

Washington Public Power Supply System
A JOINT OPERATING AGENCY

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January 29, 1980

Mr. Brian K. Grimes, Director
Emergency Preparedness Task Group
Office of Nuclear Reactor Regulations
U. S. Nuclear Regulatory Commission
Washington D. C. 20555

Dear Mr. Grimes:

Subject: EMERGENCY EVACUATION TIMES

In response to your requests dated November 29 and December 26, 1979 concerning emergency evacuation times, we are submitting the enclosed map, overlay, table and basis of methodology regarding estimates for evacuation of various areas around WNP 1, 2 and 4 located on the Hanford Reservation in Richland, Washington.

We will be sending similar information for the WNP-3/5 sites under separate cover when it is compiled.

The information provided is the best presently available. Washington Public Power Supply System has initiated a study of evacuation feasibility for the population around the Hanford site with completion expected in May 1980. Updated information will be provided at that time.

Very truly yours,

D. L. Renberger

D. L. RENBERGER
Assistant Director
Technology

mg
Attachment(s)

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ADD:
B GRIMES
STATE PROGRAM
EMERG PLAN BR 11

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POPULATION, POPULATION DENSITY & EVACUATION TIMES

WNP 1, 2- & 4

Distance	Sector	Residential Population	Population Density (For population areas within sector)	Estimated Evacuation Time
2 mi	all	0	0	0
2 - 5 mi	# 2	82 persons	10 persons/mi ²	1 hour
2 - 5 mi	all others	0	0	0
5 - 10 mi	# 1	275 persons	10 persons/mi ²	3 hours
5 - 10 mi	# 2	533 persons	10 persons/mi ²	5 hours
5 - 10 mi	# 3	1333 persons	400 persons/mi ²	5 hours
5 - 10 mi	# 4	0	0	0

EVACUATION TIMES

WNP 1, 2 & 4

Question 1:

Two estimates are requested in each of the areas defined in item 1 for a general evacuation of the population (not including special facilities). A best estimate is required and an adverse weather estimate is required for movement of the population.

Response:

Attached is a table of populations, population densities and evacuation times. A map with an overlay of the 2 mile, 5 mile, and 10 mile sectors with times indicated is also attached. The evacuation times are for normal weather conditions and include shutdown and mobilization times for farms which takes longer than in densely populated areas.

Adverse weather conditions such as a blizzard could make evacuation impossible. However, adverse weather conditions due to hurricanes, tornadoes, snow storms, etc., have been analyzed by the EPA to determine their effect on evacuation times. This has been reported in EPA document 520/6-74-002, "Evacuation Risks - An Evacuation" which states:

"Data analysis and literature reviewed in the bibliography do not reveal any correlation between time of day, weather conditions, population size, area size, area type, road conditions, time lapse before onset of incident, use of plans, or the nature of the incident and the time required to evacuate a population group."

For each of the sectors shown on the table and the overlay to the map, the following summary is given. The evacuation times agree with the estimates of the local Director of Emergency Services who was contacted in regard to this request.

2 Mile Radius:

There is no residential population living within two miles of the site which is located on the Hanford Reservation.

5 Mile Radius:

Only Sector # 2 contains a residential population within the five mile radius. This populous is located east of the Columbia River three miles and beyond from the site.

The Benton-Franklin counties Nuclear Incident Response Plan contains a phone list of all the residents within six miles of the site, which includes this area of 82 in population. Using the list, it is estimated that this population could be evacuated within one hour's time.

EVACUATION TIMES

Page 2

10 Mile Radius (Sector 1)

This is a farming area with all of the residents living east of the Columbia River in Franklin County. The population of the Sector is 275.

An approximation can be made of the time required to evacuate the affected areas based on the load capacity of roads. EPA estimates indicated that 1,000 vehicles could be moved per lane per hour, and as many as 4,000 cars per lane per hour have been observed during actual evacuations. Clearly, there are no obstacles in moving only 274 persons, and a conservative time estimate of five hours is given. This estimate is also in agreement with those that can be derived from EPA 520/1-75-001, "Manual of Protective Action Guides and Protective Actions For Nuclear Incidents", Table 1.5 - Approximate Range Time Segments Making Up The Evacuation Time.

Sector 2

This is also a farm area with similar population density to Sector 1, but with a total population of 533. This area has two main roads to be used during an evacuation, and a conservative estimate of five hours time is given. This includes the concurrent evacuation of the inner adjacent sector.

Sector 3

It is estimated that this sector, North Richland, can be evacuated in five hours. The following formula from EPA 520/6-74-002, is the basis for this time.

Evacuation time: $\log (\text{hours}) = 1.30571 - 0.21243 \log (\text{persons/square miles}).$

The population of this sector is 1333 with a population density of 400 persons/square mile for the small area of the section which is populated. This falls within the range of applicability for the formula. (The other sector's population density is too low for valid use of the formula.)

Sector 4

There is no residential population living in this area (Hanford Reservation).



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Question 2:

The total time required to evacuate special facilities (e.g., hospitals within each area must be specified (best estimate and adverse weather).

Response:

There are no special facilities located within 10 miles of WNP-2.

Question 3:

The time required for confirmation of evacuation should be indicated. Confirmation times may consider special instructions to the public (e.g., tying a handkerchief to a door or gate to indicate the occupant has left the premises).

Response:

Present plans are to notify residents to evacuate by use of the public telephone system. Using this method, confirmation would be received when the notification call is completed. These confirmation times are included in the estimates given.

Question 4:

Where plans and prompt notification systems have not been put in place for areas out to about 10 miles, estimates of the times required to evacuate until such measures are in place for the plume exposure emergency planning zone (EPZ) should also be given. Notification times greater than 15 minutes should be included in the evacuation times and footnoted to indicate the notification time.

Response:

Plans and methods of prompt notification will be in place prior to the fuel load of WNP-2.

Question 5:

Where special evacuation problems are identified (e.g., in high population density areas), specify alternative protective actions, such as sheltering, which would reduce exposures and the effectiveness of these measures.

Response:

No area is identified where special evacuation problems may exist. As can be seen on the attached table and map overlay, all areas within the 10 mile EPZ have very low populations.

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Question 6:

A short background document should be submitted giving the methods used to make the estimates and the assumptions made including the routes and methods of transportation used. This document should also note the agreement or areas of disagreement with principal local officials regarding these estimates.

Response:

Private vehicles will be the primary means of transportation for evacuees. Available types of mass-transportation include school busses and trucks. The County Emergency Services Director can arrange for such transportation, if required.

5 Mile Radius

The primary relocation center for the Franklin County population living within five miles of the site, if an evacuation out to this distance was initiated, is Basin City Elementary School. The residents of this area (Ringold) will proceed northeast on County Road 170 or east on Ringold or Eltopia Roads to Glade North Road, then north to Basin City, approximately 11 miles from the site. The roads available for evacuation from this area are two-lane, gravel surfaced which feed, approximately each mile, into improved two-lane roadways.

Sector 1

Residents of this sector will proceed east on the Russell and Basin Hill Roads, then north on County Road 17, and east on the Hendricks Road to the vicinity of Connell approximately 25 miles from the site.

Sector 2

Residents of this sector will proceed south on the Taylor Flats or Glade Roads to the vicinity of Pasco approximately 15 miles from the site.

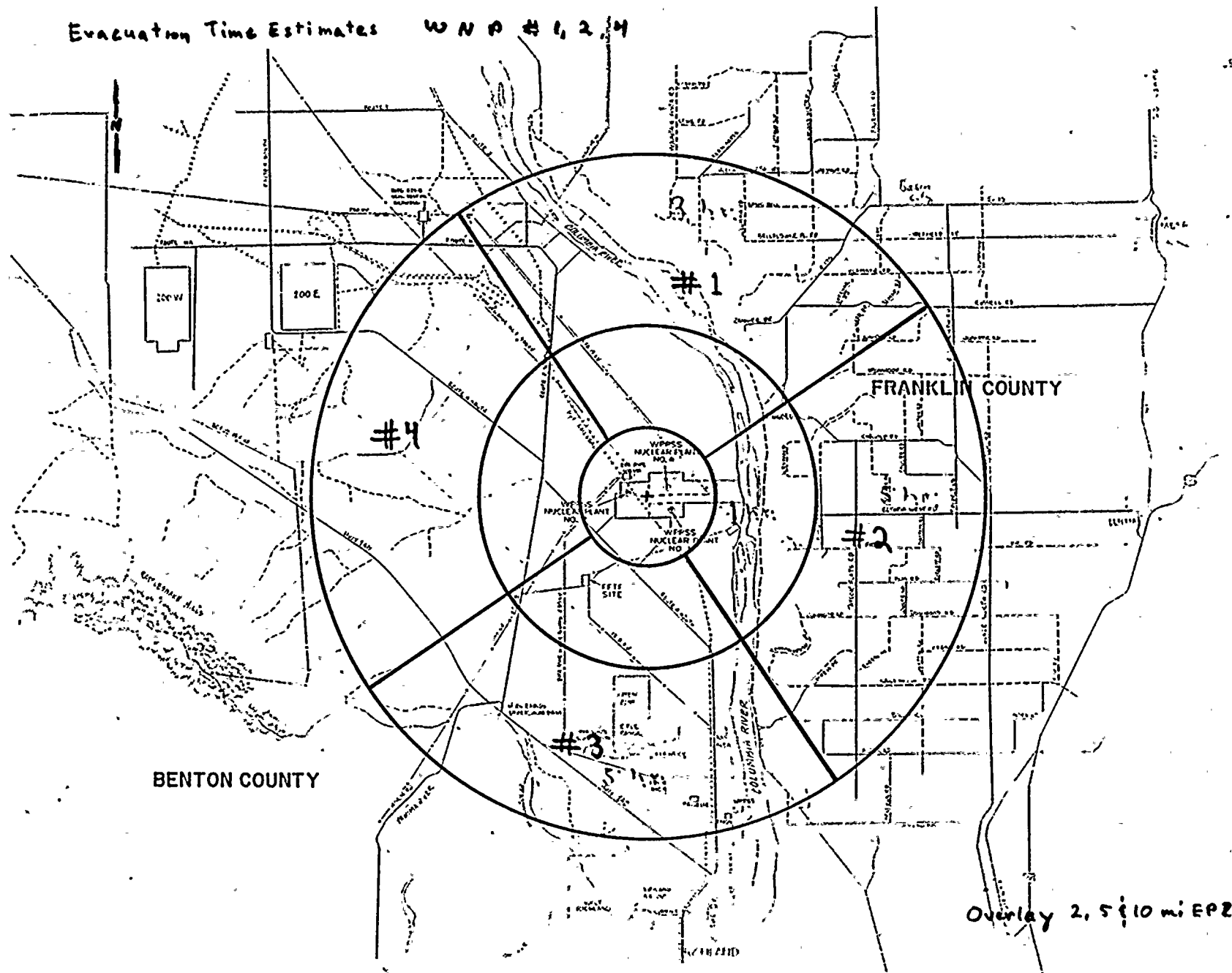
Sector 3

Persons located west of Stevens Drive will proceed south on Highway 240 to Highway 224, then west to the Elks lodge in West Richland. Persons located east of Stevens Drive will proceed south on Stevens Drive to Van Giesen, then west to the Elks lodge in West Richland. The Elks lodge is approximately 12 miles from the site.

There are alternate routes and relocation centers for each of these sectors described in the Benton-Franklin Nuclear Incident Response Plan.

All information presented in this letter is in agreement with Mr. Don Minnock, Benton County Director of Emergency Services. Mr. Minnock also directs the Franklin County nuclear response planning effort.

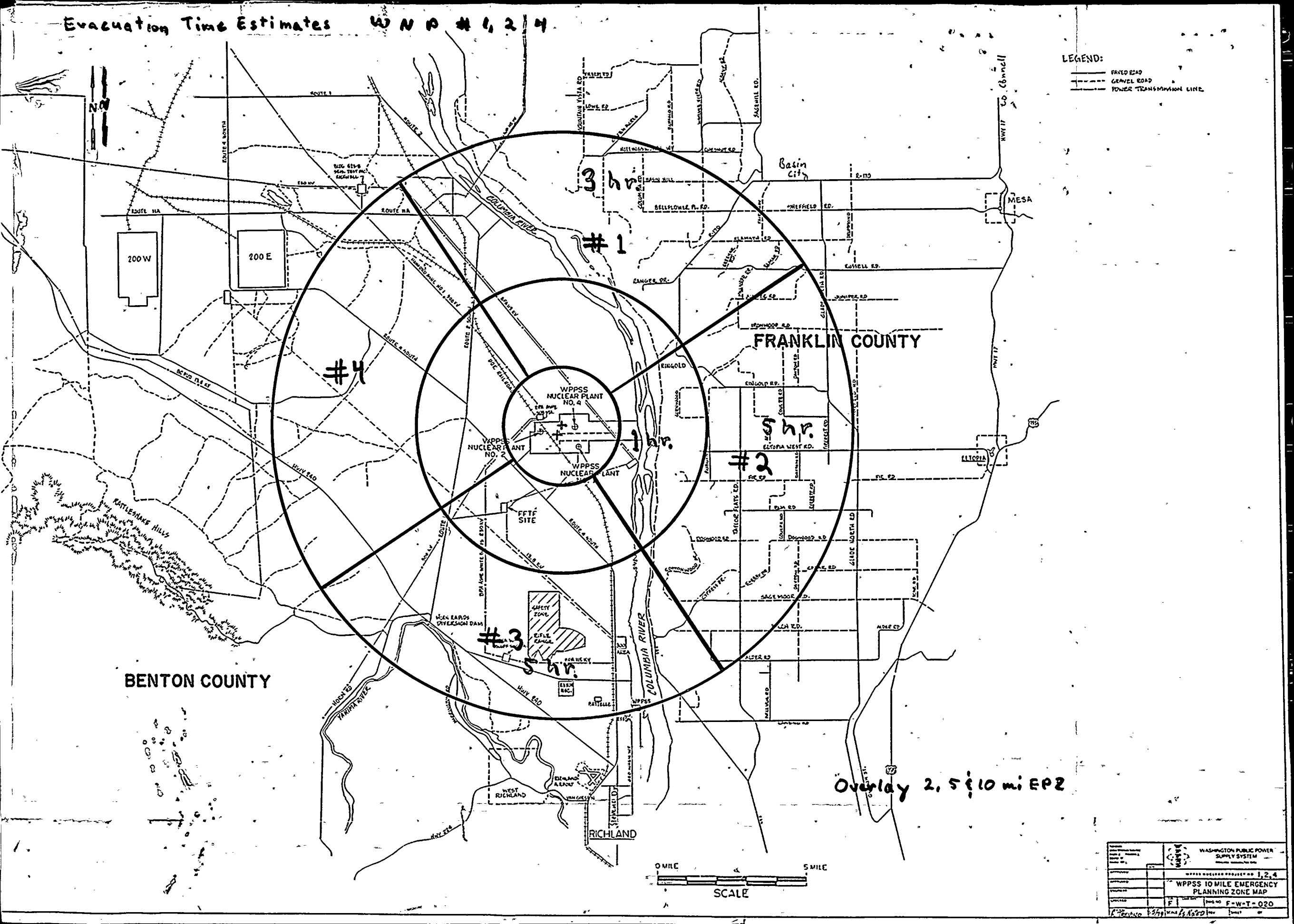
Evacuation Time Estimates W N P # 1, 2, 4



Overlay 2, 5 & 10 mi EP2

Evacuation Time Estimates W N P # 1, 2, 4

LEGEND:
 PAVED ROAD
 GRAVEL ROAD
 POWER TRANSMISSION LINE



Overlay 2, 5 & 10 mi EP2

0 MILE 5 MILE
 SCALE

WASHINGTON PUBLIC POWER SUPPLY SYSTEM	
WPPSS 10 MILE EMERGENCY PLANNING ZONE MAP	
PROJECT NO.	1, 2, 4
DATE	FEB 1978
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AUTH. NAME: RENBERGER, P.L. AUTHOR AFFILIATION: Washington Public Power Supply System
 RECIPIENT NAME: GRIMES, B.K. RECIPIENT AFFILIATION: Emergency Preparedness Task Force

SUBJECT: Submits map overlay, tables & basis of methodology re estimates for evacuation times in response to 791226 ltr. Evacuation feasibility study will be completed in May 1980. One oversize map encl.

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	09 GEOSCIEN BR	4	4	10 QAB	1	1	
	11 MECH ENG BR	1	1	12 STRUC ENG BR	1	1	
	13 MATC ENG BR	2	2	15 REAC SYS BR	1	1	
	16 ANALYSIS BR	1	1	17 CORE PERF BR	1	1	
	18 AUX SYS BR	1	1	19 CONTAIN SYS	1	1	
	20 I & C SYS BR	1	1	21 POWER SYS BR	1	1	
	22 AD SITE TECH	1	0	26 ACCDNT ANALYS	1	1	
	27 EFFC TRT SYS	1	1	28 RAD ASMT BR	1	1	
	29 KIRKWOOD	1	1	AD FOR ENG	1	0	
	AD PLANT SYS	1	0	AD REAC SAFETY	1	0	
	AD SITE ANALYSIS	1	0	DIRECTOR NRR	1	0	
	HYDRO-METEOR BR	2	2	MPA	1	0	
OELD	1	0					
EXTERNAL:	03 LPDR	1	1	04 NSIC	1	1	
	30 ACRS	10	10				

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