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50-513 WPPSS Nuclear Project, Unit 4, Washington Public Powe 05000513
AUTH.NAME AUTHOR AFFILIATION
RENBERGER,D.L. Washington Public Power Supply System
RECIP.NAME RECIPIENT AFFILIATION
SELLS,D.E. Environmental Projects Branch 2

SUBJECT: Forwards responses to 800307 hydrologic engineering questions re waste treatment sys,to assist NRC environ review of Unit 2.Affidavit encl.

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	20 I & C SYS BR	1	1	21 POWER SYS BR	1	1
	22 AD SITE TECH	1	0	26 ACCDNT ANLYS	1	1
	27 EFFL 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 ANLYSIS	1	0	DIRECTOR NRR	1	0
	HYDRO-METEOR BR	2	2	MPA	1	0
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Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. Box 968 3000 Geo. Washington Way Richland, Washington 99352 Phone (509) 375-5000

April 25, 1980
G01-80-123

Docket Nos. 50-397
50-460
50-513

Mr. Donald E. Sells, Acting Chief
Environmental Projects, Branch 2
Division of Site Safety and
Environmental Analysis
United States Nuclear Regulatory Agency
Washington, D.C. 20555

Dear Mr. Sells:

Subject: WPPSS NUCLEAR PROJECTS NOS. 1, 2 AND 4
HYDROLOGIC ENGINEERING QUESTIONS

Reference: GI2-80-49, letter, D. E. Sells to D. L. Renberger,
Dated March 7, 1980

Attached are the responses to your hydrologic engineering questions with respect to the proposed waste treatment system for the WPPSS 1, 2, and 4 plants. We trust that this will provide you with the required information for your environmental review of WPPSS 2.

Very truly yours,

D. L. Renberger

D. L. Renberger
Asistant Director, Technology

DLR:ACR:mch
Attachments

cc: Nick Reynolds, Debevoise & Liberman

B001
ES
1/1

STATE OF WASHINGTON)
) ss
COUNTY OF BENTON)

PPSS NUCLEAR PROJECTS, NOS. 1, 2 AND $
HYDROLOGIC ENGINEERING QUESTIONS

D. L. RENBERGER, Being first duly sworn, deposes and says: That he is the Assistant Director, Technology, for the WASHINGTON PUBLIC POWER SUPPLY SYSTEM, the applicant herein; that he is authorized to submit the foregoing on behalf of said applicant; that he has read the foregoing and knows the contents thereof; and believes the same to be true to the best of his knowledge.

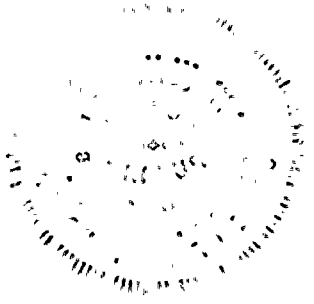
DATED April 22, 1980

D. L. Renberger
D. L. RENBERGER

On this day personally appeared before me D. L. RENBERGER to me known to be the individual who executed the foregoing instrument and acknowledged that he signed the same as his free act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and seal this 22nd day of April, 1980

Reba B. Hilgeman
Notary Public in and for the State of Washington
Residing at Richland



ATTACHMENT A

HYDROLOGIC ENGINEERING QUESTIONS

WPPSS-2 AND 1/4 SEWAGE TREATMENT FACILITY

1. PRIMARY LAGOON

Question:

Provide additional information regarding the liner that will be used to prevent seepage from the primary lagoon. This information should include liner permeability, liner strength, and durability construction techniques, and bases for the values reported.

Response:

The liner which will be used to prevent seepage in both the primary (aerated) ponds and the secondary (stabilization) ponds will be a 20-mil polyvinyl chloride (PVC) membrane. It will be installed over a prepared subgrade, then covered with 12 inches of native material for sunlight and tear protection.

The liner itself is virtually impermeable to the passage of water. Minor leaks along seams and through small tears and pinholes are, of course, unavoidable. The specifications call for the contractor to field test the completed ponds for leakage. The maximum allowable leakage during this field test will be 1/4-inch per day.

The strength and durability characteristics of the liner are listed on attachment B. Construction techniques are shown on attachment C.

2. SECONDARY LAGOON

Question:

Provide the basis for your estimate of 1/4-inch per day of seepage from the secondary lagoon. Discuss the treatment of the lagoon sides and bottom that will be used to achieve this seepage limit.

Document that buildup of salts and other solids on the bottom of the secondary lagoon will not adversely affect the quality or quantity of the seepage from this pond.

Response:

The 1/4-inch per day rate is not an estimate of the leakage rate from the secondary (stabilization) ponds; it is the maximum allowable by Washington State Standards. The actual leakage rate will be much lower than this. Rather than use a bentonite liner, it has been decided that a PVC liner will be used in the secondary ponds. This liner will be identical to the type used in the primary ponds. Our experience has shown that the leakage through this type of liner is virtually undetectable if proper construction procedures are followed. The organic sludge which will build up on the pond bottom will have a tendency to seal the bottom and reduce leakage through any small holes or tears in the liner. The chemical characteristics (salts) of any seepage through the sludge will be essentially the same as in the wastewater overlying the sludge blanket; a semipermeable membrane (similar to those used in reverse osmosis units) between the sludge and wastewater would be necessary for them to develop dissimilar chemical characteristics. The problem to which you refer with heavy metals and salts buildup in sludges is associated with mechanical treatment plants. In these plants, the sludge is separated from the main wastewater stream; digesting and dewatering increases the chemical concentrations. This problem does not occur with lagoon systems.

3. OVERFLOW LAGOON

Question:

Document the design bases for overflow into the third lagoon due to intense rainfall. Discuss the frequency of rainfall that will be contained and the methods of computation of the required storage volume.

Response:

Rainfall is not ordinarily considered as a design parameter for the flow patterns within lagoon systems. There are two reasons for this:

a) The normal variations in pond depth far exceed any rainfall considerations. The secondary ponds are designed to have a depth varying between three and five feet. This is accomplished with an adjustable outlet weir. The ponds and piping between them have been designed to handle a one-foot variation in depth (i.e., a drop from five-foot level to four-foot level or 1.5 million gallons) within a 24-hour span. The one percent storm will yield a 24-hour precipitation event of only about 2.4 inches, or 300,000 gallons--well within the design capacity.

b) All lagoons within the plant are designed with three feet of freeboard above normal maximum water levels. The 2.4-inch increase in level caused by the one percent storm will be safely contained within the freeboard.

4. ALL THREE PONDS

Question:

Provide responses to the following generic questions.

a) Provide descriptions of the floodplains of all water bodies, including intermittent water courses within or adjacent to the site. On a suitable scale map provide delineations of those areas that will be flooded during the one-percent chance flood in the absence of plant effects (i.e., pre-construction floodplain).

Response:

The flood history of the Hanford Reach of the Columbia River is discussed in Section 2.4 of the WNP-2 FSAR. The derivation of critical flood elevation and the references utilized are reported therein. The Standard Project Flood (SPF) has been defined by the Army Corps of Engineers as 570,000 cfs, which represents a 367 ft. MSL elevation at the WNP-2 intake. The makeup water pumphouse operating floor elevation is 375 ft. MSL. The lowest elevation of the Sanitary Waste Disposal System is 414 ft. MSL at the percolation beds. The one-percent flood represents 650,000 cfs and 370 ft. MSL elevation at the WNP-2 intake (please see Attachments D and E, which are respectively, Figure 2.4-3 of the WNP-2 ER-OL and Figure 2.4-14 of the WNP-2 FSAR). Attachment F shows the topographic detail of the site vicinity.

b) Provide details of the methods used to determine the floodplains in response to a) above. Include your assumptions of and bases for the pertinent parameters used in the computation of the one-percent flood flow and water elevation. If studies approved by Flood Insurance Administration (FIA), Housing and Urban Development (HUD) or the Corps of Engineers and available for the site or adjoining area, the details of analyses need not be supplied. You can instead provide the reports from which you obtained the floodplain information.

Response:

Please see response at conclusion of generic question g).

c) Identify, locate on a map, and describe all structures, construction activities and topographic alterations in the floodplains. Indicate the status of each such structure, construction activity and topographic alteration (in terms of start and completion dates) and work presently completed.

Response:

Please see response at conclusion of generic question g).

d) Discuss the hydrologic effects of all items identified in c) above. Discuss the potential for altered flood flows and levels, both upstream and downstream. Include the potential effect of debris accumulating on the plant structures. Additionally, discuss the effects of debris generated from the site on downstream facilities.

Response:

Please see response at conclusion of generic question g).

e) Provide the details of your analysis used in response to d) above. The level of detail is similar to that identified in the item b) above.

Response:

Please see response at conclusion of generic question g).

f) Identify non-floodplain alternatives for each of the items (structures, construction activities and topographic alternatives) Identified in e) above. Alternately, justify why a specific item must be in the floodplain.

Response:

Please see response at conclusion of generic question g).

g) For each item in f) above that cannot be justified as having to be in the floodplain either show that all non-floodplain alternatives are not practicable or commit to relocating the structure, construction activity or topographic alteration out of the floodplain.

Response to b), c), d), e), f), and g):

Attachment G shows the contours of the WNP 1, 2, and 4 plant vicinities. The Sanitary Waste Disposal System is located at coordinates N10,000, W000. As may also be seen in Attachment G, no other facilities are located within the designated one-percent or SPF floodplains.

mch

ATTACHMENT B

Property	Required	Test Method
Thickness, mils	20 +/-1.0	ASTM D 882
Specific gravity	1.2 - 1.3	
Elongation, % min.	300%	ASTM D 882, Method B
Tensile strength, psi, min.	2,200	ASTM D 882, Method B
100% modulus, psi	1,000 - 1,600	ASTM D 882, Method B
Elmendorf tear resistance each direction, gms/mil, min.	160	
Graves tear, lbs/in, min.	2/0	ASTM D 1004
Water extraction, % loss	0.35	ASTM D 1239
Volatility, % loss	0.7	ASTM D 1203
Low temperature impact 0 deg. ±3.6 deg. F	Not more than two specimens of 10 shall fail	ASTM D 1790
Dimensional stability % (100 deg. C - 15 min.)	5	ASTM D 1790
Outdoor exposure, sun hrs.	1,500	
Bonded factory seam strength each direction, min. % tensile strength	80	ASTM D 882
Pinholes/10 sq. yds. max.	1	
Resistance to soil burial-tensile strength loss, each direction % max.	5	USBR test for soil burial
Elongation loss, each direction % max.	20	
Alkali resistance	Pass	Corps of Engineers CRD 572-61

ATTACHMENT C

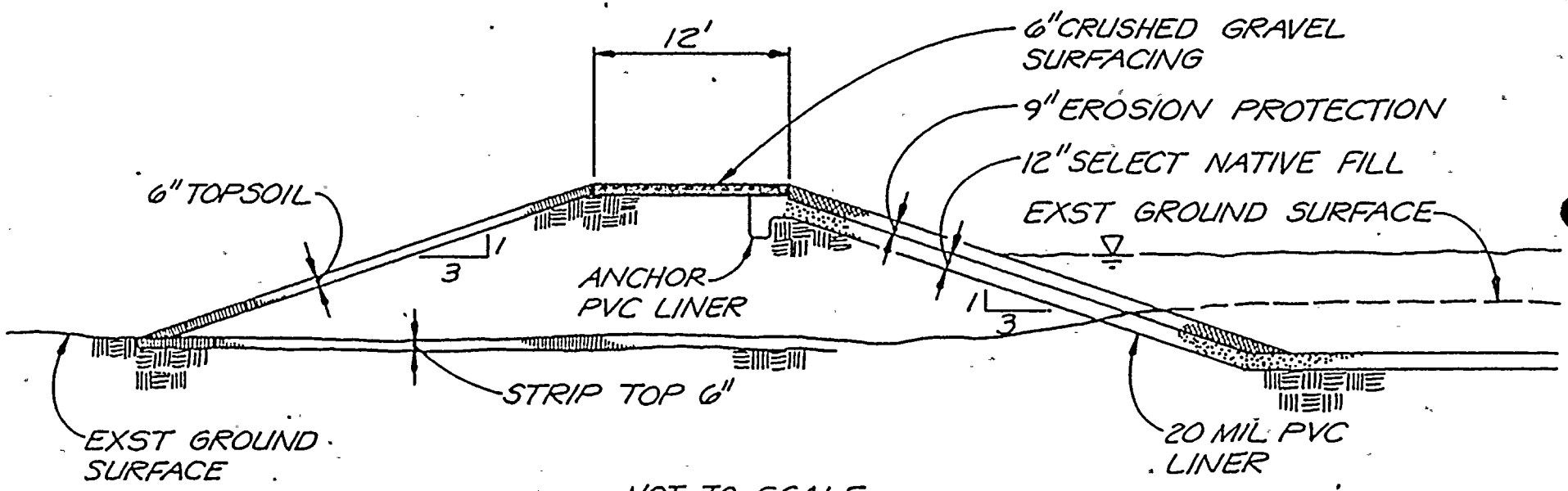


FIGURE 6.4

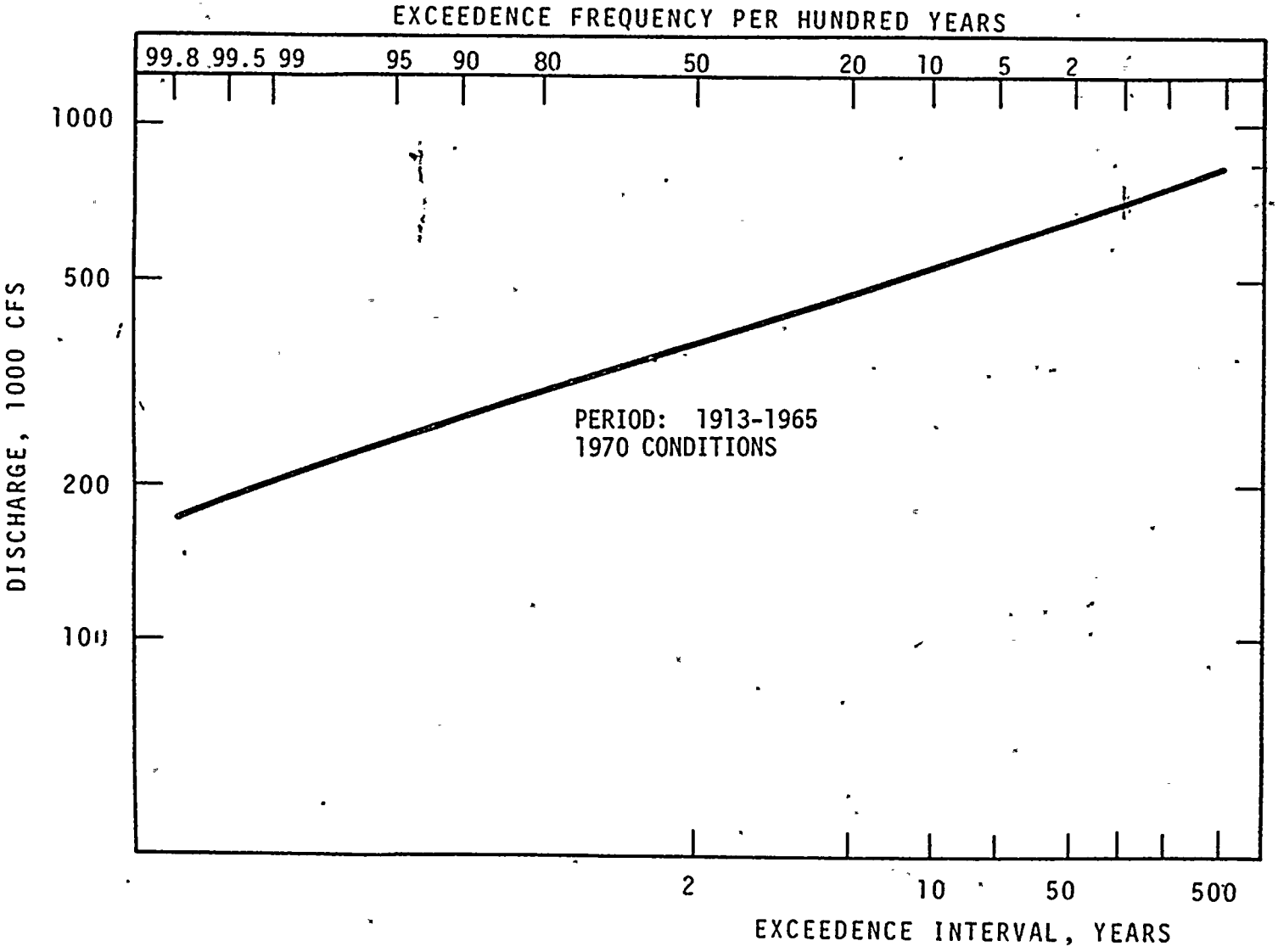
WPPSS LAGOON TREATMENT
FACILITIES
RICHLAND WASHINGTON

TYPICAL EMBANKMENT SECTION

513461.AO

CH2M HILL

ATTACHMENT D

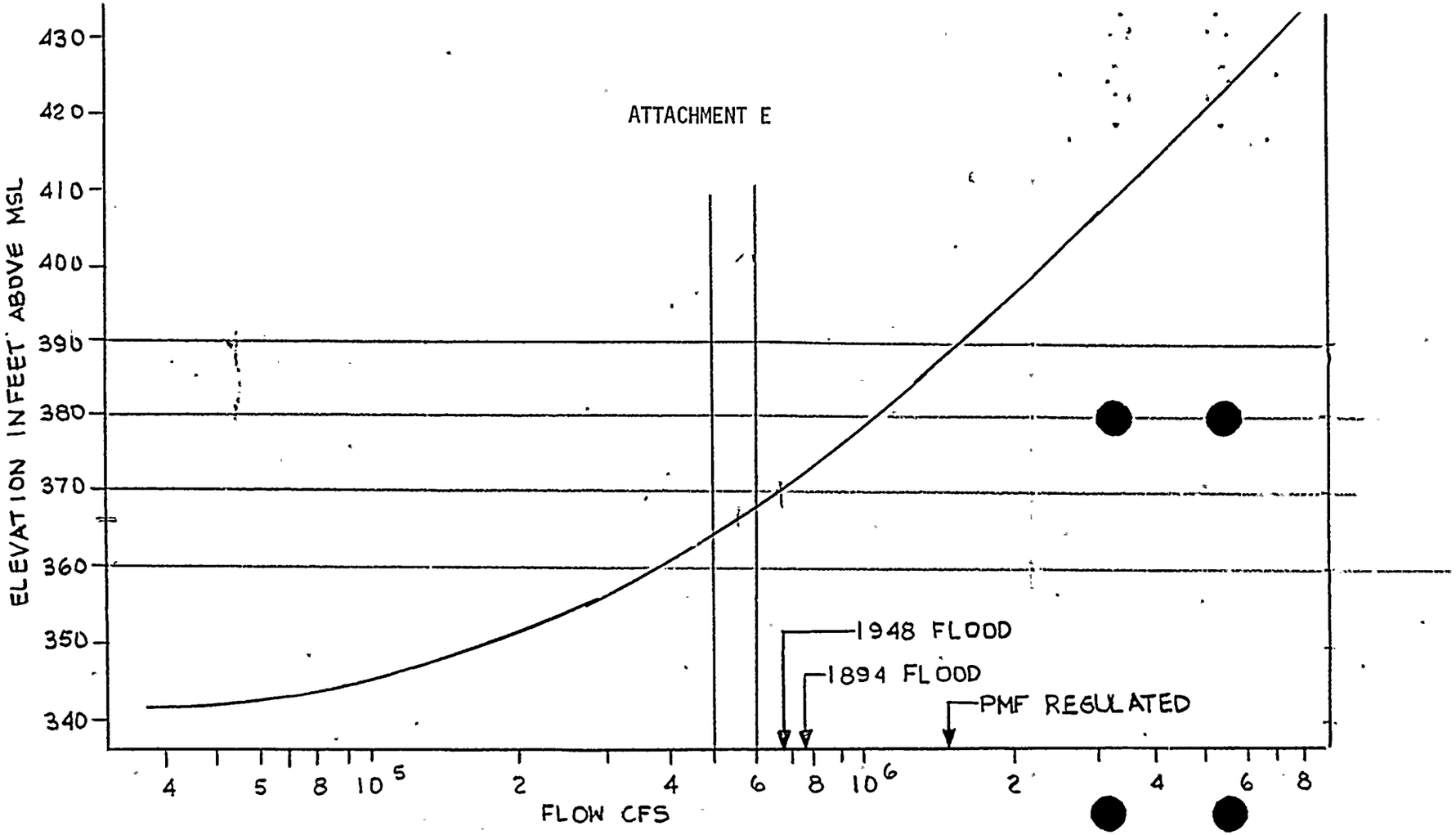


WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WPPSS NUCLEAR PROJECT NO. 2
Environmental Report

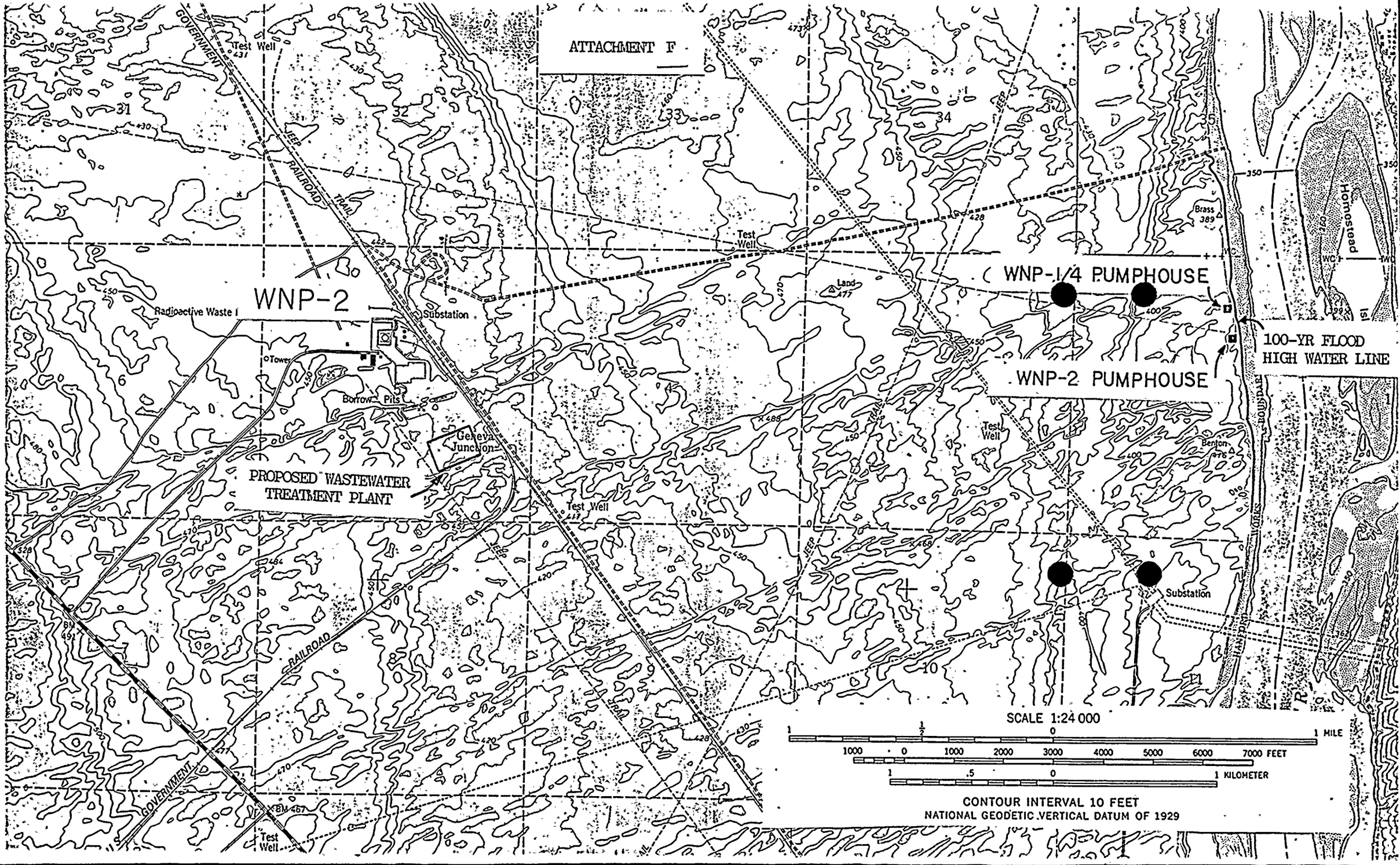
FREQUENCY CURVE OF ANNUAL MOMENTARY PEAK FLOWS FOR THE COLUMBIA RIVER BELOW PRIEST RAPIDS DAM, WA

FIG. 2.4-3

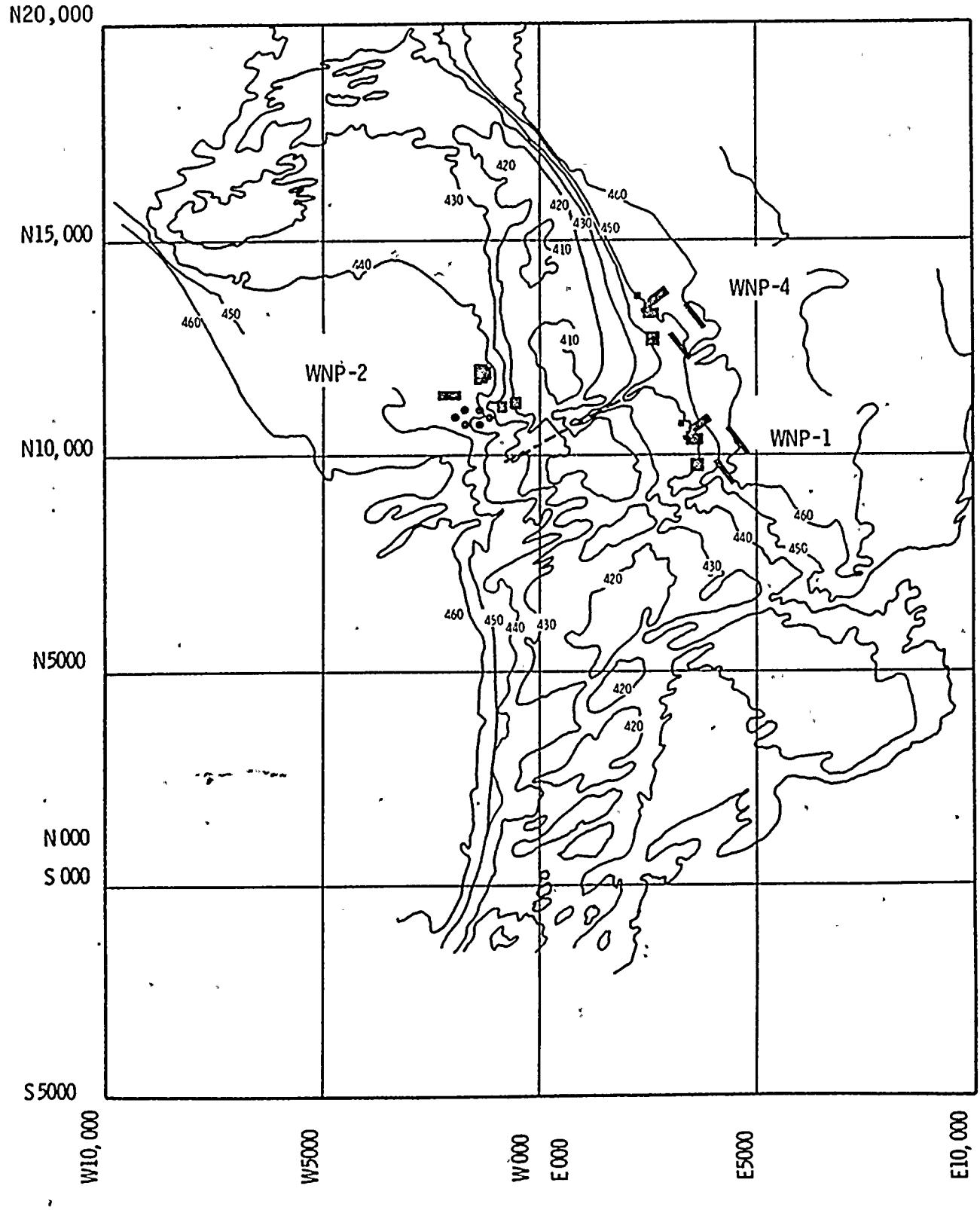
ATTACHMENT E



WASHINGTON PUBLIC POWER SUPPLY SYSTEM NUCLEAR PROJECT NO. 2	FLOW RATING CURVE FOR COLUMBIA RIVER, RIVER MILE 350	FIGURE 2.4-14


ATTACHMENT F
WNP-2
WNP-1/4 PUMPHOUSE
WNP-2 PUMPHOUSE
100-YR FLOOD
HIGH WATER LINE
PROPOSED WASTEWATER
TREATMENT PLANT
Test Well
Radioactive Waste
Substation
Tower
Borrow Pits
Geneva Junction
Land
Brass
Homestead
Benton
Boundary
Hanford
Works
Jeep
Trail
Railroad
Government
BM 467
SCALE 1:24 000
1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Amendment No. 5
August 1979



WASHINGTON PUBLIC POWER SUPPLY SYSTEM NUCLEAR PROJECT NO. 2	DETAILED CONTOURS NEAR THE SITE	FIGURE 2.4-10