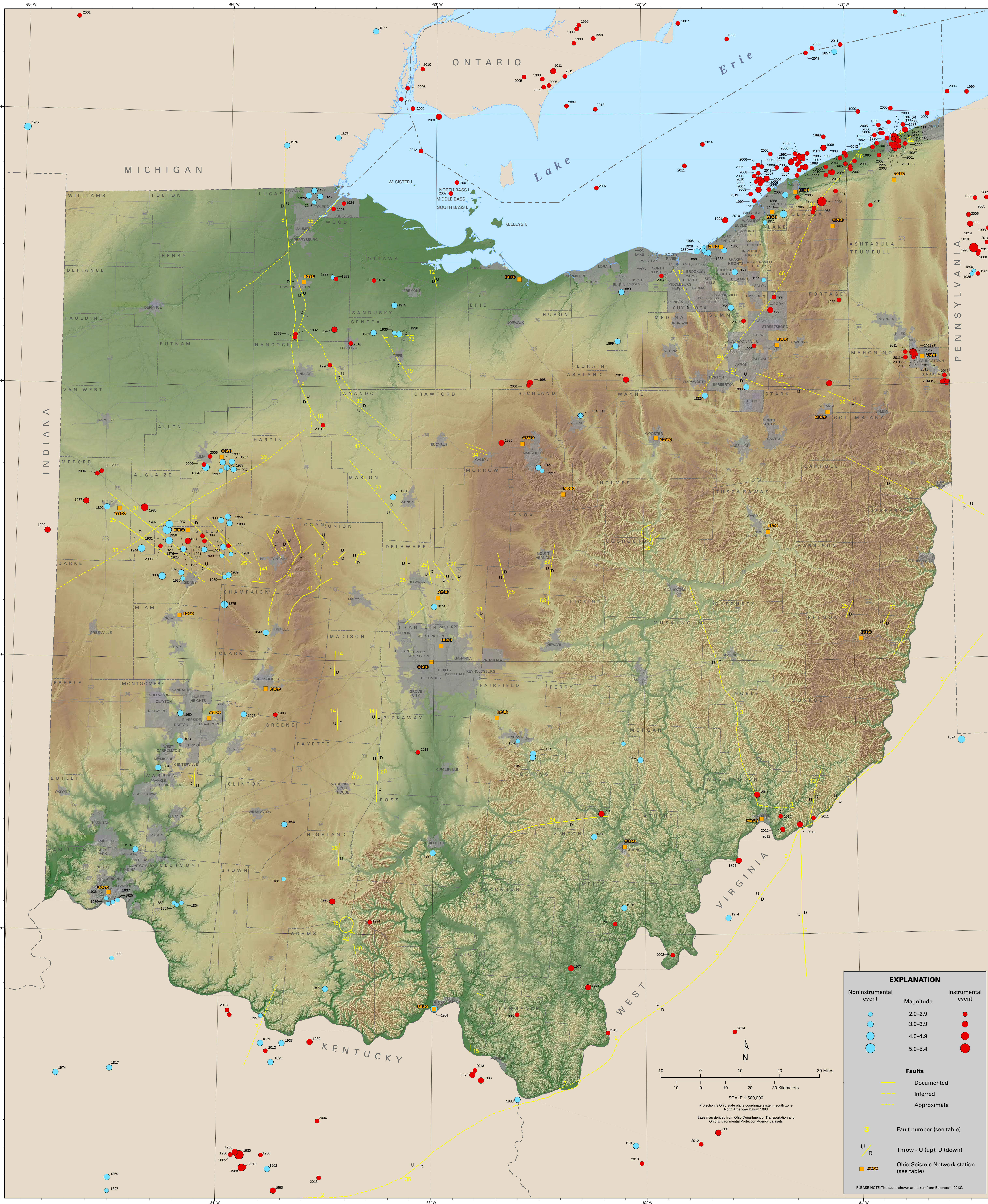
From Baranowski (2013).



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Hansen, M.G., 2014. Earthquake epicenters in Ohio and adjacent areas (map EIC-2). Columbus, Ohio: Department of Natural Resources, Division of Geological Survey Map EIC-2, scale 1:500,000.

A version of this map is available online at <http://www.geological-survey.gov/earthquake/ohio/earthquake.html>. The information contained herein may be updated or revised in the future. Please refer to the most current version of this product for the latest information.



EXPLANATION

Noninstrumental event

Instrumental event

2.0-2.9

3.0-3.9

4.0-4.9

5.0-5.4

Documented

Inferred

Approximate

Faults

Documented

Inferred

Approximate

Fault number (see table)

Throw - U (up), D (down)

Ohio Seismic Network station (see table)

PLEASE NOTE: The faults shown are taken from Baranowski (2013).

OHIO EARTHQUAKE CATALOG														
YEAR	MO	DA	HR	MIN	SEC	LAT ^N	LO ^N W	DP	MAG	MT	MMI	FA	COUNTY	SOURCE
1881	1	26	1	0	0	41.00	81.00	0	2.5	U	-	-	FA	OSU
1882	3	28	8	22	44.00	40.00	80.70	0	2.0	U	-	-	ASHT	OSU
1883	5	19	23	10	30.00	80.00	80.00	0	3.1	U	-	-	FA	OSU
1884	5	19	23	10	30.00	80.00	80.00	0	3.1	U	-	-	FA	OSU
1885	7	2	0	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1886	7	2	0	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1887	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1888	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1889	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1890	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1891	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1892	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1893	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1894	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1895	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1896	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1897	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1898	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1899	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1900	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1901	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1902	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1903	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1904	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1905	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1906	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1907	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1908	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1909	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1910	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1911	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1912	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1913	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1914	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1915	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1916	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1917	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1918	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1919	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1920	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1921	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1922	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1923	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1924	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1925	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1926	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1927	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1928	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1929	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1930	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1931	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1932	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1933	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1934	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1935	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1936	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1937	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1938	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1939	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1940	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1941	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1942	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1943	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1944	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1945	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1946	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1947	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1948	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1949	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1950	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1951	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1952	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1953	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1954	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1955	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1956	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1957	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1958	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1959	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1960	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1961	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1962	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1963	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1964	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1965	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1966	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1967	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1968	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1969	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1970	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1971	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1972	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1973	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1974	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1975	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1976	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1977	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1978	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1979	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1980	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1981	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1982	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1983	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1984	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1985	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1986	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1987	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1988	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1989	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1990	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1991	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1992	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1993	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1994	1	11	1	0	0	40.00	80.00	0	2.5	U	-	-	FA	OSU
1995	1	11	1	0	0									