

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

1.0 INTRODUCTION

This report summarizes updates to Evacuation Time Estimates (ETEs) for the Palisades Nuclear Power Plant (PNPP). The purpose of the ETEs is to analyze how the population within the Emergency Planning Zone (EPZ) around the nuclear power plant would evacuate during a radiological emergency.

Estimates of the time required to evacuate from areas around nuclear power plant sites are required for all operating plants in the United States. The Federal government has prepared guidance for the preparation and format of these evacuation time estimates. Most notable are the guidance documents prepared by the U.S. Nuclear Regulatory Commission (NUREG-0654, Rev.1¹ and NUREG/CR 4831²).

1.2 Emergency Planning Zone Description

The Palisades Nuclear Power Plant is located in Van Buren County, Michigan approximately five miles south of the city of South Haven, Michigan. The Emergency Planning Zone (EPZ) encompasses an approximate ten-mile radius around the PNPP including the town of South Haven and portions of Van Buren, Allegan and Berrien Counties.

1.3 Sources of Data

The following data sources were reviewed in order to develop the appropriate input required for the computer simulation model used for the evacuation analysis:

1. Nuclear Management Corporation (NMC) provided a copy of the previous evacuation time estimate study and maps of the EPZ. Additional information including listings of major employers, schools, daycares, nursing and group homes, and recreation areas was providing by emergency planning official from Van Buren, Allegan, and Berrien Counties and from representatives of the Emergency Management Division of the Michigan State Police.
2. U.S. Census (2000) data was used to estimate the permanent population residing in the EPZ and to estimate the average household size (persons/household). This data was obtained from the U.S. Census Bureau website and from the Environmental Systems Research Institute (ESRI), 380 New York Street, Redlands, California.
3. Estimates of workforce populations were based on information from the previous evacuation time estimate study and telephone conversations with specific employers.

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4. Listings of transient facilities (parks, hotels, motels, recreational) were provided by emergency planning officials from Van Buren, Allegan, and Berrien Counties. Additional information was obtained from telephone phone books and Internet searches.
5. Descriptions of the roadway network were obtained from the previous evacuation time estimate study and the Van Buren, Allegan, and Berrien County Highway Departments. The roadway network was surveyed and the characteristics such as number of lanes, pavement width, shoulder type and width, posted speed limits, interchange and intersection geometries were noted and used for preparing the input streams for the transportation model.

1.4 General Assumptions

1. An actual evacuation would be conducted in accordance with current State and County radiological emergency response plans.
2. The evacuation time estimates represent an estimate of the time required to evacuate the population from the affected subareas included in the evacuation cases and include estimates of preparation and mobilization time.
3. The evacuation time estimates were developed assuming that all special facilities (eg, schools, group homes) will be informed to evacuate at the same time as the general population.
4. The simultaneous evacuation of the Palisades AND DC Cook EPZs was not considered in this study.
5. It is assumed that all persons within the EPZ would evacuate the affected subareas.
6. It was assumed that the public would travel on evacuation routes designated by State and County law enforcement and emergency preparedness officials.
7. It was assumed that the permanent population would evacuate from their residences.
8. It was assumed that persons would evacuate as a family unit.
9. It was assumed that 100% of the school population would be evacuated directly to the appropriate reception centers and that no parental pickup would occur.

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10. It was assumed that school staff would evacuate with the students and not via their own vehicles.
11. Transport-dependent, including special needs individuals, would be evacuated by bus or ambulance as coordinated by State and County, and municipal emergency preparedness officials.
12. It was assumed that existing lane utilization and traffic control devices would be used during the evacuation.
13. It was assumed that State and County, and municipal preparedness officials would restrict access into the EPZ or affected areas during the evacuation.

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2.0 POPULATION ESTIMATION

The development of evacuation times necessarily involves estimation of vehicle demand. For this study, vehicle demand estimation was done in two stages. First, the number and distribution of the human population was made. Second, the number and types of vehicles that would be used during an evacuation were estimated. Regulatory guidance suggests that three population segments should be considered: permanent residents, transients, and special facility residents¹.

Permanent residents were defined as those individuals residing at a primary residence that is within the EPZ. Persons considered transients included tourists and employees not residing in the EPZ. The special facility population included those residents confined to hospitals and nursing and group homes. School populations (students and staff) were considered part of the special facility population.

2.1 Permanent Population

The permanent population was estimated by superimposing the PNPP EPZ map on U.S. Census Bureau census block maps. Using EPZ maps those census blocks that best matched the actual EPZ were selected. The five subareas within the EPZ were also defined based on the best match to the census block map. In most instances the actual EPZ edges and the subarea boundaries were consistent with census block boundaries; census boundaries usually follow man-made and natural geographic divisions such as major roadways, rivers, and political boundaries such as County lines. The location of the PNPP was taken as x=12596562, y=305912.

Once the EPZ and subarea boundaries were developed, the census tract and block attributes were linked to Table P39 in Census Summary File 1 (SF1), which was obtained from the US Census Bureau website. The linked tables were then compiled for each subarea and the permanent populations were tabulated. This data is summarized in Table 2.1. The detailed permanent population for each subarea and county data is given in Appendix A.

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Table 2.1 Permanent populations for subareas in the Palisades EPZ.

Subarea	Permanent Population		% Change
	This study	Previous Study	
1	2,001	-	-
2	1,939		-
3	2,360	-	-
4 (Van Buren)	10,283	-	-
4 (Allegan)	1,433	-	-
5 (Van Buren)	4,308	-	-
5 (Berrien)	10,703	-	-
<hr/>			
Van Buren County	20,891	19,212	8.7%
Allegan County	1,433	1,142	25.5%
Berrien County	10,703	11,180	- 4.3%
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TOTAL EPZ Perm. Pop.	33,027	31,534	4.7%

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2.2 Transient Population

The transient population includes those persons that work at locations within the EPZ. Several components of the transient population are discussed below.

Employees

A listing of major employers and employee estimates is given in Table 2.2. Employee population information provided by the Chamber of Commerce survey was updated through telephone conversations. Employers were also asked to estimate the number of workers for each shift and for weekends.

Transient Population in Hotels and Motels

Hotels, motels, and bed and breakfasts that could be identified within the EPZ are given in Table 2.3. Local telephone books were used to develop a listing of these facilities and facility information (eg, number of rooms) was gathered during telephone conversations.

Transients at Parks

A listing of the parks and recreation areas was taken from the previous ETE and was updated using information provided by emergency planning officials from Berrien and Van Buren Counties and is presented in Table 2.4. It was also assumed that all persons at these facilities would be from outside the EPZ.

Transients at Marinas

Marinas in the EPZ are listed in Table 2.5. This listing was taken from the previous ETE and updated with information provided by officials from Van Buren County.

Transients at Shopping Centers

No major shopping centers were found in the PNPP EPZ.

2.3 SPECIAL FACILITY POPULATIONS

This section describes how different components of the special facility population were estimated. In this study, special facility populations included those individuals that have special needs and might require assistance during an evacuation, school and preschool children, and residents of facilities such as hospitals, and nursing homes.

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Table 2.2 Major employers within the EPZ and estimations of employees.

Subarea	City	Facility	Workforce Population		
			Day	Night	Weekend
1	Covert	Palisades Nuclear Power Plant	395	315	315
Subarea 1 Subtotals			395	315	315
2	South Haven	Adkin's Blue Ribbon Packaging	60	0	0
	South Haven	Alpha Engineering	3	0	0
	South Haven	Baars Printing Company	6	0	0
	South Haven	Bohn Engine and Foundry	200	150	5
	South Haven	Taylor Controls, Inc	12	0	0
Subarea 2 Subtotals			281	150	5
4	South Haven	American Twisting Co	25	20	0
	South Haven	Anderson Box	4	0	0
	South Haven	B & K Machine	15	5	0
	South Haven	BEI Incorporated	24	0	0
	South Haven	Consumers Concrete Co	8	0	0
	South Haven	Controlled Rubber Products	60	60	0
	South Haven	Daggett's Concrete Products	10	0	3
	South Haven	Precision Machine	14	0	0
	South Haven	Scott Aviation Plant 4	45	45	0
	South Haven	SE Overton Co	50	0	0
	South Haven	Sherman Dairy Products, Inc	50	0	0
	South Haven	South Haven Coil	50	0	0
	South Haven	South Haven Community Hospital	152	100	100
	South Haven	South Haven Rubber Co	40	30	0
	South Haven	System Components, Inc	35	0	0
	South Haven	Triangle Trades, Inc	20	0	0
	South Haven	Wyckoff Chemical Company, Inc	60	0	0
Subarea 4 Subtotals			662	260	103
5	Watervliet	Custom Built Brush Co	12	0	0
	Coloma	Hipskind Building Supply	10	0	0
	Coloma	InnoCorp	25	0	0
	Watervliet	Jarvis Concrete Products	3	0	0
	Coloma	Menasa Corporation	70	40	0
	Coloma	Modern Light Metals	14	0	0
	Coloma	Russell Vending Company	7	0	0
	Watervliet	Shoreline Industries	15	8	0
	Coloma	Spartan Industries	8	0	0
	Watervliet	Watervliet Fruit Exchange	7	0	0
	Watervliet	Watervliet Paper Company	285	0	0
	Watervliet	Watervliet Hospital	110	90	90
	Coloma	West Gate Oil	8	3	0
Subarea 5 Subtotals			574	141	90
EPZ Totals			1,912	866	513

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Table 2.3 Hotels, motels, bed and breakfasts within the EPZ.

Subarea	City	Facility	Populations		
			Day	Night	Weekend
4	South Haven	A & R's North Beach Inn and Cottages	40	40	40
4	South Haven	A Country Place Bed and Breakfast	29	29	29
4	South Haven	Arundel House	25	25	25
4	South Haven	Compton's Cove	32	32	32
4	South Haven	Elmhurst Farm Inn	10	10	10
4	South Haven	North Beach Inn and Restaurant	16	16	16
4	South Haven	Old Harbor Inn	65	65	65
4	South Haven	The Colonial	70	70	70
4	South Haven	The Last Resort Bed and Breakfast Inn	34	34	34
4	South Haven	The New Victoria Inn	54	54	54
Subarea 4 Subtotals			375	375	375
5	Coloma	Cez Du Lac Motel	9	9	9
5	Coloma	Motto's Resort	42	42	42
Subarea 5 Subtotals			51	51	51
EPZ Totals			426	426	426

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Table 2.4 Population and vehicle demand estimates for parks, trails, and recreation areas within the EPZ.

Subarea	Site	Population	Vehicles
1	Covert Township Park	400	80
	Van Buren State Park	6,500	1,760
Subarea 1 Subtotals		6,900	1,840
3	Dune Lake Campground	100	55
	Subarea 3 Subtotals	100	55
4	Black River	600	125
	Cousin's Campground	120	30
	Jensen's Trailer Park	1,000	80
	North Beach	1,500	500
	Singing Sands RV Park	90	90
	South Beach	1,500	500
Subarea 4 Subtotals		4,810	1,325
5	Benton Harbor/St Joseph KOA	390	130
	Forest Beach	50	15
	Paw Paw Lake	280	15
	Paw Paw River Trading Post	115	30
	Rush Lake Campgrounds	24	24
	Sunset Park	50	15
Subarea 5 Subtotals		909	229
EPZ Totals		12,719	3,449

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Table 2.5 Transient population estimates for marinas within the Palisades EPZ.

Subarea	Site	No of Slips	Est Population
4	All Seasons Marine, Inc	46	92
	Bard's Marina		
	Black River Marina	45	90
	Boat Yard Basin	70	140
	Burr Docks		
	J&B Landing Launch		
	Jensen's Marina		
	Municipal Marina	74	148
	Nichols Landing Condo Assoc		
	Oak Harbor Marina	85	170
	River Noire Marina		
	River Ridge Marina		
	Slips Away		
	South Haven City		
	South Haven Yacht Club		
	Summer Place Mooring		
	Three Mile Lake		
	Woodland Harbor Marina		
Subarea 4 Subtotals			
5	Paw Paw Lake Sports and Marina	45	90
	Subarea 5 Subtotals	45	90
EPZ Totals			

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Hospitals

The hospitals and medical facilities in the EPZ are given in Table 2.6.

Nursing Homes

A list of nursing homes, group homes, and community-based care centers is given Table 2.7. This listing was taken from the previous ETE and reviewed by officials from Allegan, Van Buren, and Berrien Counties.

Schools

A listing of schools and preschools provided by emergency planning officials from Allegan, Van Buren, and Berrien Counties. Each facility was contacted via telephone and the estimates of enrollment and staff were tabulated. This data is given in Table 2.8.

2.4 Special Events Populations

Several festival events are held in the South Haven vicinity on an annual basis. The Harbor Fest and All Crafts Fair attract about 20,000 people and are held on the first weekend in September. The South Haven Blueberry Festival is held on the last full weekend of July and attracts about 14,000 people to the area. Finally, the Fourth of July parade and fireworks draw approximately 25,000 to the South Haven beach area.

These events are not concurrent so it is not necessary to plan for an event with more that the event with the greatest attendance. For these EPZ, the greatest special event attendance is the Fourth of July activity.

2.5 Adjustments To Populations

Some adjustments to the population estimates were made when it was plausible that a given population could fluctuate and affect evacuation time estimates.

For example, a population change might occur as a result of workforce populations moving in and out of the EPZ. Whatever the reason, it is impossible for a person to be in more than one place at a given time and approximated adjustments to populations may be deemed appropriate. Following are discussions on how the various populations presented in Sections 2.1 through 2.4, were adjusted.

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Table 2.6 Population estimates for hospitals.

Subarea	Facility	Patients			Staff*
		Ambulatory	Req. W.C.	Req. Amb.	
4	South Haven Community Hospital	44	26	12	252
	Subarea 4 Subtotals	44	26	12	252
5	Watervliet Hospital	48	12	10	200
	Subarea 5 Subtotals	48	12	10	200
	EPZ Totals	92	38	60	452

*List as employees in Table 2.2.

Table 2.7 Population estimates for nursing homes and community-based residential facilities.

Subarea	Facility	Residents			Staff
		Ambulatory	Req. W.C.	Req. Amb.	
3	Hebrews Adult Foster Care Home	3	-	-	1
	Subarea 3 Subtotals	3	-	-	1
4	Country Side Nursing Home	7	102	-	98
4	South Haven Care Centre	125	-	-	125
	Subarea 4 Subtotals	132	102	0	223
5	Abattoir Adult Foster Care	6	-	-	1
5	Deverney Adult Foster Care	12	-	-	1
5	Forest Beach AFC Home	15	-	-	8
5	Juniper Home	6	-	-	10
5	Pine Manor Adult Foster Care	18	-	-	1
	Subarea 5 Subtotals	57	0	0	21
	EPZ Totals	192	102	0	245

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Table 2.8 Population estimates for schools and preschools, and daycare centers.

Subarea	Facility	Summer			Winter		
		Day	Night	Weekend	Day	Night	Weekend
3	Covert Elementary	0	0	0	454	0	0
	Covert High School	0	0	0	192	0	0
	Subarea 3 Subtotals	0	0	0	646	0	0
4	Central Elementary	0	0	0	534	0	0
	Hartman Elementary	0	0	0	124	0	0
	Indiana Elementary	0	0	0	116	0	0
	Lincoln Elementary	0	0	0	489	0	0
	Maple Grove Elementary	0	0	0	220	0	0
	South Haven High School	0	0	0	764	0	0
	South Haven Middle School	0	0	0	408	0	0
	St. Basil's Catholic Church	0	0	0	201	0	0
	St. Paul's Lutheran School	0	0	0	70	0	0
	Sunshine Day Care and Preschool	38	0	0	33	0	0
	Tiny Tots Preschool	208	0	0	208	0	0
	Subarea 4 Subtotals	246	0	0	3,167	0	0
5	Bangor High School	0	0	0	485	0	0
	Bangor Middle School	0	0	0	482	0	0
	Bangor Primary School	0	0	0	551	0	0
	Coloma Elementary	0	0	0	510	0	0
	Coloma High School	0	0	0	386	0	0
	Coloma Junior High	0	0	0	564	0	0
	Coloma Middle School	0	0	0	386	0	0
	Coloma Migrant Program	186	0	0	0	0	0
	Faith Evangelic Lutheran	0	0	0	26	0	0
	Harford Center	68	0	0	68	0	0
	Preschool Learning Center	103	0	0	103	0	0
	Salem Lutheran School	0	0	0	25	0	0
	Washington Elementary	0	0	0	481	0	0
	St. Joseph Prekindergarten	0	0	0	26	0	0
	Wood School	0	0	0	73	0	0
	Subarea 5 Subtotals	357	0	0	4,166	0	0
EPZ Totals		603	0	0	7,979	0	0

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Permanent Population Adjustments

The permanent population was adjusted to account for those individuals that commute to workplaces outside the EPZ. In the event of an actual evacuation, these individuals would be outside the EPZ and would already be evacuated.

Table P31 of the U.S. Census Summary File 3 (SF3) was used to estimate the portion of employees (citizens > 16 years age) commuting to workplaces outside the EPZ. A commute time of greater than 30 minutes was assumed to be indicative of travel outside the EPZ. Based on this assumption and using Table P31 of SF3, approximately 33% of Van Buren County residents leave the EPZ for work and approximately 20% of Berrien County residents leave the EPZ for work. There are no major employers in the Allegan County portion of the EPZ.

Employee Population Adjustments

The employee populations were adjusted to reflect the knowledge that some of the employees at workplaces in the EPZ probably commute from outside the EPZ and thus were not also counted in the permanent population. During the telephone conversations conducted to update the employee populations, the employers were asked to estimate the percentage of employees traveling more than 10 miles to work. Unfortunately, none of the employers listed in Table 2.2 were able to provide such estimates.

The only worker demographic information was provided by emergency planning officials from Van Buren County and is summarized in Table 2.9. Of the approximate 19,737 workers in Van Buren County, 15,286 (or 77.5%) were from Van Buren County. It was assumed that the remaining 4,451 workers from outside the county were also from outside the EPZ. The employee transient population was not counted as permanent population and the adjustment was 22.5% (4,451/19,737).

Hotel, Motel, Park and Marina Populations

It was assumed that the transient populations estimated at hotels and motels, and for parks and recreation areas and marinas would be from outside the EPZ and were not part of the permanent population. While it is possible that permanent residents could be using these facilities, which would constitute double counting, no data was available to make such an estimate. Also, it is possible that some of the hotel and motel population might also use parks and recreation areas while in the EPZ, which would also result in double counting. Similarly, no data was available to make an estimate so it was assumed that hotel and motel populations and park and recreation area populations were distinct and separate.

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Hospital Populations

It was assumed that all patients at hospitals were from outside the EPZ. The staff were treated as employees (listed in Table 2.2) and adjusted as discussed in Sections 2.5.2.

Table 2.9 Estimation of employees commuting into the EPZ for work.

<u>Van Buren County worker place of residence</u>	<u>No. of workers</u>
Van Buren County	15,286
Berrien County	892
Allegan County	1,154
Cass County	451
Kalamazoo County	1,638
Other	316
Total workers from outside Van Buren County	4,451 (22.5%)

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Nursing and Group Home Populations

It was assumed that all residents of nursing and group homes reside at such facilities on a permanent basis and were counted as permanent residents in the Census data. Therefore, no adjustments to these populations were necessary.

School Populations

The data for schools given in Table 2.8 indicate population estimates for both staff and students. All student populations, and a portion of the staff population, were also considered part of the permanent population. During non-school times (evenings and summers) students were assumed to reside at their residences.

Special Events Populations

No data was available to estimate the percentage of the special event attendees that reside outside the EPZ. Therefore, it was assumed that all special event attendees reside outside the EPZ and were not counted as part of the permanent population.

3.0 VEHICLE DEMAND ESTIMATION

Once the specific population components were established the average number of people occupying vehicles was determined. Following are vehicle demand estimates for each of the population components.

3.1 Vehicle Demands of the Permanent Population

The average household size and vehicle occupancy data were estimated using Summary File 3 of the U.S. 2000 census. The population of each county was taken from Table P39 of Summary File 1, the number of households was taken from Table DP-4 of SF3, and the number of vehicles was taken from Table H46 of SF3.

For Allegan County the average household size was 105,665 persons per 43,292 households, or 2.44. The vehicle occupancy for the permanent population was 105,665 persons per 75,510 vehicles or 1.40.

For Berrien County the household size was 162,452/73,445, or 2.21. Vehicle occupancy was 162,452/110,443, or 1.47.

In Van Buren County, the household size was 76,263/33,975, or 2.24. Vehicle occupancy was 76,263/54,292, or 1.41.

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A summary of the permanent population, households, and vehicle count by subarea is given in Table 3.1. The data presented in Table 3.1 are estimates of the maximum permanent population and vehicle counts but do not reflect the minor corrections discussed in Section 2.5.1.

3.2 Vehicle Demands of Transient Populations

Vehicle Demands of Employees

Estimates of vehicle counts for employees are given in Table 3.2. The employee populations given in Table 2.2 were adjusted to account for only those individuals living outside the EPZ (50% of total) and were applied to each shift. Vehicle estimates were based on the assumption that an average of one person would occupy evacuating vehicles. Most, if not all, staff at schools would accompany students to relocation centers and are not counted in this table.

Vehicle Demands for Other Transient Populations

A summary of vehicle demand estimates for populations at hotels and motels is given in Table 3.3. Populations in motels and hotels were based on the assumptions that room occupancy is an average of two persons per room. Vehicle demands for hotels and motels were based on the assumption that one vehicle per room would be used during an evacuation.

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Table 3.1 Summary of the permanent population, households, and vehicle count by subarea.

Subarea	This study	Households	Vehicles
1	2,001	893	1,419
2	1,939	866	1,375
3	2,360	1,054	1,674
4 (Van Buren)	10,283	4,591	7,293
4 (Allegan)	1,433	587	1,024
5 (Van Buren)	4,308	1,923	3,055
5 (Berrien)	10,703	4,843	7,281
Van Buren County	20,891	9,326	14,816
Allegan County	1,433	587	1,024
Berrien County	10,703	4,843	7,281
TOTAL EPZ Perm Pop	33,027	14,757	23,121

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Table 3.2 Summary of the adjusted population and vehicle demand estimates for employees.

Subarea	Facility	Workforce Population			Vehicles		
		Day	Night	Weekend	Day	Night	Weekend
1	Palisades Nuclear Power Plant	395	315	315	395	315	315
	Subarea 1 Subtotals	395	315	315	395	315	315
2	Adkin's Blue Ribbon Packaging	60	0	0	60	0	0
	Alpha Engineering	3	0	0	3	0	0
	Baars Printing Company	6	0	0	6	0	0
	Bohn Engine and Foundry	200	150	5	200	150	5
	Taylor Controls, Inc	12	0	0	12	0	0
	Subarea 2 Subtotals	281	150	5	281	150	5
4	American Twisting Co	25	20	0	25	20	0
	Anderson Box	4	0	0	4	0	0
	B & K Machine	15	5	0	15	5	0
	BEI Incorporated	24	0	0	24	0	0
	Consumers Concrete Co	8	0	0	8	0	0
	Controlled Rubber Products	60	60	0	60	60	0
	Daggett's Concrete Products	10	0	3	10	0	3
	Precision Machine	14	0	0	14	0	0
	Scott Aviation Plant 4	45	45	0	45	45	0
	SE Overton Co	50	0	0	50	0	0
	Sherman Dairy Products, Inc	50	0	0	50	0	0
	South Haven Coil	50	0	0	50	0	0
	South Haven Community Hospital	152	100	100	152	100	100
	South Haven Rubber Co	40	30	0	40	30	0
	System Components, Inc	35	0	0	35	0	0
	Triangle Trades, Inc	20	0	0	20	0	0
	Wyckoff Chemical Company, Inc	60	0	0	60	0	0
	Subarea 4 Subtotals	662	260	103	662	260	103
5	Custom Built Brush Co	12	0	0	12	0	0
	Hipskind Building Supply	10	0	0	10	0	0
	InnoCorp	25	0	0	25	0	0
	Jarvis Concrete Products	3	0	0	3	0	0
	Menasa Corporation	70	40	0	70	40	0
	Modern Light Metals	14	0	0	14	0	0
	Russell Vending Company	7	0	0	7	0	0
	Shoreline Industries	15	8	0	15	8	0
	Spartan Industries	8	0	0	8	0	0
	Watervliet Fruit Exchange	7	0	0	7	0	0
	Watervliet Paper Company	285	0	0	285	0	0
	Watervliet Hospital	110	90	90	110	90	90
	West Gate Oil	8	3	0	8	3	0
	Subarea 5 Subtotals	574	141	90	574	141	90
	EPZ Totals	1,912	866	513	1,912	866	513

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Table 3.3 Vehicle demand for hotels, motels, bed and breakfasts within the EPZ.

Subarea	Facility	Population			Vehicles		
		Day	Night	Weekend	Day	Night	Weekend
4	A & R's North Beach Inn and Cottages	40	40	40	20	20	20
	A Country Place Bed and Breakfast	29	29	29	15	15	15
	Arundel House	25	25	25	13	13	13
	Compton's Cove	32	32	32	16	16	16
	Elmhurst Farm Inn	10	10	10	5	5	5
	North Beach Inn and Restaurant	16	16	16	8	8	8
	Old Harbor Inn	65	65	65	33	33	33
	The Colonial	70	70	70	35	35	35
	The Last Resort Bed and Breakfast Inn	34	34	34	17	17	17
	The New Victoria Inn	54	54	54	27	27	27
Subarea 4 Subtotals		375	375	375	188	188	188
5	Cez Du Lac Motel	9	9	9	5	5	5
	Motto's Resort	42	42	42	21	21	21
Subarea 5 Subtotals		51	51	51	26	26	26
EPZ Totals		426	426	426	213	213	213

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

A summary for parks and recreation areas was given in Table 2.4. Populations and vehicle estimates for parks and recreational facilities were based on telephone conversations, Internet searches and assumptions that maximum use is based on available parking spaces. A population of four persons per parking space was assumed. A summary of all transient populations by subarea is given in Table 3.4.

3.3 Vehicle Demands of Special Facility Populations

Estimates of the special facilities populations were presented in Table 2.6 (hospitals), Table 2.7 (nursing and group homes) and Table 2.8 (schools, preschools, daycares). Estimates of the special needs individuals and transportation-dependent individuals were presented in Section 2.3.1.

Most individuals in the special facilities population are ambulatory and would not require special transportation capability such as wheel chair lifts or ramps or an ambulance. Nevertheless, the staff at the Country Side Nursing Home and the South Haven Community Hospital (both in Subarea 4) and The Watervliet Hospital in Subarea 5 did indicate that as many as 140 persons might require wheel chair-capable transportation. Also, the two hospitals indicated that as many as 22 people may require ambulance transportation.

It was assumed that all special facility populations, including the necessary staff persons, would evacuate with the population via bus, van, ambulance, or other suitable means as described in existing response plans. Emergency planning officials provided listings of transportation resources that would be available in an evacuation event.

Van Buren County has available up to 156 school buses each with a capacity of 72 persons. Also, Van Buren County has 34 special education vehicles each with a capacity of 15 persons. Van Buren Transit could also provide 12 additional buses with capacities of 12 plus one wheel chair each, 7 buses with capacities of 22 plus two wheel chairs each, and two minivans providing capacity of nineteen. Allegan County has available 61 buses each with a capacity of 66.

Ambulances would be available from South Haven Emergency (2), Covert Fire and Ambulance (2), Van Buren EMS (4 + 3 wheel chair units), and Coloma Ambulance (3). Each ambulance unit has a capacity of two persons (plus crew). Based on these resource estimates, bus capacity is approximately 16,000 persons, wheel chair capacity is 32 persons, and ambulance capacity is 11 persons.

A summary of the special facility populations and vehicle demand is given in Table 3.5.

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

Table 3.4 Summary of transient populations and vehicle demand by subarea.

Subarea	Number of Persons			Number of Vehicles		
	Weekday	Night	Weekend	Weekday	Night	Weekend
1	7,295	7,215	7,215	2,235	2,155	2,155
2	281	150	5	281	150	5
3	100	100	100	55	55	55
4	5,847	5,445	5,288	2,175	1,773	1,616
5	1,579	1,146	1,095	874	395	390
EPZ Total	15,102	14,056	13,703	5,620	4,528	4,221

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

Table 3.5 Summary of special populations and vehicle demand by subarea.

Subarea	Number of Persons			Number of Vehicles (no of buses unless noted)		
	Ambulatory	WC	Req Amb	Ambulatory	WC	Req Amb
3	649 ^a	0	0	10	0	0
4	3,502	128	12	49 ^b	64	6
5	4,480	12	10	63	6	5
EPZ Total	8,631	140	22	122	72	11

^afrom Table 2.8, 646 + 1 staff/20 students (=33) + 3 from Table 2.7.

^bbased on expected bus capacity of 72 for Van Buren County transportation resources. Actual vehicle demand would likely be more if Allegan County transportation resources were also used because bus capacities are less (66).

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

4.0 METHODOLOGY

4.1 Estimation of Trip Generation Times

Trip generation times can be thought as descriptions of how vehicles begin to move on the roadway network. In this study, it was assumed that no vehicles would begin evacuating for at least 30 minutes (maximum 15 minute notification time and 15 minute trip preparation time) after the declaration of an emergency. It must be emphasized that the evacuating public will not begin to leave at the same time. Rather, the departure times for vehicles vary. A common way of expressing trip generation times is with cumulative time distributions. The set of these distribution used for this study is presented in Figure 4.1.

Departure times are a function of trip preparation times, perceived urgency, and logistics involved in arriving home from work and coordinating efforts with other family members. It was assumed that all the permanent population would begin an evacuation within two hours of an emergency announcement.

It was assumed that the transient population would be informed of the evacuation within 30 minutes. While employees may be expected to remain at the workplace to facilitate workplace shutdowns, it was assumed that such activities would not last longer than 30 minutes. Other components of the transient population (ie; hotel and motel patrons) would likely act similarly.

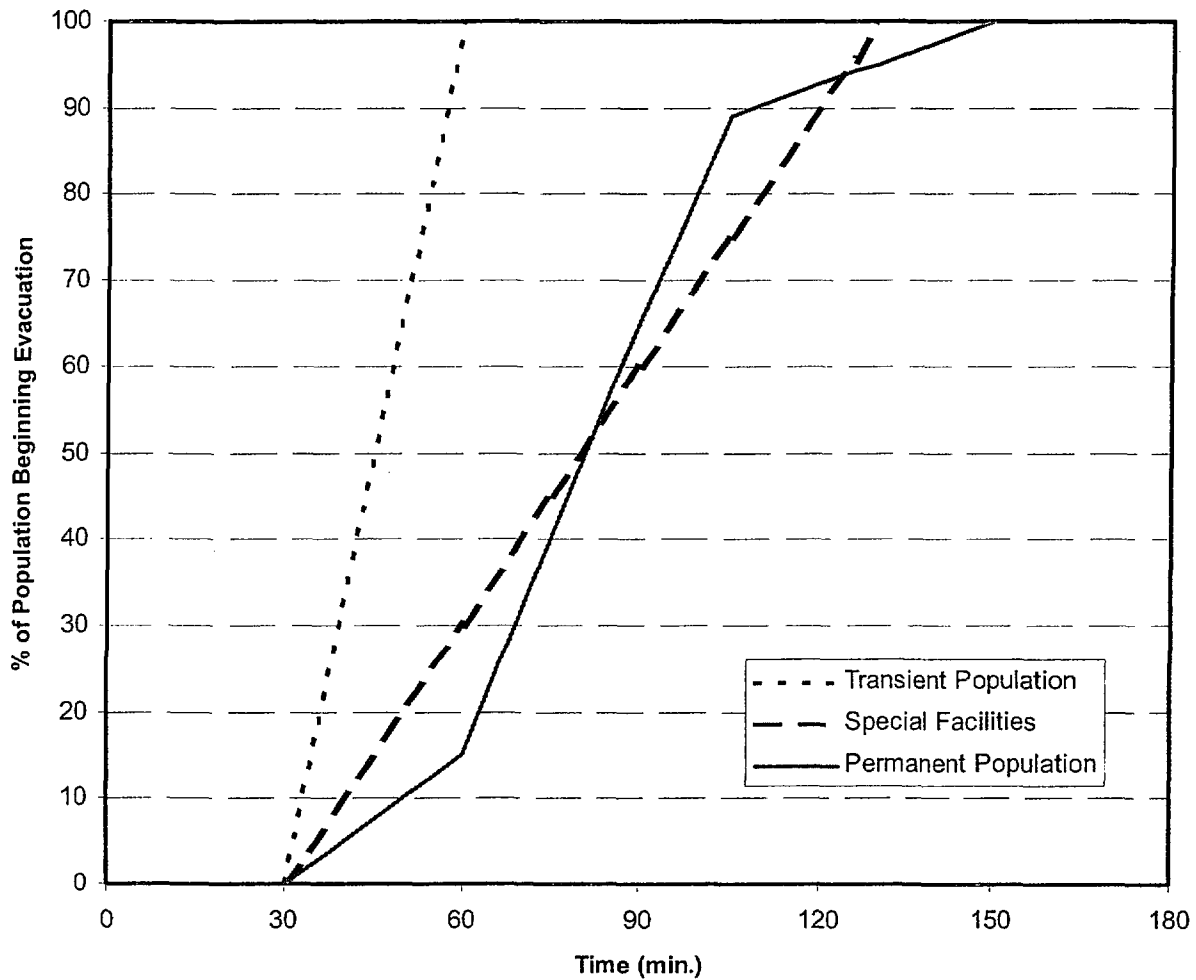
Schools will be evacuated, also at the Site Area Emergency level, directly to reception centers as soon as transportation resources arrive at the schools. It was assumed that bus mobilization times would be about an hour. Accordingly, the schools population could be expected to evacuate within ninety minutes of an evacuation decision.

4.2 Evacuation Routes

The evacuation routes evaluated in this study have been established in previous traffic network analyses and reflect the need to move vehicles from specific subareas to designated relocation destinations. The purpose of this study is to generate evacuation time estimates assuming these routes are appropriate. Evacuation routes are listed by subarea in Table 4.1.

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

Table 4.1 The cumulative time distribution describing the rate of evacuation commencement for the various population components.



POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

Table 4.2 Evacuation routes for the Palisades EPZ.

Evacuation Routes

Subarea 1

Blue Star Highway North
Blue Star Highway South
I-196 South
I-196 North
30th Ave East
32nd Ave East

Subarea 2

Blue Star Highway North
Blue Star Highway South
Adam Road North
Highway 1 South
I-196 South
I-196 North
12th Ave East
16nd Ave East

Subarea 3

Blue Star Highway North
Blue Star Highway South
I-196 South
I-196 North
Coloma North Road South
70th Street South
30th Ave East
34nd Ave East

Subarea 4

Blue Star Highway North
Blue Star Highway South
I-196 South
I-196 North
68th Street North
66th Street North
62nd Street North
Kibbie Lacota Road East
Phoenix Road East
8th Ave East
12th Ave East
16th Ave East

Subarea 5

Blue Star Highway North
Blue Star Highway South
I-196 South
I-196 North
Coloma North Road South
Friday Road South
70th Street South

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

4.3 Estimation of Highway Capacity

Once the vehicle demand and loading characteristics (eg, trip generation time) have been determined the next step is to estimate the capacity of the street and highway network. The ability of the road network to handle vehicle demand is a major factor in determining evacuation times.

By definition, capacity is the maximum numbers of vehicles that can pass a given point during a specified period considering roadway, traffic, and control conditions (ie, signaling or signage). By convention, capacity is expressed in units of vehicles per hour (vph).

In discussing capacity, different traffic flow conditions have been assigned alphabetical designations, A through F, to generally reflect varying traffic operational characteristics. These designations have been termed "Levels of Service" (LOS). For example, LOS A connotes free-flow and high-speed operating conditions; LOS F represents a forced flow condition. LOS E describes traffic operating at or near capacity.

Because of the effect of weather on the capacity of a roadway, it is necessary to adjust capacity figures to represent estimated road conditions during inclement weather. Based on limited empirical data, weather conditions such as heavy rain reduce the values of capacity for highways by approximately 20%. For snowy weather conditions during the winter months, reductions of 25% relative to normal weather conditions were assumed. Free-flow speeds for inclement weather conditions were also reduced 20% for rain and 25% for snow. These factors are applied to all roadway segments.

In the congested traffic environment, which is often characteristic of an evacuation scenario, the capacity of a roadway section has the greatest effect on travel time. The major factors that control capacity of intersections and the approaches to intersections are turning movements, competing traffic streams, control regimes, traffic composition, and approach geometries. The major factors that control capacity along roadway segments are traffic composition, weather conditions, pavement conditions, and lighting.

Capacity estimations were made for two-lane roads, multi-lane roads, multi-lane freeways, and freeway ramps. Estimates for roads and freeways were done on a "per lane" basis. Capacities at intersections were approximated by the simulation software and are described later.

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

To represent the varying road types and geometries, roads were categorized in the following manner:

- 10 ft lanes with 1 ft shoulders
- 11 ft lanes with 2 ft shoulders
- 12 ft lanes with 6 ft shoulders

Using data from Chapter 20 of HCM 2000 and from the previous ETES for the PNPP estimates were made for both two-way and one-way traffic. Highway capacity was estimated to be 1,000 vph per lane. Freeway capacity was estimated to be 1,692 vph per lane and freeway ramp capacity was estimated to be 1,333 vph.

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

4.4 Application of EPZ Data to Model

The model simulation tools used for this ETE are grouped together in a computer software package called the Traffic Software Integrated System (TSIS). TSIS is developed and distributed by the Federal Highway Administration (FHWA). TSIS consists of several modules, or components, that can be used to represent entire traffic environments.

The first tool used in TSIS is TRAFED, a graphical tool that allows one to create representations of traffic networks and is specifically designed to work with FHWA's Corridor Simulation (CORSIM) microscopic traffic simulator. CORSIM consists of an integrated set of two microscopic models; NETSIM represents traffic on urban streets and FRESIM represents traffic on freeways.

In this study, the network of major roadways in the PNPP was entered into TSIS using the TRAFED module. TRAFED network layouts consist of a series of nodes and links. In general, nodes can be thought of as intersections and links can be thought of as roadways. Some nodes are not intersections but represent sources or sinks of traffic, or describe a connection between a FRESIM and NETSIM modules. Source nodes were used to describe traffic loading onto the roadway network from population "centroids". These centroids were developed by combining vehicle counts from adjoining census blocks. Sink, or exit, nodes represented points on evacuation routes outside the EPZ.

Once a roadway network has been developed and the entry nodes have been edited to reflect the loading histograms, the TRAFED file is loaded into the CORSIM module. CORSIM is a stochastic, or probabilistic model. This means that random numbers are generated and assigned to vehicles. When a simulation is run the characteristics of that vehicles travel are the result of a specific set of random numbers. Therefore, to gain a better understanding of transportation the network must be simulated several times using different sets of random numbers. In this study, each scenario examined was run at least three times.

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

5.0 EVACUATION TIME ESTIMATES

5.1 Evacuation Regions and Scenarios

Evacuation Regions

The Palisades NPP EPZ is divided into five subareas that reflect a best match between geographic boundaries and two-, five-, and ten-mile radii around the plant.

Federal guidance documents also specify that the EPZ be divided into sixteen sectors each representing 22.5° segments around the compass¹. In the event of an emergency, officials will consider the severity and nature of the emergency and weather conditions (eg, wind strength and direction), and will recommend protective action for some or all of the subareas. Officials will specify which segment(s) at what distance from the Palisades NPP (2-, 5-, or 10-miles) are affected. This "keyhole" is superimposed on the EPZ map and subarea area selected. Sixteen compass segments at three different radii yields forty-eight, subarea groupings. Because there are only 5 subareas, however, most of the subarea groups are the same. To avoid redundant analyses of scenarios a list of unique subarea groups was assembled and is given in Table 5.1. Each of these six subarea groups is referred to as an Evacuation Region.

Evacuation Scenarios

To evaluate the evacuation of the Palisades NPP EPZ under circumstances that offer different population composition and attributes, evacuation time estimates were conducted considering different combinations of these scenarios. An evacuation scenario can be thought of as a specific set of conditions that might exist at the commencement of a General Emergency. The conditions considered in this study are season (summer versus winter), day of the week (weekday versus weekend day), Time of day (daytime versus evening or night), and weather (fair or poor). If the season is summer poor weather is rain and if the season is winter poor weather is a 6-8" snow. These scenarios are given in Table 5.2.

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

5.2 EPZ Evacuation Time Estimates

Using data described in Section 3.0 and the simulation described in Section 4.0, evacuation time estimates were made. The results of these estimates are summarized in Table 5.3 and Table 5.4. The times provided in this table represent estimates of travel time of the last evacuating vehicle to reach the EPZ edge and do not consider travel time from the EPZ edge to a relocation center. It should also be noted that these estimates only reflect the movement of people from the affected areas and do not reflect movement of those individuals that might evacuate from subareas adjoining the affected subarea(s).

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

Table 5.1 Evacuation regions for the Palisades NPP EPZ.

Evac Region	Subareas				
1	1				
2	1	2			
3	1		3		
4	1	2	3	4	
5	1	2	3		5
6	1	2	3	4	5

Table 5.2 Evacuation scenarios.

Scenario	Season	Day	Time of Day	Weather
1	Summer	Weekend	Midday	Fair
2	Summer	Weekend	Midday	Poor/Adverse
3*	Summer	Weekend	Evening/Night	Fair
4*	Summer	Weekend	Evening/Night	Poor/Adverse
5	Summer	Weekday	Midday	Fair
6	Summer	Weekday	Midday	Poor/Adverse
7	Summer	Weekday	Evening/Night	Fair
8	Summer	Weekday	Evening/Night	Poor/Adverse
9	Winter	Weekend	Midday	Fair
10	Winter	Weekend	Midday	Poor/Adverse
11	Winter	Weekend	Evening/Night	Fair
12	Winter	Weekend	Evening/Night	Poor/Adverse
13	Winter	Weekday	Midday	Fair
14	Winter	Weekday	Midday	Poor/Adverse
15	Winter	Weekday	Evening/Night	Fair
16	Winter	Weekday	Evening/Night	Poor/Adverse

*Includes summer festival populations.

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

Table 5.3 Evacuation Times Estimates (in minutes) for Scenarios 1-8
Scenarios

Region	1	2	3	4	5	6	7	8
	Summer Weekend Midday Fair	Summer Weekend Midday Poor	Summer Weekend Evening Fair	Summer Weekend Evening Poor	Summer Weekday Midday Fair	Summer Weekday Midday Poor	Summer Weekday Evening Fair	Summer Weekday Evening Poor
1	150	170	150	170	150	170	140	150
2	170	180	170	180	180	190	170	170
3	160	170	160	170	170	170	150	150
4	290	320	540	600	230	240	230	230
5	300	300	560	600	230	240	220	230
6	320	340	600	620	260	280	240	230

Table 5.4 Evacuation Times Estimates (in minutes) for Scenarios 9-16.

Scenarios								
Region	9	10	11	12	13	14	15	16
	Winter Weekend Midday Fair	Winter Weekend Midday Poor	Winter Weekend Evening Fair	Winter Weekend Evening Poor	Winter Weekday Midday Fair	Winter Weekday Midday Poor	Winter Weekday Evening Fair	Winter Weekday Evening Poor
1	160	180	170	180	180	190	160	160
2	170	190	170	190	180	250	190	210
3	160	190	170	190	190	210	180	190
4	310	350	300	330	360	390	230	240
5	320	350	320	340	340	400	330	340
6	380	380	360	390	400	440	380	420

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PERMANENT POPULATION DATA

STFID is a concatenated string of state (26), county (eg, 159), block tract (eg, 960500), and census block (4 digits).

POP100 is the permanent population

POPDENS is permanent population density (permanent population/sq. mile)

HU100 is the number of households

ZTCA5 is the five-digit zip code

AREALAND is the Block land area in units of sq. meters

AREAWATR is the Block water area in units of sq. meters

Subarea 1 (Van Buren County)

STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590105001019	0	0	15358	0	49090	0
261590105001020	79	35	517934	0	49090	395
261590105001021	0	0	6165	0	49090	0
261590105001022	131	67	7664	0	49090	44270
261590105001023	98	44	353183	0	49090	719
261590105001025	0	0	60274	0	49090	0
261590105001026	0	0	52435	0	49090	0
261590105001027	0	0	9570	0	49090	0
261590105001028	0	1	24352	0	49090	0
261590105001029	52	41	569410	0	49090	237
261590105001030	12	4	12921	0	49090	2405
261590105001031	17	5	28435	0	49090	1548
261590105001032	10	4	164313	0	49090	158
261590105001033	18	6	31028	0	49090	1503
261590105001034	28	19	14831	0	49090	4890
261590105001035	6	5	14607	0	49090	1064
261590105001036	0	0	151	0	49090	0
261590105001037	16	6	193327	0	49090	214
261590105001038	49	28	1874507	0	49090	68
261590105002014	87	31	808646	0	49090	279
261590105002015	12	13	81968	0	49090	379
261590105002016	30	14	1131101	0	49090	69
261590105002017	33	13	268142	0	49090	319
261590105002018	0	0	250454	0	49090	0
261590105002019	37	3	76977	0	49090	1245
261590105002020	42	15	245864	0	49090	442
261590105002021	55	19	1262786	0	49090	113
261590106001000	7	6	16945	0	49043	1070
261590106001001	26	13	204490	0	49043	329
261590106001002	122	47	996832	0	49043	317

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590106001003	73	24	955068	0	49043	198
261590106001004	13	6	607442	0	49043	55
261590106001006	0	0	42728	0	49043	0
261590106001009	7	6	550096	0	49043	33
261590106001010	0	0	265794	0	49090	0
261590106001011	0	0	22628	0	49090	0
261590106001012	0	0	89696	0	49043	0
261590106001013	3	35	2297131	0	49090	3
261590106001014	5	8	16633	0	49043	779
261590106001015	0	0	1955	0	49090	0
261590106001016	2	6	6509	0	49043	796
261590106001017	13	9	11769	0	49043	2861
261590106001018	0	0	1339	0	49043	0
261590106001019	6	3	236133	0	49043	66
261590106001020	0	2	1466	0	49043	0
261590106001021	59	153	1262797	0	49043	121
261590106001022	0	10	27915	0	49043	0
261590106001023	0	0	2452	0	49043	0
261590106001024	0	17	40939	0	49043	0
261590106001025	0	2	3703	0	49043	0
261590106001026	0	5	8068	0	49043	0
261590106001027	0	5	7983	0	49043	0
261590106001028	0	0	36617	0	49090	0
261590106001029	17	11	662545	0	49043	66
261590106001054	24	11	52577	0	49043	1182
261590106001055	9	5	14369	0	49043	1622
261590106002002	37	19	1198504	0	49090	80
261590106002003	18	4	189425	0	49090	246
261590106002004	30	25	1348013	0	49090	58
261590106002005	22	9	1279775	0	49090	45
261590106002006	28	13	1012716	0	49090	72
261590106002007	65	32	951371	0	49043	177
261590106002008	69	32	1079566	0	49043	166
261590106002009	41	14	202441	0	49043	525
261590106002014	26	8	145021	0	49043	464
261590106002015	48	25	1146024	0	49043	108
261590106002016	21	11	973208	0	49043	56
261590106002017	18	7	185977	0	49043	251
261590106002018	10	6	250555	0	49043	103
261590106002019	12	3	578906	0	49043	54
261590106002020	0	0	6493	0	49043	0
261590105002005	144	53	1450749	0	49090	257
261590105001024	102	89	395195	0	49090	668
261590106001008	14	8	939358	0	49043	39
261590106001005	98	36	6575096	0	49043	39
261590106001007	0	0	597615	0	49043	0

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Subarea 2 (Van Buren County)

STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590102002013	78	26	830615	0	49090	243
261590102002018	14	5	513789	0	49090	71
261590102002019	2	1	187347	0	49090	28
261590102002020	16	6	321989	0	49090	129
261590104002009	32	17	46845	0	49090	1769
261590104002010	26	14	163281	0	49090	412
261590104002011	0	0	104154	0	49090	0
261590104002021	32	24	28341	0	49090	2924
261590104002022	23	13	26774	0	49090	2225
261590104002023	31	19	24748	0	49090	3244
261590104002024	16	7	26911	0	49090	1540
261590104002025	0	3	36869	0	49090	0
261590104002026	0	1	17285	0	49090	0
261590104002027	0	0	9842	0	49090	0
261590104002028	0	0	916	0	49090	0
261590104002029	16	11	8467	0	49090	4894
261590104002030	0	0	5736	0	49090	0
261590104002031	14	16	23720	0	49090	1529
261590104002032	0	0	15890	0	49090	0
261590104002033	136	63	678220	0	49090	519
261590104002034	0	0	3185	0	49090	0
261590104002035	0	0	8450	0	49090	0
261590104003021	11	7	91533	0	49090	311
261590104003022	11	3	258678	0	49090	110
261590104003023	8	4	276873	0	49090	75
261590104003024	0	0	114242	0	49090	0
261590104003025	0	0	84625	0	49090	0
261590104003026	0	0	9735	0	49090	0
261590104003027	0	0	4358	0	49090	0
261590104003028	33	18	223665	0	49090	382
261590104003029	0	0	57752	0	49090	0
261590104003030	0	0	2113	0	49090	0
261590104003031	11	6	63522	0	49090	449
261590104003032	21	7	75117	0	49090	724
261590104003033	2	3	19829	0	49090	261
261590104003034	1	1	106772	0	49090	24
261590104003035	0	1	94107	0	49090	0
261590104003036	0	0	9073	0	49090	0
261590105001000	81	41	852222	0	49090	246
261590105001001	32	17	496148	0	49090	167
261590105001002	8	3	10982	0	49090	1887
261590105001003	4	2	100442	0	49090	103
261590105001004	24	9	363770	0	49090	171
261590105001005	9	3	280276	0	49090	83
261590105001006	0	0	37103	0	49090	0
261590105001007	11	6	274658	0	49090	104
261590105001008	10	6	133776	0	49090	194
261590105001009	2	3	1633	0	49090	3172
261590105001010	5	1	82995	0	49090	156
261590105001011	6	3	64006	0	49090	243
261590105001012	8	5	58858	0	49090	352

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590105001013	49	24	354238	0	49090	358
261590105001014	0	3	31197	0	49090	0
261590105001015	48	17	520842	0	49090	239
261590105001016	20	11	121861	0	49090	425
261590105001017	27	11	321411	0	49090	218
261590105001018	0	1	460989	0	49090	0
261590105002000	134	55	1259366	0	49090	276
261590105002001	101	38	1268686	0	49090	206
261590105002002	59	24	790512	0	49090	193
261590105002003	69	29	1243802	0	49090	144
261590105002004	32	14	378933	0	49090	219
261590105002006	26	8	160102	0	49090	421
261590105002007	74	33	2869433	0	49090	67
261590105002008	103	44	2539856	0	49090	105
261590105002009	50	23	2518218	0	49090	51
261590105002010	70	30	1366663	0	49090	133
261590105002011	2	2	76967	0	49090	67
261590105002012	52	31	1711661	0	49090	79
261590105002013	43	21	204423	0	49090	545
261590105001024	102	89	395195	0	49090	668
261590105002005	144	53	1450749	0	49090	257

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Subarea 3 (Van Buren County)

STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POP DENS
261590106001030	0	3	429917	0	49043	0
261590106001031	8	20	1204574	0	49043	17
261590106001032	2	1	63905	0	49043	81
261590106001033	1	7	108659	0	49043	24
261590106001034	26	44	947708	0	49043	71
261590106001035	0	1	626998	0	49043	0
261590106001036	11	3	677622	0	49038	42
261590106001037	0	3	652335	0	49038	0
261590106001038	21	20	455273	0	49038	119
261590106001039	39	16	45392	0	49038	2225
261590106001040	41	16	243013	0	49038	437
261590106001041	0	0	63130	0	49038	0
261590106001042	44	21	1063642	0	49038	107
261590106001043	0	0	6084	0	49038	0
261590106001044	0	0	3571	0	49038	0
261590106001045	40	17	929578	0	49038	111
261590106001046	67	34	2547361	0	49038	68
261590106001047	132	58	2566061	0	49038	133
261590106001048	97	41	3857513	0	49043	65
261590106001049	58	30	3650035	0	49043	41
261590106001050	28	11	657323	0	49043	110
261590106001051	28	11	1299136	0	49043	56
261590106001052	88	35	2554810	0	49043	89
261590106001053	162	71	2570680	0	49043	163
261590106001056	0	0	6108	0	49038	0
261590106001057	32	13	419866	0	49038	197
261590106001058	36	13	372716	0	49038	250
261590106001059	2	1	20731	0	49038	250
261590106001060	0	1	163740	0	49038	0
261590106001061	0	1	18912	0	49038	0
261590106001062	4	24	252440	0	49038	41
261590106001063	0	0	293252	0	49038	0
261590106001064	0	0	542463	0	49038	0
261590106001065	2	7	42085	0	49038	123
261590106001066	2	16	268826	0	49038	19
261590106002000	68	22	1536130	0	49090	115
261590106002001	114	46	1516556	0	49090	195
261590106002010	91	29	1305166	0	49043	181
261590106002011	42	21	2183292	0	49043	50
261590106002012	40	13	1291580	0	49090	80
261590106002013	54	29	1301817	0	49043	107
261590106002021	4	2	8424	0	49043	1230
261590106002022	62	30	1160022	0	49043	138
261590106002023	0	0	323974	0	49043	0
261590106002024	24	8	433615	0	49043	143
261590106002025	8	4	371175	0	49043	56
261590106002026	12	3	61166	0	49043	508
261590106002027	19	8	296825	0	49043	166
261590106002028	26	11	465991	0	49043	145
261590106002029	10	7	960159	0	49043	27
261590106002030	27	5	812449	0	49043	86

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590106002031	43	8	333550	0	49043	334
261590106002032	4	5	712338	0	49043	15
261590106002033	48	14	540810	0	49043	230
261590106002034	33	10	43209	0	49043	1978
261590106002035	13	6	13797	0	49043	2440
261590106002036	55	37	76548	0	49043	1861
261590106002037	46	16	46028	0	49043	2588
261590106002038	19	7	402633	0	49043	122
261590106002039	11	4	222689	0	49043	128
261590106002040	21	5	1589464	0	49043	34
261590106002041	6	3	771219	0	49043	20
261590106002042	10	4	440849	0	49043	59
261590106002043	26	8	1576056	0	49043	43
261590106002044	53	31	4474686	0	49043	31
261590106002045	0	0	277430	0	49043	0
261590106002046	0	0	32800	0	49043	0
261590106002047	22	8	674357	0	49043	84
261590106002048	7	7	624357	0	49043	29
261590106002049	9	3	57644	0	49043	404
261590106002050	1	1	401214	0	49043	6
261590106002051	0	0	31503	0	49043	0
261590106002052	0	0	37568	0	49043	0
261590106002053	0	0	100742	0	49043	0
261590106002054	0	0	25525	0	49043	0
261590106002055	68	37	2209170	0	49043	80
261590106002056	95	40	2562813	0	49043	96
261590106002057	15	6	424262	0	49043	92
261590106002058	16	8	501661	0	49043	83
261590106002059	5	2	656251	0	49043	20
261590108001018	4	2	615833	0	49090	17
261590108001019	4	1	45500	0	49043	228
261590108001070	18	11	1031177	0	49043	45
261590108001071	19	6	782099	0	49043	63
261590108001072	5	3	246373	0	49043	53
261590106001005	98	36	6575096	0	49043	39
261590106001007	0	0	597615	0	49043	0
261590106001008	14	8	939358	0	49043	39

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Subarea 4 (Van Buren County)

STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590102001000	106	34	2691213	0	49090	102
261590102001001	160	66	1362085	0	49090	304
261590102001002	395	172	1268071	0	49090	807
261590102001003	60	29	1217356	0	49090	128
261590102001004	33	13	443751	0	49090	193
261590102001005	17	10	878847	0	49090	50
261590102001006	2	1	21738	0	49090	238
261590102001007	19	7	15216	0	49090	3234
261590102001008	0	0	15629	0	49090	0
261590102001009	0	0	14250	0	49090	0
261590102001010	10	4	48459	0	49090	534
261590102001011	268	114	2586277	0	49090	268
261590102001012	0	0	6433	0	49090	0
261590102001013	0	1	7478	0	49090	0
261590102001014	248	110	1216103	0	49090	528
261590102001015	0	0	52470	0	49090	0
261590102001016	26	8	17296	0	49090	3893
261590102001017	5	3	57297	0	49090	226
261590102001018	15	8	1003692	0	49090	39
261590102001019	7	3	1696869	0	49090	11
261590102001020	70	27	599061	0	49090	303
261590102001021	21	7	25074	0	49090	2169
261590102001022	28	9	31856	0	49090	2276
261590102001023	19	8	24974	0	49090	1970
261590102001024	67	24	2565854	0	49090	68
261590102001025	25	13	2546106	0	49090	25
261590102001026	95	45	2578898	0	49090	95
261590102001027	8	4	157887	0	49090	131
261590102001028	13	4	288461	0	49090	117
261590102001029	46	18	1732979	0	49090	69
261590102001030	35	17	2313931	0	49090	39
261590102001031	0	0	52238	0	49090	0
261590102001032	5	4	487965	0	49090	27
261590102001033	18	7	299347	0	49090	156
261590102001034	23	7	1001204	0	49090	59
261590102001035	19	6	1132000	0	49090	43
261590102002000	40	21	2538136	0	49013	41
261590102002001	120	35	2578662	0	49013	121
261590102002002	49	17	1292370	0	49013	98
261590102002003	23	8	1114050	0	49013	53
261590102002004	7	2	155901	0	49013	116
261590102002005	14	7	287641	0	49090	126
261590102002006	20	10	996450	0	49013	52
261590102002007	0	1	256307	0	49013	0
261590102002008	9	5	186862	0	49090	125
261590102002009	56	14	1026751	0	49090	141
261590102002010	35	8	831324	0	49090	109
261590102002011	21	7	460793	0	49090	118
261590102002012	45	20	1135948	0	49090	103
261590102002014	197	73	342374	0	49090	1490
261590102002015	0	0	9407	0	49090	0

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590102002016	0	0	9095	0	49090	0
261590102002017	36	12	647229	0	49090	144
261590102002021	33	12	643218	0	49090	133
261590102002022	3	2	153974	0	49090	50
261590102002023	9	2	210771	0	49090	111
261590102002024	36	11	76956	0	49090	1212
261590102002025	2	1	125507	0	49090	41
261590102002026	23	10	245050	0	49090	243
261590102002027	4	2	50957	0	49090	203
261590102002028	4	2	31275	0	49090	331
261590102002029	19	10	1002322	0	49090	49
261590102002030	55	22	2338136	0	49013	61
261590102002031	25	9	640875	0	49013	101
261590102002032	98	36	3209650	0	49013	79
261590102002033	63	20	1924662	0	49013	85
261590102002034	0	0	84608	0	49013	0
261590102002035	29	12	1857794	0	49013	40
261590102002036	0	0	10288	0	49013	0
261590102002037	22	8	210985	0	49013	270
261590102002038	4	3	306701	0	49013	34
261590102002039	39	12	631543	0	49090	160
261590102002040	0	0	122080	0	49090	0
261590102002041	3	2	14267	0	49090	545
261590102002042	6	4	63464	0	49090	245
261590102002043	10	3	173630	0	49090	149
261590102002044	19	4	348010	0	49090	141
261590102002045	0	0	7725	0	49090	0
261590102002046	1	1	99048	0	49013	26
261590102003001	0	0	179065	0	49056	0
261590102003002	6	3	567649	0	49056	27
261590102003003	43	17	961167	0	49056	116
261590102003004	48	15	413387	0	49056	301
261590102003005	2	1	362285	0	49056	14
261590102003006	40	15	2655831	0	49090	39
261590102003007	105	39	1841303	0	49090	148
261590102003008	0	0	11491	0	49090	0
261590102003009	23	8	327449	0	49056	182
261590102003010	6	3	422782	0	49056	37
261590102003011	3	1	129413	0	49056	60
261590102003014	23	7	1258937	0	49056	47
261590102003015	25	9	1258152	0	49056	51
261590102003016	83	31	2568412	0	49090	84
261590102003017	44	18	2560863	0	49090	45
261590102003018	10	5	1655909	0	49090	16
261590102003019	25	8	489006	0	49090	132
261590102003020	35	19	2546731	0	49090	36
261590102003021	60	24	1191345	49816	49056	130
261590102003022	11	1	23689	0	49090	1203
261590102003023	72	24	1276896	0	49056	146
261590102003024	53	22	2525918	0	49056	54
261590102003025	29	15	2560442	0	49013	29
261590102003026	23	7	704129	0	49090	85
261590102003027	15	7	221981	0	49090	175

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STPID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590102003028	4	3	154925	0	49090	67
261590102003029	35	16	1849540	0	49090	49
261590103001000	150	95	95513	0	49090	4067
261590103001001	3	6	170441	0	49090	46
261590103001002	288	91	613281	0	49090	1216
261590103001003	4	2	787	0	49090	13164
261590103001004	11	6	18844	0	49090	1512
261590103001005	0	0	2091	0	49090	0
261590103001006	1	1	11128	0	49090	233
261590103001007	44	34	36368	0	49090	3134
261590103001008	8	17	15483	0	49090	1338
261590103001009	84	152	175774	0	49090	1238
261590103001010	8	21	12394	0	49090	1672
261590103001011	0	3	10940	0	49090	0
261590103001012	0	0	1064	0	49090	0
261590103001013	45	67	216180	0	49090	539
261590103001014	7	3	131296	0	49090	138
261590103001015	1	2	10417	0	49090	249
261590103001016	4	2	9676	0	49090	1071
261590103001017	0	0	24800	0	49090	0
261590103001018	2	1	77213	0	49090	67
261590103001019	2	1	28048	0	49090	185
261590103001020	53	37	234536	0	49090	585
261590103001021	0	0	56492	0	49090	0
261590103001022	0	0	13411	0	49090	0
261590103001023	34	46	26096	0	49090	3374
261590103001024	23	46	33700	0	49090	1768
261590103001025	22	25	23358	0	49090	2439
261590103001026	0	1	5074	0	49090	0
261590103001027	33	42	25013	0	49090	3417
261590103001028	7	7	30521	0	49090	594
261590103001029	26	31	21496	0	49090	3133
261590103001030	10	35	40999	0	49090	632
261590103001031	8	16	8937	0	49090	2318
261590103001032	0	3	10402	0	49090	0
261590103001033	12	14	20310	0	49090	1530
261590103001034	10	11	52241	0	49090	496
261590103001035	12	15	9034	0	49090	3440
261590103001036	6	9	1022	0	49090	15205
261590103001037	23	66	48731	0	49090	1222
261590103001038	7	14	5742	0	49090	3157
261590103001039	7	14	965	0	49090	18787
261590103001040	4	19	14791	0	49090	700
261590103001041	0	0	1362	0	49090	0
261590103001042	4	2	6698	0	49090	1547
261590103001043	0	0	4331	0	49090	0
261590103001044	0	0	36296	0	49090	0
261590103001045	5	4	83586	0	49090	155
261590103001999	0	0	0	58388	490HH	
261590103002000	119	60	108769	0	49090	2834
261590103002001	40	17	17393	0	49090	5956
261590103002002	47	24	21394	0	49090	5690
261590103002003	18	10	36861	0	49090	1265

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590103002004	100	84	37618	0	49090	6885
261590103002005	0	2	5452	0	49090	0
261590103002006	4	8	12703	0	49090	816
261590103002007	9	20	22568	0	49090	1033
261590103002008	6	2	16421	0	49090	946
261590103002009	53	24	55056	0	49090	2493
261590103002010	52	21	43804	0	49090	3075
261590103002011	45	14	47630	0	49090	2447
261590103002012	31	11	14019	0	49090	5727
261590103002013	96	44	67581	0	49090	3679
261590103002014	8	3	15239	0	49090	1360
261590103002015	37	21	17620	0	49090	5439
261590103002016	1	1	24899	0	49090	104
261590103002017	5	5	9278	0	49090	1396
261590103002018	0	1	7888	0	49090	0
261590103002019	2	1	11296	0	49090	459
261590103002020	15	8	6732	0	49090	5771
261590103002021	16	5	7468	0	49090	5549
261590103002022	24	13	33325	0	49090	1865
261590103002023	48	24	62610	0	49090	1986
261590103002024	45	19	21532	0	49090	5413
261590103002025	12	5	15140	0	49090	2053
261590103002026	18	6	10171	0	49090	4584
261590103002027	23	11	12594	0	49090	4730
261590103002028	38	16	26279	0	49090	3745
261590103002029	15	5	16677	0	49090	2330
261590103003000	8	34	96691	0	49090	214
261590103003001	44	33	27203	0	49090	4189
261590103003002	50	40	12493	0	49090	10366
261590103003003	20	27	12802	0	49090	4046
261590103003004	12	19	11382	0	49090	2731
261590103003005	49	24	12105	0	49090	10484
261590103003006	28	13	13847	0	49090	5237
261590103003007	23	12	13409	0	49090	4443
261590103003008	23	16	11613	0	49090	5130
261590103003009	8	4	14557	0	49090	1423
261590103003010	10	6	24251	0	49090	1068
261590103003011	0	0	11058	0	49090	0
261590103003012	0	4	5845	0	49090	0
261590103003013	24	12	11534	0	49090	5389
261590103003014	23	18	12901	0	49090	4617
261590103003015	33	16	13328	0	49090	6413
261590103003016	8	4	11775	0	49090	1760
261590103003017	29	12	11101	0	49090	6766
261590103003018	33	15	11981	0	49090	7134
261590103003019	31	17	11906	0	49090	6744
261590103003020	24	15	10579	0	49090	5876
261590103003021	1	1	8474	0	49090	306
261590103003022	18	13	12253	0	49090	3805
261590103003023	25	17	13044	0	49090	4964
261590103003024	23	14	15321	0	49090	3888
261590103003025	38	21	15680	0	49090	6277
261590103003999	0	0	0	33674	490HH	

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590104001000	60	24	41258	0	49090	3767
261590104001001	17	10	14731	0	49090	2989
261590104001002	27	13	15044	0	49090	4648
261590104001003	32	20	13086	0	49090	6333
261590104001004	23	14	14861	0	49090	4008
261590104001005	0	1	15879	0	49090	0
261590104001006	13	13	12106	0	49090	2781
261590104001007	18	16	14323	0	49090	3255
261590104001008	21	15	14846	0	49090	3664
261590104001009	33	15	15339	0	49090	5572
261590104001010	30	12	14038	0	49090	5535
261590104001011	46	17	13783	0	49090	8644
261590104001012	41	16	14574	0	49090	7286
261590104001013	108	48	78518	0	49090	3562
261590104001014	11	7	5892	0	49090	4835
261590104001015	47	30	59064	0	49090	2061
261590104001016	0	2	4039	0	49090	0
261590104001017	32	13	22840	0	49090	3629
261590104001018	7	1	12038	0	49090	1506
261590104001019	7	4	38157	0	49090	475
261590104001020	34	13	15358	0	49090	5734
261590104001021	32	12	14852	0	49090	5580
261590104001022	31	13	10953	0	49090	7330
261590104001023	24	7	11723	0	49090	5302
261590104001024	4	4	13609	0	49090	761
261590104001025	26	11	13540	0	49090	4973
261590104002000	8	3	10953	0	49090	1892
261590104002001	13	6	12613	0	49090	2669
261590104002002	0	0	38753	0	49090	0
261590104002003	0	0	66280	0	49090	0
261590104002004	95	34	42762	0	49090	5754
261590104002005	58	30	35510	0	49090	4230
261590104002006	18	12	60566	0	49090	770
261590104002007	17	10	32759	0	49090	1344
261590104002008	20	9	8281	0	49090	6255
261590104002012	22	8	12704	0	49090	4485
261590104002013	28	11	13209	0	49090	5490
261590104002014	0	0	15636	0	49090	0
261590104002015	18	9	12107	0	49090	3851
261590104002016	16	5	13528	0	49090	3063
261590104002017	37	13	12398	0	49090	7729
261590104002018	37	12	10944	0	49090	8756
261590104002019	20	7	11962	0	49090	4330
261590104002020	20	10	11777	0	49090	4398
261590104003000	0	0	7240	0	49090	0
261590104003001	1	2	11511	0	49090	225
261590104003002	4	3	37634	0	49090	275
261590104003003	12	4	8340	0	49090	3727
261590104003004	11	3	9946	0	49090	2864
261590104003005	38	14	14159	0	49090	6951
261590104003006	43	22	14106	0	49090	7895
261590104003007	14	8	10814	0	49090	3353
261590104003008	119	46	128571	0	49090	2397

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590104003009	19	12	18178	0	49090	2707
261590104003010	9	4	15271	0	49090	1526
261590104003011	0	0	17937	0	49090	0
261590104003012	22	10	17819	0	49090	3198
261590104003013	199	47	232718	0	49090	2215
261590104003014	0	0	43280	0	49090	0
261590104003015	26	14	15733	0	49090	4280
261590104003016	21	10	10218	0	49090	5323
261590104003017	19	9	13796	0	49090	3567
261590104003018	23	10	9308	0	49090	6400
261590104003019	22	13	10603	0	49090	5374
261590104003020	0	0	118392	0	49090	0
261590104004000	5	3	12888	0	49090	1005
261590104004001	83	33	15420	0	49090	13941
261590104004002	31	13	17134	0	49090	4686
261590104004003	120	54	80841	0	49090	3845
261590104004004	36	11	16830	0	49090	5540
261590104004005	33	10	15918	0	49090	5369
261590104004006	8	2	17169	0	49090	1207
261590104004007	45	18	18631	0	49090	6256
261590104004008	9	5	10496	0	49090	2221
261590104004009	7	4	8270	0	49090	2192
261590104004010	16	6	30035	0	49090	1380
261590104004011	74	33	74738	0	49090	2564
261590104004012	18	10	15432	0	49090	3021
261590104004013	8	3	8173	0	49090	2535
261590104004014	58	24	30915	0	49090	4859
261590104004015	55	32	46064	0	49090	3092
261590104004016	26	8	19404	0	49090	3470
261590104004017	9	3	60812	0	49090	383
261590104004018	0	0	62491	0	49090	0
261590104004019	44	22	108541	0	49090	1050
261590104004020	0	0	12059	0	49090	0
261590104004021	52	35	46302	0	49090	2909
261590104004022	0	0	30740	0	49090	0
261590105003000	23	8	442502	0	49090	135
261590105003001	0	0	197207	0	49090	0
261590105003002	0	0	29978	0	49090	0
261590105003003	0	0	15758	0	49090	0
261590105003004	11	10	98822	0	49090	288
261590105003005	50	23	568843	0	49090	228
261590105003006	0	0	51073	0	49090	0
261590105003007	10	5	86709	0	49090	299
261590105003008	0	0	53553	0	49090	0
261590105003009	145	64	77619	0	49090	4838
261590105003010	10	4	260645	0	49090	99
261590105003011	10	4	392242	0	49090	66
261590105003012	11	6	86359	0	49090	330
261590105003013	35	14	683596	0	49090	133
261590105003014	85	30	950440	0	49090	232
261590105003015	0	1	317606	0	49090	0
261590105003016	0	1	365730	0	49090	0
261590105003017	0	0	31930	0	49090	0

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590105003018	0	0	5270	0	49090	0
261590105003019	37	18	728979	0	49090	131
261590105003020	4	2	6500	0	49090	1594
261590105003021	0	0	690	0	49090	0
261590105003022	2	1	58398	0	49090	89
261590105003023	0	0	51420	0	49090	0
261590105003024	0	0	88092	0	49090	0
261590105003025	40	16	212672	0	49090	487
261590105003026	7	2	86167	0	49090	210
261590105003027	17	8	252061	0	49090	175
261590105003028	311	145	219813	0	49090	3664
261590105003029	10	4	130509	0	49090	198
261590105003030	16	6	28206	0	49090	1469
261590105003031	2	2	42111	0	49090	123
261590105003032	24	12	150347	0	49090	413
261590105003033	107	51	975666	0	49090	284
261590105003034	67	32	877370	0	49090	198
261590105003035	76	27	972224	0	49090	202
261590105003036	93	40	971288	0	49090	248
261590105003037	18	7	16335	0	49090	2854
261590105003038	164	65	2645518	0	49090	161
261590105003039	63	26	1258720	0	49090	130

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Subarea 4 (Allegan County)

STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POP DENS
260050309004000	38	16	945416	0	49090	104
260050309004001	133	51	3371771	0	49090	102
260050309004002	14	5	21627	0	49090	1677
260050309004003	0	1	195412	0	49090	0
260050309004004	46	13	1156669	0	49090	103
260050309004005	37	19	1393289	0	49090	69
260050309004006	18	6	323859	0	49090	144
260050309004007	48	20	1432355	0	49090	87
260050309004008	0	0	17106	0	49090	0
260050309004009	3	2	73832	0	49090	105
260050309004010	22	11	374792	0	49090	152
260050309004011	32	12	217304	0	49090	381
260050309004012	41	39	601470	0	49090	177
260050309004013	0	0	95567	0	49090	0
260050309004014	23	13	29280	0	49090	2034
260050309004015	28	38	302207	0	49090	240
260050309004018	3	2	41215	0	49090	189
260050309004019	6	3	17714	0	49090	877
260050309004020	25	6	14487	0	49090	4470
260050309004021	15	7	12446	0	49090	3121
260050309004022	2	3	17136	0	49090	302
260050309004023	5	7	42747	0	49090	303
260050309004024	0	3	12446	0	49090	0
260050309004025	0	1	29220	0	49090	0
260050309004026	5	5	44404	0	49090	292
260050309004027	0	2	5308	0	49090	0
260050309004028	10	9	75125	0	49090	345
260050309004029	0	5	13865	0	49090	0
260050309004030	0	7	18933	0	49090	0
260050309004031	0	14	16009	0	49090	0
260050309004032	0	11	14163	0	49090	0
260050309004033	0	12	18111	0	49090	0
260050309004034	5	9	18565	0	49090	698
260050309004035	0	0	100494	0	49090	0
260050309004036	0	0	6750	0	49090	0
260050309004037	9	5	63428	0	49090	368
260050309004038	11	6	310337	0	49090	92
260050309004039	8	2	16568	0	49090	1251
260050309004040	2	88	22015	0	49090	235
260050309004041	16	18	125880	0	49090	329
260050309004042	10	8	1986	0	49090	13041
260050309004043	15	15	54708	0	49090	710
260050309004044	8	13	65844	0	49090	315
260050309004045	8	21	14052	0	49090	1475
260050309005005	159	67	5134405	0	49090	80
260050309005006	0	0	11425	0	49090	0
260050309005007	61	21	635440	0	49090	249
260050309005008	34	13	3057966	0	49090	29
260050309005009	24	9	1388388	0	49090	45
260050309005010	0	0	8051	0	49090	0
260050309005011	82	29	1907483	0	49090	111

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
260050309005012	13	7	1672395	0	49090	20
260050309005013	52	22	1042439	0	49090	129
260050309005016	97	45	2708705	0	49090	93
260050309005017	0	0	98198	0	49090	0
260050309005018	42	17	2192466	0	49090	50
260050309005019	0	0	2930	0	49090	0
260050309005020	88	28	3826673	0	49090	60
260050309004016	135	263	3195547	0	49090	109

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Subarea 5 (Van Buren County)

STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590107001002	46	20	218504	0	49013	545
261590107001003	80	38	324738	0	49013	638
261590107001004	4	1	38183	0	49013	271
261590107001005	4	2	33309	0	49013	311
261590107001006	25	7	30387	0	49013	2131
261590107001007	32	13	83924	0	49013	988
261590107001008	89	45	125221	0	49013	1841
261590107001009	26	10	18441	0	49013	3652
261590107001010	32	13	33519	0	49013	2473
261590107001011	24	6	9170	0	49013	6779
261590107001012	14	6	32256	0	49013	1124
261590107001013	18	12	24198	0	49013	1927
261590107001014	8	5	22519	0	49013	920
261590107001015	18	9	15476	0	49013	3012
261590107001019	34	8	14549	0	49013	6053
261590107001020	44	16	23026	0	49013	4949
261590107001021	27	9	19583	0	49013	3571
261590107001022	10	4	12278	0	49013	2109
261590107001023	0	0	8907	0	49013	0
261590107001024	6	2	40777	0	49013	381
261590107001025	0	0	21581	0	49013	0
261590107001026	0	0	43056	0	49013	0
261590107001044	0	0	18181	0	49013	0
261590107001045	0	0	13403	0	49013	0
261590107001046	5	4	7947	0	49013	1630
261590107001047	14	5	4554	0	49013	7962
261590107001048	14	7	12196	0	49013	2973
261590107001049	12	4	9347	0	49013	3325
261590107001050	29	11	18284	0	49013	4108
261590107002000	7	3	16386	0	49013	1106
261590107002001	2	1	14512	0	49013	357
261590107002002	0	0	10773	0	49013	0
261590107002003	11	6	11688	0	49013	2438
261590107002004	17	8	13302	0	49013	3310
261590107002005	7	3	13381	0	49013	1355
261590107002006	17	5	10349	0	49013	4254
261590107002007	47	18	61076	0	49013	1993
261590107002008	0	0	3972	0	49013	0
261590107002009	10	5	13675	0	49013	1894
261590107002010	14	6	9862	0	49013	3677
261590107002011	28	10	12684	0	49013	5717
261590107002012	21	7	12810	0	49013	4246
261590107002013	31	10	12664	0	49013	6340
261590107002014	13	7	5955	0	49013	5654
261590107002015	0	1	9342	0	49013	0
261590107002016	14	7	9695	0	49013	3740
261590107002017	27	11	18332	0	49013	3815
261590107002018	0	0	712	0	49013	0
261590107002019	30	8	9679	0	49013	8028
261590107002020	15	9	9795	0	49013	3966
261590107002021	15	4	9435	0	49013	4118

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590107002022	33	8	7319	0	49013	11678
261590107002023	50	18	110538	0	49013	1172
261590107002024	50	24	287798	0	49013	450
261590107002025	0	0	4677	0	49013	0
261590107002026	0	0	7903	0	49013	0
261590107002027	3	2	161042	0	49013	48
261590107002028	2	1	8497	0	49013	610
261590107002029	26	9	22677	0	49013	2970
261590107002030	12	6	11208	0	49013	2773
261590107002031	10	4	8106	0	49013	3195
261590107002032	0	1	4246	0	49013	0
261590107002033	20	4	10795	0	49013	4798
261590107002034	25	11	12622	0	49013	5130
261590107002035	18	8	11586	0	49013	4024
261590107002036	39	11	10954	0	49013	9221
261590107002037	3	1	4710	0	49013	1650
261590107002038	18	8	11390	0	49013	4093
261590107002039	23	7	12774	0	49013	4663
261590107002040	15	5	25170	0	49013	1543
261590107002041	20	6	14415	0	49013	3593
261590107002042	3	1	5709	0	49013	1361
261590107002043	0	0	4891	0	49013	0
261590107002044	32	13	172334	0	49013	481
261590107002045	19	9	83513	0	49013	589
261590107002046	0	0	1014	0	49013	0
261590107002047	0	0	884693	0	49013	0
261590107002048	0	0	8421	0	49013	0
261590108001000	27	11	1175611	0	49013	59
261590108001001	18	7	699111	0	49013	67
261590108001002	8	6	594597	0	49013	35
261590108001003	0	0	21263	0	49013	0
261590108001004	24	8	158655	0	49013	392
261590108001005	0	0	7021	0	49013	0
261590108001006	0	0	4509	0	49013	0
261590108001007	8	4	135617	0	49013	153
261590108001008	16	12	2138789	0	49013	19
261590108001009	13	5	916675	0	49013	37
261590108001010	3	1	613740	0	49013	13
261590108001011	2	1	128166	0	49013	40
261590108001012	1	2	672599	0	49013	4
261590108001013	0	0	39255	0	49090	0
261590108001014	2	1	431714	0	49090	12
261590108001015	3	1	321050	0	49090	24
261590108001016	0	0	7526	0	49090	0
261590108001017	2	1	377807	0	49090	14
261590108001020	4	3	433420	0	49090	24
261590108001021	32	12	1279234	0	49043	65
261590108001022	14	5	350078	0	49013	104
261590108001023	8	4	934781	0	49013	22
261590108001024	5	1	169234	0	49013	77
261590108001025	0	0	136452	0	49013	0
261590108001026	2	1	132652	0	49013	39
261590108001027	0	0	24215	0	49013	0

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590108001028	0	1	62192	0	49013	0
261590108001029	2	1	408302	0	49013	13
261590108001030	6	2	35710	0	49013	435
261590108001031	13	4	220450	0	49013	153
261590108001032	0	0	12223	0	49013	0
261590108001033	0	0	4942	0	49013	0
261590108001034	23	8	1557975	0	49013	38
261590108001035	0	0	537692	0	49013	0
261590108001036	4	1	385263	0	49013	27
261590108001037	8	3	1083764	0	49013	19
261590108001038	51	18	1718612	0	49013	77
261590108001039	53	26	1829216	0	49013	75
261590108001040	20	9	432203	0	49013	120
261590108001041	36	10	313592	0	49013	297
261590108001042	71	20	1030918	0	49013	178
261590108001043	2	1	12525	0	49013	414
261590108001044	20	6	423914	0	49013	122
261590108001045	53	22	2574903	0	49013	53
261590108001046	5	1	21944	0	49013	590
261590108001047	61	20	1308412	0	49013	121
261590108001048	0	0	736	0	49013	0
261590108001049	4	3	28284	0	49013	366
261590108001050	25	9	977336	0	49013	66
261590108001051	2	1	114061	0	49013	45
261590108001052	9	3	477421	0	49013	49
261590108001053	4	2	267616	0	49013	39
261590108001054	43	15	1464126	0	49013	76
261590108001055	5	2	549799	0	49013	24
261590108001056	0	0	36963	0	49013	0
261590108001057	7	4	14789	0	49013	1226
261590108001058	0	2	9503	0	49013	0
261590108001059	8	3	69767	0	49013	297
261590108001060	2	1	329180	0	49013	16
261590108001061	41	13	1799026	0	49013	59
261590108001062	15	5	342216	0	49013	114
261590108001063	5	4	281499	0	49013	46
261590108001064	12	2	1216267	0	49013	26
261590108001065	15	7	2196229	0	49013	18
261590108001066	5	2	110197	0	49013	118
261590108001067	60	23	2638620	0	49013	59
261590108001068	45	18	1228957	0	49043	95
261590108001069	13	8	782333	0	49043	43
261590108001073	9	3	261667	0	49043	89
261590108001074	0	0	38203	0	49043	0
261590108001075	68	22	1159268	0	49043	152
261590108001076	30	12	1175380	0	49043	66
261590108001077	49	19	1917728	0	49013	66
261590108001078	25	12	2561226	0	49013	25
261590108001998	0	0	0	143909	49013	
261590108001999	0	0	0	108773	49013	
261590108002000	24	12	37204	0	49013	1671
261590108002001	19	8	762424	0	49013	65

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTAS	POPDENS
261590108002002	39	12	1567009	0	49013	64
261590108002003	0	0	40920	0	49013	0
261590108002004	13	6	894908	0	49013	38
261590108002005	38	13	1304044	0	49013	75
261590108002006	76	29	3004863	0	49013	66
261590108002007	64	16	1172789	0	49013	141
261590108002008	19	13	2226352	52968	49013	22
261590108002009	0	0	65282	0	49013	0
261590108002010	23	14	3217512	0	49013	19
261590108002011	29	14	2512160	66343	49013	30
261590108002012	10	4	436249	0	49013	59
261590108002013	0	0	174679	0	49013	0
261590108002014	0	0	34642	0	49013	0
261590108002015	14	10	2294399	117926	49057	16
261590108002016	0	0	167320	0	49057	0
261590108002017	14	6	487180	0	49013	74
261590108002018	23	9	338818	0	49057	176
261590108002019	3	1	3832	0	49013	2028
261590108002020	9	3	7026	0	49013	3318
261590108002021	23	11	1128488	0	49057	53
261590108002022	76	44	2810509	0	49013	70
261590108002023	14	9	321766	0	49013	113
261590108002024	91	98	557048	0	49013	423
261590108002025	18	8	3698	0	49013	12607
261590108002026	24	18	406402	0	49013	153
261590108002027	34	27	1271742	0	49057	69
261590108002028	83	14	1178240	0	49057	182
261590108002029	54	35	1635484	0	49057	86
261590108002030	25	12	572487	0	49057	113
261590108002031	1	1	398162	0	49057	7
261590108002032	0	0	171227	0	49013	0
261590108002033	0	0	6199	0	49013	0
261590108002034	0	0	47616	0	49013	0
261590108002035	0	0	58518	0	49057	0
261590108002036	3	1	1354403	0	49057	6
261590108002037	26	9	686604	0	49057	98
261590108002038	27	12	1058567	0	49057	66
261590108002039	20	9	1307797	148140	49064	40
261590108002040	14	7	925541	76918	49064	39
261590108002041	0	0	7783	0	49064	0
261590108002042	0	0	9592	0	49013	0
261590108002043	0	0	4622	0	49064	0
261590108002044	0	0	9414	0	49064	0
261590108002997	0	0	0	216288	49057	
261590108002998	0	0	0	487397	490HH	
261590108002999	0	0	0	507729	490HH	
261590114001005	19	9	1873618	0	49057	26
261590114001006	40	16	1383060	0	49057	75
261590114001007	57	50	301897	0	49057	489
261590114001008	0	2	14896	0	49057	0
261590114001009	0	0	104092	0	49057	0
261590114001010	30	12	283340	0	49057	274

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
261590114001011	28	10	1633096	0	49057	44
261590114001012	78	32	3912271	0	49057	52
261590114001013	14	5	310163	0	49057	117
261590114001014	18	6	1016183	0	49057	46
261590114001015	0	0	7586	0	49057	0
261590114001016	42	16	960474	0	49057	113
261590114001017	20	10	851754	0	49057	61
261590114001021	2	1	2028978	0	49057	3
261590114001024	2	1	185683	0	49057	28
261590114001025	23	9	17756	0	49057	3355
261590114001026	34	9	9942	0	49057	8857
261590114001027	0	0	18728	0	49057	0
261590114001028	0	0	6218	0	49057	0
261590114001029	38	12	293966	0	49057	335
261590114001030	4	1	13832	0	49057	749
261590114001031	37	18	632416	0	49057	152
261590114001032	13	5	440130	0	49057	76
261590114001033	9	4	268658	0	49057	87
261590114001034	215	76	3778258	0	49057	147
261590114001035	42	13	37202	0	49057	2924
261590114001036	25	10	21877	0	49057	2960
261590114001037	59	20	103694	0	49057	1474
261590114001038	26	12	90951	0	49057	740
261590114001039	0	0	15791	0	49057	0
261590114001998	0	0	0	251128	49057	
261590114001999	0	0	0	54935	49057	

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Subarea 5 (Berrien County)

STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
260210101002000	189	91	2617260	53588	49038	187
260210101002001	0	0	1050	0	49038	0
260210101002002	0	0	1196	0	49038	0
260210101002003	17	10	24088	0	49038	1828
260210101002004	11	7	23170	0	49038	1230
260210101002005	32	23	127852	0	49038	648
260210101002006	16	10	67482	0	49038	614
260210101002007	18	15	141444	0	49038	330
260210101002008	1	4	19668	0	49038	132
260210101002009	138	165	1056189	0	49038	338
260210101002010	8	17	10786	0	49038	1921
260210101002011	0	0	1972	0	49038	0
260210101002012	57	30	167599	0	49038	881
260210101002013	15	8	13740	0	49038	2827
260210101002014	53	28	1331731	0	49038	103
260210101002015	4	3	7743	0	49038	1338
260210101002016	16	7	35823	0	49038	1157
260210101002017	21	9	17895	0	49038	3039
260210101002018	3	8	9514	0	49038	817
260210101002019	22	7	19330	0	49038	2948
260210101002020	22	8	40563	0	49038	1405
260210101002021	16	5	35901	0	49038	1154
260210101002022	6	5	13600	0	49038	1143
260210101002023	5	5	16694	0	49038	776
260210101002024	16	5	17715	0	49038	2339
260210101002025	3	2	37165	0	49038	209
260210101002026	52	19	182608	0	49022	738
260210101002027	32	11	314375	0	49038	264
260210101002028	72	30	949061	0	49022	196
260210101002029	38	20	564139	0	49022	174
260210101003000	58	22	1300728	0	49038	115
260210101003001	111	62	1686518	151674	49038	170
260210101003002	51	34	261416	0	49038	505
260210101003003	15	8	25946	0	49038	1497
260210101003004	8	2	15715	0	49038	1318
260210101003005	6	3	15553	0	49038	999
260210101003006	0	0	92598	0	49038	0
260210101003007	67	29	2045875	0	49038	85
260210101003008	29	11	564191	0	49038	133
260210101003009	31	18	1301781	16468	49038	62
260210101003010	0	0	471	0	49038	0
260210101003011	27	13	688069	0	49038	102
260210101003012	0	0	22532	0	49038	0
260210101003013	0	0	65104	0	49038	0
260210101003014	78	27	1707449	0	49038	118
260210101003015	54	24	1752814	0	49038	80
260210101003016	18	8	58218	0	49038	801
260210101003021	5	5	126247	0	49038	103
260210101004000	39	18	1776837	68940	49038	57
260210101004001	23	7	629886	0	49038	95
260210101004002	27	12	13937	0	49038	5018

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
260210101004003	12	10	178824	0	49038	174
260210101004004	223	85	579676	0	49038	996
260210101004005	0	0	815	0	49038	0
260210101004006	21	21	340443	0	49038	160
260210101004007	36	37	330447	0	49038	282
260210101004008	23	20	39970	0	49038	1490
260210101004009	8	5	25124	0	49038	825
260210101004010	12	11	142057	0	49038	219
260210101004011	9	9	29294	0	49038	796
260210101004012	14	11	29295	0	49038	1238
260210101004013	8	6	12600	0	49038	1644
260210101004014	0	0	302	0	49038	0
260210101004015	17	14	29103	0	49038	1513
260210101004016	2	1	11729	0	49038	442
260210101004017	25	11	9525	0	49038	6798
260210101004018	6	8	15210	0	49038	1022
260210101004019	0	6	14476	0	49038	0
260210101004020	8	5	13795	0	49038	1502
260210101004021	39	23	108861	0	49038	928
260210101004022	15	9	21600	0	49038	1799
260210101004023	17	5	25288	0	49038	1741
260210101004024	14	10	25936	0	49038	1398
260210101004025	5	3	11669	0	49038	1110
260210101004026	59	28	178338	0	49038	857
260210101004027	0	1	6972	0	49038	0
260210101004028	0	0	627	0	49038	0
260210101004029	5	3	14034	0	49038	923
260210101004030	9	9	18256	0	49038	1277
260210101004031	3	1	8061	0	49038	964
260210101004032	7	3	16507	0	49038	1098
260210101004033	20	8	17775	0	49038	2914
260210101004034	18	9	13082	0	49038	3564
260210101004035	0	0	9520	0	49038	0
260210101004036	2	1	4912	0	49038	1055
260210101004037	15	9	4588	0	49038	8468
260210101004038	0	4	6771	0	49038	0
260210101004039	7	5	6924	0	49038	2618
260210101004040	9	4	3054	0	49038	7633
260210101004041	0	0	6556	0	49038	0
260210101004042	6	16	12640	0	49038	1229
260210101004043	13	6	17320	0	49038	1944
260210101004044	6	6	16376	0	49038	949
260210101004045	7	4	16410	0	49038	1105
260210101004046	14	10	30633	0	49038	1184
260210101004047	45	26	157095	0	49038	742
260210101004048	8	4	8347	0	49038	2482
260210101004049	3	3	13294	0	49038	584
260210101004050	12	6	13383	0	49038	2322
260210101004051	16	11	15768	0	49038	2628
260210101004052	9	9	13853	0	49038	1683
260210101004053	15	9	15105	0	49038	2572
260210101004054	0	0	1183	0	49038	0
260210101004055	6	4	18259	0	49038	851

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
260210101004056	27	9	31456	0	49038	2223
260210102001000	18	7	597447	0	49038	78
260210102001001	51	20	1639569	0	49038	81
260210102001002	87	39	2562457	0	49038	88
260210102001003	125	47	1590600	0	49038	204
260210102001004	94	49	233310	0	49038	1043
260210102001005	123	56	1682825	0	49038	189
260210102001006	23	12	704182	0	49038	85
260210102001007	48	15	260935	0	49038	476
260210102001008	26	9	34574	0	49038	1948
260210102001009	13	8	13829	0	49038	2435
260210102001010	15	16	19836	0	49038	1959
260210102001011	17	8	16261	0	49038	2708
260210102001012	11	18	28702	0	49038	993
260210102001013	24	9	10443	0	49038	5952
260210102001014	22	12	14397	0	49038	3958
260210102001015	15	11	15174	0	49038	2560
260210102001016	21	12	13540	0	49038	4017
260210102001017	9	5	8190	0	49038	2846
260210102001018	12	10	11983	0	49038	2594
260210102001019	37	15	22067	0	49038	4343
260210102001020	68	47	228943	0	49038	769
260210102001999	0	0	0	386176	49038	
260210102002000	208	209	384471	0	49038	1401
260210102002001	13	8	15811	0	49038	2130
260210102002002	21	13	26641	0	49038	2042
260210102002003	15	10	12934	0	49038	3004
260210102002004	9	7	12403	0	49038	1879
260210102002005	24	10	18102	0	49038	3434
260210102002006	12	11	27005	0	49038	1151
260210102002007	15	12	11120	0	49038	3494
260210102002008	186	92	253581	0	49038	1900
260210102002009	67	29	156763	0	49038	1107
260210102002010	138	65	362986	0	49038	985
260210102002011	18	13	13899	0	49038	3354
260210102002012	15	7	9148	0	49038	4247
260210102002013	297	122	953475	0	49038	807
260210102002014	15	8	15974	0	49038	2432
260210102002015	14	6	9562	0	49038	3792
260210102002016	12	5	17479	0	49038	1778
260210102002017	20	9	19887	0	49038	2605
260210102002018	19	9	15512	0	49038	3172
260210102002019	38	11	11223	0	49038	8769
260210102002020	97	28	153547	0	49038	1636
260210102002021	3	4	12008	0	49038	647
260210102002022	75	113	134727	0	49038	1442
260210102002023	0	12	3775	0	49038	0
260210102002999	0	0	0	1497312	490HH	
260210102003000	125	104	238018	0	49038	1360
260210102003001	6	5	11034	0	49038	1408
260210102003002	3	3	8282	0	49038	938
260210102003003	58	25	44434	0	49038	3381
260210102003004	8	4	9871	0	49038	2099

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
260210102003005	32	11	18802	0	49038	4408
260210102003006	22	10	15199	0	49038	3749
260210102003007	36	14	32449	0	49038	2873
260210102003008	0	0	9343	0	49038	0
260210102003009	0	0	601	0	49038	0
260210102003010	26	11	46987	0	49038	1433
260210102003011	114	49	158061	0	49038	1868
260210102003012	55	27	55639	0	49038	2560
260210102003013	64	31	156650	0	49038	1058
260210102003014	33	17	58958	0	49038	1450
260210102003015	57	33	87658	0	49038	1684
260210102003016	16	7	21986	0	49098	1885
260210102003017	43	19	484578	0	49098	230
260210102003018	40	13	35489	0	49038	2919
260210102003999	0	0	0	164331	490HH	
260210102005000	43	21	2495190	0	49038	45
260210102005001	7	2	330115	0	49038	55
260210102005002	33	12	827836	0	49038	103
260210102005003	47	16	1281271	0	49038	95
260210102005004	71	34	2575296	0	49038	71
260210102005005	141	51	1294431	0	49038	282
260210102005006	60	28	1282783	0	49038	121
260210102005007	91	38	1255305	0	49038	188
260210102005008	53	22	805125	56755	49038	170
260210102005009	393	143	3012121	0	49038	338
260210102005010	153	74	37924	0	49038	10449
260210102005011	90	40	454791	0	49038	513
260210102005012	0	0	6552	0	49038	0
260210102006000	37	18	534537	0	49098	179
260210102006001	78	74	14050	0	49038	14379
260210102006002	22	15	6611	0	49038	8619
260210102006003	14	13	7341	0	49038	4939
260210102006004	23	10	12623	0	49038	4719
260210102006005	27	11	13166	0	49038	5311
260210102006006	28	9	16874	0	49038	4298
260210102006007	0	0	37435	0	49098	0
260210102006008	0	0	5316	0	49098	0
260210102006009	4	1	11395	0	49038	909
260210102006010	0	0	14462	0	49038	0
260210102006011	27	15	75307	0	49038	929
260210102006012	37	17	250041	0	49038	383
260210102006013	13	5	99603	0	49038	338
260210102006014	48	21	1760139	0	49038	71
260210102006015	41	13	1386756	0	49038	77
260210102006016	123	50	205951	0	49038	1547
260210102006017	5	4	37869	0	49038	342
260210102006018	50	25	44878	0	49038	2886
260210102006019	0	0	1314	0	49038	0
260210102006020	29	12	10599	0	49038	7086
260210102006021	15	7	10735	0	49038	3619
260210102006022	13	7	11424	0	49038	2947
260210102006023	8	5	5216	0	49038	3972
260210102006024	17	8	5141	0	49038	8564

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STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
260210102006025	39	15	10493	0	49038	9626
260210102006026	0	1	9105	0	49038	0
260210102006027	0	0	4767	0	49038	0
260210102006028	0	0	4978	0	49038	0
260210102006029	0	0	8574	0	49038	0
260210102006030	0	0	4489	0	49038	0
260210102006031	21	8	168664	0	49038	322
260210102006032	12	6	242863	0	49038	128
260210102006033	19	6	15444	0	49038	3186
260210102006034	8	4	14531	0	49038	1426
260210102006035	23	10	17487	0	49038	3407
260210102006036	1	3	16093	0	49038	161
260210102006037	12	6	31195	0	49038	996
260210102006038	0	0	1906	0	49038	0
260210102006039	17	7	12664	0	49038	3477
260210102006040	34	15	14069	0	49038	6259
260210103001000	0	0	7643	0	49098	0
260210103001001	23	13	50212	0	49098	1186
260210103001002	111	44	348158	0	49098	826
260210103001003	31	12	57240	0	49098	1403
260210103001004	10	3	31467	0	49098	823
260210103001005	20	7	31190	0	49098	1661
260210103001006	0	0	5213	0	49098	0
260210103001007	13	5	5417	0	49098	6216
260210103001008	51	20	32716	0	49098	4037
260210103001009	58	25	51972	0	49098	2890
260210103001010	84	27	42862	0	49098	5076
260210103001011	17	10	7085	0	49098	6215
260210103001012	21	8	9894	0	49098	5497
260210103001013	6	3	5273	0	49098	2947
260210103001014	36	15	14812	0	49098	6295
260210103001015	24	9	14720	0	49098	4223
260210103001016	64	27	40709	0	49098	4072
260210103001017	24	10	19475	0	49098	3192
260210103001018	0	0	812	0	49098	0
260210103001019	50	22	51278	0	49098	2525
260210103001020	16	7	43059	0	49098	962
260210103001021	44	16	68038	0	49098	1675
260210103001022	26	7	21858	0	49098	3081
260210103001023	23	9	15630	0	49098	3811
260210103001024	2	1	2934	0	49098	1765
260210103002000	47	18	95777	0	49098	1271
260210103002001	51	29	471579	0	49098	280
260210103002002	59	51	637451	0	49098	240
260210103002003	27	22	36205	0	49098	1931
260210103002004	78	30	155743	0	49098	1297
260210103002005	22	10	34897	0	49098	1633
260210103002006	21	9	39859	0	49098	1365
260210103002007	0	0	479482	0	49098	0
260210103002008	148	85	283323	0	49098	1353
260210103002009	36	17	21772	0	49098	4283
260210103002010	0	0	16804	0	49098	0
260210103002011	23	10	11014	0	49098	5409

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POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
260210103002012	20	6	6938	0	49098	7466
260210103002013	14	6	7434	0	49098	4878
260210103002014	0	0	3899	0	49038	0
260210103002015	21	8	10392	0	49098	5234
260210103002016	13	4	12042	0	49098	2796
260210103002017	61	23	20370	0	49098	7756
260210103002018	47	16	13178	0	49098	9237
260210103002019	15	6	4709	0	49098	8250
260210103002020	6	2	6301	0	49098	2466
260210103002021	91	37	260866	0	49038	903
260210103002022	35	12	34408	0	49098	2635
260210103002999	0	0	0	462945	490HH	
260210103004000	49	22	1099002	0	49098	115
260210103004001	97	37	2200231	0	49098	114
260210103004002	38	14	1269199	0	49098	78
260210103004003	0	0	72530	119372	49098	0
260210103004004	11	4	28583	0	49098	997
260210103004005	5	1	54928	0	49098	236
260210103004006	30	11	222813	0	49098	349
260210103004007	6	5	114504	0	49098	136
260210103004008	12	5	87797	0	49098	354
260210103004009	49	24	47050	0	49098	2697
260210103004010	10	4	6980	0	49098	3711
260210103004011	23	9	36243	0	49098	1644
260210103004012	66	23	89855	0	49098	1902
260210103004013	29	10	35146	0	49098	2137
260210103004014	27	13	14854	0	49098	4708
260210103004015	37	16	49056	0	49098	1953
260210103004016	0	0	26668	0	49098	0
260210103004017	38	16	19279	0	49098	5105
260210103004018	6	2	11684	0	49098	1330
260210103004019	0	0	23400	0	49098	0
260210103004020	16	8	62669	0	49098	661
260210103004021	21	6	5936	0	49098	9163
260210103004022	9	2	27027	0	49098	862
260210103004023	6	3	16478	0	49098	943
260210103005000	126	34	2497360	23978	49098	131
260210103005001	84	30	1443065	0	49098	151
260210103005002	10	4	384668	0	49098	67
260210103005003	0	0	107601	0	49098	0
260210103005004	31	13	551310	0	49098	146
260210103005005	6	3	838412	0	49098	19
260210103005006	28	12	439872	0	49098	165
260210103005007	123	48	3237708	47427	49098	98
260210103005008	3	1	83646	0	49098	93
260210103005009	10	4	93382	0	49098	277
260210103005010	17	15	420387	0	49098	105
260210103005011	0	0	155270	0	49098	0
260210103005012	30	36	68375	0	49038	1136
260210103005013	0	0	178	0	49098	0
260210103005014	40	79	197807	0	49098	524
260210103005015	13	29	34066	0	49098	988
260210103005016	0	0	15970	0	49098	0

PALISADES NUCLEAR PLANT
SITE EMERGENCY PLAN

APPENDIX C
Attachment A
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POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES

STFID	POP100	HU100	AREALAND	AREAWATR	ZCTA5	POPDENS
260210103005017	8	3	7633	0	49098	2715
260210103005018	6	7	21393	0	49098	726
260210103005019	10	5	144828	0	49098	179
260210103005020	5	3	154134	0	49098	84
260210103005021	0	0	5512	0	49098	0
260210103005022	27	15	23322	0	49098	2998
260210103005023	0	2	2394	0	49098	0
260210103005024	8	3	3035	0	49098	6827
260210103005025	65	75	68885	0	49098	2444
260210103005026	0	2	3220	0	49098	0
260210103005027	0	0	26057	0	49098	0
260210103005028	6	2	3441	0	49098	4516
260210103005029	2	15	12383	0	49098	418
260210103005030	39	44	97586	0	49098	1035
260210103005031	3	4	2763	0	49098	2812
260210103005032	28	17	2939	0	49098	24675
260210103005033	120	47	231845	0	49098	1341
260210103005034	42	36	48467	0	49098	2244
260210103005035	2	17	23419	0	49098	221
260210103005036	8	14	36754	0	49098	564
260210103005037	20	10	7514	0	49098	6894
260210103005038	19	17	22028	0	49098	2234
260210103005039	11	9	9920	0	49098	2872
260210103005040	25	10	13750	0	49098	4709
260210103005041	59	19	49623	0	49098	3079
260210103005042	28	11	14881	0	49098	4873
260210103005043	13	7	10992	0	49098	3063
260210103005044	8	5	11879	0	49098	1744
260210103005045	44	13	17491	0	49098	6515
260210103005046	18	6	8797	0	49098	5300
260210103005047	26	12	25426	0	49098	2648
260210103005048	18	5	8862	0	49098	5261
260210103005999	0	0	0	1436216	490HH	

Procedure No EI-6.13
Revision 13
Effective Date 9/19/05

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTING PROCEDURE

TITLE: PROTECTIVE ACTION RECOMMENDATIONS FOR OFFSITE POPULATIONS

Approved: <u>NKBrott</u>	<u>/</u>	<u>9/19/05</u>
Procedure Sponsor		Date

New Procedure/Revision Summary:

Editorial to Revision 13

Specific Changes

TITLE: PROTECTIVE ACTION RECOMMENDATIONS FOR OFFSITE POPULATIONS

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ATTACHMENTS

Attachment 1, "Protective Action Recommendations for Offsite Population"
Attachment 2, "Area/Sector Map"
Attachment 3, "Determination of Affected Downwind Sectors"
Attachment 4, "Palisades 10-Mile EPZ Evacuation Time Estimates Summary"
Attachment 5, "Projected Dose Evaluation From Field Data"

TITLE: PROTECTIVE ACTION RECOMMENDATIONS FOR OFFSITE POPULATIONS

USER ALERT
REFERENCE USE PROCEDURE

Refer to the procedure periodically to confirm that all procedure segments of an activity will be or are being performed. Where required, sign appropriate sign-off blanks to certify that all segments are complete.

1.0 RESPONSIBILITIES AND AUTHORITIES

This procedure provides protective action recommendations. The authority and responsibility for the selection and implementation of offsite response options rests fully with the appropriate state and local authorities. Nuclear Management Company (NMC) has no authority with respect to imposing protective response options beyond the boundaries of its site.

- 1.1 If the Technical Support Center (TSC) is not operational, the Shift Manager/Site Emergency Director is responsible for recommending protective actions to local or state authorities.
- 1.2 If the TSC is operational, but the Emergency Operations Facility (EOF) is not operational, Radiation Protection staff will be responsible for providing dose calculations and advising the Site Emergency Director on protective action recommendations. The Operations Support Group is responsible for providing core damage determinations. The Site Emergency Director is responsible for recommending protective actions to the local or state authorities.
- 1.3 If the EOF is operational, the Radiation Protection staff in that facility is responsible for providing dose calculations and advising the EOF Director on a protective action recommendation. A Reactor Engineer is available to provide core damage determinations. The EOF Director is responsible for making protective action recommendations and should discuss the protective action with the SED before recommending protective actions to the local or state authority.

2.0 PURPOSE

This procedure provides guidelines for determining protective actions for the general public to be recommended to the appropriate local or state authorities in the event of a radiological emergency.

TITLE: PROTECTIVE ACTION RECOMMENDATIONS FOR OFFSITE POPULATIONS

3.0 REFERENCES

3.1 SOURCE DOCUMENTS

- 3.1.1 Emergency Implementing Procedure EI-1, "Emergency Classification and Actions"
- 3.1.2 Emergency Implementing Procedure EI-2.1, "Site Emergency Director"
- 3.1.3 Emergency Implementing Procedure EI-11, "Determination of Extent of Core Damage"
- 3.1.4 Site Emergency Plan, Section 6, "Emergency Measures"
- 3.1.5 NUREG 0654, Rev 1
- 3.1.6 EA-JLF-93-01

3.2 REFERENCE DOCUMENTS

- 3.2.1 Emergency Implementing Procedure EI-6.7, "Plant Site Meteorological System"
- 3.2.2 Emergency Implementing Procedure EI-6.8, "Backup and Supplemental Meteorology"
- 3.2.3 Emergency Implementing Procedure EI-6.9, "Automated Dose Assessment Program"
- 3.2.4 Emergency Implementing Procedure EI-6.10, "Offsite Dose Calculation - Straight Line Gaussian (Manual Method)"
- 3.2.5 Emergency Implementing Procedure EI-13, "Evacuation/Reassembly"
- 3.2.6 TOM COD Data Systems "Evacuation Time Estimates for the Palisades Power Plant Plume Exposure Pathway Emergency Planning Zone," December 19, 2003
- 3.2.7 Emergency Implementing Procedure EI-3, "Communications and Notifications"
- 3.2.8 Palisades Administrative Procedure 10.46, "Plant Records"
- 3.2.9 NMC Fleet Procedure FP-G-DOC-04, "Procedure Processing" |

TITLE: PROTECTIVE ACTION RECOMMENDATIONS FOR OFFSITE POPULATIONS

4.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

- 4.1 Attachment 1 provides a flowchart of PARs and the recommended protective actions for the plume exposure pathway. The flowchart is divided into three sections:
- MINIMUM RECOMMENDATIONS - Minimum protective action recommendations when a General Emergency is being declared.
 - CORE/CONTAINMENT STATUS RECOMMENDATIONS - Protective actions that are required whenever major core/containment failure has occurred, or is projected.
 - OFFSITE DOSE STATUS RECOMMENDATIONS - Protective actions that are required when offsite doses exceed the EPA protective actions dose limits.
- 4.2 Attachment 1 also includes tables for identifying affected areas.
- 4.3 Attachment 2 is a map showing sectors and areas.
- 4.4 Attachment 3 converts the direction the wind is coming from to the 3 affected downwind sectors.
- 4.5 Attachment 4 provides evacuation time estimates for the 10 mile Emergency Planning Zone (EPZ).

TITLE: PROTECTIVE ACTION RECOMMENDATIONS FOR OFFSITE POPULATIONS

5.0 PRECAUTIONS AND LIMITATIONS

This procedure is a guide for determining recommended protective actions. Since it is impossible to cover all potential situations, the judgment of the person responsible for recommending protective actions shall take precedence over the requirements of this procedure. However, since the protection of the general public is the ultimate concern, protective actions less stringent than those in this procedure should be recommended only if constraints make the actions a greater hazard to public health.

NOTE: Severe core damage is indicated by:

1. Loss of critical functions required for core protection (eg, loss of injection combined with a LOCA);
2. High core temperatures;
3. Very high radiation levels in area or process monitors.

Following the declaration of a General Emergency, the initial minimum protective action recommendation must focus on the status of the core. **IF** severe core damage cannot be ruled out, **THEN** the initial recommendation shall be to evacuate. It may be concluded that "severe core damage **cannot** be ruled out" if any of the following conditions exist:

- a. If there are symptoms of severe core damage, whether explainable or not.
- b. If there is not enough information to positively state that there is **no** severe core damage.
- c. If current plant conditions persist, severe core damage is projected, unless some improvement is seen in plant conditions.

Field surveys should be conducted to confirm dose projections. If these recommendations are available at the time a recommendation is made, they should be considered together with the dose projection. However, a protective action recommendation should not be delayed until field survey results are reported.

If Protective Action Guidelines are exceeded beyond 10 miles, consult with the state on ad hoc protective actions. The dose assessment computer may be used to estimate dose beyond 10 miles by changing the "Downwind Distance, Miles" parameter to a desired distance.

TITLE: PROTECTIVE ACTION RECOMMENDATIONS FOR OFFSITE POPULATIONS

6.0 PROCEDURE

USER ALERT

REFERENCE USE PROCEDURE

Refer to the procedure periodically to confirm that all procedure segments of an activity will be or are being performed. Where required, sign appropriate sign-off blanks to certify that all segments are complete.

6.1 DECLARATION OF UNUSUAL EVENT OR ALERT

- 6.1.1 Unusual Event - No protective actions required. Emergency Implementing Procedure EI-3, "Communications and Notifications," Attachment 1, "Palisades Event Notification Form," should be used.
- 6.1.2 Alert - No protective actions required beyond accountability.

6.2 DECLARATION OF A SITE AREA EMERGENCY

- 6.2.1 Evacuate nonessential personnel from the site per Emergency Implementing Procedure EI-13, "Evacuation/Reassembly."

6.3 DECLARATION OF GENERAL EMERGENCY

6.3.1 Initial Recommendation

NOTE: The Initial recommendation that is formulated should evaluate whether the Minimum, Core/Containment, or Dose Status recommendation is applicable.

The declaration of a General Emergency requires that an **INITIAL PROTECTIVE ACTION RECOMMENDATION** be formulated (see Attachment 1, Pages 1 and 2) and communicated to offsite authorities.

- a. **IF** the State Emergency Operations Center is **not** activated, **THEN** the SED shall personally communicate the General Emergency and the initial protective action recommendation to Van Buren County.
- b. **WHEN** the State Emergency Operations Center (EOC) is activated, **THEN** the General Emergency and the initial protective action recommendation shall be communicated directly (via telephone) from the SED/EOF Director to the State EOC Director.

TITLE: PROTECTIVE ACTION RECOMMENDATIONS FOR OFFSITE POPULATIONS

6.3.2 Follow-Up Recommendation

- a. Using available Plant status information, dose projections, and/or field surveys, and Attachment 1, "Protective Action Recommendations for Offsite Population," evaluate and recommend a follow-up protective action. Notification to the appropriate state and local authorities shall be made as soon as the recommendation has been prepared (not later than 30 minutes after initial recommendations).
- b. Assess the conditions affecting the follow-up protective action and make revisions to the protective action recommendation that include appropriate consideration of the protective action orders given to the public by offsite authorities. For example: If a protective action order has been given to the public to evacuate an area, a change in protective action recommendation to shelter would not be appropriate until the source of the threat to the public is clearly under control.
- c. Attachment 5 provides a work sheet that may be used to assist in determining Projected TEDE, adult thyroid CDE, and/or skin DE from field survey data.

6.3.3 The Radiation Protection Group Leader should provide the protective action recommendation for SED/EOF Director approval.

6.3.4 Record the recommended protective action and affected area(s) on the Palisades Event Notification Form.

7.0 ATTACHMENTS AND RECORDS

7.1 Attachment 1, "Protective Action Recommendations for Offsite Population"

7.2 Attachment 2, "Area/Sector Map"

7.3 Attachment 3, "Determination of Affected Downwind Sectors"

7.4 Attachment 4, "Palisades 10-Mile EPZ Evacuation Time Estimates Summary"

7.5 Attachment 5, "Projected Dose Evaluation From Field Data"

7.6 RECORDS

Records generated by this procedure shall be filed in accordance with Palisades Administrative Procedure 10.46, "Plant Records." Refer to the records matrix attached to Palisades Administrative Procedure 10.46 for information needed to complete Record Indexing Form (Form 104).

TITLE: PROTECTIVE ACTION RECOMMENDATIONS FOR OFFSITE POPULATIONS

8.0 SPECIAL REVIEWS

The scope of this procedure does not include activities that require a 50.59 review per NMC Fleet Procedure FP-G-DOC-04, "Procedure Processing." Therefore, changes to this procedure do not require a 50.59 review.

PROTECTIVE ACTION RECOMMENDATIONS FOR OFFSITE POPULATION

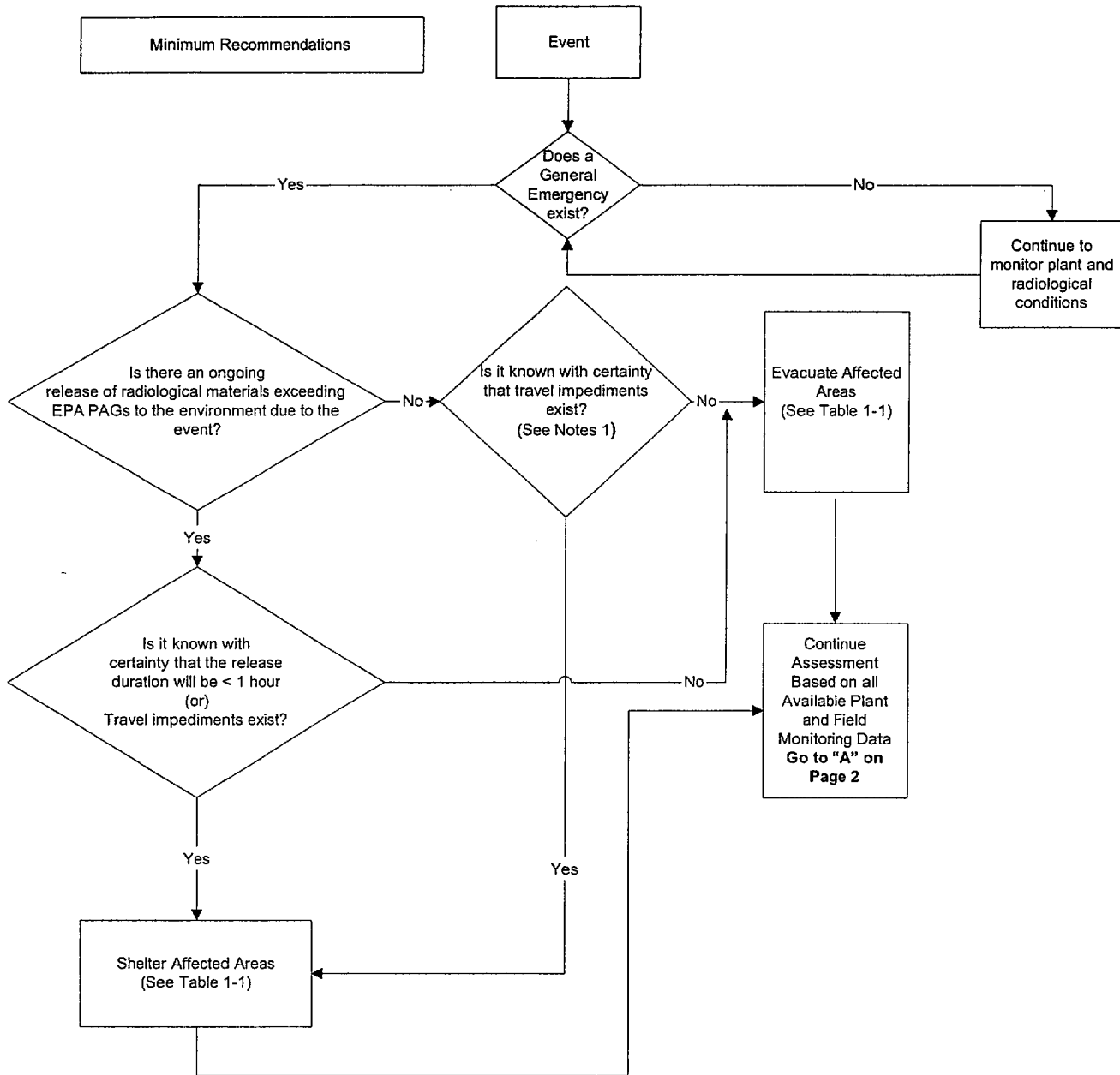


TABLE 1 - 1 0 - 5 Miles Wind Direction Conversion	
Wind Direction Degrees (From):	Areas Affected
≥169 and <236	1 and 2
≥236 and <303	1, 2 and 3
≥303 and <56	1 and 3
≥56 and <169	1

PROTECTIVE ACTION RECOMMENDATIONS FOR OFFSITE POPULATION

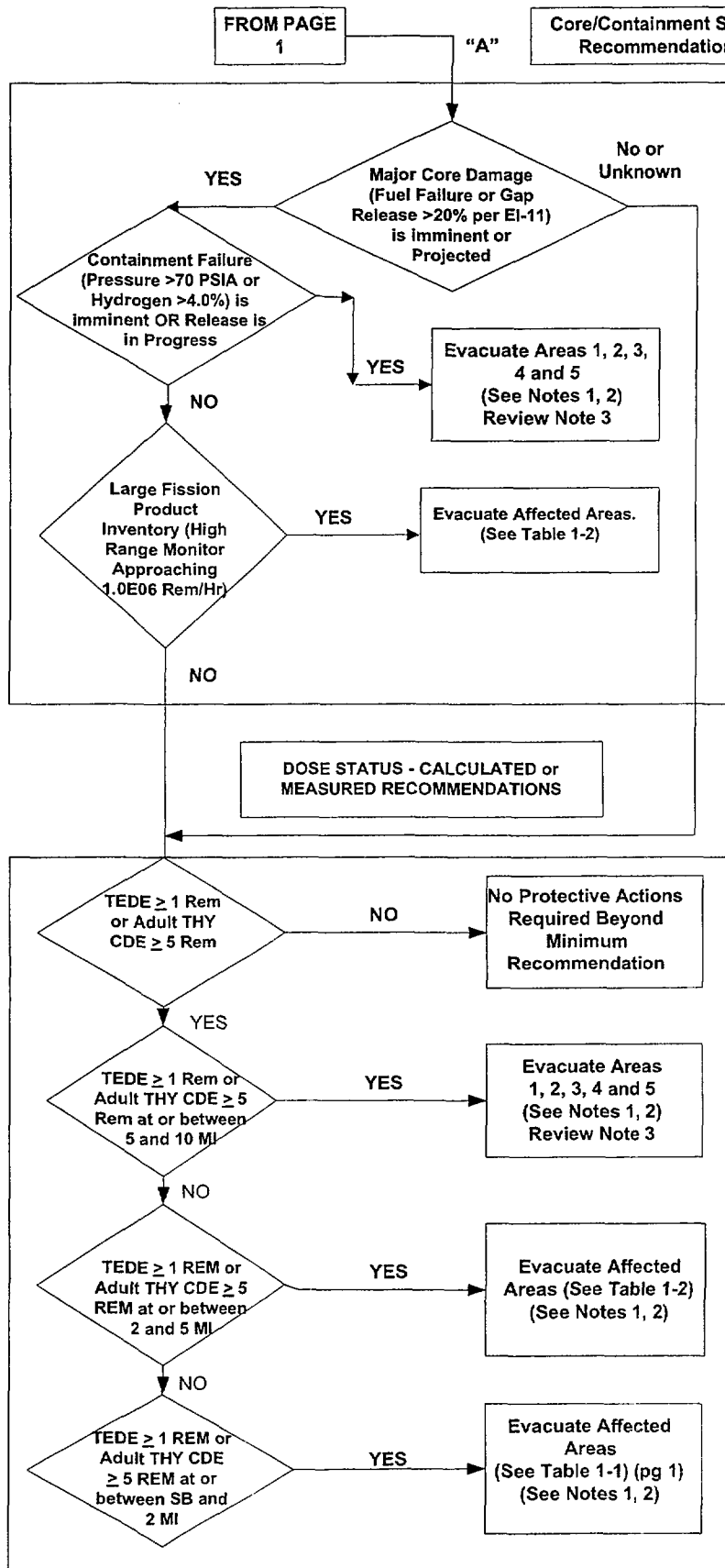


Table 1-2
0-10 Miles Wind Direction Conversion

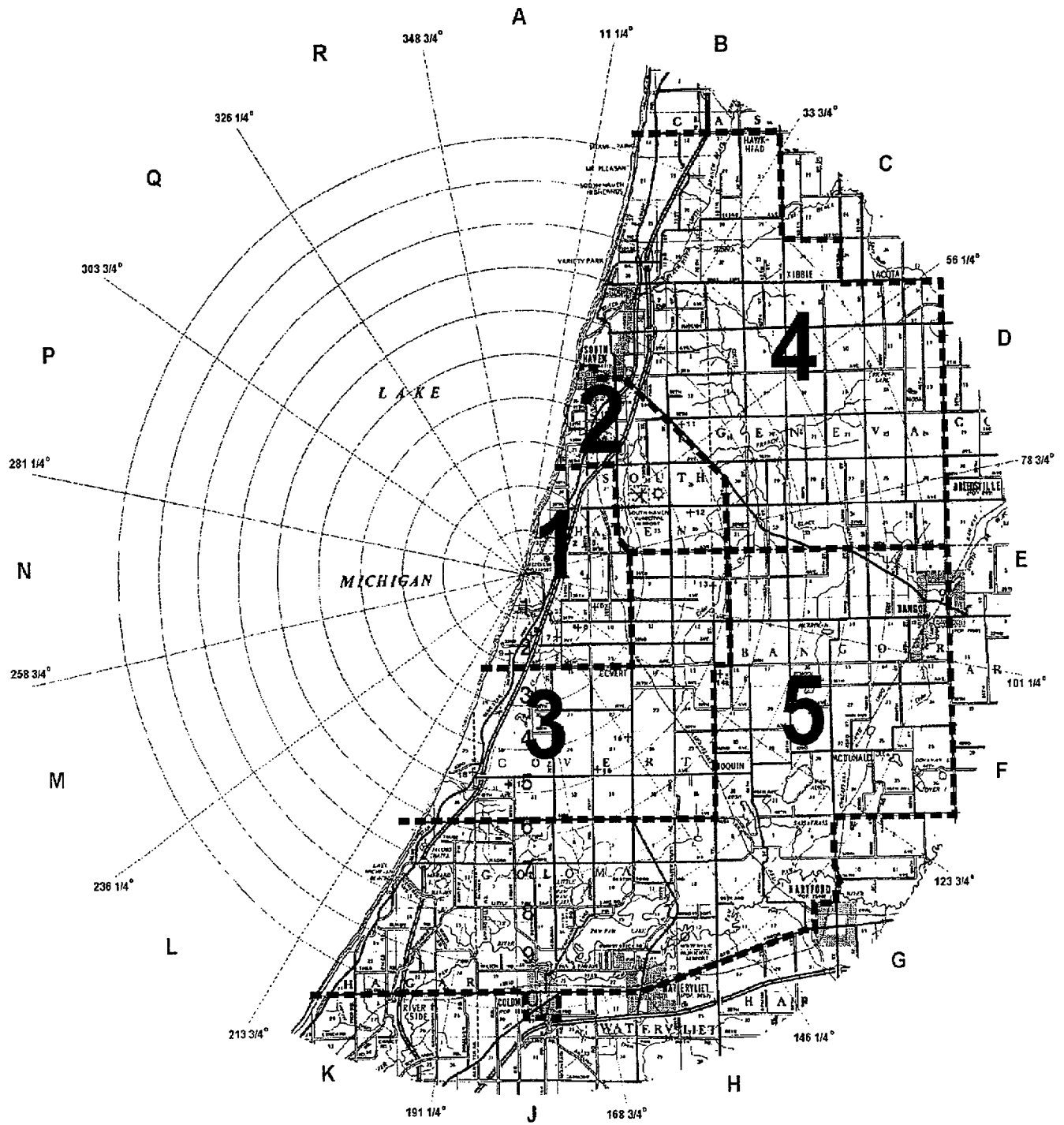
Wind Direction Degrees (From):	Areas Affected
>169 and <236	1, 2, 3 and 4
\geq 236 and <303	1, 2, 3, 4 and 5
\geq 303 and <56	1, 2, 3 and 5
\leq 56 and <169	1, 2, and 3

NOTE 1: If there are known travel impediments (Adverse weather that impacts most or all the Affected Areas e.g. a blizzard which has caused known widespread road closures or an ongoing security event in which Areas 1 and 2 and/or 3 have or potentially will be occupied by an adversarial force), initially shelter rather than evacuate until conditions improve.

NOTE 2: Sheltering may be the appropriate action for controlled releases from containment if there is assurance that the release is short term (puff release) and the area near the plant cannot be evacuated before the plume arrives.

NOTE 3: If TEDE \geq 1 REM or Thyroid CDE \geq 5 REM are expected to be exceeded beyond 10 Miles consult with the State of Michigan on ad hoc protective actions

AREA/SECTOR MAP



DETERMINATION OF AFFECTED DOWNWIND SECTORS

WIND DIRECTION (DEGREES FROM)	SECTOR	AFFECTED DOWNWIND SECTORS		
		CENTERLINE	ADJACENT	
169-191	J	A	R	B
192-213	K	B	A	C
214-236	L	C	B	D
237-258	M	D	C	E
259-281	N	E	D	F
282-303	P	F	E	G
304-326	Q	G	F	H
327-348	R	H	G	J
349-11	A	J	H	K
12-33	B	K	J	L
34-56	C	L	K	M
57-78	D	M	L	N
79-101	E	N	M	P
102-123	F	P	N	Q
124-146	G	Q	P	R
147-168	H	R	Q	A

PALISADES 10-MILE EPZ EVACUATION TIME ESTIMATES SUMMARY*

AREA	AREA DESCRIPTION	WEEKDAY FAIR WEATHER	WEEKNIGHT FAIR WEATHER	WEEKNIGHT ADVERSE WEATHER
Area 1	All sectors to 2 miles	180	160	190
Areas 1 & 2	All sectors to 2 miles - northeast sectors to 5 miles	180	180	250
Areas 1 & 3	All sectors to 2 miles - southeast sectors to 5 miles	190	180	210
Areas 1, 2, 3, & 4	All sectors to 5 miles - northeast sectors to 10 miles	360	230	600
Areas 1, 2, 3 & 5	All sectors to 5 miles - southeast sectors to 10 miles	340	330	600
Areas 1, 2, 3, 4, & 5	All sectors to 10 miles	400	380	620

* These are comparative times based on data drawn from the Evacuation Time Estimates for the Palisades Nuclear Power Plant Plume Exposure Pathway Emergency Planning Zone, December 19, 2003, prepared by TOM COD Data Systems. **Times are given in minutes.**

PROJECTED DOSE EVALUATION FROM FIELD DATA

1. Determination of Projected TEDE:

NOTE: Perform A OR B and then perform C AND D.

A. DDE (Plume Shine or Immersion):

3-Foot Closed Window Reading	_____	mrem/h
Expected Duration (Default 2h)	X _____	h
Projected DDE	= _____	mrem (A)

B. DDE (Ground Disposition):

3-Inch Closed Window Reading	_____	mrem/h
Expected Duration (Default 96h)	X _____	h
Projected DDE	= _____	mrem (B)

C. CEDE:

Particulate:

_____ $\mu\text{Ci/cc}$ x $3.90 \text{ E}+7 \text{ mrem cc}/\mu\text{Ci-h}^*$ x _____ h = _____ mrem (C)

Iodine:

_____ $\mu\text{Ci/cc}$ x $3.90 \text{ E}+7 \text{ mrem cc}/\mu\text{Ci-h}^*$ x _____ h = _____ mrem (D)

D. Projected TEDE:

_____ mrem (A or B) + _____ mrem (C) + _____ mrem (D) = _____ mrem (TEDE)

2. Determination of Projected Adult Thyroid CDE:

Iodine CDE: _____ $\mu\text{Ci/cc}$ x $1.30 \text{ E}+9 \text{ mrem cc}/\mu\text{Ci-h}^*$ x _____ h = _____ mrem

3. Determination of Projected Skin DE:

3ft or 3in: (OW - CW) X BCF	= _____	mrem**
Expected Duration (default 2h)	X _____	h
Projected Beta Skin DE	= _____	mrem
Projected DDE (A or B)	+ _____	mrem
Total Projected Skin Dose	= _____	mrem

* Dose conversion factor from EPA-400 Table 5-2.

** Assumes 1 rad = 1 rem