

Saginaw County Local Hazard Analysis



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INTRODUCTION

Saginaw County is vulnerable to a wide range of natural, technological and human-related hazards. The intent of this document is to (1) educate local policy makers and emergency service organizations to the hazards of the area, and (2) provide a comprehensive reference document for planning and mitigation activities.

Managing these many varied threats, and protecting life and property, are the challenges faced by emergency management officials at all levels of government. In order to attain an effective emergency management capability to mitigate, prepare for, respond to, and recover from all types of hazards, an understanding of the multitude of hazards that confront the County must first be obtained. The first step in the process of building an effective emergency management capability is the preparation of a hazard analysis that provides an understanding of those threats.

When coupled with relevant land use and demographic information, a hazard analysis becomes a powerful planning tool that enables emergency management officials to set priorities and goals for resource allocation and mitigation and preparedness activities.

In Saginaw County, the Office of Emergency Management is the coordinating agency for all emergency management activities. The office is responsible for continually monitoring and updating the Saginaw County Emergency Action Guidelines, as well as many other disaster related activities.

Questions and comments concerning this document should be addressed to the Saginaw County Office of Emergency Management, 111 S. Michigan Avenue, Saginaw, Michigan 48602, (989) 790-5434, FAX (989) 792-6852 or e-mail: tgenovese@saginawcounty.com.

SAGINAW COUNTY PROFILE

SAGINAW TOWNSHIP

For a period extending over four years between 1831 and 1835, the district known as the County of Saginaw formed a township attached to Oakland County for judicial purposes.

The Legislative Council of the Territory ordained that - "all that part of the country lying with the limits of the County of Sagana here fore set off and established as the County of Saginaw, be and the same hereby be set off into a separate township and the name thereof shall be Sagana. The first township meeting to be held in such township shall be held at the Fort of Sagana, on the first Monday in April, which will be in the year 1831."

This act was approved July 12, 1830, and came into force in 1831, when Gardner D. Williams was elected supervisor.

The name Saginaw is derived from the language of the Chippewa Indians and means "Land of the Sauks." The warlike Sauks inhabited the entire Saginaw Valley. However, around the year 1520, the Chippewas invaded the territory in great force, and in a series of battles, the Sauks were virtually annihilated. The bloodiest of these battles was fought on what has since been known as Skull Island in the Saginaw River and on a bluff on the Flint River about a mile from the present Village of Flushing.

SAGINAW BECOMES A COUNTY

The boundaries of the County of Saginaw were set by proclamation of Governor Cass on September 10, 1822. These boundaries were subsequently changed by an act of the Legislative Council, approved March 2, 1831.

During 1834, the question of conferring on the township of Saginaw the status of a county was discussed and a resolution of the Council passed to the effect - "That the County of Saginaw shall be organized when this act takes effect." This act of organization was approved January 28, 1835, and put into force the second Monday of February 1835.

Saginaw County now contains three cities, 27 townships and five incorporated villages. The County is home to two airports, MBS International Airport and Harry Browne Airport. Both airports service the private and public aviation needs for the County. The population of the County, according to the Federal Census of 2000, is 210,039, of which the City of Saginaw has 61,799. The County of Saginaw contains 85,506 housing units.

Saginaw County has thousands of acres of rich fertile soil. It is one of the leading producers of sugar beets and beans in the nation. The top employers of the County include Delphi Saginaw Steering Systems, General Motors Power Train Division, St. Mary's Medical Center, Covenant HealthCare, Delphi Chassis Systems, Saginaw City School District, AT&T, and Hemlock Semiconductor Corporation.

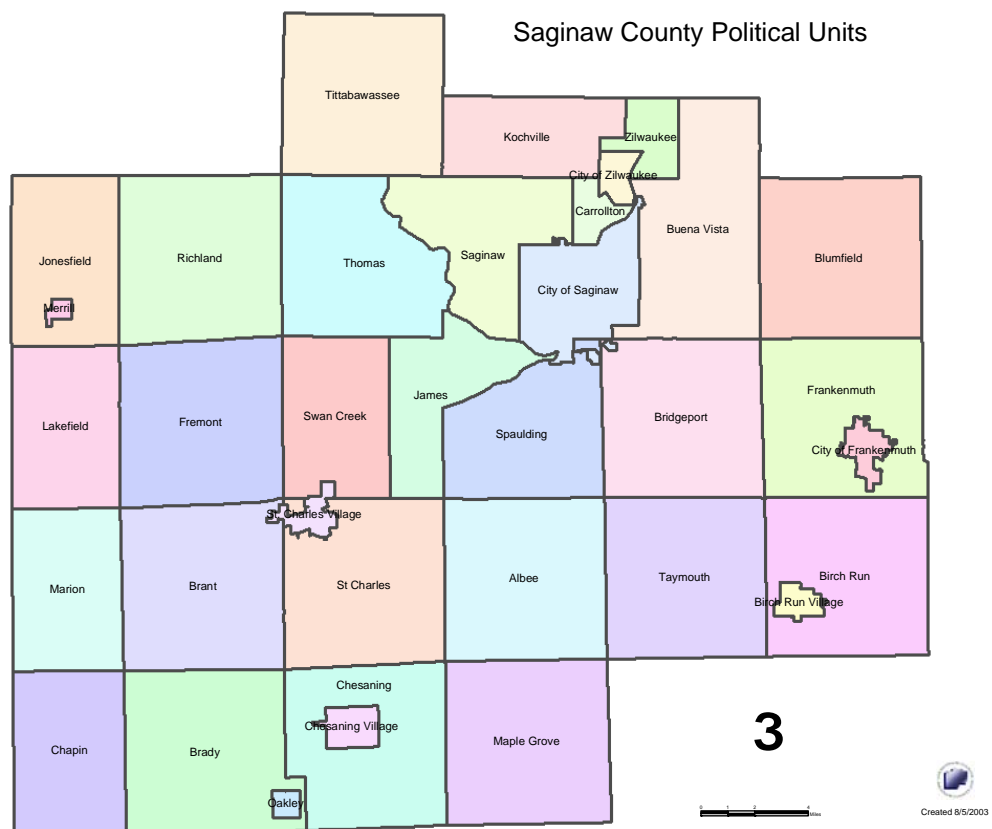
Saginaw County has 13 Public School Districts that offer K-12, encompassing 14 high schools, 16 middle schools, and 50 elementary schools. There are also seven public school academies with an enrollment of 1,760. There are seven non-public high schools. Total enrollment for public schools is 34,246 with non-public schools providing an additional 7,500 students. Saginaw County has a vocational training center called the Saginaw Career Complex, and continuing educational services are offered in most school districts having day and evening enrollment. The Saginaw Intermediate School District maintains Hartley Outdoor Education Center, the Transitions Center, and Melvin G. Millet Learning Center. Saginaw Valley State University, Central Michigan University, Delta College, a community college, and Davenport University, a business college, operate within Saginaw County's boundaries.

The County has an annual average temperature of 45.8° F., an annual rainfall of 30.0 inches, and an average snowfall of 40 inches. There are, on average, 33 annual thunderstorms, the hottest month is July with 71.6°, and the coldest months are January and February with an average temperature of 23.6°

The County & all its parts

THE CITIES AND TOWNSHIPS

Saginaw County consists of 27 townships, 3 cities (Frankenmuth, Saginaw and Zilwaukee) and 5 villages (Birch Run, Chesaning, Merrill, Oakley and St. Charles). These political jurisdictions are illustrated on the map appearing below. Information appears on the following pages for each of the component jurisdictions of the county.



Courtesy of Saginaw County Geographic Information Services

ALBEE TOWNSHIP

Albee Township Community Center
10645 East (M-13) Rd, Burt, MI 48417

Mailing Address: Use Clerks

Phone No.: (989) 770-4844

FAX: (989) 770-5001

Office Hours: Tues. 12-5, Thurs. & Sat. 9-1

SUPERVISOR: Leon Turnwald (D) 3395 W Birch Run Rd, Burt, MI 48417

CLERK: Thomas Gasser (D) 10639 Bishop Rd, St. Charles, MI 48655

BIRCH RUN TOWNSHIP

Township Office: 8425 Main St., Box 152
Birch Run MI 48415

Mailing Address: Same as office

Phone No.: (989) 624-9773; FAX: (989) 624-1177

www.birchruntownship.com

Office Hours: Mon. - Fri. 9 - 5

SUPERVISOR: Earl R. Schlegel (R) 9455 S Gera Rd, Birch Run, MI 48415

CLERK: Amy Cook (R) 7190 E Burt Rd, Birch Run, MI 48415

BLUMFIELD TOWNSHIP

Township Office: 1175 Vassar Rd
Reese, MI 48757

Mailing Address: Use Clerks

Phone No.: (989) 868-9512; FAX: (989) 868-9519

No Regular Office Hours - Leave brief message on voice mail

SUPERVISOR: Charles Kern (NP) 1502 N Block Rd, Reese, MI 48757

CLERK: Lisa Roethlisberger (R) 1175 Vassar Rd., Reese, MI 48757

BRADY TOWNSHIP

Township Office: 16020 Peet Rd.
Oakley, MI 48649

Mailing Address: Use Clerks

FAX: (989) 845-4300

SUPERVISOR: Ron Gasper (NP) 16172 Baldwin Rd, Chesaning, MI 48616

CLERK: Beverly Wenzlick (NP) 15735 Baldwin Rd, Chesaning, MI 48616

BRANT TOWNSHIP

Township Office: S. Hemlock & Brant Rds
Brant, MI 48614

Mailing Address: Use Clerks

Phone No.: (989) 585-3448; FAX: (989) 585-3886

SUPERVISOR: Judy Schlitts (R) 10210 S Brennan Rd, Brant, MI 48614

CLERK: Theresa Schroeder (R) 9812 S Hemlock Rd, St. Charles, MI 48655

BRIDGEPORT TOWNSHIP

Township Office: 6206 Dixie Hwy, PO Box 319
Bridgeport, MI 48722

Phone No.: (989) 777-0940; FAX: (989) 777-4802

Office Hours: Mon. - Fri. 8 – 5

SUPERVISOR: Patrick Gilles (D) 6800 Dixie Hwy, Bridgeport, MI 48722

CLERK: Barbara A. Montgomery (D) 1601 Prueter, Saginaw, MI 48601

BUENA VISTA TOWNSHIP

Township Office: 1160 S Outer Dr
Saginaw, MI 48601

Phone No.: (989) 754-6536; FAX: (989) 754-5930

Office Hours: Mon. - Fri. 8 – 5

SUPERVISOR: Dwayne A. Parker (D) 1401 N Outer Dr, Saginaw, MI 48601

CLERK: Patricia Watkins (D) 4646 S Michelle, Saginaw, MI 48601

CARROLLTON TOWNSHIP

Township Office: 1645 Mapleridge
Saginaw, MI 48604

Phone No.: (989) 754-4611; FAX: (989) 754-5705

Office Hours: Mon. - Fri. 8 – 5

SUPERVISOR: Marvin Kozara (D) 915 Atlanta, Saginaw, MI 48604

CLERK: Jerry W. Fritz (D) 3363 Terry St, Saginaw, MI 48604

CHAPIN TOWNSHIP

Township Office: 21481W Peet Rd
Henderson, MI 48841

Mailing Address: Use Clerks Address

Phone No.: Use Clerk's No.: (989) 661-2327; FAX: 661-4418

No Regular Office Hours, Contact Person Desired

SUPERVISOR: Robb C. Maynard (R) 19650 Fenmore Rd, Elsie, MI 48831

CLERK: Virginia J. Leckenby (R) 19131 Ridge Rd, Henderson, MI 48841

CHESANING TOWNSHIP

Township Office: 1025 W Brady St
Chesaning, MI 48616

Phone No.: (989) 845-2341; FAX: (989) 845-5555

Office Hours: Mon. 9 - 5; Tues. & Fri. 9 - 2

SUPERVISOR: Robert Corrin (D) 429 S Chapman St, Chesaning, MI 48616

CLERK: Sue Emmendorfer (NP) 1025 W Brady St, Chesaning, MI 48616

FRANKENMUTH TOWNSHIP Township Office: 218 W Genesee St
Frankenmuth, MI 48734

Fax: (989) 652-3795

Mailing Address: P.O. Box 245

SUPERVISOR: Tim Hildner (R) 3763 S Gera Rd, Frankenmuth, MI 48734

CLERK: Paul F. Bergdolt (R) 11170 Roedel Rd, Frankenmuth, MI 48734

FREMONT TOWNSHIP Township Office: 5980 E Hemlock Rd
St Charles, MI 48655

Mailing Address: Use Clerks

Phone No.: (989) 642-2884; FAX: (989) 642-5162

No Regular Office Hours, Contact Clerk at 642-5162

SUPERVISOR: Donald LaClair (R) 17600 McKay Rd, St. Charles, MI 48655

CLERK: Patricia J. Wesener (R) 16901 Palomino Dr, Hemlock, MI 48626

JAMES TOWNSHIP Township Office: 6060 Swan Creek Rd
Saginaw, MI 48609

Mailing Address: Use Clerks

Phone No.: (989) 781-1353; FAX: (989) 781-9086

Office Hours: Tues. & Thurs. 11 – 4

SUPERVISOR: Gerald Wieneke (R) 2255 Weigl Rd, Saginaw, MI 48609

CLERK: Roger L. Lichon (R) 2590 Sierra Dr, Saginaw, MI 48609

JONESFIELD TOWNSHIP Township Office: 217 Eddy
Merrill, MI 48637

Mailing Address: Use Clerks

Phone No.: (989) 643-7707; FAX: (989) 643-7707

Office Hours: No regular hours, leave name, number & brief message

SUPERVISOR: Larry P. Fleming (R) 22469 Frost Rd, Merrill, MI 48637

CLERK: Rochelle Siler (R) 21420 O'Hara Rd, Merrill, MI 48637-9740

KOCHVILLE TOWNSHIP Township Office: 5851 Mackinaw Rd
Saginaw, MI 48604

Phone No.: (989) 792-7596; FAX: (989) 793-7498

Office Hours: Mon. - Fri. 8 - 12 & 12:30 - 4:30

SUPERVISOR: Patricia Bourdow (D) 6370 N Michigan Rd, Saginaw, MI 48604

CLERK: Sheila Hill (D) 5243 Lawndale Rd, Saginaw, MI 48604

LAKEFIELD TOWNSHIP Township Office: 21050 Lakefield Rd

Merrill, MI 48637

Mailing Address: Use Clerks

Phone No.: (989) 643-5343

SUPERVISOR: Terry T. Crevia (R) 19095 Nelson Rd, St. Charles, MI 48655

CLERK: Barbara Reist (R) 20225 Nelson Rd, Merrill, MI 48637

MAPLE GROVE TOWNSHIP

Township Office: 17010 Lincoln Rd
New Lothrop, MI 48460

Phone No.: (989) 845-6155; FAX: (989) 845-3554

Office Hours: Mon. & Thurs. 12 Noon to 5:00 p.m.

SUPERVISOR: Kevin M. Krupp (D) 6352 Ditch Rd, Chesaning, MI 48616

CLERK: Richard Maxa (D) 4200 Volkmer Rd., Chesaning, MI 48616

MARION TOWNSHIP

Township Office: 10925 S Merrill Rd
Brant, MI 48614

Mailing Address: Use Clerks

No Regular Office Hours, Contact Clerk for Appointment (989) 643-5635

SUPERVISOR: Audrey Reikowski (NP) 20684 Ithaca Rd, Brant, MI 48614

CLERK: Ruby Kienitz (D) 11530 S Fenmore Rd, Brant, MI 48614

RICHLAND TOWNSHIP

Township Office: 1180 N Hemlock Rd
Hemlock, MI 48626

Phone No.: (989) 642-2097; FAX: (989) 642-5882

www.richlandtownship.com

Office Hours: Mon. - Fri. 8 - 5

SUPERVISOR: Joel F. Wardin (R) 2260 N. Fordney Rd, Hemlock, MI 48626

CLERK: Kevin J. Kreger (R) 1180 N Hemlock Rd, Hemlock, MI 48626

SAGINAW TOWNSHIP

Township Office: 4980 Shattuck Rd
Saginaw, MI 48603

Phone No.: (989) 791-9800; FAX: (989) 797-5360

www.saginawtownship.org

Office Hours: Mon. - Fri. 8 - 5

SUPERVISOR: Timothy J. Braun (D) 4273 S. Wayside, Saginaw, MI 48603

CLERK: Shirley M. Wazny (R) 1640 Linden Pl, Saginaw, MI 48603

SPAULDING TOWNSHIP

Township Office: 5025 East Rd
Saginaw, MI 48601

Phone No.: (989) 777-0950; (989) 777-1522
Office Hours: Mon. - Fri. 9 – 5
SUPERVISOR: John A. Tagget (R) 6335 Cole, Saginaw, MI 48601
CLERK: Richard E. Leach (R) 2375 W. Moore, Saginaw, MI 48601

ST CHARLES TOWNSHIP Township Office: 1003 N Saginaw St
St. Charles, MI 48655

Phone No.: (989) 865-9010; FAX: (989) 865-9099
Office Hours: Tues & Wed 8 - 12 & 1-5; Thurs. 8 – 12
SUPERVISOR: Larry J. Mahoney (R) 12905 Mahoney Rd, St. Charles, MI 48655
CLERK: Elaine K. Rolando (D) 8191 Beaver Rd, St. Charles, MI 48655

SWAN CREEK TOWNSHIP Township Office: 11415 Lakefield Rd
P.O. Box 176
St Charles, MI 48655

Phone No.: (989) 865-6251; FAX: (989) 865-7941
SUPERVISOR: Roland G. Niederstadt (D) 11190 Roosevelt Rd, Saginaw, MI 48609
CLERK: Ronald G. Blaine (D) 10745 Spencer, St Charles, MI 48655

TAYMOUTH TOWNSHIP Township Office: 4343 E Birch Run Rd
P.O. Box 387
Birch Run, MI 48415

Phone No.: (989) 624-4159; FAX: (989) 624-5466
Office Hours: Mon. - Fri. 8 – 5; Closed 12 - 1 daily
SUPERVISOR: Douglas E. James (D) 5277 E. Burt Rd, Birch Run, MI 48415
CLERK: Gail Basner (D) 12850 Marshall Rd, Birch Run, MI 48415

THOMAS TOWNSHIP Township Office: 249 N Miller Rd
Saginaw, MI 48609

Phone No.: (989) 781-0150; FAX: (989) 781-0290
www.thomastwp.org
Office Hours: Mon. - Fri. 8 – 5
SUPERVISOR: Robert A. Weise(R) 9135 Greenway Ct K-163, Saginaw, MI 48609
CLERK: Edward Brosowski (R) 1689 Horseshoe, Saginaw, MI 48609

TITTABAWASSEE TOWNSHIP Township Office: 145 S Second St
P.O. Box 158
Freeland, MI 48623

Phone No.: (989) 695-9512; FAX: (989) 695-5060

Office Hours: Mon. - Fri. 7:30 – 4:30
SUPERVISOR: Kenneth Kasper (R) 7555 Midland Rd, Freeland, MI 48623
CLERK: Robert D. DuCharme (D) 5585 N. River Rd, Freeland, MI 48623

ZILWAUKEE TOWNSHIP Township Office: 6189 Sherman Rd
Saginaw, MI 48604

Mailing Address: Use Clerks
Phone No.: (989) 753-6036; FAX: (989) 753-6036
No Regular Office Hours, Contact Clerk
SUPERVISOR: David Bradt (D) 7600 Melbourne Rd, Saginaw, MI 48604
CLERK: Patricia Bradt (R) 7600 Melbourne Rd, Saginaw, MI 48604

CITY OF FRANKENMUTH 240 W. Genesee St
Frankenmuth, MI 48734

Phone No.: (989) 652-9901; FAX: (989) 652-3451
www.frankenmuthcity.com
Office Hours: Mon. - Fri. 8:30 – 5
MAYOR: Gary C. Rupprecht
CITY MANAGER: Charles Graham

CITY OF SAGINAW 1315 S Washington Ave
Saginaw, MI 48601

Phone No: (989) 759-1480; FAX: (989) 759-1447
www.saginaw-mi.com
Office Hours: Mon. - Fri. 8 – 5
MAYOR: Joyce Seals
CITY MANAGER: Darnell Earley

CITY OF ZILWAUKEE 319 Tittabawassee Rd
Saginaw, MI 48604

Phone No.: (989) 755-0931; FAX: (989) 755-2202
Office Hours: Mon. - Fri. 8 - 5
MAYOR: Eugene C. Jolin
CITY ADMINISTRATOR: Patricia Hascall

VILLAGE OF BIRCH RUN P. O. Box 371
Birch Run, MI 48415

Phone No.: (989) 624-5711; FAX: (989) 624-9681
COUNCIL PRESIDENT: Marianne D. Nelson

VILLAGE MANAGER: Paul T. Moore

VILLAGE OF CHESANING

1100 W. Broad St
Chesaning, MI 48616

Phone No.: (989) 845-3800; FAX: (989) 845-2277

COUNCIL PRESIDENT: Douglas E. Corwin, Jr.,

VILLAGE MANAGER: Marlene Schultz

VILLAGE OF MERRILL

148 W. Saginaw St
Merrill, MI 48637

Phone No: (989) 643-5660; FAX: (989) 643-5445

COUNCIL PRESIDENT: David S. Novak

VILLAGE OF OAKLEY

201 Parshall
Oakley, MI 48649

Phone No.: (989) 845-2222

COUNCIL PRESIDENT: Douglas Shindorf

VILLAGE OF ST. CHARLES

110 Spruce St
St. Charles, MI 48655

Phone No.: (989) 865-8287; FAX: (989) 865-6480

www.stmi.com

Office Hours: Mon-Fri 8 a.m. to 5 p.m.

COUNCIL PRESIDENT: Ray Cornford

VILLAGE MANAGER: Hal Mead

The County Then & Now

INFORMATION & STATISTICS

The U.S. Census survey of 2000 provides an insight into the trends of Saginaw County and its residents. The following information is considered a fairly good indicator of the current conditions in Saginaw County.

POPULATION AND HOUSING ANALYSIS OF THE COUNTY

As the following table shows, Saginaw County had been experiencing a population growth. However, the 1990 and 2000 censuses indicate that the population may be facing a downward turn.

YEAR	POPULATION
1960	190,752
1970	219,743
1980	228,059
1990	211,946
2000	210,039

Source: U.S. Bureau of Census, Census of Population and Housing

In the 2000 census, there were 210,039 persons living in the County; of that, 100,937 (48.1%) were male and 109,102 (51.9%) were female. 26.6% of the population was under the age of 18, and 13.5% of the population base was 65 years of age and over. The entire state of Michigan has an average 26.1% of its population under 18 and 12.3% of the population 65 and older. This shows Saginaw County with an above average aging population. While this cannot directly be considered a hazard for the purpose of this document, an aging population requires additional precautions when dealing with natural, technological and human-related hazards.

There were 80,430 households in the County as of the 2000 census. Of the 80,430 households in the County, 55,790 were family households with a County average of 2.54 people per household. Of the homes in Saginaw County, 59,390 are owner-occupied and 21,040 are rental properties. There were also 5,076 vacant homes. The owner-occupied median value of homes in Saginaw County is \$85,200. The following table provides a snapshot of the median home values for Saginaw County.

<i>VALUE</i>	<i>PERCENTAGE OF HOUSEHOLDS</i>
Less than \$50,000	23.4 %
\$50,000 - \$99,999	39.0%
\$100,000 - \$149,999	22.7%
\$150,000 - \$199,999	8.9%
\$200,000 - \$299,999	4.5%
\$300,000 - \$499,999	1.2%
\$500,000 - \$999,999	.2%

Source: U.S. Bureau of Census, Census of Population and Housing

As of the 2000 census, 25.4% of the homes in Saginaw County were constructed between 1940-1959 and another 20.4% were built prior to 1939. Of all the homes in Saginaw County, the majority (77.9%) heat with utility gas. In Saginaw County, 0.4% of homes do not have completed plumbing available. Another .5% of homes do not have full kitchen facilities and 2.8% of homes do not have a telephone. The lack of plumbing and kitchen facilities leaves a question of the basic public health and hygiene abilities for some county residents. The lack of telephone service provides additional hurdles in warning systems and emergency communications that are necessary in emergency situations.

The median household income for Saginaw County is \$38,637, just below the state average income of \$44,667. The county average for persons below the national poverty level is 13.9%; the State of Michigan average for persons below the poverty level is 10.5%. Saginaw County has not only an aging population but also a population sector of young families with school age children. Of these households, an above average number is functioning on a poverty level income.

Saginaw County is comprised of 809 square miles of property with an average of 259.6 persons per square mile. The State of Michigan has an average of 175 persons per square mile. Therefore, Saginaw County's population density is above that for the entire state. Again, this cannot be directly attributed as a hazard. However, when emergency situations arise a dense population can compound the hazards simply due to the number of residents affected in any one region of the county. Thus, evacuation and mitigation issues can and mostly likely will be more complex and should be addressed accordingly.

EDUCATIONAL & SOCIAL CHARACTERISTICS OF COUNTY RESIDENTS

According to the 2000 Census for Saginaw County 58,489 of the county's residents were enrolled in some type of educational institution. The K-12 population was 43,311 including non-public and charter schools. Of significant interest in the County's educational makeup are the 270 disabled children that are schooled at the Millet Learning Center in Bridgeport. Continuing education for the county's 25 and older population has been on the increase as of the current census 81.6% of the county residents are high school graduates and 15.9% of the population has a bachelor's degree or higher. The mitigation plans for the townships listed on the following page that maintain school districts should reflect the number of persons on a given school day in each jurisdiction. The exceptions to this would be the highly tourist populated communities of Birch Run and Frankenmuth; these communities need to anticipate the influx of tourists as well as the students into their boundaries. In addition, the County is home to several festivals throughout the year, which can temporarily increase the population statistics and must be noted in mitigation preparedness and response strategies.

Another significant fact of the populations make up for Saginaw County is that 49.2 % of the aging population is the prime caregiver for their grandchildren. Of the total population 3,982 of the grandparents have one or more grandchildren under eighteen year's old living with them.

The county also has a significant number of disabled adults living within its boundaries. Of the 65 and older population 43.7% (11,867) are disabled. There are an additional 19.6% (22,552) of the county residents 25 to 64 years old that are disabled. Of these disabled residents 951 live in nursing care facilities. In addition, the county is the regions medical center with 1,700 hospital patient beds.

<i>School District</i>	<i>Enrollment</i>
Birch Run	1,872
Bridgeport – Spaulding Community	1,874
Buena Vista	1,046
Carrollton	1,417
Chesaning Union	1,891
Frankenmuth	1,257
Freeland Community	1,748
Hemlock	1,414
Merrill Community	846
City of Saginaw	9,678
Saginaw Township Community	5,026
St. Charles Community	1,168
Swan Valley	1,753

Source: Saginaw Intermediate School District

In addition, to the K-12 system Saginaw County is home to three secondary educational facilities. Saginaw Valley State University is a fully credited four-year university with approximately 9,800 students and faculty. Delta College is a two-year community college with approximately 10,700 students and faculty, and Davenport University is a business college with an average of 700 students and faculty. Only Saginaw Valley State University provides on-site student housing with about 2,200 students of their 9,600 who utilize the on-site housing. The other facilities are commuter schools.

ECONOMIC AND LABOR FORCE CHARACTERISTICS OF COUNTY RESIDENTS

According to the 2000 U.S. Census, Saginaw County has a population of 160,074 that is 16 years of age or older. There are 98,602 (61.6%) of this population segment gainfully employed. Of this group 57.3% are female. Earlier in this document, it was noted that Saginaw County has a significant number of young families moving into the county. Another factor that could hamper an evacuation is the high number of families with children under 6 years old where both parents are employed. For Saginaw County, the number of families with children under 6 is 16,293; of that number, 10,939 (67.1%) have both parents employed. With both parents employed, the children in these families would likely be placed into temporary care (day-care) facilities. Thus, in the event of a disaster, parents seeking access to their child may create a sense of panic and may provide an additional obstacle for emergency planning.

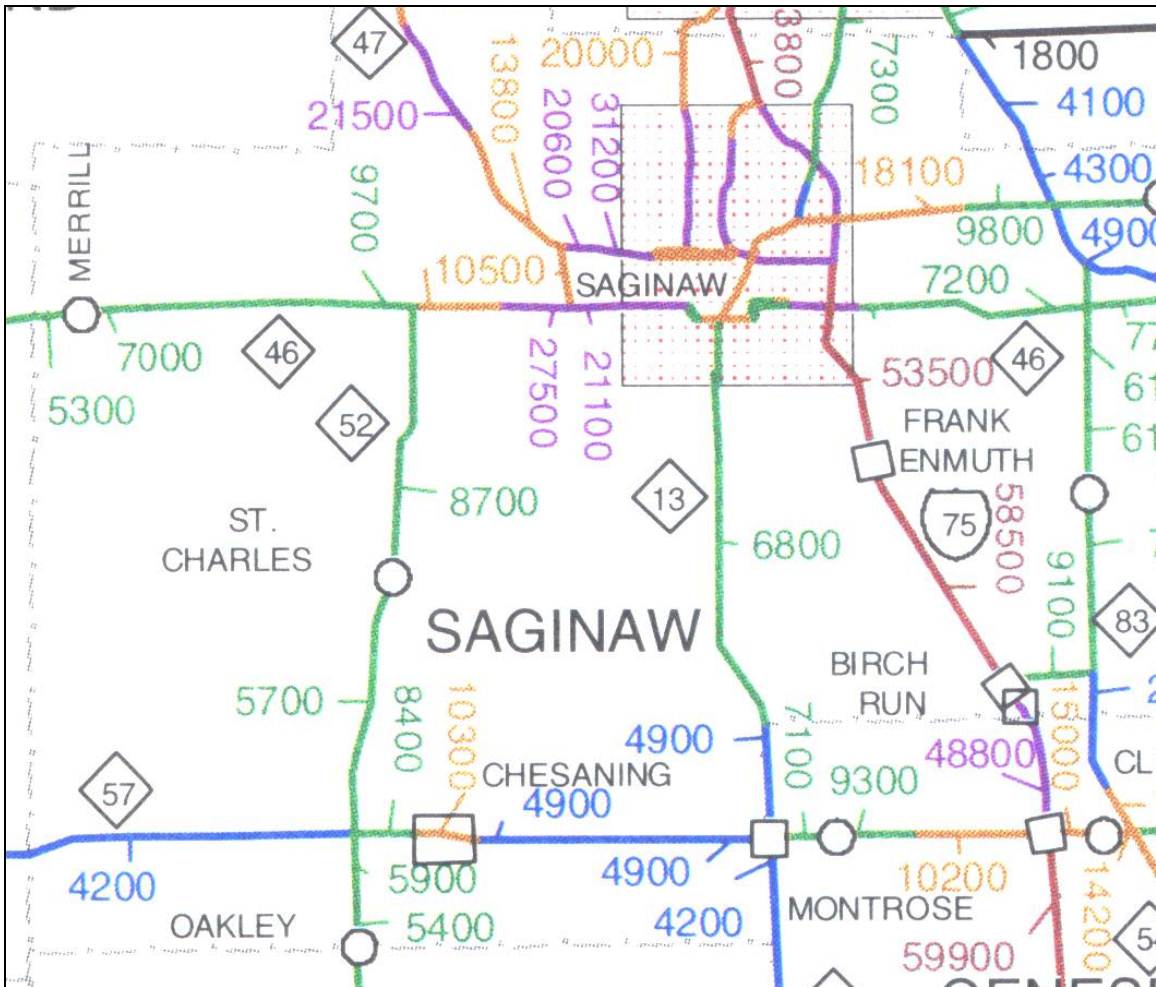
The top three industries that employ the majority of Saginaw County's workforce are: the Educational, health and social services industry with 20,488 employees (22.5%), the Manufacturing industry with 18,598 employees (20.4%), and the Retail trade industry with 13,057 employees (14.3%). The following table illustrates the types of occupations that make up the Saginaw County workforce.

Occupation	Number	Percent
Management, professional	24,893	27.3%
Service occupations	16,319	17.9%
Sales and office occupation	24,710	27.1%
Farming, fishing & forestry occupations	332	0.4%
Construction, extraction & maintenance occupations	8,446	9.3%
Production, transportation & material moving occupations	16,413	18.0%

Source: U.S. Census Bureau, Census of Labor & Economic Characteristics

SAGINAW COUNTY IN MOTION

Saginaw County is accessible via Michigan and Interstate highways. From North to South Saginaw County is traveled via Interstate 75. In addition, to the major Interstate the county can be on (Michigan Highways) M-46, M-13, M-81, M-57, M-52, and M-83. Saginaw County is also has a CSX switching yard in the City of Saginaw where three major rail-lines juncture. Also, along the Saginaw River (which is one of only five rivers in the world that flow northward) there is an industrial shipping port at Carrollton, which serves the stone and gravel industry as well as the agricultural community. In addition, to the shipping port the Saginaw River is the confluence point of five tributary rivers that flow from southwestern portion of Saginaw County toward the Saginaw Bay. The point at which these tributaries join is known as Greenpoint. Below is a map that indicates the Average Daily Traffic counts for Saginaw County.



Courtesy of: Michigan Department of Transportation

**CRITICAL FACILITIES, MUNICIPAL SERVICES,
AND PUBLIC SAFETY**

There are a number of medical facilities within Saginaw County. The two major hospitals are St. Mary’s Medical Center and Covenant Medical Center; these systems have several satellite facilities throughout the county servicing a variety of medical arenas. In addition to the medical facilities, Saginaw County has a Mobile Medical Response (MMR) Center. The MMR facility provides emergency medical transportation to 90% of Saginaw County with seventy-five emergency response rigs on duty. There are also a dozen nursing home facilities; earlier in this document, nursing home care was sited as a potential evacuation hazard.

Medical Facility	Number of Patient Beds
Covenant Medical – Cooper Campus	700
St. Mary’s Ambulatory Care	35
St. Mary’s Medical Facility	268
HealthSource Saginaw	319
Veteran’s Administration Hospital	155
Synergy Medical	1,000
Combined Nursing Home Facilities	1,064

Some information on the number of households receiving water, sewer, and heating gas utility services has already been provided in the section on Population and Housing Characteristics. Following is some more information on other important services provided in the county.

Saginaw County Municipal Services:

Utilities: Consumers Energy
2400 Weiss Street
Saginaw, MI

Telecommunications: AT&T
309 S. Washington Avenue
Saginaw, MI

Licensed Landfills: Waste Management (People's Landfill, Inc.)
4143 East Rathburn Road
Birch Run, MI

Public Safety – Saginaw County has thirteen municipal law enforcement agencies within the county. In addition to the municipality services, the Saginaw County Sheriff's Department has 24-hour road patrol strategically placed throughout the County. The Michigan State Police operate a patrol post with a Crime Lab in the southern end of Saginaw County. In total, there are approximately 300 full-time law enforcement officers in Saginaw County.

If severe weather threatens the county, NOAA Weather Radio is available as a means of warning citizens. Saginaw County also has a Severe Weather Siren Warning System, which reaches the majority of the County's residents. There are extensive tests performed on this system monthly. In addition to the local siren system, Saginaw County is the only county in Michigan to have a cable television interrupt system available for disaster warning as well as the Emergency Alert System via radio, cable television and local network television. When necessary, people or places with special needs or vulnerabilities are notified by a paging system regarding possible hazards. The list of places contacted includes nursing homes, hospitals and schools. Each of these institutions has its own plan to enact when severe weather is expected. An amateur radio network is also utilized to ensure that people can be reached even if telecommunications systems are not functional. Included in the message relay chains are door-to-door notifications via the local police and fire personnel.

Fire Services - There is only one completely full-time fire department in Saginaw County; it is the City of Saginaw Fire Department. The City of Saginaw has four firehouses that maintain round the clock manned coverage. There are twenty-one municipalities with fire service. The majority is completely volunteer based however; a few departments have paid positions. Some of the fire departments cover more than one township. The Department of Natural Resources (DNR) is responsible for fire protection on the Shiawassee National Wildlife Refuge and it works closely with local fire fighters whenever the danger of woodland and urban fires is elevated. Additionally, all departments have entered into mutual aid agreements for response anywhere in the County. Saginaw County also has two fully suited Hazmat Teams (City of Saginaw and Saginaw Township) that work mutually when necessary.

Emergency Medical Services – Almost 90% of Saginaw County’s emergency medical services is provided by the Mobile Medical Response (MMR), a non-profit corporation. The MMR team provides both emergency and non-emergency pre-hospital care and medical transportation. MMR also provides several other services: MedConnection, a 24-hour Nurse Call Center, MainStreet Messenger Personal Help Alarms, membership programs covering insurance deductibles, and an EMS training facility offering MFR, EMT and Paramedic training. The only privately owned emergency transportation service in the County is Valley Ambulance, which covers the Chesaning area. Both ambulance services can be accessed by the 9-1-1 communications system which covers all of Saginaw County. The emergency communications system has just recently added a non-life threatening contact system which can be accessed by dialing 3-1-1. 3-1-1 enables callers to reach an emergency dispatcher on a non-urgent basis.

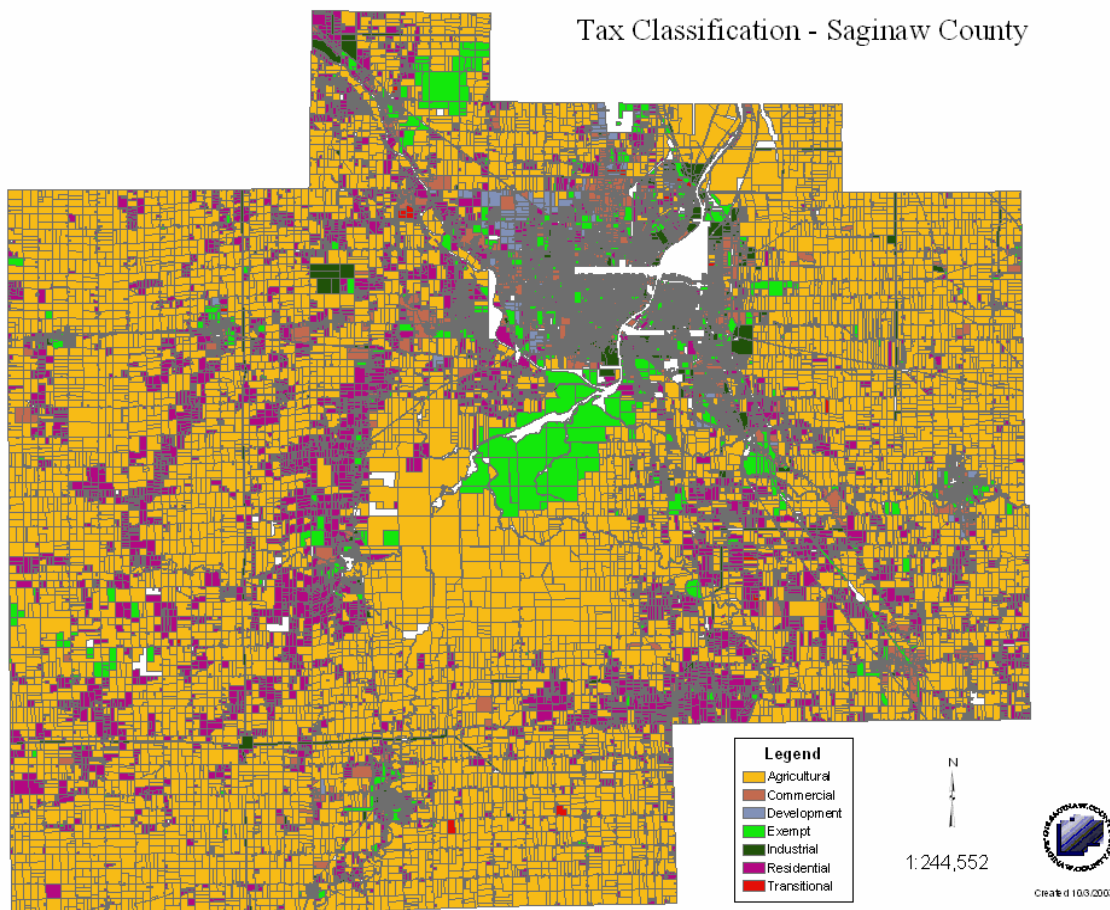
Special Events – Saginaw County’s tourism plays an important role in the economy of the County. The county ranks third among the state’s 83 counties based on overnight visitor expenditures. AAA of Michigan lists Frankenmuth as Michigan’s most-visited tourist attraction. The Prime Outlets in Birch Run has an average yearly visitation of six million visitors. A number of annual special events in the County create significant population explosions based on the aforementioned reasons. Of the special events/festivals held in the County of few of the highest attended are the *Chesaning Showboat* (avg. attendance 28,826 people), *Zehnder’s Snowfest* (avg. attendance 150,000 people during the week-long event), *Frankenmuth Autofest* (avg. attendance 110,000 people during the three-day event), *WKCQ Country Music Fest* (avg. attendance 85,000 people) and the *Saginaw Fireworks* (avg. attendance 100,000 people).

<u><i>Saginaw County Special Events</i></u>	<u><i>Date</i></u>
Zehnders Snowfest	January 23-28, 2008
WKCQ Country Music Fest	June 21, 2008
Saginaw Fireworks	July 4, 2008
Chesaning Showboat	July 12-19, 2008
Frankenmuth Autofest	September 5-7, 2008

SAGINAW COUNTY LAND USE, PLANNING, FINANCE, CLIMATE AND ENVIRONMENT

No detailed and comprehensive land use map of Saginaw County is currently available. However, approximate land uses in the County, based on information gathered by the County Treasurer's Office and the Saginaw Area Geographic Information Services Authority (SAGA), are illustrated below.

Land Use Map: This land use map was generated using the tax classification information provided by the Saginaw County Treasurer's Office and compiled by SAGA. The heavy agricultural base is spread throughout the county with scattered pockets of industrial and residential properties outside of the core urban area surrounding the City of Saginaw.

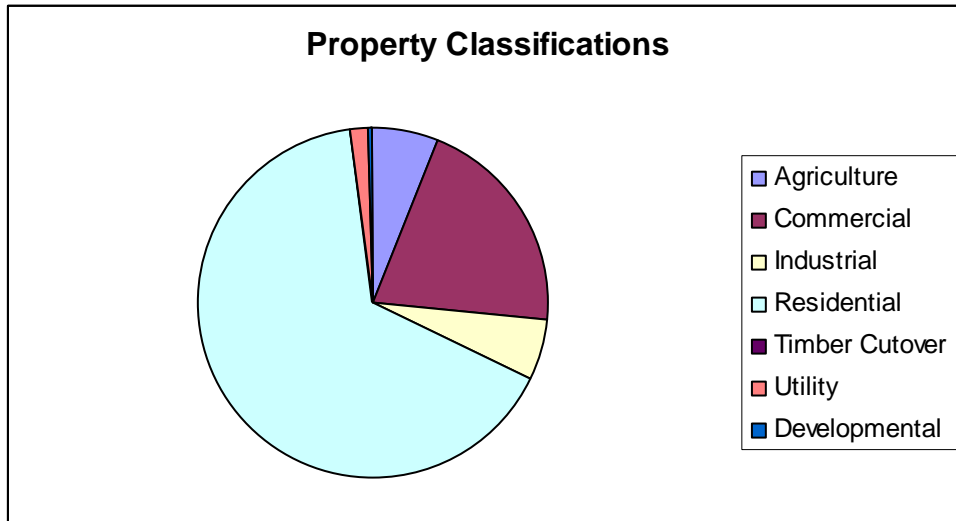


Source: Saginaw County Geographic Information Systems

The chart below illustrates the percentage of land in each property classification countywide. It may be useful to deduce that County tax revenues, which are based on real and personal property taxes, follow a similar pattern.

Agricultural property accounted for 6.02% of County land use; commercial property accounted for 20.04%; industrial property made up 5.23%; residential property accounted for 64.17%; utility property accounted for 1.71%; and developmental properties accounted for 0.20% of the tax base.

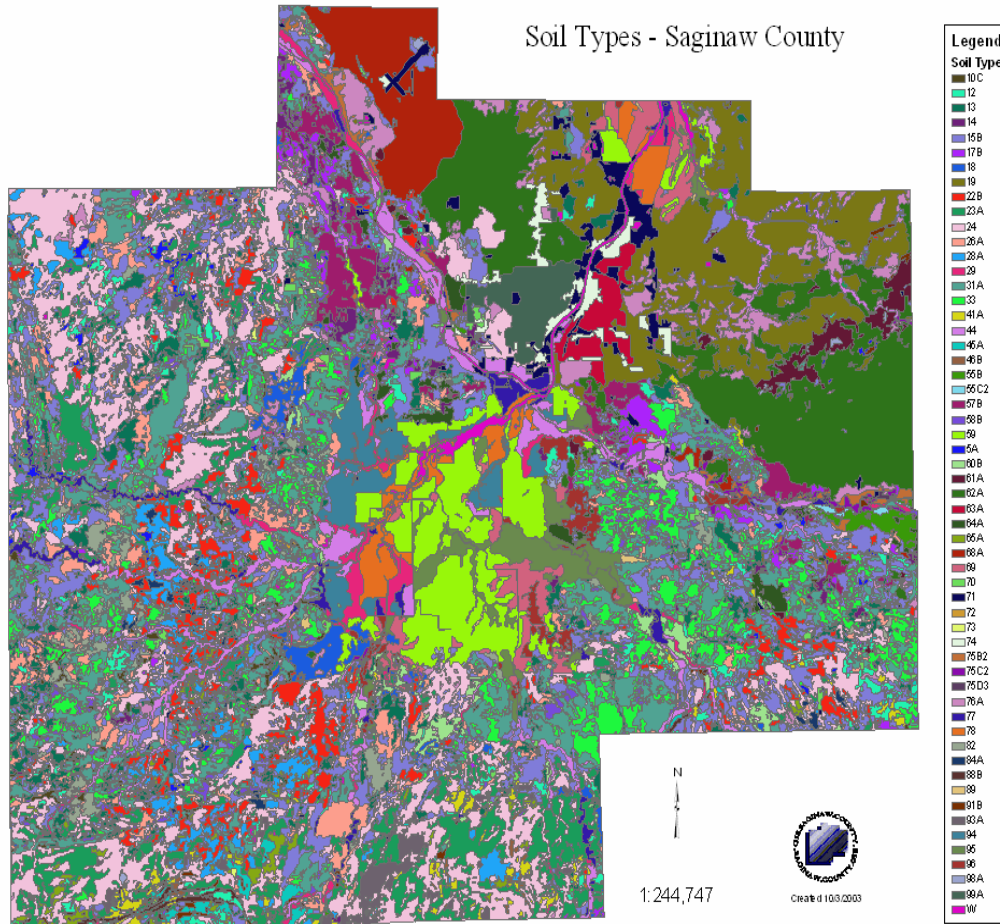
County Property Classifications



Source: Saginaw County 2007 Equalization Report

IT'S SAGINAW COUNTY

Saginaw County has a rich history of agricultural significance; even today the area is rich in agricultural industry. Saginaw Valley farmers raise corn, navy beans, sugar beets, and wheat as their most productive cash crops. The Saginaw Valley is home to Star of the West Milling Company, one of only five mills in the country that processes red wheat. Most of this processed wheat is used in industrial baking for such companies as Sara Lee, Kellogg's and McDonald's. The Saginaw Valley is also home to Michigan Sugar and its sugar beet processing plant. Some of the richest exports come from the Saginaw Valley and are transported all over the world. The average length of the growing season in Saginaw County is a very short 128 days. The average temperature during this growing season is 66° from May until September. The average rainfall for the Saginaw Valley is twenty-nine inches with an additional thirty-six inches of snowfall precipitation. The following map illustrates the soil types of Saginaw County.



Hazard Assessment

Hazard Summary Description And Rankings

Hazard Ranking Methodology

A draft hazard ranking for Saginaw County was completed using a three step process. The first step was the selection of evaluation criteria, the second step was assigning relative weights to each of the rating criteria, and the third step was assigning point values to each of the selected criteria for each of the hazards. The evaluation criteria were selected by determining what aspects of the hazards were of greatest concern to the community.

Each of the evaluation criteria was then assigned a “weight” (percentage value) to express the level of importance each of the criteria will have in ranking hazards. The sum of the weights of all of the evaluation criteria must equal 100%. The selected evaluation factors and their relative weights are described below:

Likelihood of Occurrence (30%)

Likelihood of occurrence measures the frequency with which a particular hazard occurs. The more frequently a hazard event occurs, the more potential there is for damage and negative impact on a community.

Potential for Property Damage (10%)

The capacity to cause property damage refers to the destructive capacity of the hazard. The destructive capacity of some hazard events, such as floods and tornadoes, is often immediate and readily apparent.

Percent of Population Affected (10%)

This evaluation factor refers to the relative number of people who would be likely to be affected by a particular hazard.

Potential Death or Injury (30%)

This factor refers to the number of casualties (deaths and injuries) that can be expected if a particular hazard event occurs.

Potential Economic Impacts (20%)

Economic effects are the monetary losses incurred from a hazard event, and include both public and private damage. Direct physical damage costs, as well as indirect impact costs such as lost business and tax revenue, are included as part of the total monetary losses.

To evaluate the hazards, point values of 1 – 10 were assigned to each hazard for each of the evaluation factors. The results of this step are shown in **Table 1, Hazard Assessment Ranking**. Next, the point values were multiplied by the weighting factor (percentage) that was assigned for each evaluation factor. Finally, the weighted values were added together to obtain a total score for each hazard. The hazards were then ranked in descending order according to their total scores. The results of this scoring process along with the hazard rankings are shown in **Table 2, Hazard Scores & Ranking**.

**Table 1. Saginaw County
Hazard Assessment Ranking**

Hazard	Likelihood of occurrence	Potential property damage	Percent of population affected	Potential death or injury	Potential Economic impacts	score
Civil disturbance	3	7	3	7	5	5
Drought	6	2	6	0	9	4.4
Earthquakes	1	1	1	0	9	4.4
Extreme temperatures	6	1	8	4	3	4.5
Scrap tire fires	3	2	1	1	2	1.9
Structural fires	7	7	4	6	6	6.2
Wildfires	6	4	2	1	2	3.1
Dam failures	3	3	1	1	2	2
flooding	9	8	4	1	7	5.6
Inclement weather (severe winds, thunderstorms, hail, lightning, snow storm, ice storm)	9	9	9	5	5	7
Hazmat fixed site incident	5	1	4	7	5	5.1
Hazmat transportation Incident	6	4	4	7	7	6.1
Infrastructure failures	9	7	7	2	3	5.3
Nuclear attack	1	1	1	2	1	1.3
Nuclear power plant accident	1	0	2	0	1	0.7
Oil & gas well accidents	2	4	2	2	4	2.6
Pipeline accidents	6	4	3	4	2	4.1
Public health emergencies	7	1	8	6	3	5.4
Terrorism/sabotage/WM D	2	4	1	7	2	3.6
Subsidence	1	1	1	1	0	0.8
Tornadoes	4	8	3	8	9	6.5
Transportation accidents	6	6	6	6	2	5.2

**Table 2. Saginaw County
Hazard Scores & Ranking**

Hazard	Likelihood of occurrence (30%)	Potential property damage (10%)	Percent of population affected (10%)	Potential death or injury (30%)	Potential economic impacts (20%)	Score Total	Rank
Inclement Weather (severe winds, thunderstorms, hail, lightning, snow storm, ice storm)	2.7	0.9	0.9	1.5	1	7	1
Tornado	1.2	0.8	0.3	2.4	1.8	6.5	2
Structural fires	2.1	0.7	0.4	1.8	1.2	6.2	3
Hazmat transportation. Incident	1.8	0.4	0.4	2.1	1.4	6.1	4
flooding	2.7	0.8	0.4	0.3	1.4	5.6	5
Public Health Emergencies	2.1	0.1	0.8	1.8	0.6	5.4	6
Infrastructure failures	2.7	0.7	0.7	0.6	0.6	5.3	7
Transportation accidents	1.8	0.6	0.6	1.8	0.4	5.2	8
Hazmat fixed site incident	1.5	0.1	0.4	2.1	1	5.1	9
Civil disturbance	0.9	0.7	0.3	2.1	1	5	10
Extreme temperatures	1.8	0.1	0.8	1.2	0.6	4.5	11
Drought	1.8	0.2	0.6	0	1.8	4.4	12
Pipeline accidents	1.8	0.4	0.3	1.2	0.4	4.1	13
Terrorism/sabotage/WMD	0.6	0.4	0.1	2.1	0.4	3.6	14
Wildfires	1.8	0.4	0.2	0.3	0.4	3.1	15
Oil & gas well accidents	0.6	0.4	0.2	0.6	0.8	2.6	16
Dam failures	0.9	0.3	0.1	0.3	0.4	2	17
Scrap tire fires	0.9	0.2	0.1	0.3	0.4	1.9	18
Nuclear attack	0.3	0.1	0.1	0.6	0.2	1.3	19
Subsidence	0.3	0.1	0.1	0.3	0	0.8	20
Nuclear power plant accident	0.3	0	0.2	0	0.2	0.7	21
Earthquakes	0.3	0.1	0.1	0	0	0.5	22

Hazard Number 1: Inclement Weather

(Thunderstorms, Hail, Lightning Wind, Snow, Ice)

These weather hazards are all combined under the “inclement weather” category because of their connectivity.

a) Thunderstorms

Severe thunderstorms are weather systems accompanied by strong winds, lightning, heavy rain, and possibly hail and tornados.

Hazard Description

Inclement weather is ranked as the number one hazard in Saginaw County, and thunderstorms are part of that weather picture. Severe thunderstorms can occur at any time in Michigan, although they are most frequent during the warm spring and summer months from May through September. The potential thunderstorm threat is often measured by the number of “thunderstorm days” – defined as days in which thunderstorms are observed. Michigan is, on average, subject to 30-40 thunderstorm days per year. The National Weather Service (NWS) in Michigan has further refined that statewide average figure and found that the southern two tiers of counties of the Lower Peninsula (roughly the area south of Interstate 94) is subject to 40-60 thunderstorm days per year. The Lower Peninsula, in general, is subject to approximately 40 thunderstorm days per year, while the Upper Peninsula average is closer to 30 thunderstorm days per year. Thunderstorms form when a shallow layer of warm, moist air is overrun by a deeper layer of cool, dry air. Cumulonimbus clouds, frequently called “thunderheads”, are formed in these conditions. These clouds are often enormous (up to six miles or more across and 40,000 to 50,000 feet high) and may contain tremendous amounts of water and energy. That energy is often released in the form of high winds, excessive rains, lightning, and possibly hail and tornados. Thunderstorms are typically short-lived (often lasting no more than 30-40 minutes) and fast moving (30-50 miles per hour). Strong frontal systems, however, may spawn one squall line after another composed of many individual thunderstorm cells. Other sections in this document address specific thunderstorm-related hazards such as hail, lightning, and tornados.

b) Hail

A condition where atmospheric water particles from thunderstorms form into rounded or irregular lumps of ice that fall to the earth.

Hazard Description

Hail is another product of the strong thunderstorms that frequently move across the state. As one of these thunderstorms passes over, hail usually falls near the center of the storm, along with the heaviest rain. Sometimes, strong winds occurring at high altitudes in the thunderstorms can blow the hailstones away from the storm center, causing an unexpected hazard at places that otherwise might not appear threatened. Most hailstones range in size from a pea to a golf ball, but hailstones larger than baseballs have occurred with the most severe thunderstorms. Hail is formed when strong updrafts within the storm carry water droplets above the freezing level, where they remain suspended and continue to grow larger until their weight can no longer be supported by the winds. They finally fall to the ground,

battering crops, denting autos, and injuring wildlife and people. Large hail is a characteristic of severe thunderstorms, and it may precede the occurrence of a tornado.

c) Lightning

Lightning is the discharge of electricity from within a thunderstorm.

Hazard Description

Lightning is a random and unpredictable product of a thunderstorm's tremendous energy. The energy in the storm produces an intense electrical field similar to a giant battery, with the positive charge concentrated at the top and the negative charge concentrated at the bottom. Lightning strikes when a thunderstorm's electrical potential (the difference between its positive and negative charges) becomes great enough to overcome the resistance of the surrounding air. Bridging that difference, lightning can jump from cloud to cloud, cloud to ground, or even from the cloud to the air surrounding the thunderstorm. Lightning strikes can generate current levels of 30,000 to 40,000 amperes, with air temperatures often superheated to higher than 50,000 degrees Fahrenheit (hotter than the surface of the sun) and speeds approaching one-third the speed of light. Globally, there are about 2,000 thunderstorms occurring at any given time, and those thunderstorms cause approximately 100 lightning strikes to earth each second. In the United States, approximately 100,000 thunderstorms occur each year, and every one of those storms generates lightning. It is not uncommon for a single thunderstorm to produce hundreds or even thousands of lightning strikes. However, to the majority of the general public, lightning is perceived as a minor hazard. That perception lingers despite the fact that lightning damages many structures and kills and injures more people in the United States per year, on average, than tornadoes or hurricanes. Many lightning deaths and injuries could be avoided if people would have more respect for the threat lightning presents to their safety. Lightning deaths are usually caused by the electrical force shocking the heart into cardiac arrest or throwing the heartbeat out of its usual rhythm. Lightning can also cut off breathing by paralyzing the chest muscles or damaging the respiratory center in the brain stem. It takes only about one-hundredth of an ampere of electric current to stop the human heartbeat or send it into ventricular fibrillation. Lightning can also cause severe skin burns that can lead to death if complications from infection set in. Statistics compiled by the National Oceanic and Atmospheric Administration (NOAA) and the National Lightning Safety Institute (NLSI) for the period 1959-1994 revealed the following about lightning fatalities, injuries and damage in the United States:

Location of Lightning Strikes

- 40% are at unspecified locations
- 27% occur in open fields and recreation areas (not golf courses)
- 14% occur to someone under a tree (not on golf course)
- 8% are water-related (boating, fishing, swimming, etc.)
- 5% are golf-related (on golf course or under tree on golf course)
- 3% are related to heavy equipment and machinery
- 2.4% are telephone-related
- 6% are radio, transmitter and antenna-related

Gender of Victims

84% are male; 16% are female

Months of Most Strikes

July (30%); August (22%); June (21%)

d) Severe Winds

Severe winds are winds of 58 miles per hour or greater

Hazard Description

Severe winds spawned by thunderstorms or other storm events have had devastating effects on Michigan in terms of loss of life, injuries and property damage. According to data compiled by the National Weather Service for the period 1970-1996, Michigan experienced over 8,300 severe wind events (does not include tornadoes), which resulted in 98 deaths and millions of dollars in damage. It is important to note that the high number of severe wind events is due in part to the fact that the data was compiled by county; thus, multi-county storms are counted more than once. Severe wind events are characterized by wind velocities of 58 miles per hour or greater, with gusts sometimes exceeding 74 miles per hour (hurricane velocity). tree or caught by a downed utility line.

e) Snow and Ice storms

A period of rapid accumulation of snow often accompanied by high winds, cold temperatures, and low visibility.

Hazard Description

As a result of being surrounded by the Great Lakes, Michigan experiences large differences in snowfall in relatively short distances. The annual mean accumulation ranges from 30 to 170 inches of snow. The highest accumulations are in the northern and western parts of the Upper Peninsula. In Lower Michigan, the highest snowfall accumulations occur near Lake Michigan and in the higher elevations of northern Lower Michigan. Blizzards are the most dramatic and perilous of all snowstorms, characterized by low temperatures and strong winds (35 miles per hour or greater) bearing enormous amounts of snow. Most of the snow accompanying a blizzard is in the form of fine, powdery particles that are windblown in such great quantities that, at times, visibility is reduced to only a few feet. Blizzards have the potential to result in property damage and loss of life. Just the cost of clearing the snow can be enormous. Most of the severe winter weather events that occur in Michigan have their origin as Canadian and Arctic cold fronts that move across the state from the west or northwest. Michigan is susceptible to moderate snowfall and extreme cold, averaging 90-180 days per year below freezing in the Lower Peninsula, and over 180 days below freezing in most of the Upper Peninsula. Saginaw County also has to deal with ice and sleet storms. Ice storms are sometimes incorrectly referred to as sleet storms. Sleet is similar to hail only smaller and can be easily identified as frozen rain drops (ice pellets), which bounce when hitting the ground or other objects. Sleet does not stick to trees and wires, but sleet in sufficient depth does cause hazardous driving conditions. Ice storms are the result of cold rain that freezes on contact with the surface, coating the ground, trees, buildings, overhead wires and other exposed objects with ice, sometimes causing extensive damage. When electric lines are downed, households may be without power for several days, resulting in significant economic loss and disruption of essential services in affected communities.

Hazard Number 2: Tornadoes

An intense rotating column of wind that extends from the base of a severe thunderstorm to the ground.

Hazard Description

Tornadoes in Michigan are most frequent in the spring and early summer when warm, moist air from the Gulf of Mexico collides with cold air from the Polar Regions to generate severe thunderstorms. These thunderstorms often produce the violently rotating columns of wind that are called tornadoes. Michigan lies at the northeastern edge of the nation's primary tornado belt, which extends from Texas and Oklahoma through Missouri, Illinois, Indiana, and Ohio. Most of a tornado's destructive force is exerted by the powerful winds that knock down walls and lift roofs from buildings in the storm's path. The violently rotating winds then carry debris aloft that can be blown through the air, becoming dangerous missiles. A tornado may have winds up to 300 miles per hour and an interior air pressure that is 10-20% below that of the surrounding atmosphere. The typical length of a tornado path is approximately 16 miles, but tracks much longer than that – even up to 200 miles – have been reported. Tornado path widths are generally less than one-quarter mile wide.

Tornado Intensity

Tornado intensity is measured on the Fujita Scale, which examines the damage caused by a tornado on homes, commercial buildings, and other man-made structures.

Magnitude Description Wind Speeds

F0 =Gale Tornado 42-72 m.p.h.

F1 =Moderate Tornado 73-112 m.p.h.

F2=Significant Tornado 113-157 m.p.h.

F3= Severe Tornado 158-206 m.p.h.

F4 =Devastating Tornado 207-260 m.p.h.

F5 =Incredible Tornado 261-318 m.p.h.

The Fujita Scale rates the intensity of a tornado based on damage caused, not by its size. It is important to remember that the size of a tornado is not necessarily an indication of its intensity. Large tornadoes can be weak, and small tornadoes can be extremely strong, and vice versa. It is very difficult to judge the intensity and power of a tornado while it is occurring. Generally, that can only be done after the tornado has passed, using the Fujita Scale as the measuring stick. According to the National Weather Service (NWS), since 1950, the vast majority of tornadoes that occurred in the United States (approximately 74%) were classified as weak tornadoes (F0 or F1 intensity), approximately 25% were classified as strong tornadoes (F2 or F3 intensity), and only 1% was classified as violent tornadoes (F4 or F5 intensity). Unfortunately, those violent tornadoes, while few in number, caused 67% of all tornado-related deaths nationally. Strong tornadoes accounted for another 29% of tornado-related deaths, while weak tornadoes caused only 4% of tornado-related deaths. If the data prior to 1950 is examined, the percentage of deaths attributable to violent tornadoes climbs drastically. That is largely due to the fact that tornado forecasting and awareness programs were not yet established. As a result, it was not uncommon for death tolls from a single tornado to reach several hundred. Typically, tornadoes last only a few minutes on the ground, but those few minutes can result in tremendous damage and devastation. Historically, tornadoes have resulted in tremendous loss of life, with the mean national annual death toll being 111 persons. Property damage from tornadoes is in the hundreds of millions of dollars every year.

Hazard Number 3: Structure Fires

A fire, of any origin, that ignites one or more structures, causing loss of life and/or property.

Hazard description

Structure fires are ranked as the number three hazard in Saginaw County. Structure fires are often referred to as the “universal hazard” because they occur in virtually every community. The highest risk is during winter months, when wood stoves and faulty heaters are used. Each year in the United States, fires result in approximately 5,000 deaths and 25,000 injuries requiring medical treatment. According to some sources, structure fires cause more loss of life and property damage than all types of natural disasters combined. Direct property losses due to fire exceed \$9,000,000,000.00 per year – and much of that figure is the result of structure fire. Ironically, while the United States has made great strides in lessening deaths and injuries caused by other types of disasters, the problem of structure fires is worse in this Country than in many other industrialized countries (even those with a more densely developed population pattern). The United States Centers for Disease Control (CDC) Figures indicate that fire-associated mortality rates in the United States are approximately 2-3 times greater than those in many other developed countries.

Hazard Number 4: Hazardous Materials Incidents during Transportation

An uncontrolled release of hazardous materials during transport capable of posing a risk to life, health, safety, property or the environment.

Hazard Description

Hazardous materials incidents during transportation are ranked as the number four Hazard in Saginaw County. As a result of the extensive use of chemicals in our society, all Modes of transportation – highway, rail, air, marine, and pipeline – are carrying thousands of hazardous materials shipments on a daily basis through local communities. A transportation accident involving any one of those hazardous material shipments could cause a local emergency affecting many people. Pipeline transportation accident issues are addressed in the “Oil or Natural Gas Well/Pipeline Accidents” section of this document. Refer to that section for information on those particular hazards. Michigan has had numerous hazardous material transportation incidents that affected the immediate vicinity of an accident site or a small portion of the surrounding community. Those types of incidents, while problematic for the affected community, are fairly commonplace. They are effectively dealt with by local and state emergency responders and hazardous material response teams. Larger incidents, however, pose a whole new set of problems and concerns for the affected community. Large-scale or serious hazardous material transportation incidents that involve a widespread release of harmful material (or have the potential for such a release) can adversely impact the life, safety and/or health and well-being of those in the immediate vicinity of the accident site, as

well as those who come in contact with the spill or airborne plume. In addition, damage to property and the environment can be severe as well. Statistics show almost all hazardous material transportation incidents are the result of an accident or other human error. Rarely are they caused simply by mechanical failure of the carrying vessel. Being surrounded by the Great Lakes, one of the most dangerous hazardous material transportation accident scenarios that could occur in Michigan would be a spill or release of oil, petroleum or other harmful materials into one of the lakes from a marine cargo vessel. Such an incident, if it involved a large quantity of material, could cause environmental contamination of unprecedented proportions. Fortunately, the Great Lakes states, working in partnership with oil and petroleum companies and other private industries, have taken significant steps to ensure that a spill of significant magnitude is not likely to occur on the Great Lakes. Heating fuel and motor fuel account for approximately 98% of all the hazardous materials that are being transported on today's roadways. The remaining 2% includes all other hazardous materials. Anhydrous ammonia is sprayed on farm fields, and is also used for air conditioning and refrigeration purposes. This would also be an extremely dangerous hazardous material if a release occurred during transportation.

Saginaw County Perspective:

Saginaw County has had numerous small-scale hazardous material transportation incidents that required a response by local fire departments and hazardous material teams, and many required the implementation of evacuation and other protective actions. As a major manufacturer, user and transporter of hazardous materials, Saginaw County remains vulnerable to the threat of a serious hazardous material transportation incident at any point in time. Also, Saginaw County is criss-crossed by major interstate routes and State trunk line roads, all of which are used by commercial traffic that may be transporting hazardous materials. To get an estimate of how many trucks may be carrying hazardous materials on these roads, MDOT's 2003 commercial traffic counts were used as a baseline. These counts are Average Daily Traffic (ADT) counts for major routes

Hazard Number 5: Flooding

The overflowing of rivers, streams, drains and lakes due to excessive rainfall, rapid snowmelt or ice.

Hazard Description

Flooding of land adjoining the normal course of a stream or river has been a natural occurrence since the beginning of time. If these floodplain areas were left in their natural state, flooding would not cause significant damage. Development has increased the potential for serious flooding because rainfall that used to soak into the ground or take several days to reach a river or stream via a natural drainage basin, now quickly runs off streets, parking lots, and rooftops, and through man-made channels and pipes. Floods can damage or destroy public and private property, disable utilities, make roads and bridges impassable, destroy crops and agricultural lands, cause disruption to emergency services, and result in fatalities. People may be stranded in their homes for several days without power or heat, or they may be unable to reach their homes at all. Long-term collateral dangers include the outbreak of disease, widespread animal death, broken sewer lines causing water supply pollution downed power lines, broken gas lines, fires, and the release of hazardous materials. Flood-prone areas are found throughout the state, as every lake, river, stream and county drain has a floodplain. The type of development that exists within the floodplain will determine whether or not flooding will cause damage. The Michigan Department of Environmental Quality estimates that about 6% of Michigan's land is flood-prone, which includes about 200,000

buildings in those areas. Floodplain areas are identified based on hydrological and topographical surveys, as well as, soil studies and land cover characteristics. The result of this research is a statistical model that indicates an area vulnerable to the “100-year” flood. The term “100-year flood” is often used incorrectly and can be misleading. It does not refer to a certain flood that will occur once every 100 years. Rather, it is the flood elevation that has a 1% chance of being equaled or exceeded each year. So actually, the 100-year flood could occur more than once in a relatively short period of time. It is also referred to as the “1% annual chance flood.” The 100-year flood, which is the standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. The 100-year flood only has a 1% chance of occurring in any given year, but structures located in the flood hazard area have a 26% chance of suffering flood damage during the term of a 30-year mortgage. This means a home in the mapped flood hazard area is five times more likely to be damaged by flood than to have a major fire. The southern half of the Lower Peninsula contains the areas with the most flood damage potential. The primary flooding sources include the Great Lakes and connecting waters (Detroit River, St. Clair River, and St. Mary’s River), thousands of miles of rivers and streams, and hundreds of inland lakes. Michigan is divided into 63 major watersheds. All of these watersheds experience flooding, although the following watersheds have experienced the most extensive flooding problems or have significant damage potential: 1) Clinton River; 2) Ecorse River; 3) Grand River; 4) Huron River; 5) Kalamazoo River; 6) Muskegon River; 7) Saginaw River; 8) Rifle River; 9) River Raisin; 10) Rouge River; 11) St. Joseph River; and 12) Whitefish River. The flooding is not restricted to the main

branches of these rivers. Most river line flooding occurs in early spring and is the result of excessive rainfall and/or the combination of rainfall and snowmelt. Ice jams also cause flooding in winter and early spring. Severe thunderstorms may cause flooding during the summer or fall, although these are normally localized and have more impact on watercourses with smaller drainage areas. Oftentimes, flooding may not necessarily be directly attributable to a river, stream or lake overflowing its banks. Rather, it may simply be the combination of excessive rainfall and/or snowmelt, saturated ground, and inadequate drainage. With no place to go, the water will find the lowest elevations – areas that are often not in a floodplain. This type of flooding is becoming increasingly prevalent in Michigan, as development outstrips the ability of the drainage infrastructure to properly carry and disburse the water flow. Flooding also occurs due to combined storm and sanitary sewers that cannot handle the tremendous flow of water that often accompanies storm events. Typically, the result is water backing up into basements, which damages mechanical systems and can create serious public health and safety concerns.

Hazard Number 6: Public Health Emergency

A widespread and/or severe epidemic, incident of contamination, or other situation that resents a danger to or otherwise negatively impacts the general health and well being of the public.

Hazard Description

Public health emergencies are ranked as the number six hazard in Saginaw County. Public health emergencies can take many forms – disease epidemics, large-scale incidents of food or water contamination, extended periods without adequate water and sewer services, harmful exposure to chemical, radiological or biological agents, and large-scale infestations of disease-carrying insects or rodents – to name just a few. Public health emergencies can

occur as primary events by themselves, or they may be secondary events to another disaster or emergency such as a flood, tornado, or a hazardous materials incident. The common characteristic of most public health emergencies is that they adversely impact, or have the potential to adversely impact, a large number of people. Public health emergencies can be statewide, regional, or localized in scope and magnitude. Perhaps the greatest emerging public health hazard would be the intentional release of a radiological, chemical or biological agent to adversely impact a large number of people. Such a release would most likely be an act of terrorism aimed at the government or a specific organization or segment of the population. Fortunately, to date, Michigan has not yet experienced such a release aimed at mass destruction. However, it is probably only a matter of time before an incident of that nature and magnitude does occur. If and when it does, the public health implications – under the right set of circumstances – could be staggering.

County Perspective:

Like the rest of the United States and the world, Saginaw County has had serious outbreaks of diseases like smallpox, mumps, and influenza. It has been many years since the county has had to deal with diseases like polio, which gripped the country in the '50s. Saginaw County is susceptible to health emergencies such as the recent Severe Acute Respiratory Syndrome (SARS) outbreak in nearby Canada, the West Nile Virus, and the meningitis outbreaks that occur sporadically on local college campuses.

Hazard Number 7: Infrastructure Failure

The failure of critical public or private utility infrastructure resulting in a temporary loss of essential functions and/or services.

Hazard Description

Infrastructure failure is ranked as the number seven hazard in Saginaw County. Michigan's citizens are dependent on the public and private utility infrastructure to provide essential life supporting services such as electric power, heating and air conditioning, water, sewage disposal and treatment, storm drainage, communications, and transportation. When one or more of these independent, yet interrelated systems fail due to disaster or other cause, even for a short period of time, it can have devastating consequences. For example, when power is lost during periods of extreme heat or cold, people can die in their homes if immediate mitigative action is not taken. When the water or wastewater treatment systems in a community are inoperable, serious public health problems arise that must be addressed immediately to prevent outbreaks of disease. When storm drainage systems fail due to damage or capacity overload, serious flooding can occur. These are just some examples of the types of infrastructure failures that can occur, and all of these situations can lead to disastrous public health and safety consequences if immediate mitigative actions are not taken. Typically, it is the most vulnerable members of society (i.e., the elderly, children, impoverished individuals, and people in poor health) that are the most heavily impacted by an infrastructure failure. If the failure involves more than one system, or is large enough in scope and magnitude, whole communities and possibly even regions can be severely impacted. Refer to the "Dam Failure" and "Oil or Natural Gas Well/Pipeline Accidents" sections for more information on those particular types of infrastructure failure

Hazard Number 8: Transportation Accident (Bus, Airplane, Train)

A crash or accident involving an air, land or water-based commercial passenger carrier resulting in death or serious injury.

Hazard Description

Transportation accidents are ranked as the number eight hazard in Saginaw County. In terms of commercial passenger transportation service, Michigan has approximately: 1) 19 airports that offer commercial air passenger service; 2) 130 certified intercity passenger bus carriers providing service to 220 communities; 3) 72 local bus transit systems serving 85 million passengers; 4) 19 marine passenger ferry services; and 5) 3 intercity rail passenger routes operating on 568 miles of track, along 3 corridors, serving 22 communities. Air Transportation Accidents There are four circumstances that can result in an air transportation accident: 1) an airliner colliding with another aircraft in the air; 2) an airliner crashing while in the cruise phase of a flight due to mechanical problems, sabotage, or other cause; 3) an airliner crashing while in the takeoff or landing phase of a flight; or 4) two or more airlines colliding with one another on the ground during staging or taxi operations. When responding to any of these types of air transportation accidents, emergency personnel may be confronted with a number of problems, such as: 1) suppressing fires; 2) rescuing and providing emergency first aid for survivors; 3) establishing mortuary facilities for victims; 4) detecting the presence of explosive or radioactive materials; 5) providing crash site security, crowd and traffic control, and protection of evidence.

Land transportation accident in Michigan could involve a commercial intercity passenger bus, a local public transit bus, a school bus, or an intercity passenger train. Although these modes of land transportation have a good safety record, accidents do occur. Typically, bus accidents are caused by the bus slipping off the roadway in inclement weather, or colliding with another vehicle. Intercity passenger train accidents usually involve a collision with a vehicle attempting to cross the railroad tracks before the train arrives at the crossing. Unless the train accident results in a major derailment, serious injuries are usually kept to a minimum. Bus accidents, on the other hand, can be quite serious, especially if the bus has tipped over. Numerous injuries are a very real possibility in these types of situations.

Hazard Number 9: Hazardous Materials Incidents at Fixed Sites

An uncontrolled release of hazardous materials from a fixed site capable of posing risk to life, health, safety, property, or the environment.

Hazard Description

Hazardous materials incidents at fixed sites are ranked as the number nine hazard in Saginaw County. Over the past few decades, new technologies have developed at a stunning pace. As a result, hazardous materials are present in quantities of concern in business and industry, agriculture, universities, hospitals, utilities, and other facilities in our communities. Hazardous materials are materials or substances which, because of their chemical, physical, or biological nature, pose a potential risk to life, health, property, or the environment if they are released. Examples of hazardous materials include corrosives, explosives, flammable materials, radioactive materials, poisons, oxidizers, and dangerous gasses. Hazardous materials are highly regulated by federal and state agencies to reduce risk to the general public and the environment. Despite precautions taken to ensure careful handling during the manufacture, transport, storage, use, and disposal of these materials, accidental releases do occur. Often, these releases can cause severe harm to people or the environment if proper

mitigative action is not immediately taken. Most releases are the result of human error. Occasionally, releases can be attributed to natural causes, such as a flood that washes away barrels of chemicals stored at a site. However, those situations are the exception rather than the rule. In 1986, the President signed into law the Superfund Amendments and Reauthorization Act (SARA). Included under Title III of SARA was the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), commonly known as SARA Title III. SARA Title III is meant to encourage and support emergency planning efforts at the State and local levels and to provide the public and local units of government with information concerning potential chemical hazards present in their communities.

Determining if a facility is subject to emergency planning requirements is straightforward. The Environmental Protection Agency (EPA) publishes a list of Extremely Hazardous Substances (EHS). For each EHS, the list identifies and describes the chemical, and includes a number called a Threshold Planning Quantity (TPQ). The TPQ, expressed in pounds, is the key number. If a facility has within its boundaries an amount of an EHS equal to or in excess of its TPQ, then Section 302 of SARA Title III requires that the facility is subject to emergency planning requirements and must notify both the State Emergency Response Commission (SERC) and the Local Emergency Management Office of this fact. The facility must also identify an emergency response coordinator who works with the Local Emergency Management Office on developing and implementing the local emergency plan at the facility. This regulation applies even if the chemical is on site for only a day. There are no exemptions for emergency planning notification.

Hazard Number 10: Civil Disturbance

A public demonstration or gathering, or a prison uprising, that results in a disruption of essential functions; rioting, looting, arson or other unlawful behavior.

Hazard Description

Civil disturbance is ranked the number ten hazard in Saginaw County. Large-scale civil disturbances rarely occur, but when they do they are usually an offshoot or result of one or more of the following events: 1) labor disputes where there is a high degree of animosity between the participating parties; 2) high profile/controversial judicial proceedings; 3) the implementation of controversial laws or other governmental actions; 4) resource shortages caused by a catastrophic event; 5) disagreements between special interest groups over a particular issue or cause; or 6) a perceived unjust death or injury to a person held in high esteem or regard by a particular segment of society. Prison uprisings are normally the result of perceived injustice by inmates regarding facility rules, operating policies and/or living conditions, or insurrections started by rival groups or gangs within the facility. Saginaw County has experienced many labor strikes over the years, and rallies concerning jobs and politics.

Hazard Number 11: Extreme Temperatures

Prolonged periods of very high or very low temperatures, often accompanied by other Extreme meteorological conditions.

Hazard Description

Extreme temperatures are ranked as the number eleven hazard in Saginaw County. This county is susceptible to both extreme heat and extreme cold. It is not uncommon to have a 40-degree swing in temperature within a 24-hour period. Prolonged periods of extreme temperatures, whether extreme summer heat or extreme winter cold, can pose severe and often life-threatening problems for Michigan's citizens. Although they are radically different in terms of initiating conditions, the two hazards share a commonality in that they both primarily affect the most vulnerable segments of the population – the elderly, children, impoverished individuals, and people in poor health.

Extreme Summer Heat

Extreme summer weather is characterized by a combination of very high temperatures and exceptionally humid conditions. When persisting over a long period of time, this phenomenon is commonly called a heat wave. The major threats of extreme summer heat are heatstroke (a major medical emergency), and heat exhaustion. Heatstroke often results in high body temperatures, and the victim may be delirious, comatose, or fall into a stupor. Rapid cooling is essential to preventing permanent neurological damage or death. Heat exhaustion is a less severe condition than heatstroke, although it can still cause severe problems such as dizziness, weakness and fatigue. Heat exhaustion is often the result of fluid imbalance due to increased perspiration in response to the intense heat. Treatment generally consists of restoring fluids and staying indoors in a cooler environment until the body returns to normal. Other, less serious risks associated with extreme summer heat are often exercise-related and include heat syncope (a loss of consciousness by persons not acclimated to hot weather), and heat cramps (an imbalance of fluids that occurs when people unaccustomed to heat exercise outdoors).

Because the combined effects of high temperatures and high humidity are more intense in urban centers, heatstroke and heat exhaustion are a greater problem in cities than in suburban or rural areas. Nationwide, approximately 200 deaths a year are directly attributable to extreme heat. Extreme summer heat is also hazardous to livestock and agricultural crops, and it can cause water shortages, exacerbate fire hazards, and prompt excessive demands for energy. Roads, bridges, railroad tracks and other infrastructure are susceptible to damage from extreme heat. Air conditioning is probably the most effective measure for mitigating the effects on extreme summer heat on people. Unfortunately, many of those most vulnerable to this hazard do not live or work in air conditioned environments, especially in major urban centers where the vulnerability is highest. The use of fans to move air may help some, but recent research indicates that increased air movement may actually exacerbate heat stress in many individuals.

Extreme Winter Cold

Like heat waves, periods of prolonged, unusually cold weather can result in a significant number of temperature-related deaths. Each year in the United States, approximately 700 people die as a result of severe cold temperature-related causes. This is substantially higher than the average of 200 heat-related deaths each year. It should be noted that a significant number of cold-related deaths are not the direct result of “freezing” conditions. Rather, many deaths are the result of illnesses and diseases that are negatively impacted by severe cold weather, such as stroke, heart disease and pneumonia. It could convincingly be argued that, were it not for the extreme cold temperatures, death in many cases would not have occurred at the time it did from the illness or disease alone. Hypothermia (the unintentional lowering of core body temperature), and frostbite (damage from tissue being frozen) are probably the two conditions most closely associated with cold temperature-related injury and death.

Hypothermia is usually the result of over-exposure to the cold, and is generally thought to be clinically significant when core body temperature reaches 95 degrees or less. As body temperature drops, the victim may slip in and out of consciousness, and appear confused or disoriented. Treatment normally involves re-warming the victim, although there is some controversy in the medical community as to exactly how that should be done. Frostbite rarely results in death, but in extreme cases it can result in amputation of the affected body tissue. Hypothermia usually occurs in one of two sets of circumstances. One situation involves hypothermia associated with prolonged exposure to cold while participating in outdoor sports such as skiing, hiking, or camping. Most victims of this form of hypothermia tend to be young, generally healthy individuals who may lack experience in dealing with extreme cold temperatures. The second situation involves a particularly vulnerable person who is subjected to only a moderate, indoor cold stress. A common example would be that of an elderly person living in an inadequately heated home. In such circumstances, hypothermia may not occur until days or perhaps weeks after the cold stress begins. The special vulnerability of elderly persons to hypothermia has become readily apparent. Over half of the approximately 700 persons who die each year due to cold exposure are 60 years of age or older, even though this age group only represents about 20% of the country's population. This remarkable statistic may be due, in part, to the fact that elderly persons appear to perceive cold less well than younger persons and may voluntarily set thermostats to relatively low temperatures. In addition, high energy costs and the relative poverty among some elderly people may discourage their setting thermostats high enough to maintain adequate warmth. Because many elderly people live alone and do not have regular visitors, the cold conditions may persist for several days or weeks, thus allowing hypothermia to set in. Babies and very young children are also very vulnerable to hypothermia. In addition, statistics indicate that death due to cold is more frequent among males than females in virtually all age groups. Part of that may be explained by differences in risk factors, and part may be due to different rates of cold exposure between the sexes.

Hazard Number 12: Drought

A water shortage caused by a deficiency of rainfall, generally lasting for an extended period of time.

Hazard Description

Drought is a normal part of the climate of Michigan and of virtually all other climates around the world – including areas with high and low average rainfall. Drought differs from normal arid conditions found in low rainfall areas in that aridity is a permanent characteristic of that type of climate. Drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. The severity of a drought depends not only on its location, duration, and geographical extent, but also on the water supply demands made by human activities and vegetation. This multi-faceted nature of the hazard makes it difficult to define a drought and assess when and where one is likely to occur. Drought differs from other natural hazards in several ways. First, it is difficult to determine the exact beginning and end of a drought, since its effects may accumulate slowly and linger even after the event is generally thought of as being over. Second, the lack of a clear-cut definition of drought often makes it difficult to determine whether one actually exists, and if it does, its degree of severity. Third, drought impacts are often less obvious than other natural hazards, and they are typically spread over a much larger geographic area. Fourth, due primarily to the aforementioned reasons, most communities do not have in place any contingency plans for addressing drought. This lack of pre-planning can greatly hinder a community's response capability when a drought does

occur. Droughts can cause many severe impacts on communities and regions, including: 1) water shortages for human consumption, industrial, business and agricultural uses, power generation, recreation and navigation; 2) a drop in the quantity and quality of agricultural crops; 3) decline of water quality in lakes, streams and other natural bodies of water; 4) malnourishment of wildlife and livestock; 5) increase in wildfires and wildfire-related losses

Hazard Number 13: Oil and Natural Gas Pipeline Accidents

An uncontrolled release of oil or natural gas, or the poisonous by-product hydrogen sulfide, from a pipeline.

Hazard Description

Accidents from oil and natural gas pipelines are ranked as the number thirteen hazard in Saginaw County. Gas and oil in Michigan is imported by five interstate pipeline companies that have access to the major natural gas producing regions in North America. Michigan cycles more natural gas through its storage system than any other state. Michigan's gas and petroleum networks are highly developed and extensive, representing every sector of the two industries – from wells and production facilities, to cross-country transmission pipelines that bring the products to market, to storage facilities, and finally to local distribution systems. Even though pipelines are by far the safest form of transportation for these products, the threat of fires, explosions, ruptures, and spills nevertheless exists. Petroleum and natural gas pipelines can leak or erupt and cause property damage, environmental contamination, injuries, and even loss of life. The vast majority of pipeline accidents that occur in Michigan are caused by third party damage to the pipeline, often due to construction or some other activity that involves trenching or digging operations. In addition to these hazards, many of Michigan's oil and gas wells contain extremely poisonous hydrogen sulfide (H₂S) gas. Hydrogen sulfide is a naturally occurring gas mixed with natural gas or dissolved in the oil or brine and released upon exposure to atmospheric conditions. Over 1,300 wells in Michigan have been identified as having H₂S levels exceeding 300 parts per million (ppm). At concentrations of 700 ppm, as little as one breath of hydrogen sulfide can be deadly. Although hydrogen sulfide can be detected by a "rotten egg" odor in concentrations from .03 ppm to 150 ppm, larger concentrations paralyze a person's olfactory nerves so that odor is no longer an indicator of the hazard. Within humans, small concentrations can cause coughing, nausea, severe headaches, irritation of mucous membranes, vertigo, and loss of consciousness. Hydrogen sulfide forms explosive mixtures with air at temperatures of 500 degrees Fahrenheit or above, and is dangerously reactive with powerful oxidizing materials. Hydrogen sulfide can also cause the failure of high-strength steels and other metals. This requires that all company and government responders be familiar not only with emergency procedures for the site, but also with the kinds of materials that are safe for use in sour gas response.

Hazard Number 14: Terrorism

An intentional unlawful use of force, violence or subversion against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political, social, or religious objectives.

Hazard Description

Terrorism is ranked as the number fourteenth hazard in Saginaw County. In today's world, terrorism can take on many forms, although civilian bombings, assassination and extortion are probably the methods with which we are most familiar. Internationally, such acts have, unfortunately, become quite commonplace, as various religious, ethnic, and nationalistic groups have attempted to alter and dictate political agendas, seek revenge for perceived past wrongdoing, or intentionally disrupt the political, social and economic infrastructure of individual businesses, units of government, or nations. The Middle East, in particular, and parts of Europe have been hard hit by acts of terrorism over the past several decades. Parts of Asia and South America have also experienced a high level of activity. Tragically, with the events of September 11th, terrorism has now occurred on our own soil. Equally alarming is the rapid increase in the scope and magnitude of terrorism methods and threats, which now include: 1) nuclear, chemical and biological weapons; 2) information warfare; 3) ethnic/religious/gender intimidation (hate crimes); 4) state and local militia groups that advocate the overthrow of our government; 5) eco-extremism, designed to destroy or disrupt specific research or resource related activities; and 6) widespread and organized narcotics (and other contraband) smuggling and distribution organizations. Just as the methods and potential instigators have increased, so too have the potential targets of terrorism. As recent events across the country have shown, virtually any Deaths

Hazard Number 15: Wildfires

An uncontrolled fire in grasslands, brush lands or forested areas.

Hazard Description

Wildfires are ranked as the number fifteen hazard in Saginaw County. Forests cover approximately 49% (18.2 million acres) of Michigan's total land base. These vast forests provide Michigan with the largest state owned forest system in the United States. In addition, Michigan has the fifth largest timberland acreage, with 4.2 million acres of softwoods and 13.1 million acres of hardwoods. That vast forest cover is a boon for both industry and recreation. However, it also makes many areas of Michigan highly vulnerable to wildfires. Although Michigan's landscape has been shaped by wildfire, the nature and scope of the wildfire threat has changed. Because Michigan's landscape has changed substantially over the last several decades due to wild land development, the potential danger from wildfires has become more severe. Increased development in and around rural forested areas (a 63% increase in the number of rural homes during the 1980s) has increased the potential for loss of life and property from wildfires. There are simply not enough fire suppression forces available in rural areas to protect every structure from wildfire. Contrary to popular belief, lightning strikes are **not** the primary cause of wildfires in Michigan. Today, only about 2% of all wildfires in Michigan are caused by lightning strikes; the rest are caused by human activity. Outdoor burning is the leading cause of wildfires in Michigan. Most Michigan wildfires occur close to where people live and recreate, which puts both people and property at risk. The immediate danger from wildfires is the destruction of timber, property, wildlife, and injury or loss of life to persons who live in the affected area or who are using recreational facilities in the area.

Hazard Number 16: Oil and Natural Gas Well Accidents

An uncontrolled release of oil or natural gas, or the poisonous by-product hydrogen sulfide, from production wells.

Hazard Description

Accidents from oil and natural gas wells are ranked as the number sixteenth hazard in Saginaw County. Oil and natural gas are produced from fields scattered across 61 counties in the Lower Peninsula. Since 1925, over 41,000 oil and natural gas wells have been drilled in Michigan, of which roughly half have produced oil and gas. To date, Michigan wells have produced approximately 1.2 billion barrels of crude oil and 3.6 trillion cubic feet of gas. The petroleum and natural gas industry is highly regulated and has a fine safety record, but the threat of accidental releases, fires and explosions still exists.

Michigan is both a major consumer and producer of natural gas and petroleum products. According to the Michigan Public Service Commission (MPSC), approximately 25% of the natural gas consumed in Michigan is produced within the state. The remaining 75% is imported by five interstate pipeline companies that have access to the major natural gas producing regions in North America. Michigan cycles more natural gas through its storage system than any other state. Michigan ranks 11th in the nation in production of natural gas, and ranks 6th in consumption at 937.2 billion cubic feet. Michigan's petroleum product consumption in 1997 was 189 million barrels, ranking it 10th nationally. These figures underscore the fact that vast quantities of petroleum and natural gas are extracted from, transported through, and stored in the state, making many areas vulnerable to petroleum and natural gas emergencies. Michigan's gas and petroleum networks are highly developed and extensive.

Hazard number 17: Dam Failure

The collapse or failure of an impoundment resulting in downstream flooding.

Hazard Description

Dam failures are ranked as the number seventeenth hazard in Saginaw County. A dam failure can result in loss of life and extensive property or natural resource damage for miles downstream from the dam. Dam failures occur not only during flood events, which may cause overtopping of a dam, but also as a result of poor operation, lack of maintenance and repair, and vandalism. Such failures can be catastrophic because they occur unexpectedly, with no time for evacuation. The Michigan Department of Environmental Quality (MDEQ) has documented approximately 263 dam failures throughout Michigan. There are over 2,400 dams in the state of Michigan and about 935 of them are regulated by Part 315 of the Dam Safety Program. Dams are regulated when they are over 6 feet in height, and when over 5 acres are impounded during the design flood. (a flood that does not exceed the magnitude of the discharge for the design frequency.) Permits are required for construction and repair of regulated dams. Inspection reports are also required every three to five years for dams based on their hazard potential rating. The hazard potential rating is determined by the Dam Safety Program, and is based on an assessment of the potential for loss of life, property damage, and environmental damage in the area downstream of a dam in the event of dam failure or failure of appurtenant works. Hazard potential rating is not based upon the structural or hydraulic condition of the dam. The definitions for the hazard classification as specified in the state's Dam Safety Statute, Part 315, Dam Safety, of Act 451, P.A. 1994 are as follows:

“Low hazard potential dam” means a dam located in an area where failure may cause damage limited to agriculture, uninhabited buildings, structures, or township or county roads, where environmental degradation would be minimal, and where danger to individuals is slight or nonexistent.

“Significant hazard potential dam” means a dam located in an area where its failure may cause damage limited to isolated inhabited homes, agricultural buildings, structures, secondary highways, short line railroads, or public utilities, where environmental degradation may be significant, or where danger to individuals exists.

“High hazard potential dam” means a dam located in an area where a failure may cause serious damage to inhabited homes, agricultural buildings, campgrounds, recreational facilities, industrial or commercial buildings, public utilities, main highways, or Class I carrier railroads, or where environmental degradation would be significant, or where danger to individuals exists with the potential for loss of life.

Part 315 of the Dam Safety Program also requires that dam owners prepare and keep current, Emergency Action Plans (EAP) for all high hazard and significant hazard potential dams. An EAP is a plan developed by the owner that establishes notification procedures for its departments, public off-site authorities, and other agencies of the emergency actions to be taken before and following an impending or actual dam failure. After the events of September 11th, it became evident that dams could be attractive targets to terrorists. Dam failures could not only cause enormous loss of life and property and infrastructure damage, but could have residual long-lasting social, economic, and public health impacts

Hazard Number 18: Scrap Tire Fires

A large fire that burns scrap tires which are being stored for recycling or re-use.

Hazard Description

Scrap tire fires are ranked the number eighteenth hazard in Saginaw County. With the disposal of an estimated 250 million vehicle tires annually in the United States, management of scrap tires has become a major economic and environmental issue. Michigan generates some 7.5 to 9 million scrap tires each year. Although responsible means of disposal have become more common, tire dumps of the last forty years present environmental and safety hazards that will last into the foreseeable future. The estimated 296,500 scrap tires in Saginaw County is an alarm for severe emergencies and disaster. The State of Michigan has identified a total in excess of 15 million scrap tires in disposal sites scattered around the state. (Note: some estimates place the number at closer to 30 million scrap tires.) Issues pertaining to the management of scrap tire disposal sites are difficult and diverse. Whole tires are difficult to landfill because they tend to float to the surface, and are banned by many licensed landfills due to associated problems. In addition, scrap tires are breeding grounds for mosquitoes, which can reproduce at 4,000 times their natural rate in a scrap tire disposal site. From an emergency management perspective, the most serious problem that scrap tire disposal sites pose is that they can be a tremendous fire hazard if not properly designed and managed.

Hazard Number 19: Nuclear Attack

Any large-scale hostile action taken against the United States which involves nuclear weapons and results in destruction of military and/or civilian targets.

Hazard Description

Nuclear attack is ranked the number nineteenth hazard in Saginaw County. The United States is vulnerable to a number of national security threats from external, hostile forces. National security threats include nuclear attack, chemical and biological warfare, and terrorism. The potential for damage resulting from a national security emergency ranges from the relatively localized damage caused by a terrorist attack using weapons of mass destruction, to the catastrophic devastation that could be expected following a full-scale nuclear attack. World events in recent years have greatly changed the nature of the nuclear attack threat against the United States. The breakup of and establishment of democratic forms of government in the former Soviet Union and other Soviet-Bloc nations in Eastern Europe has essentially ended the "Cold War" that shaped and influenced world politics since the late 1940s. That tremendous turn of events has, for all intents and purposes, reduced the need for the United States and former Soviet states to maintain huge stockpiles of nuclear weapons. The reduction in nuclear weapons stockpiles that has occurred over the past few years in both countries has diminished the threat of a full-scale, massive nuclear attack that would threaten the very existence of the world as we know it. However, while the threat of attack is diminished, it is still a possibility due to the large number of nuclear weapons still in existence in present-day Russia and throughout the rest of the world. Even though an International Nuclear Non-Proliferation Treaty is in place, several countries are thought to be actively pursuing the development of nuclear weapons. In addition, internal instability and strife within Russia and some of its neighboring weapons systems remain on high alert, which increases the risk of an accidental nuclear launch that could spawn a nuclear counter-attack. Given the state of Russia's aging nuclear technical systems, that scenario is not out of the realm of possibility. Although the nature and scope of an attack at this time would likely be reduced from previous possibilities, the potential impact on the country would still be devastating.

Despite the fact that it is based on a fully-armed and functional Soviet Union as an adversary, the Federal Emergency Management Agency (FEMA) attack planning guidance provided in the document "Nuclear Attack Planning Base 1990" (NAPB-90) remains the basis for the population protection strategy adopted for Michigan. This strategy is incorporated in the Michigan Emergency Management Plan (MEMP) and most local Emergency Operations Plans (EOP). The NAPB report identifies potential aiming points or target areas throughout the United States. These targets were categorized into seven classifications: 1) commercial power plants; 2) chemical facilities; 3) counterforce military installations; 4) other military bases; 5) military support industries; 6) refineries; and 7) political targets. The potential size, or yield, and the height of burst were postulated for each target. The State of Michigan has 25 target areas. In addition, four target areas near the Ohio and Indiana borders directly affect Michigan jurisdictions. The NAPB report was an attempt by FEMA to develop a risk assessment of a potential attack upon the United States. Targets are identified using specific criteria, part of which involved the target's importance to counter attack measures. For this reason, not all chemical facilities, for example, are included. Further, designation as a target area does not imply that all targets will be affected equally. The NAPB-90 planning base is, by design, a worse case nuclear scenario. Even though the situation in the former Soviet Union and its neighboring countries has changed dramatically, the NAPB report still contains some valid assumptions about a potential nuclear attack upon the United States.

Hazard Number 20: Subsidence (Sinkholes)

The lowering or collapse of the land surface caused by natural or human induced activities that erode or remove subsurface support.

Hazard Description

Subsidence is ranked as the number twenty hazard in Saginaw County. Subsidence can be caused by a variety of natural or human-induced activities. Natural subsidence occurs when the ground collapses into underground cavities produced by the solution of limestone or other soluble materials by groundwater. Human-induced subsidence is caused principally by groundwater withdrawal, drainage of organic soils, and underground mining. In the United States, these activities have caused nearly 17,000 square miles of surface subsidence, with groundwater withdrawal (10,000 square miles of subsidence) being the primary culprit. In addition, approximately 18% of the United States land surface is underlain by cavernous limestone, gypsum, salt, or marble, making the surface of these areas susceptible to sinkholes. Generally, subsidence poses a greater risk to property than to life. Nationally, the average annual damage from all types of subsidence is conservatively estimated to be at least \$125 million.

In Michigan, the primary cause of subsidence is underground mining. Although mine subsidence is not as significant a hazard in Michigan as in other parts of the country, many areas in Michigan are potentially vulnerable to mine subsidence hazards. Mine subsidence is a geologic hazard that can strike with little or no warning and can result in very costly damage. Mine subsidence occurs when the ground surface collapses into underground mined areas. In addition, the collapse of improperly stabilized mine openings is also a form of subsidence. Mine subsidence generally affects very few people, unlike other natural hazards that may impact a large number of people. Mine subsidence can cause damage to buildings, disrupt underground utilities, and be a potential threat to human life. In extreme cases, mine subsidence can literally swallow whole buildings or sections of ground into sinkholes, endangering anyone that may be present at that site. Mine subsidence may take years to manifest. Examples of collapses occurring 100 years after mines were abandoned have been documented in several areas of the country.

Hazard Number 21: Nuclear Power Plant Accidents

An actual or potential release of radioactive material at a commercial nuclear power plant or other nuclear facility, in sufficient quantity to constitute a threat to the health and safety of the off-site population.

Hazard Description

Nuclear power plant accidents are ranked as hazard number twenty one in Saginaw County. Though the construction and operation of nuclear power plants are closely monitored and regulated by the Nuclear Regulatory Commission (NRC), accidents at these plants are considered a possibility and appropriate on-site and off-site emergency planning is conducted. An accident could result in the release of potentially dangerous levels of radioactive materials into the environment that could affect the health and safety of the public living near the nuclear power plant. A nuclear power plant accident might involve both a release of air borne radioactive materials and radioactive contaminate of the environment around the plant. The degree and area of environmental contamination could vary greatly depending on the type and amount of radioactivity and weather conditions. Response to a nuclear power plant accident requires specialized personnel who have been trained to handle radioactive materials safely, who have specialized equipment to detect and monitor radiation, and who are trained in personal radiation exposure control.

Saginaw County Perspective:

Nuclear power plant accidents are not considered a threat in Saginaw County, due to the fact that none exist in the county. The closest one is about 125 miles away from Saginaw. It is the Fermi 2 Nuclear Power Station located in Newport, Michigan. There are also two other nuclear power plant facilities operating in Michigan. These are the Cook Nuclear Plant, which is located north of Bridgman along Lake Michigan, and the Palisades Nuclear Plant near South Haven. Michigan's fourth nuclear facility, Big Rock Point, was located near Charlevoix, but stopped generating electricity in 1997. The facility was scheduled to be turned into a "Greenfield" area in 2004.

Hazard Number 22: Earthquake

A shaking or trembling of the crust of the earth caused by the breaking and shifting of rock beneath the surface.

Hazard Description

Earthquakes are ranked as number twenty two in Saginaw County. Earthquakes range in intensity from slight tremors to great shocks. They may last a few seconds to several minutes, or come as a series of tremors over a period of several days. The energy of an earthquake is released in seismic waves. Earthquakes usually occur without warning. In some instances, advance warnings of unusual geophysical events may be issued. However, scientists cannot yet predict exactly when or where an earthquake will occur. Earthquakes tend to strike repeatedly along fault lines, which are formed where large plates of the earth's crust below the surface constantly push and move against one another. Risk maps have been produced which show areas where an earthquake is more likely to occur. Earthquake monitoring is conducted by the United States Geological Survey (USGS), the National Oceanic and Atmospheric Administration (NOAA), and universities throughout the country. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Most casualties result from falling objects and debris. Disruption of communication systems, and damage to electric power lines, gas, sewer and water mains can be expected. Water supplies can become contaminated by seepage around water mains. Damage to roadways and other transportation systems may create food and other resource shortages if transportation is interrupted. In addition, earthquakes may trigger other emergency situations such as fires and hazardous material spills, thereby compounding the situation.

Saginaw County Perspective:

Earthquakes are not considered a threat because the nearest recorded fault line is no closer than the lower third of the state, and there is no record of an earthquake in Saginaw County. Also, Michigan is only ranked number 36 out of 50 states.

Historical Data

PRESIDENTIAL DECLARATIONS* 1974-2004 (11)

5/20-24 /04 Flooding Major Disaster
12/11-31/00 Blizzard& Snowstorm Snow Emergency
5/31/98 Thunderstorms & high winds Major Disaster
7/2/97 Tornadoes & flooding Major Disaster
6/21-7/1/96 Rainstorms, flooding & tornado Major Disaster
9/10-19/86 Flooding Major Disaster.
9/5-6/85 Flooding Major Disaster
1/26-27/78 Blizzard, snowstorm Statewide Emergency
3/20/76 3/2-7/76 Ice storm, Tornado Major Disaster
8/20/75- 9/6/75 Rainstorms, high winds, flooding Major Disaster
4/18-30/75 Flooding, rain, tornadoes Major Disaster

GOVERNOR'S DECLARATIONS* 1977-2005 (10)

9/7/2005 Katrina Assistance
12/9/2000 Blizzard, snow storm disaster
6/3/98 6/4/98 6/5/98 Thunderstorms and High winds Disaster
7/3/97 7/6/97 Village of Chesaning (Saginaw Co.) Tornado Disaster
6/21/96 6/26/96 Rainstorms, flooding Disaster
10/28/86 9/15/86 9/12/86 Flooding Heavy Rains Disaster
2/21/86 Great Lakes flooding & wave action Disaster
9/10/85 Heavy rain, flooding Disaster
4/13/85 Great Lakes flooding & wave action Disaster

Saginaw County hazard-related events since 2000

(source: Law Enforcement Information Network records, 2000-2004, 2006-2007)

5-19-2000

SAGINAW, at 0901, the Shiawassee River at Fergus reportedly had minor flooding occurring, with flood stage of 10.0 feet matched by actual water levels.

7-14-2000

SAGINAW, Severe thunderstorm warnings issued

7-27-2000

SAGINAW, Severe thunderstorm warnings issued

8-9-2000

SAGINAW, Severe thunderstorm warnings issued

8-22-2000

SAGINAW, Severe thunderstorm warnings issued

1-10-2001

SAGINAW covered under presidentially-declared snow emergency.

2-9-2001

SAGINAW, Flood warnings issued. At 2300, river flood warnings for the Shiawassee River from Owosso downstream to Fergus; near Fergus minor flooding occurring (10.2' observed vs. 10.0' flood stage). At 2351, Cass River at Frankenmuth flood stage 17.0' expected crest 18.1'; Saginaw River at Saginaw confluence of Tittabawassee downstream to Saginaw Bay flood stage 19.0' expected crest 20.6'.

2-10-2001

SAGINAW, Flood warnings. At 0509, minor flooding at Shiawassee River from Owosso downstream to Fergus observed 7.8' vs. 7' flood stage (near Fergus, observed 10.2' vs. 10' flood stage but expected to crest between 12' and 13'). At 1404, minor flooding on the Shiawassee River from Owosso to Fergus, with Fergus stage observed at 12.2' vs. flood stage of 10' (forecasted to crest between 12.5' and 13'). At 2154, Shiawassee River near Fergus, minor flooding 12.4' observed vs. 10.0' flood stage with crest of 12.5' expected (previous crest 12.3' on 2-21-94). At 0530, Cass River at Frankenmuth observed at 17.5' vs. flood stage of 17'. Maximum stage expected at 18.1' (previous crest at 18.1' on May 27, 1991). By 1404, Flooding at Cass River at Frankenmuth, observed at 18.3' vs. 17' flood stage. Minor flooding forecast from Frankenmuth to Bridgeport. At 2154, Cass River at Frankenmuth, minor flooding observed 19.2' vs. 17.0' flood stage and expected crest of 19.3'. Saginaw River at Saginaw forecast to crest at 20.6' vs. flood stage of 19' (previous crest of 20.6' on Apr. 6 1950). At 2154, Saginaw River at Saginaw observed 19.1' vs. 19.0' flood stage. At 1700, roadway flooding; dikes on Flint River breached in the county. 13 roads impassable and closed (Gary bet. Corunna and Sharon, Corunna bet. Gary and Chesaning, East bet. Chesaning and Gary, East bet. Chesaning and Volkmer, Beuche bet. Chesaning and Volkmer, Brennan bet. Marion and Marion, Pettit bet. Rathburn and Canada, Rathburn Way bet. Elms and Maple, Birch Run bet. Dixie and Rook, Courtney bet. Morseville and McKinley, Busch bet. Blackmar and Marshall, Marshall bet. Busch and Lang). 18 roads with water over them but passable: Beuche & Ferden, Cupp bet. Merrill & Chapin, Chesaning bet. Amman & Stuart, 1300 Kennely, 9000 blk Hospital, Lincoln S of Chesaning, Volkmer bet. Corunna & Stuart, Chesaning & Lincoln, Rathbunway & Maple, Birchrun west of the village, 12000 Tittabawassee (large

hole in road), Ditch between Lincoln and M13, Carter & Hotchkiss, Busch West of Blackmar, 14500 Corunna, Titabawassee E of Lawndale, Doorwood bet Townline & Fosters, 4100 blk Amelia. Two dikes on Flint River failed – Taymouth & Albee Twps; several roads underwater. Area residents notified door-to-door.

2-11-2001

SAGINAW, flood warnings continue for the Shiawassee River at Fergus (12.4' observed vs. 10.0 flood stage; 12.5' crest expected, previous crest 12.3' on Feb. 21, 1994, forecast to stay above flood stage through 2-12-2001), and the Cass River at Frankenmuth (observed 20.4' at 0900 vs. 17.0' flood stage; crest of 20.5' expected, with flood levels persisting through 2-12-2001); and for the Saginaw River at Saginaw (20.9' estimated at 1900 vs. 19.0' flood stage; expected crest near 21'; likely to persist above flood stage through 2-13-2001).

2-12-2001

SAGINAW, flood warnings continue.

2-26-2001

SAGINAW, Flood Warning for the Cass River from Frankenmuth to Bridgeport. Flood Warnings remain for the Shiawassee River from Chesaning to Fergus (river crested at 11.5 ft vs. Flood stage 10 ft.)

2-27-2001

SAGINAW, Flood Warnings continue for the Cass River from Frankenmuth to Bridgeport (River crested in Frankenmuth at 18 ft, Flood stage is 17 ft)

4-12-2001

High wind warnings for **SAGINAW**.

8-8-2001

Heat advisory for **SAGINAW**. Heat index reaching 110 degrees.

10-24-2001

Tornado warning issued for **SAGINAW** at 1633.

1-31-2002

Ice storm warning issued for **SAGINAW**. Snowfall up to one foot, and ice accumulation of one-tenth inch. School closings occurred the next day, 2-1-2002.

2-22-2002

A flood warning continues for the Cass River at Frankenmuth in **SAGINAW** County during the afternoon. Minor flooding is forecast. 1 p.m. stage was 17.7 feet and rising slowly, compared with a flood stage of 17.0 feet. The river rose above flood stage late the previous evening. The crest was forecast near 17.9 feet that afternoon.

3-9-2002

High wind warnings issued for **SAGINAW**. Flood warnings were issued. Shiawassee River near Fergus - stage is 8.9 feet and rising; flood stage is 10.0 feet. Forecast to rise above flood stage by late afternoon and crest around 11.1 feet next morning.

Cass River near Frankenmuth, stage is 11.9 feet and rising. Flood stage is 17.0 feet. Forecast to rise above flood stage by Sunday morning and crest around 19.7 feet Monday morning.

4-19-2002

Severe thunderstorm warnings issued for **SAGINAW**.

5-31-2002

Flood statement: An urban and small stream advisory has been issued for **SAGINAW** county.

6-17-2002

Severe thunderstorm warnings were issued for **SAGINAW**.

8-12-2002

Severe thunderstorm warnings were issued for **SAGINAW**.

8-13-2002

Severe thunderstorm warnings were issued for **SAGINAW**.

8-1-2003

Severe thunderstorm warnings were issued for **SAGINAW**.

11-12-2003 to 11-13-2003

High wind warnings were issued for **SAGINAW**.

3-2-2004

At 2057, a flood warning was issued for the Shiawassee River near Fergus in **SAGINAW** due to widespread rain.

3-3-2004

At 0600, Shiawassee River crested at 10.8 feet, .8 feet above flood stage, at Fergus (**SAGINAW**). Minor flooding is occurring. Previous crest at this location was 11.6 ft. on 2-26-2001.

3-4-2004

The flood warning for the Shiawassee River was extended due to expected rainfall; new warnings issued for the Cass River (**SAGINAW**).

At 1008, additional rainfall of 1 inch expected to cause the Shiawassee River to rise to 10.3 feet (.3 feet above flood stage) (**SAGINAW**).

At 2049, flood warnings were issued for the Cass River from Frankenmuth to Bridgeport. Flood stage is 17 feet, but river level was at 17.1 feet and expected to reach 18 feet (**SAGINAW**). Previous crest at that location was 18.6 ft. on 3-11-2002.

3-5-2004

Flood warnings issued for **SAGINAW**. High wind warnings issued for **SAGINAW**.

At 0218, the Shiawassee River near Fergus (**SAGINAW**) was at 10.2 ft. (0.2 ft. above flood stage) and expected to crest at 11.7 ft. and the Cass River (**SAGINAW**) was at 18 ft. and rising, and expected to crest at 19.3 ft.

At 1151, high wind warnings were issued for **SAGINAW**. Winds of 40 mph or greater, or gusts to 58 mph or greater, were predicted.

3-6-2004

Flood warnings continue for **SAGINAW**.

At 0134, the Cass River at Vassar (**SAGINAW**) was expected to crest at 14.2 ft. (0.2 ft. above flood stage). Previous crest was at 14.8 ft. on 2-11-2001. The Cass River between Frankenmuth and

Bridgeport (SAGINAW) was expected to crest at 21.1 ft. (4.1 ft. above flood stage). The Shiawassee River (near Fergus) (SAGINAW) was expected to crest at 12.3 ft. (2.3 ft. above flood stage).

At 0600, flood warnings were issued for the Cass River from Frankenmuth to Bridgeport (SAGINAW). The river was at 20.1 ft. and rising (3.1 ft. above flood stage). Previous crest was 14.1 ft. on 2-11-2001.

At 1500, flood warnings were discontinued for the Shiawassee River near Fergus (SAGINAW) and the upper portions of the Cass River. The Cass had fallen to 13.6 ft. (0.4 ft. below flood stage). Moderate flooding continued at Vassar (TUSCOLA), with the river at 15.5 ft., 1.5 ft. above flood stage. From Frankenmuth (SAGINAW) to Bridgeport (SAGINAW), moderate flooding continued on the Cass River, whose level was at 20.6 ft., 3.6 ft. above flood stage. Minor flooding was predicted at Saginaw (SAGINAW) on the Saginaw River (crest expected to be 19.5 ft., .5 ft. above flood stage).

At 2142, flooding continued from Frankenmuth to Bridgeport (SAGINAW) on the Cass River (river is at 20.9 ft., 3.9 ft. above flood stage), and on the Saginaw River at Saginaw (SAGINAW), with that river projected to rise to 19.1 ft., 0.1 ft. above flood stage.

3-7-2004

Flood warnings continued for SAGINAW.

At 0135, flooding was approaching the M-46 and M-47 intersection in SAGINAW Co.

At 0151, the Cass River from Frankenmuth to Bridgeport (SAGINAW) was forecast to crest at 21.2 ft. (4.2 ft. above flood stage). Saginaw River at Saginaw (SAGINAW) was expected to crest at 19.1 ft. (0.1 ft. above flood stage).

At 0927, the Cass River level from Frankenmuth to Bridgeport (SAGINAW) was falling (21 ft. was the current level, still 4 ft. above flood stage). The Saginaw River at Saginaw (SAGINAW) was rising (19.3 ft. is current level, 0.3 ft. above flood stage).

1451 Levels for the Cass River between Frankenmuth and Bridgeport (SAGINAW) were falling. The Saginaw River at Saginaw (SAGINAW) had risen to 19.5 ft. (0.5 ft. above flood stage).

3-8-2004

Flood warnings continued for SAGINAW.

At 0519, the Saginaw River at Saginaw (SAGINAW) was rising and was at 19.9 ft. (0.9 ft. above flood stage). Water levels for the Cass (SAGINAW) river continued to fall.

At 1032, the Cass River from Frankenmuth to Bridgeport (SAGINAW) was still 0.4 ft. above flood stage (17 ft.). The Saginaw River at Saginaw (SAGINAW) was still 0.9 ft. above flood stage (19 ft.).

At 1645, the Saginaw River at Saginaw (SAGINAW) was still 0.9 ft. above flood stage (19 ft.).

At 2107, the Saginaw River at Saginaw (SAGINAW) was 0.8 ft. above flood stage (19 ft.).

3-9-2004

Flood warnings continued for SAGINAW

At 0524, flood warnings continued for Saginaw River. The river was at 19.7 ft. (flood stage is 19.0 ft.).

5-4-2004

Severe thunderstorm warnings were issued for SAGINAW.

5-9-2004

Severe thunderstorm warnings were issued for SAGINAW.

5-14-2004

Severe thunderstorm warnings were issued for SAGINAW.

12-1-2006

SAGINAW, flood warnings were issued for the Cass River from Frankenmuth to Bridgeport, with minor flooding forecast due to a forecast crest of 17.5' vs. flood stage of 17.0' (previous crest 17.8' on 1-15-2005). Water levels were rising sharply due to heavy rainfall in parts of the Cass River Basin. Flood stage of 17.0' was reached at 0200, 17.3' was reached by 0600 and 17.5' was reached by 1500, with a crest of 17.6' reached at 2000 and expected to fall below flood stage late on the evening of 12-3-2007.

12-2-2006 to 12-3-2006

SAGINAW, flood warnings issued for the Cass River from Frankenmuth downstream to Bridgeport, with minor flooding and a crest of 17.6' vs. flood stage 17.0'.

3-11-2007

SAGINAW, flood warnings were issued for the Shiawassee River near Fergus, with a crest of 10.5' forecast vs. 10.0' flood stage (previous crest 10.3' on 3-14-2006). Actual reported water levels went to 10.4' at 1300.

3-13-2007

SAGINAW, flood warnings were issued for the Cass River near Frankenmuth, with an observed stage of 17.3' vs. flood stage 17.0'. Flooding resulted from both snowmelt runoff and the formation of an ice jam downstream from Frankenmuth. The ice jam had apparently broken the next day and quickly reduced the extent of flood conditions in that area.

3-14-2007

SAGINAW, on the Cass River near Frankenmuth, ice jam flooding was forecast (expected to fluctuate around the flood stage of 17.0').

4-22-2007

Red flag warnings issued for **SAGINAW**.

6-27-2007

Severe thunderstorm warnings issued for **SAGINAW**.

7-5-2007

Severe thunderstorm warnings issued for **SAGINAW**.

7-9-2007

Severe thunderstorm warnings issued for **SAGINAW**.

7-18-2007

Severe thunderstorm warnings issued for **SAGINAW**.

8-17-2007

Red flag warnings issued for **SAGINAW**. A proclamation was issued by the Michigan DNR prohibiting the use of fire on forest lands and adjacent lands in many counties, including **SAGINAW**. This prohibited (except under specified conditions) the building of campfires, smoking, and the burning of materials within the county.

8-22-2007 to 8-23-2007

Severe thunderstorm warnings were issued for **SAGINAW**. These were overnight warnings.

8-29-2007

Severe thunderstorm warnings were issued for **SAGINAW**.

A drought and wildfire related bulletin was issued by DNR director Rebecca Humphries, rescinding the burning ban for 23 counties, including SAGINAW, but stating that despite some rainfall, numerous areas of the state “have not received enough to alleviate current drought conditions, and the long range weather forecast does not indicate that adequate rainfall is coming.” A ban on burning was therefore maintained in those areas, which “prohibits the following acts on forest lands or lands adjacent to forest lands: burning of any flammable material, including refuse, brush, stumps, rubbish, grass, stubble, leaves, or crop residue; burning materials in a burn barrel; pipe, cigar and/or cigarette smoking outdoors adjacent to forest lands, with the exception of places of habitation, authorized and improved campgrounds, or in any automobile or truck.” The ban was shortly lifted in SAGINAW, however, with the caution that citizens were advised “to continue to exercise extreme caution with outdoor flame.”

9-25-2007

Severe thunderstorm warnings issued for **SAGINAW**.

10-18-2007 to 10-19-2007

Severe thunderstorm warnings were issued for **SAGINAW**. Tornado warnings were also issued for **SAGINAW**.

384 event(s) were reported in **Saginaw County, Michigan** between **01/01/1950** and **01/31/2008** (**High Wind limited to speed greater than 0 knots**).

*Click on **Location or County** to display Details.*

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Michigan								
Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 SAGINAW	06/05/1953	1700	Tornado	F2	0	0	25K	0
2 SAGINAW	05/12/1956	1700	Tornado	F2	0	0	25K	0
3 SAGINAW	04/25/1957	1108	Tstm Wind	0 kts.	0	0	0	0
4 SAGINAW	07/28/1958	1500	Tstm Wind	0 kts.	0	0	0	0
5 SAGINAW	07/28/1958	1500	Tstm Wind	0 kts.	0	0	0	0
6 SAGINAW	09/26/1959	2200	Tstm Wind	0 kts.	0	0	0	0
7 SAGINAW	05/04/1963	1530	Hail	1.00 in.	0	0	0	0
8 SAGINAW	05/24/1964	1630	Tstm Wind	55 kts.	0	0	0	0
9 SAGINAW	05/26/1965	1430	Tstm Wind	0 kts.	0	0	0	0
10 SAGINAW	07/12/1966	0855	Tstm Wind	55 kts.	0	0	0	0
11 SAGINAW	04/14/1967	1920	Tornado	F1	0	0	250K	0
12 SAGINAW	04/21/1967	2030	Tstm Wind	0 kts.	0	0	0	0
13 SAGINAW	07/02/1967	1640	Tstm Wind	0 kts.	0	0	0	0
14 SAGINAW	06/11/1968	1350	Tstm Wind	0 kts.	0	0	0	0
15	06/19/1968	1302	Hail	1.00	0	0	0	0

SAGINAW				in.				
16 SAGINAW	06/12/1969	1615	Tstm Wind	0 kts.	0	0	0	0
17 SAGINAW	08/26/1970	1615	Hail	1.00 in.	0	0	0	0
18 SAGINAW	05/19/1971	1410	Tstm Wind	50 kts.	0	0	0	0
19 SAGINAW	06/07/1971	1240	Hail	0.75 in.	0	0	0	0
20 SAGINAW	08/22/1972	1745	Tornado	F1	0	0	3K	0
21 SAGINAW	06/01/1973	1615	Tornado	F1	0	0	250K	0
22 SAGINAW	07/04/1974	1213	Tstm Wind	55 kts.	0	0	0	0
23 SAGINAW	07/04/1974	1240	Tstm Wind	0 kts.	0	0	0	0
24 SAGINAW	05/21/1975	1324	Tstm Wind	50 kts.	0	0	0	0
25 SAGINAW	05/25/1975	1730	Tstm Wind	61 kts.	0	0	0	0
26 SAGINAW	06/05/1975	0100	Tstm Wind	0 kts.	0	0	0	0
27 SAGINAW	05/05/1976	1855	Tstm Wind	0 kts.	0	0	0	0
28 SAGINAW	06/18/1976	1716	Tornado	F1	0	0	25K	0
29 SAGINAW	09/19/1977	0200	Hail	1.75 in.	0	0	0	0
30 SAGINAW	06/20/1979	1145	Tstm Wind	0 kts.	0	0	0	0
31 SAGINAW	06/26/1980	1455	Tstm Wind	60 kts.	0	0	0	0
32 SAGINAW	07/22/1980	1610	Hail	1.75 in.	0	0	0	0
33 SAGINAW	07/22/1980	1610	Hail	1.75 in.	0	0	0	0
34 SAGINAW	03/31/1981	2204	Tstm Wind	62 kts.	0	0	0	0

35 SAGINAW	06/15/1982	1425	Tornado	F2	0	3	2.5M	0
36 SAGINAW	06/20/1982	1832	Hail	1.00 in.	0	0	0	0
37 SAGINAW	06/20/1982	1915	Tornado	F1	0	0	250K	0
38 SAGINAW	08/03/1982	1730	Tstm Wind	0 kts.	0	0	0	0
39 SAGINAW	07/21/1983	1000	Tstm Wind	0 kts.	0	0	0	0
40 SAGINAW	07/21/1983	1100	Tstm Wind	0 kts.	0	0	0	0
41 SAGINAW	07/29/1983	0000	Tstm Wind	0 kts.	0	0	0	0
42 SAGINAW	09/02/1984	1330	Hail	3.50 in.	0	0	0	0
43 SAGINAW	09/02/1984	1330	Tstm Wind	0 kts.	0	0	0	0
44 SAGINAW	05/26/1985	1837	Tstm Wind	0 kts.	0	0	0	0
45 SAGINAW	04/28/1986	1433	Tornado	F2	0	0	2.5M	0
46 SAGINAW	07/09/1987	1720	Hail	0.75 in.	0	0	0	0
47 SAGINAW	07/20/1987	1724	Tstm Wind	0 kts.	0	0	0	0
48 SAGINAW	07/16/1988	1500	Tstm Wind	0 kts.	0	0	0	0
49 SAGINAW	07/23/1988	1500	Hail	0.75 in.	0	0	0	0
50 SAGINAW	07/25/1988	1727	Hail	0.75 in.	0	0	0	0
51 SAGINAW	08/12/1988	1649	Tstm Wind	70 kts.	0	0	0	0
52 SAGINAW	05/25/1989	0200	Tstm Wind	0 kts.	0	0	0	0
53 SAGINAW	09/06/1990	1412	Tstm Wind	0 kts.	0	0	0	0
54 SAGINAW	09/06/1990	1417	Tstm Wind	0 kts.	0	0	0	0

55 SAGINAW	10/04/1990	1600	Tstm Wind	0 kts.	0	0	0	0
56 SAGINAW	03/26/1991	2257	Hail	0.75 in.	0	0	0	0
57 SAGINAW	03/27/1991	1900	Tstm Wind	0 kts.	0	0	0	0
58 SAGINAW	03/27/1991	1949	Tstm Wind	0 kts.	0	0	0	0
59 SAGINAW	05/28/1991	1800	Tstm Wind	0 kts.	0	0	0	0
60 SAGINAW	05/29/1991	1730	Hail	0.75 in.	0	0	0	0
61 SAGINAW	05/29/1991	1845	Tstm Wind	0 kts.	0	0	0	0
62 SAGINAW	05/31/1991	1655	Tstm Wind	0 kts.	0	0	0	0
63 SAGINAW	05/31/1991	1715	Tstm Wind	0 kts.	0	0	0	0
64 SAGINAW	07/06/1991	2127	Hail	1.50 in.	0	0	0	0
65 SAGINAW	07/07/1991	1805	Tstm Wind	0 kts.	0	0	0	0
66 SAGINAW	07/07/1991	1815	Tstm Wind	0 kts.	0	0	0	0
67 SAGINAW	08/17/1991	1700	Tornado	F0	0	0	OK	0
68 SAGINAW	05/17/1992	1230	Tstm Wind	52 kts.	0	0	0	0
69 SAGINAW	05/17/1992	1255	Tstm Wind	0 kts.	0	0	0	0
70 SAGINAW	06/17/1992	1624	Tstm Wind	54 kts.	0	0	0	0
71 SAGINAW	06/17/1992	1645	Tstm Wind	0 kts.	0	0	0	0
72 SAGINAW	06/17/1992	1650	Tstm Wind	0 kts.	0	1	0	0
73 MIZ001>073 - 080>083	01/21/1993	0000	Ice Storm	N/A	0	0	0	0
74 Western	02/17/1993	1300	Lake Effect	N/A	0	0	0	0

Upper And			Snow					
75 MIZ001>010 - 013>017 - 029>032 - 035>037 - 049>059 - 073 - 077	02/22/1993	1000	Lake Effect Snow	N/A	0	0	0	0
76 MIZ004>006 - 013>017 - 025 - 026 - 031>044 - 049 - 051 - 053	03/23/1993	0300	Freezing Rain	N/A	0	0	0	0
77 Chesaning	08/23/1993	2238	Thunderstorm Winds	N/A	0	0	0	0
78 Part Of Upper And All	01/27/1994	0000	Heavy Snow/freezing Rain	N/A	0	0	5.0M	0
79 South Half Of Lower M	02/07/1994	1800	Snow	N/A	0	0	0	0
80 SAGINAW	02/19/1994	2300	Flood/flash Flood	N/A	0	0	5K	0
81 Saginaw	04/12/1994	2215	Hail	0.75 in.	0	0	0	0
82 Bridgeport	04/12/1994	2230	Hail	0.75 in.	0	0	0	0
83 Tri Cities Airport (m	06/28/1994	1336	Thunderstorm Winds	N/A	0	0	0	0
84 Hemlock	06/28/1994	1420	Hail	0.75 in.	0	0	0	0
85 Saginaw	07/06/1994	1815	Lightning	N/A	0	3	0	0
86 MIZ054 - 53	07/08/1994	0100	Flood	N/A	0	0	5.0M	5.0M
87 Arthur	07/20/1994	2045	Thunderstorm Winds	N/A	0	0	0	0
88 Southern Lower	12/06/1994	1800	Heavy Snow	N/A	0	0	0	0
89 Lower Michigan	01/11/1995	1800	Dense Fog	N/A	0	0	0	0

90 Northwest Upper	01/20/1995	0000	Heavy Snow	N/A	0	0	0	0
91 MIZ001>008 - 016>078	02/03/1995	1800	Heavy Lake Snow	N/A	0	0	0	0
92 MIZ001>003 - 006>008 - 016>078	02/11/1995	0000	Heavy Lake Snow	N/A	0	0	0	0
93 Southern Lower	02/25/1995	1500	Heavy Snow	N/A	0	0	0	0
94 Southern Lower	02/27/1995	0100	Ice Storm	N/A	0	0	0	0
95 MIZ040>083	03/06/1995	0000	Ice Storm	N/A	0	0	0	0
96 Birch Run	06/27/1995	1615	Hail	1.50 in.	0	0	0	0
97 Countywide	07/13/1995	1600	Thundertorm Winds	N/A	0	0	300K	0
98 Zilwaukee	07/13/1995	1615	Thunderstorm Winds	N/A	0	0	5K	0
99 Freeland	08/13/1995	1521	Thunderstorm Winds	N/A	0	0	0	0
100 North Side Of Saginaw	08/13/1995	1600	Thunderstorm Winds	N/A	0	0	5K	0
101 Freeland	08/16/1995	1840	Thunderstorm Winds	N/A	0	0	0	0
102 East Central Lower	11/27/1995	0400	Heavy Snow	N/A	0	0	0	0
103 All Of S.e. Lower	12/09/1995	0400	Cold Wave	N/A	3	0	0	0
104 All Of S.e. Lower	12/13/1995	1800	Ice Storm	N/A	0	0	0	0
105 St Charles	01/18/1996	06:55 PM	Hail	0.75 in.	0	0	0	0
106 MIZ047>049 - 053>055 -	02/01/1996	12:00 AM	Extreme Cold	N/A	1	0	0	0

060>063 - 068>070 - 075>076 - 082>083								
107 MIZ053	03/20/1996	12:00 AM	High Wind	75 kts.	0	0	0	0
108 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	03/25/1996	12:00 PM	High Wind	50 kts.	0	0	65K	0K
109 Mbs Airport	04/13/1996	12:13 AM	Hail	1.25 in.	0	0	0	0
110 MIZ053	05/21/1996	06:00 AM	Flood	N/A	0	0	0	1.0M
111 MIZ053	05/22/1996	12:00 AM	Flood	N/A	0	0	0	0
112 MIZ053	06/19/1996	12:00 AM	Flood	N/A	0	0	0	0
113 MIZ053	06/21/1996	10:00 AM	Flood	N/A	0	0	0	0
114 Nrn 1/2 Of Co.	06/21/1996	10:00 PM	Flash Flood	N/A	0	0	1.0M	0
115 Frankenmuth	06/21/1996	10:02 PM	Tornado	F3	0	0	5.0M	0
116 Brant	08/07/1996	04:40 PM	Tstm Wind	60 kts.	0	0	0	0
117 Chesaning	08/07/1996	05:05 PM	Tstm Wind	60 kts.	0	0	0	0
118 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	10/30/1996	12:00 AM	High Wind	60 kts.	0	0	90K	0
119 MIZ047>049 - 053>055 - 060 - 062	01/09/1997	08:00 AM	Heavy Snow	N/A	0	0	0	0

120 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	01/17/1997	12:00 AM	Extreme Cold	N/A	2	0	0	0
121 MIZ053	02/21/1997	09:00 AM	Flood	N/A	0	0	0	0
122 Countywide	02/21/1997	12:00 PM	Flash Flood	N/A	0	0	50K	0
123 MIZ053	02/22/1997	04:00 PM	Flood	N/A	0	0	0	0
124 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	02/27/1997	08:00 AM	High Wind	55 kts.	0	0	20K	0
125 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	03/13/1997	09:00 PM	Ice Storm	N/A	0	0	19.0M	0
126 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	04/06/1997	03:00 PM	High Wind	70 kts.	0	1	1.2M	0
127 Hemlock	05/05/1997	07:20 PM	Hail	1.75 in.	0	0	0	0
128 Hemlock	05/05/1997	07:30 PM	Tstm Wind	60 kts.	0	0	5K	0
129 Merrill	05/05/1997	07:33 PM	Hail	0.75 in.	0	0	0	0
130 Freeland	05/08/1997	08:55 PM	Hail	1.00 in.	0	0	0	0
131 Marion Spgs	07/02/1997	02:31 PM	Hail	0.75 in.	0	0	0	0

132 Brant	07/02/1997	02:40 PM	Tstm Wind	70 kts.	0	0	10K	0
133 Chesaning	07/02/1997	02:41 PM	Tornado	F1	0	0	400K	0
134 Chesaning	07/02/1997	02:50 PM	Tornado	F1	0	0	400K	0
135 Layton Corners	07/02/1997	03:10 PM	Tornado	F1	0	0	200K	0
136 Burt	07/02/1997	03:20 PM	Tornado	F1	0	0	50K	0
137 Saginaw	07/14/1997	06:43 PM	Tstm Wind	52 kts.	0	0	0	0
138 Bridgeport	07/14/1997	06:45 PM	Tstm Wind	52 kts.	0	0	0	0
139 Freeland	07/14/1997	06:54 PM	Tstm Wind	52 kts.	0	0	0	0
140 Frankenmuth	07/27/1997	09:26 PM	Tstm Wind	52 kts.	0	0	50K	0
141 MIZ047>049 - 053>054 - 060>062 - 068	10/26/1997	10:00 PM	Heavy Snow	N/A	0	0	0	0
142 MIZ047>048 - 053	01/07/1998	08:00 PM	Ice Storm	N/A	0	0	0	0
143 MIZ053>054	03/20/1998	04:00 AM	Flood	N/A	0	0	0	0
144 Fenmore	03/30/1998	12:40 PM	Hail	0.88 in.	0	0	0	0
145 MIZ053	04/13/1998	02:15 PM	High Wind	40 kts.	0	0	2K	0
146 Saginaw	04/16/1998	02:30 PM	Hail	0.75 in.	0	0	0	0
147 Saginaw	04/16/1998	02:45 PM	Lightning	N/A	0	0	1K	0
148 Chapin	05/01/1998	08:18 PM	Flash Flood	N/A	0	0	0	0
149 Chesaning	05/29/1998	02:00 AM	Tstm Wind	52 kts.	0	0	0	0

150 Birch Run	05/29/1998	02:15 AM	Tstm Wind	52 kts.	0	0	0	0
151 Saginaw	05/29/1998	02:30 AM	Tstm Wind	52 kts.	0	0	0	0
152 Oakley	05/31/1998	05:05 AM	Tstm Wind	59 kts.	0	0	10K	0
153 Merrill	05/31/1998	05:10 AM	Tstm Wind	75 kts.	0	0	80K	0
154 Freeland	05/31/1998	05:19 AM	Tstm Wind	75 kts.	0	0	1.0M	0
155 Birch Run	05/31/1998	05:25 AM	Tstm Wind	65 kts.	0	0	125K	0
156 Bridgeport	05/31/1998	05:26 AM	Tstm Wind	70 kts.	0	0	300K	0
157 MIZ047>049 - 053>055 - 060>063 - 068>069 - 075	06/02/1998	01:00 PM	High Wind	35 kts.	0	0	0	0
158 Bridgeport	06/21/1998	05:15 PM	Tstm Wind	52 kts.	0	0	8K	0
159 Freeland	07/14/1998	04:40 PM	Hail	1.00 in.	0	0	0	0
160 Saginaw	07/14/1998	04:50 PM	Flash Flood	N/A	0	0	0	0
161 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	11/10/1998	12:00 PM	High Wind	61 kts.	0	0	1.1M	0
162 MIZ053	12/30/1998	12:00 PM	Cold	N/A	0	0	500K	0
163 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	01/02/1999	09:00 AM	Heavy Snow	N/A	0	0	50K	0

164 MIZ047>049 - 053>055 - 060>063	01/12/1999	04:00 PM	Heavy Snow	N/A	0	0	0	0
165 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	01/12/1999	05:00 PM	Snow	N/A	0	3	1.8M	0
166 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	02/11/1999	12:00 PM	Record Warmth	N/A	0	0	0	0
167 MIZ049 - 053>054 - 060>063 - 068>070 - 075>076 - 082>083	03/05/1999	06:00 PM	Heavy Snow	N/A	0	0	0	0
168 MIZ048 - 053 - 061 - 063 - 068 - 082	05/06/1999	12:00 PM	Wind	N/A	0	0	92K	0
169 Oakley	05/17/1999	05:00 PM	Tstm Wind	52 kts.	0	0	5K	0
170 Saginaw	05/17/1999	05:22 PM	Tstm Wind	52 kts.	0	0	3K	0
171 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	07/04/1999	11:00 AM	Excessive Heat	N/A	0	52	0	0
172 Merrill	07/23/1999	01:23 PM	Tstm Wind	52 kts.	0	0	5K	0
173 Swan Creek	07/23/1999	01:34 PM	Tstm Wind	52 kts.	0	0	5K	0
174 Bridgeport	07/23/1999	01:46 PM	Tstm Wind	52 kts.	0	0	5K	0

175 Frankenmuth	07/23/1999	02:00 PM	Lightning	N/A	0	0	12K	0
176 Saginaw	07/24/1999	02:25 PM	Hail	1.75 in.	0	0	0	0
177 Bridgeport	07/24/1999	02:55 PM	Tstm Wind	52 kts.	0	0	8K	0
178 Chesaning	07/24/1999	03:25 PM	Tstm Wind	50 kts.	0	0	3K	0
179 Shields	07/28/1999	08:00 PM	Tstm Wind	50 kts.	0	0	5K	0
180 MIZ047 - 053>055	01/12/2000	05:00 PM	Heavy Snow	N/A	0	0	0	0
181 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	03/08/2000	12:00 PM	Record Warmth	N/A	0	0	0	0
182 MIZ047 - 053>054	04/07/2000	03:30 PM	Heavy Snow	N/A	0	0	0	0
183 MIZ053 - 060 - 082	05/19/2000	01:30 PM	Flood	N/A	0	0	0	0
184 Saginaw	07/14/2000	01:00 PM	Tstm Wind	55 kts.	0	0	60K	0
185 Fosters	07/27/2000	06:38 PM	Hail	0.75 in.	0	0	0	0
186 Arthur	08/09/2000	06:00 AM	Tstm Wind	56 kts.	0	0	3K	0
187 Frankenmuth	08/22/2000	09:15 PM	Tstm Wind	50 kts.	0	0	2K	0
188 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	10/07/2000	01:00 AM	Snow	N/A	0	0	0	0
189 MIZ047>048 - 053	10/25/2000	03:00 AM	Fog	N/A	0	0	0	0
190	12/11/2000	12:00	Heavy Snow	N/A	0	1	1.1M	0

MIZ047>049 - 053>055 - 060>062 - 068>069		PM						
191 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076	12/13/2000	03:00 PM	Snow	N/A	0	0	25K	0
192 MIZ047>048 - 053>054 - 060>061	12/17/2000	01:00 AM	Heavy Snow	N/A	0	0	560K	0
193 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	12/21/2000	06:00 PM	Extreme Cold	N/A	0	0	475K	0
194 MIZ048>049 - 053>054	02/07/2001	11:00 PM	Ice Storm	N/A	0	0	0	0
195 MIZ053	02/10/2001	03:00 AM	Flood	N/A	0	0	50K	0
196 MIZ053 - 063 - 069>070 - 076	02/24/2001	06:00 AM	Ice Storm	N/A	0	0	2K	0
197 MIZ053	02/25/2001	01:00 PM	Flood	N/A	0	0	0	0
198 Saginaw	04/23/2001	04:10 PM	Tstm Wind	52 kts.	0	0	5K	0
199 Frankenmuth	05/25/2001	06:01 PM	Hail	0.88 in.	0	0	0	0
200 Fergus	06/10/2001	08:05 PM	Tornado	F0	0	0	5K	5K
201 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 -	07/01/2001	12:00 AM	Drought	N/A	0	0	0	150.0M

082>083								
202 Saginaw	07/22/2001	07:43 PM	Tstm Wind	50 kts.	0	0	0	0
203 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	08/06/2001	12:00 PM	Excessive Heat	N/A	1	200	0	0
204 Chesaning	09/07/2001	06:17 PM	Tstm Wind	55 kts.	0	0	0	0
205 Buena Vista	09/07/2001	06:30 PM	Tstm Wind	55 kts.	0	0	0	0
206 Oakley	10/24/2001	03:12 PM	Hail	0.75 in.	0	0	0	0
207 St Charles	10/24/2001	03:30 PM	Hail	0.75 in.	0	0	0	0
208 Bridgeport	10/24/2001	03:34 PM	Hail	0.75 in.	0	0	0	0
209 Bridgeport	10/24/2001	03:35 PM	Tstm Wind	54 kts.	0	0	15K	0
210 Fosters	10/24/2001	03:41 PM	Tornado	F0	0	0	0	0
211 Bridgeport	10/24/2001	03:50 PM	Tstm Wind	50 kts.	0	0	0	0
212 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076	01/30/2002	08:00 AM	Winter Storm	N/A	0	0	0	0
213 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	02/01/2002	09:00 AM	High Wind	40 kts.	0	1	30K	0
214 MIZ053	02/22/2002	04:00 AM	Flood	N/A	0	0	0	0
215	03/02/2002	06:00	Winter Storm	N/A	0	0	0	0

MIZ047>048 - 053		AM						
216 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	03/09/2002	03:00 PM	High Wind	61 kts.	0	2	780K	0
217 MIZ053	03/10/2002	05:00 AM	Flood	N/A	0	0	0	0
218 Saginaw	04/18/2002	11:30 PM	Tstm Wind	50 kts.	0	0	0	0
219 Saginaw	04/18/2002	11:35 PM	Tstm Wind	53 kts.	0	0	0	0
220 Burt	05/31/2002	02:47 AM	Tstm Wind	55 kts.	0	0	0	0
221 Fenmore	06/17/2002	04:05 PM	Hail	0.75 in.	0	0	0	0
222 Chesaning	07/22/2002	04:15 PM	Tstm Wind	50 kts.	0	0	0	0
223 Saginaw	08/13/2002	02:30 PM	Tstm Wind	55 kts.	0	0	0	0
224 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	09/01/2002	12:00 AM	Drought	N/A	0	0	0	0
225 Saginaw	09/19/2002	04:00 PM	Tstm Wind	50 kts.	0	0	0	0
226 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	01/10/2003	08:00 AM	Extreme Cold/wind Chill	N/A	0	0	0	0
227 MIZ053>055 - 060>063 - 068>070	03/04/2003	04:00 PM	Heavy Snow	N/A	0	0	0	0

228 MIZ047>049 - 053>055 - 060>063 - 068>070	04/03/2003	10:00 PM	Ice Storm	N/A	1	2	161.1M	0
229 Saginaw	06/08/2003	04:15 PM	Tstm Wind	50 kts.	0	0	1K	0
230 Saginaw	07/04/2003	11:50 AM	Tstm Wind	55 kts.	0	0	0	0
231 Birch Run	07/06/2003	08:50 PM	Tstm Wind	56 kts.	0	0	0	0
232 Freeland	07/17/2003	03:43 PM	Hail	0.88 in.	0	0	0	0
233 Freeland	07/17/2003	03:43 PM	Tstm Wind	56 kts.	0	0	0	0
234 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	11/12/2003	05:00 PM	High Wind	76 kts.	0	0	21.0M	0
235 MIZ047>049 - 053>054	12/24/2003	05:00 PM	Heavy Snow	N/A	0	0	0	0
236 MIZ047>048 - 053>054 - 060>063 - 068>070	01/14/2004	06:00 AM	Heavy Snow	N/A	0	0	0	0
237 MIZ047>049 - 053>055 - 060>062 - 068>069 - 075	01/26/2004	07:00 PM	Winter Storm	N/A	0	0	0	0
238 MIZ053	03/02/2004	10:00 PM	Flood	N/A	0	0	0	0
239 MIZ053	03/05/2004	10:30 AM	Flood	N/A	0	0	0	0
240 MIZ053	03/05/2004	12:20 AM	Flood	N/A	0	0	0	0
241 MIZ053	03/07/2004	03:45	Flood	N/A	0	0	0	0

		AM						
242 MIZ047>049 - 053>055 - 068>070 - 075	04/19/2004	10:45 AM	High Wind	63 kts.	0	1	0	0
243 Shields	05/14/2004	03:20 PM	Tornado	F1	0	0	250K	0
244 Fosters	05/17/2004	03:00 PM	Tstm Wind	52 kts.	0	0	0	0
245 Bridgeport	05/17/2004	03:05 PM	Tstm Wind	52 kts.	0	0	0	0
246 Frankenmuth	05/17/2004	03:05 PM	Tstm Wind	52 kts.	0	0	0	0
247 Chapin	05/22/2004	02:35 PM	Tstm Wind	70 kts.	0	0	0	0
248 Burt	05/22/2004	02:58 PM	Tornado	F0	0	0	0	0
249 Arthur	05/22/2004	03:02 PM	Tornado	F0	0	0	0	0
250 MIZ047>048 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	05/23/2004	03:00 AM	Flood	N/A	0	0	100.0M	0
251 MIZ053	05/23/2004	09:15 AM	Flood	N/A	0	0	0	0
252 MIZ053	05/24/2004	09:15 AM	Flood	N/A	0	0	0	0
253 MIZ053	05/25/2004	02:15 PM	Flood	N/A	0	0	0	0
254 Layton Corners	06/09/2004	03:40 PM	Hail	1.00 in.	0	0	0	0
255 (mbs)tri City Apt Sa	06/13/2004	05:11 PM	Tstm Wind	50 kts.	0	0	0	0
256 Oakley	06/23/2004	08:17 PM	Hail	0.75 in.	0	0	0	0
257 Chesaning	06/23/2004	08:30 PM	Hail	1.00 in.	0	0	0	0

258 Oakley	07/13/2004	08:48 PM	Tstm Wind	52 kts.	0	0	0	0
259 Arthur	08/02/2004	05:18 PM	Hail	0.75 in.	0	0	0	0
260 Chesaning	08/09/2004	09:26 PM	Tstm Wind	52 kts.	0	0	0	0
261 Chesaning	08/25/2004	06:30 PM	Tstm Wind	52 kts.	0	0	0	0
262 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	10/30/2004	11:30 AM	High Wind	54 kts.	0	0	3.5M	0
263 MIZ047>048 - 053>054 - 060>062 - 068	11/24/2004	04:00 PM	Winter Storm	N/A	0	0	0	0
264 MIZ047>048 - 053	01/06/2005	04:00 AM	Heavy Snow	N/A	0	0	0	0
265 MIZ053	01/13/2005	10:00 AM	Flood	N/A	0	0	0	0
266 MIZ053	01/15/2005	08:00 AM	Flood	N/A	0	0	0	0
267 MIZ048 - 053 - 060>062 - 068>070 - 075>076 - 082>083	01/22/2005	03:00 AM	Winter Storm	N/A	0	0	0	0
268 MIZ047>049 - 053>055	02/14/2005	06:00 PM	Ice Storm	N/A	0	0	0	0
269 MIZ047>049 - 053>055 - 061>063 - 069>070 - 076	02/20/2005	12:00 AM	Heavy Snow	N/A	0	0	0	0
270 MIZ053	03/08/2005	12:30 AM	Flood	N/A	0	0	0	0

271 MIZ047>048 - 053>055 - 060>063 - 069>070	04/23/2005	04:00 PM	Winter Storm	N/A	0	0	0	0
272 Bridgeport	05/06/2005	11:00 PM	Lightning	N/A	0	0	15K	0
273 Saginaw	05/06/2005	11:50 PM	Lightning	N/A	0	0	50K	0
274 Merrill	06/05/2005	02:12 PM	Hail	0.75 in.	0	0	0	0
275 Hemlock	06/05/2005	03:15 PM	Tornado	F0	0	0	0	0
276 Hemlock	06/05/2005	03:16 PM	Tstm Wind	61 kts.	0	0	0	0
277 Freeland	06/05/2005	03:45 PM	Hail	0.75 in.	0	0	0	0
278 Hemlock	06/05/2005	05:19 PM	Hail	1.75 in.	0	0	0	0
279 Saginaw	06/05/2005	05:58 PM	Hail	1.75 in.	0	0	0	0
280 Merrill	06/05/2005	06:14 PM	Tstm Wind	60 kts.	0	0	0	0
281 Hemlock	06/09/2005	06:50 PM	Tstm Wind	54 kts.	0	0	0	0
282 Brant	06/09/2005	07:00 PM	Tstm Wind	54 kts.	0	0	0	0
283 Burt	06/14/2005	02:01 PM	Hail	1.00 in.	0	0	0	0
284 Burt	06/14/2005	02:01 PM	Tstm Wind	52 kts.	0	0	0	0
285 Frankenmuth	06/14/2005	02:18 PM	Tstm Wind	56 kts.	0	0	0	0
286 Saginaw	06/14/2005	03:05 PM	Tstm Wind	54 kts.	0	0	0	0
287 Freeland	06/14/2005	03:08 PM	Tstm Wind	53 kts.	0	0	0	0
288 Marion Spgs	06/28/2005	06:05 PM	Tstm Wind	56 kts.	0	0	0	0
289 Oakley	06/28/2005	06:15	Tstm Wind	54	0	0	30K	0

		PM		kts.				
290 Saginaw	07/05/2005	04:45 PM	Tstm Wind	54 kts.	0	0	5K	0
291 Saginaw	07/05/2005	04:59 PM	Tstm Wind	54 kts.	0	0	0	0
292 Saginaw	07/18/2005	01:52 PM	Tstm Wind	52 kts.	0	0	0	0
293 Saginaw	07/24/2005	08:15 AM	Tstm Wind	54 kts.	0	0	0	0
294 Arthur	07/24/2005	08:20 AM	Tstm Wind	55 kts.	0	0	0	0
295 Birch Run	09/22/2005	01:02 PM	Tstm Wind	52 kts.	0	0	0	0
296 Saginaw	11/05/2005	09:10 PM	Tstm Wind	57 kts.	0	0	0	0
297 Saginaw	11/05/2005	09:15 PM	Tstm Wind	57 kts.	0	1	0	0
298 MIZ047 - 049 - 053>055 - 060>063 - 068>070 - 075>076 - 083	11/06/2005	10:00 AM	High Wind	52 kts.	0	0	4.2M	0
299 MIZ047 - 053	11/13/2005	10:00 AM	High Wind	52 kts.	0	0	35K	0
300 MIZ047>048 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	11/15/2005	09:00 PM	Strong Wind	N/A	0	0	7.2M	0
301 MIZ049 - 053>055 - 060>063 - 069>070 - 075>076 - 082>083	12/15/2005	06:00 PM	Heavy Snow	N/A	0	0	0	0
302 MIZ047>049 - 053>054	01/21/2006	05:00 AM	Heavy Snow	N/A	0	0	0	0

303 MIZ047>048 - 053	02/16/2006	04:00 PM	Ice Storm	N/A	0	0	1.0M	0
304 MIZ047>049 - 053>055	03/02/2006	08:00 AM	Winter Storm	N/A	0	0	0	0
305 Saginaw	03/11/2006	06:00 AM	Flood	N/A	0	0	10K	0
306 MIZ047>049 - 053 - 061>063 - 068>070 - 076 - 082	03/13/2006	02:00 PM	High Wind	52 kts.	1	2	0	0
307 Freeland	03/13/2006	08:00 PM	Flood	N/A	0	0	7K	0
308 Freeland	03/31/2006	05:02 PM	Hail	1.00 in.	0	0	0	0
309 Bridgeport	03/31/2006	05:44 PM	Hail	0.88 in.	0	0	0	0
310 Burt	03/31/2006	05:45 PM	Hail	0.75 in.	0	0	0	0
311 Arthur	03/31/2006	06:08 PM	Hail	1.00 in.	0	0	0	0
312 Birch Run	04/22/2006	09:32 PM	Hail	1.75 in.	0	0	0	0
313 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	05/29/2006	12:00 PM	Heat	N/A	0	75	0	0
314 Fergus	05/30/2006	06:05 PM	Tstm Wind	52 kts.	0	0	0	0
315 Saginaw	05/30/2006	06:10 PM	Tstm Wind	52 kts.	0	0	1K	0
316 Gera	05/30/2006	06:30 PM	Tstm Wind	52 kts.	0	0	1K	0
317 Saginaw	06/28/2006	01:10 PM	Hail	0.75 in.	0	0	0	0
318 Saginaw	06/28/2006	01:10	Hail	0.75	0	0	0	0

		PM		in.				
319 Saginaw	06/28/2006	12:50 PM	Hail	0.75 in.	0	0	0	0
320 Saginaw	07/09/2006	11:00 PM	Lightning	N/A	0	0	9K	0
321 Freeland	07/17/2006	05:40 PM	Tstm Wind	58 kts.	0	0	60K	0
322 St Charles	07/17/2006	05:40 PM	Tstm Wind	55 kts.	0	0	0	0
323 Saginaw Arpt	07/17/2006	05:42 PM	Tstm Wind	57 kts.	0	0	0	0
324 Saginaw	07/17/2006	05:45 PM	Lightning	N/A	0	0	106K	0
325 Saginaw	07/17/2006	05:45 PM	Tstm Wind	52 kts.	0	0	0	0
326 Merrill	07/17/2006	05:50 PM	Tstm Wind	55 kts.	0	0	0	0
327 Burt	07/17/2006	06:05 PM	Tstm Wind	53 kts.	0	0	0	0
328 Merrill	07/17/2006	07:35 PM	Hail	1.75 in.	0	0	0	0
329 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	07/29/2006	12:00 PM	Heat	N/A	0	25	0	0
330 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082>083	08/01/2006	12:00 AM	Heat	N/A	0	215	0	0
331 MIZ053 - 068	12/01/2006	01:00 AM	Ice Storm	N/A	0	0	0K	0K
332 MIZ053 - 068	12/01/2006	01:00 AM	Sleet	N/A	0	0	0K	0K
333 MIZ053 - 068	12/01/2006	01:00 AM	Winter Weather	N/A	0	0	0K	0K

334 MIZ047>049 - 053 - 063 - 070	01/14/2007	23:00 PM	Heavy Snow	N/A	0	0	0K	0K
335 MIZ047>049 - 053 - 063 - 070	01/14/2007	23:00 PM	Ice Storm	N/A	0	0	100K	0K
336 MIZ047>049 - 053 - 063 - 070	01/14/2007	23:00 PM	Winter Weather	N/A	0	0	0K	0K
337 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082	02/03/2007	16:00 PM	Cold/wind Chill	N/A	0	10	25K	0K
338 MIZ053 - 061 - 070	02/25/2007	06:00 AM	Winter Weather	N/A	0	0	0K	0K
339 MIZ053 - 055 - 063	03/01/2007	08:00 AM	Winter Storm	N/A	0	0	0K	0K
340 MIZ053 - 055 - 063	03/01/2007	08:00 AM	Winter Weather	N/A	0	0	0K	0K
341 MIZ053	04/04/2007	17:00 PM	Winter Weather	N/A	0	0	0K	0K
342 Freeland	06/27/2007	14:20 PM	Hail	0.88 in.	0	0	0K	0K
343 Saginaw	06/27/2007	14:30 PM	Hail	0.75 in.	0	0	0K	0K
344 Saginaw	06/27/2007	14:35 PM	Thunderstorm Wind	N/A	0	0	0K	0K
345 Saginaw	06/27/2007	14:40 PM	Hail	1.00 in.	0	0	0K	0K
346 Saginaw	06/27/2007	14:40 PM	Thunderstorm Wind	N/A	0	0	0K	0K
347 Bridgeport	06/27/2007	15:00 PM	Hail	0.75 in.	0	0	0K	0K
348 Saginaw	06/27/2007	16:55 PM	Flash Flood	N/A	0	0	10K	0K
349 Saginaw	06/27/2007	16:55	Thunderstorm	N/A	0	0	3K	0K

		PM	Wind					
350 Burt	06/27/2007	17:35 PM	Thunderstorm Wind	N/A	0	0	0K	0K
351 Shields	07/05/2007	15:58 PM	Hail	0.75 in.	0	0	0K	0K
352 St Charles	07/05/2007	16:12 PM	Thunderstorm Wind	N/A	0	0	0K	0K
353 Burt	07/05/2007	16:25 PM	Hail	1.00 in.	0	0	0K	0K
354 Shields	07/05/2007	18:10 PM	Hail	0.75 in.	0	0	0K	0K
355 Nelson	07/09/2007	15:55 PM	Hail	0.75 in.	0	0	0K	0K
356 Saginaw	07/10/2007	15:35 PM	Thunderstorm Wind	N/A	0	0	2K	0K
357 Brant	07/18/2007	17:14 PM	Thunderstorm Wind	N/A	0	0	2K	0K
358 Marion Spgs	07/18/2007	17:14 PM	Thunderstorm Wind	N/A	0	0	10K	0K
359 Bridgeport	07/18/2007	17:48 PM	Thunderstorm Wind	N/A	0	0	0K	0K
360 Merrill	07/18/2007	19:06 PM	Thunderstorm Wind	N/A	0	0	0K	0K
361 Hemlock	07/18/2007	19:20 PM	Lightning	N/A	0	0	10K	0K
362 St Charles	07/18/2007	19:36 PM	Thunderstorm Wind	N/A	0	0	50K	0K
363 Saginaw	08/22/2007	22:00 PM	Thunderstorm Wind	N/A	0	0	0K	0K
364 Freeland	08/22/2007	22:07 PM	Thunderstorm Wind	N/A	0	0	0K	0K
365 Saginaw	08/22/2007	22:08 PM	Thunderstorm Wind	N/A	0	0	0K	0K
366 Saginaw	08/23/2007	16:40 PM	Thunderstorm Wind	N/A	0	0	2K	0K
367 Frankenmuth	08/29/2007	14:10 PM	Hail	1.50 in.	0	0	0K	0K
368 Burt	08/29/2007	15:03 PM	Thunderstorm Wind	N/A	0	0	0K	0K

369 Oakley	08/29/2007	15:25 PM	Thunderstorm Wind	N/A	0	0	3K	0K
370 Birch Run	08/29/2007	15:38 PM	Thunderstorm Wind	N/A	0	0	0K	0K
371 Brant	10/18/2007	19:42 PM	Thunderstorm Wind	N/A	0	0	0K	0K
372 St Charles	10/18/2007	19:48 PM	Thunderstorm Wind	N/A	0	0	0K	0K
373 St Charles	10/18/2007	19:48 PM	Thunderstorm Wind	N/A	0	0	0K	0K
374 MIZ049 - 053>055 - 061>063 - 068	12/01/2007	19:00 PM	Winter Storm	N/A	0	0	0K	0K
375 MIZ049 - 053>055 - 061>063 - 068	12/01/2007	19:00 PM	Winter Weather	N/A	1	0	0K	0K
376 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082	12/11/2007	09:00 AM	Winter Weather	N/A	0	0	0K	0K
377 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082	12/16/2007	00:00 AM	Blizzard	N/A	0	0	0K	0K
378 MIZ047>049 - 053>055 - 060>063 - 068>070 - 075>076 - 082	12/16/2007	00:00 AM	Winter Storm	N/A	0	0	0K	0K
379 MIZ053 - 060>063 - 068>070 - 075	12/23/2007	07:00 AM	High Wind	50 kts.	0	0	35K	0K
380 MIZ053	12/28/2007	13:30	Heavy Snow	N/A	0	0	0K	0K

		PM						
381 MIZ053>055 - 060>063 - 068>070 - 075 - 082	01/01/2008	00:00 AM	Winter Storm	N/A	0	0	0K	0K
382 MIZ053 - 061 - 062	01/14/2008	16:00 PM	Heavy Snow	N/A	0	0	0K	0K
383 MIZ053	01/21/2008	22:00 PM	Heavy Snow	N/A	0	0	0K	0K
384 MIZ049 - 053>055 - 061>063 - 068>069 - 076 - 083	01/30/2008	00:00 AM	High Wind	59 kts.	0	0	0K	0K
TOTALS:					10	598	350.733M	156.005M