Duquesne Light

Nuclear Construction Division
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November 8, 1984

United States Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Mr. George W. Knighton, Chief
Licensing Branch 3
Office of Nuclear Reactor Regulation

SUBJECT: Beaver Valley Power Station - Unit No. 2
Docket No. 50-412
FSAR Environmental and Hydrologic Engineering Branch Questions

Gentlemen:

Attached to this letter are Duquesne Light Company's (DLC) responses to the Environmental Hydrologic Engineering Branch (EHEB) questions (240.12-240.16) forwarded to DLC in you letter dated October 12, 1984, received October 18, 1984, and SER Open Item Nos. 1 and 2. These are also provided in response to the EHEB questions (240.1, 240.2, 240.4, 240.6, 240.7, and 240.8, dated August 13, 1983) in which the staff required revised information using Hydrometeorology Reports 51 and 52. It is DLC's understanding that responses to the above EHEB questions are now complete. These responses will be incorporated into the next FSAR amendment.

DUQUESNE LIGHT COMPANY

By [signature]
E. J. Woolever
Vice President

TJZ/wjs
Attachment

cc: Mr. B. K. Singh, Project Manager (w/a)
Mr. G. Walton, NRC Resident Inspector (w/a)

Hearing Card Dist

B001 Drawings
1/1 To: EHEB

SUBSCRIBED AND SWORN TO BEFORE ME THIS
8th DAY OF November, 1984.
Anita Elaine Reiter
Notary Public

ANITA ELAINE REITER, NOTARY PUBLIC
ROBINSON TOWNSHIP, ALLEGHENY COUNTY
MY COMMISSION EXPIRES OCTOBER 20, 1986

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF ALLEGHENY)

On this 8th day of November, 1984, before me, a Notary Public in and for said Commonwealth and County, personally appeared H. M. Siegel, who being duly sworn, deposed and said that he is authorized to sign for E. J. Woolever, who (1) is Vice President of Duquesne Light, (2) is duly authorized to execute and file the foregoing Submittal on behalf of said Company, and (3) the statements set forth in the Submittal are true and correct to the best of his knowledge.

Anita Elaine Reiter
Notary Public

ANITA ELAINE REITER, NOTARY PUBLIC
ROBINSON TOWNSHIP, ALLEGHENY COUNTY
MY COMMISSION EXPIRES OCTOBER 20, 1986

TJZ/wjs
NR/NRC/EHEB
Attachment

bcc: J. J. Carey (w/attachment)
W. T. Wardzinski "
E. J. Woolever "
C. E. Ewing "
T. D. Jones "
J. A. Hultz "
R. E. Dougher "
E. F. Kurtz, Jr. "
J. H. Latshaw "
T. P. Noonan "
J. A. Rocco "
H. M. Siegel "
R. J. Swiderski "
G. L. Beatty "
E. T. Eilmann "
K. M. Holcomb "
J. Lee, Esq. "
R. E. Martin "
S. L. Pernick, Jr. "
T. J. Zoglmann "
C. R. Bishop "
D. E. Burke (CEI) "
R. G. Schuerger (CEI) "
E. A. Licitra (NRC) "
G. Walton (NRC) "
W. T. Keller (NUTEC) "
B. M. Miller (2) (OEC) "
J. Silberg (SPPT) "
P. RaySircar (S&W) "
D. Chamberlain (S&W) "
T. J. Lex (W) "
S. Phillips (W) "
NCD File "

240.12 (FSAR 2.4.2.3.1) (SRP 2.4.3)

In determining the local PMF for Peggs Run, you used a rainfall intensity of 9.3 in./hr. The staff does not agree that this approach is correct since 9.3 in. is the total PMP that you determined for a 1-hr period. The PMP must be broken down to appropriate time increments suitable for the drainage area and times of concentration that exist at the site. Document the adequacy of your design by using a rainfall intensity corresponding to the time of concentration for Peggs Run. Provide your estimate of time of concentration together with an explanation of how it was calculated.

Response:

In determining the local PMF for Peggs Run, a 6-hr PMP with a total rainfall of 24.6 in. using HMR No. 33 was calculated. The PMP was distributed in 1-hr increments as shown below:

Time (Hr)	PMP (In.)
1	2.7
2	3.4
3	9.3
4	3.7
5	3.0
6	2.5

Peggs Run basin is an ungaged watershed. A method proposed by McSparran (1968) was used to calculate the PMF. In this method, the time to peak (tp) for the unit hydrograph was calculated by the following equation and found to be 1.26 hr.

$$tp = \frac{8.51\ A^{0.0732}\ W_a^{0.186}}{S^{0.699}\ D_d^{0.417}}$$

where A = drainage area of the watershed (sq miles)

W_a = percentage of wooded area in watershed

S = geometric mean stream slope (feet per 1000 ft)

D_d = drainage density (miles per sq. miles)

Since Peggs Run is a small basin (4 sq miles), the time of concentration would be close to the time to peak. Consequently, the 6-hr PMP was broken down to 1-hr increments for PMF analysis.

Reference:

John E. McSparran, "Design Hydrographs for Pennsylvania Watersheds," Journal of Hydraulic Division, ASCE, Vol. 94, No. HY7, July 1968, pp 937-960.

240.14
(FSAR 2.4.2.3.1)
(SRP 2.4.3)

You have not provided any information concerning the effects of the RR culvert on potential flooding of the site. However, the staff notes that in responding to a USAEC staff position on the BVPS-2 PSAR, you stated that assuming the RR culvert is blocked and that the RR embankment does not wash out, water will rise to elevation of 729.6 ft on-site. In your analysis, you routed the Peggs Run PMF over the RR embankment assuming an 800 ft weir length. Is this analysis still valid? If it is, please provide the following information for staff review:

a. The basis for assuming a weir length of 800 ft.

b. A profile of the RR, in the vicinity of the culvert, showing elevations of the top of the rail at each break in slope.

c. Elevation-storage data for the ponding area behind the RR embankment.

If conditions or design of the RR culvert have changed from the PSAR, you should reevaluate the flood potential of the RR culvert, make appropriate changes to the FSAR, and provide your reanalysis for staff review.

Response:

One 14,000 ft long section of Peggs Run is enclosed in a 15-ft diameter culvert (refer to Response to Question 240.05 for detail). The culvert is connected to the RR culvert and the stream channel is backfilled up to the ground level of approximately el 727 ft to 728 ft. The Peggs Run culvert was assumed blocked, and the PMF flow discharges through the channels east and west of Route 168. Hence, the RR culvert has no impact on the flooding of the site.

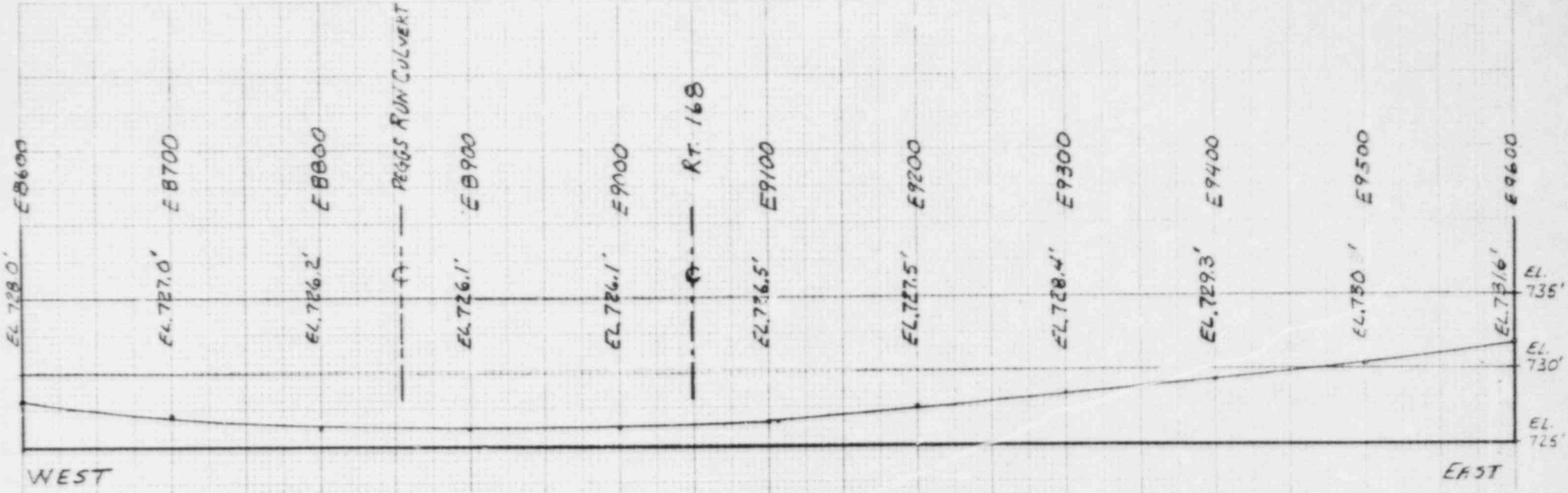
The area between the BVPS-2 cooling tower and Route 168 is generally flat with a mild slope which continues to the northern edge of the RR embankment. The ground then drops down to the Peggs Run natural channel which connects to the Ohio River.

a. The Peggs Run PMF discharges over the railroad embankment. The embankment is no longer a weir since the stream bed south of the railroad was backfilled up to the level of the embankment.

b. A profile of the railroad in the vicinity of the culvert is shown on Figure 240.14-1.

c. A site topographic map shows that there is no ponding area behind the railroad embankment.

The water elevation analysis used in the FSAR was revised to reflect the modifications made to the channels east and west of Route 168. The revised analysis is summarized in the Response to NRC Question 240.15.



PROFILE - NEW CUMBERLAND - PITTSBURGH RAILROAD TRACK

FIGURE 240.14-1

240.15
(FSAR 2.4.2.3.1)
(SRP 2.4.3)

You state that you determined that, if the Peggs Run culvert failed during a PMF such that it would carry only negligible flow, due to blockage by debris, water levels in the vicinity of safety related structures would be below an elevation of 730 ft. What elevation did you calculate? You further state that the U.S. Army Corps of Engineers water surface profiles program HEC-2, was used to generate a series of water surface elevations. Please provide those elevations together with the cross-sections used and their locations. Also provide all pertinent values such as Mannings "n" values, flows, starting water levels, slopes, and any other assumptions used in computing water surface profiles. If you determined that water would overflow Peggs Run to the area east and south of the Highway 168 bridge approach, provide a detailed topographic map of this area.

Response:

The Peggs Run PMF peak flow of 17,000 cfs (Response to Question 240.13) was used for water level analysis. The flood flow is divided and discharges through channels on both sides of Route 168, near where Route 168 turns northwest before crossing the Ohio River. Most of the flow (15,000 cfs) discharges in the channel west of Route 168, following the general direction of the original Peggs Run, over the railroad embankment into the natural Peggs Run channel, and finally to the Ohio River. The critical section is at the northern edge of the railroad embankment where the ground drops down to the Peggs Run natural channel. A smaller portion of the flood flows through the channel east of Route 168. In the water elevation analysis, the security fences in the east channel were conservatively assumed blocked by debris. A critical depth occurred at the security fence section.

The division of the PMF flow by Route 168 near the turning point of Route 168 was evaluated for various flow rates using the U.S. Corps of Engineers' water surface profile HEC-2 program (1979). The calculation started from downstream control sections with critical depth and was carried upstream. By matching the water surface elevation from both channels at the point where the two channels join together with a combined discharge equal to 17,000 cfs, the flow rate for each channel was determined. Mannings 'n' values of 0.04 on the floodway channel and 0.05 on the overbank were used. The topography and cross-section locations are shown on Figure 240.15-1. Cross-section plots for the west and east channels are shown on Figures 240.15-2 and 240.15-3, respectively. HEC-2 input data for the west and east channels are presented in Tables 240.15-1 and 240.15-2, respectively. The water surface profile for the channel west of Route 168 is shown on Figure 240.15-4.

As shown on Figure 240.15-1, all safety related structures are located away from the Peggs Run floodway, and downstream of the railroad embankment. The water surface elevation at cross-section 40, at the railroad embankment, is 730.07 ft msl

(Figure 420.15-4). The floodway drops sharply downstream of cross-section 40 and the water elevation there will be below 730 ft msl. Safety related structures will not be impacted by Peggs Run flooding since minimum plant finished grade is 730 ft-4 in. (FSAR Section 3.4).

Reference:

U.S. Corps of Engineers, "HEC-2 Water Surface Profiles," Users Manual, Hydrologic Engineering Center, 1979.

ECHO PRINT OF INPUT DATA

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00000000011111111112222222222333333333344444444445555555555666666666677777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890

T1      PEGGS RUN PMF W.S. PROFILE - STARTS AT CRITICAL DEPTH,JUST DOWNSTREAM
T2      OF RR EMBANKMENT, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, 7/27/83
T3      WEST OF RT.168 TO DIVERG, 'TOPOGRAPHIC & SURFACE FEATURE' 7/27/83
J1             2                      -1                               729.
J2     1                                              -1                      15
J3   110     150
NC   .05     .05     .04      .1      .3
QT     5    8000   10000   14000   17000   20000
X1   400      10     386     770       0       0       0
X3    10                                                     740     740
GR   730       0     729     190     729     300     740     301     740     385
GR   728     386     727     415     726     580     726     770     740     771
X1   390       9     540     925      35      25      25
GR   740       0     740      40     740     125     740     315     740     450
GR   727     540     726     845     726     925     740     940
X1   380      14     532     860      50      35      35
GR   740       0     740      25     740      65     740     130     740     227
GR   740     260     728     450     728     465     740     466     740     532
GR   727     550     727     850     730     860     740     875
X1   370      17     470     750      90      95      90
GR   740       0     740      15     740      25     740      50     740     100
GR   740     165     740     165     740     275     740     280     728     330
GR   728     355     738     355     738     470     727     475     727     745
GR   730     750     740     760
X1   360       9      40     370     150     140     135
GR   738       0     735      15     730      25     728      30     727      40
GR   727     368     730     370     735     380     745     385
NC   .05     .05     .05
X1   350       8      37     240     210     185     185
GR   740       0     735       5     730       8     729      12     727      37
GR   727     235     730     240     740     260
X1   340       8     120     280     170     170     170
GR   739       0     735      20     730     120     728     140     728     250
GR   730     280     735     285     740     290
X1   330      10      80     270     140     140     140
GR   740       0     735      10     730      80     729      95     728     110
GR   728     265     730     270     735     275     737     290     740     300
X1   320       9      40     265     210     220     235
GR   745       0     740      10     735      15     730      40     729      50
GR   728     100     728     255     730     265     740     290
X1   310       9      25     345     145     140     150
GR   745       0     730      25     729      30     729     175     728     290
GR   728     325     729     340     730     345     740     360
EJ
T1      PEGGS RUN PMF W.S. PROFILE - STARTS AT CRITICAL DEPTH,JUST DOWNSTREAM
T2      OF RR EMBANKMENT, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, 7/27/83
T3      WEST OF RT.168 TO DIVERG, 'TOPOGRAPHIC & SURFACE FEATURE' 7/27/83
J1             3                      -1             0.5              729.2
J2     2       1                                      -1                      15
T1      PEGGS RUN PMF W.S. PROFILE - STARTS AT CRITICAL DEPTH,JUST DOWNSTREAM
T2      OF RR EMBANKMENT, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, 7/27/83
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Table 240.15-1 pg. 1 of 2

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T3      WEST OF RT.168 TO DIVERG, 'TOPOGRAPH'C & SURFACE FEATURE' 7/27/83
J1              4                             -1                          729.4
J2      3                                                     -1                          15
T1      PEGGS RUN PMF W.S. PROFILE - STARTS AT CRITICAL DEPTH,JUST DOWNSTREAM
T2      OF RR EMBANKMENT, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, 7/27/83
T3      WEST OF RT.168 TO DIVERG, 'TOPOGRAPHIC & SURFACE FEATURE' 7/27/83
J1              5                             -1                          729.6
J2      4                                                     -1                          15
T1      PEGGS RUN PMF W.S. PROFILE - STARTS AT CRITICAL DEPTH,JUST DOWNSTREAM
T2      OF RR EMBANKMENT, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, 7/27/83
T3      WEST OF RT.168 TO DIVERG, 'TOPOGRAPHIC & SURFACE FEATURE' 7/27/83
J1              6                             -1                          729.8
J2     15       1                                             -1                          15


ER
X1    410      20     280     665       0       0       0
GR    730       0     729     105     729     160     740     161     740     249
GR    728     250     728     265     727     280     726     355     725     370
GR    724     430     725     440     720     465     685     495     685     530
GR    715     550     720     645     725     665     730     670     740     675
X1    390       9     540     925      35      25      25
GR    733       0     731      40     730     125     729     315     728     450
GR    727     540     726     845     726     925     740     940
X1    380      14     532     860      50      35      35
GR    733       0     732      25     731      65     730     130     730     227
GR    729     260     728     450     728     465     740     466     740     532
GR    727     550     727     850     730     860     740     875
X1    370      17     470     750      90      95      90
GR    740       0     732      15     730      25     732      50     731     100
GR    732     165     740     165     740     275     729     280     728     330
GR    728     355     738     355     738     470     727     475     727     745
GR    730     750     740     760
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ECHO PRINT OF INPUT DATA

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T1        PEGGS RUN PMF W.S. PROFILE - STARTS AT CRITICAL DEPTH, JUST DOWNSTREAM
T2        OF WAREHOUSE, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, BVPS SITE
T3        EAST OF RT. 168 TO DVIERG., 'TOPOGRAPHIC & SURFACE FEATURE' 7/27/83
J1              2                             -1                    738.
J2       1                                                    -1                     15
J3     110     150
NC     .05     .05     .04      .1      .3
QT       5    1000    1200    1400    1600    1800
X1      80      15      15     400       0       0       0
GR     740       0     735       5     730      15     740      16     740      40
GR     740      41     740      70     740     138     740     230     740     255
GR     740     400     736     400     737     480     738     495     740     500
X1      70      10      10     190     210     250     230
GR     740       0     735      10     730      30     732      40     733      95
GR     734     160     735     190     736     270     736     490     740     570
X1      60      12      40     480     230     260     240
GR     740       0     738      10     735      40     730      60     732      90
GR     732     185     734     250     735     370     735     480     734     520
GR     735     545     740     555
X1      50      10      65     450     150     250     210
GR     740       0     735       0     730      65     730      85     731     105
GR     731     250     730     270     725     340     735     450     740     500
EJ
T1        PEGGS RUN PMF W.S. PROFILE - STARTS AT CRITICAL DEPTH, JUST DOWNSTREAM
T2        OF WAREHOUSE, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, BVPS SITE
T3        EAST OF RT. 168 TO DVIERG., 'TOPOGRAPHIC & SURFACE FEATURE' 7/27/83
J1              3                             -1                    738.2
J2       2                                                    -1                     15
T1        PEGGS RUN PMF W.S. PROFILE - STARTS AT CRITICAL DEPTH, JUST DOWNSTREAM
T2        OF WAREHOUSE, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, BVPS SITE
T3        EAST OF RT. 168 TO DVIERG., 'TOPOGRAPHIC & SURFACE FEATURE' 7/27/83
J1              4                             -1                    738.4
J2       3                                                    -1                     15
T1        PEGGS RUN PMF W.S. PROFILE - STARTS AT CRITICAL DEPTH, JUST DOWNSTREAM
T2        OF WAREHOUSE, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, BVPS SITE
T3        EAST OF RT. 168 TO DVIERG., 'TOPOGRAPHIC & SURFACE FEATURE' 7/27/83
J1              5                             -1                    738.6
J2       4       1                                            -1                     15
T1        PEGGS RUN PMF W.S. PROFILE - STARTS AT CRITICAL DEPTH, JUST DOWNSTREAM
T2        OF WAREHOUSE, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, BVPS SITE
T3        EAST OF RT. 168 TO DVIERG., 'TOPOGRAPHIC & SURFACE FEATURE' 7/27/83
J1              6                             -1                    738.8
J2      15       1                                            -1                     15


ER
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TABLE 240.15-2 pg 1 of 1

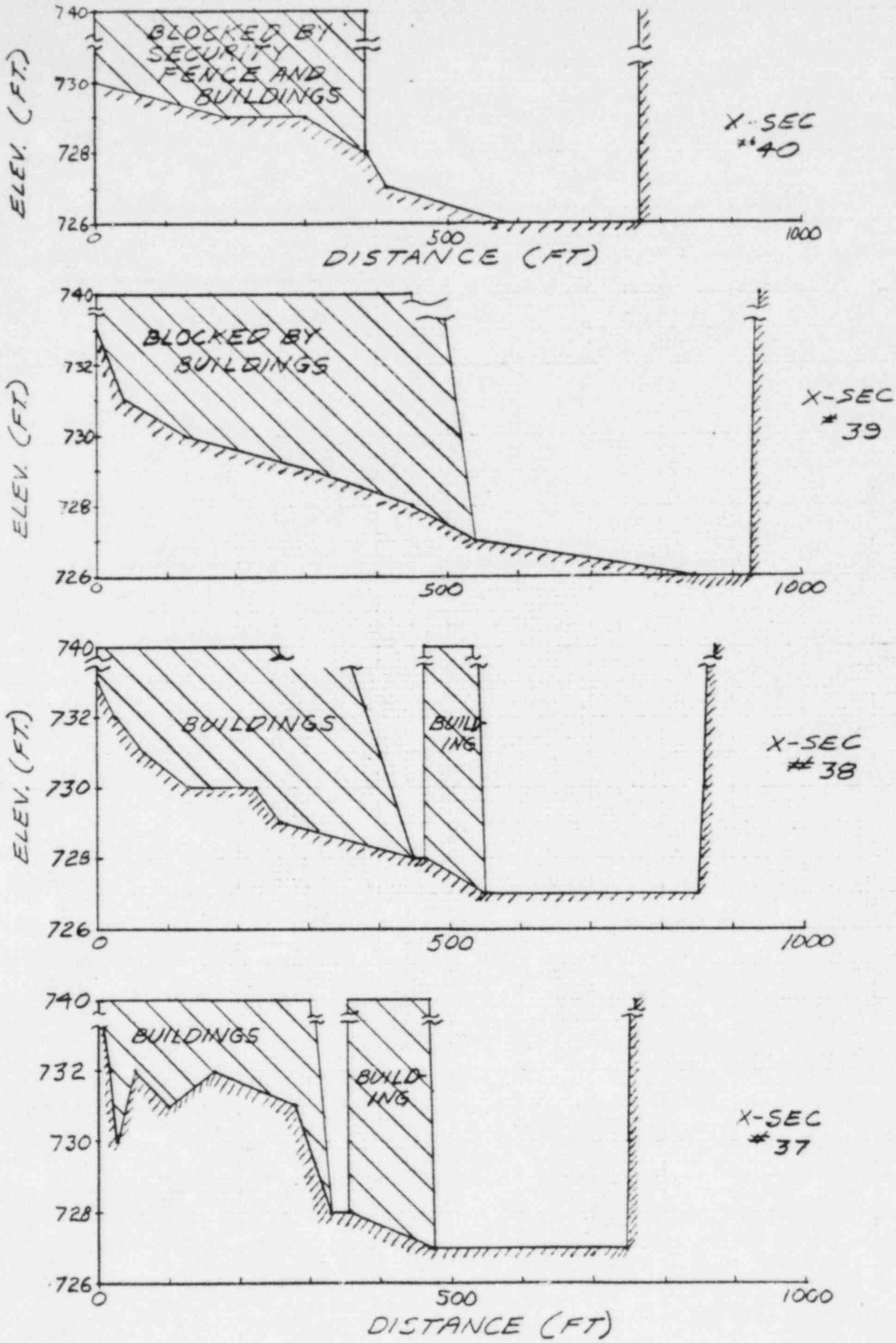

FIGURE 240.15-2
CROSS-SECTIONS, WEST OF RT. 168

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ANO. 8411190306

NO. OF PAGES 1

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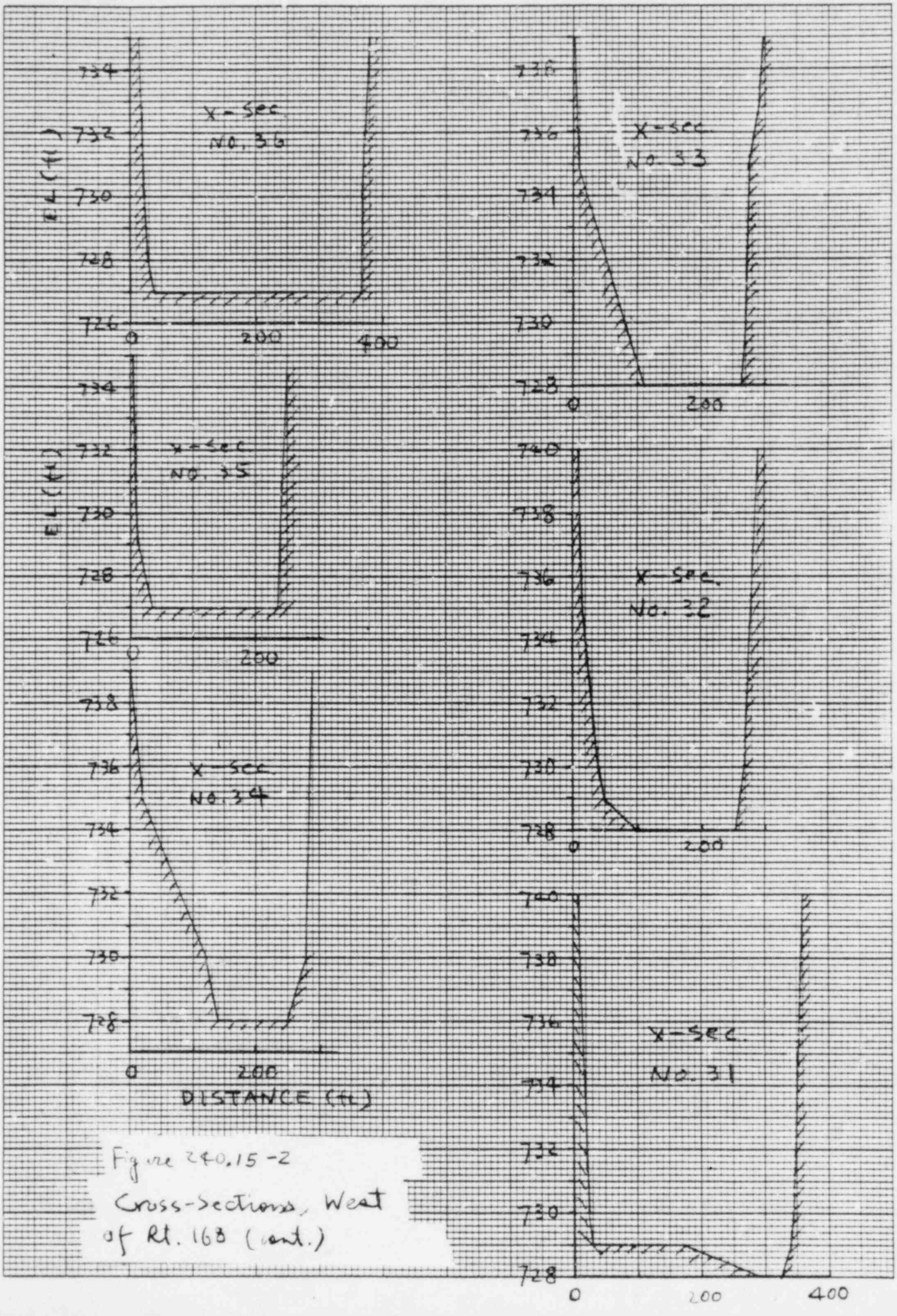

Figure 240.15-2
Cross-Sections, West of Rt. 168 (cont.)

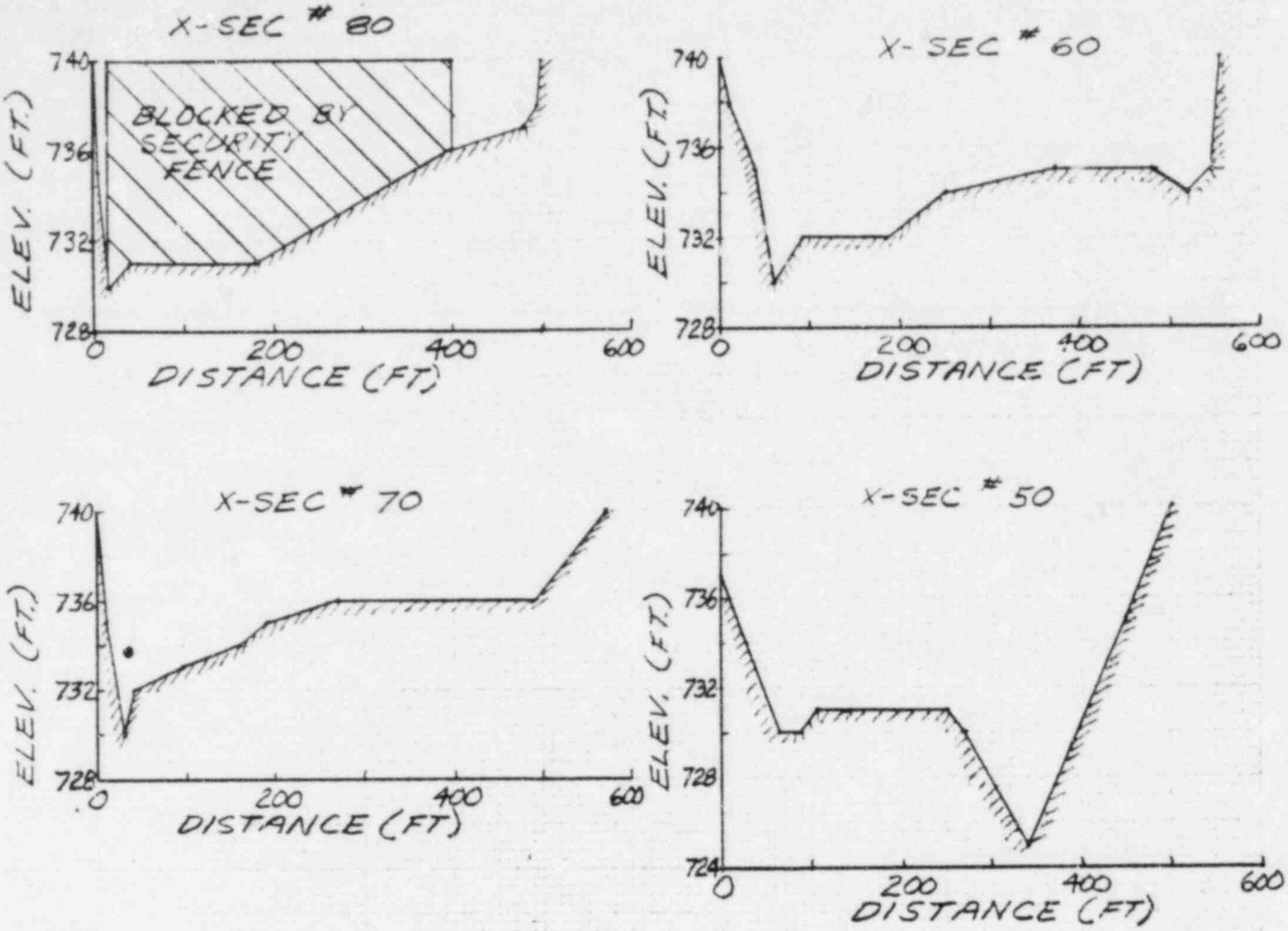

FIGURE 240.15-3
CROSS-SECTIONS, EAST OF RT. 168

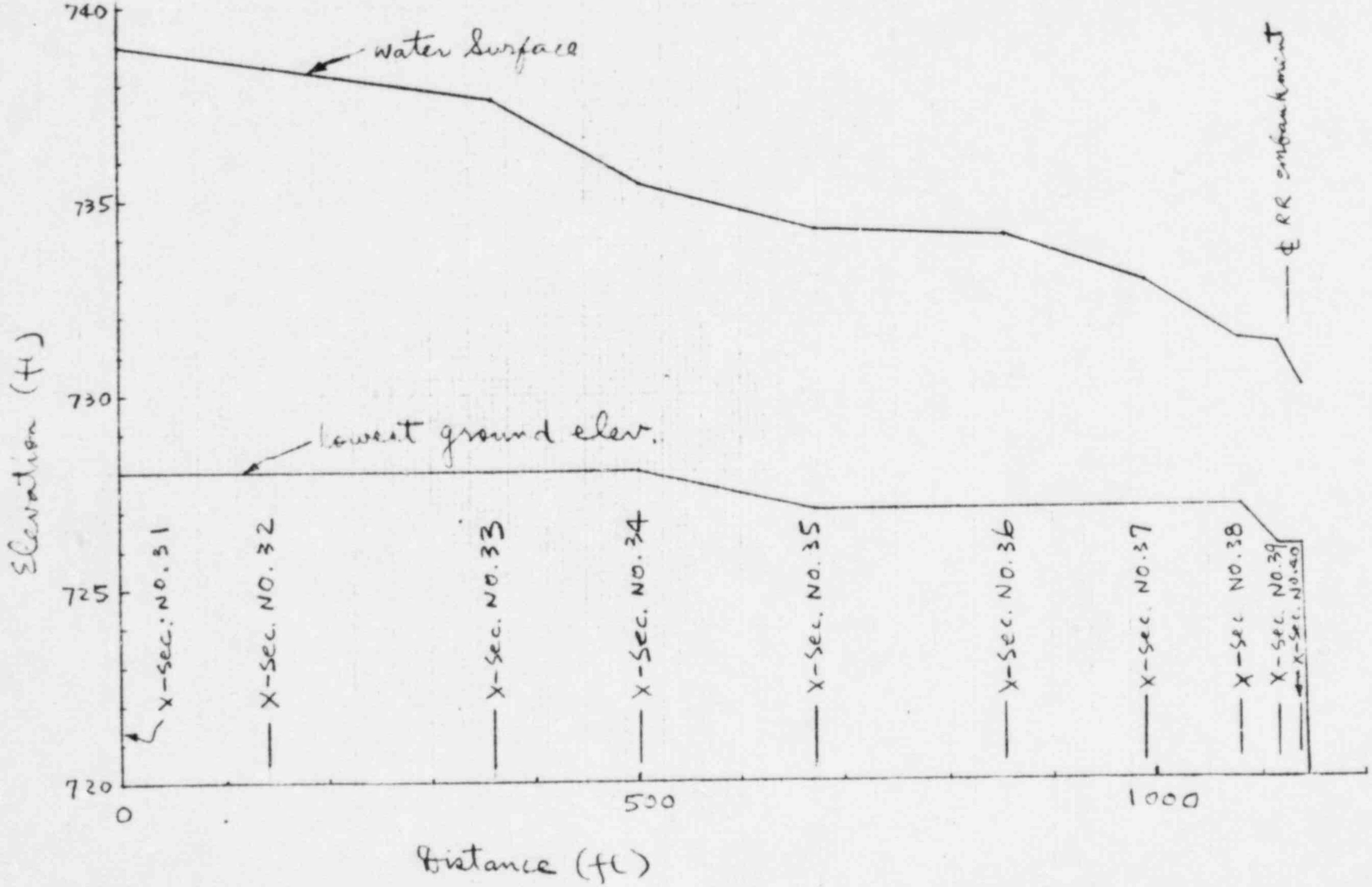

Figure 240.15-4. Peggs Run PMF Water Surface Elevation, Floodway West of Rt. 168

240.16
(FSAR 2.4.2.3.2)
(SRP 2.4.3)

In analyzing local flooding, all you state is the method used to determine water depths and the maximum water elevations computed at the Reactor Building, the Control Building, and the Radwaste Building.

a. Are these the only safety-related buildings that could be affected by local flooding?

b. You have not provided the staff sufficient information to enable it to review your local flood analysis. Please provide a more detailed description of your analysis.

c. You should also provide a detailed topographic map of the site showing roads and railroads together with their top elevations. Other obstructions to flow such as temporary and permanent buildings, trailers, sheds, fences, etc, should also be shown.

d. Provide assurances that all obstructions were considered in your analysis of site flooding due to a local PMP.

Response:

The local flooding was reanalyzed to reflect changes in site grade due to construction and to incorporate the additional guidance received from the NRC staff during the March 21, 1984 hydrometeorology meeting. The PMP was calculated using HMR No. 33 and the Corps of Engineers' Civil Engineering Bulletin No. 52-8 (Bulletin 52-8).

a. The initial analysis for the construction stage only considered the Reactor Building, the Control Building, and the Radwaste Building. In reanalyzing the effect of PMP on the BVPS site, it was determined that additional safety related buildings should be included in the reanalysis. All of the safety-related buildings with access doors considered in the revised study are shown in detail in part (b).

b. In analyzing the local on-site flooding, the plant site (including the switchyard) was divided into five subdrainage areas (E, W, I, II, III) as shown on Figures 240.16-1, -2, and -3. The following assumptions were made in the analysis.

   (1) The roof and storm drains were completely blocked by debris.

   (2) Credit of roof storage capacity was not taken (in accordance with the March 21, 1984 meeting with the NRC).

   (3) The Rational Method was used for calculating the PMF.

(4) The direction and rate of roof flow were based on the elevation and length of the parapet.

(5) Areas E and W were included in the analyses (in accordance with the March 21, 1984 meeting with the NRC).

The value of the runoff coefficient "C" for use in the Rational Method was set equal to 1.0 for the roofs, walks, driveways, and other highly impervious areas around the buildings (in accordance with the March 21, 1984 meeting with the NRC). A value of 0.9 was used for other areas in the analysis.

The rainfall intensity "I" used in the analysis was based on the concentration time for each of the subdrainage basin areas. In all cases, the concentration time was calculated to be approximately 10 minutes. To compute "I," the original intensity calculation for a 1 hour time period was extended by directly applying the ratios from Bulletin 52-8 to the 1 hour duration PMP. The maximum 10-minute PMP was found to be 3.5 in. Thus, the intensity used to determine peak local flood elevations was 21.0 in./hr.

Subdrainage basin areas were determined using a planimeter. The areas computed for basins E, W, I, II, and III on Figures 240.16-1, -2, and -3 are 50.1, 10.3, 2.1, 0.5, and 2.2 acres, respectively.

Water surface elevations along each flow path were calculated using the Corps of Engineers HEC-2 computer program. Cross-sections were located based on topography and restrictions to flow. Flow was varied based on the portion of the subdrainage basin discharging upstream of a particular section. The HEC-2 output for basin E was used to determine the starting water level for the basin I HEC-2 run. Flow paths and cross-section locations are indicated on Figures 240.16-1, -2, and -3.

In two cases, flow paths for the runoff from two subdrainage basins abutted each other at the upstream ends of the channels. For basins E and W (Figure 240.16-1), cross-section 10 is at the upstream end of the flow path for each area. For basins I and III (Figures 240.16-2 and -3), the flow paths meet at common cross-section 16 (Area I)/59 (Area III). In both cases, flows in the flow paths were adjusted until the water level in the vicinity of the common cross section was equal.

HEC-2 input for all five basins is included as Table 240.16-1. For basins E and W and basins I and III, input flow values reflect the fact that the flow rates were balanced between abutting flow paths. For basin II, input flow values are for the greatest three 10-minute PMP intensities for evaluating the flow seeping through a Service Building door.

The resulting maximum water surface elevation versus lowest access to Category I buildings are tabulated below:

Category I Structures	Lowest Access to Bldg. (Ft-Msl)	Max. Water Surface Elev.at Access Doors (Ft)	Max. Water Depth Over Sill (Ft)
Main Steam Valve Building Area	735.5	732.5	-
Safeguards Bldg	737.5	732.5	-
Reactor Containment (Equipment Hatch)	767.83	735.1	-
Emergency Diesel Generator Bldg.			
1 dr	732.5	732.5	-
3 drs	732.5	732.4	-
Auxiliary Bldg.			
3 drs	735.5	735.4	-
Fuel & Decontamination Bldg.			
1 dr	735.5	735.3	-
3 drs	735.5	735.3	-
Control Bldg.			
3 drs (So.)	735.5	735.4	-
1 dr (No.)	735.5	732.4	-
Service Bldg.			
1 dr (SB30-8)	732.0	732.5	0.5
1 dr	732.5	732.5	-

As shown in the above table, the maximum water surface is above the sill of only one door to a safety related structure. Since the sill to the affected door for the Service Building is at grade, runoff water from local site flooding will seep under the door during the PMP until the site drainage system becomes operational.

An analysis was performed to calculate the quantity of water entering the Service Building under the affected door. HEC-2 runs were made using flows from time periods of the PMP after the peak 10-minute intensity. From the water levels computed using HEC-2, an estimate was made of the quantity of water seeping between the bottom of the door and the sill. In the analysis, a maximum gap of 1/16 in. between the bottom of the door and the door sill was assumed. A door width of 8 ft and 1.5 in. thick was used. The flow rate was calculated by assuming laminar steady flow between fixed-parallel plates. In the most intense 1 hour rainfall, the water depths over the door sill varies from 0.2 to 0.5 ft. The total volume of water seeping through the door was calculated to be 475 ft^3. Taking into consideration the size of the room, equipment location, and no credit taken for floor drains and sumps, the accumulation of water in the Service Building has been conservatively estimated to be less than 1.6 in. deep. Since there are no QA Category 1 equipment or electrical connections located closer than 2 in. to the floor, there is no impact on the operation of safety related equipment due to a PMP.

c. A detailed topographic map of the site is included as Figure 240.16-1. Finished paving, grading plans, and structures for the BVPS-1 and -2 plant sites are shown on Figures 240-16-2 and -3.

d. All obstructions were considered in the site flooding analysis.

ECHO PRINT OF INPUT DATA

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000000000111111111122222222223333333333444444444455555555556666666666777777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890
```

T1	MAX. WATER SURFACE ELEV. DUE TO LOCAL PMP - S. OF PLANT SITE & N.									
T2	OF BIG SLOPE, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, 7/27/83									
T3	FLOW TOWARD EAST TO PEGGS RUN, THEN TO OHIO RIVER									
J1		2			.0091				730.	
J2	1						-1			
J3	110	150								
NC	.04	.04	.03	.1	.3					
QT	4	730	820	910	885					
X1	26	9	160	240	0	0	0			
GR	735	0	730	0	72[illegible]	10	728.3	100	728.5	160
GR	728.3	200	729	240	730	310	735	310		
X1	25	8	145	300	120	100	120			
GR	735	0	730	0	730	64	729	140	729	145
GR	729	300	730	350	735	350				
QT	4	675	765	855	830					
X1	24	7	110	216	180	155	160			
GR	735	0	730	14	730	110	730	216	731	238
GR	732	264	735	265						
QT	4	255	345	435	410					
X1	23	6	5	124	40	40	40			
GR	735	0	730	5	730	80	731	124	732	142
GR	735	150								
X1	22	5	50	102	185	185	185			
GR	735	0	730.7	5	730.7	50	731	102	732	110
X1	21	6	52	110	45	45	45			
GR	735	0	732	50	731	52	731	85	732	110
GR	735	112								
QT	4	175	265	355	330					
X1	20	8	18	80	140	140	140			
GR	740	0	735	0	734	18	733	20	732	42
GR	732	70	735	80	740	90				
QT	4	60	150	240	215					
X1	18	9	50	95	100	100	100			
GR	740	0	735	0	731	20	731	40	733	45
GR	733	50	732	76	732	95	740	96		
X1	16	6	55	100	200	200	200			
GR	740	0	735	0	734	30	733	55	733	100
GR	740	100								
X1	14	8	76	112	108	108	108			
GR	740	0	735	0	734	38	733.5	60	733	76
GR	733	112	735	120	740	120				
QT	4	0	90	180	155					
X1	13	8	20	46	86	86	86			
GR	740	0	734	0	733.5	20	733	40	733	46
GR	734	50	735	51	740	60				
X1	12	5	20	36	64	64	64			
GR	740	0	734	0	733.5	20	733.5	36	740	36
X1	11	6	30	70	110	110	110			
GR	740	0	734	0	733.7	30	733.7	70	734	80
GR	740	80								
EJ										

TABLE 240.16-1
AREA E
pg. 1 of 6

ECHO PRINT OF INPUT DATA

```
00000000011111111112222222222333333333344444444445555555555666666666677777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890

T1      MAX. WATER SURFACE ELEV. DUE TO LOCAL PMP - S. OF PLANT SITE & N.
T2      OF BIG SLOPE, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, 7/27/83
T3      FLOW TOWARD EAST TO PEGGS RUN, THEN TO OHIO RIVER
J1            3                   .0091                                 730.
J2     2                                               -1
T1      MAX. WATER SURFACE ELEV. DUE TO LOCAL PMP - S. OF PLANT SITE & N.
T2      OF BIG SLOPE, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, 7/27/83
T3      FLOW TOWARD EAST TO PEGGS RUN, THEN TO OHIO RIVER
J1            4                   .0091                                 730.
J2     3                                               -1
T1      MAX. WATER SURFACE ELEV. DUE TO LOCAL PMP - S. OF PLANT SITE & N.
T2      OF BIG SLOPE, REF. MAP - DLC DWG. NO. 8700-RX-001-F&G, 7/27/83
T3      FLOW TOWARD EAST TO PEGGS RUN, THEN TO OHIO RIVER
J1            5                   .0091                                 730.
J2    15                                               -1


ER
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TABLE 240.16-1
AREA E (con't)
Pg. 2 of 6

ECHO PRINT OF INPUT DATA

```
000000000111111111122222222223333333333444444444455555555556666666666777777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890

T1        MAX. WATER SURFACE ELEV. DUE TO LOCAL PMP - S. OF PLANT SITE & N.
T2        OF BIG SLOPE, REF. MAP - DLC DWG. NO. 8700-RX-001-F, 7/27/83
T3        FLOW TOWARD E. TO PEGGS RUN & W. AROUND SHIPPINGPORT TO OHIO R.
J1             2                      -1                                730.
J2     1                                              -1
J3   110     150
NC   .04     .04     .03      .1      .3
QT     4     440     350     260     205
X1    60      12      24     144       0       0       0
GR   735       0     734       4     733      24     732      28     731      32
GR   730      38     729      42     728      72     730      80     733      82
GR   734     144     735     164
X1    58      10      22     148      65      65      65
GR   740       0     735       6     734      12     734      22     733      36
GR   732      60     733      68     734     148     735     195     740     196
X1    56      10      30     182     136     115     125
GR   740       0     735       6     734      10     734      30     733      86
GR   733     140     734     182     734     200     735     220     740     220
X1    54      13     130     230     200     195     195
GR   740       0     735       8     734      12     734      22     734      40
GR 733.5      88     740      88     740     130     733     130     733     182
GR   734     230     734     290     740     290
QT     4     405     315     225     250
X1    52       8     108     250     118     100     104
GR   740       0     735      20     735      50     740      50     740     108
GR   734     108     734     250     740     250
X1    51      10      82     220     110     105     110
GR   740       0     736       4     735      46     740      46     740      82
GR   735      82     734     112     734     220     734     232     740     232
X1    50       9     105     230     135     130     130
GR   740       0     735      18     735      50     740      50     740     105
GR   734     105     734     230   734.5     280     740     280
X1    10       8      26     142     140     100     120
GR   740       0     735       8     734      14   734.5      26     734     115
GR   734     142     734     148     740     148
EJ
T1        MAX. WATER SURFACE ELEV. DUE TO LOCAL PMP - S. OF PLANT SITE & N.
T2        OF BIG SLOPE, REF. MAP - DLC DWG. NO. 8700-RX-001-F, 7/27/83
T3        FLOW TOWARD E. TO PEGGS RUN & W. AROUND SHIPPINGPORT TO OHIO R.
J1             3                      -1                                730.
J2     2                                              -1
T1        MAX. WATER SURFACE ELEV. DUE TO LOCAL PMP - S. OF PLANT SITE & N.
T2        OF BIG SLOPE, REF. MAP - DLC DWG. NO. 8700-RX-001-F, 7/27/83
T3        FLOW TOWARD E. TO PEGGS RUN & W. AROUND SHIPPINGPORT TO OHIO R.
J1             4                      -1                                730.
J2     3                                              -1
T1        MAX. WATER SURFACE ELEV. DUE TO LOCAL PMP - S. OF PLANT SITE & N.
T2        OF BIG SLOPE, REF. MAP - DLC DWG. NO. 8700-RX-001-F, 7/27/83
T3        FLOW TOWARD E. TO PEGGS RUN & W. AROUND SHIPPINGPORT TO OHIO R.
J1             5                      -1                                730.
J2    15                                              -1
```

TABLE 240.16-1
AREA W

pg. 3 of 6

ECHO PRINT OF INPUT DATA

```
00000000011111111112222222222333333333344444444445555555555666666666677777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890

T1       LOCAL PMP ON SITE - BASED ON HMR NO 33,       REF DWG 12241-RY-8E
T2       -7 & 11700-RY-2C-9, DIRC. OF ROOF FLOW CONSID. FOR AREA BETWEEN
T3       UNIT #1 & #2 TOWARD SOUTH, DOWNSTREAM DEPTH DETERM. BY SEP. RUN
J1              2                             -1                            733.8
J2       1                                                    -1
J3     110     150
NC    .030    .030     .016      .1      .3
QT       3    30.9     33.9    43.9
X1      10       6        1     105       0       0       0
GR     736       0    734.8       1     735      50   735.3      80     735     105
GR     736     106
QT       3    30.3     33.3    43.3
X1      11       6       50     105      30      30      30
GR     736       0    734.8       1   734.8      50     735      79     735     105
GR     736     106
QT       3    25.2     28.2    38.2
X1      12       8       50     113      50      50      50
GR     736       0    735.5       1   735.5      50     735      51     735      80
GR   735.3     100      735     113     736     113
NC    .030    .030     .025      .1      .3
QT       3    21.6     24.6    34.6
X1      13       6        1      77      60      60      60
GR     736       0    734.7       1   734.7      23   735.3      63     735      77
GR     736      77
X1      14       5        1     131      60      60      60
GR     736       0      735       1   735.3      73     735     131     736     132
QT       3    0.01      3.0    13.0
X1      15       6        2     133      60      60      60
GR     736       0    735.2       2   735.2      55   735.3      75     735     133
GR     736     134
X1      16       6        2     133      30      30      30
GR     736       0    735.2       2   735.2      55   735.3      75     735     133
GR     736     134
EJ
T1       LOCAL PMP ON SITE - BASED ON HMR NO 33,       REF DWG 12241-RY-8E
T2       -7 & 11700-RY-2C-9, DIRC. OF ROOF FLOW CONSID. FOR AREA BETWEEN
T3       UNIT #1 & #2 TOWARD SOUTH, DOWNSTREAM DEPTH DETERM. BY SEP. RUN
J1              3                             -1                            733.8
J2       2                                                    -1
T1       LOCAL PMP ON SITE - BASED ON HMR NO 33,       REF DWG 12241-RY-8E
T2       -7 & 11700-RY-2C-9, DIRC. OF ROOF FLOW CONSID. FOR AREA BETWEEN
T3       UNIT #1 & #2 TOWARD SOUTH, DOWNSTREAM DEPTH DETERM. BY SEP. RUN
J1              4                             -1                            734.1
J2      15                                                    -1


ER
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TABLE 240.16-1
AREA I

pg. 4 of 6

ECHO PRINT OF INPUT DATA

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00000000011111111112222222222333333333344444444445555555555666666666677777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890

T1       LOCAL PMP ON SITE - BASED ON HMR NO. 33,
T2       REF DWG. 12241-RY-8E-7 & DLC DWG. NO. 8700-RX-001-F, 7/27/83
T3       REACTOR CONT. TOWARD EAST  START COMPUTATION AT CRITICAL DEPTH
J1             2                      -1                             732.
J2     1                                         -1
J3   110     150
NC  .030    .030     .016       .1        .3
QT     3     6.1      6.6     16.4
X1    20       4        0       10         0         0         0
GR   735       0   731.75        0    731.75        10       735        10
QT     3     4.4      4.7     11.8
X1    21       0        0        0        40        40        40
QT     3     4.0      4.3     10.7
X1    22       4        0       17        20        20        22
GR   735       0    732.0        0     732.0        17       735      17.5
QT     3     3.6      3.8      9.6
X1    23       4        0       11        20        22        20
GR   735       0    732.0        0     732.0        11       735        11
X1    24       4        3       25        20        22        20
GR   735       0    732.0        3     732.0        25       735      25.5
QT     3     3.0      3.3      8.2
X1    25       4        5       55        11        16        12
GR   735       0    732.0        5     732.0        55       735        60
X1    26       4        3       22        25        25        25
GR   735       0    732.2        3     732.2        22       735        25
EJ
T1       LOCAL PMP ON SITE - BASED ON HMR NO. 33,
T2       REF DWG. 12241-RY-8E-7 & DLC DWG. NO. 8700-RX-001-F, 7/27/83
T3       REACTOR CONT. TOWARD EAST  START COMPUTATION AT CRITICAL DEPTH
J1             3                      -1                             732.
J2     2                                         -1
T1       LOCAL PMP ON SITE - BASED ON HMR NO. 33,
T2       REF DWG. 12241-RY-8E-7 & DLC DWG. NO. 8700-RX-001-F, 7/27/83
T3       REACTOR CONT. TOWARD EAST  START COMPUTATION AT CRITICAL DEPTH
J1             4                      -1                             732.
J2    15                                         -1

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TABLE 240.16-1
AREA II

Pg. 5 of 6

ECHO PRINT OF INPUT DATA

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00000000011111111112222222222333333333344444444445555555555666666666677777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890

T1      LOCAL PHP ON S TE - BASED ON HHR NO. 33, REF DWG: S&W 11700
T2      -RY-2C-9,12241-RY-8E-7 & DLC DWG. NO. 8700-RX-001-F, 7/27/83, N.
T3      OF REACOTR CONT. TOWARD EAST  START COMPUTATION AT NORMAL DEPTH
J1             2                          .01328                             734.2
J2     1                                                      -1
J3   110     150
NC  .030    .030    .016      .1      .3
QT     3    58.3    55.3    45.3
X1    50       5      20      70       0       0       0
GR   735       0     734      20     734      47     734      70     735      70
QT     3    54.9    51.9    41.9
X1    51       5      14      65      60      60      60
GR   735       0   734.2      14   734.8      55   734.8      65     735      65
QT     3    51.8    48.8    38.8
X1    52       5      23      80      55      60      65
GR   735       0   735.0      10   734.6      23   734.5      55   735.2 [illegible]
QT     3    46.7    43.7    33.7
X1    53       5      20      90      80      80      80
GR   735       0  734.75      20   734.5      50   735.5      90   735.5     100
QT     3    44.4    41.4    31.4
X1    54       5      20      90      40      40      40
GR   735       0  734.75      20   734.5      50   735.5      90   735.5     100
QT     3    38.5    35.5    25.5
X1    55       5      20      90      55      60      65
GR   735       0  734.75      20   734.5      45   735.5      90   735.5      90
NC  .030    .030    .025      .1      .3
QT     3    35.8    32.8    22.8
X1    56       5      23      98      25      35      50
GR   735       0  734.75      23   735.0      50   735.5      98   735.5     105
QT     3    33.9    30.9    20.9
X1    57       4       0      60      10      25      50
GR   736       0     735       0  734.75      60   735.5     150   735.5     105
QT     3    25.2    22.2    12.2
X1    58       4       5     115      15      45      80
GR   736       0    735.       5   735.0     115   736.0     120
QT     3    21.1    18.1     8.1
X1    59       4       5      75      35      45      60
GR   736       0     735       5    735.      75   736.0      80
EJ
T1      LOCAL PHP ON SITE - BASED ON HHR NO. 33, REF DWG: S&W 11700
T2      -RY-2C-9,12241-RY-8E-7 & DLC DWG. NO. 8700-RX-001-F, 7/27/83, N.
T3      OF REACOTR CONT. TOWARD EAST STARTS COMPUTATION AT NORMAL DEPTH
J1             3                          .01328                             734.3
J2     2                                                      -1
T1      LOCAL PHP ON SITE - BASED ON HHR NO. 33, REF DWG: S&W 11700
T2      -RY-2C-9,12241-RY-8E-7 & DLC DWG. NO. 8700-RX-001-F, 7/27/83, N.
T3      OF REACOTR CONT. TOWARD EAST STARTS COMPUTATION AT NORMAL DEPTH
J1             4                          .01328                             734.5
J2    15                                                      -1
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TABLE 240.16-1
AREA III
pg. 6 of 6

DOCUMENT/ PAGE PULLED

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