

PALO VERDE NUCLEAR GENERATING STATION

EVACUATION TIME ANALYSIS

10 MILE EMERGENCY PLANNING ZONE

JANUARY 1984

8401270306 840124
PDR ADOCK 05000528
E PDR

Evacuation Time Analysis

I. General Description and Introduction

The Arizona Nuclear Power Project (ANPP) was organized by Arizona Public Service Company (APS) and Salt River Project (SRP). ANPP, with APS as project Manager and operating agent, was established to engineer, design, construct, and operate nuclear power facilities to help meet anticipated customer electric demands in the mid 1980's and beyond. One of the first steps in building the Palo Verde Nuclear Generating Station was a thorough statewide search for a site, conducted by NUS corporation, an environmental consulting firm specializing in this type of activity. The 4000 acre site eventually selected by NUS is a combination of desert land and irrigated acreage located 55 miles west of downtown Phoenix, in western Maricopa County.

The project is a joint effort of seven utility companies who share construction, operating costs and the electricity which will be generated by the plant. The participants are APS, SRP, El Paso Electric Company, Southern California Edison, Public Service Company of New Mexico, Southern California Public Power Authority and LADWAP.

The ten mile emergency Plume Exposure Pathway Planning Zone (EPZ), surrounding the facility has an adequate road network to accommodate an evacuation of the relatively small number of persons (approximately 3000), living in the area. Corridors of egress were defined by three sectors and were identified.

Load capacities, travel times, characteristics of roadway accessibility and population densities were analyzed using established methodologies. A sequential occurrence of events was used to determine evacuation times in order to provide a conservative estimate.

II. Background Information

A. Site Location

As stated the Palo Verde Nuclear Generating Station is located 55 miles west of Phoenix, Arizona and 8 miles south of Interstate 10 on Wintersburg Road. The site is located in a relatively unpopulated area of western Maricopa County. A large portion of the ten mile EPZ is zoned for agricultural purposes. Unless unanticipated zoning changes occur, the resident population will remain relatively constant and stable. Population growth is further discouraged due to a limited supply of potable water.

An area map of the 10 mile EPZ is located on page V-1, with page V-1-1 illustrating transportation networks, evacuation routes, major topographical features. There are no incorporated communities within the ten mile EPZ, but there are population centers with transportation routes. Both were used in the selection of sectors.

B. Assumptions

Assumptions for the analysis were obtained from national averages, existing Arizona Department of Transportation studies for roadways, Federal Highway administration manuals and personal observation and monitoring.

B. Assumptions (cont.)

Aerial photographs were taken to determine the EPZ non-transient population. The residential structures were counted, multiplied by 3.1, the national average for family size. Non-transient vehicles were determined in a like manner, dividing the population by the national average of persons per vehicle, 2.5.

The transient population is almost entirely the employees at the Nuclear Generating station. The evacuation time estimates were based upon current employment figures of approximately 6000 persons. However, as construction is completed in each of the three units, the number of employees will decline dramatically. By using the higher number of employees, a more than conservative estimate has been achieved. Most of the employees live outside the EPZ and commute daily to work. While many carpool due to the extreme distance of the facility from metropolitan Phoenix, others use bus transportation provided by the consortium and the contractor. Fifty buses, with a 47 passenger capacity are onsite and available for emergency evacuation, as are the employees personal vehicles. The number of transient vehicles was determined by a 5 day count of all personal vehicles onsite, during the most populated day shift. The average number of vehicles found to be onsite daily, including buses, was found to be 1687. A more conservative figure of 1900 vehicles was used for time estimate purposes (see page V-2).

Roadway capacities and characteristics were obtained from a study conducted by the Arizona Department of transportation. Their study estimates a capacity of 2000 vehicles per lane hour. A more conservative figure of 1200 vehicles per lane hour was used for the time estimates.

The conservative estimate of free flow traffic speed was 50 MPH for normal conditions and 30MPH for adverse conditions. In addition, all time evacuation estimates were derived from the assumption that all vehicles would be at the farthest point inside the sector so as to insure a conservative estimate. In addition all sector evacuation times assumed the large transient population at the Nuclear Generating Station would evacuate through that sector.

It was further assumed that the time established for the last vehicle to exit the EPZ would remain constant, and when then added to the time derived for the first vehicle to exit the EPZ would establish the total response time for all vehicles.

All evacuation routes were driven and mileage established (December 12, 1983). When determining evacuation times, only the route in each individual sector with the greatest distance in miles was used in order to further insure a conservative estimate.

Other assumptions include prompt reporting of an incident and a timely decision from government. Due to the extremely unlikely situation of complete flooding of the area, it was assumed this would not be a factor.

C. Methodology

Evacuation times for each sector (at 2.5 and 10 miles) as well as the simultaneous evacuation for the complete 10 mile EPZ were computed using an approach assuming sequential events, with each component in the process not starting until all of the estimated time for each had expired. Each component time estimate was then added to obtain a

C. Methodology (cont.)

conservative overestimate.

Response time, or the time it will take for a vehicle to exit the 10 mile EPZ is a function of vehicle speed, distance and lane capacity. The speed at which evacuees will travel when capacity exceeds demand (which is always true in this instance) was determined by the use of the formula contained in the Federal Highway Administration Traffic Assignment Manual (August, 1973).

$$\text{Evacuation Speed} = \frac{\text{Free Flow Speed}}{0.25 \left[\frac{(\text{Demand})}{(\text{Capacity})} \right]^4 + 1}$$

The evacuation speed was then applied to the longest evacuation route in each sector to determine the time required for the first vehicle to exit the 10 mile EPZ.

The time to clear the last vehicle from each sector was determined by adding the standard length of a vehicle (10 feet), to the length of distance required between moving vehicles as established by Arizona State law (10 feet per 10 MPH). The times varied by sector depending upon number of vehicles (less of more distance) and evacuation speed (depending upon normal versus adverse conditions). This figure remains constant for each sector. By multiplying the total length of one vehicle and the required distance between moving vehicles, by the total number of vehicles in each sector, the total length in feet for all vehicles is established. When divided by the number of feet in a mile (5280), the total number of additional vehicle miles required to clear the 10 mile EPZ is established. When then applied to evacuation speed, the time required to clear the last vehicle is obtained. When then added to the time required to clear the first vehicle, the total response time is derived.

In all sectors, evacuation time was established for clearing the 2, 5, and 10 mile rings. Since each sector has its own separate evacuation routes, simultaneous evacuation of the entire zone can occur with the greatest amount of time to do so being the time required to clear the farthest point from the border of the 10 mile EPZ in time.

D. Demand Estimation

1. Permanent Residents

As stated, the number of permanent residents was computed by identifying residential structures through aerial photographs and multiplying by 3.1, the national average family size. A specific population distribution map and chart are provided on pages V-3 and V-3-1.

By dividing the population by the national average for persons per vehicle (2.5), the number of evacuating vehicles was obtained. The specific vehicle distribution map and chart are provided on pages V-4 and V-4-1.

2. Transient Population

The work force at the PVNGS site is the only significant

2. Transient Population (cont.)

transient population. Time estimates were based on current employment figures of approximately 6000 persons. This represents a conservative overestimate since the number of employees will decline rapidly as construction terminates. Because the site is located in a rural/desert environment, tourist visits are virtually non-existent.

3. Special Facility Population.

The only institutions located in the 10 mile EPZ are two elementary schools, Arlington and Ruth Fisher. If required the students will be bussed to Reception and Care centers outside the EPZ. While school is in session, busses are located at the schools to provide emergency evacuation transportation. Arlington School is attended by 128 students with three 60 passenger and two 36 passenger busses available for transportation. Ruth Fisher School is attended by 200 students with Five 60 passenger busses available for transportation.

4. Special Needs Population

The Maricopa County Civil Defense and Emergency Services Department, through return mail and personal visits identified 19 EPZ residents requiring special evacuation (see page V-5 for complete listing). The Sheriff's department will be dispatched to evacuate these individuals with a conservative time estimate to do so of one hour.

E. Traffic Routing

1. Evacuation Road Network

Each of the three EPZ sectors has their own evacuation routes, which range from high speed interstate highways to unimproved county roads. The transportation network and roads to be used for evacuation are identified on page V-1-1. The road characteristics, lane capacity, etc. are outlined on page V-6. The evacuation routes are: Sector One(1); I-10 West and the Buckeye Salome Highway West, Sector Two (2); I-10 East, the Buckeye Salome Highway and Baseline Road East, Sector Three (3); Elliot Road West and Arlington Road (Old Hiway 80) South.

2. Roadway Segment Characteristics

These are outlined on Page V-6. The characteristics of each road were evaluated where traffic flow was most inhibited. The designated evacuation roads are capable of providing maximum egress from the area.

F. Analysis of Evacuation Times

Evacuation times are made of several components, which, when added together, total evacuation time. The components are decision, notification, preparation and response time.

1. Decision time is measured from the point of the protective action recommendation from the facility to government to evacuate, to the actual decision by the competent authority to order the evacuation. The nature of an incident requiring an evacuation is likely to be

2. Transient Population (cont.)

transient population. Time estimates were based on current employment figures of approximately 6000 persons. This represents a conservative overestimate since the number of employees will decline rapidly as construction terminates. Because the site is located in a rural/desert environment, tourist visits are virtually non-existent.

3. Special Facility Population.

The only institutions located in the 10 mile EPZ are two elementary schools, Arlington and Ruth Fisher. If required the students will be bussed to Reception and Care centers outside the EPZ. While school is in session, busses are located at the schools to provide emergency evacuation transportation. Arlington School is attended by 128 students with three 60 passenger and two 36 passenger busses available for transportation. Ruth Fisher School is attended by 200 students with Five 60 passenger busses available for transportation.

4. Special Needs Population

The Maricopa County Civil Defense and Emergency Services Department, through return mail and personal visits identified 19 EPZ residents requiring special evacuation (see page V-5 for complete listing). The Sheriff's department will be dispatched to evacuate these individuals with a conservative time estimate to do so of one hour.

E. Traffic Routing

1. Evacuation Road Network

Each of the three EPZ sectors has their own evacuation routes, which range from high speed interstate highways to unimproved county roads. The transportation network and roads to be used for evacuation are identified on page V-1-1. The road characteristics, lane capacity, etc. are outlined on page V-6. The evacuation routes are: Sector One(1); I-10 West and the Buckeye Salome Highway West, Sector Two (2); I-10 East, the Buckeye Salome Highway and Baseline Road East, Sector Three (3); Elliot Road West and Arlington Road (Old Hiway 80) South.

2. Roadway Segment Characteristics

These are outlined on Page V-6. The characteristics of each road were evaluated where traffic flow was most inhibited. The designated evacuation roads are capable of providing maximum egress from the area.

F. Analysis of Evacuation Times

Evacuation times are made of several components, which, when added together, total evacuation time. The components are decision, notification, preparation and response time.

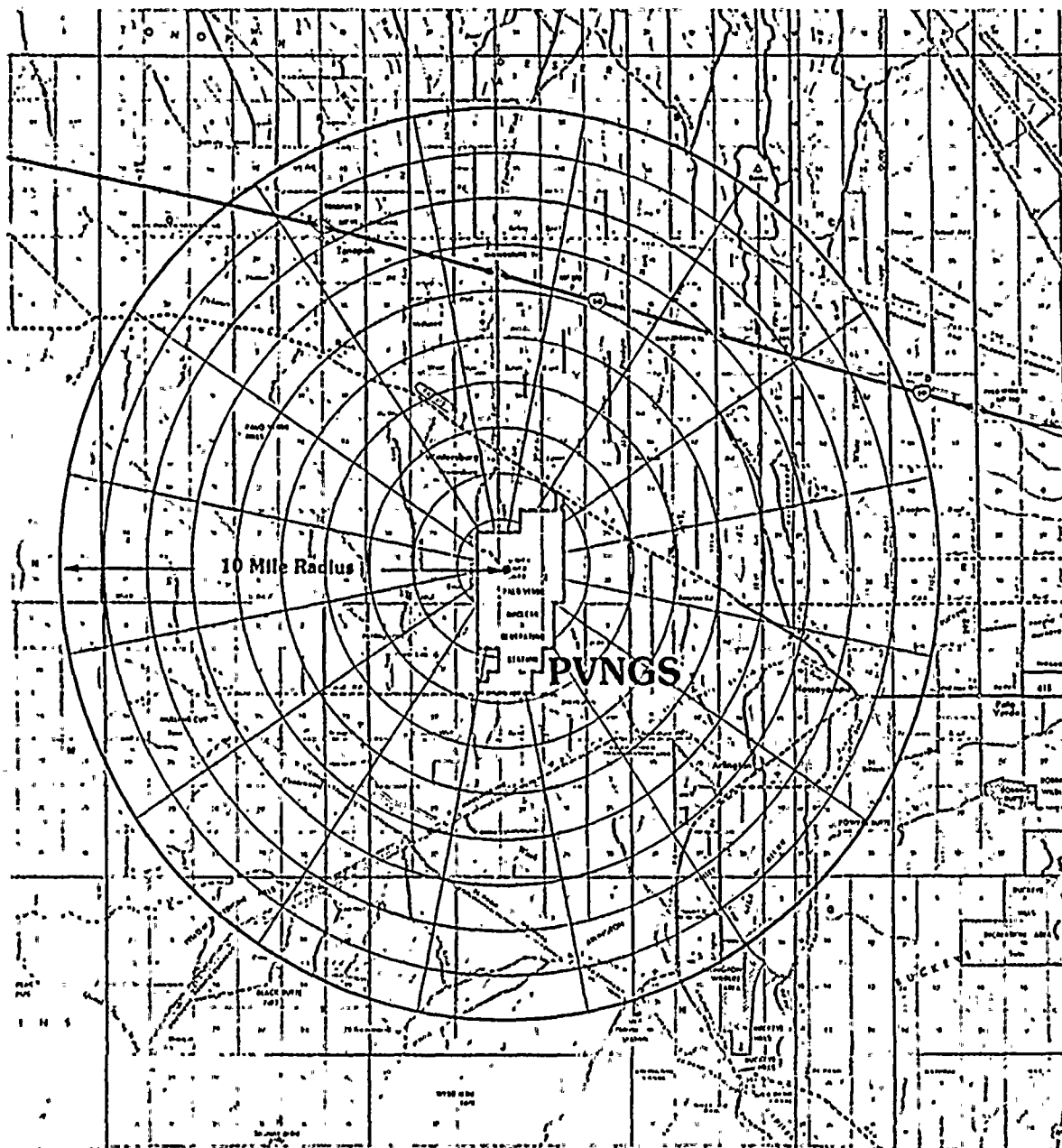
1. Decision time is measured from the point of the protective action recommendation from the facility to government to evacuate, to the actual decision by the competent authority to order the evacuation. The nature of an incident requiring an evacuation is likely to be

1. Decision Time (cont.)

more severe than other incidents where evacuation is not considered for protective action. For that reason reporting time to government and there subsequent reaction will be shorter. Decision time is estimated at thirty minutes.

2. Notification Time. The Nuclear Regulatory Commission has established that government shall be notified of an incident within fifteen minutes of it being identified. Notification time is established for the EPZ residents at 15 minutes also. An encompassing siren system throughout the EPZ will insure the notification of the residents.
3. Preparation Time is the time required for resident preparation for evacuation. It is dependent upon several variables including family size, time of day and family location. Preparation time is estimated at 30 minutes through practical observation.
4. Response Time. Each sector response time (the time required to drive out and clear the 10 mile EPZ) was determined seperately, for both normal and adverse conditions, and are reported on page V-7. As stated, since each sector uses independent evacuation routes, the full 360 degree evacuation time is represented by the time it will take to clear the slowest sector. For normal conditions that will be two hours eighteen minutes, for adverse conditions it will be two hours forty-one minutes.

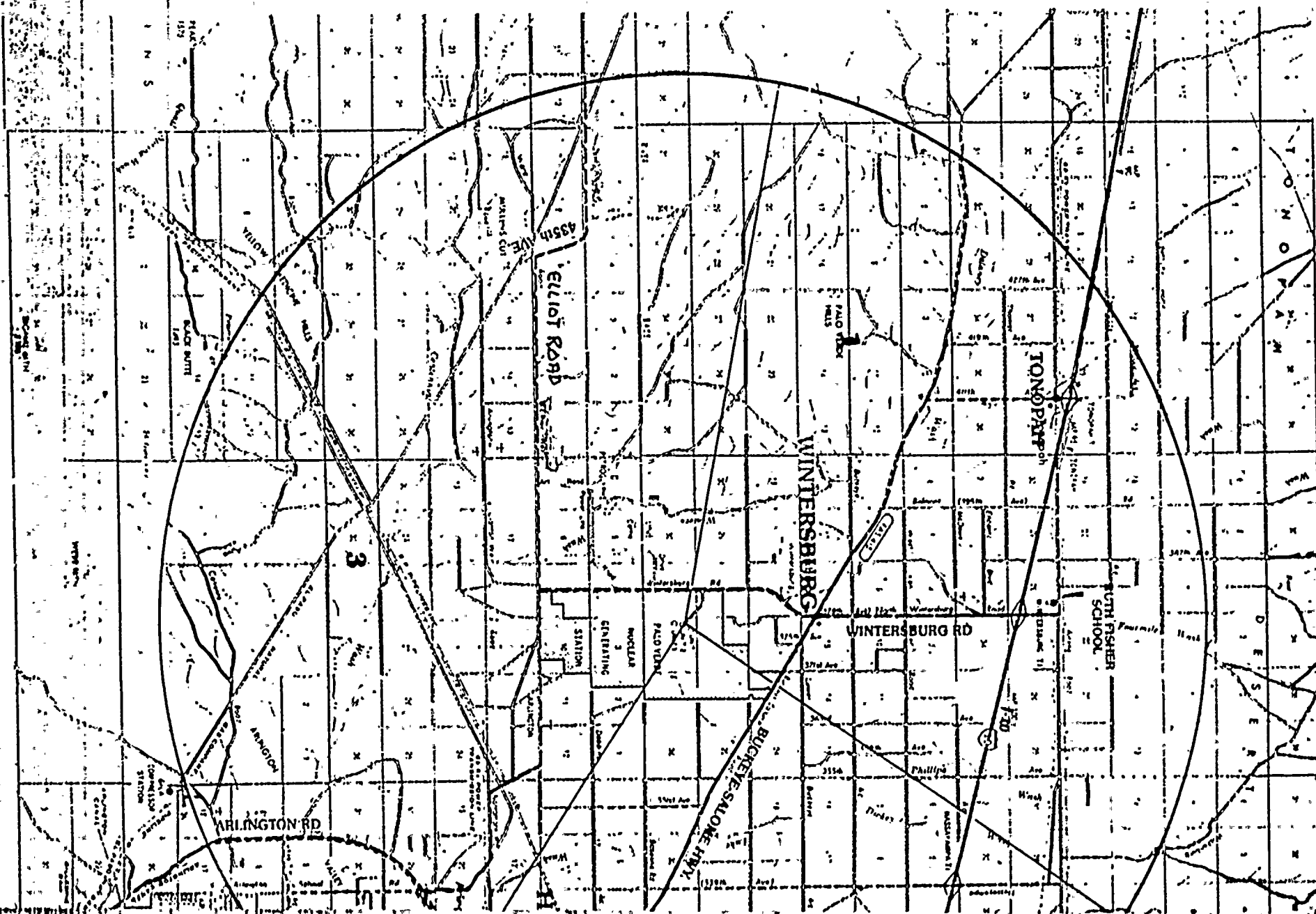
.All time estimates reflect a straight addition of the total time for each component. Realistically, these times will overlap, with some families in preparation and others already evacuated. Given that the assumptions include an inflated transient population, all times estimated for the farthest point inside the individual sectors and the aforementioned overlap factors, it is safe to conclude the actual evacuation time for the 10 mile EPZ will be less than the times estimated, and further will continue to diminish as construction is completed at the facility.

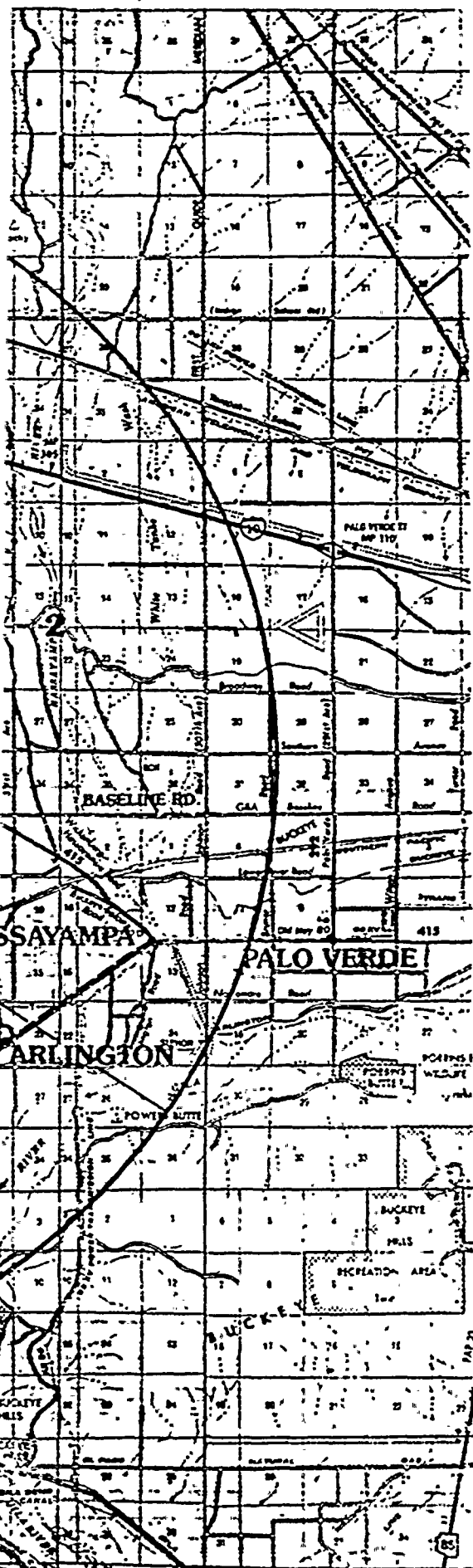


1 0 1 2 3 4

Scale in Miles

**Figure 10.C-2
DEMOGRAPHY WITHIN THE
PLUME EXPOSURE PATHWAY
EMERGENCY PLANNING ZONE
PALO VERDE NUCLEAR
GENERATING STATION
(PVNGS)**





LEGEND:

- < 2 Evacuation Route Sections
- Traffic Routing
- < 1 Comprises Protective Action Sectors P, Q, R, A, and B
- < 2 Comprises Protective Action Sectors C, D, E and F
- < 3 Comprises Protective Action Sectors G, H, J, K, L, M and N



There are 16 Protective Action Sectors, shown on the PVNGS Emergency Brochure, with Sector "A" being centered on North



Scale in Miles

**Figure 10.C-1
POPULATION
EVACUATION ROUTE SECTIONS
AND EVACUATION ROUTING
PALO VERDE NUCLEAR
GENERATING STATION
(PVNGS)**

Revision 3
October, 1983

VEHICLE COUNT

	5 Dec	6 Dec	7 Dec	8 Dec	9 Dec
PK LOT #1	229	336	343	339	355
PK LOT #2	85	85	90	90	99
PK LOT #2A	231	219	229	241	260
PK LOT #3	426	422	432	430	437
PK LOT #4	52	52	54	49	57
V.I.C.	45	49	53	49	54
OPERATIONS	455	431	487	411	506
TOTAL	1,523	1,594	1,688	1,609	1,768

GRAND TOTAL OF ALL FIVE DAYS- 8,182

1. In order to finalize the Time Evacuation Analysis of the plant for NRC, APS requests the assistance of TATT Co. Intr'l as indicated below:

a. A count of all employees vehicles for five (5) consecutive day period is required.


b. This includes all Parking Lots: Parking Lots #1, 2, 2A, 3, 4, V.I.C. and Operations.

c. The vehicle count will be accomplished during the Day Shift from 0800-1500 and only once during these times.

d. The assigned Truck Patrol Officer assigned to the above, will indicate on this form and under the appropriate date the total amount of vehicles in each Parking Lot indicated above.

e. The assigned Truck Patrol Officer assigned to the above vehicle count, will report directly to the O.I.C. with the daily count. If the O.I.C. is not available, the count will be given to the Leading Day Shift Sergeant at the Main Gate.

f. To expedite the vehicle count, it is recommended that the assigned Truck Patrol Officer conclude his count prior to 1130 unless his assistance is needed else where.


R. RODRIQUEZ
Lt. O.I.C.

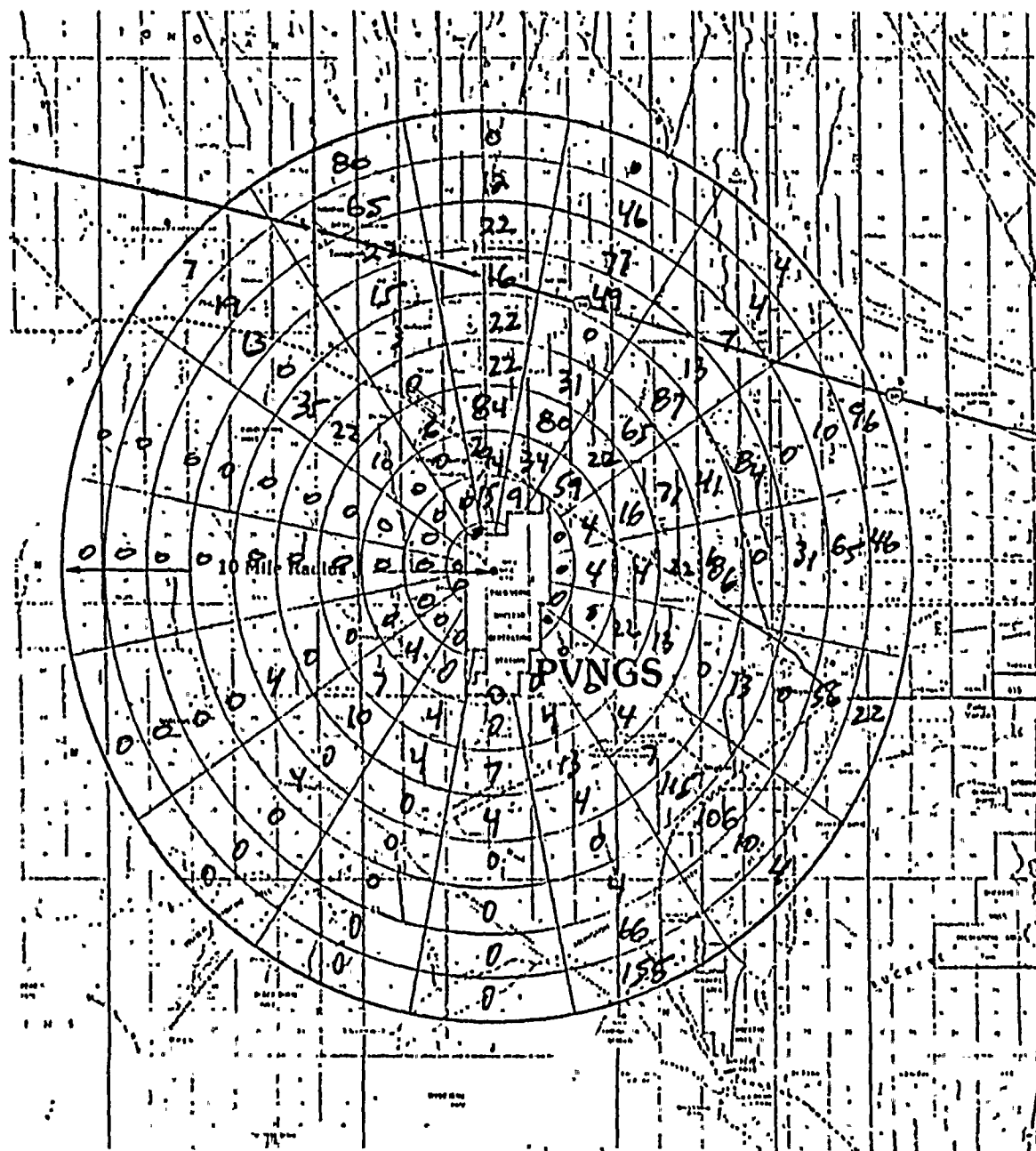
Enclosure (1)

SECTOR

10 Mile EPZ Population Distribution (note: any variance from ring total due to rounding)

R
A
D
I
U
S

	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	15	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	294	34	59	4	4	0	0	0	0	0	4	0	0	0	0	0
4	84	80	22	16	4	22	0	4	0	4	7	0	0	0	10	6
5	22	31	65	71	22	13	4	13	7	4	10	0	0	0	22	0
6	22	0	87	41	186	0	7	4	4	0	0	4	0	0	35	3
7	16	49	13	84	0	13	115	0	0	0	4	0	0	0	0	15
8	22	77	7	0	31	0	106	4	0	0	0	0	0	0	13	22
9	12	46	4	10	65	56	10	66	0	0	0	0	0	0	19	65
10	0	0	4	96	46	22	4	155	0	0	0	0	0	0	7	80



1 0 1 2 3 4 5
Scale in Miles

Figure 10.C-2
DEMOGRAPHY WITHIN THE
PLUME EXPOSURE PATHWAY
EMERGENCY PLANNING ZONE
PALO VERDE NUCLEAR
GENERATING STATION
(PVNGS)

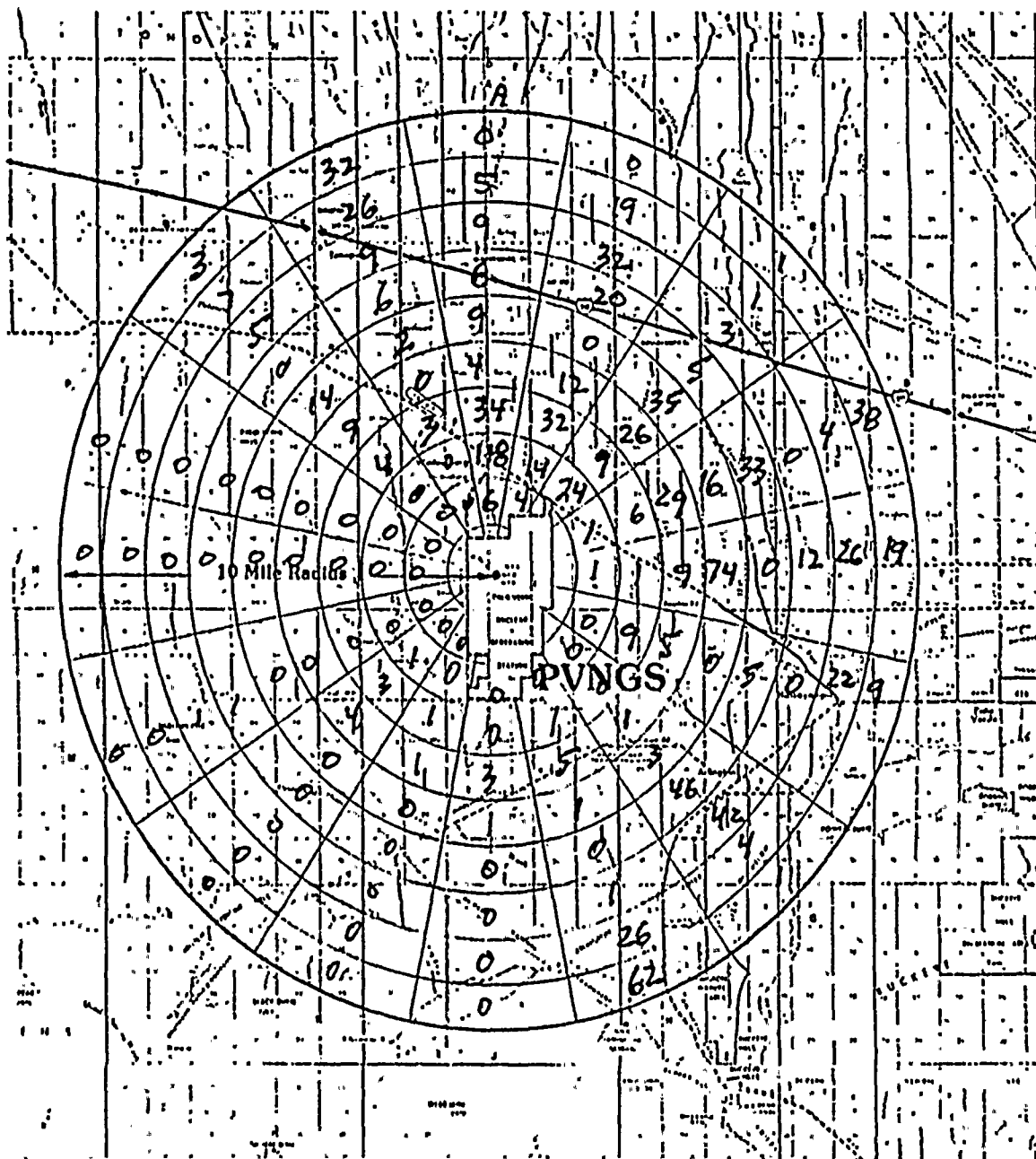
SECTOR

PAGE V-4

10 Mike EPZ Vehicle Distribution (Note: any variance from ring totals due to rounding)

R
A
D
I
U
S

	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	6	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	118	14	24	1	1	0	0	0	0	0	1	0	0	0	0	0
4	34	32	9	6	1	9	0	1	0	1	3	0	0	0	4	3
5	4	12	26	29	9	5	1	5	3	1	4	0	0	0	9	0
6	9	0	35	16	74	0	3	1	1	0	0	0	0	0	14	2
7	6	20	5	33	0	5	46	0	0	0	0	1	0	0	0	6
8	9	32	3	0	12	0	42	1	0	0	0	1	0	0	5	9
9	5	19	1	4	26	22	4	26	0	0	0	0	0	0	7	26
10	0	0	1	38	19	9	1	62	0	0	0	0	0	0	3	32



1 0 1 2 3 4 5
Scale in Miles

Figure 10.C-2
DEMOGRAPHY WITHIN THE
PLUME EXPOSURE PATHWAY
EMERGENCY PLANNING ZONE
PALO VERDE NUCLEAR
GENERATING STATION
(PVNGS)

PALO VERDE NUCLEAR GENERATING STATION EMERGENCY PLANNING ZONE - PLUME EXPOSURE PATHWAY

Special Care and Transportation Cases

Name	Address/Directions	Telephone Numbers(s)	Needs	Reason(s)	Arrangements Made/Planned
<u>SECTOR B-7</u>					
Opal L. Mason	2575 North 355th Avenue (Sun Spiritualist Camp. South house on west side with Office sign)	386-3877	Transportation		Call, see if other in camp can provide
Ruth Matthews	2537 North 355th Avenue (Sun Spiritualist Camp. 2 houses north of Mason)	386-3834	Transportation	(Age 87)	Call Mrs. Mason, same as for her.
<u>SECTOR B-9</u>					
Dorothy Jonker	4413 North 359th Avenue Third residence south from corner, trailer to south of cinder block house	386-3906	Reassurance	Highly nervous & alone days	Call, check Lives with Zarbo (386-5342)
<u>SECTOR C-3</u>					
Verdie Mounts	36647 West Jones Drive (Often lives with son & his wife)	386-5119	Assistance		Call son, Thomas, check if assistance is needed
<u>SECTOR C-5</u>					
James A. Phillips	35700 West Buckeye Rd. (Light brown house, north side of road)	386-3994	Possible Assistance,	94 years old, hard of hearing	Call (Gladys Nalb and check
L. J. Herrgott	35900 West Buckeye Rd. Large mobile home type, many trees around house)	386-3859	Check	Hard of hearing, 71 years old, as is wife, Mary	Call, check
<u>SECTOR C-6</u>					
Marshall Shephard	34715 West Van Buren At "Double S&D Nut Farms" Fenced gate, second trailer	386-5534	Check	Legally blind	Call, check if assistance needed

PALO VERDE NUCLEAR GENERATING STATION EMERGENCY PLANNING ZONE - PLUME EXPOSURE PATHWAY

Special Care and Transportation Cases

Name	Address/Directions	Telephone Numbers(s)	Needs	Reason(s)	Arrangements Made/Planned
<u>SECTOR D-1C</u>					
Therese Van Parys	1700(?) South Johnson Road. 1.65 miles north of Broadway, .1 mile east Adobe colored house/shack 2 broken-down cars in yard	None	Possible Transportation	When son not home, no car, no near neighbors	Check
<u>SECTOR E-1</u>					
Sara Malloy	7200 South 351st Avenue Isolated house with trees, west side of road, north of Baseline alignment	386-3808	Assistance, Transportation	85 years old, legally blind	Call, send transportation
<u>SECTOR F-4</u>					
Ray Koch	35001 West Caldwell St. East of 351st Ave., north of Dobbins. Slump block house with car port.	386-5362	Check	Heart & Nerves, hearing impairment	Call, check
<u>SECTOR G-7</u>					
Ysidro Gutierrez	Arlington Farms North .2 mile on 339th Ave. (Arlington School Road) east 100 feet (just north of Tierra Verde sign), north $\frac{1}{4}$ mile, east $\frac{1}{4}$ mile. Mobile home with enclosed porch which is painted red.	386-6278	Check	Deaf, wife unable to drive. Have not heard sirens in area.	Call, check, be prepared to provide transportation
<u>SECTOR G-8</u>					
Retta Jores	33891 West Old Highway 80 (Trailer N.E. of house) (South of Highway, north of canal)	386-2109	Possible assistance	Aged 81, No Transportation	Call, check with Carol Griffin (Hou at 386-2114 or at Office, 386-3679,

PALO VERDE NUCLEAR GENERATING STATION EMERGENCY PLANNING ZONE - PLUME EXPOSURE PATHWAY

Special Care and Transportation Cases

Name	Address/Directions	Telephone Numbers(s)	Needs	Reason(s)	Arrangements Made/Planned
<u>SECTOR G-8 (Cont.)</u>					
Evelyn Boyer	32801 West Old Highway 80 $\frac{1}{2}$ mile east of Post Office, on top of bluff, white house, (double width mobile home) northernmost of houses on bluff.	386-3522	Transportation		Call, check if assistance needed
<u>SECTOR H-9</u>					
Hubert A. Dreager	$\frac{1}{2}$ mile south of Desert Rose, dirt road, $\frac{1}{4}$ mile east. Weathered house.	None	Notification	No telephone, old age (88, wife 80) Lives with son, 57	Check
<u>SECTOR H-10</u>					
Norman Hoase	C & C Feedyard east of Old U.S. 80. First large trailer on north side of road.	None	Possible assistance	Hearing impairment, no telephone	Check (feed yard closing 1 May 83, may be gone)
<u>SECTOR I-5</u>					
Ed J. Arend	39901 West Salome Highway. Green house, south side of highway, $\frac{1}{4}$ mile off road.	386-3837	Assistance (Has transportation)	Isolated home, 82 years old	Call, check if needs assistance.
<u>SECTOR R-8</u>					
Mary Dow	403rd Avenue (Approximately) & Indian School Road. (Only house on road, east of Tonopah 1 mile)	None	Transportation 0600 - 1700 work days	No neighbors, no phone	Provide transportation
Nettie Kennedy	2734 North 411th Avenue 1.1 miles south of Indian School Road. Southern of 2 houses furthest to west of road.	386-3948 (Son)	Check for assistance	90 years old, with (66 year old) daughter who is blind and deaf	Call to see if assistance needed. Son lives next door has phone.

PALO VERDE NUCLEAR GENERATING STATION EMERGENCY PLANNING ZONE - PLUME EXPOSURE PATHWAY

Special Care and Transportation Cases

Name	Address/Directions	Telephone Numbers(s)	Needs	Reason(s)	Arrangements Made/Planned
<u>SECTOR R-9</u>					
Henry Carrillo	Corner of 403rd Avenue and Camelback	None	Possible assistance	Hearing impairment, no telephone, isolated location. Aged 73	Check

Table 1: Example of Roadway Characteristics

Segment	Number ¹ of Lanes	Type ²	Capacity ³	Comments ⁴
Sector One:				
I-10 West	2	F	1200**	Excellent
Buckeye/Salome West	1	R	1200	Good
Sector Two:				
I-10 East	2	F	1200	Excellent
Buckeye/Salome East	1	R	1200	Good
Baseline Rd./E	1	U	1200	Good
Sector Three:				
Elliot Rd/West	1	R	1200	Fair/Good
Arlington/South	1	R	1200	Good

** Vehicles Per lane Hour

NOTES: ¹Total number of through lanes in both directions. If roadway cross section is not uniform, use section with least number of lanes

²F = Freeways and Expressways

U = Urban Streets

R = Rural Highways

³If known

⁴Indicate any special conditions that may affect roadway capacity.


[illegible][illegible]

	Sector 1			Sector 2			Sector 3		
	2	5	10	2	5	10	2	5	10
Permanent Population **	25	608	1110	0	298	1057	0	50	524
Perm. Population Vehicles	10	243	444	0	119	423	0	20	209
Transient Population	6000	0	0	6000	0	0	6000	0	0
Trans. Population Vehicles	1900	0	0	1900	0	0	1900	0	0
Evacuation Capacity	1200 Vehicles per Lane Hour			1200 Vehicles per Lane Hour			1200 Vehicles per Lane Hour		
Decision Time	30 minutes			30 minutes			30 Minutes		
Notification Time	15			15			15		
Preparation Time	30			30			30		
Subtotal	75 minutes			75 minutes			75 minutes		
Response Time (Normal Conditions)	2	5	10	2	5	10	2	5	10
Total Evacuation Time in Minutes	40 min	44 min	55 min	40 min	54 min	63 min	36 min	42 min	55 min
Time in Hours	115 1 Hr 55 min	119 1 Hr 59 min	130 2 Hr 10 min	115 1 Hr 55 min	129 2 Hrs 9 min	138 2 Hrs 18 min	111 1 Hr 51 min	117 1 Hr 57 min	130 2 Hrs min
Response Time Adverse Conditions	2	5	10	2	5	10	2	5	10
Total Evacuation Time Minutes	48	55	72	48	71	86	47	58	79
Time Hours	123 2 Hrs 3 min	130 2 Hrs 10 min	147 2 Hrs 27 min	123 2 Hrs 3 min	126 2 Hrs 6 min	161 2 Hrs 41 min	122 2 Hrs 2 min	133 2 Hrs 13 min	154 2 Hrs 34 min

** Figures will vary slightly from sector distribution charts due to rounding

To Whom It May Concern:

After review of the attached Time Evacuation Analysis, the Arizona Division of Emergency Services is in agreement with the assumptions, methodology and estimates outlined in the Analysis.


For: Arizona Division of Emergency Services

1/13/84
Date

To Whom It May Concern:

After review of the attached Time Evacuation Analysis, the Maricopa County Department of Civil Defense and Emergency Services is in agreement with the assumptions, methodology and estimates outlined in the Analysis.

Roy B. Bluhm
For: Maricopa County Department of Civil Defense
and Emergency Services

January 12, 1984
Date

