APPENDIX F

Telephone Survey

F. TELEPHONE SURVEY

F.1 Introduction

The development of evacuation time estimates for the Beaver Valley Power Station EPZ requires the identification of travel patterns, car ownership and household size of the population within the EPZ. Demographic information can be obtained from U.S. Census data. The use of this data has several limitations when applied to emergency planning. First, the U.S. Census data do not encompass the range of information needed to identify the time required for preliminary activities (mobilization) that must be undertaken prior to evacuating the area. Secondly, U.S. Census data do not contain attitudinal responses needed from the population of the EPZ and consequently may not accurately represent the anticipated behavioral characteristics of the evacuating populace.

These concerns are addressed by conducting a telephone survey of a representative sample of the EPZ population. The survey is designed to elicit information from the public concerning family demographics and estimates of response times to well defined events. The design of the survey includes a limited number of questions of the form "What would you do if ...?" and other questions regarding activities with which the respondent is familiar ("How long does it take you to ...?")

F.2 Survey Instrument and Sampling Plan

Attachment A presents the final survey instrument used in this study. A draft of the instrument was submitted to stakeholders for comment. Comments were received and the survey instrument was modified accordingly, prior to conducting the survey.

Following the completion of the instrument, a sampling plan was developed. A sample size of approximately 600 **completed** survey forms yields results with a sampling error of ±4% at the 95% confidence level. The sample must be drawn from the EPZ population. Consequently, a list of zip codes in the EPZ was developed using GIS software. This list is shown in Table F-1. Along with each zip code, an estimate of the population and number of households in each area was determined by overlaying U.S. Census data and the EPZ boundary, again using GIS software. The proportional number of desired completed survey interviews for each area was identified, as shown in Table F-1. Note that the average household size computed in Table F-1 was an estimate for sampling purposes and was not used in the ETE study.

The completed survey adhered to the sampling plan.

Table F-1. Beaver Valley Power Station Telephone Survey Sampling Plan

Zip Code	Population within EPZ (2010)[1]	Households	Required Sample
15001	32,433	13,625	170
15009	14,993	6,307	79
15010	7,214	3,074	38
15021	51	22	0
15026	2,453	920	11
15043	2,513	928	12
15050	2,446	907	11
15052	3,669	1,485	19
15059	4,247	1,835	23
15061	12,824	5,491	69
15066	187	85	1
15077	118	50	1
15126	4	1	0
16115	284	103	1
26034	4,952	2,150	27
26047	4,114	1,715	21
26050	1,696	720	9
43920	20,398	8,524	107
44441	155	57	1
Total	**114,751**	**47,999**	**600**
		Average Household Size:	**2.39**
		Total Sample Required:	**600**

[1] The EPZ population used for the telephone survey is slightly higher (1%) than that reported in Table 3-2. The EPZ boundary in West Virginia was moved closer to the 10-mile radius during the ETE study, reducing the land area and population within the West Virginia portion of the EPZ.

F.3 Survey Results

The results of the survey fall into two categories. First, the household demographics of the area can be identified. Demographic information includes such factors as household size, automobile ownership, and automobile availability. The distributions of the time to perform certain pre-evacuation activities are the second category of survey results. These data are processed to develop the trip generation distributions used in the evacuation modeling effort, as discussed in Section 5.

A review of the survey instrument reveals that several questions have a "don't know" (DK) or "refused" entry for a response. It is accepted practice in conducting surveys of this type to accept the answers of a respondent who offers a DK response for a few questions or who refuses to answer a few questions. To address the issue of occasional DK/refused responses from a large sample, the practice is to assume that the distribution of these responses is the same as the underlying distribution of the positive responses. In effect, the DK/refused responses are ignored and the distributions are based upon the positive data that is acquired.

F.3.1 Household Demographic Results

Household Size

Figure F-1 presents the distribution of household size within the EPZ. The average household contains 2.40 people. The estimated household size (2.39 persons) used to determine the survey sample (Table F-1) was drawn from U.S. Census data. The close agreement between the average household size obtained from the survey and from the census is an indication of the reliability of the survey.

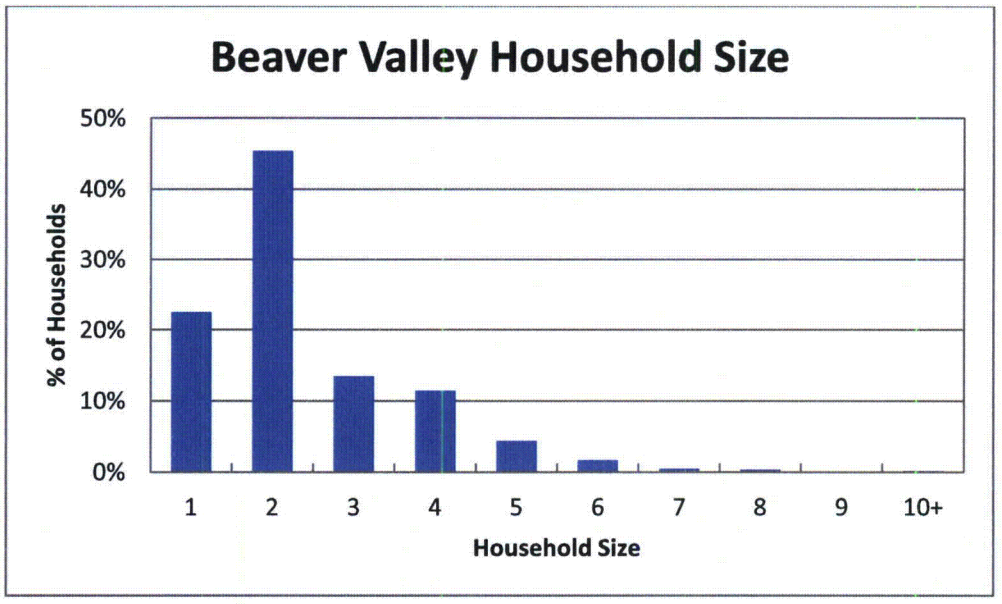

Figure F-1. Household Size in the EPZ

Automobile Ownership

The average number of automobiles available per household in the EPZ is 1.87. It should be noted that approximately 3.6 percent of households do not have access to an automobile. The distribution of automobile ownership is presented in Figure F-2. Figure F-3 and Figure F-4 present the automobile availability by household size. Note that the majority of households without access to a car are single person households. As expected, nearly all households of 2 or more people have access to at least one vehicle.

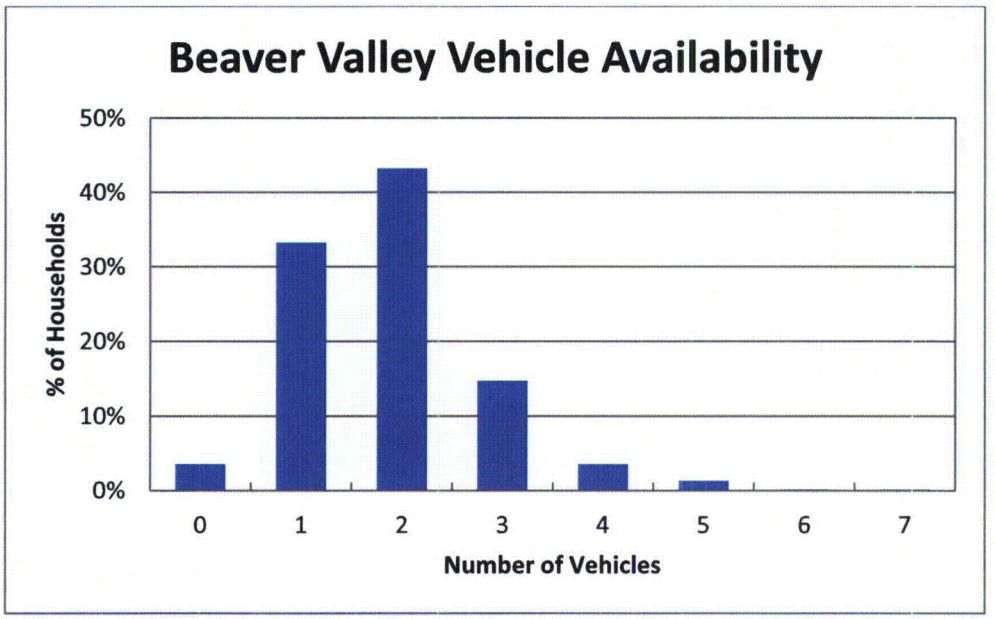

Figure F-2. Household Vehicle Availability

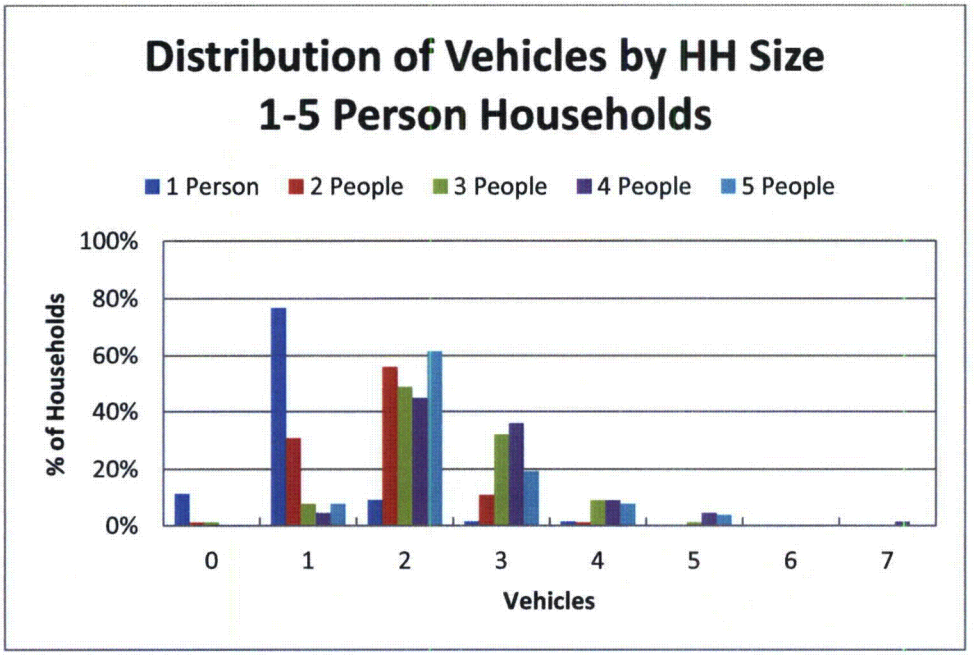

Figure F-3. Vehicle Availability - 1 to 5 Person Households

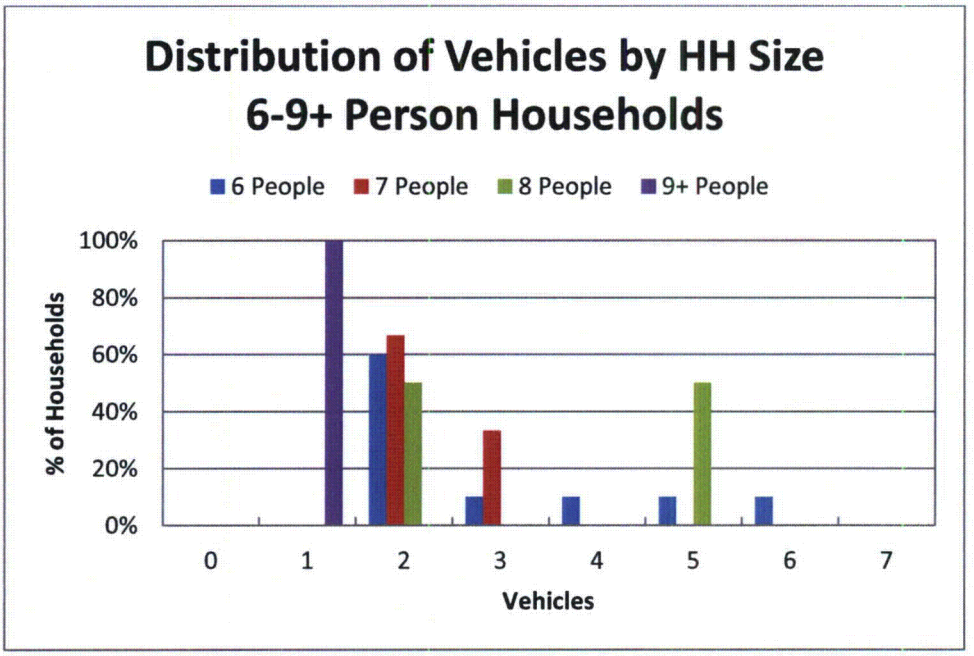

Figure F-4. Vehicle Availability - 6 to 9+ Person Households

Ridesharing

Ninety-three percent (93%) of the households surveyed who do not own a vehicle responded that they would share a ride with a neighbor, relative, or friend if a car was not available to them when advised to evacuate in the event of an emergency. Note, however, that only those households with no access to a vehicle – 30 total out of the sample size of 600 – answered this question. Thus, the results are not statistically significant. As such, the NRC recommendation of 50% ridesharing is used throughout this study. Figure F-5 presents this response.

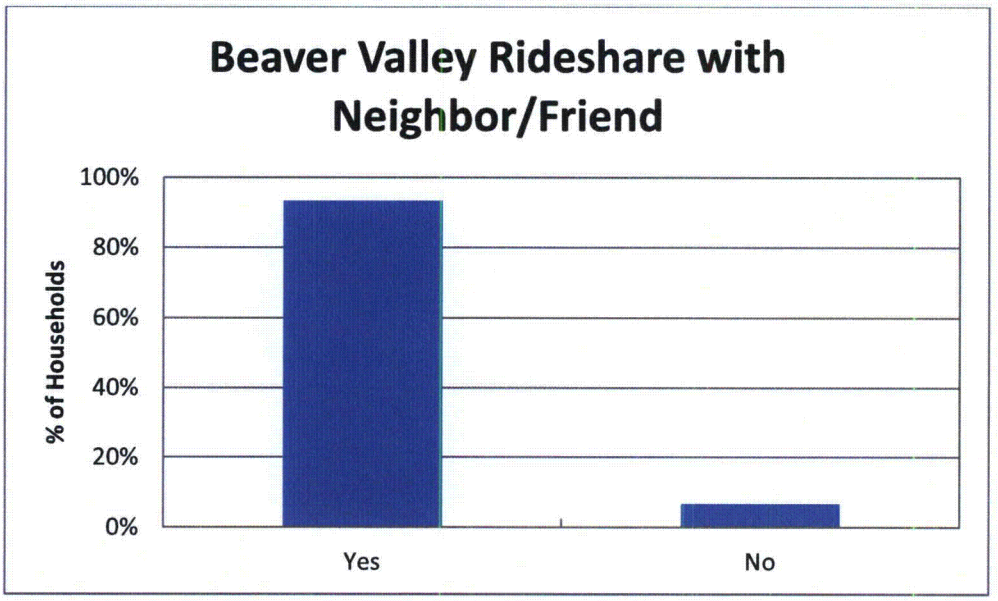

Figure F-5. Household Ridesharing Preference

Commuters

Figure F-6 presents the distribution of the number of commuters in each household. Commuters are defined as household members who travel to work or college on a daily basis. The data shows an average of 0.90 commuters in each household in the EPZ, and 52% of households have at least one commuter.

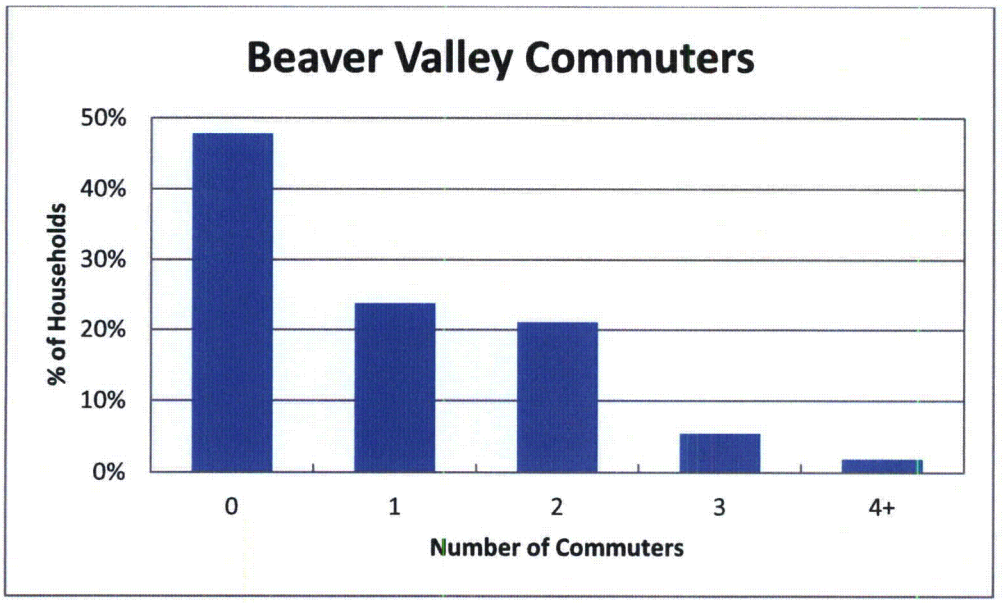

Figure F-6. Commuters in Households in the EPZ

Commuter Travel Modes

Figure F-7 presents the mode of travel that commuters use on a daily basis. The vast majority of commuters use their private automobiles to travel to work. The data shows an average of 1.04 employees per vehicle, assuming 2 people per vehicle – on average – for carpools.

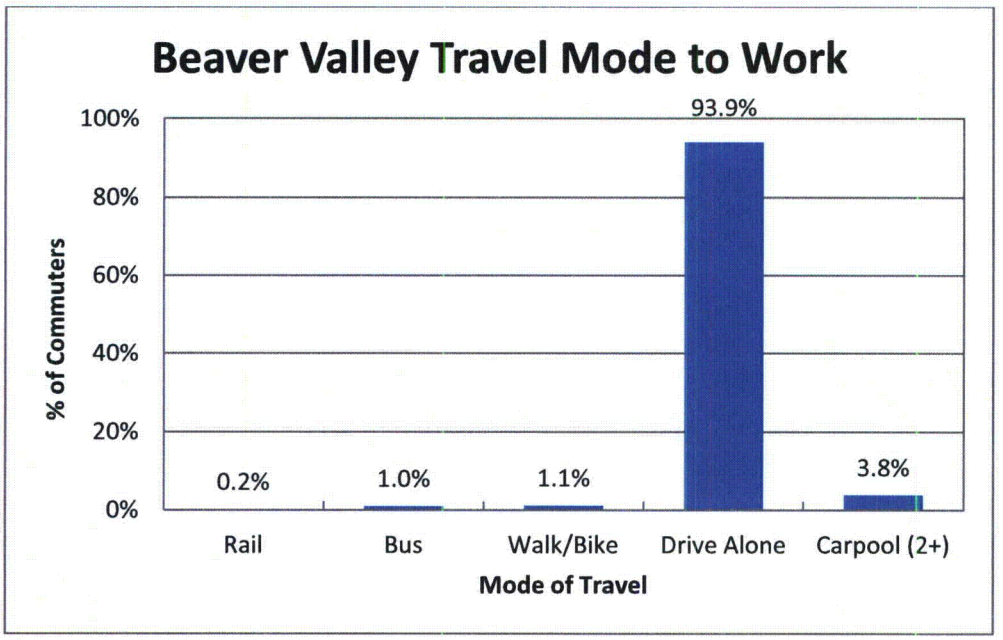

Figure F-7. Modes of Travel in the EPZ

F.3.2 Evacuation Response

Several questions were asked to gauge the population's response to an emergency. These are now discussed:

"How many of the vehicles would your household use during an evacuation?" The response is shown in Figure F-8. On average, evacuating households would use 1.23 vehicles.

"Would your family await the return of other family members prior to evacuating the area?" Of the survey participants who responded, 48 percent said they would await the return of other family members before evacuating and 52 percent indicated that they would not await the return of other family members.

"If you had a household pet, would you take your pet with you if you were asked to evacuate the area?" Based on the responses to the survey, 64 percent of households have a family pet. Of the households with pets, 94 percent of them indicated that they would take their pets with them, as shown in Figure F-9.

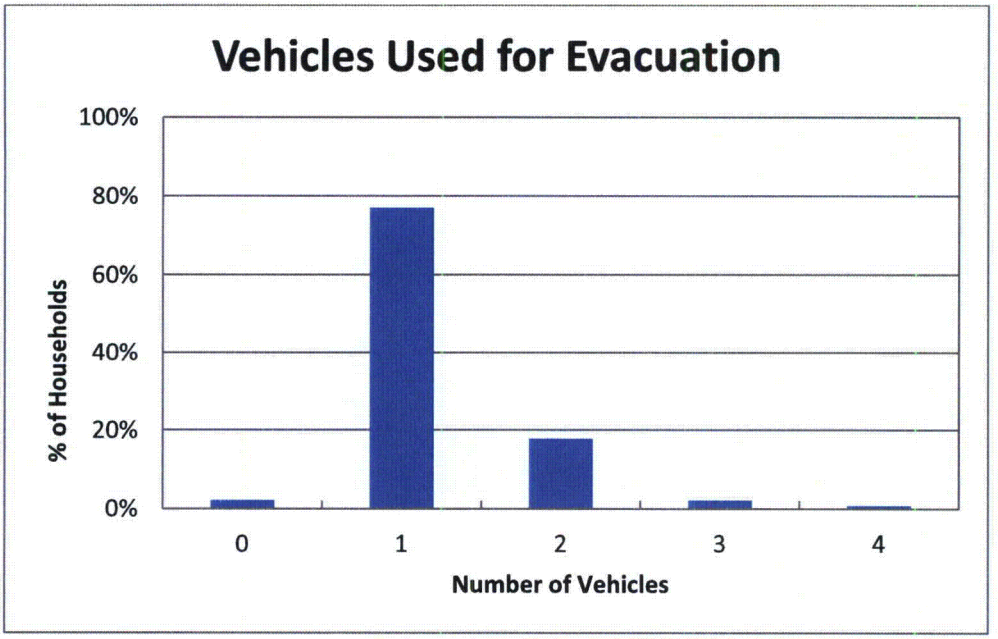

Figure F-8. Number of Vehicles Used for Evacuation

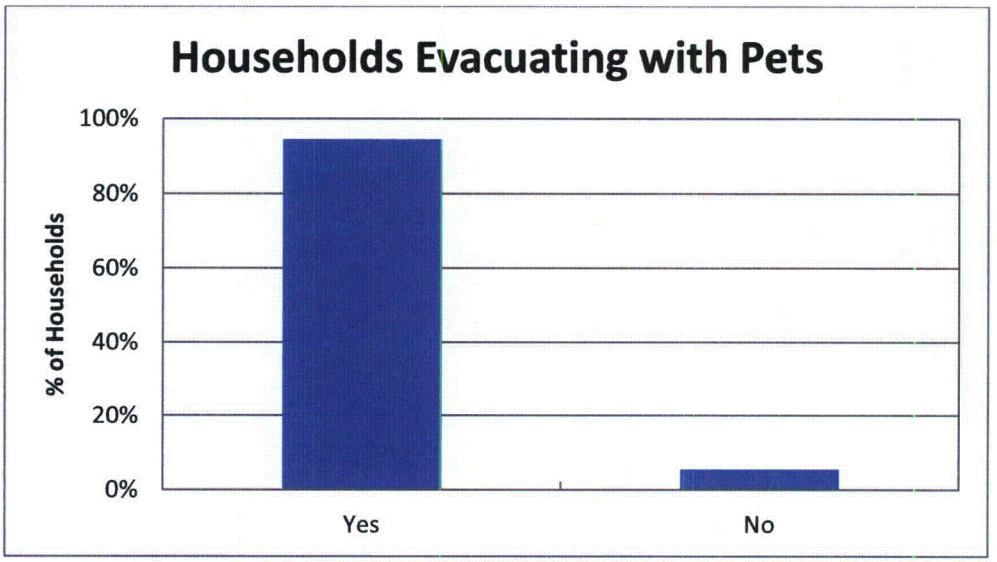

Figure F-9. Households Evacuating with Pets

"Emergency officials advise you to take shelter at home in an emergency. Would you?" This question is designed to elicit information regarding compliance with instructions to shelter in place. The results indicate that 83 percent of households who are advised to shelter in place would do so; the remaining 17 percent would choose to evacuate the area. Note the baseline ETE study assumes 20 percent of households will not comply with the shelter advisory, as per Section 2.5.2 of NUREG/CR-7002. Thus, the data obtained above is in good agreement with the federal guidance.

"Emergency officials advise you to take shelter at home now in an emergency and possibly evacuate later while people in other areas are advised to evacuate now. Would you?" This question is designed to elicit information specifically related to the possibility of a staged evacuation. That is, asking a population to shelter in place now and then to evacuate after a specified period of time. Results indicate that 68 percent of households would follow instructions and delay the start of evacuation until so advised, while the balance of 32 percent would choose to begin evacuating immediately.

F.3.3 Time Distribution Results

The survey asked several questions about the amount of time it takes to perform certain pre-evacuation activities. These activities involve actions taken by residents during the course of their day-to-day lives. Thus, the answers fall within the realm of the responder's experience.

The mobilization distributions provided below are the result of having applied the analysis described in Section 5.4.1 on the component activities of the mobilization.

"How long does it take the commuter to complete preparation for leaving work?" Figure F-10 presents the cumulative distribution; in all cases, the activity is completed within 75 minutes. Eighty-six percent can leave within 30 minutes.

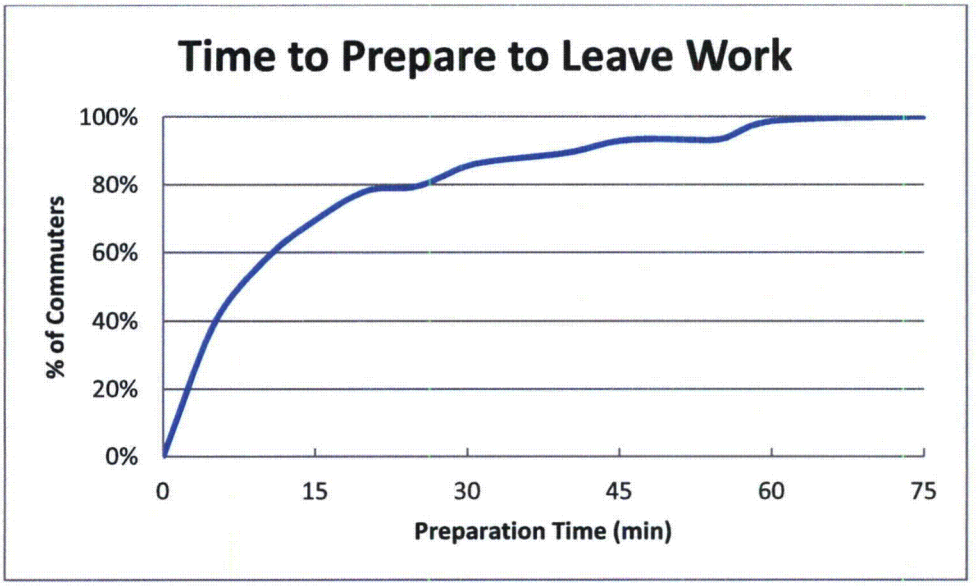

Figure F-10. Time Required to Prepare to Leave Work/School

"How long would it take the commuter to travel home?" Figure F-11 presents the work to home travel time for the EPZ. About 77 percent of commuters can arrive home within 30 minutes of leaving work; all within 90 minutes.

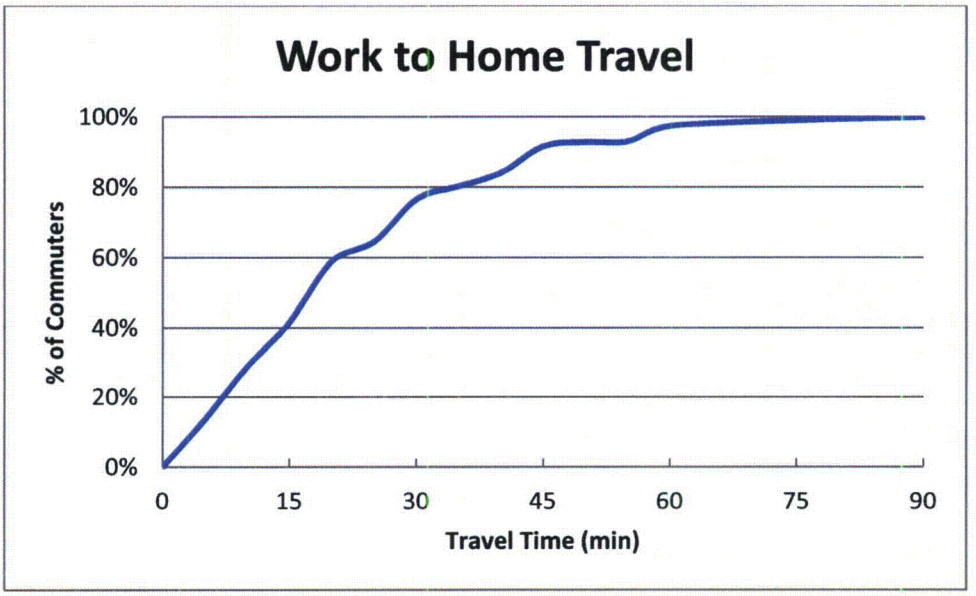

Figure F-11. Work to Home Travel Time

"How long would it take the family to pack clothing, secure the house, and load the car?" Figure F-12 presents the time required to prepare for leaving on an evacuation trip. In many ways this activity mimics a family's preparation for a short holiday or weekend away from home. Hence, the responses represent the experience of the responder in performing similar activities.

The distribution shown in Figure F-12 has a long "tail." About 85 percent of households can be ready to leave home within 60 minutes; the remaining households require up to an additional two hours.

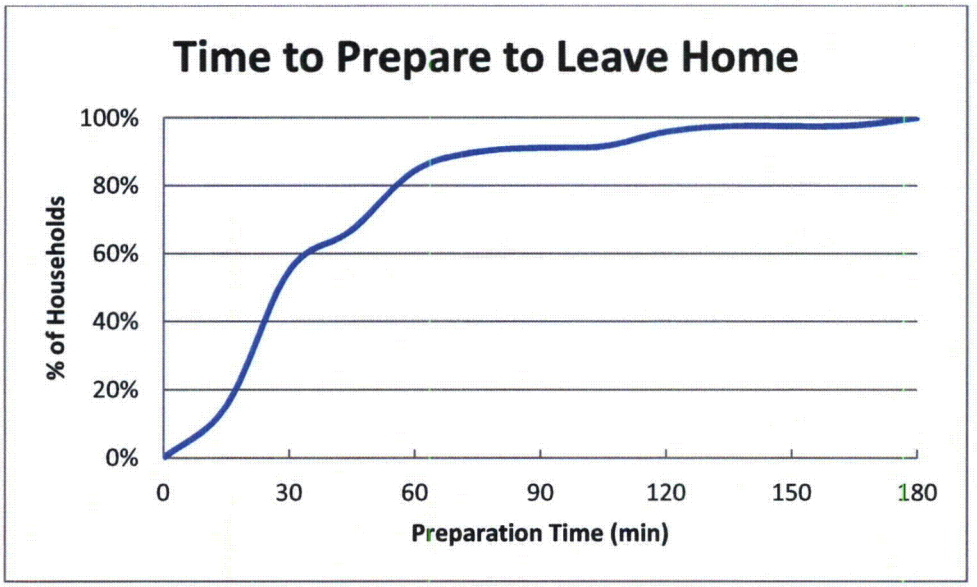

Figure F-12. Time to Prepare Home for Evacuation

"How long would it take you to clear 6 to 8 inches of snow from your driveway?" During adverse, snowy weather conditions, an additional activity must be performed before residents can depart on the evacuation trip. Although snow scenarios assume that the roads and highways have been plowed and are passable (albeit at lower speeds and capacities), it may be necessary to clear a private driveway prior to leaving the home so that the vehicle can access the street. Figure F-13 presents the time distribution for removing 6 to 8 inches of snow from a driveway. The time distribution for clearing the driveway has a long tail; about 77 percent of driveways are passable within 30 minutes. The last driveway is cleared three hours after the start of this activity. Note that those respondents (58%) who answered that they would not take time to clear their driveway were assumed to be ready immediately at the start of this activity. Essentially they would drive through the snow on the driveway to access the roadway and begin their evacuation trip.

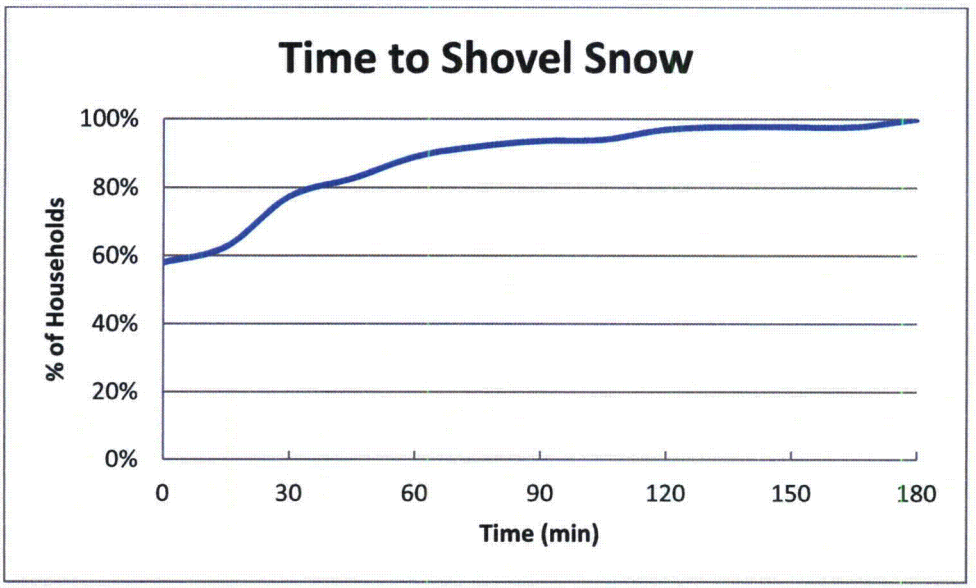

Figure F-13. Time to Clear Driveway of 6"-8" of Snow

F.4 Conclusions

The telephone survey provides valuable, relevant data associated with the EPZ population, which have been used to quantify demographics specific to the EPZ, and "mobilization time" which can influence evacuation time estimates.

ATTACHMENT A

Telephone Survey Instrument

Telephone Survey Instrument

Hello, my name is _____ and I'm working on a survey for **[Beaver County (if zip code begins with 1); Columbiana County Emergency Management Agency (if zip code begins with 4); Hancock County (if zip code begins with 2)]** to identify local behavior during emergency situations. This information will be used for emergency planning and will be shared with local emergency officials to enhance emergency response plans in your area for all hazards; Emergency planning for some hazards may require evacuation. Your responses will greatly contribute to local emergency preparedness. You will not be asked for your name or personal information.

COL. 1	Unused
COL. 2	Unused
COL. 3	Unused
COL. 4	Unused
COL. 5	Unused
Sex	COL. 8
1	Male
2	Female

INTERVIEWER: ASK TO SPEAK TO THE HEAD OF HOUSEHOLD OR THE SPOUSE OF THE HEAD OF HOUSEHOLD. (Terminate call if not a residence.)

DO NOT ASK:

1A.	Record area code. To Be Determined	COL. 9-11
1B.	Record exchange number. To Be Determined	COL. 12-14
2A.	What is your home zip code? (DO NOT READ ANSWERS)	COL. 15-16
	15001	01 (SKIP TO 2B)
	15009	02 (SKIP TO 2B)
	15010	03 (SKIP TO 2B)
	15026	04 (SKIP TO 2B)
	15043	05 (SKIP TO 2B)
	15050	06 (SKIP TO 2B)
	15052	07 (SKIP TO 2B)
	15059	08 (SKIP TO 2B)
	15061	09 (SKIP TO 2B)
	15066	10 (SKIP TO 2B)
	15077	11 (SKIP TO 2B)
	16115	12 (SKIP TO 2B)
	26034	13 (SKIP TO 3A)
	26047	14 (SKIP TO 3A)
	26050	15 (SKIP TO 3A)
	43920	16 (SKIP TO 3A)
	44441	17 (SKIP TO 3A)
	All Other Zip Codes or Don't Know/Refused	Out of Study Area – Terminate Call

2B.	Which municipality do you live in? (DO NOT READ ANSWERS)	COL. 17-18
	Aliquippa	01
	Beaver	02
	Bridgewater	03
	Brighton	04
	Center	05
	Chippewa– (bisected) – **Ask follow up question**	
	Do you live:	
	South of State Hwy 251 (Blackhawk Rd)	06
	North of State Hwy 251 (Blackhawk Rd)	Out of Study Area – Terminate Call
	Fallston	07
	Frankfort Springs	08
	Glasgow	09
	Georgetown	10
	Greene	11
	Hanover – (bisected) – **Ask follow up question**	
	Do you live in:	
	Beaver County	12
	Washington County	Out of Study Area – Terminate Call
	Hookstown	13
	Hopewell	14
	Independence	15
	Industry	16
	Monaca	17
	Midland	18
	Ohioville	19
	Patterson Heights	20
	Patterson	21
	Potter	22
	Raccoon	23
	Shippingport	24
	South Beaver – (bisected) – **Ask follow up question**	
	Do you live:	
	South of State Hwy 251 (Blackhawk Rd)	25
	North of State Hwy 251 (Blackhawk Rd)	Out of Study Area – Terminate Call
	South Heights	26

	Vanport	27	
	All other municipalities or don't know/refused	Out of Study Area – Terminate Call	
3A.	In total, how many cars, or other vehicles are usually available to the household? (DO NOT READ ANSWERS)	COL. 20	SKIP TO
		1 ONE	Q. 4
		2 TWO	Q. 4
		3 THREE	Q. 4
		4 FOUR	Q. 4
		5 FIVE	Q. 4
		6 SIX	Q. 4
		7 SEVEN	Q. 4
		8 EIGHT	Q. 4
		9 NINE OR MORE	Q. 4
		0 ZERO (NONE)	Q. 3B
		X DON'T KNOW/REFUSED	Q. 3B
3B.	In an emergency, could you get a ride out of the area with a neighbor or friend?	COL. 21	
		1 YES	
		2 NO	
		X DON'T KNOW/REFUSED	
4.	How many people usually live in this household? (DO NOT READ ANSWERS)	COL. 22	COL. 23
		1 ONE	0 TEN
		2 TWO	1 ELEVEN
		3 THREE	2 TWELVE
		4 FOUR	3 THIRTEEN
		5 FIVE	4 FOURTEEN
		6 SIX	5 FIFTENN
		7 SEVEN	6 SIXTEEN
		8 EIGHT	7 SEVENTEEN
		9 NINE	8 EIGHTEEN
			9 NINETEEN OR MORE
			X DON'T KNOW/REFUSED
5.	How many adults in the household commute to a job, or to college on a daily basis?	COL. 24	SKIP TO
		0 ZERO	Q. 9
		1 ONE	Q. 6
		2 TWO	Q. 6
		3 THREE	Q. 6
		4 FOUR OR MORE	Q. 6
		5 DON'T KNOW/REFUSED	Q. 9

INTERVIEWER: For each person identified in Question 5, ask Questions 6, 7, and 8.

6. Thinking about commuter #1, how does that person usually travel to work or college? (REPEAT QUESTION

FOR EACH COMMUTER)

	Commuter #1	Commuter #2	Commuter #3	Commuter #4
	COL. 25	COL. 26	COL. 27	COL. 28
Rail	1	1	1	1
Bus	2	2	2	2
Walk/Bicycle	3	3	3	3
Drive Alone	4	4	4	4
Carpool-2 or more people	5	5	5	5
Don't know/Refused	6	6	6	6

7. How much time on average, would it take Commuter #1 to travel home from work or college? (REPEAT QUESTION FOR EACH COMMUTER) (DO NOT READ ANSWERS)

COMMUTER #1

COL. 29		COL. 30	
1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 – 1 HOUR
4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5	21-25 MINUTES	5	BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6	26-30 MINUTES	6	BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)
9	41-45 MINUTES	9	
		0	
		X	DON'T KNOW /REFUSED

COMMUTER #2

COL. 31		COL. 32	
1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 – 1 HOUR
4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5	21-25 MINUTES	5	BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6	26-30 MINUTES	6	BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)
9	41-45 MINUTES	9	
		0	
		X	DON'T KNOW /REFUSED

COMMUTER #3

COL. 33		COL. 34	
1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 – 1 HOUR
4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES

COMMUTER #4

COL. 35		COL. 36	
1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 – 1 HOUR
4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES

5	21-25 MINUTES	5	BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES	5	21-25 MINUTES	5	BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6	26-30 MINUTES	6	BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES	6	26-30 MINUTES	6	BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS	7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)	8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)
9	41-45 MINUTES	9		9	41-45 MINUTES	9	
		0				0	
		X	DON'T KNOW /REFUSED			X	DON'T KNOW /REFUSED

8. Approximately how much time does it take Commuter #1 to complete preparation for leaving work or college prior to starting the trip home? (REPEAT QUESTION FOR EACH COMMUTER) (DO NOT READ ANSWERS)

COMMUTER #1				COMMUTER #2			
COL. 37		COL. 38		COL. 39		COL. 40	
1	5 MINUTES OR LESS	1	46-50 MINUTES	1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES	2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 – 1 HOUR	3	11-15 MINUTES	3	56 – 1 HOUR
4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES	4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5	21-25 MINUTES	5	BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES	5	21-25 MINUTES	5	BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6	26-30 MINUTES	6	BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES	6	26-30 MINUTES	6	BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS	7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)	8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)
9	41-45 MINUTES	9		9	41-45 MINUTES	9	
		0				0	
		X	DON'T KNOW /REFUSED			X	DON'T KNOW /REFUSED

COMMUTER #3				COMMUTER #4			
COL. 41		COL. 42		COL. 43		COL. 44	
1	5 MINUTES OR LESS	1	46-50 MINUTES	1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES	2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 – 1 HOUR	3	11-15 MINUTES	3	56 – 1 HOUR
4	16-20 MINUTES	4	OVER 1 HOUR, BUT	4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS

			LESS THAN 1 HOUR 15 MINUTES				THAN 1 HOUR 15 MINUTES
5	21-25 MINUTES	5	BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES	5	21-25 MINUTES	5	BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6	26-30 MINUTES	6	BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES	6	26-30 MINUTES	6	BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS	7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)	8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)
9	41-45 MINUTES	9		9	41-45 MINUTES	9	
		0				0	
		X	DON'T KNOW /REFUSED			X	DON'T KNOW /REFUSED

9. If you were advised by local authorities to evacuate, how much time would it take the household to pack clothing, medications, secure the house, load the car, and complete preparations prior to evacuating the area? (DO NOT READ ANSWERS)

COL. 45

1 LESS THAN 15 MINUTES
2 15-30 MINUTES
3 31-45 MINUTES
4 46 MINUTES – 1 HOUR
5 1 HOUR TO 1 HOUR 15 MINUTES
6 1 HOUR 16 MINUTES TO 1 HOUR 30 MINUTES
7 1 HOUR 31 MINUTES TO 1 HOUR 45 MINUTES
8 1 HOUR 46 MINUTES TO 2 HOURS
9 2 HOURS TO 2 HOURS 15 MINUTES
0 2 HOURS 16 MINUTES TO 2 HOURS 30 MINUTES
X 2 HOURS 31 MINUTES TO 2 HOURS 45 MINUTES
Y 2 HOURS 46 MINUTES TO 3 HOURS

COL. 46

1 3 HOURS TO 3 HOURS 15 MINUTES
2 3 HOURS 16 MINUTES TO 3 HOURS 30 MINUTES
3 3 HOURS 31 MINUTES TO 3 HOURS 45 MINUTES
4 3 HOURS 46 MINUTES TO 4 HOURS
5 4 HOURS TO 4 HOURS 15 MINUTES
6 4 HOURS 16 MINUTES TO 4 HOURS 30 MINUTES
7 4 HOURS 31 MINUTES TO 4 HOURS 45 MINUTES
8 4 HOURS 46 MINUTES TO 5 HOURS
9 5 HOURS TO 5 HOURS 30 MINUTES
0 5 HOURS 31 MINUTES TO 6 HOURS
X OVER 6 HOURS (SPECIFY _____)

COL. 47

1 DON'T KNOW/REFUSED

10. If there is 6-8" of snow on your driveway or curb, would you need to shovel out to evacuate? If yes, how much time, on average, would it take you to clear the 6-8" of snow to move the car from the driveway or curb to begin the evacuation trip? Assume the roads are passable. (DO NOT READ RESPONSES)

COL. 48

1 LESS THAN 15 MINUTES
2 15-30 MINUTES
3 31-45 MINUTES
4 46 MINUTES – 1 HOUR

COL. 49

1 OVER 3 HOURS (SPECIFY _____)
2 DON'T KNOW/REFUSED

5	1 HOUR TO 1 HOUR 15 MINUTES
6	1 HOUR 16 MINUTES TO 1 HOUR 30 MINUTES
7	1 HOUR 31 MINUTES TO 1 HOUR 45 MINUTES
8	1 HOUR 46 MINUTES TO 2 HOURS
9	2 HOURS TO 2 HOURS 15 MINUTES
0	2 HOURS 16 MINUTES TO 2 HOURS 30 MINUTES
X	2 HOURS 31 MINUTES TO 2 HOURS 45 MINUTES
Y	2 HOURS 46 MINUTES TO 3 HOURS
Z	NO, WILL NOT SHOVEL OUT

11. Please choose one of the following (READ ANSWERS):

A. I would await the return of household commuters to evacuate together.

B. I would evacuate independently and meet other household members later.

COL. 50

1	A
2	B
X	DON'T KNOW/REFUSED

12. How many vehicles would your household use during an evacuation? (DO NOT READ ANSWERS)

COL. 51

1	ONE
2	TWO
3	THREE
4	FOUR
5	FIVE
6	SIX
7	SEVEN
8	EIGHT
9	NINE OR MORE
0	ZERO (NONE)
X	DON'T KNOW/REFUSED

13A. Emergency officials advise you to take shelter at home in an emergency. Would you: (READ ANSWERS)

A. SHELTER; or

B. EVACUATE

COL. 52

1	A
2	B
X	DON'T KNOW/REFUSED

13B. Emergency officials advise you to take shelter at home now in an emergency and possibly evacuate later while people in other areas are advised to evacuate now. Would you: (READ ANSWERS)

A. SHELTER; or

B. EVACUATE

COL. 53

1	A
2	B
X	DON'T KNOW/REFUSED

14. **(ONLY ASK IF ZIP CODE BEGINS WITH 1)** If you have a household pet, would you take your pet with you if you were asked to evacuate the area? (READ ANSWERS)

COL. 54

1	DON'T HAVE A PET
2	YES
3	NO

X DON'T KNOW/REFUSED

Thank you very much. _____

(TELEPHONE NUMBER CALLED)

IF REQUESTED:

For additional information, contact your County Emergency Management Agency during normal business hours.

County	EMA Phone
Beaver	724.775.1700
Columbiana	330.424.9725
Hancock	304.564.4040

APPENDIX G

Traffic Management Plan

G. TRAFFIC MANAGEMENT PLAN

NUREG/CR-7002 indicates that the existing TCPs and ACPs identified by the offsite agencies should be used in the evacuation simulation modeling. The traffic and access control plans for the EPZ were provided by each county.

These plans were reviewed and the TCPs and ACPs were modeled accordingly.

G.1 Traffic Control Points

As discussed in Section 9, traffic control points at intersections (which are controlled) are modeled as actuated signals. If an intersection has a pre-timed signal, stop, or yield control, and the intersection is identified as a traffic control point, the control type was changed to an actuated signal in the DYNEV II system. Table K-2 provides the control type and node number for those nodes which are controlled. If the existing control was changed due to the point being a TCP, the control type is indicated as "Traffic Control Point" in Table K-2.

Figure G-1 maps the TCPs identified in the county emergency plans. These TCPS are concentrated in Monaca, PA and along major evacuation routes which were identified as the congested areas/roadways in Section 7.3. Theses TCPs would be manned during evacuation by traffic guides who would direct evacuees in the proper direction and facilitate the flow of traffic through the intersections.

G.2 Access Control Points

It is assumed that ACPs will be established within 2 hours of the ATE to discourage through travelers from using major through routes which traverse the EPZ. As discussed in Section 3.6, external traffic was only considered on two routes which traverse the study area – Interstate-376 and US 22 – in this analysis. The generation of these external trips ceased at 2 hours after the ATE in the simulation.

According to the counties' emergency plans, the access control points in Beaver, Hancock, and Columbiana are listed in their respective emergency operations centers, and will be manned after the ATE has been given. It is recommended that ACPs on the northern and southern boundaries of the EPZ along I-376 be the top priority in assigning manpower and equipment as it is a major route traversing the EPZ, which will typically carry the highest volume of through traffic.

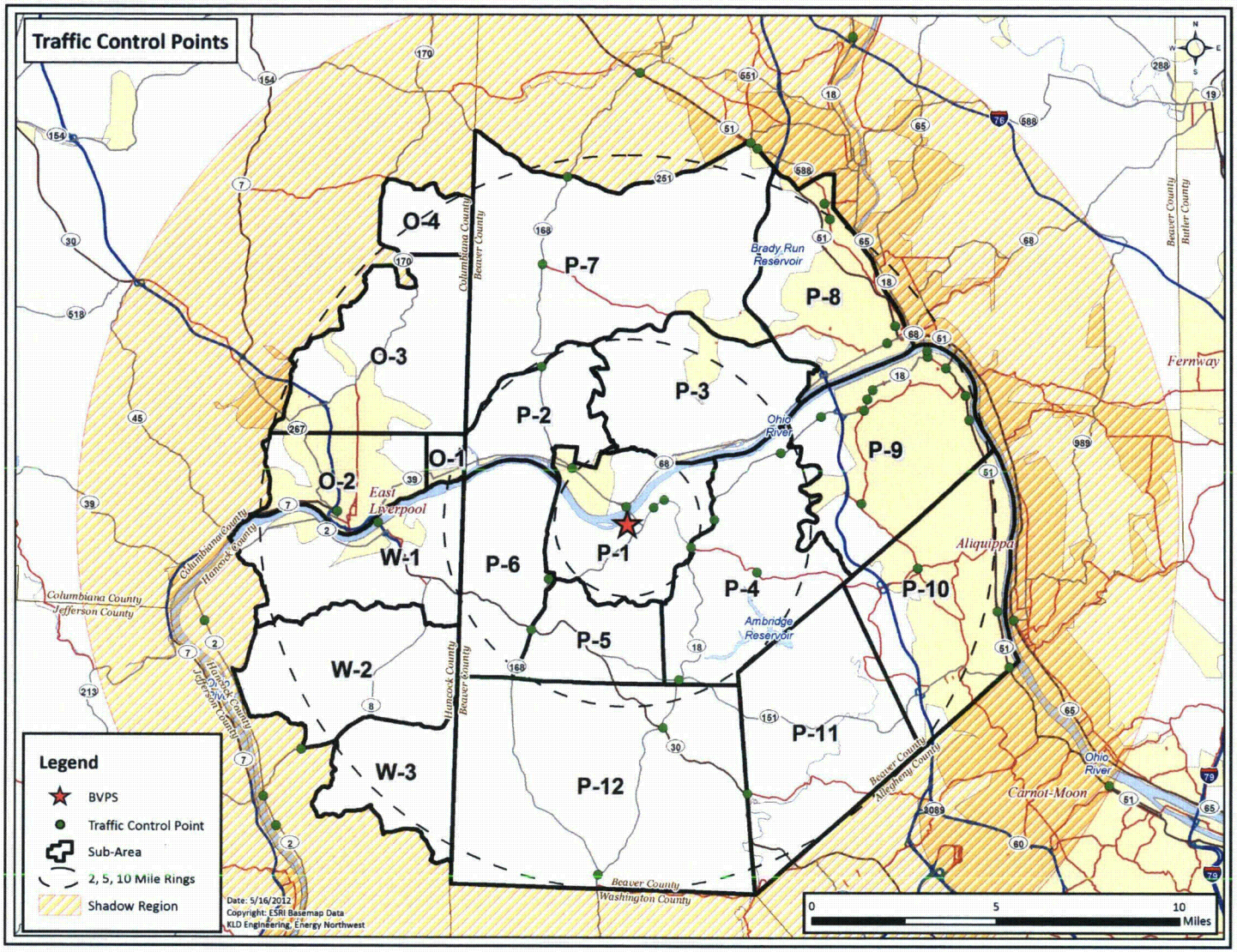

Figure G-1. Traffic Control Points for the Beaver Valley Power Station Modeled in DYNEV II

APPENDIX H

Evacuation Regions

H EVACUATION REGIONS

This appendix presents the evacuation percentages for each evacuation region (Table H-1) and maps of all evacuation regions. The percentages presented in Table H-1 are based on the methodology discussed in assumption 5 of Section 2.2 and shown in Figure 2-1.

Note, the baseline ETE study assumes 20 percent of households will not comply with the shelter advisory, as per Section 2.5.2 of NUREG/CR-7002.

Table H-1. Percent of Sub-Area Population Evacuating for Each Region

		Sub-Area																		
		Pennsylvania												Ohio				West Virginia		
Region	Description	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	P-11	P-12	O-1	O-2	O-3	O-4	W-1	W-2	W-3
R01	2-Mile Region	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
R02	5-Mile Region	100%	100%	100%	100%	100%	100%	20%	20%	20%	20%	20%	20%	100%	20%	20%	20%	20%	20%	20%
R03	Full EPZ	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
R04	PA	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%
R05	OH	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	100%	100%	100%	100%	20%	20%	20%
R06	WV	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	100%	100%	100%
Evacuate 2-Mile Region and Downwind to 5 Miles																				
		Sub-Area																		
		Pennsylvania												Ohio				West Virginia		
Region	Wind Direction From:	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	P-11	P-12	O-1	O-2	O-3	O-4	W-1	W-2	W-3
R07	350-11, 12-34	100%	20%	20%	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
R08	35-56	100%	20%	20%	20%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
R09	57-79, 80-101	100%	100%	20%	20%	100%	100%	20%	20%	20%	20%	20%	20%	100%	20%	20%	20%	20%	20%	20%
R10	102-124	100%	100%	20%	20%	20%	100%	20%	20%	20%	20%	20%	20%	100%	20%	20%	20%	20%	20%	20%
R11	125-146, 147-169	100%	100%	100%	20%	20%	100%	20%	20%	20%	20%	20%	20%	100%	20%	20%	20%	20%	20%	20%
R12	170-191	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
R13	192-214	100%	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
R14	215-236, 237-259, 260-281	100%	20%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
R15	282-304, 305-326, 327-349	100%	20%	20%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Evacuate 2-Mile Region and Downwind to EPZ Boundary																				
		Sub-Area																		
		Pennsylvania												Ohio				West Virginia		
Region	Wind Direction From:	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	P-11	P-12	O-1	O-2	O-3	O-4	W-1	W-2	W-3
R16	350-11	100%	20%	20%	100%	100%	100%	20%	20%	20%	20%	100%	100%	20%	20%	20%	20%	20%	100%	100%
R17	12-34	100%	20%	20%	100%	100%	100%	20%	20%	20%	20%	100%	100%	20%	20%	20%	20%	100%	100%	100%
R18	35-56	100%	20%	20%	20%	100%	100%	20%	20%	20%	20%	20%	100%	100%	100%	20%	20%	100%	100%	100%
R19	57-79	100%	100%	20%	20%	100%	100%	20%	20%	20%	20%	20%	100%	100%	100%	100%	20%	100%	100%	100%
R20	80-101	100%	100%	20%	20%	100%	100%	100%	20%	20%	20%	20%	100%	100%	100%	100%	100%	100%	100%	100%
R21	102-124	100%	100%	20%	20%	20%	100%	100%	20%	20%	20%	20%	20%	100%	100%	100%	100%	100%	100%	20%
R22	125-146	100%	100%	100%	20%	20%	100%	100%	20%	20%	20%	20%	20%	100%	100%	100%	100%	100%	20%	20%
R23	147-169	100%	100%	100%	20%	20%	100%	100%	100%	20%	20%	20%	20%	100%	100%	100%	100%	20%	20%	20%
R24	170-191	100%	100%	100%	20%	20%	20%	100%	100%	20%	20%	20%	20%	20%	20%	100%	100%	20%	20%	20%
R25	192-214	100%	100%	100%	100%	20%	20%	100%	100%	100%	20%	20%	20%	20%	20%	20%	100%	20%	20%	20%
R26	215-236	100%	20%	100%	100%	20%	20%	100%	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%
R27	237-259	100%	20%	100%	100%	20%	20%	100%	100%	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%
R28	260-281	100%	20%	100%	100%	20%	20%	20%	100%	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%
R29	282-304, 305-326	100%	20%	20%	100%	100%	20%	20%	20%	100%	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%
R30	327-349	100%	20%	20%	100%	100%	20%	20%	20%	20%	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%

Evacuate 5-Mile Region and Downwind to the EPZ Boundary

		Sub-Area																		
		Pennsylvania												Ohio				West Virginia		
Region	Wind Direction From:	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	P-11	P-12	O-1	O-2	O-3	O-4	W-1	W-2	W-3
R31	350-11	100%	100%	100%	100%	100%	100%	20%	20%	20%	20%	100%	100%	100%	20%	20%	20%	20%	100%	100%
R32	12-34	100%	100%	100%	100%	100%	100%	20%	20%	20%	20%	100%	100%	100%	20%	20%	20%	100%	100%	100%
R33	35-56	100%	100%	100%	100%	100%	100%	20%	20%	20%	20%	20%	100%	100%	100%	20%	20%	100%	100%	100%
R34	57-79	100%	100%	100%	100%	100%	100%	20%	20%	20%	20%	20%	100%	100%	100%	100%	20%	100%	100%	100%
R35	80-101	100%	100%	100%	100%	100%	100%	100%	20%	20%	20%	20%	100%	100%	100%	100%	100%	100%	100%	100%
R36	102-124	100%	100%	100%	100%	100%	100%	100%	20%	20%	20%	20%	20%	100%	100%	100%	100%	100%	100%	20%
R37	125-146	100%	100%	100%	100%	100%	100%	100%	20%	20%	20%	20%	20%	100%	100%	100%	100%	100%	20%	20%
R38	147-169	100%	100%	100%	100%	100%	100%	100%	100%	20%	20%	20%	20%	100%	100%	100%	100%	20%	20%	20%
R39	170-191	100%	100%	100%	100%	100%	100%	100%	100%	20%	20%	20%	20%	100%	20%	100%	100%	20%	20%	20%
R40	192-214	100%	100%	100%	100%	100%	100%	100%	100%	100%	20%	20%	20%	100%	20%	20%	100%	20%	20%	20%
R41	215-236	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	20%	20%	100%	20%	20%	20%	20%	20%	20%
R42	237-259	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	20%	100%	20%	20%	20%	20%	20%	20%
R43	260-281	100%	100%	100%	100%	100%	100%	20%	100%	100%	100%	100%	20%	100%	20%	20%	20%	20%	20%	20%
R44	282-304, 305-326	100%	100%	100%	100%	100%	100%	20%	20%	100%	100%	100%	100%	100%	20%	20%	20%	20%	20%	20%
R45	327-349	100%	100%	100%	100%	100%	100%	20%	20%	20%	100%	100%	100%	100%	20%	20%	20%	20%	20%	20%

Staged Evacuation - 2-Mile Region Evacuates, then Evacuate Downwind to 5 Miles

		Sub-Area																		
		Pennsylvania												Ohio				West Virginia		
Region	Wind Direction From:	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	P-11	P-12	O-1	O-2	O-3	O-4	W-1	W-2	W-3
R46	350-11, 12-34	100%	20%	20%	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
R47	35-56	100%	20%	20%	20%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
R48	57-79, 80-101	100%	100%	20%	20%	100%	100%	20%	20%	20%	20%	20%	20%	100%	20%	20%	20%	20%	20%	20%
R49	102-124	100%	100%	20%	20%	20%	100%	20%	20%	20%	20%	20%	20%	100%	20%	20%	20%	20%	20%	20%
R50	125-146, 147-169	100%	100%	100%	20%	20%	100%	20%	20%	20%	20%	20%	20%	100%	20%	20%	20%	20%	20%	20%
R51	170-191	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
R52	192-214	100%	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
R53	215-236, 237-259, 260-281	100%	20%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
R54	282-304, 305-326, 327-349	100%	20%	20%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
R55	5-Mile Region	100%	100%	100%	100%	100%	100%	20%	20%	20%	20%	20%	20%	100%	20%	20%	20%	20%	20%	20%

Sub-Area(s) Shelter-in-Place until 90% ETE for R01, then Evacuate	Sub-Area(s) Shelter-in-Place	Sub-Area(s) Evacuate

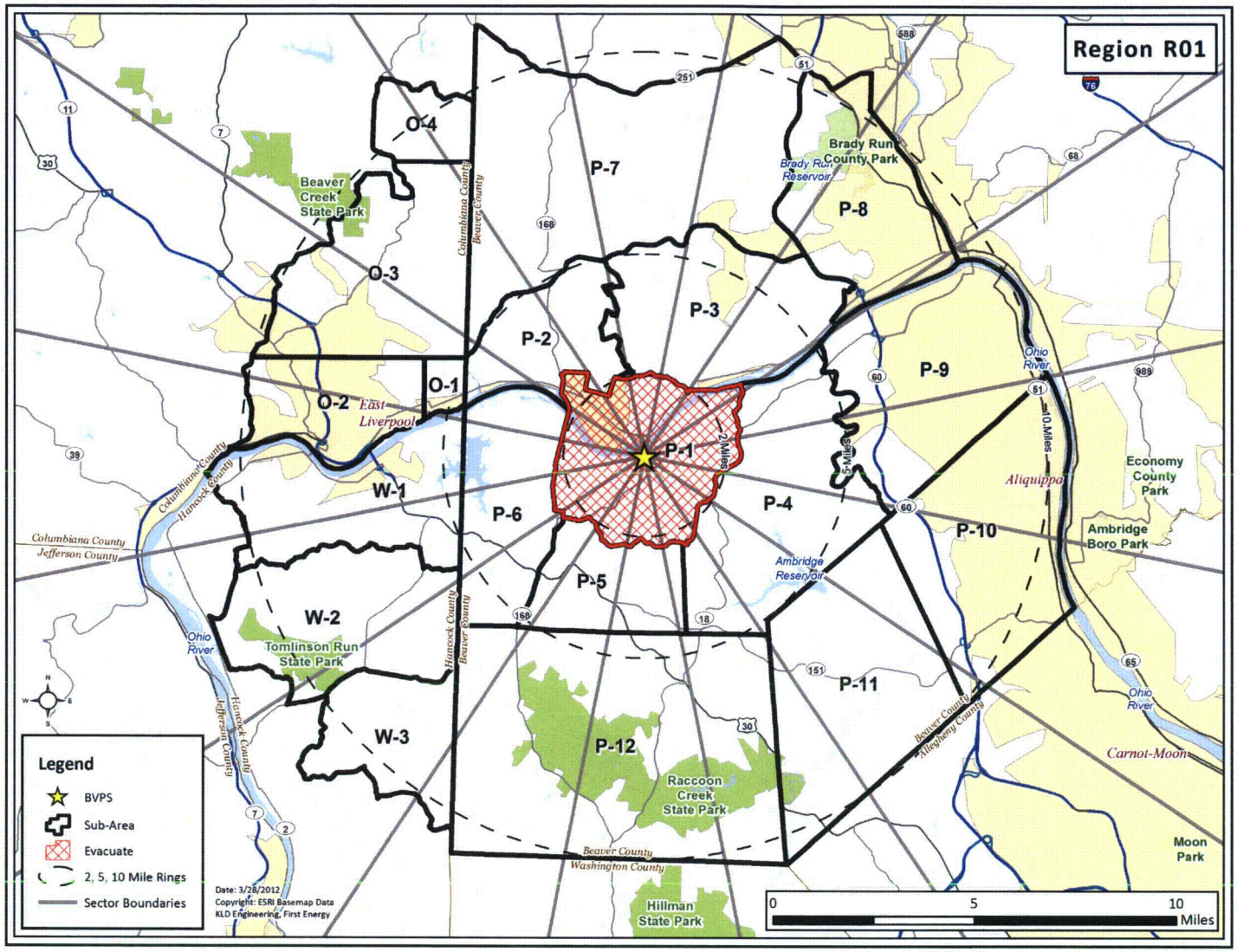

Figure H-1. Region R01

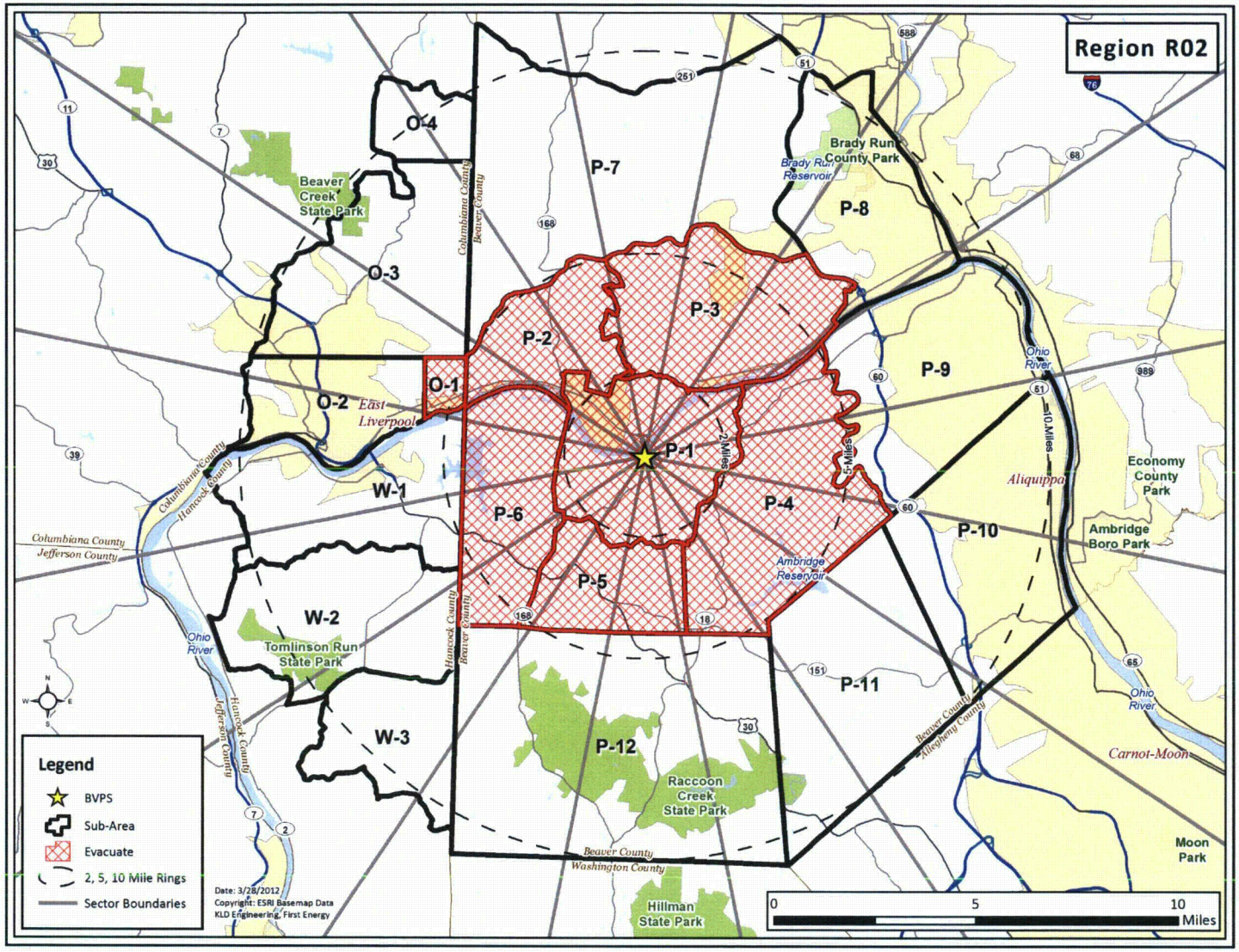

Figure H-2. Region R02

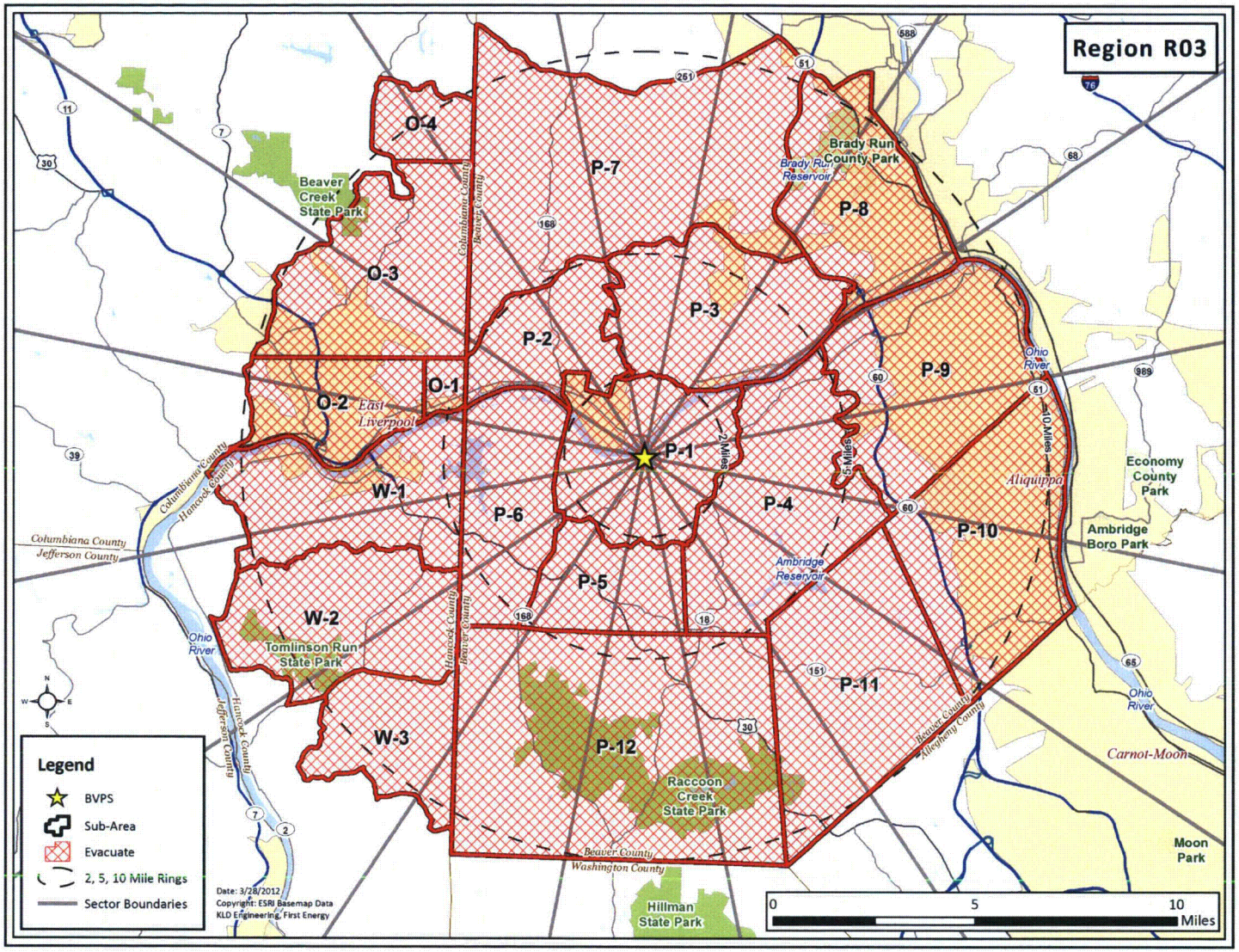

Figure H-3. Region R03

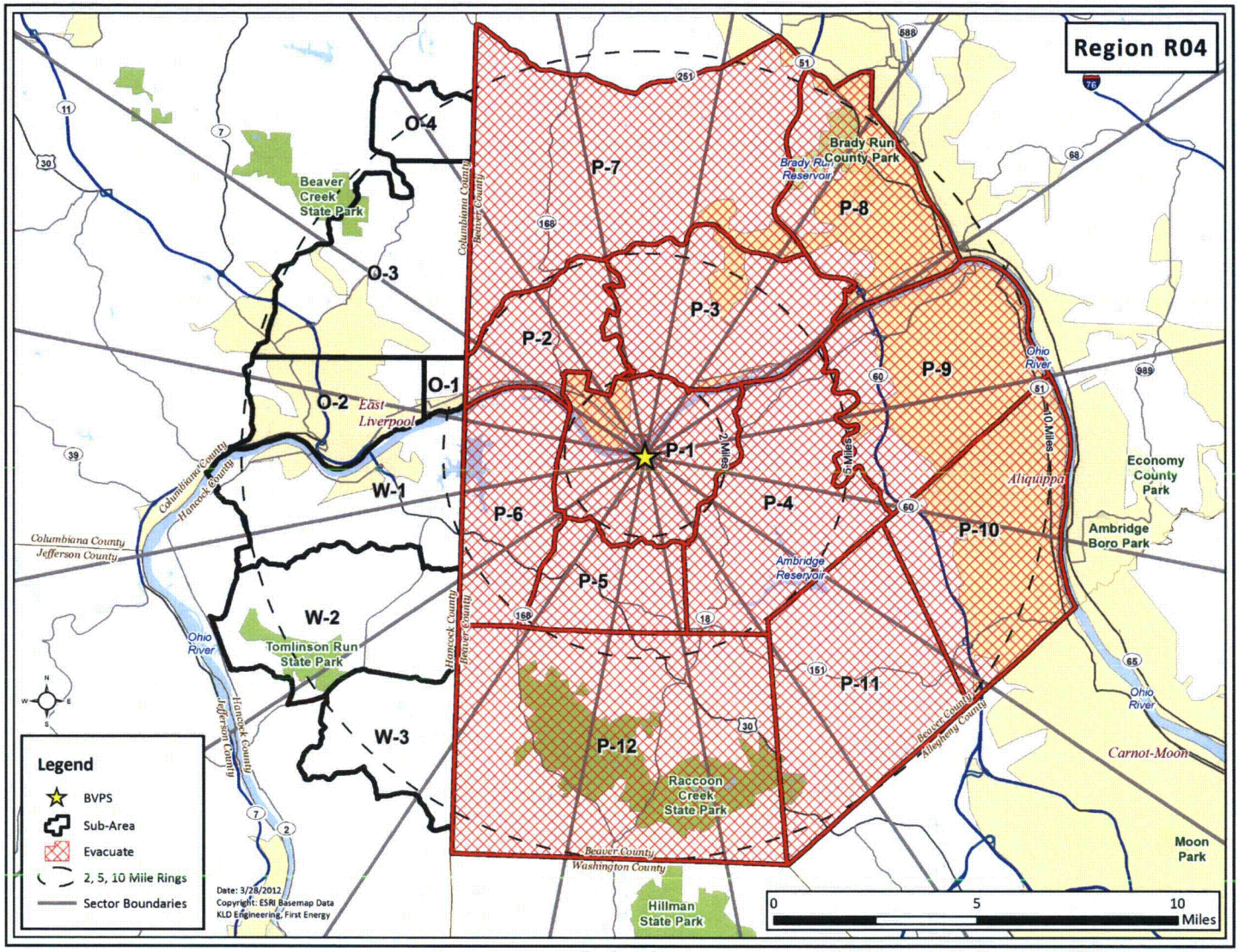

Figure H-4. Region R04

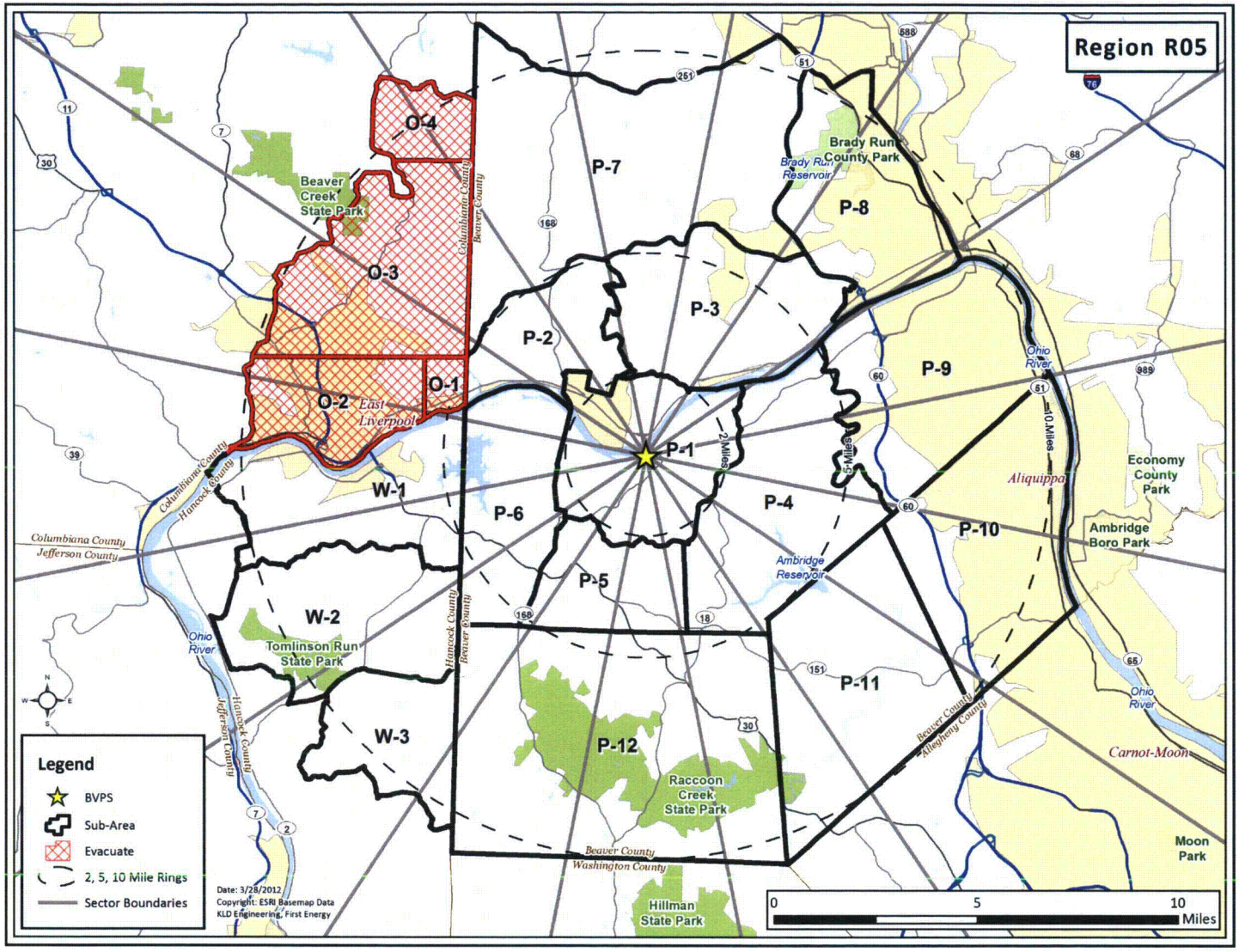

Figure H-5. Region R05

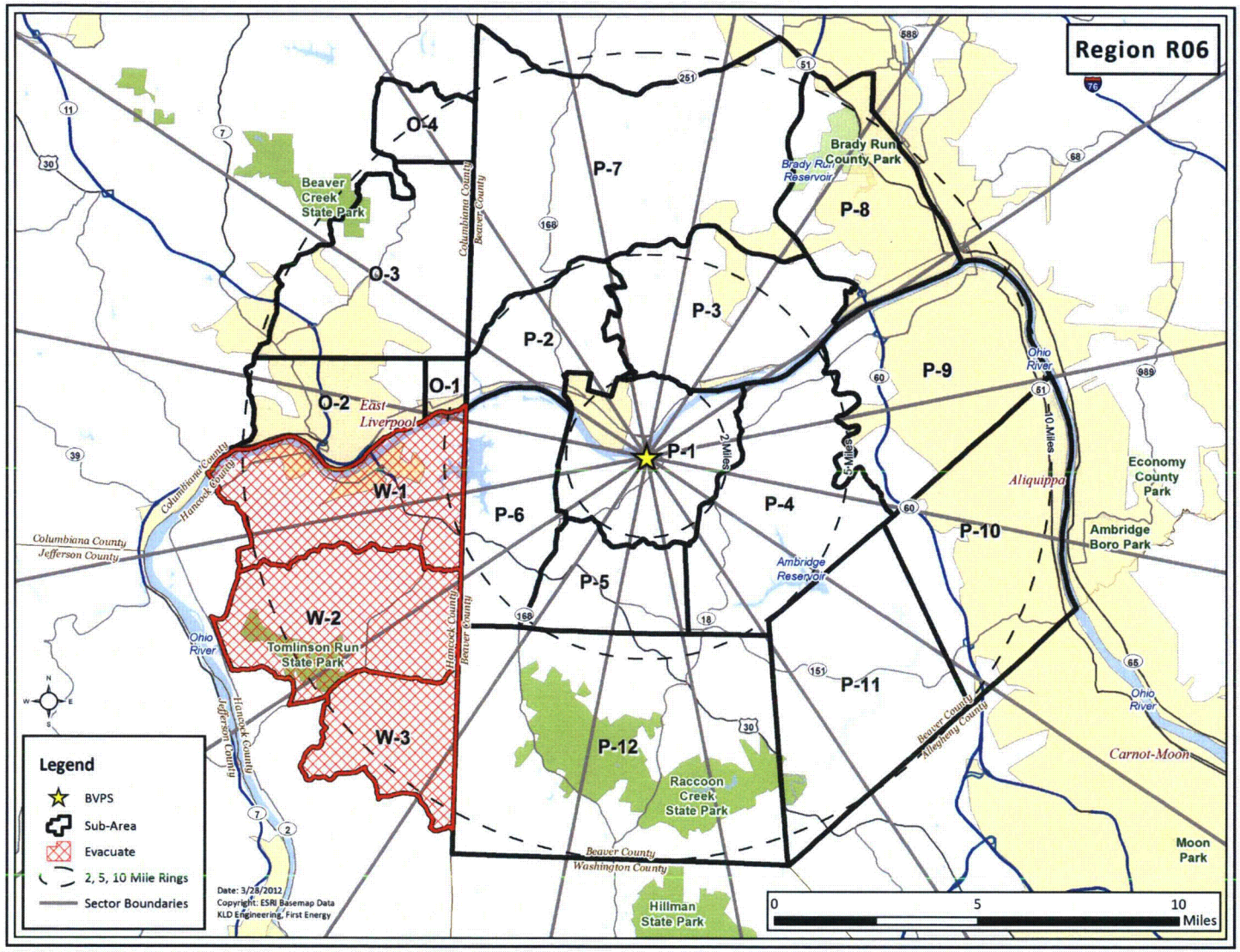

Figure H-6. Region R06

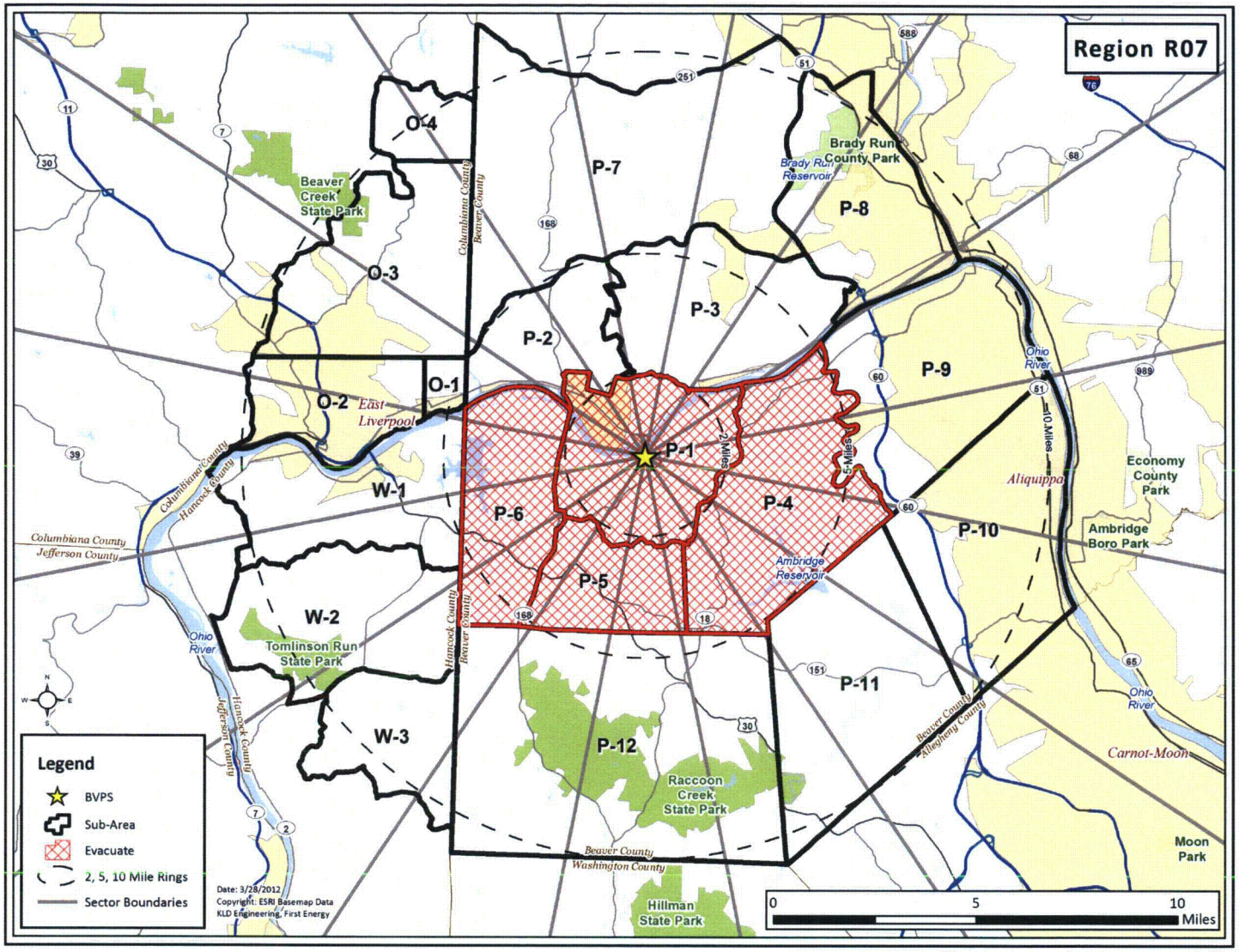

Figure H-7. Region R07

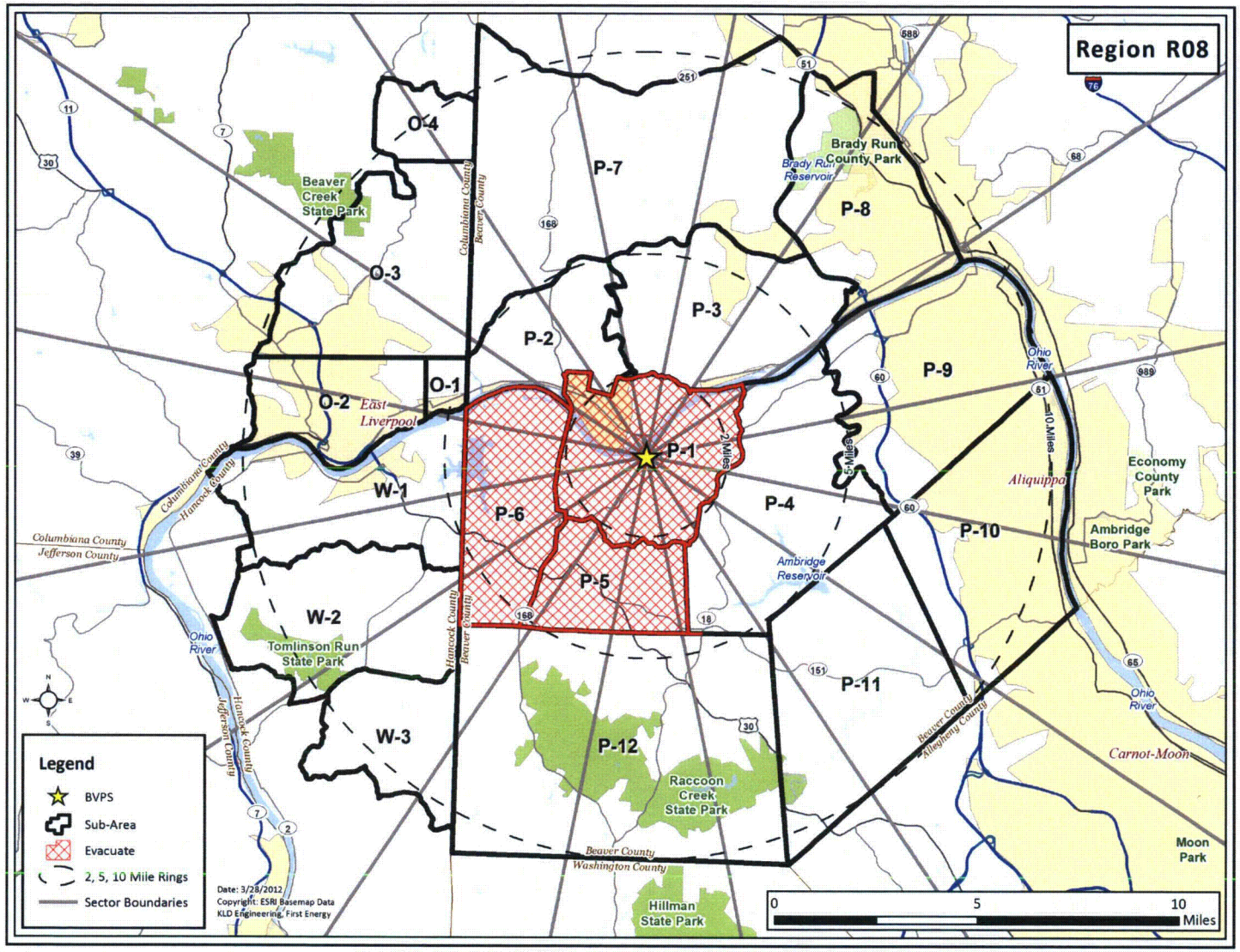

Figure H-8. Region R08

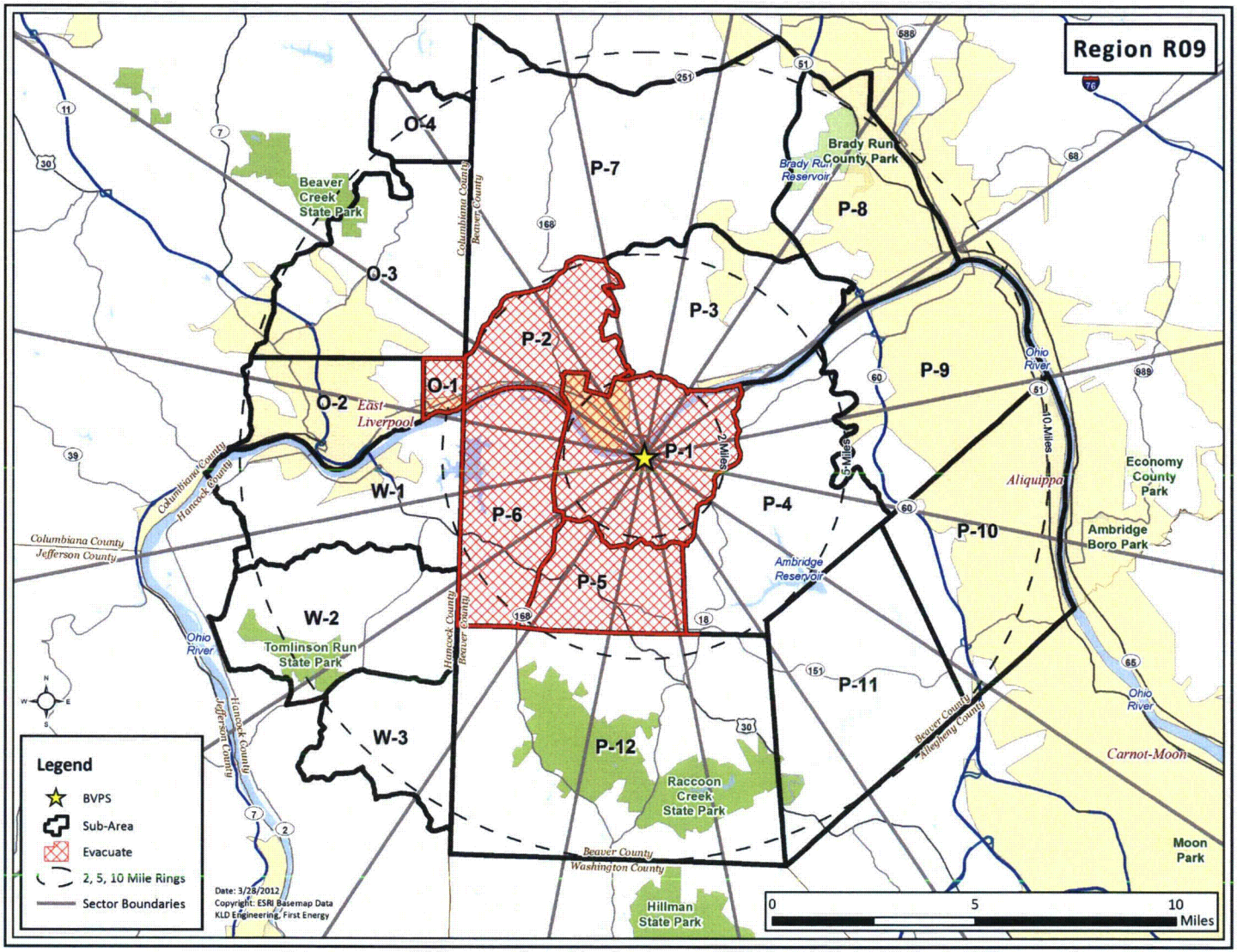

Figure H-9. Region R09

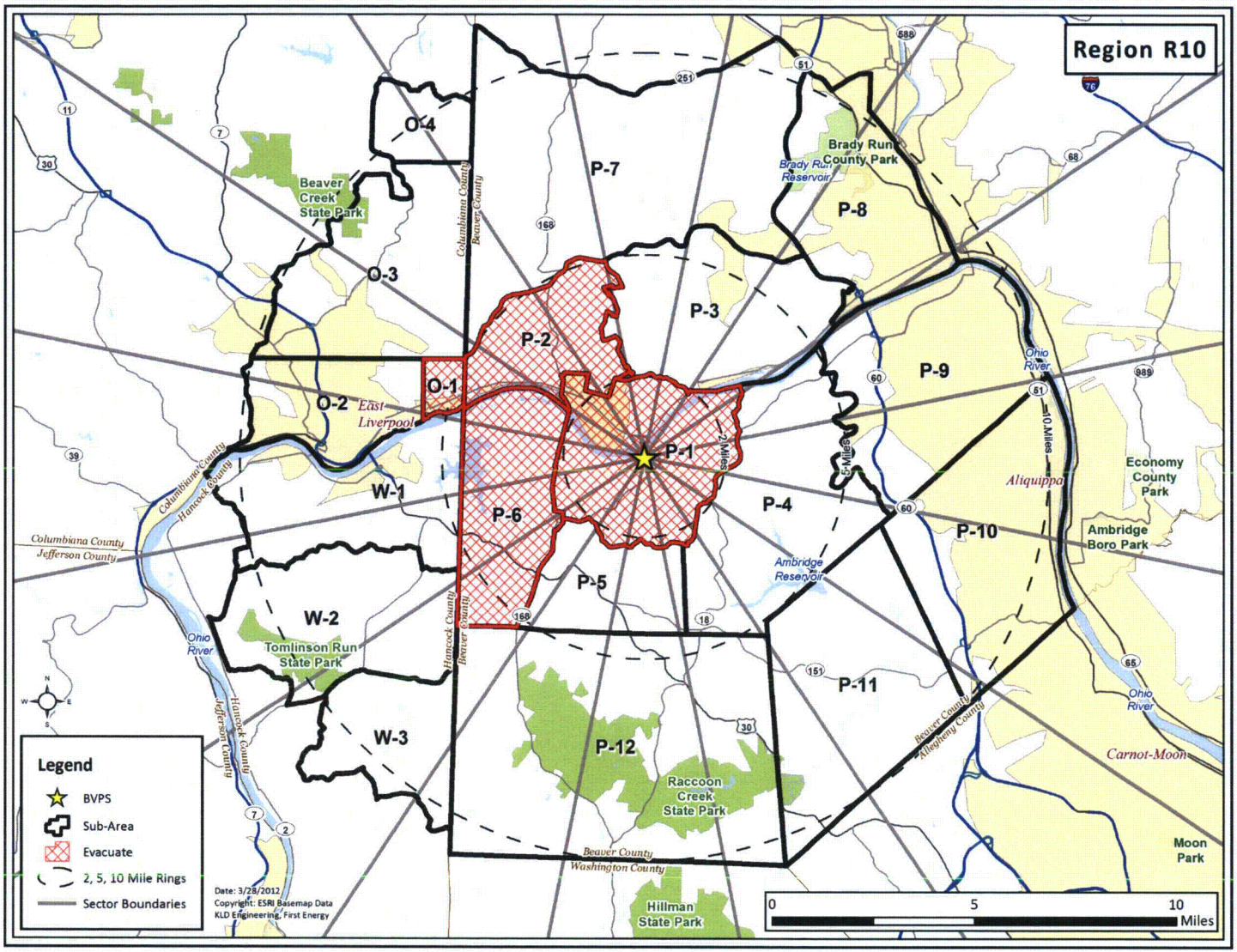

Figure H-10. Region R10

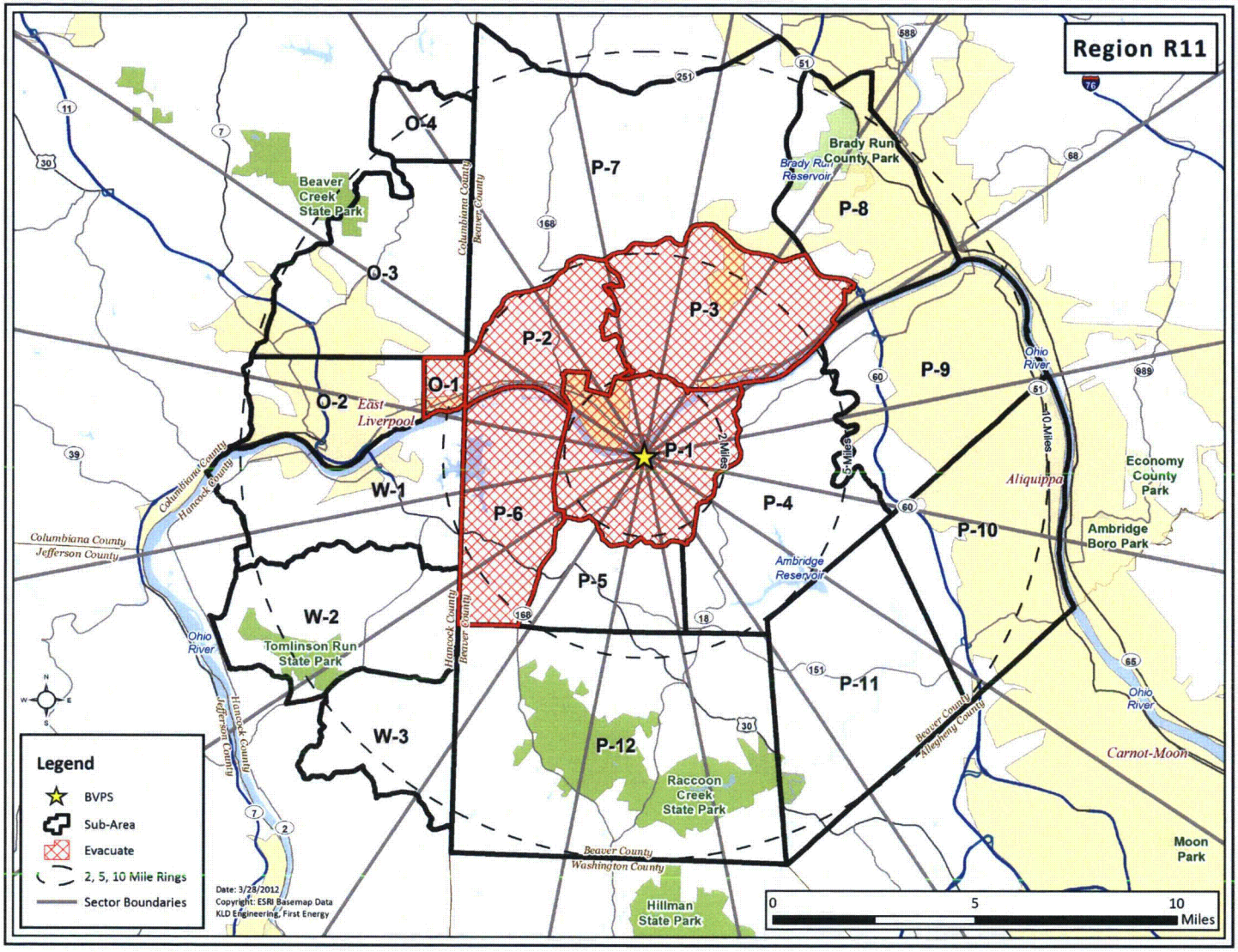

Figure H-11. Region R11

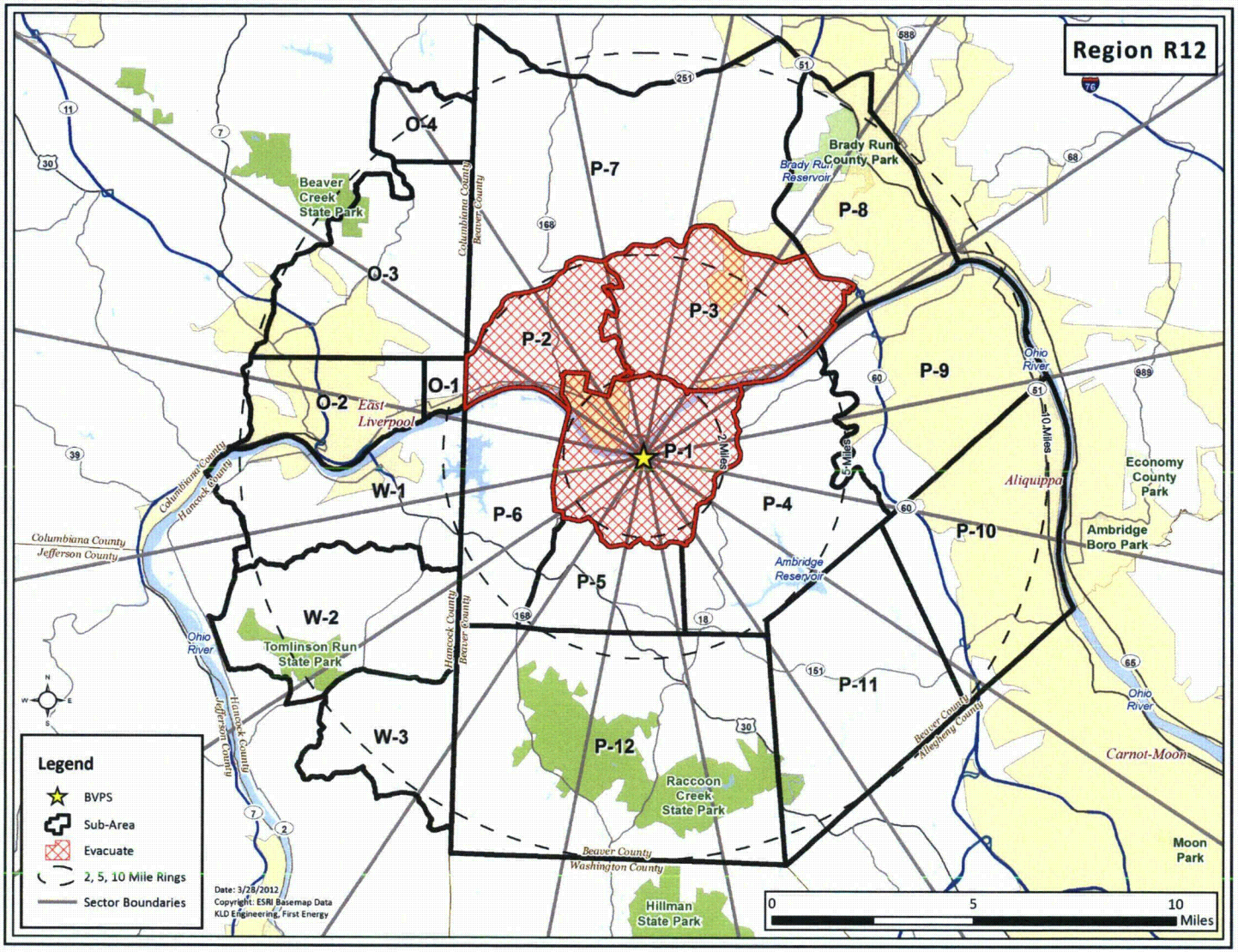

Figure H-12. Region R12

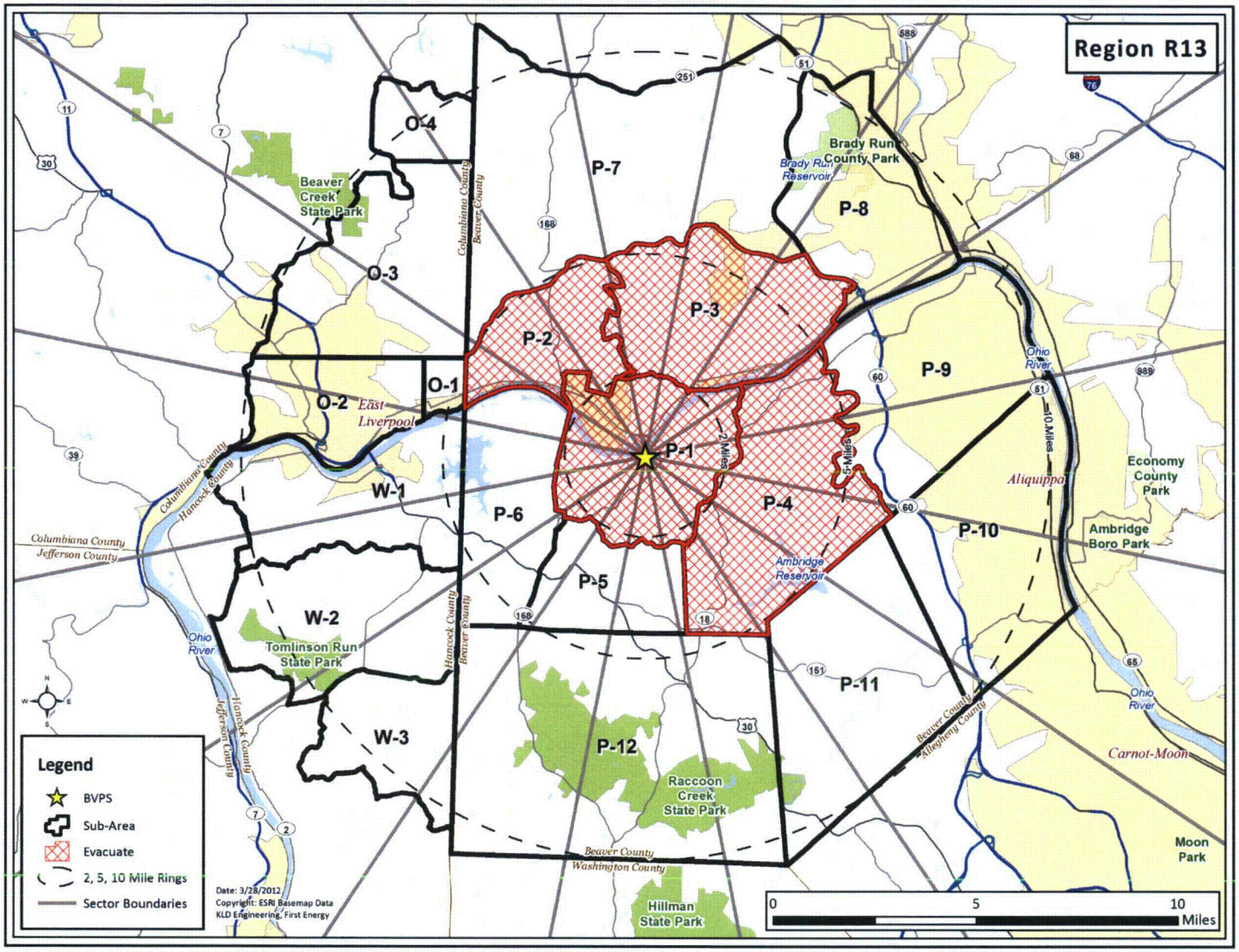

Figure H-13. Region R13

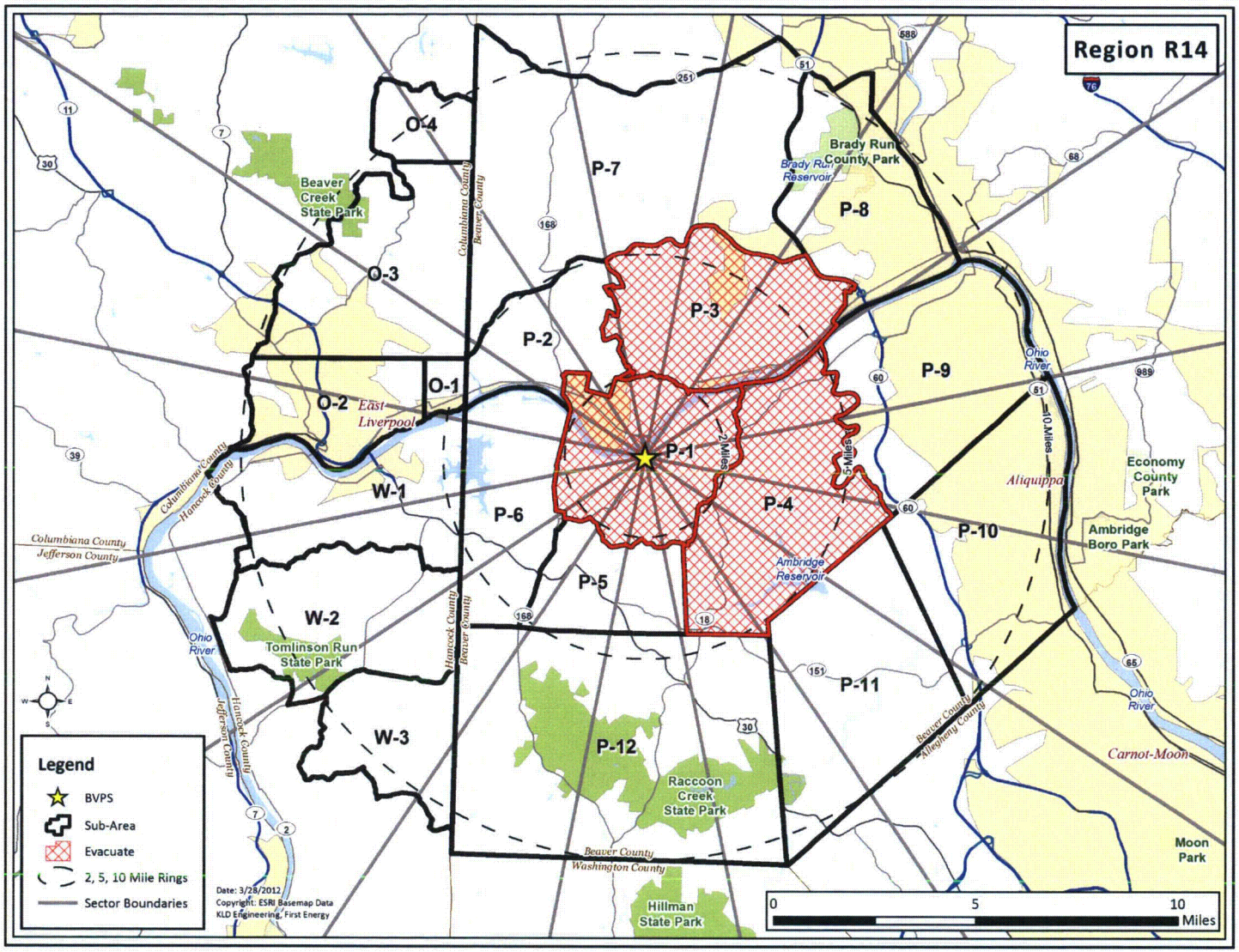

Figure H-14. Region R14

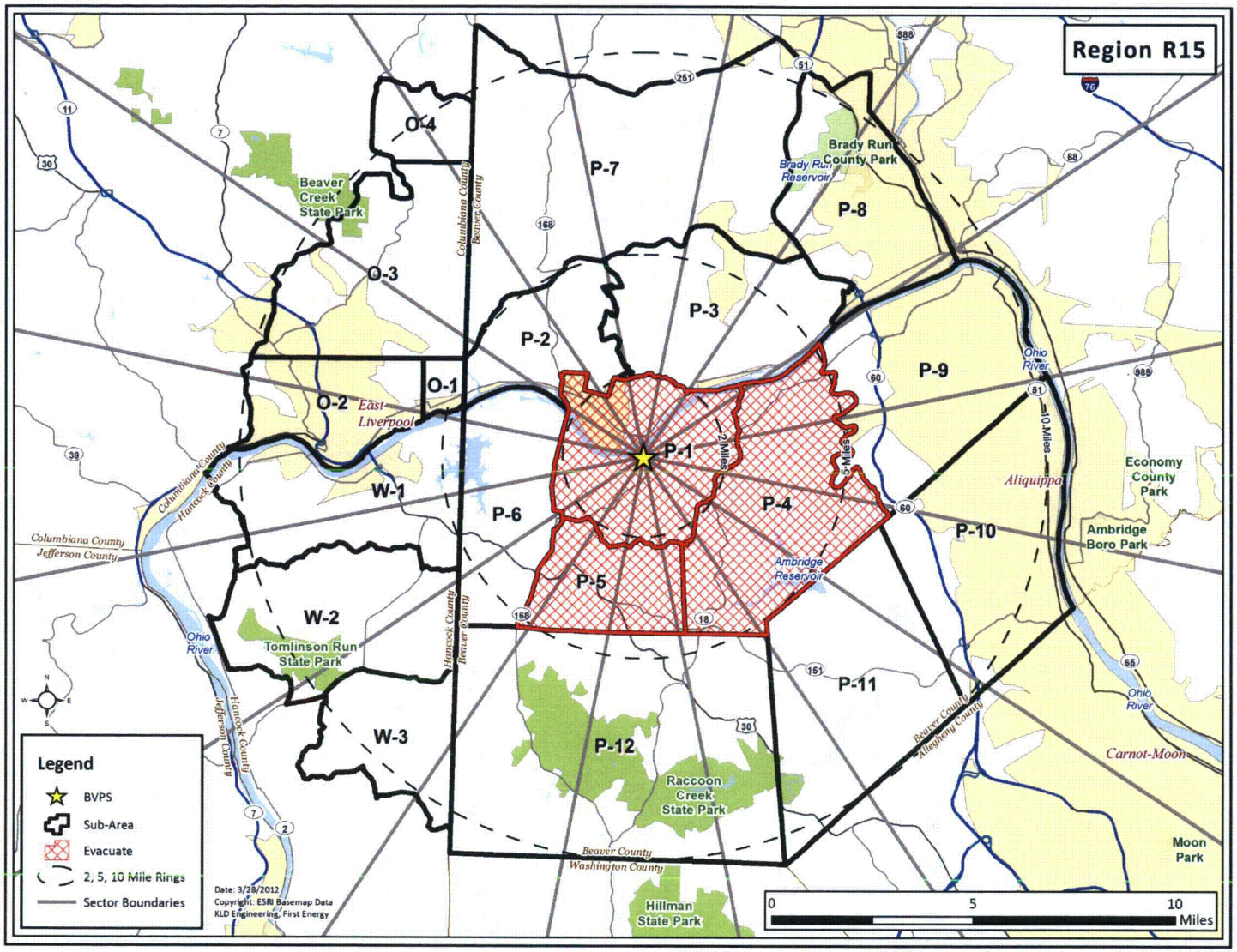

Figure H-15. Region R15

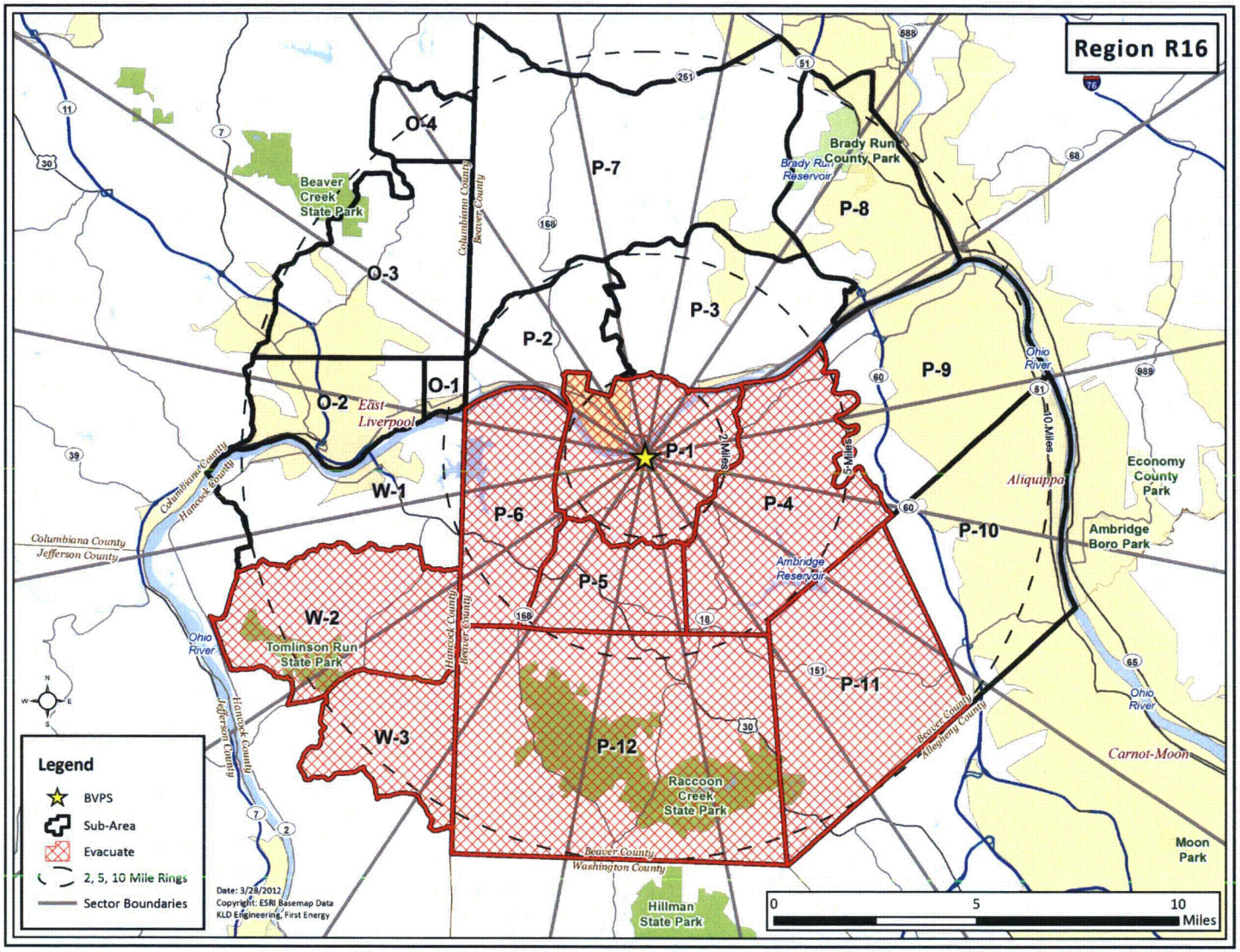

Figure H-16. Region R16

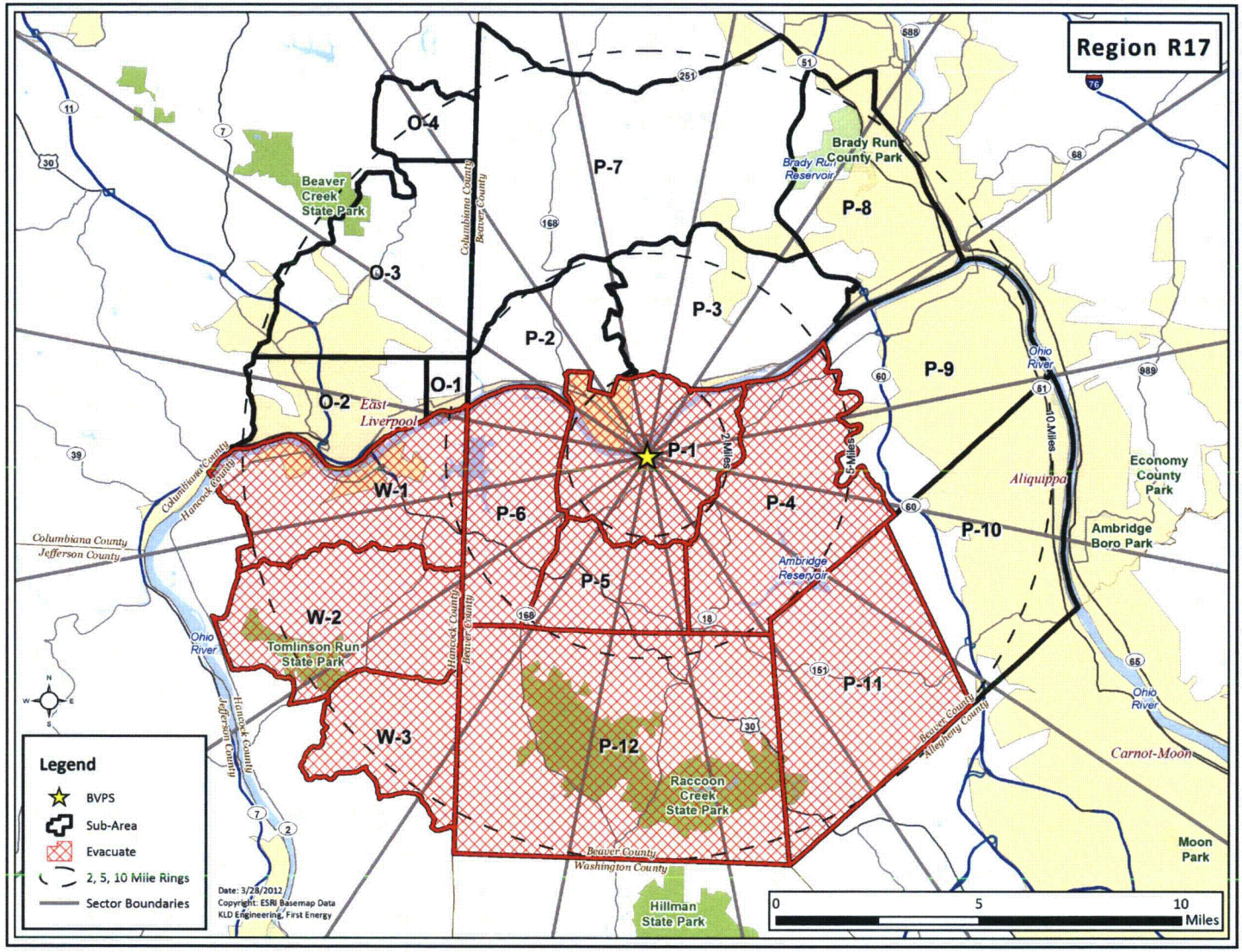

Figure H-17. Region R17