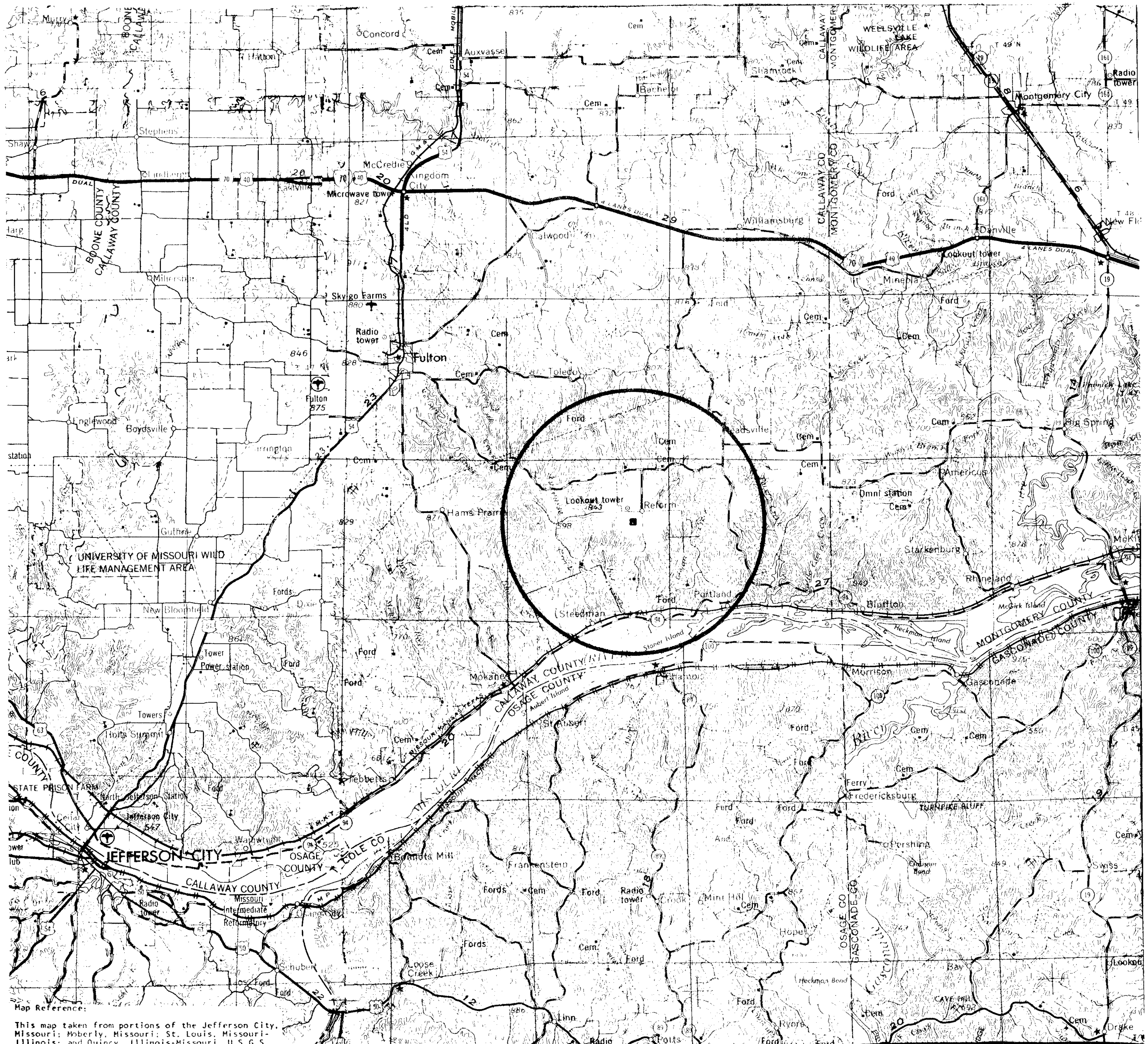
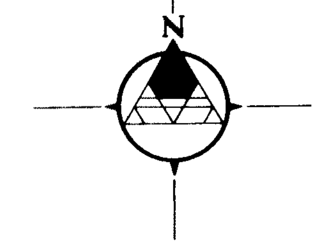
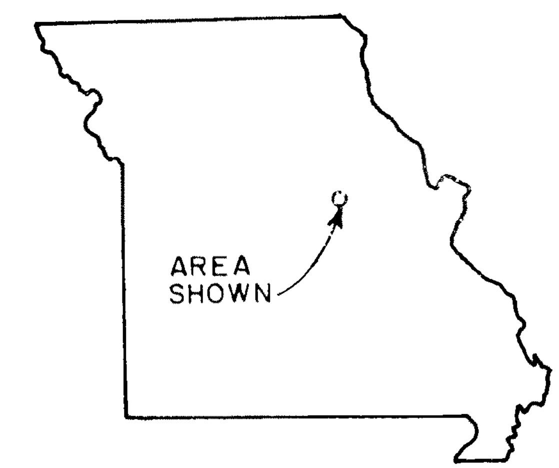
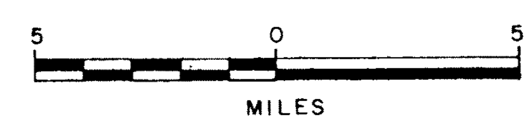


Map Reference:

This map taken from portions of the Jefferson City, Missouri; Moberly, Missouri; St. Louis, Missouri-Illinois; and Quincy, Illinois-Missouri, U.S.G.S. Quadrangles. Dated 1955, 1960, 1966 and 1956 respectively.







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CALLAWAY PLANT
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FIGURE 2.1-1

REGIONAL TOPOGRAPHIC MAP

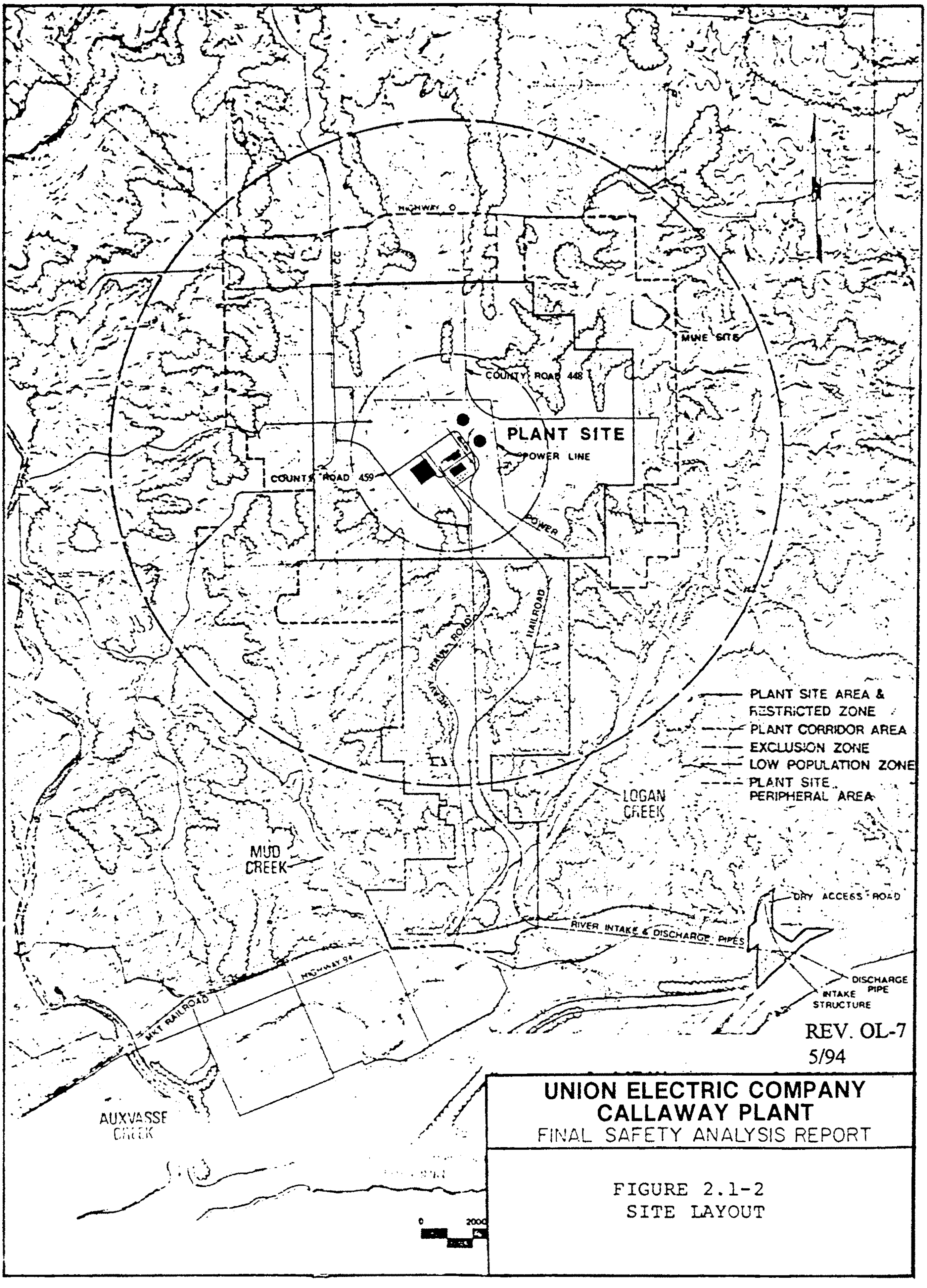

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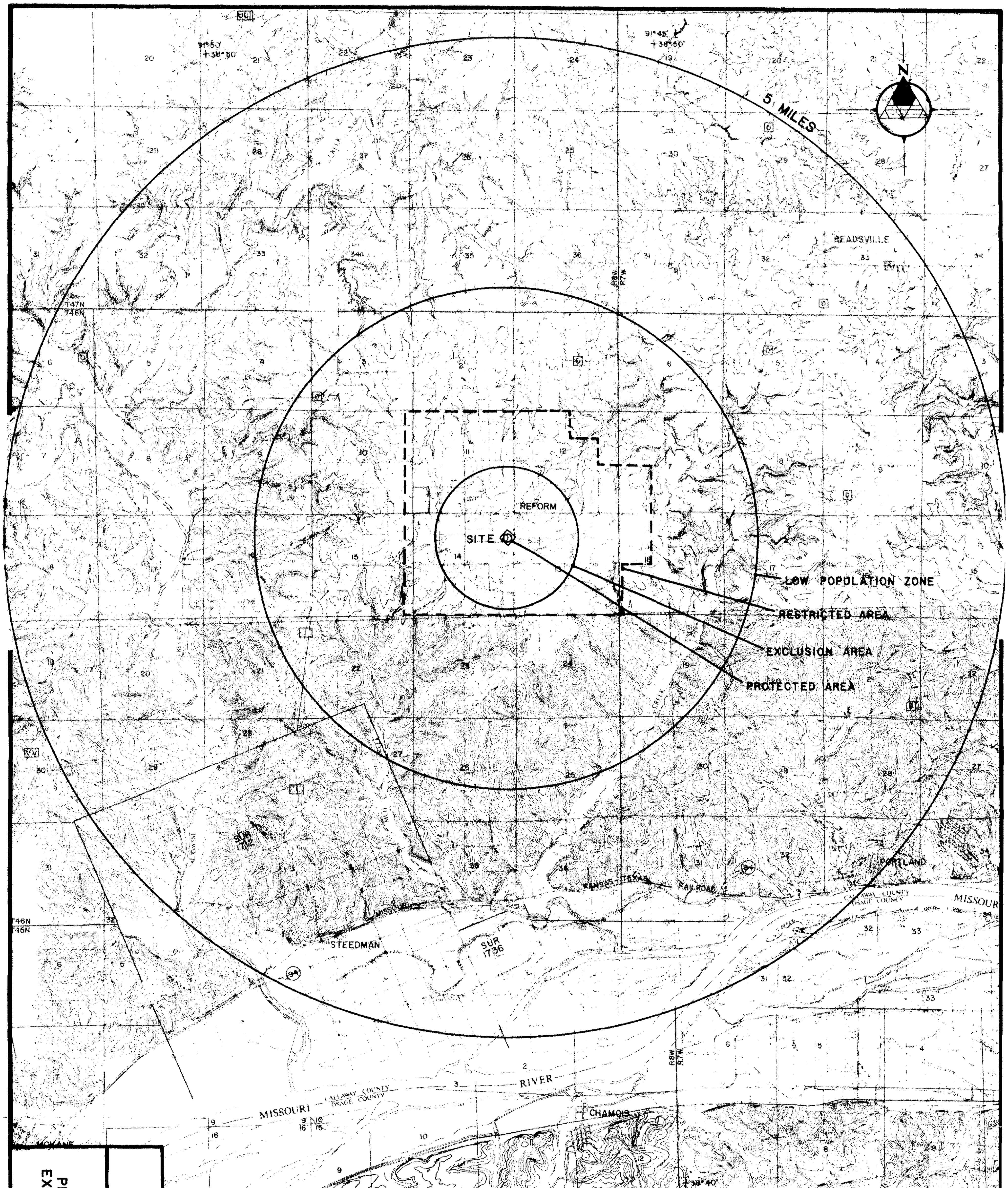
FIGURE 2.1-2
SITE LAYOUT

8600-X-88100

SA Figure 2.1-3 is withheld per RIS 2015-17

DRAWN (DATE) N/A	PROPERTY-SITE LAYOUT OWNER CONTROLLED AREA AND SURROUNDING AREA
CHKD. (DATE) N/A	FSAR FIGURE 1.2-44
SUPV. (DATE) N/A	
APPD. (DATE) N/A	LOCATION 001017 / CALLAWAY LOCATION 982 / CALLAWAY ENERGY CENTER / CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO	8600-X-88100 / REV. 74

SA Figure 2.1-3 is withheld per RIS 2015-17



5000 0 5000

FEET

REFERENCE:
TOPOGRAPHY BASED ON PORTIONS OF U.S.G.S. 7.5 MIN.
TOPOGRAPHIC MAP ADVANCE PRINTS:
FULTON SE, MISSOURI QUADRANGLE
MONTGOMERY CITY SW, MISSOURI QUADRANGLE
MOKANE NE, MISSOURI QUADRANGLE
MORRISON NW, MISSOURI QUADRANGLE
SECTION LINES SHOWN ARE APPROXIMATE

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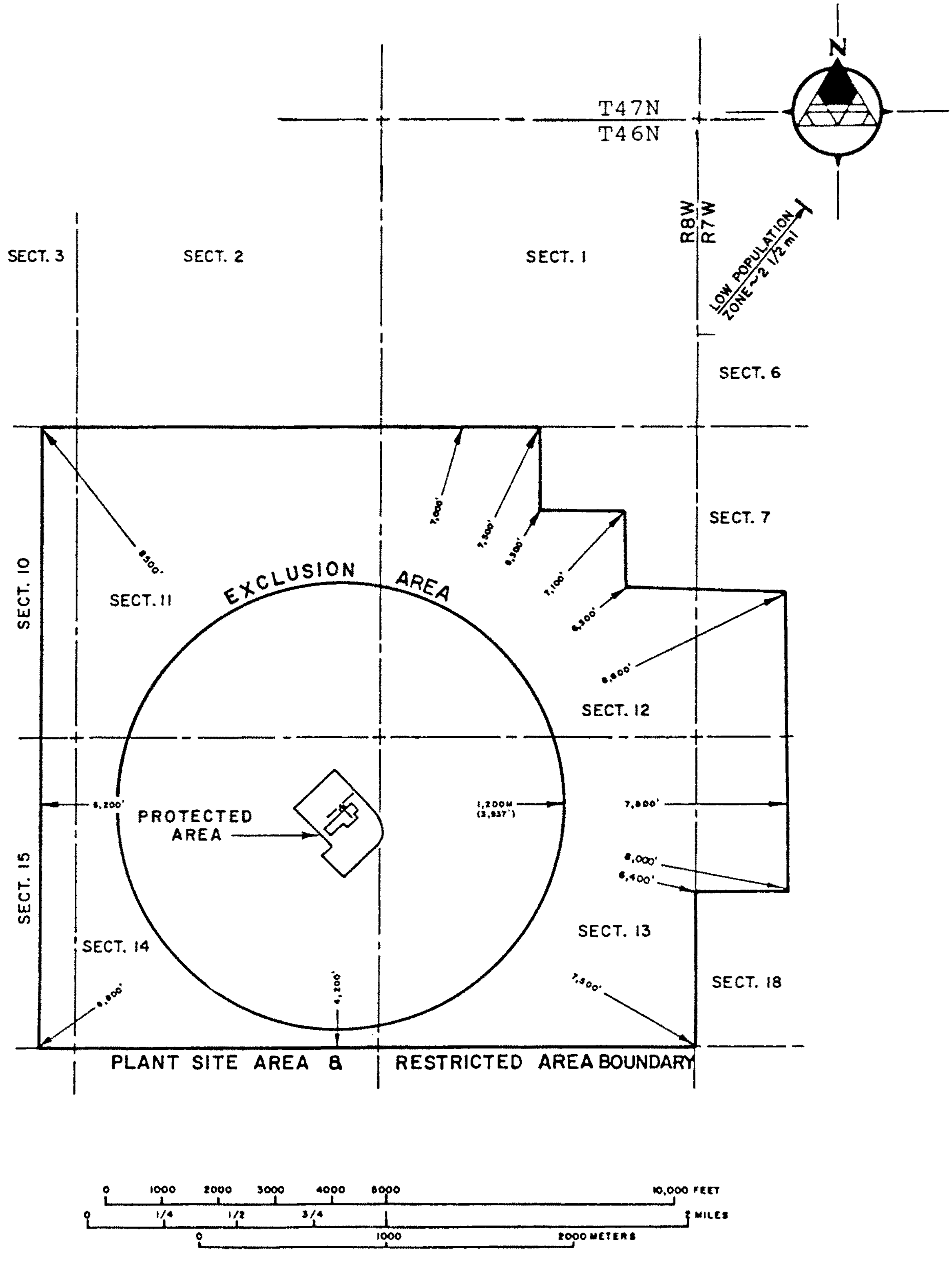
FIGURE 2.1-4
PLAN SHOWING PROTECTED AREA, EXCLUSION AREA, RESTRICTED AREA, AND LOW POPULATION ZONE



REV. OL-6
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NEW RESTRICTED AREA: 2800 ACRES

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CALLAWAY PLANT
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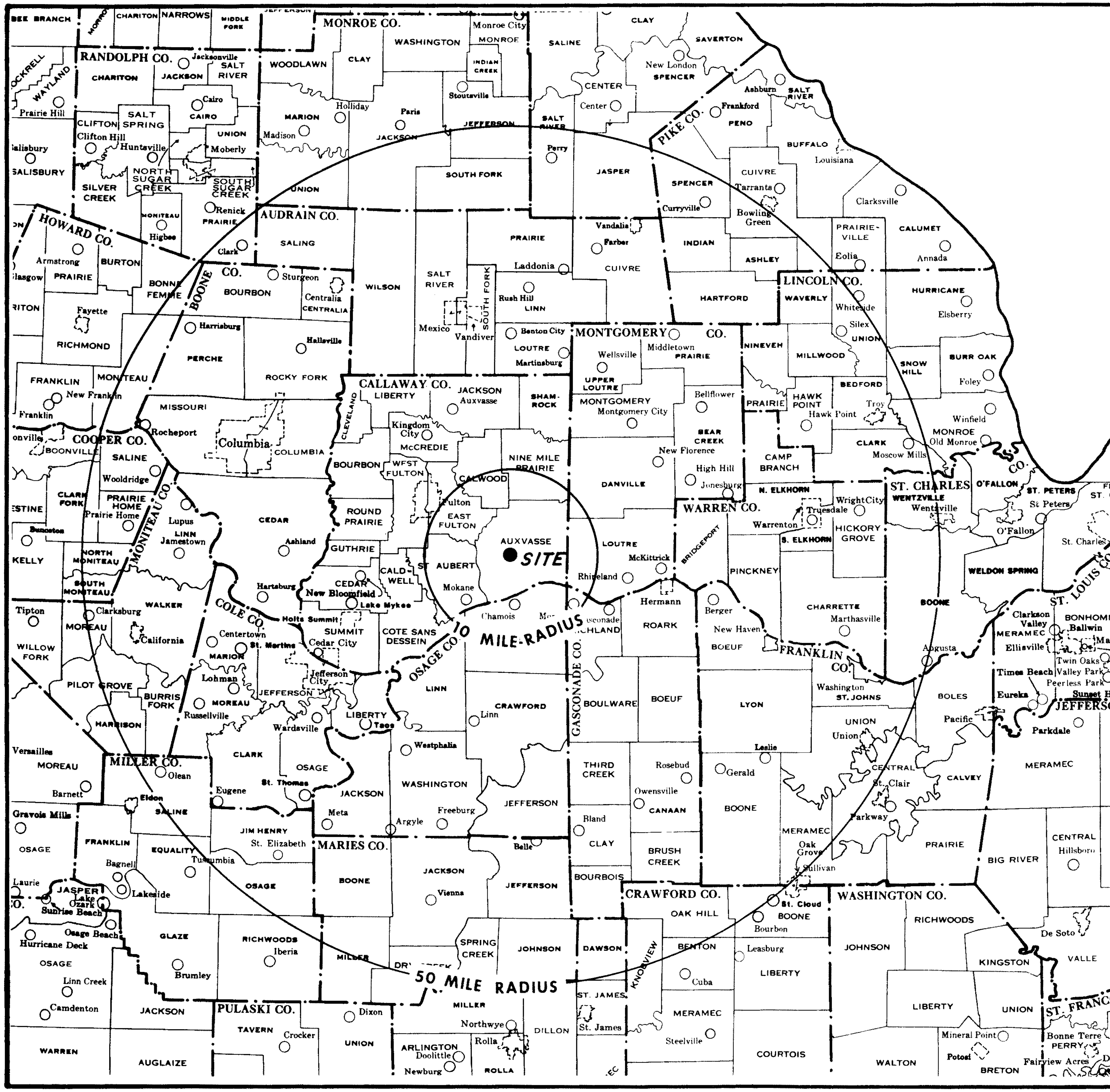
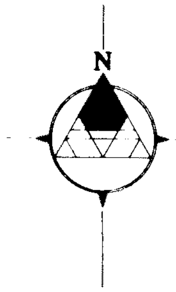
FIGURE 2.1-5

PLAN SHOWING DISTANCES TO PROTECTED AREA, EXCLUSION AREA, LOW POPULATION ZONE, RESTRICTED AREA, AND PLANT SITE AREA BOUNDARY.





LEGEND:

- COUNTY
- MINOR CIVIL DIVISION
- o INCORPORATED OR UNINCORPORATED PLACE WITH FEWER THAN 2500 INHABITANTS

REFERENCES:

1. BUREAU OF CENSUS, 1980, MISSOURI COUNTY SUBDIVISIONS - TOWNSHIPS AND PLACES MAP.
2. U.S. BUREAU OF CENSUS, 1981, NUMBER OF INHABITANTS, STATE OF MISSOURI.

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FIGURE 2.1-6

REGIONAL CENSUS MAP
SHOWING CITIES AND TOWNS

N

LEGEND:

INCORPORATED COMMUNITIES

UNINCORPORATED COMMUNITIES

REFERENCE:
THIS MAP WAS PREPARED FROM A PORTION OF THE FOLLOWING U.S.G.S. MAP: ST. LOUIS, MO., 1962.

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FIGURE 2.1-7
SITE VICINITY MAP

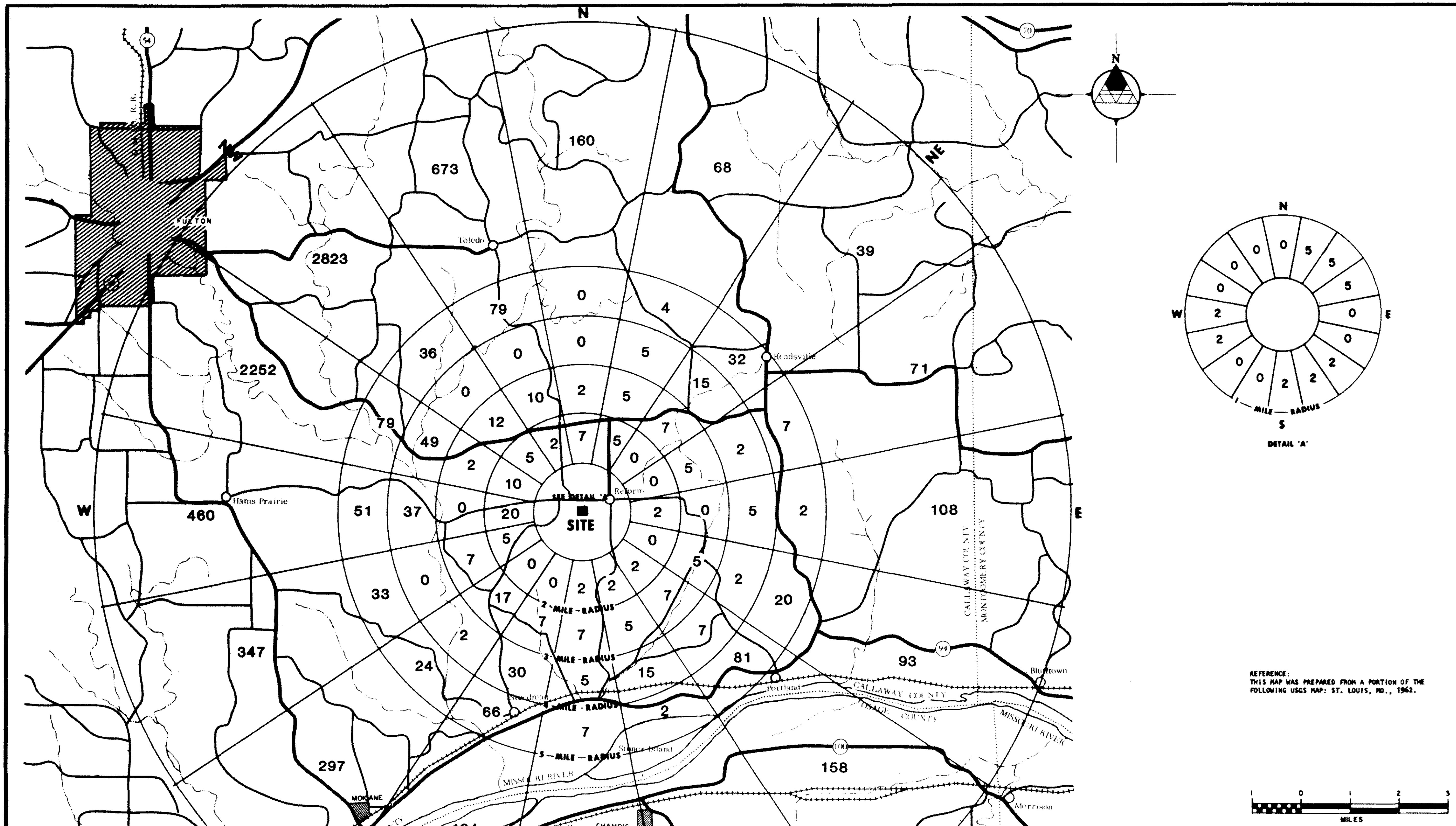

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FIGURE 2.1-8
CURRENT AND PROJECTED DISTRIBUTION OF RESIDENT POPULATION 0 TO 10 MILES
1980

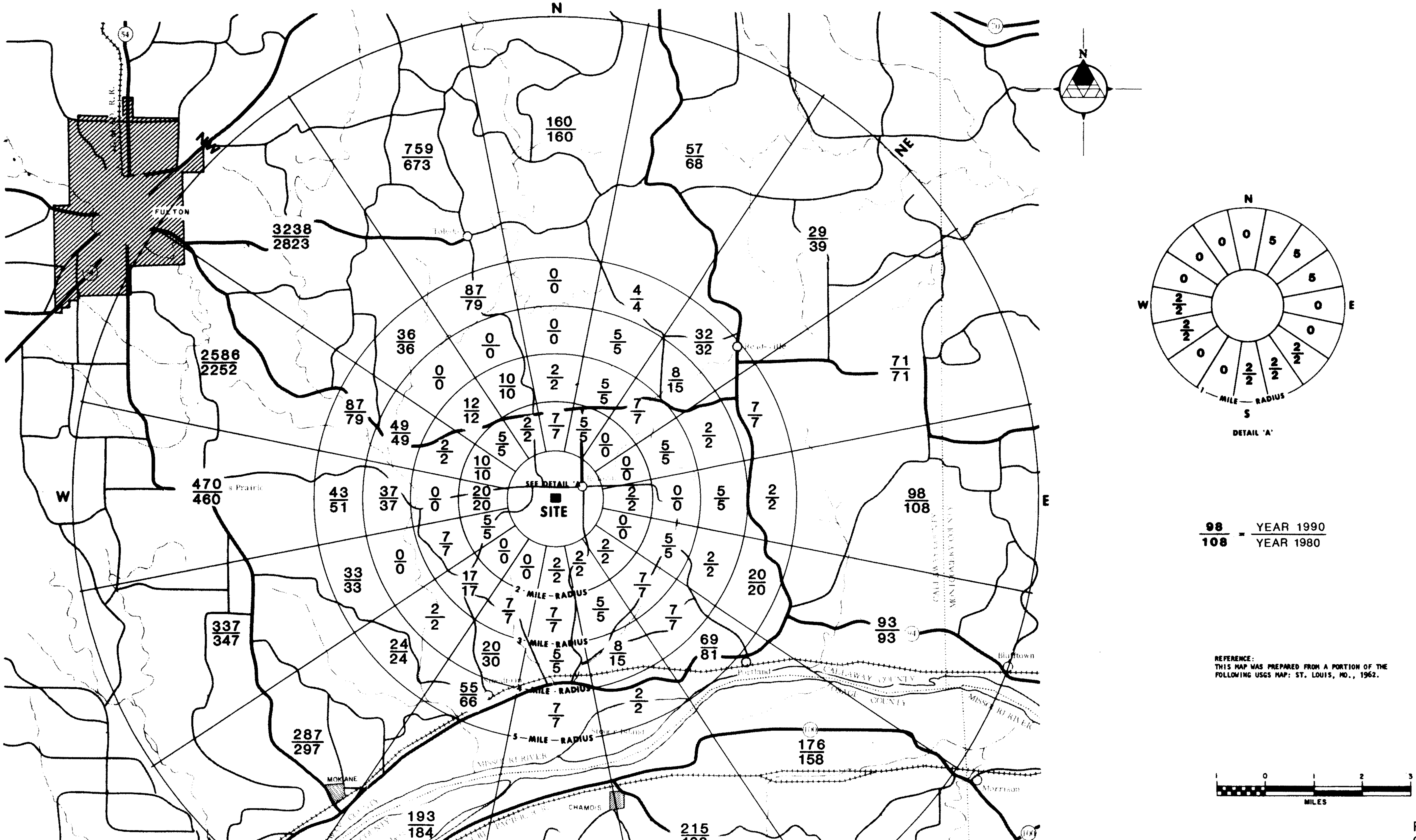

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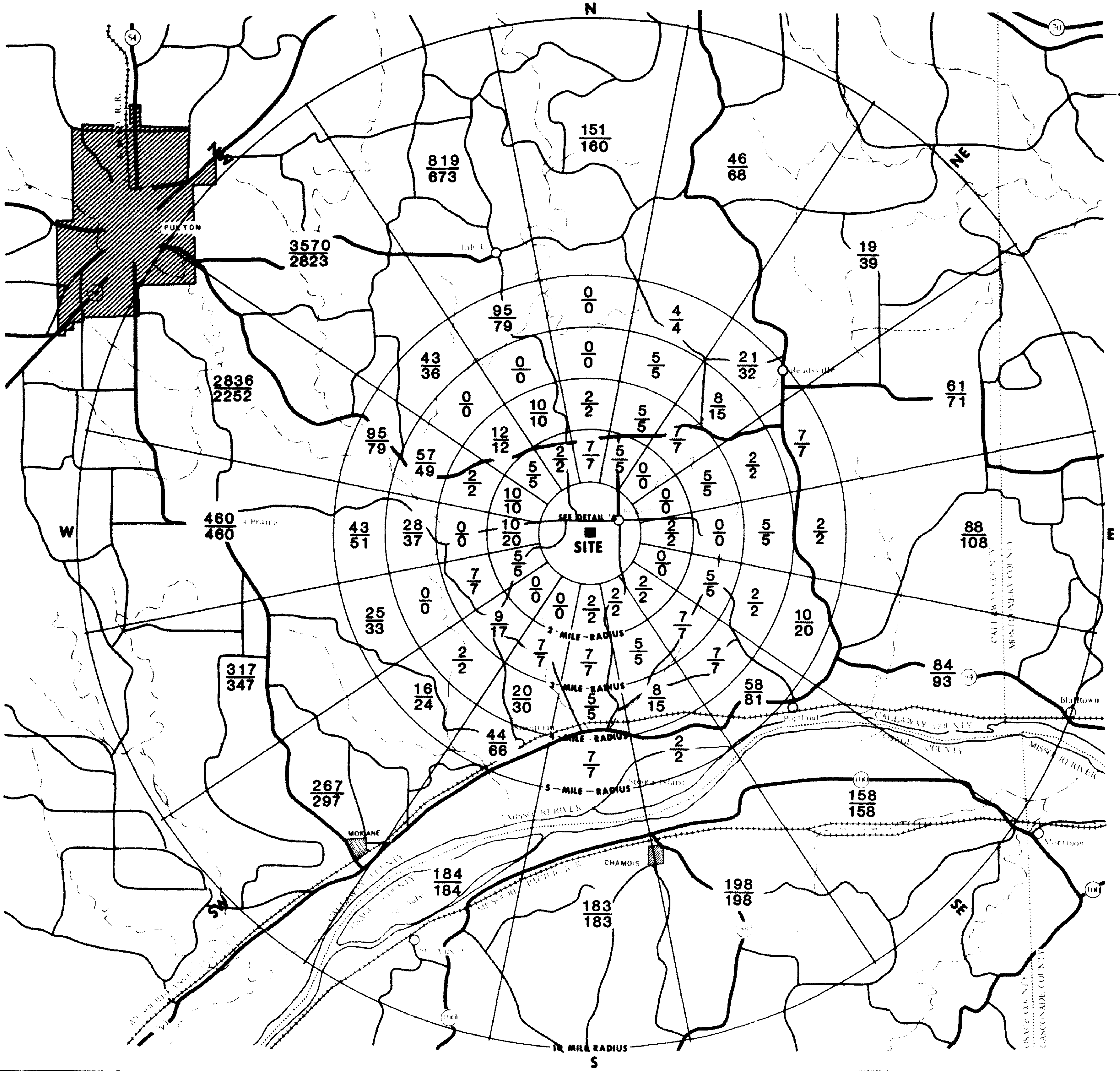
FIGURE 2.1-9
CURRENT AND PROJECTED DISTRIBUTION OF RESIDENT POPULATION 0 TO 10 MILES 1980 TO 1990



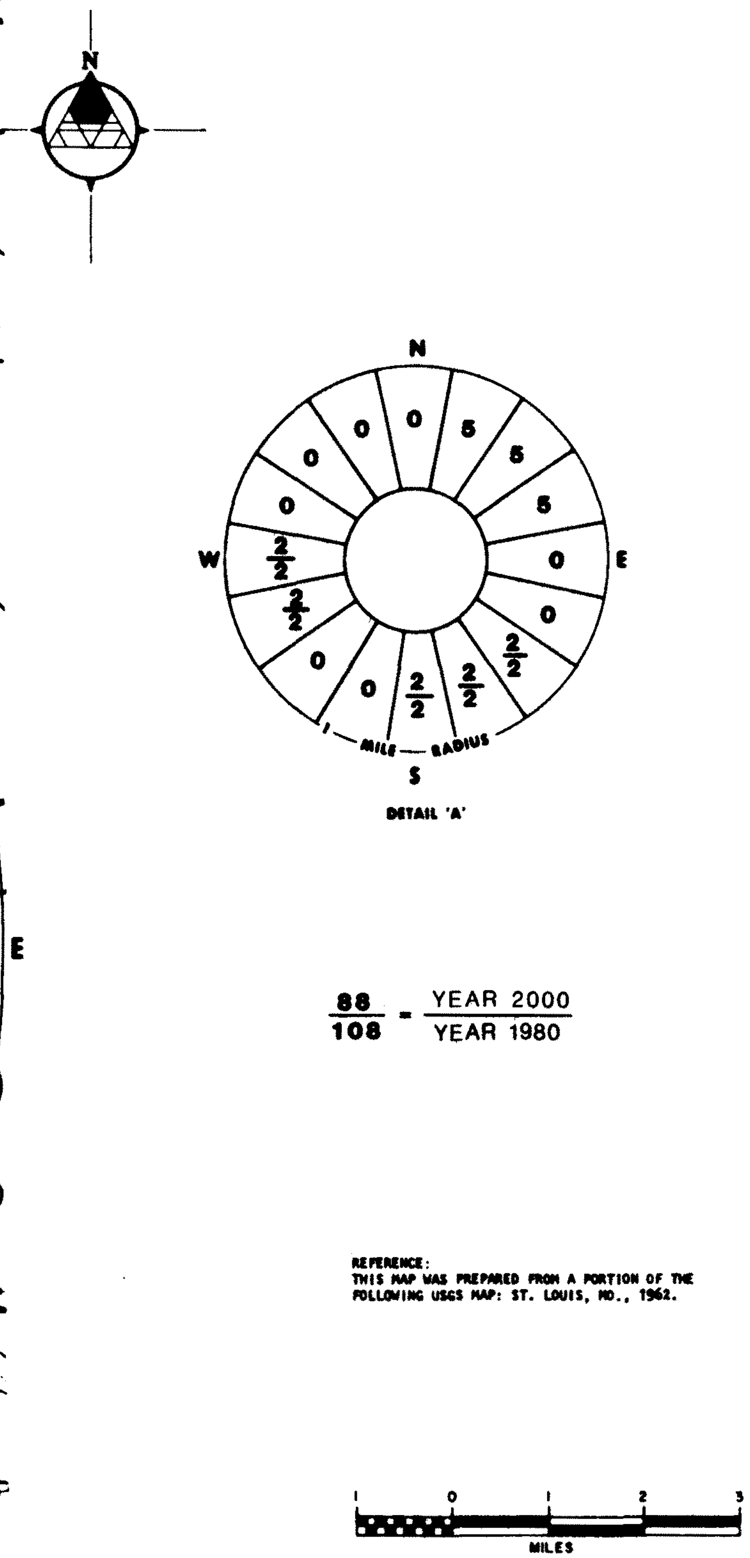


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FIGURE 2.1-10

CURRENT AND PROJECTED DISTRIBUTION OF RESIDENT POPULATION 0 TO 10 MILES 1980 TO 2000

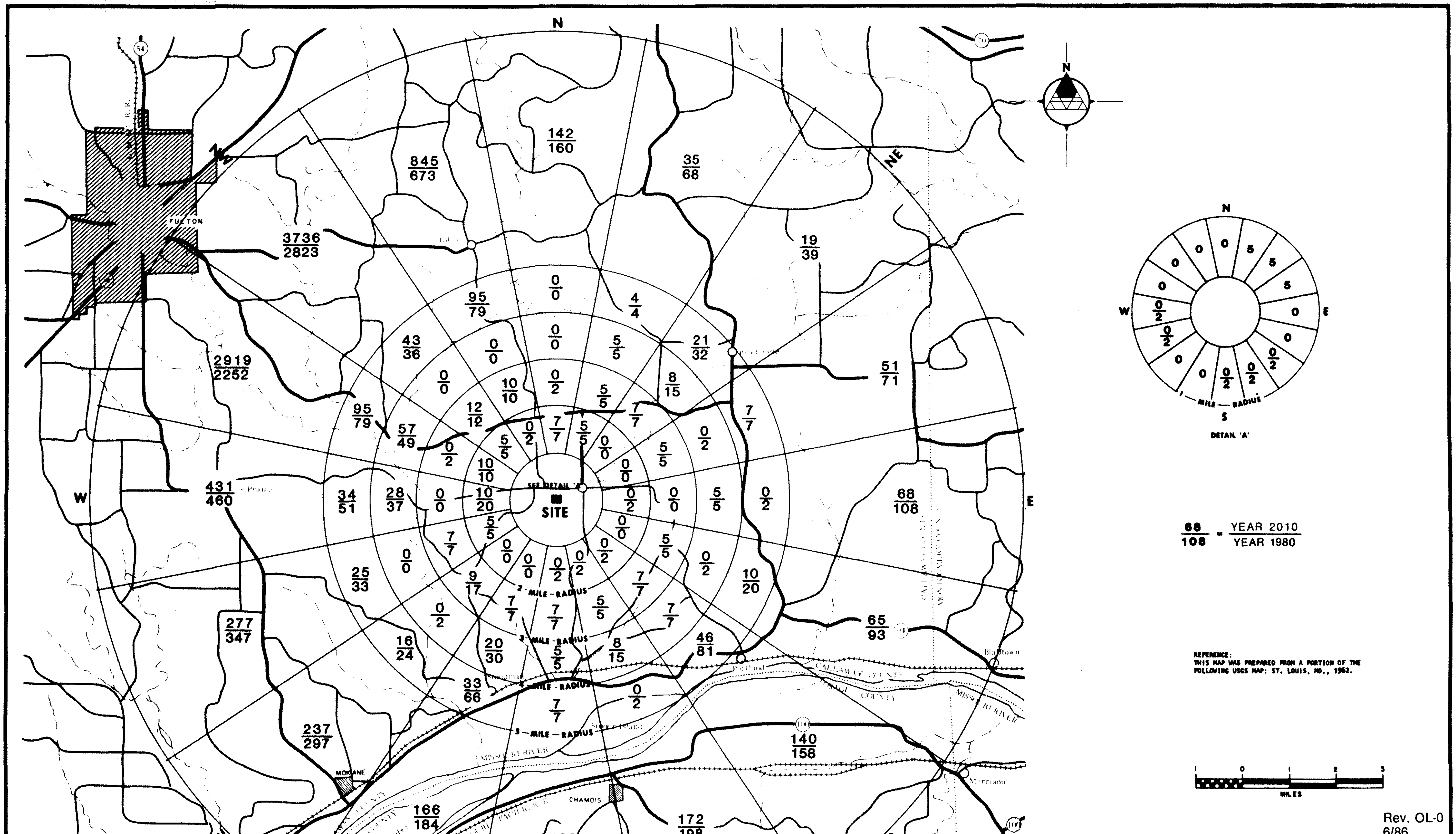

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FIGURE 2.1-11
CURRENT AND PROJECTED DISTRIBUTION OF RESIDENT POPULATION
0 TO 10 MILES
1980 TO 2010

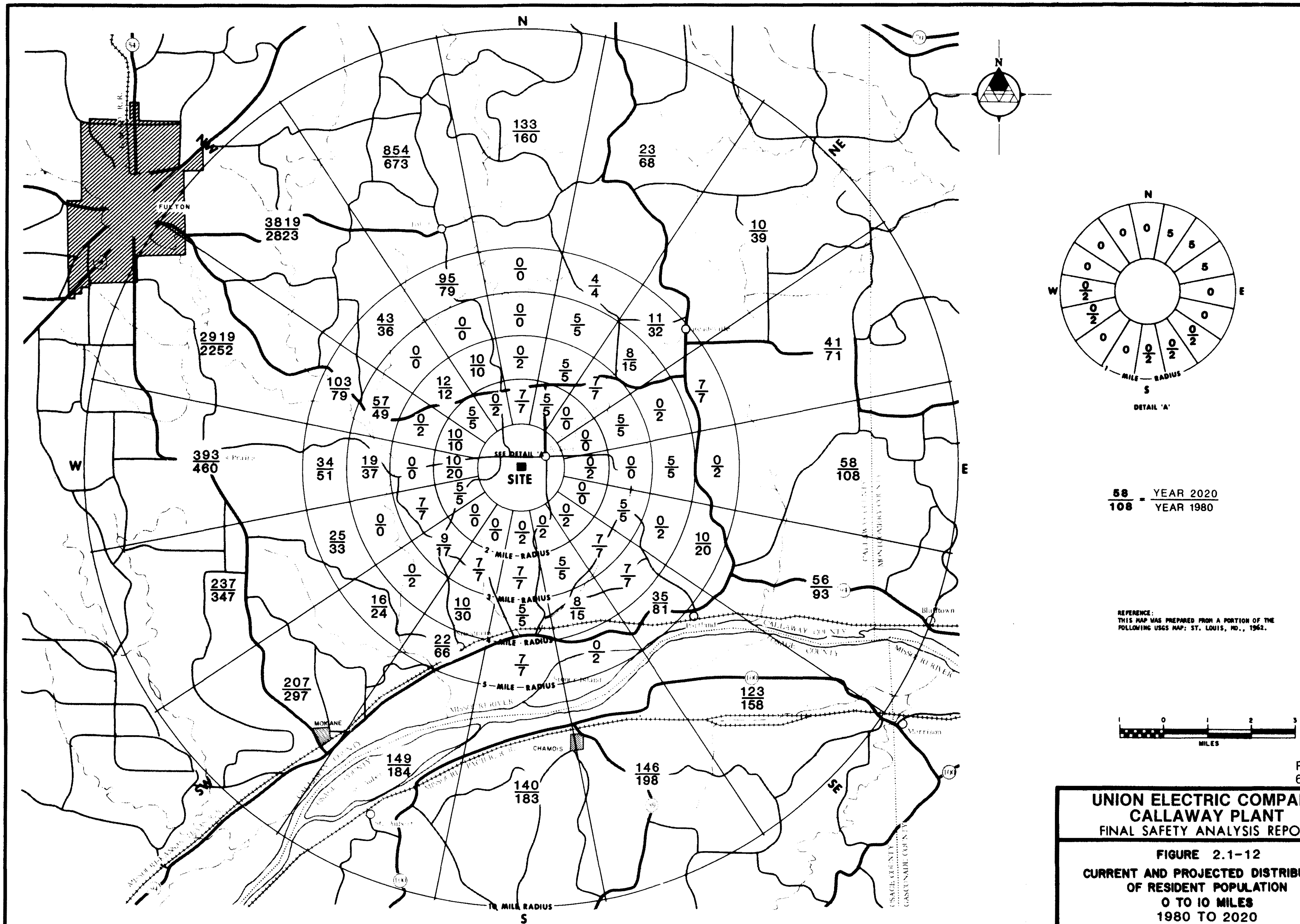

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FIGURE 2.1-12
CURRENT AND PROJECTED DISTRIBUTION OF RESIDENT POPULATION 0 TO 10 MILES 1980 TO 2020

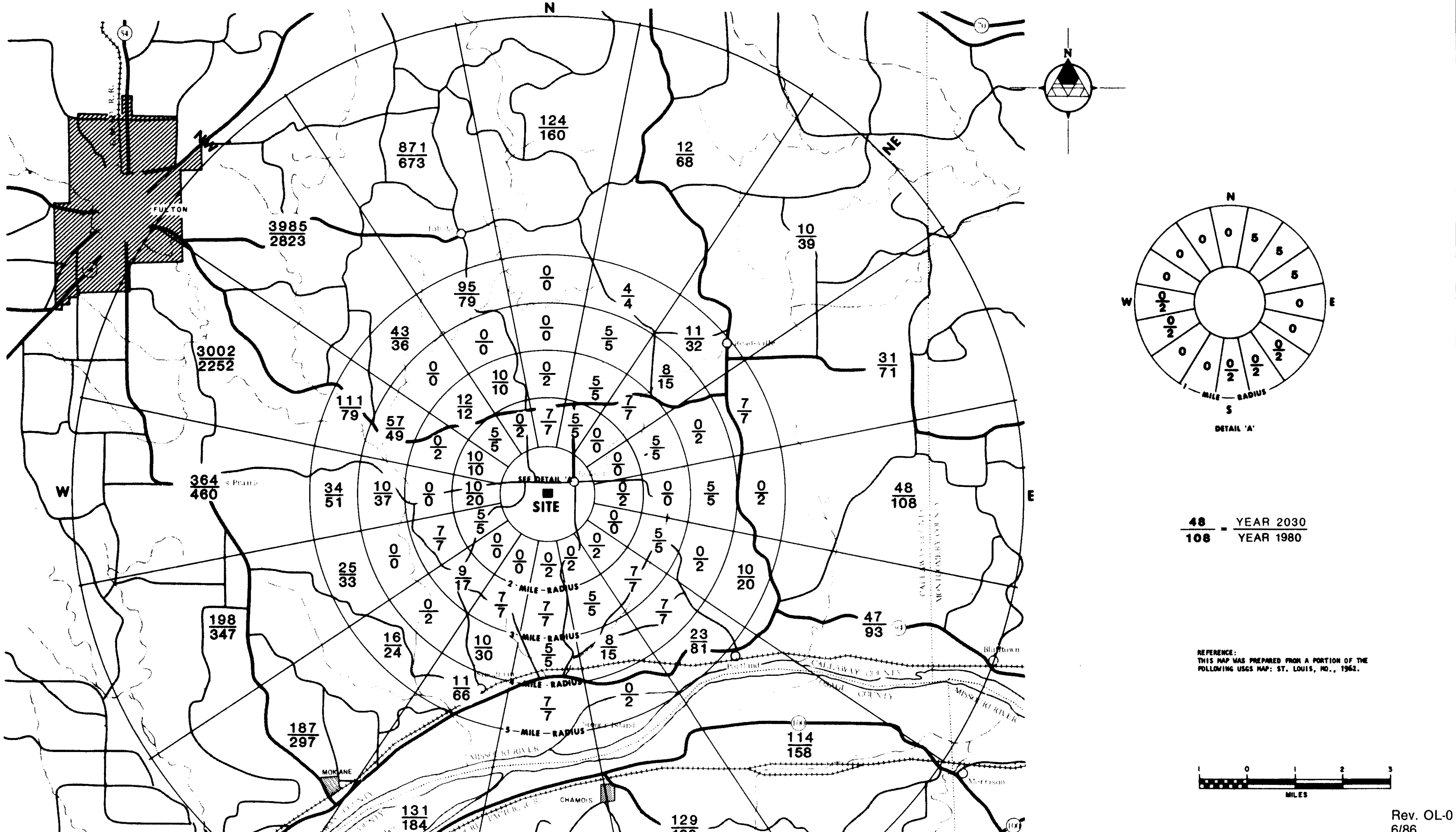

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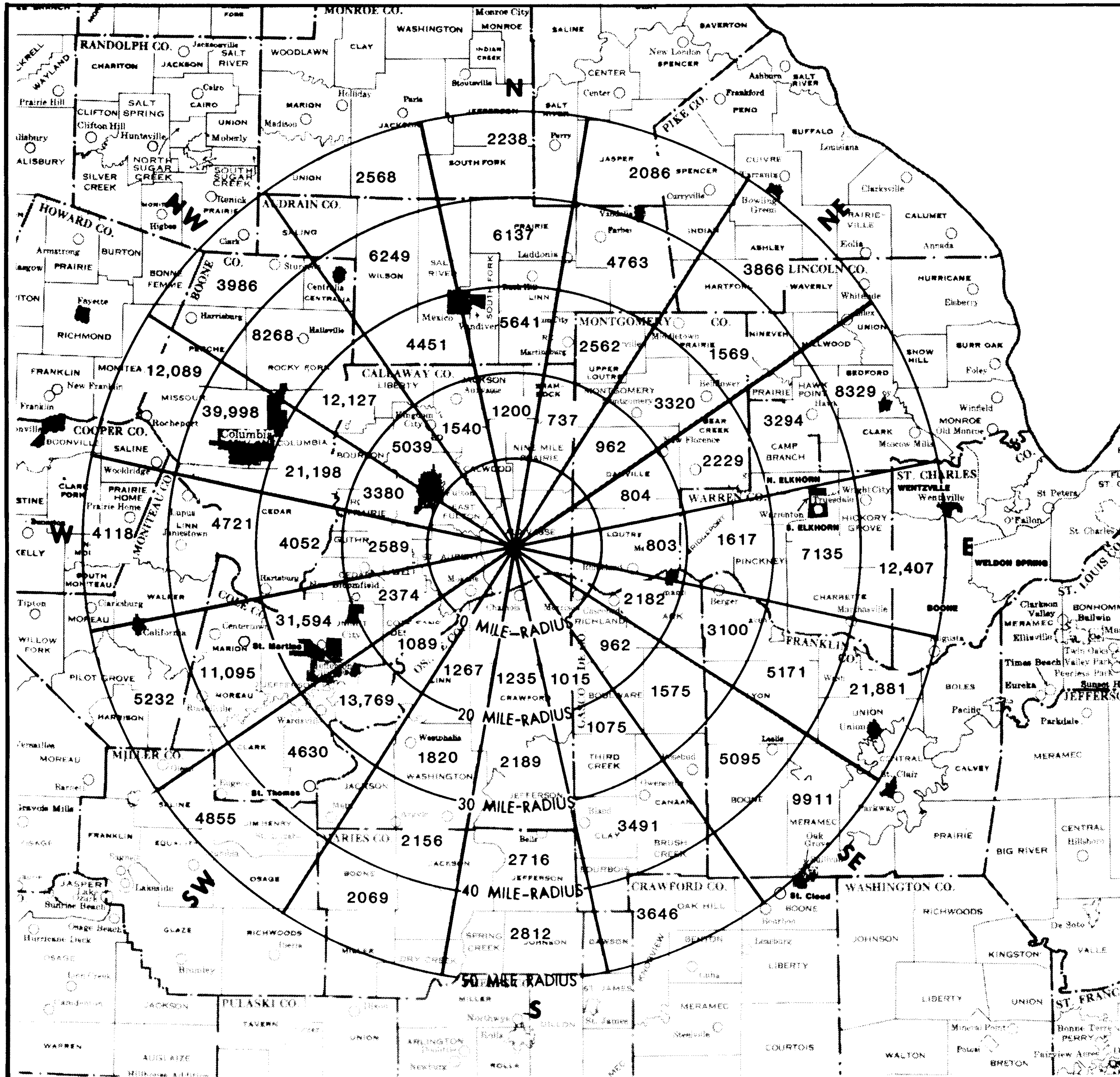
FIGURE 2.1-13
CURRENT AND PROJECTED DISTRIBUTION
OF RESIDENT POPULATION
0 TO 10 MILES
1980 TO 2030



LEGEND:

- COUNTY
- MINOR CIVIL DIVISION
- o INCORPORATED OR UNINCORPORATED PLACE WITH FEWER THAN 2500 INHABITANTS

2238 = YEAR 1980 POPULATION

REFERENCES:

1. BUREAU OF CENSUS, 1980, MISSOURI COUNTY SUBDIVISIONS - TOWNSHIPS AND PLACES MAP.
2. U.S. BUREAU OF CENSUS, 1981, NUMBER OF INHABITANTS, STATE OF MISSOURI.

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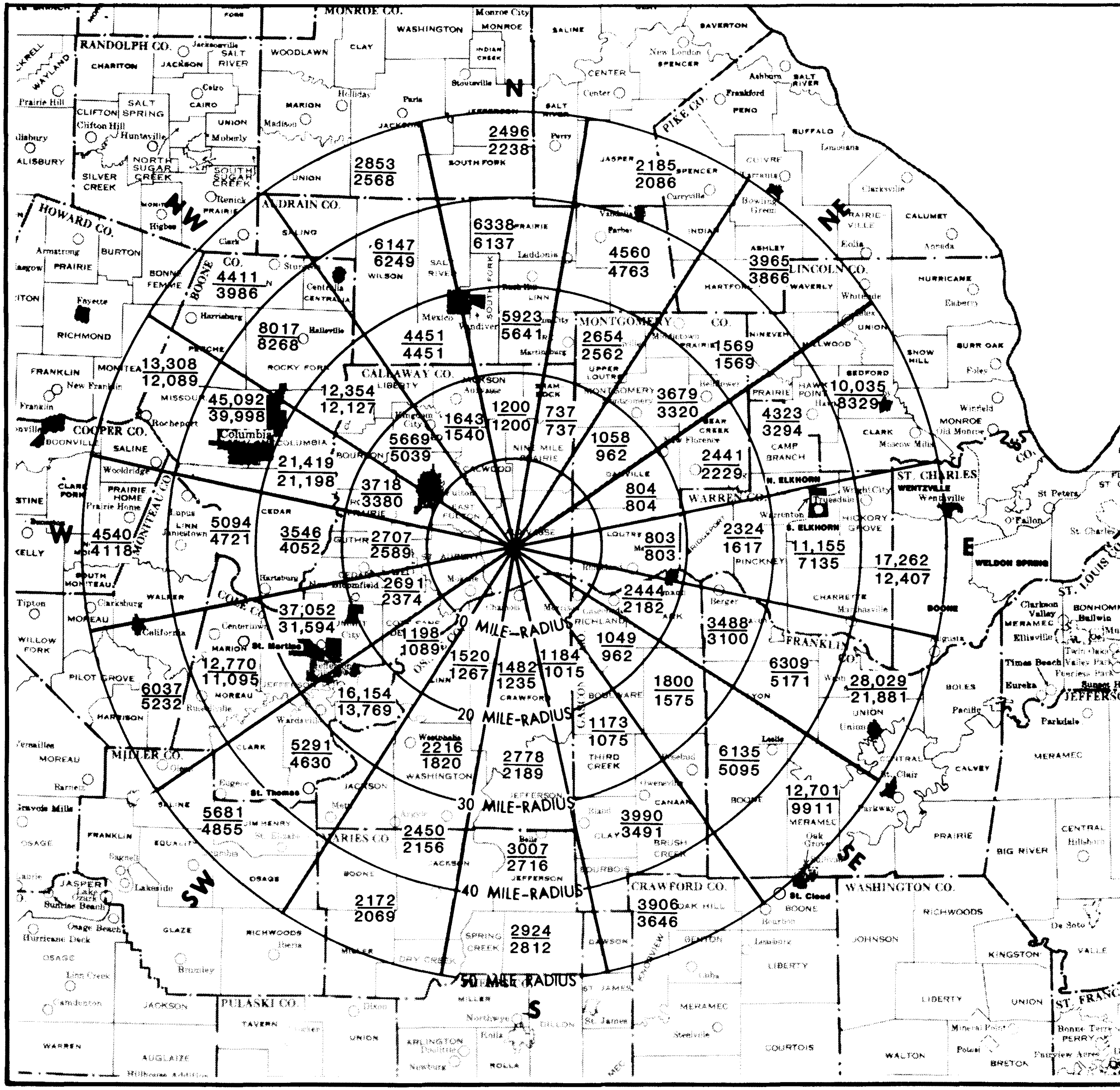
FIGURE 2.1-14

CURRENT AND PROJECTED DISTRIBUTION OF RESIDENT POPULATION 10 TO 50 MILES
1980



LEGEND:

—·—·— COUNTY

——— MINOR CIVIL DIVISION

o INCORPORATED OR UNINCORPORATED PLACE WITH FEWER THAN 2500 INHABITANTS

$\frac{3546}{4052}$ = $\frac{\text{YEAR 1990}}{\text{YEAR 1980}}$

REFERENCES:

1. BUREAU OF CENSUS, 1980, MISSOURI COUNTY SUBDIVISIONS - TOWNSHIPS AND PLACES MAP.
2. U.S. BUREAU OF CENSUS, 1981, NUMBER OF INHABITANTS, STATE OF MISSOURI.

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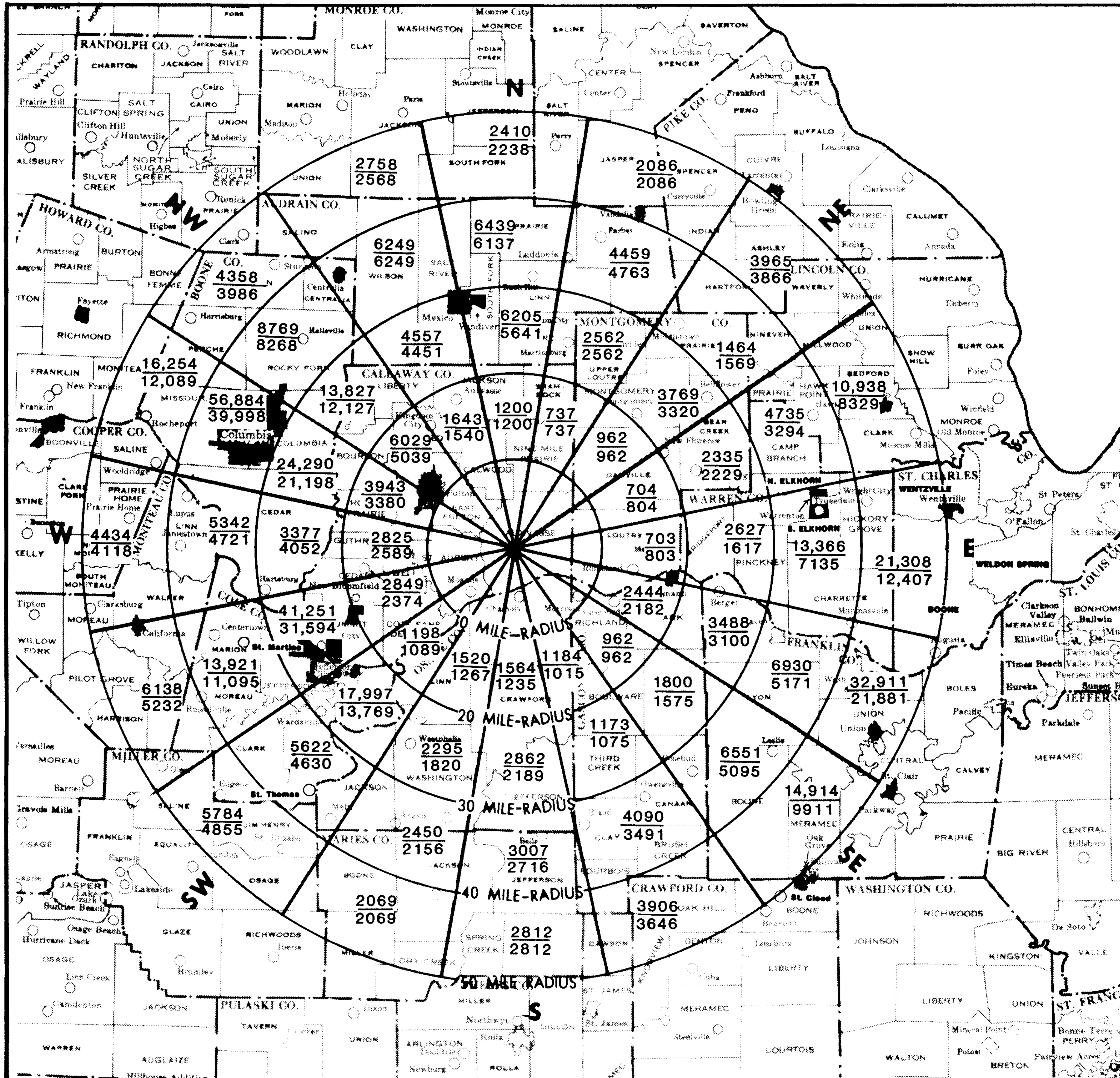
FIGURE 2.1-15

CURRENT AND PROJECTED DISTRIBUTION OF RESIDENT POPULATION 10 TO 50 MILES 1980 TO 1990



LEGEND:

- COUNTY
- MINOR CIVIL DIVISION
- o INCORPORATED OR UNINCORPORATED PLACE WITH FEWER THAN 2500 INHABITANTS

3377/4052 = YEAR 2000/YEAR 1980

REFERENCES:

1. BUREAU OF CENSUS, 1980, MISSOURI COUNTY SUBDIVISIONS - TOWNSHIPS AND PLACES MAP.
2. U.S. BUREAU OF CENSUS, 1981, NUMBER OF INHABITANTS, STATE OF MISSOURI.

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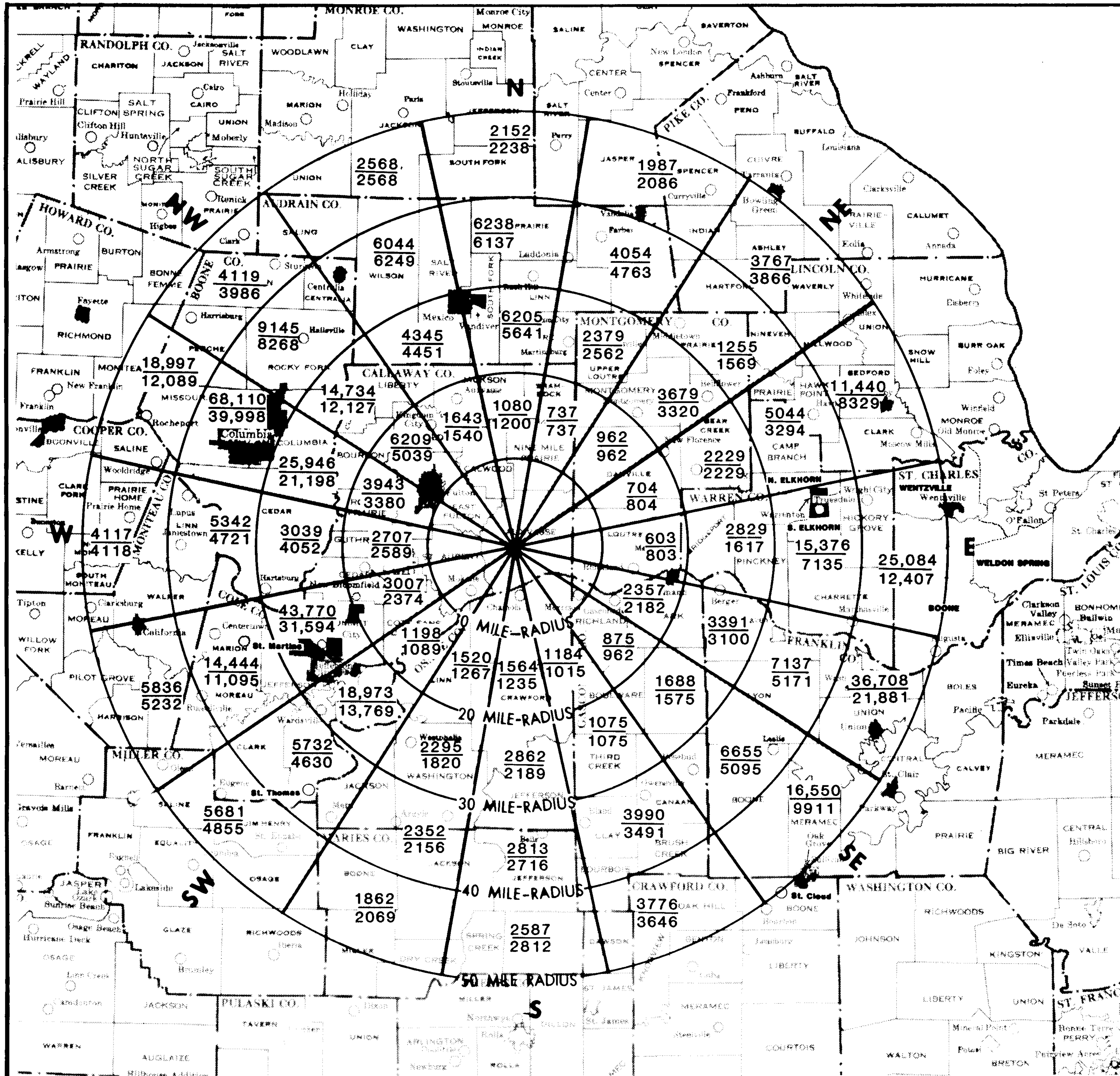
FIGURE 2.1-16

CURRENT AND PROJECTED DISTRIBUTION OF RESIDENT POPULATION 10 TO 50 MILES
1980 TO 2000



LEGEND:

- COUNTY
- MINOR CIVIL DIVISION
- o INCORPORATED OR UNINCORPORATED PLACE WITH FEWER THAN 2500 INHABITANTS
- $\frac{3039}{4052}$ - $\frac{\text{YEAR 2010}}{\text{YEAR 1980}}$

REFERENCES:

1. BUREAU OF CENSUS, 1980, MISSOURI COUNTY SUBDIVISIONS - TOWNSHIPS AND PLACES MAP.
2. U.S. BUREAU OF CENSUS, 1981, NUMBER OF INHABITANTS, STATE OF MISSOURI.

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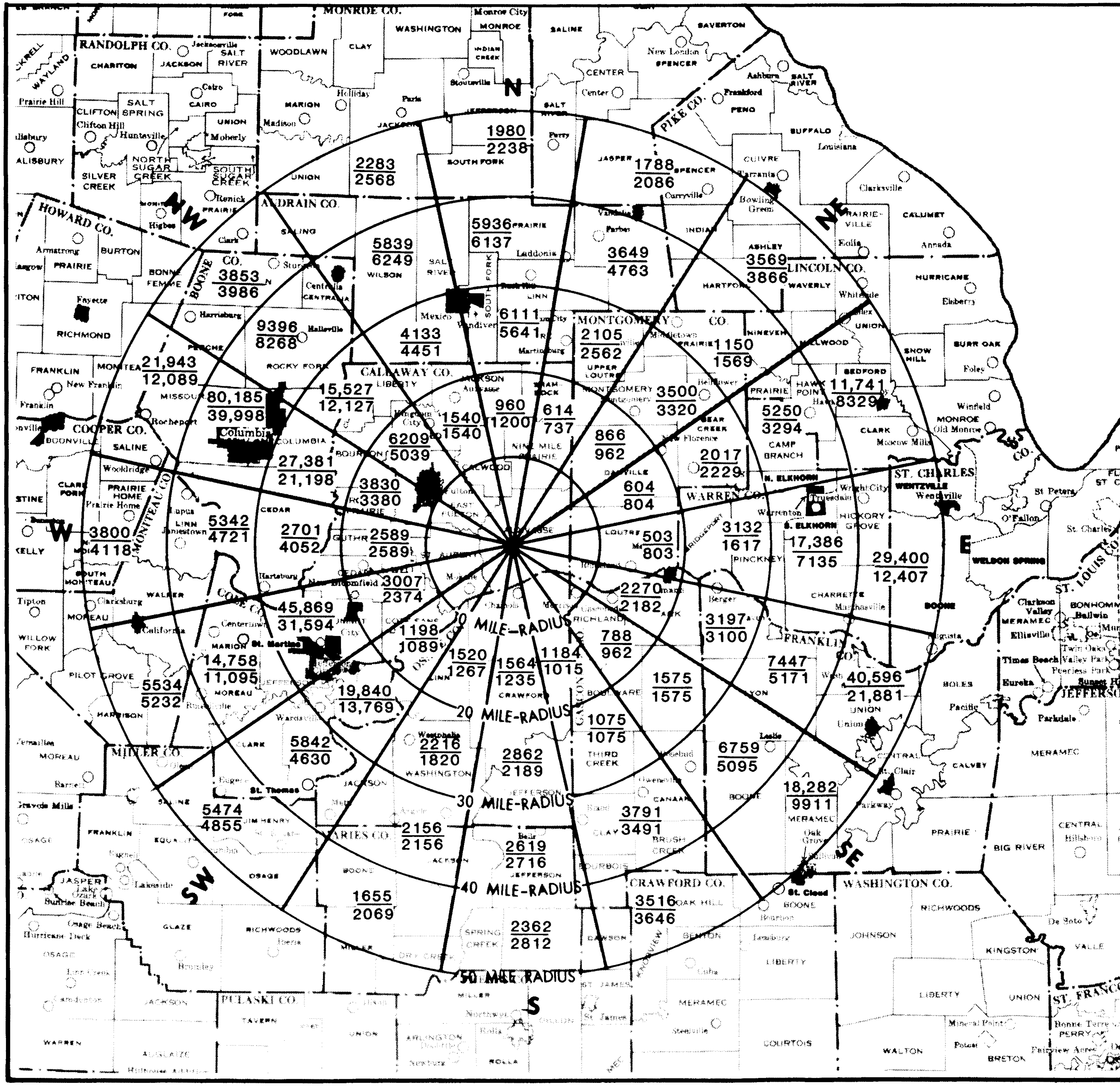
FIGURE 2.1-17

CURRENT AND PROJECTED DISTRIBUTION OF RESIDENT POPULATION 10 TO 50 MILES 1980 TO 2010



LEGEND:

- COUNTY
- MINOR CIVIL DIVISION
- ○ INCORPORATED OR UNINCORPORATED PLACE WITH FEWER THAN 2500 INHABITANTS

2701 / 4052 - YEAR 2020 / YEAR 1980

REFERENCES:

1. BUREAU OF CENSUS, 1980, MISSOURI COUNTY SUBDIVISIONS - TOWNSHIPS AND PLACES MAP.
2. U.S. BUREAU OF CENSUS, 1981, NUMBER OF INHABITANTS, STATE OF MISSOURI.

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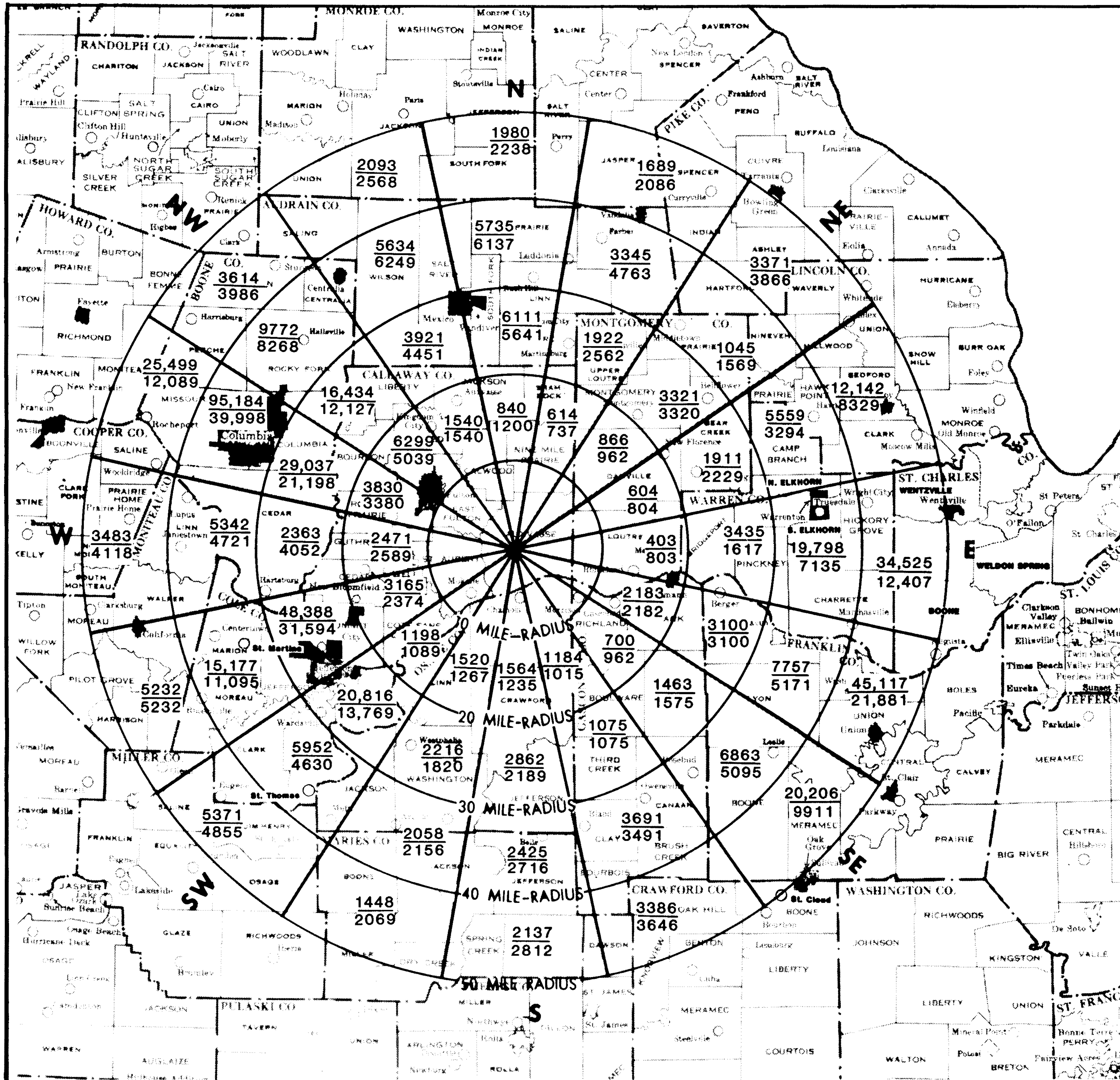
FIGURE 2.1-18

CURRENT AND PROJECTED DISTRIBUTION OF RESIDENT POPULATION 10 TO 50 MILES
1980 TO 2020



LEGEND:

COUNTY

MINOR CIVIL DIVISION

o INCORPORATED OR UNINCORPORATED PLACE WITH FEWER THAN 2500 INHABITANTS

$\frac{2363}{4052}$ - $\frac{\text{YEAR 2030}}{\text{YEAR 1980}}$

REFERENCES:

1. BUREAU OF CENSUS, 1980, MISSOURI COUNTY SUBDIVISIONS - TOWNSHIPS AND PLACES MAP.
2. U.S. BUREAU OF CENSUS, 1981, NUMBER OF INHABITANTS, STATE OF MISSOURI.

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FIGURE 2.1-19

CURRENT AND PROJECTED DISTRIBUTION OF RESIDENT POPULATION 10 TO 50 MILES 1980 TO 2030

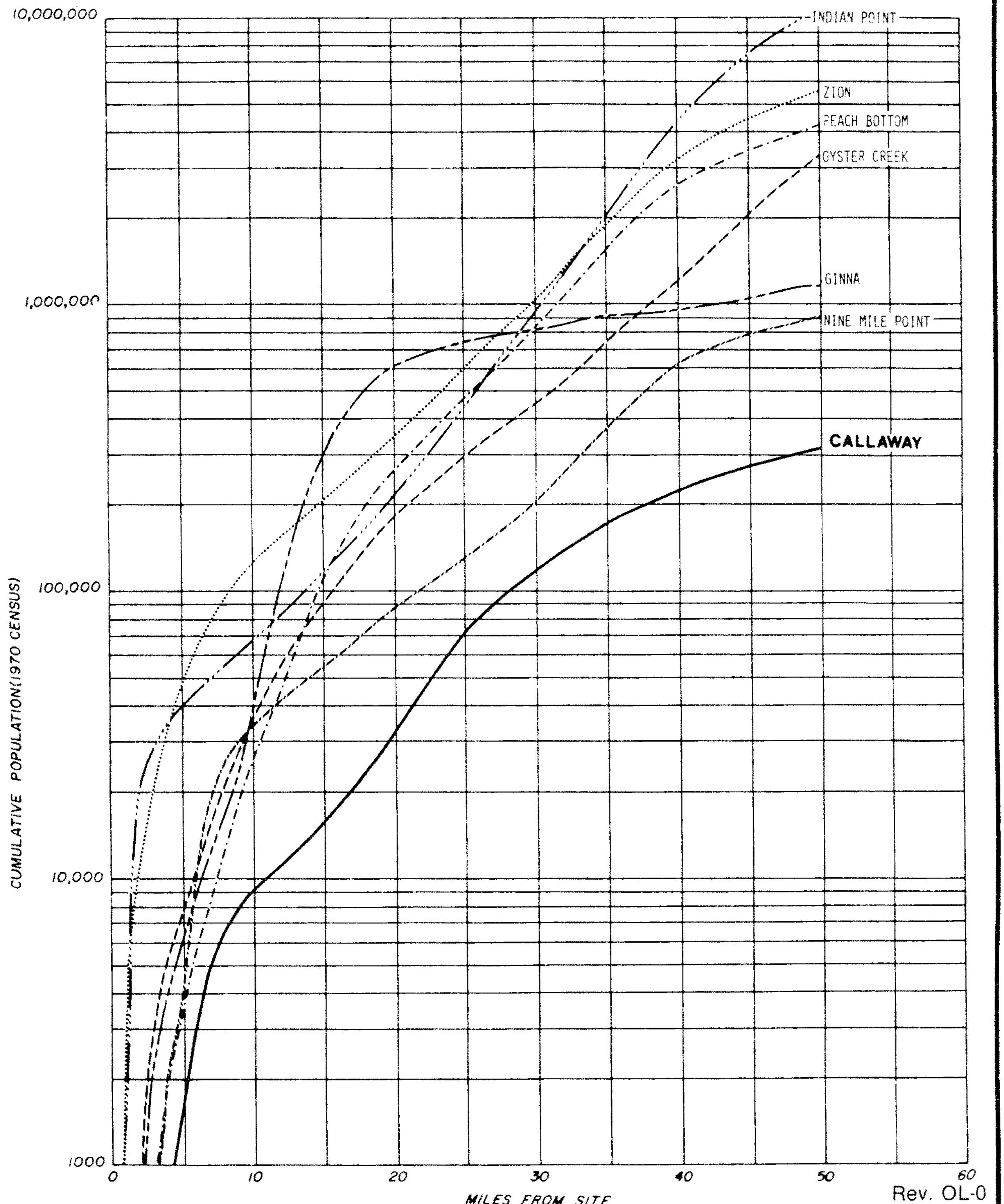

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FIGURE 2.1-20

COMPARISON OF CUMULATIVE POPULATIONS

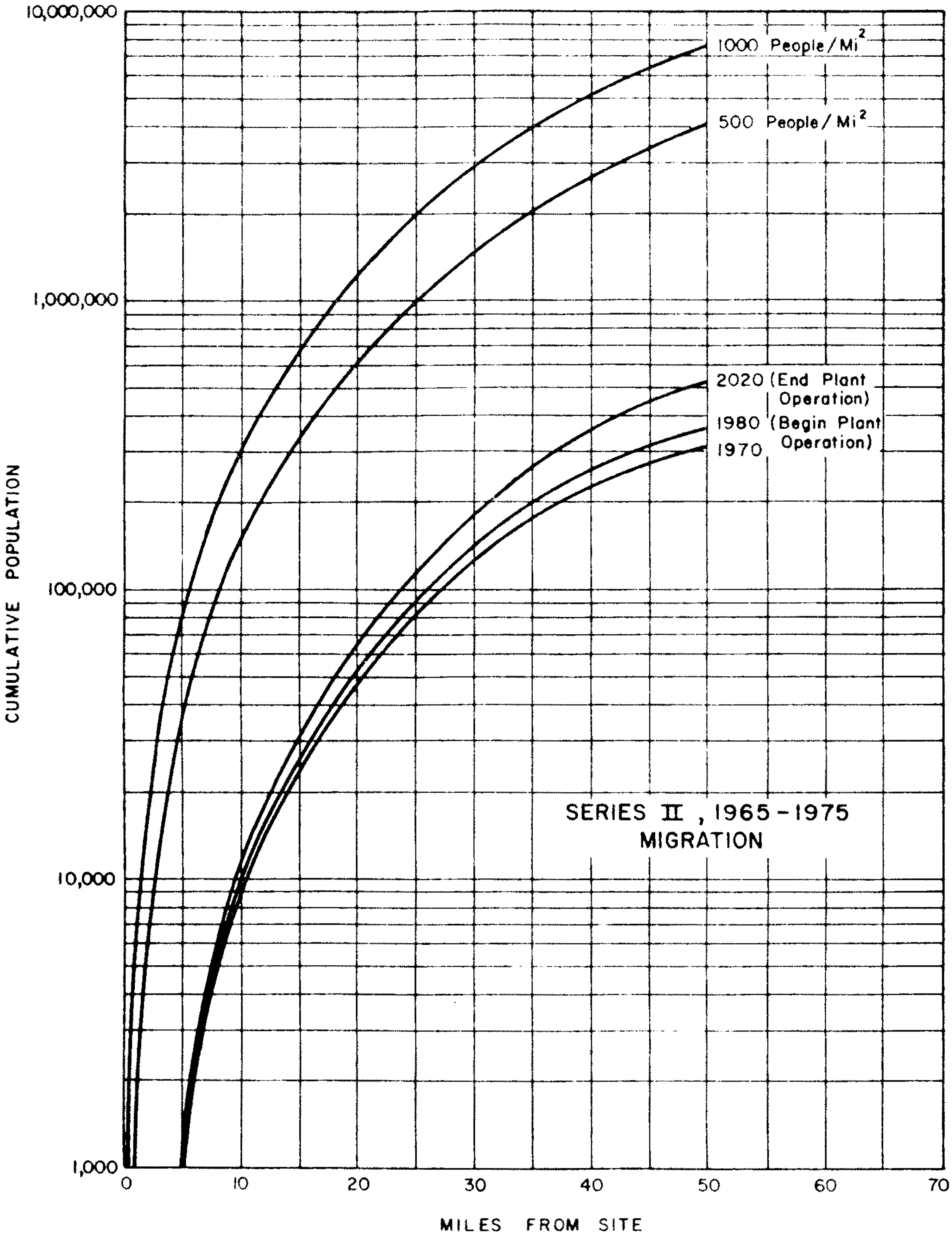

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FIGURE 2.1-21

PROJECTED CUMULATIVE RESIDENT POPULATIONS, SERIES II, 1965-1975 MIGRATION

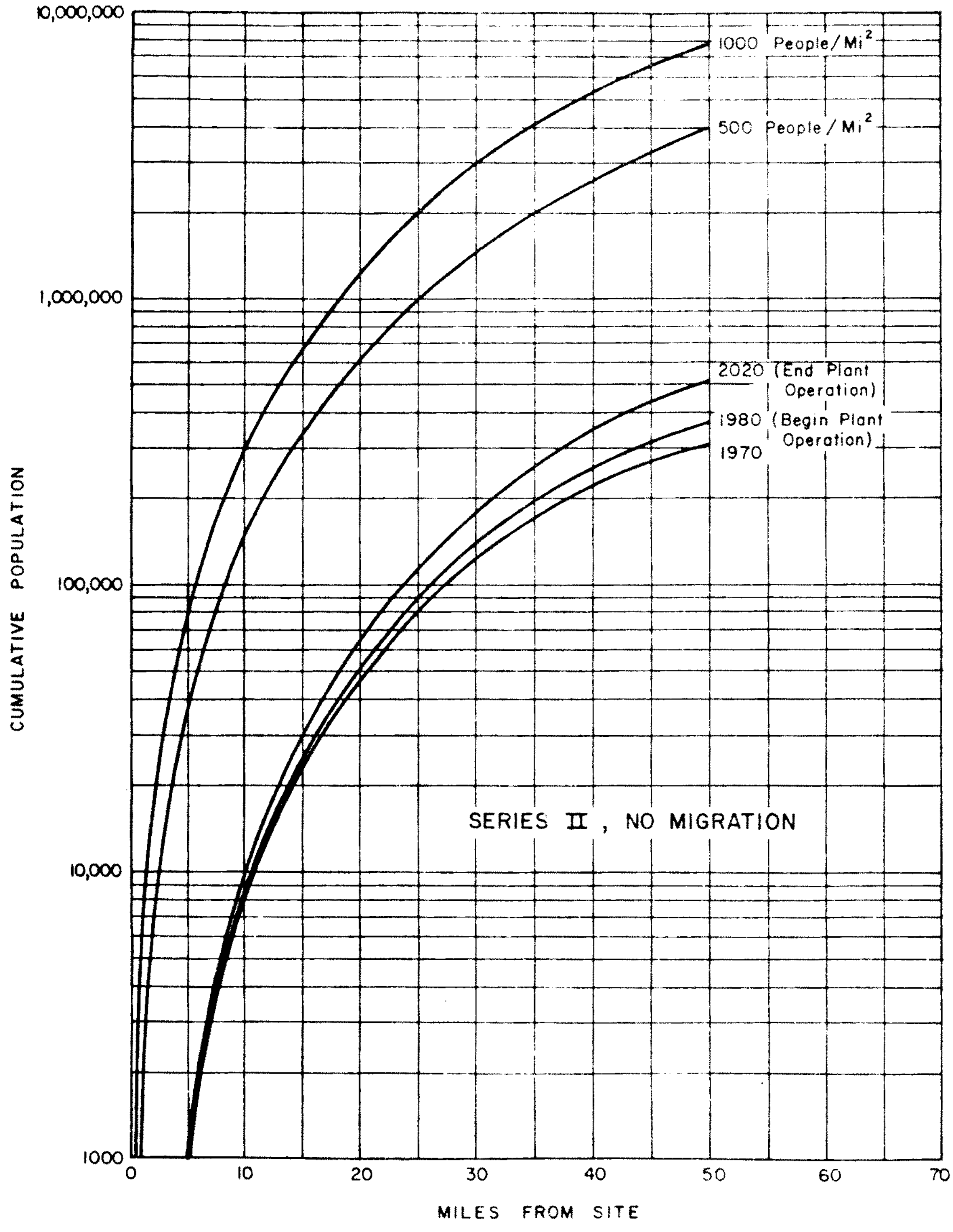

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FIGURE 2.1-22

PROJECTED CUMULATIVE RESIDENT POPULATIONS, SERIES II, 1965 - 1975 NO MIGRATION

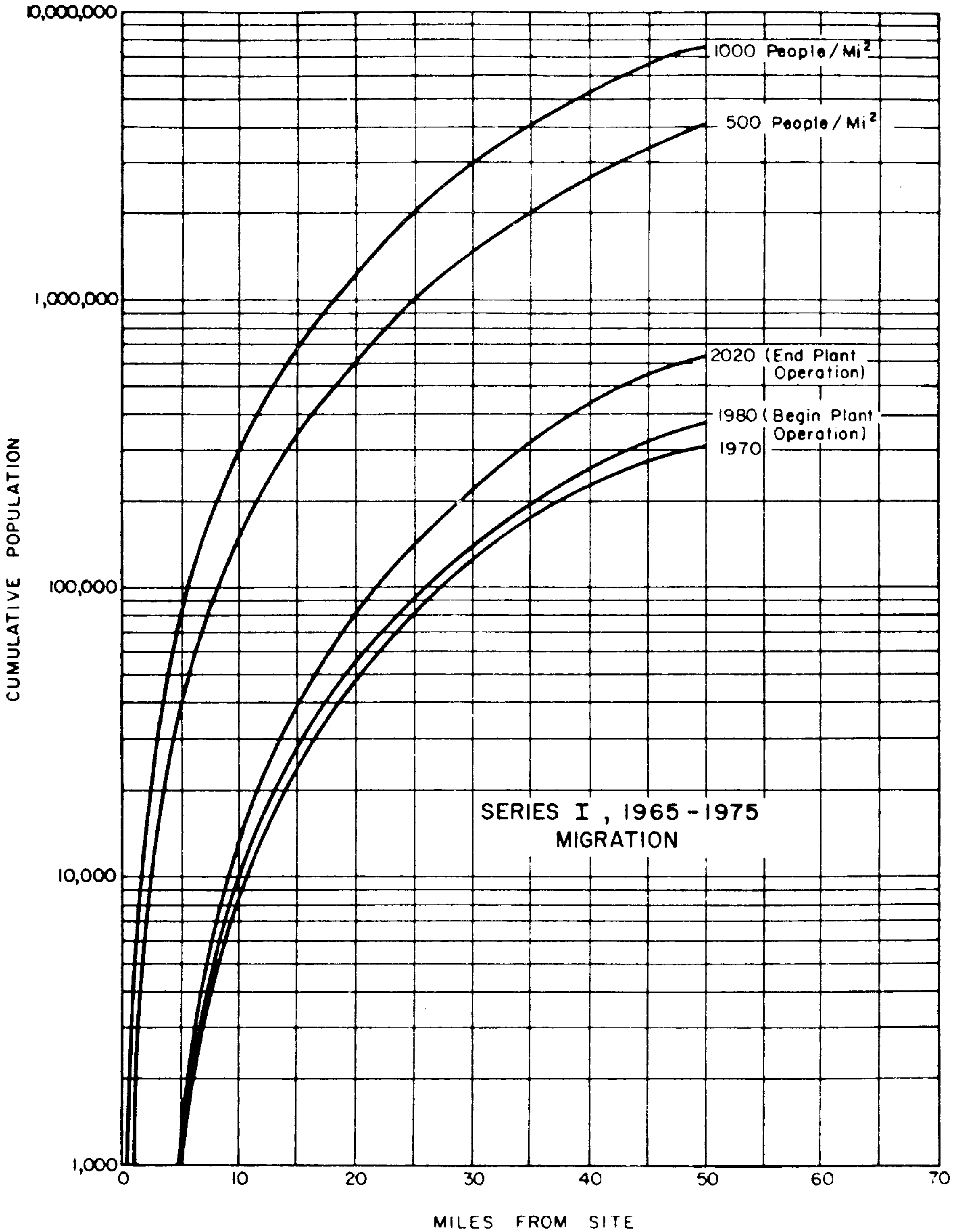

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FIGURE 2.1-23

PROJECTED CUMULATIVE RESIDENT POPULATIONS, SERIES I, 1965-1975 MIGRATION

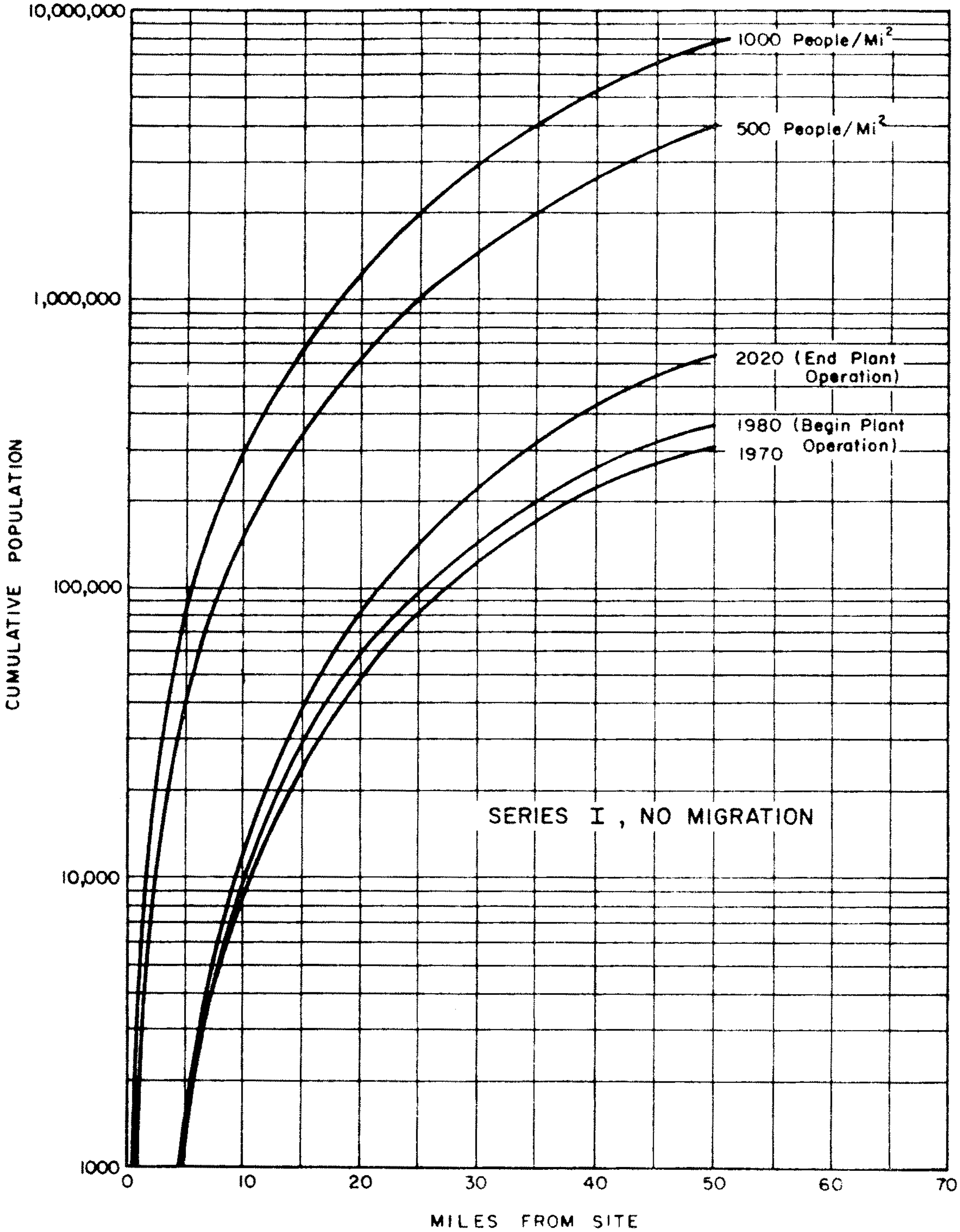

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FIGURE 2.1-24

PROJECTED CUMULATIVE RESIDENT POPULATIONS, SERIES I, 1965-1975 NO MIGRATION

Figure 2.1-25 HAS BEEN DELETED

Figure 2.1-26 HAS BEEN DELETED

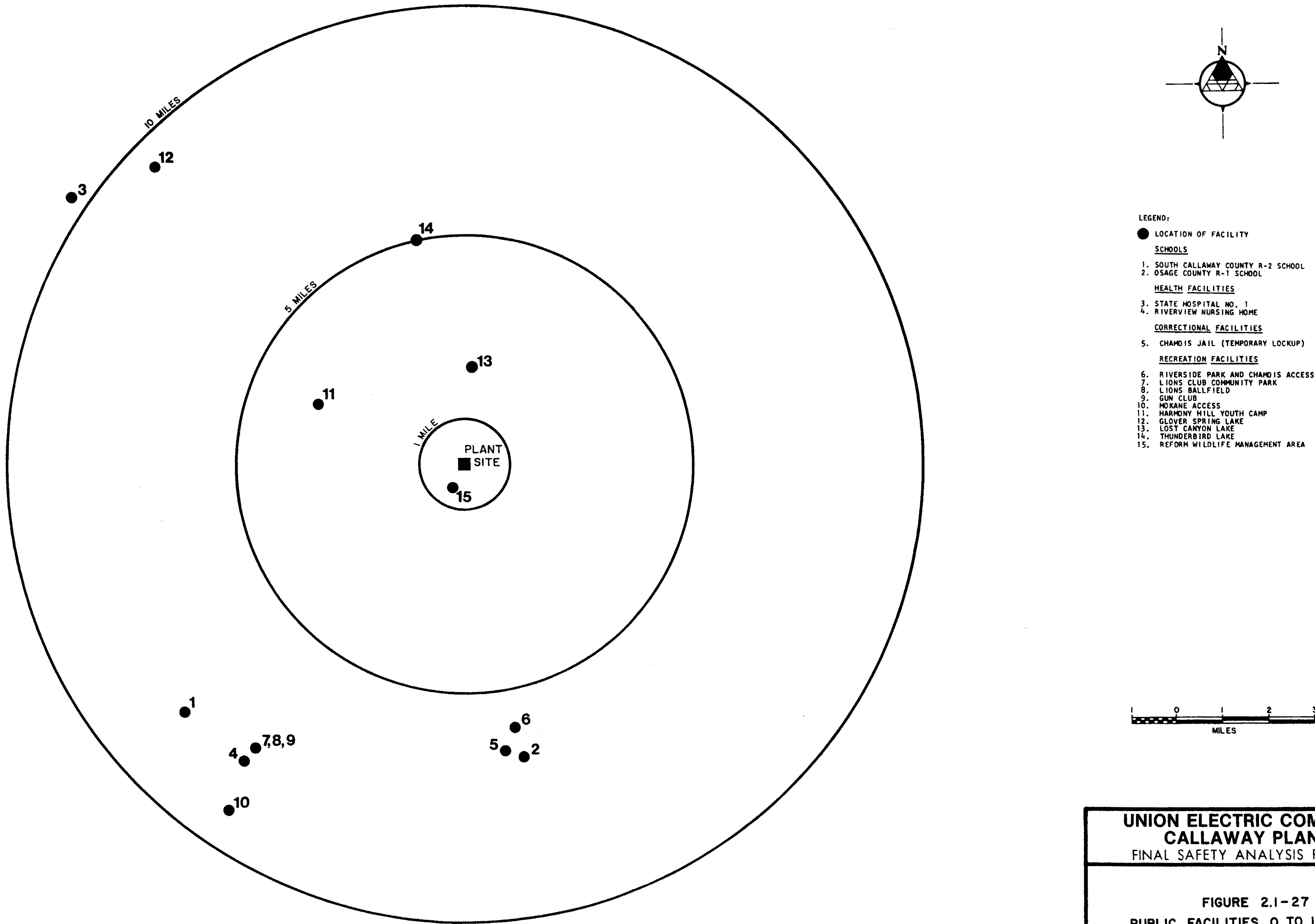

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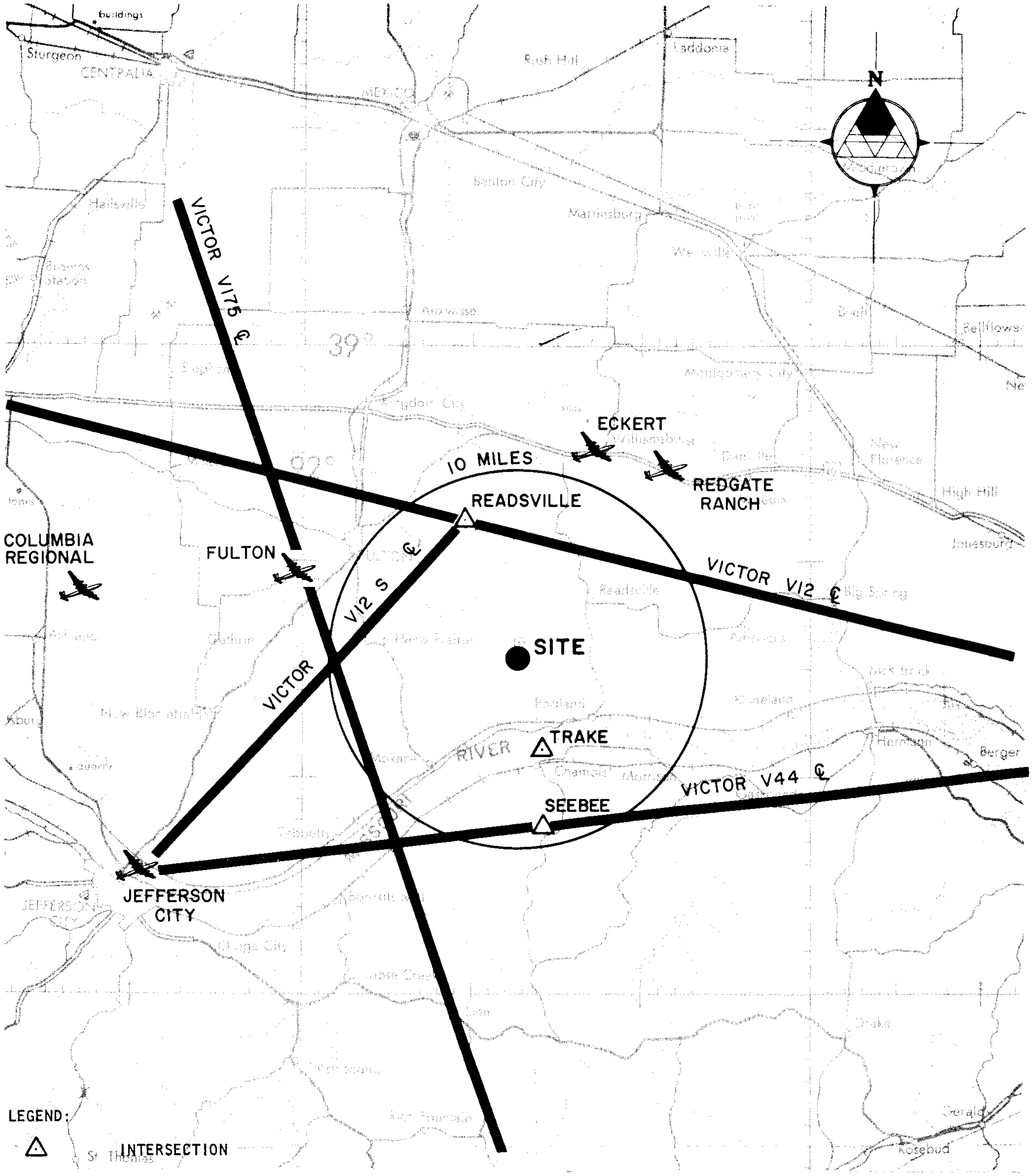
FIGURE 2.1-27
PUBLIC FACILITIES 0 TO 10 MILES



LEGEND:

△ INTERSECTION

▬▬ VICTOR ROUTE

10 0 10

MILES

NOTE:

THE CORRIDOR FOR LOW ALTITUDE ROUTES EXTENDS 4 NAUTICAL MILES ON EITHER SIDE OF CENTERLINE.

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REFERENCE:

1. U.S. DEPARTMENT OF COMMERCE, NOAA; OPERATIONAL NAVIGATION CHART, KANSAS CITY; G-20.
2. U.S. DEPARTMENT OF COMMERCE; KANSAS CITY, SECTIONAL AERONAUTICAL CHART; 21ST EDITION; DECEMBER 28, 1978.
3. UNITED STATES GOVERNMENT FLIGHT INFORMATION PUBLICATION; ENROUTE HIGH ALTITUDE-U.S.; NORTH EAST, H-3.

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CALLAWAY PLANT
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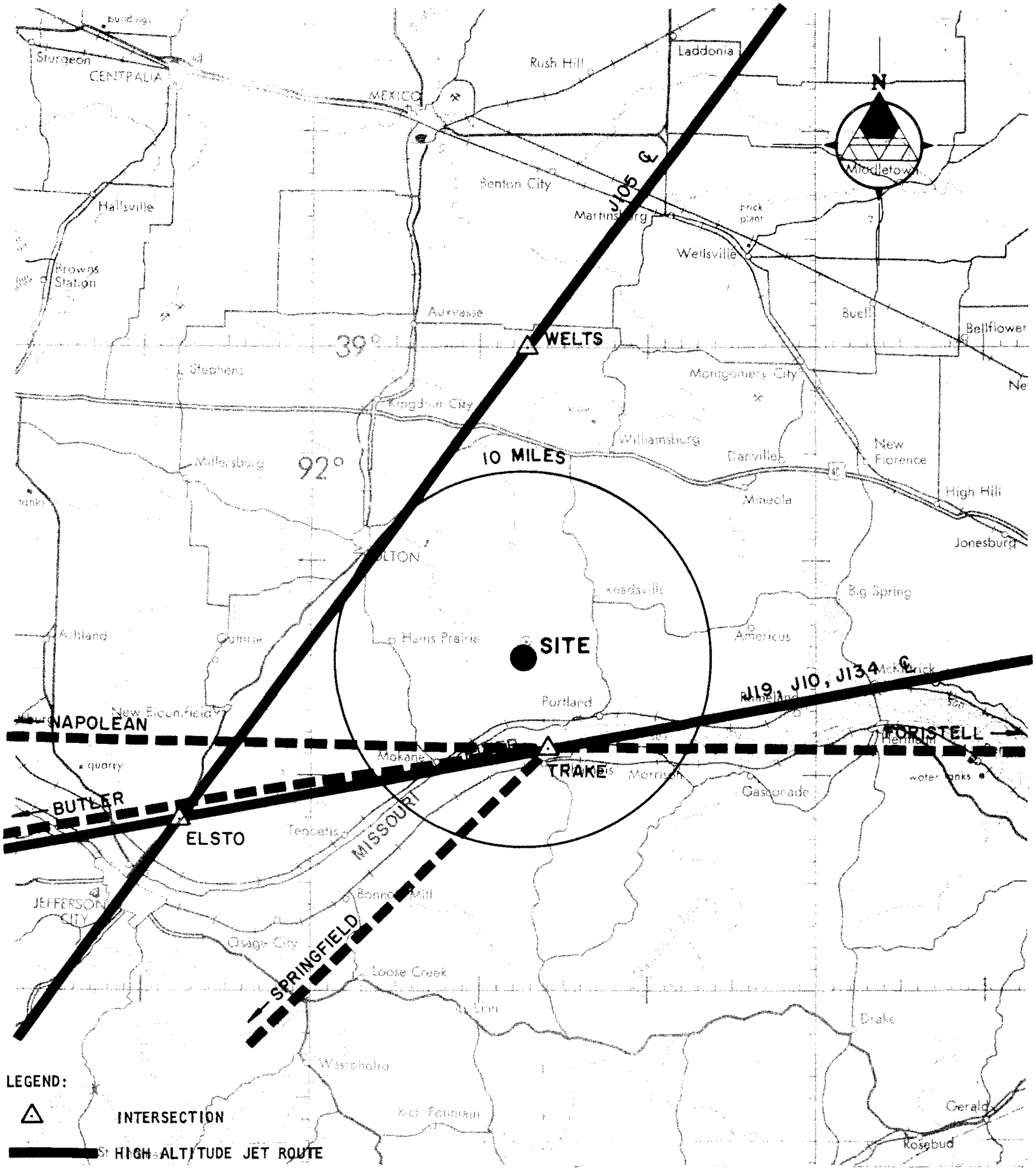
FIGURE 2.2-1
LOW ALTITUDE AIR ROUTES AND AIRPORTS



LEGEND:

△ INTERSECTION

▬▬▬ HIGH ALTITUDE JET ROUTE

▬ ▬ ▬ ARRIVAL ROUTE

10 0 10

MILES

NOTE:

THE CORRIDOR FOR HIGH ALTITUDE ROUTES EXTENDS 4 NAUTICAL MILES ON EITHER SIDE OF CENTERLINE.

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REFERENCE:

1. U.S. DEPARTMENT OF COMMERCE, NOAA; OPERATIONAL NAVIGATION CHART, KANSAS CITY; G-20.
2. U.S. DEPARTMENT OF COMMERCE; KANSAS CITY, SECTIONAL AERONAUTICAL CHART; 21ST EDITION; DECEMBER 28, 1978.
3. UNITED STATES GOVERNMENT FLIGHT INFORMATION PUBLICATION; ENROUTE HIGH ALTITUDE-U.S.; NORTH EAST, H-3.
4. JEPPESEN AIRWAYS MANUAL; JEPPESEN APPROACH CHART, STANDARD TERMINAL ARRIVAL; JEPPESEN SANDERSEN, INC., DENVER, APRIL 13, 1979.

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FIGURE 2.2-2
APPROACH AND HIGH ALTITUDE AIR ROUTES

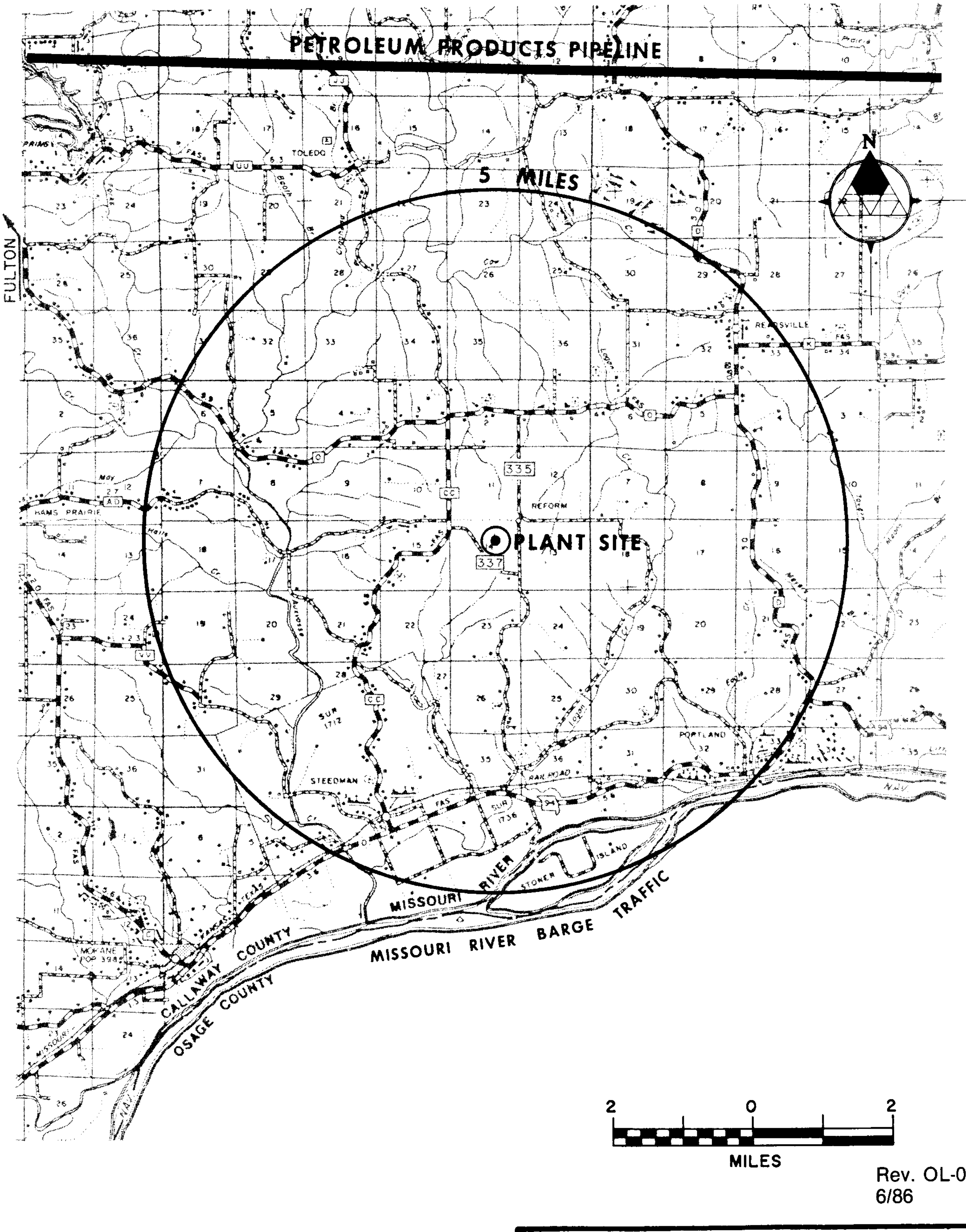

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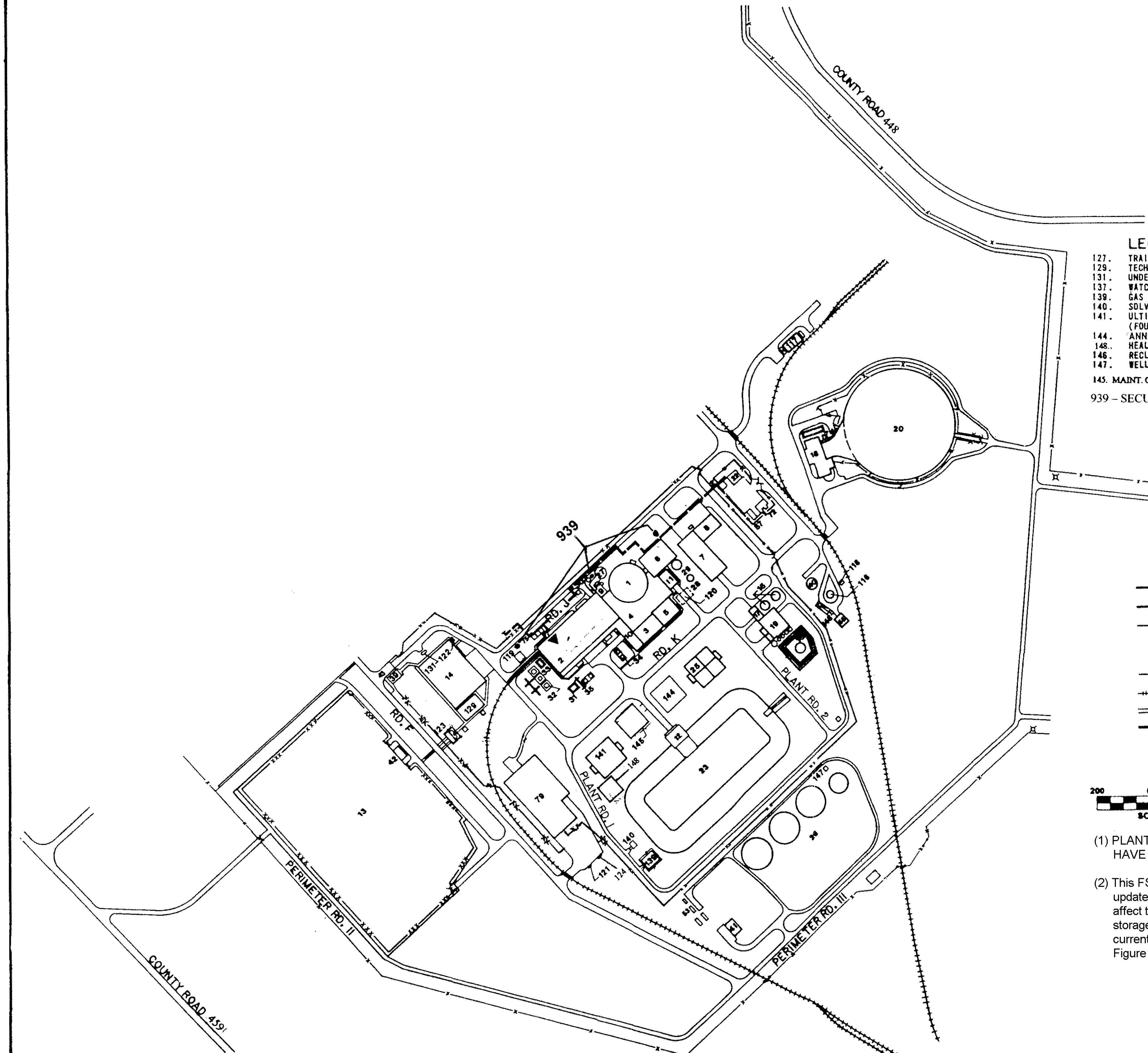
FIGURE 2.2-3

LAND AND WATER TRANSPORTATION ROUTES

REFERENCE:
MISSOURI STATE HIGHWAY DEPARTMENT;
GENERAL HIGHWAY MAP OF CALLAWAY,
MISSOURI; OCTOBER 1, 1977.



LEGEND CONTINUED

127. TRAINING CENTER
129. TECHNICAL SUPPORT CENTER
131. UNDERGROUND DIESEL FUEL STORAGE TANK
137. WATCHMAN GATEHOUSE
139. GAS CYLINDER STORAGE
140. SOLVENT STORAGE TANK
141. ULTIMATE HEAT SINK COOLING TOWER NO. 2 (FOUNDATION TO FINISH GRADE ONLY)
144. ANNEX BLDG.
148. HEALTH PHYSICS CALIBRATION FACILITY
146. RECLAIMED OIL STORAGE TANK
147. WELL NO. 3
145. MAINT. OUTAGE FACILITY
939 – SECURITY RESPONSE CENTERS

LEGEND

- SWITCHYARD FENCE
- PROTECTED AREA FENCE
- OWNER CONTROL FENCE
- GATE
- PLANT RAILROAD (1)
- PLANT ROAD
- DISTRIBUTION PIPING
- INTERFACE

200 0 200 400
SCALE IN FEET

(1) PLANT RAILROAD TRACKS HAVE BEEN REMOVED

(2) This FSAR Figure is only updated to show changes that affect the hydrogen systems storage & distribution. For the current site layout see FSAR Figure 1.2-44.

LEGEND

1. REACTOR BLDG.
2. TURBINE BLDG.
3. CONTROL BLDG.
4. AUXILIARY BLDG.
5. DIESEL GENERATOR BLDG.
6. FUEL BLDG.
7. RADWASTE BLDG.
8. DRUM STORAGE (SOLID WASTE)
9. AUXILIARY BOILER ROOM
10. CONTROL BLDG. COMMUNICATIONS CORR.
11. HOT MACHINE SHOP
12. ESSENTIAL SERVICE WATER PUMPHOUSE
13. SWITCHYARD
14. SERVICE BLDG.
15. FIRE WATER STORAGE TANKS
16. FUEL OIL STORAGE TANK
17. FIRE PUMPHOUSE
18. COOLING WATER SYSTEM PUMPHOUSE (CIRC & SERVICE)
19. DEMINERALIZED & POTABLE WATER PLANT
20. COOLING TOWER
21. CO2 STORAGE
22. HYDROGEN STORAGE
23. ULTIMATE HEAT SINK RETENTION POND
24. PARKING–OPERATIONAL
25. ULTIMATE HEAT SINK COOLING TOWER NO. 1
26. WATER TREATMENT PLANT
27. CONDENSATE WATER STORAGE TANK
28. REACTOR MAKEUP WATER STORAGE TANK
29. REFUELING WATER STORAGE TANK
30. DEMINERALIZED WATER STORAGE TANK
31. START–UP TRANSFORMER
32. MAIN TRANSFORMERS
33. UNIT AUXILIARY TRANSFORMER
34. ESF TRANSFORMER-CAPACITOR BANK
35. STATION SERVICE TRANSFORMER
39. SECURITY BLDG.
40. NEUTRALIZATION TANK
41. WATER TREATMENT PLANT CONTROL BLDG.
42. SWITCHYARD CONTROL BLDG.
43. MAIN PERMANENT ENTRANCE
53. SEWAGE TREATMENT PLANT
55. OILY WASTE TREATMENT AREA
57. OXYGEN STORAGE
72. NITROGEN STORAGE
75. BULK CHEMICAL STORAGE
79. STORES BLDG.
116. EQUALIZATION BASIN
117. COOLING WATER CHEMICAL CONTROL AREA
118. AUXILIARY OIL TRANSFER
119. SPARE MAIN TRANSFORMER STORAGE AREA
120. UNDERGROUND DIESEL FUEL STORAGE TANKS
121. ABOVEGROUND GASOLINE STORAGE TANK
122. SECURITY DIESEL GENERATOR BLDG.
123. SECONDARY ACCESS FACILITY
124. DIESEL FUEL STORAGE TANK

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CALLAWAY PLANT
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FIGURE 2.2-4

HYDROGEN SYSTEM

STORAGE & DISTRIBUTION

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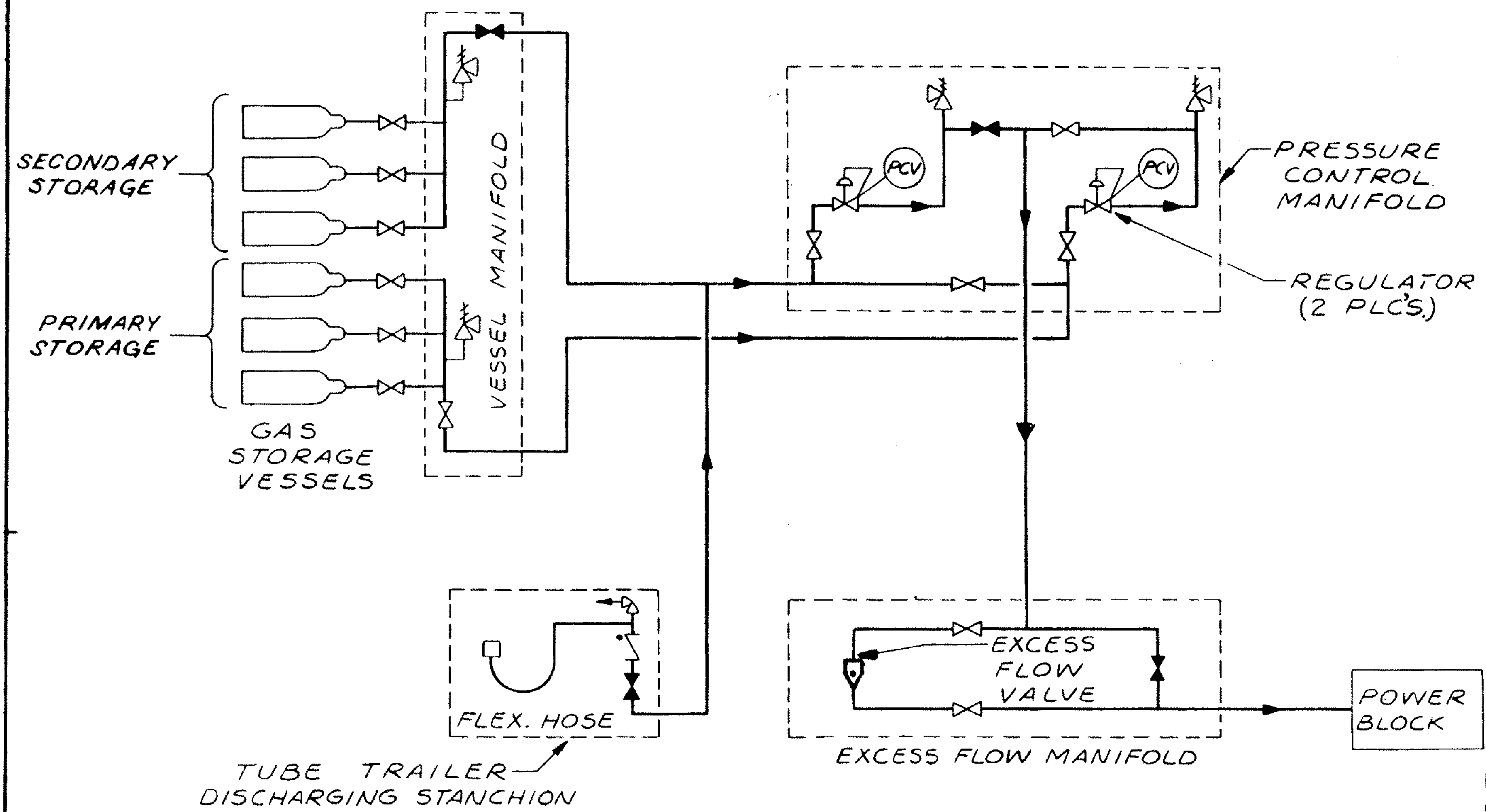

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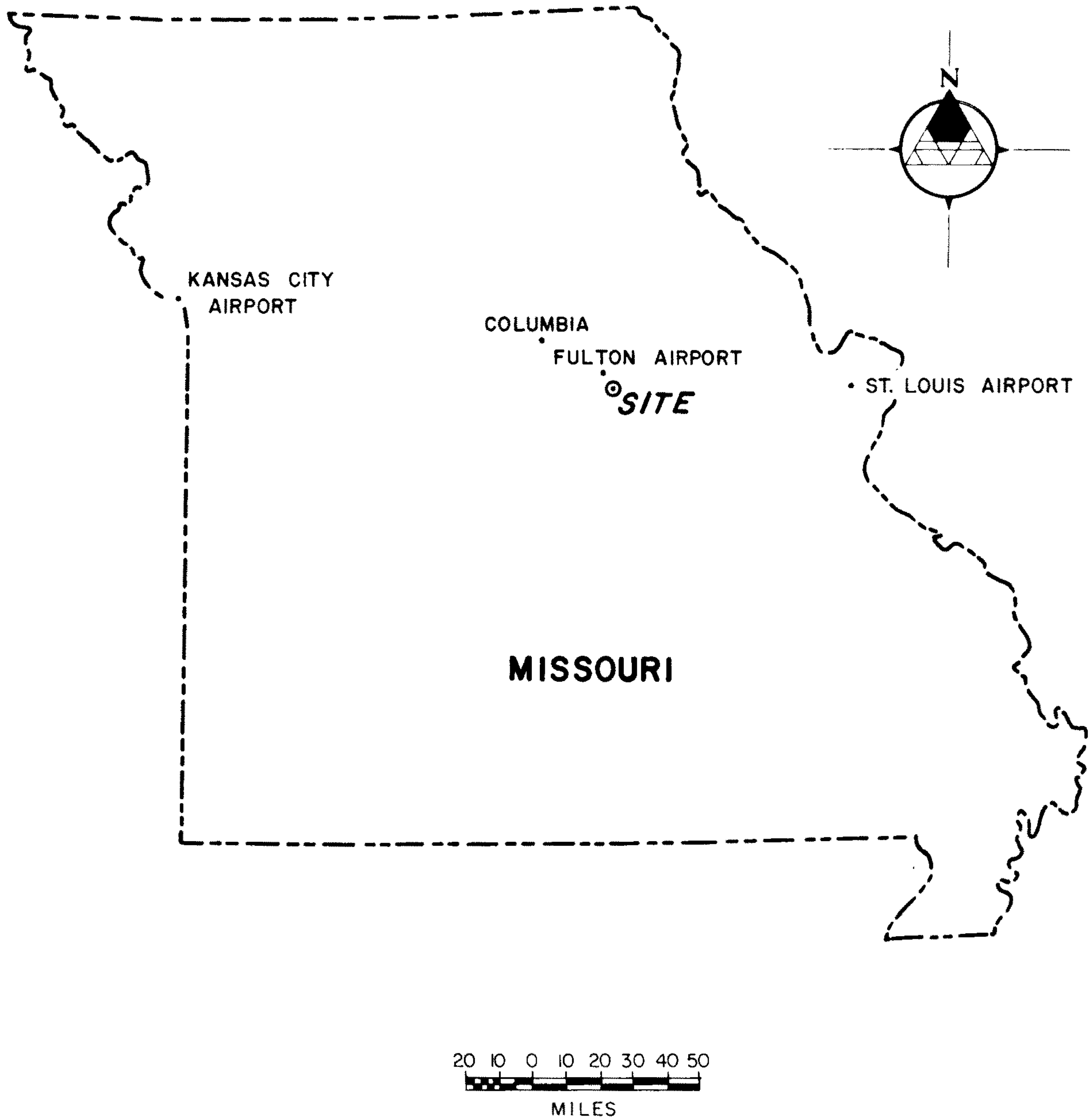
FIGURE 2.2-5
HYDROGEN SYSTEM
FLOW DIAGRAM

N12263



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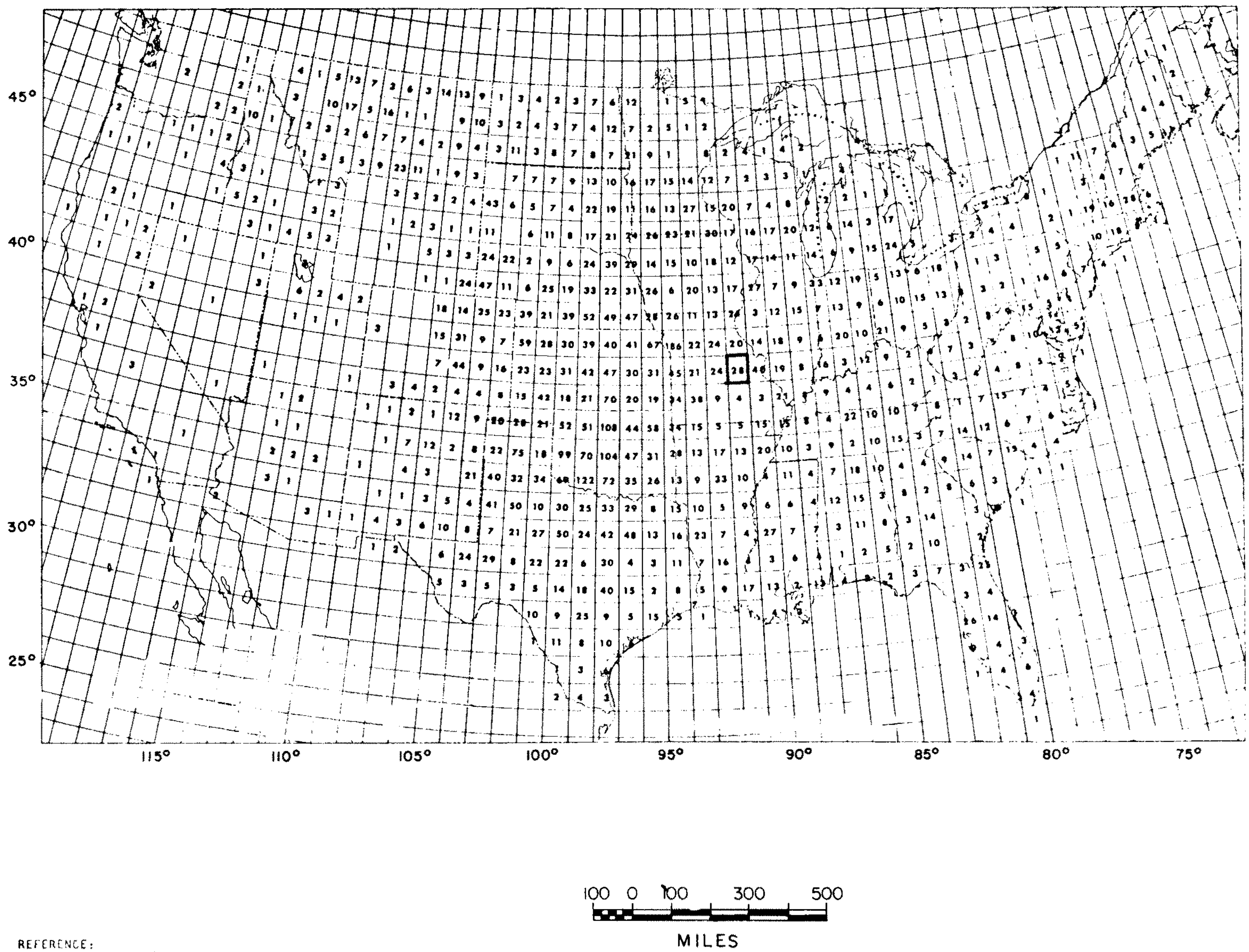
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.3-1

CLIMATOLOGICAL STATIONS



REFERENCE:
PAUTZ, M.E., 1969: SEVERE LOCAL STORM OCCURRENCES 1955-1967. ESSA TECH. MEMO WBTM FCST 12, OFFICE OF METEOROLOGICAL OPERATIONS, SILVER SPRING, MD.

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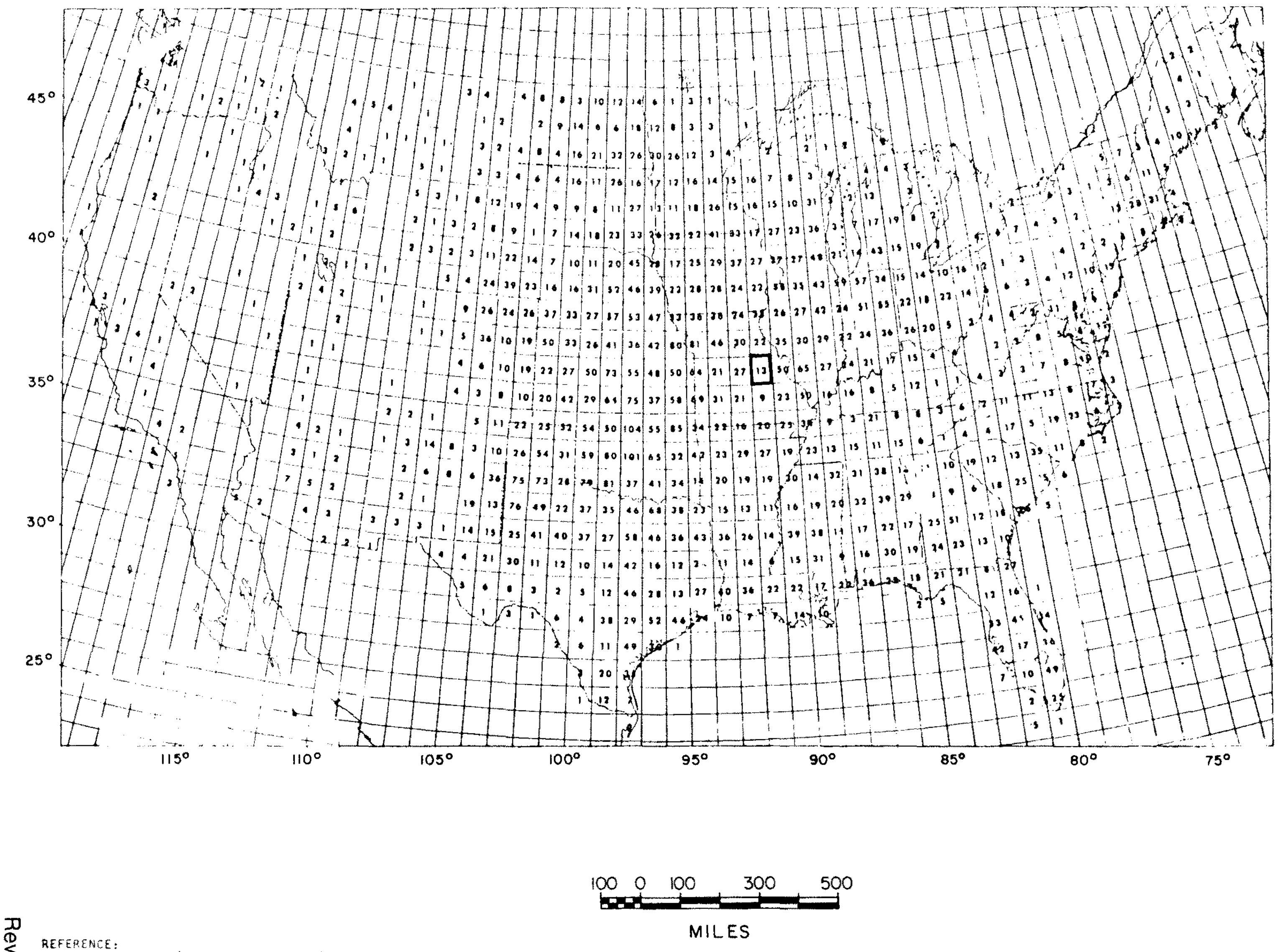
FIGURE 2.3-2
TOTAL NUMBER OF HAIL REPORTS 3/4 INCH AND GREATER, 1955-1967 BY 1° SQUARES



REFERENCE:
PAUTZ, M.E., 1969. SEVERE LOCAL STORM OCCURRENCES 1955-1967. ESSA TECH. MEMO WBTM FCST 12, OFFICE OF METEOROLOGICAL OPERATIONS, SILVER SPRING, MD.

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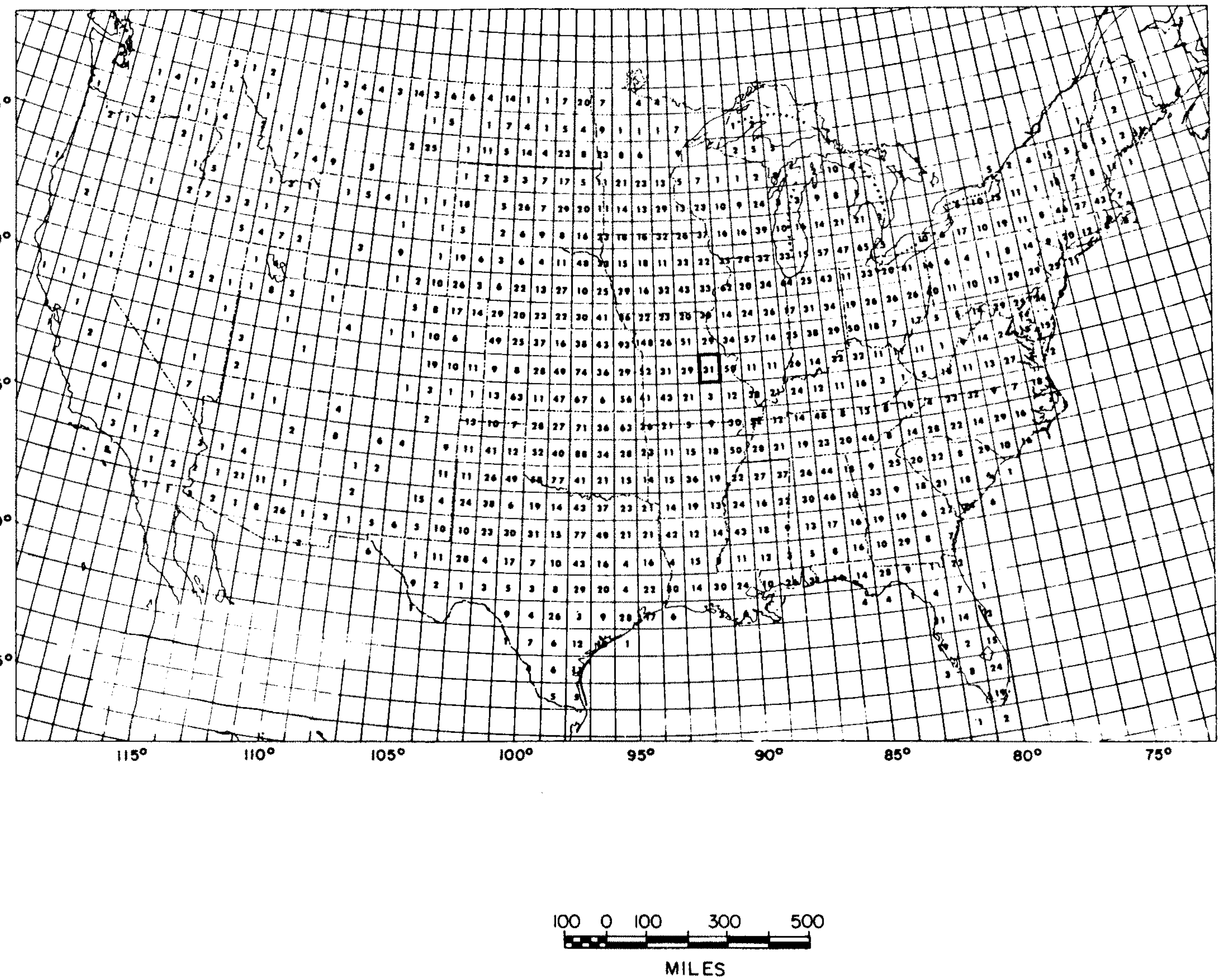
FIGURE 2.3-3
TOTAL TORNADOES 1955-1967
BY 1° SQUARES



REFERENCE:
PAUTZ, M.E., 1969: SEVERE LOCAL STORM OCCURRENCES 1955-1967. ESSA TECH. MEMO WBTM FCST 12, OFFICE OF METEOROLOGICAL OPERATIONS, SILVER SPRING, MD.

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FIGURE 2.3-4
TOTAL NUMBER OF WINDSTORMS 50 KNOTS AND GREATER, 1955-1967 BY 1° SQUARES

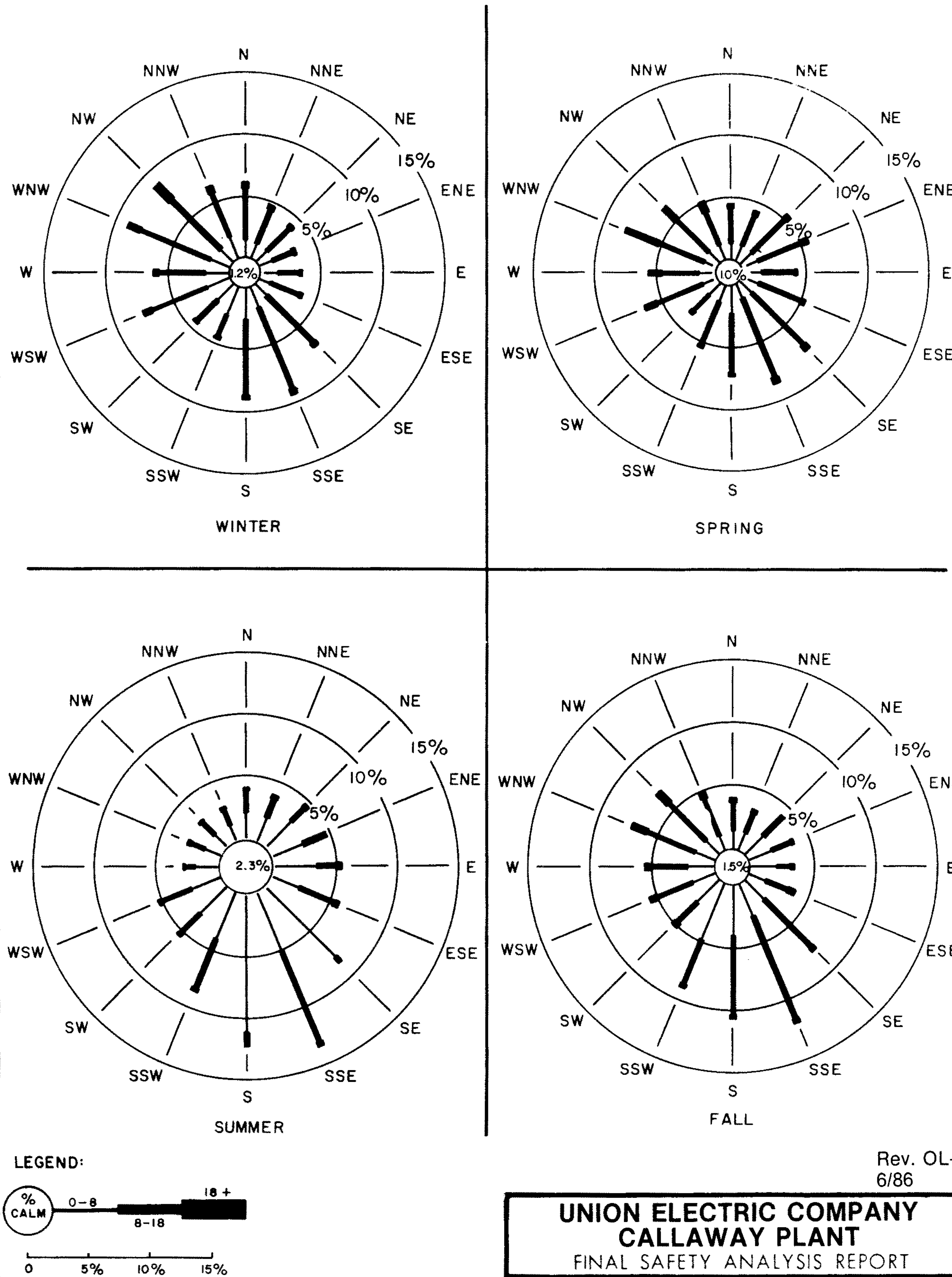

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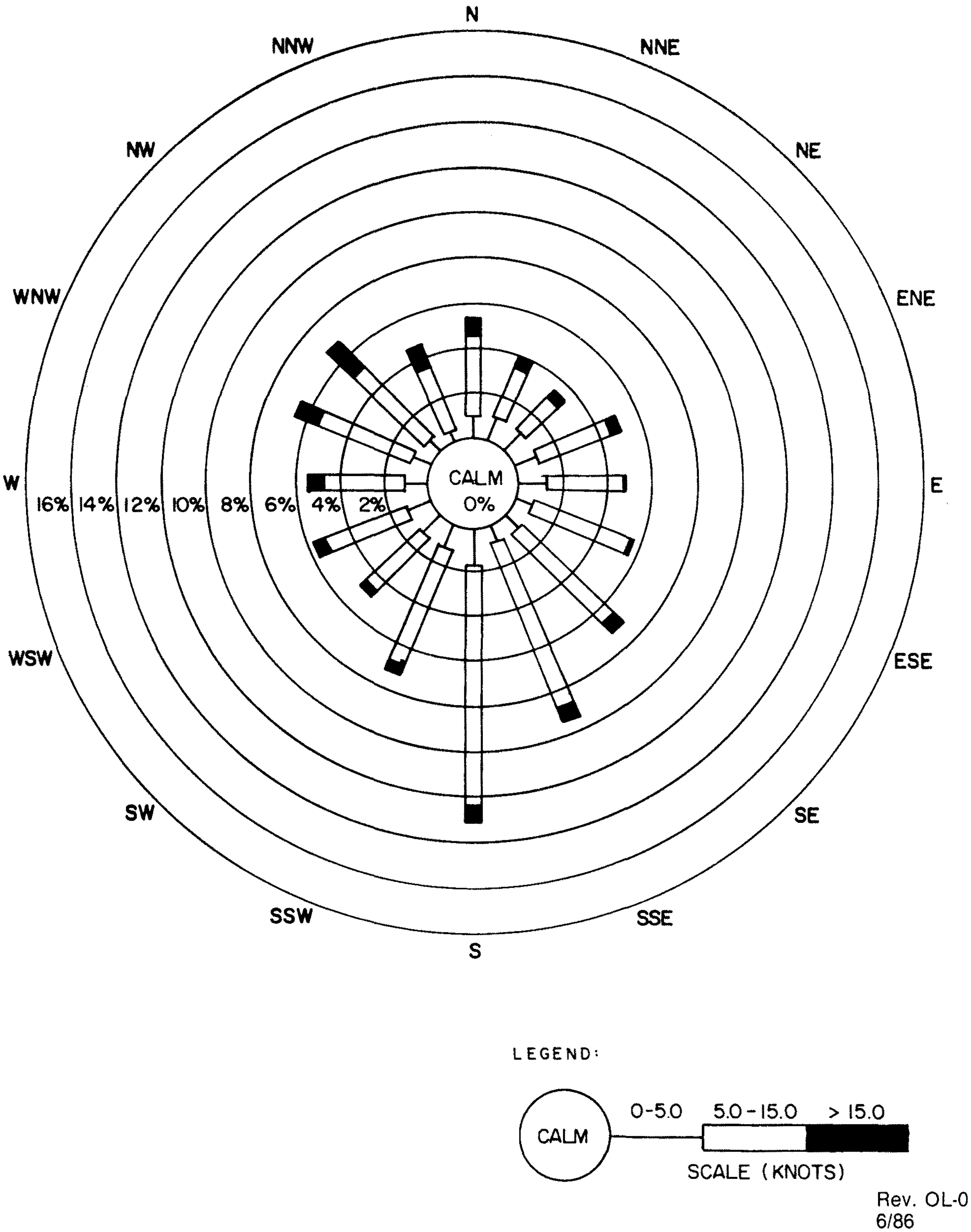
FIGURE 2.3-5

SURFACE WIND ROSES
FOR THE PERIOD 1951-1959
COLUMBIA, MISSOURI



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NOTE:
ANEMOMETER HEIGHT 48 FEET

REFERENCE:
3-HOURLY NATIONAL WEATHER SERVICE WIND DATA, 1960-1969.

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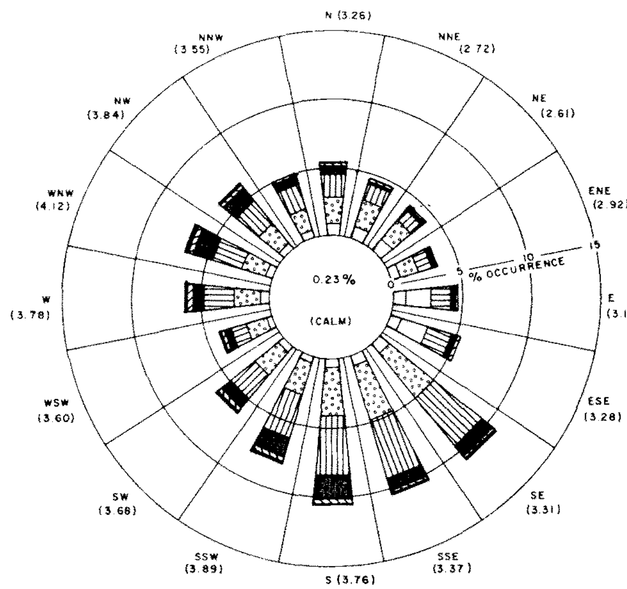
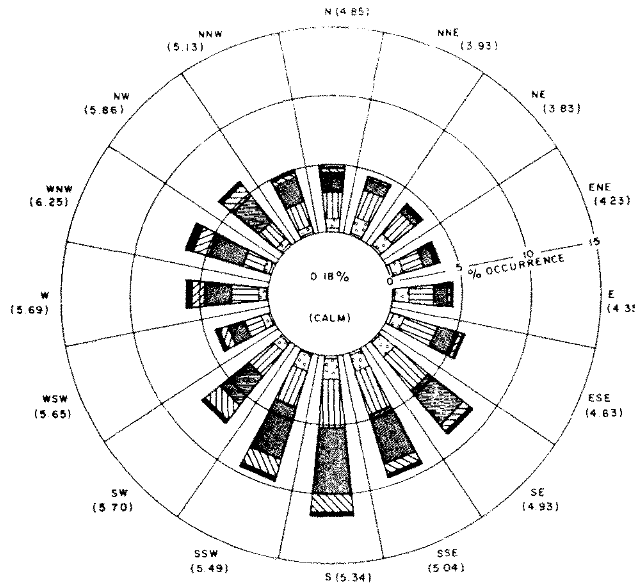
FIGURE 2.3-6
SURFACE WIND ROSE
AT COLUMBIA, MISSOURI



10 METER LEVEL



60 METER LEVEL

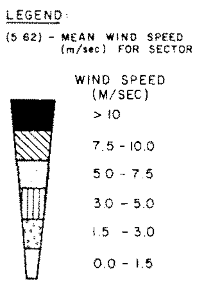


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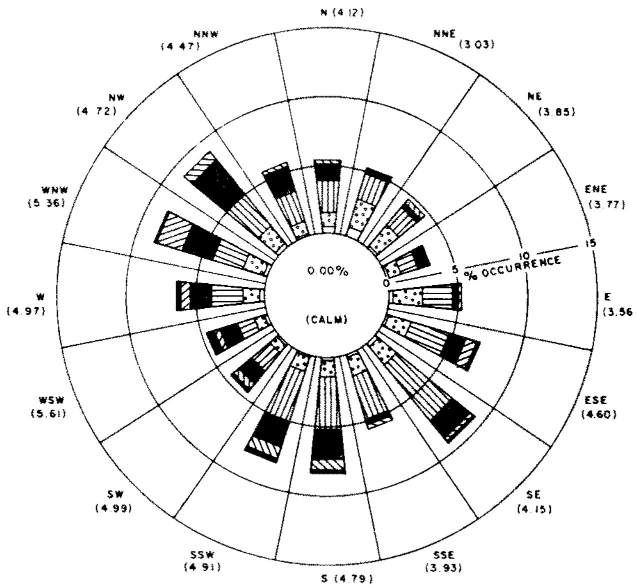
FIGURE 2.3-7

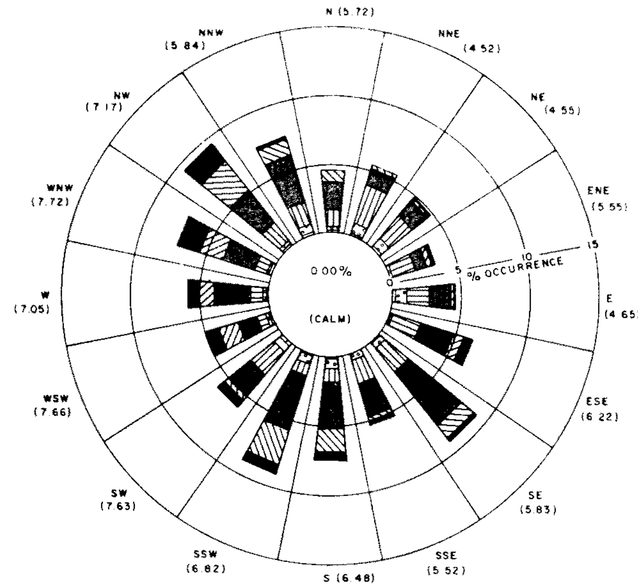
WIND ROSES

MONTHLY - THREE YEARS COMBINE

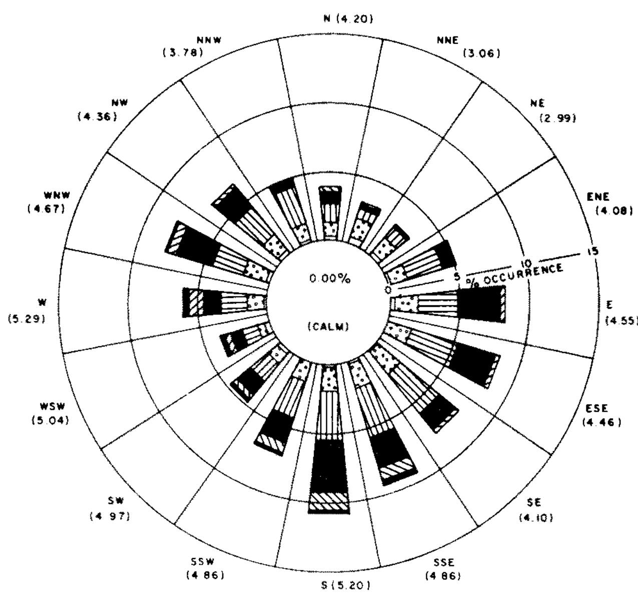
SHEET 1 OF 7



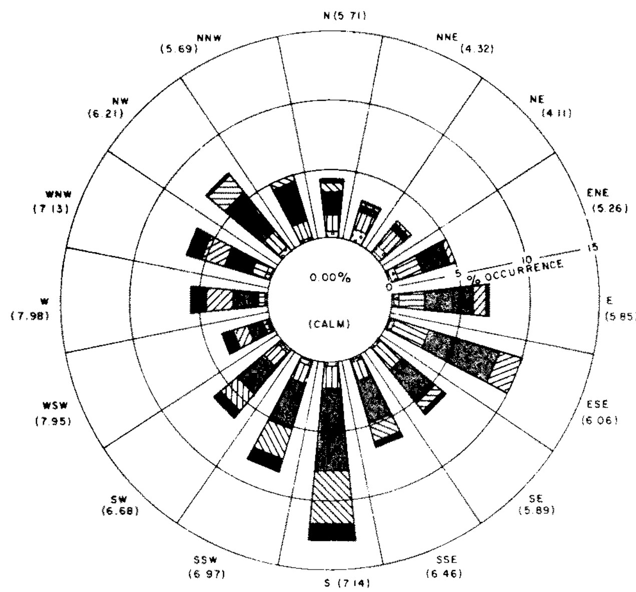
MARCH
10 METER LEVEL



MARCH
60 METER LEVEL



APRIL
10 METER LEVEL



APRIL
60 METER LEVEL

LEGEND

(5.62) - MEAN WIND SPEED (m/sec) FOR SECTOR

WIND SPEED (M/SEC)

- > 10
- 7.5 - 10.0
- 5.0 - 7.5
- 3.0 - 5.0
- 1.5 - 3.0
- 0.0 - 1.5

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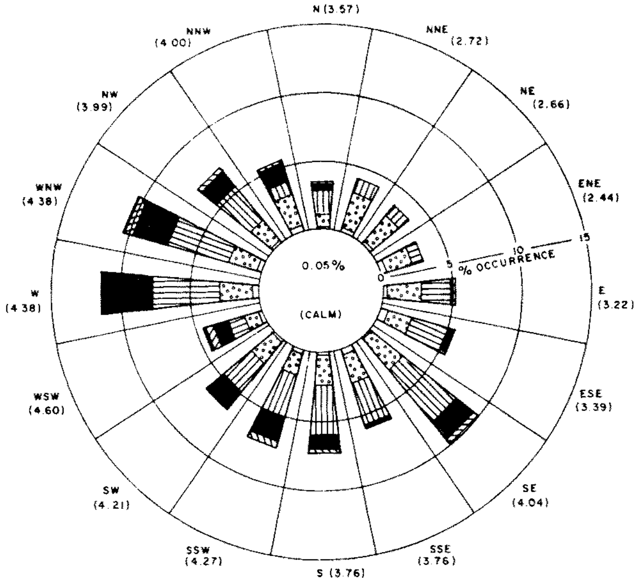
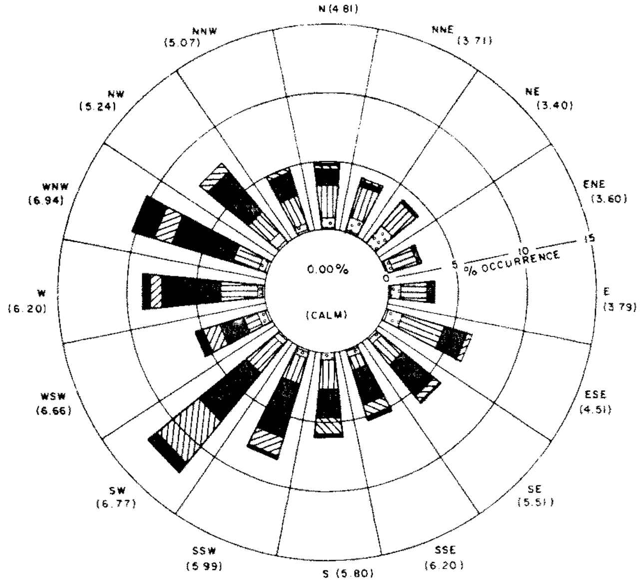
FIGURE 2.3-7

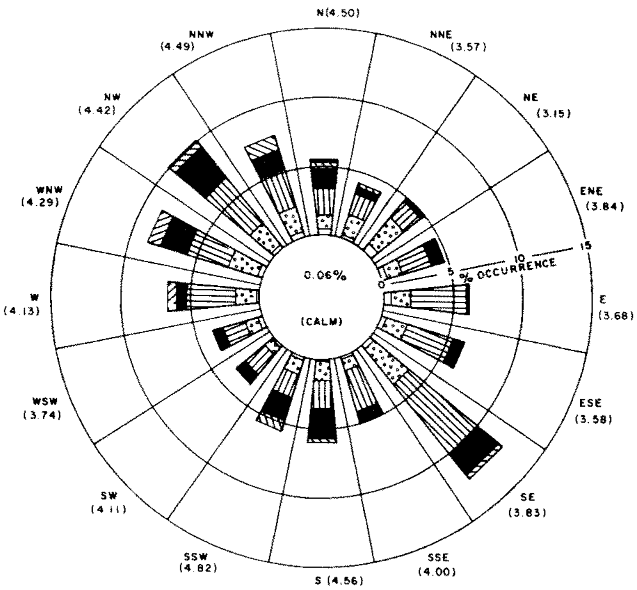
WIND ROSES
MONTHLY - THREE YEARS COMBINE
SHEET 2 OF 7



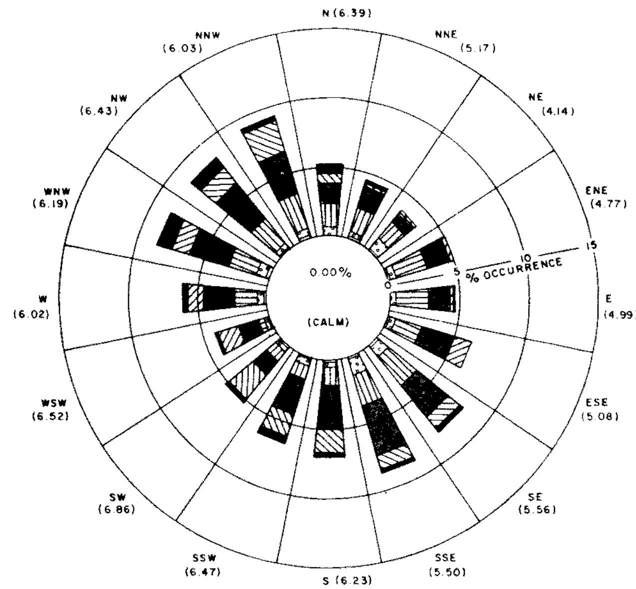
JANUARY
10 METER LEVEL



JANUARY
60 METER LEVEL



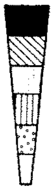
FEBRUARY
10 METER LEVEL



FEBRUARY
60 METER LEVEL

LEGEND:
(5.62) - MEAN WIND SPEED (m/sec) FOR SECTOR

WIND SPEED (M/SEC)



> 10
7.5 - 10.0
5.0 - 7.5
3.0 - 5.0
1.5 - 3.0
0.0 - 1.5

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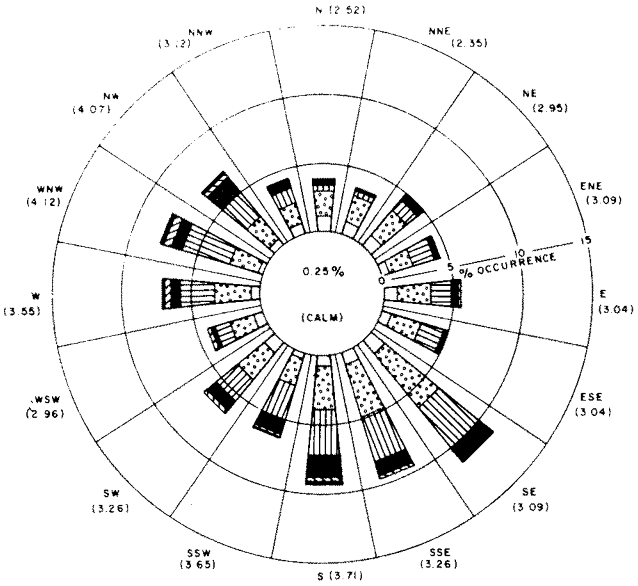
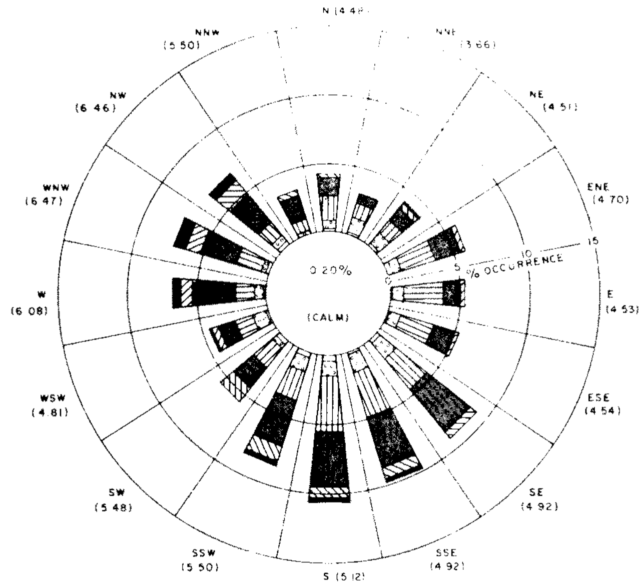
FIGURE 2.3-7

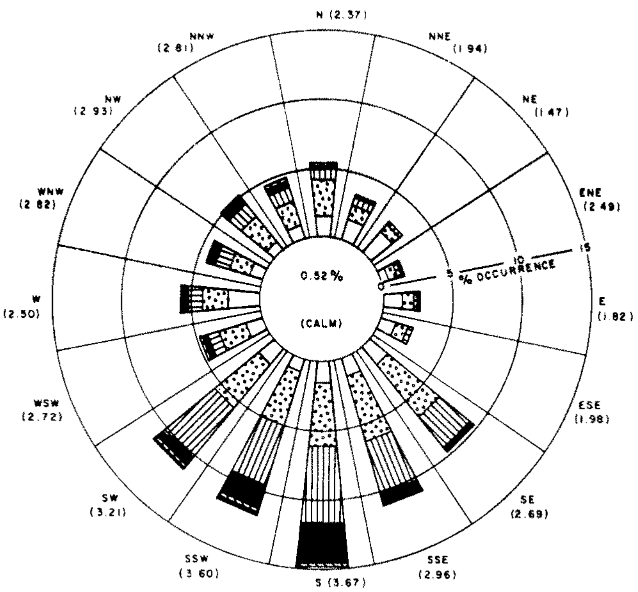
WIND ROSES
MONTHLY - THREE YEARS COMBINE
SHEET 3 OF 7



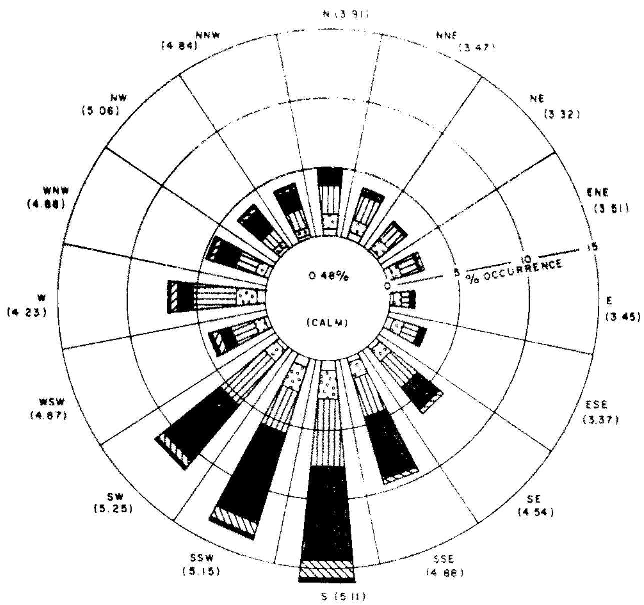
MAY
10 METER LEVEL



MAY
60 METER LEVEL



JUNE
10 METER LEVEL



JUNE
60 METER LEVEL

LEGEND:

(5.62) - MEAN WIND SPEED (m/sec) FOR SECTOR

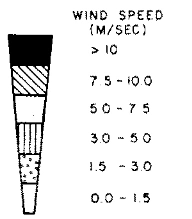


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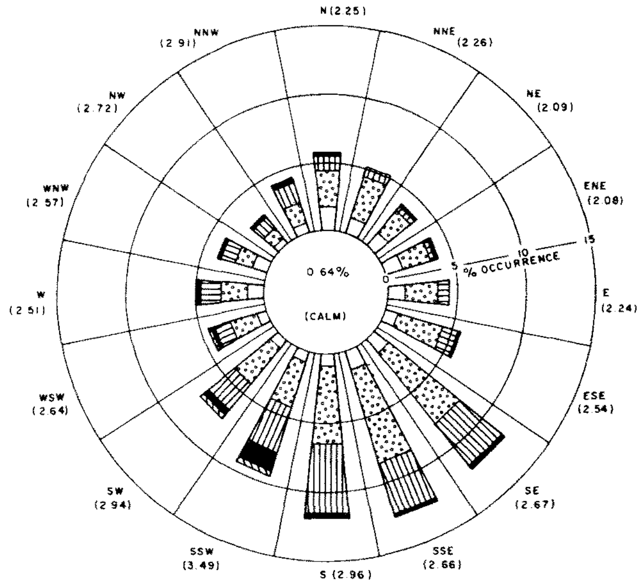
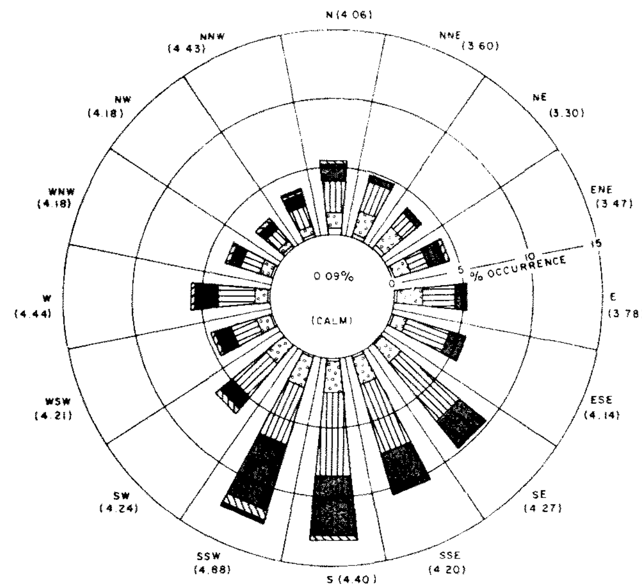
FIGURE 2.3-7

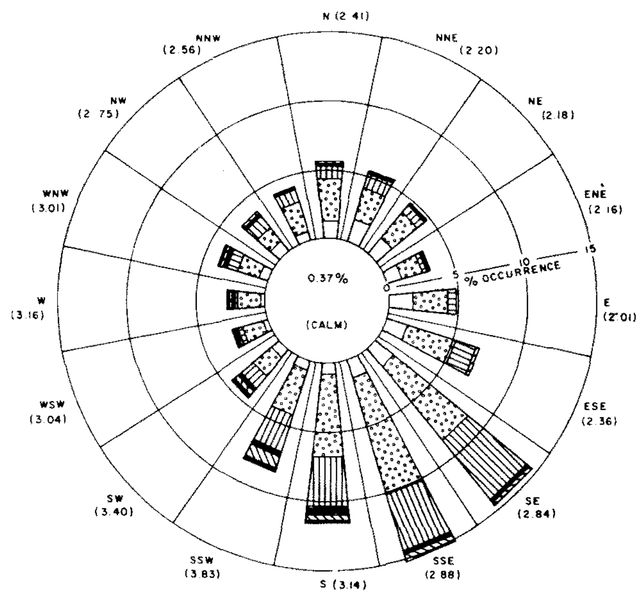
WIND ROSES
MONTHLY - THREE YEARS COMBINE
SHEET 4 OF 7



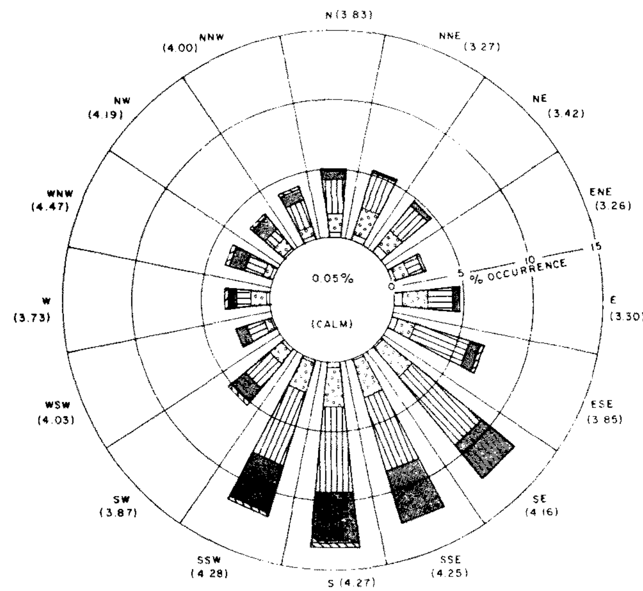
JULY
10 METER LEVEL



JULY
60 METER LEVEL



AUGUST
10 METER LEVEL



AUGUST
60 METER LEVEL

LEGEND:
(5.62) - MEAN WIND SPEED (m/sec) FOR SECTOR

WIND SPEED (M/SEC)

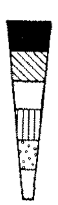


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FIGURE 2.3-7
WIND ROSES
MONTHLY - THREE YEARS COMBINE
SHEET 5 OF 7

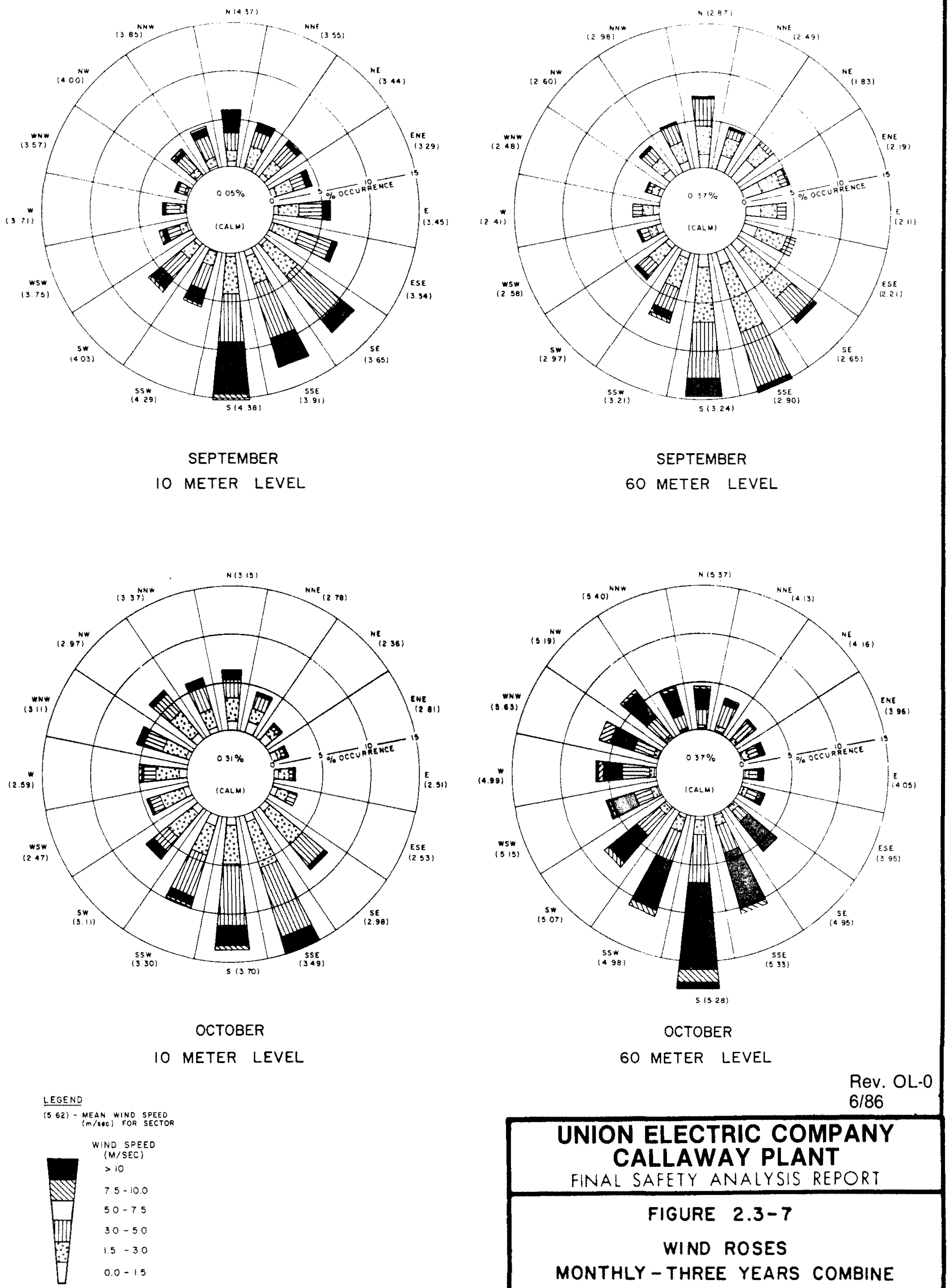

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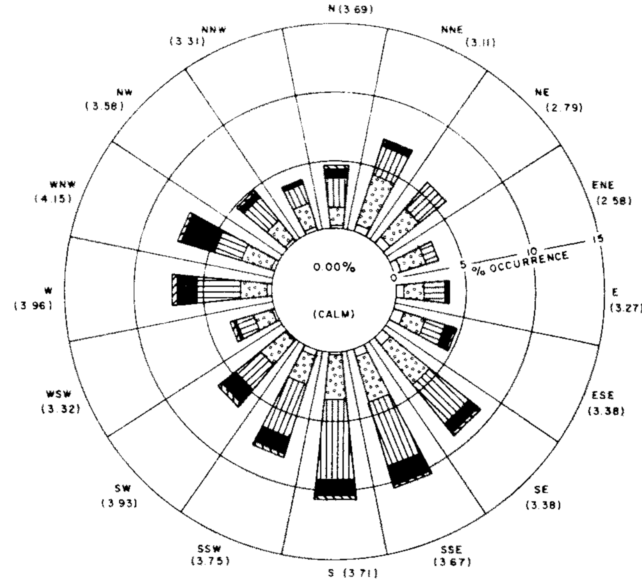
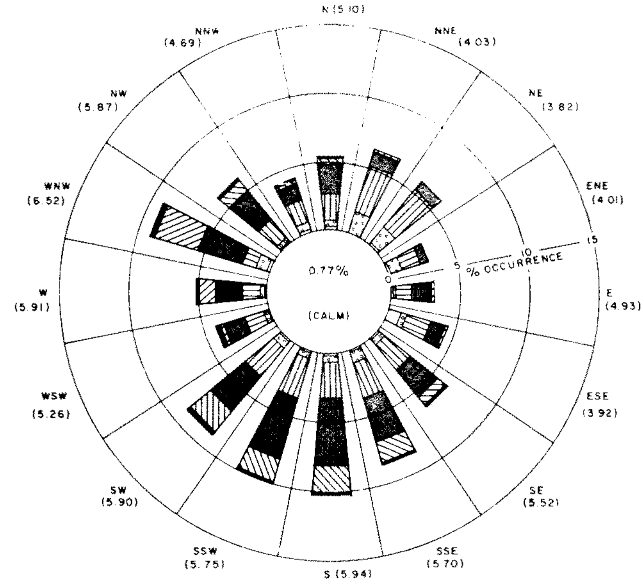
FIGURE 2.3-7

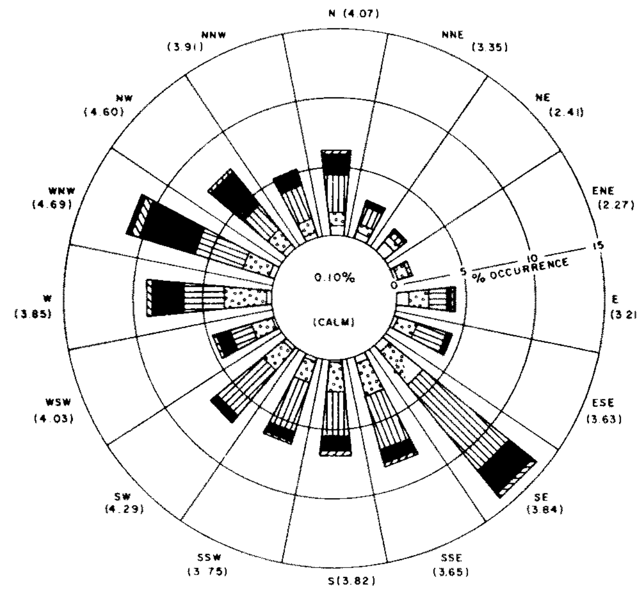
WIND ROSES
MONTHLY - THREE YEARS COMBINE
SHEET 6 OF 7



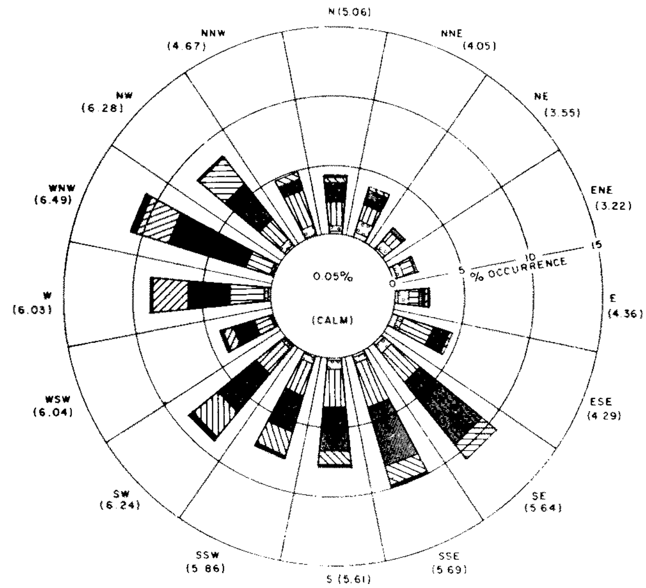
NOVEMBER
10 METER LEVEL



NOVEMBER
60 METER LEVEL



DECEMBER
10 METER LEVEL



DECEMBER
60 METER LEVEL

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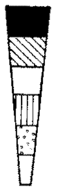
LEGEND

(5.62) - MEAN WIND SPEED (m/sec) FOR SECTOR

WIND SPEED (M/SEC)



> 10
7.5 - 10.0
5.0 - 7.5
3.0 - 5.0
1.5 - 3.0
0.0 - 1.5

UNION ELECTRIC COMPANY
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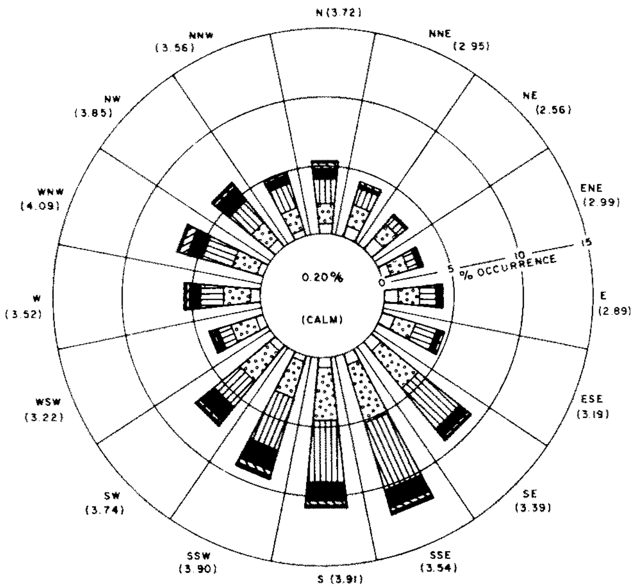
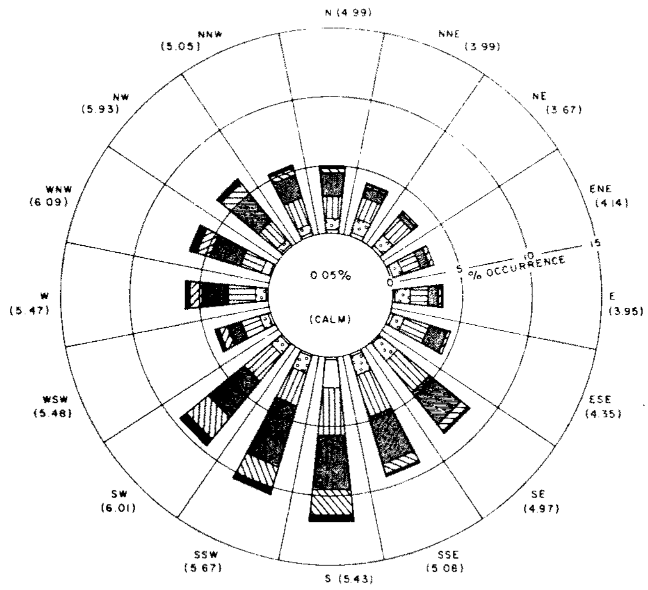
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.3-7

WIND ROSES
MONTHLY - THREE YEARS COMBINE
SHEET 7 OF 7



10 METER LEVEL



60 METER LEVEL

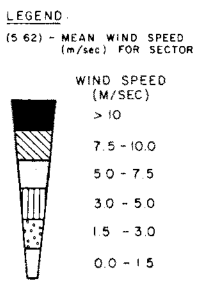


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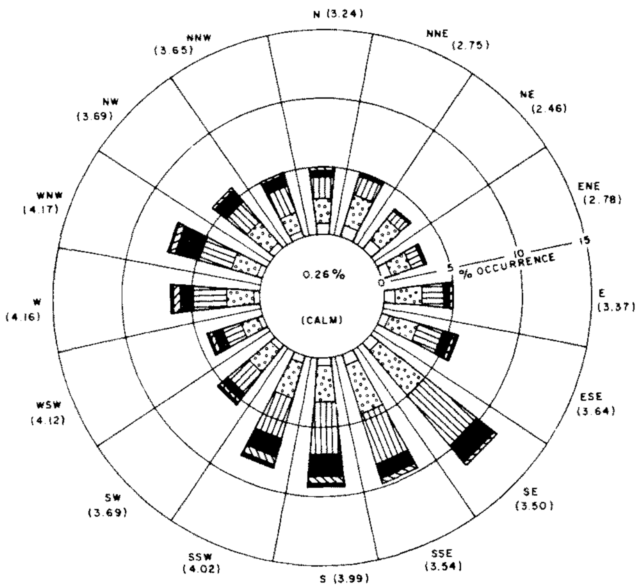
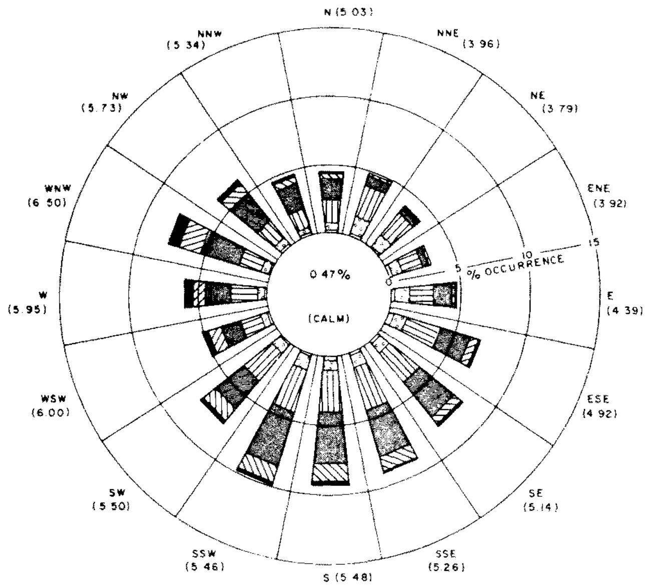
FIGURE 2.3-8

WIND ROSES
ANNUAL 1973-1974



10 METER LEVEL



60 METER LEVEL

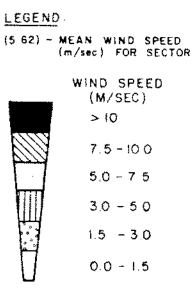


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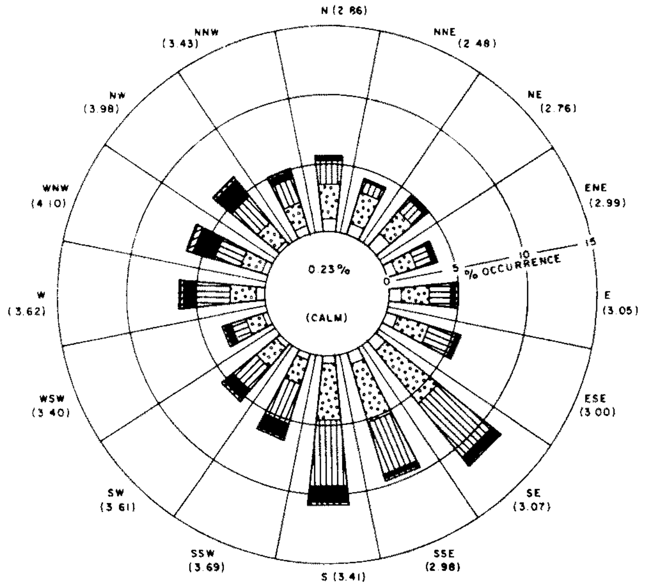
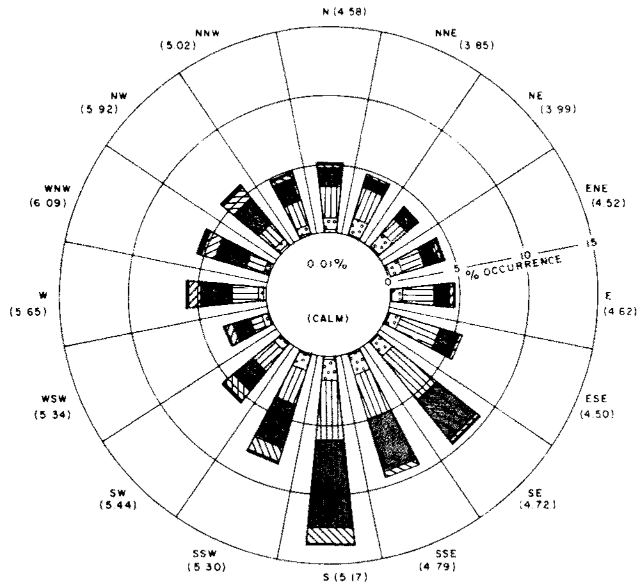
FIGURE 2.3-9

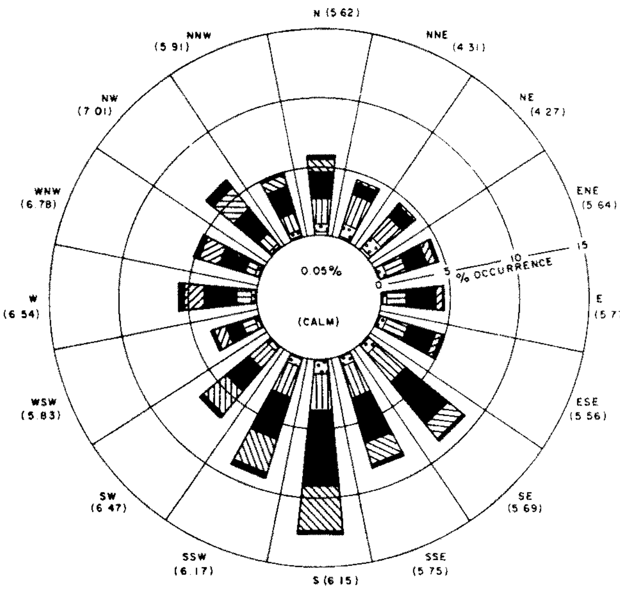
WIND ROSES
ANNUAL 1974-1975



10 METER LEVEL



60 METER LEVEL



90 METER LEVEL

LEGEND:

(5.62) - MEAN WIND SPEED (m/sec) FOR SECTOR

WIND SPEED (M/SEC)

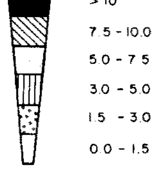


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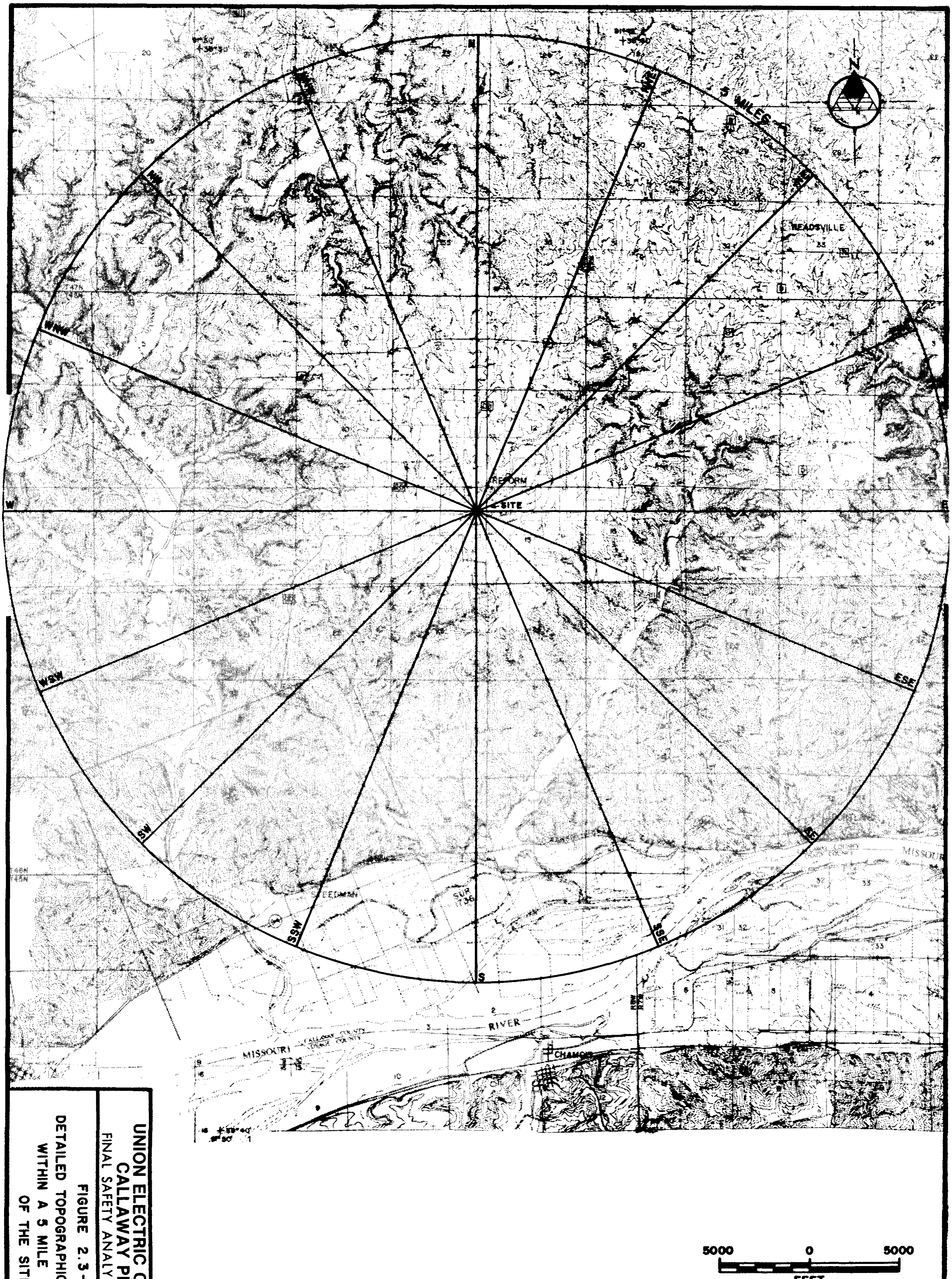
FIGURE 2.3-10

WIND ROSES
ANNUAL 1978 - 1979



MAP REFERENCE:
TOPOGRAPHY BASED ON PORTIONS OF U.S.G.S. 7.5 MIN.
TOPOGRAPHIC MAP ADVANCE PRINTS:
FULTON SE, MISSOURI QUADRANGLE
MONTGOMERY CITY SW, MISSOURI QUADRANGLE
MORANE NE, MISSOURI QUADRANGLE
MORRISON NW, MISSOURI QUADRANGLE
SECTION LINES SHOWN ARE APPROXIMATE

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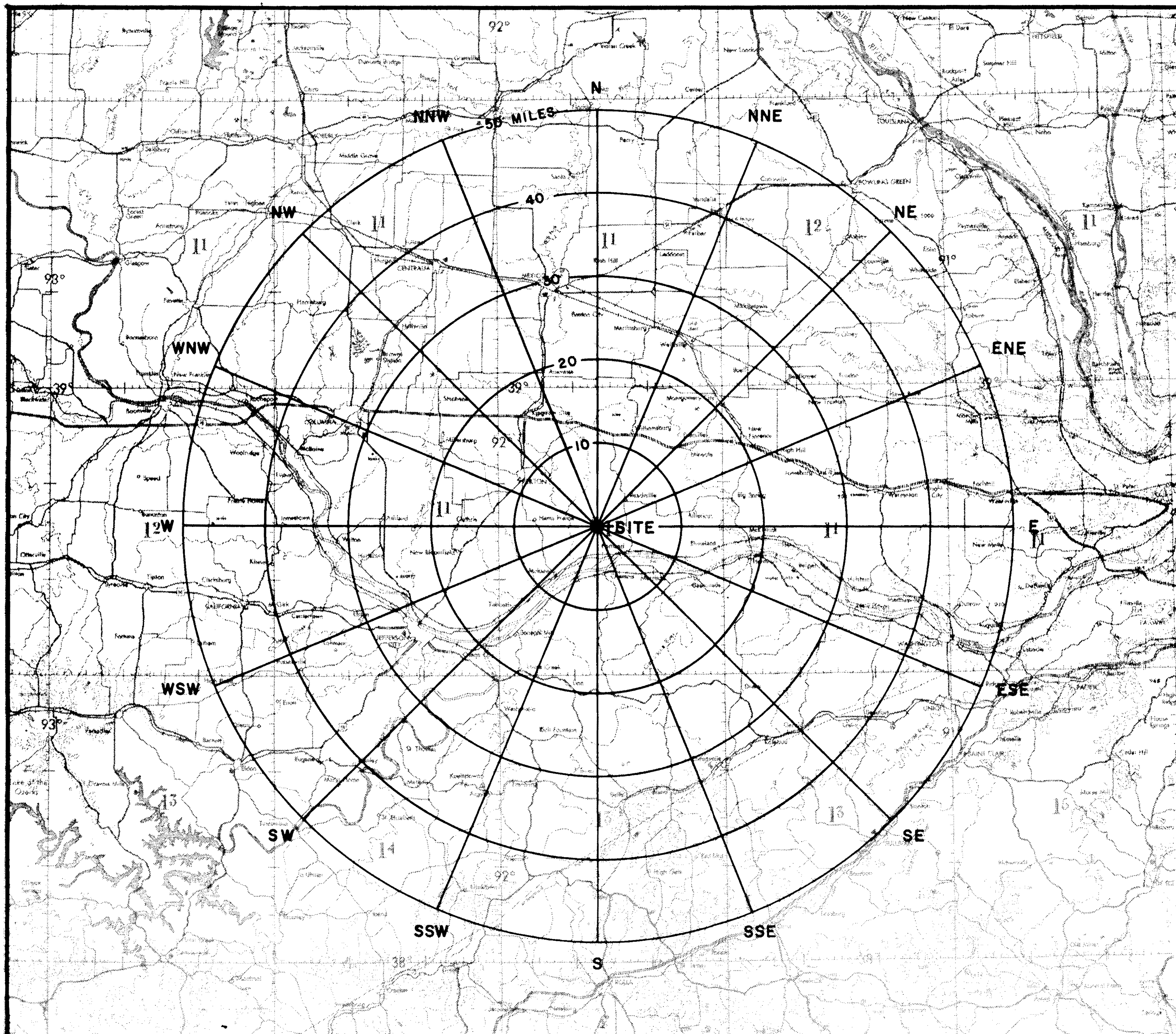
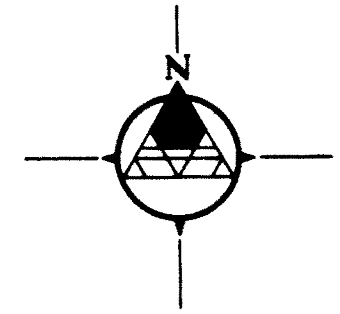
FIGURE 2.3-11
DETAILED TOPOGRAPHIC FEATURES
WITHIN A 5 MILE RADIUS
OF THE SITE





REFERENCE:

THIS MAP WAS PREPARED FROM A PORTION OF KANSAS CITY SECTIONAL AERONAUTICAL CHART.

10 0 10
MILES

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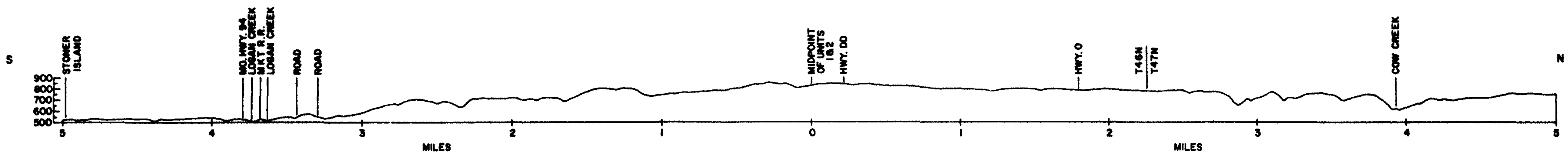
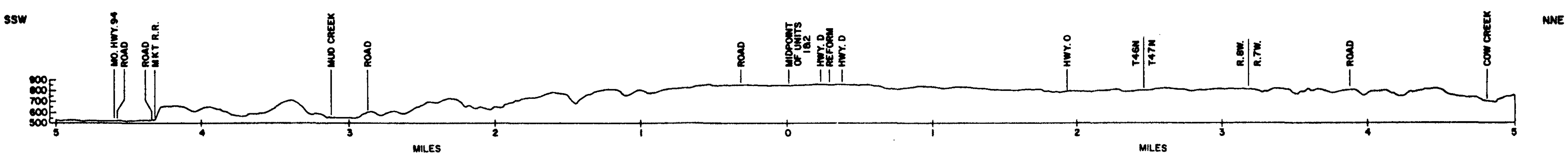
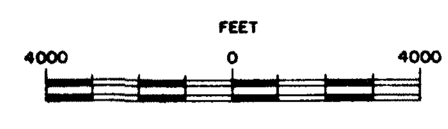
FIGURE 2.3-12

TOPOGRAPHIC FEATURES WITHIN A 50 MILE RADIUS OF THE SITE







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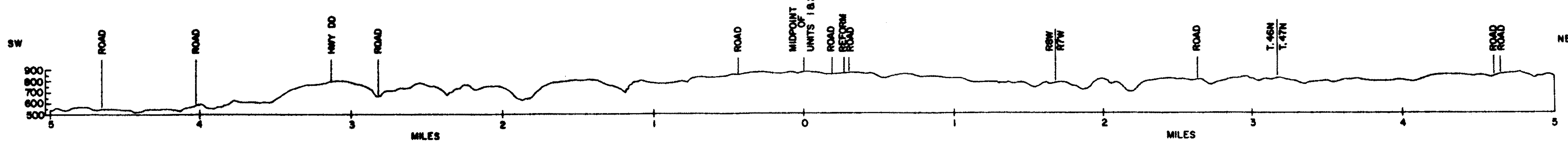
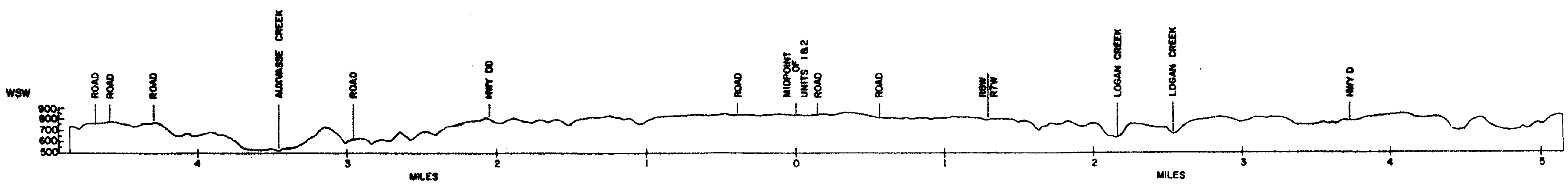
CALLAWAY PLANT
FINAL SAFETY ANALYSIS. REPORT

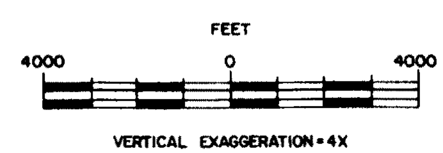
FIGURE 2.3-13

TOPOGRAPHIC CROSS SECTIONS WITHIN A 5 MILE RADIUS OF THE SITE

SHEET 1 OF 4







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CALLAWAY PLANT
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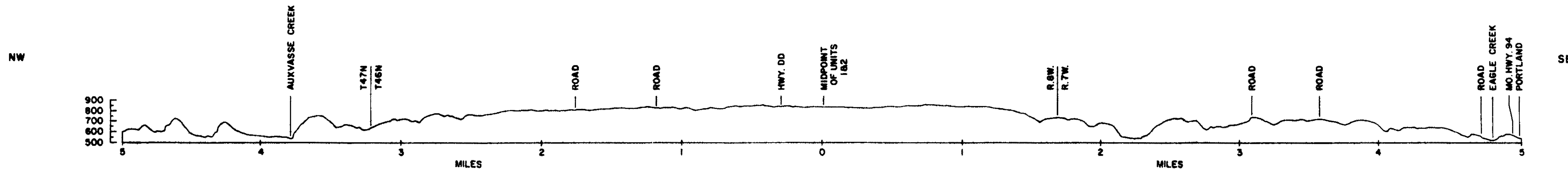
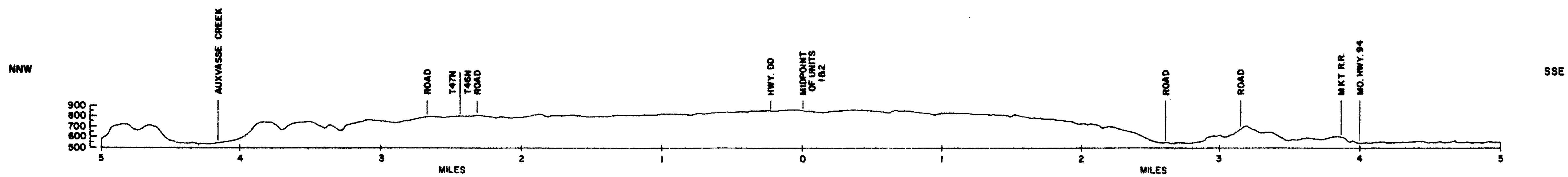
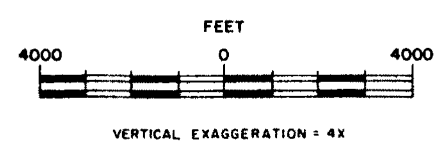
FIGURE 2.3-13

TOPOGRAPHIC CROSS SECTIONS WITHIN A 5 MILE RADIUS OF THE SITE

SHEET 2 OF 4







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CALLAWAY PLANT
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.3-13

TOPOGRAPHIC CROSS SECTIONS WITHIN A 5 MILE RADIUS OF THE SITE

SHEET 3 OF 4

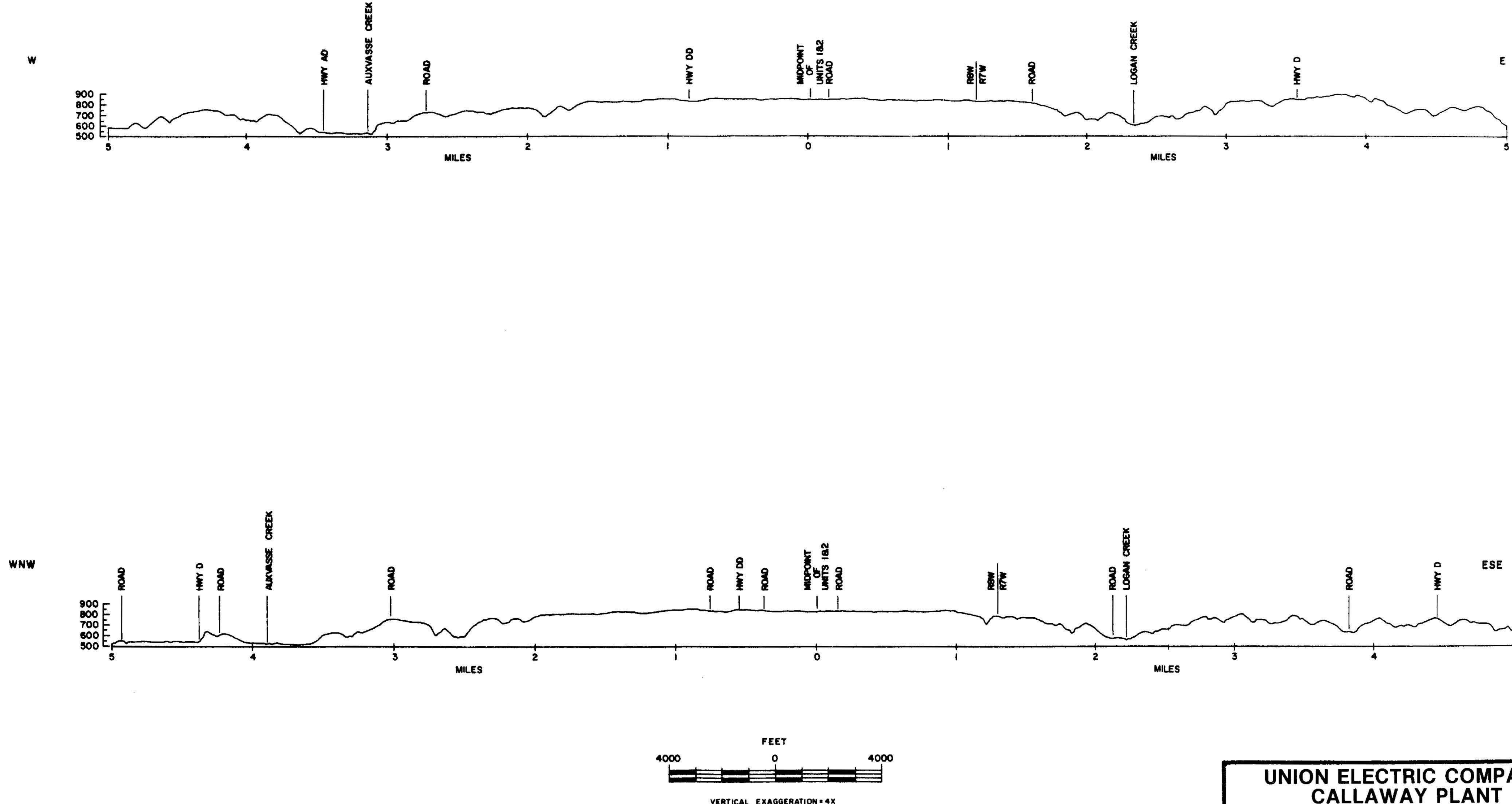

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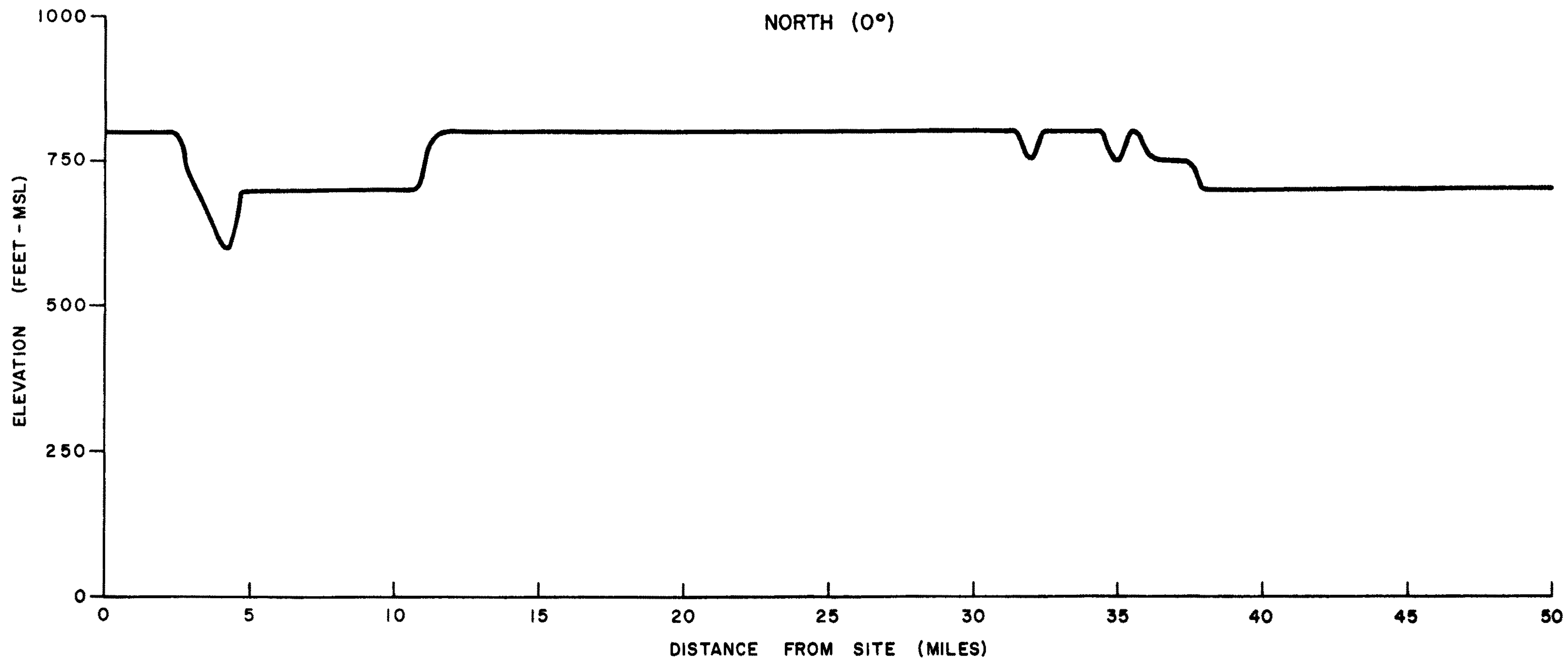
FIGURE 2.3-13

TOPOGRAPHIC CROSS SECTIONS WITHIN A 5 MILE RADIUS OF THE SITE

SHEET 4 OF 4



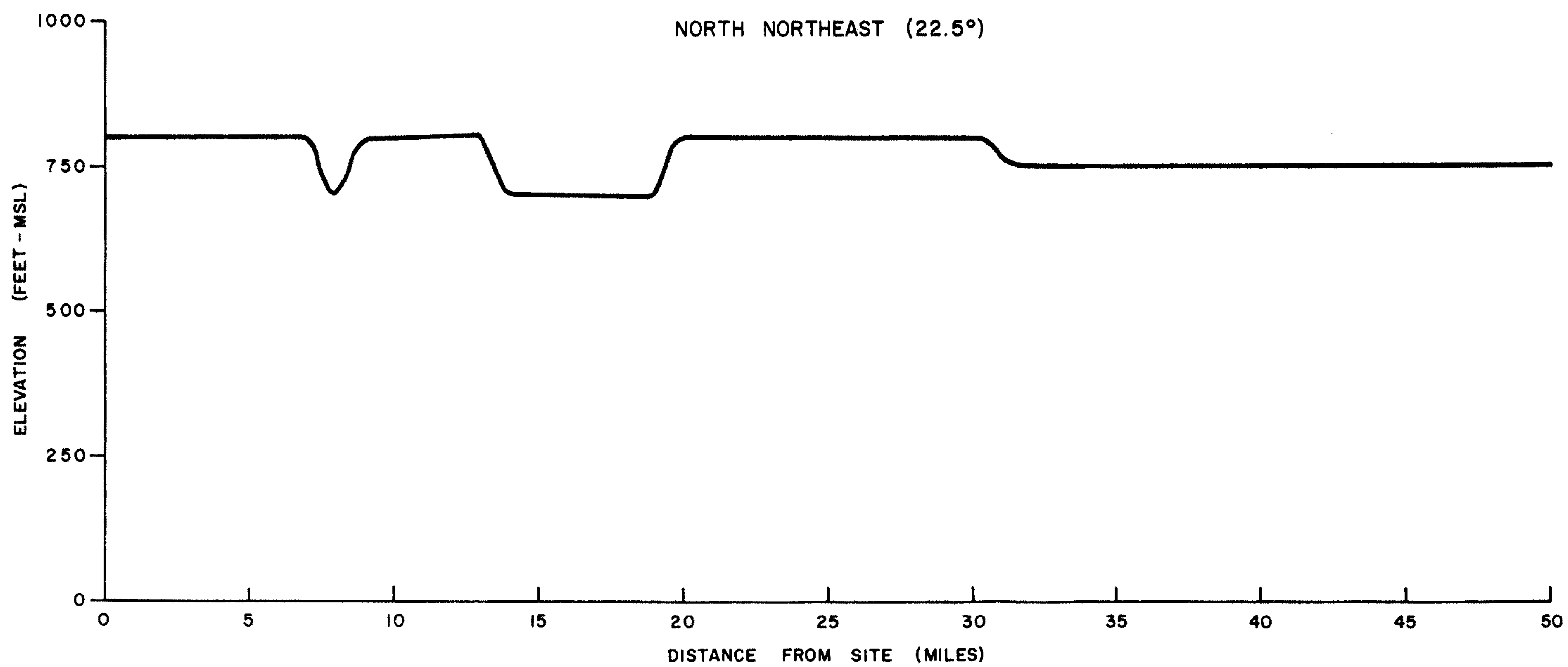


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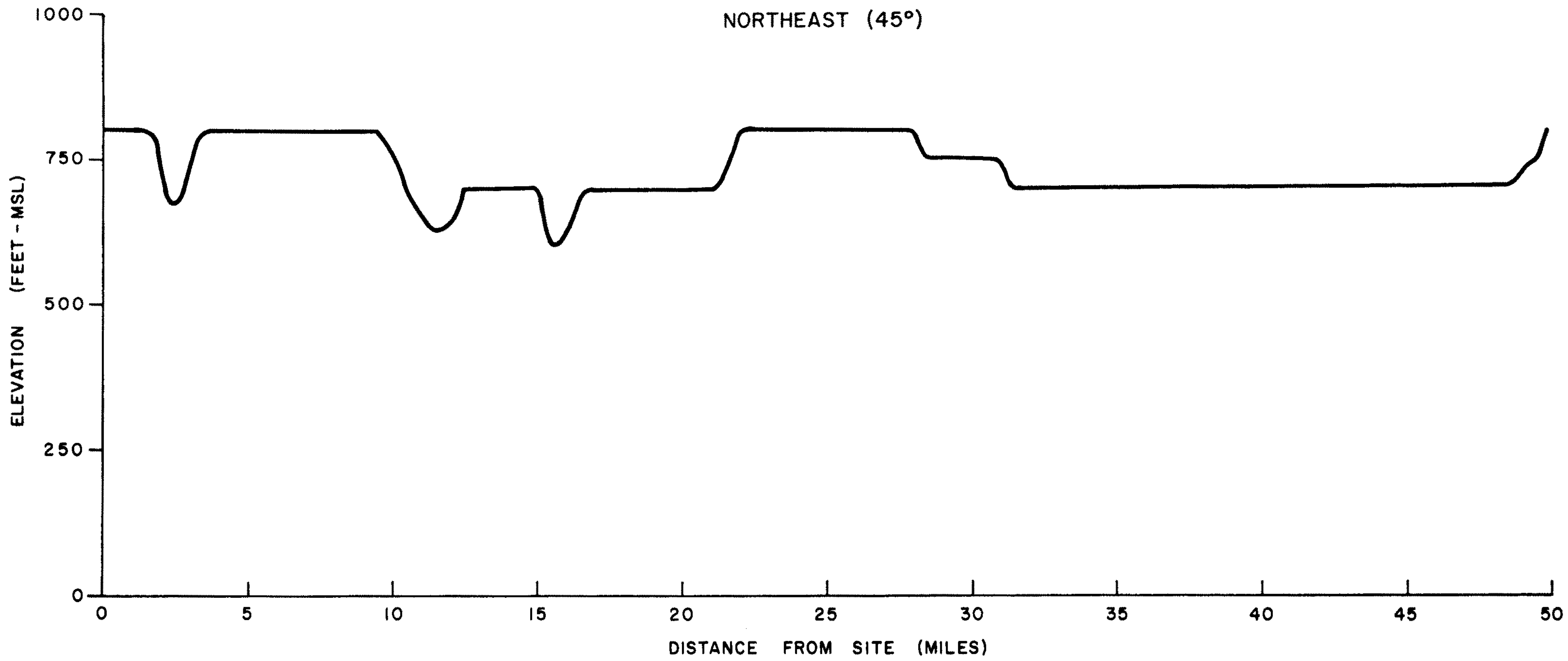
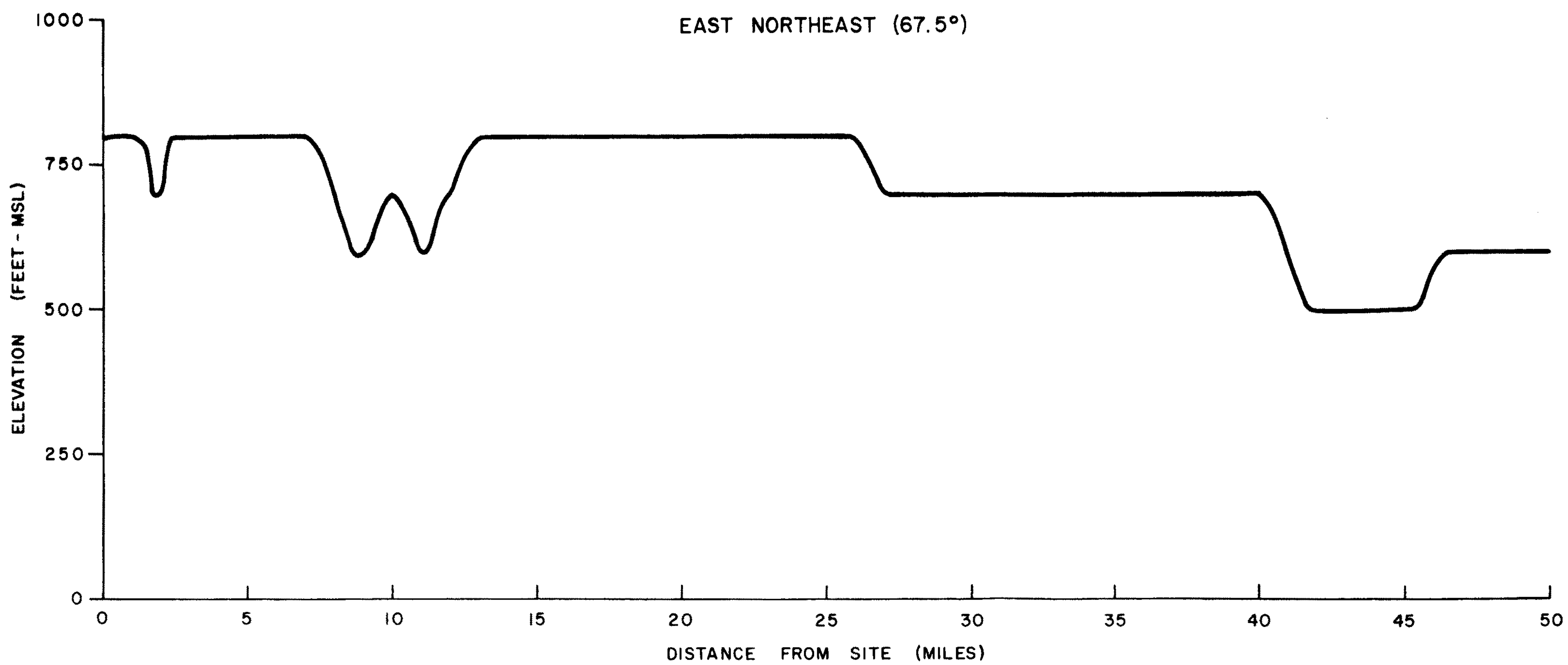
FIGURE 2.3-14

TOPOGRAPHIC CROSS SECTIONS WITHIN A 50 MILE RADIUS OF THE SITE

SHEET 1 OF 8





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UNION ELECTRIC COMPANY
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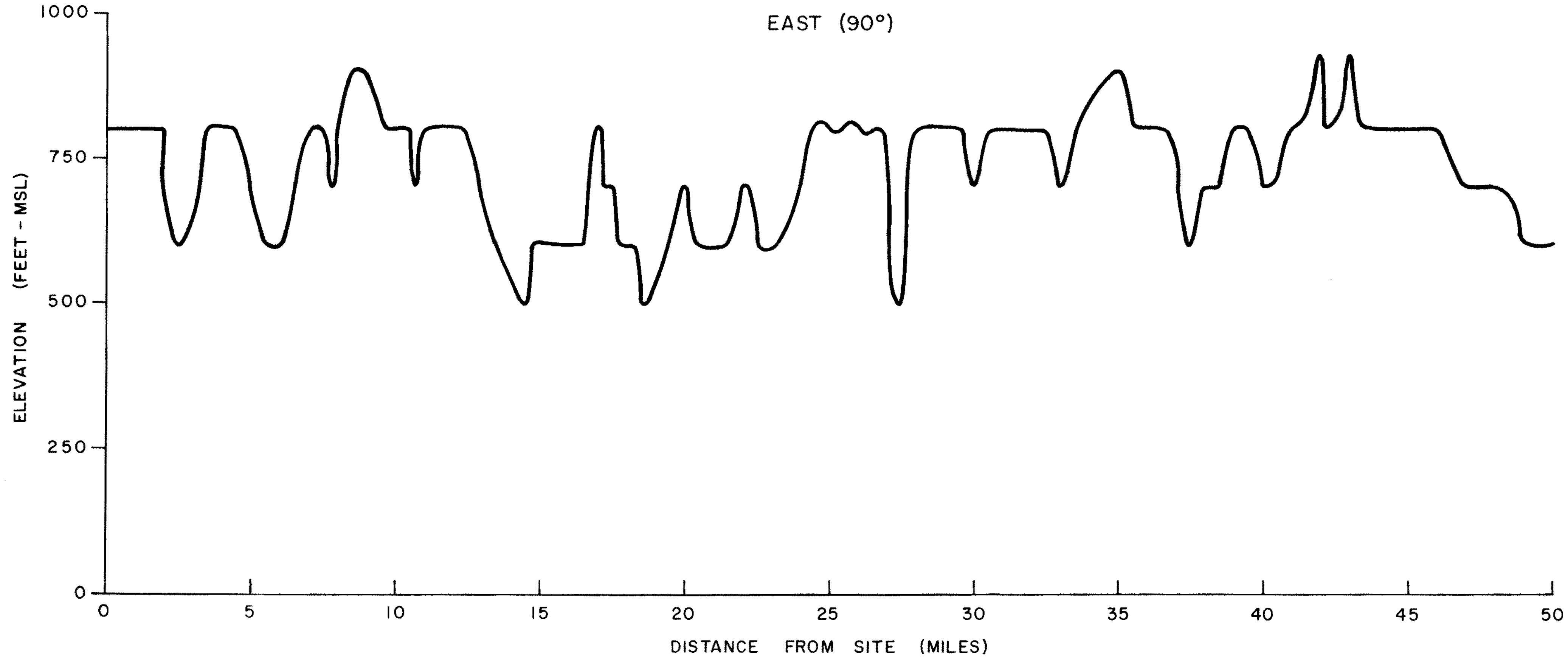
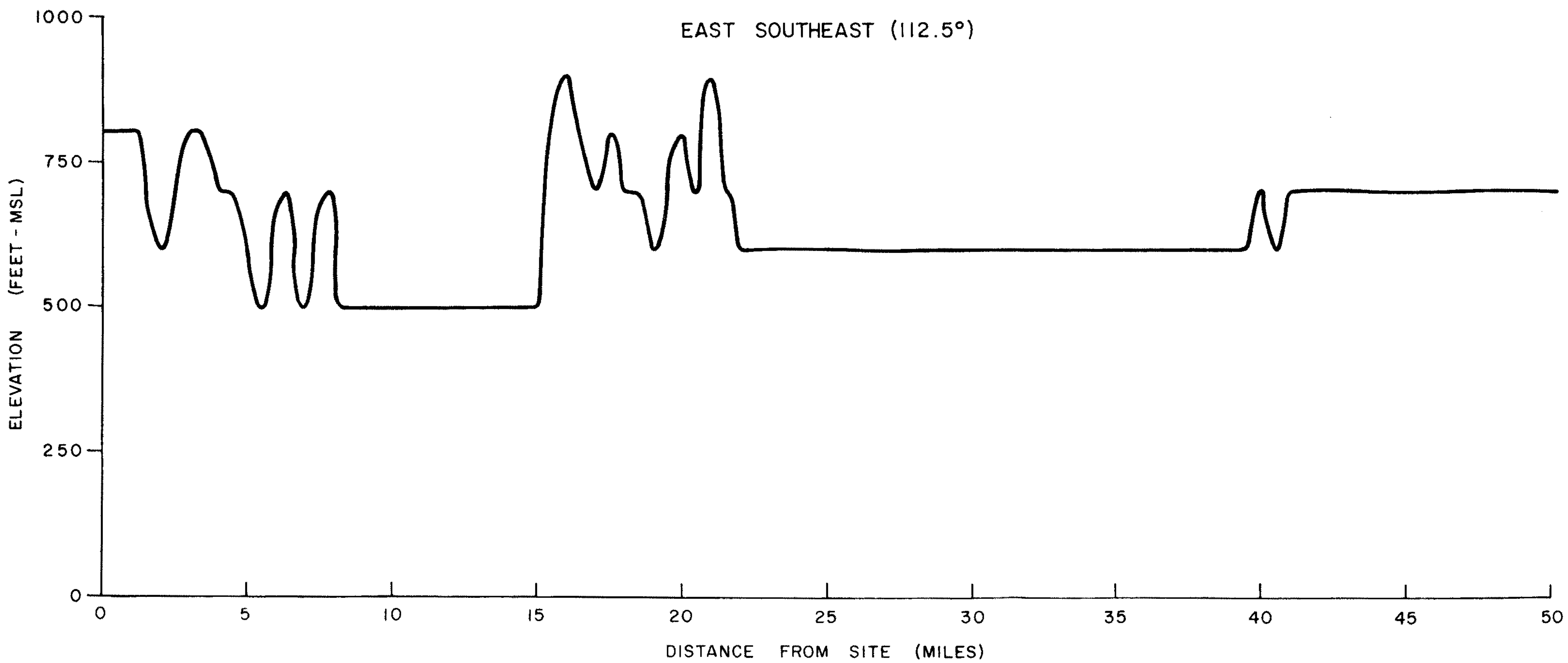
FIGURE 2.3-14

TOPOGRAPHIC CROSS SECTIONS WITHIN A 50 MILE RADIUS OF THE SITE

SHEET 2 OF 8





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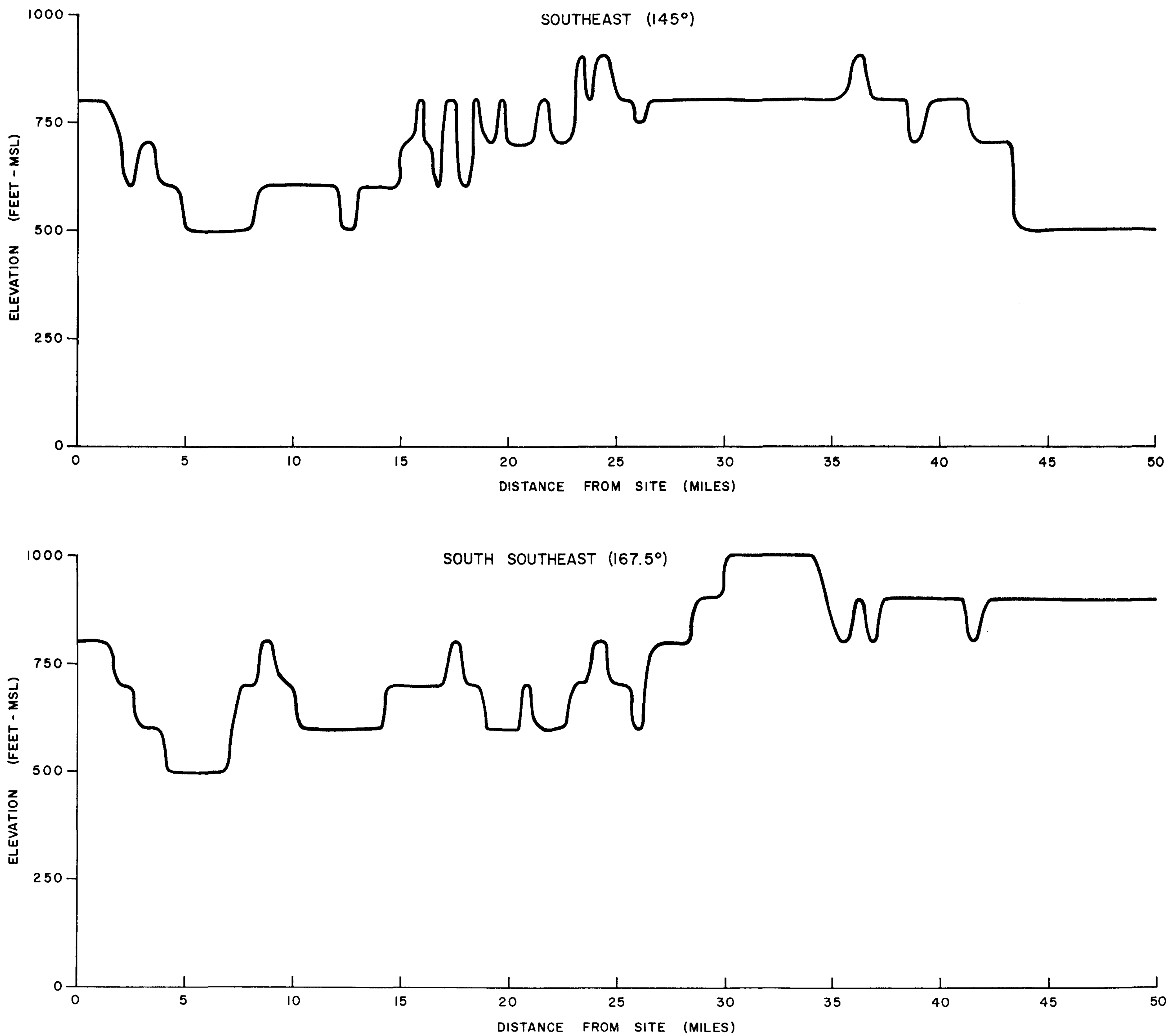
UNION ELECTRIC COMPANY
CALLAWAY PLANT
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.3-14

TOPOGRAPHIC CROSS SECTIONS WITHIN A 50 MILE RADIUS OF THE SITE

SHEET 3 OF 8



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UNION ELECTRIC COMPANY
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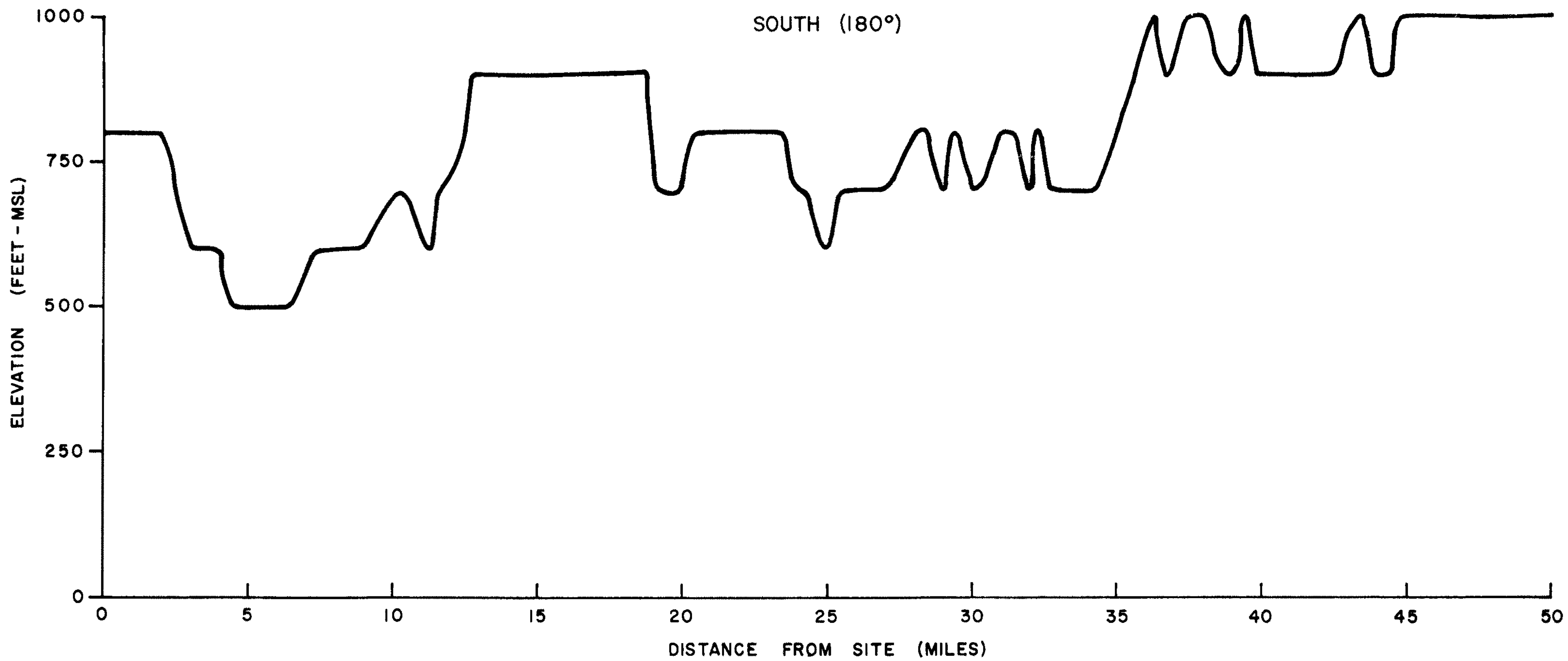
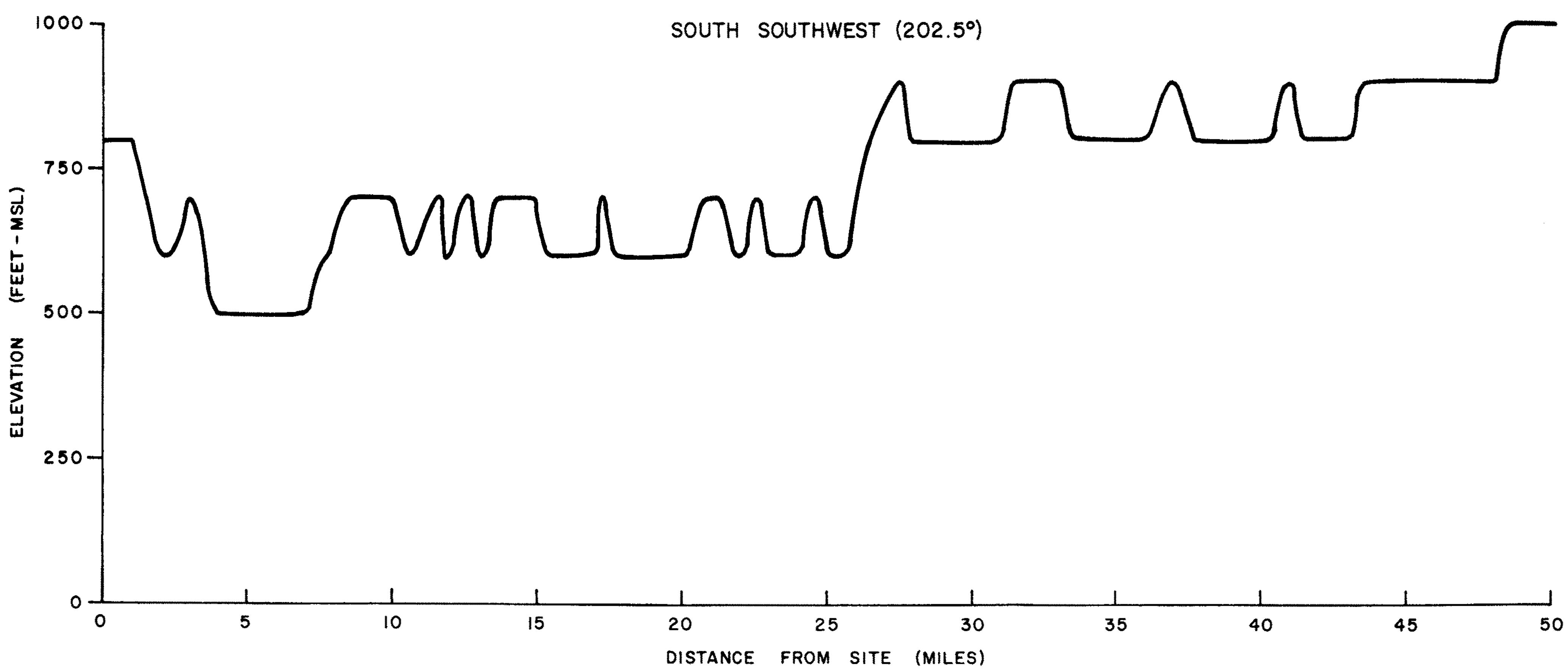
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.3-14

TOPOGRAPHIC CROSS SECTIONS WITHIN A 50 MILE RADIUS OF THE SITE

SHEET 4 OF 8





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UNION ELECTRIC COMPANY
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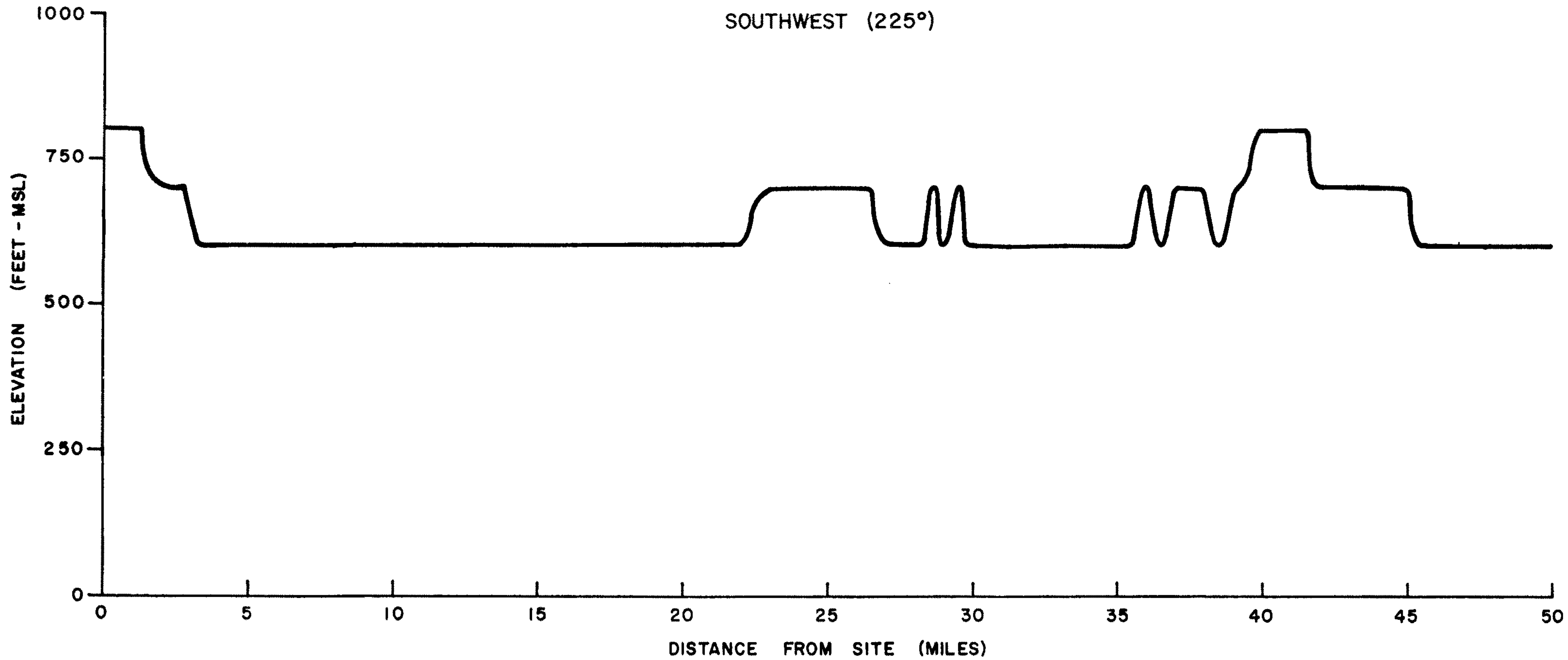
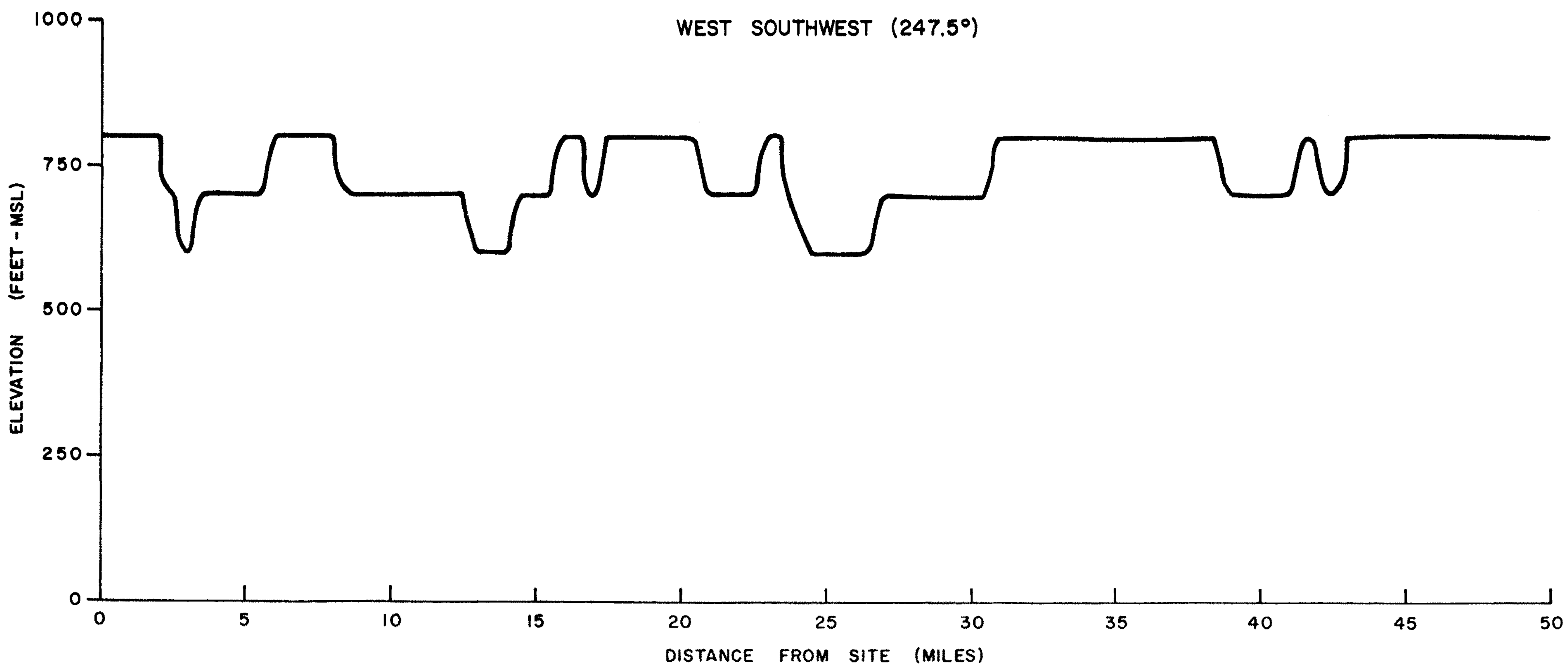
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.3-14

TOPOGRAPHIC CROSS SECTIONS WITHIN A 50 MILE RADIUS OF THE SITE

SHEET 5 OF 8





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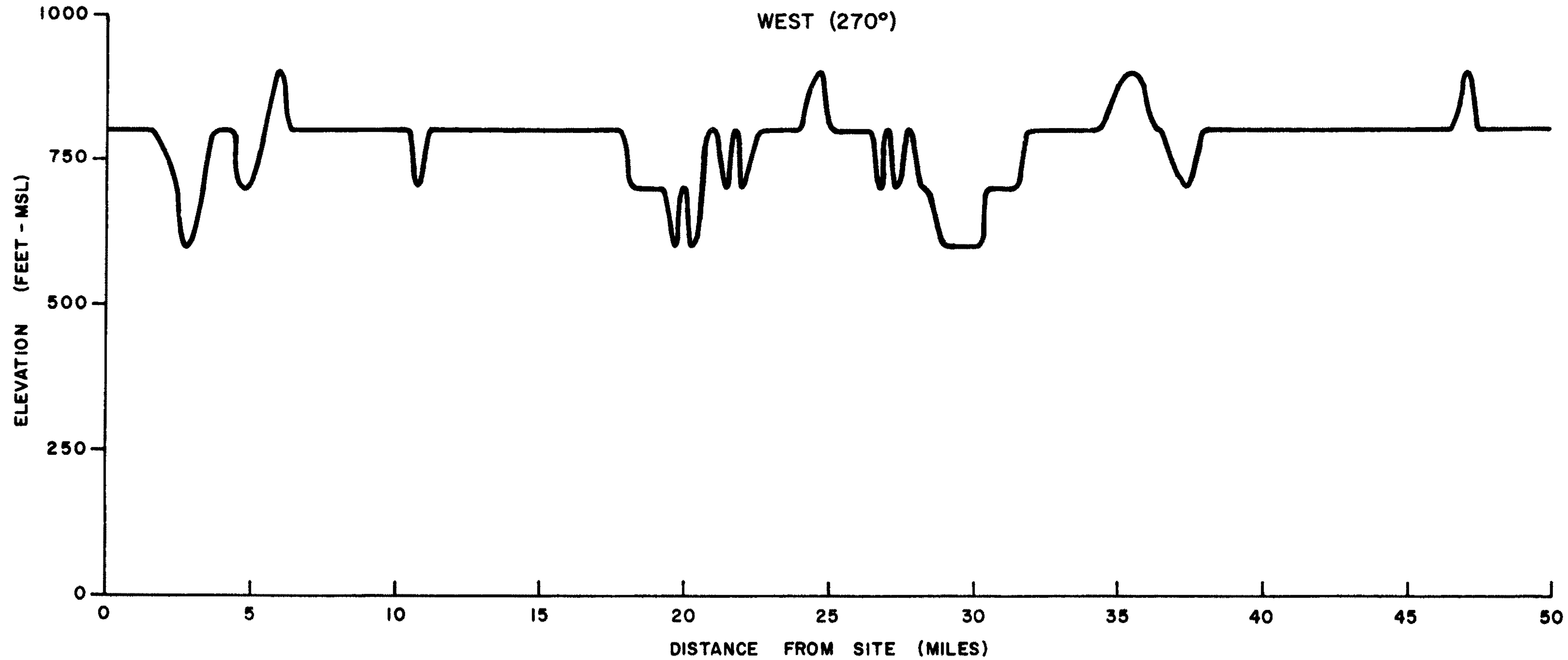
UNION ELECTRIC COMPANY
CALLAWAY PLANT
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.3-14

TOPOGRAPHIC CROSS SECTIONS WITHIN A 50 MILE RADIUS OF THE SITE

SHEET 6 OF 8



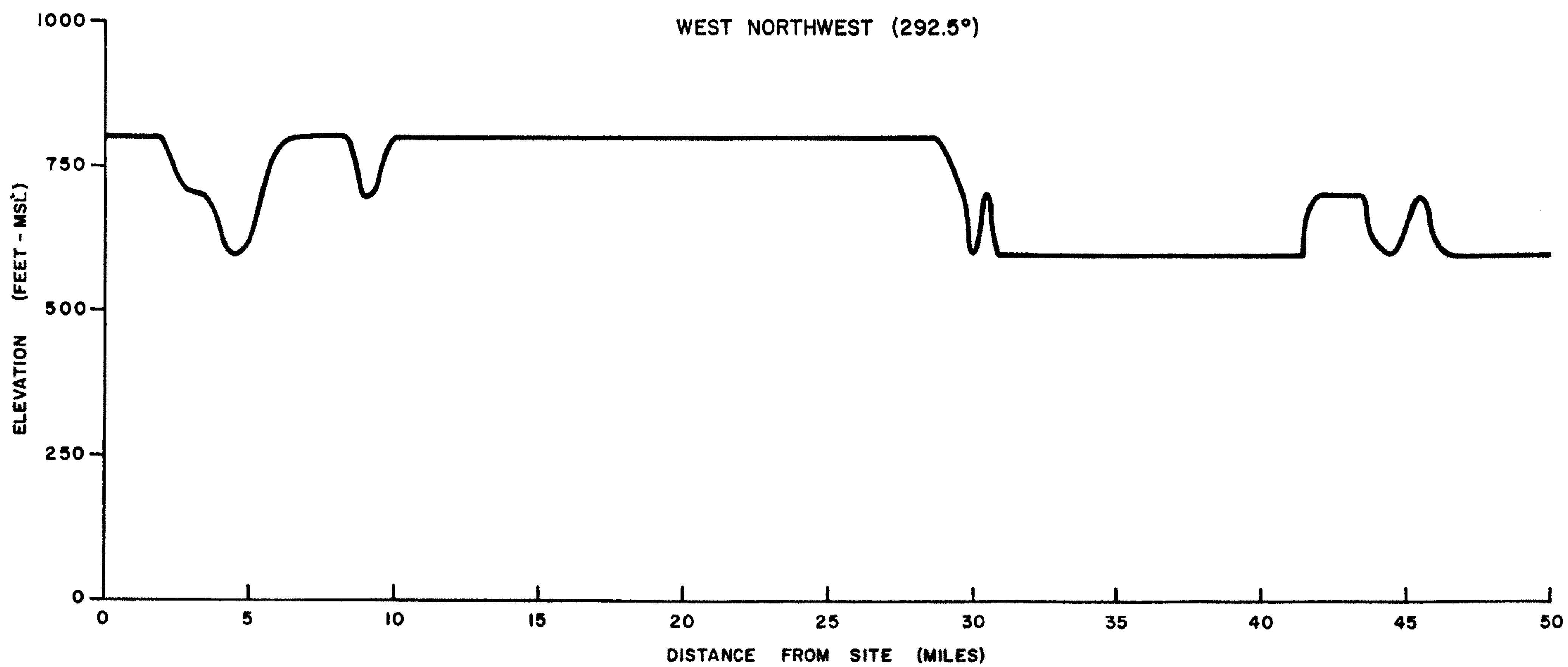


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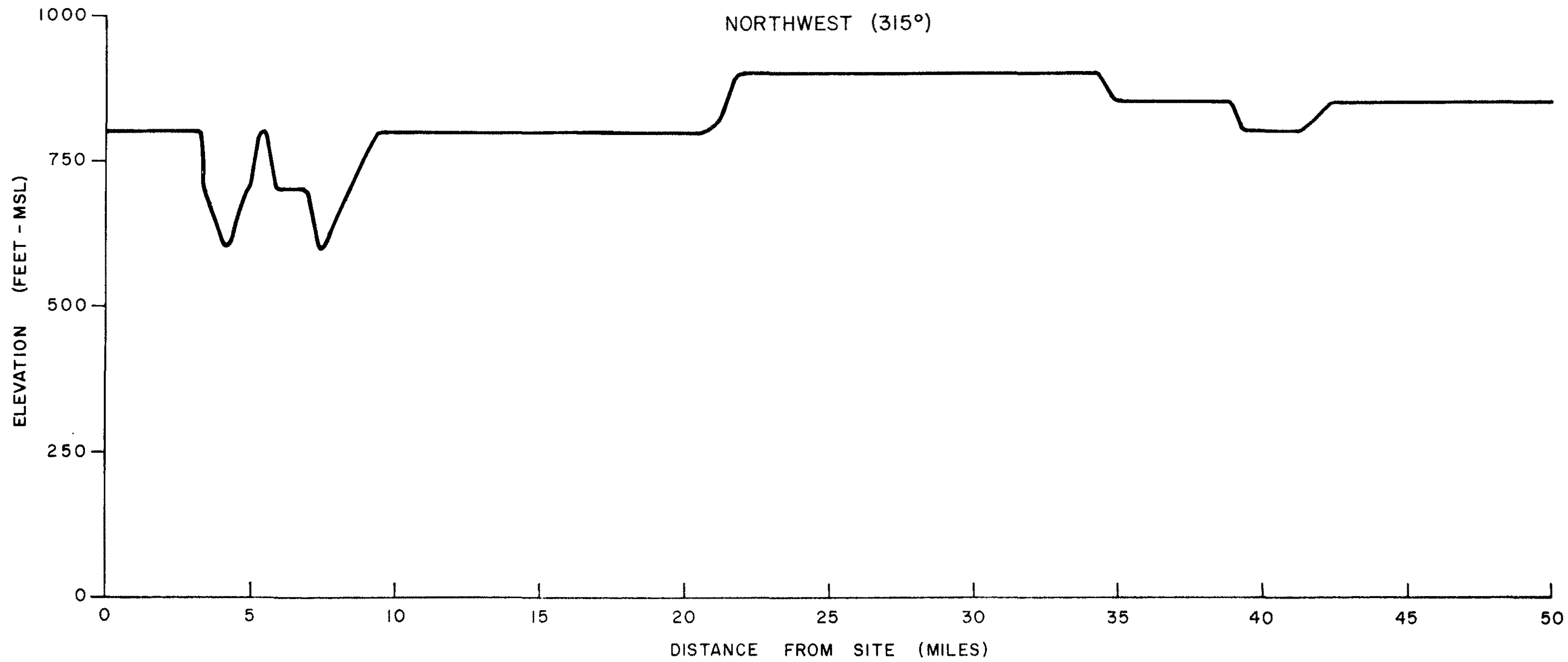
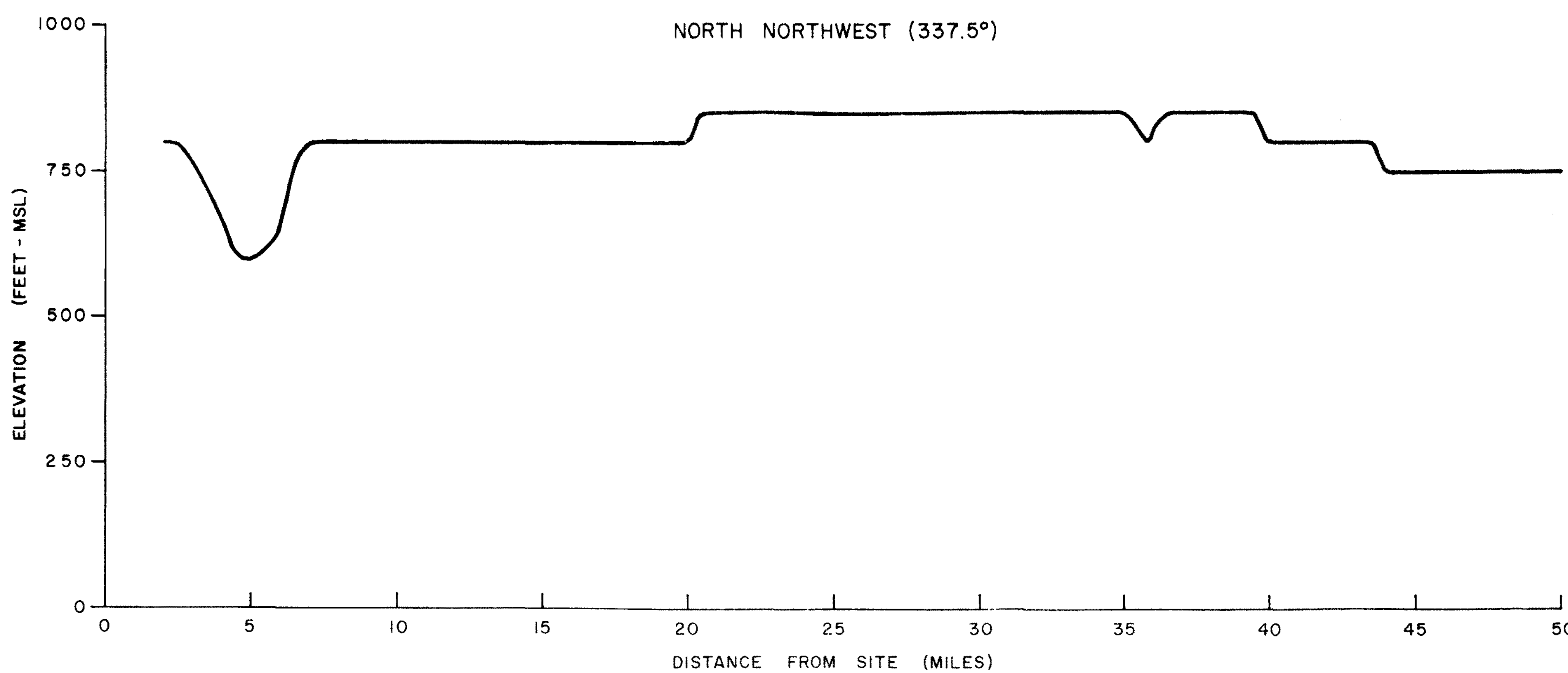
FIGURE 2.3-14

TOPOGRAPHIC CROSS SECTIONS WITHIN A 50 MILE RADIUS OF THE SITE

SHEET 7 OF 8





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UNION ELECTRIC COMPANY
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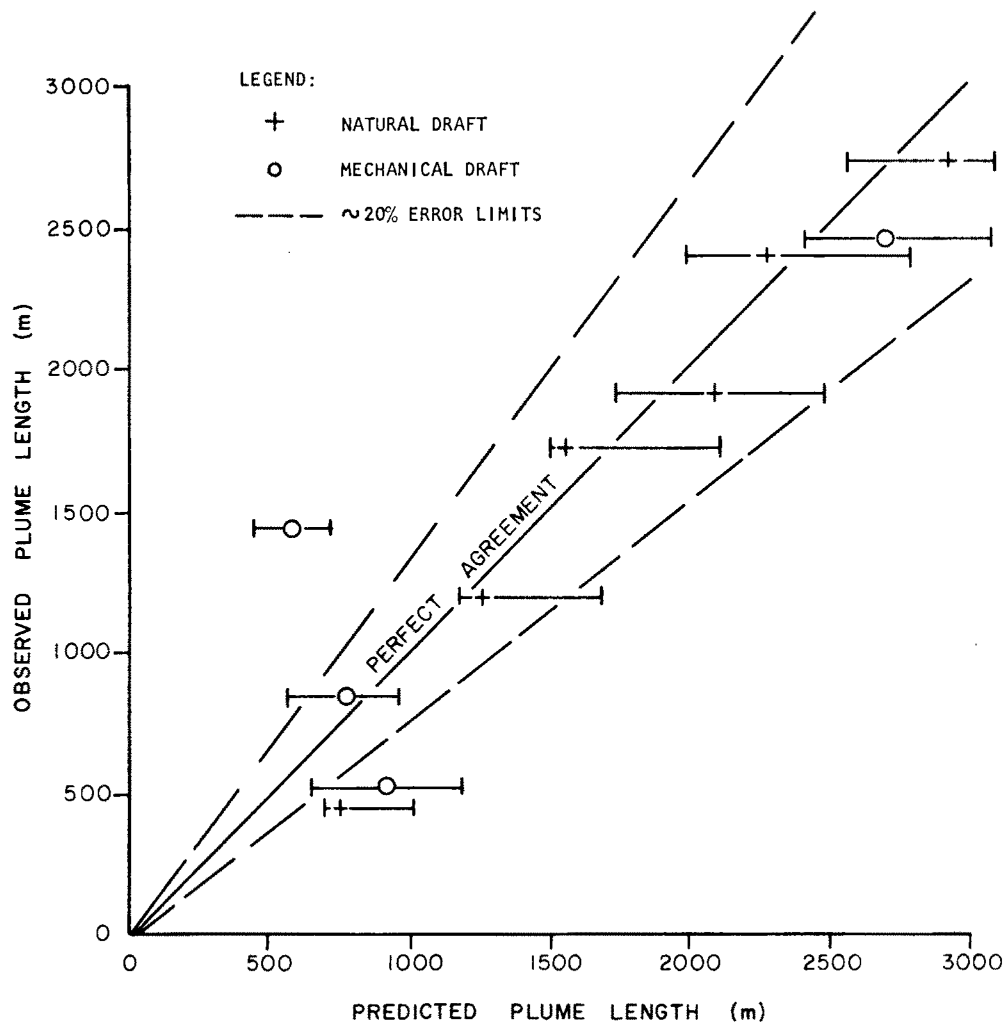
FIGURE 2.3-14

TOPOGRAPHIC CROSS SECTIONS WITHIN A 50 MILE RADIUS OF THE SITE

SHEET 8 OF 8



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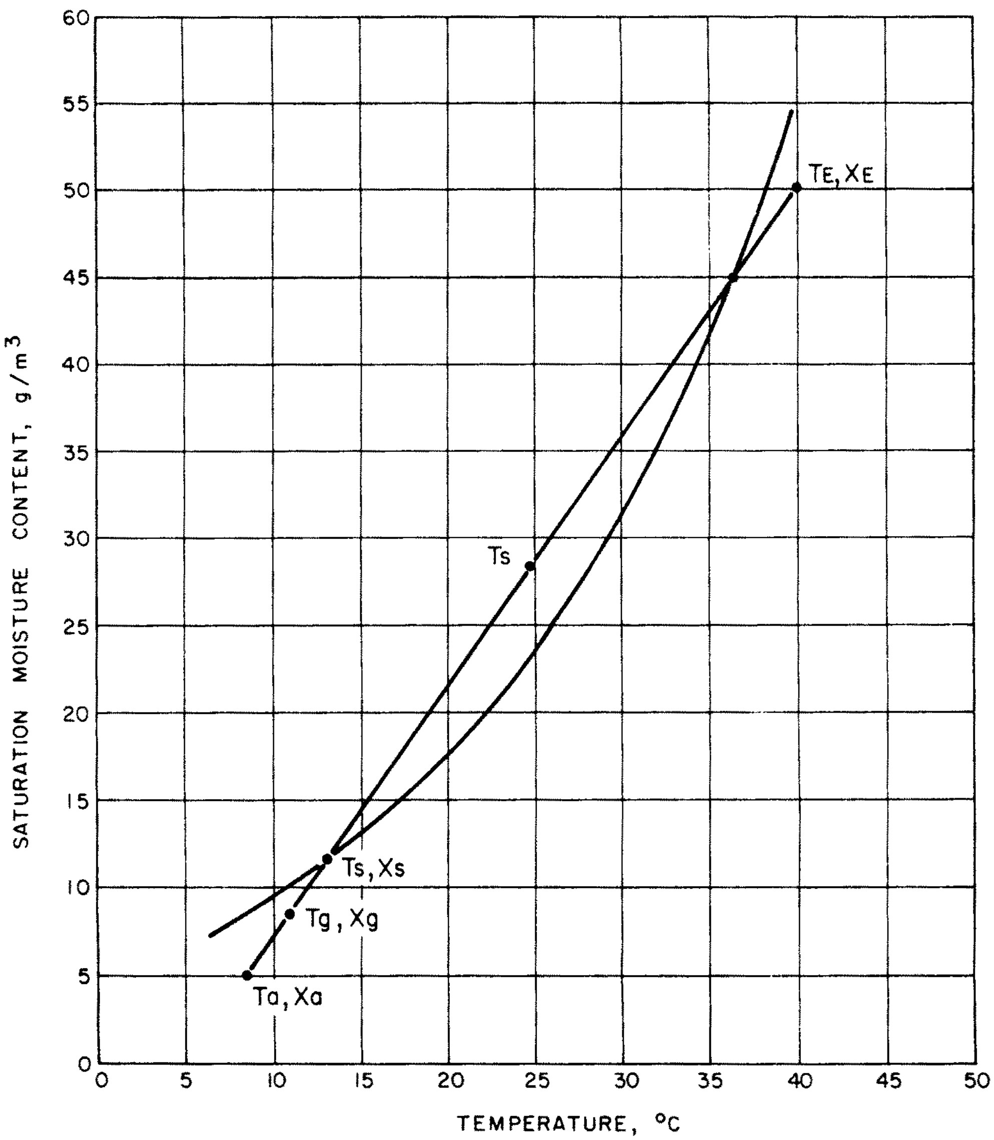
REFERENCE:
TVA PARADISE STEAM PLANT;
PARADISE, KY., WINTER, 1973.

FIGURE 2.3-15
OBSERVED VERSUS PREDICTED
COOLING TOWER VISIBLE PLUME LENGTHS



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REFERENCE:
PSYCHROMETRIC CHART, GENERAL ELECTRIC CO., 1968.

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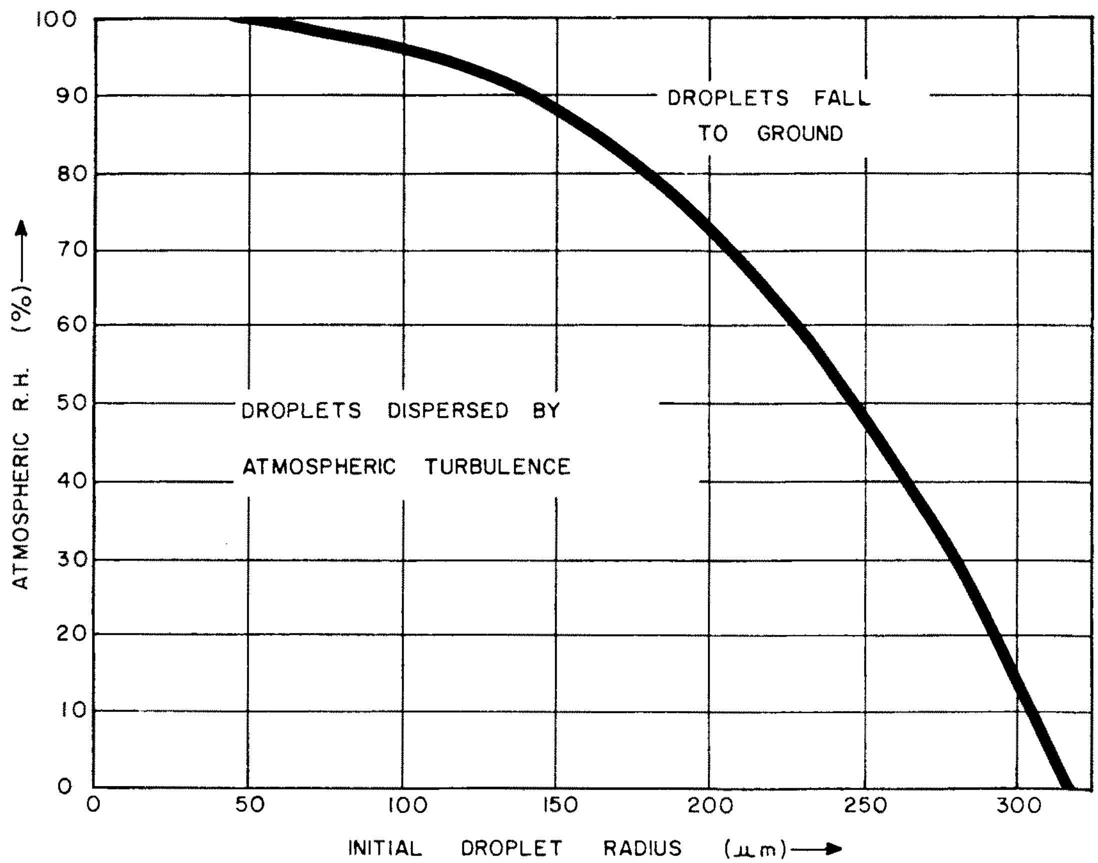
CALLAWAY PLANT
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.3-16

SATURATION MOISTURE CONTENT OF AIR AS A FUNCTION OF TEMPERATURE



REFERENCE:

SLAWSON, P.R., 1976: COOLING TOWER DRIFT DEPOSITION-PROGRAM GUIDE TO ENDRIFT II, ENVIRODYNE LTD. REPORT, APRIL.

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CALLAWAY PLANT
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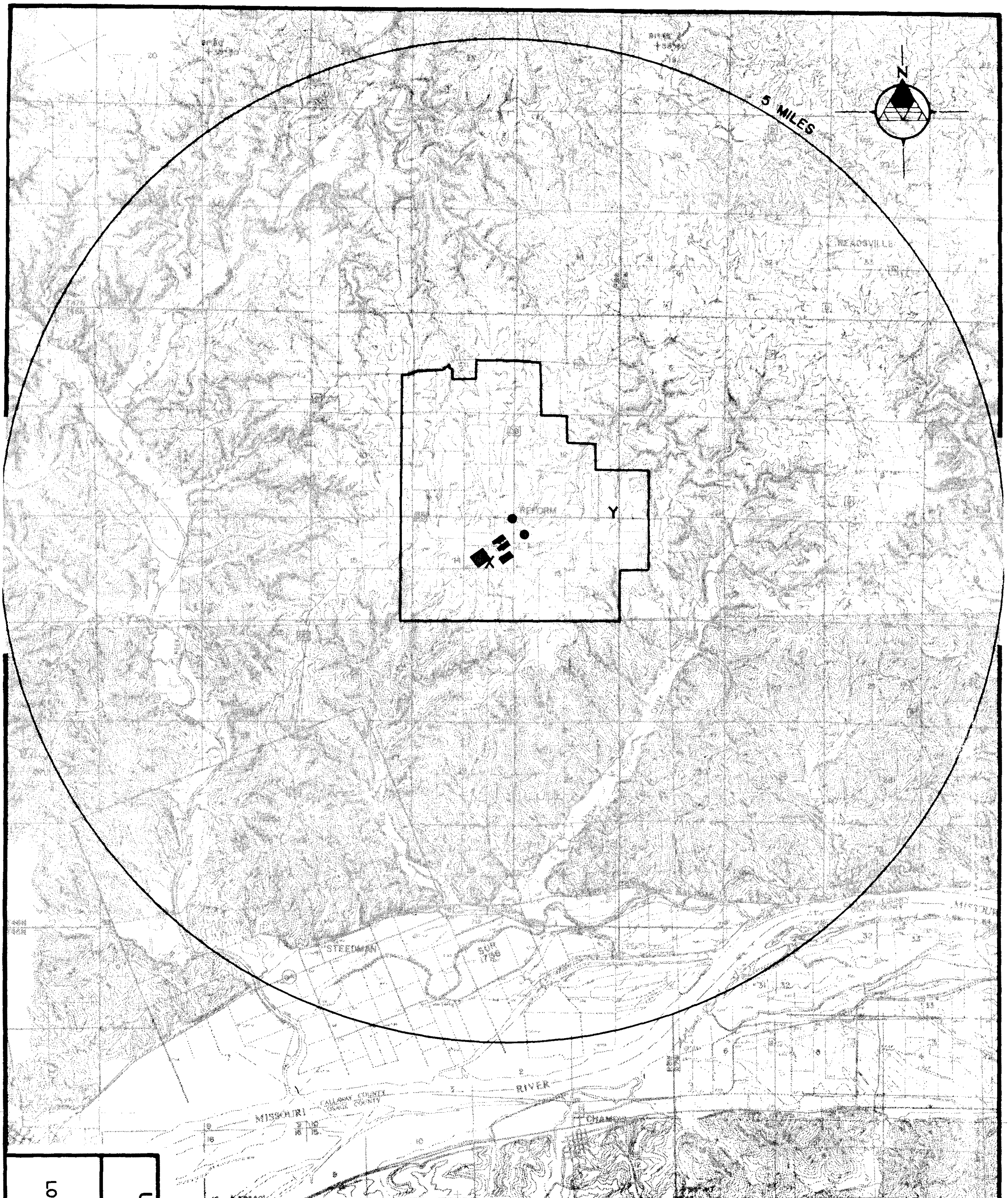
FIGURE 2.3-17
DRIFT DROPLET DISPERSION
VERSUS
RELATIVE HUMIDITY



EXPLANATION

X MECHANICAL WEATHER STATION, SITE C-5 REFORM, MISSOURI
ELEVATION 852 FEET ABOVE M.S.L.

Y PERMANENT METEOROLOGICAL TOWER
ELEVATION 824 FEET ABOVE M.S.L.

● NATURAL DRAFT COOLING TOWER

■ PLANT STRUCTURE

5000 0 5000
FEET

NOTE: Unit 2 was cancelled in 1981.

MAP REFERENCE:
TOPOGRAPHY BASED ON PORTIONS OF U.S.G.S. 7.5 MIN.
TOPOGRAPHIC MAP ADVANCE PRINTS:
FULTON SE, MISSOURI QUADRANGLE
MONTGOMERY CITY SW, MISSOURI QUADRANGLE
MOKANE NE, MISSOURI QUADRANGLE
MORRISON NW, MISSOURI QUADRANGLE
SECTION LINES SHOWN ARE APPROXIMATE

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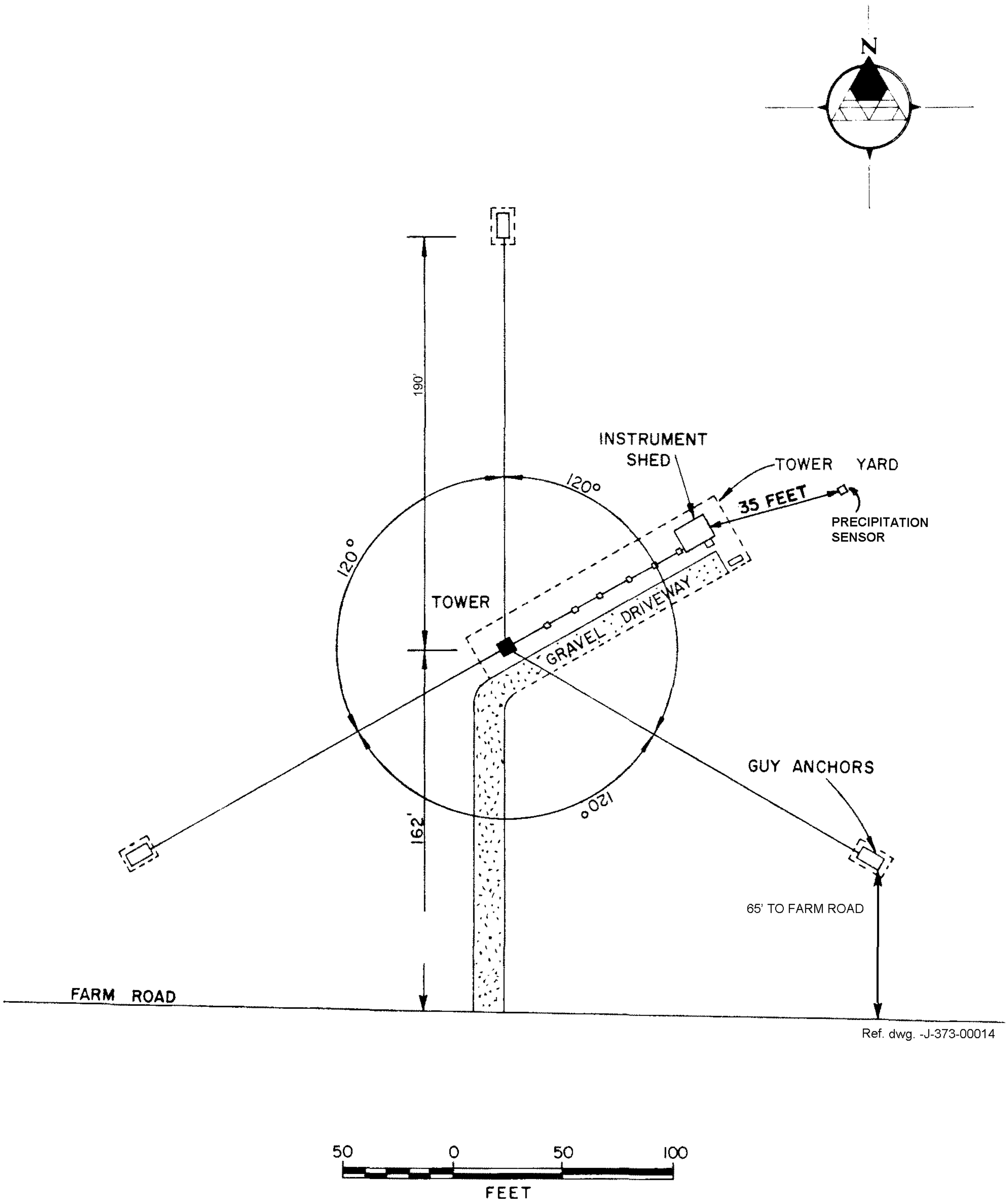
FIGURE 2.3-18
LOCATIONS OF TOWER, MECHANICAL
WEATHER STATION AND PLANT



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CALLAWAY PLANT
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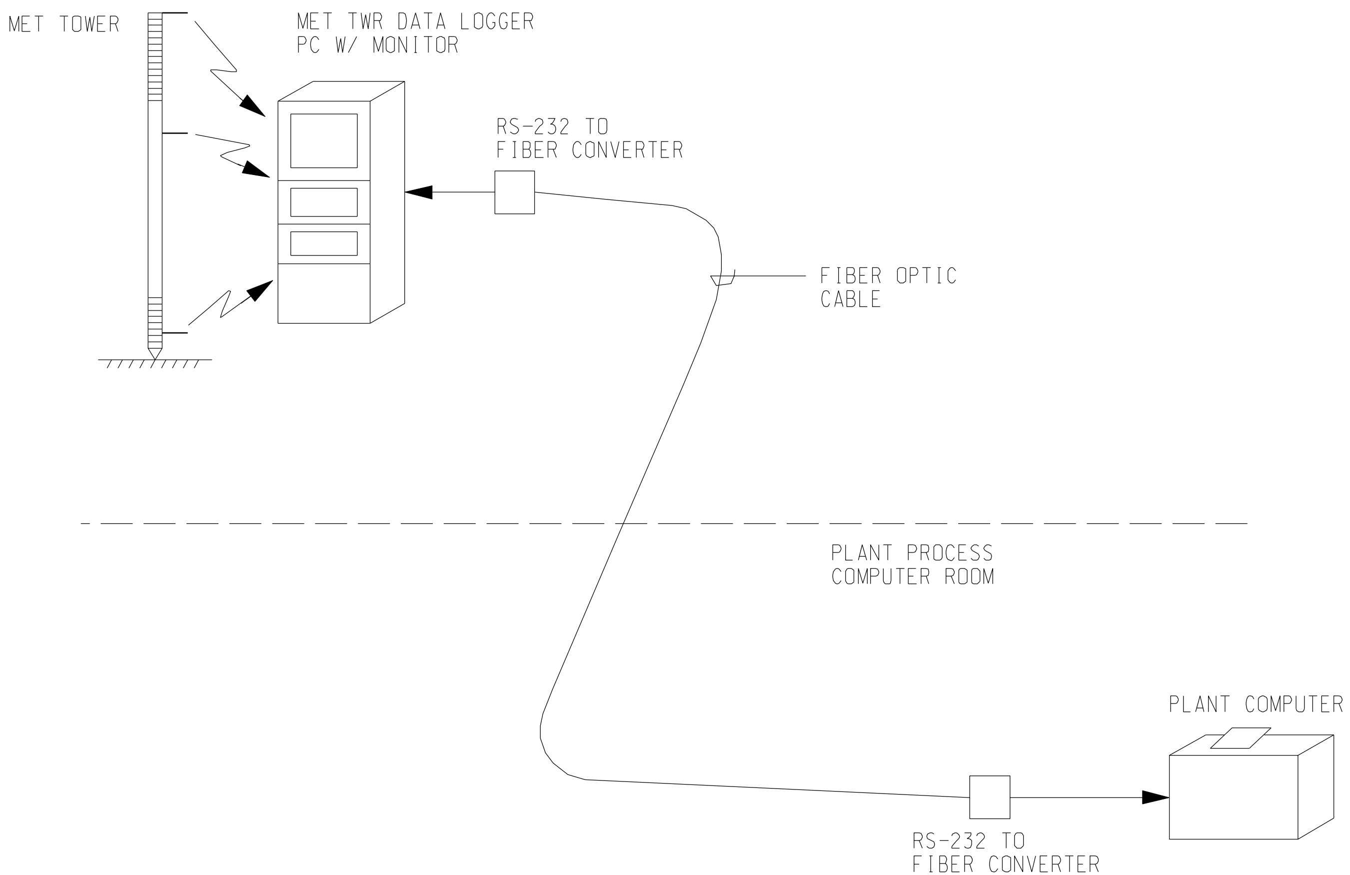
FIGURE 2.3-19

PLOT PLAN OF PERMANENT
METEOROLOGY TOWER FACILITY

REV. 1 1/09



REF. DWGS:
J-373-00029
J-373-00030

UNION ELECTRIC COMPANY
CALLAWAY ENERGY CENTER
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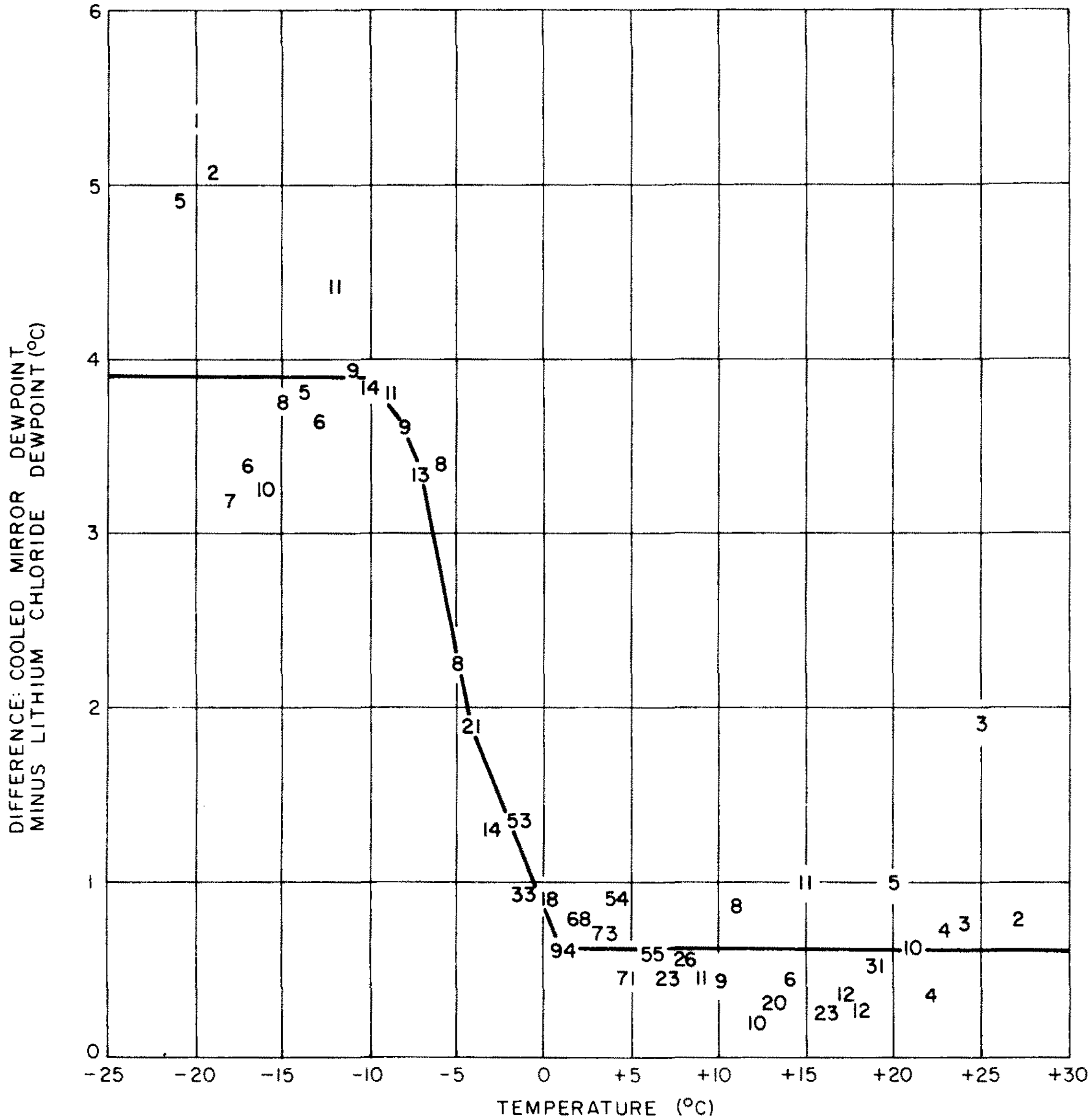
FIGURE 2.3-20
SYSTEMATIC DIAGRAM OF
DATA PROCESSING
REV. OL-23 6/18



NOTES:

1. BASED ON HOURLY ONSITE DATA 12/22/78 THRU 4/23/79.
2. NUMBERS REPRESENT OBSERVATION PER 1°C TEMPERATURE CLASS.
3. CURVE IS EYE FITTED BETWEEN -10° AND 0°, CONSTANT = 3.9°C BELOW -10° AND CONSTANT = 0.65°C ABOVE 0°.

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FIGURE 2.3-21

TEMPERATURE VERSUS DIFFERENCE BETWEEN COOLED MIRROR AND LITHUM CHLORIDE DEWPOINTS

SCALE IN FEET

5000 0 5000

MAP REFERENCE:
TOPOGRAPHY BASED ON PORTIONS OF U.S.C.S. 7.5 MIN.
TOPOGRAPHIC MAP ADVANCE PRINTS:
FULTON SE, MISSOURI QUADRANGLE
MONTGOMERY CITY SW, MISSOURI QUADRANGLE
MOKANE NE, MISSOURI QUADRANGLE
MORRISON NW, MISSOURI QUADRANGLE
SECTION LINES SHOWN ARE APPROXIMATE

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FIGURE 2.4-1
INDEX MAP SHOWING LOCATIONS
OF TOPOGRAPHIC PROFILES
ON FIGURE 2.4-2

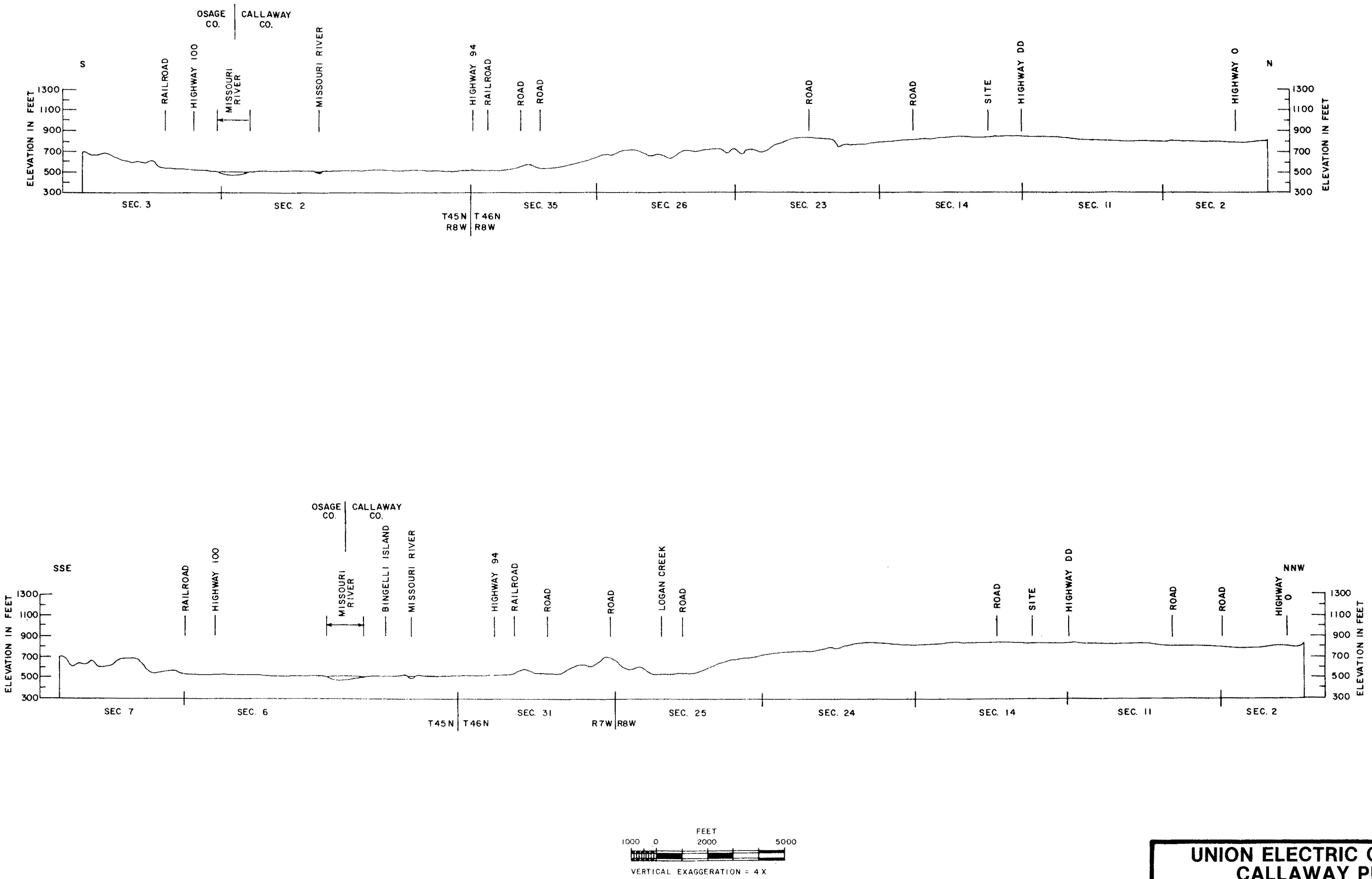

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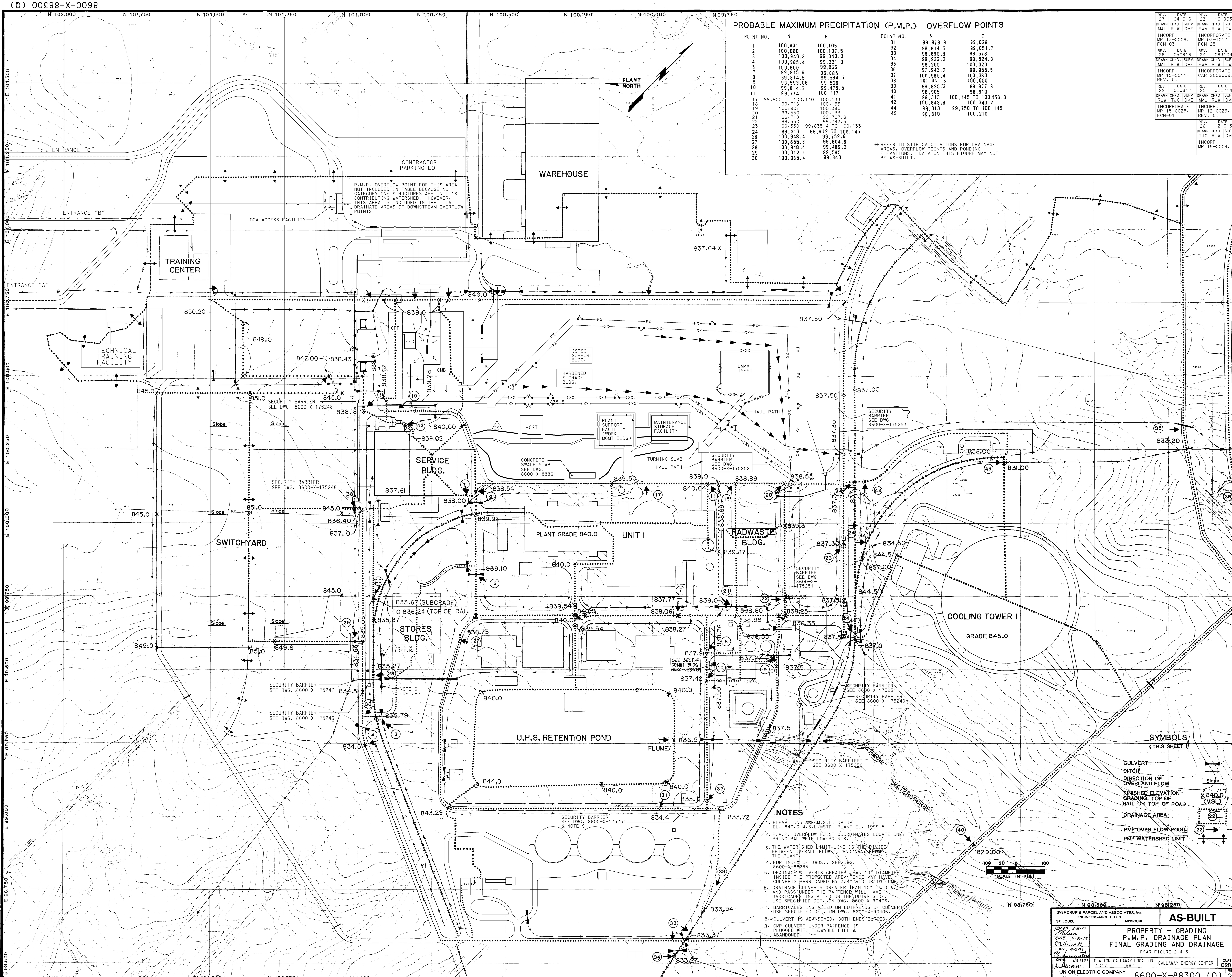
FIGURE 2.4-2
TOPOGRAPHIC PROFILES SHOWING RELATIONSHIP BETWEEN PLANT SITE AND MISSOURI RIVER VALLEY



PROBABLE MAXIMUM PRECIPITATION (P.M.P.) OVERFLOW POINTS

POINT NO.	N	E
1	100,631	100,106
2	100,600	100,107.5
3	100,940.3	99,340.0
4	100,985.4	99,331.9
5	100,600	99,826
7	99,915.6	99,685
8	99,814.5	99,564.5
9	99,593.08	99,528
10	99,814.5	99,475.5
11	99,774	100,117
17	99,900 TO 100,140	100,133
18	99,718	100,133
19	100,907	100,380
20	99,550	100,133
21	99,718	99,707.9
22	99,550	99,742.5
23	99,350	99,835.4 TO 100.133
24	99,313	96,612 TO 100,145
26	100,948.4	99,752.6
27	100,655.3	99,604.6
28	100,948.4	99,486.2
29	100,012.1	99,595
30	100,985.4	99,340
31	99,973.9	99,028
32	99,814.5	99,051.7
33	98,890.9	98,578
34	99,926.2	98,524.3
35	98,200	100,320
36	97,943.2	99,955.5
37	100,985.4	100,380
38	101,011.6	100,050
39	99,825.3	98,677.8
40	98,905	98,910
41	99,313	100,145 TO 100,456.3
42	100,843.6	100,340.2
44	99,313	99,750 TO 100,145
45	98,810	100,210

✳ REFER TO SITE CALCULATIONS FOR DRAINAGE AREAS, OVERFLOW POINTS AND PONDING ELEVATIONS. DATA ON THIS FIGURE MAY NOT BE AS-BUILT.

REV.	DATE	DRAWN	CHKD.	SUPV.	DESCRIPTION
27	041016	MAL	RLW	DME	INCORP. MP 13-0009, FCN-03.
23	101905	EWM	RLW	TWS	INCORPORATE MP 03-1017 FCN 25
28	050816	MAL	RLW	DME	INCORP. MP 15-0011, REV. 0.
24	083109	EWM	RLW	TWS	INCORPORATE CAR 200900939
29	020817	RLW	TJC	DME	INCORPORATE MP 15-0028, FCN-01
25	022714	MAL	RLW	DME	INCORP. MP 12-0023, REV. 0.
26	121615	TJC	RLW	DME	INCORP. MP 15-0004.

NOTES

1. ELEVATIONS ARE M.S.L. DATUM EL. 840.0 M.S.L.=STD. PLANT EL. 1999.5
2. P.M.P. OVERFLOW POINT COORDINATES LOCATE ONLY PRINCIPAL WEIR LOW POINTS.
3. THE WATER SHED LIMIT LINE IS THE DIVIDE BETWEEN OVERALL FLOW TO AND AWAY FROM THE PLANT.
4. FOR INDEX OF DWGS., SEE DWG. 8600-X-88285
5. DRAINAGE CULVERTS GREATER THAN 10" DIAMETER INSIDE THE PROTECTED AREA FENCE MAY HAVE CULVERTS BARRICADED BY 3/4" ROD OR 10" CMP'S.
6. DRAINAGE CULVERTS GREATER THAN 10" IN DIA. AND PASS UNDER THE PA FENCE WILL HAVE BARRICADES INSTALLED ON THE OUTER SIDE. USE SPECIFIED DET. ON DWG. 8600-X-90406.
7. BARRICADES INSTALLED ON BOTH ENDS OF CULVERT USE SPECIFIED DET. ON DWG. 8600-X-90406.
8. CULVERT IS ABANDONED, BOTH ENDS BURIED.
9. CMP CULVERT UNDER PA FENCE IS PLUGGED WITH FLOWABLE FILL & ABANDONED.

SVERDRUP & PARCEL AND ASSOCIATES, Inc.
ENGINEERS-ARCHITECTS
ST. LOUIS, MISSOURI

AS-BUILT

DRAWN 4-8-77 P. Nelson
CHKD. 4-8-77 CA Hewett
SUPV. 4-8-77 P.J. Sprengnether
APPD. 4-13-77 [signature]

PROPERTY - GRADING
P.M.P. DRAINAGE PLAN
FINAL GRADING AND DRAINAGE
FSAR FIGURE 2.4-3

LOCATION 1017 | CALLAWAY LOCATION 982 | CALLAWAY ENERGY CENTER | CLASS 02010

UNION ELECTRIC COMPANY
ST. LOUIS, MO.

8600-X-88300 (Q) REV. 29

4645 76C49

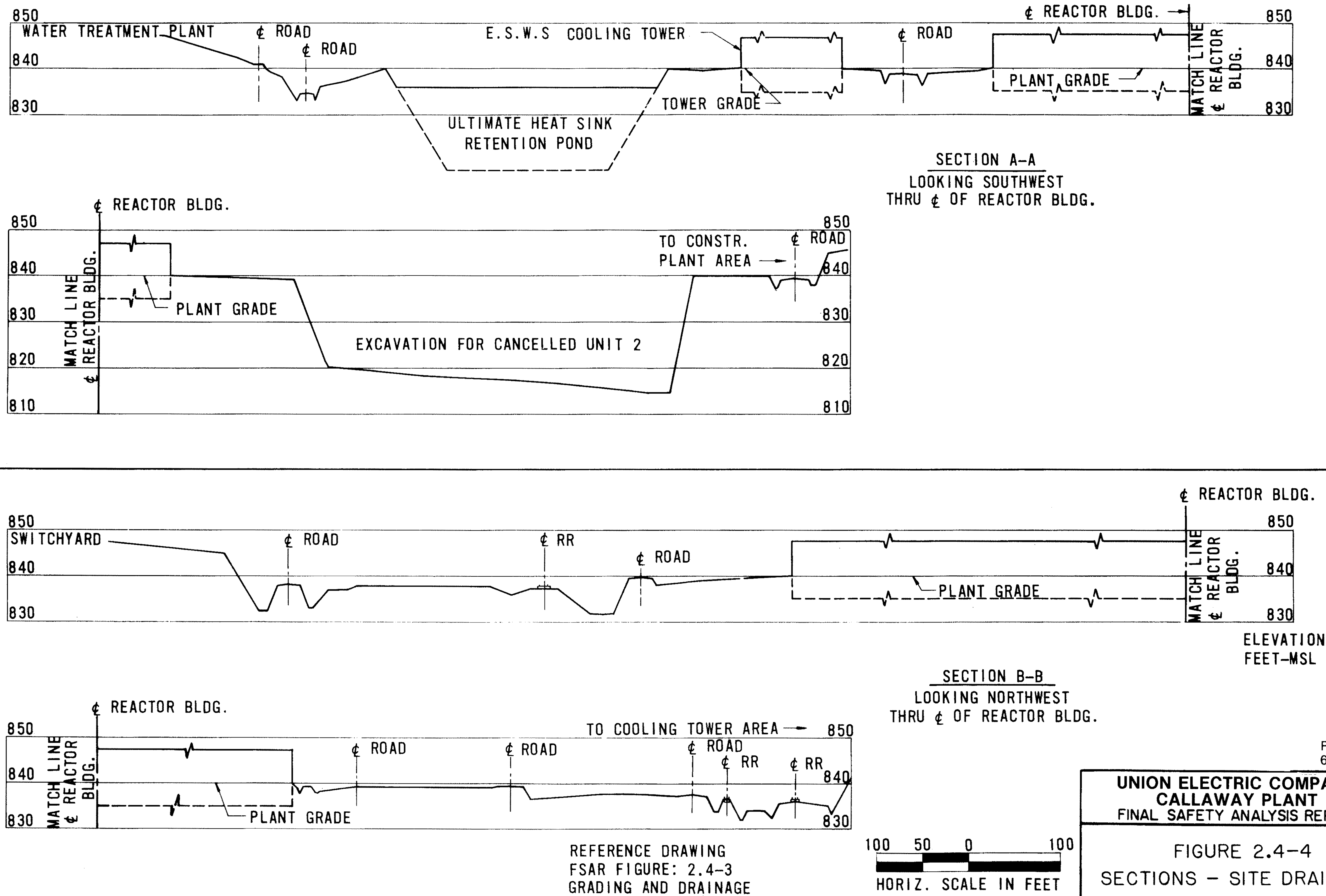


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FIGURE 2.4-4
SECTIONS - SITE DRAINAGE

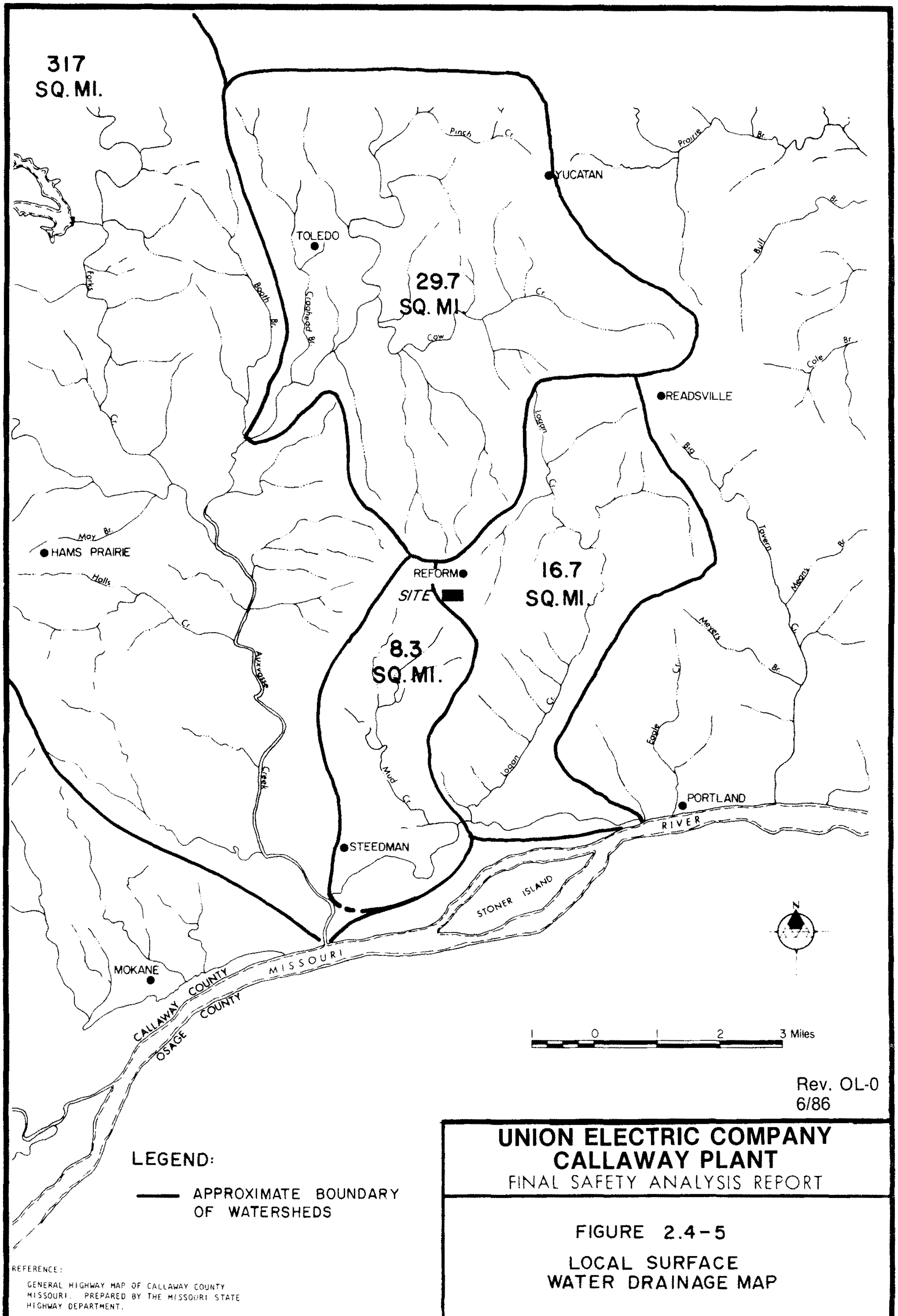

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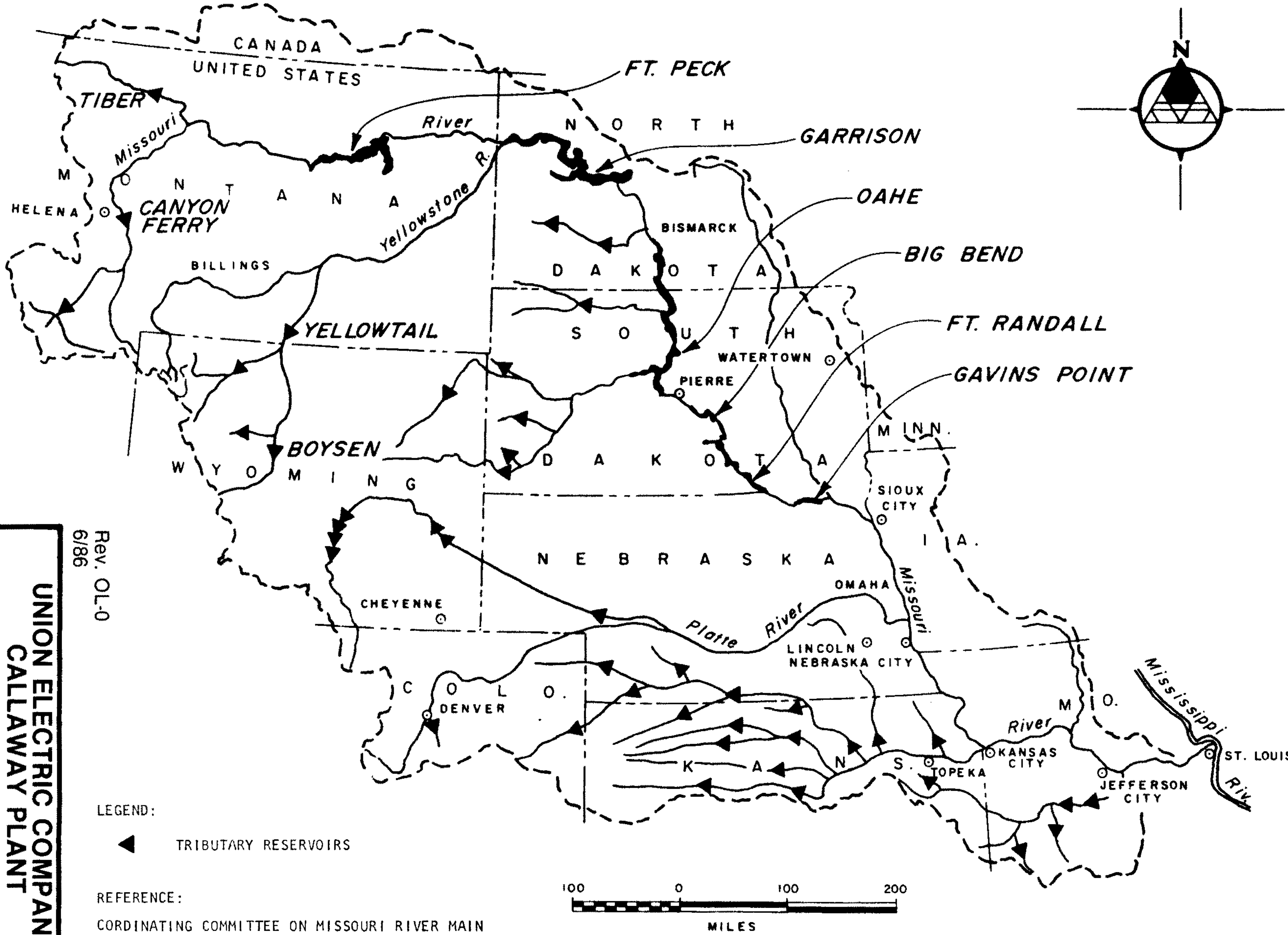
FIGURE 2.4-5

LOCAL SURFACE
WATER DRAINAGE MAP



LEGEND:

◄ TRIBUTARY RESERVOIRS

REFERENCE:

CORDINATING COMMITTEE ON MISSOURI RIVER MAIN STEM RESERVOIR OPERATIONS, 1973; MISSOURI RIVER MAIN STEM RESERVOIRS 1973-1974 ANNUAL OPERATING PLAN.

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FIGURE 2.4-6
MISSOURI RIVER BASIN

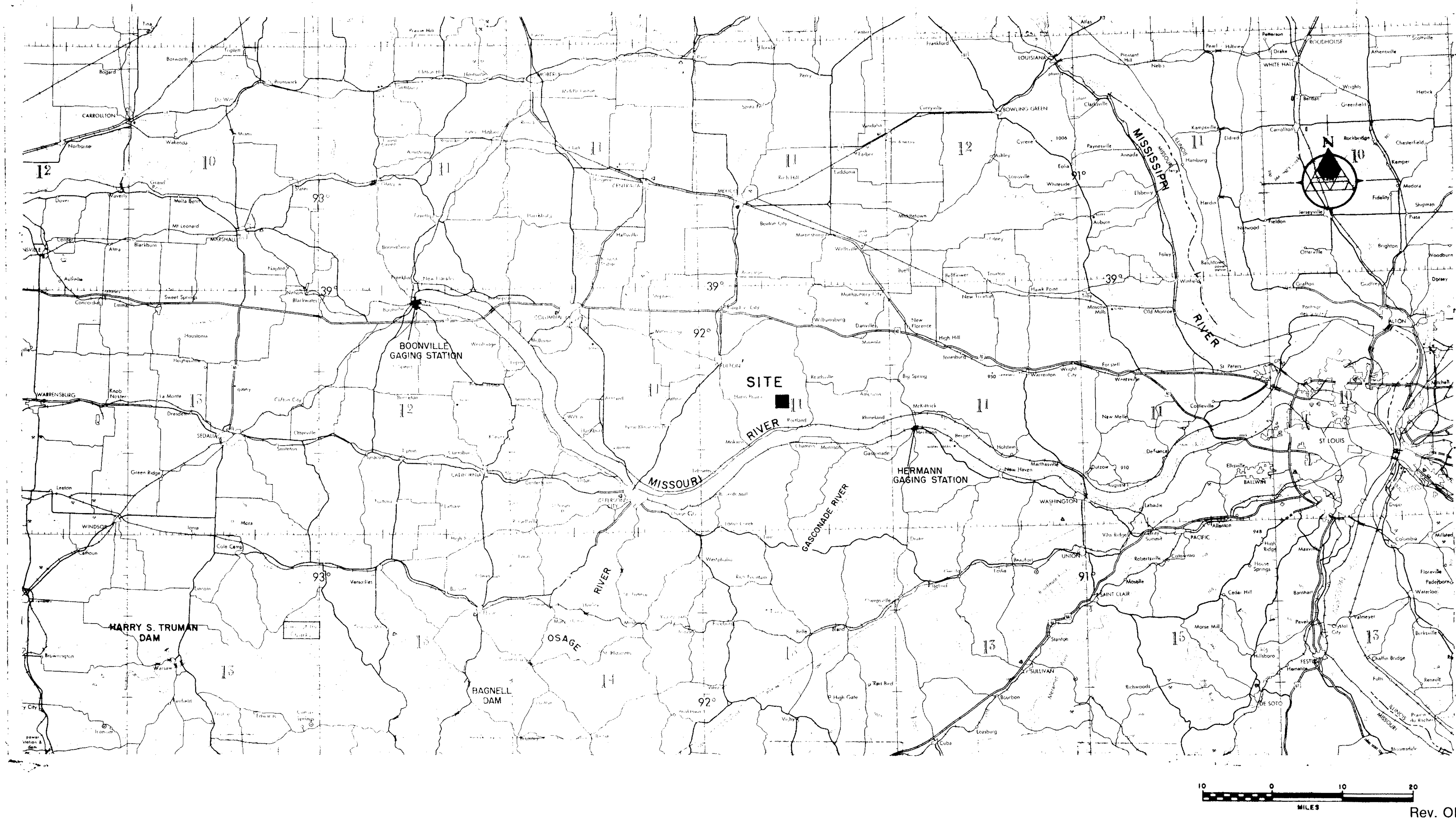

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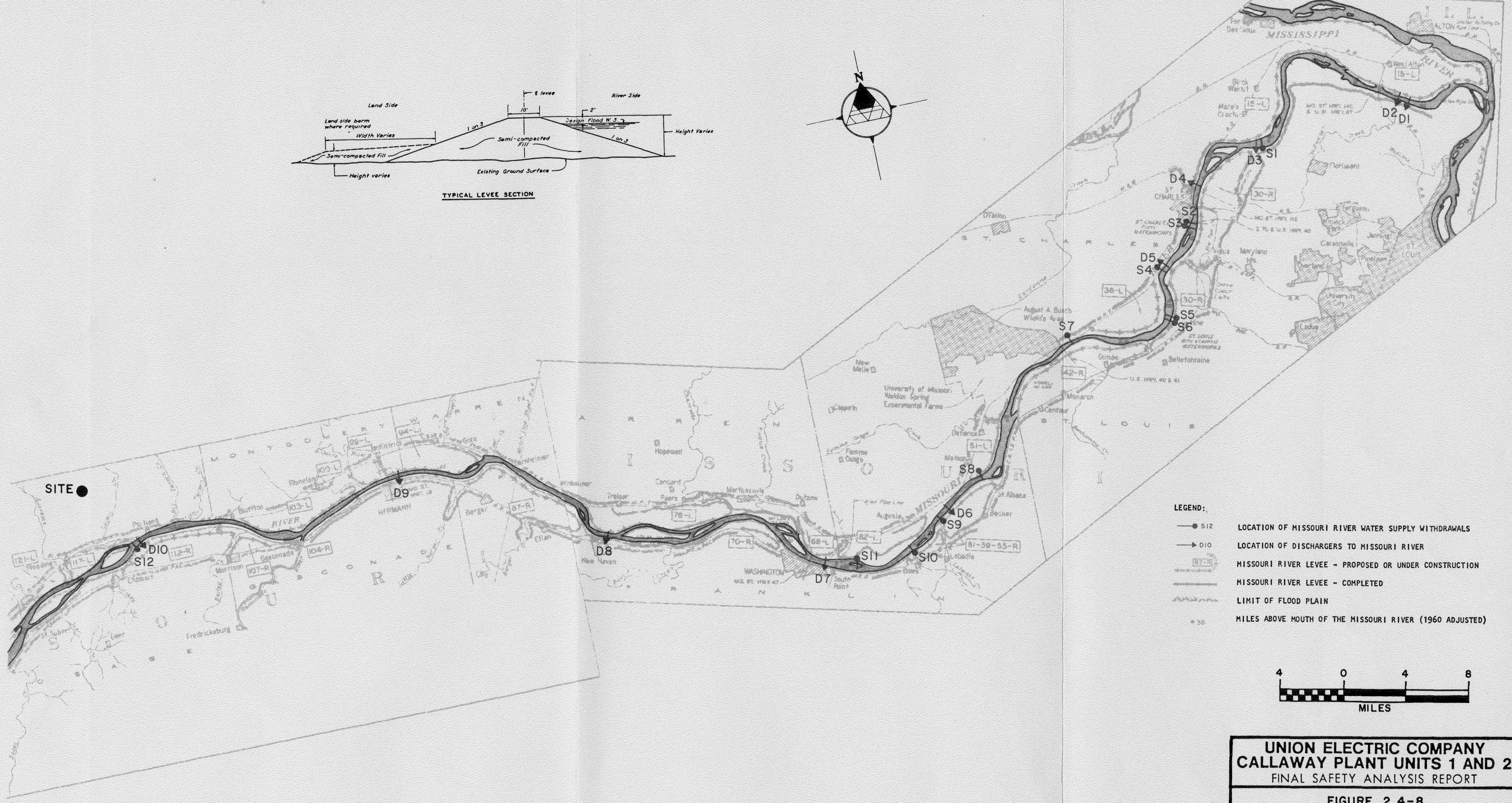
FIGURE 2.4-7
REGIONAL HYDROLOGIC FEATURES

REFERENCE:
BASED ON KANSAS CITY SECTIONAL AERONAUTICAL CHART DATED OCTOBER 1972.



REFERENCE:

U.S. ARMY CORPS OF ENGINEERS, 1977 MISSOURI RIVER HYDROGRAPHIC SURVEY, RULO, NEBRASKA TO THE SOUTH, KANSAS CITY DISTRICT.

NOTE: REFER TO TABLE 2.4-3 AND 2.4-4 FOR OWNER, SOURCE AND USAGE INFORMATION

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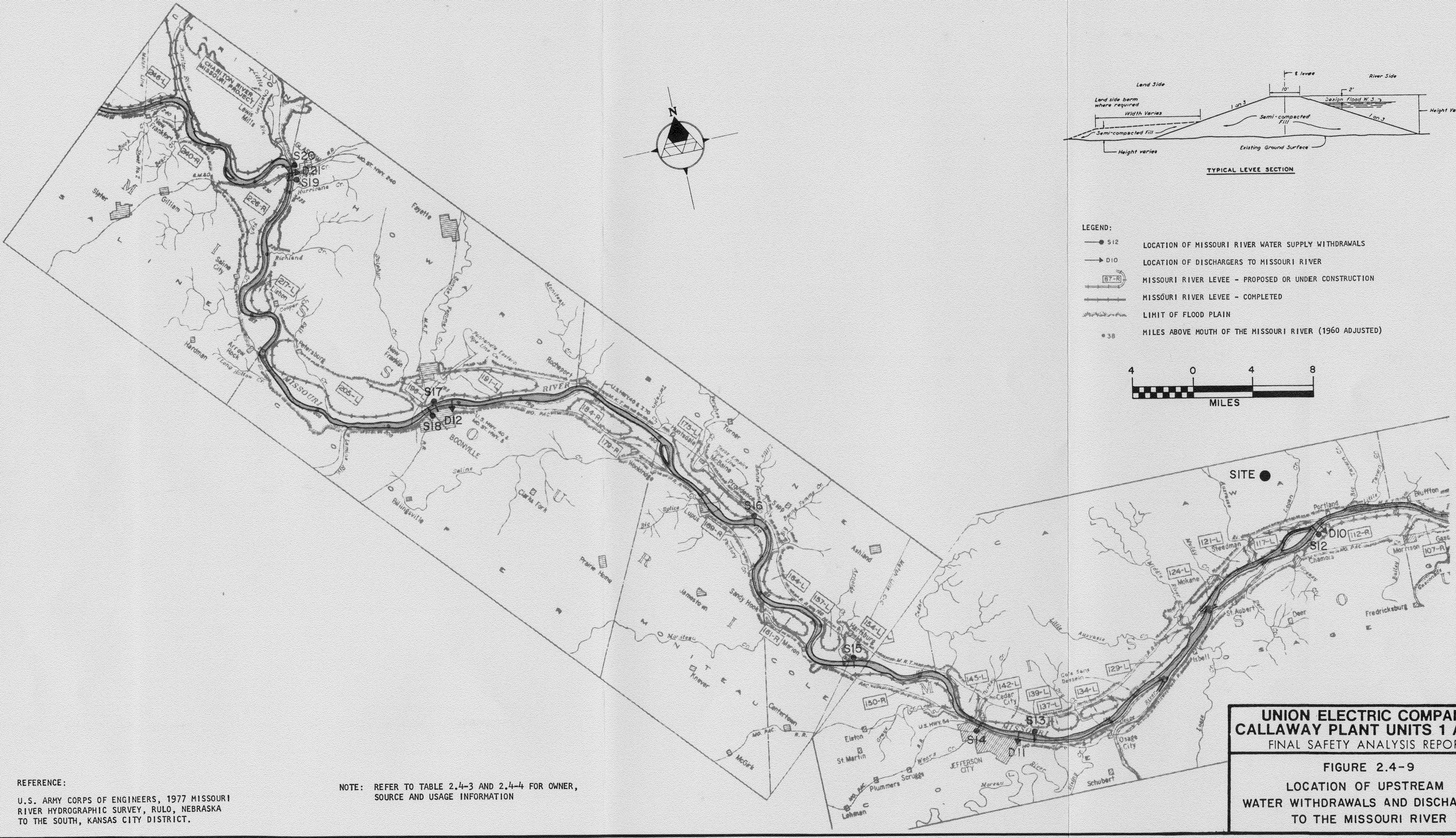
FIGURE 2.4-8

LOCATION OF DOWNSTREAM WATER WITHDRAWALS AND DISCHARGES TO THE MISSOURI RIVER



REFERENCE:

U.S. ARMY CORPS OF ENGINEERS, 1977 MISSOURI RIVER HYDROGRAPHIC SURVEY, RULO, NEBRASKA TO THE SOUTH, KANSAS CITY DISTRICT.

NOTE: REFER TO TABLE 2.4-3 AND 2.4-4 FOR OWNER, SOURCE AND USAGE INFORMATION

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FIGURE 2.4-9

LOCATION OF UPSTREAM WATER WITHDRAWALS AND DISCHARGES TO THE MISSOURI RIVER

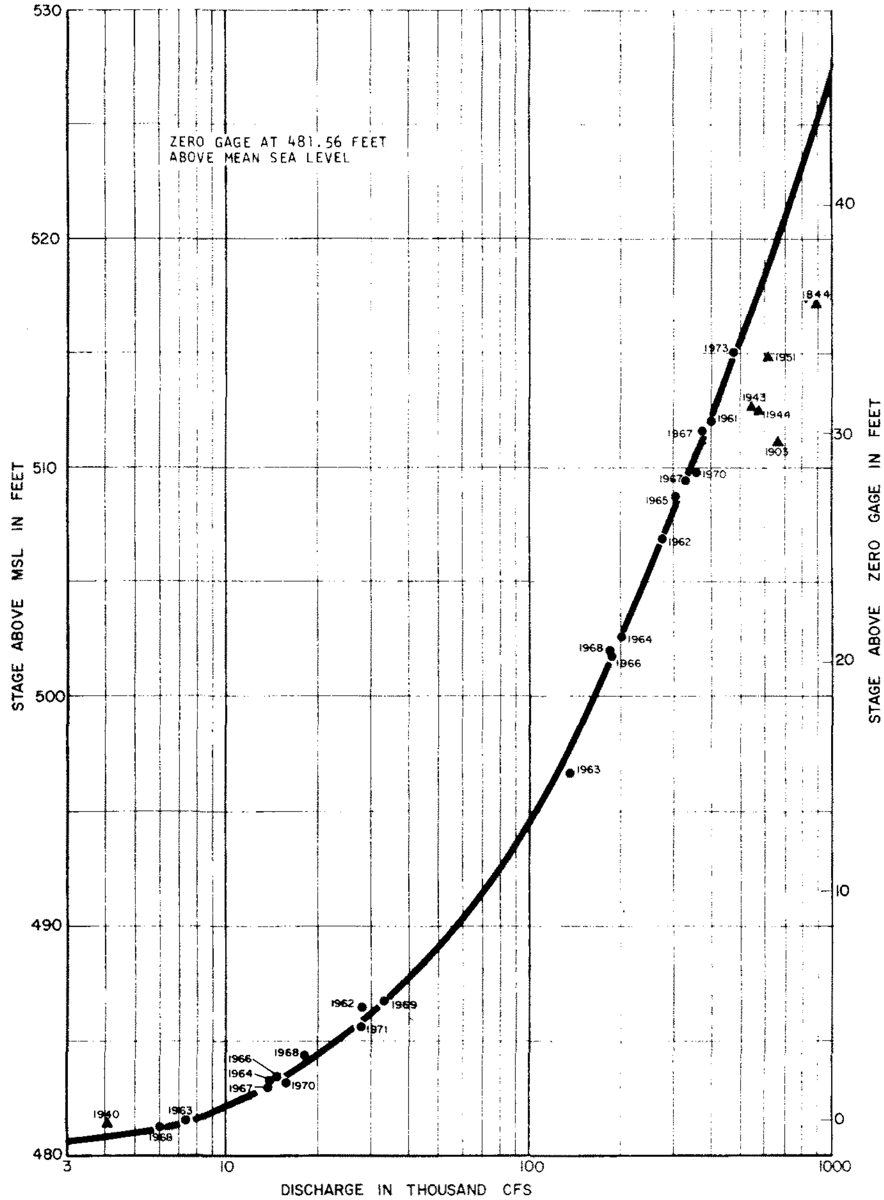

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FIGURE 2.4-10

STAGE-DISCHARGE RATING CURVE FOR THE MISSOURI RIVER AT HERMANN, MISSOURI

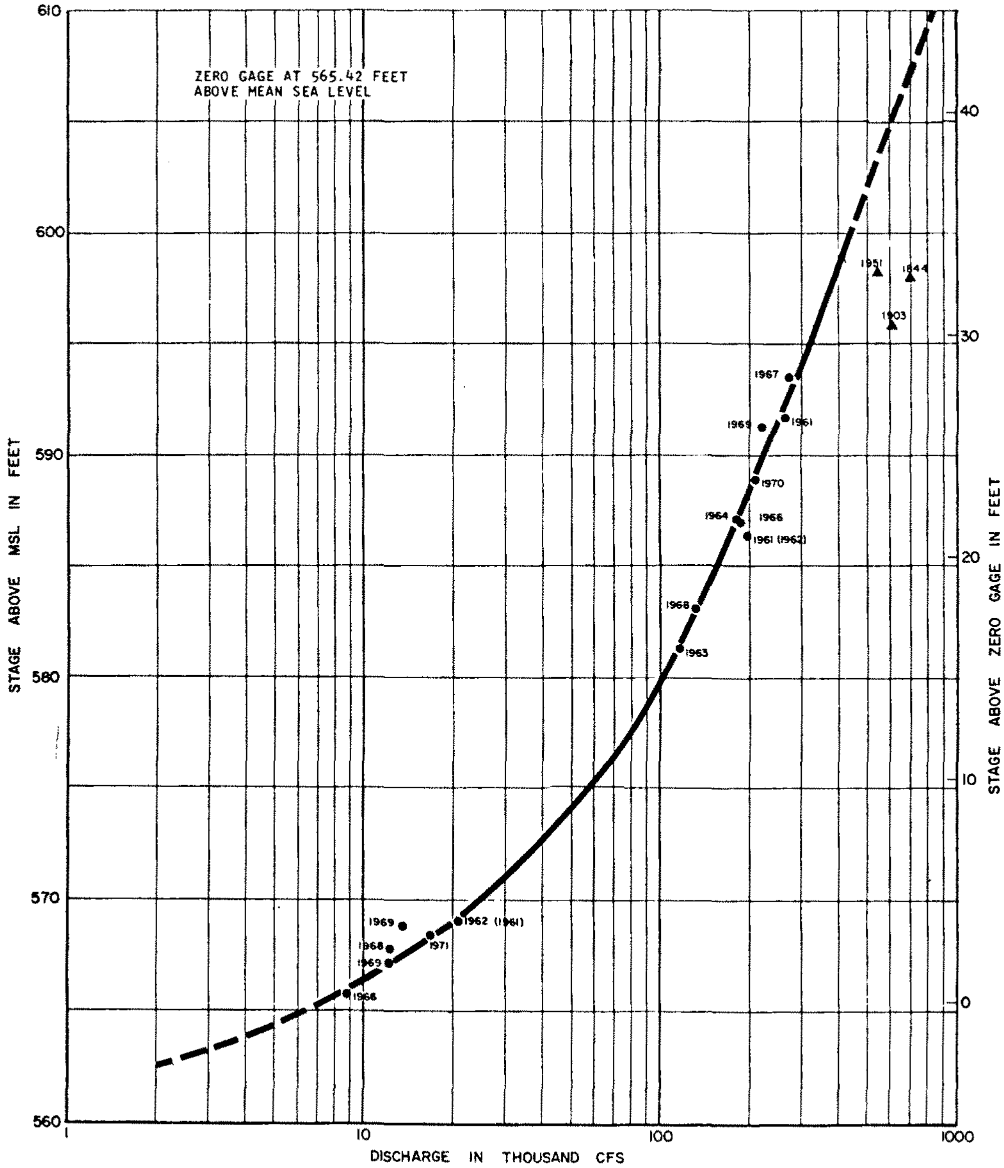

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FIGURE 2.4-11

STAGE-DISCHARGE RATING CURVE FOR THE MISSOURI RIVER AT BOONVILLE, MISSOURI

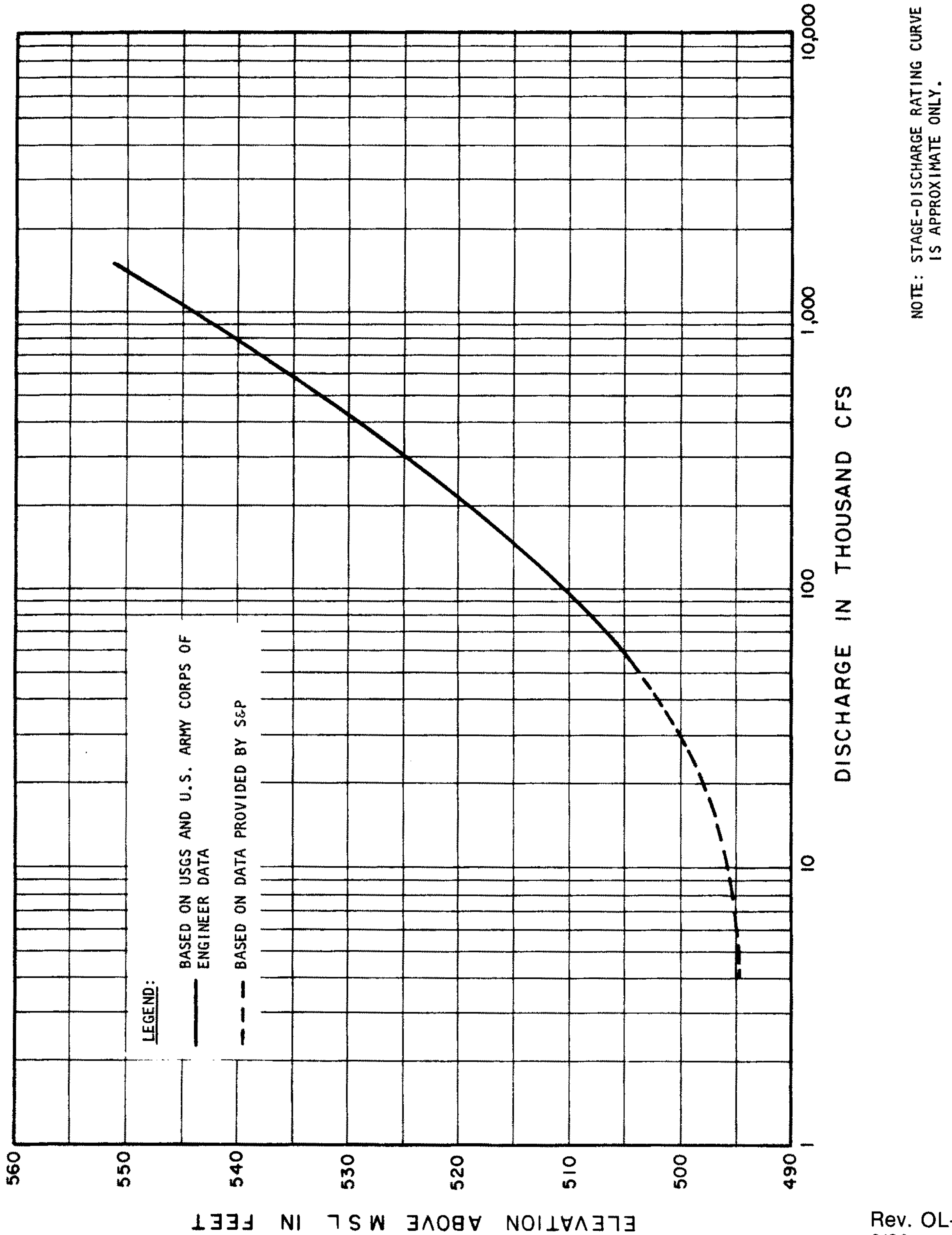

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FIGURE 2.4-12

STAGE-DISCHARGE RATING CURVE FOR THE MISSOURI RIVER NEAR THE CALLAWAY PLANT SITE (MISSOURI RIVER MILE 115)

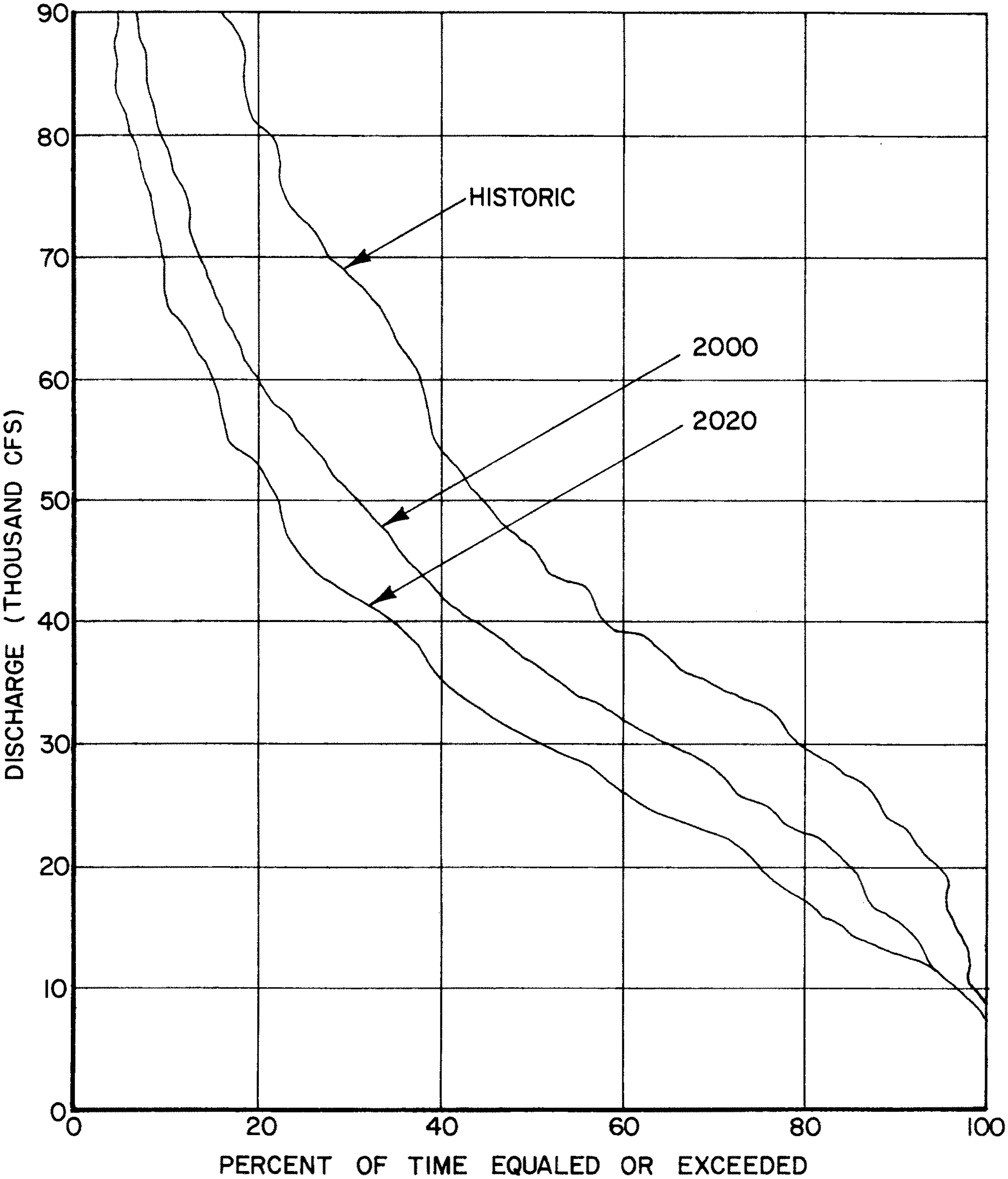

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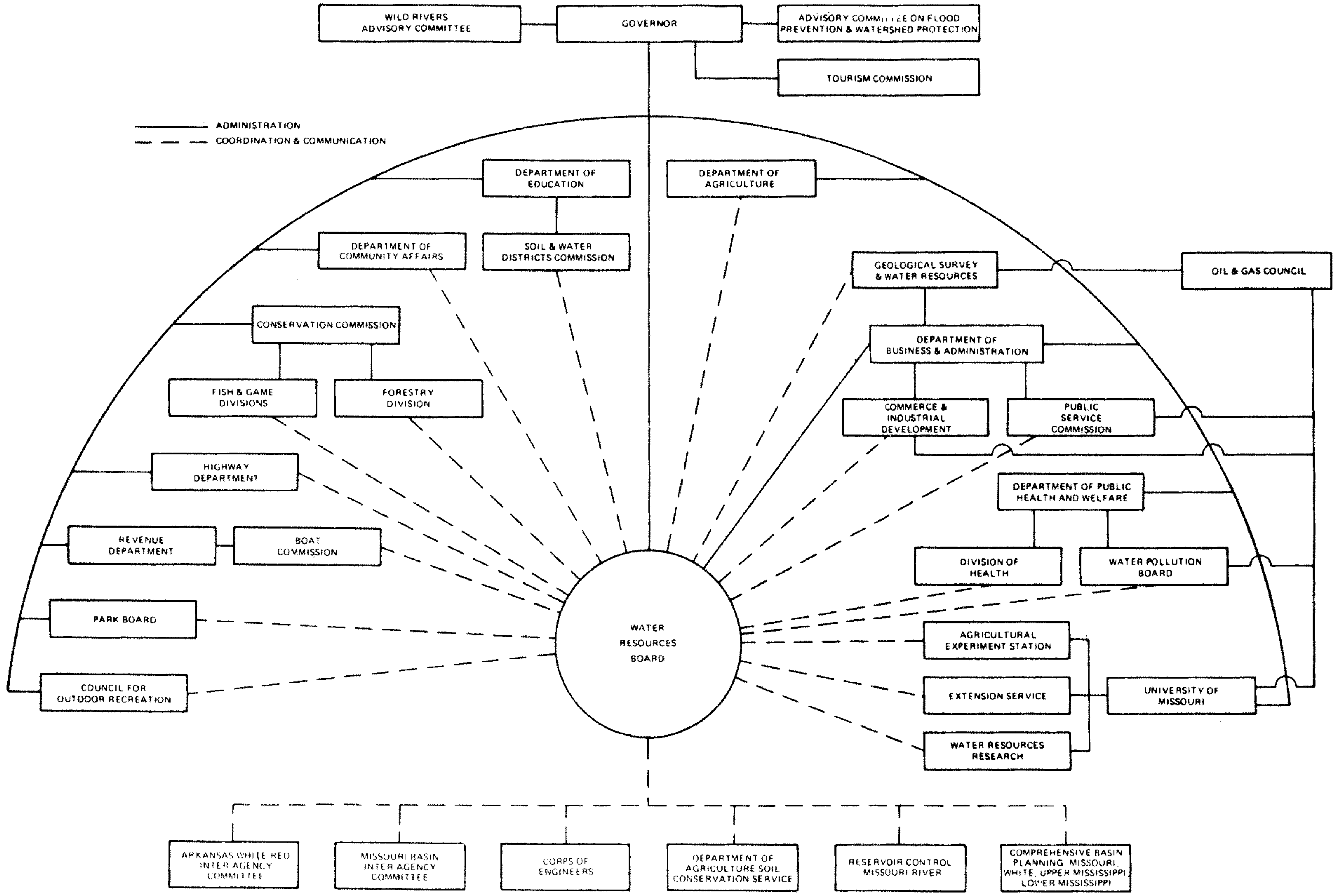
FIGURE 2.4-13
FLOW - DURATION CURVES FOR THE MISSOURI RIVER AT HERMAN, MISSOURI, DURING WINTER SEASON

REFERENCE:
REPRODUCED FROM THE MISSOURI RIVER BASIN COMPREHENSIVE FRAMEWORK STUDY, PREPARED BY THE MISSOURI BASIN INTER-AGENCY COMMITTEE, STANDING COMMITTEE, JUNE 1969.



Water Resource Organization and Communication, State of Missouri.

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FIGURE 2.4-14

WATER RESOURCE ORGANIZATION AND COMMUNICATION STATE OF MISSOURI

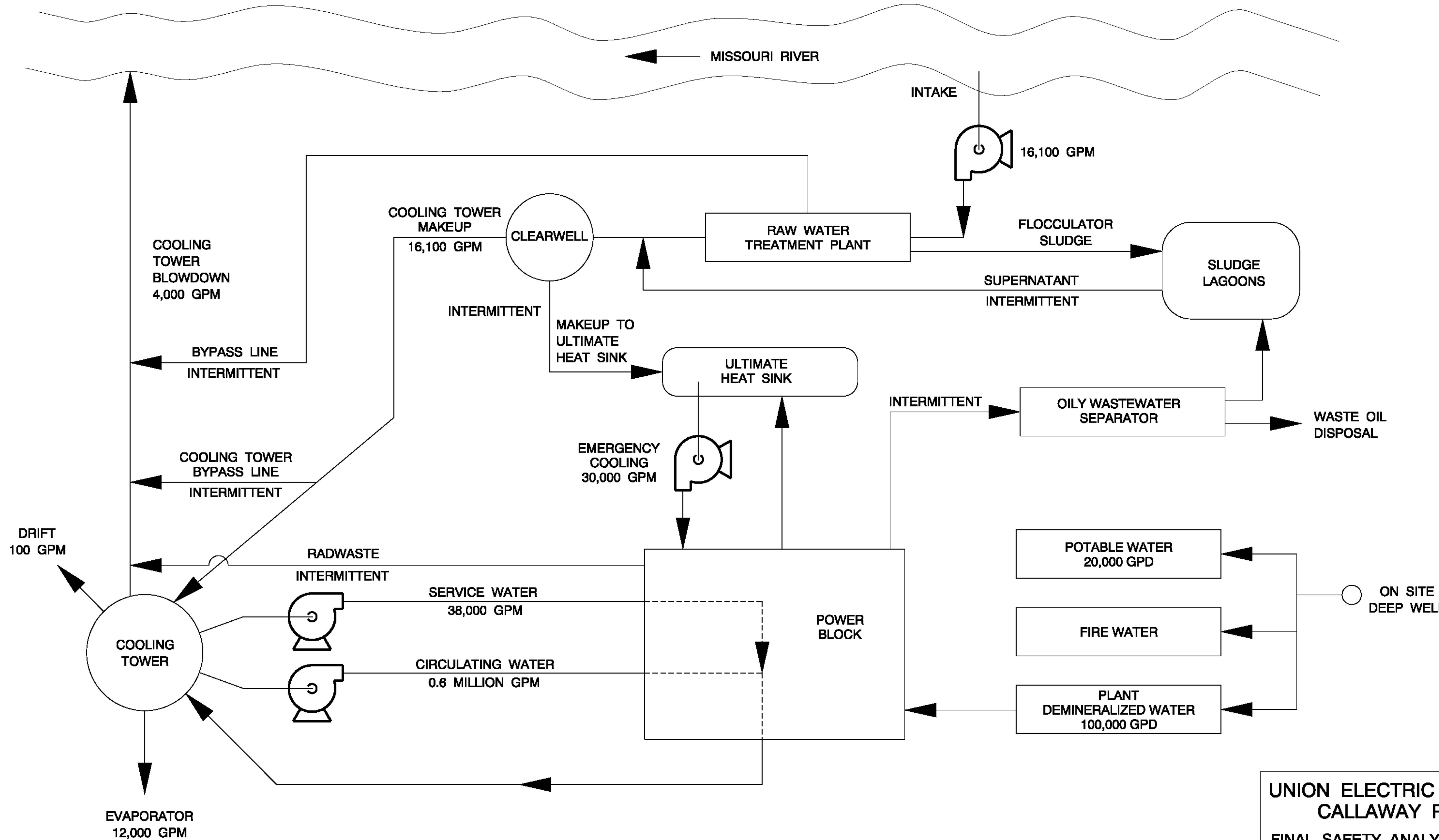

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FIGURE 2.4-15

PLANT WATER USE DIAGRAM

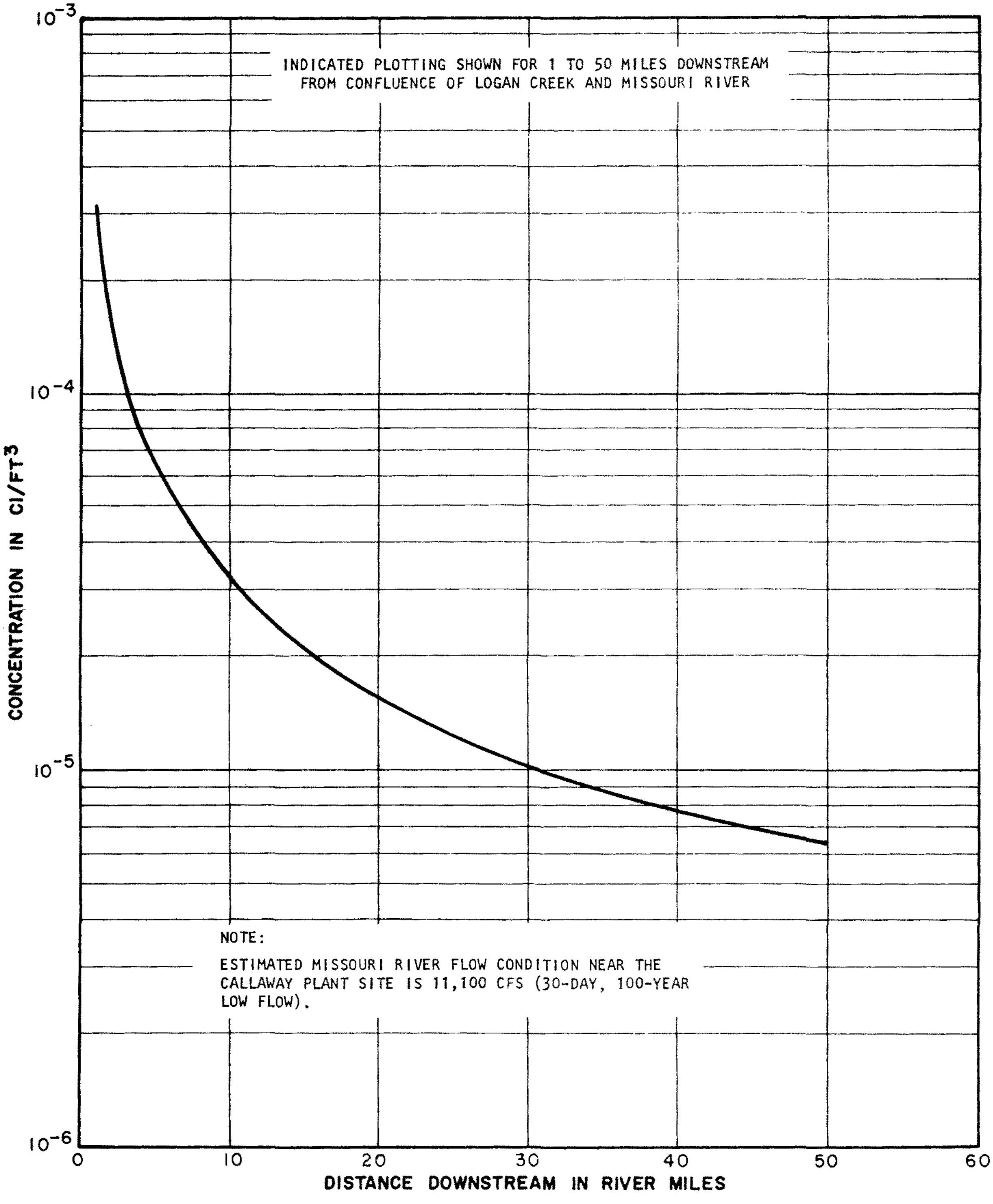

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FIGURE 2.4-16

PREDICTED PEAK POINT CONCENTRATION OF H-3 IN MISSOURI RIVER FOR LOW FLOW CONDITION

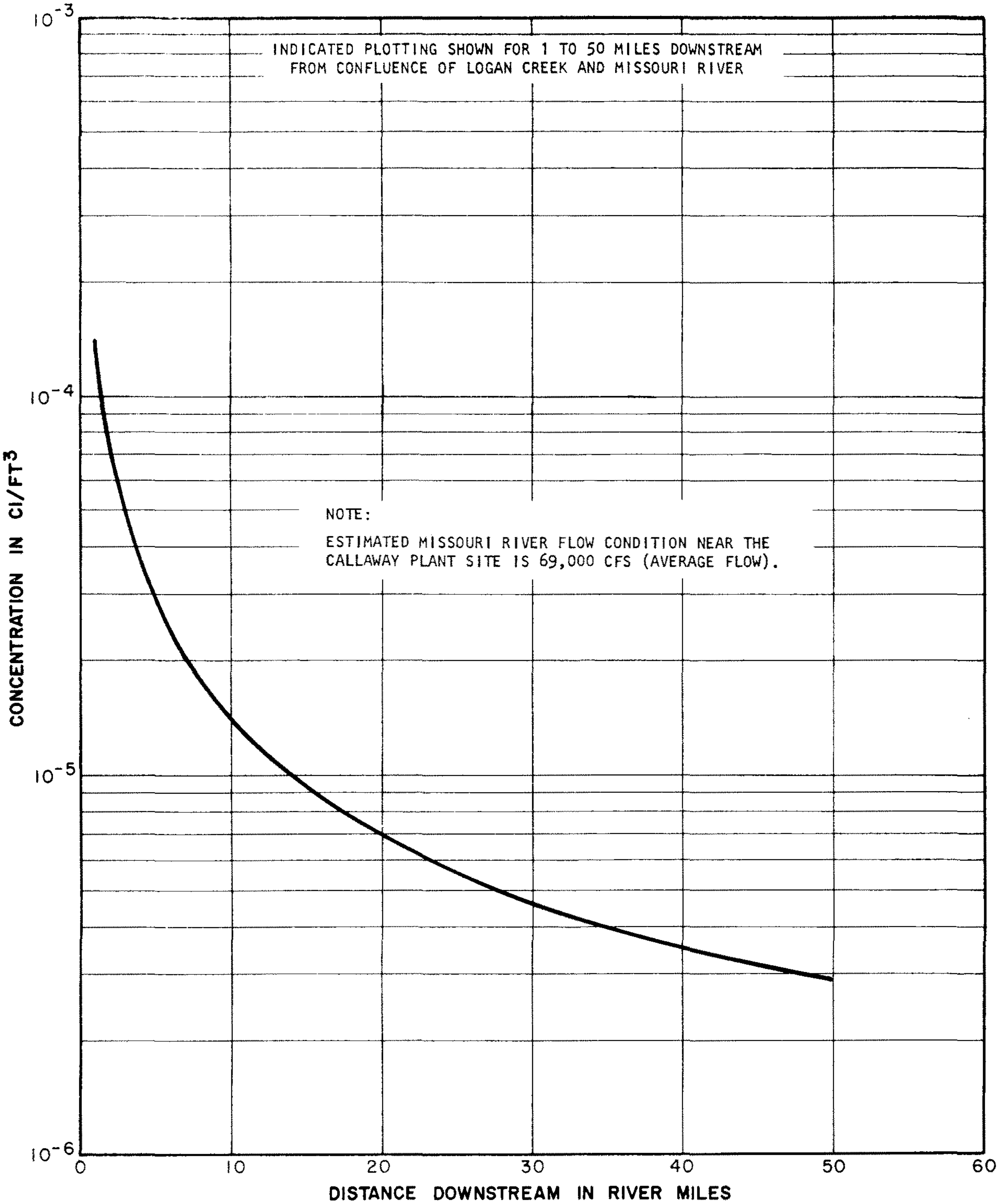

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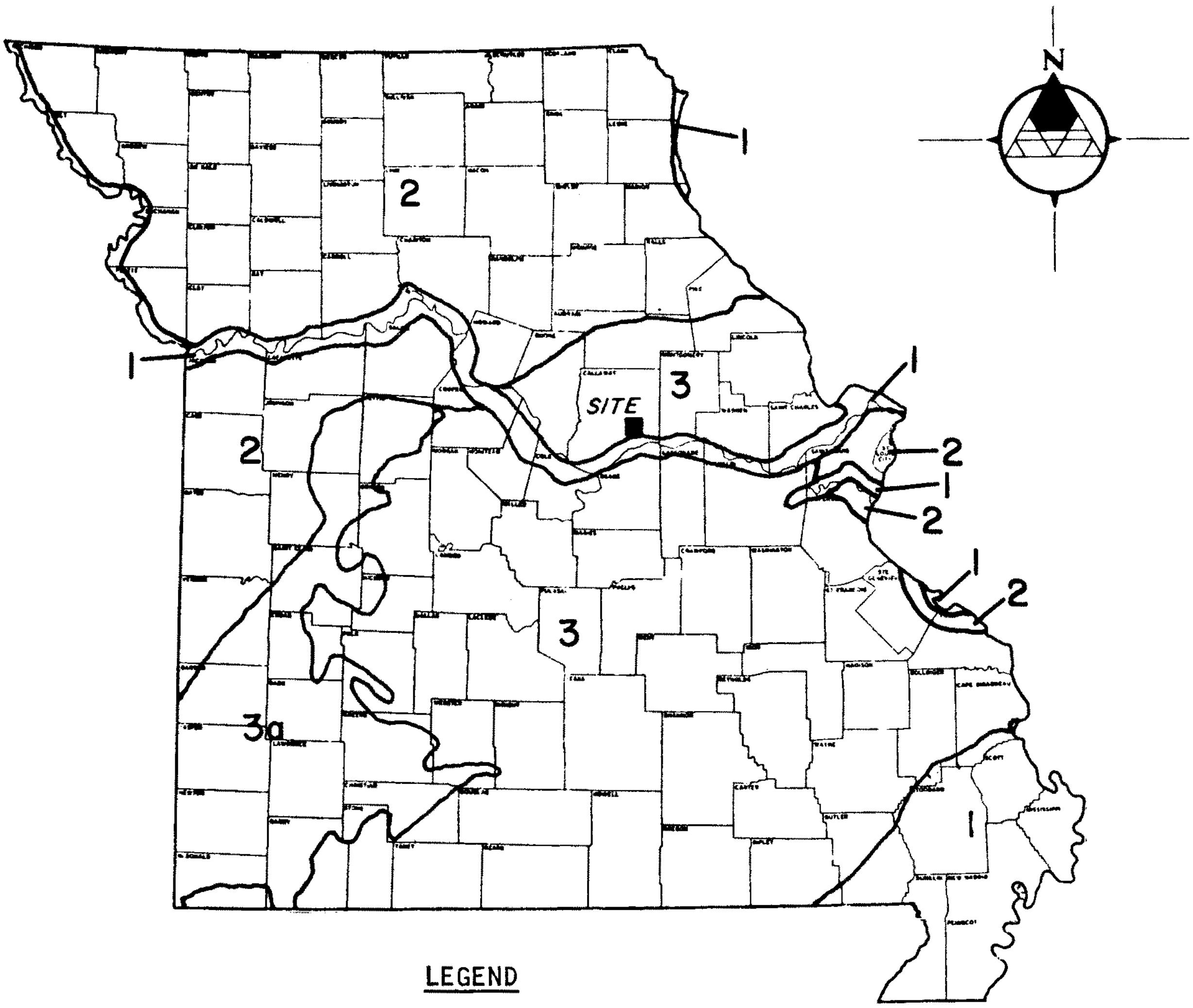
FIGURE 2.4-17
PREDICTED PEAK POINT CONCENTRATION
OF H-3 IN MISSOURI RIVER
FOR AVERAGE FLOW CONDITION



LEGEND

1 SOUTHEAST MISSOURI LOWLAND AND THE ALLUVIAL VALLEYS OF THE MAJOR STREAMS

2 SALINE GROUND WATER PROVINCE

3 THE OZARKS

3a SPRINGFIELD PLATEAU

SCALE IN MILES

20 0 20 40 60

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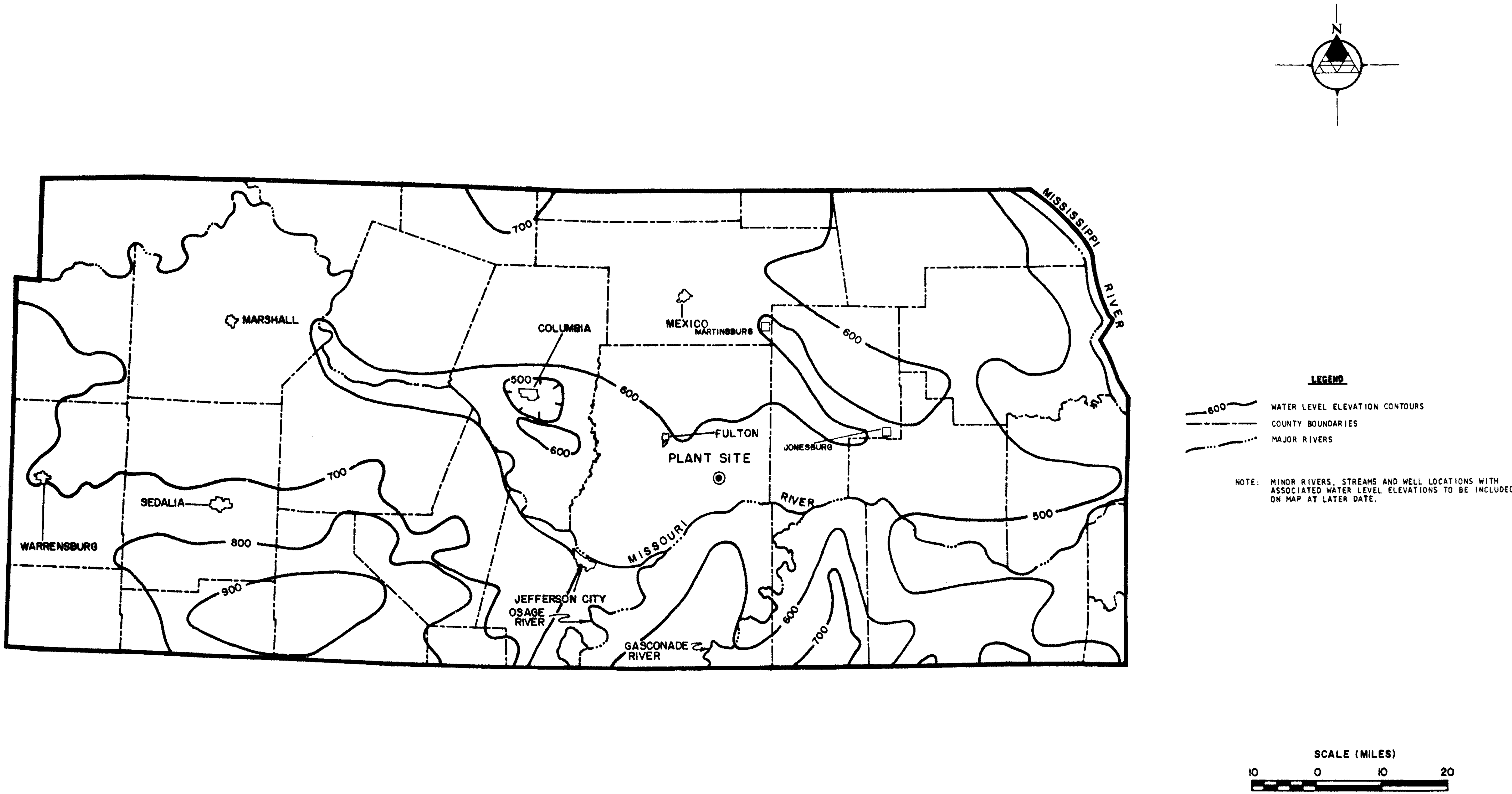
FIGURE 2.4-18

GROUND WATER PROVINCES OF MISSOURI

REFERENCE:
MODIFIED FROM FULLER ET AL., 1967, P. 283.



SOURCE: FULLER, D.
MISSOURI GEOLOGICAL SURVEY,
UNDATED WORK MAP

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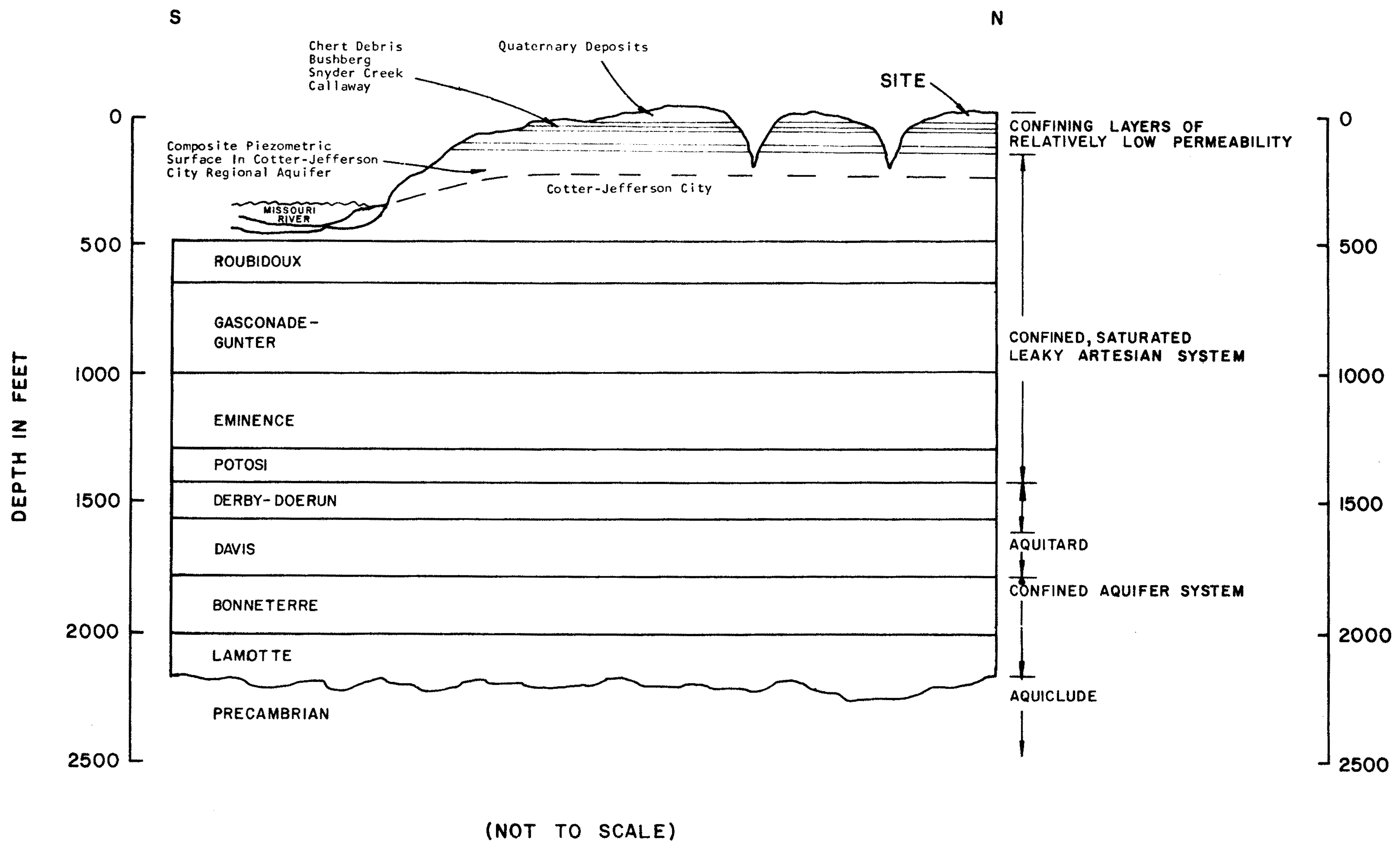
FIGURE 2.4-19

REGIONAL POTENTIOMETRIC SURFACE MAP



REFERENCE: ADAPTED FROM FULLER ET AL.,
TEXT (1967)

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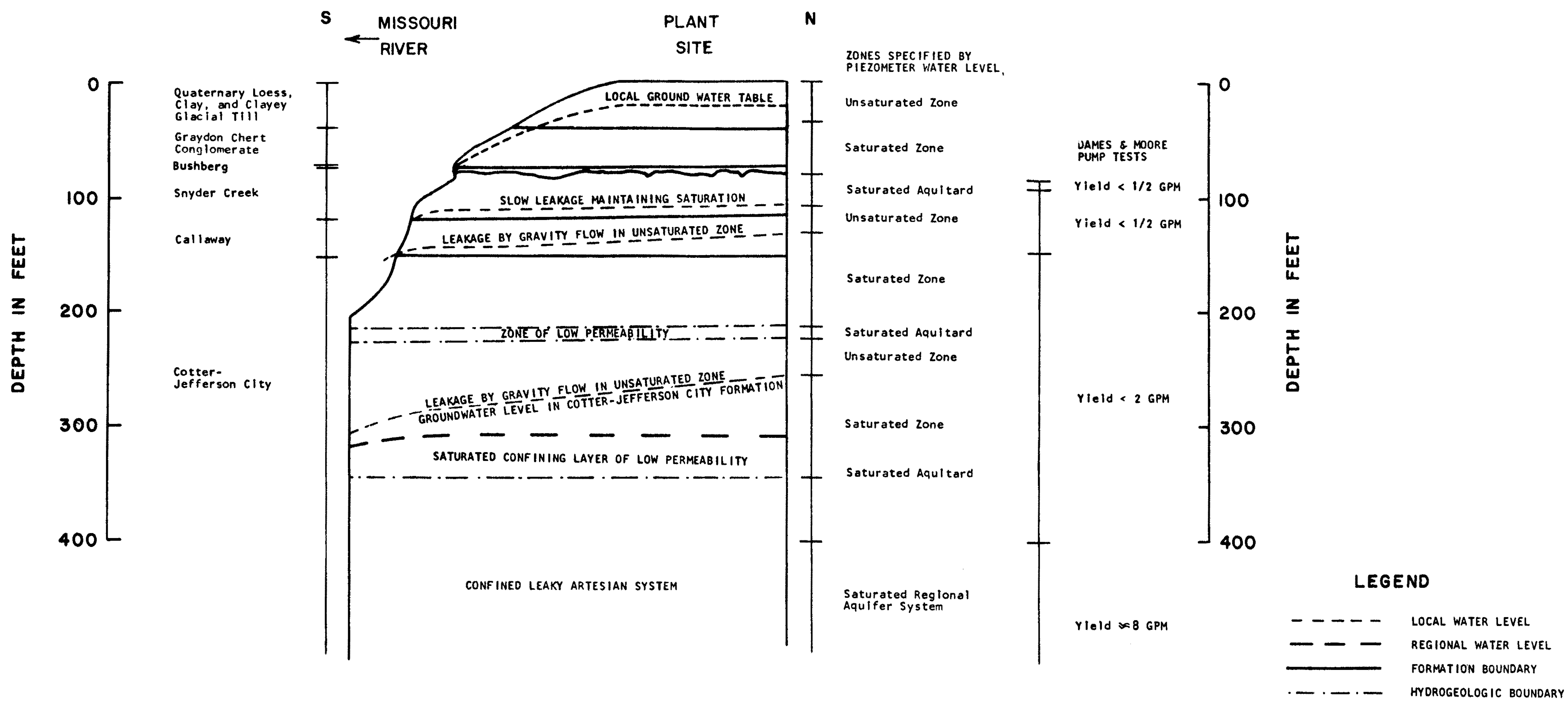
FIGURE 2.4-20

REGIONAL AQUIFER SYSTEMS
GENERALIZED SCHEMATIC DIAGRAM



(NOT TO SCALE)

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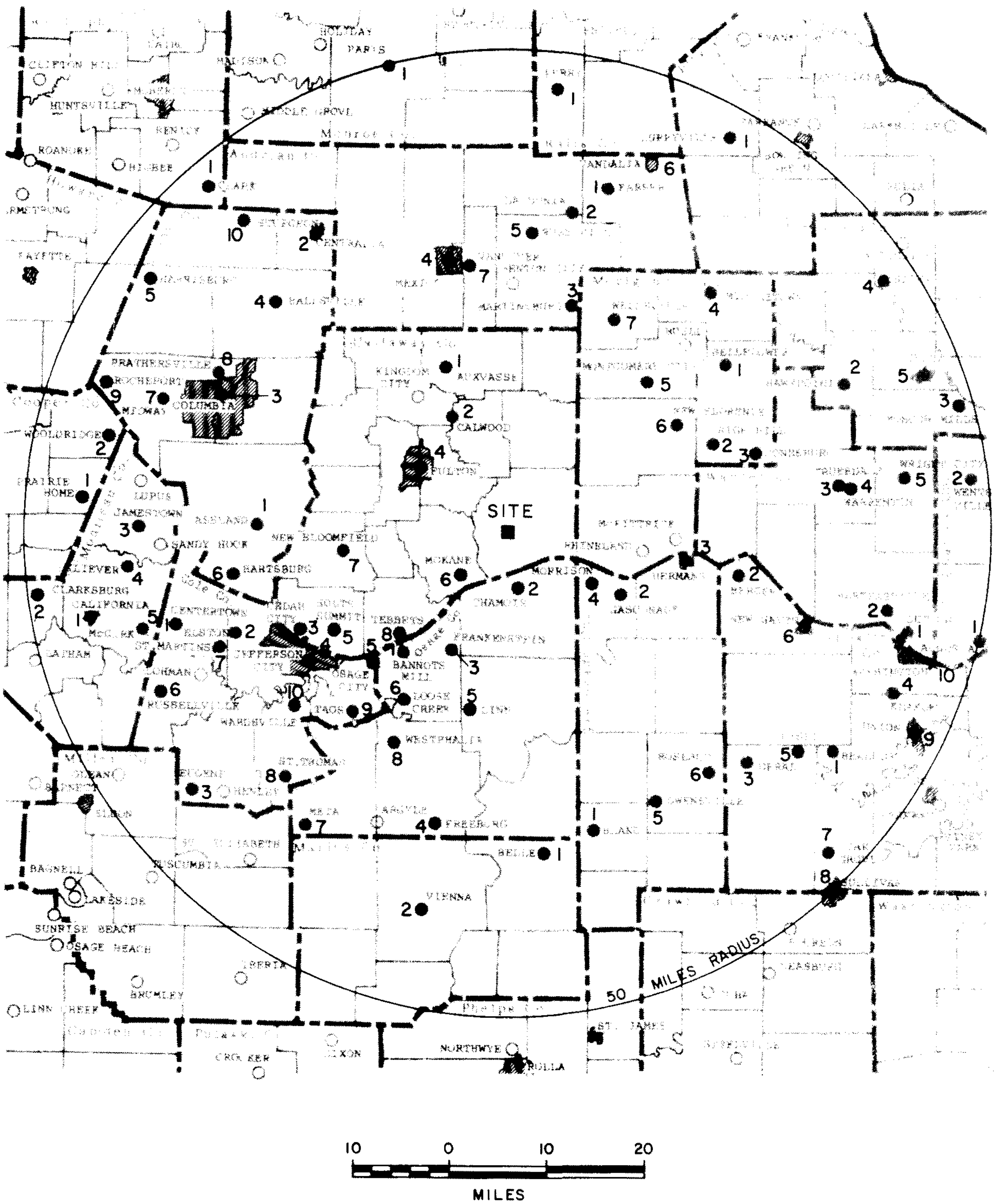
FIGURE 2.4-21
HYDROGEOLOGIC ENVIRONMENT
GENERALIZED SCHEMATIC DIAGRAM



LEGEND:

● 2 LOCATION OF MUNICIPAL WATER SUPPLY (FOR DETAILS OF INDIVIDUAL LOCATION REFER TO TABLE 2.4-18)

REFERENCE:
BUREAU OF CENSUS, 1970, MISSOURI COUNTY SUBDIVISIONS - TOWNSHIPS AND PLACES MAP.

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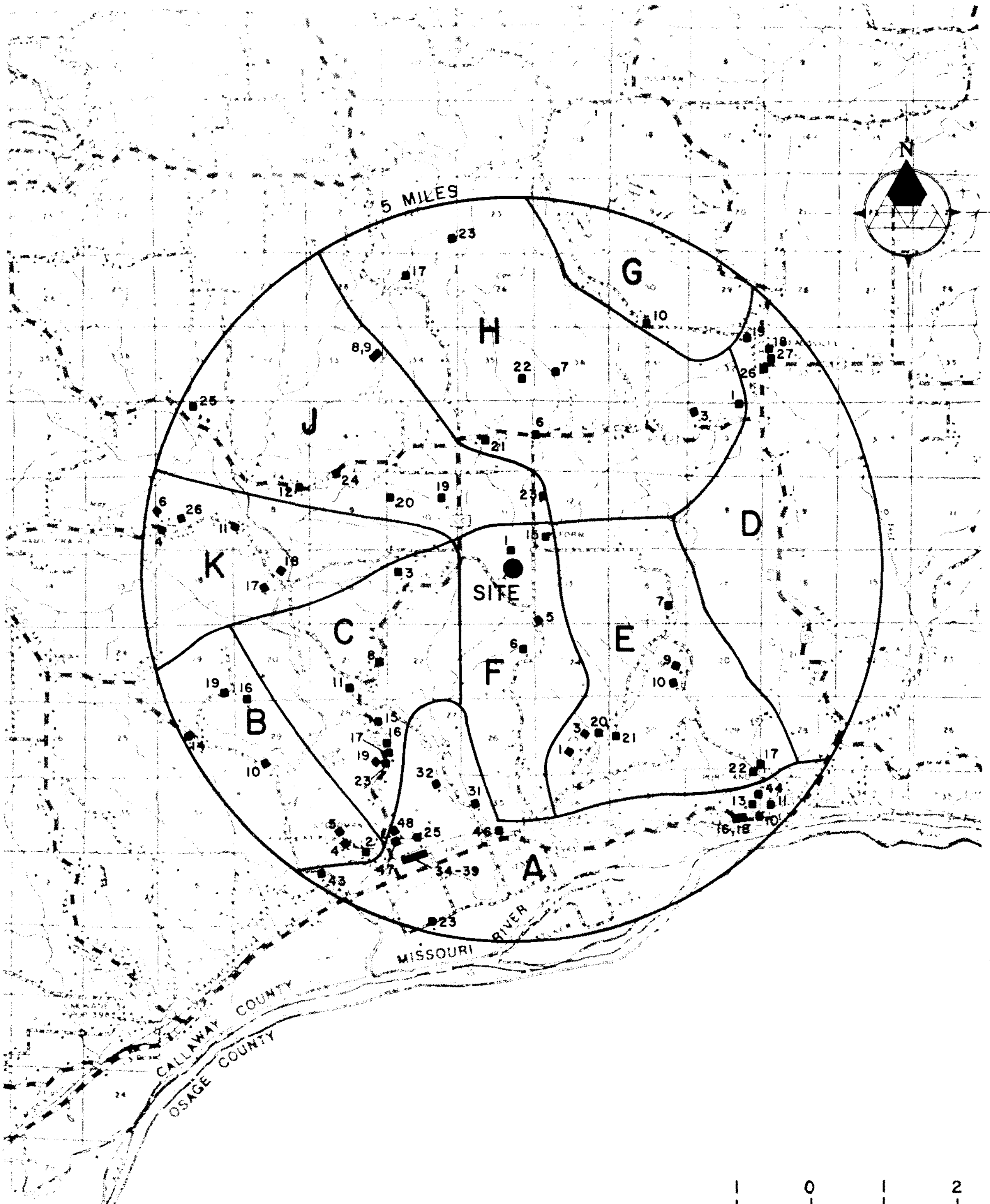
FIGURE 2.4-22

REGIONAL GROUND-WATER USERS WITHIN 50 MILES



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LEGEND:

A AREA DESIGNATION

■3 PROPERTY LOCATION (FOR WELL INVENTORY REFER TO TABLE 2.4-20)

BASE MAP:

GENERAL HIGHWAY MAP OF CALLAWAY COUNTY, MISSOURI. PREPARED BY THE MISSOURI STATE HIGHWAY DEPARTMENT

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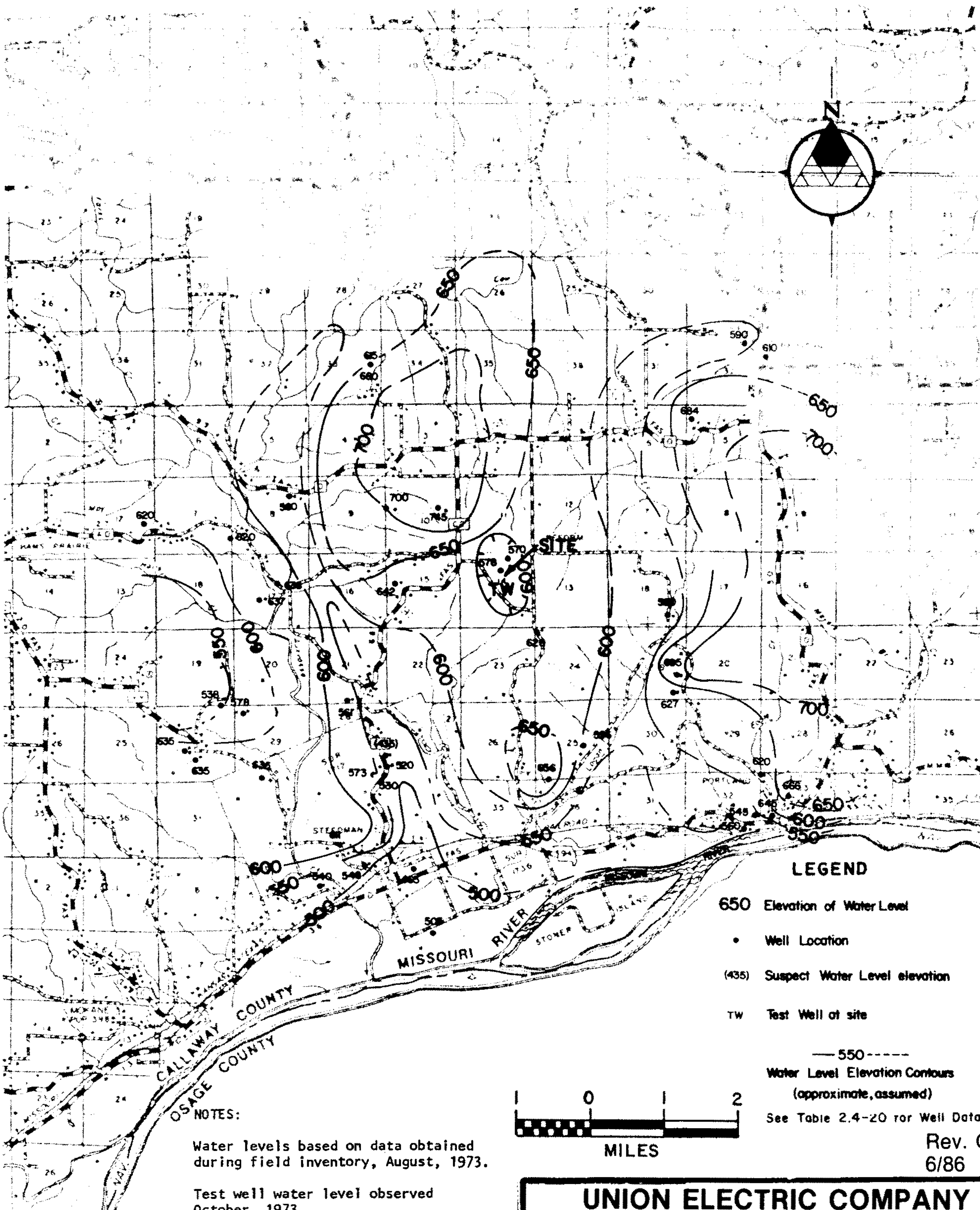
FIGURE 2.4-23

LOCATION OF WELL INVENTORY WITHIN A 5 MILE RADIUS



NOTES:

Water levels based on data obtained during field inventory, August, 1973.

Test well water level observed October, 1973.

Water level contours are approximate.

As a consequence of variation in casing depth and well penetration into the Jefferson City Formation, Potentiometric contours can be considered only as approximate.

BASE MAP:

GENERAL HIGHWAY MAP OF CALLAWAY COUNTY, MISSOURI. PREPARED BY THE MISSOURI STATE HIGHWAY DEPARTMENT

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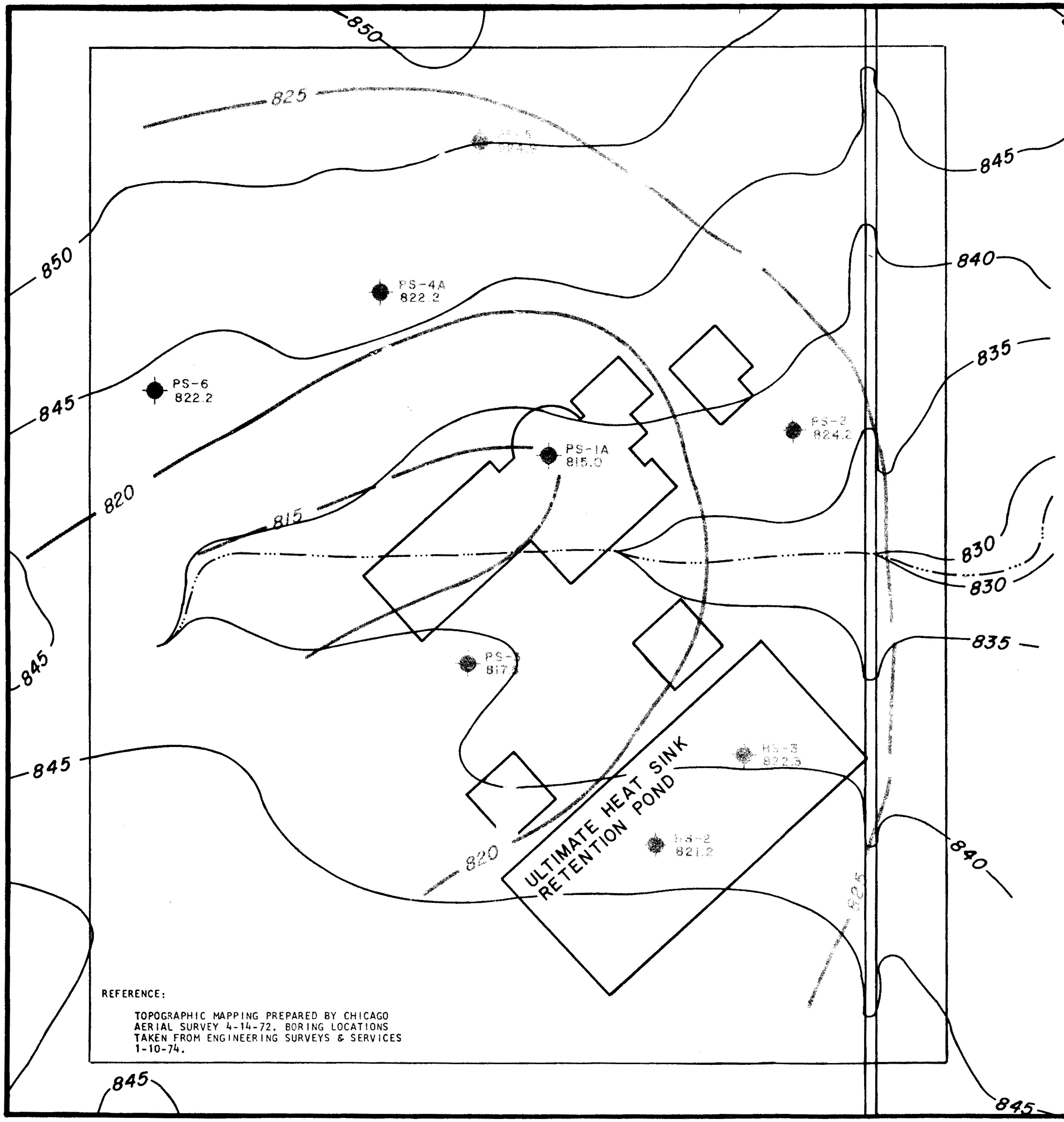
FIGURE 2.4-24

POTENTIOMETRIC SURFACE CONTOURS COTTER-JEFFERSON CITY FORMATION



N

LEGEND:

PS-4B	PIEZOMETER NUMBER AND LOCATION
817.7 *	WATER LEVEL ELEVATION IN FEET
HS AND PS	PIEZOMETERS READ DECEMBER 23, 1974
P	PIEZOMETERS READ JANUARY 25, 1975

* NOTE: POTENTIOMETRIC SURFACE MAY BE ALTERED IN AREA OF DEEP EXCAVATIONS.

SCALE IN FEET

200 100 0 200

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FIGURE 2.4-25
POTENTIOMETRIC SURFACE CONTOURS
GRAYDON CHERT CONGLOMERATE

BASE MAP:
MODIFIED FROM TOPOGRAPHIC MAPPING PREPARED BY CHICAGO AERIAL SURVEY, 4-14-72.

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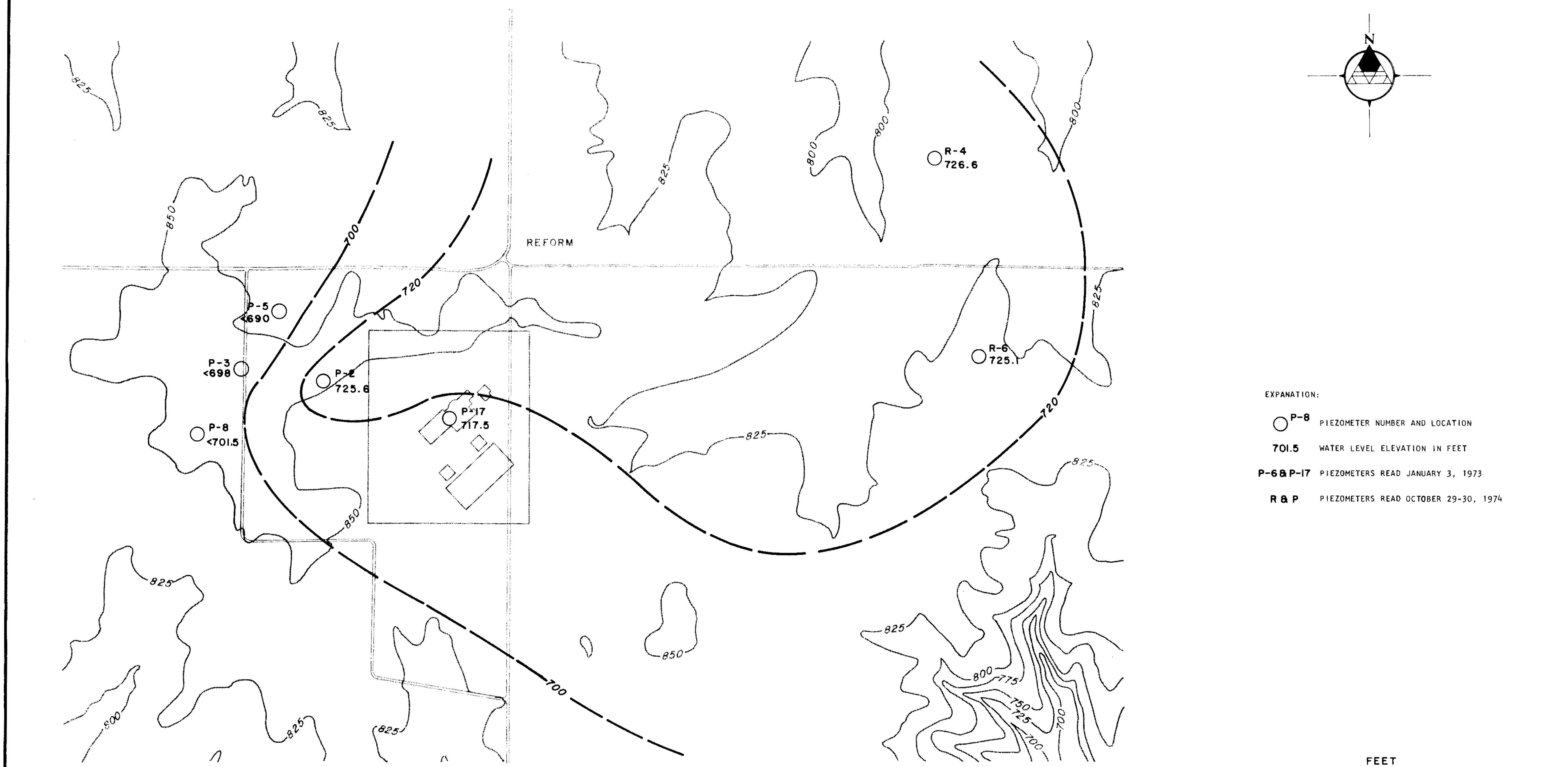
FIGURE 2.4-26

POTENTIOMETRIC SURFACE CONTOURS
BUSHBERG SANDSTONE
AND SNYDER CREEK SHALE



BASE MAP:
MODIFIED FROM TOPOGRAPHIC MAPPING PREPARED BY CHICAGO AERIAL SURVEY, 4-14-72.

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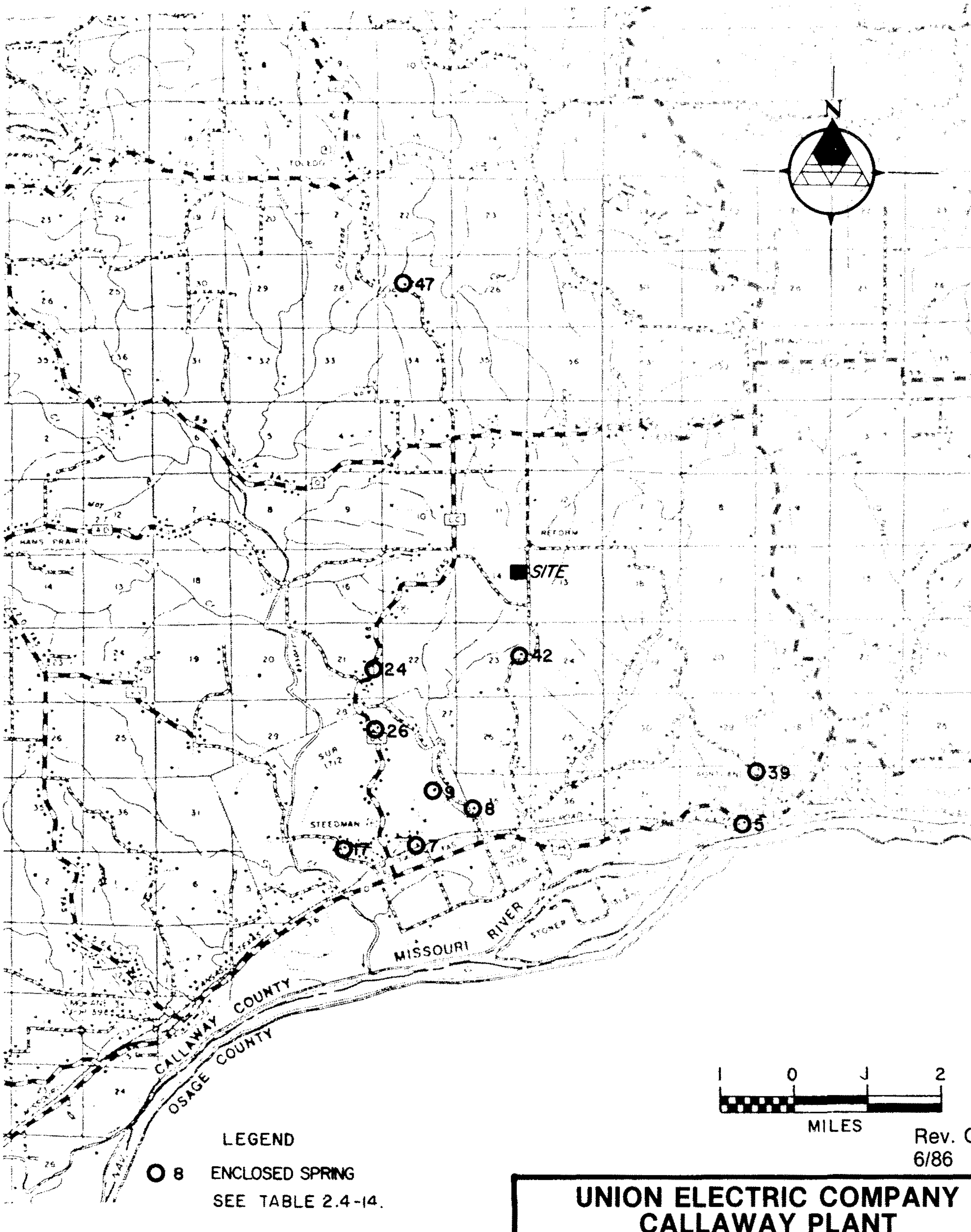
FIGURE 2.4-27
POTENTIOMETRIC SURFACE CONTOURS
CALLAWAY LIMESTONE



LEGEND

O 8 ENCLOSED SPRING
SEE TABLE 2.4-14.

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FIGURE 2.4-28

DOMESTIC WATER SUPPLIES
FROM ENCLOSED SPRINGS
IN SITE VICINITY

BASE MAP:

GENERAL HIGHWAY MAP OF CALLAWAY COUNTY, MISSOURI. PREPARED BY THE MISSOURI STATE HIGHWAY DEPARTMENT

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FIGURE 2.4-29

LOCATION OF PRECONSTRUCTION PIEZOMETERS

BASE MAP:

MODIFIED FROM TOPOGRAPHIC MAPPING PREPARED BY CHICAGO AERIAL SURVEY, 4-14-72.

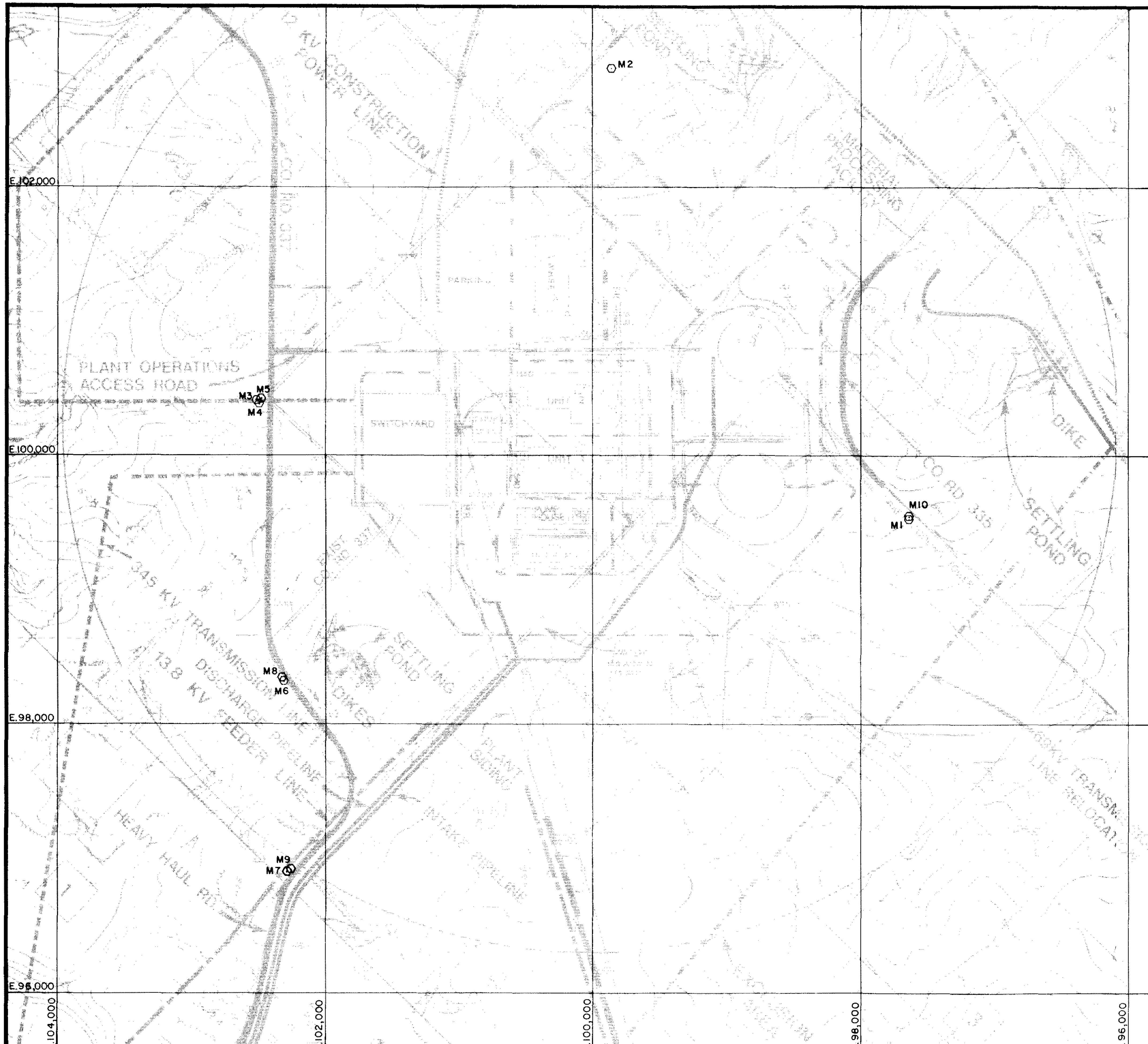

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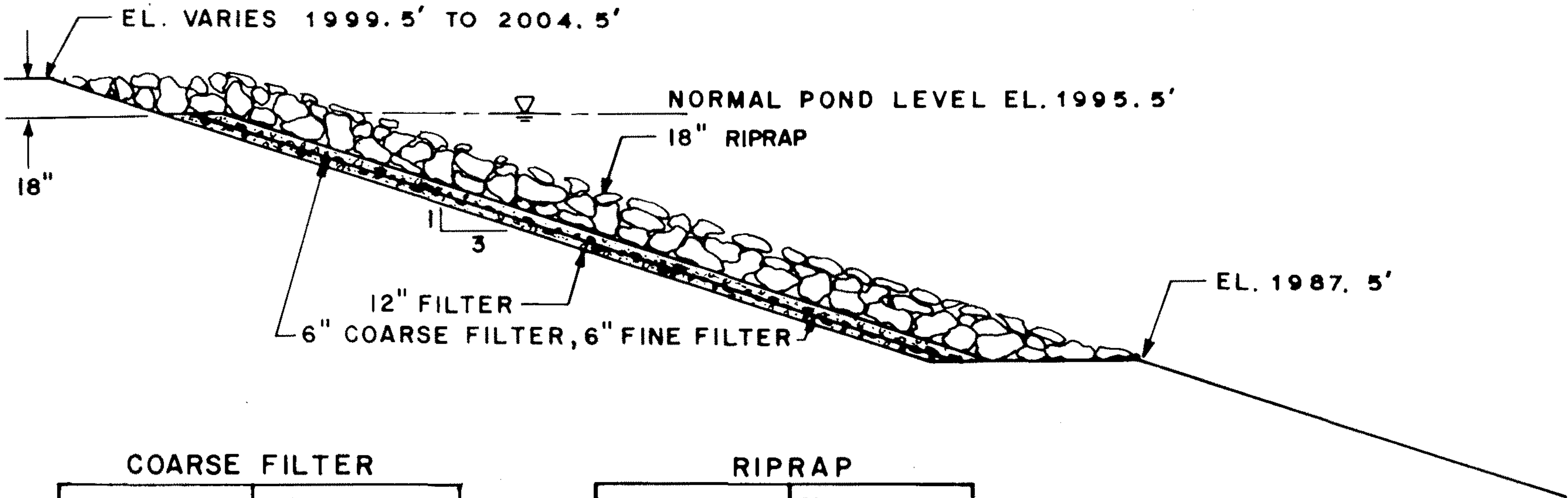
FIGURE 2.4-30

LOCATION MAP OF PERMANENT MONITORING PIEZOMETERS



COARSE FILTER

SIEVE SIZE*	% FINER BY WEIGHT
2"	100
1-1/2"	95 - 100
3/4"	35 - 70
3/8"	10 - 30
#4	0 - 5

*U.S. BUREAU OF STANDARDS
**ASTM C-33, FINE CONCRETE AGGREGATE

RIPRAP

WEIGHT (lbs.)	% SMALLER BY WEIGHT
500	100
350	92 – 98
225	75 – 85
100	45 – 55
12	8 - 12

FINE FILTER**

SIEVE SIZE*	% FINER BY WEIGHT
3/8"	100
#4	95 – 100
#8	80 – 100
#16	50 – 85
#30	25 – 60
#50	5 – 30
#100	0 – 10

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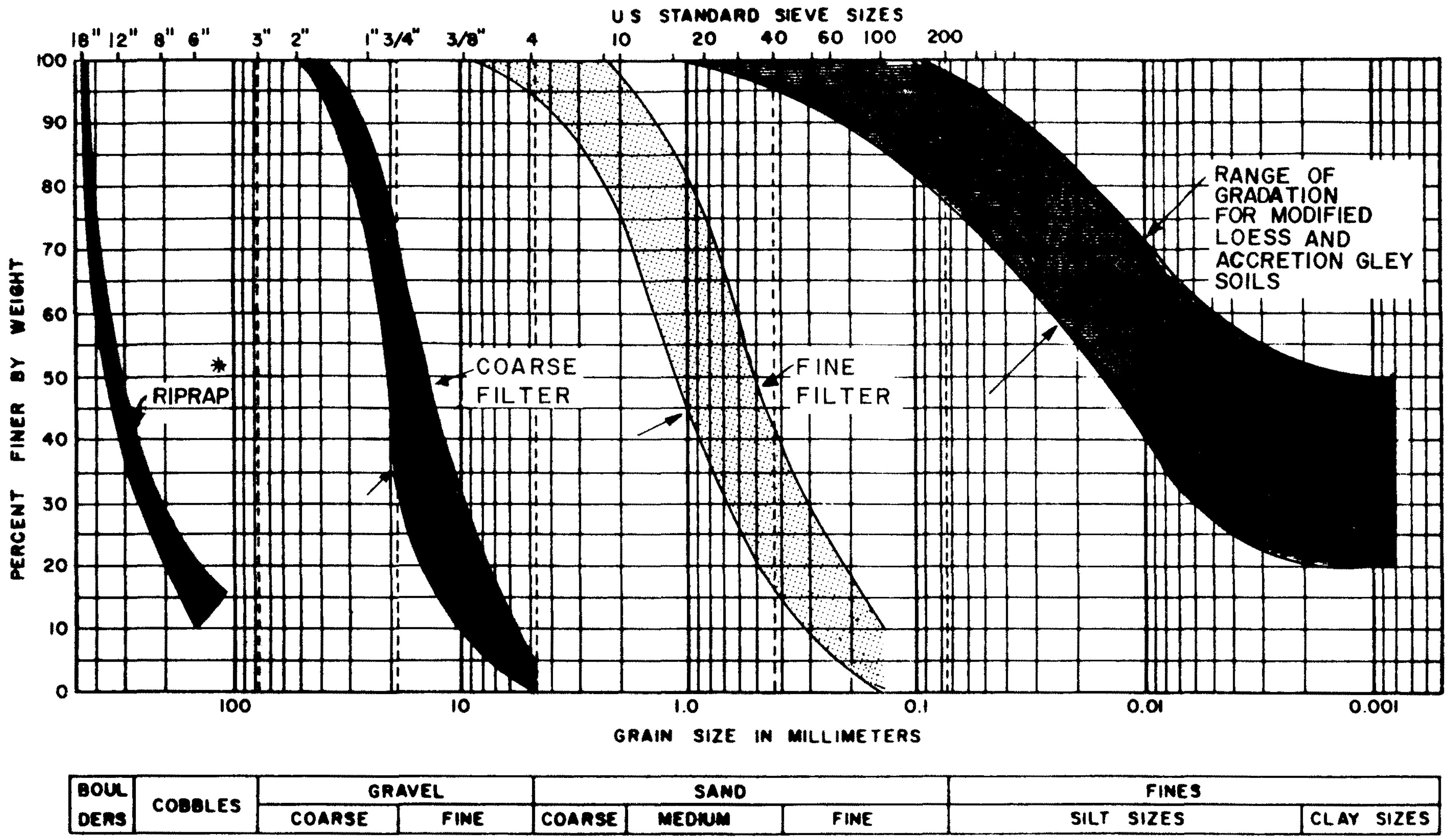
FIGURE 2.4-31
RIPRAP AND FILTER DETAILS



GRAIN SIZE DISTRIBUTION

* RIPRAP GRADATION TO BE SPECIFIED FOR CONSTRUCTION SHOULD BE THE GRADATION BY WEIGHT GIVEN ON FIGURE 2.4-31 WITH SIZES DOWN TO 1"(SEE SECT. 2.4.5.3)

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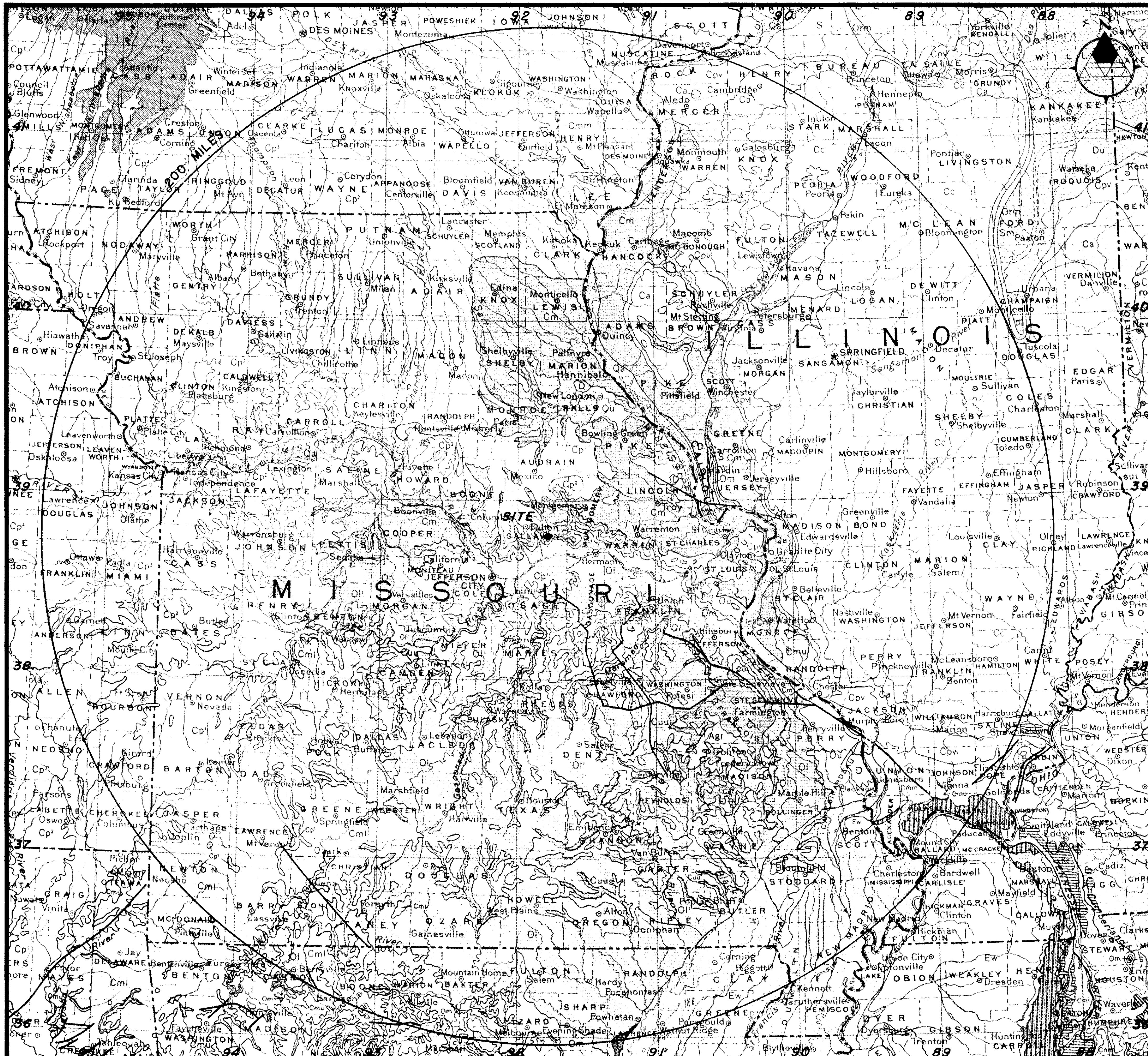
FIGURE 2.4-32
GRAIN SIZE DISTRIBUTION
RIPRAP AND FILTERS



NOTE: SEE SECTION 2.5.1 FOR THE DESCRIPTION OF EQUIVALENT UNITS AS DISCUSSED IN THIS REPORT.

REFERENCE: REPRINTED FROM GEOLOGIC MAP OF THE UNITED STATES, U.S. GEOLOGICAL SURVEY, 1960.

EXPLANATION

Era	Period	Symbol	Unit	Symbol	Unit
CENOZOIC	QUATERNARY	Qa	ALLUVIUM		
	TERTIARY	Ew	WILCOX GROUP		
		Em	MIDWAY GROUP		
MESOZOIC	CRETACEOUS	Kn	NAVARRO FORMATION		RIPLEY FORMATION/ SELMA CHALK
		Ke	EUTAW FORMATION	Ku	UPPER CRETACEOUS
PALEOZOIC	PERMIAN	Cpm¹	LOWER PERMIAN ROCKS		
	PENNSYLVANIAN	Cp⁴	UPPER PENNSYLVANIAN ROCKS		
		Cp³	UPPER-MIDDLE PENNSYLVANIAN ROCKS	Cc	CONEMAUGH GROUP
		Cp²	LOWER-MIDDLE PENNSYLVANIAN	Ca	ALLEGHENY GROUP
		Cp¹	LOWER PENNSYLVANIAN ROCKS	Cpv	POTTSVILLE GROUP
	MISSISSIPPIAN	Cm	MISSISSIPPIAN ROCKS		
		Cmu	CHESTER AGE ROCKS		
		Cmm	ST. LOUIS–WARSAW AGE ROCKS		
		Cml	BOONE LIMESTONE		
	DEVONIAN	D	DEVONIAN ROCKS		
		Du	PORTAGE–CATSKILL AGE ROCKS		
		Dm Dm	HAMILTON–ONONDAGA AGE ROCKS		
	SILURIAN	Sm	UPPER NIAGARA AGE ROCKS		
		S	EARLY SILURIAN ROCKS		
	ORDOVICIAN	Ou	MAQUOKETA SHALE– JOACHIM LIMESTONE	Orm	RICHMOND GROUP
		Om		Osp	ST. PETER SANDSTONE & EVERTON LIMESTONE
		Cl Ol	BEEKMANTOWN AGE ROCKS		
	CAMBRIAN	Cuu	UPPER–UPPER CAMBRIAN		
		Cul	LOWER–UPPER CAMBRIAN		
PRE-CAMBRIAN		Agr	GRANITE, PORPHYRY, GABBRO		

MILES
25 0 25 50

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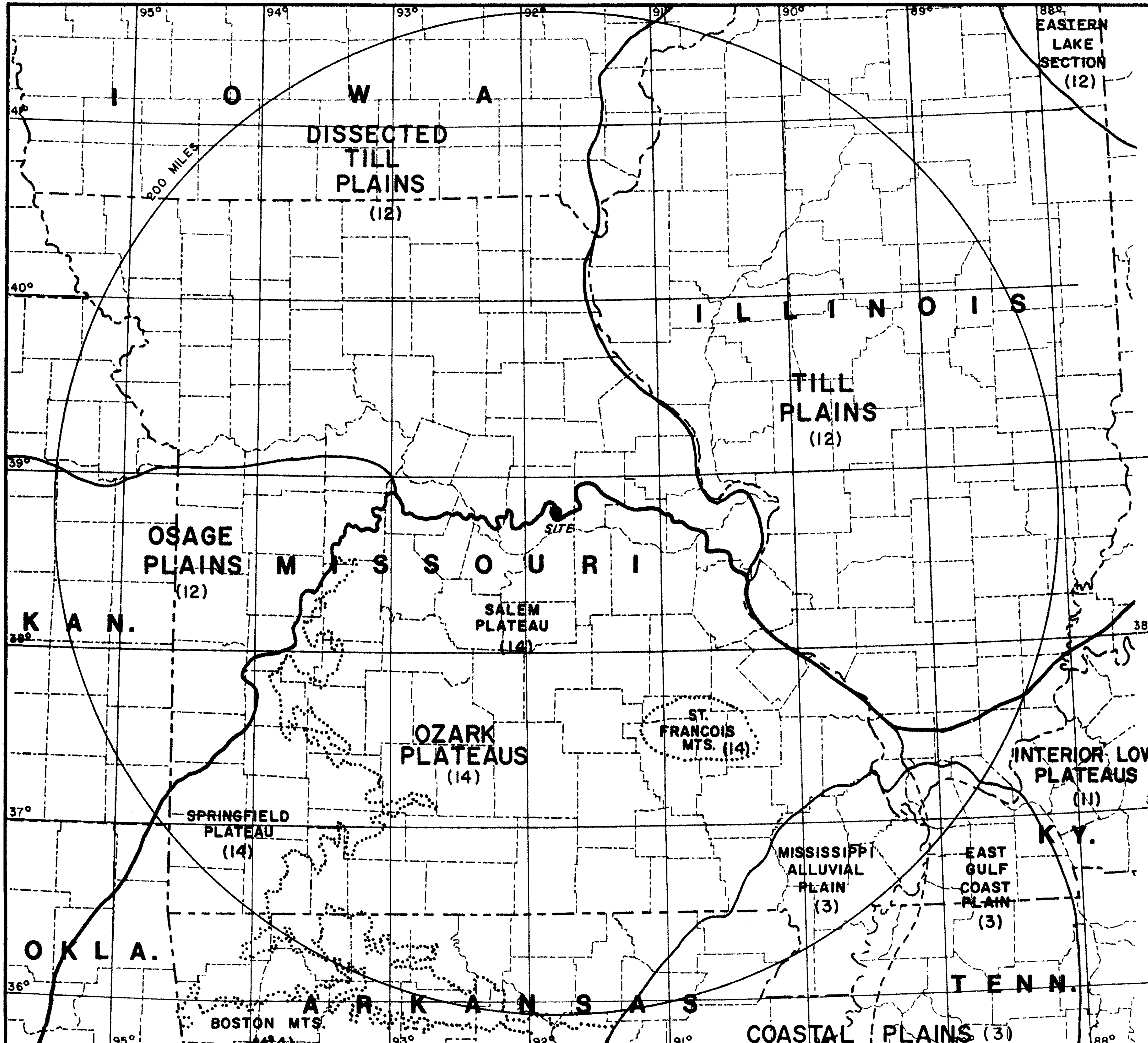
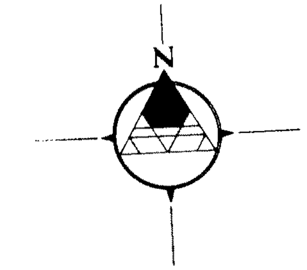
FIGURE 2.5-1
REGIONAL GEOLOGY MAP





REFERENCES:

DATA ON THIS MAP MODIFIED FROM PORTION OF: FENNEMAN, N.F., PHYSICAL DIVISION OF THE UNITED STATES: WASHINGTON D.C., U.S. DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY, 1946, MAP.

MODIFICATION WERE TAKEN FROM:

1. ILLINOIS STATE GEOLOGICAL SURVEY; PHYSIOGRAPHIC DIVISION OF ILLINOIS, 1960, MAP.
2. UNITED STATES GEOLOGICAL SURVEY AND MISSOURI DIVISION OF GEOLOGICAL SURVEY AND WATER RESOURCES, MINERAL AND WATER RESOURCES OF MISSOURI: DOCUMENT NO. 19, VOL. XLIII, 2ND, SET, ROLLA, MISSOURI, 1967, P-14.
3. CRONEIS, C., GEOLOGY OF THE ARKANSAS PALEOZOIC AREA, BULLETIN 3, LITTLE ROCK, ARKANSAS, ARKANSAS GEOLOGICAL SURVEY, 1930, PLATE III.

BASE MAP DRAFTED FROM PORTION OF UNITED STATES BASE MAP, U.S. GEOLOGICAL SURVEY, 1961.

ALL (11) AND (12) PROVINCES HAVE BEEN ASSIGNED TO A MAJOR PHYSIOGRAPHIC DIVISION CALLED THE INTERIOR HIGHLANDS MAJOR DIVISION.

THE OZARK PLATEAUS PROVINCE, (14), BELONGS TO THE INTERIOR PLAINS.

THE COASTAL PLAIN PROVINCE, (3), BELONGS TO THE ATLANTIC PLAIN MAJOR DIVISION

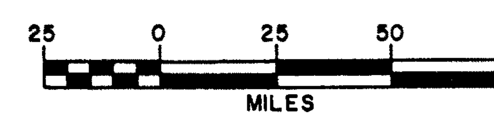


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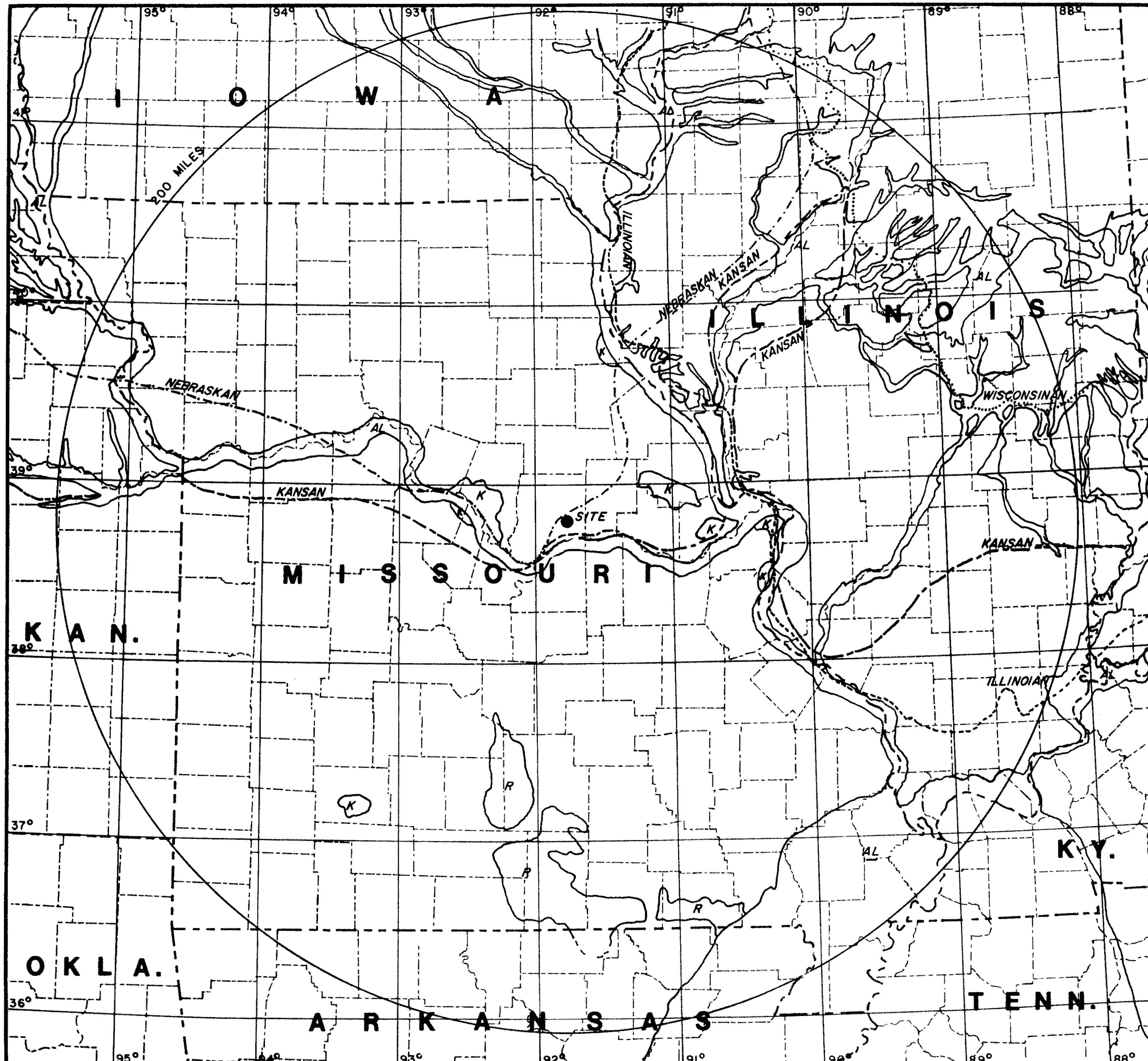
FIGURE 2.5-2
REGIONAL PHYSIOGRAPHY



LEGEND

AL ALLUVIAL SOILS; INCLUDES GLACIAL OUTWASH

R THICK RESIDUAL SOIL

K THIN SOILS OVER WELL DEVELOPED KARST TOPOGRAPHY

SOUTHERN EXTENT OF WISCONSINAN GLACIAL ADVANCES

SOUTHERN EXTENT ILLINOIAN GLACIAL ADVANCES

SOUTHERN EXTENT OF KANSAN GLACIAL ADVANCES

SOUTHERN EXTENT OF NEBASKAN GLACIAL ADVANCES

NOTES

GLACIAL SOILS OF VARIABLE THICKNESS OCCUPY THE AREAS NORTH OF THE SOUTHERN EXTENT OF GLACIATION.

NON-GLACIAL SOILS OF VARIABLE CHARACTER AND THICKNESS OCCUPY THE AREAS SOUTH OF THE SOUTHERN EXTENT OF OF GLACIATION.

DATA ON THIS MAP COMPILED FROM PORTIONS OF:

1. THE GEOLOGICAL SOCIETY OF AMERICA, GLACIAL MAP OF THE UNITED STATES EAST OF THE ROCKY MOUNTAINS: NEW YORK, 1959, MAP.
2. MISSOURI GEOLOGICAL SURVEY AND WATER RESOURCES, "GENERALIZED ENGINEERING GEOLOGY UNITS:" 1973, UNPUBLISHED MAP.

REFERENCES:

BASED MAP FROM PORTION OF UNITED STATES BASE MAP, U.S. GEOLOGICAL SURVEY, 1961.

25 0 25 50 75

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FIGURE 2.5-3

REGIONAL SURFACE SEDIMENT MAP
LIMITS OF GLACIATION

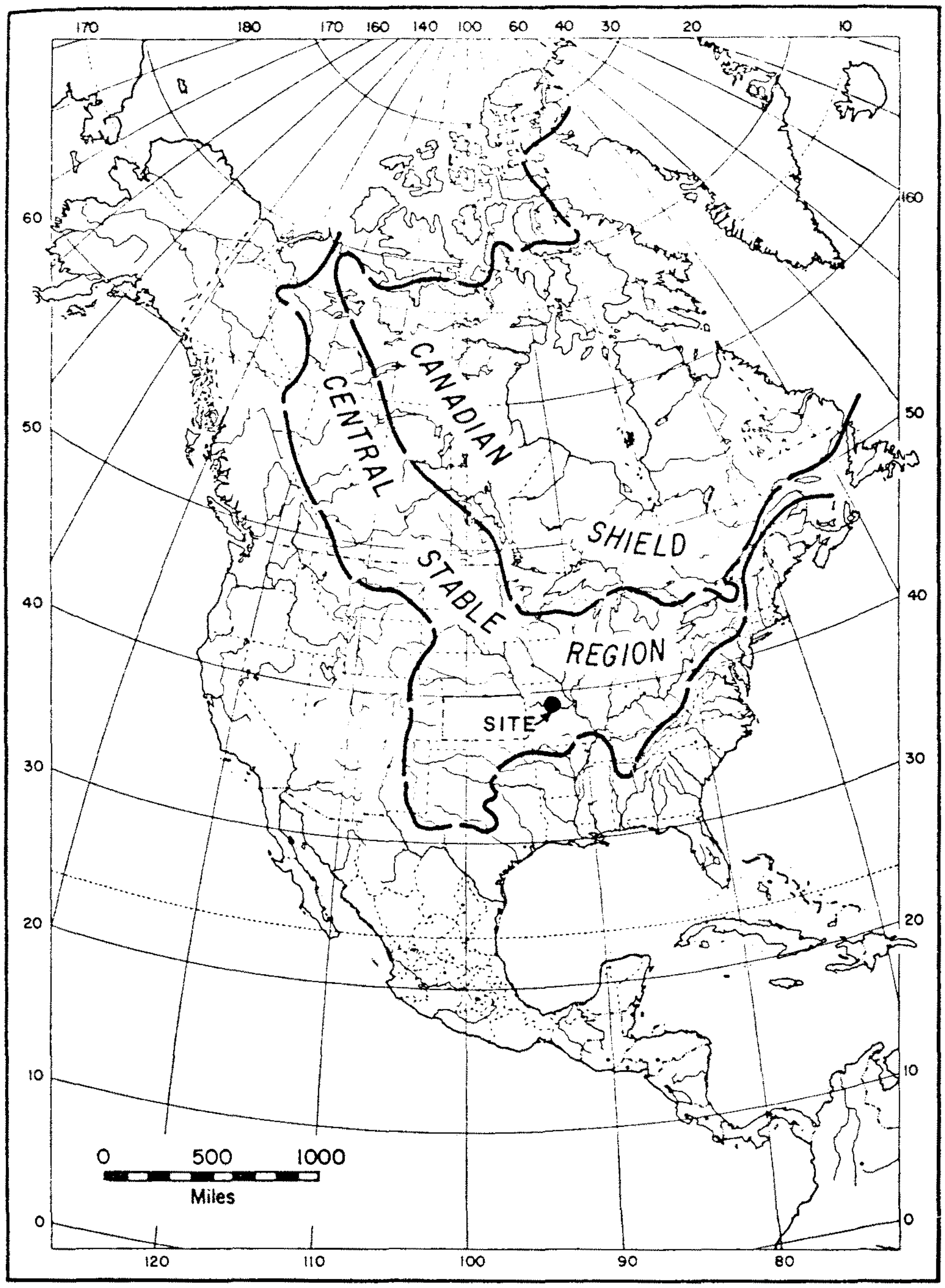

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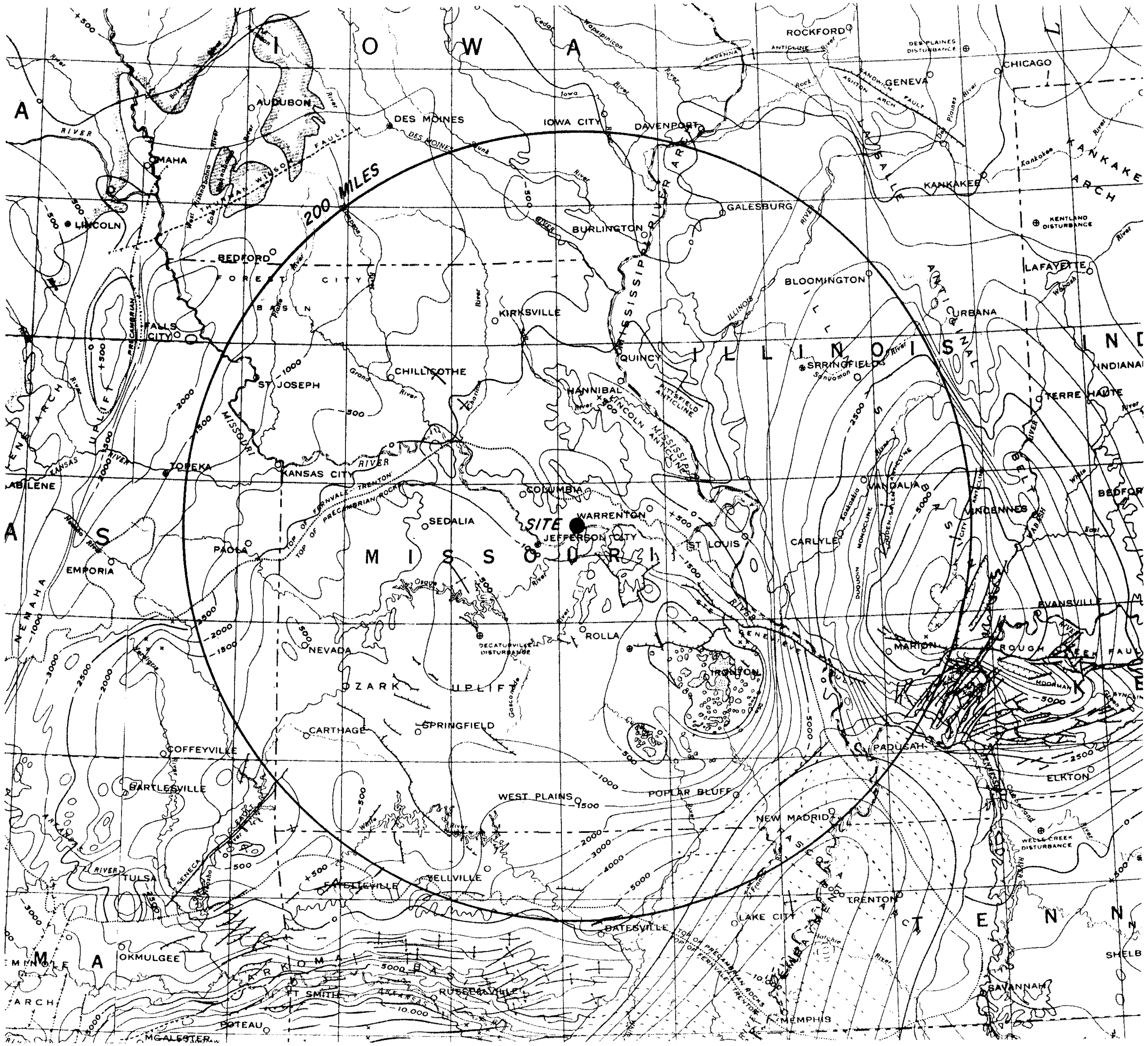
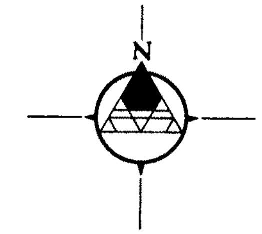
FIGURE 2.5-4

CENTRAL STABLE REGION

REFERENCE:
MODIFIED FROM INDEX MAP OF NORTH AMERICA, KANSAS GEOLOGICAL SURVEY, BULLETIN 162, FIGURE 1, P. 14, 1963; SHOWING SITE IN RELATION TO CANADIAN SHIELD AND CENTRAL STABLE REGION (ADAPTED FROM EARDLEY, 1951, STRUCTURAL GEOLOGY OF NORTH AMERICA: HARPER BROS., NEW YORK, P. 1-624).





LEGEND:

- THRUST FAULT
- NORMAL FAULT
- EN ECHELON FAULT SYSTEM
- BURIED FAULT
- UNCLASSIFIED FAULTS
- INTENSELY DISTURBED, LOCALIZED UPLIFT
- ANTICLINAL AXIS
- SYNCLINAL AXIS
- AXIS OF OVERTURNED ANTICLINE
- ELONGATE, CLOSELY COMPRESSED ANTICLINE
- STRUCTURE CONTOURS (~7500~)

REFERENCE:

UNITED STATES GEOLOGICAL SURVEY AND THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, 1962, TECTONIC MAP OF UNITED STATES.

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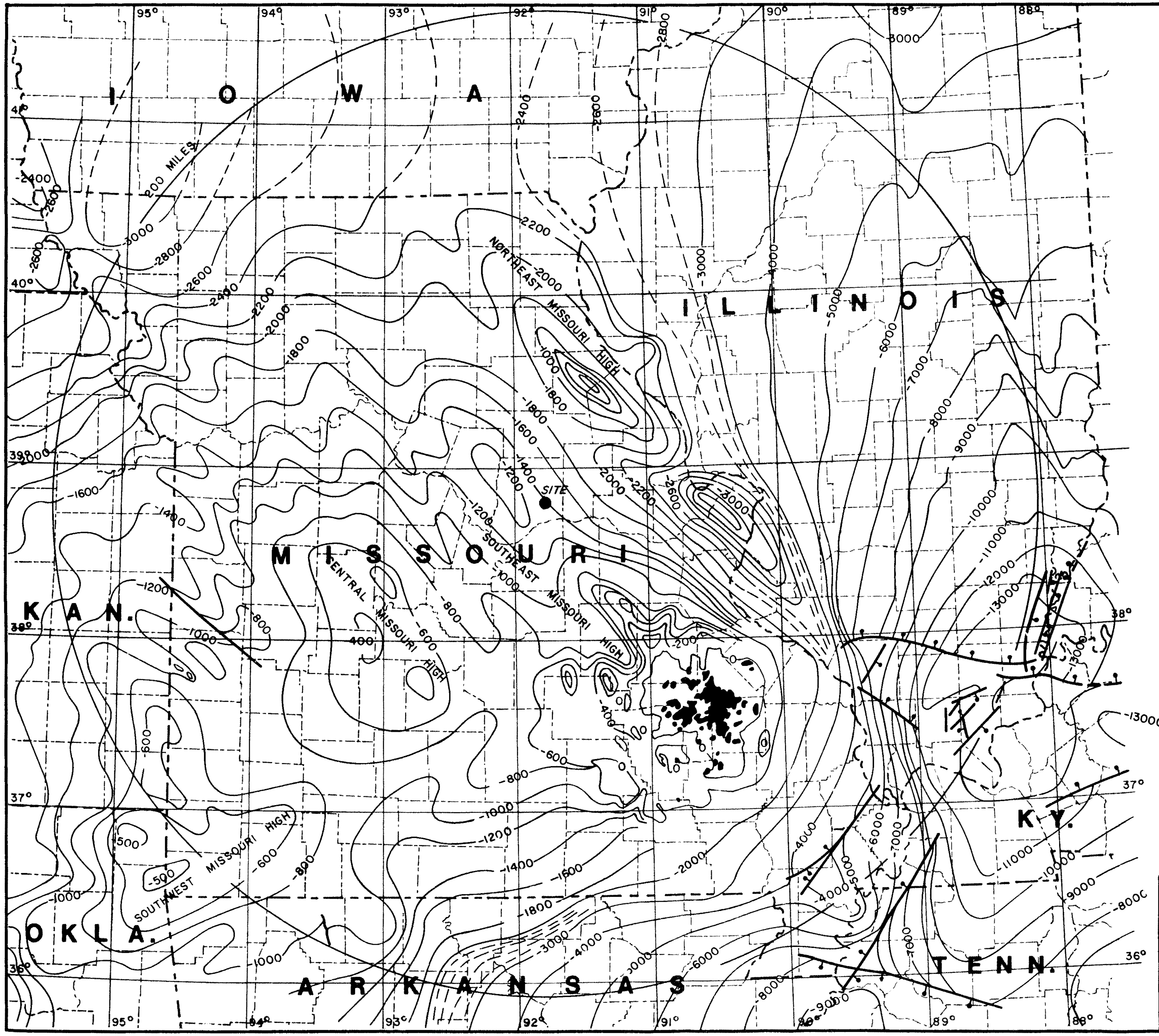
FIGURE 2.5-5

REGIONAL TECTONIC MAP



LEGEND

FAULT; DOWNTHROWN SIDE INDICATED

PRECAMBRIAN OUTCROP

NOTES:

CONTOURS WERE MODIFIED SLIGHTLY IN ORDER TO CONFORM ACROSS STATE BOUNDARIES.

DATUM IS MEAN SEA LEVEL

CONTOUR INTERVALS - 250', 500', & 1000'.

REFERENCE:

1. KISVARSANYI, E.B. OPERATION BASEMENT: BURIED PRECAMBRIAN ROCKS OF MISSOURI - THEIR PETROGRAPHY AND STRUCTURE, APRIL, 1974 A.A.P.G. BULLETIN.
2. ATHERTON, E., ET. AL., CONTOUR MAP OF PRECAMBRIAN SURFACE. ILLINOIS PETROLEUM 96, URBANA ILLINOIS, ILLINOIS STATE GEOLOGICAL SURVEY, 1971, P-24.
3. MERRIMAN, D.F., THE GEOLOGIC HISTORY OF KANSAS: BULLETIN 162, LAWRENCE, KANSAS, STATE GEOLOGICAL SURVEY OF KANSAS, 1967, P-209.
4. CARLSON, M.D., CONFIGURATION OF PRECAMBRIAN SURFACE: REPORT OF INVESTIGATION NO. 3, LINCOLN NEBRASKA, NEBRASKA GEOLOGICAL SURVEY, 1967, FIGURE 3.
5. AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS AND UNITED STATES GEOLOGICAL SURVEY, BASEMENT MAP OF NORTH AMERICA, WASHINGTON D.C., 1967, MAP.
6. BASE MAP FROM PORTION OF UNITED STATES BASE MAP, U.S. GEOLOGICAL SURVEY, 1961.

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CONTOUR INTERVAL: 200' FROM 0' TO -3000'
1000' FROM -3000' TO -13000'

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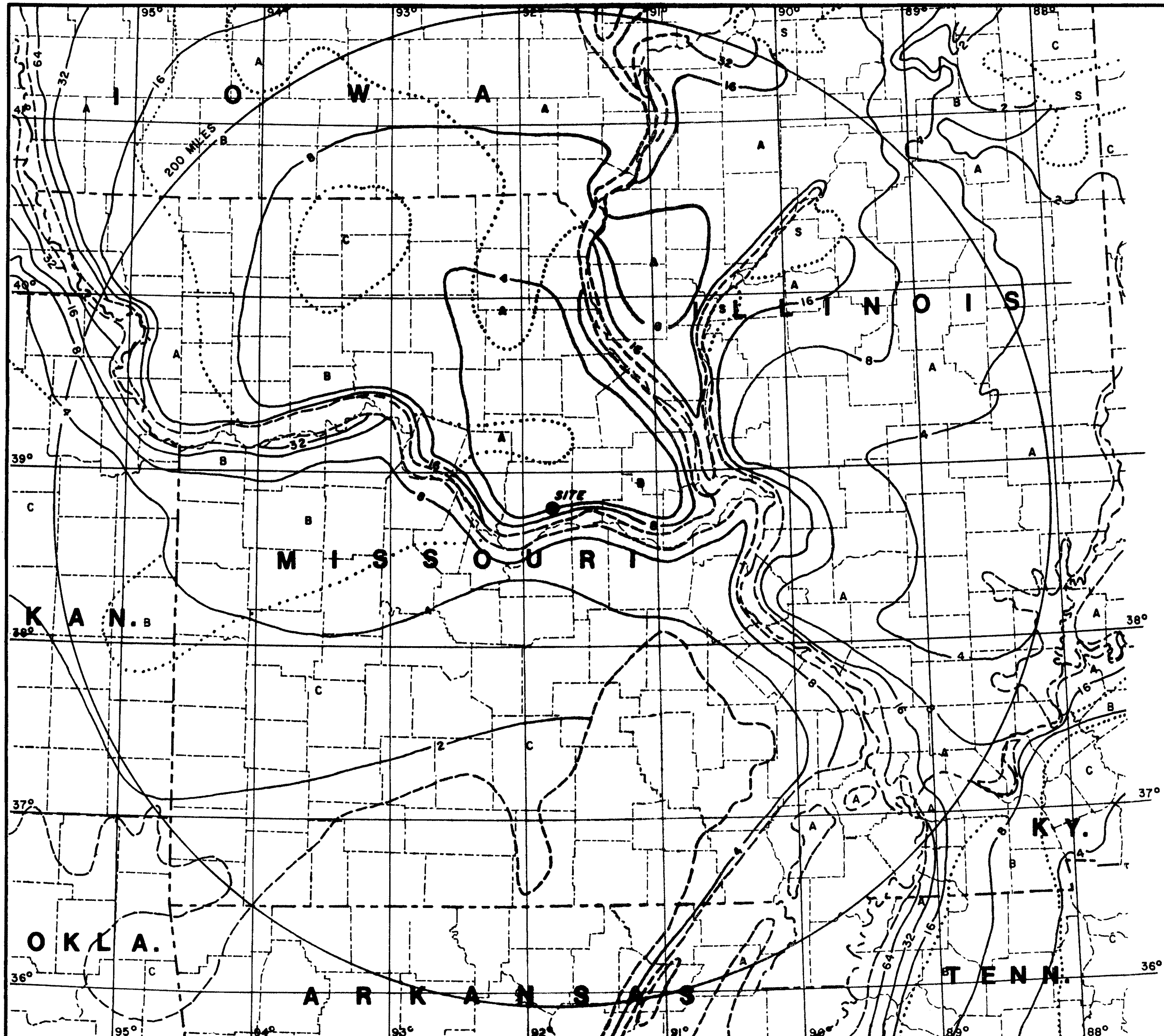
FIGURE 2.5-6

CONTOURS ON PRECAMBRIAN SURFACE



LEGEND:

—4—	CONTOUR SHOWING LOESS THICKNESS IN FEET
– – – –	APPROXIMATE LIMIT OF EOLIAN DEPOSITS
A	67 TO 100% OF SURFACE AREA COVERED BY EOLIAN DEPOSITS
B	33 TO 67% OF SURFACE AREA COVERED BY EOLIAN DEPOSITS
C	LESS THAN 33% OF SURFACE AREA COVERED BY EOLIAN DEPOSITS
········	BOUNDARY BETWEEN AREAS A, B, & C
S	DUNE SAND

NOTES:

EOLIAN DATA ON THIS MAP WAS TAKEN FROM PORTION OF PLEISTOCENE EOLIAN DEPOSITS OF THE UNITED STATES, ALASKA, AND PARTS OF CANADA, COMPILED BY NATIONAL RESEARCH COUNCIL COMMITTEE FOR THE STUDY OF EOLIAN DEPOSITS, DIVISION OF GEOLOGY AND GEOGRAPHY, GEOLOGICAL SOCIETY OF AMERICA, 1952.

REFERENCE:

BASE MAP DRAFTED FROM PORTION OF UNITED STATES BASE MAP, U.S. GEOLOGICAL SURVEY, 1961.

25 0 25 50 75

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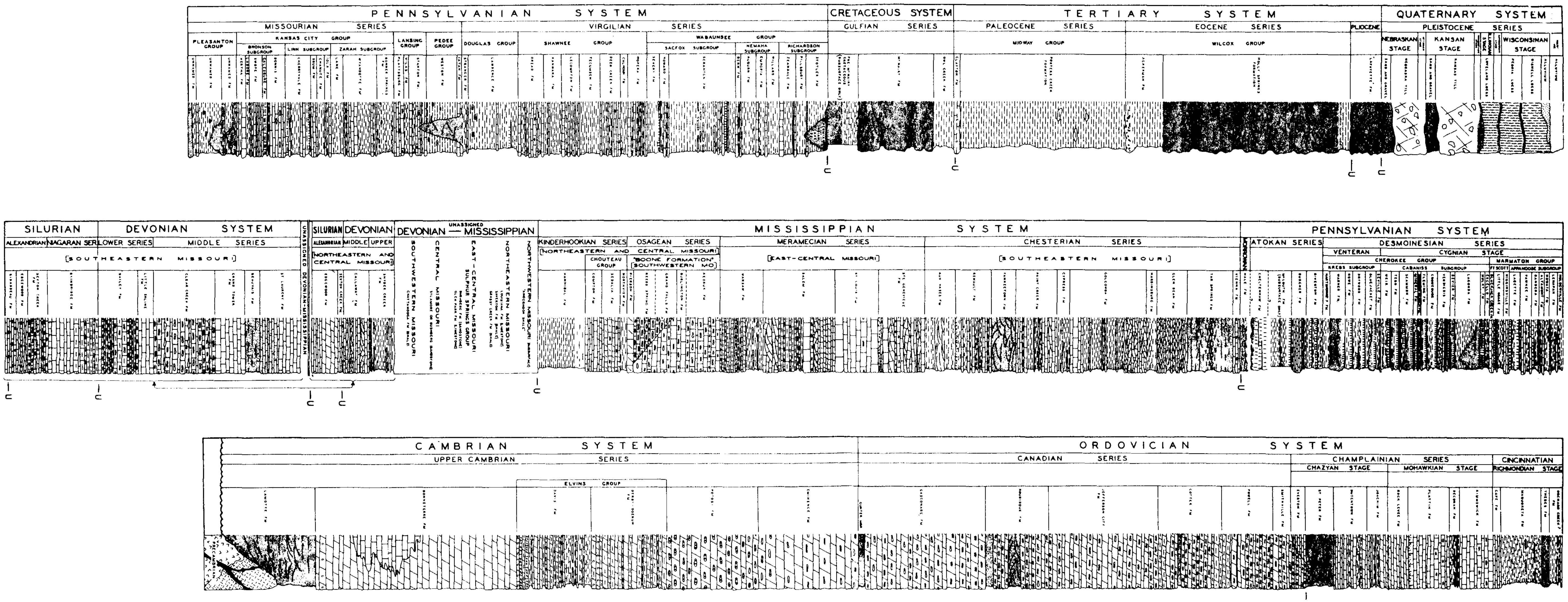
FIGURE 2.5-7

REGIONAL LOESS DISTRIBUTION AND THICKNESS



REFERENCE:
TAKEN FROM STATE OF MISSOURI
GEOLOGICAL SURVEY AND WATER
RESOURCES, ROLLA, MISSOURI,
1961.

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FIGURE 2.5-8
GENERALIZED
GEOLOGIC COLUMN
OF MISSOURI

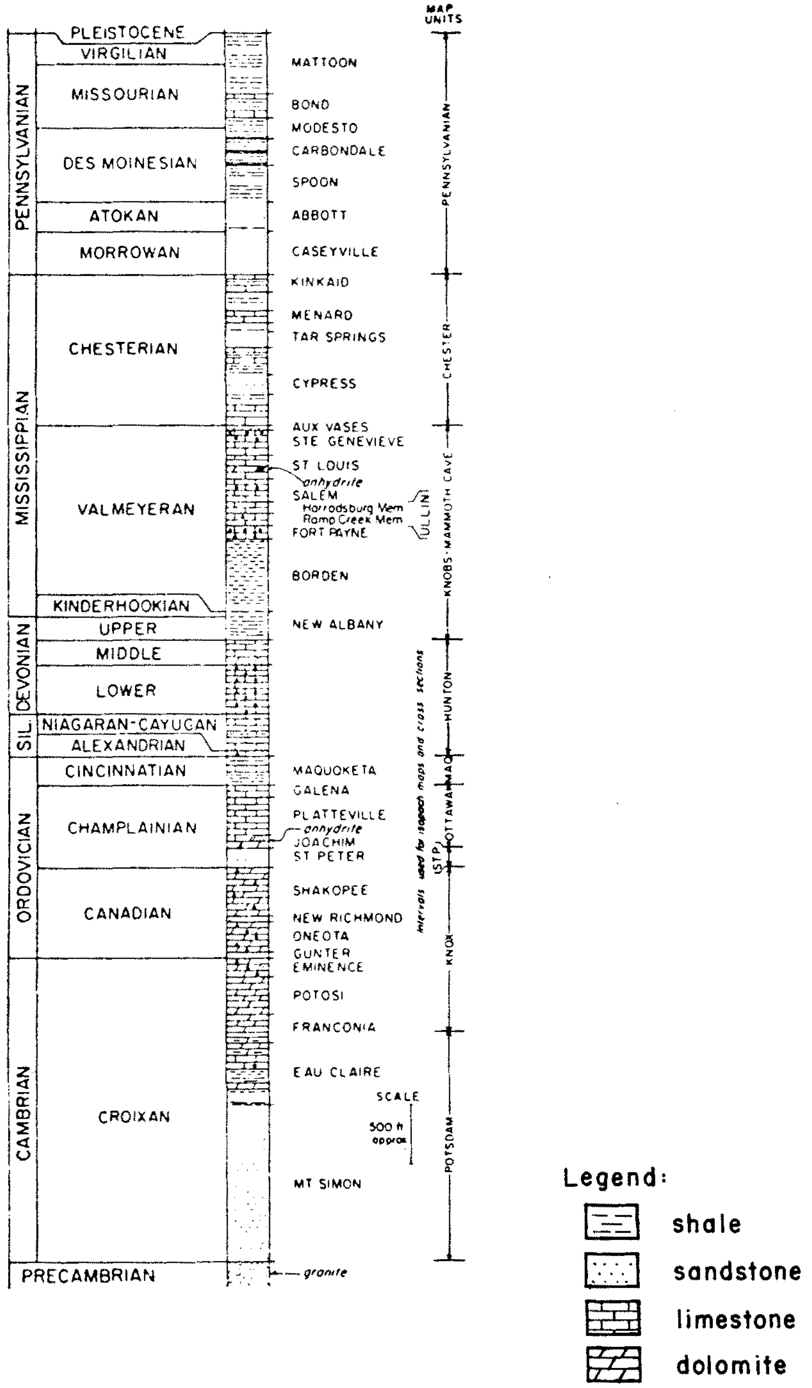

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FIGURE 2.5-9

GENERALIZED GEOLOGIC COLUMN OF ILLINOIS

REFERENCE:

THIS DRAWING TAKEN FROM:
FUTURE PETROLEUM PROVINCES OF THE UNITED STATES, THEIR GEOLOGY AND POTENTIAL MINERALS, AAPG, 1971, FIGURE 8, PAGE 1172.

REFERENCE:
TAKEN FROM IOWA GEOLOGICAL SURVEY, 1968.

SYSTEM	SERIES	GROUP	FORMATION	DESCRIPTION	THICKNESS	(MILLION YEARS)
Quaternary	Pleistocene		Wisconsin	loess, glacial till and interbedded sand and gravel		
			Illinoian		500'	
			Kansan			
			Nebraskan			
Cretaceous		Colorado	Carlile	shale		
			Greenhorn	limestone and shale	350'	
			Graneros	shale		
		Dakota		sandstone and shale	200'	90
Jurassic			Fort Dodge beds	gypsum, red and green shales in Webster County only	50'	181
Pennsylvanian	Virgil	Wabaunsee	French Creek	shale		
			Jim Creek	limestone		
			Friedrich	shale		
			Grandhaven	limestone		
			Dry	shale		
			Dover	limestone		
			Langdon includes (Nyman Coal)	shale		
			Maple Hill	limestone		
			Wamego	shale		
			Tarkio	limestone		
			Willard	shale		
			Elmont	limestone		
			Harveyville	shale		
			Reading	limestone	210'	
			Auburn	shale		
			Wakarusa	limestone		
			Soldier Creek	shale		
			Burlingame	limestone		
			Silver Lake	shale		
			Rulo	limestone		
			Cedar Vale (includes Elmo bed at top)	shale		
			Happy Hollow	limestone		
			White Cloud	shale		
			Howard	limestone		
			Severy (includes Nodaway coal bed at base)	shale		
		Shawnee	Topeka	limestone		
			Calhoun	shale		
			Deer Creek	limestone		
			Tecumseh	shale	180'	
			Lecompton	limestone		
			Kanwaka	shale		
			Oread	limestone		
		Douglas	Lawrence	shale		
			Stranger	shale	110'	
			Iatan	limestone		
			Weston	shale		
	Missouri	Lansing	Stanton	limestone		
			Vilas	shale	50'	
			Plattsburg	limestone		
		Kansas City	Bonner Springs	shale		
			Wyandotte	limestone and shale		
			Lane	shale		
			Iola	limestone and shale		
			Chanute	shale		
			Drum	limestone		
			Quivira	shale	215'	
			Westerville	limestone		
			Cherryvale	shale		
			Dennis	limestone and shale		
			Galesburg	shale		
			Swope	limestone		
			Ladore	shale		
			Hertha	limestone		
		Pleasanton	undifferentiated	shale and sandstone, thin coal beds	40'	
	Des Moines	Marmaton	Lenapah	limestone		
			Nowata	shale		
			Altamont	limestone and shale		
			Bandera	shale	145'	
			Pawnee	limestone and shale		
			Labette	shale		
			Fort Scott	limestone		
		Cherokee	undifferentiated	shale, sandstone, thin limestones and coal	755'	310
Mississippian	Meramec		Ste. Genevieve	shale and limestone		
			St. Louis	sandy limestone	140'	
			Spergen	limestone		
	Osage		Warsaw	shale and dolomite		
			Keokuk	cherty dolomite and limestone	250'	
			Burlington	cherty dolomite and limestone		
	Kinderhook		Gilmore City	limestone, oolitic	300'	
			Hampton	limestone and dolomite		
		North Hill	Starrs Cave	limestone		
			Prospect Hill	siltstone	100'	
			McCraney	limestone		345
Devonian	Upper	Yellow Spring	English River	siltstone		
			Maple Mill	shale	300'	
			Aplington	dolomite		
			Sheffield	shale		
			Lime Creek	dolomite and shale	225'	
			Shell Rock	limestone and dolomite		
	Middle		Cedar Valley	limestone and dolomite		
			Wapsipinicon	limestone and dolomites, shales in middle	270'	
	Lower		La Porte City	chert, limestone and dolomite	50 - 100'	400
Silurian	Niagaran		Gower	dolomite	300'	
			Hopkinton			
	Alexandrian		Kankakee	cherty dolomite	100'	
			Edgewood	sandy dolomite		425
Ordovician	Cincinnatian		Maquoketa	dolomite and shale	300'	
	Mohawkian		Galena	dolomite and chert	320'	
			Decorah	limestone and shale		
			Platteville	limestone, shale and sandstone	70'	
	Chazyan		St. Peter	sandstone	50 - 230'	
	Beekmantown		Prairie du Chien	sandy and cherty dolomite and sandstone	290'	500
Cambrian	St. Croixan	Trempealeau	Madison[a]	sandstone		
			Jordan		185'	
			Lodi[a]			
			St. Lawrence	dolomite		
			Franconia	glauconitic sandstone, siltstone, shale	160'	
		Dresbach	Galesville	sandstone		
			Eau Claire	sandstone and shale, dolomite	550'	
			Mt. Simon	sandstone		600?
Precambrian				sediments (sandstones), igneous, and metamorphic rocks		

[a] recognized only in extreme northeast Iowa

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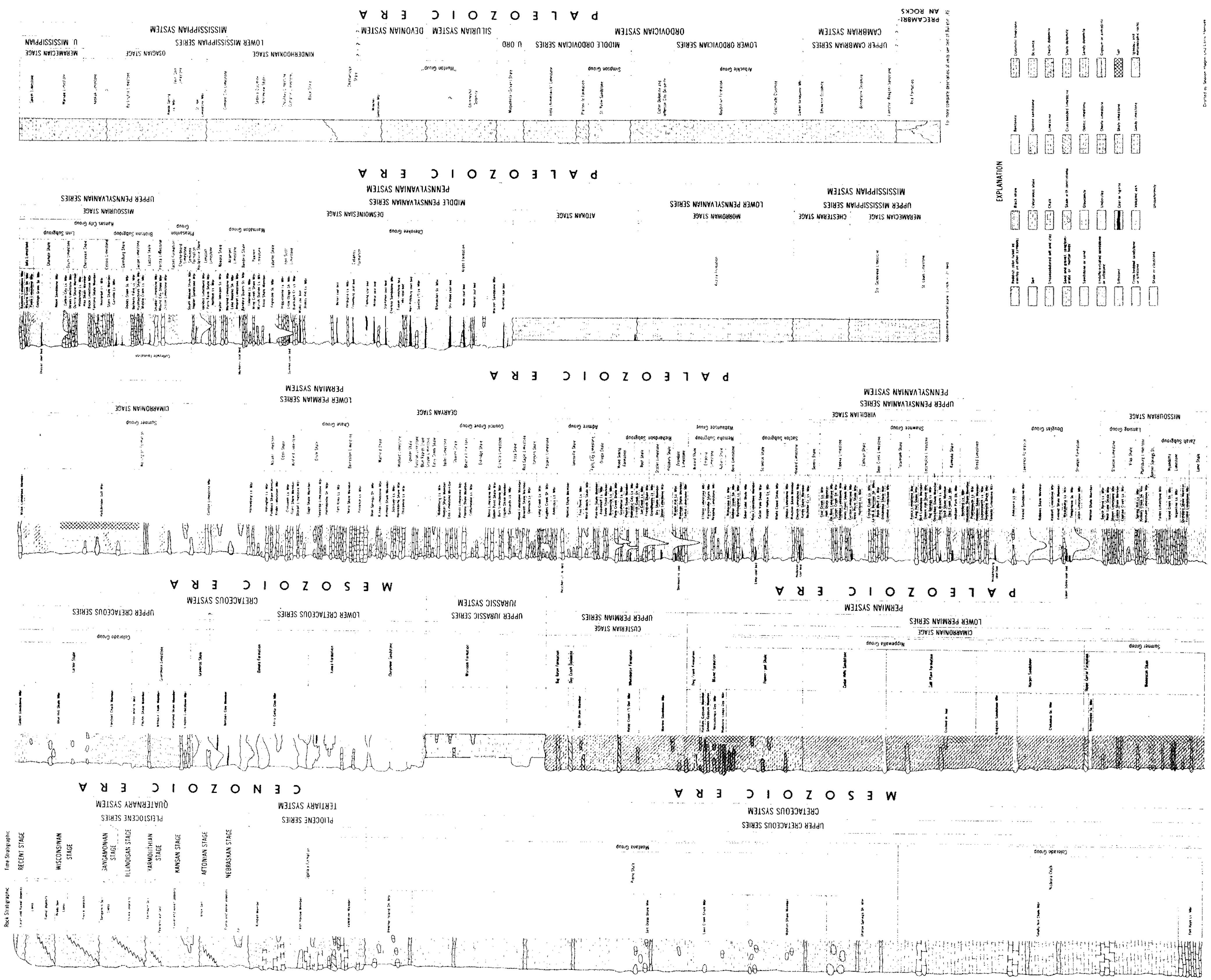
FIGURE 2.5-10
GENERALIZED GEOLOGIC COLUMN OF IOWA



REFERENCE:
TAKEN FROM D.E. ZELLER, THE STRATIGRAPHIC SUCCESSION IN KANSAS, BULL. 189, STATE GEOLOGICAL SURVEY OF KANSAS, 1968, PLATE 1.

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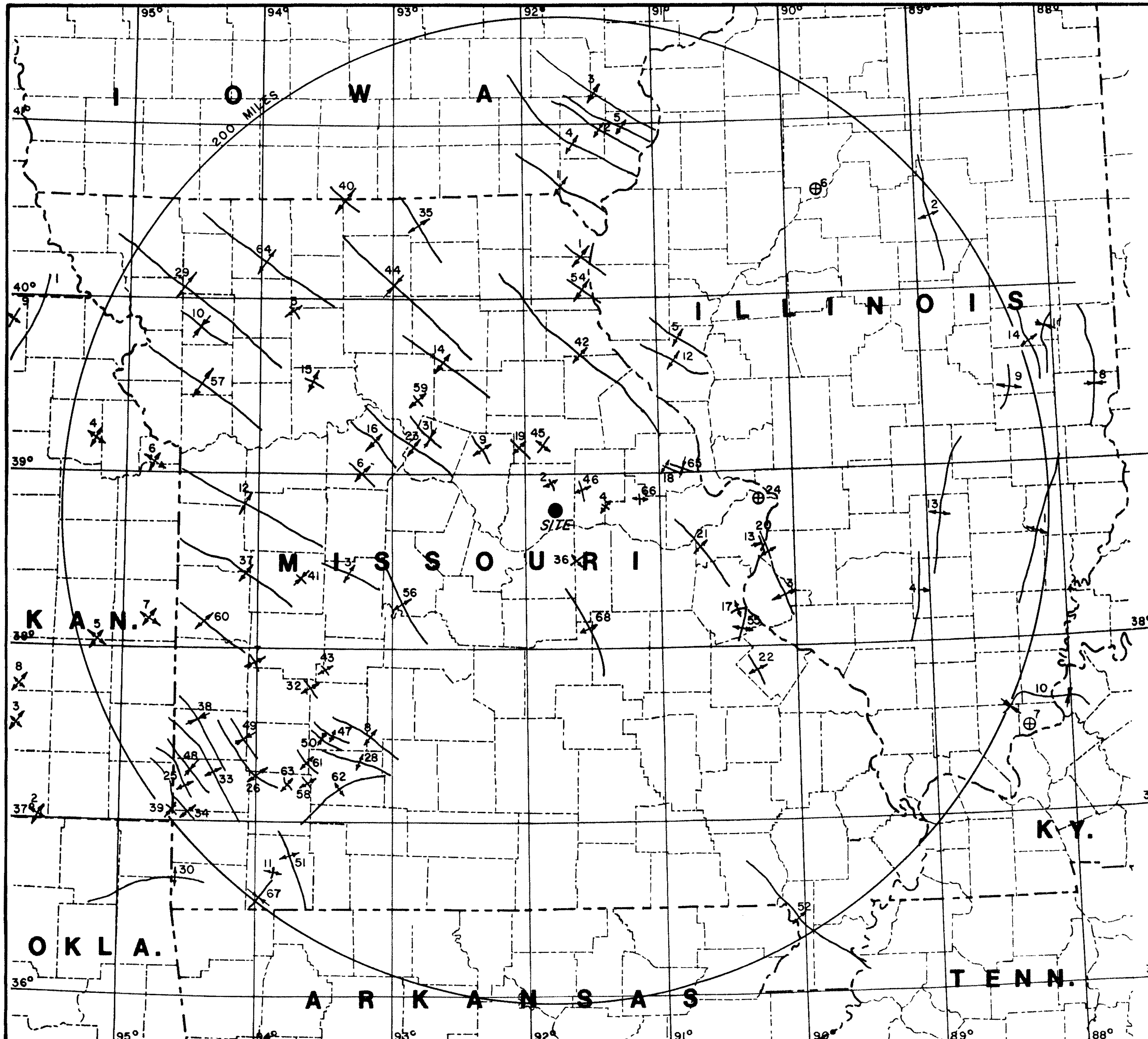
FIGURE 2.5-11

GENERALIZED GEOLOGIC COLUMN OF KANSAS



LEGEND:

AXIS OF ANTICLINE

AXIS OF SYNCLINE

MONOCLINE

⊕ X DOME OR DISTURBANCE

NOTE:

FOLDS ARE IDENTIFIED ON TABLE 2.5-2

REFERENCES:

DATA SHOWN ON THIS MAP WAS COMPILED FROM PORTIONS OF:

1. McCRACKEN, M.H., STRUCTURAL FEATURES OF MISSOURI; REPORT OF INVESTIGATION NO. 49, ROLLA, MISSOURI, MISSOURI GEOLOGICAL SURVEY AND WATER RESOURCES, 1971, MAP.
2. MERRIMAN, D.F. THE GEOLOGIC HISTORY KANSAS; BULLETIN 162, LAWRENCE, KANSAS, STATE GEOLOGICAL SURVEY OF KANSAS, 1963, FIGURE 101.
3. BUSCHBACH, T.C., STRUCTURE CONTOURS ON TOP OF GALENA GROUP , 1973, UNPUBLISHED MAP.
4. ILLINOIS STATE GEOLOGICAL SURVEY, STRUCTURAL FEATURES OF THE EASTERN INTERIOR REGION; ILLINOIS PETROLEUM 96, 1971, FIGURE 1.
5. CLEGG, K.E., SUBSURFACE GEOLOGY AND COAL RESOURCES OF THE PENNSYLVANIAN SYSTEM IN CLARK AND EDGAR COUNTIES, ILLINOIS; CIRCULAR 380, URBANA, ILLINOIS, ILLINOIS, STATE GEOLOGICAL SURVEY, 1965, P-6.
6. LANDES, K.K., PETROLEUM GEOLOGY; NEW YORK, JOHN WILEY AND SONS, 1951, P-378, FIGURE 111.
7. IOWA GEOLOGICAL SURVEY, STRUCTURAL MAP OF SOUTHEASTERN IOWA; REPORT INVESTIGATION 1, IOWA CITY, IOWA, 1964, PLATE 2.
8. ILLINOIS STATE GEOLOGICAL SURVEY, GEOLOGIC MAP OF ILLINOIS; URBANA, ILLINOIS, 1967, MAP.
9. BASE MAP DRAFTED FROM PORTION OF UNITED STATES BASE MAP; U.S. GEOLOGICAL SURVEY, 1961.

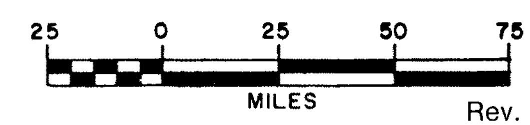


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FIGURE 2.5-12
REGIONAL FOLDING

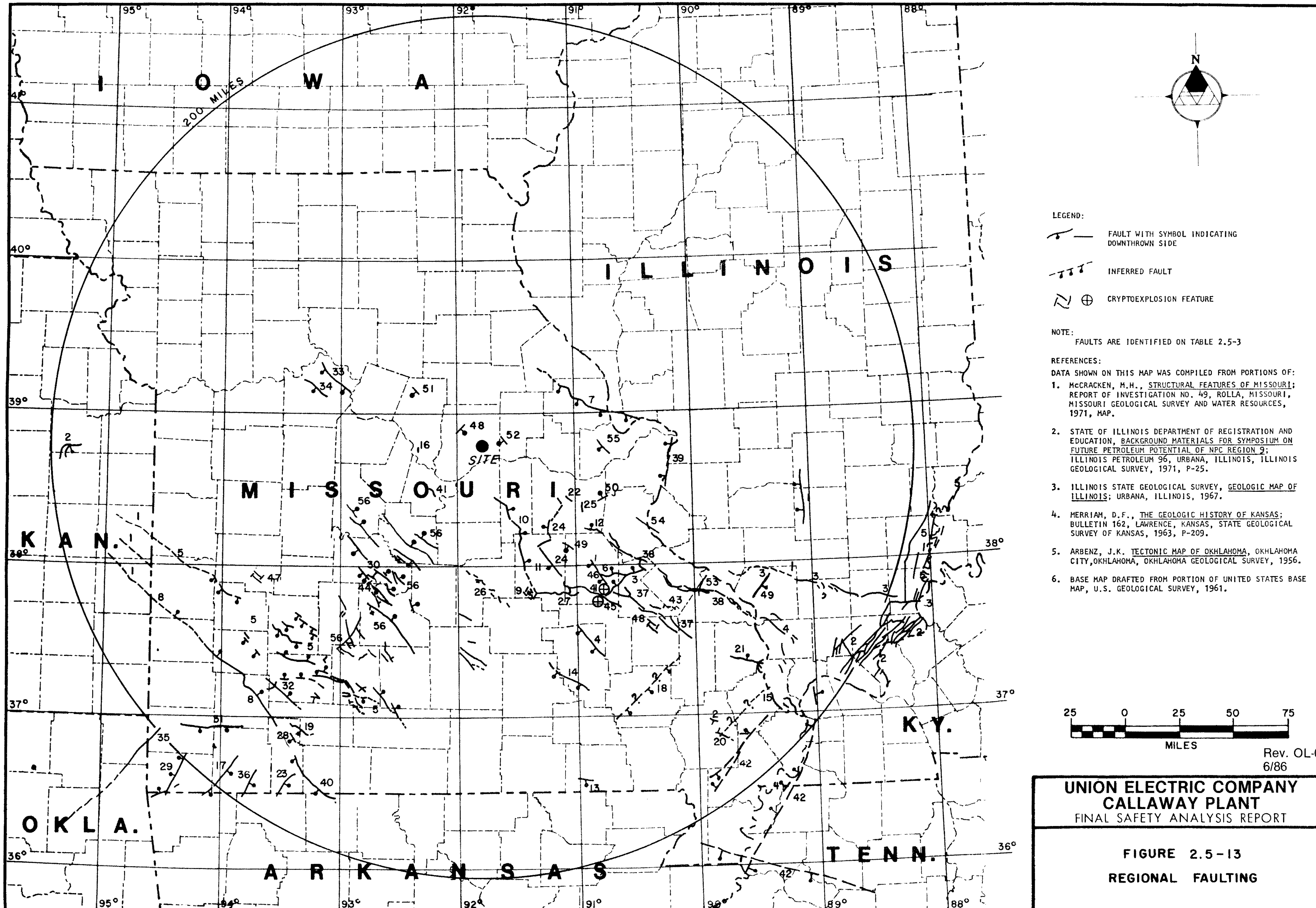

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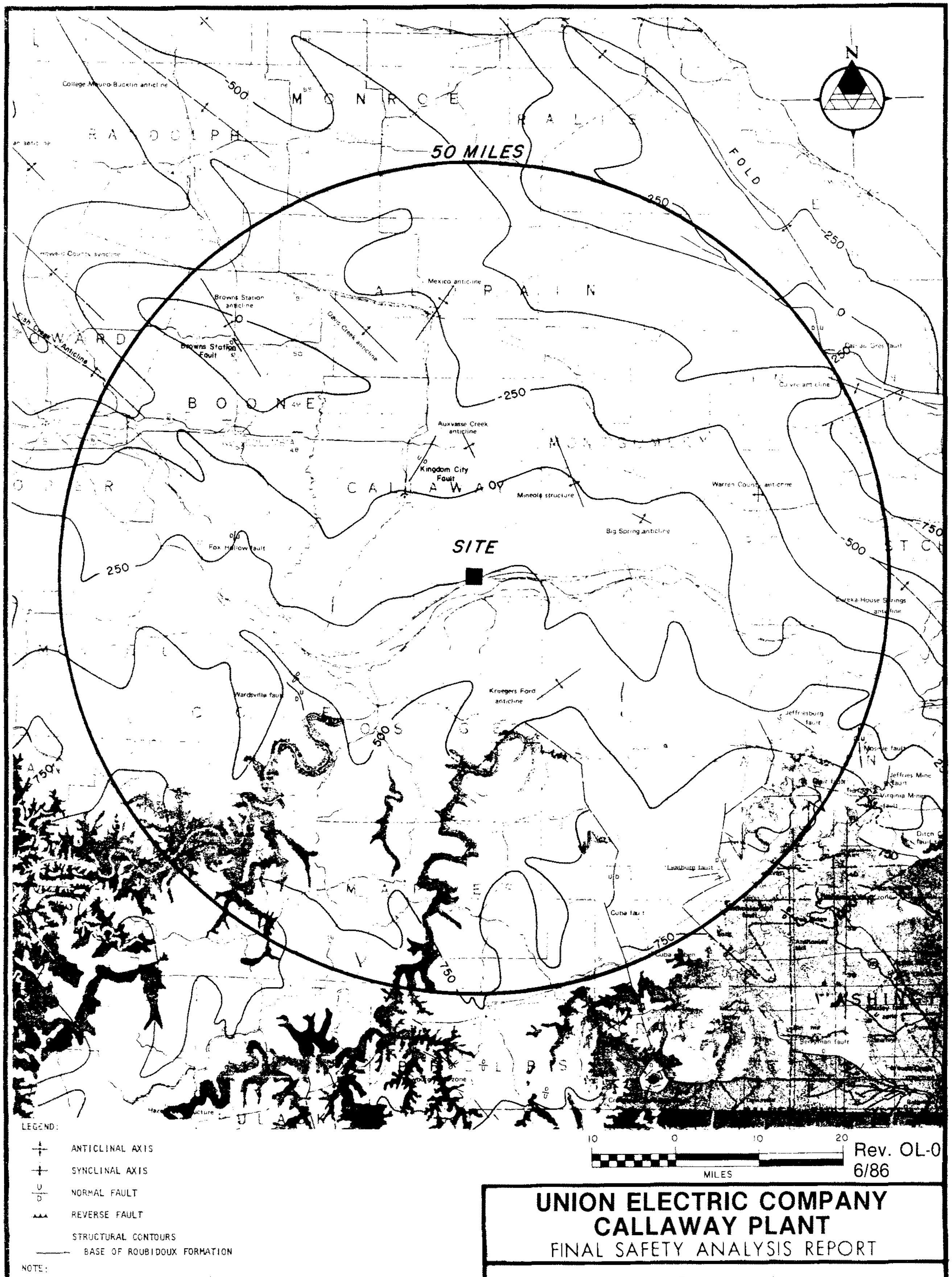
FIGURE 2.5-13
REGIONAL FAULTING



LEGEND:

ANTICLINAL AXIS

SYNCLINAL AXIS

NORMAL FAULT

REVERSE FAULT

STRUCTURAL CONTOURS
BASE OF ROUBIDOUX FORMATION

NOTE:
FEATURES ARE LISTED ON TABLES 2.5-4 AND 2.5-5

REFERENCES:
A PORTION OF STRUCTURAL FEATURES MAP OF MISSOURI, COMPILED BY MARY H. McCRACKEN, MISSOURI GEOLOGICAL SURVEY AND WATER RESOURCES, 1971.

CONTOURS ON TOP OF ROUBIDOUX FORMATION OF ORDOVICIAN AGE.

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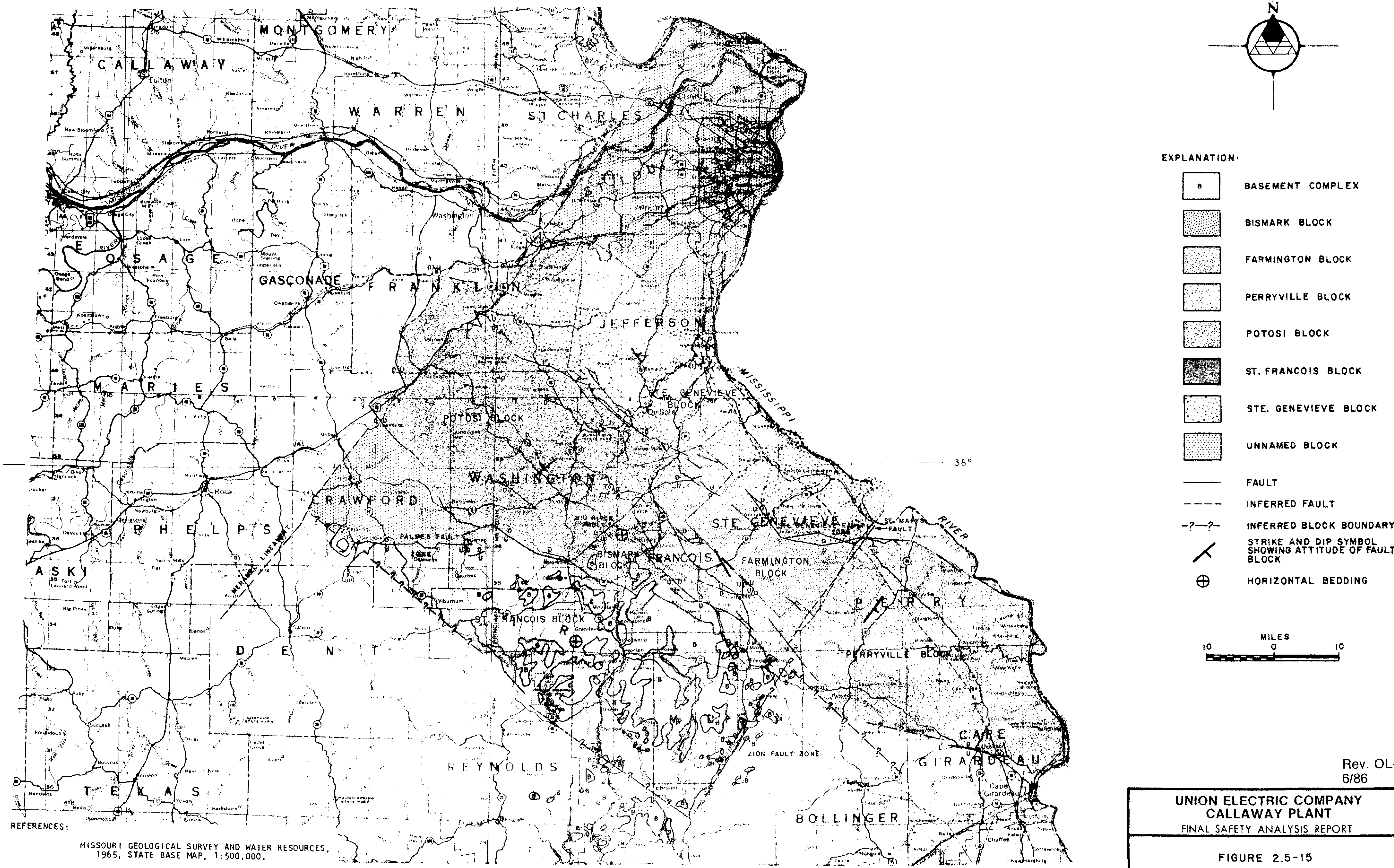
FIGURE 2.5-14

TECTONIC FEATURES WITHIN 50 MILES OF THE SITE



REFERENCES:

MISSOURI GEOLOGICAL SURVEY AND WATER RESOURCES, 1965, STATE BASE MAP, 1:500,000.

GEOLOGICAL MAP OF MISSOURI, 1961, COMPILED BY M. McCRACKEN.

GEOLOGY BY GIBBONS, 1965-66 AND 1974-75.

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FIGURE 2.5-15

TILTED FAULT BLOCKS OF THE EASTERN OZARK REGION

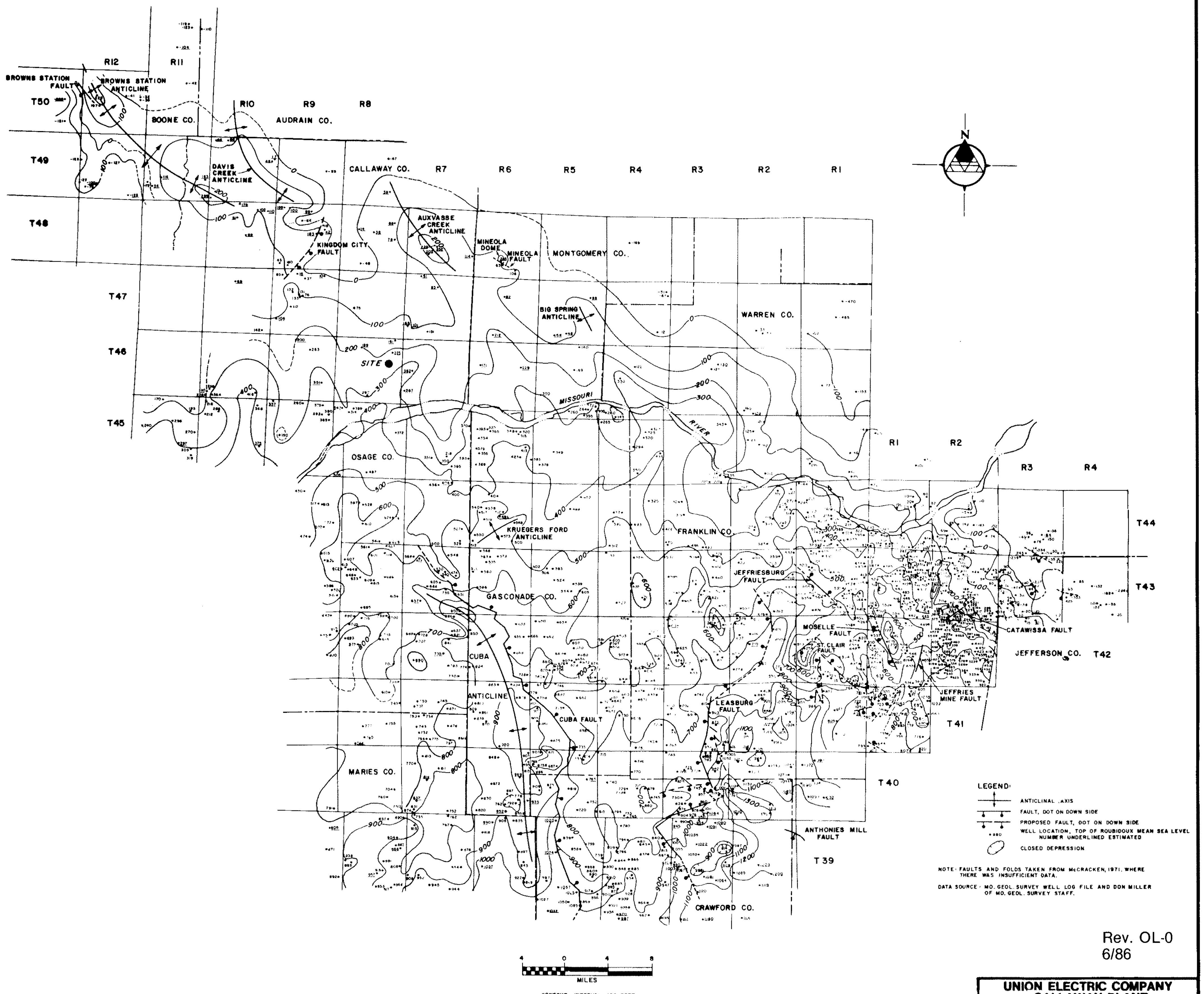

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FIGURE 2.5-16

STRUCTURE CONTOURS ON TOP OF ROUBIDOUX FORMATION

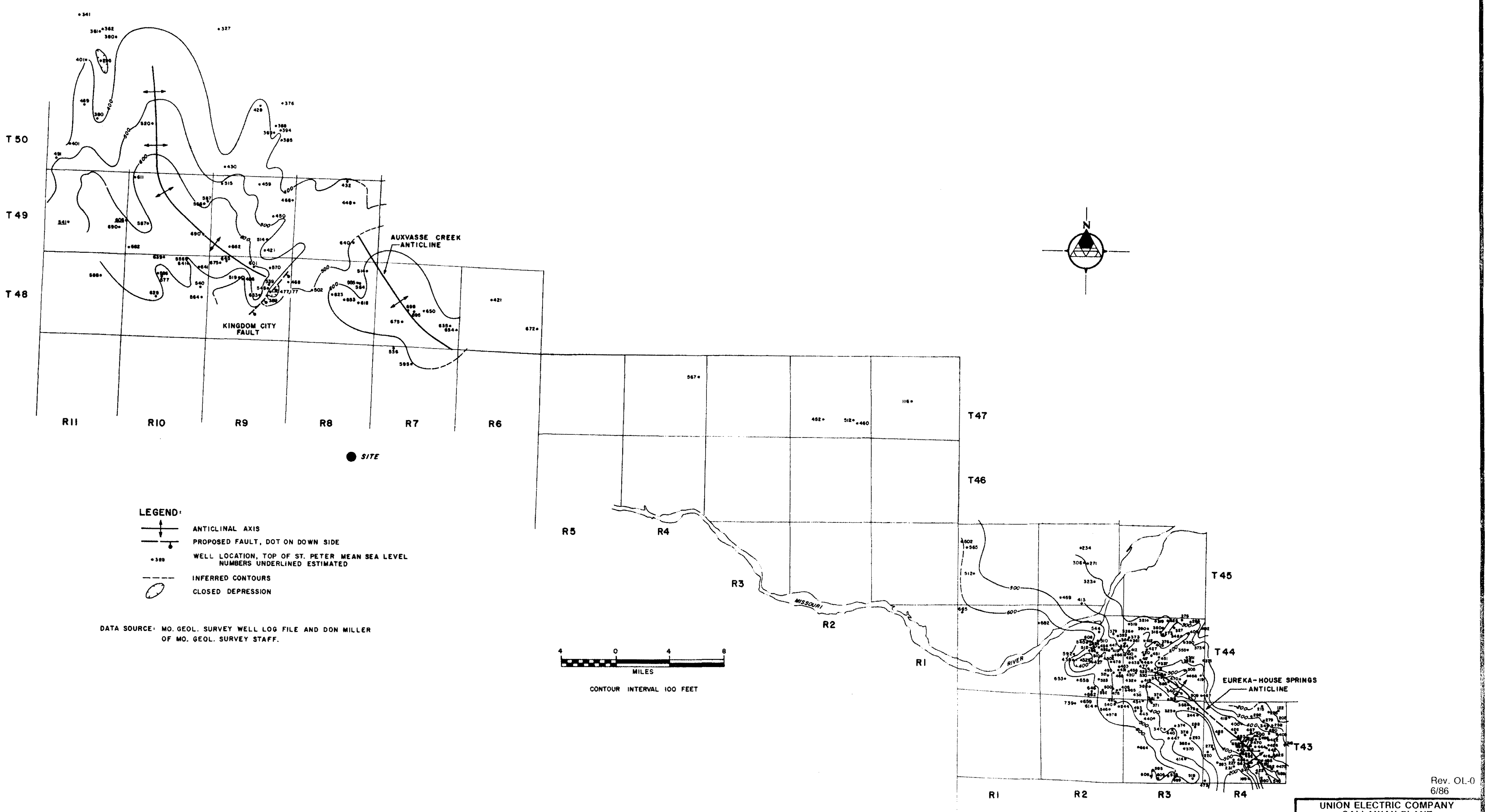

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FIGURE 2.5-17

STRUCTURE CONTOURS ON TOP OF ST. PETER FORMATION

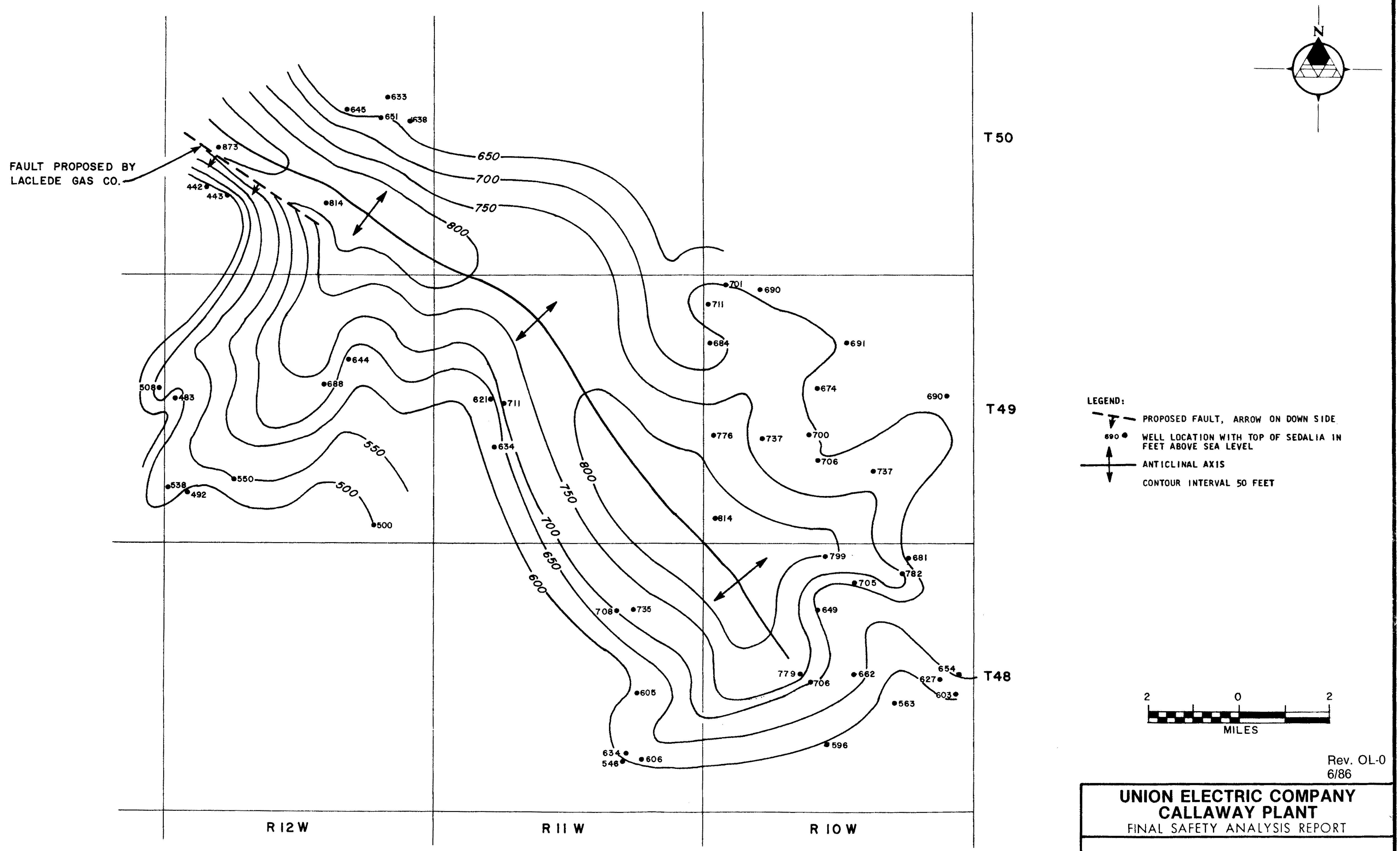

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FIGURE 2.5-18

BROWNS STATION ANTICLINE CONTOURS ON TOP OF THE SEDALIA FORMATION

REFERENCE: LACLEDE GAS COMPANY, HALLSVILLE UNDERGROUND STORAGE, BROWNS STATION ANTICLINE, CONTOUR MAP ON BASE OF CHOUTEAU LIMESTONE.

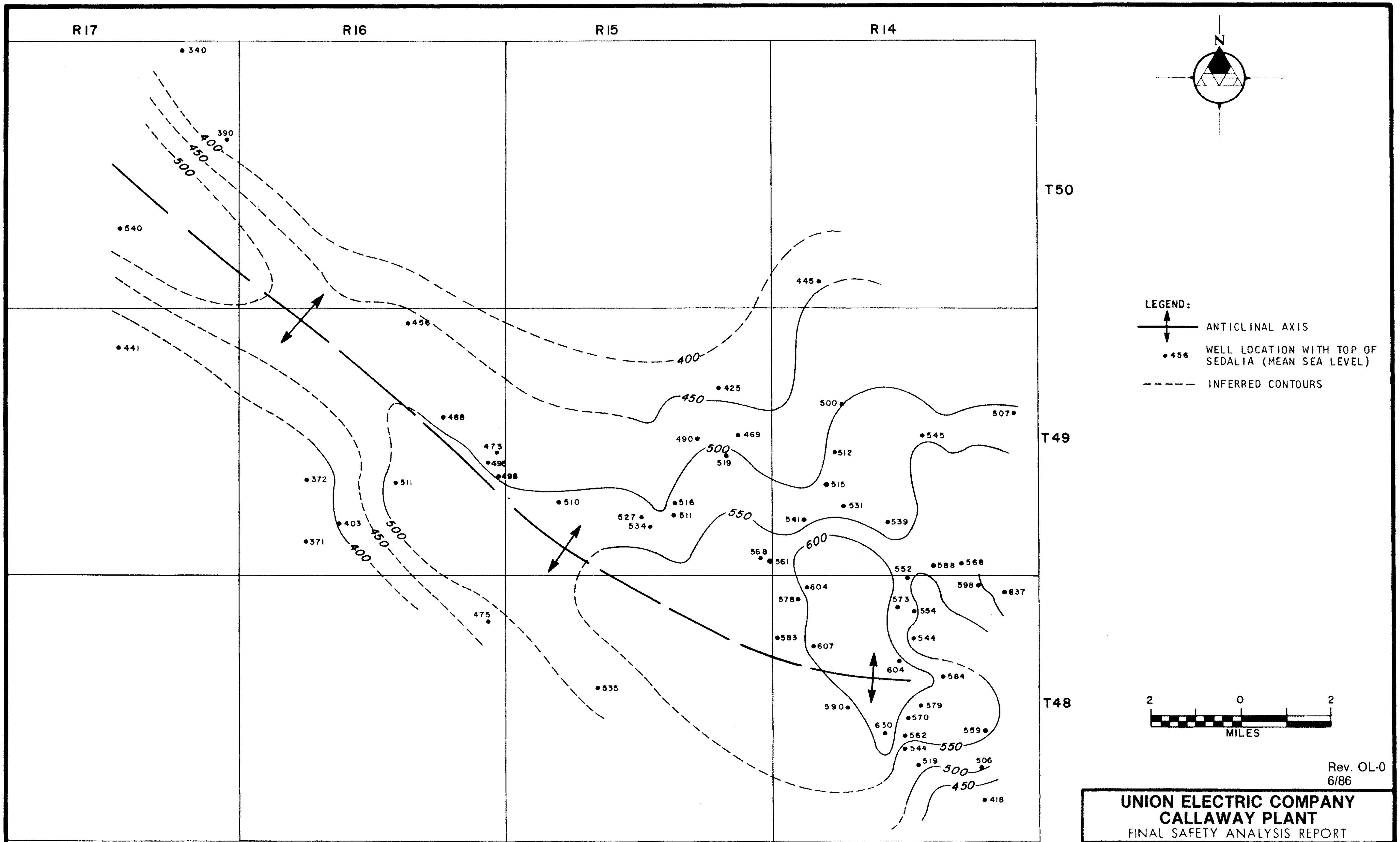

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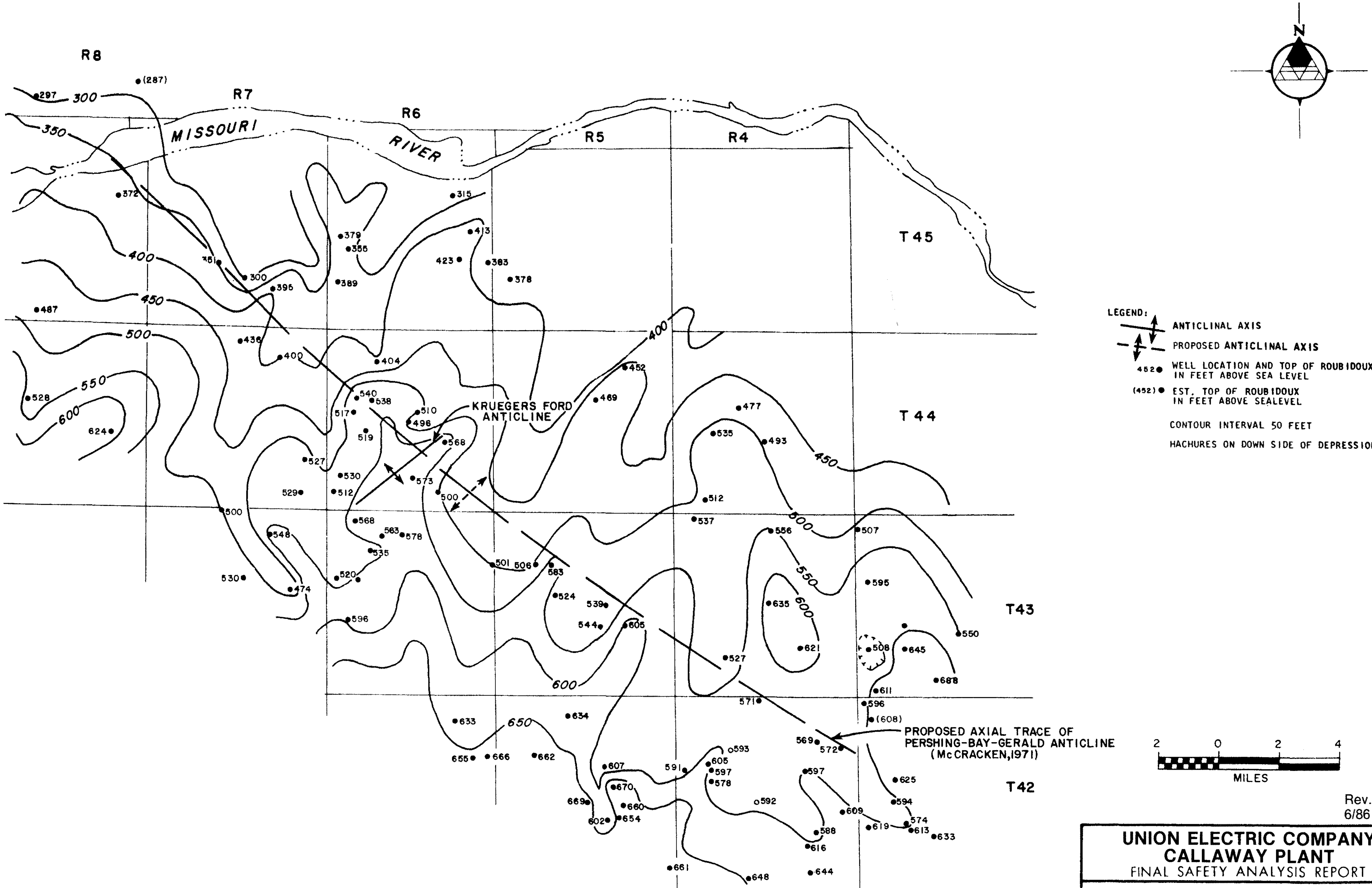
FIGURE 2.5-19
SOUTHEASTERN TERMINUS OF THE FISH CREEK ANTICLINE FROM CONTOURS ON TOP OF SEDALIA FORMATION



REFERENCE: McCRACKEN, M.H., 1971, STRUCTURAL FEATURES OF MISSOURI, MO. GEOL. SURVEY, REPT. INV. 49, MAP.

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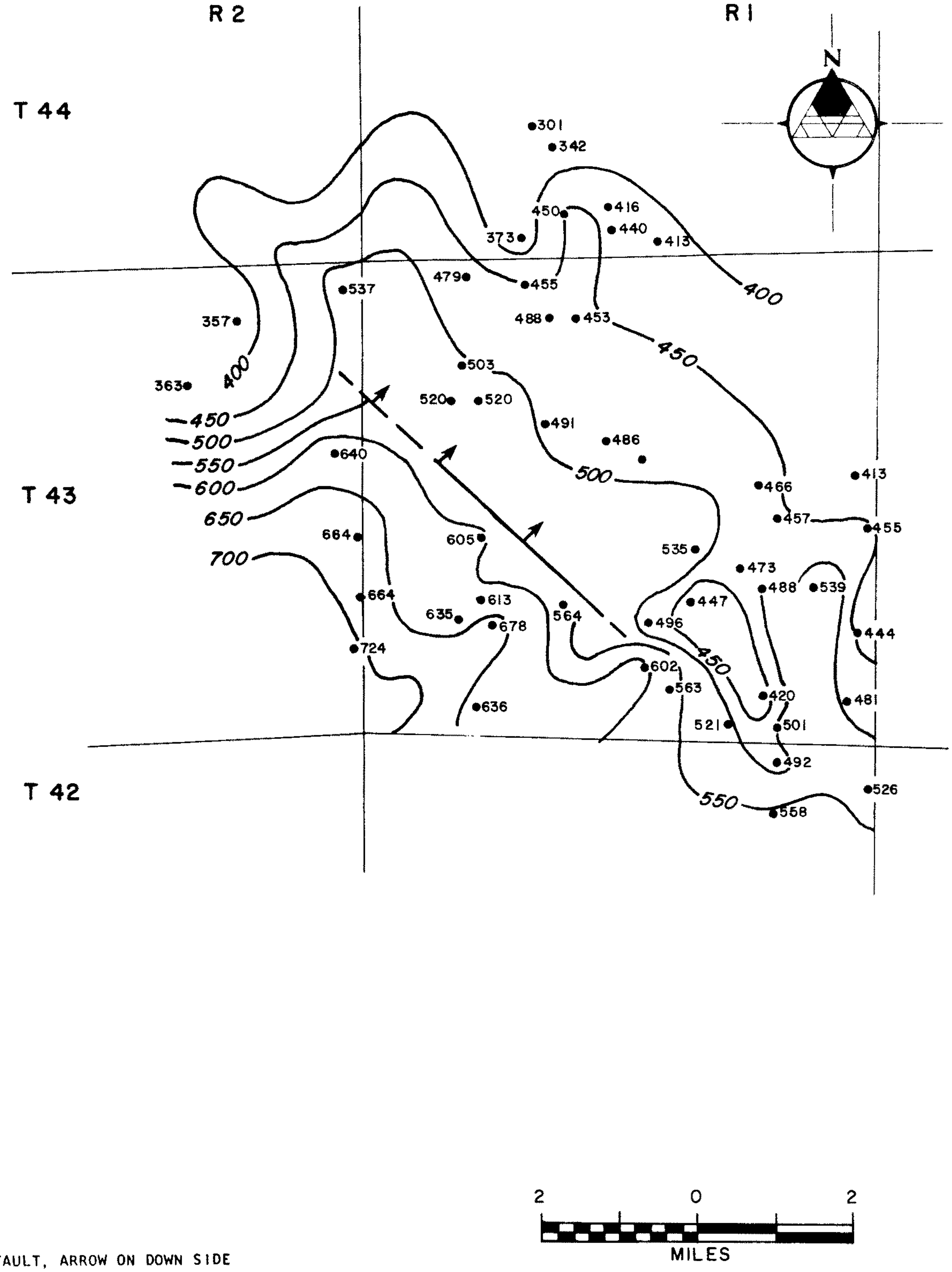
FIGURE 2.5-20

PERSHING-BAY-GERALD AREA CONTOURS ON TOP OF THE ROUBIDOUX FORMATION



LEGEND:

FAULT, ARROW ON DOWN SIDE

PROPOSED FAULT

724 ● WELL LOCATION AND TOP OF ROUBIDOUX IN FEET ABOVE SEALEVEL

CONTOUR INTERVAL 50 FEET

REFERENCE: FAULT MODIFIED FROM McCRACKEN, M.H., 1971, STRUCTURAL FEATURES OF MISSOURI, MO. GEOL. SURVEY, REPT. INV. 49, MAP.

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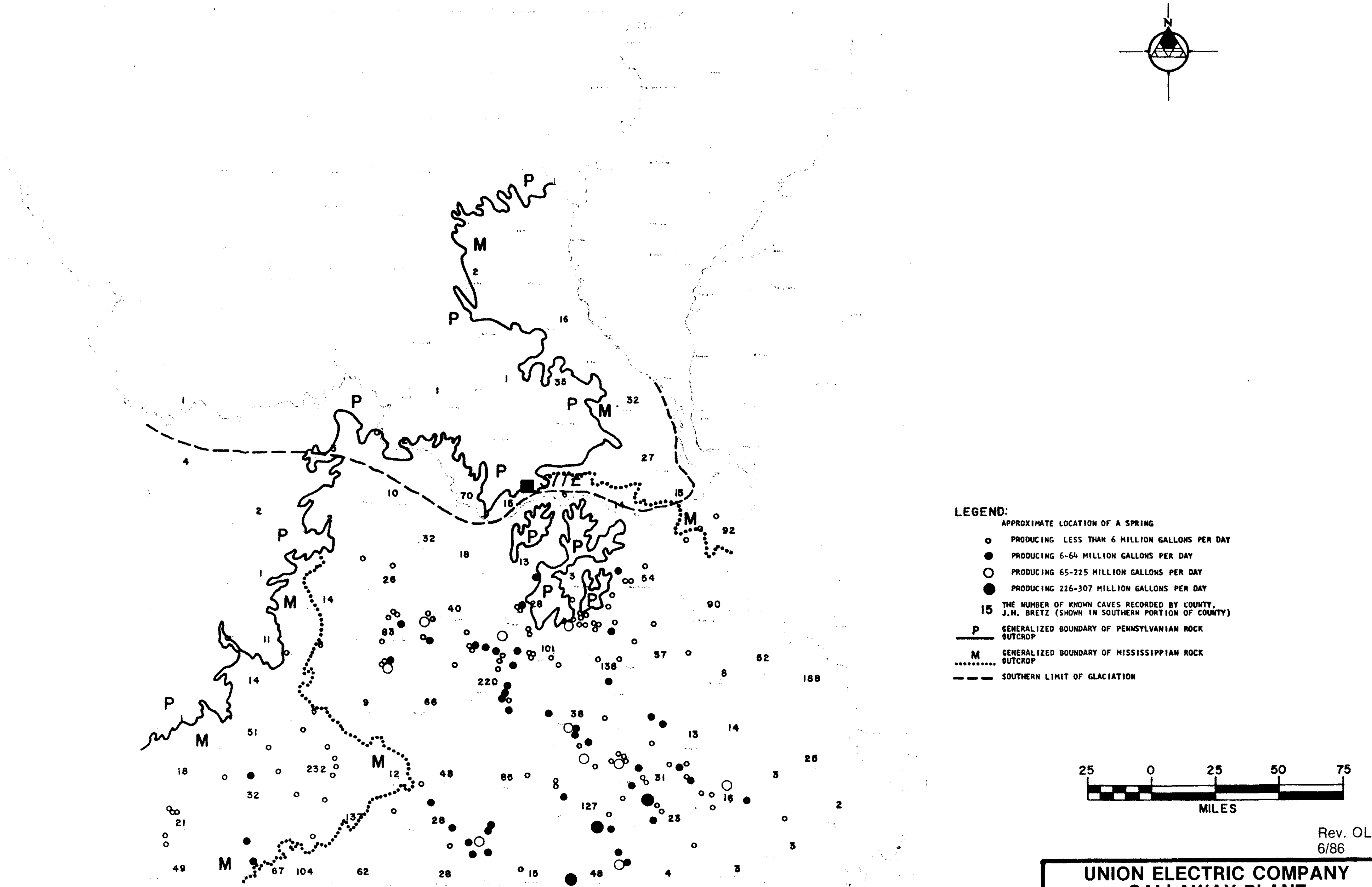
FIGURE 2.5-21

JEFFRIESBURG FAULT AND CONTOURS ON TOP OF THE ROUBIDOUX FORMATION



REFERENCES:

1. LARGE SPRINGS OF MISSOURI; H.C. BECKMAN AND N.S. HINCHEY, MISSOURI GEOLOGICAL SURVEY, P-13, 1944.
2. CAVES OF MISSOURI; J.H. BRETZ, VOLUME XXXIX, SECOND SERIES, MISSOURI GEOLOGICAL SURVEY, 1956.
3. GEOLOGICAL MAP OF MISSOURI; MISSOURI GEOLOGICAL SURVEY, 1961.

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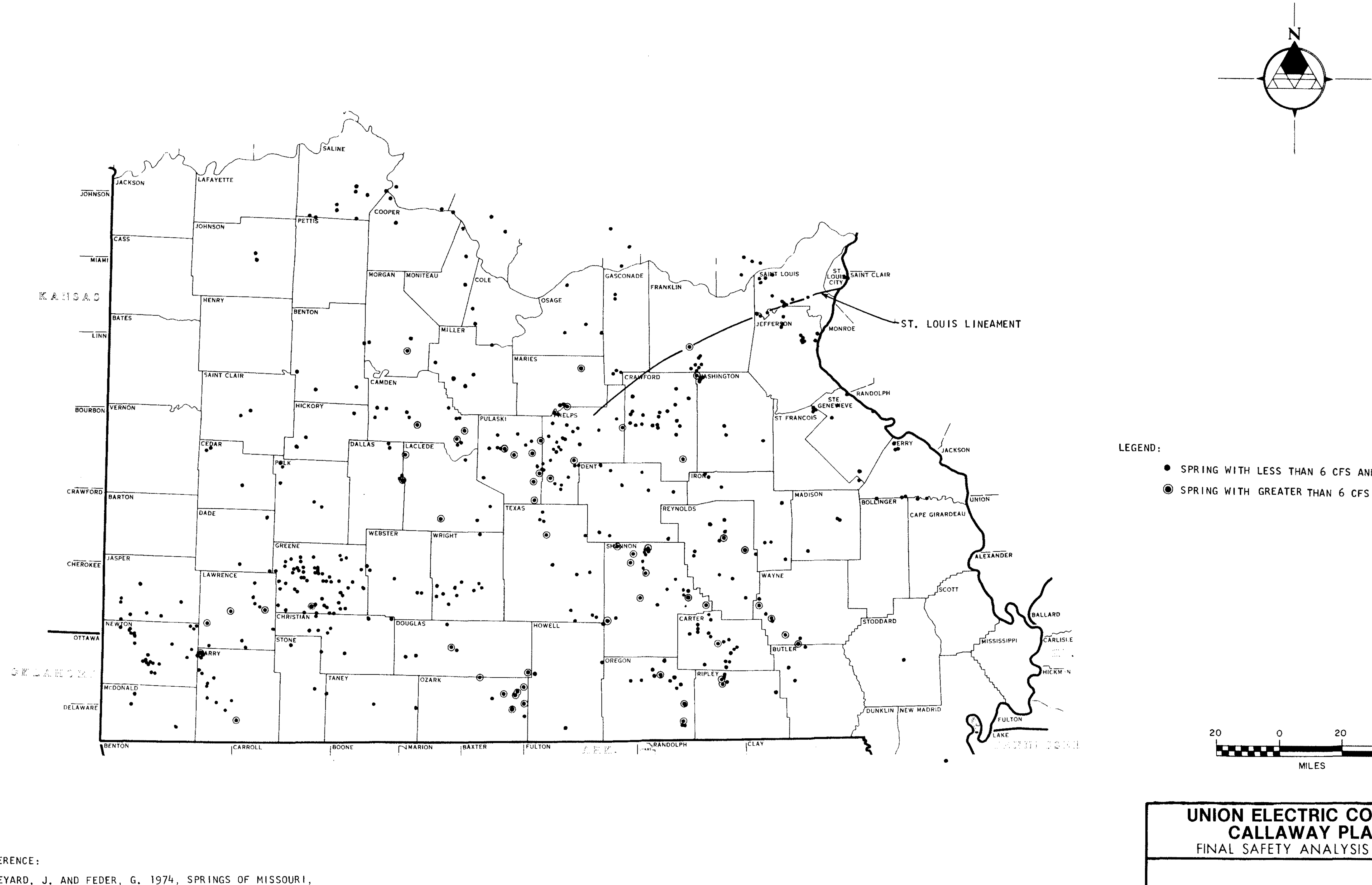
FIGURE 2.5-22

CAVES AND SPRINGS OF MISSOURI



LEGEND:

- SPRING WITH LESS THAN 6 CFS ANNUAL FLOW
- SPRING WITH GREATER THAN 6 CFS ANNUAL FLOW

REFERENCE:

VINEYARD, J. AND FEDER, G. 1974, SPRINGS OF MISSOURI, MO. GEOL. SURVEY AND WATER RESOURCES, WATER RESOURCES 29.

PHELAN, M., 1969, CRUSTAL STRUCTURE IN THE CENTRAL MISSISSIPPI VALLEY EARTHQUAKE ZONE, WASHINGTON UNIV. UNPBL. DISSERTATION.

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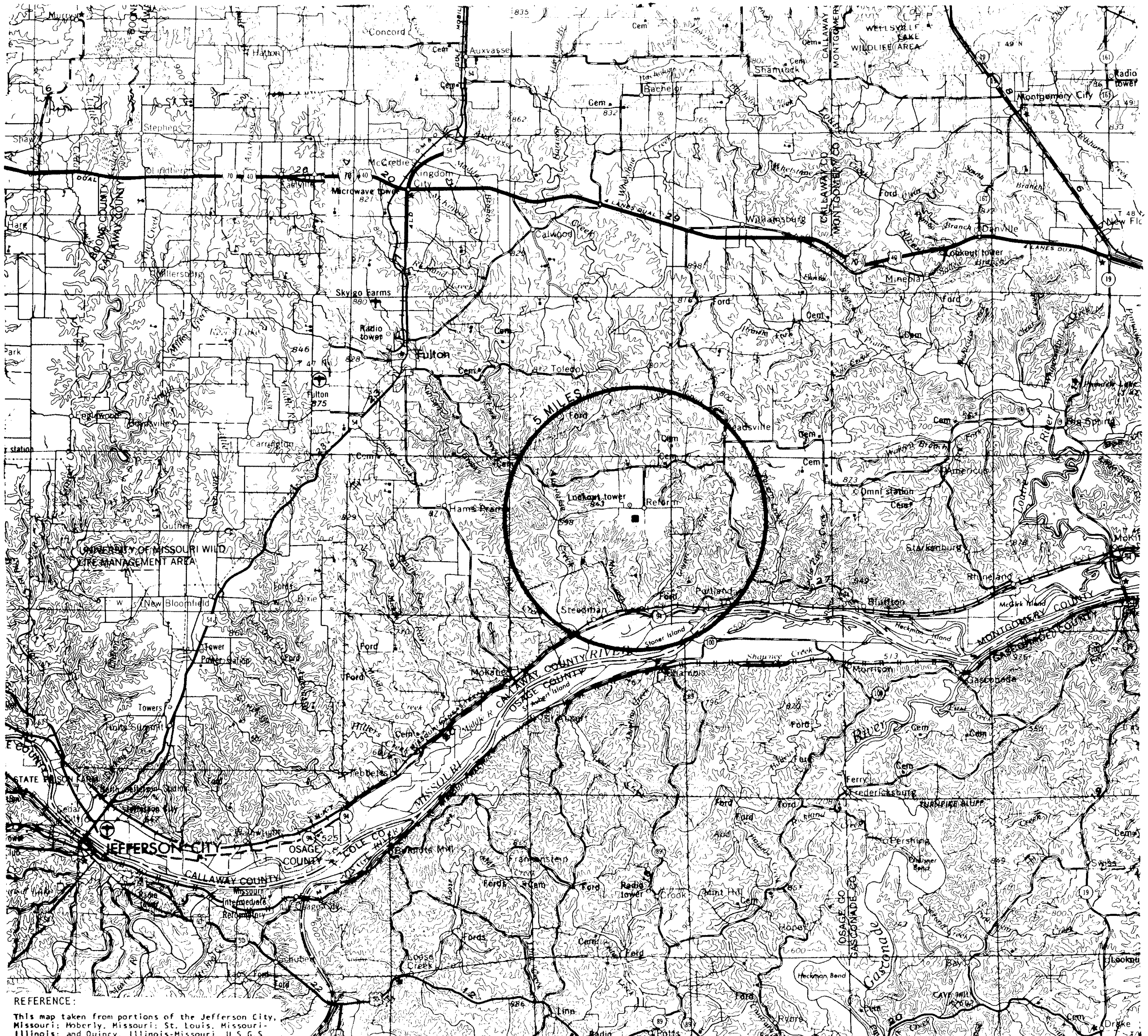
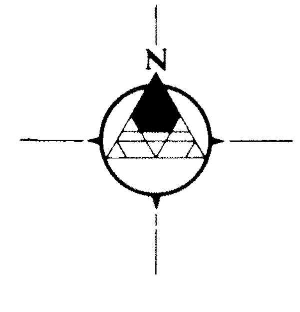
FIGURE 2.5-23

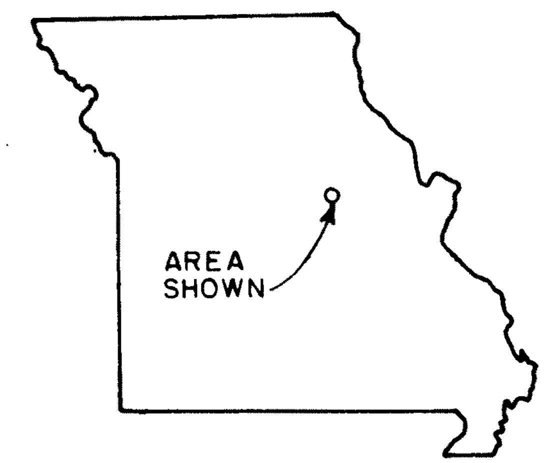
SPRINGS IN SOUTHERN MISSOURI



REFERENCE:

This map taken from portions of the Jefferson City, Missouri; Moberly, Missouri; St. Louis, Missouri-Illinois; and Quincy, Illinois-Missouri, U.S.G.S. Quadrangles. Dated 1955, 1960, 1966 and 1956 respectively.





MILES

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CONTOUR INTERVAL 100 FEET

NOTE:
PREPARED BY DAMES AND MOORE 1973

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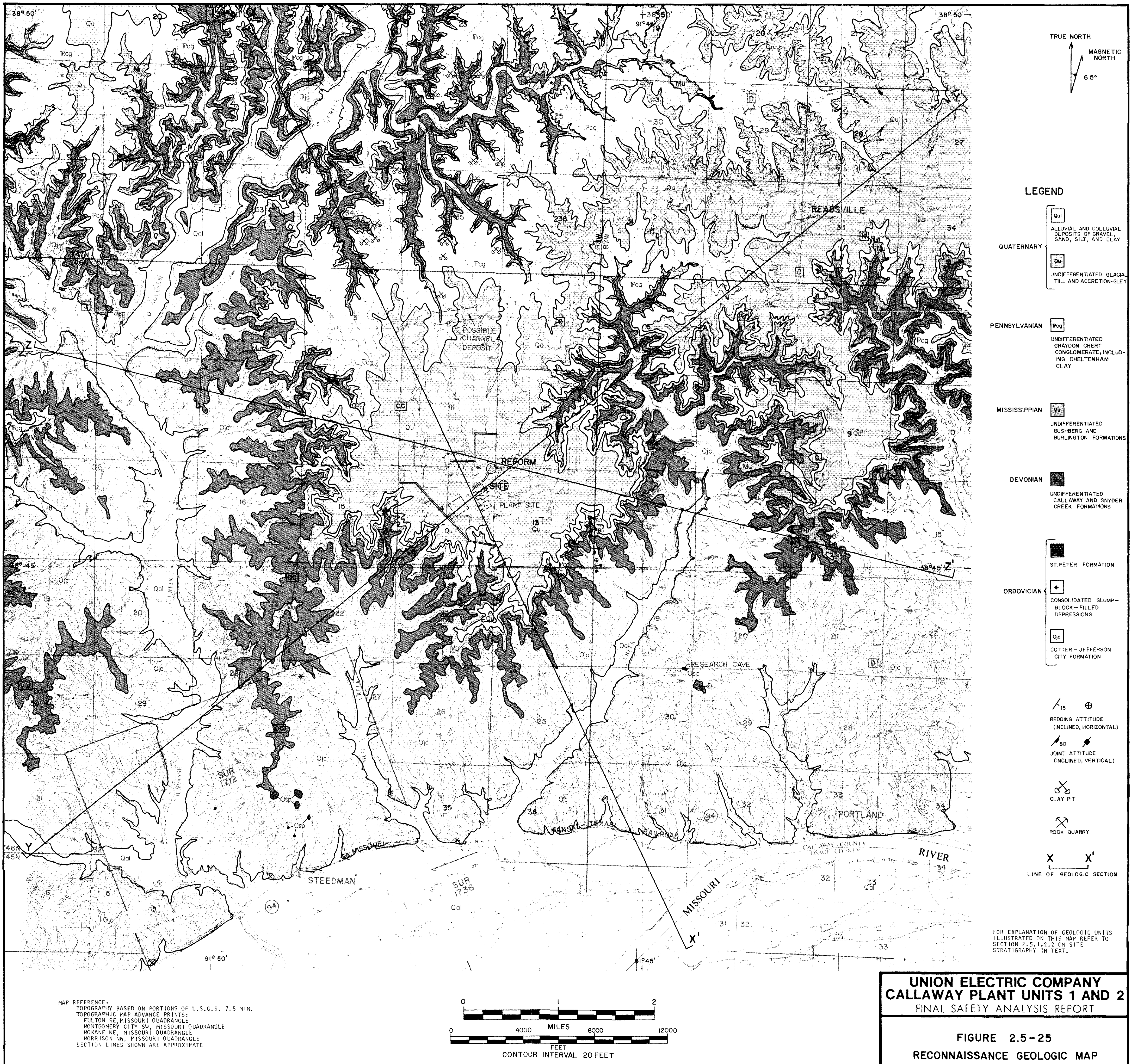
FIGURE 2.5-24

REGIONAL TOPOGRAPHIC MAP



FOR EXPLANATION OF GEOLOGIC UNITS ILLUSTRATED ON THIS MAP REFER TO SECTION 2.5.1.2.2 ON SITE STRATIGRAPHY IN TEXT.

MAP REFERENCE:
TOPOGRAPHY BASED ON PORTIONS OF U.S.G.S. 7.5 MIN. TOPOGRAPHIC MAP ADVANCE PRINTS:
FULTON SE, MISSOURI QUADRANGLE
MONTGOMERY CITY SW, MISSOURI QUADRANGLE
MOKANE NE, MISSOURI QUADRANGLE
MORRISON NW, MISSOURI QUADRANGLE
SECTION LINES SHOWN ARE APPROXIMATE

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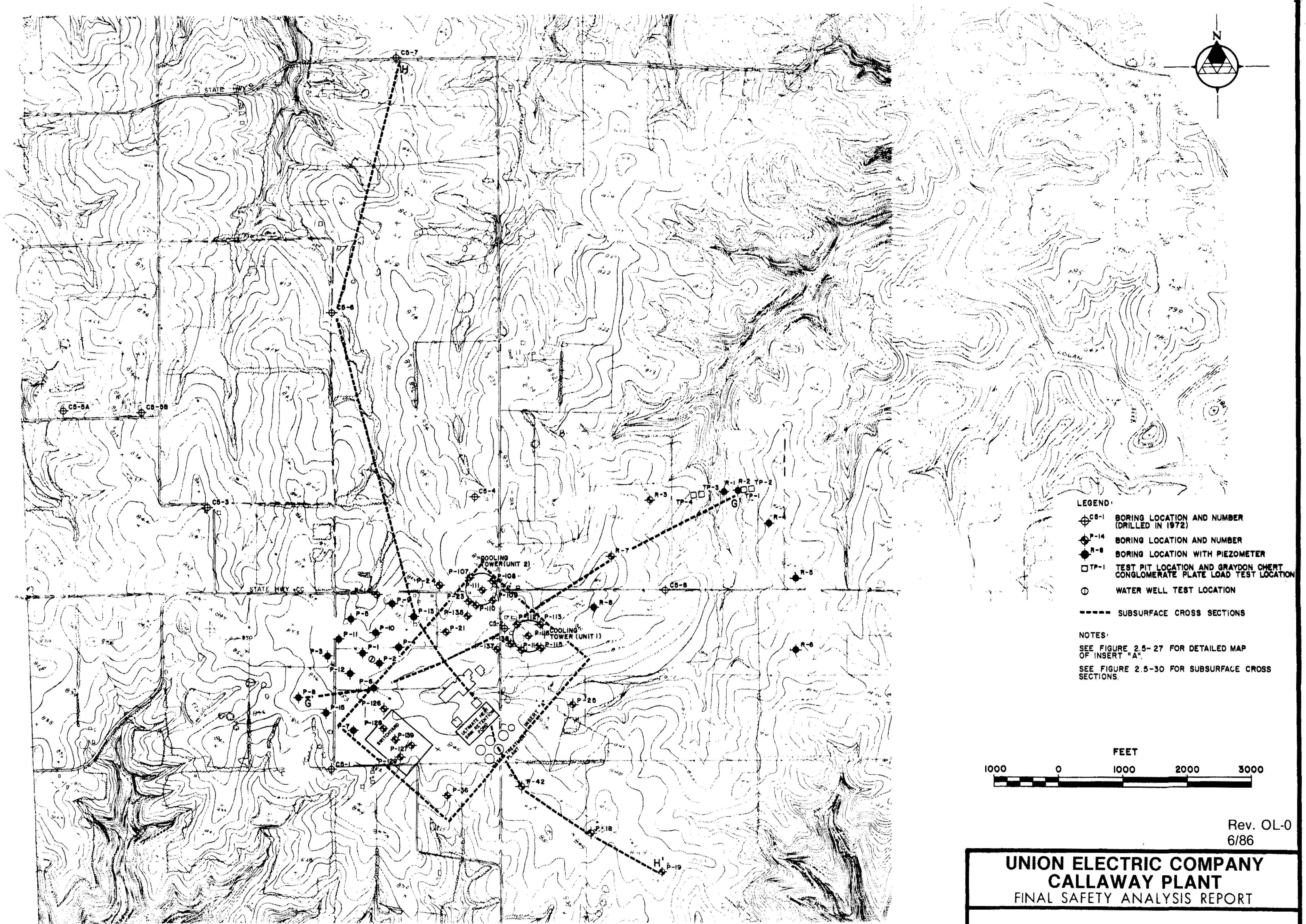
FIGURE 2.5-25

RECONNAISSANCE GEOLOGIC MAP
SITE AREA



REFERENCE:

TOPOGRAPHIC MAPPING PREPARED BY CHICAGO AERIAL SURVEY 4-14-72

STRUCTURE LOCATIONS FROM SVERDRUP & PARCEL AND ASSOCIATES, INC FIGURE SK-101874101

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FIGURE 2.5-26
AREAL PLOT PLAN

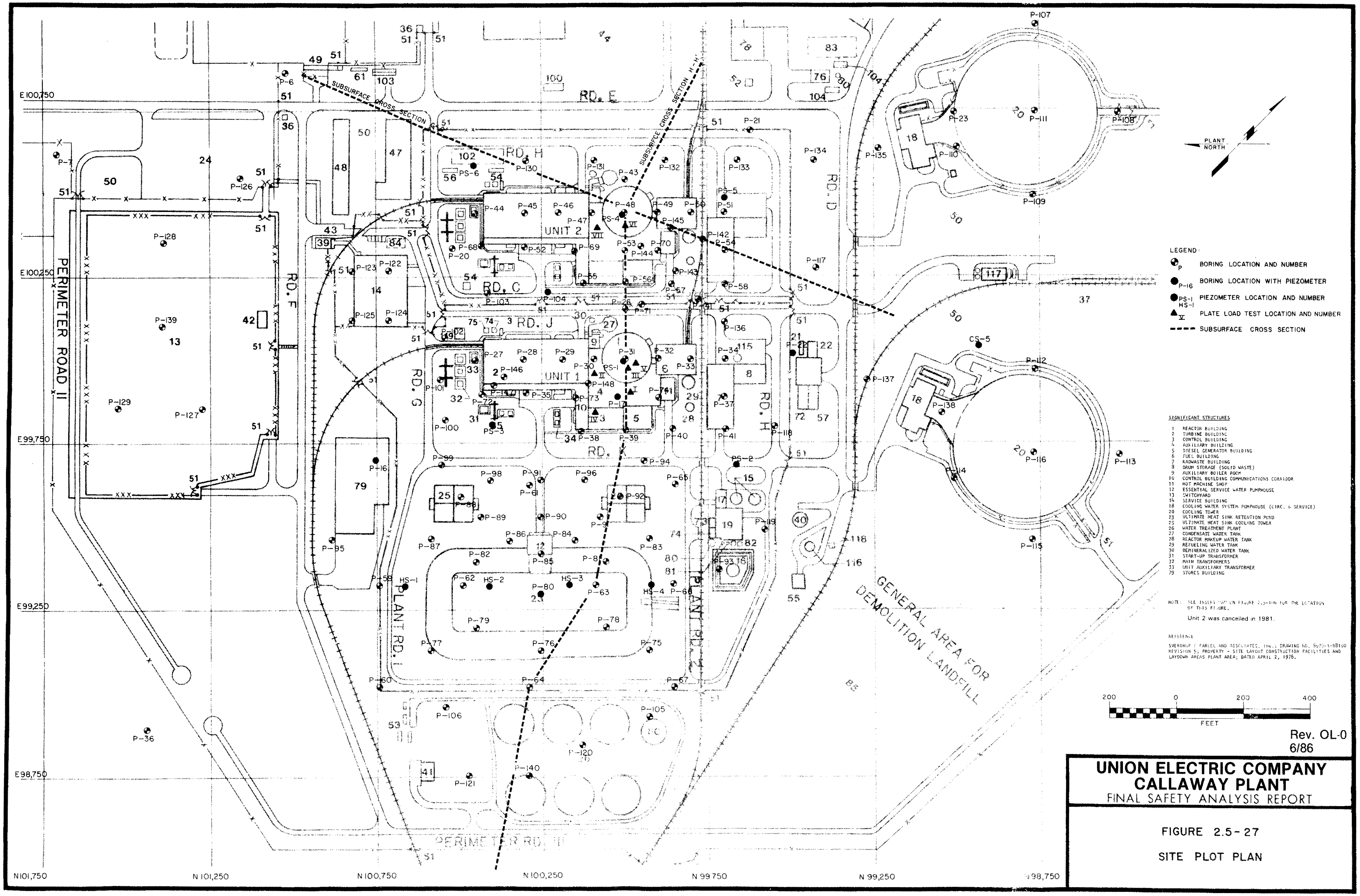

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FIGURE 2.5-27

SITE PLOT PLAN

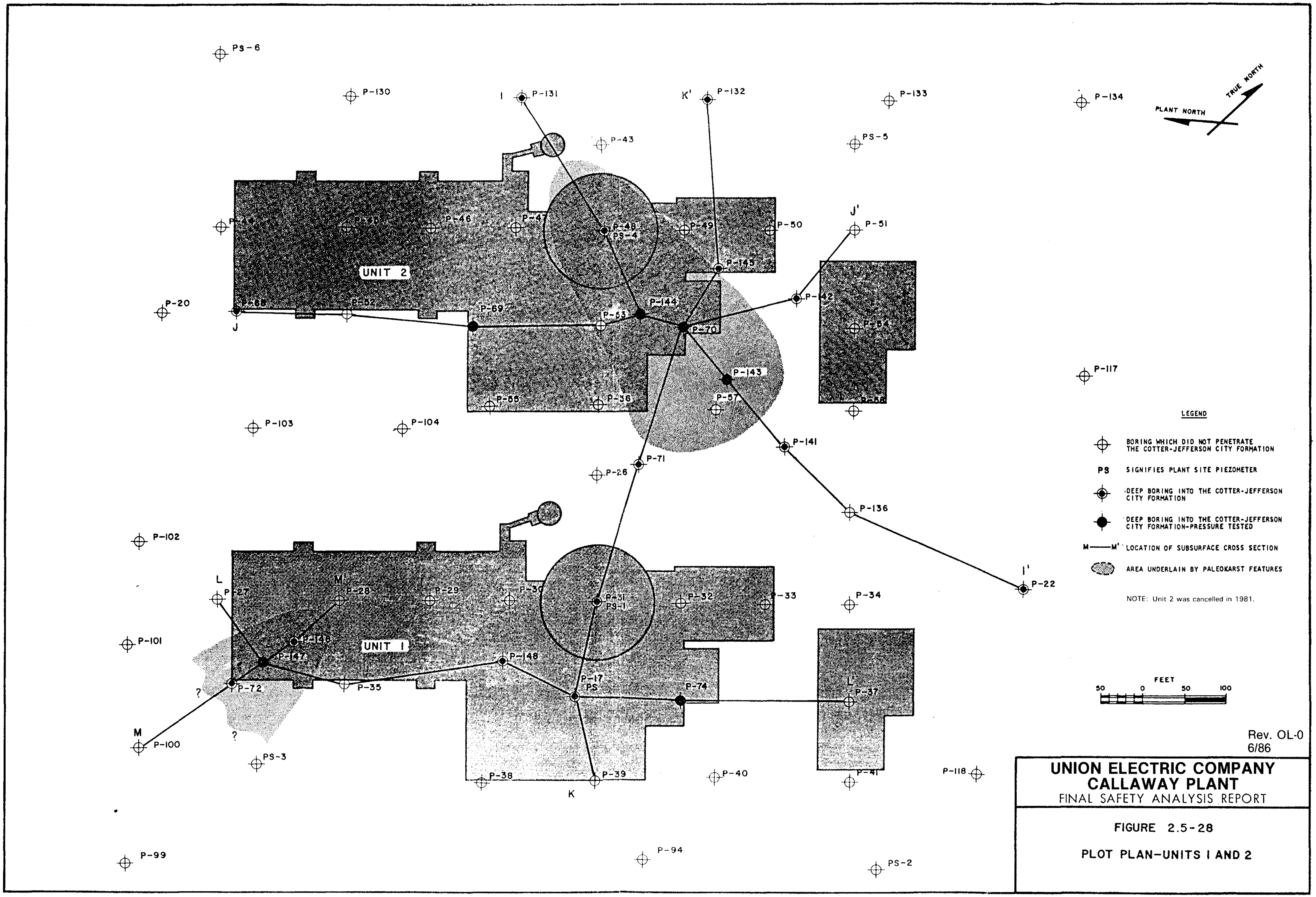

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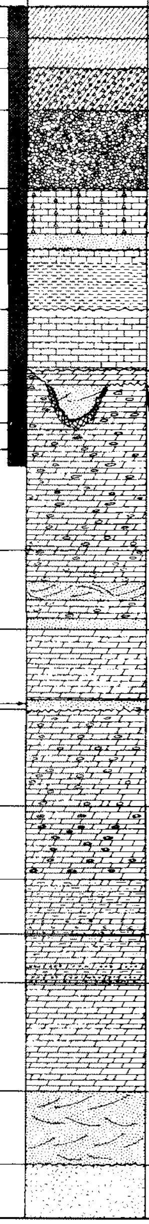
FIGURE 2.5-28

PLOT PLAN-UNITS I AND 2



SYSTEM	SERIES	STAGE	FORMATION OR UNIT	LITHOLOGIC COLUMN	DESCRIPTION	RANGE OF THICKNESS (FEET)
QUATERNARY	PLEISTOCENE	WISCONSINAN AND/OR ILLINOIAN	LOESS		WIND-BLOWN SILT - ALTERED TO BROWN SILTY CLAY BY WEATHERING	3-15
		KANSAN	ACCRETION-GLEY		GRAY SILTY CLAY - MODERATELY PLASTIC	4-28
		KANSAN	GLACIAL TILL		REDDISH-BROWN SILTY CLAY WITH SOME SAND AND GRAVEL	3-27
PENNSYL-VANIAN *			GRAYDON CHERT CONGLOMERATE*		REDDISH-BROWN, BUFF, PURPLE, AND GREEN CLAY CONTAINING 20% TO 65% ANGULAR TO ROUNDED, GRAVEL TO BOULDER SIZE CHERT PARTICLES. INDURATED SANDSTONE AND SANDY CHERT CONGLOMERATE DEVELOPED LOCALLY	4-50
MIS-SISSIPPIAN			BURLINGTON		GRAY TO TAN LIMESTONE, COARSE GRAINED, CHERTY, CRYNOIDAL	0-42
			BUSHBERG		GREENISH TO YELLOWISH-BROWN SANDSTONE, FINE TO MEDIUM GRAINED, FRIABLE	0-8
DEVONIAN			SNYDER CREEK		BROWN LIMESTONE, SILTY, FOSSILIFEROUS; GRADES DOWNWARD TO PURPLE AND GREEN, CALCAREOUS SILTSTONE WHICH IS UNDERLAIN BY GRAY SILTY SHALE	10-47
			CALLAWAY		BROWNISH-GRAY LIMESTONE - FINE TO COARSE GRAINED, FOSSILIFEROUS, PYRITE AT TOP, SANDY AT BASE	11-47
ORDOVICIAN			JOACHIM		BROWN DOLOMITE, SILTY, CALCITIC, SANDY AT BASE	0-10
			ST. PETER		WHITE SANDSTONE, FINE GRAINED, MASSIVE TO CROSS BEDDED, FRIABLE, WEATHERS TO BROWN	0-100
			PALEOKARST RUBBLE		DOLOMITE, SANDSTONE, SILTSTONE, AND SHALE; DISORIENTED, RECEMENTED	0-36
			COTTER-JEFFERSON CITY		LIGHT GRAY DOLOMITE - FINE TO MEDIUM GRAINED, THIN BEDDED, NUMEROUS GREEN SHALE STRINGERS IN ZONES. GRAY BANDED CHERT	830-900
			ROUBIDOUX		PREDOMINANTLY A QUARTZOSE SANDSTONE IN CENTRAL MISSOURI, SOME DOLOMITIC SANDSTONE AND CHERTY DOLOMITE	
			GASCONADE		LIGHT BROWNISH-GRAY DOLOMITE - CHERTY, COARSELY CRYSTALLINE NEAR BASE, FINE CRYSTALLINE UPPER 1/2	
			GUNTER MEMBER		SANDSTONE - MEDIUM GRAINED, QUARTZOSE	
CAMBRIAN			EMINENCE		LIGHT GRAY DOLOMITE - MEDIUM TO MASSIVELY BEDDED, MEDIUM TO COARSE GRAINED. SOME CHERT IN UPPER 1/2 - LARGE CHERT BOULDERS LOCALLY, FOSSILIFEROUS	700-860
			POTOSI		FINE GRAINED DOLOMITE - MASSIVE TO THICKLY BEDDED, ABUNDANT QUARTZ DRUSE	
			DERBY-DOE RUN		THIN TO MEDIUM BEDDED DOLOMITE ALTERNATING WITH THIN BEDDED SILTSTONE AND SHALE	
			DAVIS		INTERBEDDED SILTSTONE, SHALE, SANDSTONE, AND DOLOMITE, FOSSILIFEROUS NEAR TOP	
			BONNETERRE		LIGHT GRAY DOLOMITE - FINE TO MEDIUM GRAINED, LOCALLY PURE, MEDIUM BEDDED	
			LAMOTTE		PINK SANDSTONE - FINE TO COARSE GRAINED, CROSS BEDDED	160-300
PRE-CAMBRIAN					GRANITIC ROCKS - SOME INTRUSIVE OR METAMORPHIC ROCKS POSSIBLE	?

KEY:

■ INDICATES DRILLED INTERVAL; THICKNESS OF UNITS NOT DRAWN TO SCALE

* THE GRAYDON CHERT CONGLOMERATE IS NOT A RECOGNIZED FORMATION. THE AGE ASSIGNMENT OF PENNSYLVANIAN IS TENTATIVE. REFER TO DISCUSSION IN TEXT UNDER SITE STRATIGRAPHY.

WAVY CONTACTS DENOTE UNCONFORMABLE SURFACES.

STRAIGHT CONTACTS DENOTE CONFORMABLE SURFACES.

NOTES:

DISCUSSION IN TEXT IS ESSENTIAL FOR PROPER UNDERSTANDING OF THE STRATIGRAPHIC COLUMN.

TOTAL THICKNESS OF STRATIGRAPHIC UNITS IS APPROXIMATED ON THE BASIS OF BORING DATA AND PUBLISHED LITERATURE.

STRATIGRAPHIC UNITS NOT DRAWN TO SCALE.

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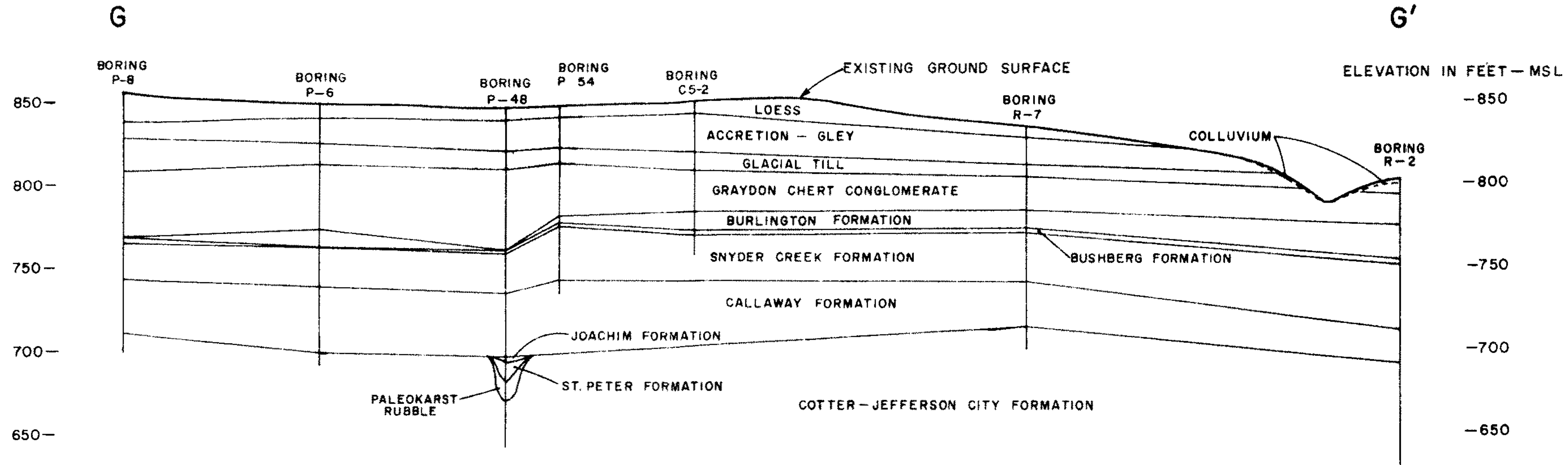
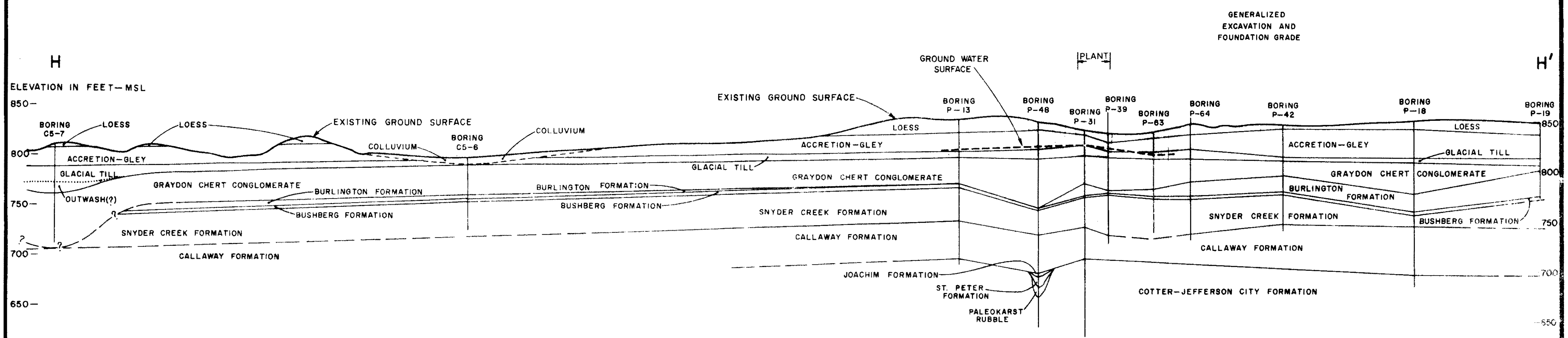
FIGURE 2.5-29

SITE STRATIGRAPHIC COLUMN



SECTION G–G′



SECTION H–H′

HORIZONTAL SCALE IN FEET
0 500 1000

NOTES:

SEE FIGURES 2.5-26 AND 2.5-27 FOR LOCATION OF SECTIONS.

THE DEPTH AND THICKNESS OF STRATA INDICATED ON THE SUBSURFACE SECTIONS WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION OF ACTUAL CONDITIONS EXISTS ONLY AT BORING LOCATIONS. IT IS POSSIBLE THAT CONDITIONS BETWEEN BORINGS MAY VARY FROM THOSE INDICATED.

THE DISCUSSION IN THE TEXT IS NECESSARY FOR PROPER UNDERSTANDING OF THE NATURE OF THE SUBSURFACE MATERIALS.

ELEVATIONS REFER TO MEAN SEA LEVEL DATUM.

VERTICAL EXAGGERATION = 10X

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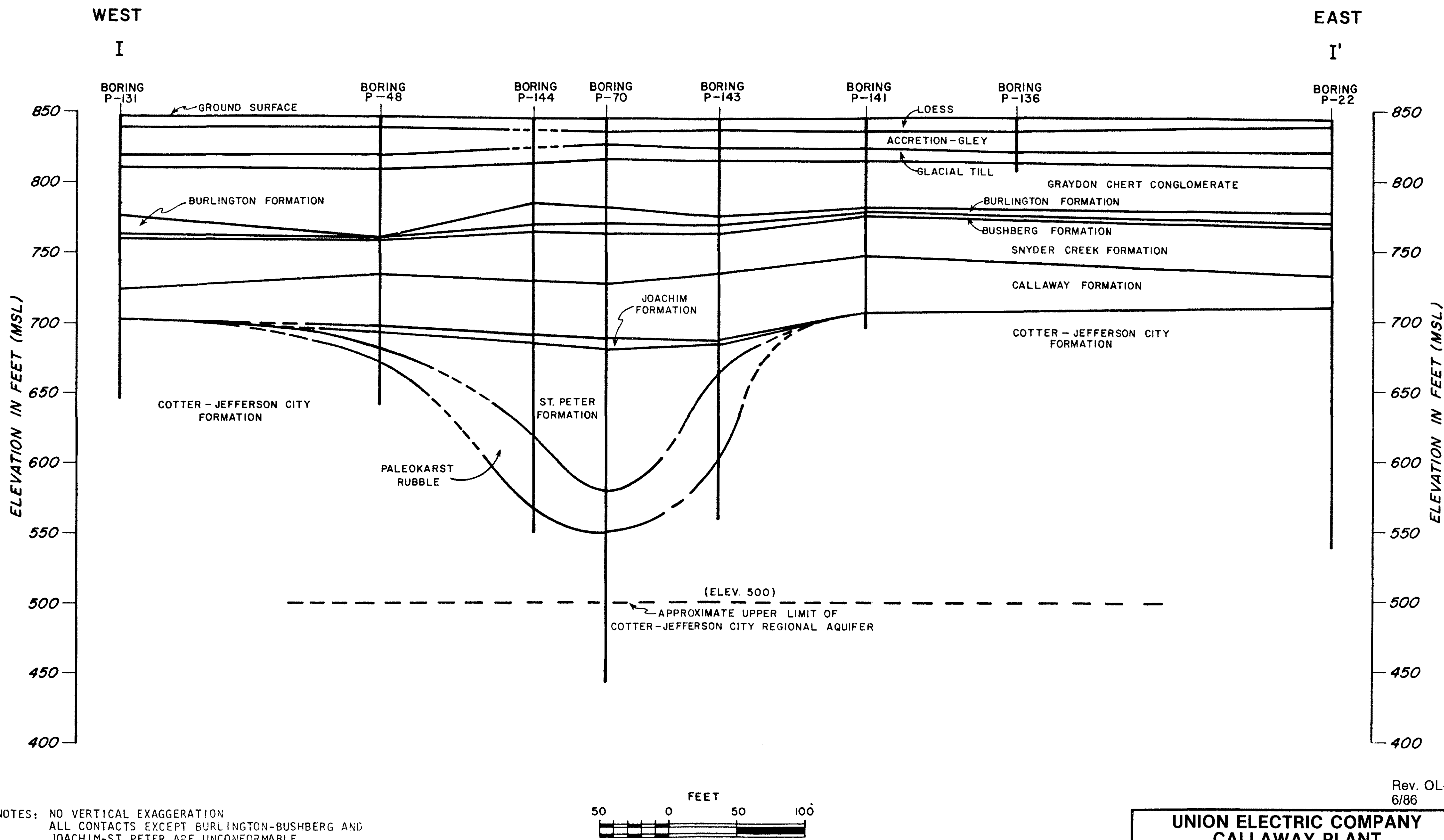
FIGURE 2.5-30
SUBSURFACE SECTIONS



NOTES: NO VERTICAL EXAGGERATION
ALL CONTACTS EXCEPT BURLINGTON-BUSHBERG AND JOACHIM-ST. PETER ARE UNCONFORMABLE.

THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE SUBSURFACE PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXIST ONLY AT BORING LOCATIONS.

REFER TO FIGURE 2.5-28 FOR LOCATION OF SUBSURFACE PROFILE.

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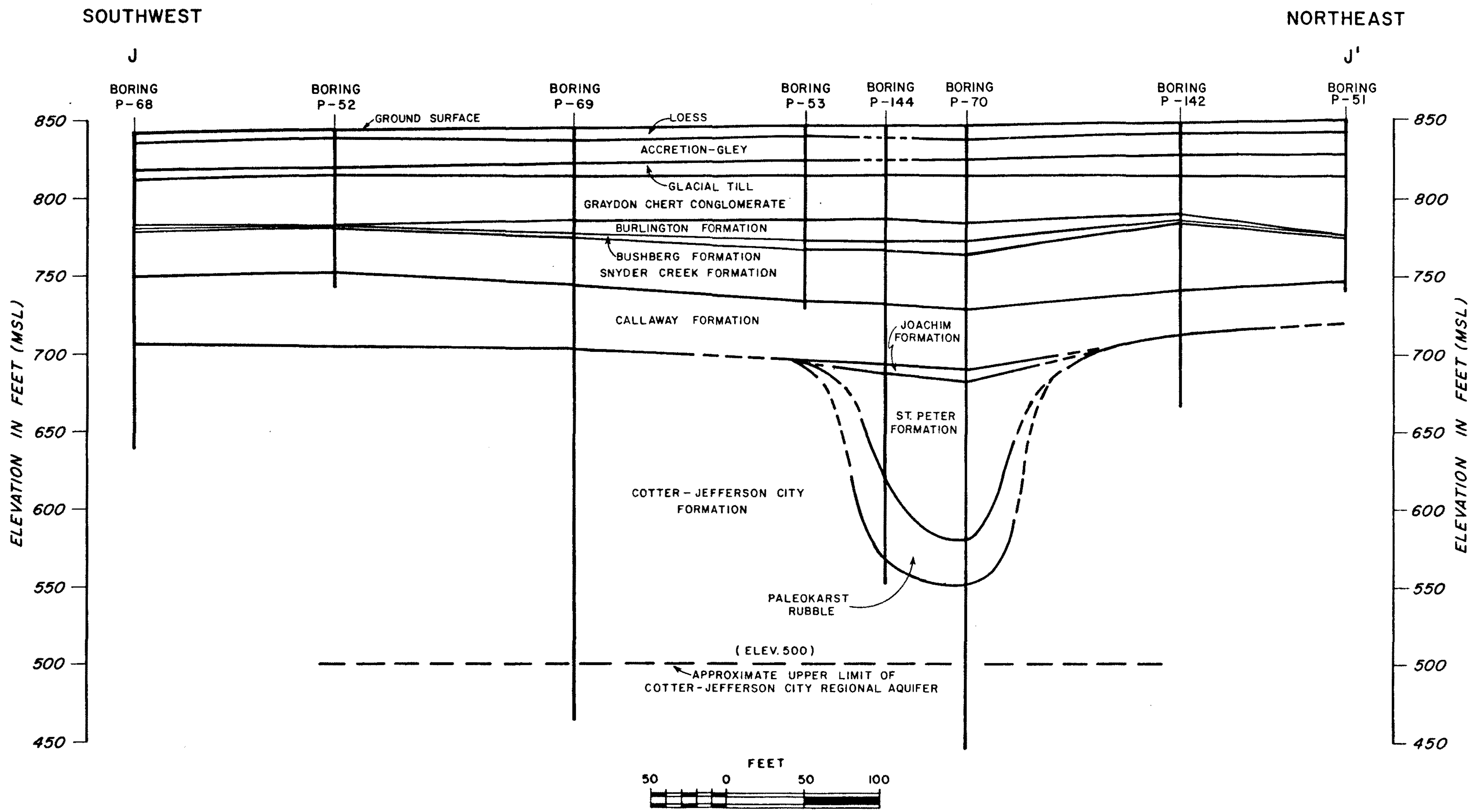
FIGURE 2.5-31

SUBSURFACE CROSS SECTION I-I'



NOTES: NO VERTICAL EXAGGERATION
ALL CONTACTS EXCEPT BURLINGTON-BUSHBERG AND JOACHIM-ST.PETER ARE UNCONFORMABLE.

THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE SUBSURFACE PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXIST ONLY AT BORING LOCATIONS.

REFER TO FIGURE 2.5-28 FOR LOCATION OF SUBSURFACE PROFILE.

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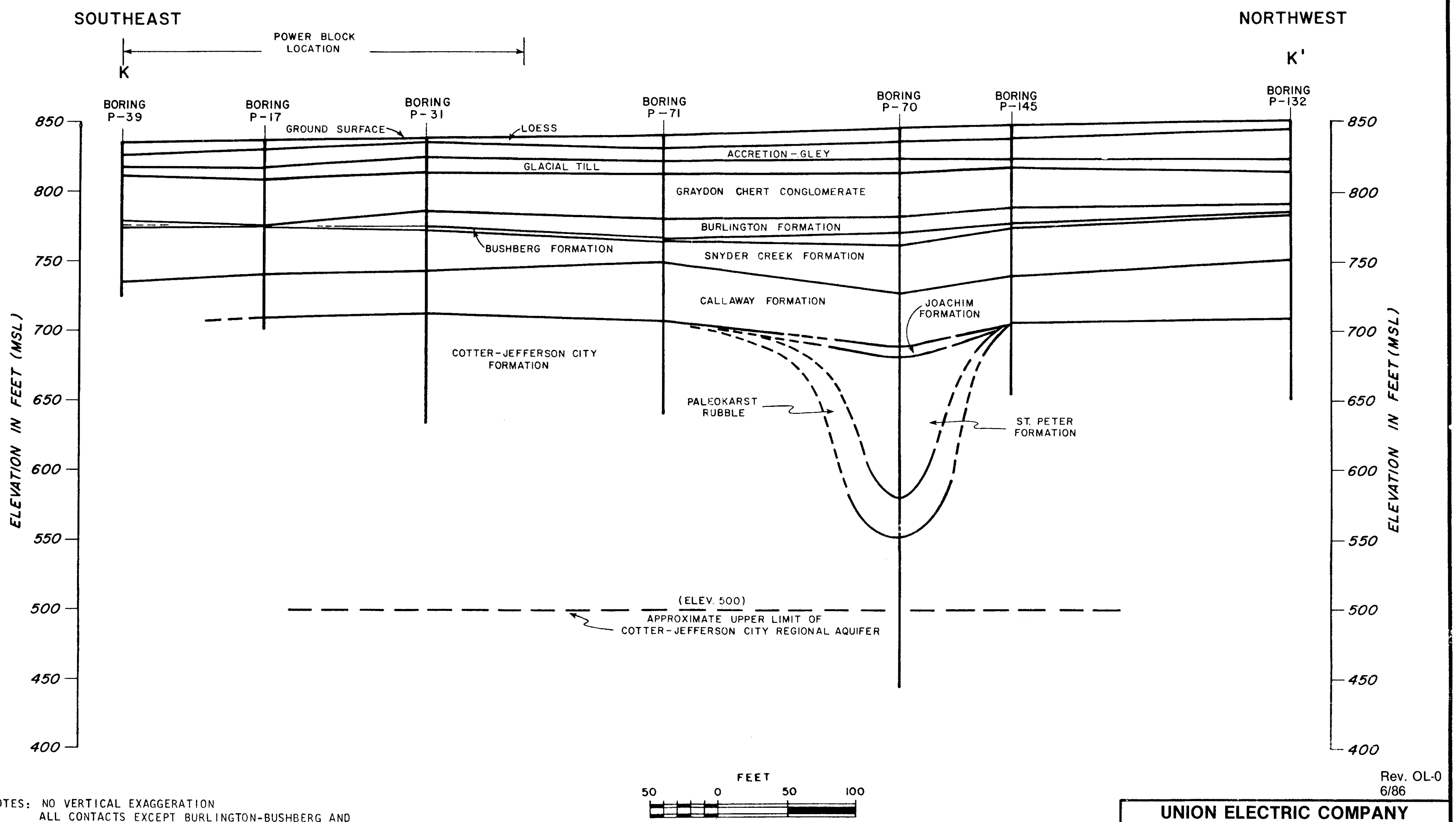
FIGURE 2.5-32

SUBSURFACE CROSS SECTION J-J'



NOTES: NO VERTICAL EXAGGERATION
ALL CONTACTS EXCEPT BURLINGTON-BUSHBERG AND JOACHIM-ST.PETER ARE UNCONFORMABLE.

THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE SUBSURFACE PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXIST ONLY AT BORING LOCATIONS.

REFER TO FIGURE 2.5-28 FOR LOCATION OF SUBSURFACE PROFILE.

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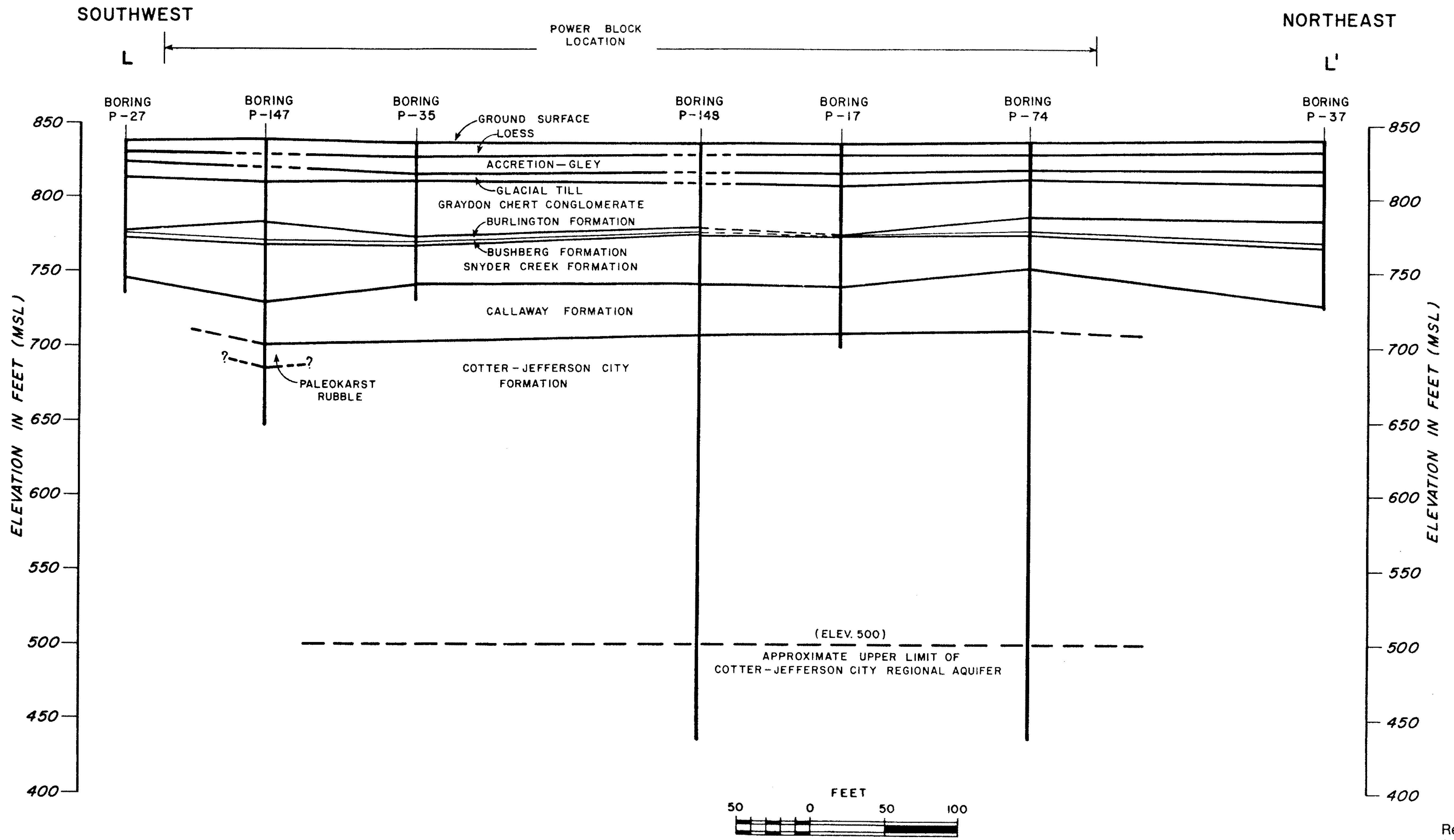
FIGURE 2.5-33

SUBSURFACE CROSS SECTION K-K'



NOTES: NO VERTICAL EXAGGERATION
ALL CONTACTS EXCEPT BURLINGTON-BUSHBERG AND JOACHIM-ST. PETER ARE UNCONFORMABLE.

THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE SUBSURFACE PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXIST ONLY AT BORING LOCATIONS.

REFER TO FIGURE 2.5-28 FOR LOCATION OF SUBSURFACE PROFILE.

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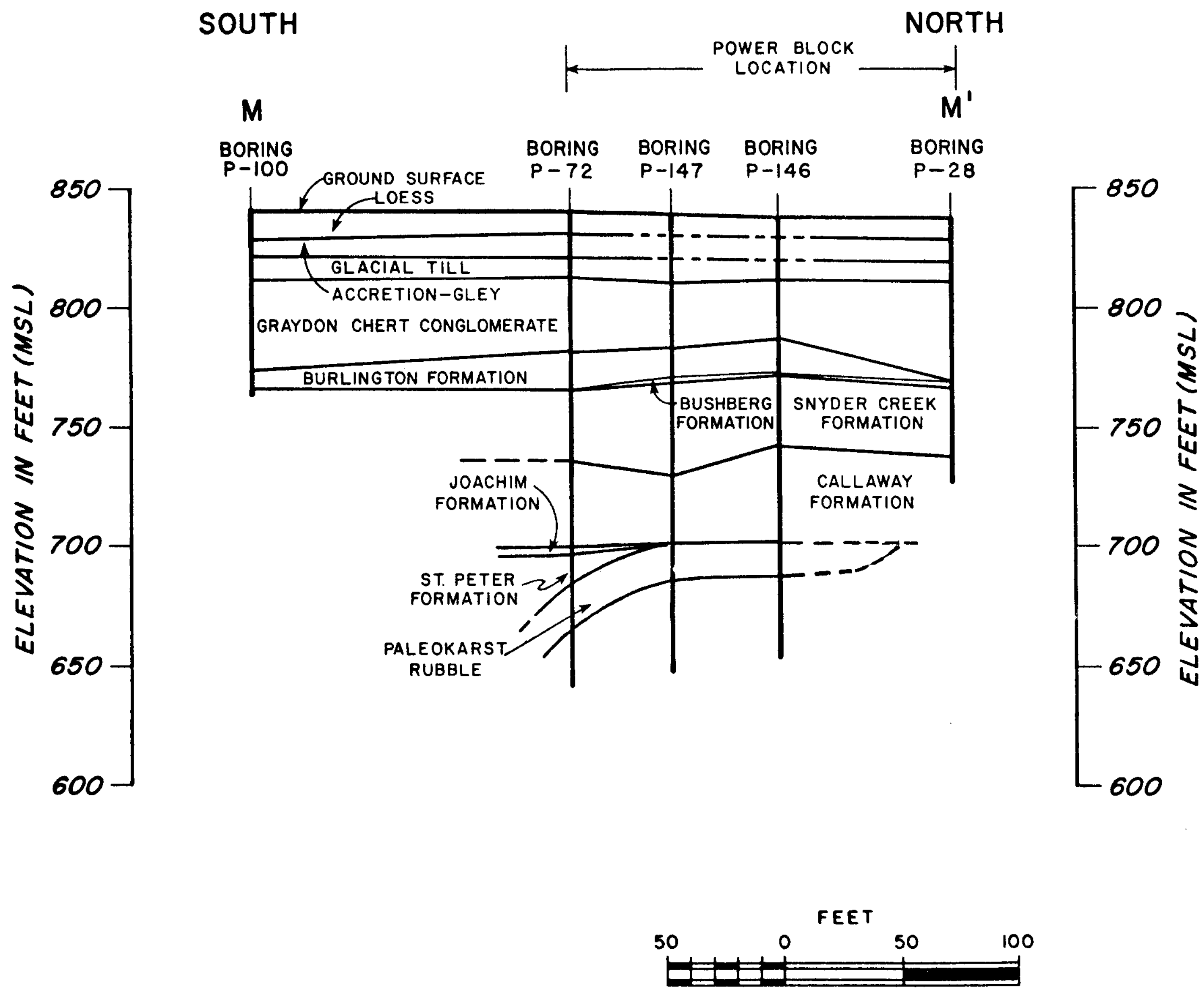
FIGURE 2.5-34

SUBSURFACE CROSS SECTION L-L'



NOTES: NO VERTICAL EXAGGERATION
ALL CONTACTS EXCEPT BURLINGTON-BUSHBERG AND JOACHIM-ST. PETER ARE UNCONFORMABLE.

THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE SUBSURFACE PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXIST ONLY AT BORING LOCATIONS.

REFER TO FIGURE 2.5-28 FOR LOCATION OF SUBSURFACE PROFILE.

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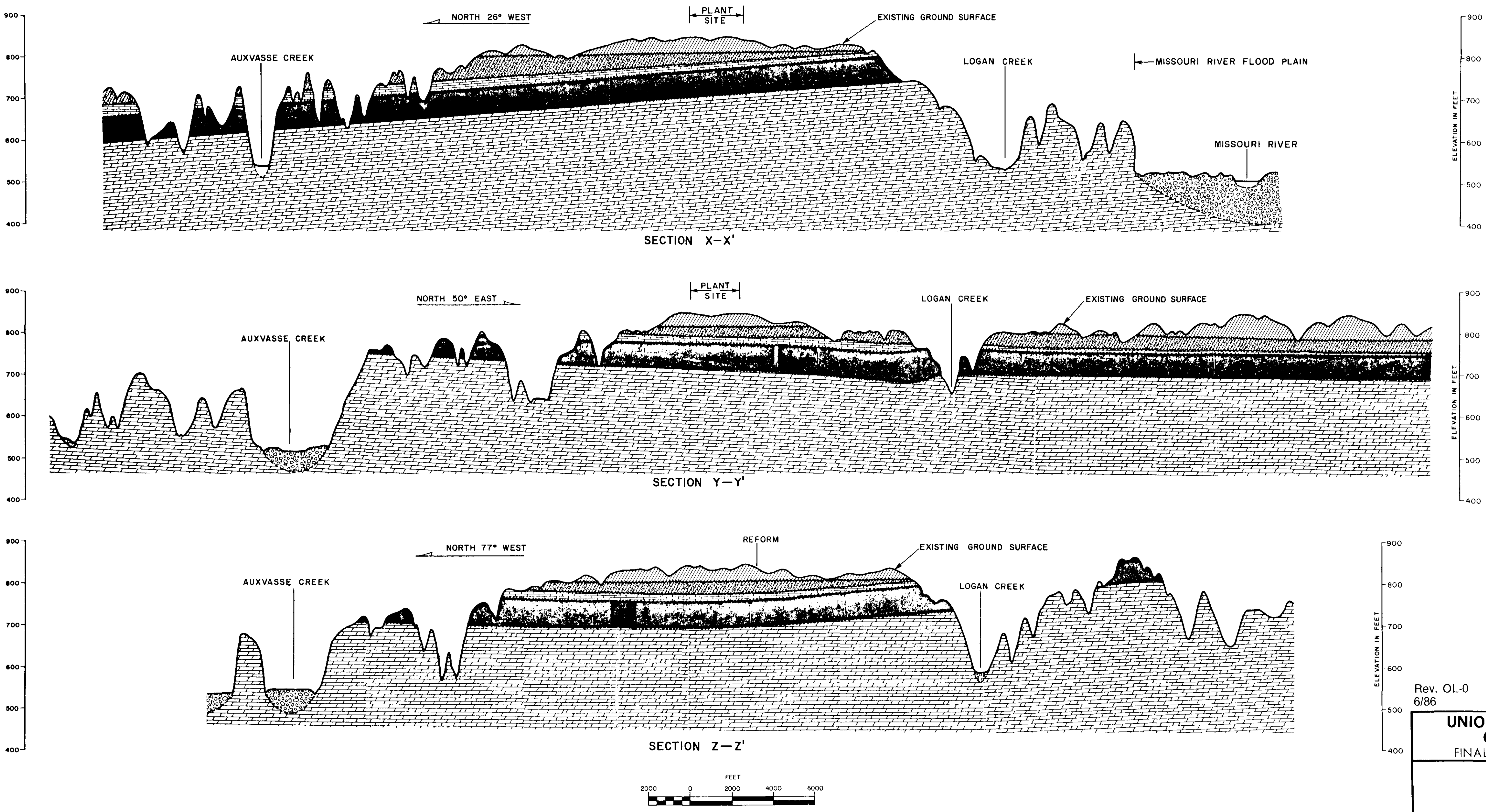
FIGURE 2.5-35

SUBSURFACE CROSS SECTION M-M'



LEGEND

QUATERNARY ALLUVIUM VALLEY FILL DEPOSITS CONSISTING OF CLAY, SILT, SAND AND GRAVEL ALONG EXISTING STREAMS.

QUATERNARY UNDIFFERNTIATED - PLEISTOCENE SOIL DEPOSITS CONSISTING OF GLACIAL TILL, ACCRETION-GLEY AND LOESS.

PENNSYLVANIAN UNDIFFERENTIATED - INCLUDES LIMITED EXPOSURES OF CHELTENHAM CLAY IN NORTHERN PORTION OF SECTION X - X' AND GRAYDON CHERT CONGLOMERATE OF TENATIVE PENNSYLVANIAN AGE.

MISSISSIPPIAN UNDIFFERENTIATED - INCLUDES BURLINGTON LIMESTONE AND UNDERLYING BUSHBERG SANDSTONE.

DEVONIAN UNDIFFERENTIATED - INCLUDES SNYDER CREEK SILTSTONE AND UNDERLYING CALLAWAY LIMESTONE.

ORDOVICIAN UNDIFFERENTIATED - INCLUDES COTTER-JEFFERSON CITY DOLOMITE AND OVERLYING PATCHES OF ST. PETER SANDSTONE AND JOACHIM DOLOMITE.

NOTES:

SEE FIGURE 2.5-15 FOR LOCATION OF SECTIONS.

THE DEPTH AND THICKNESS OF STRATA DEPICTED ON THE SUBSURFACE SECTIONS WAS OBTAINED BY RECONNAISSANCE GEOLOGIC MAPPING. AT THE PLANT SITE, BORING DATA WAS AVERAGED TO OBTAIN THICKNESS AND ELEVATIONS OF STRATA. IT IS POSSIBLE THAT CONDITIONS MAY VARY FROM THOSE INDICATED.

DISCUSSION IN TEXT IS ESSENTIAL FOR PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS.

THE SITE STRATIGRAPHIC COLUMN IS SHOWN ON FIGURE 2.5-17; MORE DETAILED SUBSURFACE SECTIONS ARE PRESENTED ON FIGURE 2.5-18.

ELEVATIONS REFER TO MEAN SEA LEVEL DATUM.

VERTICAL EXAGGERATION = 20X

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FIGURE 2.5-36
GENERALIZED
SUBSURFACE SECTIONS

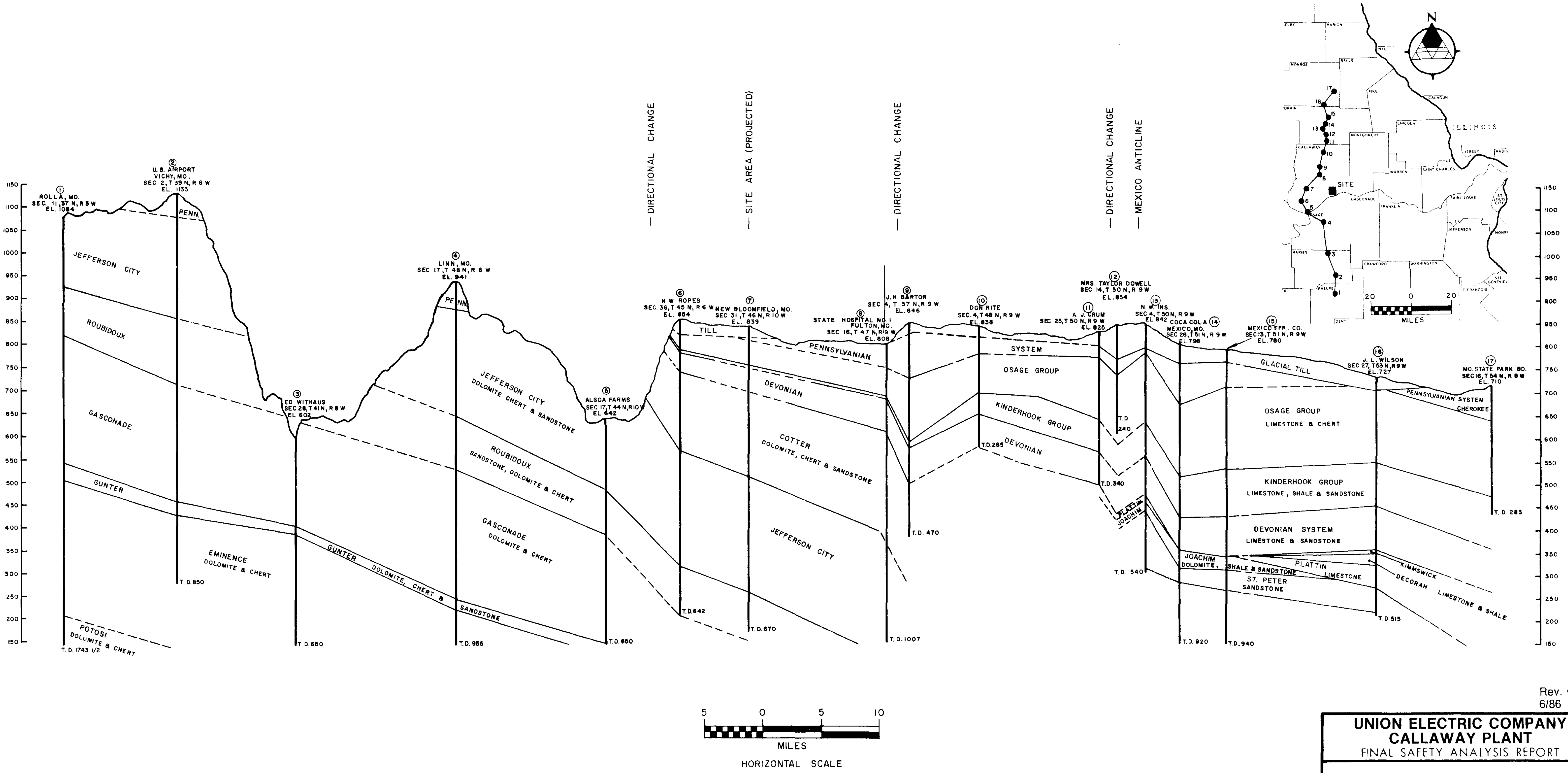

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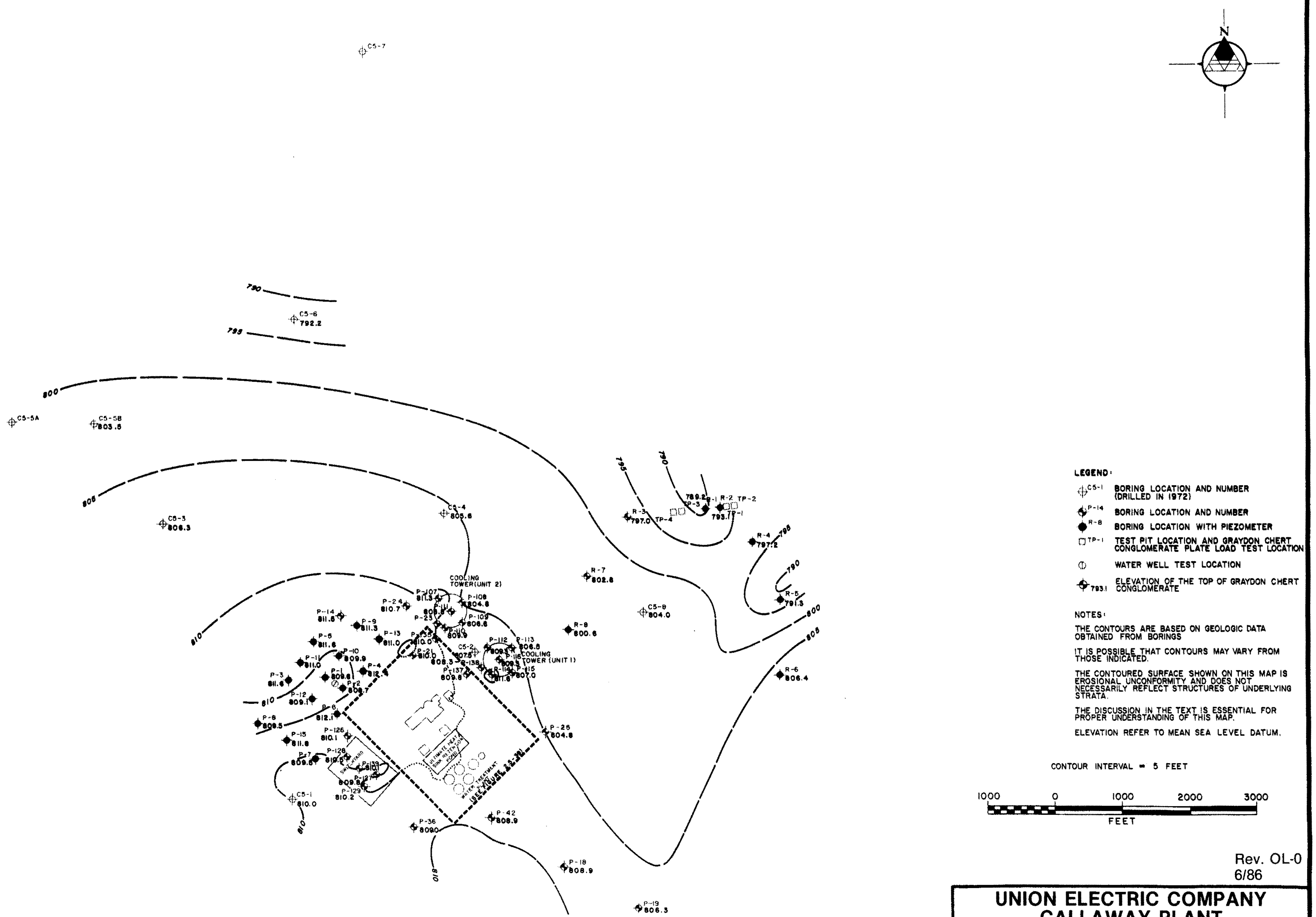
FIGURE 2.5-37
REGIONAL GEOLOGIC CROSS SECTION
ROLLA, MISSOURI TO FLORIDA, MISSOURI

REFERENCE:

MISSOURI GEOLOGICAL SURVEY AND WATER RESOURCES
VOL. 28 SECOND SERIES, PLATE 4



STRUCTURE LOCATIONS FROM SVERDRUP &
PARCEL AND ASSOCIATES, INC. FIGURE SK-101874 I01

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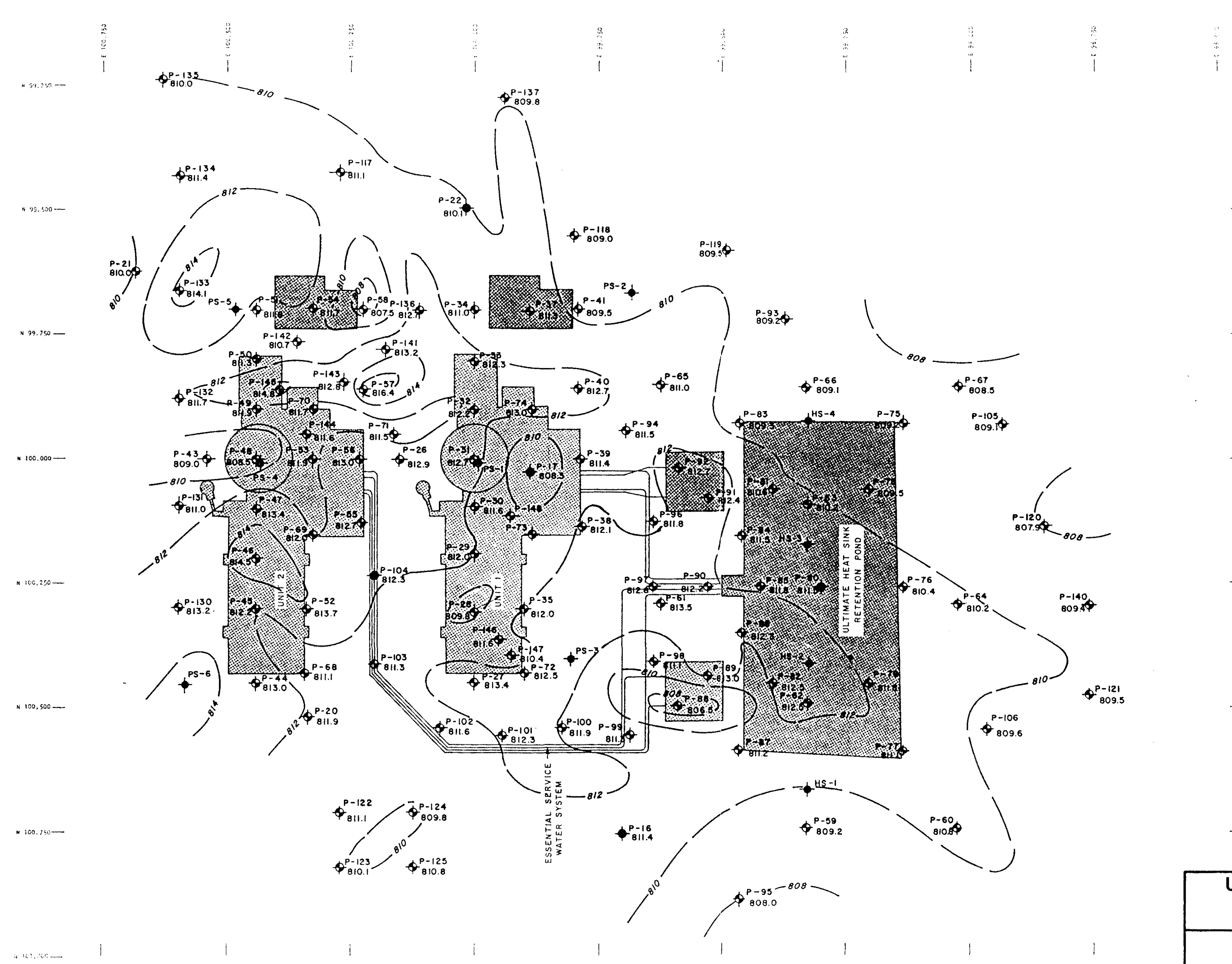
FIGURE 2.5-38

CONTOURS ON TOP OF GRAYDON CHERT CONGLOMERATE - SITE AREA



EXPLANATION

P-31 BORING LOCATION AND NUMBER

P-16 BORING LOCATION WITH PIEZOMETER

PS-1 HS-1 PIEZOMETER LOCATION AND NUMBER

810.4 ELEVATION OF TOP OF GRAYDON CHERT CONGLOMERATE

NOTES:

THE CONTOURS ARE BASED ON GEOLOGIC DATA OBTAINED FROM BORINGS (SEE TABLE 2.5-6).

IT IS POSSIBLE THAT CONTOURS MAY VARY FROM THOSE INDICATED.

THE CONTOURED SURFACE SHOWN ON THIS MAP IS AN EROSIONAL UNCONFORMITY AND DOES NOT NECESSARILY REFLECT STRUCTURES OR ATTITUDE OF THE UNDERLYING STRATA.

THE DISCUSSION IN THE TEXT IS ESSENTIAL FOR PROPER UNDERSTANDING OF THIS MAP.

ELEVATIONS REFER TO MEAN SEA LEVEL DATUM.

Unit 2 was cancelled in 1981.

FEET

100 0 100 200

CONTOUR INTERVAL: 2 FEET

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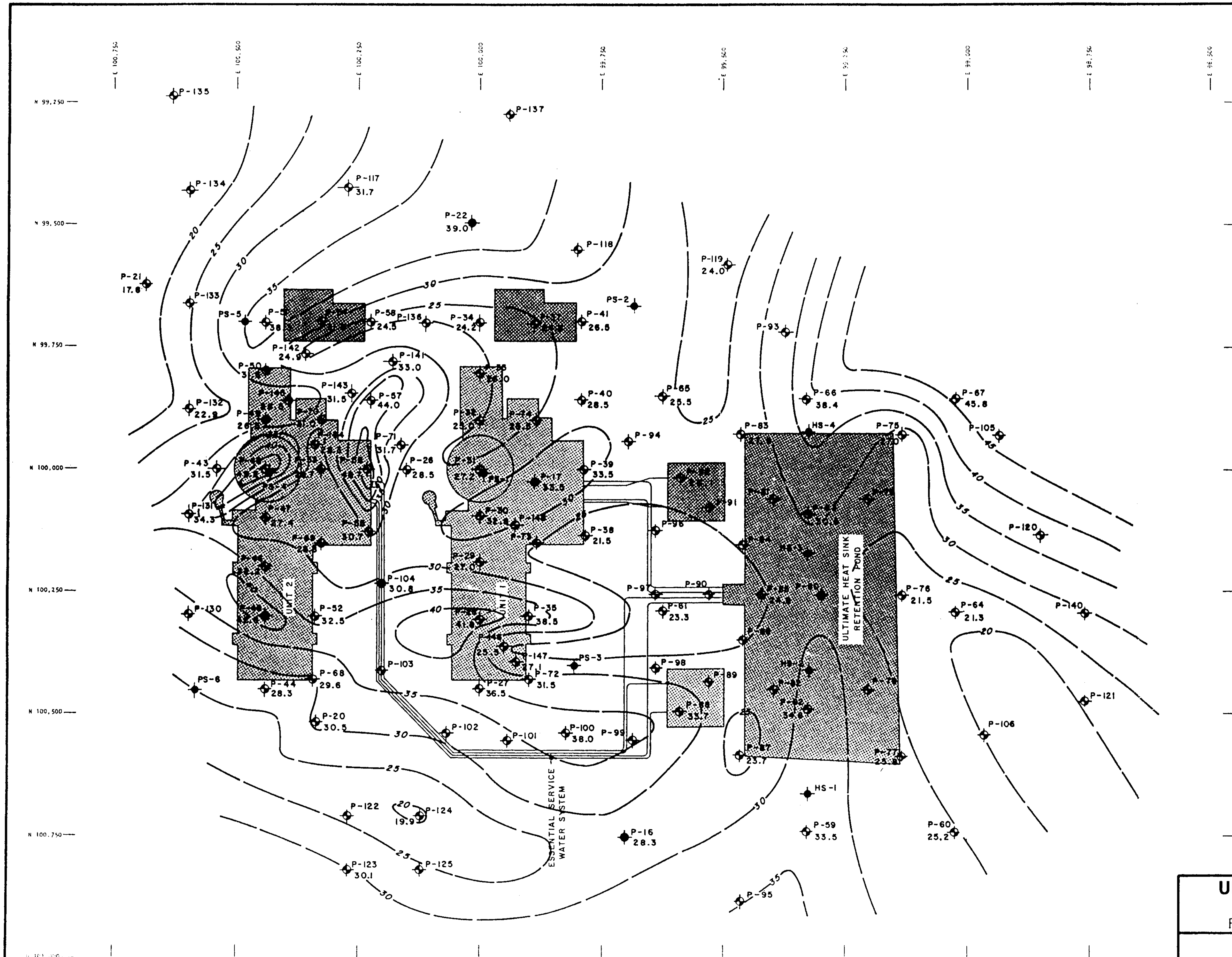
FIGURE 2.5-39

CONTOURS ON TOP OF GRAYDON CHERT CONGLOMERATE-PLANT SITE



EXPLANATION

P-31 BORING LOCATION AND NUMBER

P-16 BORING LOCATION WITH PIEZOMETER

PS-1, HS-1 PIEZOMETER LOCATION AND NUMBER

21.5 THICKNESS IN FEET OF THE GRAYDON CHERT CONGLOMERATE

NOTES:

THE CONTOURS ARE BASED ON GEOLOGIC DATA OBTAINED FROM BORINGS (SEE TABLE 2.5-6).

IT IS POSSIBLE THAT CONTOURS MAY VARY FROM THOSE INDICATED.

THE CONTOURS SHOW VARIATIONS IN THICKNESS OF THE GRAYDON CHERT CONGLOMERATE AND DO NOT NECESSARILY REFLECT STRUCTURE OR ATTITUDE OF UNDERLYING STRATA.

THE DISCUSSION IN THE TEXT IS ESSENTIAL FOR PROPER UNDERSTANDING OF THIS MAP.

Unit 2 was cancelled in 1981.

FEET

100 0 100 200

CONTOUR INTERVAL: 5 FEET

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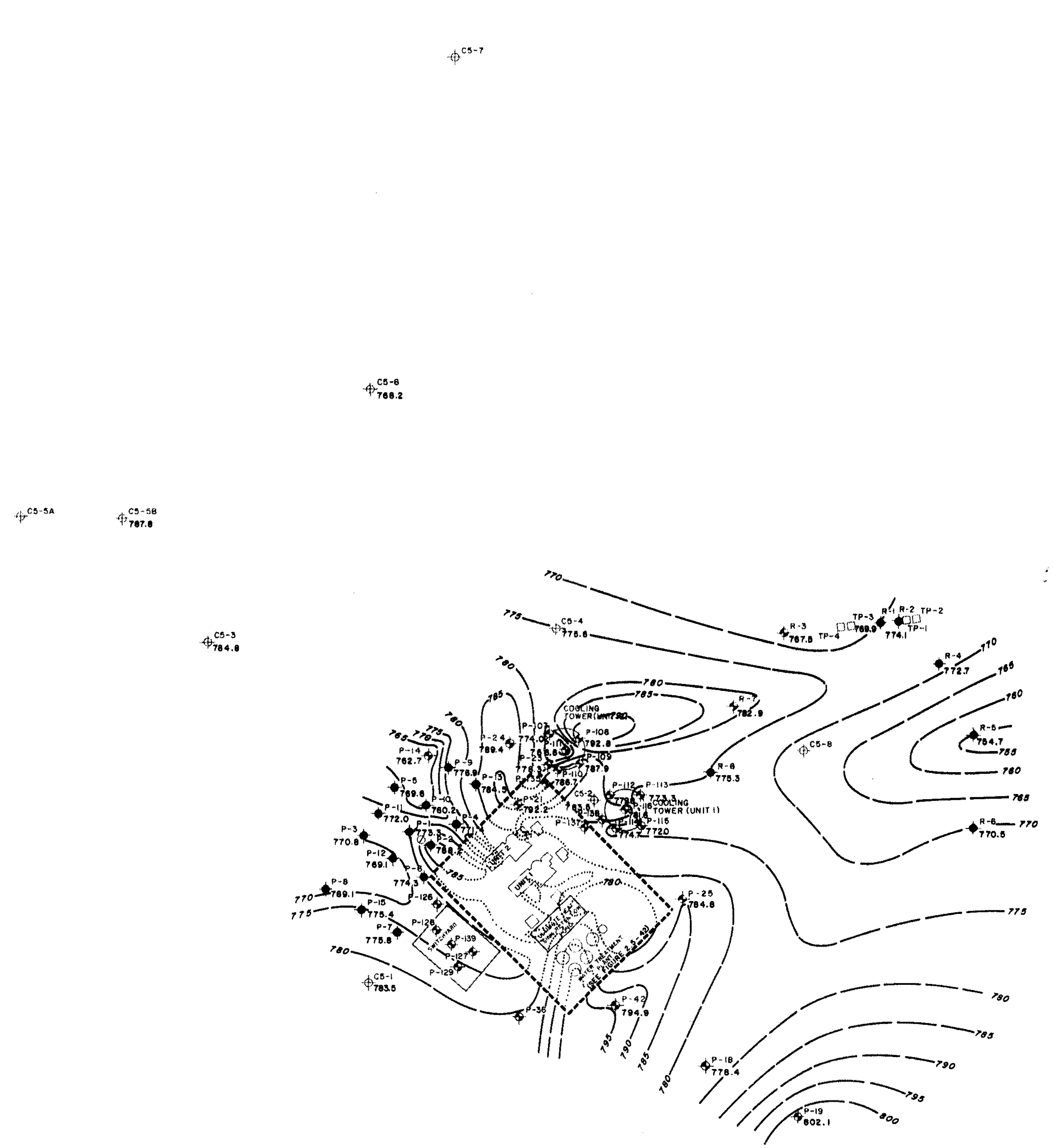
FIGURE 2.5-40

ISOPACH OF GRAYDON CHERT CONGLOMERATE



LEGEND:

- C5-1 BORING LOCATION AND NUMBER (DRILLED IN 1972)
- P-14 BORING LOCATION AND NUMBER
- R-8 BORING LOCATION WITH PIEZOMETER
- TP-1 TEST PIT LOCATION AND GRAYDON CHERT CONGLOMERATE PLATE LOAD TEST LOCATION
- WATER WELL TEST LOCATION
- 793.1 ELEVATION OF THE TOP OF GRAYDON CHERT CONGLOMERATE

NOTES:

THE CONTOURS ARE BASED ON GEOLOGIC DATA OBTAINED FROM BORINGS

IT IS POSSIBLE THAT CONTOURS MAY VARY FROM THOSE INDICATED.

THE CONTOURED SURFACE SHOWN ON THIS MAP IS EROSIONAL UNCONFORMITY AND DOES NOT NECESSARILY REFLECT STRUCTURES OF UNDERLYING STRATA.

THE DISCUSSION IN THE TEXT IS ESSENTIAL FOR PROPER UNDERSTANDING OF THIS MAP.

ELEVATION REFER TO MEAN SEA LEVEL DATUM.

Unit 2 was cancelled in 1981.

CONTOUR INTERVAL = 5 FEET

1000 0 1000 2000 3000

FEET

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STRUCTURE LOCATIONS FROM SVERDRUP & PARCEL AND ASSOCIATES, INC. FIGURE SK-101874 I01

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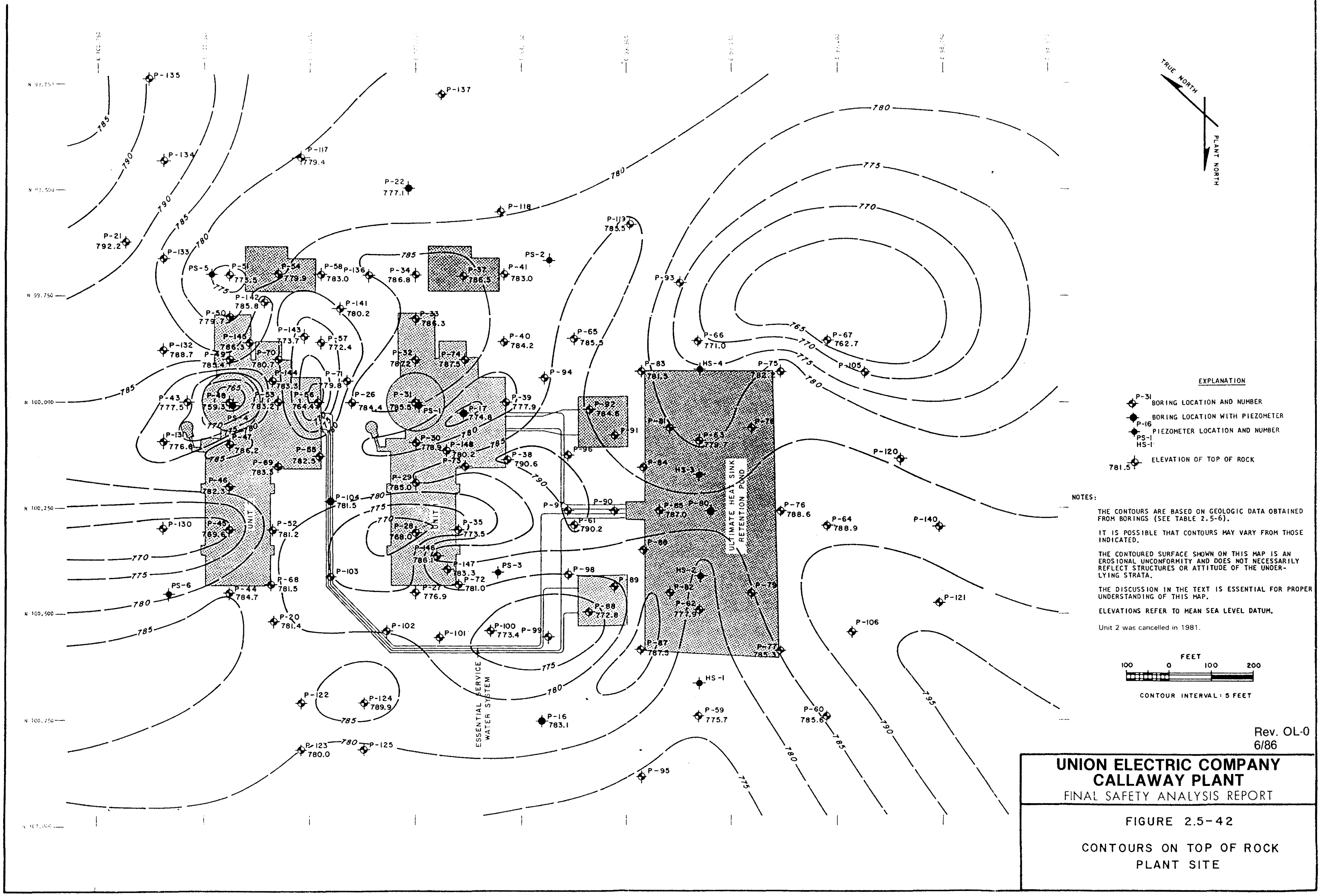
FIGURE 2.5-41

CONTOURS ON TOP OF ROCK
SITE AREA



NOTES:

THE CONTOURS ARE BASED ON GEOLOGIC DATA OBTAINED FROM BORINGS (SEE TABLE 2.5-6).

IT IS POSSIBLE THAT CONTOURS MAY VARY FROM THOSE INDICATED.

THE CONTOURED SURFACE SHOWN ON THIS MAP IS AN EROSIONAL UNCONFORMITY AND DOES NOT NECESSARILY REFLECT STRUCTURES OR ATTITUDE OF THE UNDERLYING STRATA.

THE DISCUSSION IN THE TEXT IS ESSENTIAL FOR PROPER UNDERSTANDING OF THIS MAP.

ELEVATIONS REFER TO MEAN SEA LEVEL DATUM.

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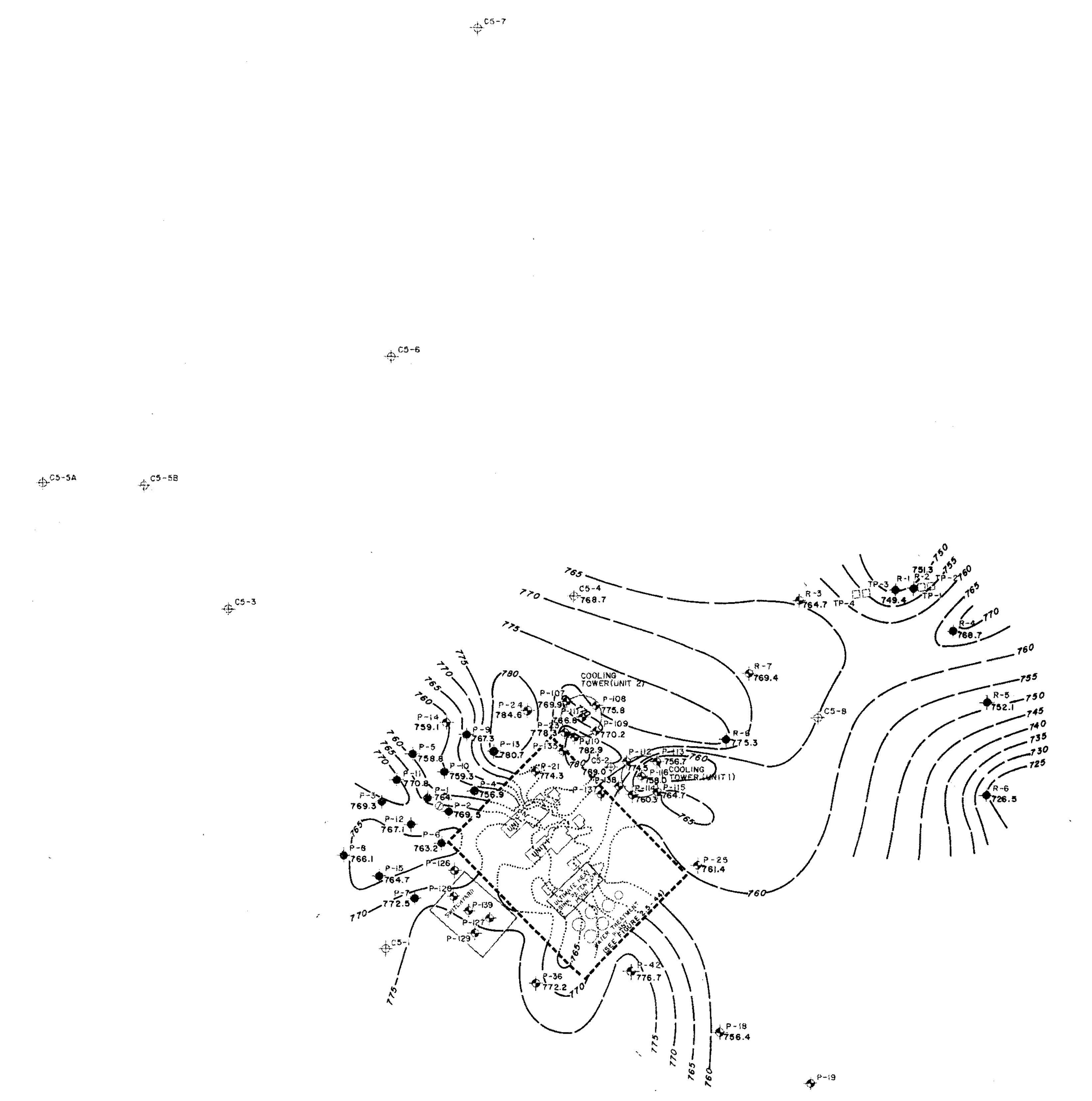
FIGURE 2.5-42

CONTOURS ON TOP OF ROCK
PLANT SITE



N

LEGEND:

- C5-1 BORING LOCATION AND NUMBER (DRILLED IN 1972)
- P-14 BORING LOCATION AND NUMBER
- R-8 BORING LOCATION WITH PIEZOMETER
- TP-1 TEST PIT LOCATION AND GRAYDON CHERT CONGLOMERATE PLATE LOAD TEST LOCATION
- WATER WELL TEST LOCATION
- 793.1 ELEVATION OF THE TOP OF GRAYDON CHERT CONGLOMERATE

NOTES:

THE CONTOURS ARE BASED ON GEOLOGIC DATA OBTAINED FROM BORINGS.

IT IS POSSIBLE THAT CONTOURS MAY VARY FROM THOSE INDICATED.

THE CONTOURED SURFACE SHOWN ON THIS MAP IS EROSIONAL UNCONFORMITY AND DOES NOT NECESSARILY REFLECT STRUCTURES OF UNDERLYING STRATA.

THE DISCUSSION IN THE TEXT IS ESSENTIAL FOR PROPER UNDERSTANDING OF THIS MAP.

ELEVATION REFER TO MEAN SEA LEVEL DATUM.

Unit 2 was cancelled in 1981.

CONTOUR INTERVAL = 5 FEET

1000 0 1000 2000 3000

FEET

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FIGURE 2.5-43

CONTOURS ON TOP OF SNYDER CREEK FORMATION – SITE AREA

STRUCTURE LOCATIONS FROM SVERDRUP & PARCEL AND ASSOCIATES, INC. FIGURE SK-101874 I01

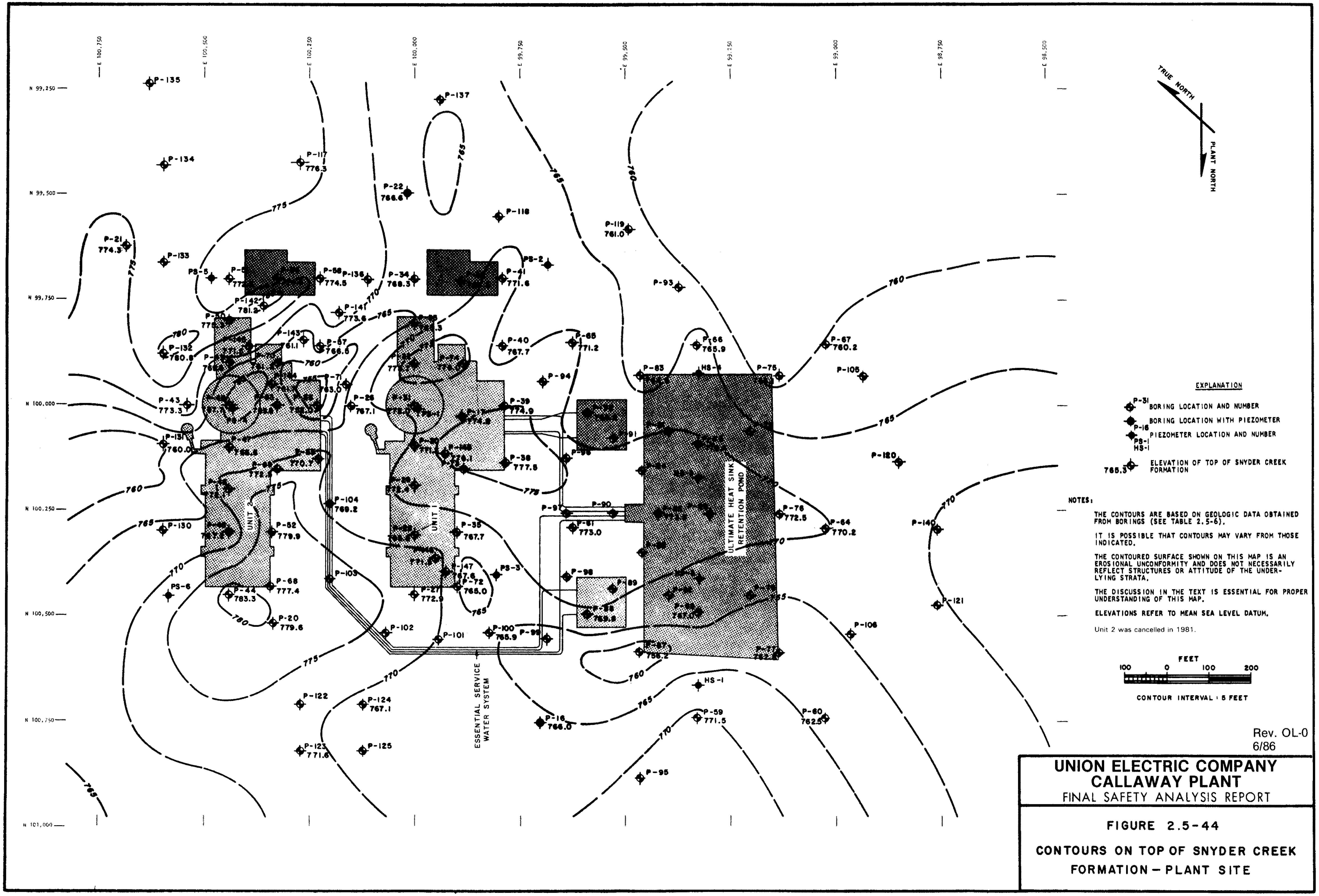

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FIGURE 2.5-44

CONTOURS ON TOP OF SNYDER CREEK FORMATION – PLANT SITE

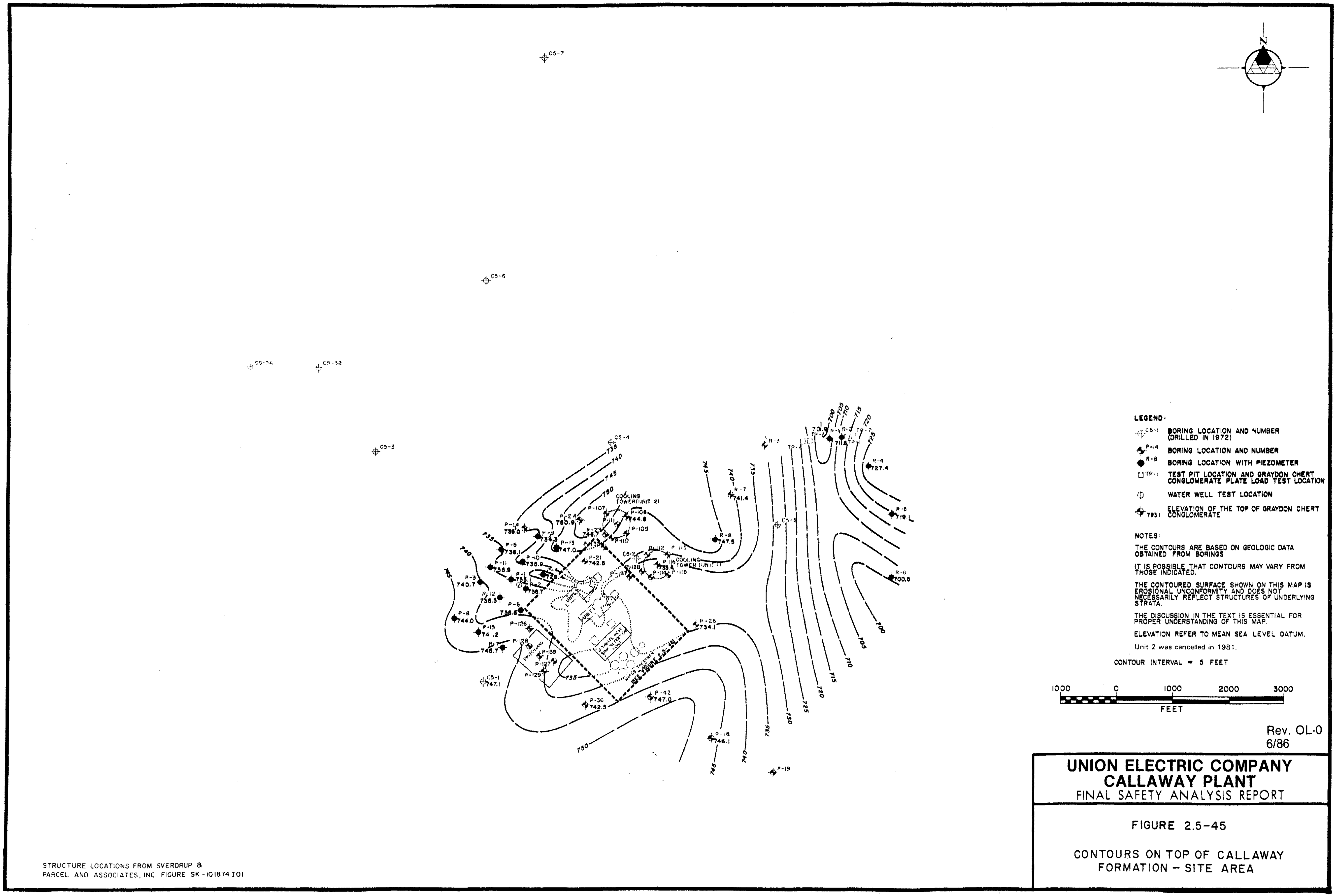

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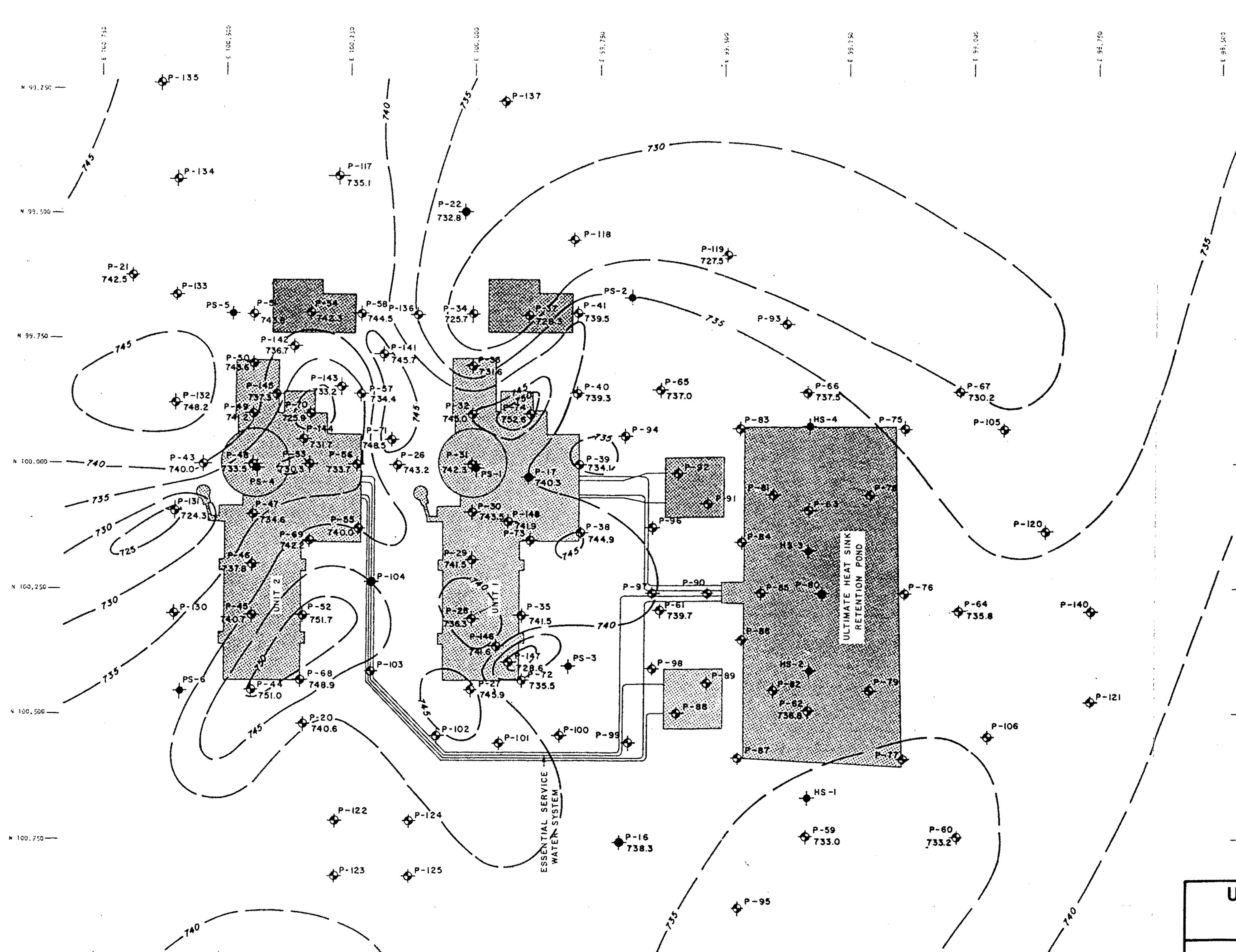
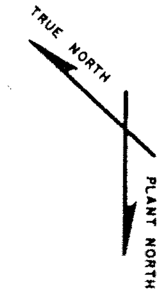
FIGURE 2.5-45

CONTOURS ON TOP OF CALLAWAY FORMATION – SITE AREA





EXPLANATION

P-31 BORING LOCATION AND NUMBER

P-16 BORING LOCATION WITH PIEZOMETER

PS-1 HS-1 PIEZOMETER LOCATION AND NUMBER

735.8 ELEVATION OF TOP OF CALLAWAY FORMATION

NOTES:

THE CONTOURS ARE BASED ON GEOLOGIC DATA OBTAINED FROM BORINGS (SEE TABLE 2.5-6).

IT IS POSSIBLE THAT CONTOURS MAY VARY FROM THOSE INDICATED.

THE CONTOURED SURFACE SHOWN ON THIS MAP IS AN EROSIONAL UNCONFORMITY AND DOES NOT NECESSARILY REFLECT STRUCTURES OR ATTITUDE OF THE UNDERLYING STRATA.

THE DISCUSSION IN THE TEXT IS ESSENTIAL FOR PROPER UNDERSTANDING OF THIS MAP.

ELEVATIONS REFER TO MEAN SEA LEVEL DATUM.

Unit 2 was cancelled in 1981.

FEET
100 0 100 200

CONTOUR INTERVAL 5 FEET

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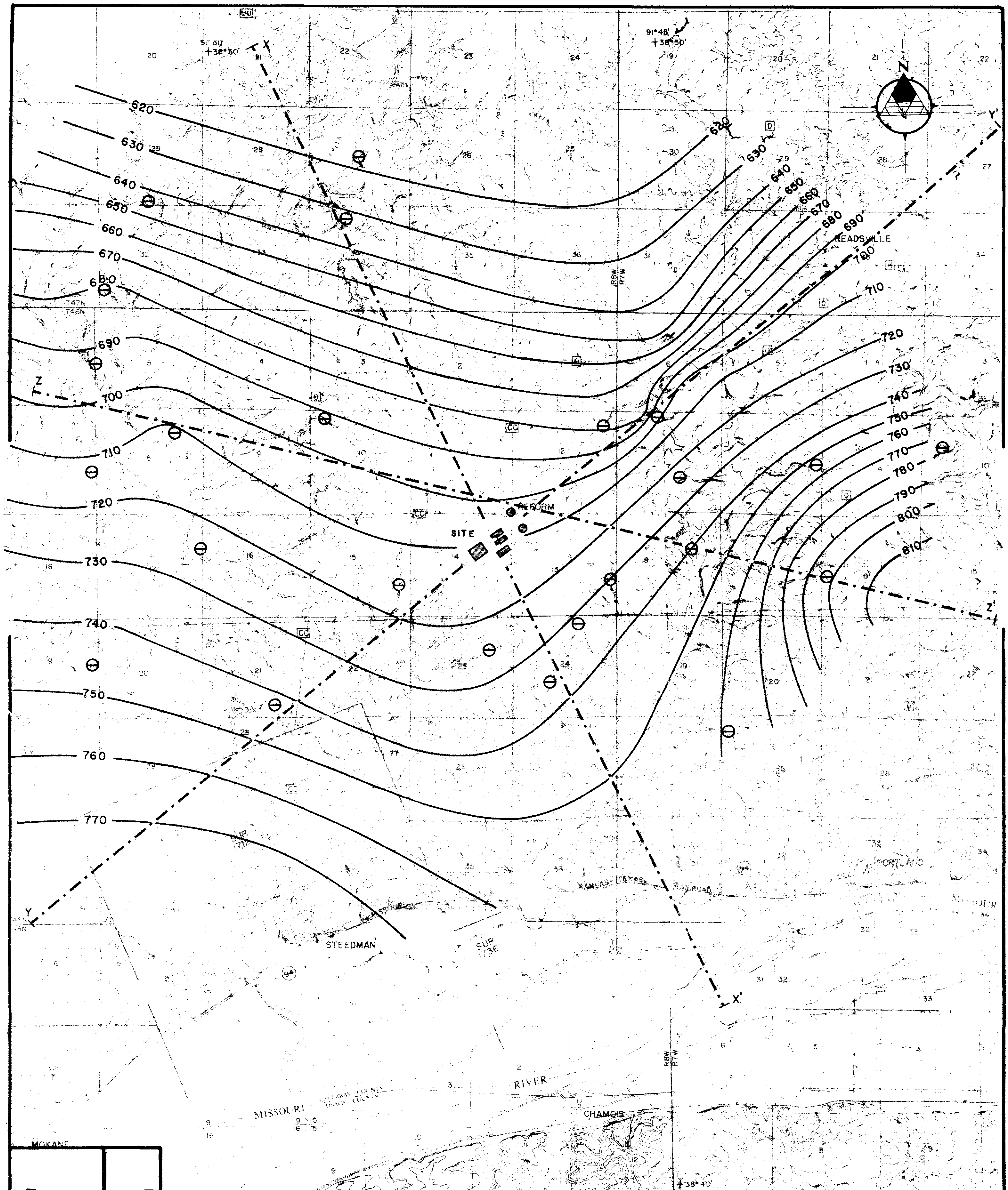
FIGURE 2.5-46

CONTOURS ON TOP OF CALLAWAY FORMATION— PLANT SITE



NOTES:

THE DASHED LINES X-X', Y-Y', AND Z-Z' LOCATE SUBSURFACE SECTIONS THAT ARE SHOWN ON FIGURE 2.5-19.

THE CONTOURS ARE BASED ON DATA OBTAINED BY RECONNAISSANCE GEOLOGIC MAPPING.

IT IS POSSIBLE THAT CONDITIONS MAY VARY FROM THOSE INDICATED.

THE DISCUSSION IN THE TEXT IS ESSENTIAL FOR PROPER UNDERSTANDING OF THIS MAP.

ELEVATIONS REFER TO MEAN SEA LEVEL DATUM.

Unit 2 was cancelled in 1981.

⊖ POINTS OF FIELD OBSERVATION

CONTOUR INTERVAL = 10 FEET

SCALE IN FEET

5000 0 5000

MAP REFERENCE:
TOPOGRAPHY BASED ON PORTIONS OF U.S.G.S. 7.5 MIN.
TOPOGRAPHIC MAP ADVANCE PRINTS:
FULTON SE, MISSOURI QUADRANGLE
MONTGOMERY CITY SW, MISSOURI QUADRANGLE
MOKANE NE, MISSOURI QUADRANGLE
MORRISON NW, MISSOURI QUADRANGLE
SECTION LINES SHOWN ARE APPROXIMATE

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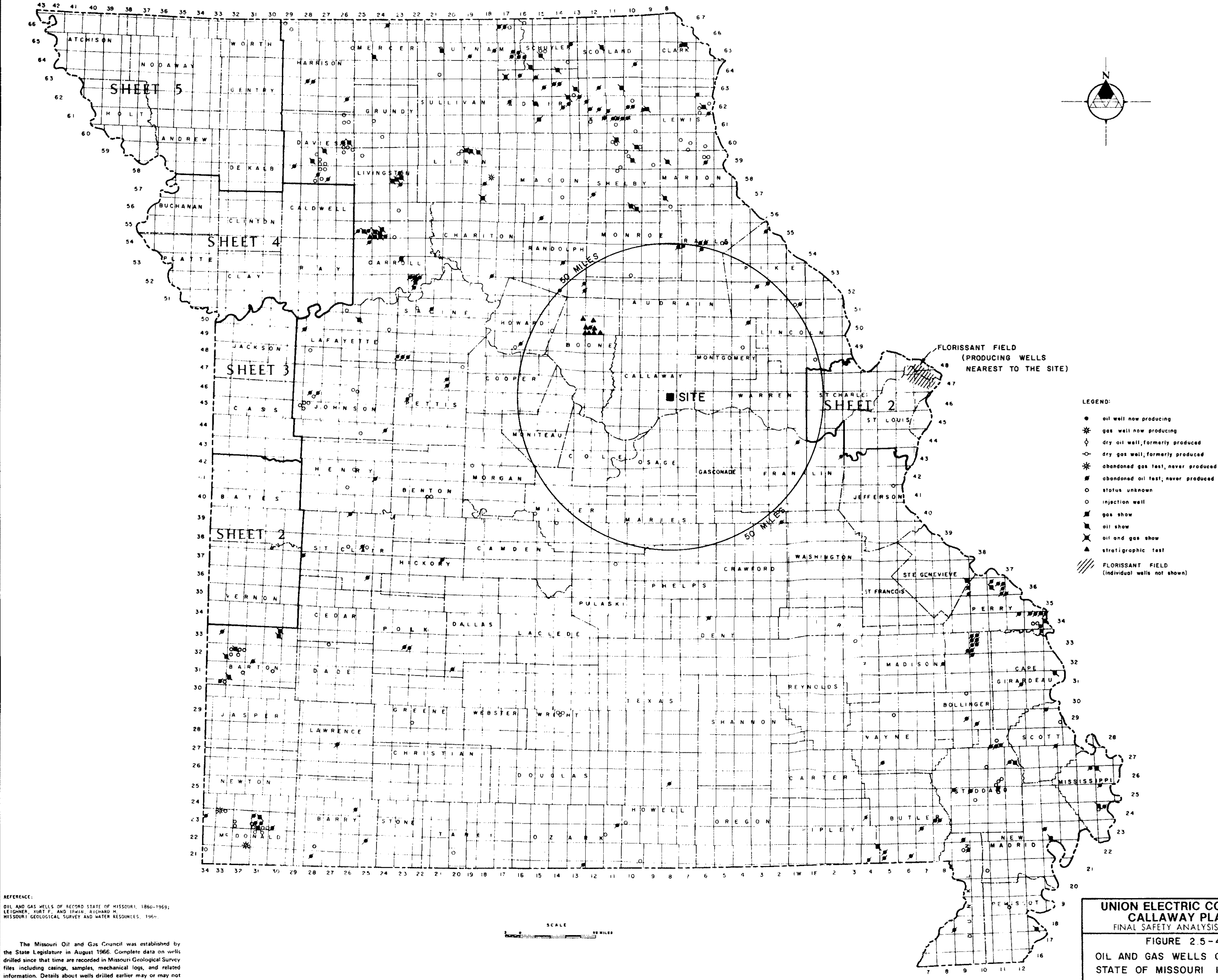
FIGURE 2.5-47
STRUCTURE CONTOURS ON
BASE OF CALLAWAY FORMATION



REFERENCE:

OIL AND GAS WELLS OF RECORD STATE OF MISSOURI, 1860-1969;
LEIGHNER, KURT F. AND IRWIN, RICHARD M.
MISSOURI GEOLOGICAL SURVEY AND WATER RESOURCES, 1969.

The Missouri Oil and Gas Council was established by the State Legislature in August 1966. Complete data on wells drilled since that time are recorded in Missouri Geological Survey files including casings, samples, mechanical logs, and related information. Details about wells drilled earlier may or may not be available.

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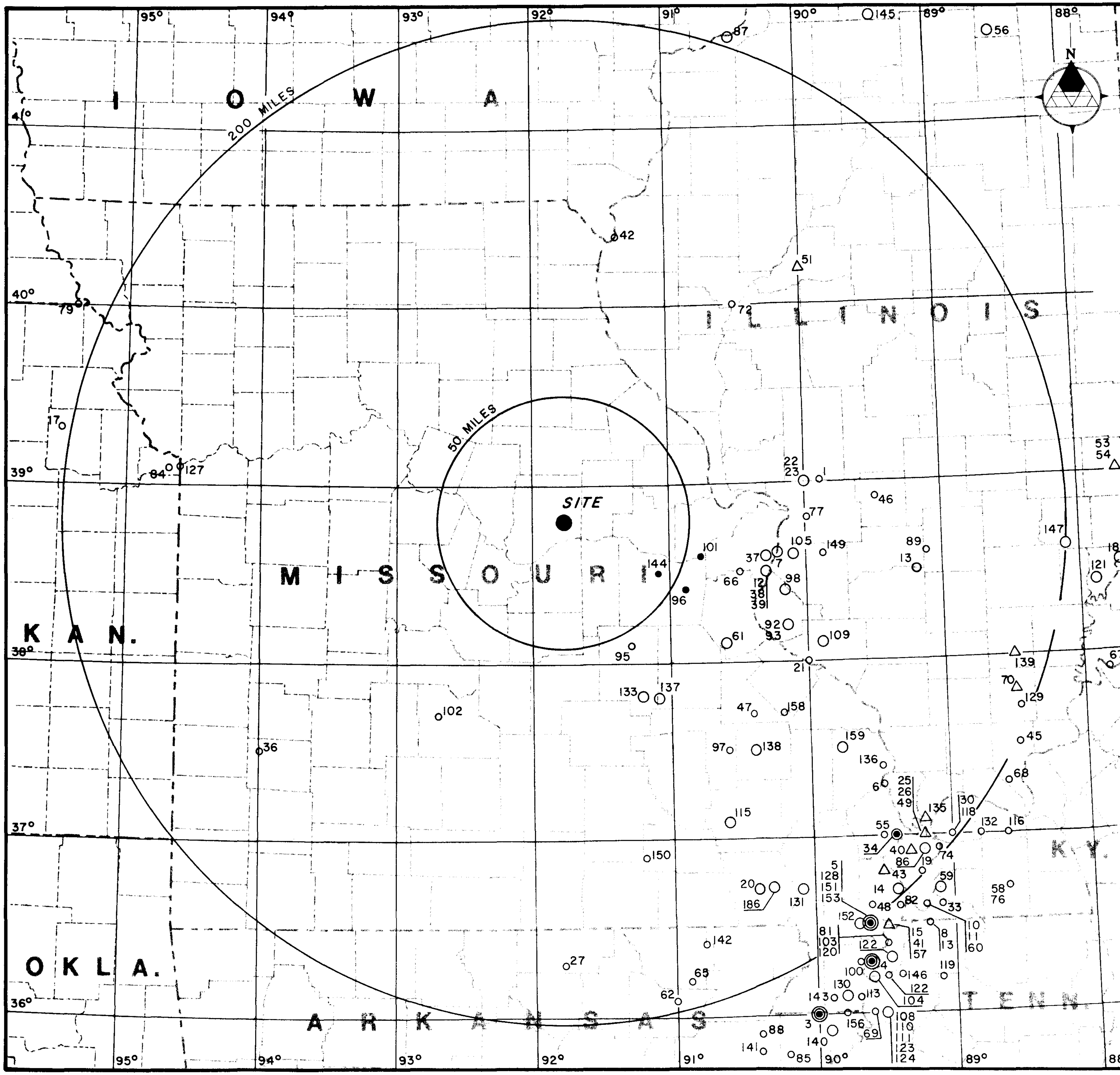
FIGURE 2.5-48

OIL AND GAS WELLS OF RECORD
STATE OF MISSOURI 1860 - 1969



INDEX NUMBER	DATE	MMI	INDEX NUMBER	DATE	MMI	INDEX NUMBER	DATE	MMI
1	1795 JAN 8	IV-V	56	1912 JAN 2	VI	111	1955 DEC 13	V
2*	1804 AUG 20, 24	V-VI	57	1915 APR 28	IV-V	112*	1956 JAN 28	VI
3	1811 DEC 16	X-XI	58	1915 OCT 26	V	113	1956 OCT 29	V
4	1812 JAN 23	X-XI	59	1915 DEC 7	V-VI	114*	1956 OCT 30	VII
5	1812 FEB 7	XI-XII	60	1916 DEC 18	VI-VII	115	1956 NOV 25	VI
6	1820 NOV 9	IV-V				116	1957 MAR 26	V
7	1838 JUN 9	VI	61	1917 APR 9	VI	117*	1958 JAN 26	V
8	1841 DEC 27	V	62	1918 OCT 13	V	118	1958 JAN 27	V
9*	1843 JAN 4	VIII	63*	1918 OCT 15	V	119	1958 APR 8	V
10	1848 JAN 24	V	64	1919 MAY 25	V	120	1958 APR 26	V
			65	1919 NOV 3	IV-V			
11	1853 DEC 18	IV-V	66	1920 MAY 1	V	121	1958 NOV 7	VI
12	1857 OCT 8	VI	67	1922 JAN 10	IV-V	122	1959 FEB 13	V
13	1858 SEP 21	VI	68	1922 MAR 22	V	123	1959 DEC 21	V
14	1860 AUG 7	V	69	1922 MAR 30	IV-V	124	1960 JAN 28	V
15	1865 AUG 17	VII	70	1922 NOV 26	VI-VII	125	1960 APR 21	V
16*	1867 APR 24	VII				126*	1961 APR 27	V
17	1875 NOV 8	V	71*	1923 OCT 28	VII	127	1961 DEC 25	V
18	1876 SEP 25	VI	72	1923 NOV 9	V	128	1962 FEB 2	VI
19	1878 MAR 12	V	73*	1923 DEC 31	V	129	1962 JUN 26	V
20	1878 NOV 18	VI	74	1924 MAR 2	V	130	1962 JUL 23	VI
			75	1925 APR 26	VI			
21	1882 JUL 20	V	76	1925 MAY 13	V	131	1963 MAR 3	VI
22	1882 SEP 27	VI	77	1925 JUL 13	V	132	1963 AUG 2	V
23	1882 OCT 15	V	78	1925 SEP 2	V-VI	133	1965 MAR 6	VI
24*	1882 OCT 22	VI-VII	79	1927 MAR 18	V	134	1965 AUG 13	VI
25	1883 JAN 11	VI	80*	1927 MAY 7	VII	135	1965 AUG 14	VII
26	1883 APR 12	VI-VII				136	1965 AUG 15	V
27	1883 DEC 5	V	81	1927 AUG 13	V	137	1965 OCT 20	VI
28*	1886 AUG 31	IX-X	82	1930 SEP 1	V	138	1967 JUL 21	VI
29*	1887 FEB 6	V-VI	83*	1931 JAN 5	V	139	1968 NOV 9	VII
30	1887 AUG 2	V	84*	1931 AUG 9	IV-V	140	1970 NOV 16	VI
			85	1933 DEC 9	V			
31*	1889 JUL 19	VI	86	1934 AUG 19	VI	141	1971 OCT 1	V
32	1891 JUL 26	VI	87	1934 NOV 12	VI	142	1972 FEB 1	V
33	1891 SEP 26	V	88	1937 MAY 16	IV-V	143	1972 MAR 29	V
34	1895 OCT 31	VIII	89	1937 NOV 17	V	144	1972 APR 4	II
35*	1899 APR 29	VI-VII	90*	1938 FEB 12	V	145	1972 SEP 15	VI
36	1901 JAN 3	V				146	1974 JAN 8	V
37	1902 JAN 24	VI	91*	1938 SEP 16	IV-V	147	1974 APR 3	VI
38	1903 FEB 8	VI	92	1939 NOV 23	V	148	1974 MAY 13	VI
39	1903 OCT 4	V-VI	93	1940 NOV 23	VI	149	1974 JUN 5	V
40	1903 NOV 4	VI-VII	94*	1941 NOV 16	VI	150	1974 AUG 11	V
			95	1943 JUL 25	IV-V			
41	1903 NOV 27	V	96	1945 MAR 27	III	151	1975 FEB 13	V
42	1905 APR 13	V	97	1946 OCT 7	IV-V	152	1975 JUN 13	VI
43	1905 AUG 21	VI-VII	98	1947 JUN 29	VI	153	1975 DEC 3	V
44*	1906 MAY 11	V	99*	1947 DEC 15	V	154	1976 MAR 25	VI
45	1906 MAY 21	V	100	1949 JAN 13	V	155	1976 APR 15	V
46	1907 JAN 30	V				156	1976 MAY 22	V
47	1907 JUL 4	IV-V	101	1949 AUG 26	III	157	1976 SEP 25	V
48	1908 SEP 28	IV-V	102	1950 FEB 8	V	158	1976 DEC 1[illegible]	V
49	1908 OCT 27	V	103	1952 FEB 20	V	159	1977 JAN 3	VI
50*	1909 MAY 26	VII	104	1952 JUL 16	VI			
			105	1953 SEP 11	VI			
51	1909 JUL 18	VII	106	1954 FEB 2	VI			
52	1909 AUG 16	---	107*	1954 APR 26	V			
53	1909 SEP 27	VII	108	1955 MAR 29	VI			
54	1909 OCT 23	V	109	1955 APR 9	VI			
55	1909 OCT 23	V	110	1955 SEP 5	V			

NOTE:
*EPICENTERS LOCATED OUTSIDE OF MAP; SEE TABLE 2.5-12 FOR LOCATION OF THESE POINTS.

LEGEND:

- II - IV
- V
- VI
- VII
- VIII
- IX OR GREATER

25 0 25 50 75
MILES

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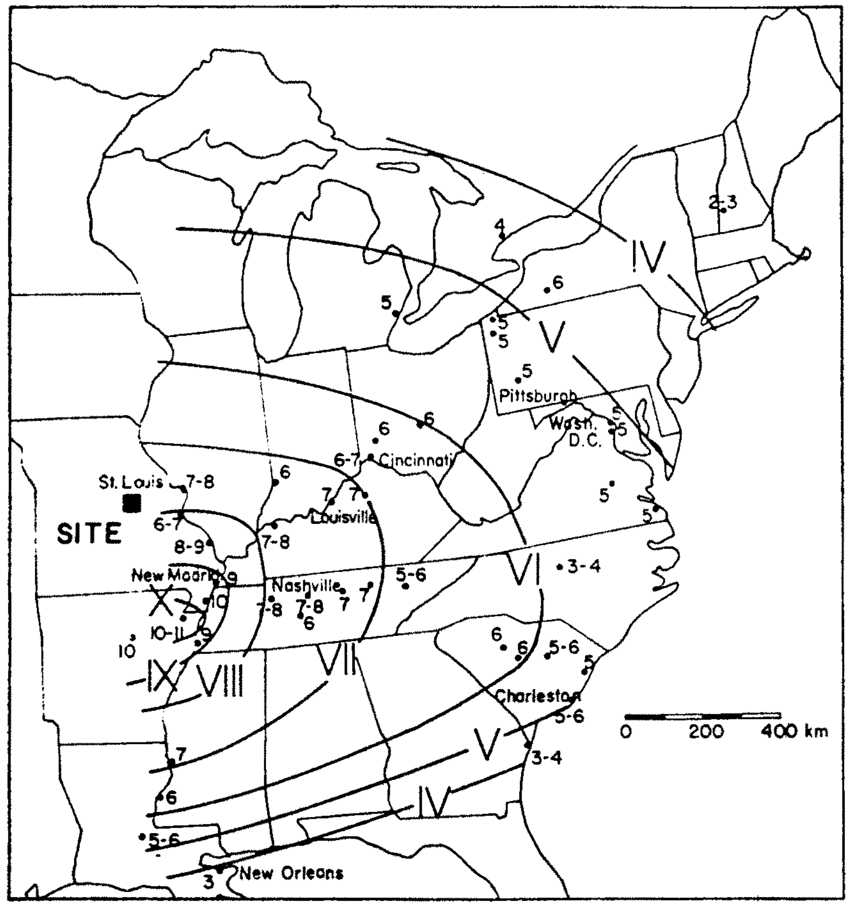
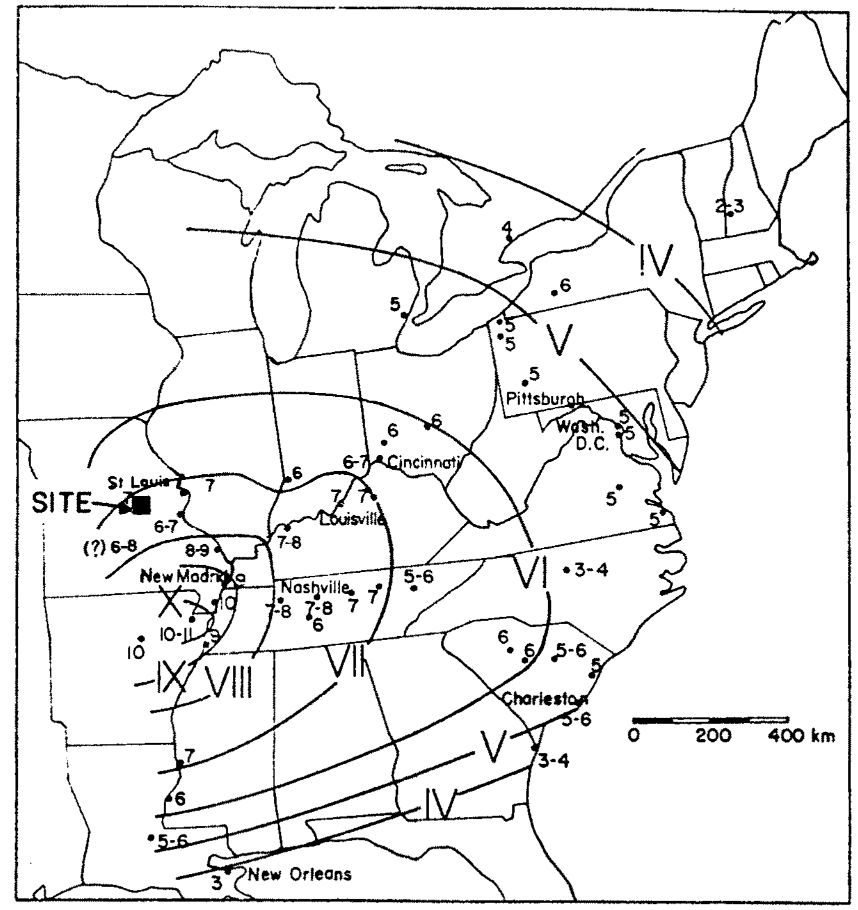
FIGURE 2.5-49

EPICENTER LOCATIONS



Generalized isoseismal map of the earthquake of December 16, 1811 at 08h15m GMT. MM intensity values at individual points are given in Arabic numerals (see Table 1 for sources of information). The isoseisms, labeled with Roman numerals, indicate the outer bound of the region of specified intensity.

NOTE: ISOSEISMAL CONTOURS BY NUTTLI (1973)



Generalized isoseismal map of the earthquake of December 16, 1811 at 08h15m GMT. MM intensity values at individual points are given in Arabic numerals (see Table 1 for sources of information). The isoseisms, labeled with Roman numerals, indicate the outer bound of the region of specified intensity.

NOTE: ISOSEISMAL CONTOURS BY NUTTLI (1973), MODIFIED BY DAMES AND MOORE (1974)

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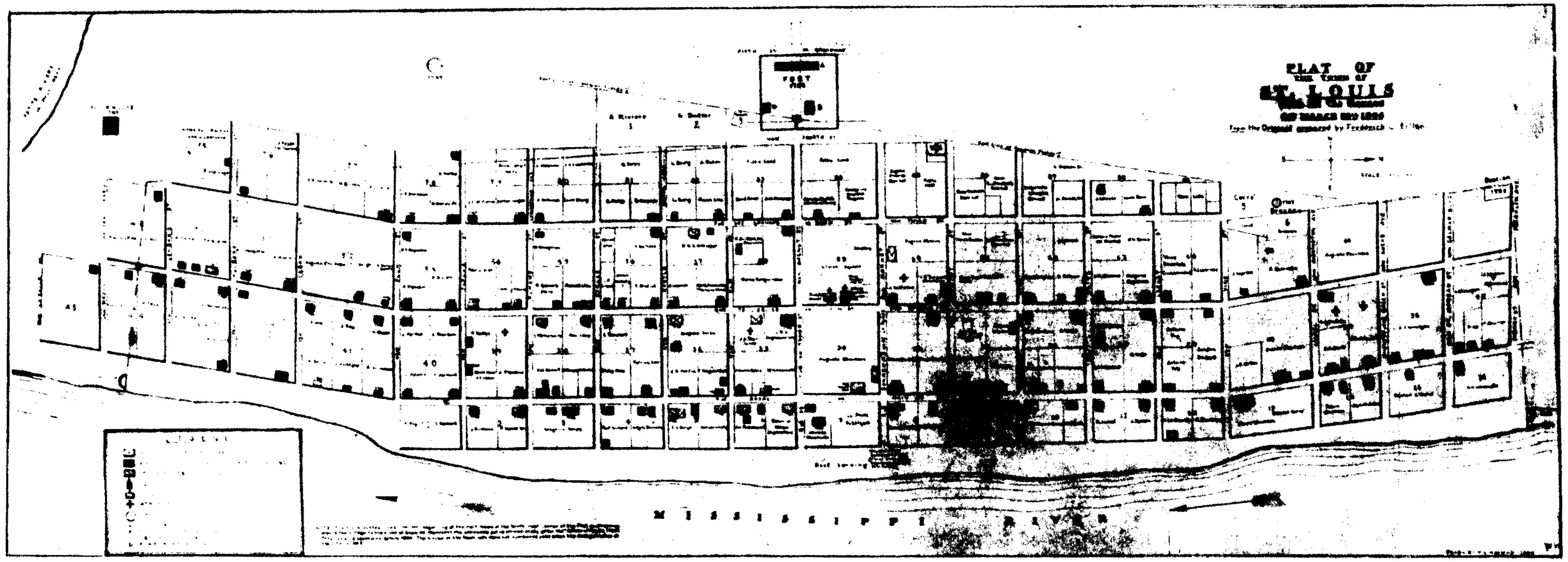
FIGURE 2.5-50
ISOSEISMAL MAP FOR
NEW MADRID EARTHQUAKE OF
DECEMBER 16, 1811



REFERENCE: WAYMAN, NORBURY L., 1968, A PICTORIAL HISTORY OF ST. LOUIS: WAYMAN, NORBURY L., ST. LOUIS.

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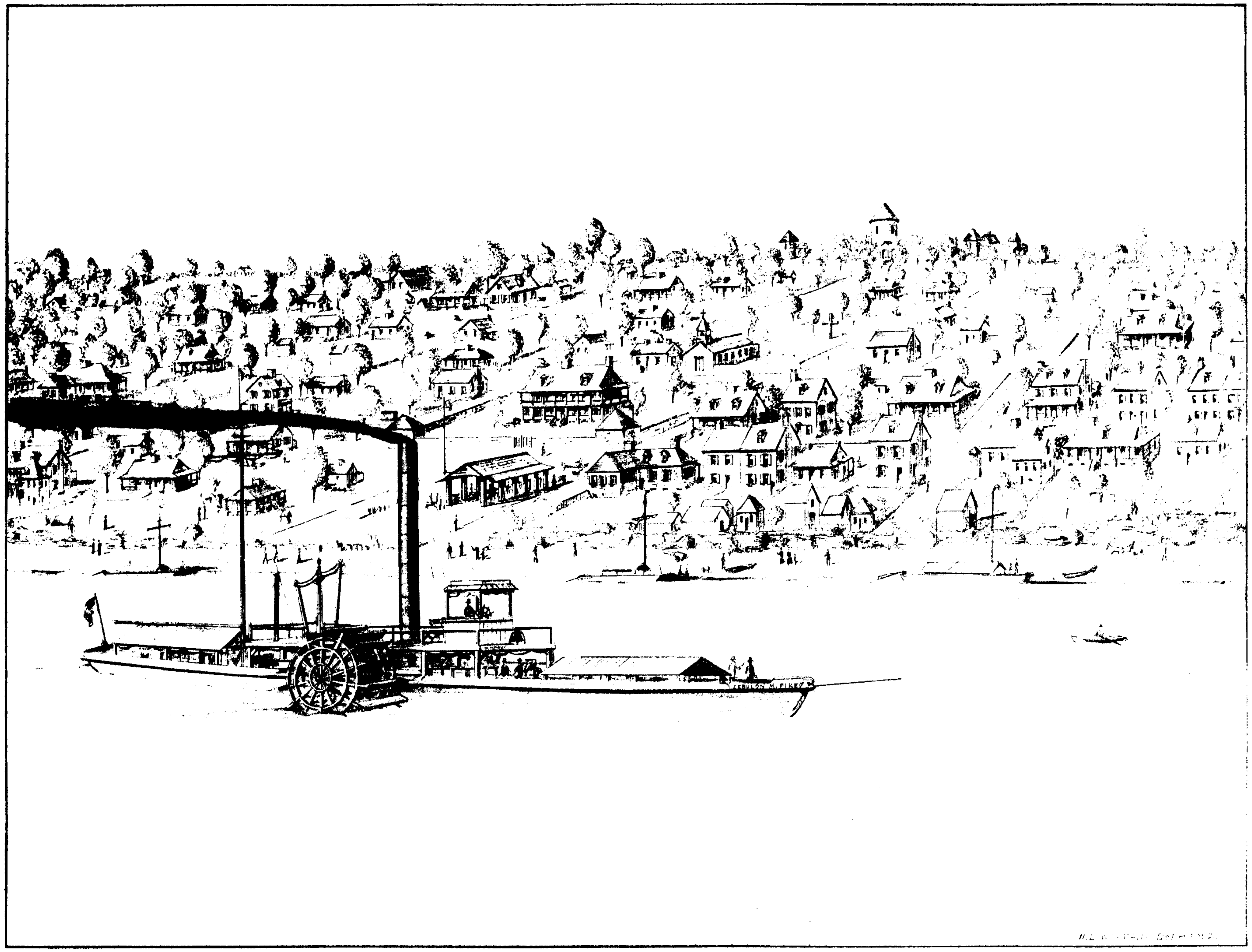
FIGURE 2.5-51
PLAT OF THE TOWN OF ST. LOUIS IN 1804 SHOWING ITS LOCATION ON THE FLOOD PLAIN OF THE MISSISSIPPI RIVER



REFERENCE: WAYMAN, NORBURY L., 1968, A PICTORIAL HISTORY OF ST. LOUIS: WAYMAN, NORBURY L., ST. LOUIS.

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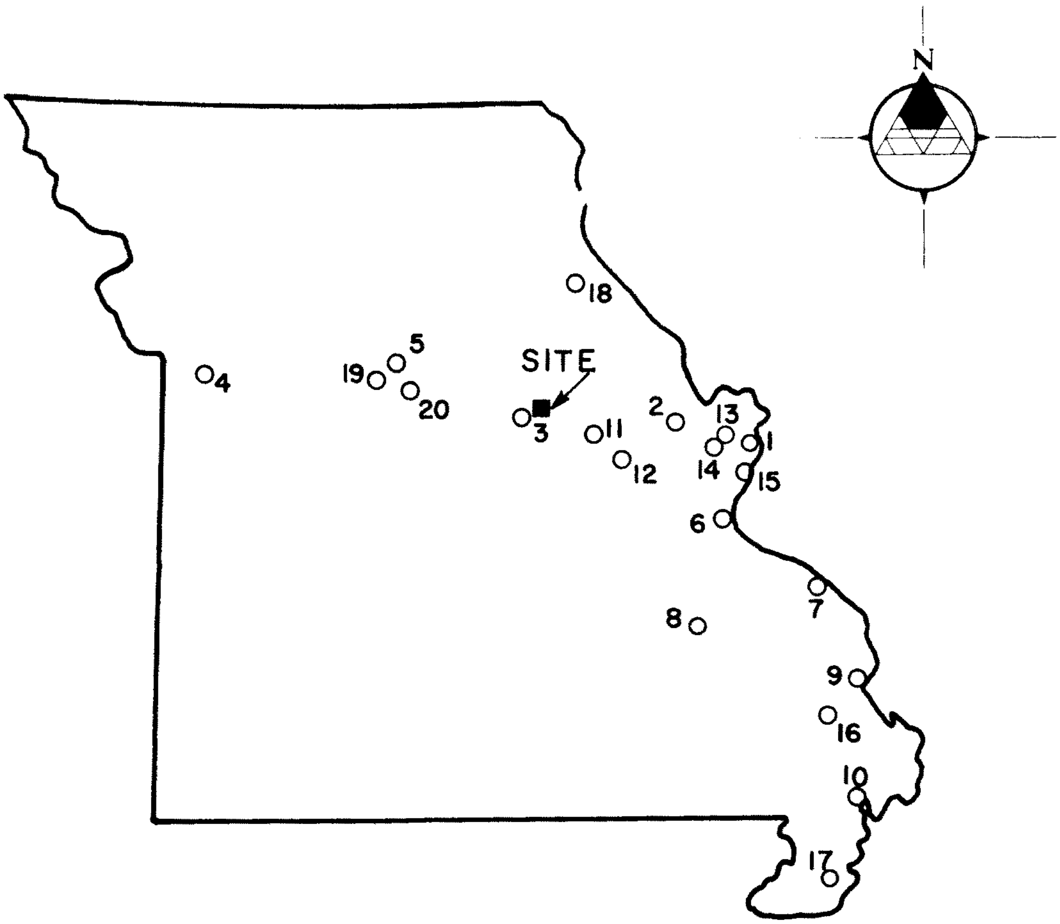
FIGURE 2.5-52
VIEW OF THE TOWN OF ST. LOUIS IN 1817
SHOWING ITS LOCATION ON THE
FLOOD PLAIN OF THE MISSISSIPPI RIVER



SETTLEMENTS IN MISSOURI -- 1811

1. ST. LOUIS
2. ST. CHARLES
3. COTE SANS DESSEIN
4. FORT OSAGE
5. BOONSLICK
6. HERCULANEUM
7. STE. GENEVIEVE
8. LEAD MINES
9. CAPE GIRARDEAU
10. NEW MADRID
11. DEFIANCE
12. CHARETTE
13. FLORISSANT
14. BON HOMME
15. CARONDOLET
16. BARD
17. LITTLE PRAIRIE
18. FORT MASON
19. ARROWROCK
20. FRANKLIN

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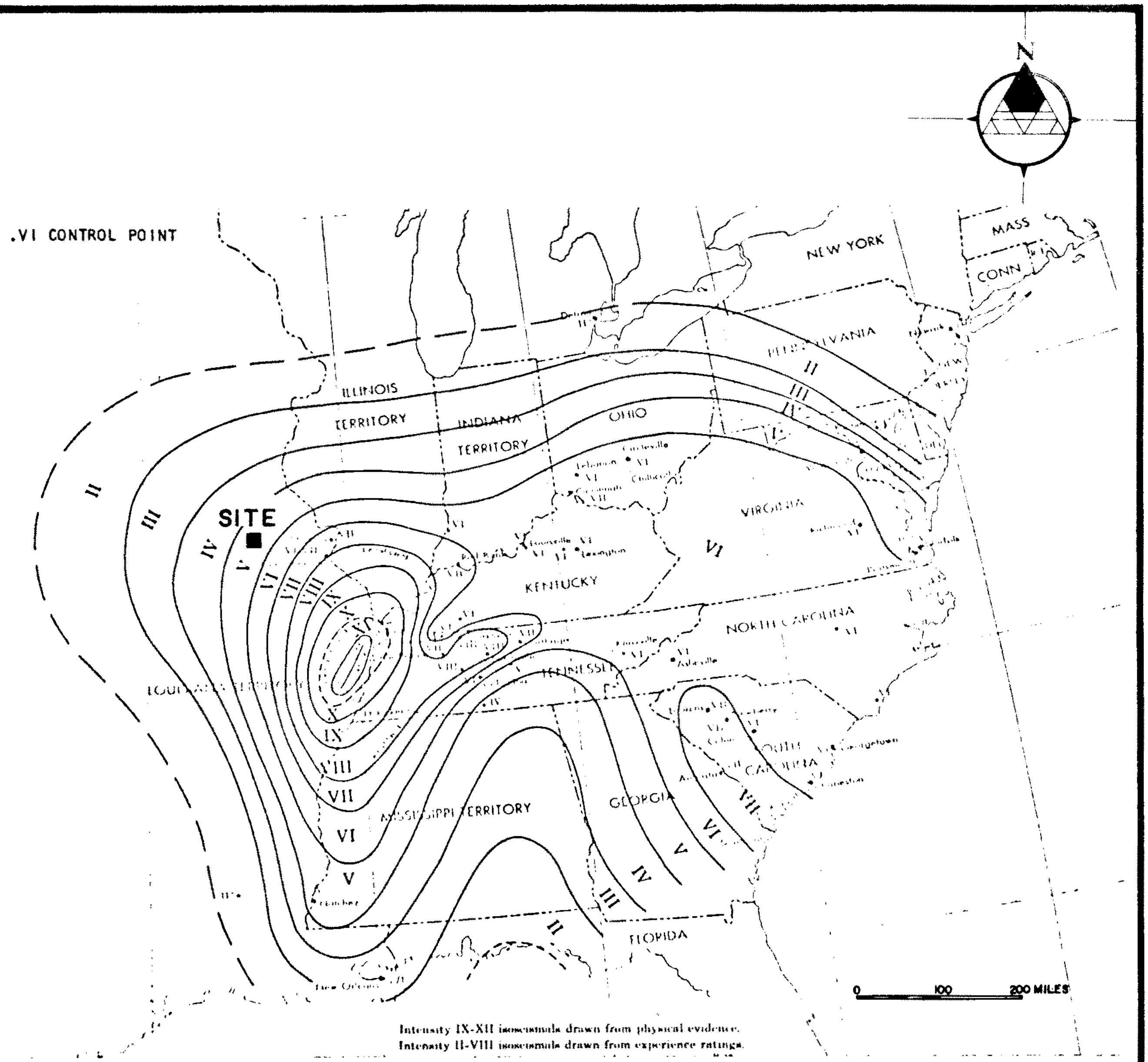
FIGURE 2.5-53
SETTLEMENTS IN MISSOURI – 1811



NOTES:
ISOSEISMAL CONTOURS BY
STEARNS AND WILSON (1972)

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FIGURE 2.5-54
ISOSEISMAL MAP FOR
NEW MADRID EARTHQUAKE OF
DECEMBER 16, 1811

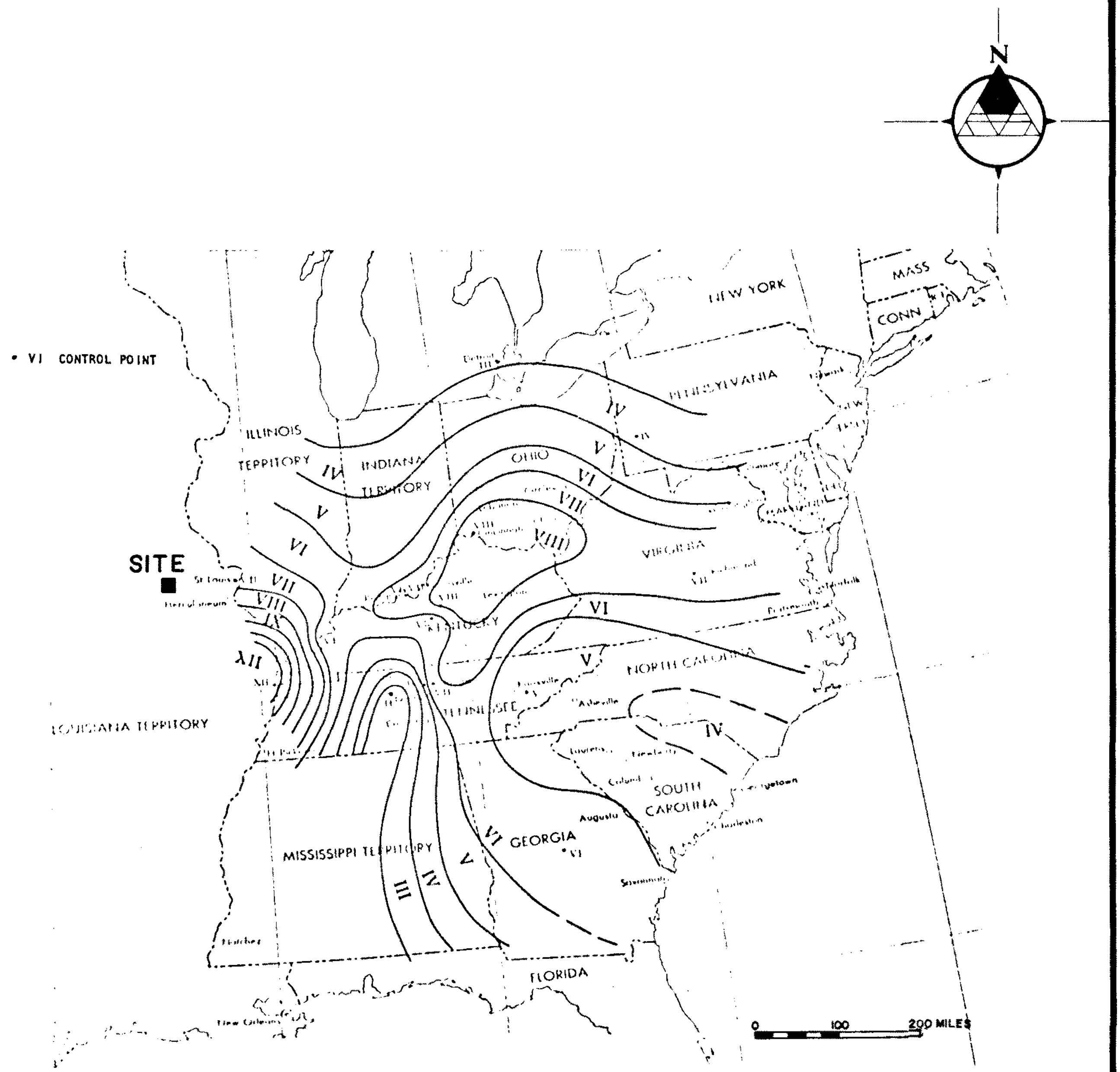

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FIGURE 2.5-55
ISOSEISMAL MAP FOR
NEW MADRID EARTHQUAKE OF
FEBRUARY 7, 1812

NOTES:
ISOSEISMAL CONTOURS BY
STEARNS AND WILSON (1972)

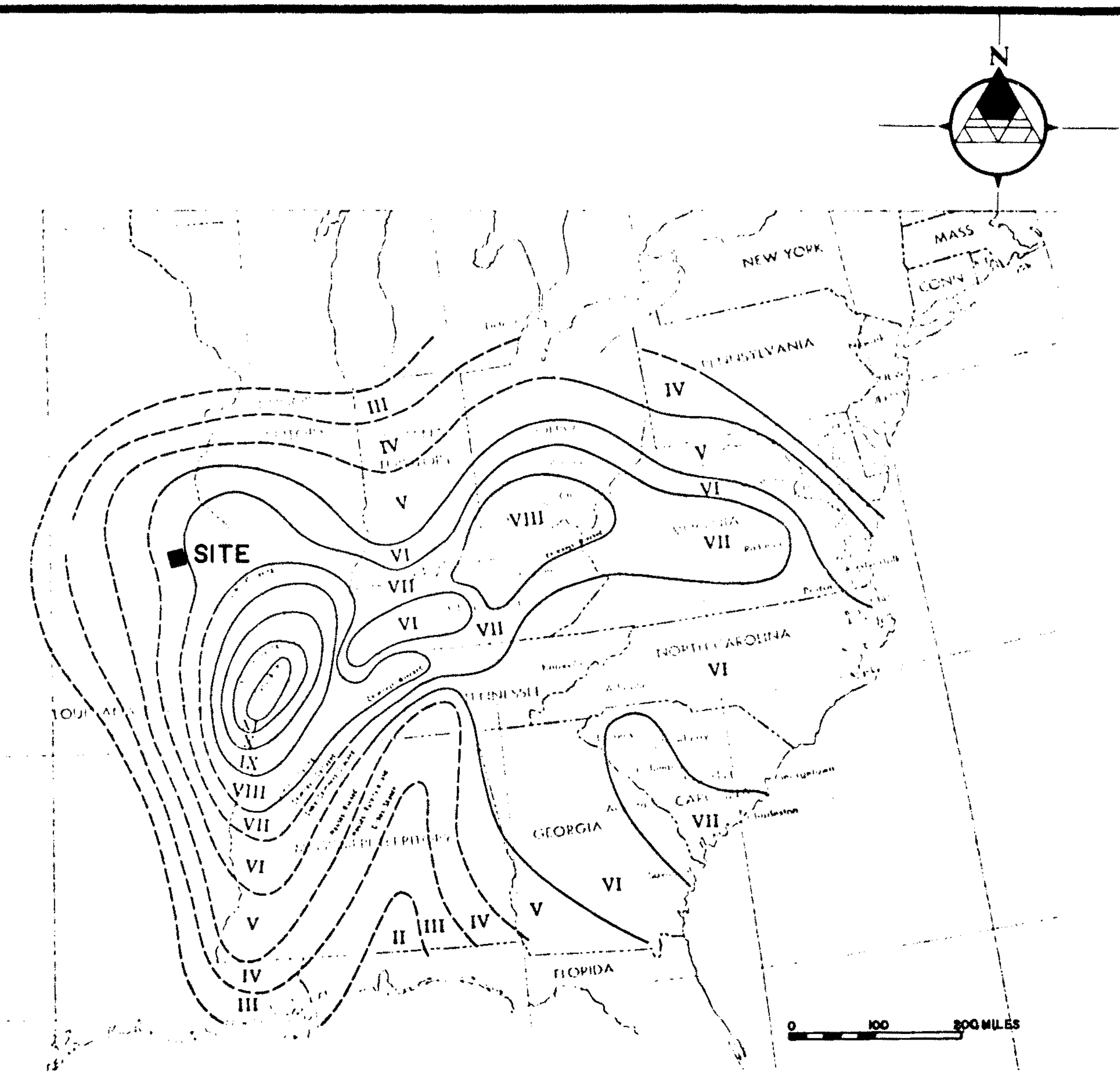

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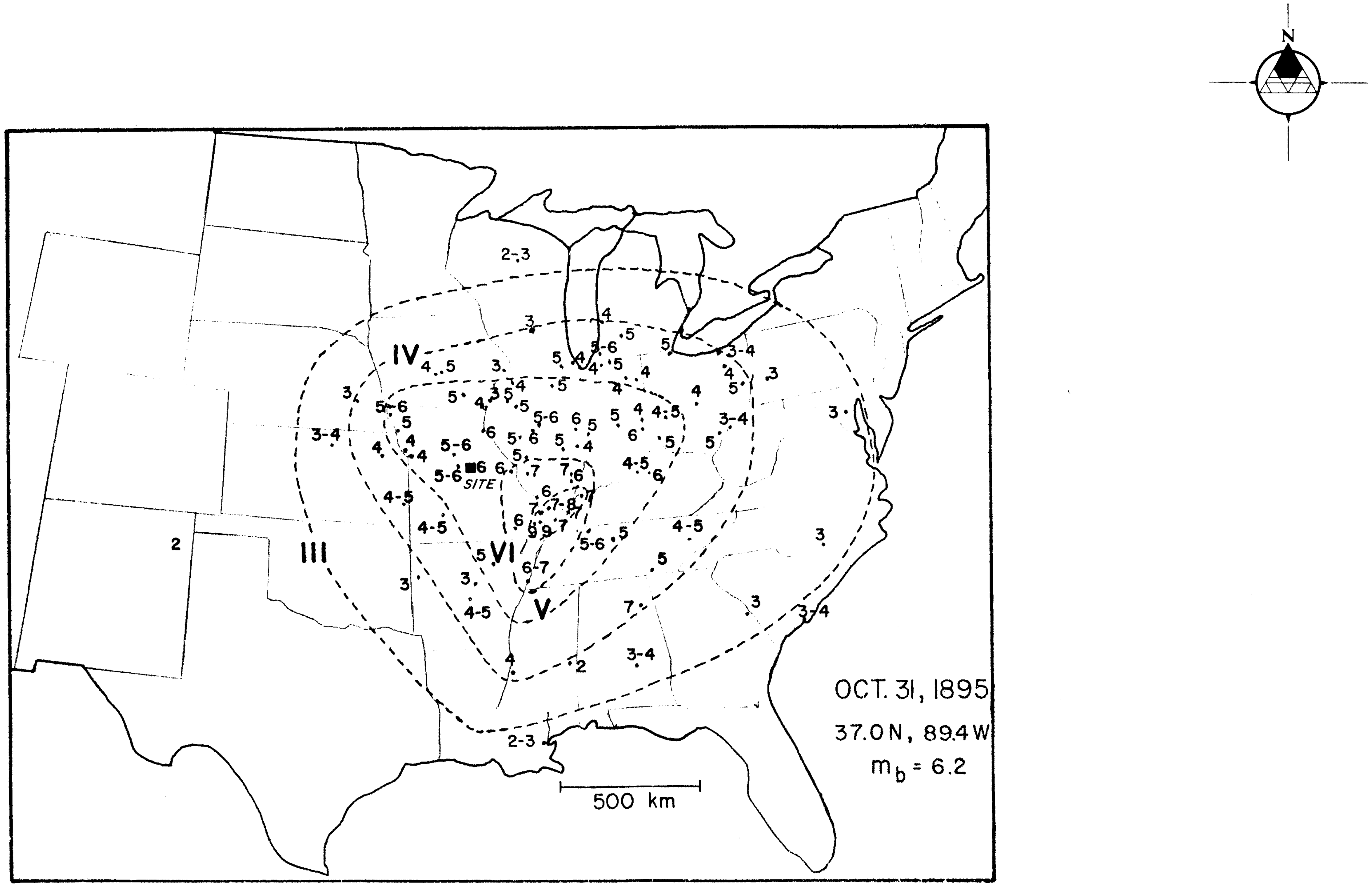
FIGURE 2.5-56
COMPOSITE ISOSEISMAL MAP FOR THE NEW MADRID, MISSOURI EARTHQUAKES

NOTES:
ISOSEISMAL CONTOURS BY STEARNS AND WILSON (1972) SHOW MAXIMUM EFFECTS OF SERIES AND ARE DASHED WHERE INFERRED.



NOTE :
ISOSEISMAL CONTOURS BY
NUTTLI (1973)

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FIGURE 2.5- 57
ISOSEISMAL MAP FOR THE
CHARLESTON, MISSOURI EARTHQUAKE
OF OCTOBER 31, 1895

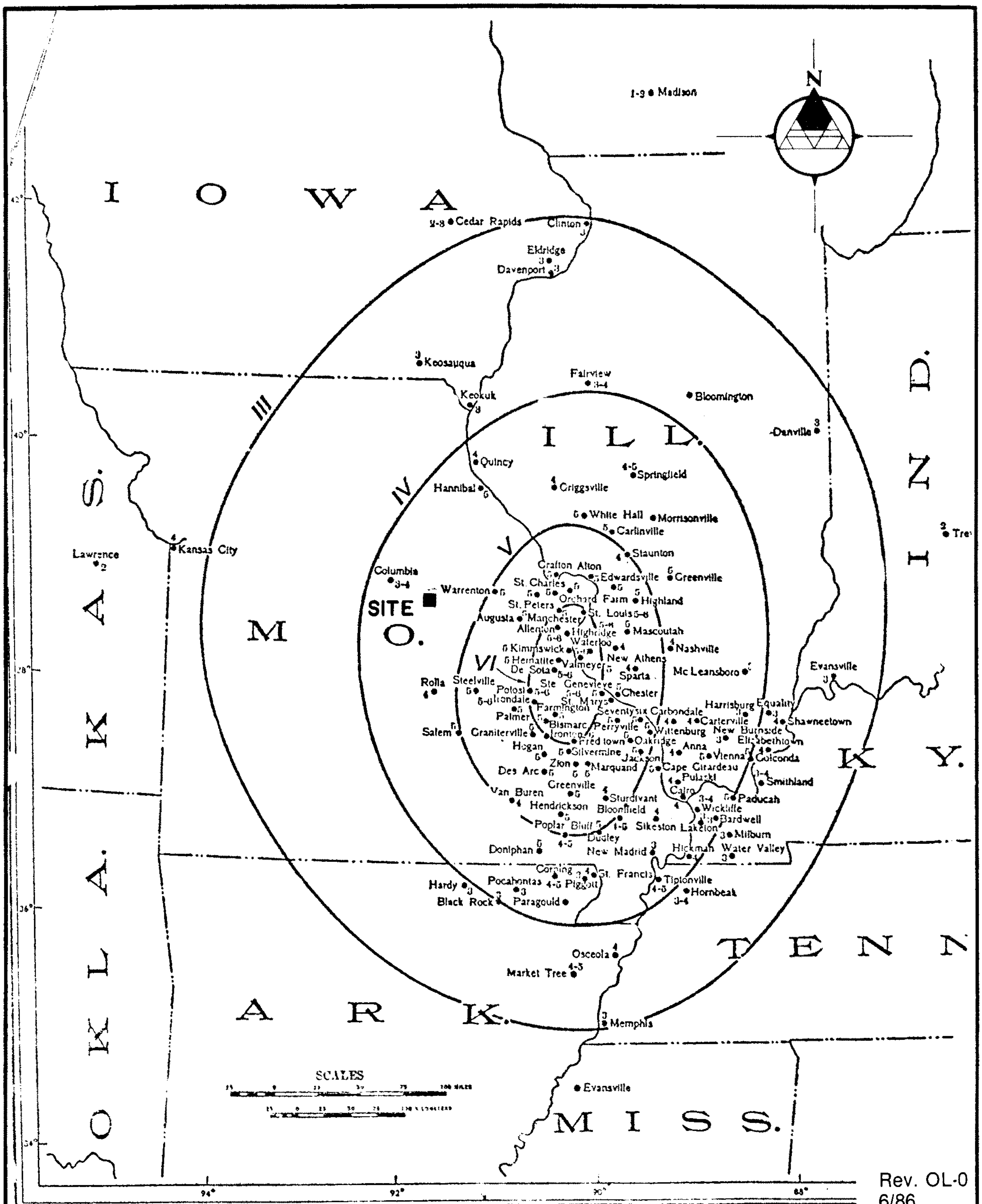

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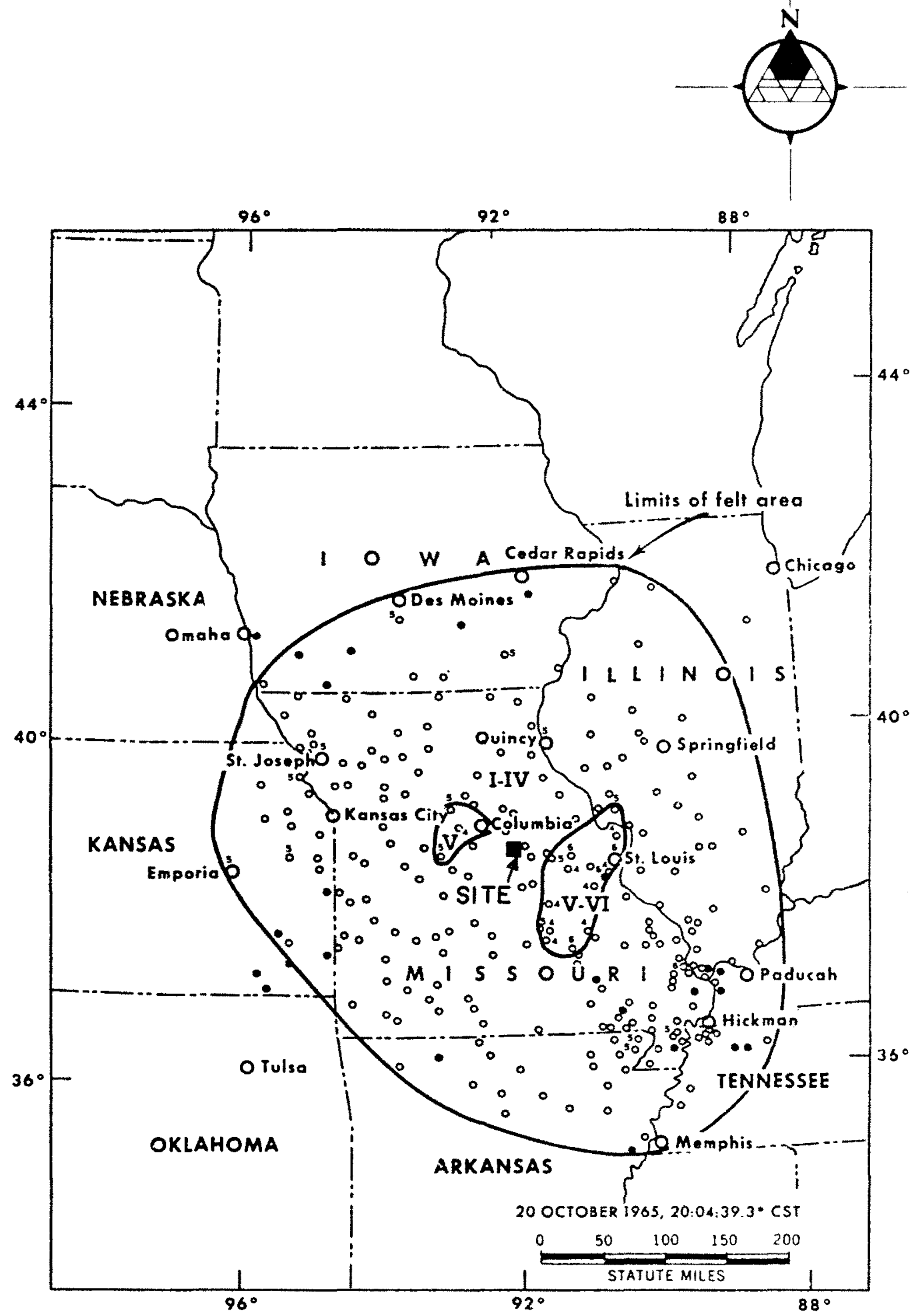
FIGURE 2.5-58
ISOSEISMAL MAP FOR THE
EARTHQUAKE OF APRIL 9, 1917 IN
MISSOURI AND ILLINOIS

NOTES:
ARABIC NUMBERS OPPOSITE PLACES
INDICATE ROSSI-FOREL VALUES.
DATA FROM FINCH, MONTHLY
WEATHER REVIEW (1917)



EXPLANATION:

○ DATA POINT REPORTING EARTHQUAKE

● DATA POINT NOT REPORTING EARTHQUAKE

SOURCE: U.S. EARTHQUAKES (1965)

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FIGURE 2.5-59
ISOSEISMAL MAP FOR THE
ST. LOUIS, MISSOURI EARTHQUAKE
OF OCTOBER 20, 1965

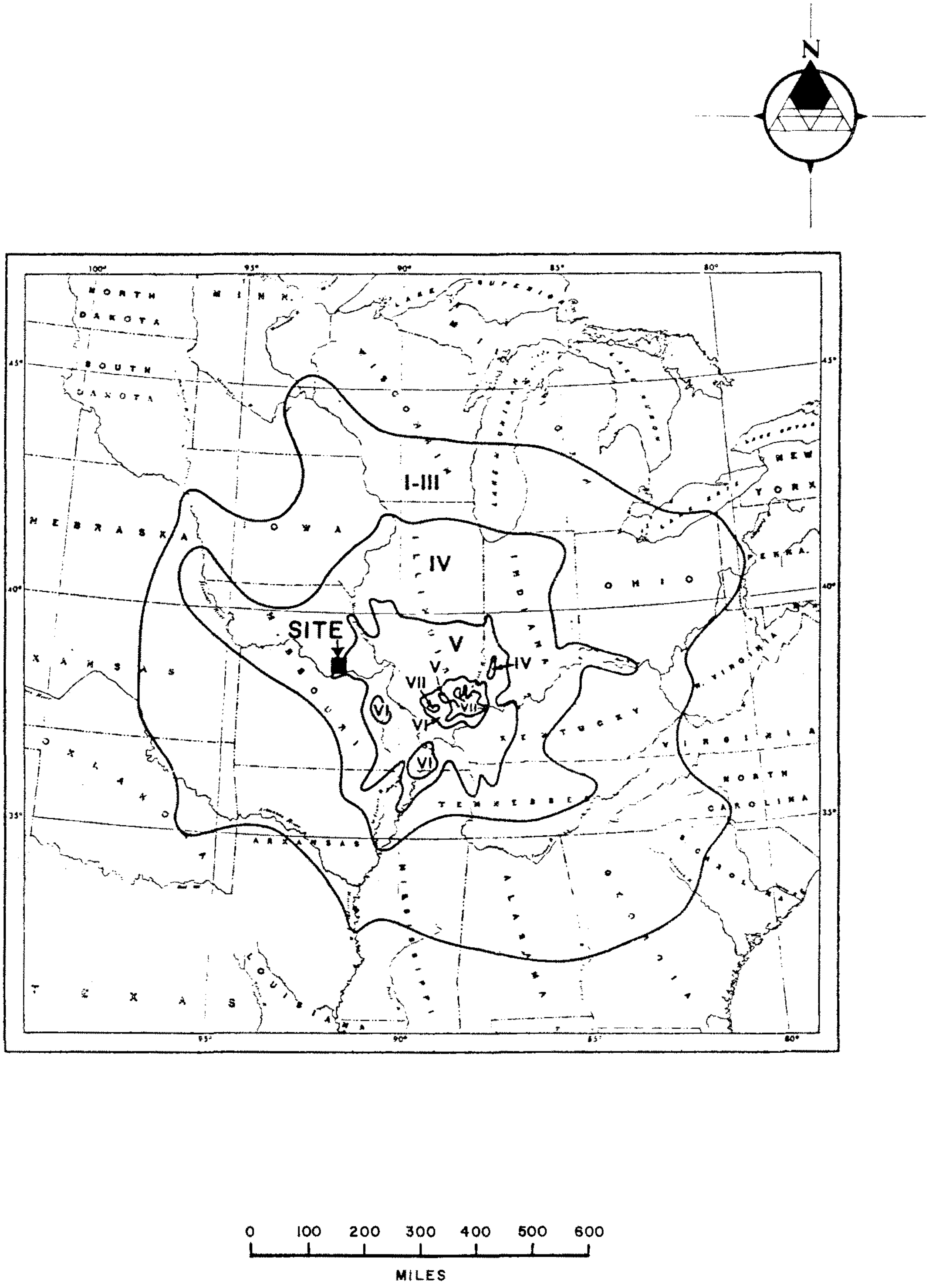

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FIGURE 2.5-60
ISOSEISMAL MAP FOR
SOUTHERN ILLINOIS EARTHQUAKE OF
NOVEMBER 9, 1968

SOURCE: GORDEN AND OTHERS (1968)

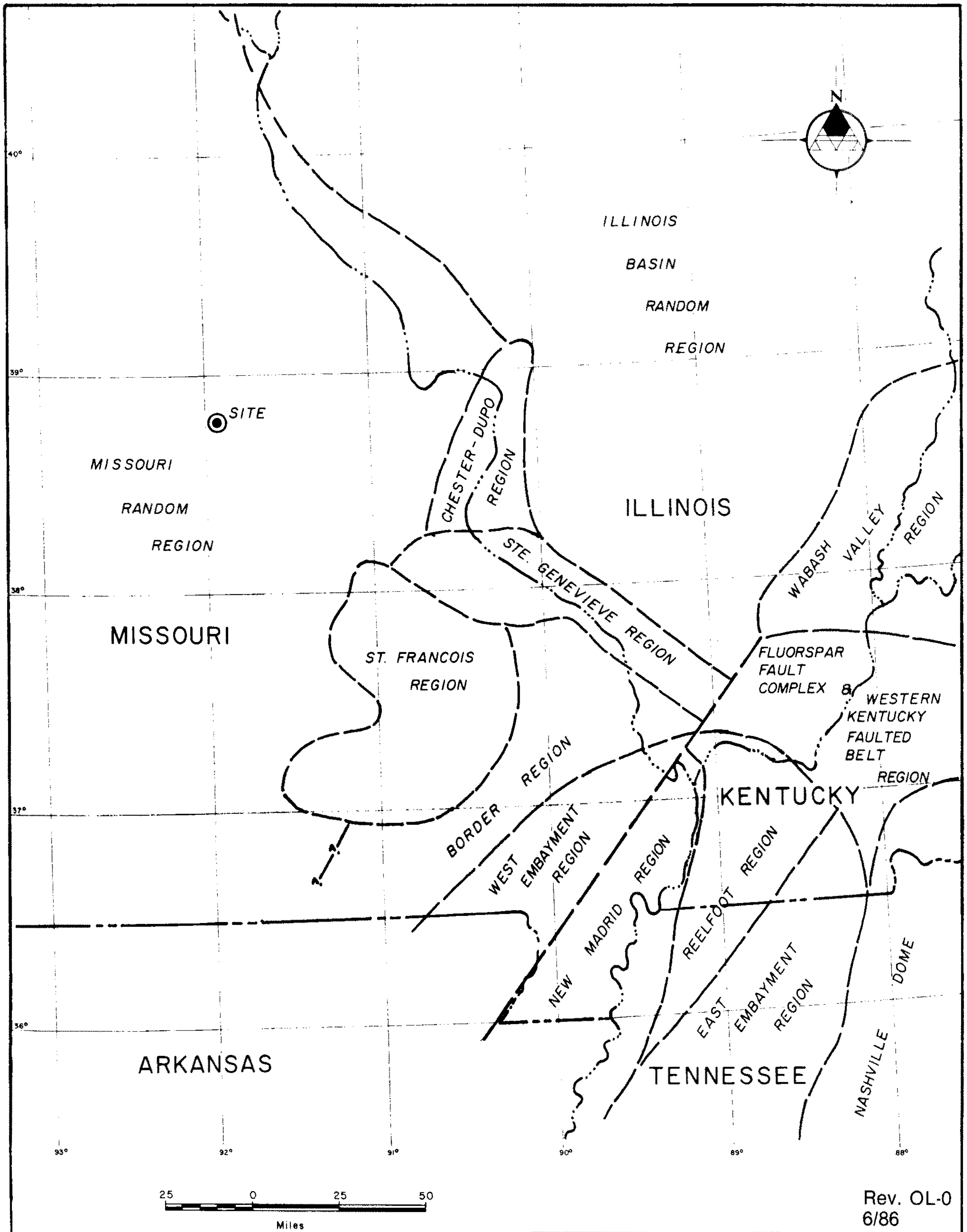

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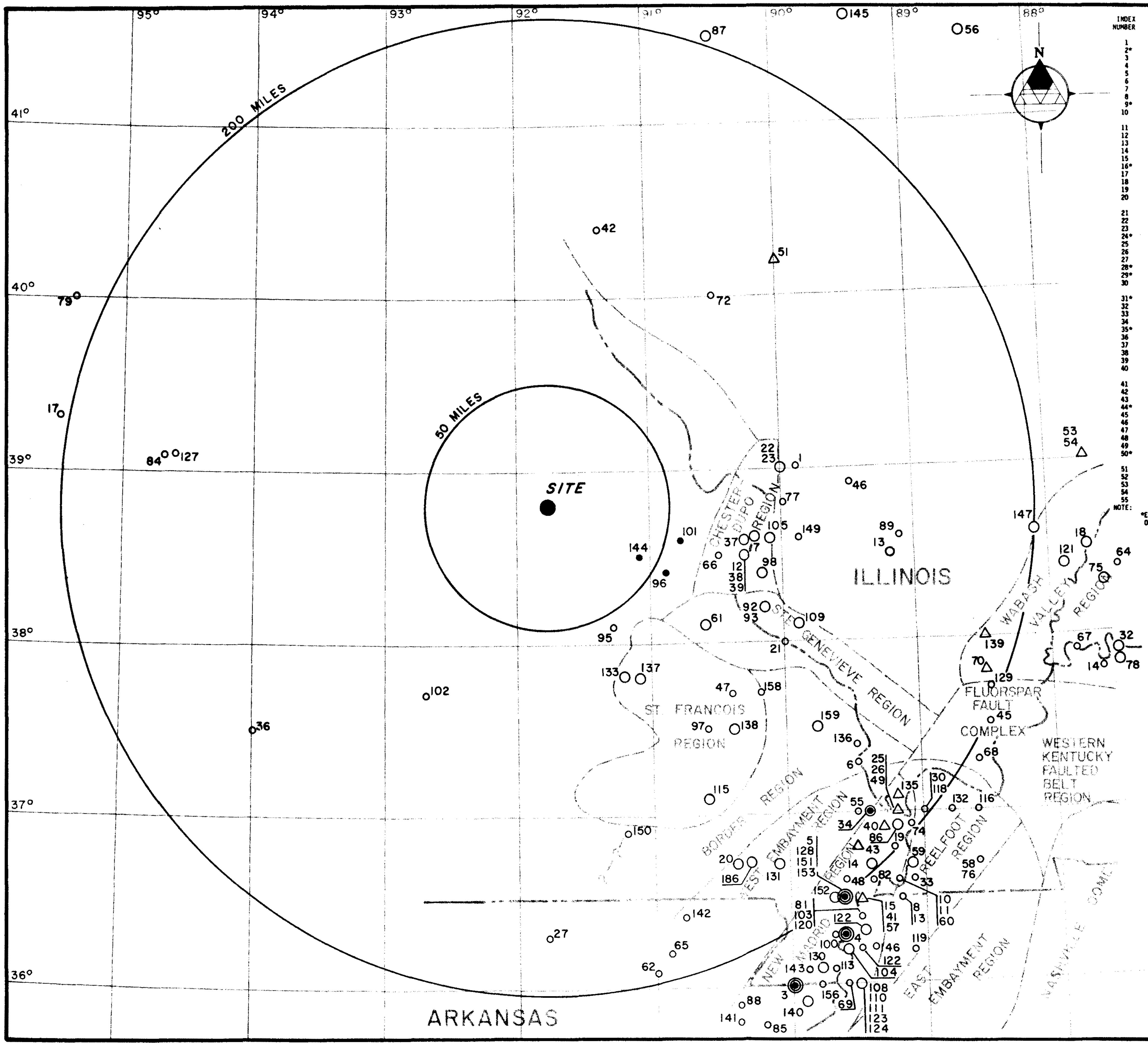
FIGURE 2.5-61

SEISMOTECTONIC MAP OF THE UPPER MISSISSIPPI VALLEY



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3	1811 DEC 16	X-XI	58	1915 OCT 26	V	113	1956 OCT 29	V
4	1812 JAN 23	X-XI	59	1915 DEC 7	V-VI	114*	1956 OCT 30	VII
5	1812 FEB 7	XI-XII	60	1916 DEC 18	VI-VII	115	1956 NOV 25	VI
6	1820 NOV 9	IV-V	61	1917 APR 9	VI	116	1957 MAR 26	V
7	1838 JUN 9	VI	62	1918 OCT 13	V	117*	1958 JAN 26	V
8	1841 DEC 27	V	63*	1918 OCT 15	V	118	1958 JAN 27	V
9*	1843 JAN 4	VIII	64	1919 MAY 25	V	119	1958 APR 8	V
10	1848 JAN 24	V	65	1919 NOV 3	IV-V	120	1958 APR 26	V
11	1853 DEC 18	IV-V	66	1920 MAY 1	V	121	1958 NOV 7	VI
12	1857 OCT 8	VI	67	1922 JAN 10	IV-V	122	1959 FEB 13	V
13	1858 SEP 21	VI	68	1922 MAR 22	V	123	1959 DEC 21	V
14	1860 AUG 7	V	69	1922 MAR 30	IV-V	124	1960 JAN 28	V
15	1865 AUG 17	VII	70	1922 NOV 26	VI-VII	125	1960 APR 21	V
16*	1867 APR 24	VII	71*	1923 OCT 28	VII	126*	1961 APR 27	V
17	1875 NOV 8	V	72	1923 NOV 9	V	127	1961 DEC 25	V
18	1876 SEP 25	VI	73*	1923 DEC 31	V	128	1962 FEB 2	VI
19	1878 MAR 12	V	74	1924 MAR 2	V	129	1962 JUN 26	V
20	1878 NOV 18	VI	75	1925 APR 26	VI	130	1962 JUL 23	VI
21	1882 JUL 20	V	76	1925 MAY 13	V	131	1963 MAR 3	VI
22	1882 SEP 27	VI	77	1925 JUL 13	V	132	1963 AUG 2	V
23	1882 OCT 15	V	78	1925 SEP 2	V-VI	133	1965 MAR 6	VI
24*	1882 OCT 22	VI-VII	79	1927 MAR 18	V	134	1965 AUG 13	VI
25	1883 JAN 11	VI	80*	1927 MAY 7	VII	135	1965 AUG 14	VII
26	1883 APR 12	VI-VII	81	1927 AUG 13	V	136	1965 AUG 15	V
27	1883 DEC 5	V	82	1930 SEP 1	V	137	1965 OCT 20	VI
28*	1886 AUG 31	IX-X	83*	1931 JAN 5	V	138	1967 JUL 21	VI
29*	1887 FEB 6	V-VI	84*	1931 AUG 9	IV-V	139	1968 NOV 9	VII
30	1887 AUG 2	V	85	1933 DEC 9	V	140	1970 NOV 16	VI
31*	1889 JUL 19	VI	86	1934 AUG 19	VI	141	1971 OCT 1	V
32	1891 JUL 26	VI	87	1934 NOV 12	VI	142	1972 FEB 1	V
33	1891 SEP 26	V	88	1937 MAY 16	IV-V	143	1972 MAR 29	V
34	1895 OCT 31	VIII	89	1937 NOV 17	V	144	1972 APR 4	II
35*	1899 APR 29	VI-VII	90*	1938 FEB 12	V	145	1972 SEP 15	VI
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37	1902 JAN 24	VI	92	1939 NOV 23	V	147	1974 APR 3	VI
38	1903 FEB 8	VI	93	1940 NOV 23	VI	148	1974 MAY 13	VI
39	1903 OCT 4	V-VI	94*	1941 NOV 16	VI	149	1974 JUN 5	V
40	1903 NOV 4	VI-VII	95	1943 JUL 25	IV-V	150	1974 AUG 11	V
41	1903 NOV 27	V	96	1945 MAR 27	III	151	1975 FEB 13	V
42	1905 APR 13	V	97	1946 OCT 7	IV-V	152	1975 JUN 13	VI
43	1905 AUG 21	VI-VII	98	1947 JUN 29	VI	153	1975 DEC 3	V
44*	1906 MAY 11	V	99*	1947 DEC 15	V	154	1976 MAR 25	VI
45	1906 MAY 21	V	100	1949 JAN 13	V	155	1976 APR 15	V
46	1907 JAN 30	V	101	1949 AUG 26	III	156	1976 MAY 22	V
47	1907 JUL 4	IV-V	102	1950 FEB 8	V	157	1976 SEP 25	V
48	1908 SEP 28	IV-V	103	1952 FEB 20	V	158	1976 DEC 13	V
49	1908 OCT 27	V	104	1952 JUL 16	VI	159	1977 JAN 3	VI
50*	1909 MAY 26	VII	105	1953 SEP 11	VI			
51	1909 JUL 18	VII	106	1954 FEB 2	VI			
52	1909 AUG 16	---	107*	1954 APR 26	V			
53	1909 SEP 27	VII	108	1955 MAR 29	VI			
54	1909 OCT 23	V	109	1955 APR 9	VI			
55	1909 OCT 23	V	110	1955 SEP 5	V			

NOTE:
*EPICENTERS LOCATED OUTSIDE OF MAP; SEE TABLE 2.5-12 FOR LOCATION OF THESE POINTS.

LEGEND:

- II - IV
- V
- VI
- VII
- VIII
- IX OR GREATER
- STATE BOUNDARIES
- SEISMOGENIC BOUNDARIES

25 0 25 50 75
MILES

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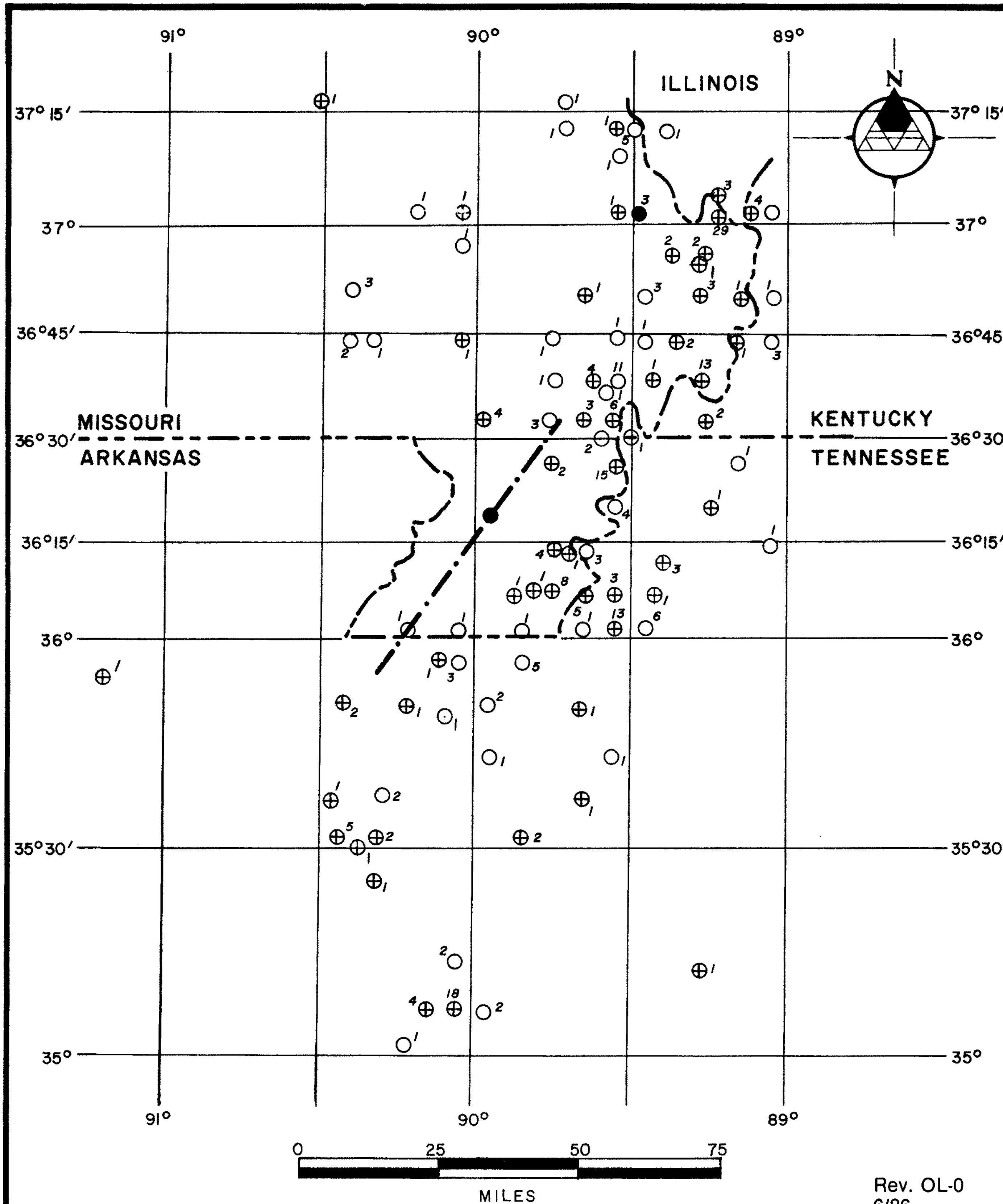
FIGURE 2.5-62

EARTHQUAKE EPICENTERS AS RELATED TO SEISMOTECTONIC REGIONS



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EXPLANATION:
INTENSITY OF GREATEST SINGLE EVENT

○ ≤MMI-IV

⊕ MMI V-VII

● ≥MMI-VIII

—·— EPICENTRAL LINE OF 1811-12 EARTHQUAKES (FULLER, 1912)

NUMERALS INDICATE NUMBER OF EVENTS
DATA PRESENTED ON TABLE 2.5-10

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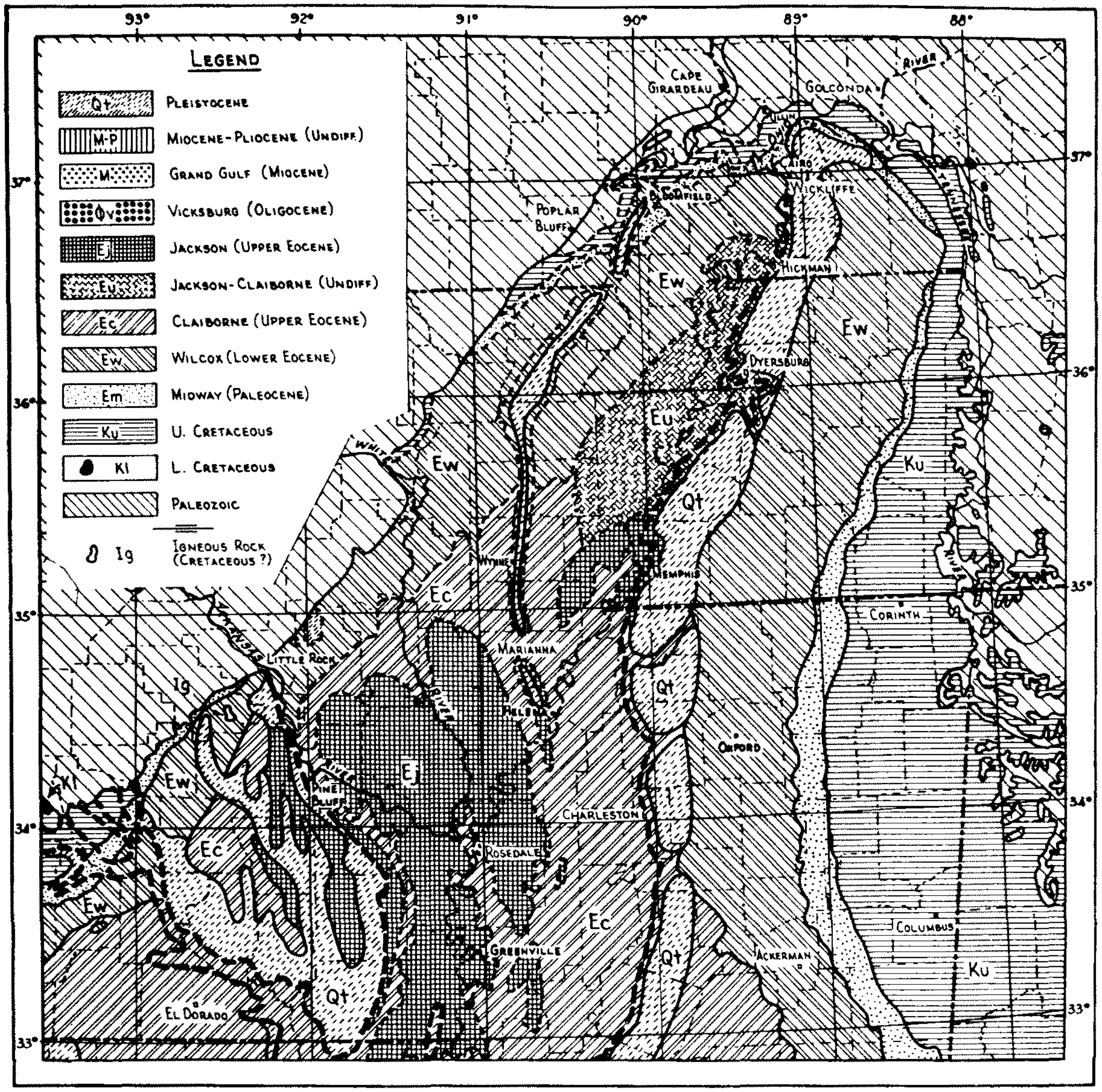
FIGURE 2.5-63
EPICENTERS OF PERCEPTIBLE SEISMIC EVENTS NEAR NEW MADRID
1811-1980



MILES

0 25 50 75

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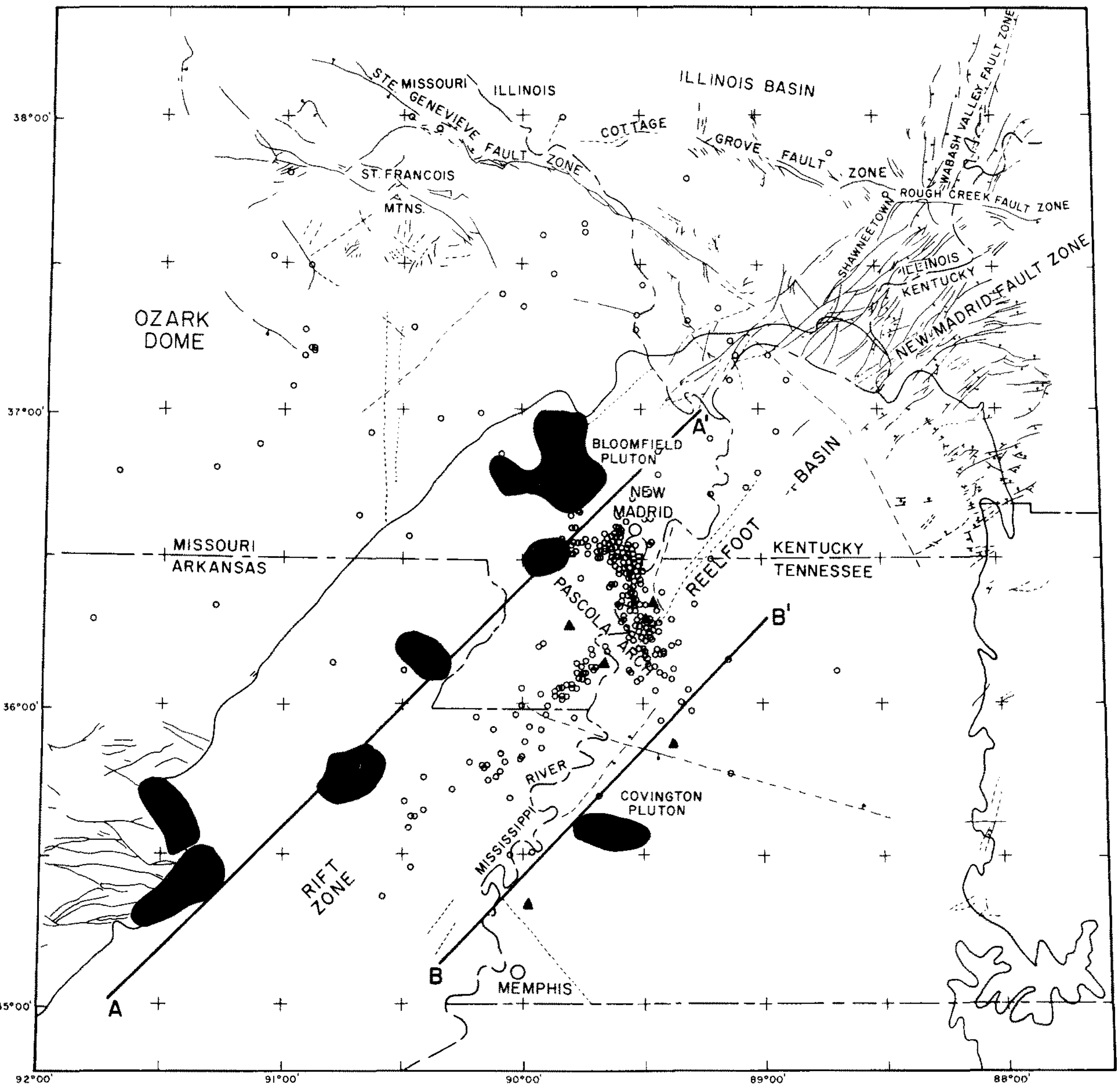
FIGURE 2.5-64
SURFACE GEOLOGY
OF NEW MADRID

REFERENCE: FISK, 1944



LEGEND:

- Northern limit of coastal plain material of the Mississippi embayment
- ▲ Mafic or ultramafic intrusion (within the Mississippi embayment) encountered in a drill hole
- Mafic or ultramafic intrusion (within the Mississippi embayment) interpreted from the magnetic and gravity fields. Approximate boundary of intrusion determined from zero contour of associated anomaly on the second vertical derivative magnetic map
- Fault--Bar and ball on downthrown side. Dashed where inferred
- Possible or hypothetical fault based upon subsurface data or exceptionally strong lineaments from aerial photos
- A A' Approximate margins of proposed rift
- o Earthquake epicenter

REFERENCE: HILDENBRAND AND OTHERS, 1977 (FIGURE 1)

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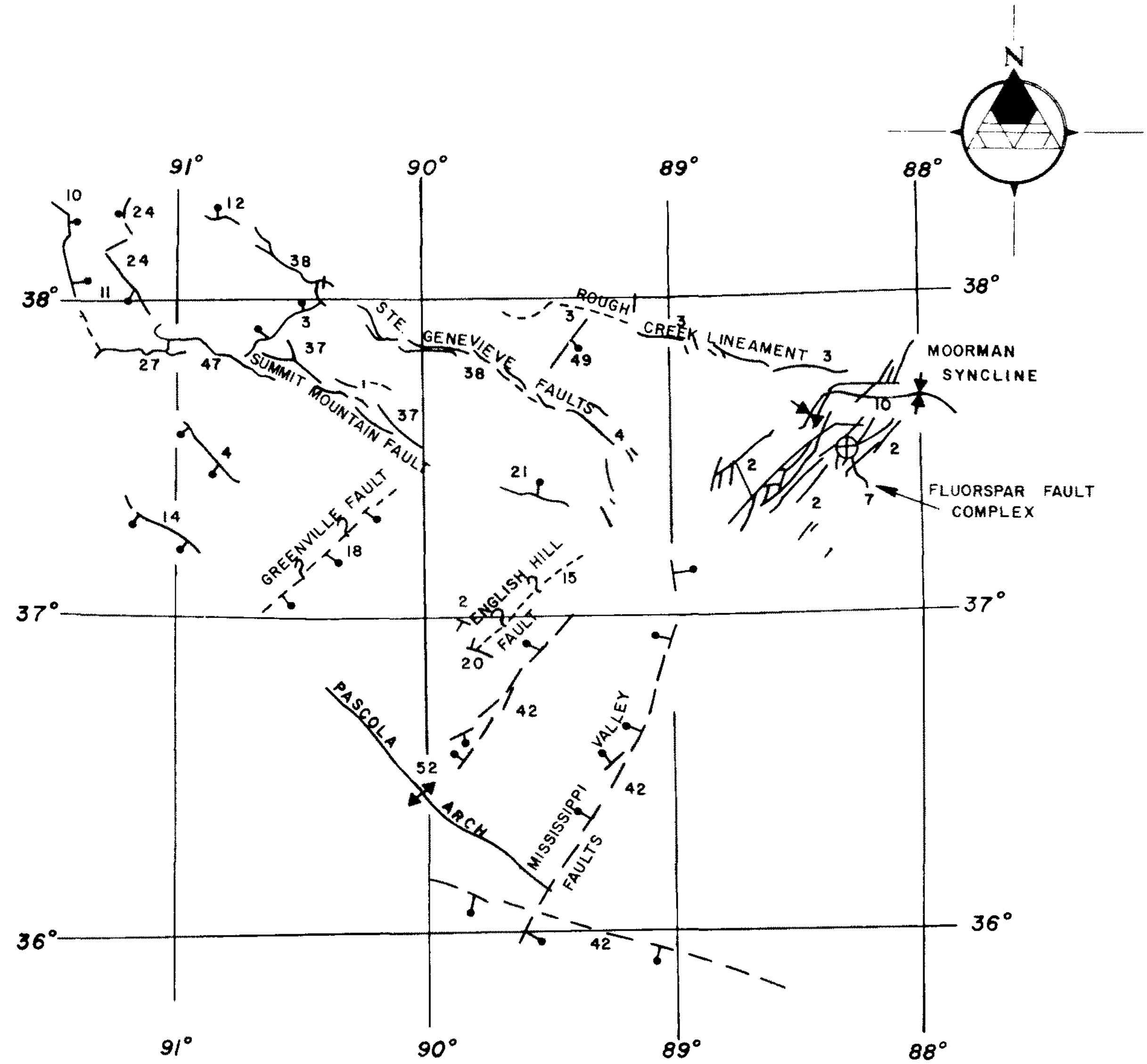
FIGURE 2.5-65

SIESMOTECTONIC MAP OF THE NORTHERN MISSISSIPPI EMBAYMENT AND SURROUNDING REGIONS



EXPLANATION

HORIZONTAL STRATA

AXIS OF ANTICLINE

AXIS OF SYNCLINE

AXIS OF MONOCLINE

FAULT WITH SYMBOL INDICATING DOWNTHROWN SIDE

NOTES:

FOLDS ARE IDENTIFIED IN TABLE 2.5-2

FAULTS ARE IDENTIFIED IN TABLE 2.5-3

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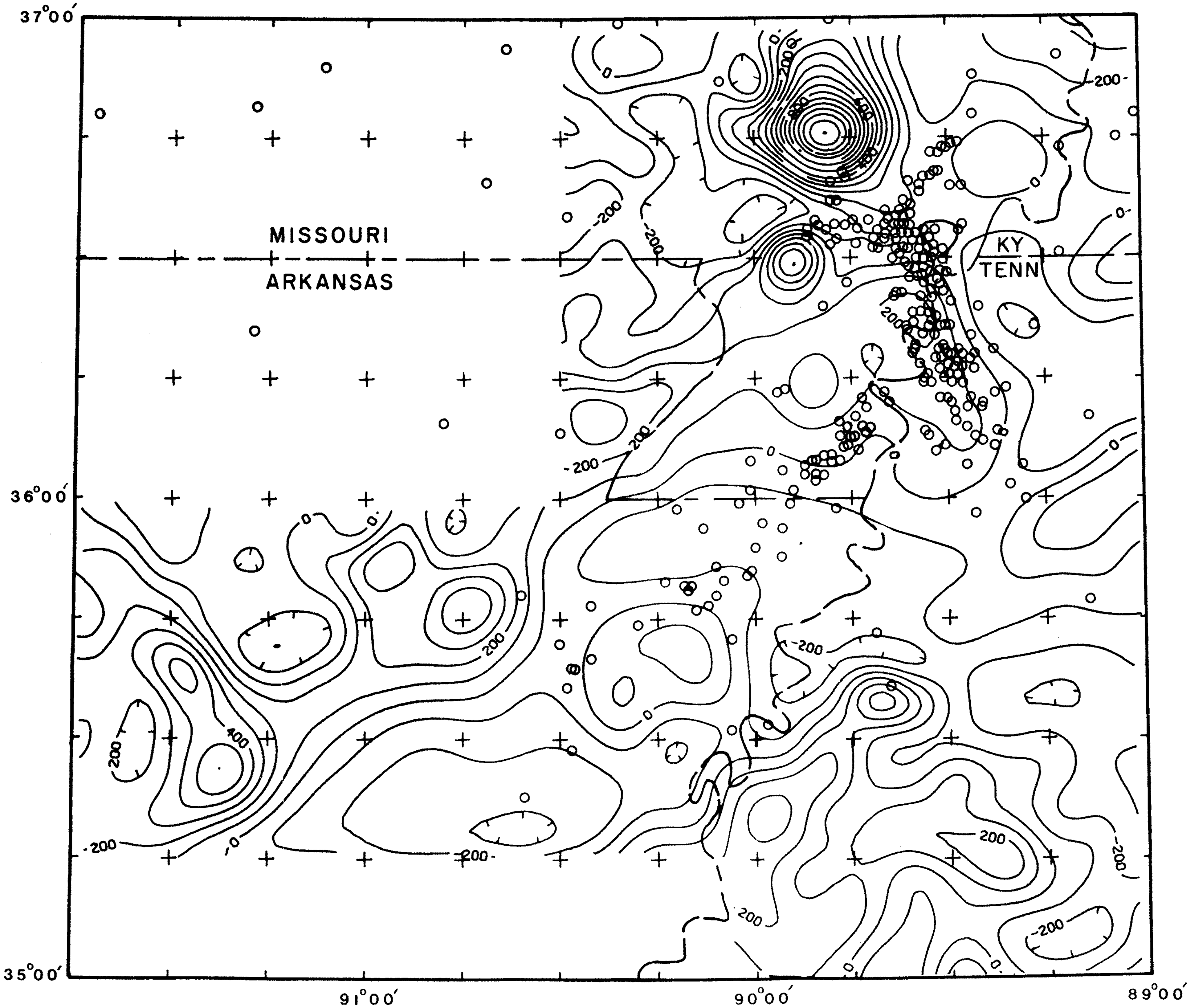
FIGURE 2.5-66

FAULTS AND FOLDS NEAR NEW MADRID



NOTE: TOTAL MAGNETIC FIELD INTENSITY MAP. EPICENTERS OF EARTHQUAKES (DETECTED BY THE SOUTHEAST MISSOURI REGIONAL SEISMIC NETWORK FROM JULY 1974 TO JUNE 1976) ARE DENOTED BY THE OPEN CIRCLES.

REFERENCE: HILDENBRAND AND OTHERS, 1977 (FIGURE 2)

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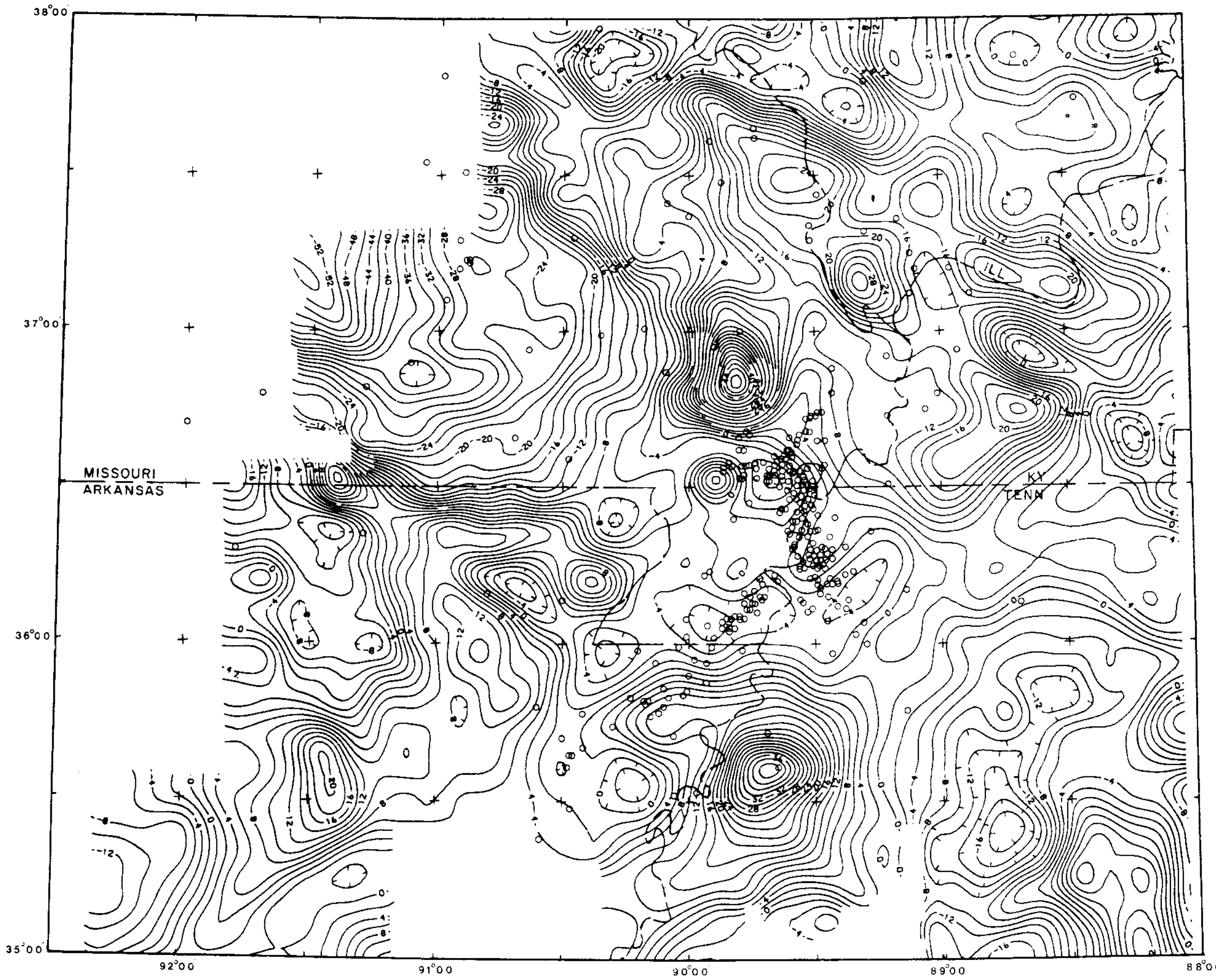
FIGURE 2.5-67
MAGNETIC MAP OF NEW MADRID AREA



NOTE: BOUGUER GRAVITY MAP. EPICENTERS OF EARTHQUAKES (DETECTED BY SOUTHEAST MISSOURI REGIONAL SEISMIC NETWORK FROM JULY 1974 TO JUNE 1976) ARE DENOTED BY OPEN CIRCLES.

ADAPTED FROM HILDENBRAND AND OTHERS, 1977

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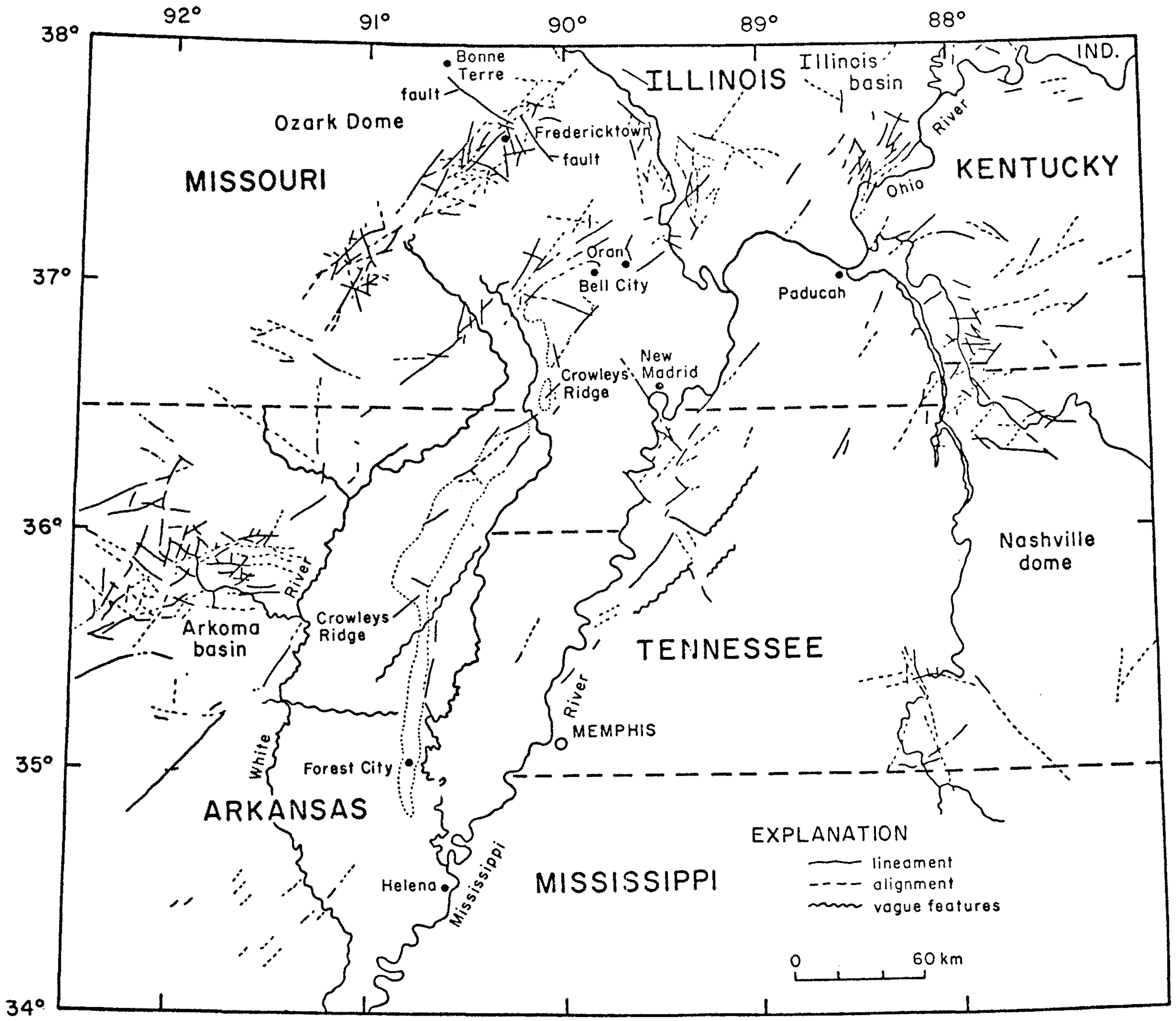
FIGURE 2.5-68

GRAVITY MAP
OF THE NEW MADRID AREA



REFERENCE: O'LEARY AND HILDENBRAND, 1978 (FIGURE 1)

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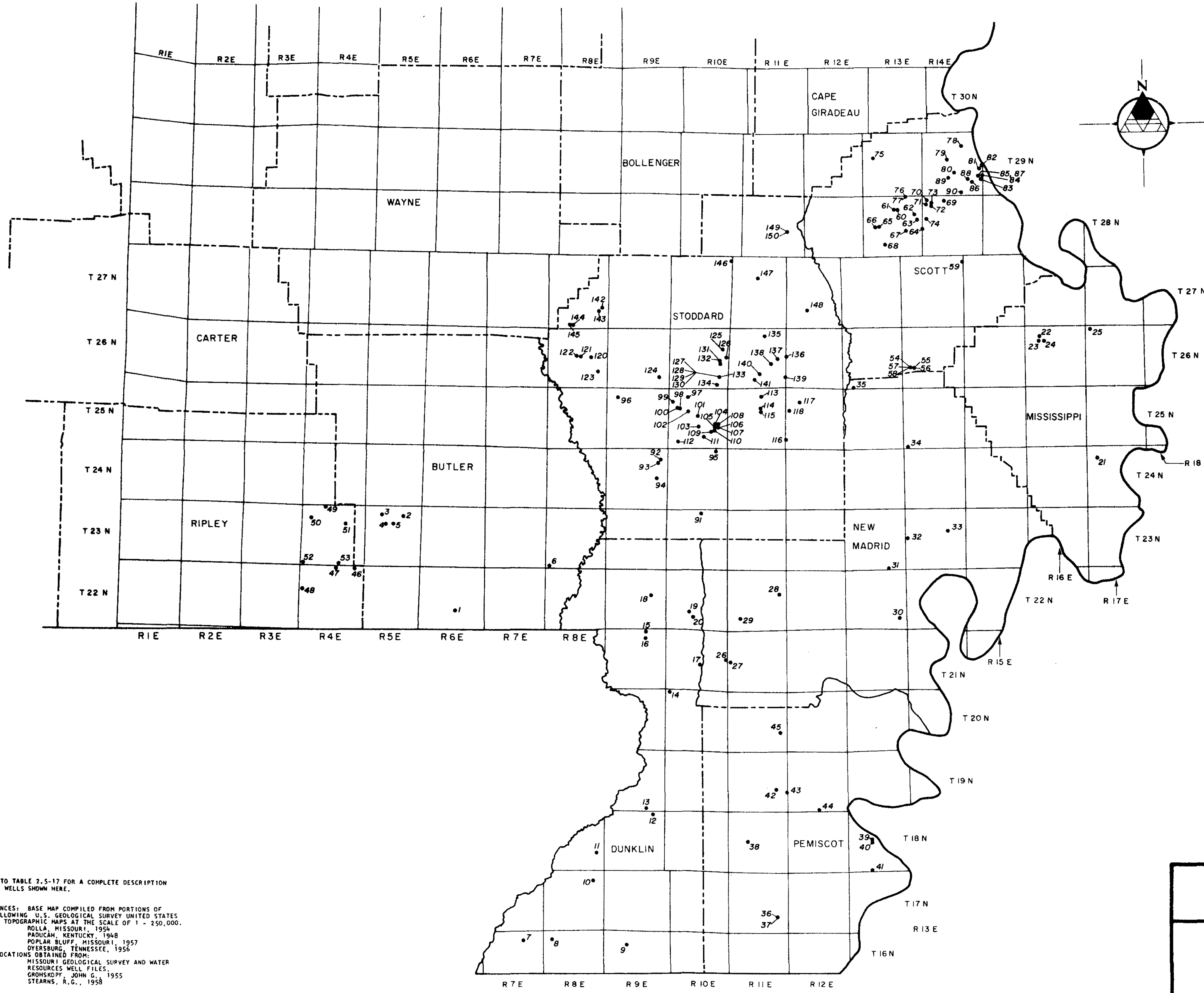
FIGURE 2.5-69

LINEAR FEATURES OF MISSISSIPPI ENBAYMENT AND SURROUNDING REGION



Well No.	Owner
1	J.P. Pearson
2	Eder Oil Co. No. 1
3	Neelyville School Dist. No. 1
4	Boste Station, Miss. River Fuel Co.
5	Mississippi River Fuel Co.
6	City of Qulin
7	City of Cardwell No. 1
8	City of Arbyrd
9	City of Hornersville No. 2
10	City of Sennath No. 3
11	Hellor No. 1
12	City of Kennett No. 3
13	City of Kennett No. 2
14	City of Holcomb
15	Campbell Lumber Co. No. 1
16	City of Campbell No. 3
17	City of Clarkton
18	John Stewart No. 1
19	U.S. Army Basic Flying School No. 1
20	U.S. Army Basic Flying School No. 2
21	Big Oak Tree No. 1
22	City of Charleston No. 3
23	City of Charleston (test hole)
24	City of Charleston No. 1
25	R.G. DeLaney No. 1
26	City of Gideon No. 4
27	City of Gideon No. 5
28	City of Risco
29	R.B. Oliver, Jr. No. 1
30	City of Marston
31	City of Lilbourn
32	Mrs. S.L. Hunter No. 1
33	Mrs. Eddye Phillips No. 1
34	City of Matthews No. 1
35	Himmelberger-Harrison
36	City of Steele No. 1
37	City of Stelle No. 2
38	City of Deering No. 2
39	City of Caruthersville No. 5
40	City of Caruthersville No. 6
41	Kenneth Pattison
42	Pemiscot Water Supply Dist. No. 2, test hole No. 1
43	T.P. Russell No. 1
44	City of Hayti No. 4
45	City of Wardell
46	Farrer No. 1
47	Doug Woodard
48	Paul Porter
49	B. Stickler
50	J.M. Nichols No. 1
51	Ron Yacks
52	Earl Clayton
53	Sherman Cress No. 1
54	City of Sikeston No. 2
55	City of Sikeston No. 3
56	City of Sikeston No. 5
57	City of Sikeston No. 6
58	Sikeston Water Works
59	Gypsy No. 1
60	Oscar Deinberger Fee No. 1
61	Oscar Deinberger No. 1
62	Stephan A. Barton
63	Scott County Jail
64	Tom Scott No. 1
65	City of Oran, test
66	City of Oran No. 1
67	C.E. Faulkner No. 1
68	Charles Butler No.1
69	Kay-Ranch No. 1
70	Clarence LeGrand No. 1
71	Jim Norrid No. 1
72	W.C. Pattongill Fee No. 1
73	W.C. Pattongill No. 1
74	Benton Public School No. 1
75	City of Chaffee No. 2
76	St. Lawrence Catholic Church No. 1
77	St. Lawrence Catholic Church No. 2
78	Illmo-Commerce
79	Herman Blattel
80	H. V. Ashley
81	John Davis
82	Tenant Keller No. 1
83	Joe Ellis No. T291425-28
84	H.W. Dodge No. T291425-18
85	Joe Ellis No. T291425-30
86	Joe Ellis
87	Mo. Geol. Survey W.P.A. Project No. T291426-1
88	Carol Anderson No. 1
89	H.V. Ashley
90	R.W. Schimitz
91	City of Bernio
92	D.L. Garner
93	Snider
94	Asa Dowdy
95	Guethe Brothers
96	Higgins No. 1
97	R. Pixley
98	Sam Garner
99	County Court
100	Jack Jones
101	Missouri Highway Dept.
102	Elmer Hoffman
103	Missouri Pacific RR
104	Coffey Coal Co.
105	C. Dexter Fee No. 1
106	City of Dexter, test hole
107	City of Dexter No. 11
108	City of Dexter No. 4
109	City of Dexter No. 12
110	City of Dexter
111	Knollwood Association
112	Public Water Supply Dist. No. 1
113	Barnett No. 1
114	W.J. Crutcher No. 4
115	City of Essex
116	Miss Lorena L. Thomason
117	Public Water Supply Dist. No. 3
118	B.B. Zarecore No. 1
119	Doyle Case
120	Halen Smith
121	John Richards
122	Charles V. Kush
123	Carl Limbaugh
124	Charles O. Stevens
125	J.E. Freshoune
126	Jess Bennett
127	City of Bloomfield
128	City of Bloomfield No. 4, test
129	City of Bloomfield No. 1
130	City of Bloomfield No. 2
131	City of Bloomfield No. 6
132	City of Bloomfield No. 4
133	Monte White
134	Will Shipman
135	Godwin No. 2
136	Jess Bennett No. 1
137	Harry Pullum
138	Will Reed No. 6
139	Carl Needham No. 12-M-3
140	M.H. Marr
141	James Swan No. 7
142	Edward Dunivan
143	Johney R. Jones
144	Mingo Wildlife Refuge
145	Mingo Fish-wildlife No. 1
146	Phillips
147	Daniel Byrd
148	Himmelberger
149	Ringer Hill A
150	D.B. Perkins B

NOTE:
REFER TO TABLE 2.5-17 FOR A COMPLETE DESCRIPTION OF THE WELLS SHOWN HERE.

REFERENCES: BASE MAP COMPILED FROM PORTIONS OF THE FOLLOWING U.S. GEOLOGICAL SURVEY UNITED STATES SERIES TOPOGRAPHIC MAPS AT THE SCALE OF 1 - 250,000.
ROLLA, MISSOURI, 1954
PADUCAH, KENTUCKY, 1948
POPLAR BLUFF, MISSOURI, 1957
DYERSBURG, TENNESSEE, 1956

WELL LOCATIONS OBTAINED FROM:
MISSOURI GEOLOGICAL SURVEY AND WATER RESOURCES WELL FILES.
GROHSKOPF, JOHN G., 1955
STEARNS, R.G., 1958

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FIGURE 2.5-70
LOCATION OF DRILL HOLES NEAR NEW MADRID

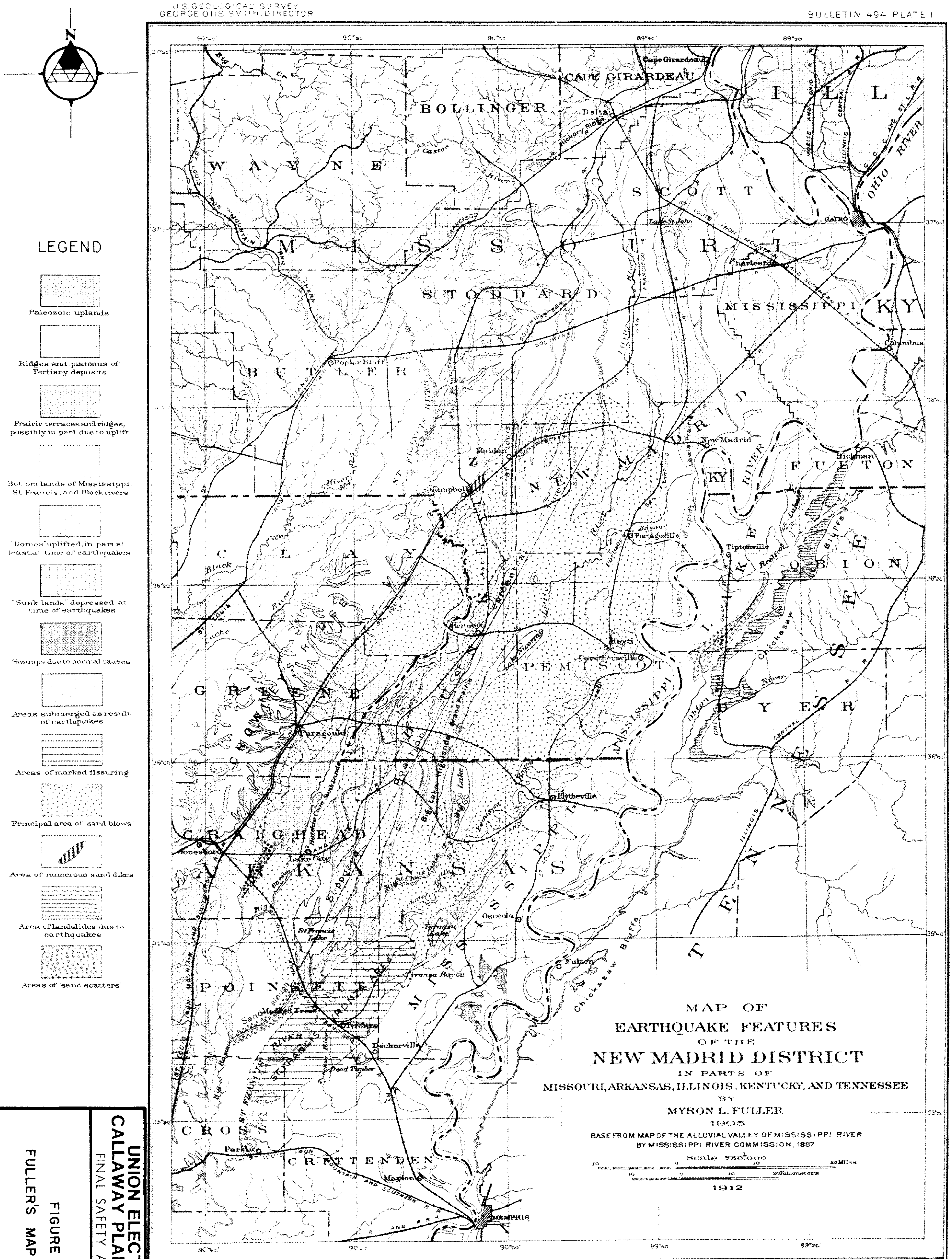

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FIGURE 2.5-71
FULLER'S MAP OF NEW MADRID

SOURCE: FULLER, M.L., 1912, THE NEW MADRID EARTHQUAKE: USGS, BULL. 494.

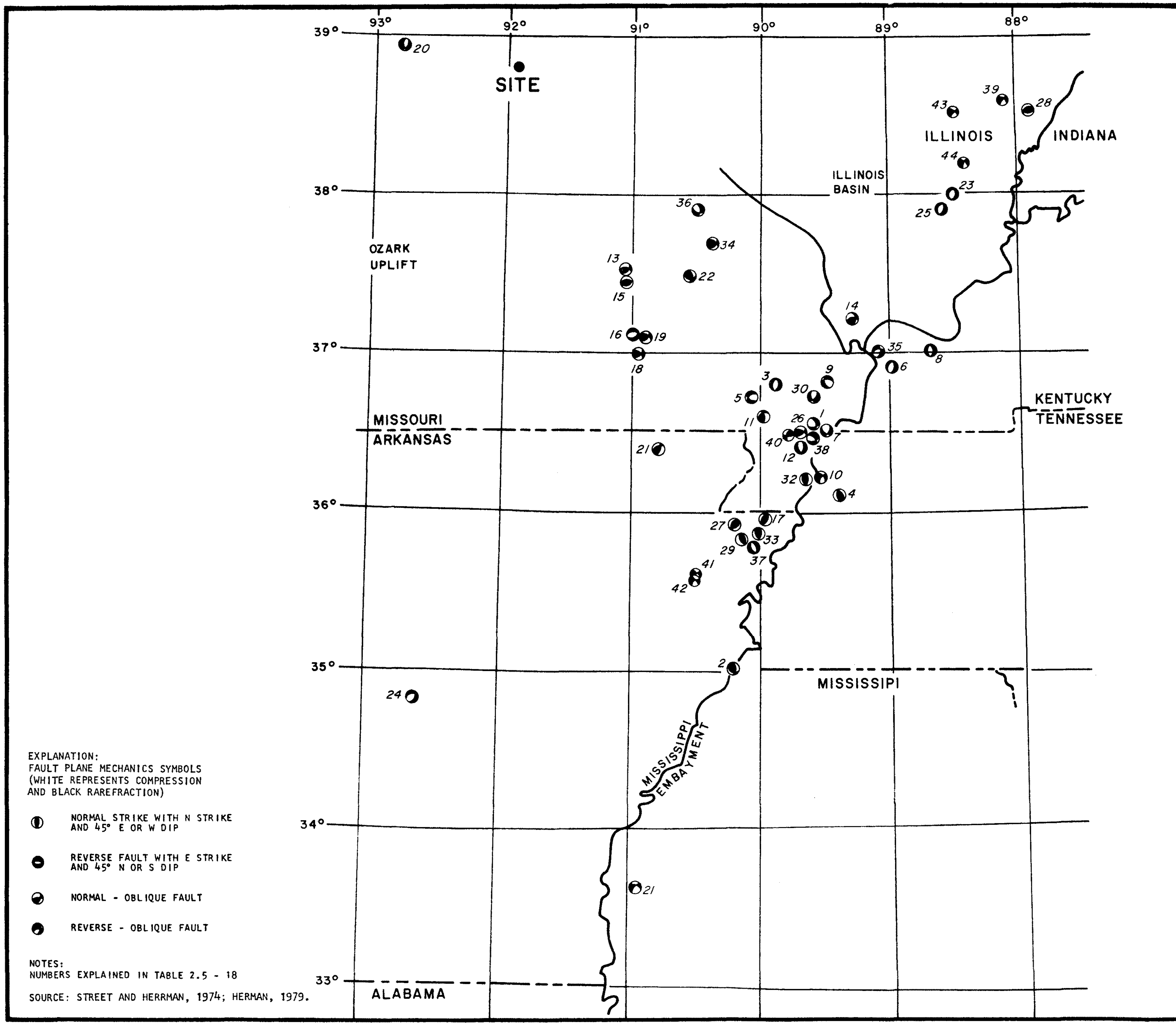

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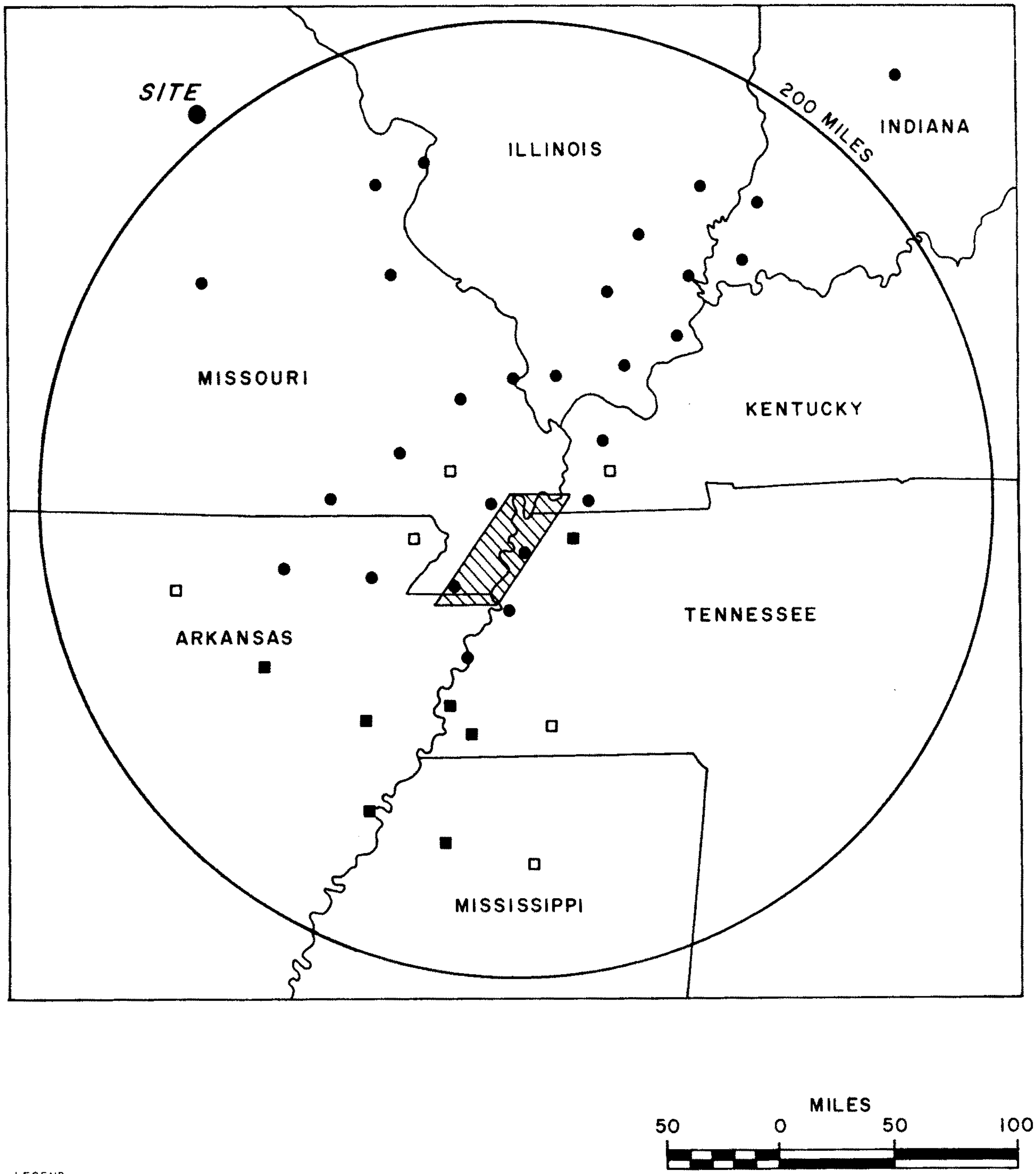
FIGURE 2.5-72
FAULT PLANE SOLUTIONS FOR SEISMIC EVENTS IN THE REGION OF INTEREST FOR THE PERIOD 1962 TO 1976



LEGEND:

- □ PROPOSED MEMPHIS NETWORK TENNESSEE INFORMATION CENTER U.S.N.R.C.
- ■ EXISTING MEMPHIS NETWORK TENNESSEE INFORMATION CENTER U.S.N.R.C.
- ▨ PROPOSED REGION OF 8-STATION HIGH-FREQUENCY MICRO-NET SAINT LOUIS UNIVERSITY - U.S.N.R.C.
- ● EXISTING STATION, INCLUDING NEW MADRID NETWORK SAINT LOUIS UNIVERSITY U.S.G.S.

NOTE:

ADAPTED FROM HERMAN, 1978 AND ZOLLWEG, 1979.

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FIGURE 2.5- 73
PROPOSED AND EXISTING SEISMOGRAPH STATIONS WITHIN 200 MILES OF NEW MADRID SEISMIC ZONE

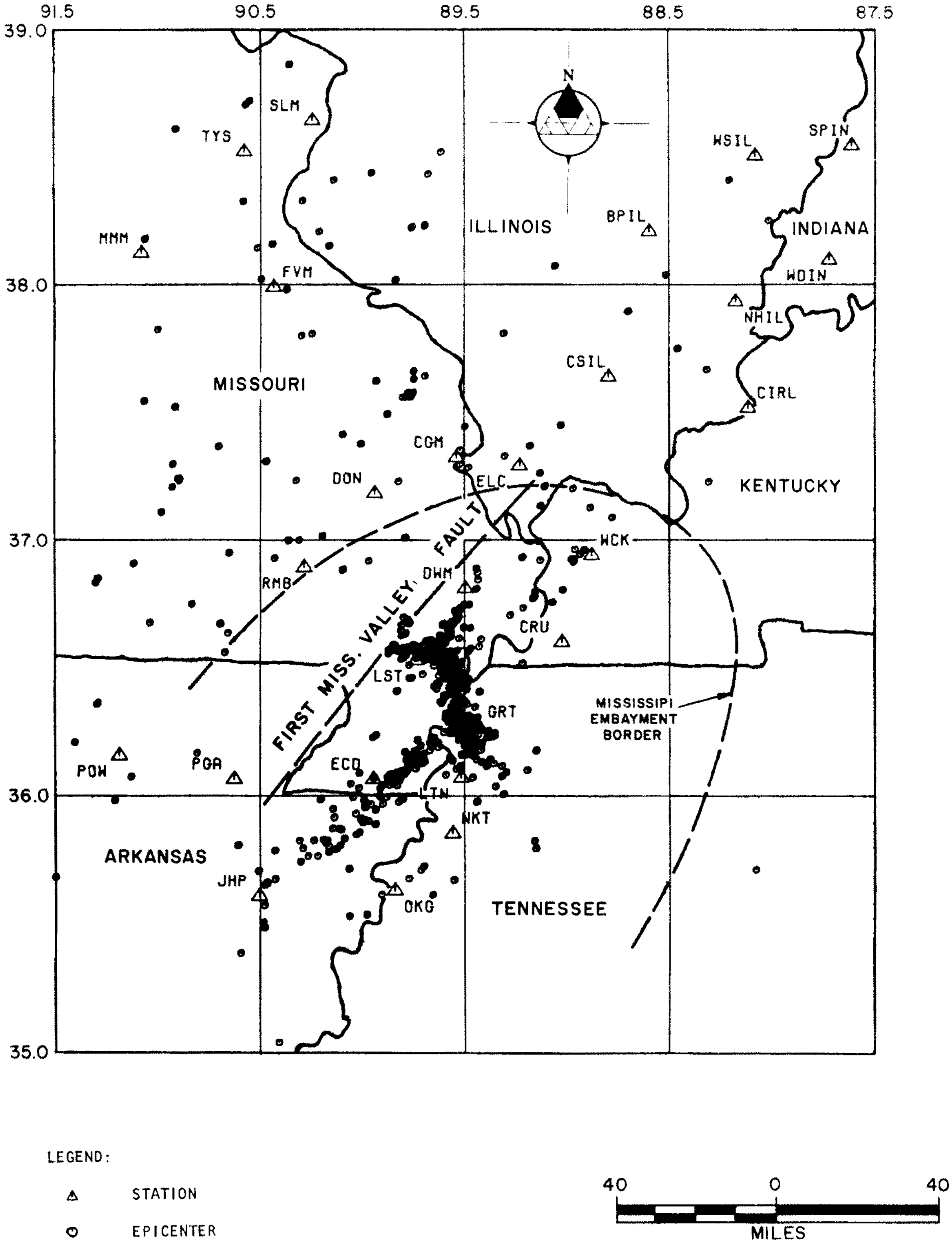

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FIGURE 2.5-74

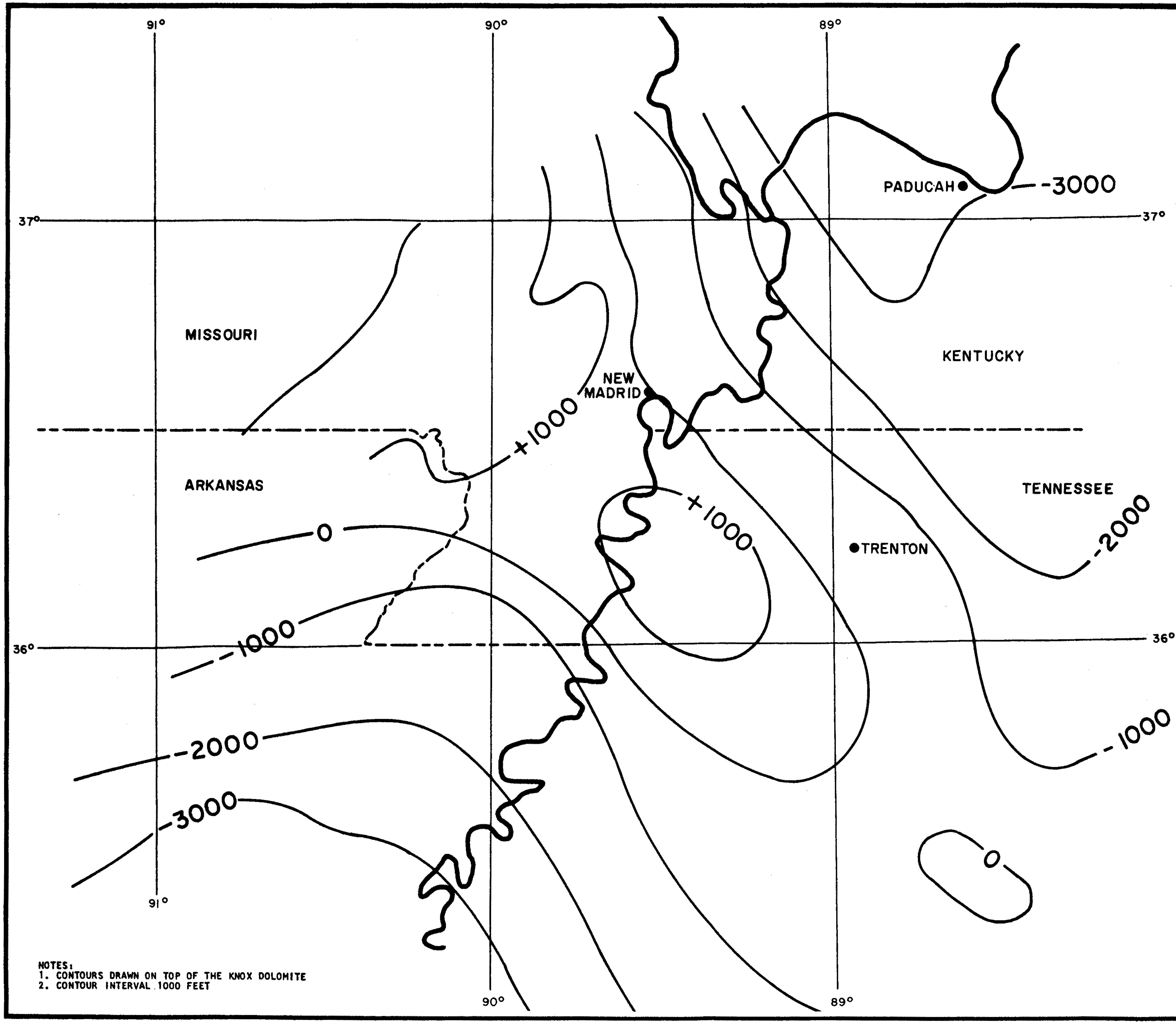
REGIONAL EPICENTER LOCATIONS CUMULATIVE EVENTS 01 JUL 1974 TO 31 MAR 1978

REFERENCE:

ILLINOIS STATE GEOLOGICAL SURVEY, NEW MADRID SEISMOTECTONICS STUDY-ACTIVITIES DURING FISCAL YEAR 1978, P-100.

NOTE:

ADAPTED FROM HERRMAN, 1978.



NOTES:
1. CONTOURS DRAWN ON TOP OF THE KNOX DOLOMITE
2. CONTOUR INTERVAL 1000 FEET

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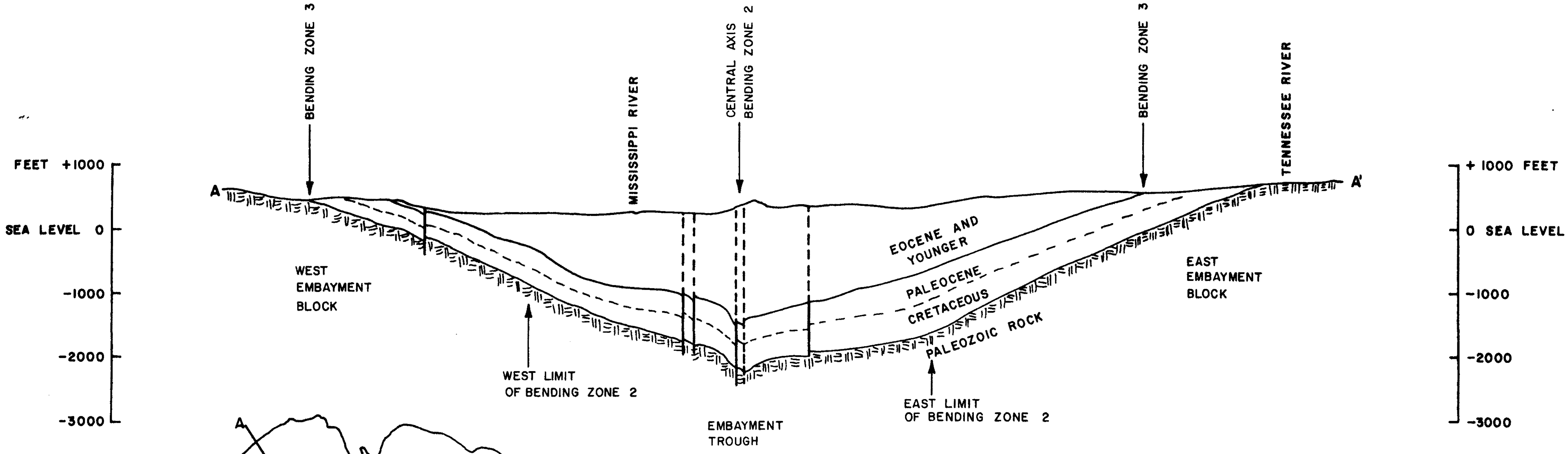
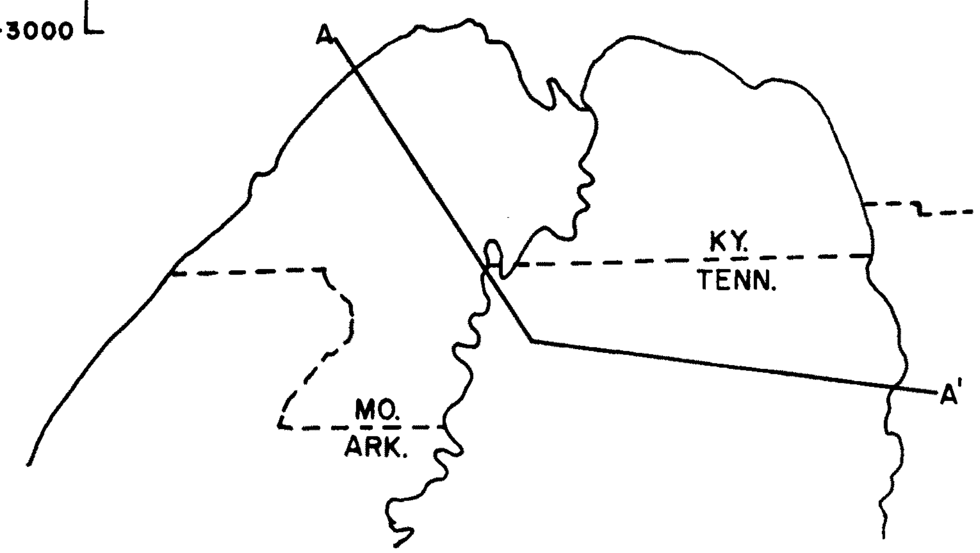
FIGURE 2.5-75
STRUCTURE CONTOUR MAP
OF THE PASCOLA ARCH





0 10 20 30

HORIZONTAL SCALE IN MILES

SOURCE: STEARNS (1973)

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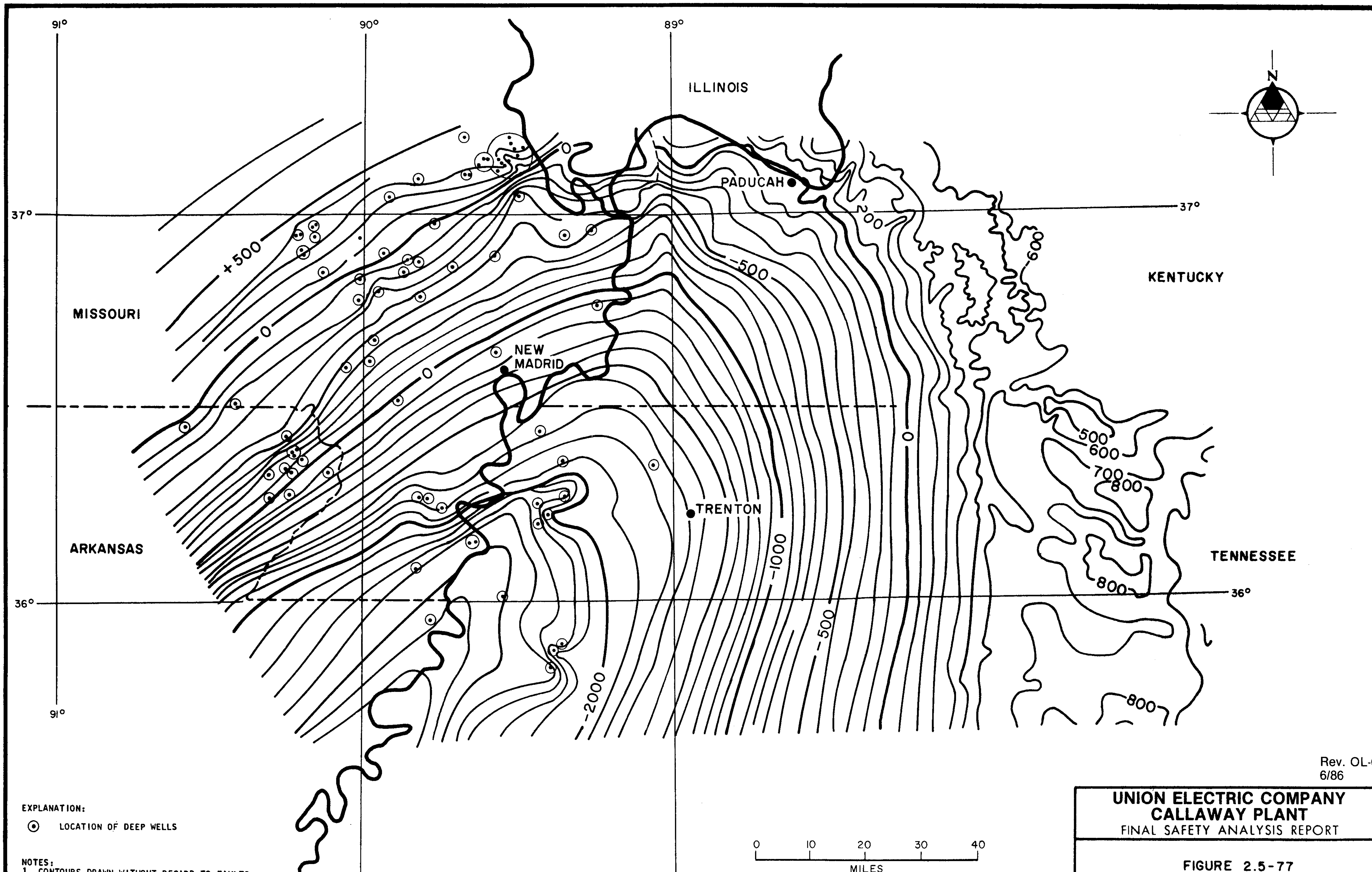
FIGURE 2.5-76
GEOLOGIC CROSS SECTION
OF THE MISSISSIPPI EMBAYMENT



EXPLANATION:

⊙ LOCATION OF DEEP WELLS

NOTES:
1. CONTOURS DRAWN WITHOUT REGARD TO FAULTS
2. CONTOUR INTERVAL 100 FEET
3. KENTUCKY CONTOURS BY H. SCHWALB (1969)
TENNESSEE CONTOURS BY STEARNS AND WILSON (1972)

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FIGURE 2.5-77
STRUCTURE CONTOURS ON TOP
OF PALEOZOIC ROCKS

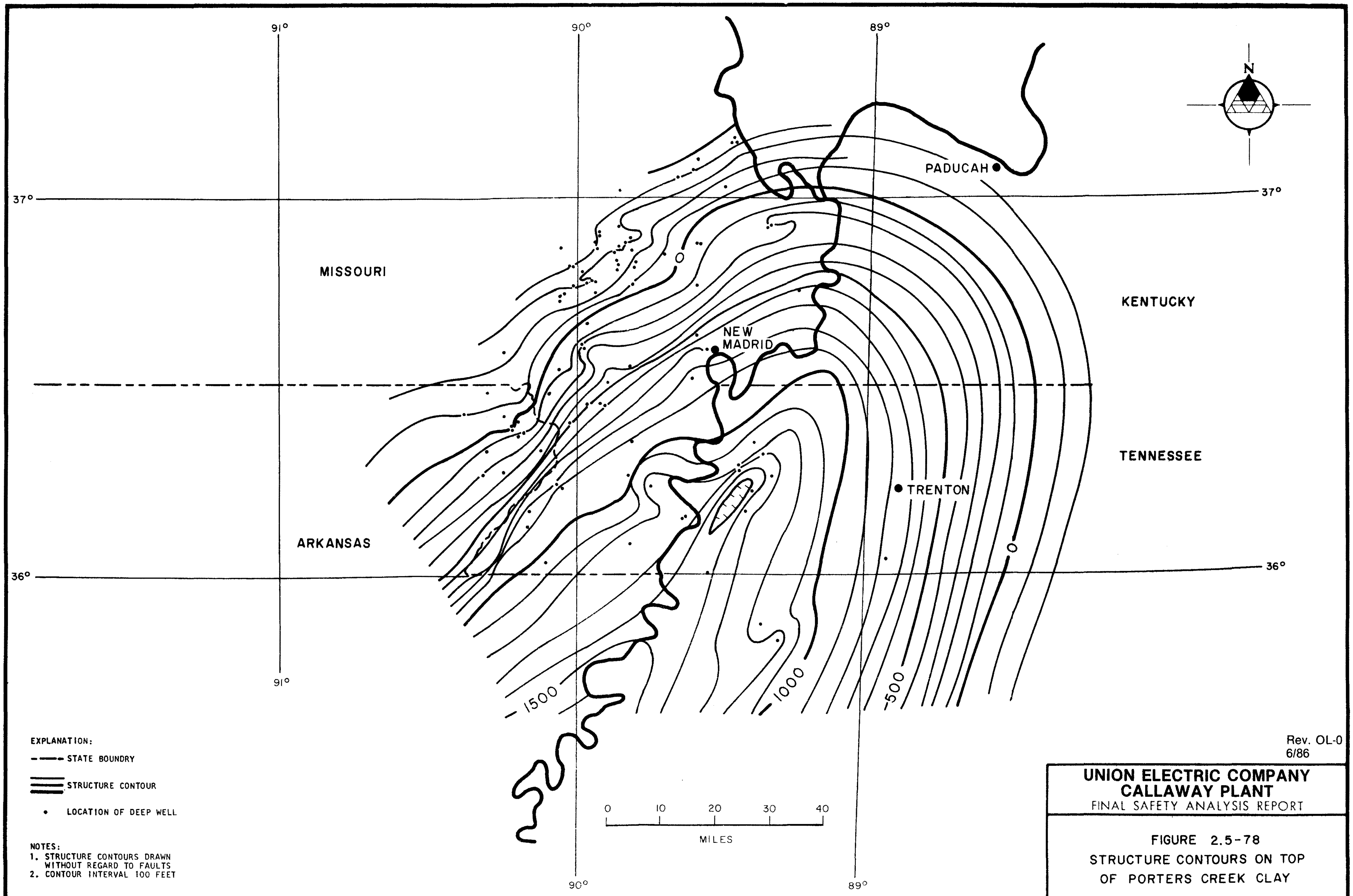

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FIGURE 2.5-78
STRUCTURE CONTOURS ON TOP OF PORTERS CREEK CLAY

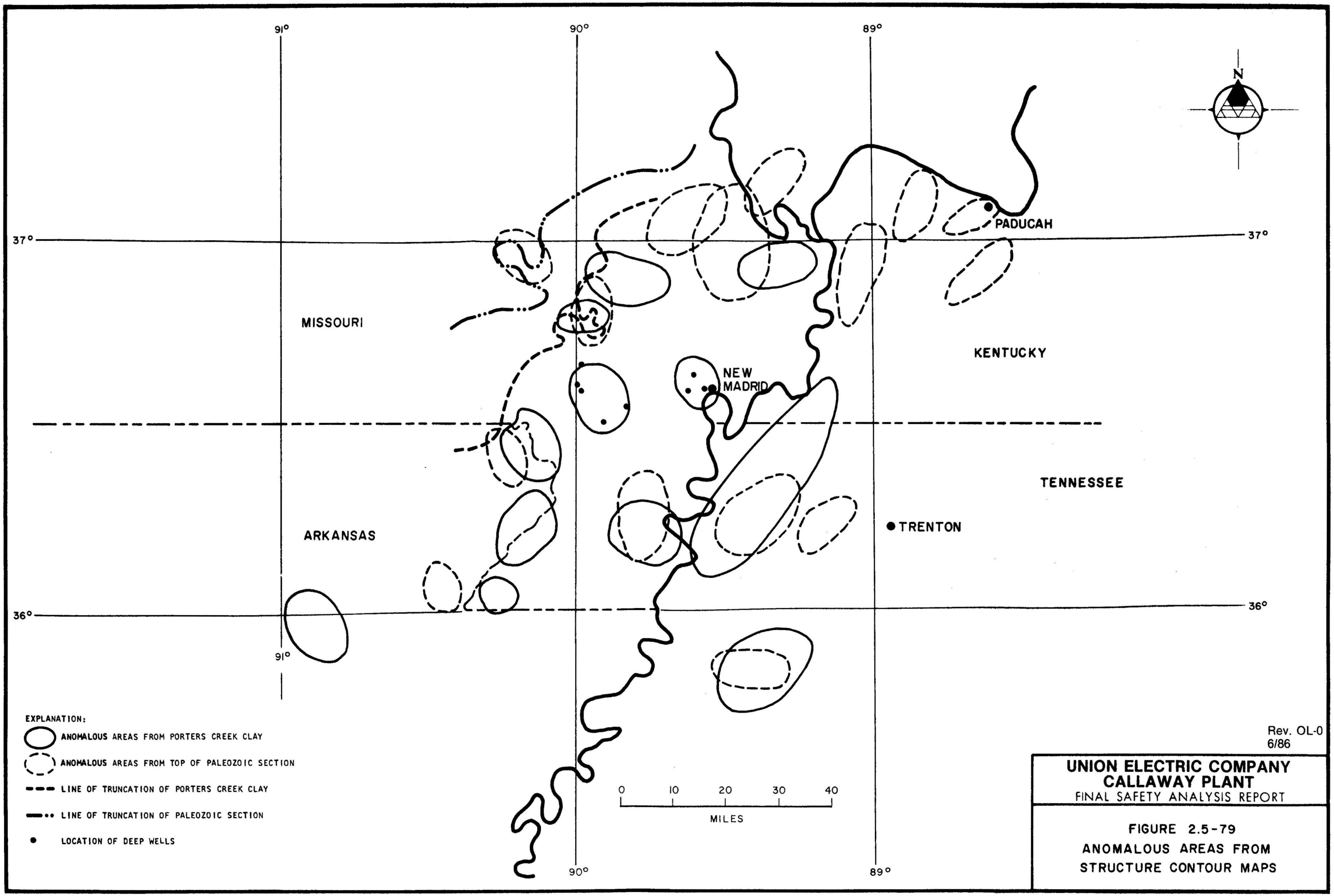

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FIGURE 2.5-79
ANOMALOUS AREAS FROM
STRUCTURE CONTOUR MAPS

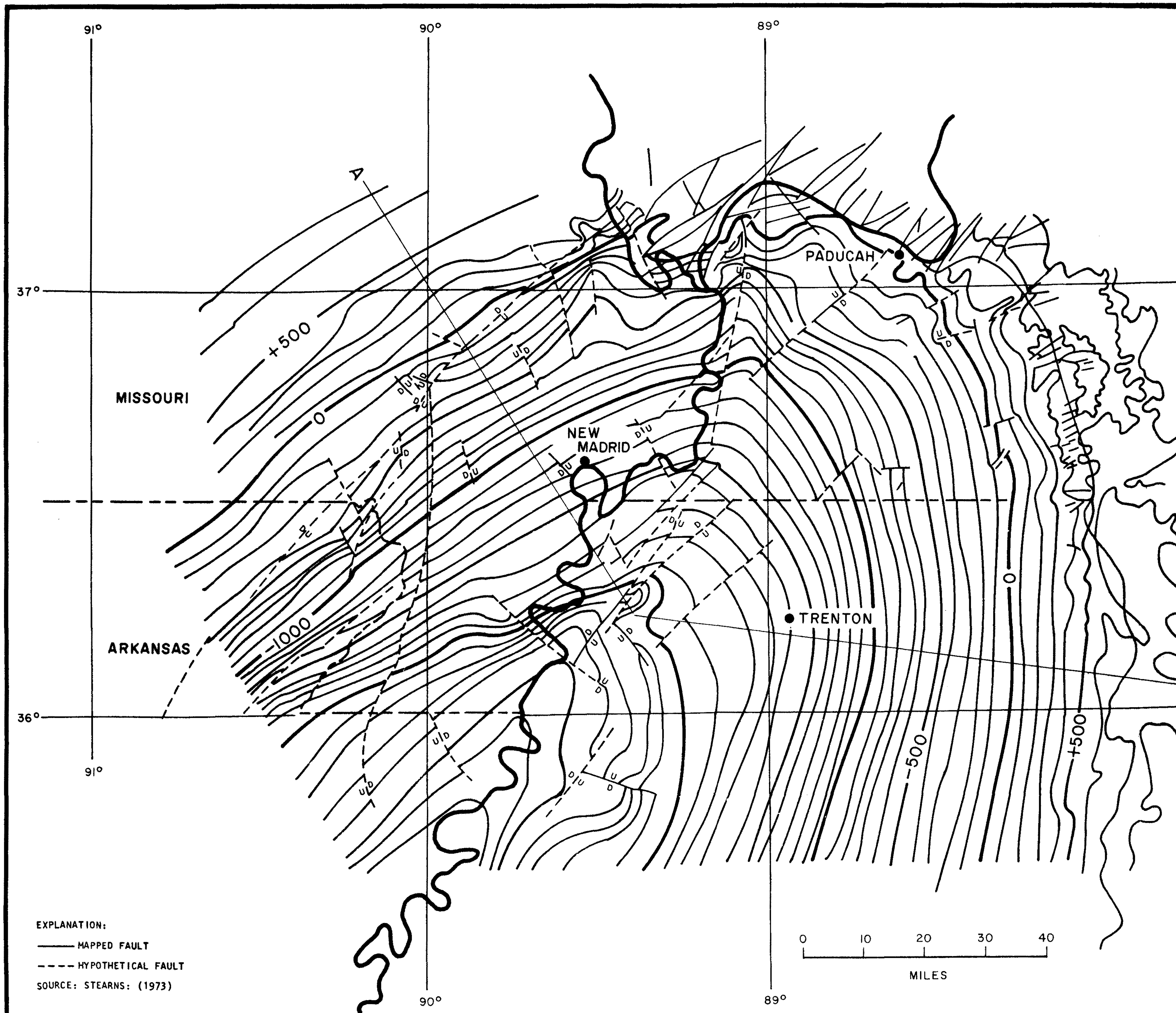

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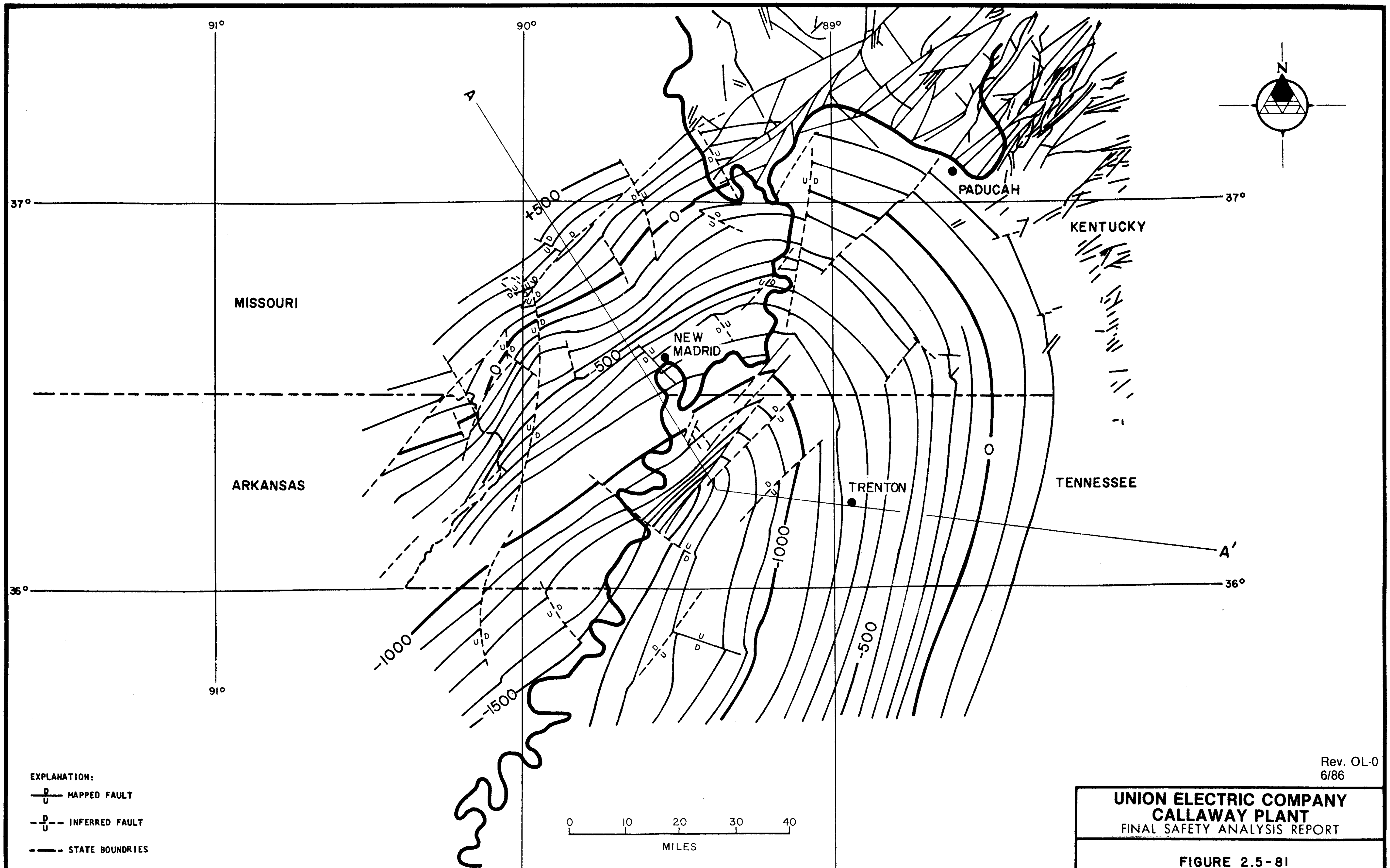
FIGURE 2.5-80
STRUCTURE CONTOURS ON TOP OF PALEOZOIC ROCKS WITH INTERPRETIVE FAULT OFFSET



EXPLANATION:

D/U — MAPPED FAULT

D/U - - INFERRED FAULT

— - — STATE BOUNDRIES

NOTES:
1. CONTOUR INTERVAL 100 FEET
2. FAULT OFFSETS ARE INTERPRETIVE

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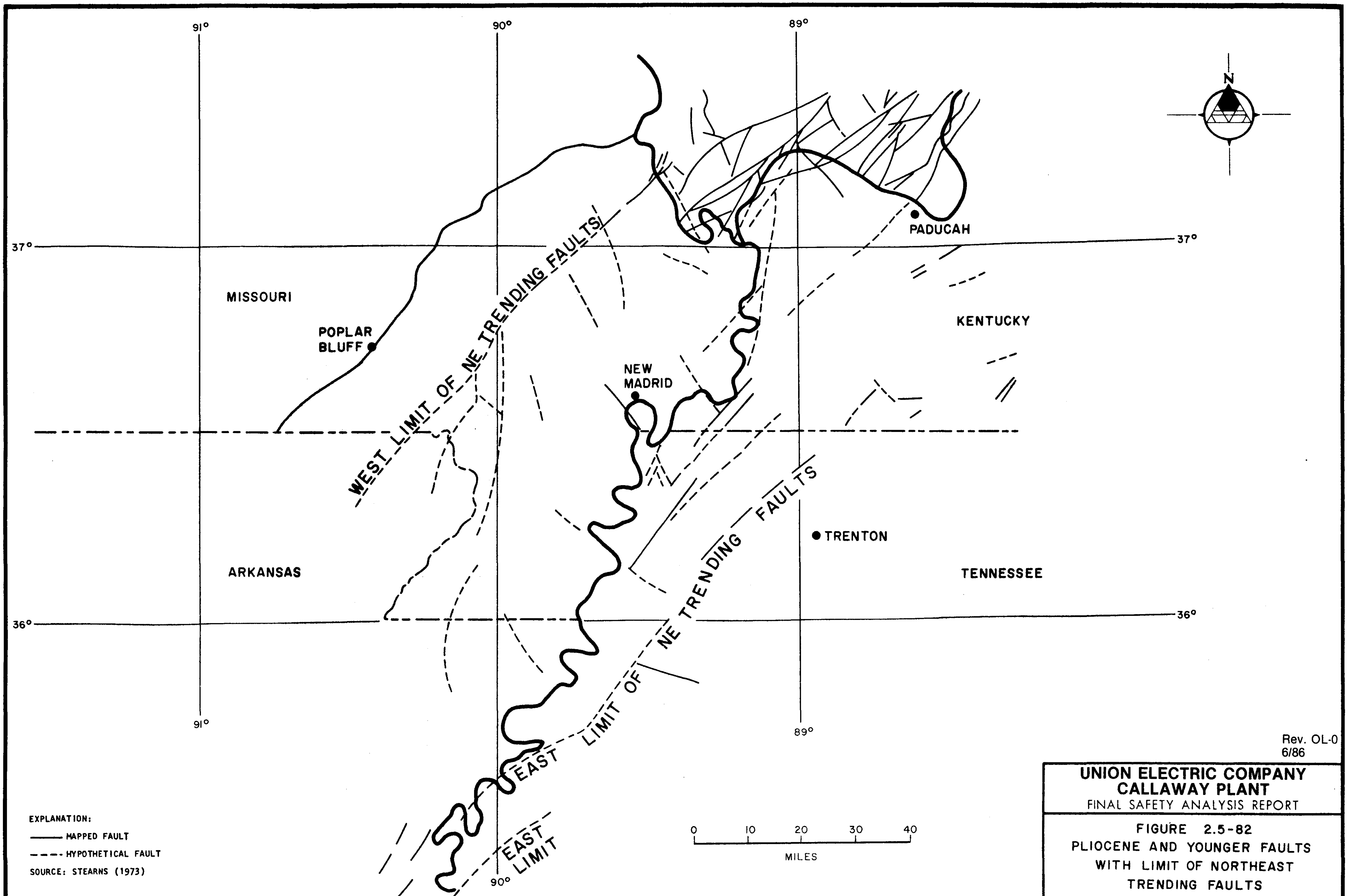
FIGURE 2.5-81
STRUCTURE CONTOURS ON TOP
OF PORTERS CREEK CLAY
WITH INTERPRETIVE FAULT OFFSET



EXPLANATION:
——— MAPPED FAULT
- - - - HYPOTHETICAL FAULT
SOURCE: STEARNS (1973)

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FIGURE 2.5-82
PLIOCENE AND YOUNGER FAULTS
WITH LIMIT OF NORTHEAST
TRENDING FAULTS

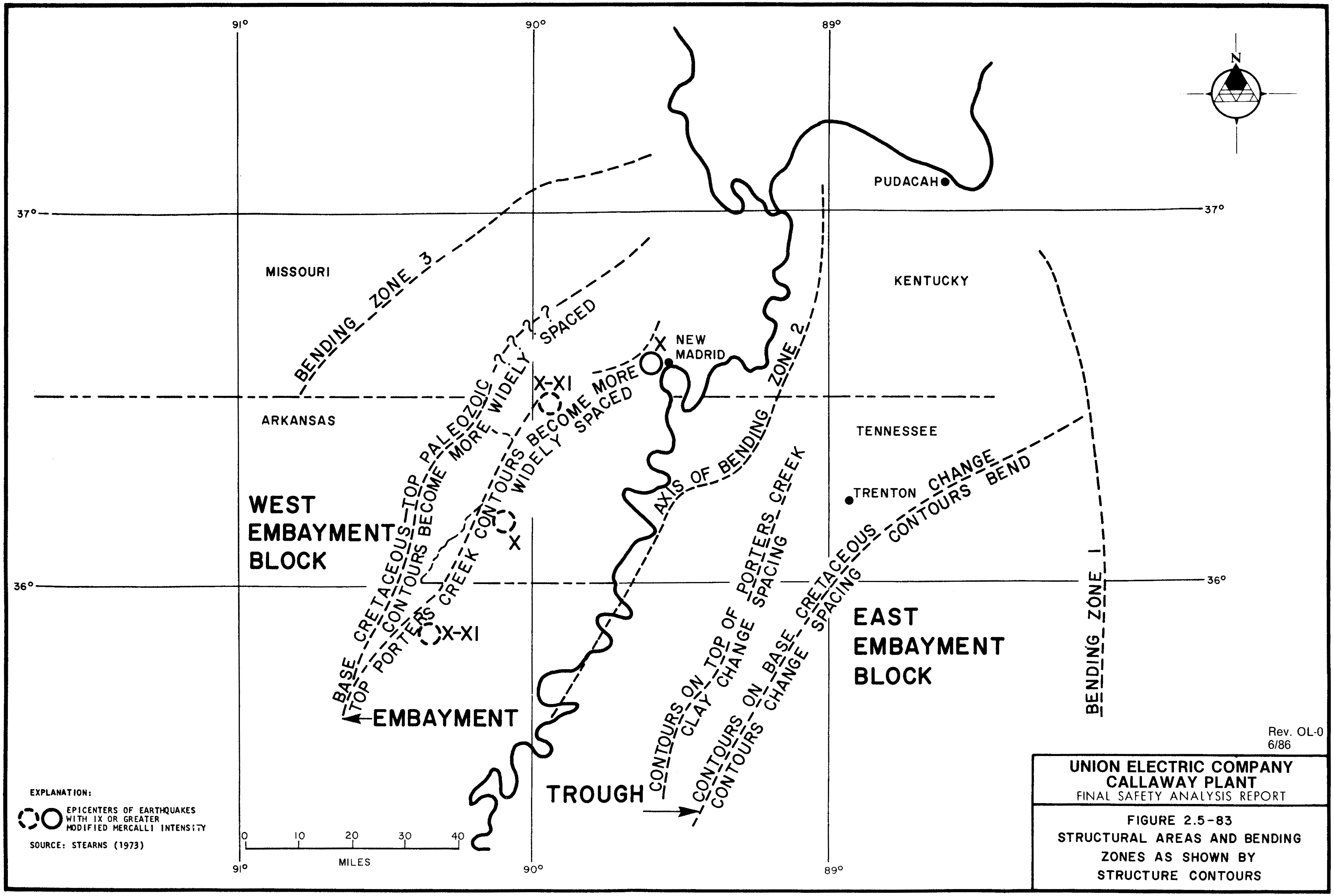

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FIGURE 2.5-83
STRUCTURAL AREAS AND BENDING ZONES AS SHOWN BY STRUCTURE CONTOURS

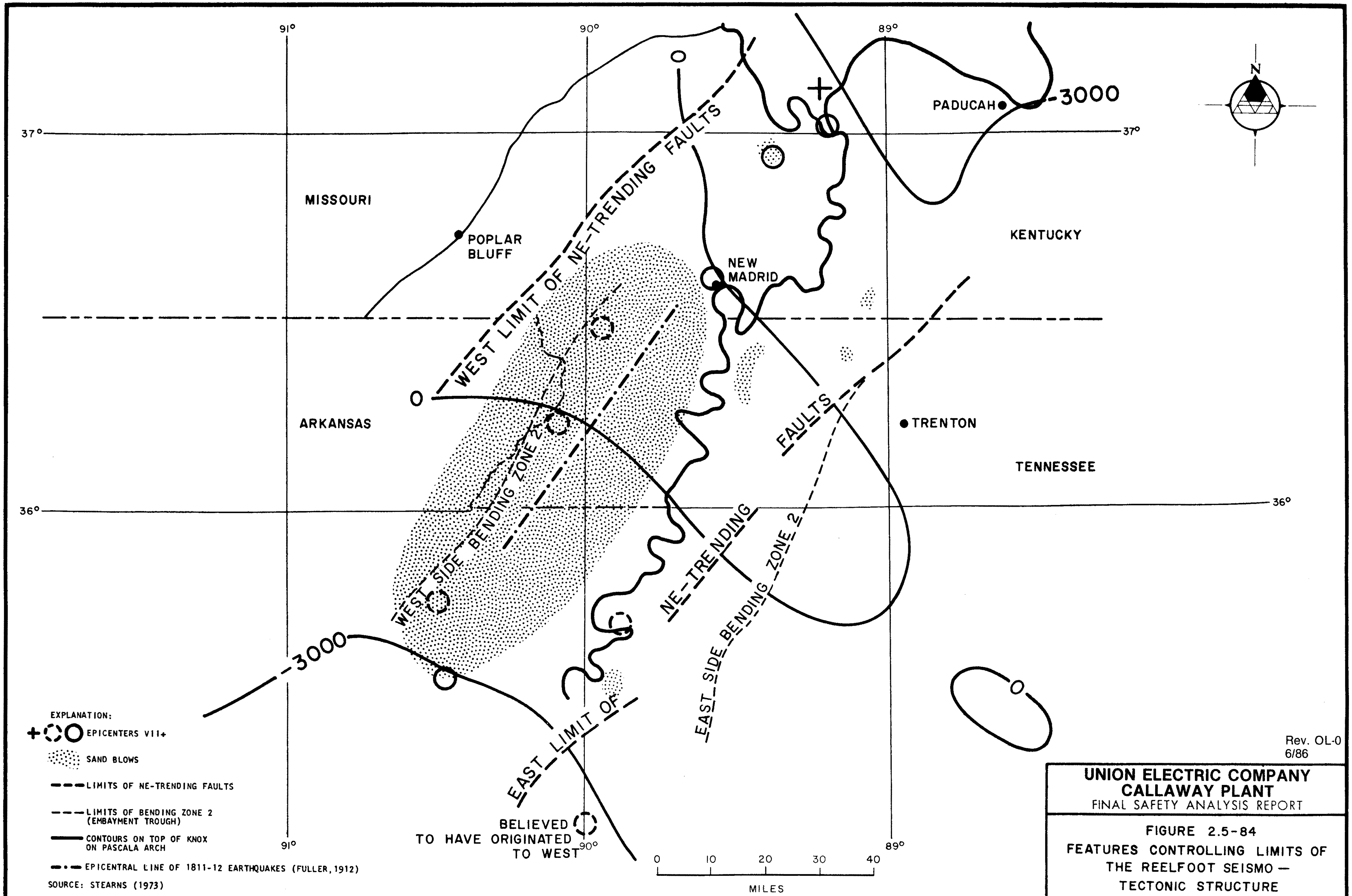

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FIGURE 2.5-84
FEATURES CONTROLLING LIMITS OF THE REELFOOT SEISMO-TECTONIC STRUCTURE

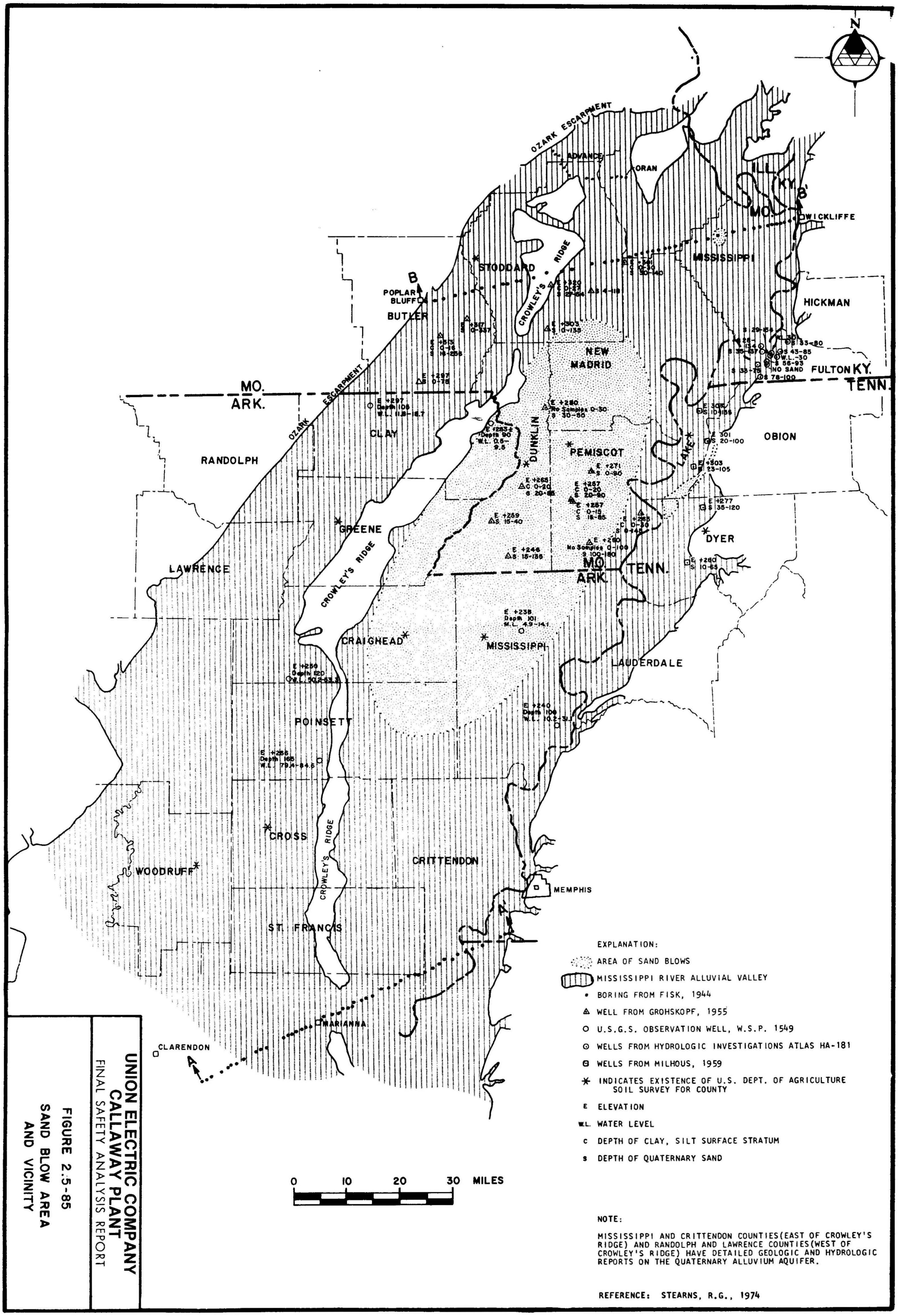

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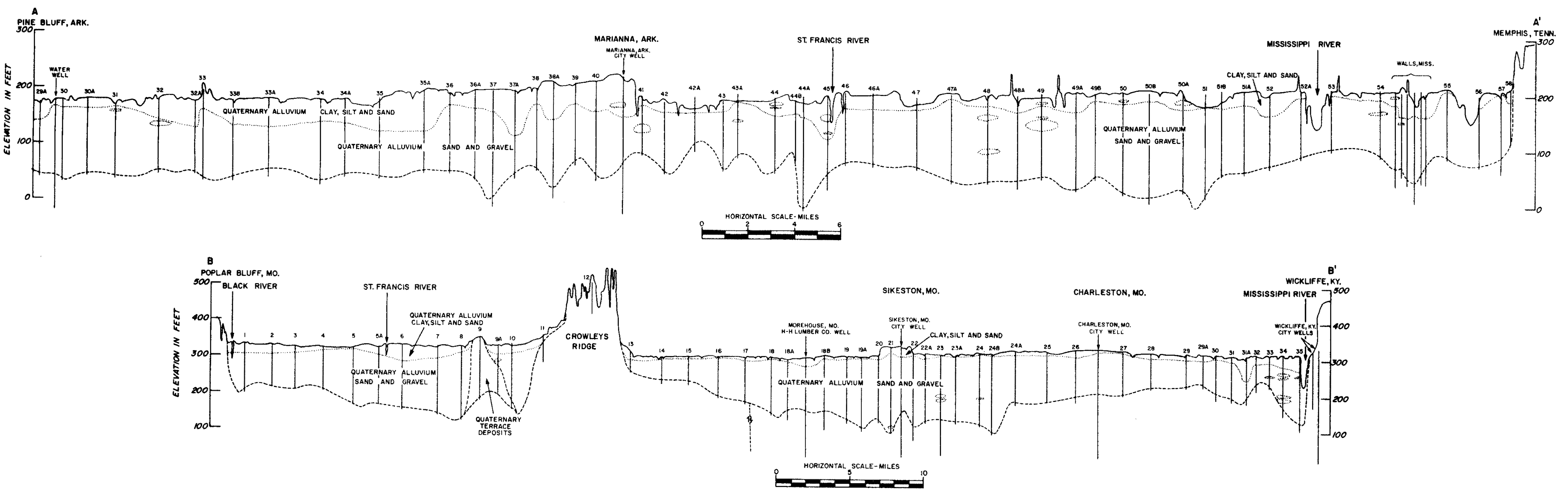
FIGURE 2.5-85
SAND BLOW AREA
AND VICINITY



REFERENCE:

MODIFIED BY STEARNS, 1974 AFTER FISK, 1944 (PLATES 6 AND 7)

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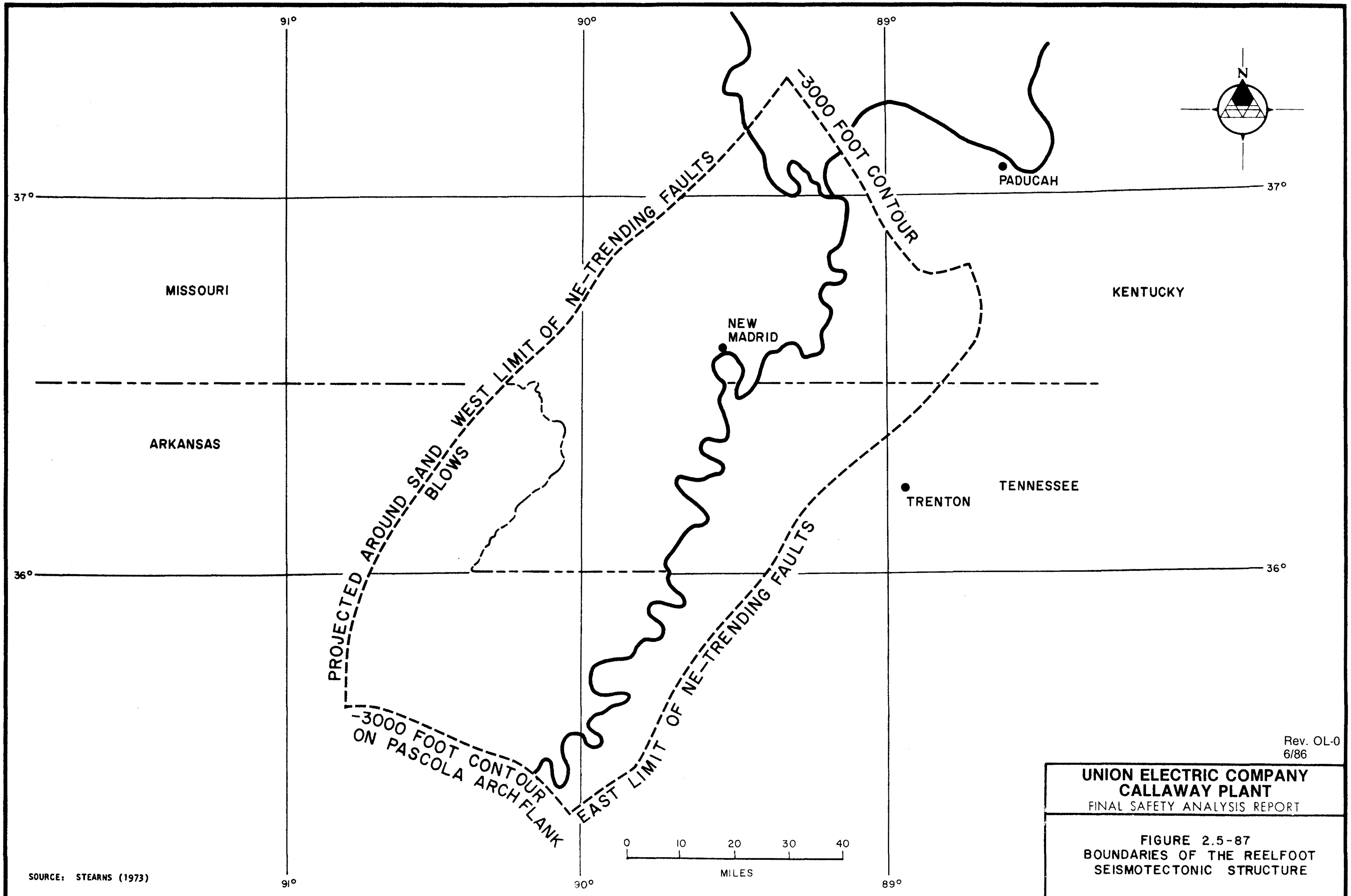
FIGURE 2.5-86
CROSS SECTION OF MISSISSIPPI VALLEY QUATERNARY ALLUVIUM



SOURCE: STEARNS (1973)

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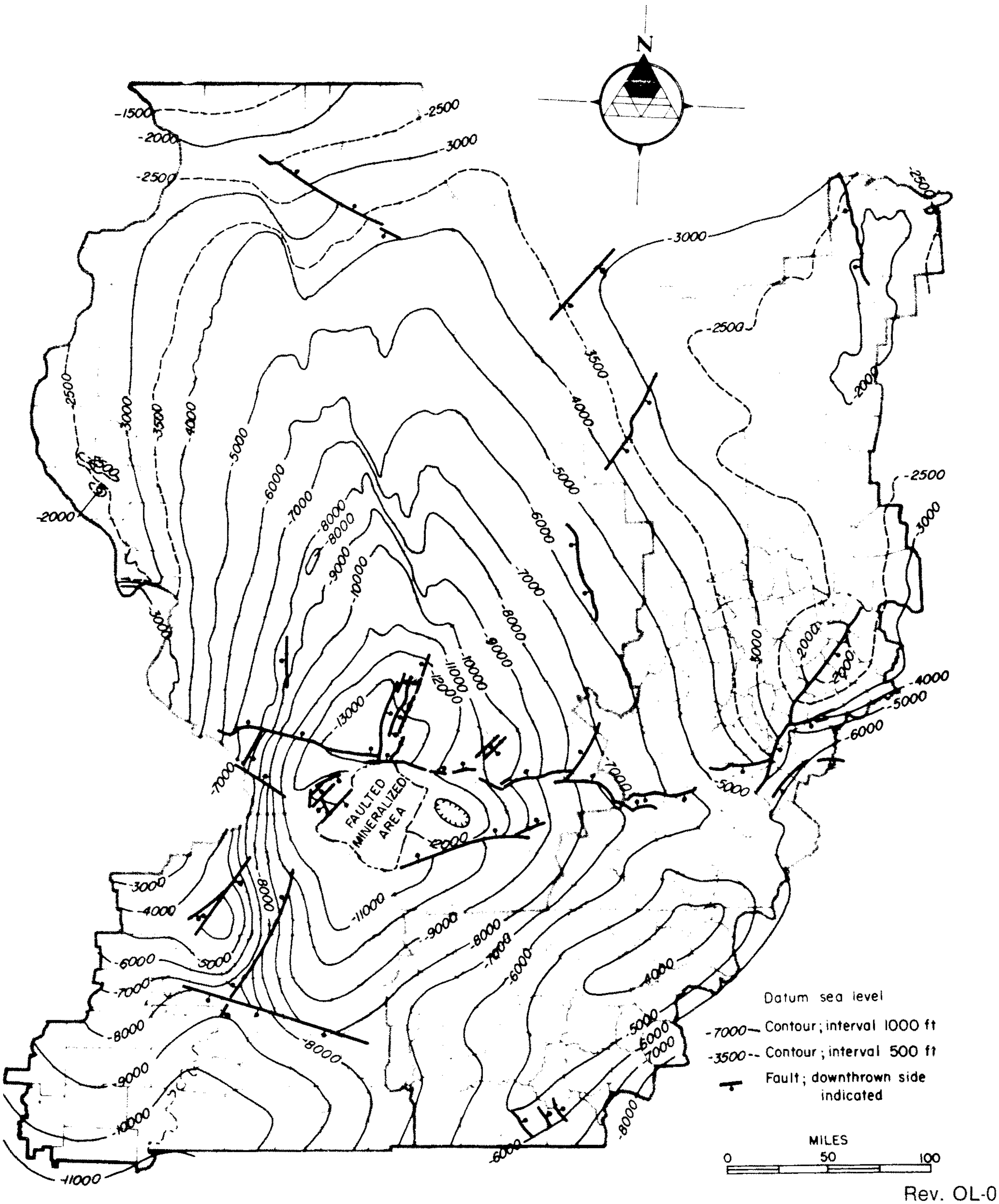
FIGURE 2.5-87
BOUNDARIES OF THE REELFOOT SEISMOTECTONIC STRUCTURE



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Reference:

Structure on top of Precambrian basement. Prepared by E. Atherton in cooperation with H. M. Bristol, T. C. Buschbach, L. E. Becker, T. A. Dawson, H. schwalb, E. N. Wilson, A. T. Statler, and J. H. Buehner for publication in AAPG Memoir 15.

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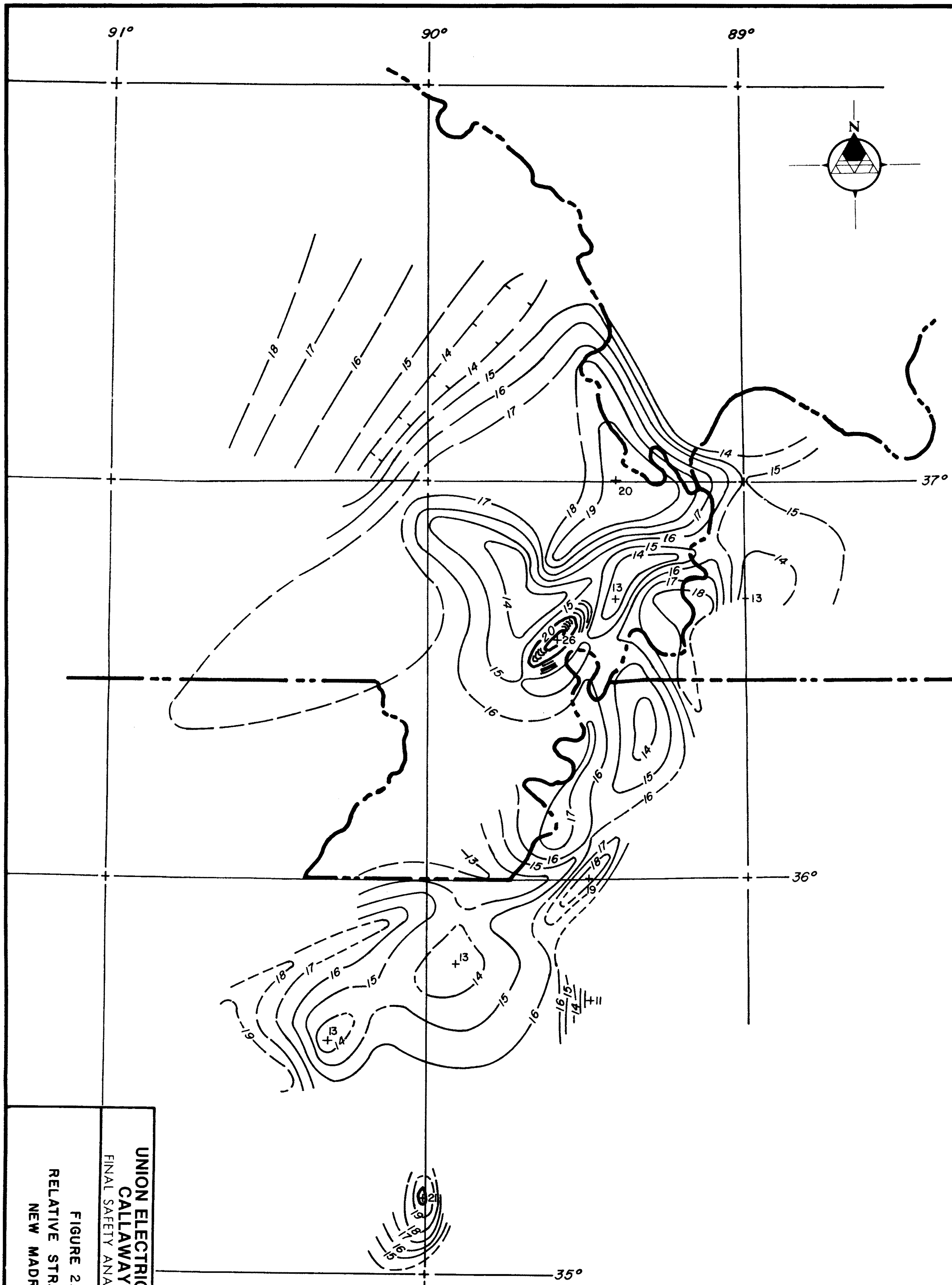
FIGURE 2.5-88

STRUCTURE ON TOP OF PRECAMBRIAN BASEMENT IN ILLINOIS, INDIANA, KENTUCKY AND TENNESSEE



NOTE: CONTOURS ARE LINES OF CUMULATIVE ENERGY RELEASE FROM HISTORIC DATA PERIOD 1811-1974.
CONTOUR VALUES ARE LOG_{10} OF ENERGY RELEASED IN ERGS.
LOG_{10} ENERGY = 5.8+2.4 MAGNITUDE;
MAGNITUDE ≈ 2/3 INTENSITY + 1.

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FIGURE 2.5-89
RELATIVE STRAIN RELEASE
NEW MADRID AREA

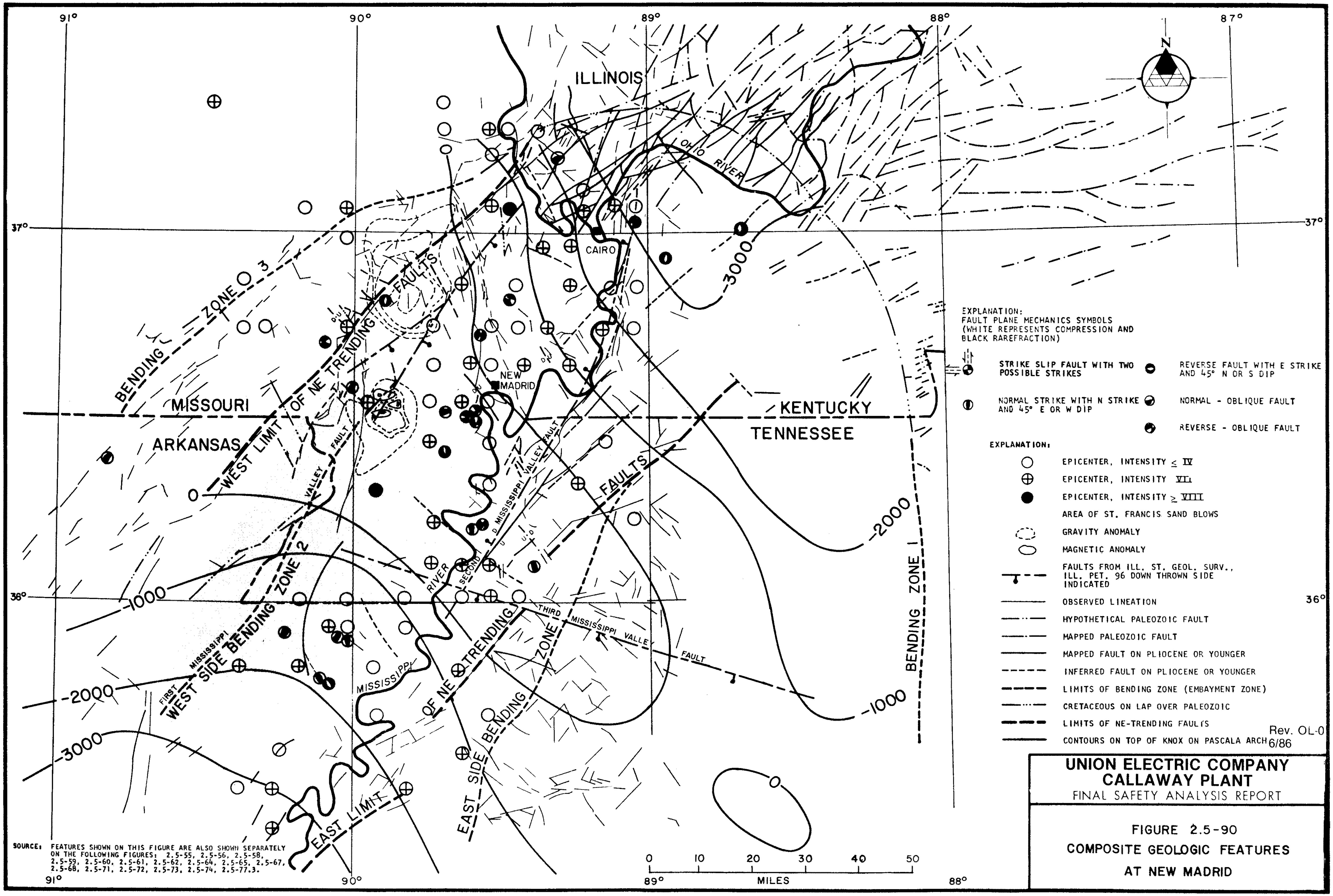

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FIGURE 2.5-90
COMPOSITE GEOLOGIC FEATURES AT NEW MADRID

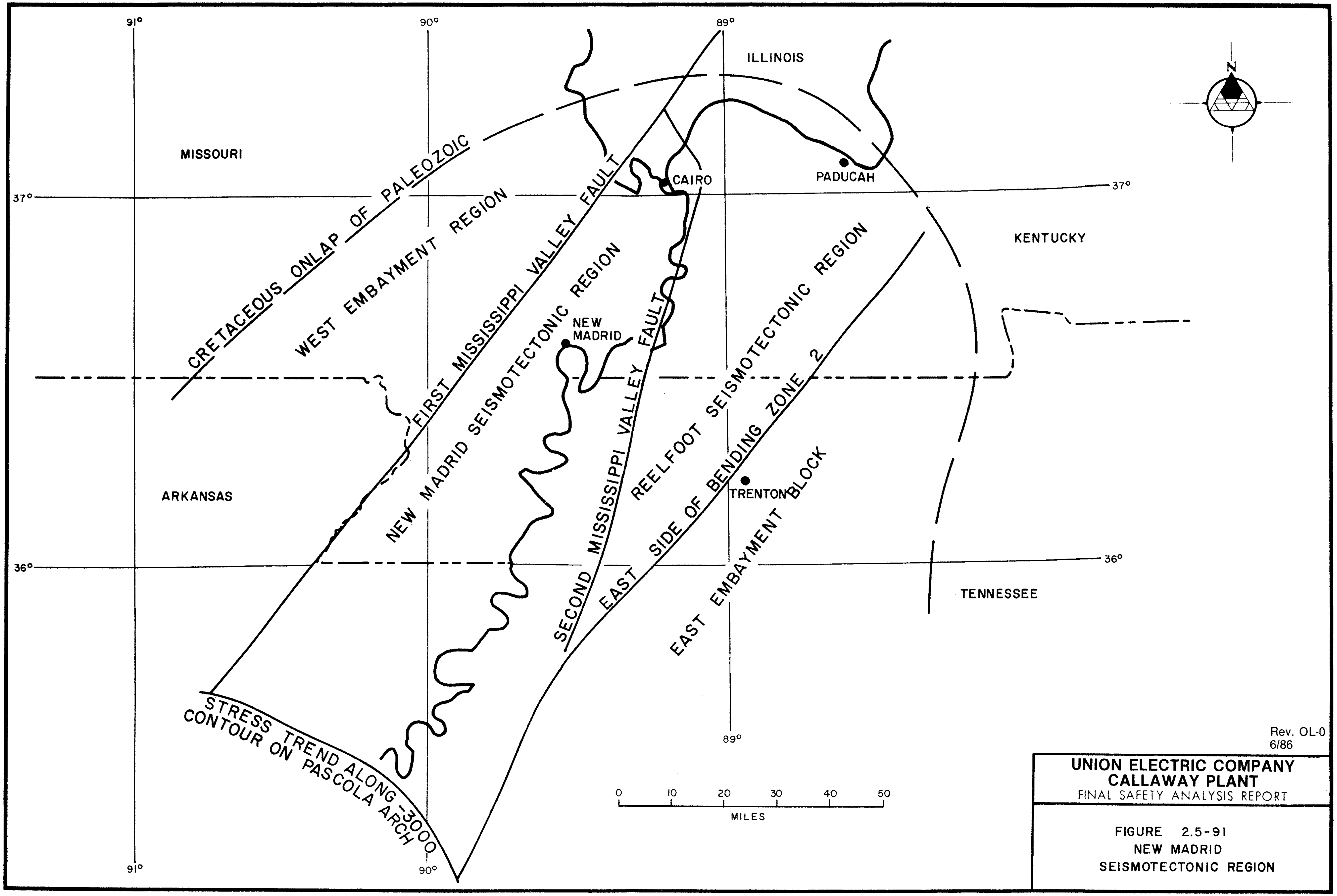

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FIGURE 2.5-91
NEW MADRID
SEISMOTECTONIC REGION

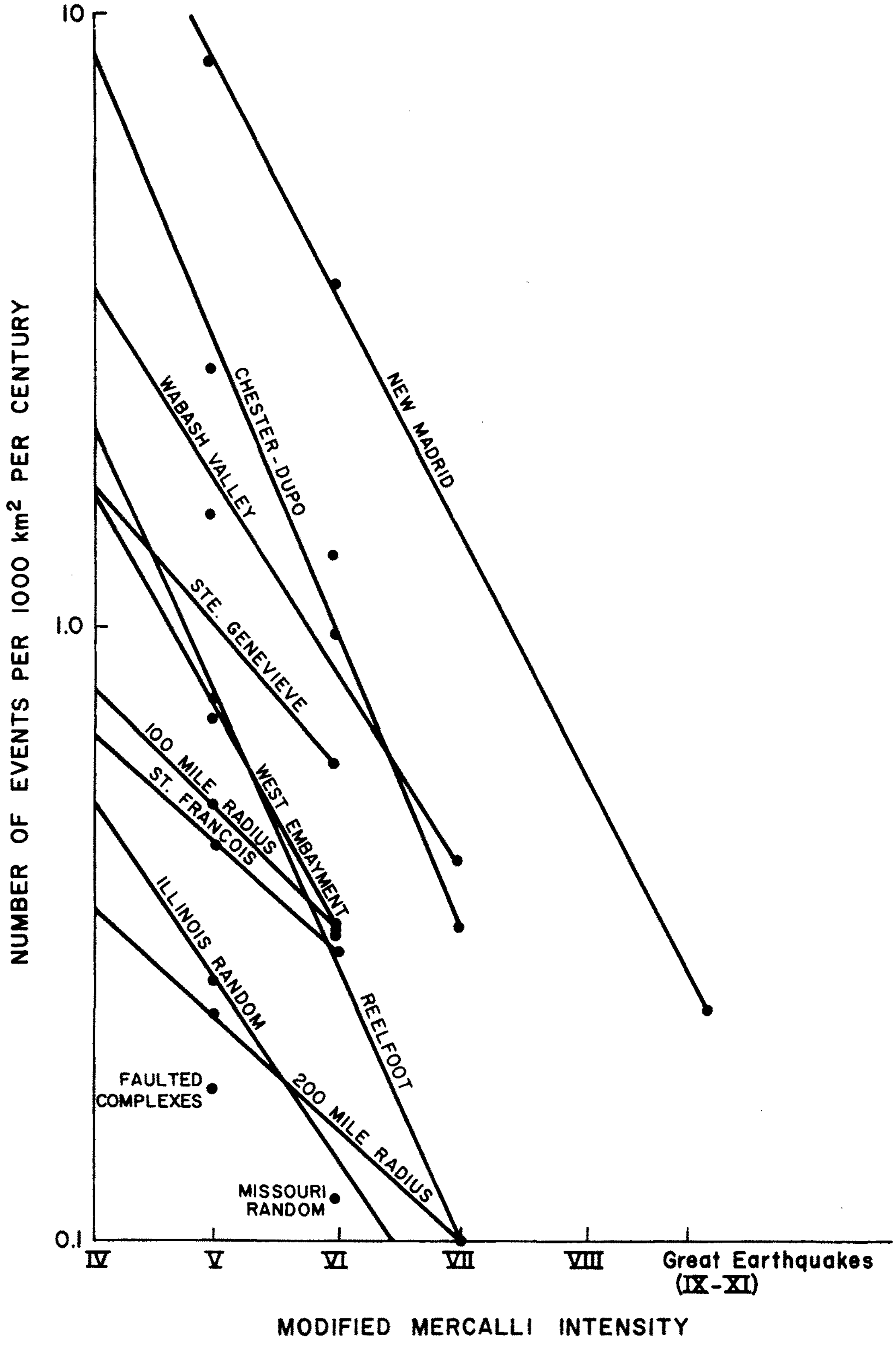

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FIGURE 2.5-92
RECURRENCE RELATIONS
FOR SEISMOTECTONIC REGIONS

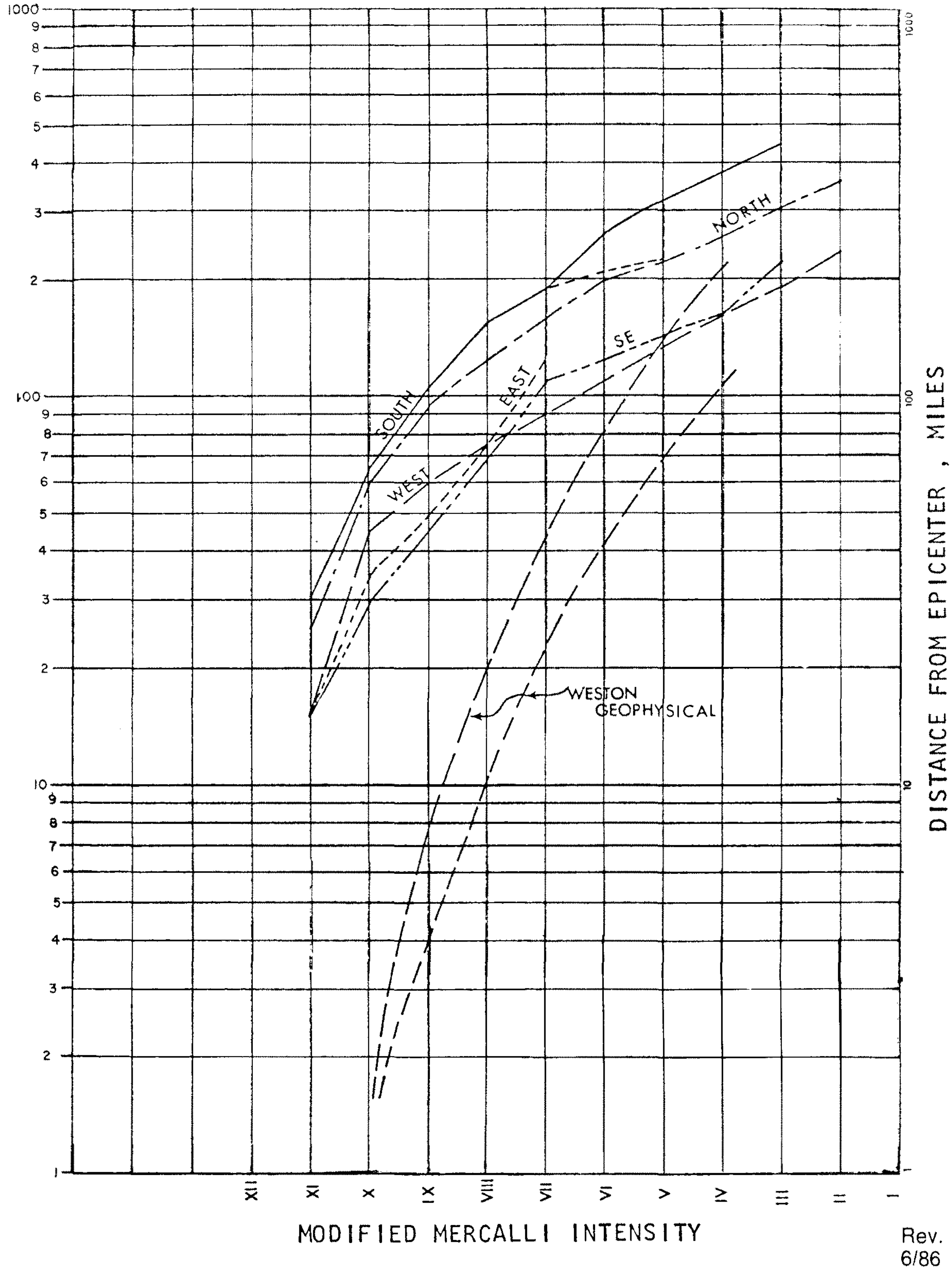

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FIGURE 2.5-93
ATTENUATION OF INTENSITY XII
NEW MADRID EARTHQUAKE
DECEMBER 16, 1811

NOTES:
WESTON CURVES ARE BASED ON CALIFORNIA DATA AND ARE FOR COMPARISON ONLY.

DATA BY STEARNS (1972)

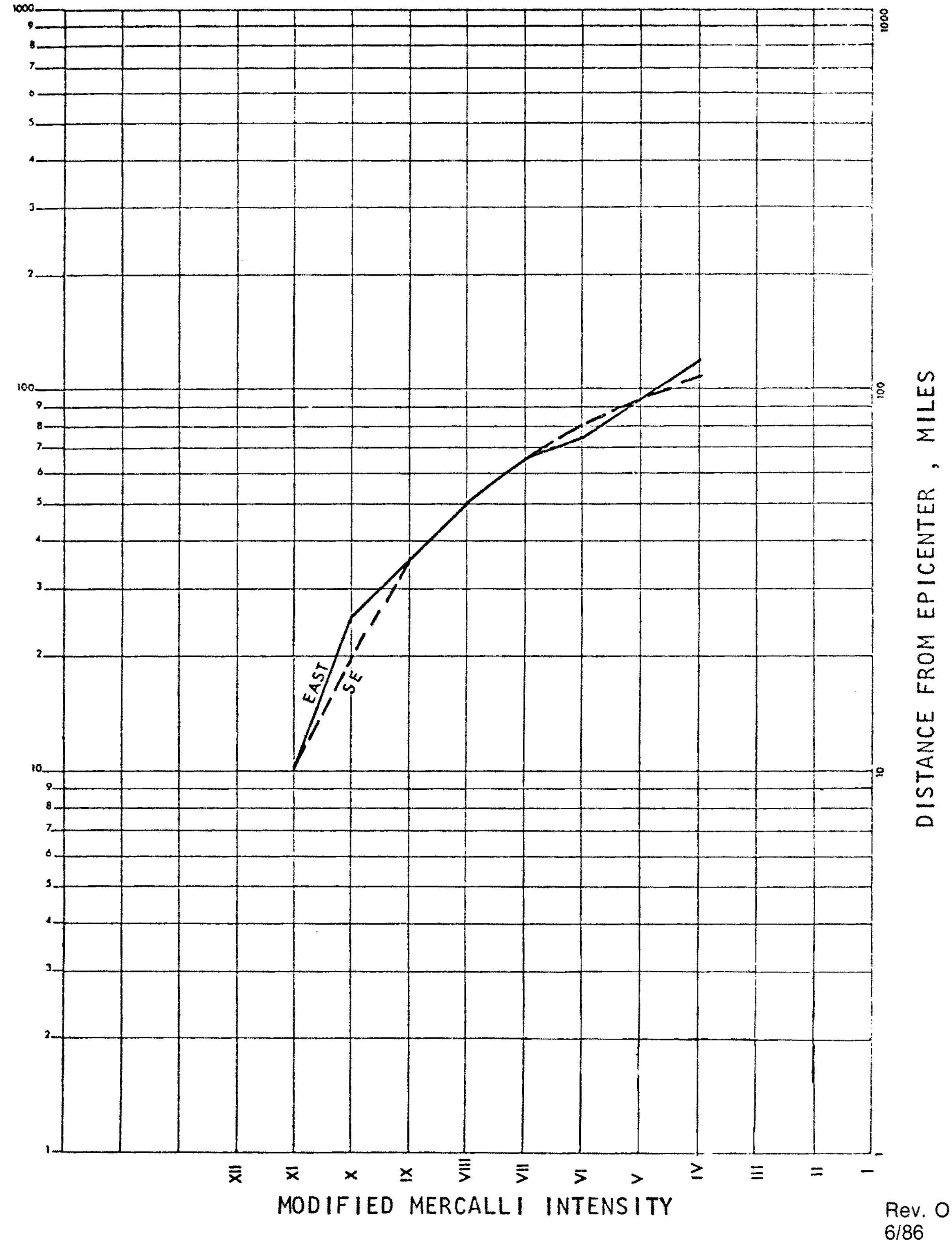

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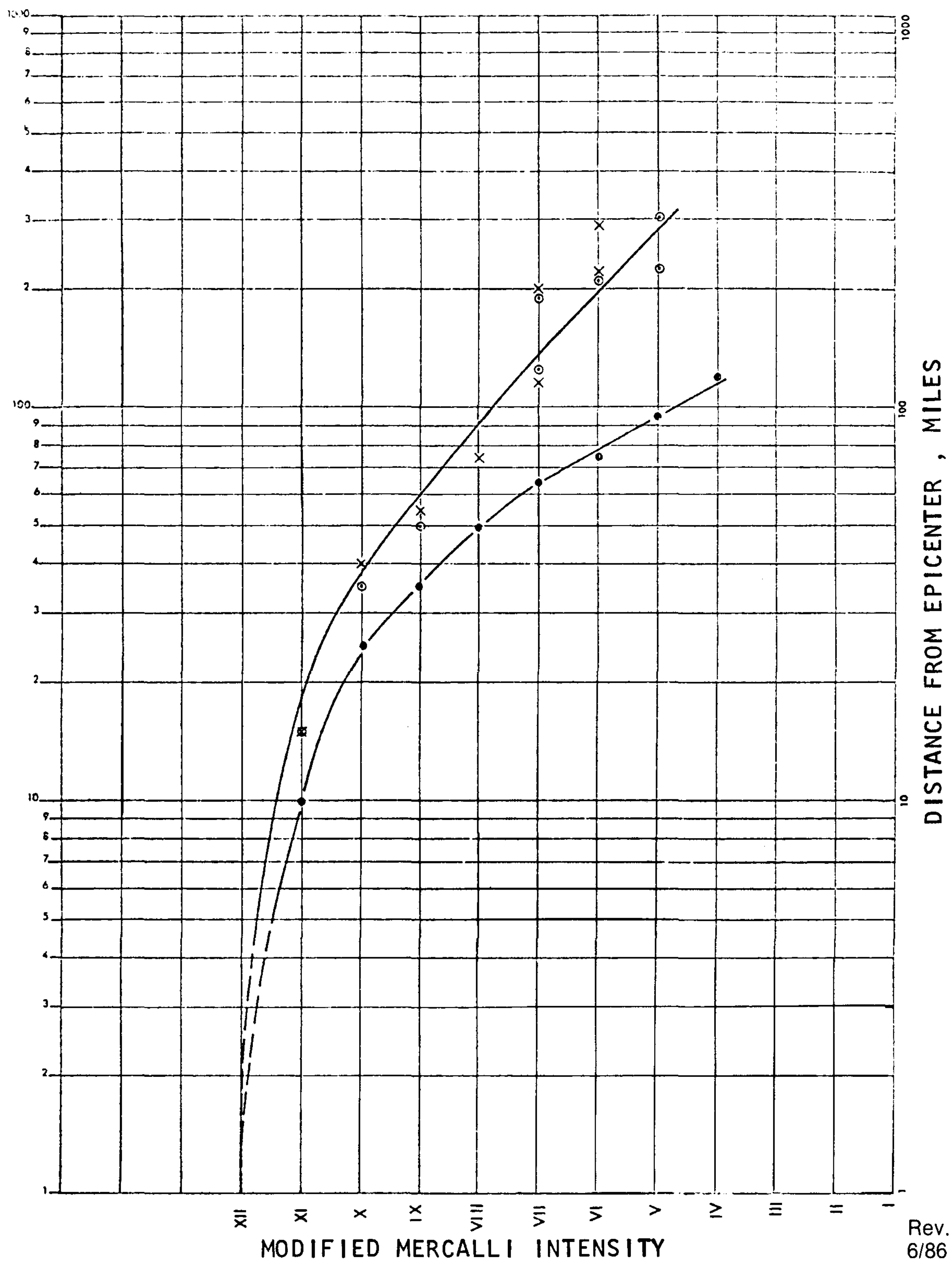
FIGURE 2.5-94
ATTENUATION OF INTENSITY XII
NEW MADRID EARTHQUAKE
FEBRUARY 7, 1812

SOURCE: STEARNS AND WILSON (1972)



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EXPLANATION:

● FEBRUARY 7, 1812

⊙ DECEMBER 11, 1811

× COMPOSITE EFFECT

SOURCE: STEARNS AND WILSON (1972)

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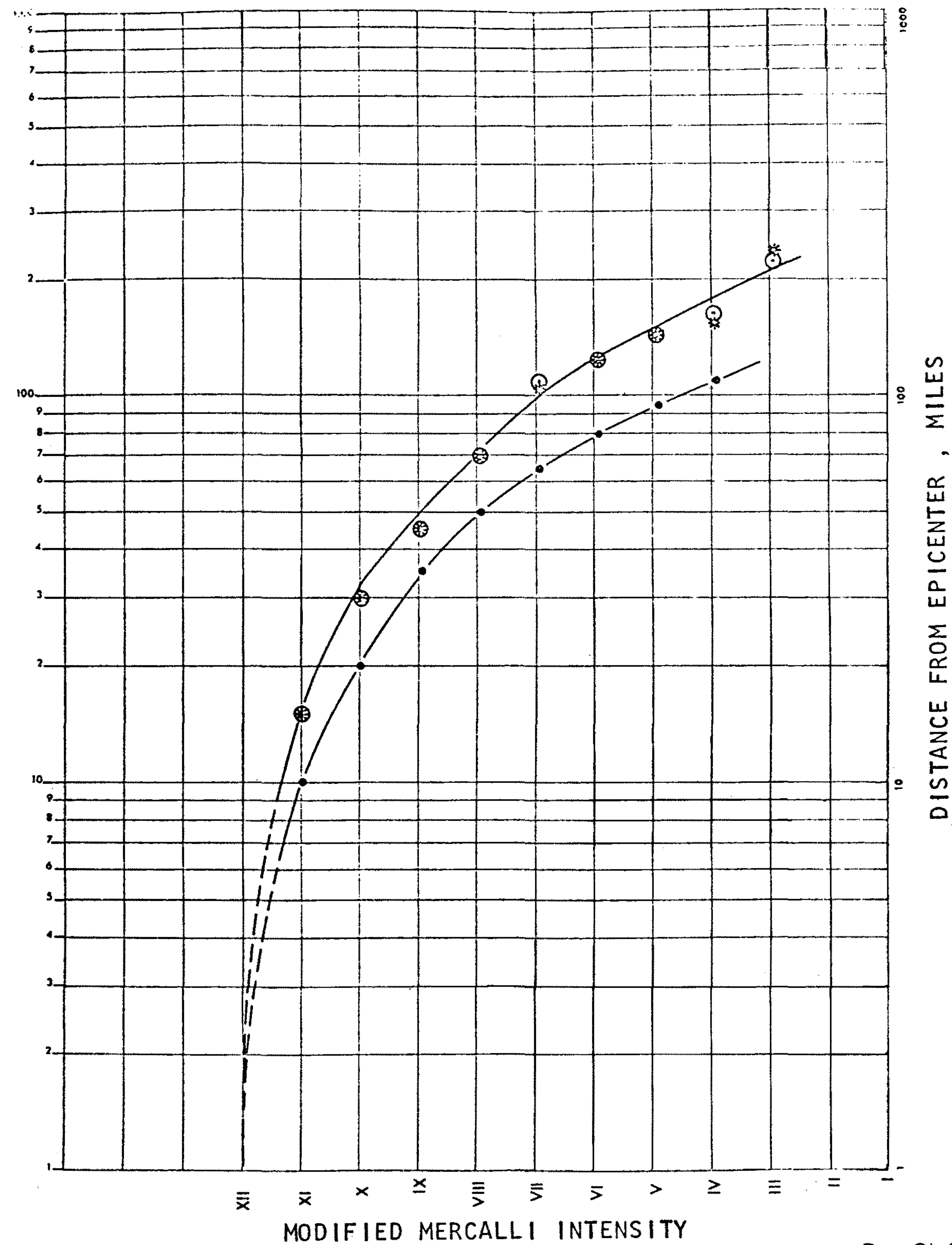
FIGURE 2.5-95
NEW MADRID 1811-12 EARTHQUAKES
ATTENUATION IN THE EAST DIRECTION
FROM NEW MADRID EPICENTRAL AREA



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EXPLANATION:

● FEBRUARY 7, 1812

⊙ DECEMBER 16, 1811

✲ COMPOSITE EFFECT

SOURCE: STEARNS AND WILSON (1972)

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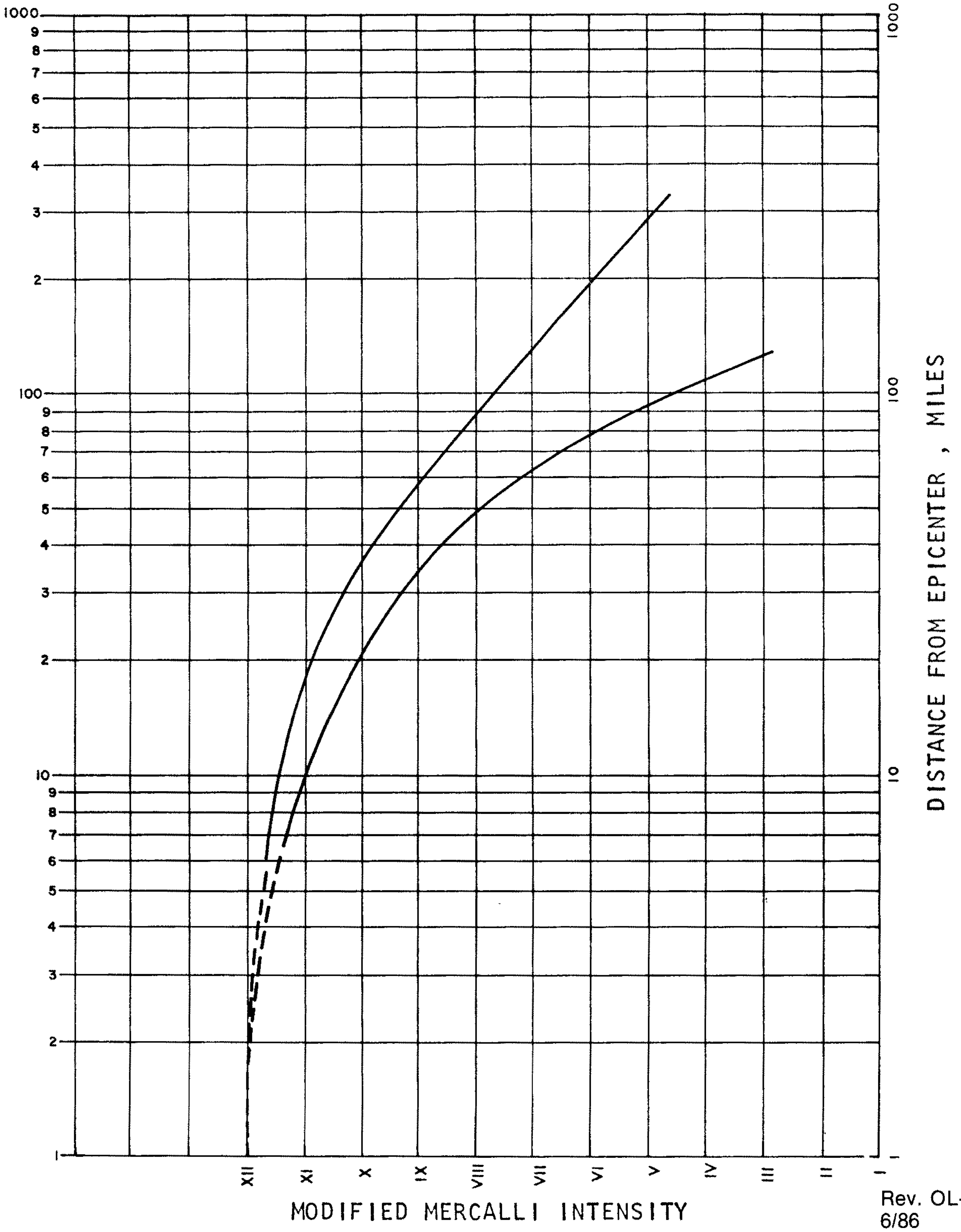
FIGURE 2.5-96
NEW MADRID 1811-12 EARTHQUAKES
ATTENUATION IN THE SOUTHEAST
DIRECTION FROM NEW MADRID
EPICENTRAL AREA



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NOTES:
CURVES SHOW ATTENUATION IN EASTERN AND SOUTHEASTERN DIRECTIONS FROM NEW MADRID.
SOURCE: STEARNS AND WILSON (1972)

FIGURE 2.5-97
ATTENUATION CURVES FOR
NEW MADRID EARTHQUAKES, 1811-12

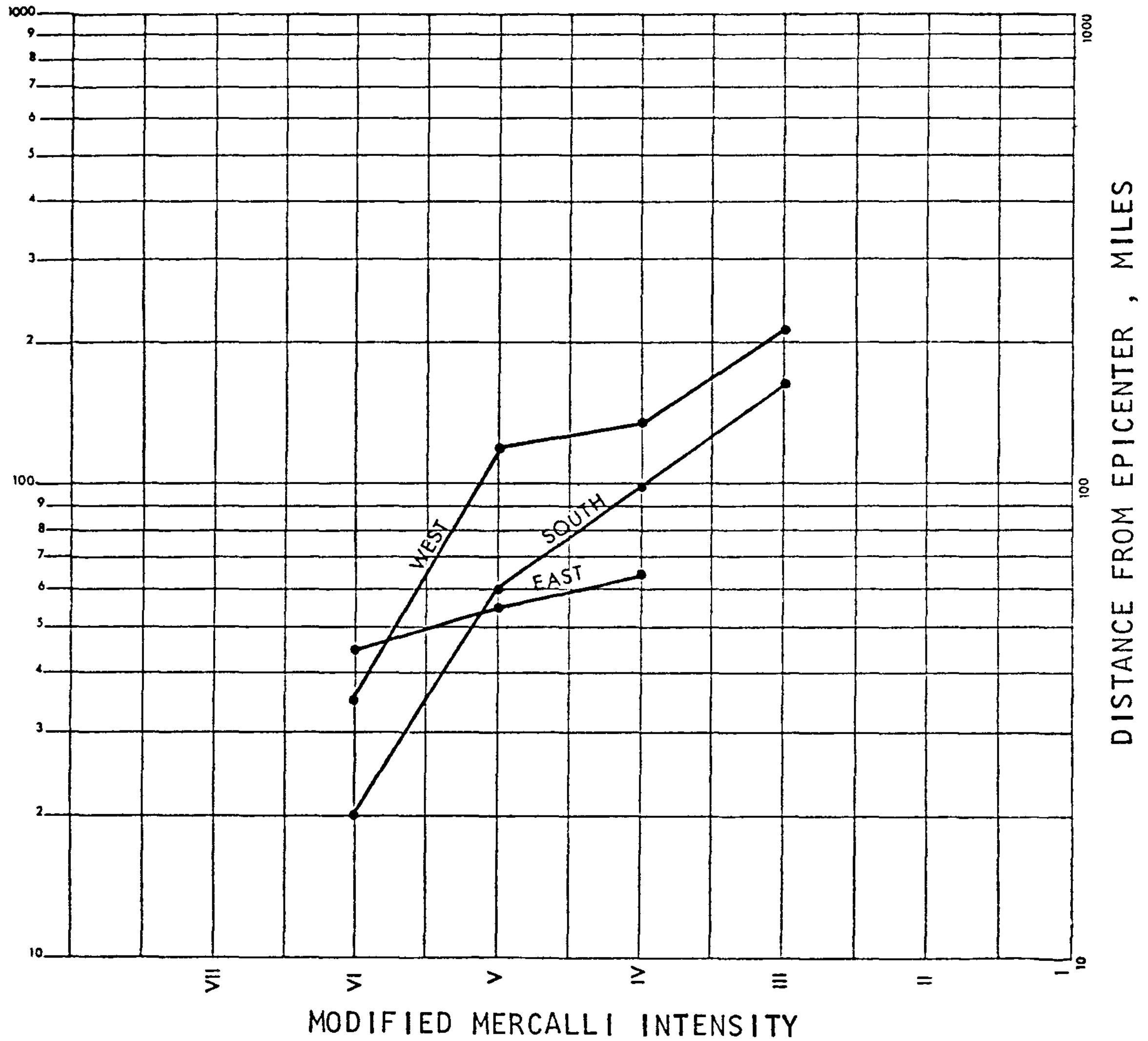

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FIGURE 2.5-98
ATTENUATION OF EARTHQUAKE
IN HAMILTON COUNTY, ILLINOIS
NOVEMBER 9, 1968

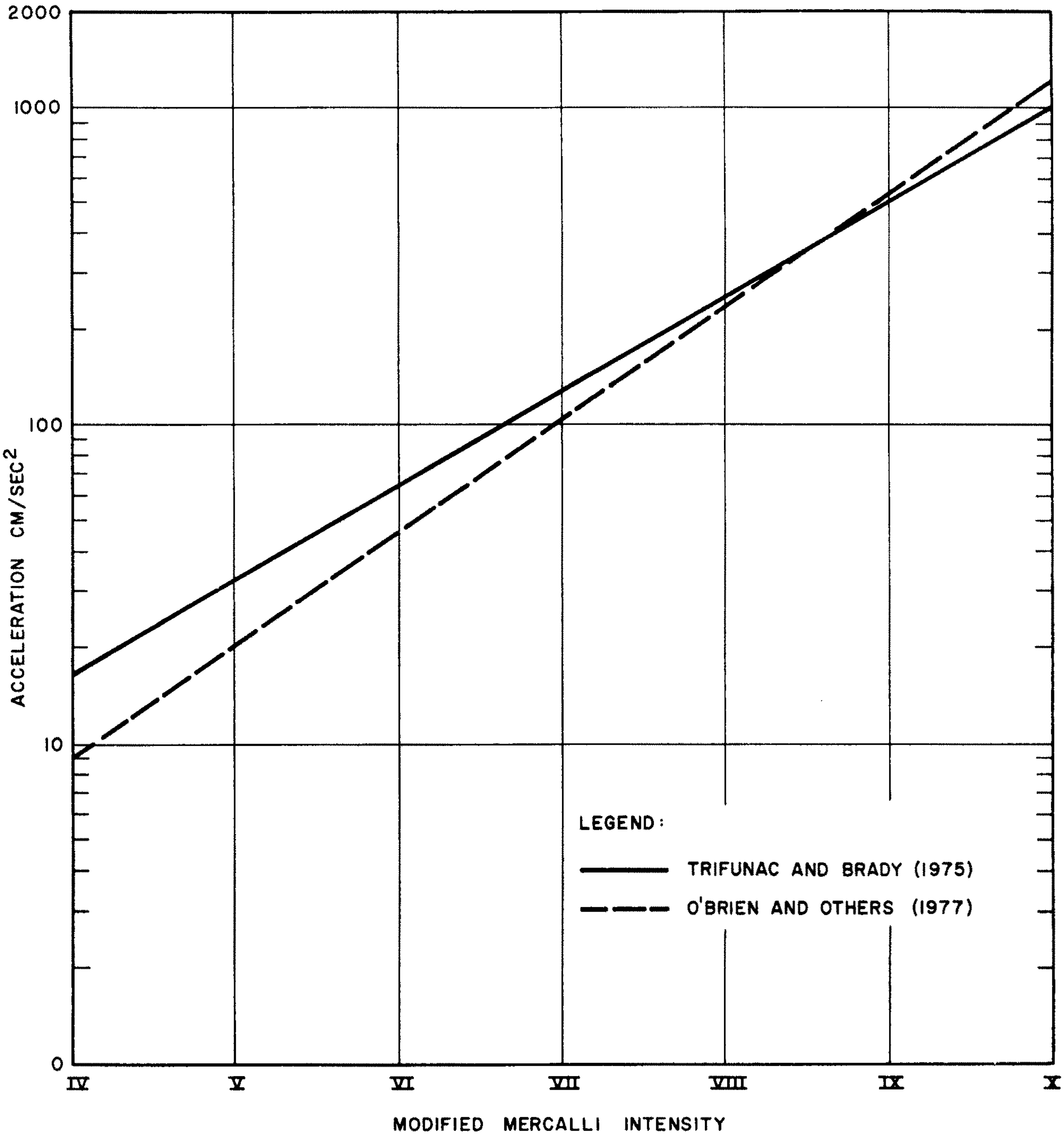

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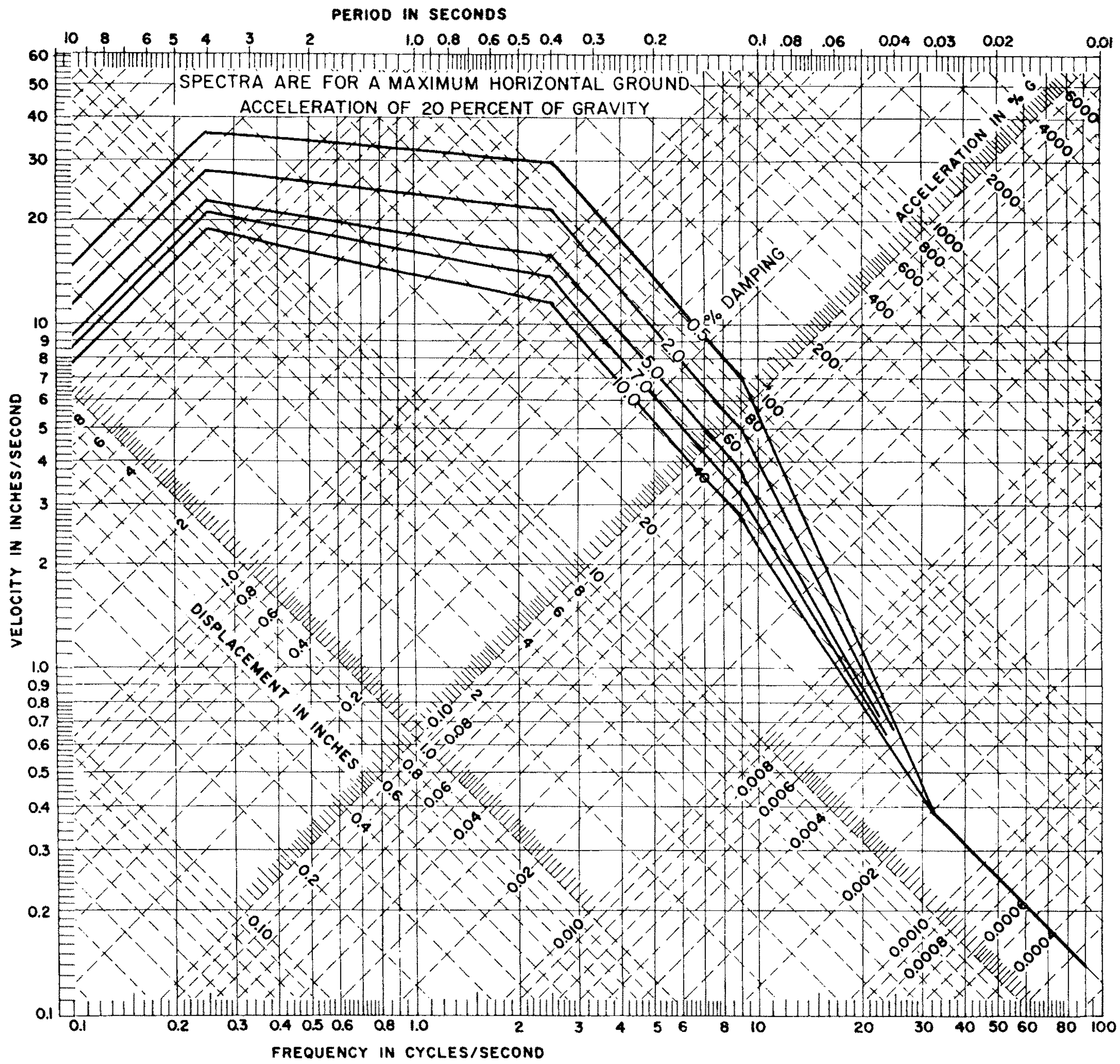
FIGURE 2.5-99
COMPARISON OF THE INTENSITY /ACCELERATION RELATIONSHIPS OF TRIFUNAC AND BRADY (1975), AND O'BRIEN AND OTHERS (1977) HORIZONTAL COMPONENTS.

NOTE:

ADAPTED FROM O'BRIEN AND OTHERS, 1977.

HORIZONTAL



VERTICAL

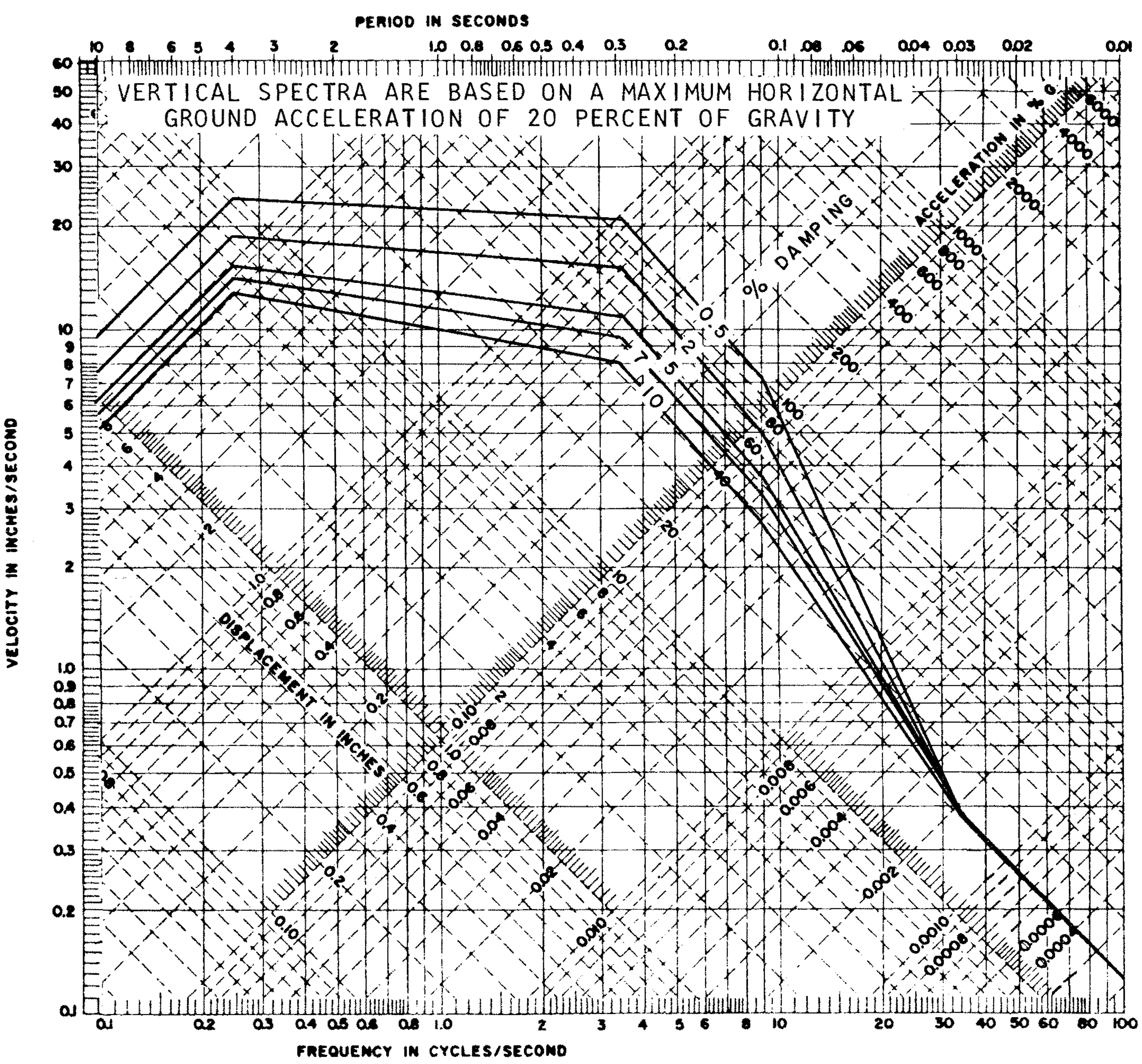


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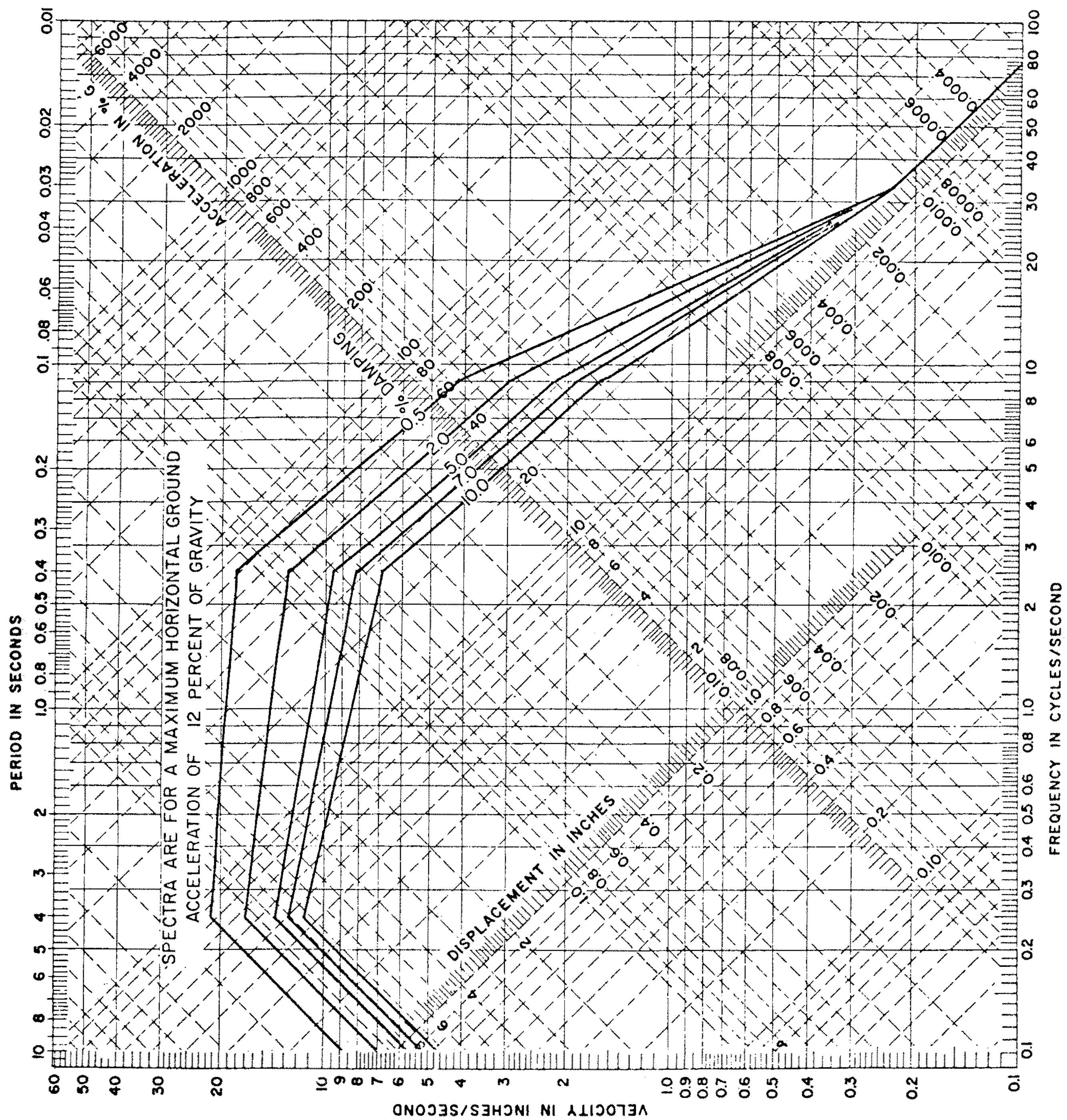
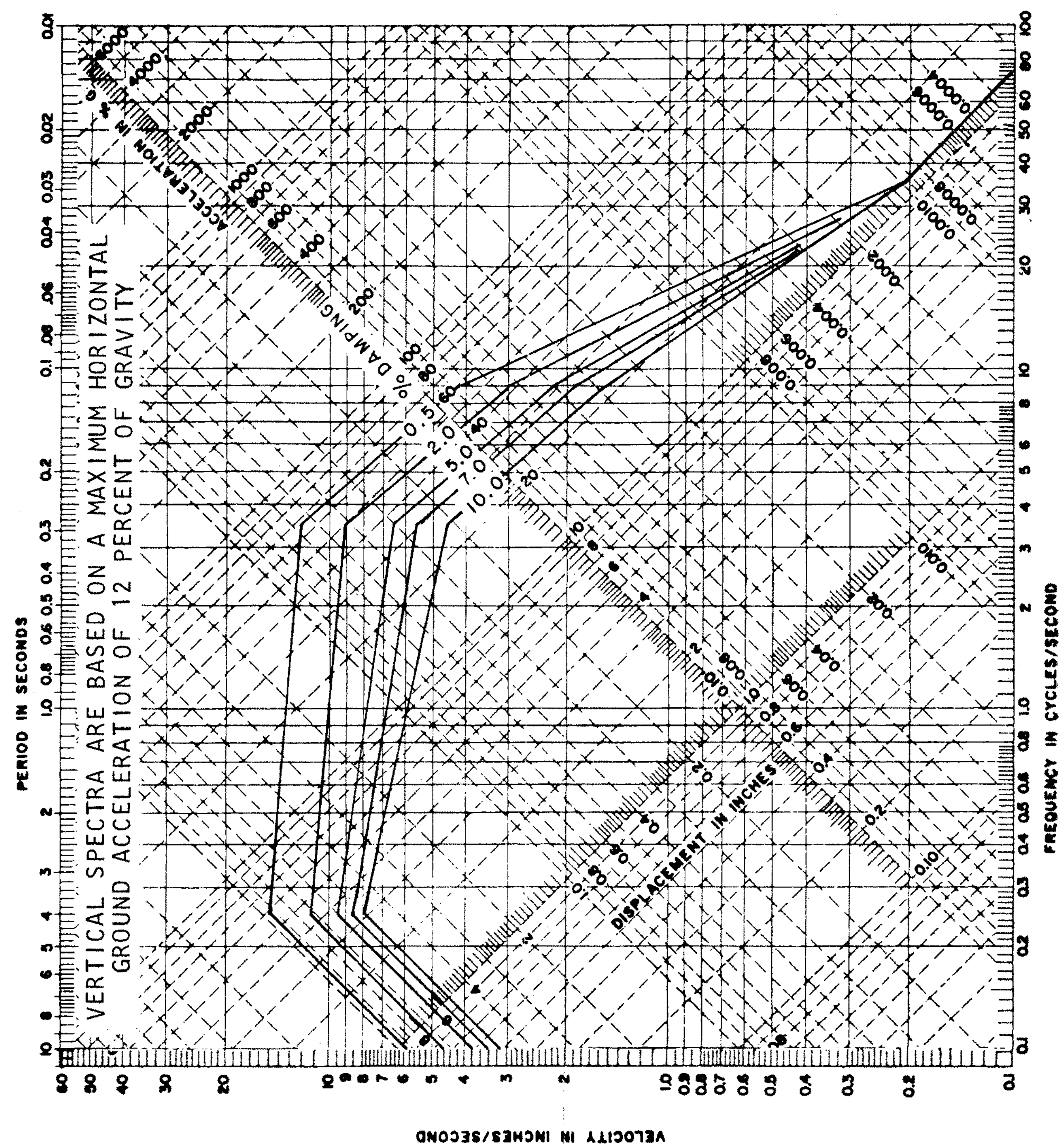
FIGURE 2.5-100
RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE



HORIZONTAL



VERTICAL

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FIGURE 2.5-101
RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE

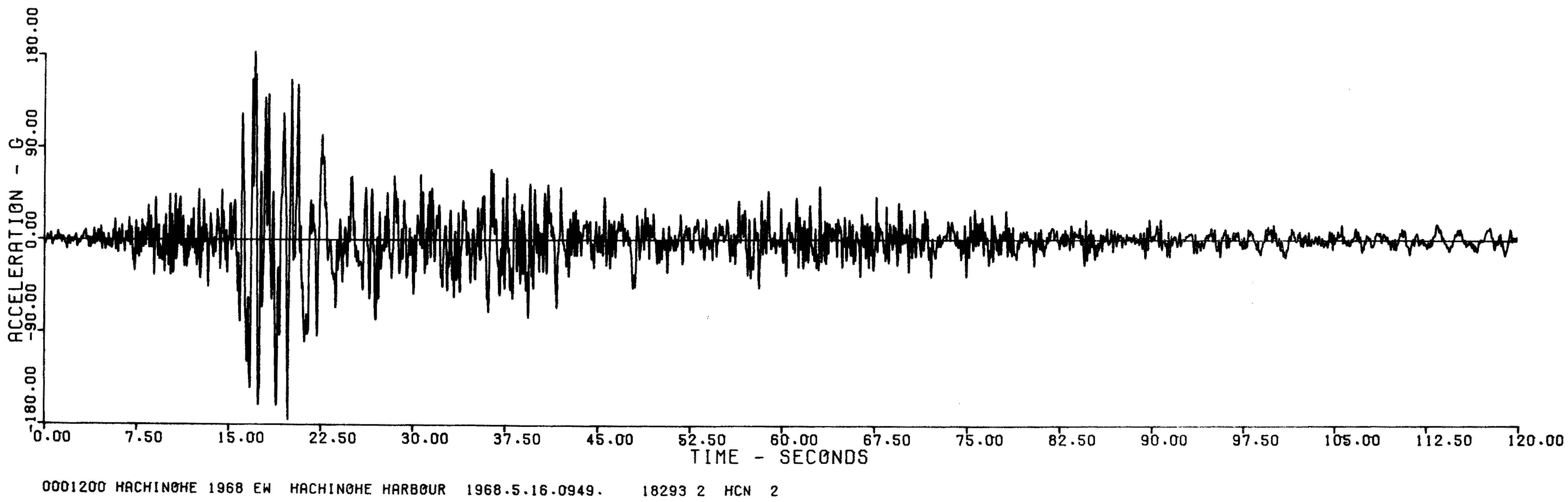

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FIGURE 2.5-102

TIME HISTORY OF ACCELERATION FOR TOKACHIOKI EARTHQUAKE, 1968, RECORDED AT HACHINOHE HARBOUR

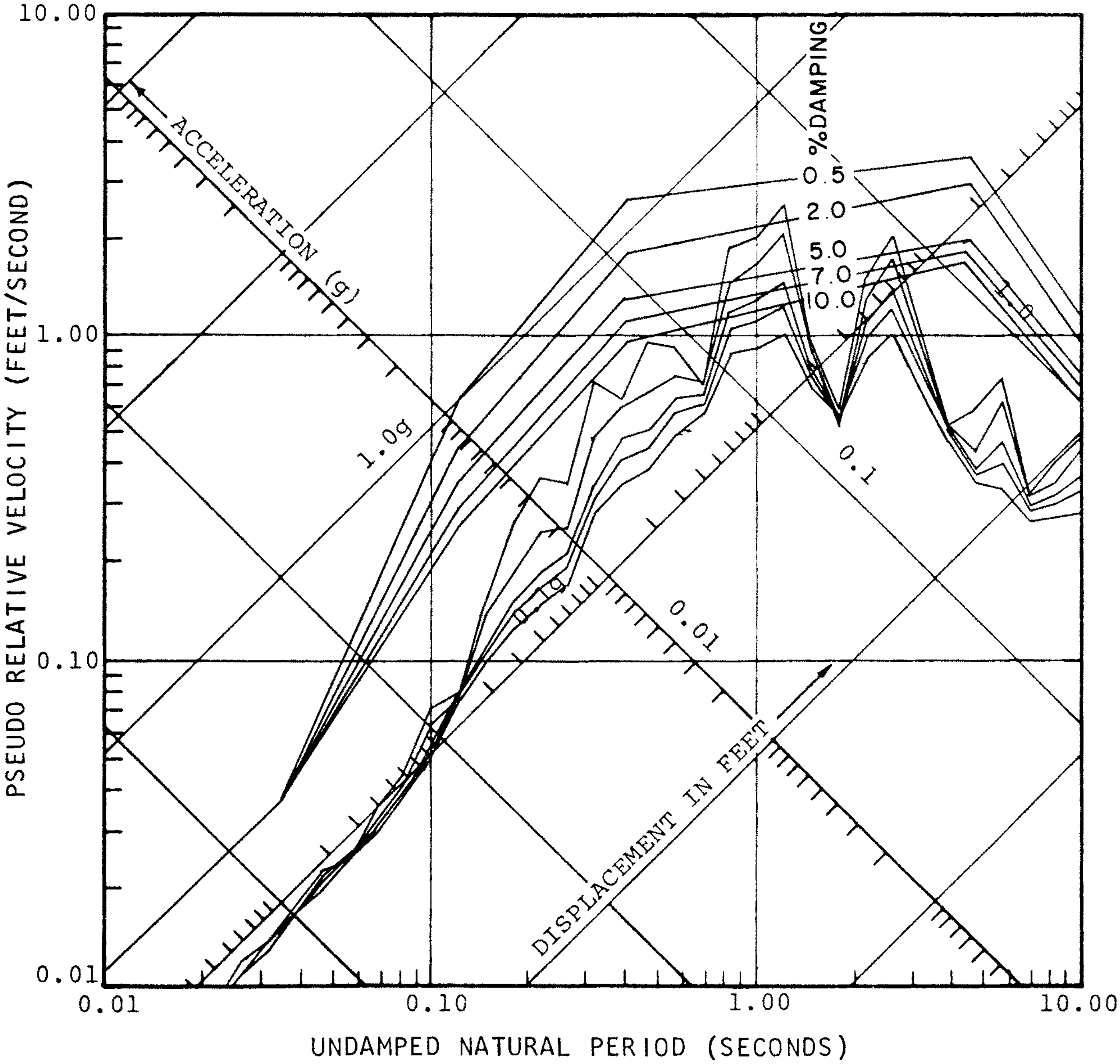

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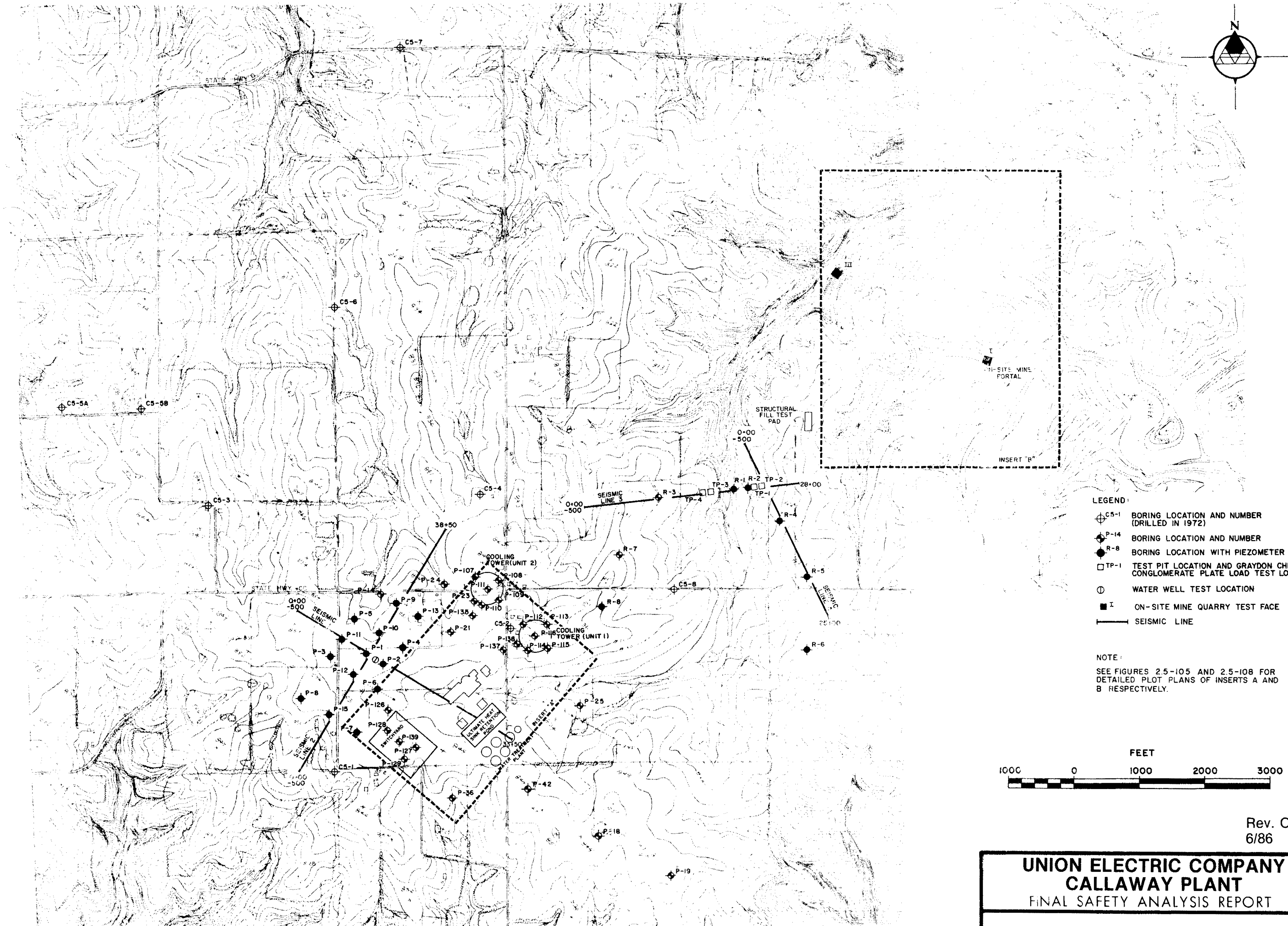
FIGURE 2.5-103

COMPARISON OF HACHINOHE RESPONSE SPECTRA WITH NRC RESPONSE SPECTRA FOR 0.20g



LEGEND:

- C5-1 BORING LOCATION AND NUMBER (DRILLED IN 1972)
- P-14 BORING LOCATION AND NUMBER
- R-8 BORING LOCATION WITH PIEZOMETER
- TP-1 TEST PIT LOCATION AND GRAYDON CHERT CONGLOMERATE PLATE LOAD TEST LOCATION
- WATER WELL TEST LOCATION
- I ON-SITE MINE QUARRY TEST FACE
- SEISMIC LINE

NOTE:
SEE FIGURES 2.5-105 AND 2.5-108 FOR DETAILED PLOT PLANS OF INSERTS A AND B RESPECTIVELY.

FEET
1000 0 1000 2000 3000

REFERENCE:
TOPOGRAPHIC MAPPING PREPARED BY CHICAGO AERIAL SURVEY 4-14-72

STRUCTURE LOCATIONS FROM SVERDRUP & PARCEL AND ASSOCIATES, INC FIGURE SK-101874 101

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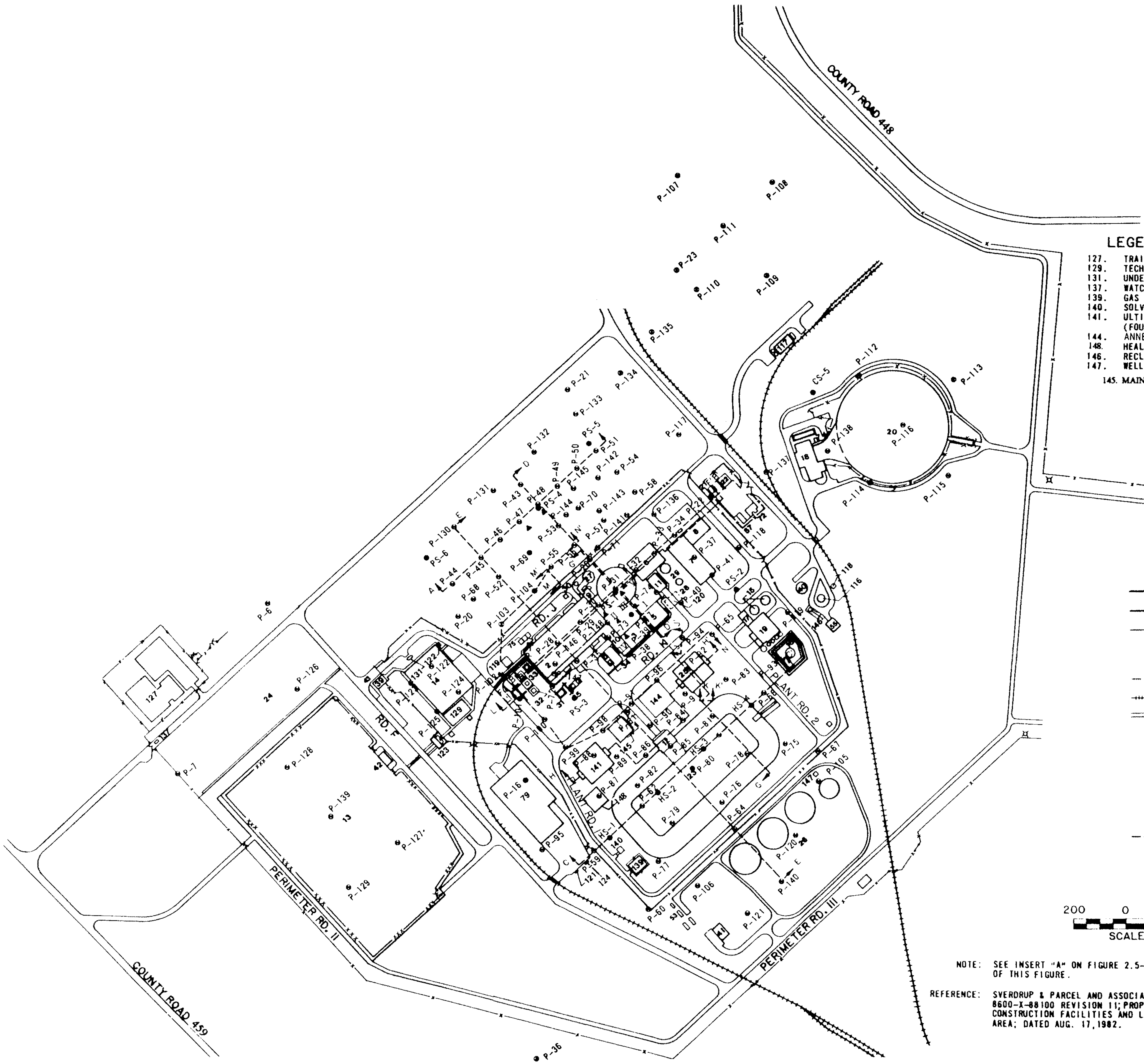
FIGURE 2.5-104

AREAL PLOT PLAN



LEGEND CONTINUED

127. TRAINING CENTER
129. TECHNICAL SUPPORT CENTER
131. UNDERGROUND DIESEL FUEL STORAGE TANK
137. WATCHMAN GATEHOUSE
139. GAS CYLINDER STORAGE
140. SOLVENT STORAGE TANK
141. ULTIMATE HEAT SINK COOLING TOWER NO. 2 (FOUNDATION TO FINISH GRADE ONLY)
144. ANNEX BLDG
148. HEALTH PHYSICS CALIBRATION FACILITY
146. RECLAIMED OIL STORAGE TANK
147. WELL NO. 3
145. MAINT. OUTAGE FACILITY

(1) PLANT RAILROAD TRACKS HAVE BEEN REMOVED

(2) This FSAR Figure is only updated to show changes that affect boring and piezometer locations. For the current site layout see FSAR Figure 1.2-44.

LEGEND

- SWITCHYARD FENCE
- PROTECTED AREA FENCE
- OWNER CONTROL FENCE
- GATE
- PLANT RAILROAD(1)
- PLANT ROAD
- P BORING LOCATION AND NUMBER
- P-16 BORING LOCATION WITH PIEZOMETER
- PS-1 HS-1 PIEZOMETER LOCATION AND NUMBER
- Y PLATE LOAD TEST LOCATION AND NUMBER
- PROFILE LINE

LEGEND

1. REACTOR BLDG.
2. TURBINE BLDG.
3. CONTROL BLDG.
4. AUXILIARY BLDG.
5. DIESEL GENERATOR BLDG.
6. FUEL BLDG.
7. RADWASTE BLDG.
8. DRUM STORAGE (SOLID WASTE)
9. AUXILIARY BOILER ROOM
10. CONTROL BLDG. COMMUNICATIONS CORR.
11. HOT MACHINE SHOP
12. ESSENTIAL SERVICE WATER PUMPHOUSE
13. SWITCHYARD
14. SERVICE BLDG.
15. FIRE WATER STORAGE TANKS
16. FUEL OIL STORAGE TANK
17. FIRE PUMPHOUSE
18. COOLING WATER SYSTEM PUMPHOUSE (CIRC & SERVICE)
19. DEMINERALIZED & POTABLE WATER PLANT
20. COOLING TOWER
21. CO2 STORAGE
22. HYDROGEN STORAGE
23. ULTIMATE HEAT SINK RETENTION POND
24. PARKING-OPERATIONAL
25. ULTIMATE HEAT SINK COOLING TOWER NO. 1
26. WATER TREATMENT PLANT
27. CONDENSATE WATER STORAGE TANK
28. REACTOR MAKEUP WATER STORAGE TANK
29. REFUELING WATER STORAGE TANK
30. DEMINERALIZED WATER STORAGE TANK
31. START-UP TRANSFORMER
32. MAIN TRANSFORMERS
33. UNIT AUXILIARY TRANSFORMER
34. ESF TRANSFORMER
35. STATION SERVICE TRANSFORMER
39. SECURITY BLDG.
40. NEUTRALIZATION TANK
41. WATER TREATMENT PLANT CONTROL BLDG.
42. SWITCHYARD CONTROL BLDG.
43. MAIN PERMANENT ENTRANCE
53. SEWAGE TREATMENT PLANT
55. OILY WASTE TREATMENT AREA
57. OXYGEN STORAGE
72. NITROGEN STORAGE
75. BULK CHEMICAL STORAGE
79. STORES BLDG.
116. EQUALIZATION BASIN
117. COOLING WATER CHEMICAL CONTROL AREA
118. AUXILIARY OIL TRANSFER
119. SPARE MAIN TRANSFORMER STORAGE AREA
120. UNDERGROUND DIESEL FUEL STORAGE TANKS
121. ABOVEGROUND GASOLINE STORAGE TANK
122. SECURITY DIESEL GENERATOR BLDG.
123. SECONDARY ACCESS FACILITY
124. DIESEL FUEL STORAGE TANK

200 0 200 400
SCALE IN FEET

NOTE: SEE INSERT "A" ON FIGURE 2.5-104 FOR LOCATION OF THIS FIGURE.

REFERENCE: SVERDRUP & PARCEL AND ASSOCIATES, Inc.; DRAWING NO. 8600-X-88100 REVISION 11; PROPERTY-SITE LAYOUT CONSTRUCTION FACILITIES AND LAYDOWN AREAS PLANT AREA; DATED AUG. 17, 1982.

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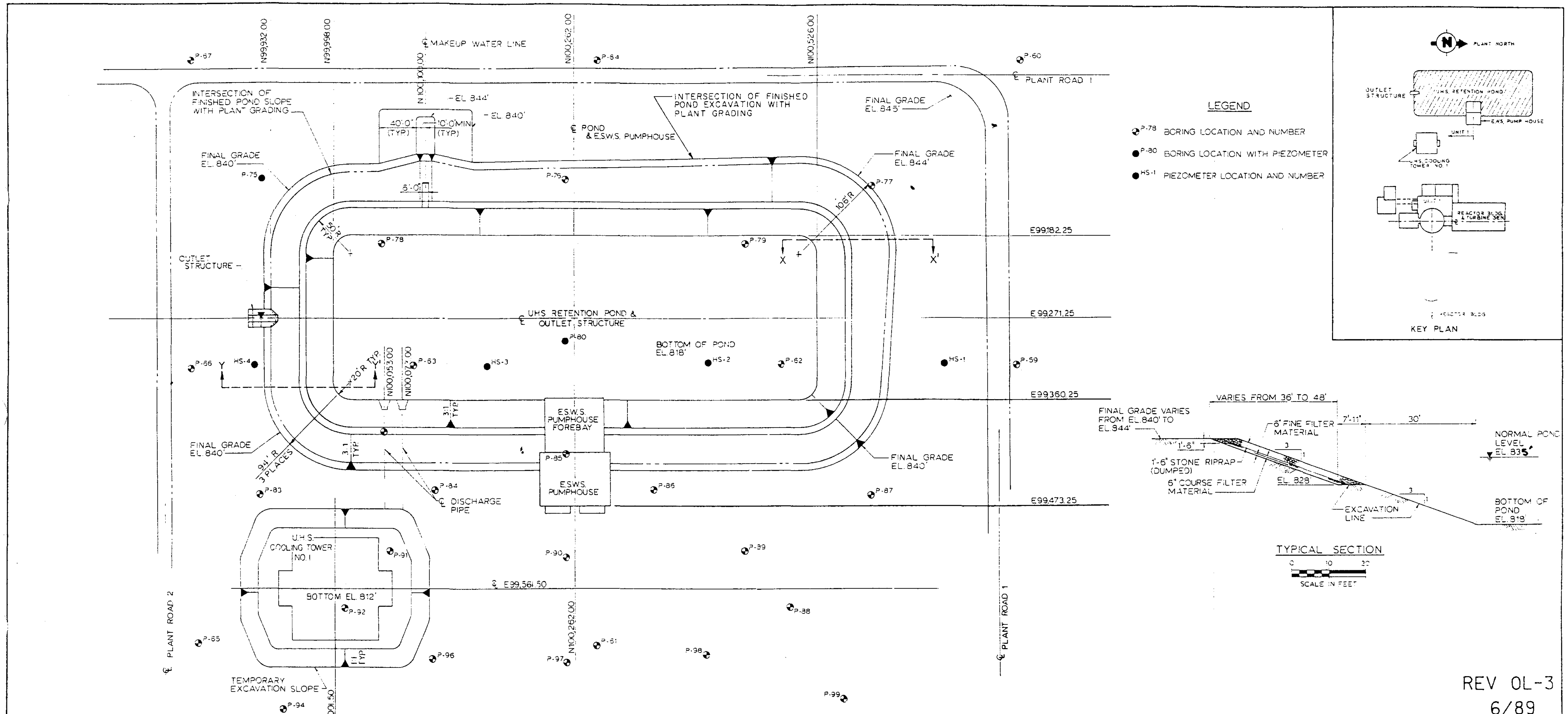
FIGURE 2.5-105
SITE PLOT PLAN

REV. 14 10/08



REV OL-3
6/89

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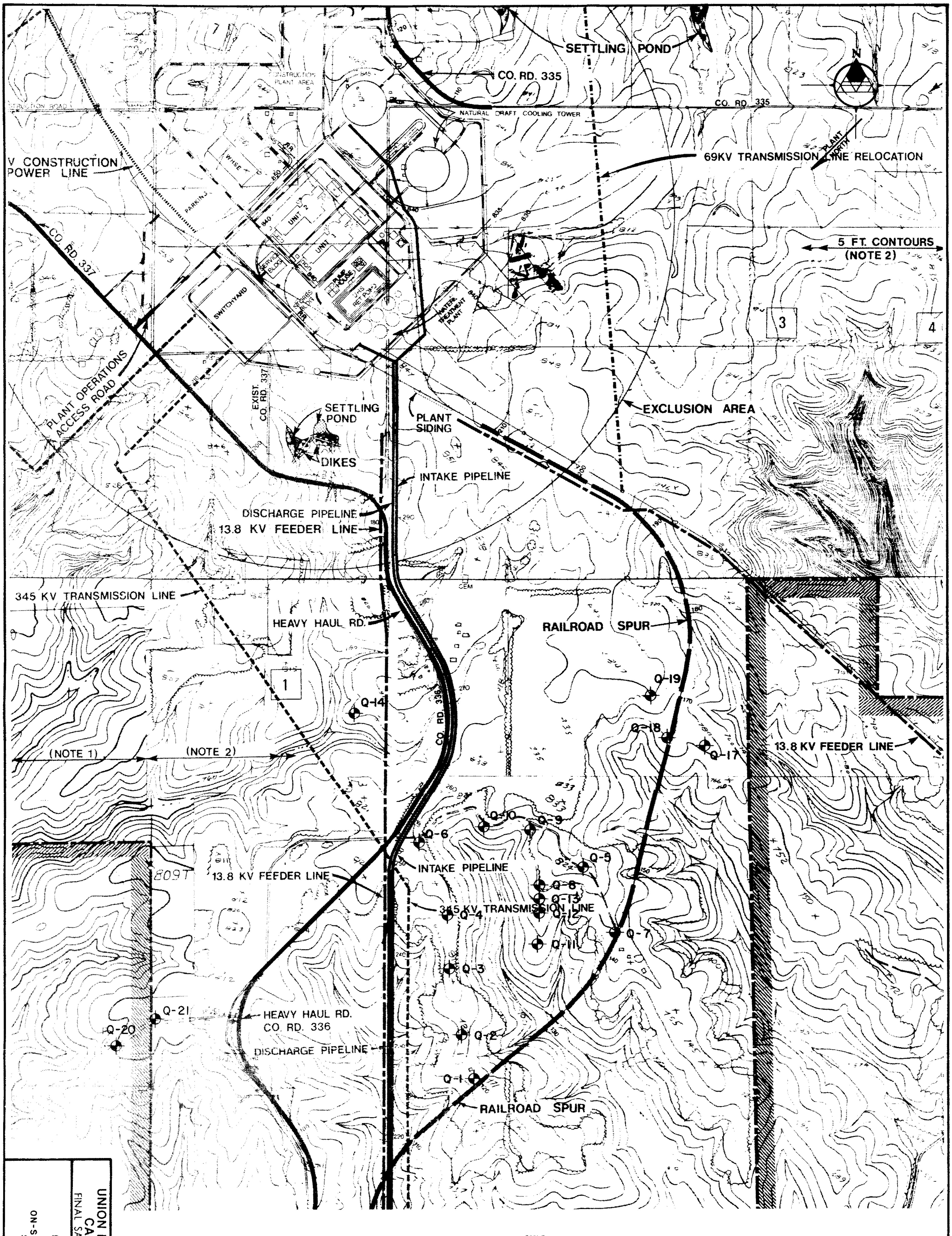
FIGURE 2.5-106
ULTIMATE HEAT SINK
RETENTION POND
PLAN AND SECTION



LEGEND:

Q-1 INDICATES BORING NUMBER AND LOCATION

NOTE: Unit 2 was cancelled in 1981.

U.E. PROPERTY LINE

REFERENCE: SVERDRUP AND PARCEL AND ASSOCIATES, INC., DRAWINGS SK 102974C01 AND SK 102974C01 FOR UNION ELECTRIC COMPANY

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FIGURE 2.5-107
PLOT PLAN
ON-SITE QUARRY BORINGS
SOUTH OF PLANT

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6/86

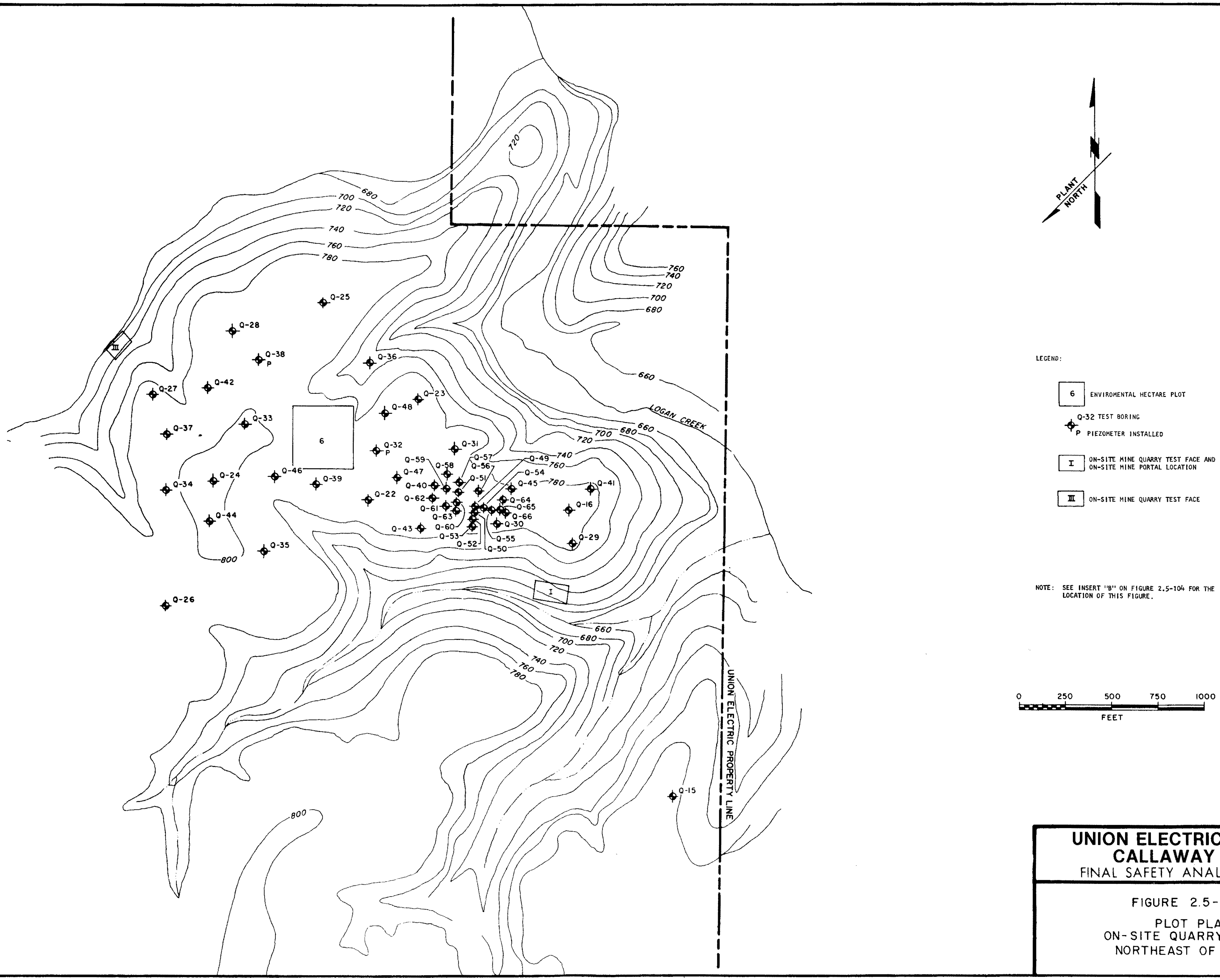

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FIGURE 2.5-108

PLOT PLAN
ON-SITE QUARRY BORINGS
NORTHEAST OF PLANT

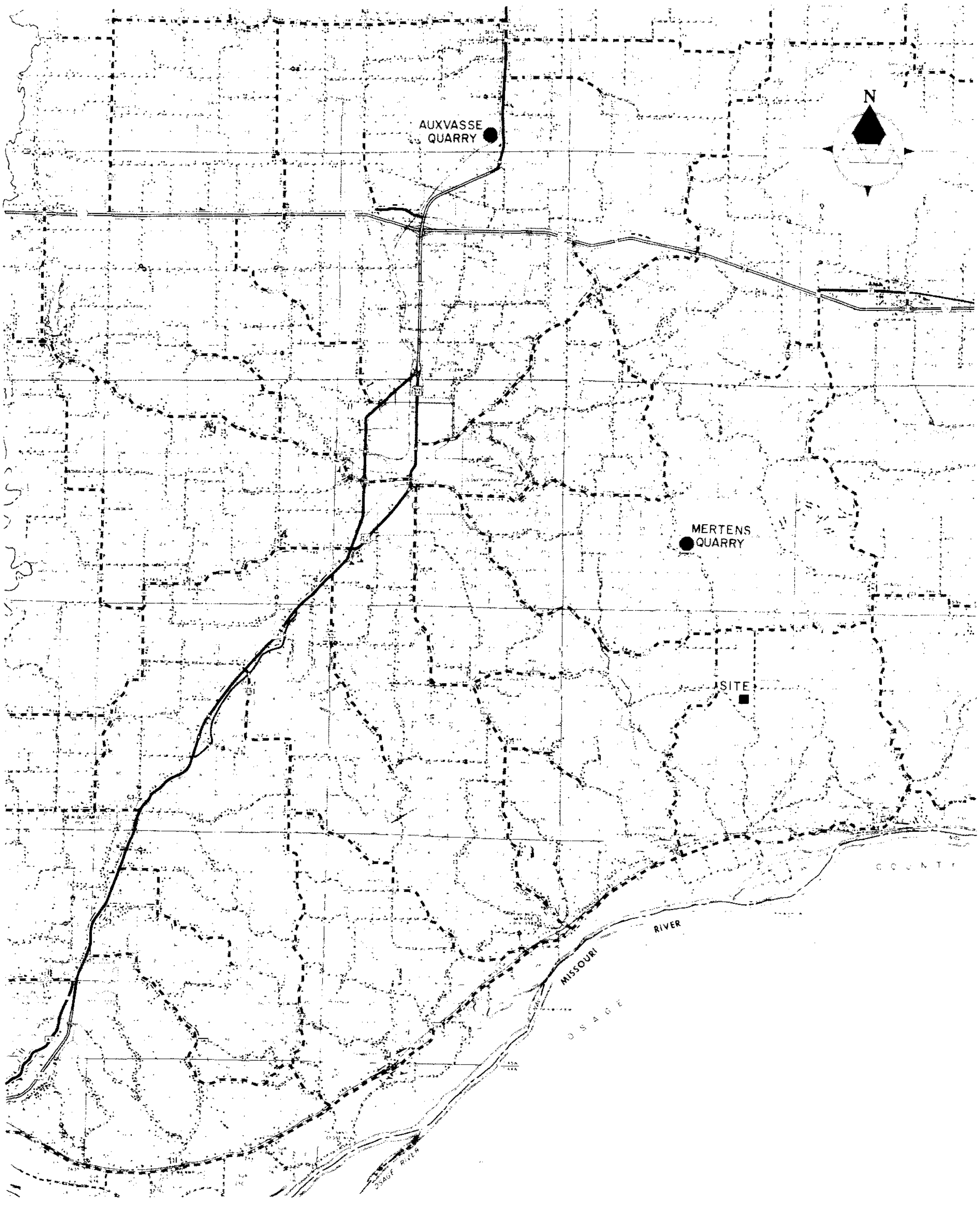

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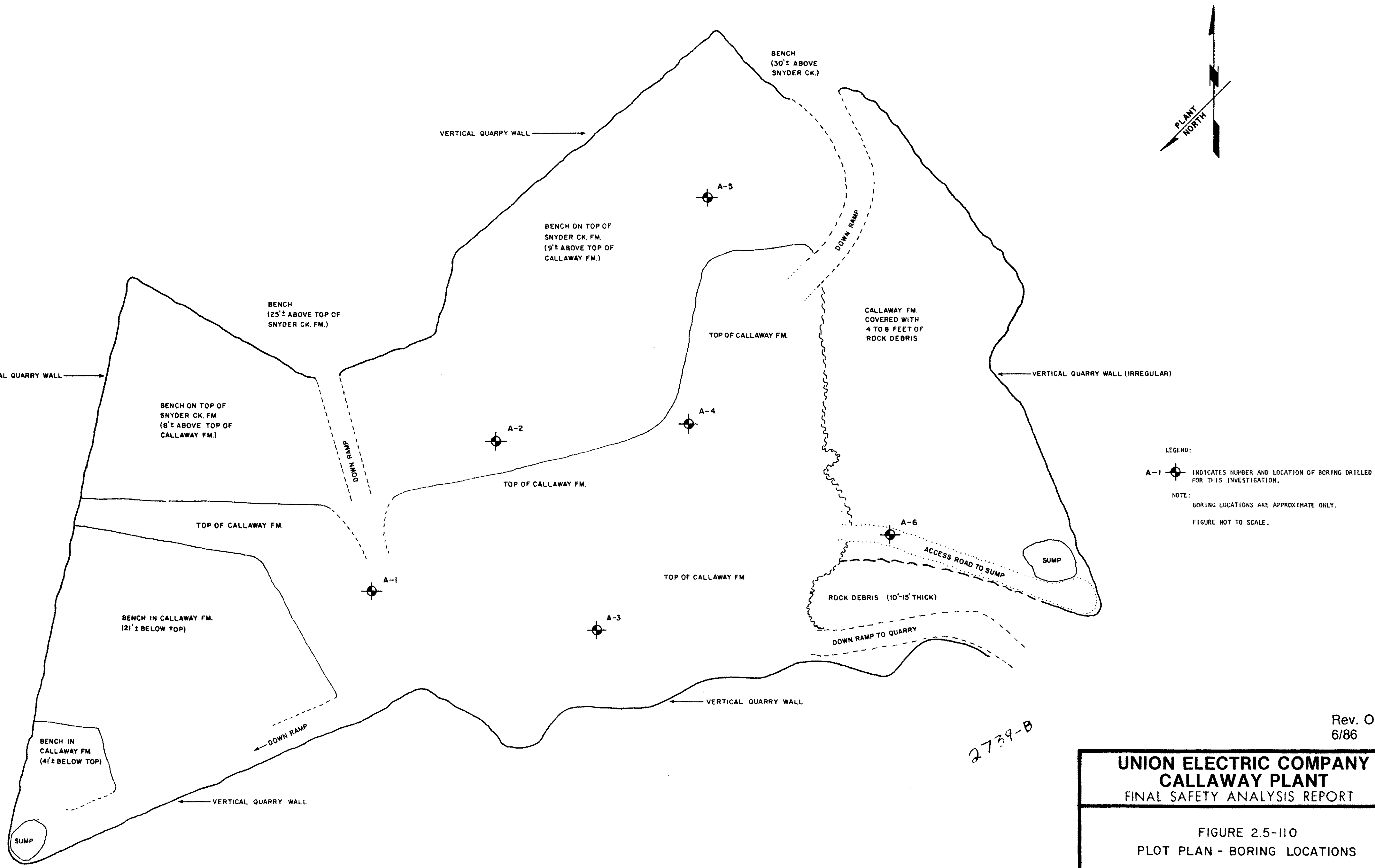
FIGURE 2.5-109

OFF-SITE QUARRIES
LOCATION PLAN

REFERENCE:
MISSOURI STATE HIGHWAY DEPARTMENT; GENERAL HIGHWAY MAP CALLAWAY COUNTY, MISSOURI; OCTOBER 1, 1977.



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2739-B

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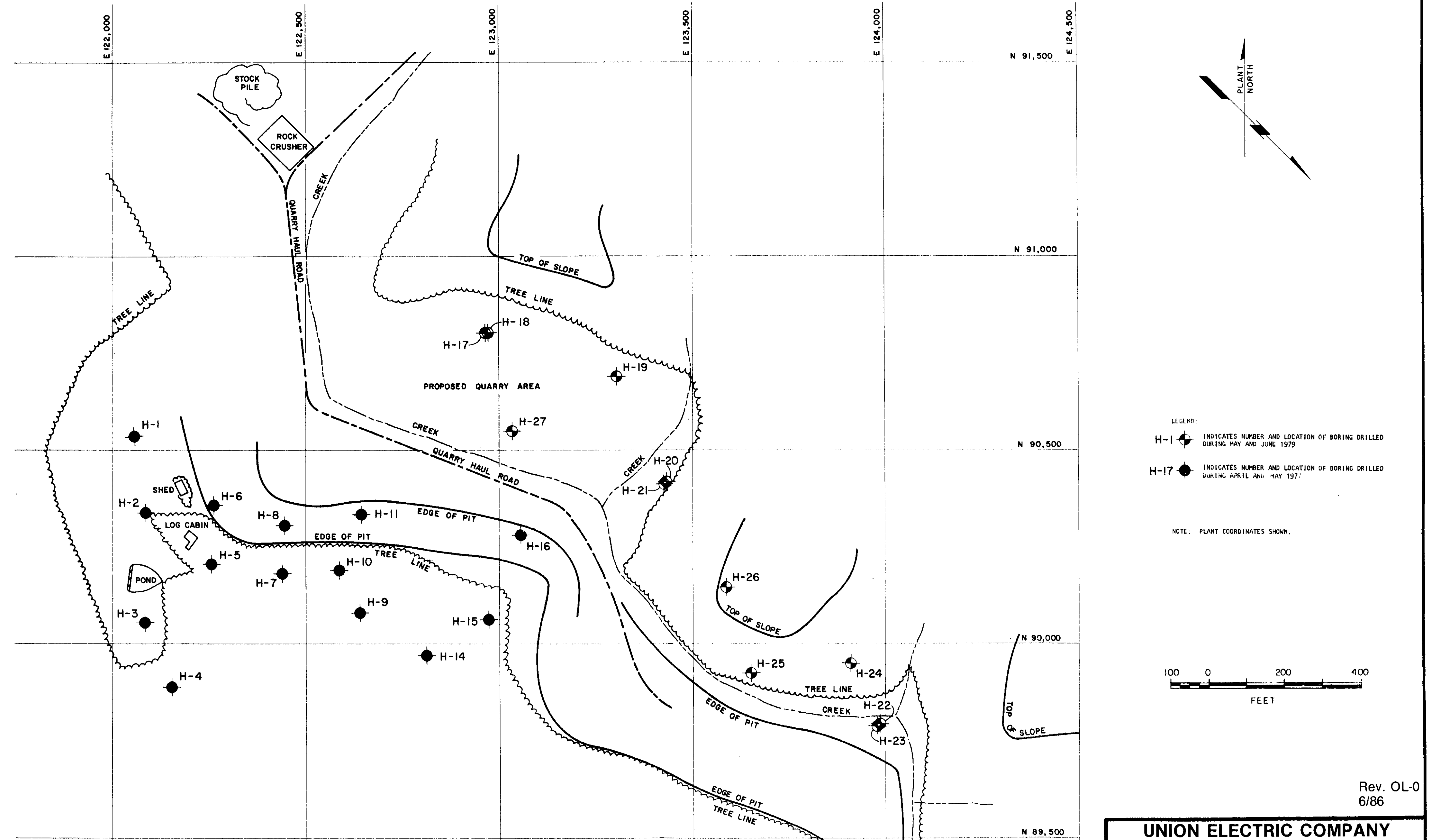
FIGURE 2.5-110
PLOT PLAN - BORING LOCATIONS
AUXVASSE QUARRY



DRAWING REFERENCE:

TITLE: MERTENS QUARRY AND BORING LOCATIONS

FOR: UNION ELECTRIC COMPANY CALLAWAY PLANT

BY: DANIEL INTERNATIONAL

DRAWING NO.: FS-X-0072

DATE: 6-22-79

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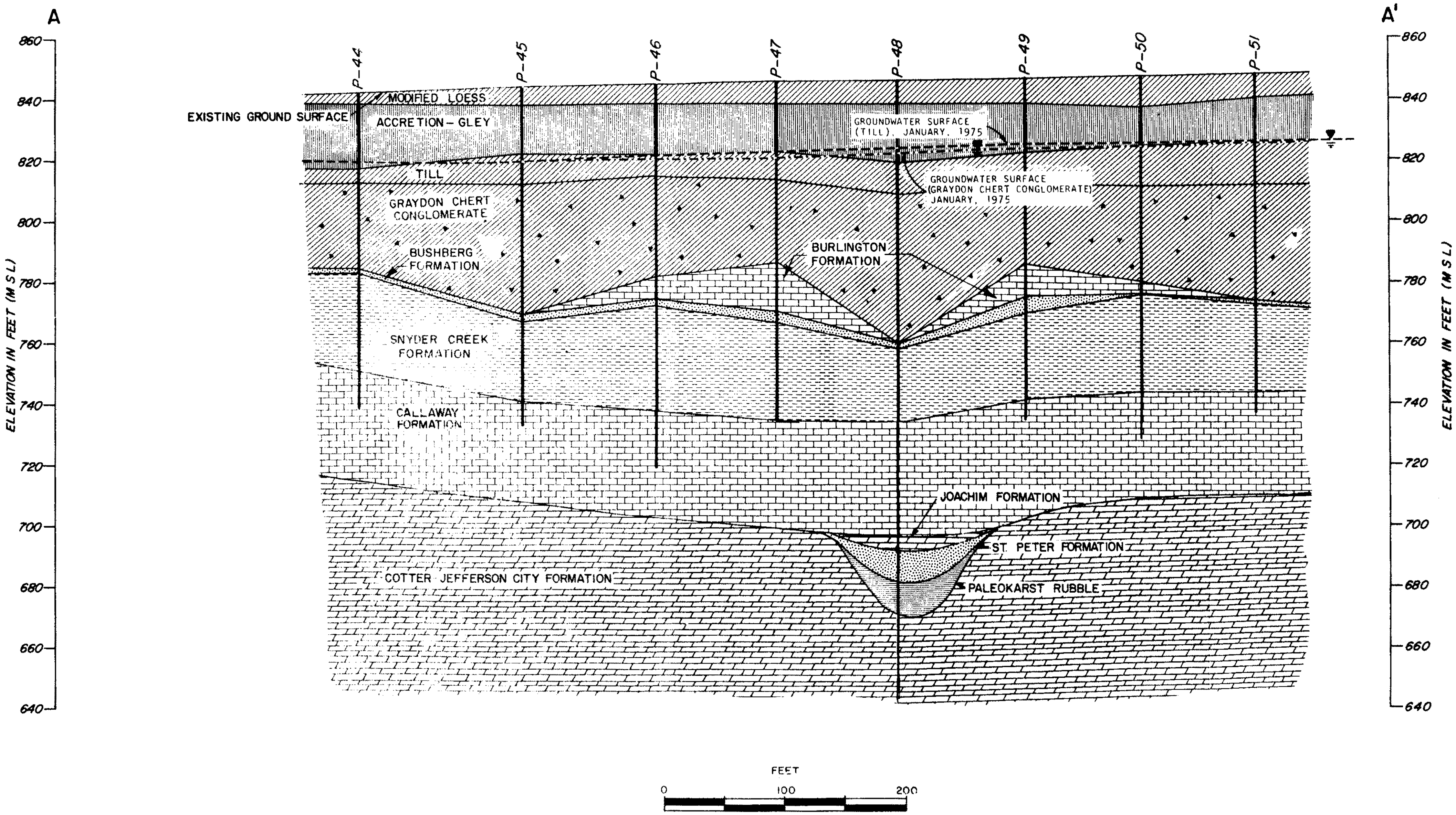
FIGURE 2.5-111
PLOT PLAN-BORING LOCATIONS
MERTENS QUARRY



SECTION A-A'

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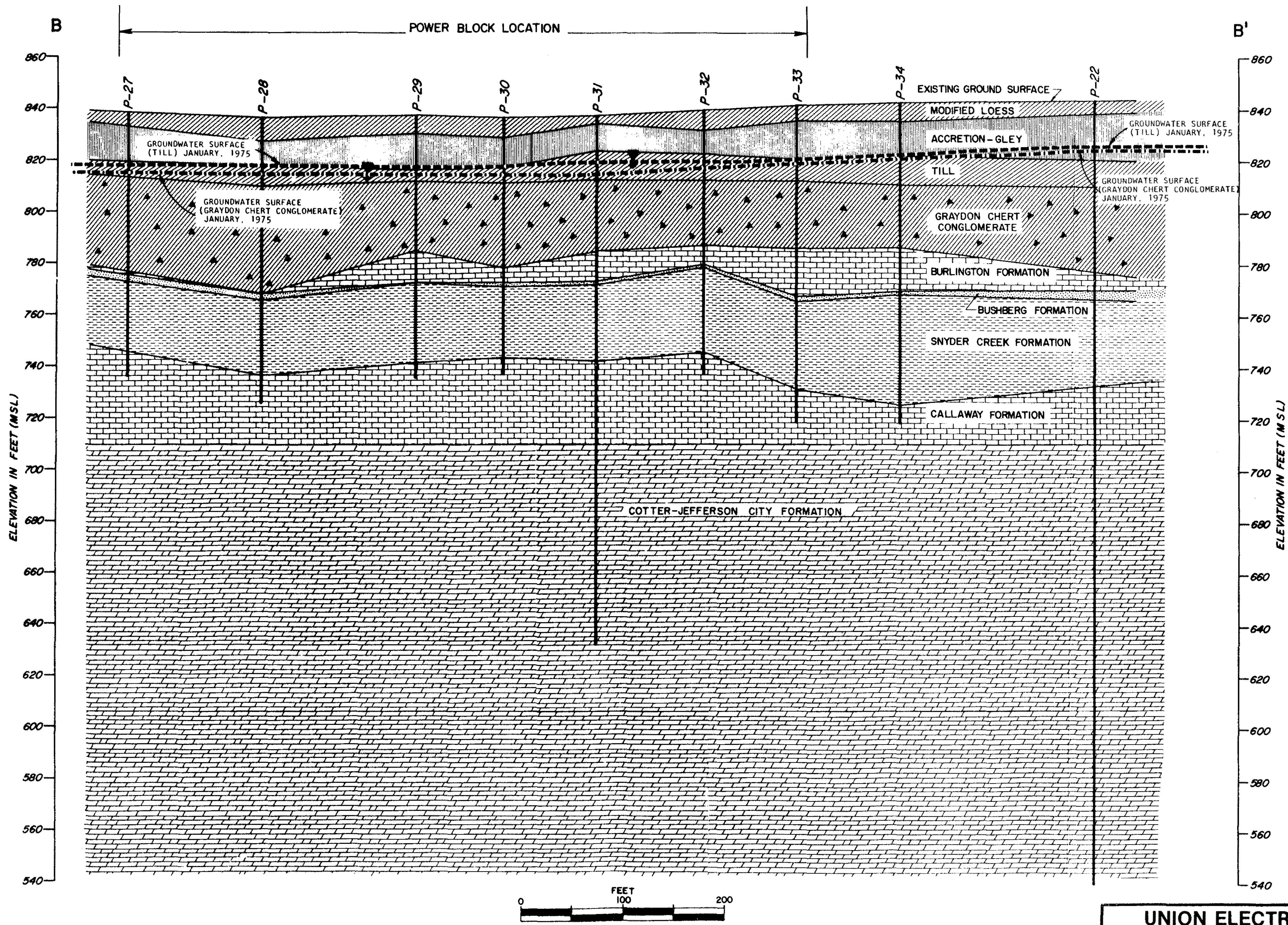
FIGURE 2.5-112

SUBSURFACE SECTION A-A'

NOTES: ALL CONTACTS EXCEPT BURLINGTON-BUSHBERG AND JOACHIM-ST. PETER ARE UNCONFORMABLE.

THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE SUBSURFACE PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXIST ONLY AT BORING LOCATIONS.



SECTION B-B'

NOTES: ALL CONTACTS EXCEPT BURLINGTON-BUSHBERG ARE UNCONFORMABLE

THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE SUBSURFACE PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXIST ONLY AT BORING LOCATIONS.

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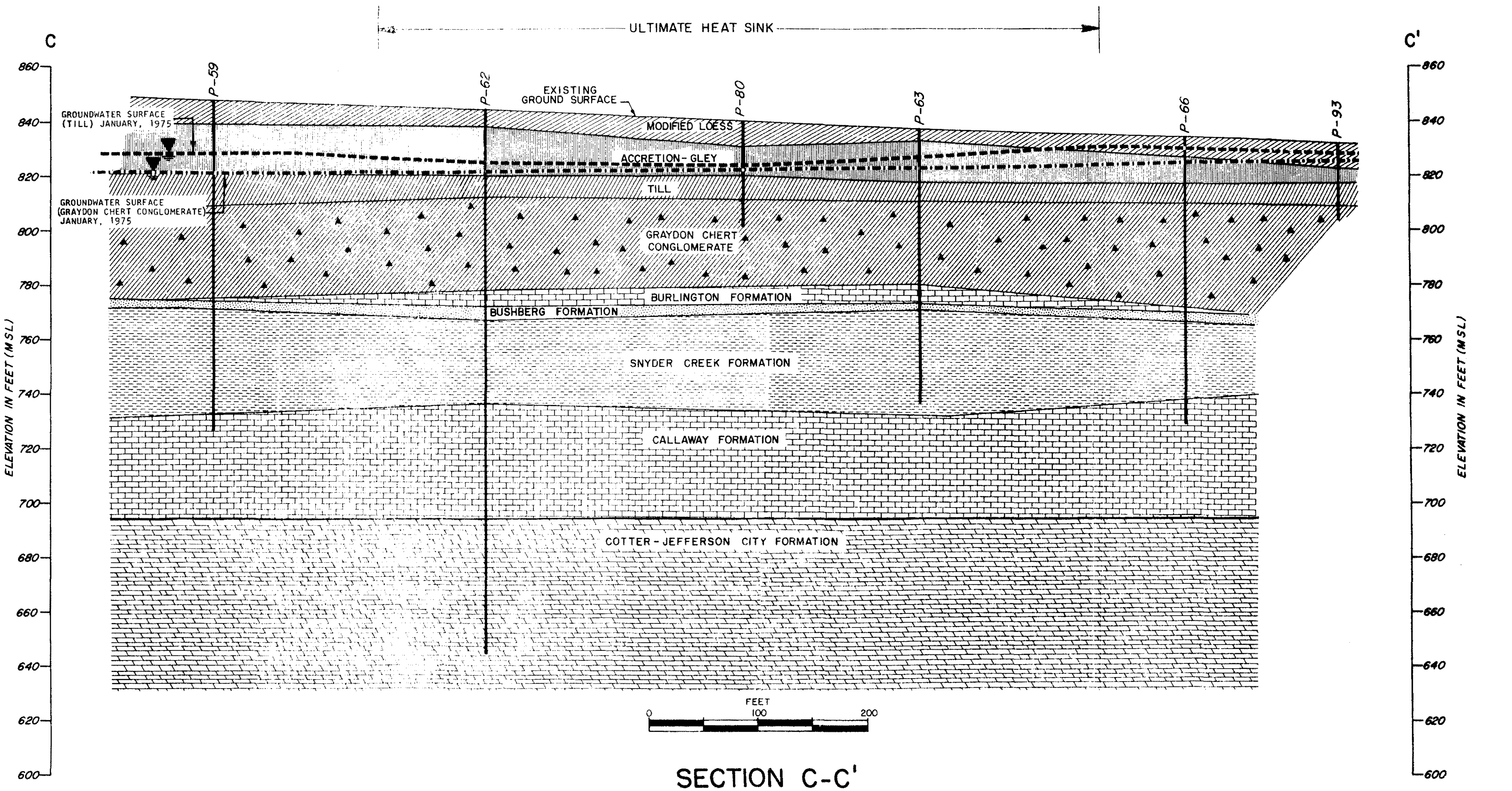
FIGURE 2.5-113

SUBSURFACE SECTION B-B'



SECTION C-C'

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NOTES: ALL CONTACTS EXCEPT BURLINGTON-BUSHBERG ARE UNCONFORMABLE.

THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE SUBSURFACE PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXIST ONLY AT BORING LOCATIONS.

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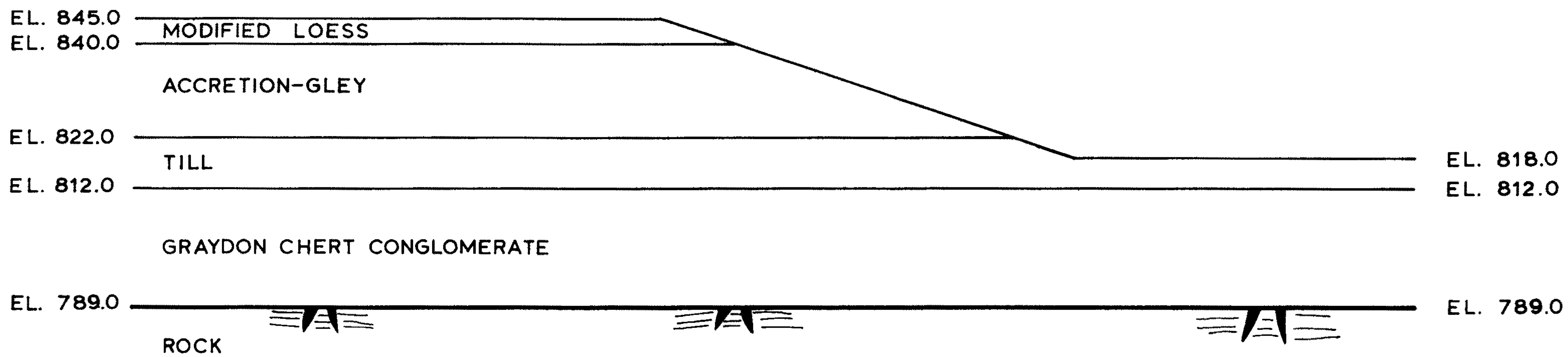
FIGURE 2.5-114

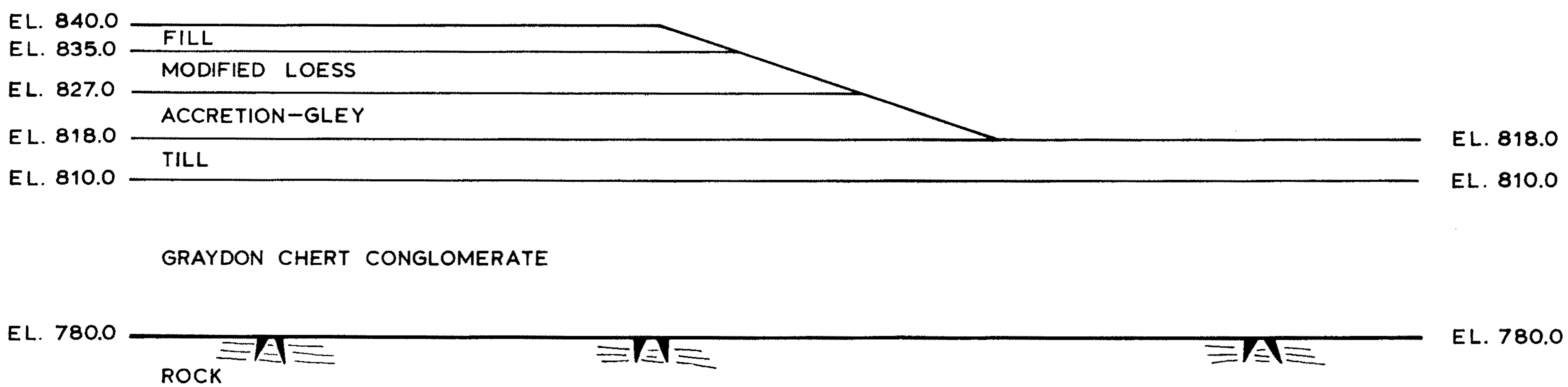
SUBSURFACE SECTION C-C'

NOTES

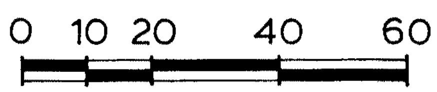
1. SLOPE PROTECTION AND BENCHES NOT SHOWN OR CONSIDERED IN ANALYSES.
2. FOR LOCATION OF SECTIONS, SEE FIGURE 2.5-106.



SECTION X-X'



SECTION Y-Y'



SCALE IN FEET

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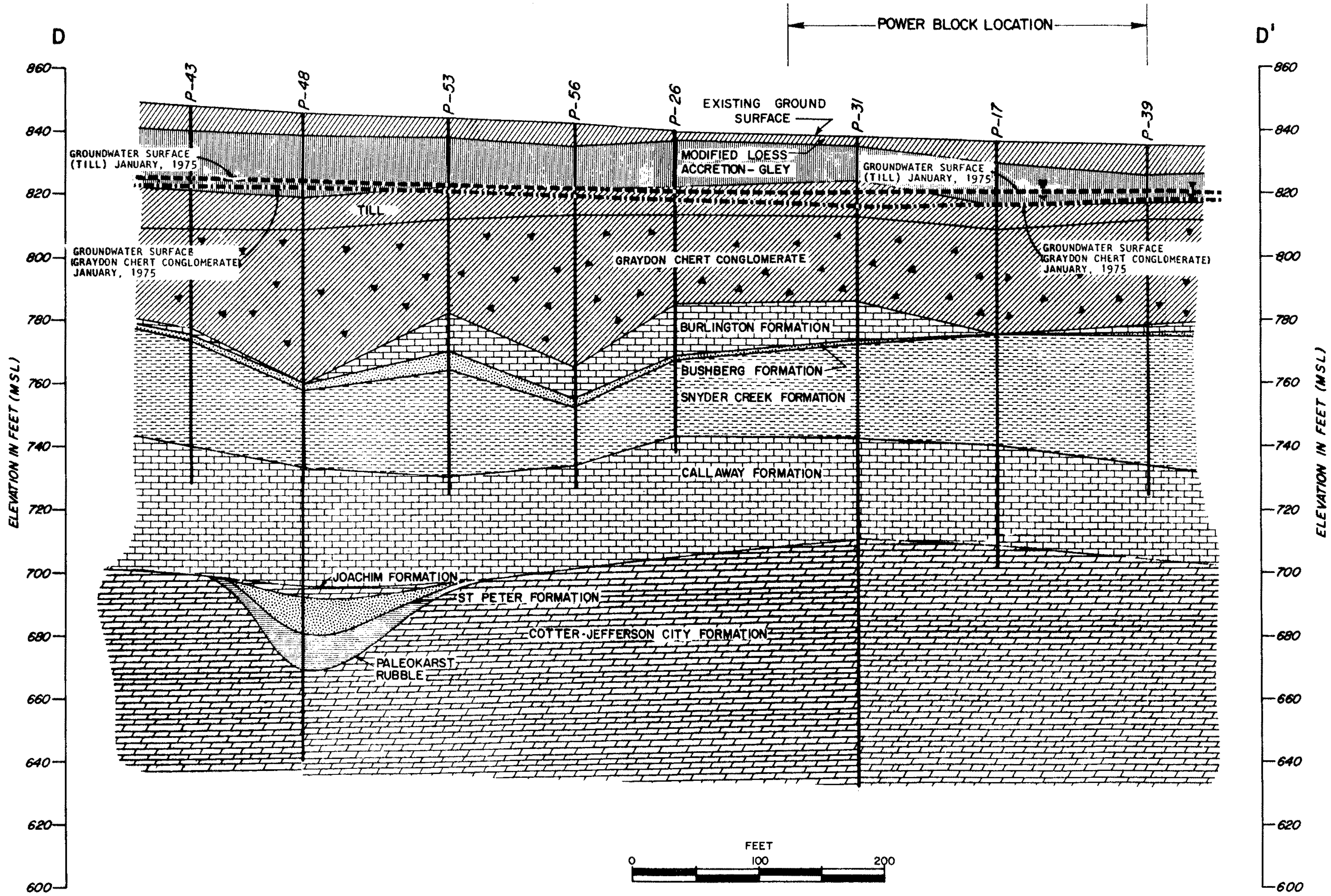
FIGURE 2.5-115

ULTIMATE HEAT SINK RETENTION POND SECTIONS FOR STABILITY ANALYSES



SECTION D-D'

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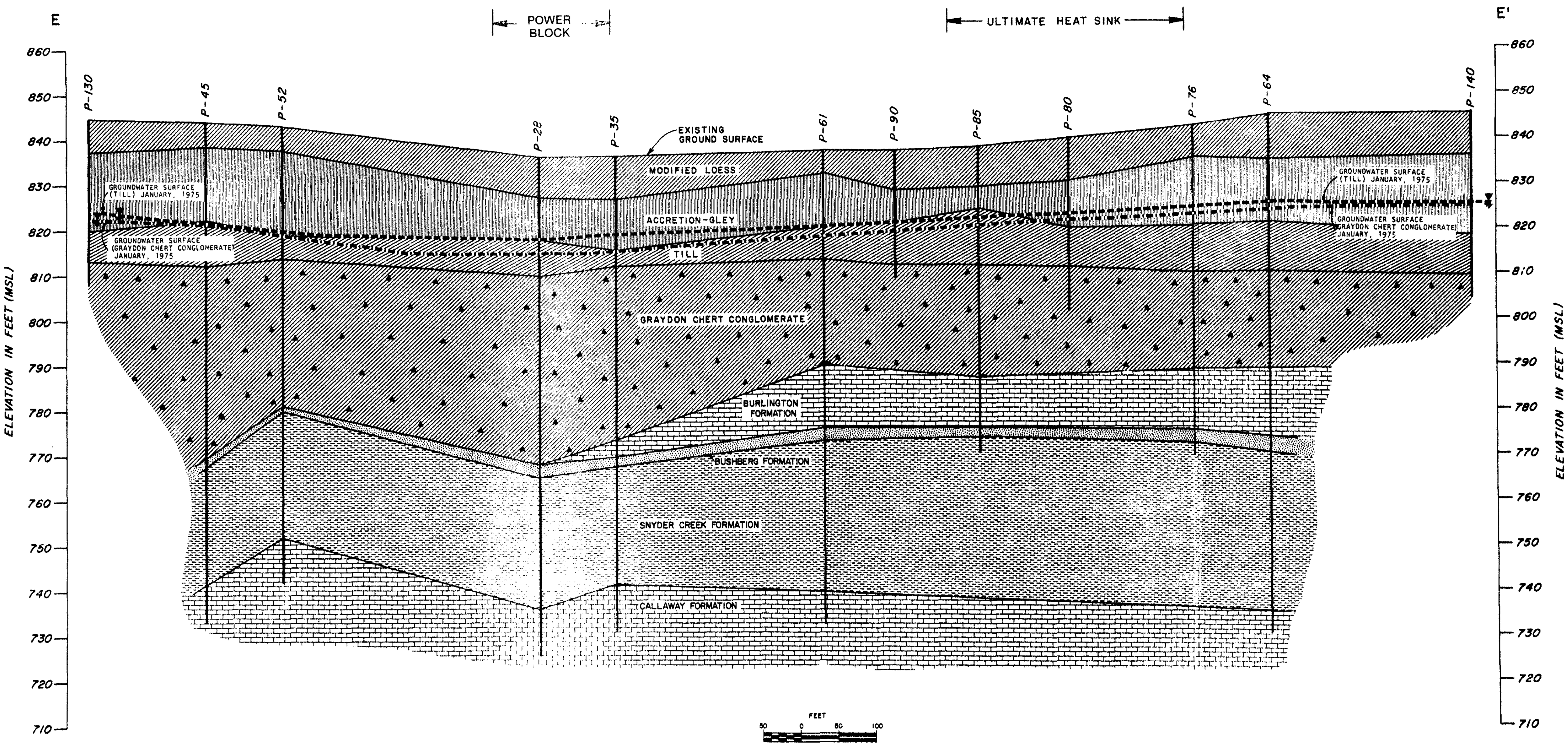
FIGURE 2.5-116

SUBSURFACE SECTION D-D'

NOTES: ALL CONTACTS EXCEPT BURLINGTON-BUSHBERG AND JOACHIM-ST.PETER ARE UNCONFORMABLE.

THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE SUBSURFACE PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXIST ONLY AT BORING LOCATIONS.



SECTION E-E'

NOTES: ALL CONTACTS EXCEPT BURLINGTON-BUSHBERG ARE UNCONFORMABLE.

THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE SUBSURFACE PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXIST ONLY AT BORING LOCATIONS.

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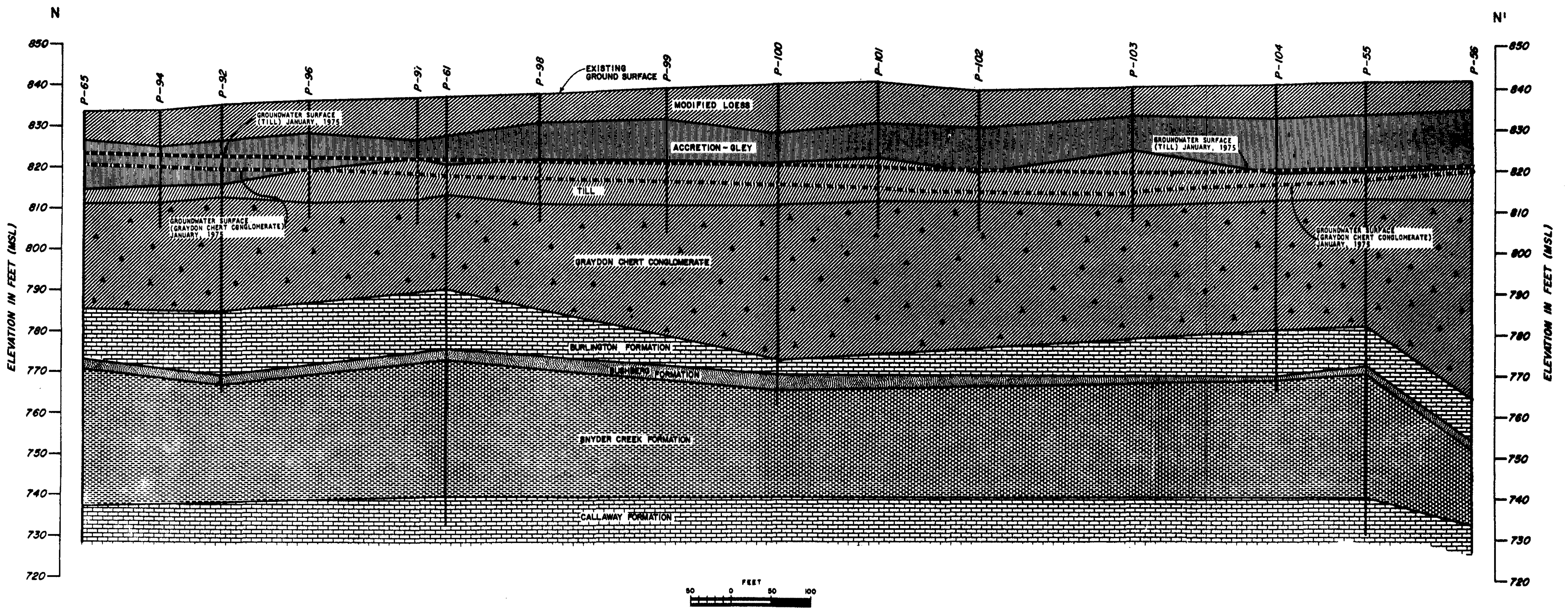
FIGURE 2.5-117

SUBSURFACE PROFILE E-E'



SECTION N-N'

NOTES: ALL CONTACTS EXCEPT BURLINGTON-BUSHBERG ARE UNCONFORMABLE.

THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE SUBSURFACE PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXIST ONLY AT BORING LOCATIONS.

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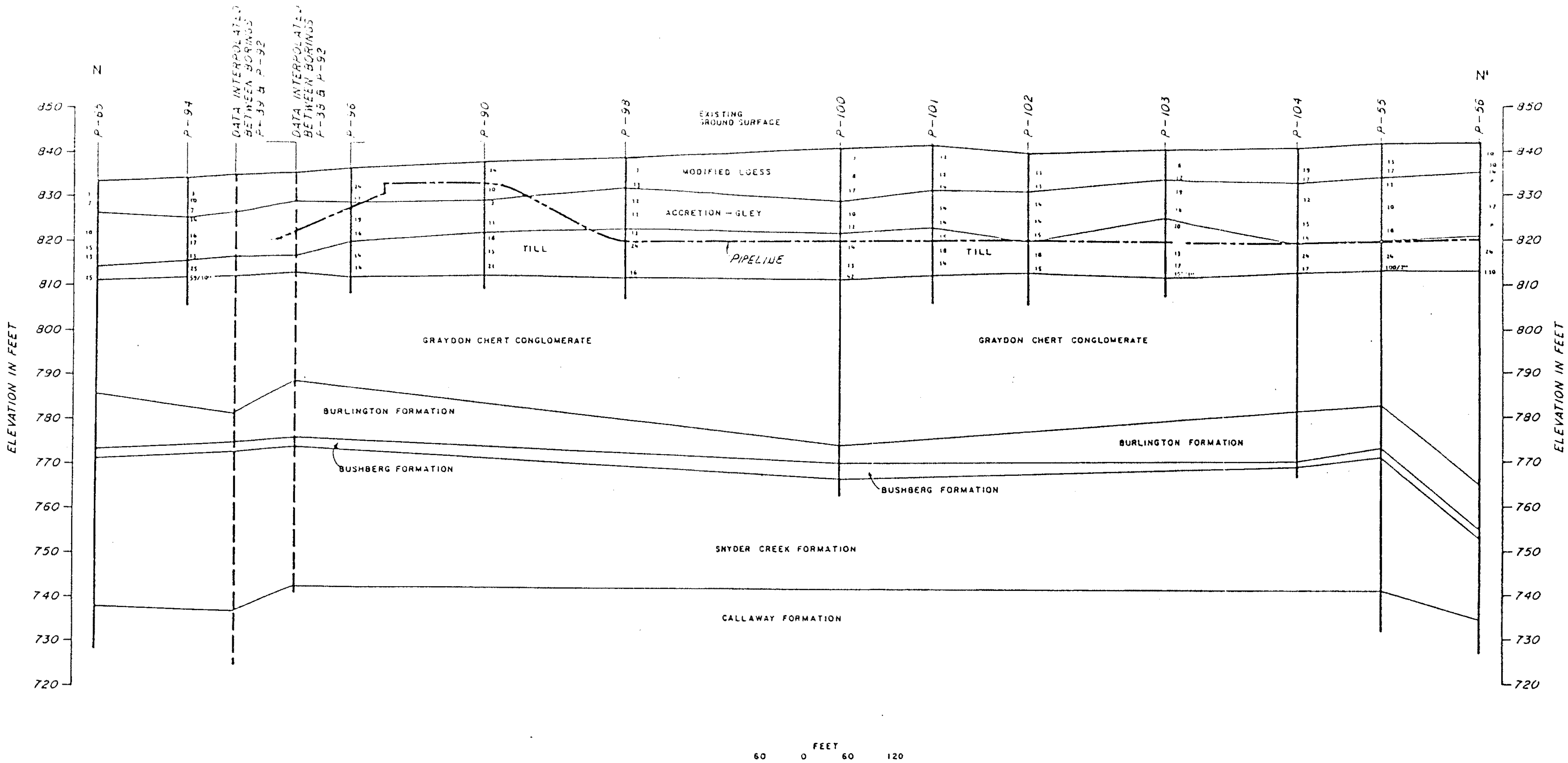
FIGURE 2.5-118

SUBSURFACE PROFILE N-N'



NOTES: ALL CONTACTS EXCEPT BURLINGTON-BUSHBERG ARE UNCONFORMABLE.

THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE SUBSURFACE PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXIST ONLY AT BORING LOCATIONS.

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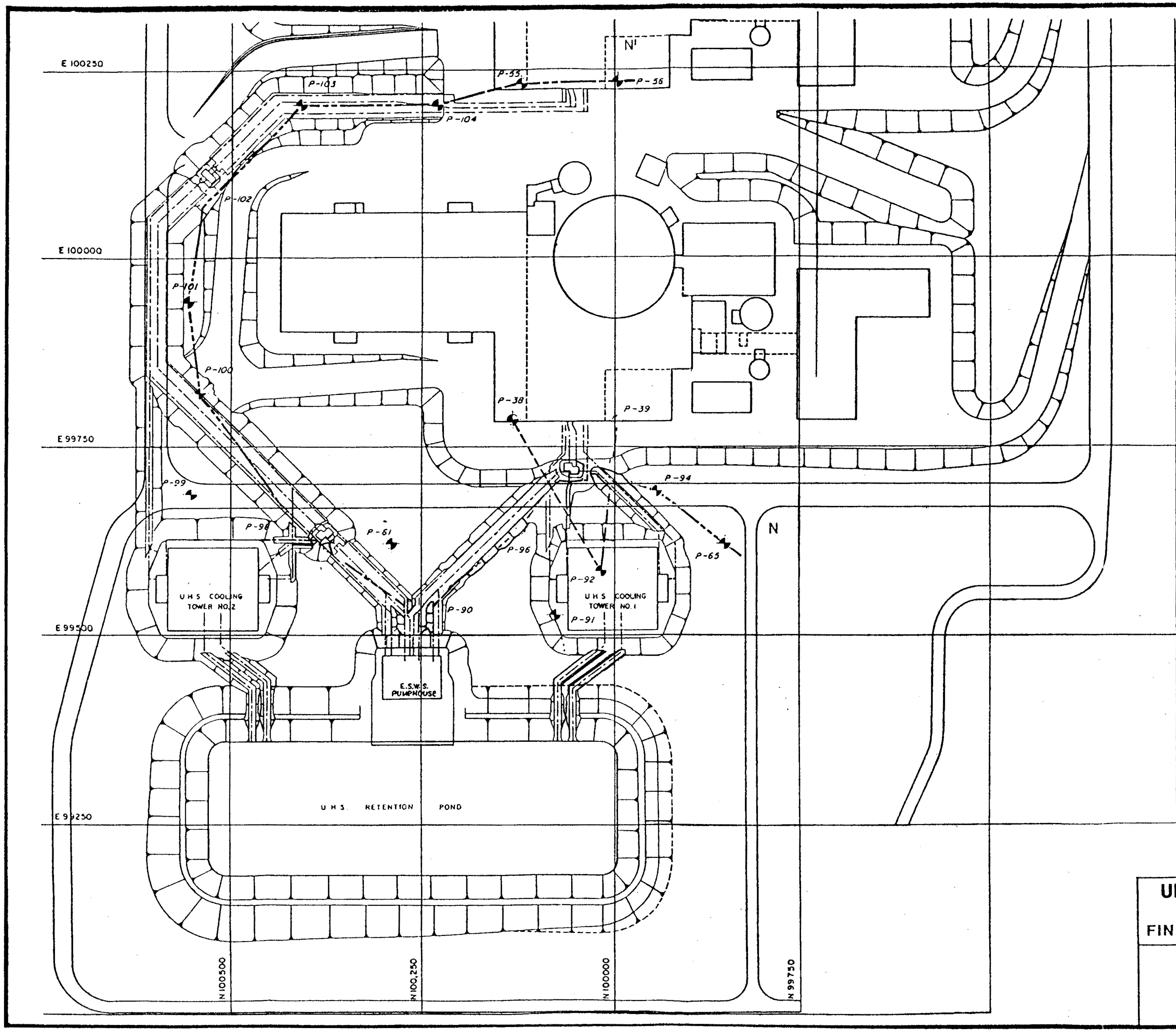
FIGURE **2.5-118a**
SUBSURFACE PROFILE N-N'
ESW SYSTEM



NOTES:

UNIT 2 WAS CANCELLED IN 1981.

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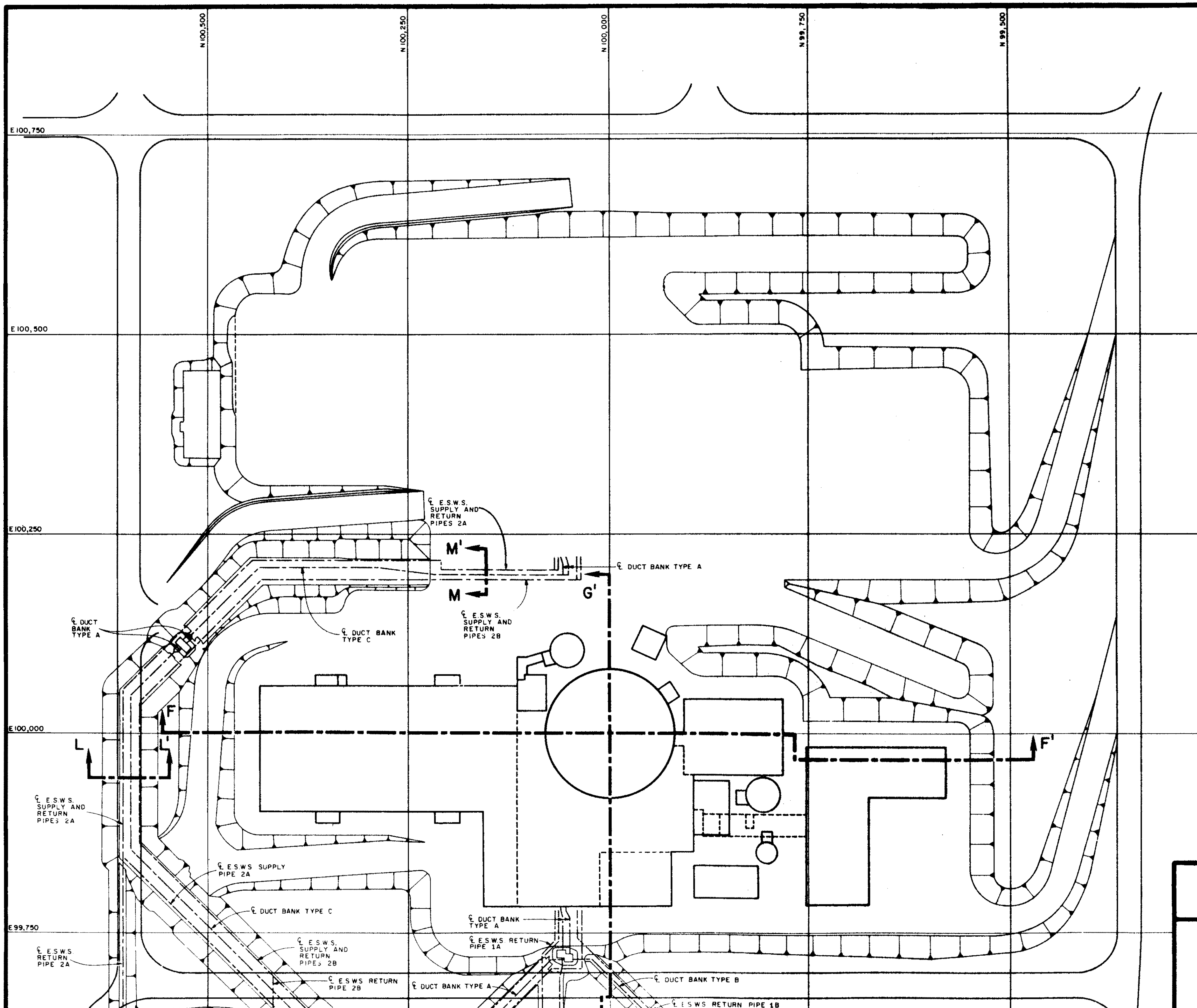
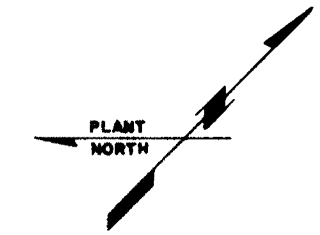
FIGURE **2.5-118b**
BORING LOCATION MAP
ESW SYSTEM





DRAWING REFERENCE:

1. TITLED: BUILDING-FILL AND BACKFILL PLAN
POWER BLOCK
BY: SVERDRUP AND PARCEL AND ASSOCIATES, INC.
ST. LOUIS, MISSOURI
FOR: UNION ELECTRIC COMPANY
ST. LOUIS, MISSOURI
DRAWING NO: 8600-X-88130 (Q), REV. 9
DATED: SEPT. 1, 1981

2. TITLED: INSTALLATION - DETAILS - WATER
YARD LOCATION
E.S.W. SYSTEM
BY: SVERDRUP AND PARCEL AND ASSOCIATES, INC.
ST. LOUIS, MISSOURI
FOR: UNION ELECTRIC COMPANY
ST. LOUIS, MISSOURI
DRAWING NO: 8600-X-88379 (Q), REV. 3
DATED: DEC. 11, 1979

LEGEND:

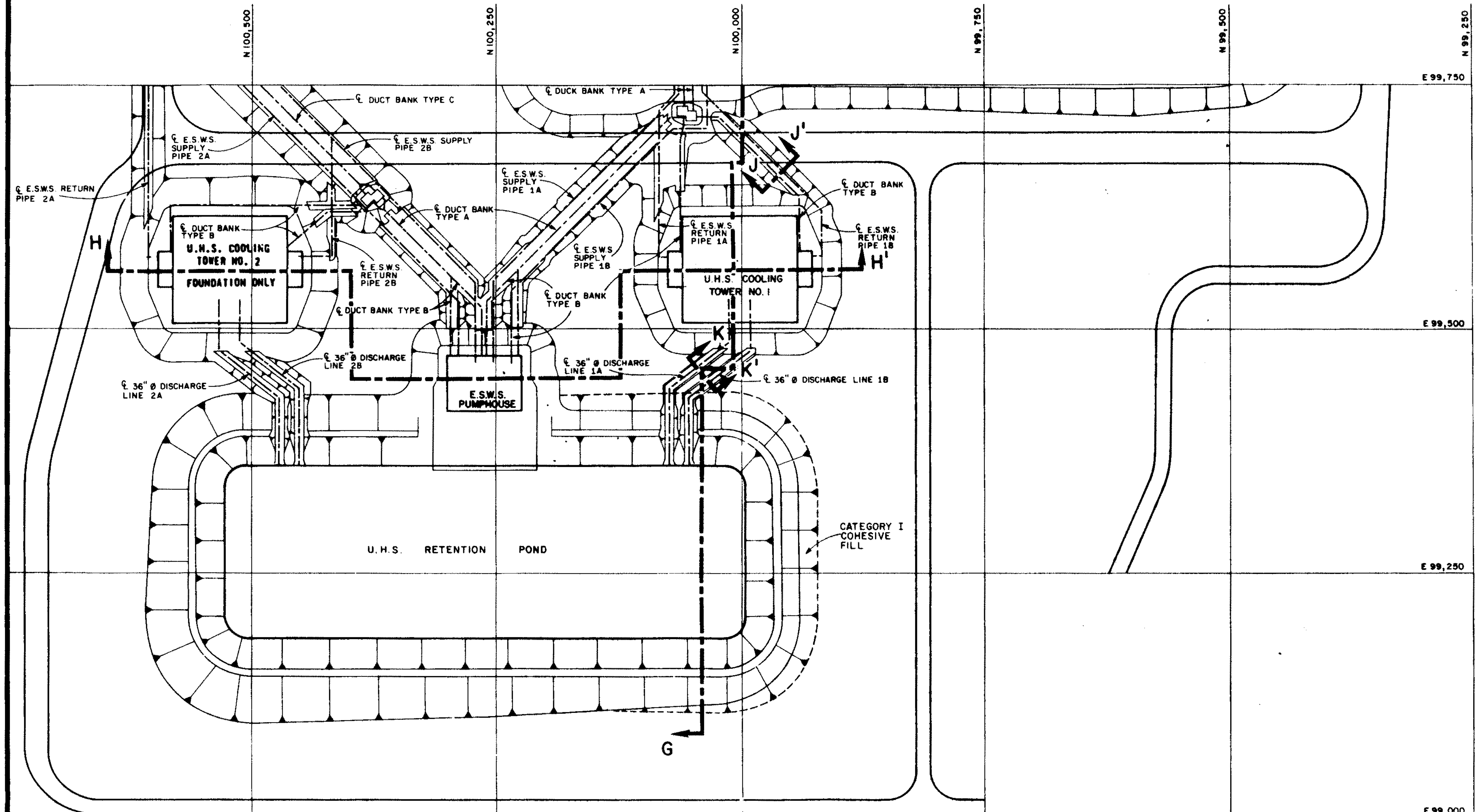
EXCAVATION PROFILE

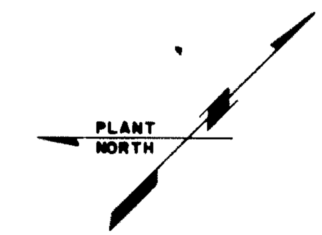
30 0 30 90 150 210
FEET

UNION ELECTRIC COMPANY
CALLAWAY PLANT
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.5-119
EXCAVATION PLAN
SHEET 1 OF 2

Historical 11/10





DRAWING REFERENCES:

1. TITLED: BUILDING - FILL AND BACKFILL PLAN POWER BLOCK
BY: SVERDRUP AND PARCEL AND ASSOCIATES, INC. ST. LOUIS, MISSOURI
FOR: UNION ELECTRIC COMPANY ST. LOUIS, MISSOURI
DRAWING NO: 8600-X-88130 (Q), REV. 8
DATED: SEPT. 1, 1981

2. TITLED: INSTALLATION - DETAILS - WATER YARD LOCATION E.S.W. SYSTEM
BY: SVERDRUP AND PARCEL AND ASSOCIATES, INC. ST. LOUIS, MISSOURI
FOR: UNION ELECTRIC COMPANY ST. LOUIS, MISSOURI
DRAWING NO: 8600-X-88379 (Q), REV. 3
DATED: DEC. 11, 1979

3. TITLED: BUILDING - FILL AND BACKFILL PLAN SHEET ULTIMATE HEAT SINK AREA
BY: SVERDRUP AND PARCEL AND ASSOCIATES, INC.
FOR: UNION ELECTRIC COMPANY ST. LOUIS, MISSOURI
DRAWING NO: 8600-X-88275 (Q), REV. 3
DATED: DEC. 11, 1979

NOTE: Unit 2 was cancelled in 1981.

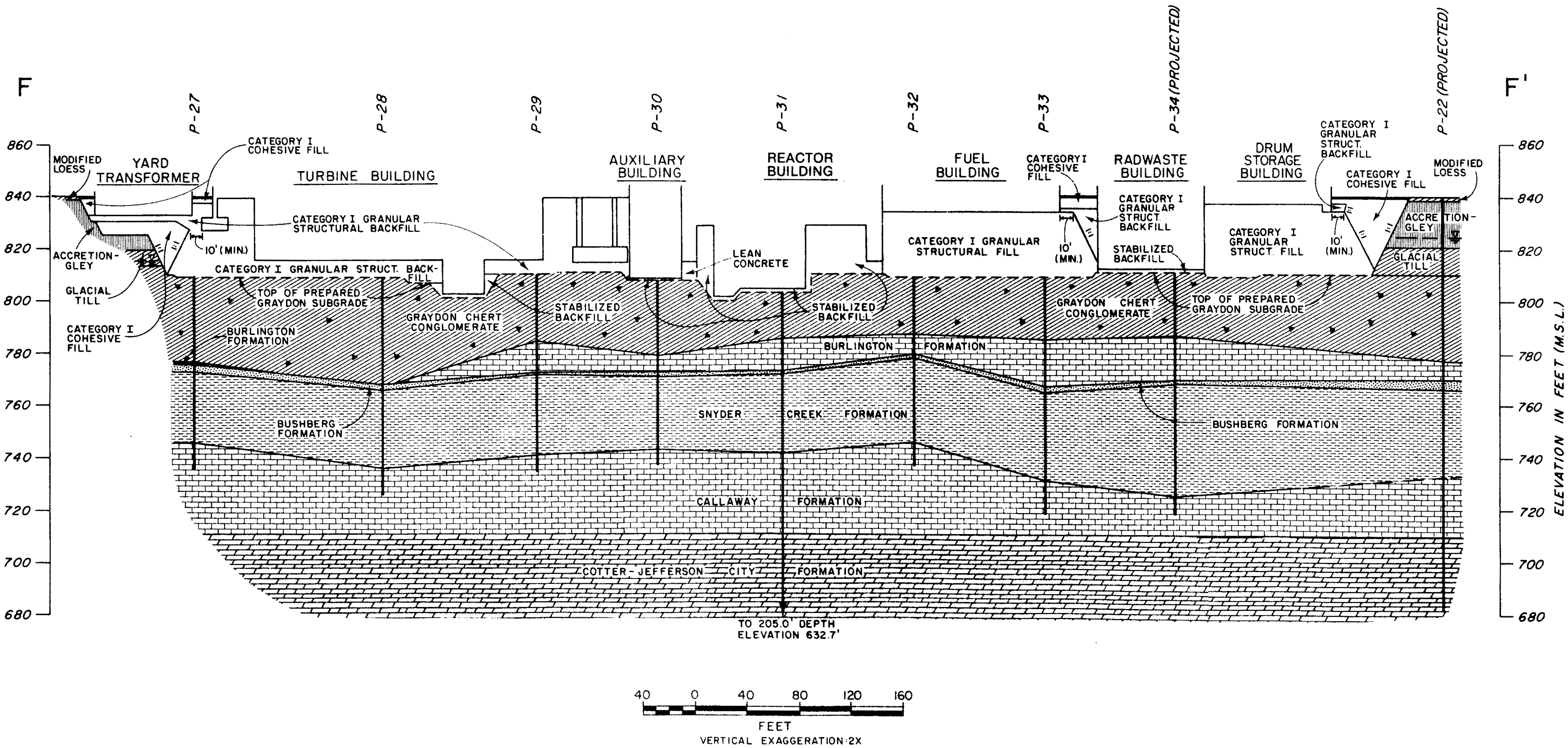
LEGEND:

— - — EXCAVATION PROFILE

30 0 60 120 180
FEET

UNION ELECTRIC COMPANY
CALLAWAY PLANT
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.5-119
EXCAVATION PLAN
SHEET 2 OF 2
Historical 11/10



NOTES.

1. THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE EXCAVATION PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXISTS ONLY AT BORING LOCATIONS.

2. APPROXIMATE GROUND-WATER LEVEL INDICATED WAS MEASURED BY PIEZOMETERS IN THE GRAYDON CHERT CONGLOMERATE, DURING DECEMBER, 1974, PRIOR TO CONSTRUCTION. THE GROUND-WATER LEVEL WAS PROBABLY ALTERED IN THE AREAS OF DEEP EXCAVATIONS.

3. TYPICAL FILL AND BACKFILL GEOMETRIES ARE SHOWN. SUBSTITUTION OF MATERIALS MAY HAVE BEEN PERFORMED DURING CONSTRUCTION. SEE SECTION 2.5.4.5.4.

REFERENCES:

SVERDRUP & PARCEL AND ASSOCIATES, INC.; DRAWING NO. 8600-X-88139(Q) REVISION 9; DATED APRIL 24, 1976.

SVERDRUP & PARCEL AND ASSOCIATES, INC., DRAWING NO. 8600-X-88140(Q) REVISION 7; DATED SEPTEMBER 13, 1976.

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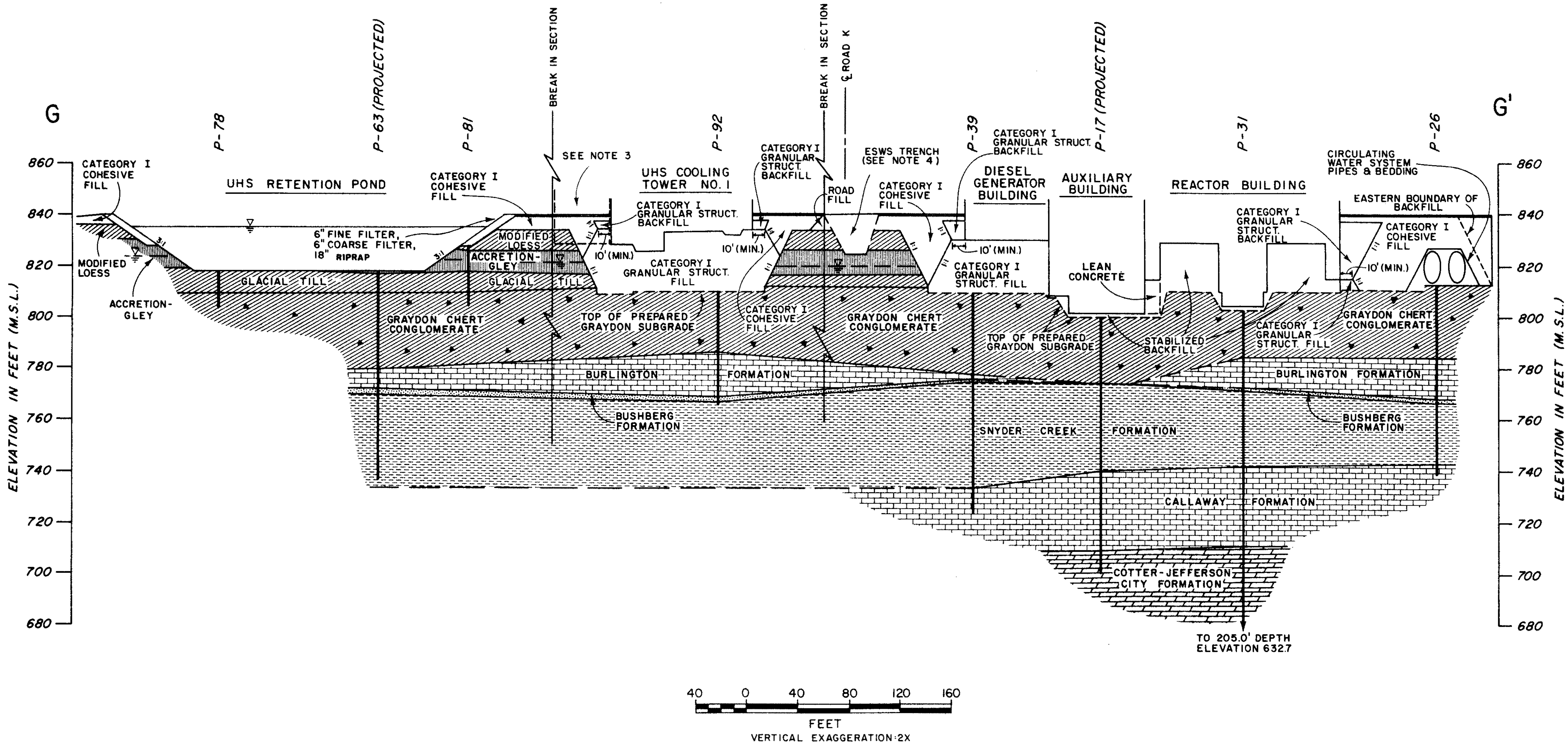
FIGURE 2.5-120

EXCAVATION PROFILE F-F'



NOTES:

1. THE DEPTH AND THICKNESS OF THE SOIL AND ROCK STRATA INDICATED ON THE EXCAVATION PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS WITH OCCASIONAL MODIFICATION BY DATA FROM GEOLOGIC MAPPING. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXISTS ONLY AT BORING LOCATIONS AND MAPPED EXCAVATION SURFACES.

2. APPROXIMATE GROUNDWATER LEVEL INDICATED WAS MEASURED BY PIEZOMETERS IN THE GRAYDON CHERT CONGLOMERATE DURING DECEMBER, 1974, PRIOR TO CONSTRUCTION. THE GROUND-WATER LEVEL WAS PROBABLY ALTERED IN THE AREAS OF DEEP EXCAVATIONS.

3. TYPICAL FILL/BACKFILL SECTION SHOWN SOUTHEAST OF UHS COOLING TOWER 1. SEE FIGURE 25-123 FOR TYPICAL EXCAVATION PROFILE K-K' OF ESWS PIPES WEST OF THE COOLING TOWER.

4. SEE FIGURE 2.5-123 FOR TYPICAL EXCAVATION PROFILE J-J'.

5. TYPICAL FILL AND BACKFILL GEOMETRIES ARE SHOWN. SUBSTITUTION OF MATERIALS MAY HAVE BEEN PERFORMED DURING CONSTRUCTION. SEE SECTION 2.5.4.5.4.

REFERENCES:

SVERDRUP & PARCEL AND ASSOCIATES, INC.; DRAWING NO. 8600-X-88133(Q) REVISION 7; DATED MAY 14, 1976.

SVERDRUP & PARCEL AND ASSOCIATES, INC.; DRAWING NO. 8600-X-88277(Q) REVISION 2; DATED FEBRUARY 16, 1977.

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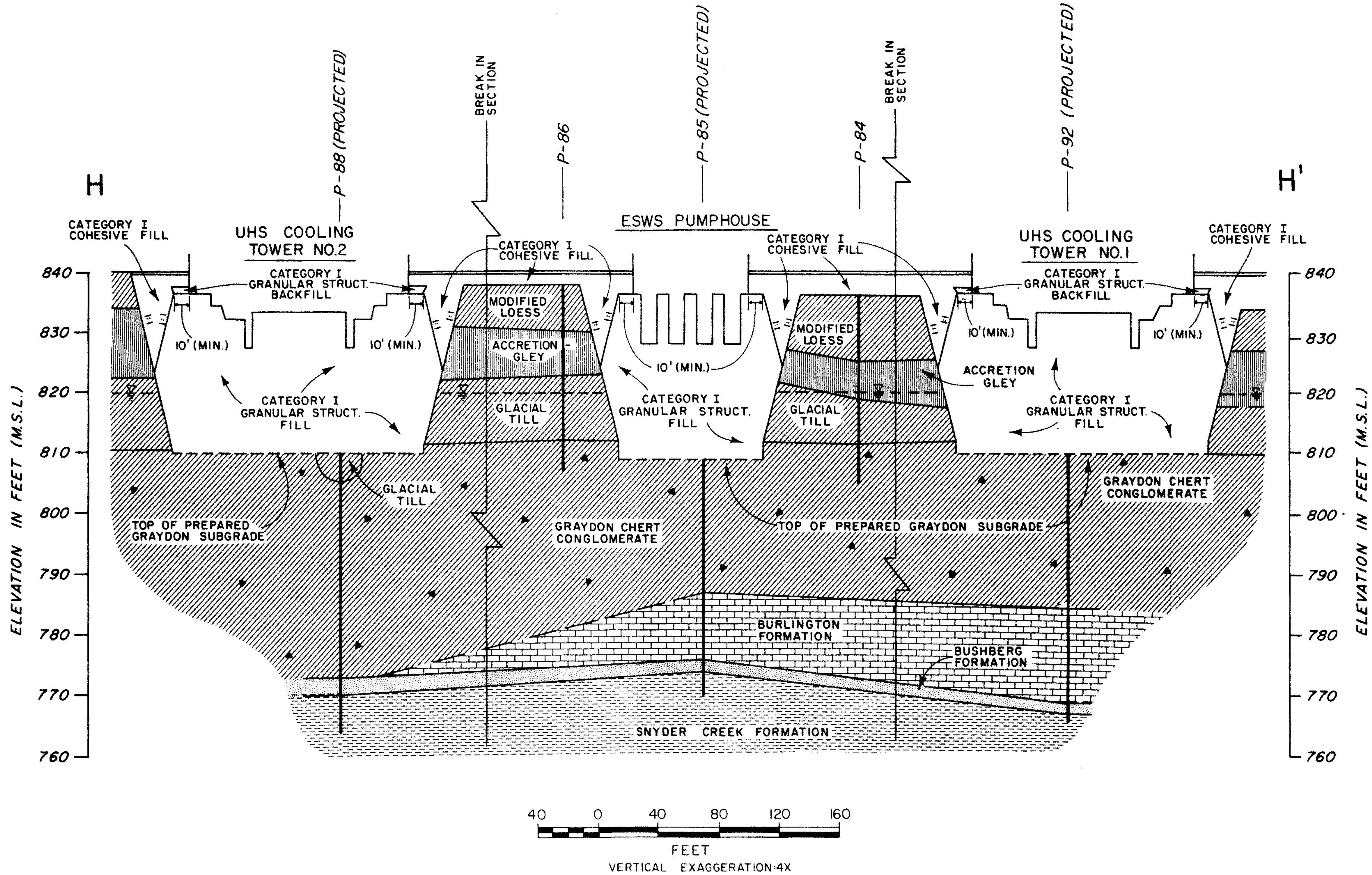
FIGURE 2.5-121

EXCAVATION PROFILE G-G'



NOTES:

1. THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE EXCAVATION PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS WITH OCCASIONAL MODIFICATION BY DATA FROM GEOLOGIC MAPPING. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXISTS ONLY AT BORING LOCATIONS AND MAPPED EXCAVATION SURFACES.

2. APPROXIMATE GROUND-WATER LEVEL INDICATED WAS MEASURED BY PIEZOMETERS IN THE GRAYDON CHERT CONGOLMERATE DURING DECEMBER, 1974, PRIOR TO CONSTRUCTION. THIS GROUND-WATER LEVEL WAS PROBABLY ALTERED IN THE AREAS OF THE DEEP EXCAVATIONS.

3. DEPTH TO TOP OF GRAYDON CHERT CONGLOMERATE INDICATED BY BORING P-88 WAS NOT SUBSTANTIATED IN THE UHS COOLING TOWER NO. 2 EXCAVATION. FEATURE WAS PROBABLY A MINOR DEPRESSION.

4. TYPICAL FILL AND BACKFILL GEOMETRIES ARE SHOWN. SUBSTITUTION OF MATERIALS MAY HAVE BEEN PERFORMED DURING CONSTRUCTION SEE SECTION 2.5.4.5.4.

5. UNIT 2 WAS CANCELLED IN 1981.

REFERENCES:

SVERDRUP & PARCEL AND ASSOCIATES, INC.; DRAWING NO. 8600-X-88276(Q) REVISION 1; DATED FEBRUARY 16, 1977.

SVERDRUP & PARCEL AND ASSOCIATES, INC.; DRAWING NO. 8600-X-88277(Q) REVISION 2, DATED FEBRAURY 16, 1977.

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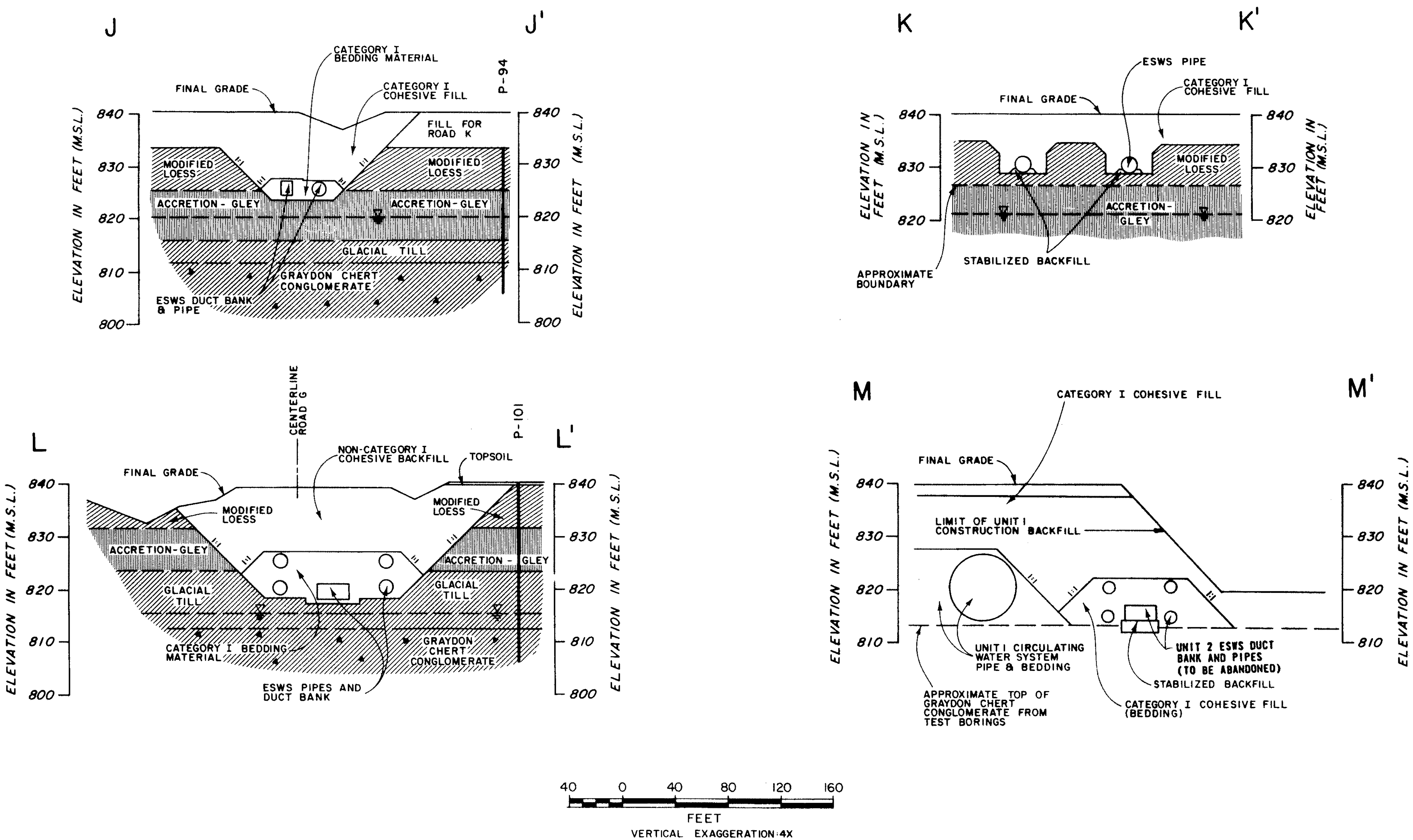
FIGURE 2.5-122
EXCAVATION PROFILE H-H'



NOTES:

1. THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE EXCAVATION PROFILE WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXISTS ONLY AT BORING LOCATIONS.
2. APPROXIMATE GROUND-WATER LEVEL INDICATED WAS MEASURED BY PIEZOMETERS IN THE GRAYDON CHERT CONGLOMERATE, DURING DECEMBER, 1974, PRIOR TO CONSTRUCTION. THE GROUND-WATER LEVEL WAS PROBABLY ALTERED IN THE AREAS OF DEEP EXCAVATIONS.
3. TYPICAL FILL AND BACKFILL GEOMETRIES ARE SHOWN. SUBSTITUTION OF MATERIALS MAY HAVE BEEN PERFORMED DURING CONSTRUCTION. SEE SECTION 2.5.4.5.4.
4. UNIT 2 WAS CANCELLED IN 1981.

REFERENCES:

SVERDRUP & PARCEL AND ASSOCIATES, INC. DRAWING NO. 8600-X-88377(0) REVISION 3; DATED DEC. 11, 1979.

SVERDRUP & PARCEL AND ASSOCIATES, INC. DRAWING NO. 8600-X-88378(0) REVISION 2. DATED DEC. 11, 1979

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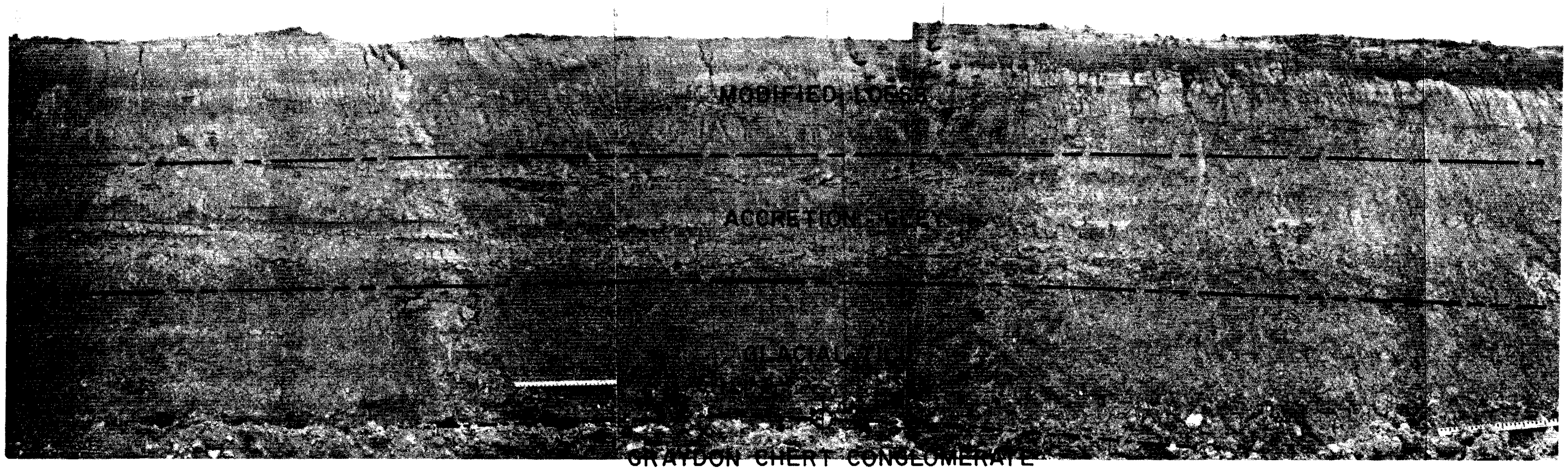
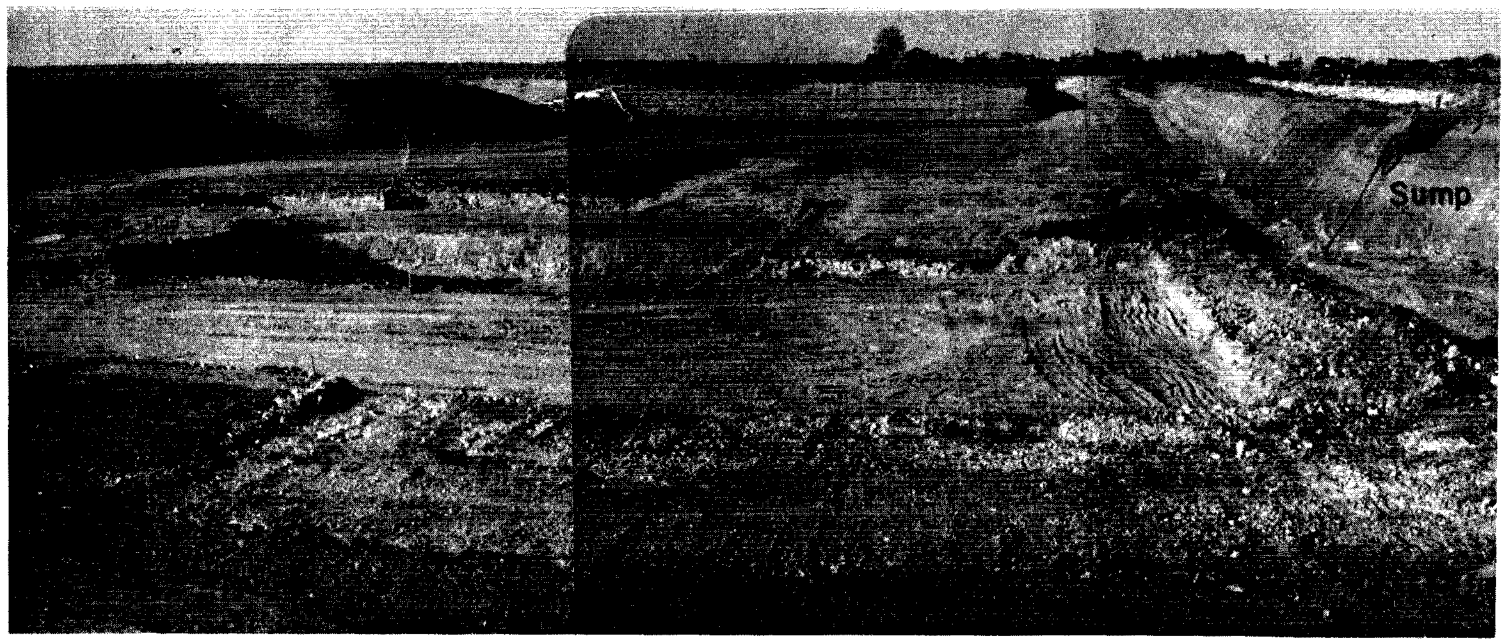
FIGURE 2.5-123
EXCAVATION PROFILES J-J', K-K', L-L' AND M-M'



TYPICAL EXCAVATION CUT SLOPE; SOUTHEAST SLOPE OF UNIT 1 EXCAVATION JUST NORTHEAST OF SUMP SHOWN IN PANORAMA VIEW BELOW; VIEW S 42° E TO S 44° E; APRIL,1976.



PANORAMA OF UNIT 1 POWER BLOCK EXCAVATION; VIEW N 25° E TO N 45° E; APRIL,1976

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FIGURE 2.5- 124

UNIT I EXCAVATION
TYPICAL PHOTOGRAPHS

TYPICAL UHS RETENTION POND SLOPE;
AREA SHOWN IS ABOVE BENCH ON NORTH-
EAST END OF SOUTHEAST SLOPE; VIEW
SOUTHEAST, SEPTEMBER, 1978

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FIGURE 2.5-125

UHS RETENTION POND
TYPICAL SLOPE PHOTOGRAPH

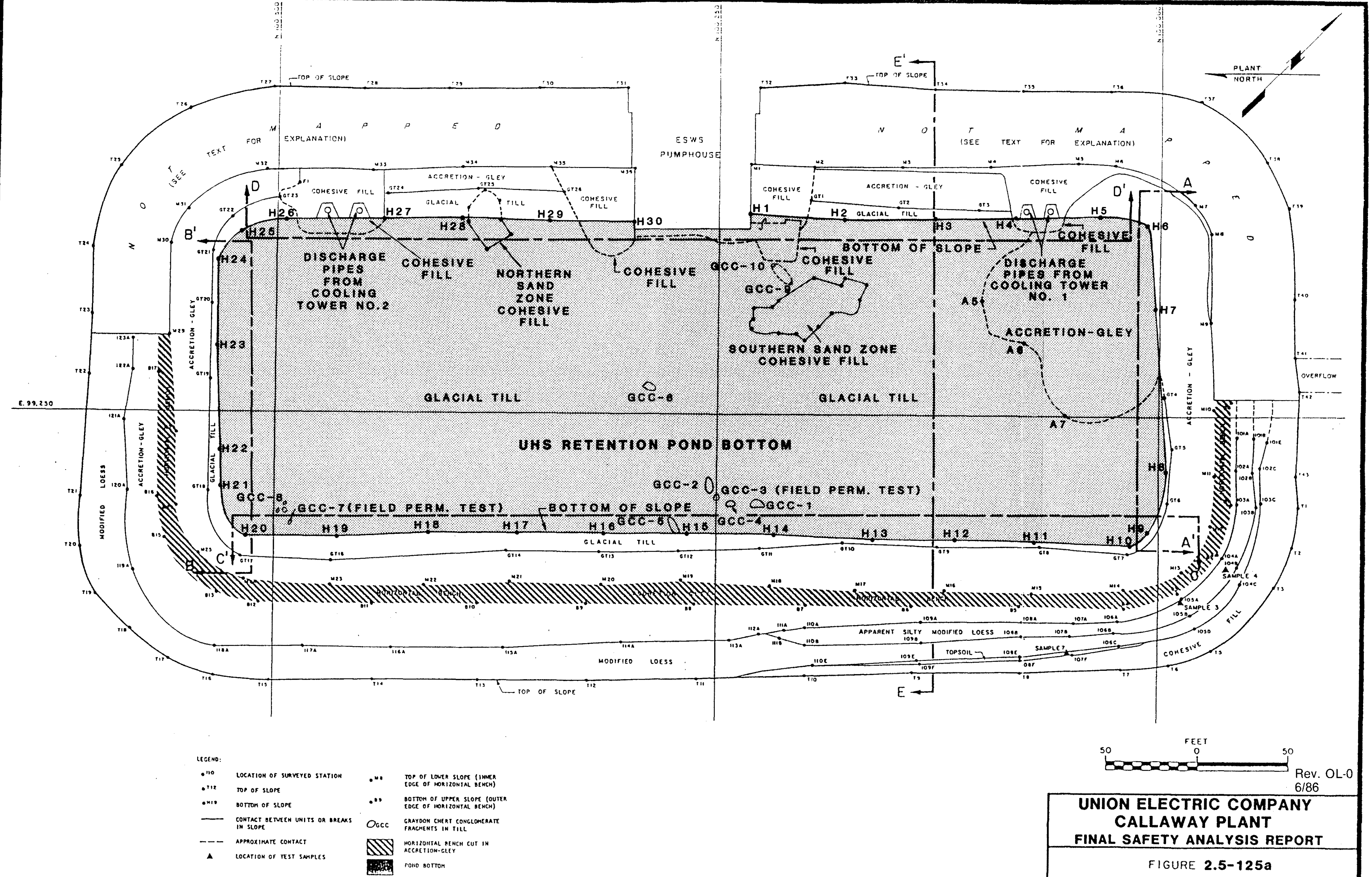

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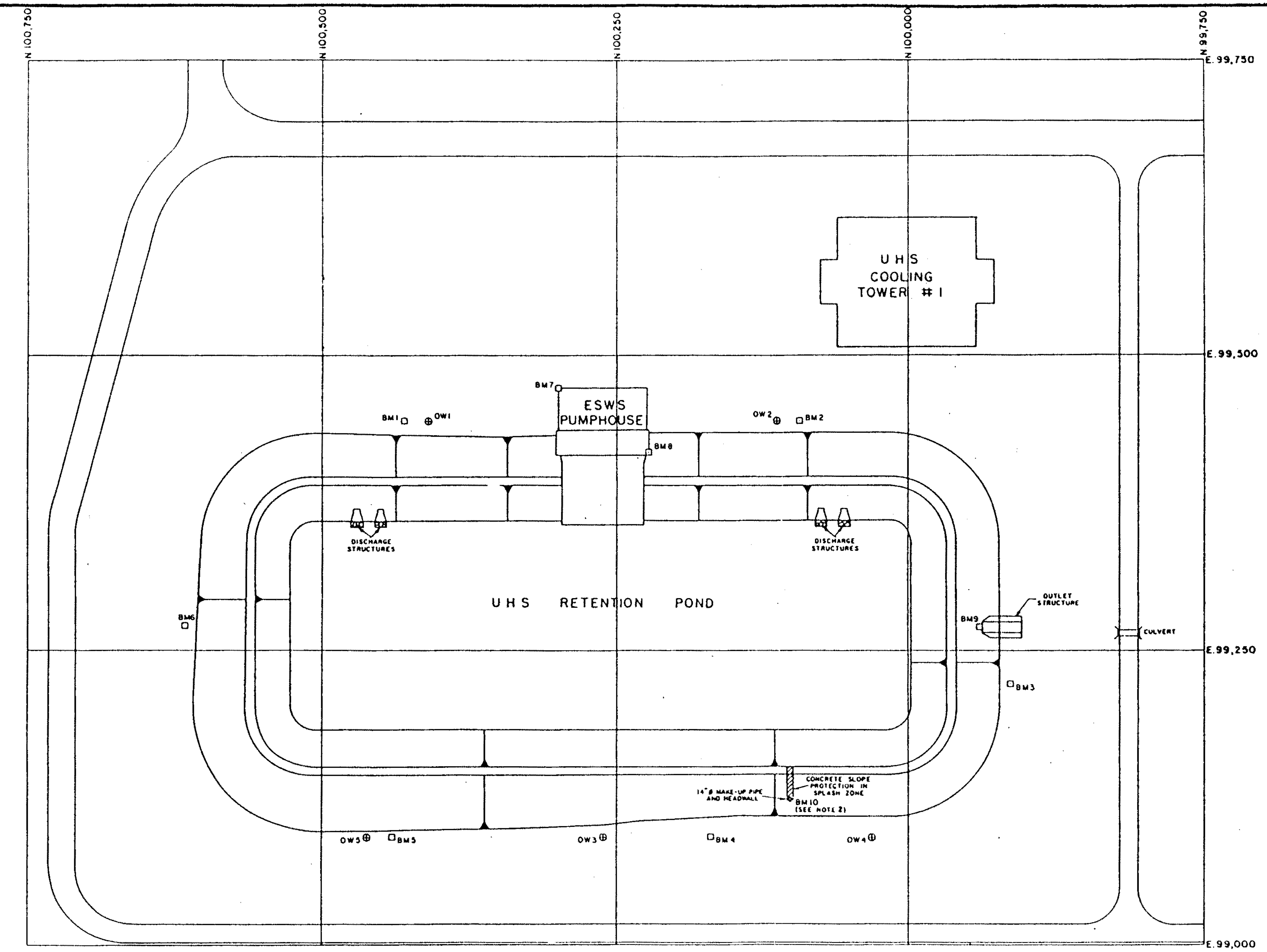
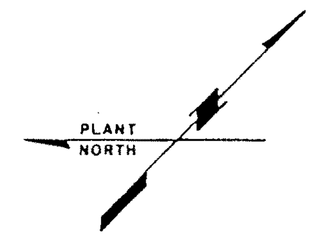
FIGURE **2.5-125a**
DETAILED GEOLOGIC MAP
SLOPES AND BOTTOM
UHS RETENTION POND





LEGEND:

UHS AREA EXCAVATION SLOPES

BM2 MOVEMENT MONUMENT LOCATION AND NUMBER

OW2 OBSERVATION WELL LOCATION AND NUMBER

NOTES:

1. COORDINATES SHOWN ARE PLANT COORDINATES.
2. BM 10 IS ON TOP OF MAKE-UP PIPE HEADWALL.

DRAWING REFERENCES:

1. TITLED: BUILDING - FILL AND BACKFILL PLAN SHEET ULTIMATE HEAT SINK
   BY: SVERDRUP AND PARCEL AND ASSOCIATES, INC.
   FOR: UNION ELECTRIC COMPANY ST. LOUIS, MISSOURI
   DRAWING NO: 8600-X-88275 (Q), REV. 1
   DATED: FEBRUARY 15. 1977

2. TITLED: UHS RETENTION POND PLAN AND SECTIONS
   BY: BECHTEL, GAITHERSBURG MARYLAND
   DRAWING NO: C-U101 (Q), REV. 4 (UNO)

FEET
100 0 100

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FIGURE **2.5-125b**
UHS AREA PLAN

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50 % OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50 % OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
MORE THAN 50 % OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICTY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

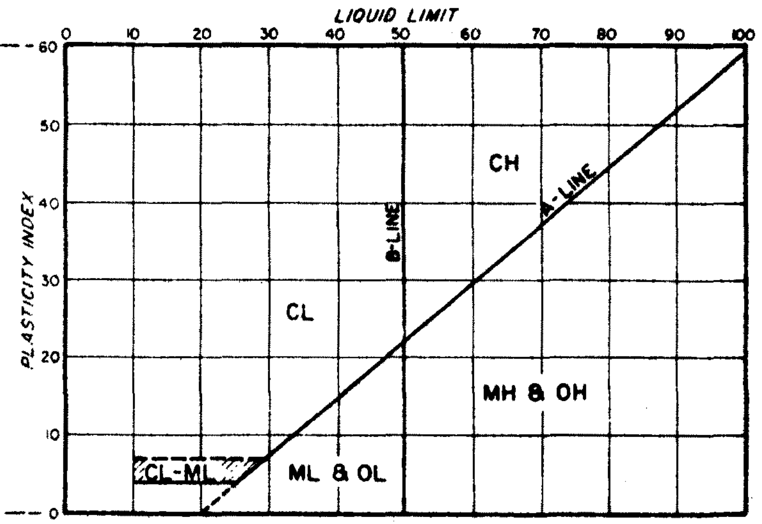
FOR LABORATORY CLASSIFICATION OF FINE-GRAINED SOILS

GRADATION CHART

MATERIAL SIZE	PARTICLE SIZE			
	LOWER LIMIT		UPPER LIMIT	
	MILLIMETERS	SIEVE SIZE●	MILLIMETERS	SIEVE SIZE●
SAND				
FINE	.074	#200●	0.42	#40●
MEDIUM	0.42	#40●	2.00	#10●
COARSE	2.00	#10●	4.76	#4●
GRAVEL				
FINE	4.76	#4●	19.1	3/4"•
COARSE	19.1	3/4"•	76.2	3"•
COBBLES	76.2	3"•	304.8	12"•
BOULDERS	304.8	12"•	914.4	36"

● U.S. STANDARD • CLEAR SQUARE OPENINGS

PLASTICITY CHART



NOTES:

1. DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE CLASSIFICATIONS.
2. WHEN SHOWN ON THE BORING LOGS, THE FOLLOWING TERMS ARE USED TO DESCRIBE THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE COMPACTNESS OF COHESIONLESS SOILS.

COHESIVE SOILS

	(APPROXIMATE SHEARING STRENGTH IN KSF)
VERY SOFT	LESS THAN .25
SOFT	0.25 TO 0.5
MEDIUM STIFF	0.5 TO 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	GREATER THAN 4.0

COHESIONLESS SOILS

VERY LOOSE
LOOSE
MEDIUM DENSE
DENSE
VERY DENSE

THESE ARE USUALLY BASED ON AN EXAMINATION OF SOIL SAMPLES, PENETRATION RESISTANCE, AND SOIL DENSITY DATA.

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FIGURE 2.5-126
UNIFIED SOIL CLASSIFICATION SYSTEM

KEY TO TEST DATA

SHEAR STRENGTH DEFINED AS ONE-HALF THE PEAK AXIAL COMPRESSIVE STRESS IN PSF DETERMINED BY TRIAXIAL COMPRESSION TEST OR ONE-HALF THE AXIAL COMPRESSIVE STRESS AT 10 PERCENT STRAIN, WHICHEVER OCCURRED FIRST.

STRENGTH DATA PRESENTED FOR ROCK SAMPLES ARE UNCONFINED COMPRESSIVE STRENGTHS (UC) IN PSI.

90% PERCENT RECOVERED INDICATES TOTAL AMOUNT OF CORE RECOVERED FOR EACH RUN, EXPRESSED AS A PERCENTAGE OF THE TOTAL LENGTH OF THE CORE RUN.

RQD ROCK QUALITY DESIGNATION
A MODIFIED CORE RECOVERY PERCENTAGE IN WHICH ALL THE PIECES OF SOUND CORE OVER 4 INCHES LONG ARE COUNTED AS RECOVERY. THE MODIFIED SUM OF CORE RECOVERED IS EXPRESSED AS A PERCENTAGE OF THE TOTAL LENGTH OF THE CORE RUN.

SYMBOLS FOR SHEAR STRENGTH TESTS

TX / CU	CONSOLIDATED-UNDRAINED TRIAXIAL TEST
TX / UU	UNCONSOLIDATED-UNDRAINED TRIAXIAL TEST
/PP	PORE PRESSURE READINGS TAKEN
/SW	SAMPLED ALLOWED TO SWELL DURING SATURATION
U C	UNCONFINED COMPRESSION TEST
(3000)	CONFINING PRESSURE IN PSF FOR TRIAXIAL TESTS
LL, PL, PI	INDICATES ATTERBERG LIMITS: LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX (FOR C-SERIES ONLY)

SYMBOLS FOR OTHER TESTS

TX/DY	DYNAMIC TRIAXIAL COMPRESSION TEST	**P**	PETROGRAPHIC EXAMINATION
RES	RESONANT COLUMN TEST	**E**	MODULUS OF ELASTICITY
C	CONSOLIDATION TEST	**R**	MODULUS OF RUPTURE
S A	SIEVE ANALYSIS	**qu**	UNCONFINED COMPRESSION
PERM	PERMEABILITY TEST		
X-RAY	X-RAY ANALYSIS		
(H)	HYDROMETER ANALYSIS		
COMP	COMPACTION TEST		
EXP	EXPANSION TEST		
SHOCK	SHOCKSCOPE TEST		

KEYS TO SAMPLES

INDICATES THE NUMBER OF BLOWS REQUIRED TO DRIVE A DAMES AND MOORE TYPE U SAMPLER OR A STANDARD SPLIT SPOON SAMPLER, ONE FOOT OR LENGTH INDICATED. WEIGHT OF HAMMER AND LENGTH OF DROP IS SHOWN ON EACH BORING LOG.

13 ■ INDICATES DEPTH OF SAMPLE OBTAINED WITH DAMES AND MOORE TYPE U SAMPLER (3.25" O.D., 2.42" I.D. SPLIT SPOON SAMPLER)

INDICATES DISTURBED SAMPLE.

□ INDICATES DEPTH OF SAMPLING ATTEMPT WITH NO RECOVERY.

INDICATES DEPTH OF SAMPLE OBTAINED WITH STANDARD SPLIT SPOON SAMPLER (2.00" O.D., 1.38" I.D.).

INDICATES DEPTH OF SAMPLING ATTEMPT WITH NO RECOVERY.

INDICATES DEPTH OF SAMPLE OBTAINED WITH HYDRAULICALLY PUSHED SHELBY TUBE (3.0" O.D , 2.9" I.D.).

INDICATES DEPTH OF SAMPLE OBTAINED USING PITCHER SAMPLER (3" O.D., 2.9" I.D.).

NOTES

ELEVATIONS REFER TO U.S.G.S. DATUM (MEAN SEA LEVEL).

MISSOURI STATE PLANE COORDINATES (CENTRAL ZONE) ARE SHOWN ON EACH BORING LOG.

5% VUGS INDICATES THE ESTIMATED RATIO OF VUGGED CORE SURFACE AREA TO TOTAL CORE SURFACE AREA. BOTH OPEN AND FILLED ARE INCLUDED IN THE VUGGED CATEGORY.

BEDDING TERMINOLOGY

THINNLY LAMINATED	LESS THAN 1/4 INCH
LAMINATED	1/4 INCH TO 2 INCHES
THIN BEDDED	2 TO 6 INCHES
MEDIUM BEDDED	6 TO 12 INCHES
MASSIVE BEDDED	GREATER THAN 12 INCHES

THE DISCUSSION IN THE TEXT IS NECESSARY FOR PROPER UNDERSTANDING OF THE NATURE OF THE SUBSURFACE MATERIALS.

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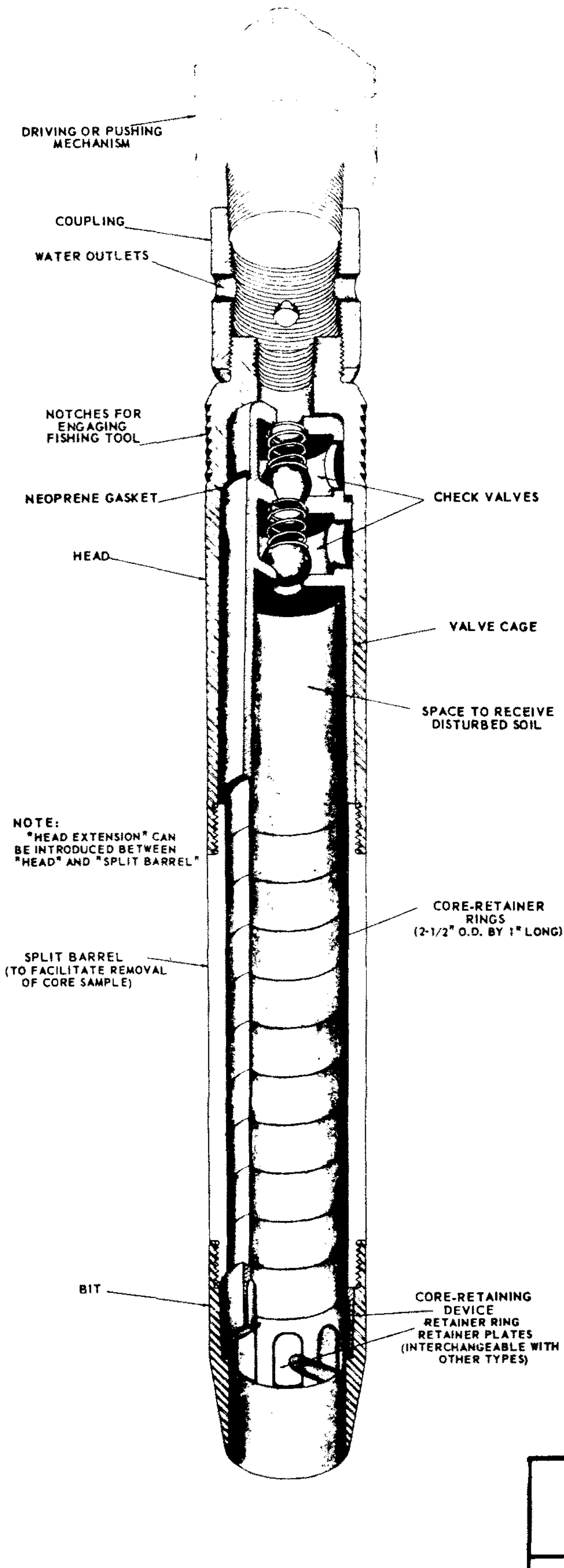
FIGURE 2.5-127
KEY TO LOG OF BORINGS

FOR SOILS DIFFICULT TO RETAIN IN SAMPLER
U. S. PATENT NO. 2,318,062



ALTERNATE ATTACHMENTS

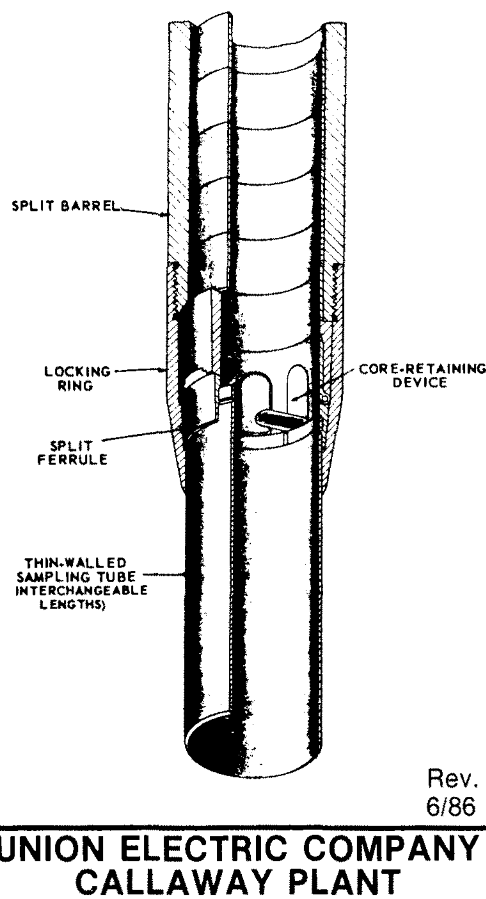


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FIGURE 2.5-128
DAMES & MOORE
SOIL SAMPLER TYPE U

LOG BORING NOTES

1) All Log Boring Figures were deleted from the text in Revision OL-0 dated 6/86.
2) The deleted sections of the FSAR are contained in the FSAR on record as of the receipt of Callaway Operating License #NPF-30 on October 18, 1984. These sections are not reproduced in later revisions due to the historical status of the contents. This information can be provided, however, upon request from the Union Electric Nuclear Licensing Department.

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6/86

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FIGURE 2.5- 129

LOG BORING NOTES

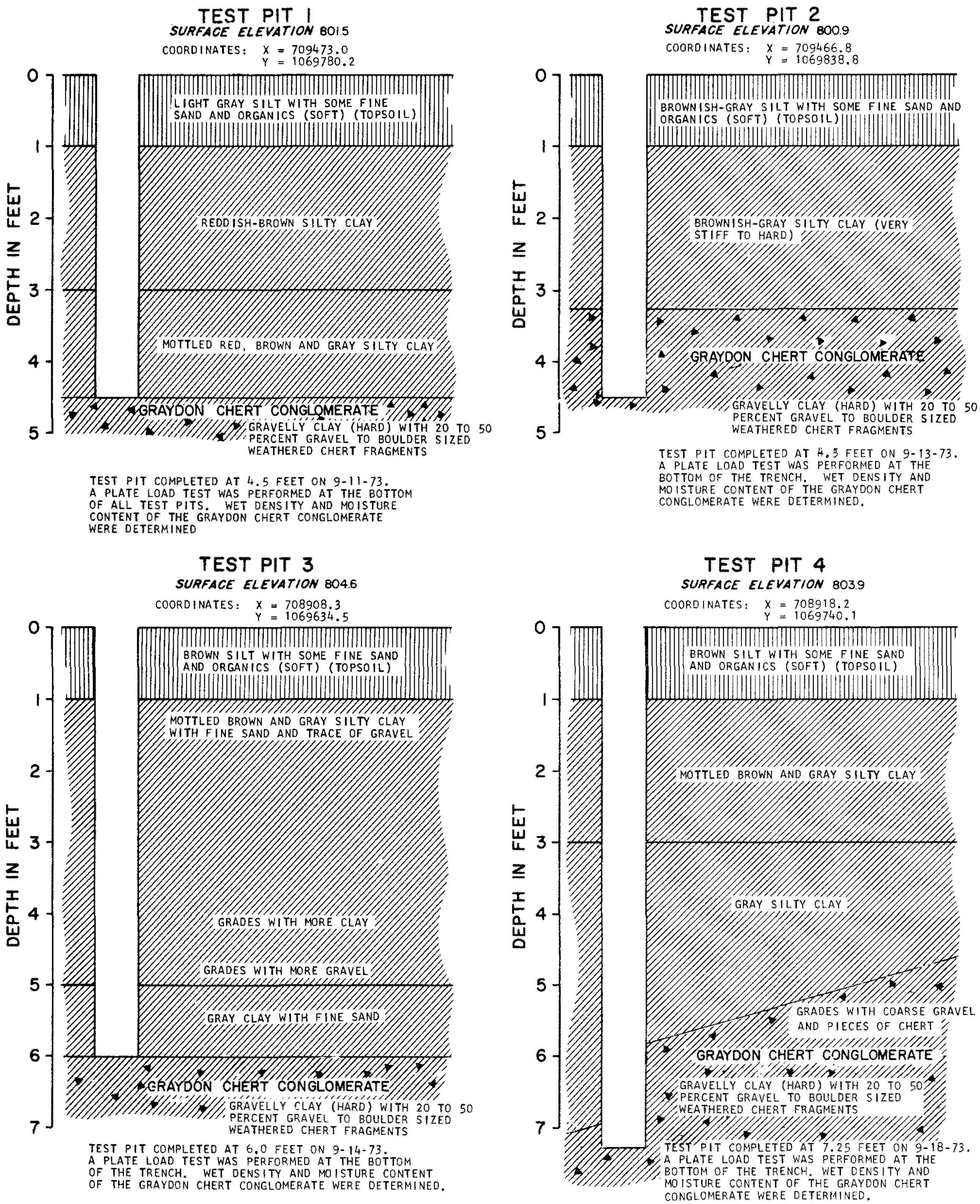

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FIGURE 2.5-393

LOG OF TEST PITS - TP1, TP2, TP3, AND TP4

SHEET 1 OF 1

TEST PIT AT P-79, DEPTH: 10.5 FEET
GRAY SILTY CLAY WITH SOME BROWN MOTTLING
(ACCRETION GLEY)
OPTIMUM MOISTURE CONTENT: 13.0%
MAXIMUM DRY DENSITY: 120 PCF
METHOD OF COMPACTION: ASTM
TEST DESIGNATION D1557-70

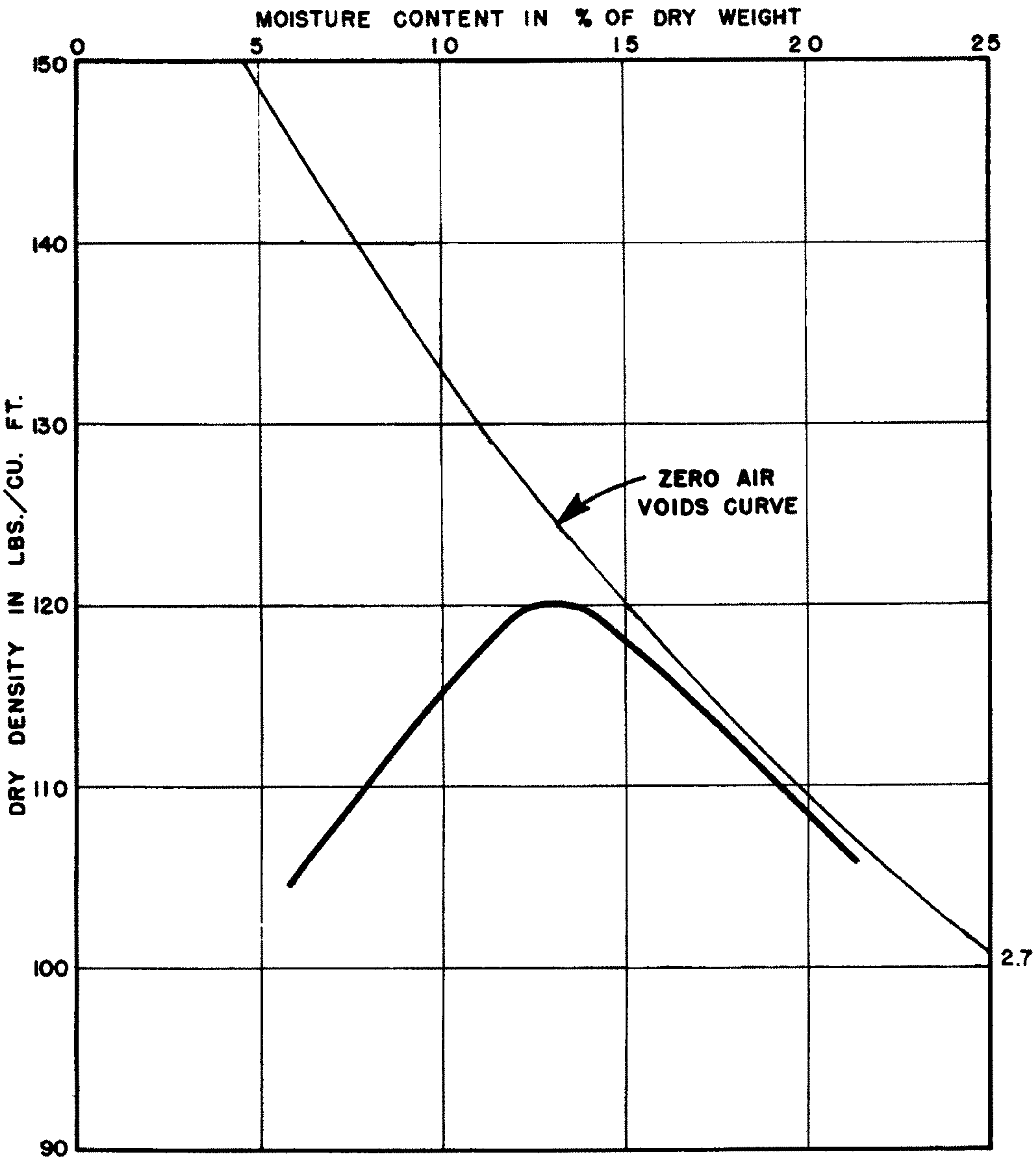

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FIGURE 2.5-394

COMPACTION TEST DATA

TEST PIT AT P-79, DEPTH: 4.0 FEET
MOTTLED BROWN AND GRAY SILTY CLAY
(MODIFIED LOESS)
OPTIMUM MOISTURE CONTENT: 11.0%
MAXIMUM DRY DENSITY: 118 PCF
METHOD OF COMPACTION: ASTM
TEST DESIGNATION D1557-70

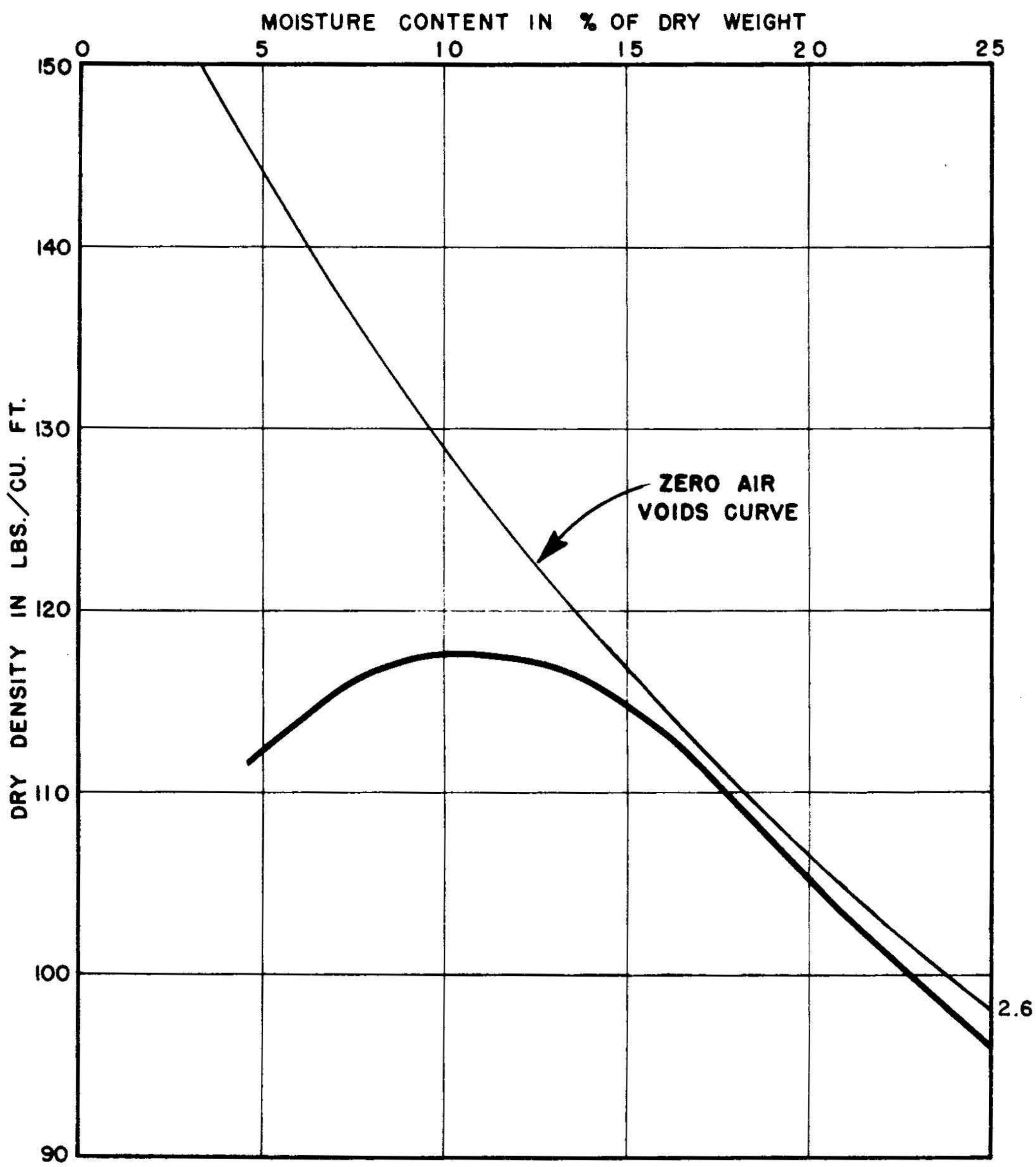

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FIGURE 2.5-395

COMPACTION TEST DATA

COMBINED SAMPLE FROM 7.0 TO 12.0 FOOT
DEPTH AT P-1 AND 8.0 TO 13.5 FOOT
DEPTH AT P-4
GRAY SILTY CLAY WITH SOME FINE SAND
(ACCRETION-GLEY)
OPTIMUM MOISTURE CONTENT: 12.5%
MAXIMUM DRY DENSITY: 117 PCF
METHOD OF COMPACTION: ASTM
TEST DESIGNATION D1557-70

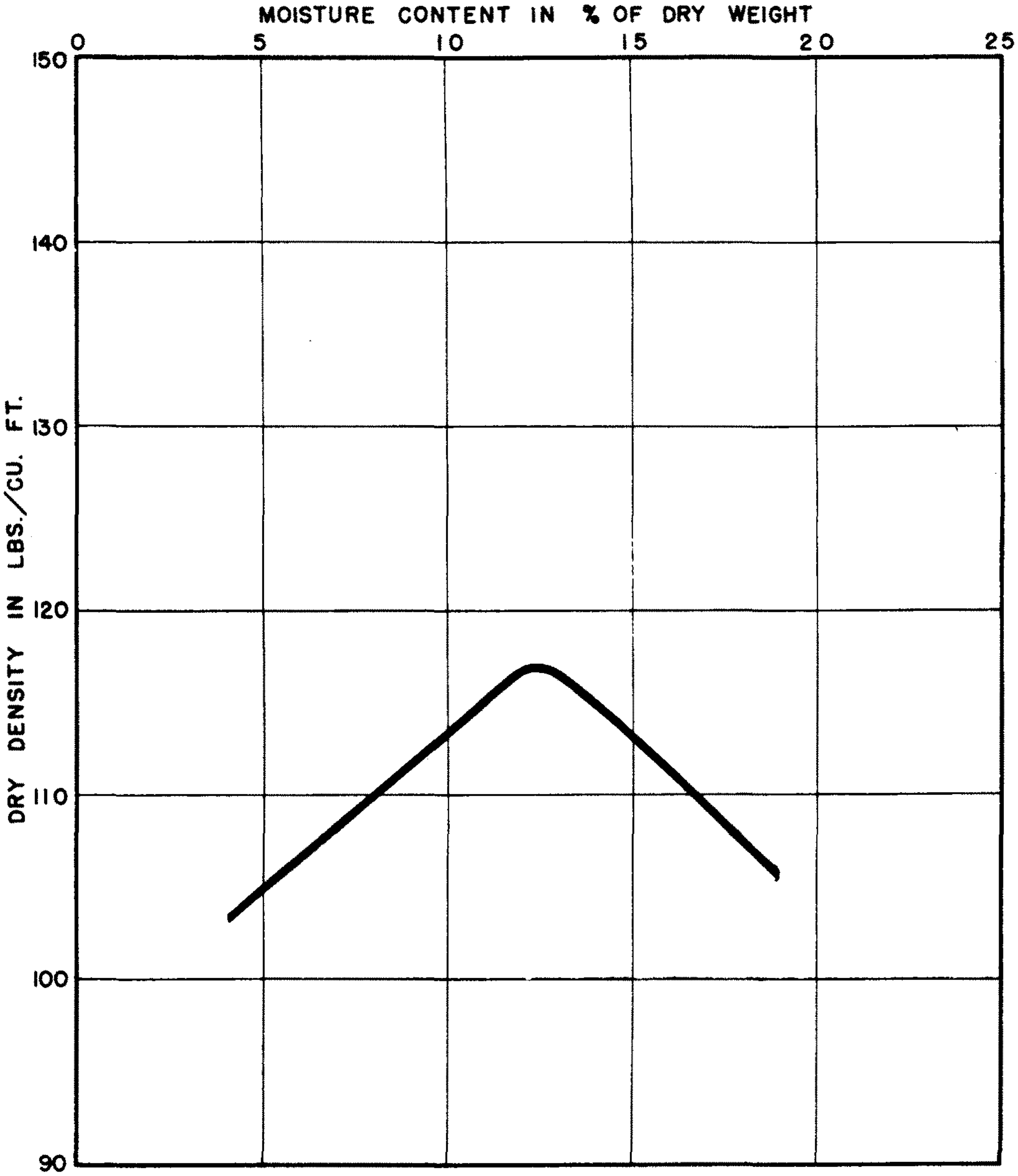

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FIGURE 2.5-396

COMPACTION TEST DATA

TEST PIT AT P-1, DEPTH: 3.0 TO 7.0 FEET
MOTTLED BROWN AND GRAY SILTY CLAY
(MODIFIED LOESS)
OPTIMUM MOISTURE CONTENT: 12.0%
MAXIMUM DRY DENSITY: 118 PCF
METHOD OF COMPACTION: ASTM
TEST DESIGNATION D1557-70

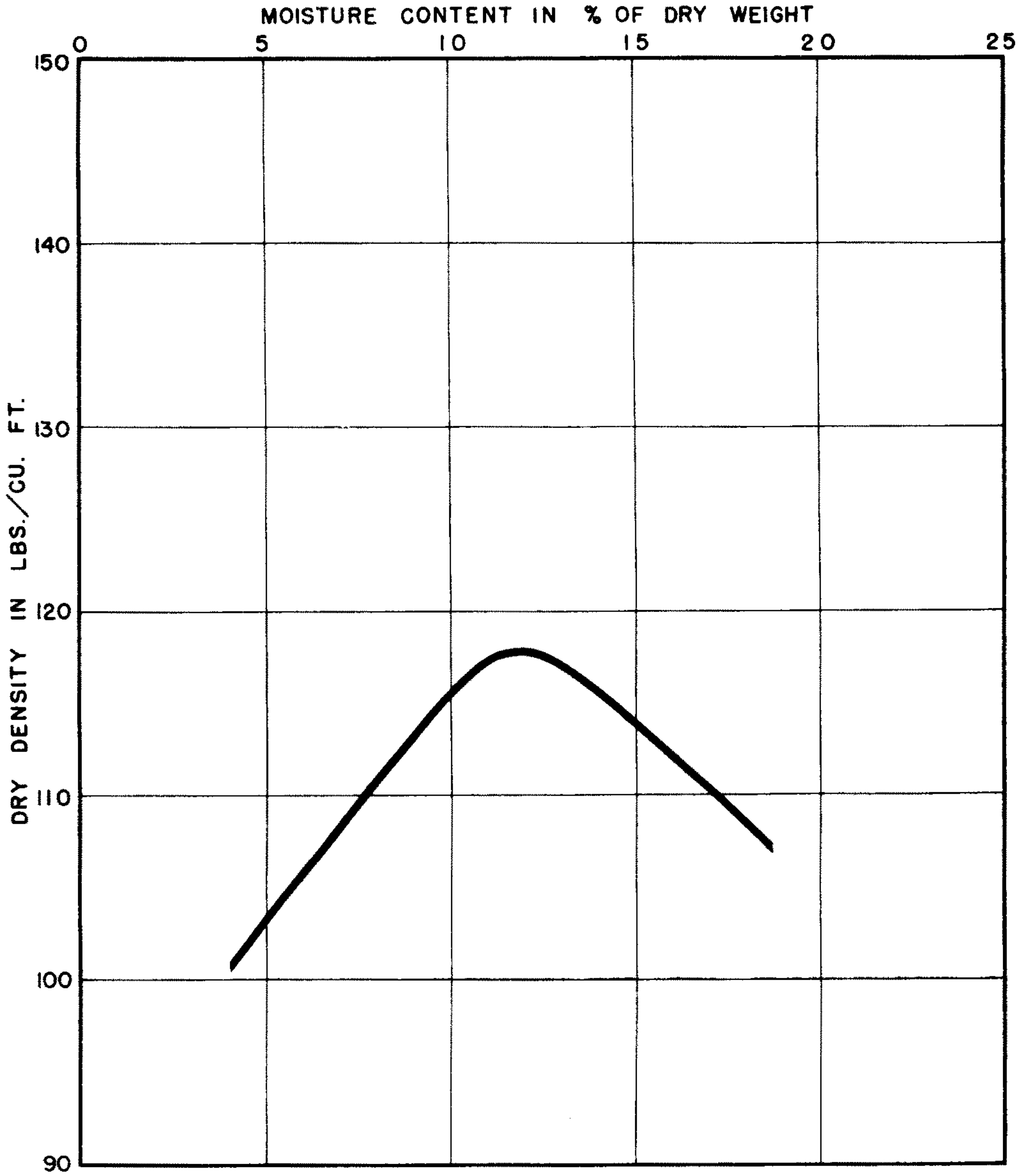

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FIGURE 2.5-397

COMPACTION TEST DATA

TEST PIT AT P-90, DEPTH: 3.5 FEET
GRAY SILTY CLAY WITH SOME BROWN MOTTLING
(MODIFIED LOESS)
OPTIMUM MOISTURE CONTENT: 14.0%
MAXIMUM DRY DENSITY: 117 PCF
METHOD OF COMPACTION: ASTM
TEST DESIGNATION D1557-70

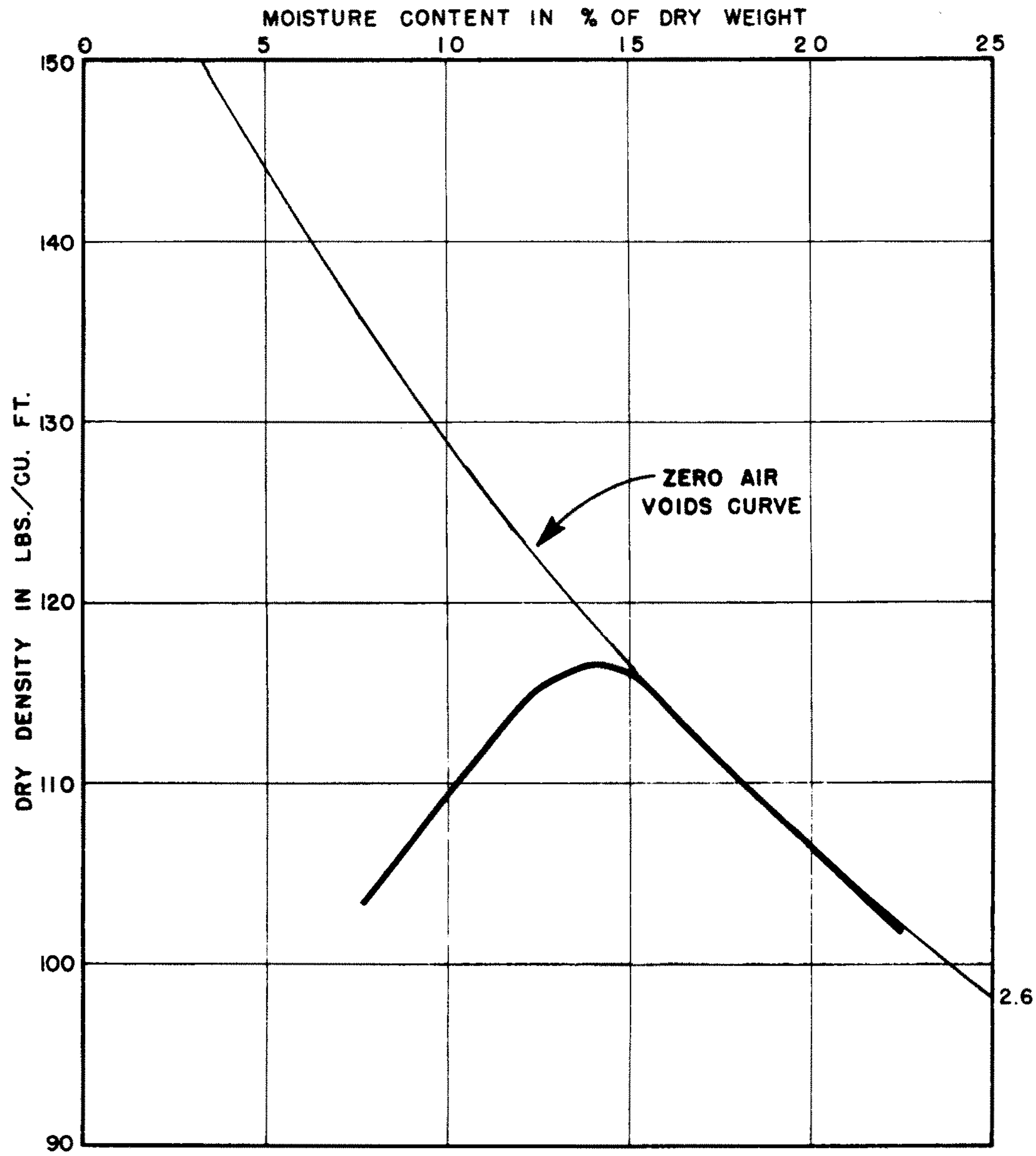

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FIGURE 2.5-398

COMPACTION TEST DATA

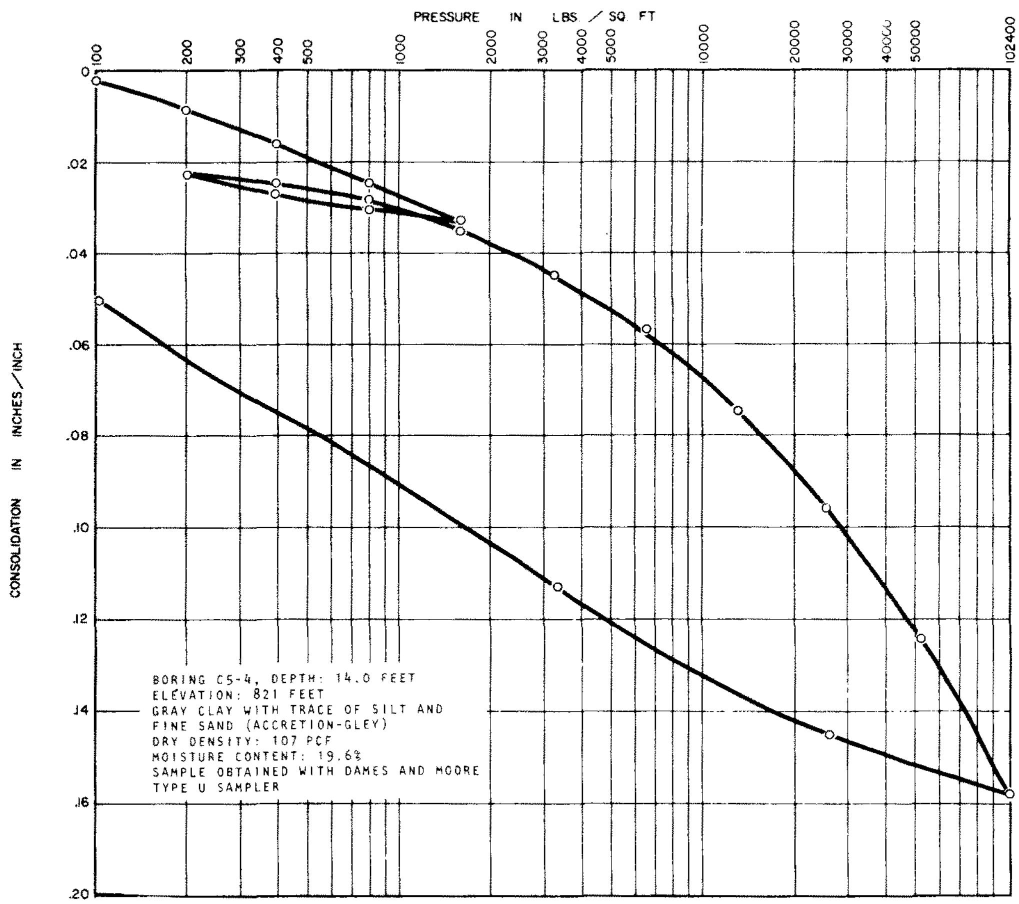

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FIGURE 2.5-399

CONSOLIDATION TEST DATA

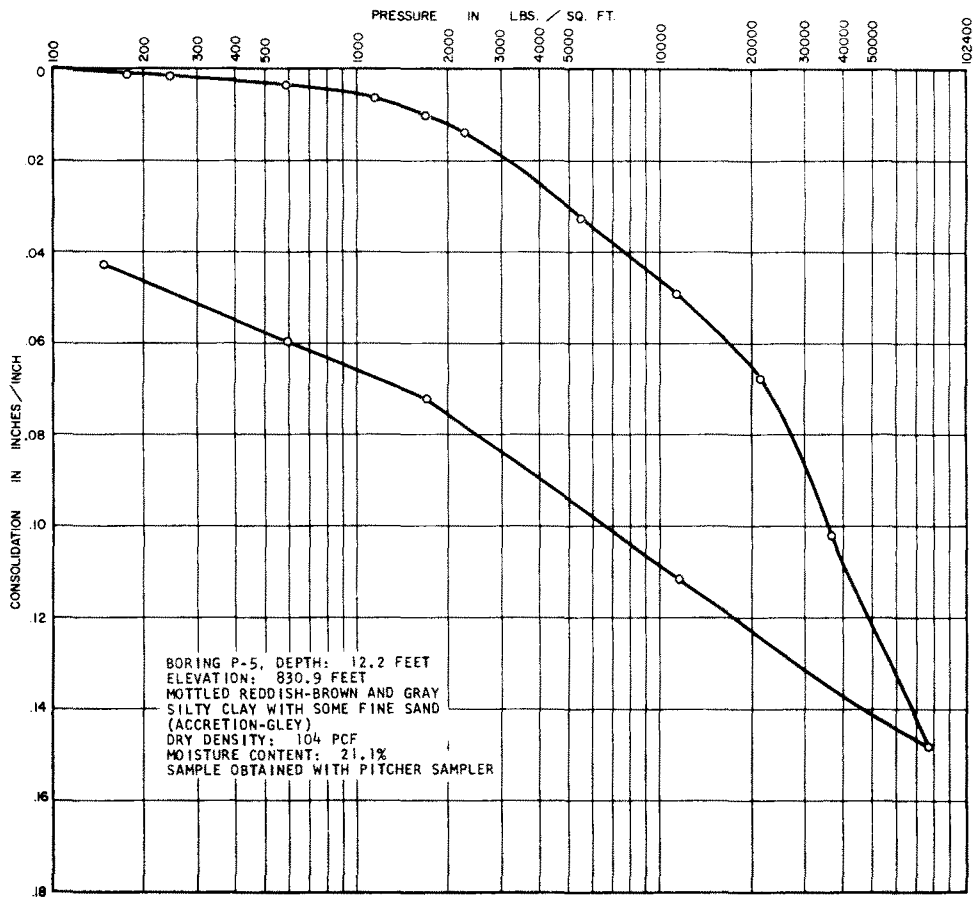

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FIGURE 2.5-400

CONSOLIDATION TEST DATA

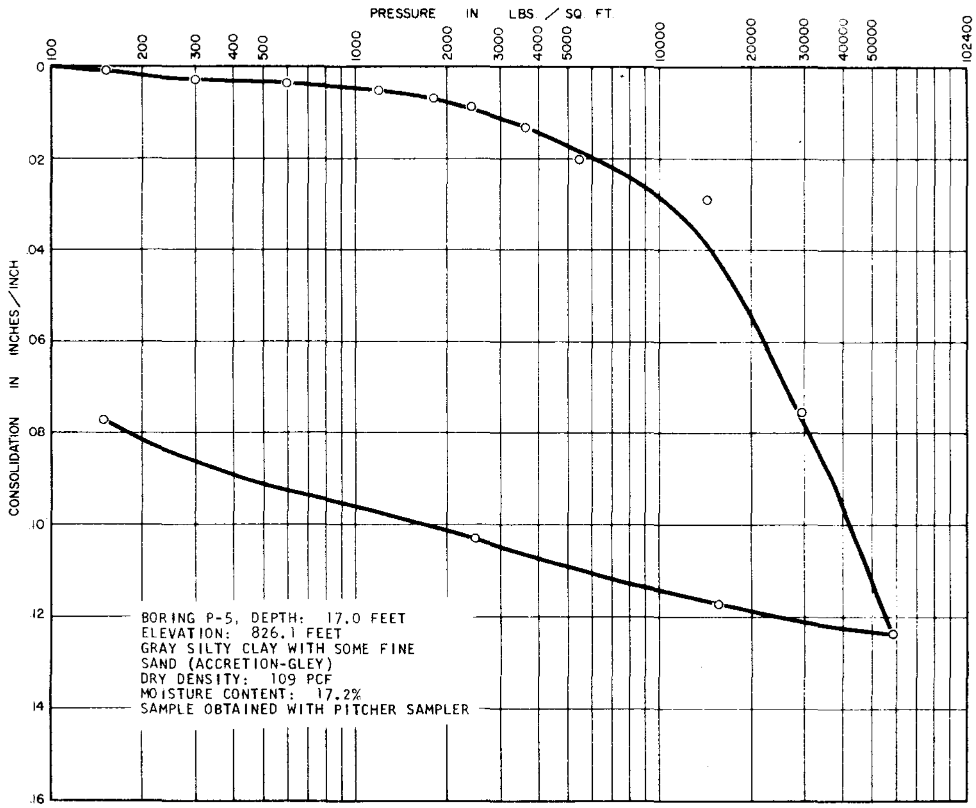

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FIGURE 2.5-401

CONSOLIDATION TEST DATA

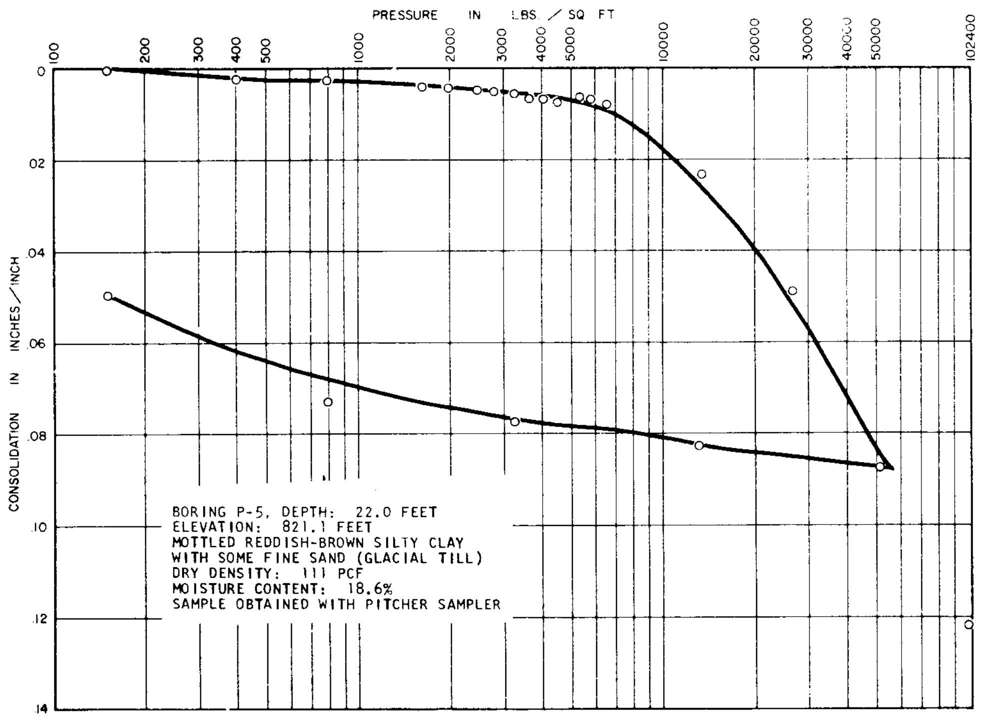

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FIGURE 2.5-402

CONSOLIDATION TEST DATA

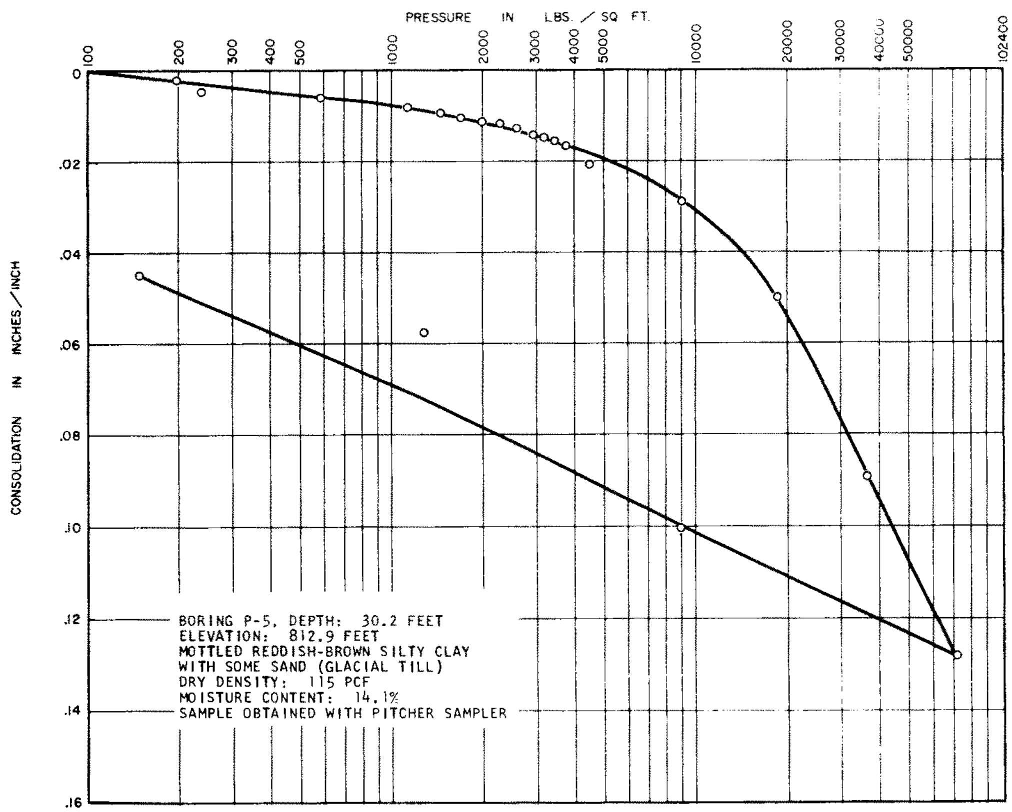

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FIGURE 2.5-403

CONSOLIDATION TEST DATA

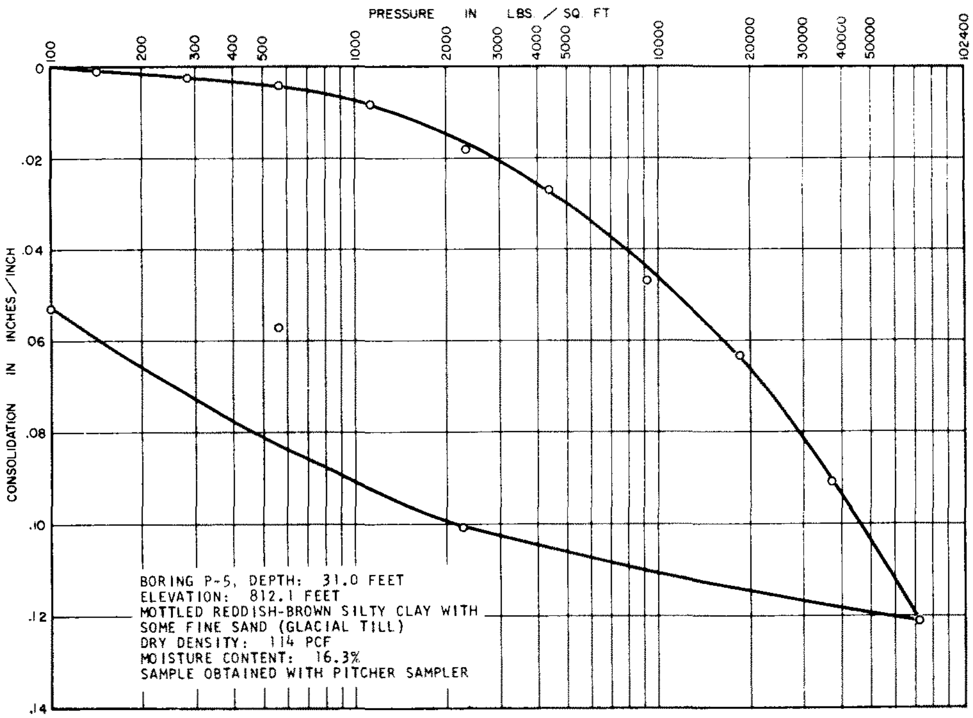

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FIGURE 2.5-404

CONSOLIDATION TEST DATA

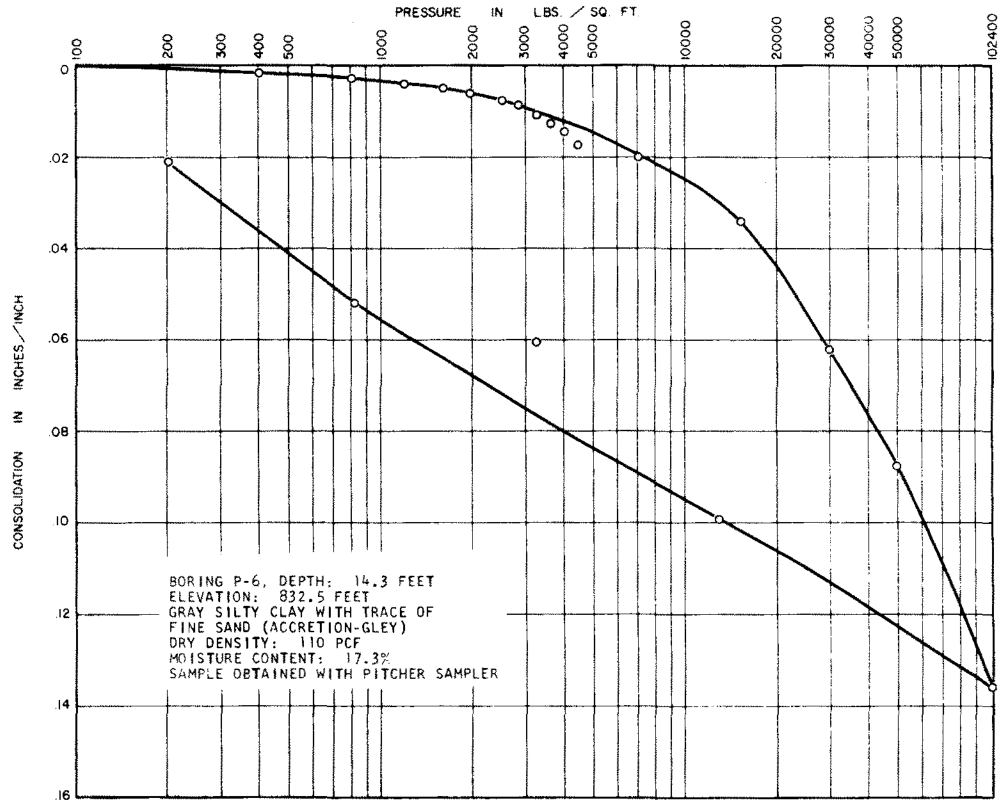

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FIGURE 2.5-405

CONSOLIDATION TEST DATA

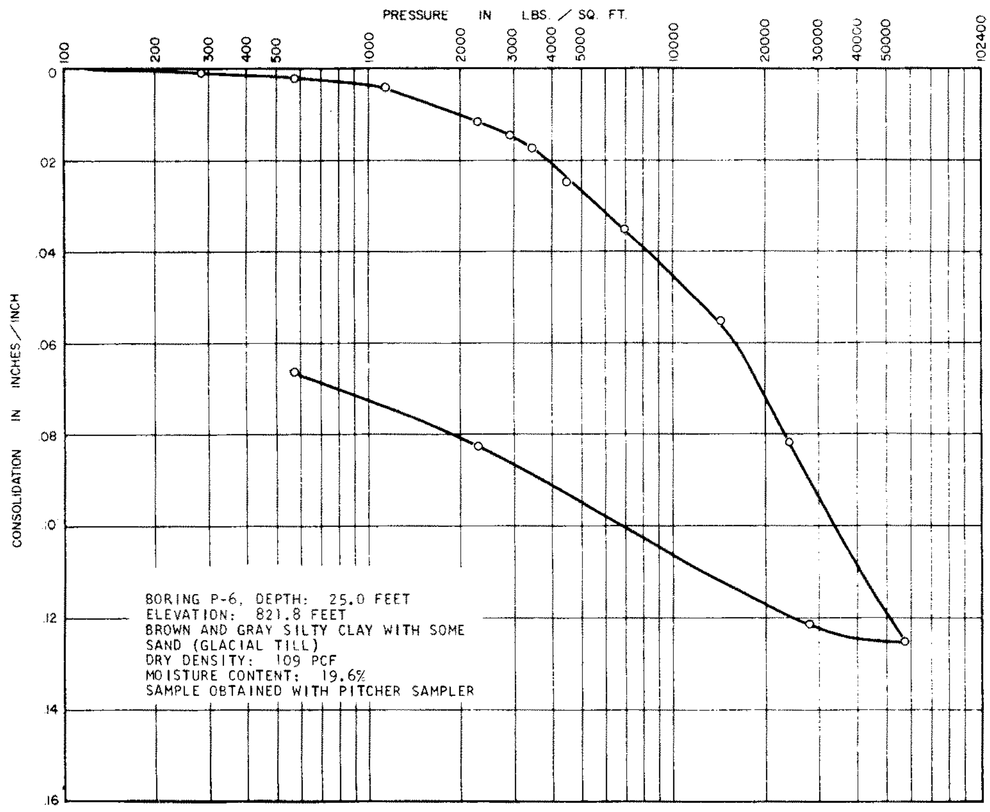

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FIGURE 2.5-406

CONSOLIDATION TEST DATA

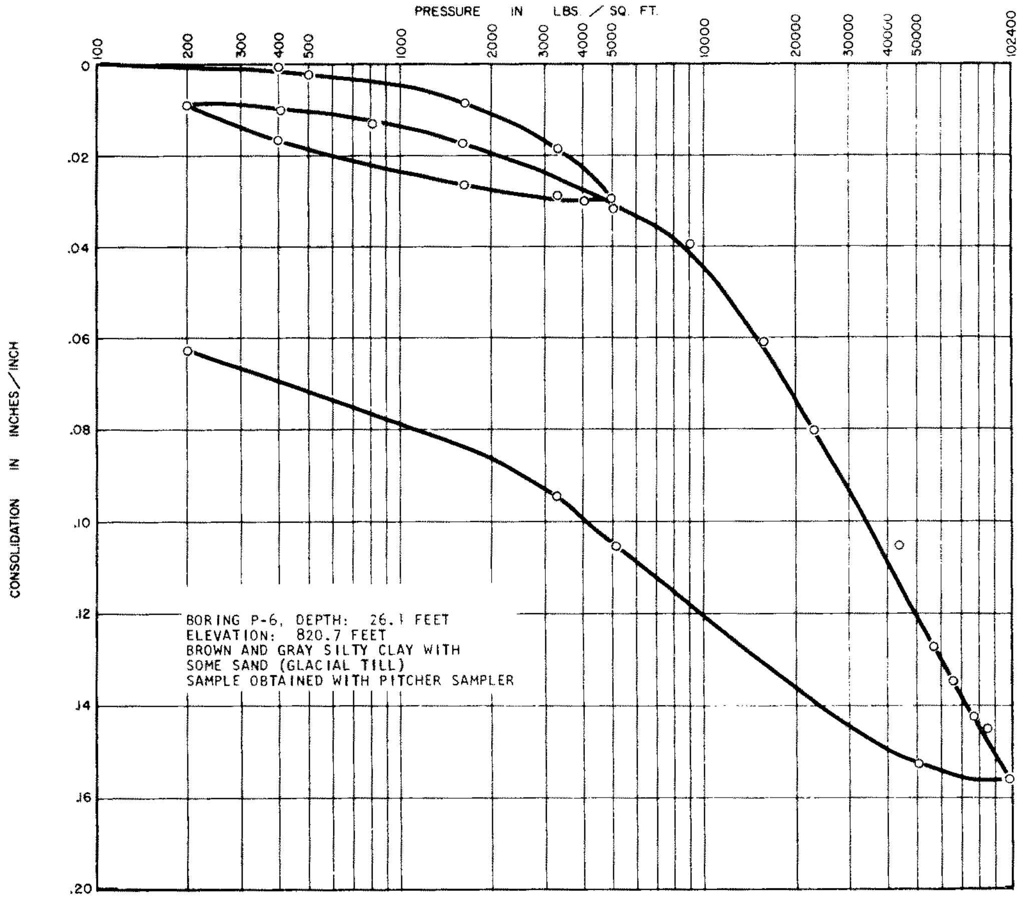

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FIGURE 2.5-407

CONSOLIDATION TEST DATA

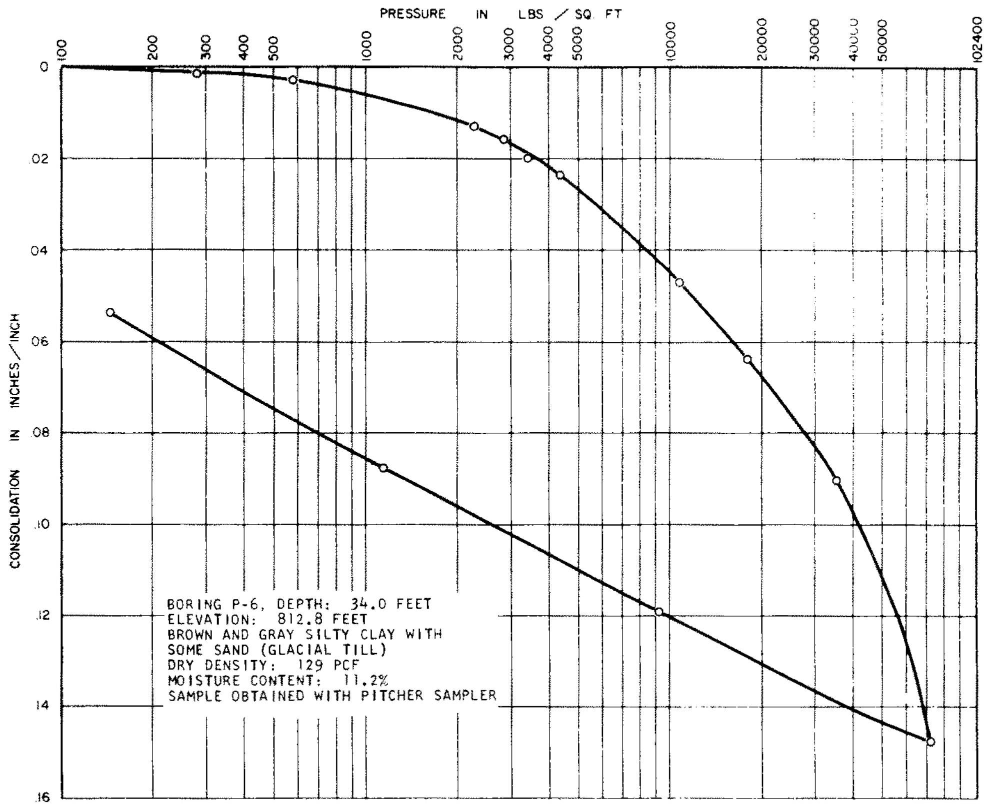

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FIGURE 2.5-408

CONSOLIDATION TEST DATA

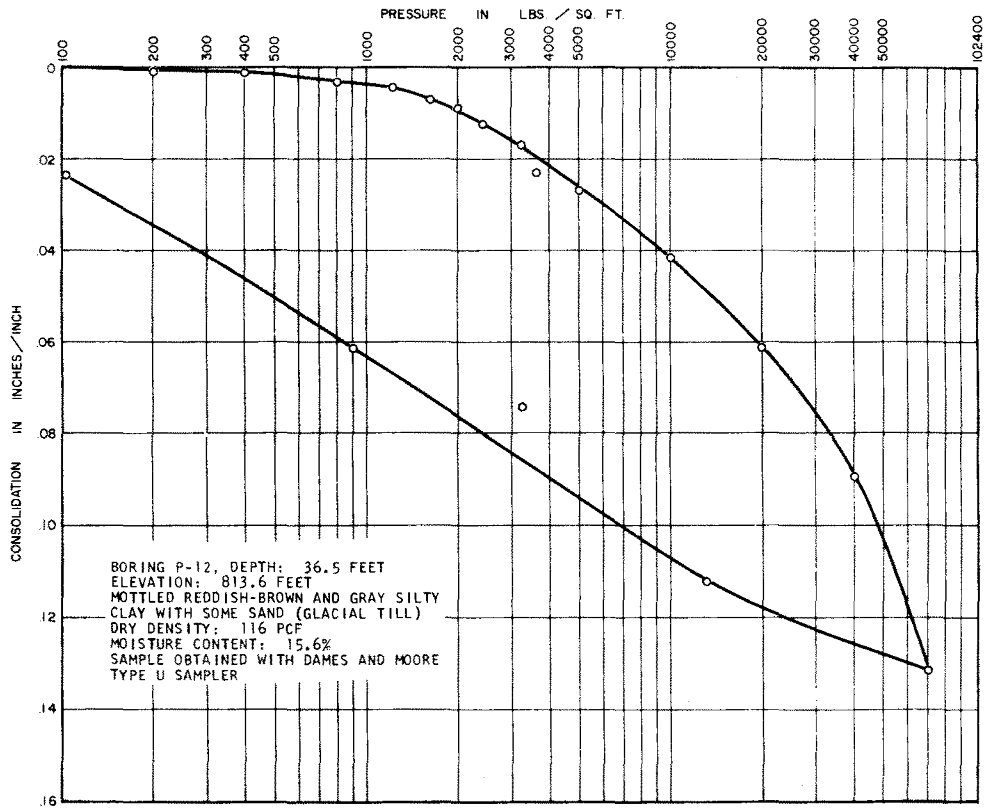

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FIGURE 2.5-409

CONSOLIDATION TEST DATA

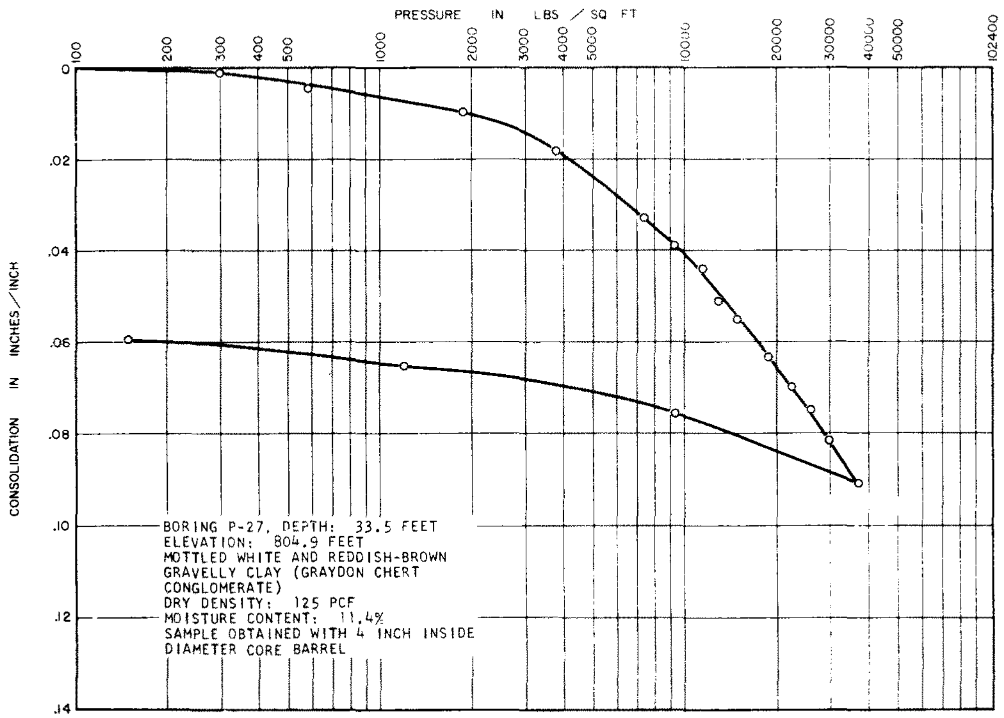

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FIGURE 2.5-410

CONSOLIDATION TEST DATA

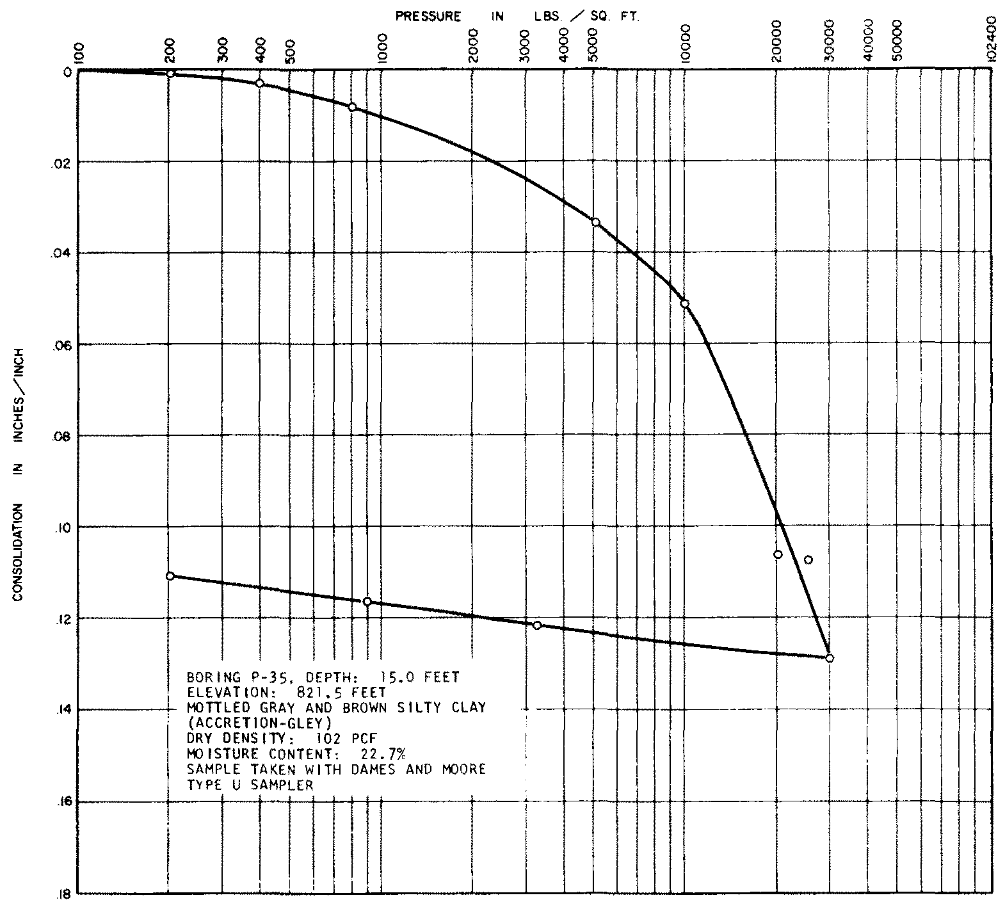

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FIGURE 2.5-411

CONSOLIDATION TEST DATA

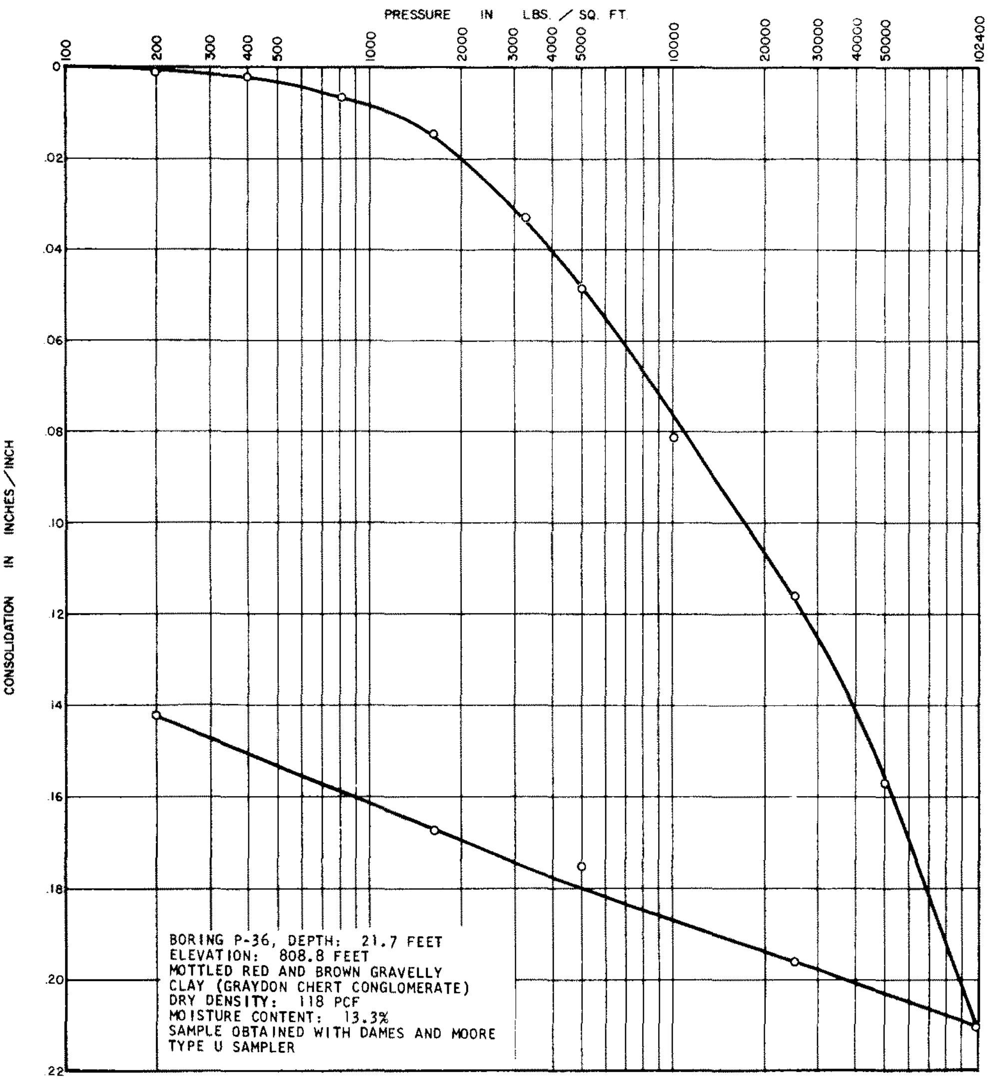

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FIGURE 2.5-412

CONSOLIDATION TEST DATA

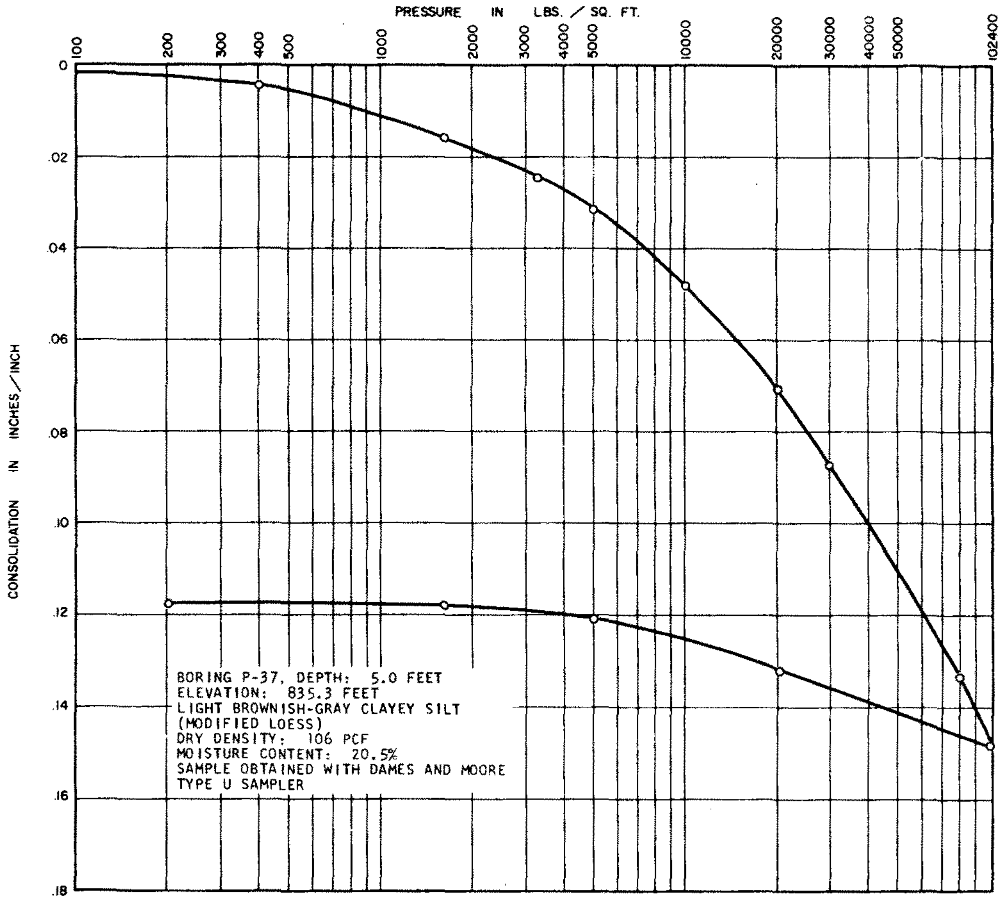

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FIGURE 2.5-413

CONSOLIDATION TEST DATA

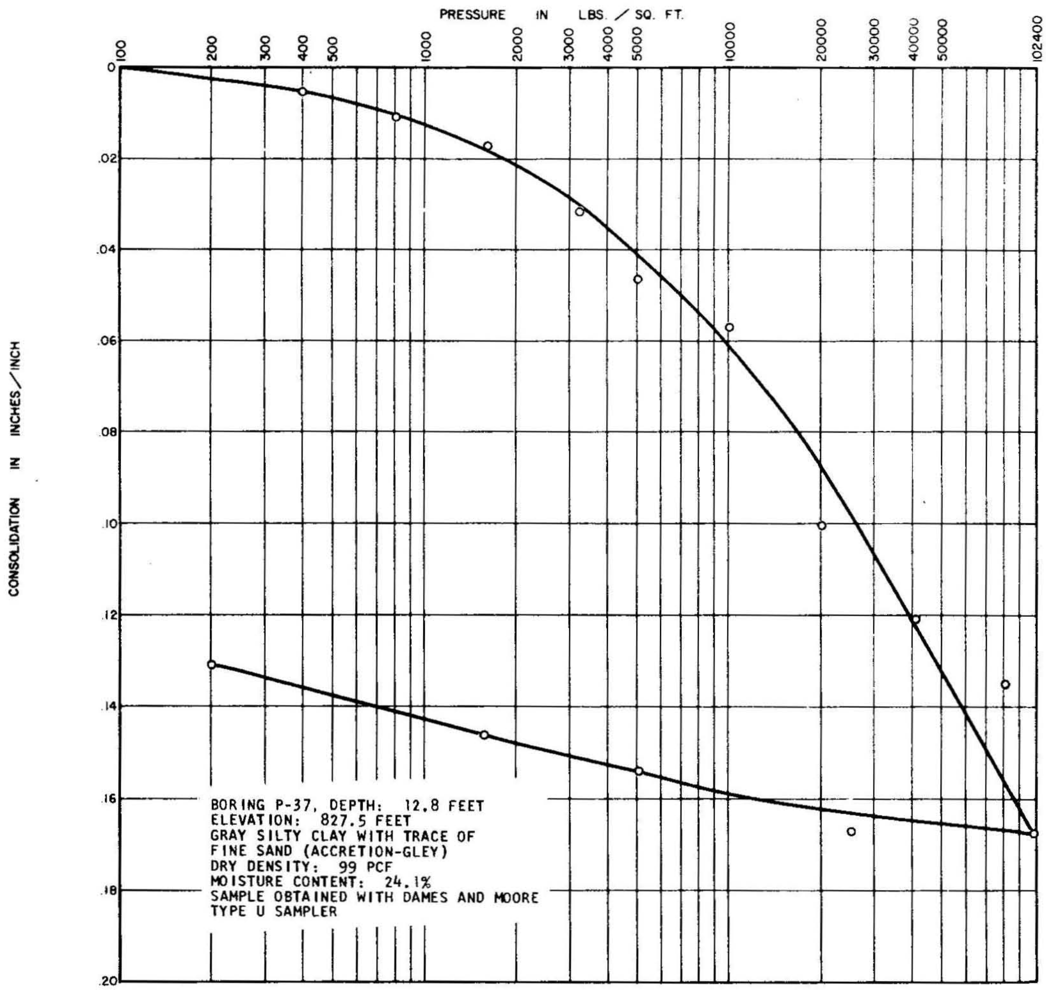

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FIGURE 2.5-414

CONSOLIDATION TEST DATA

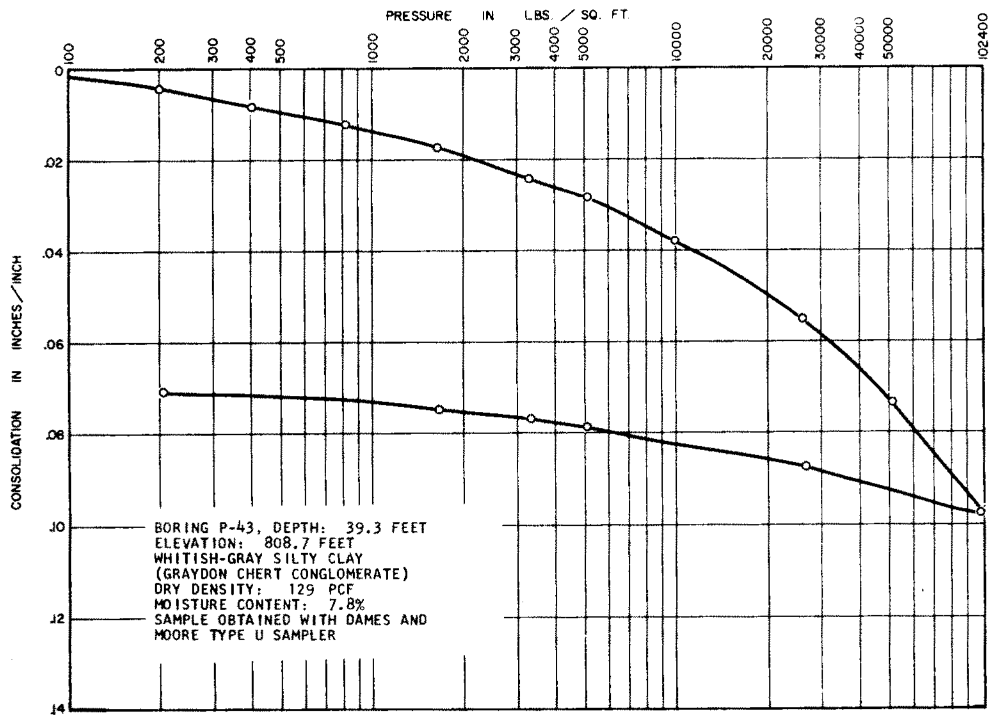

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FIGURE 2.5-415

CONSOLIDATION TEST DATA

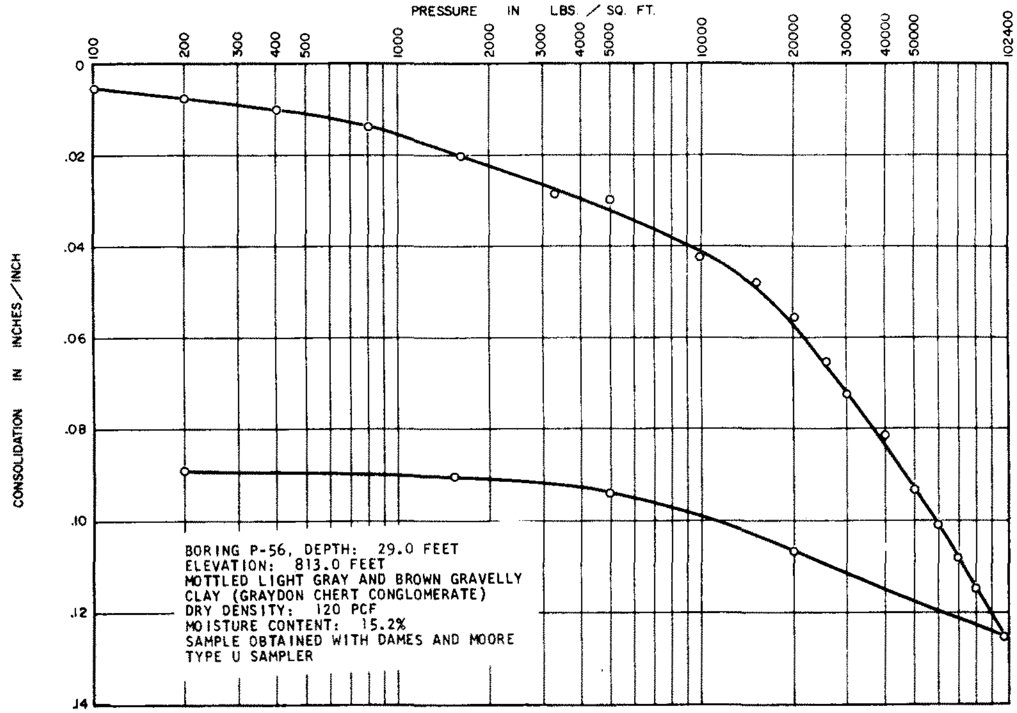

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FIGURE 2.5-416

CONSOLIDATION TEST DATA

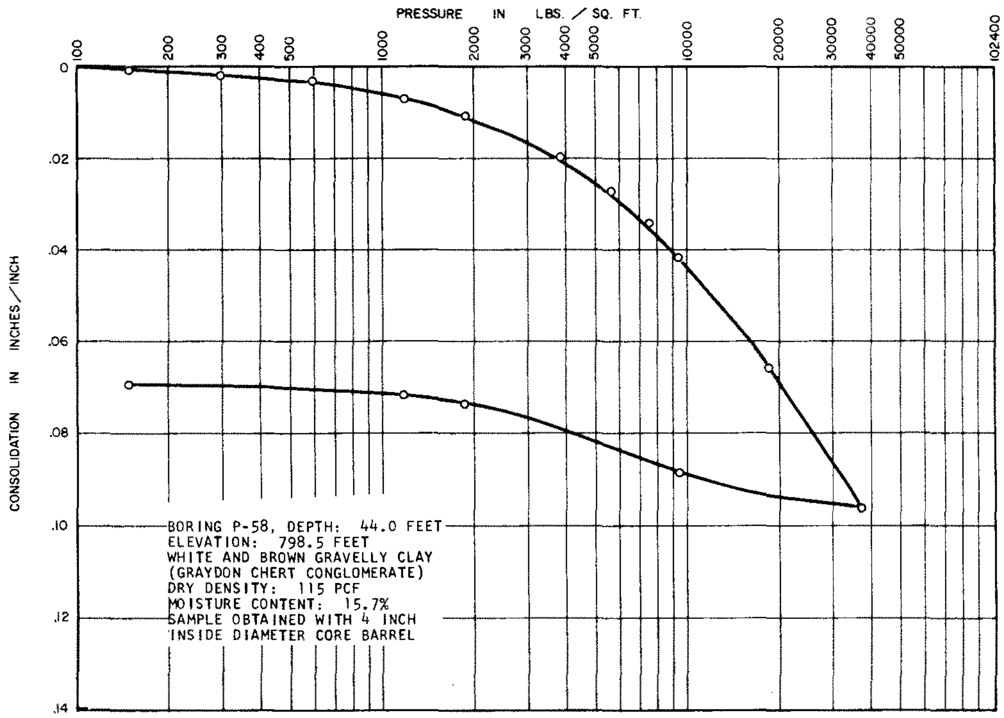

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FIGURE 2.5-417

CONSOLIDATION TEST DATA

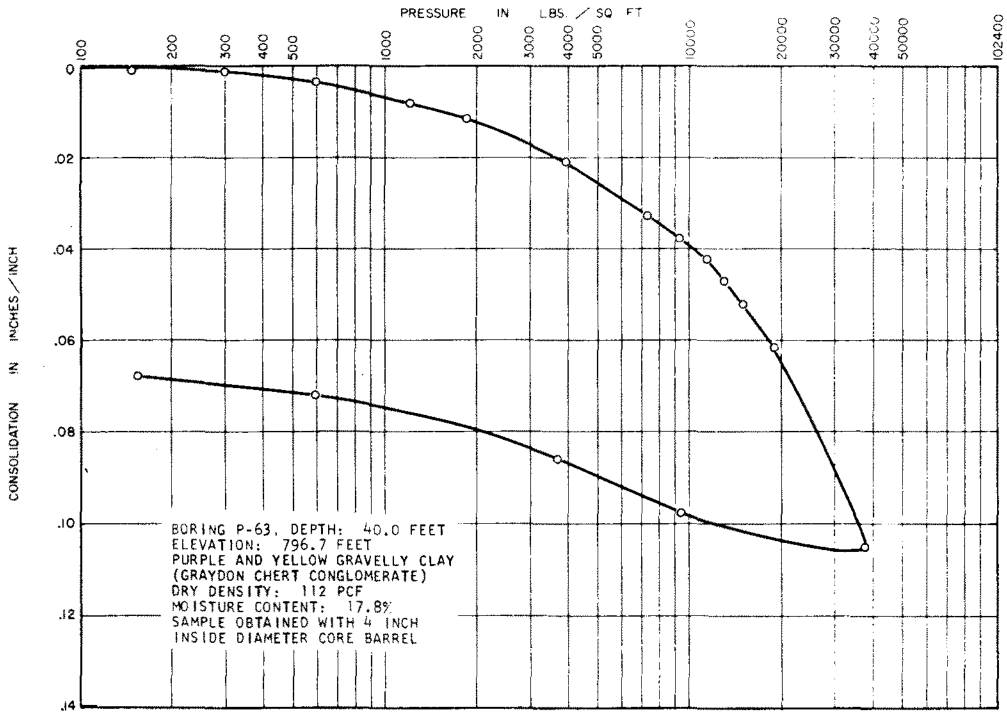

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FIGURE 2.5-418

CONSOLIDATION TEST DATA

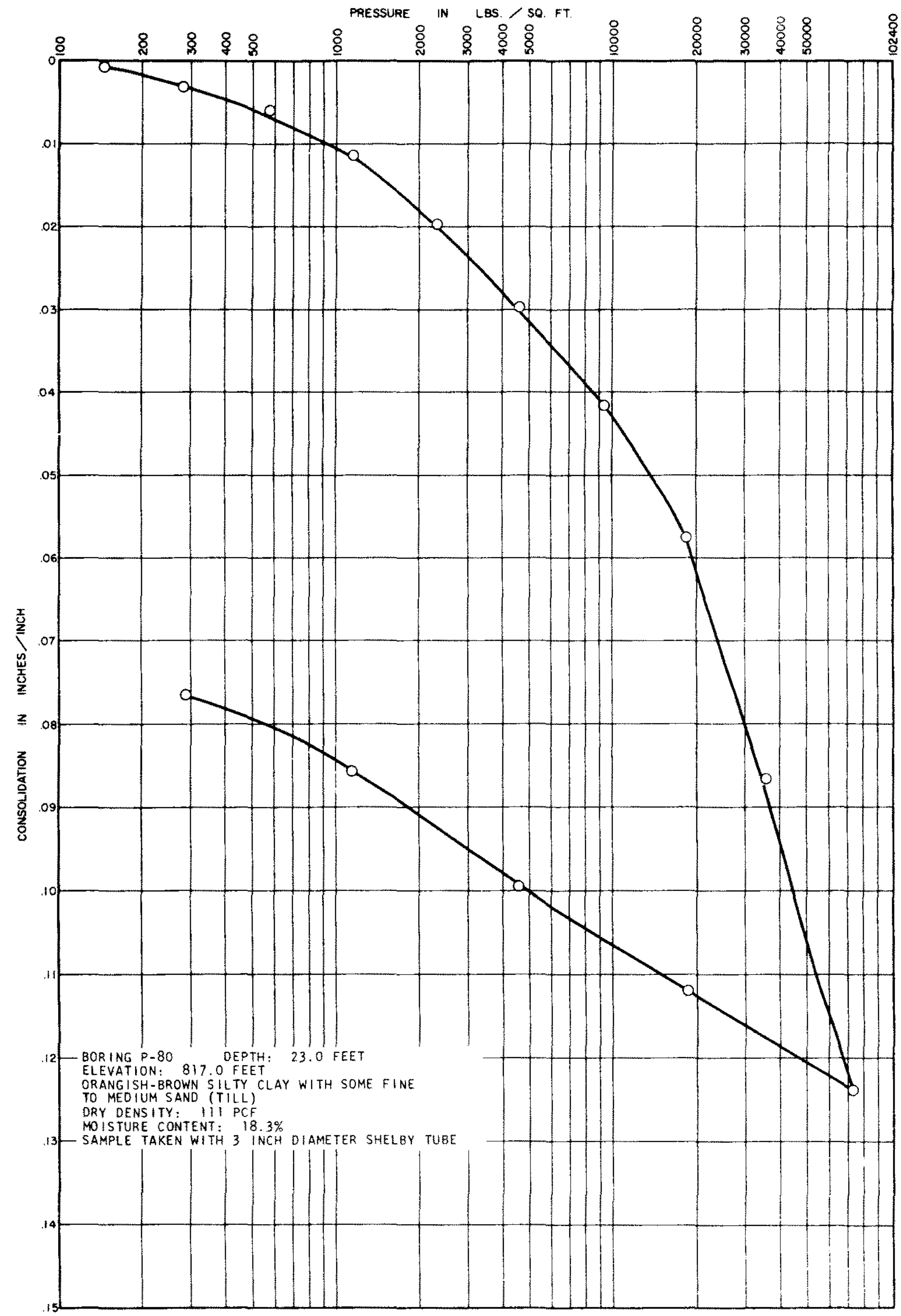

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FIGURE 2.5-419

CONSOLIDATION TEST DATA

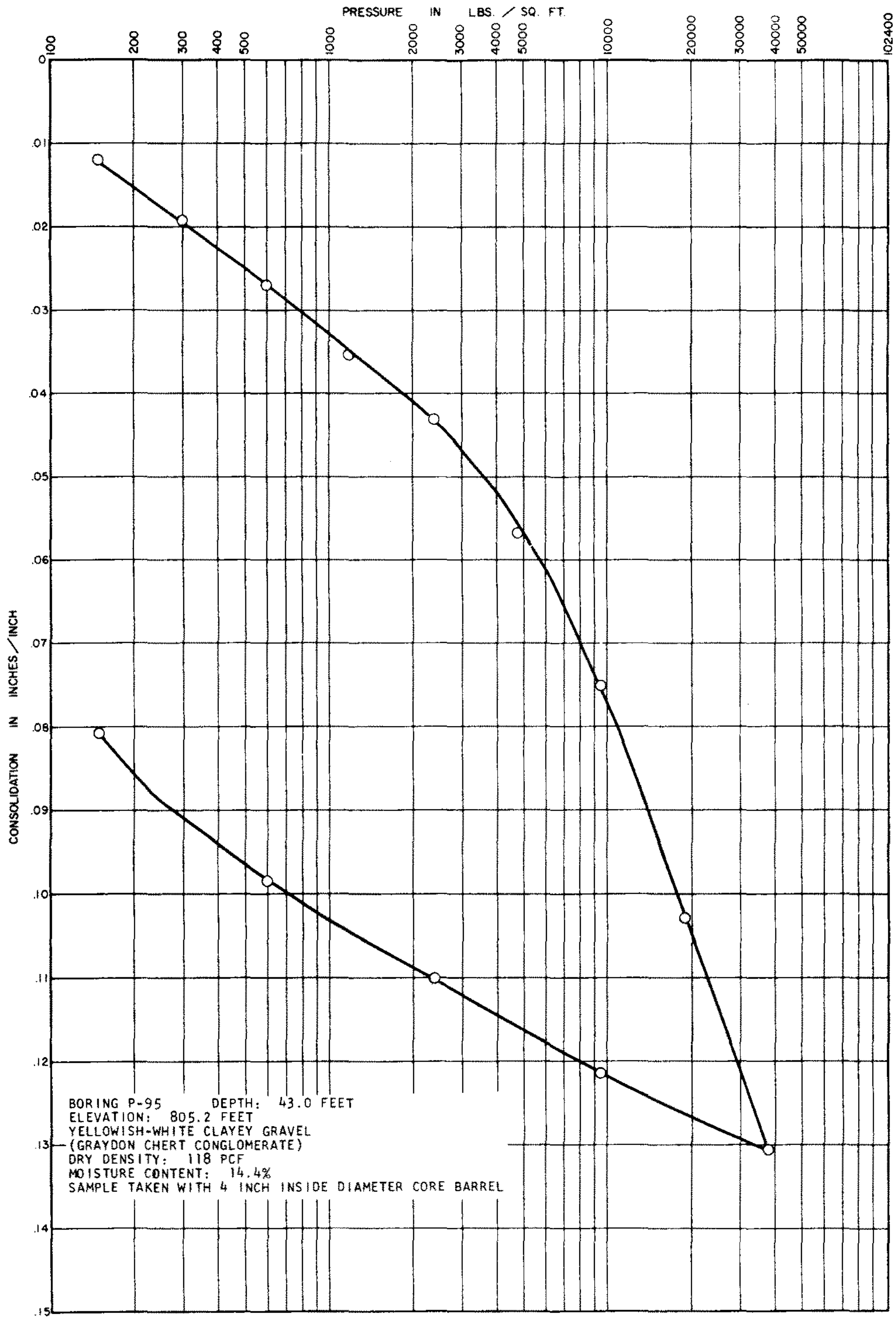

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FIGURE 2.5-420

CONSOLIDATION TEST DATA

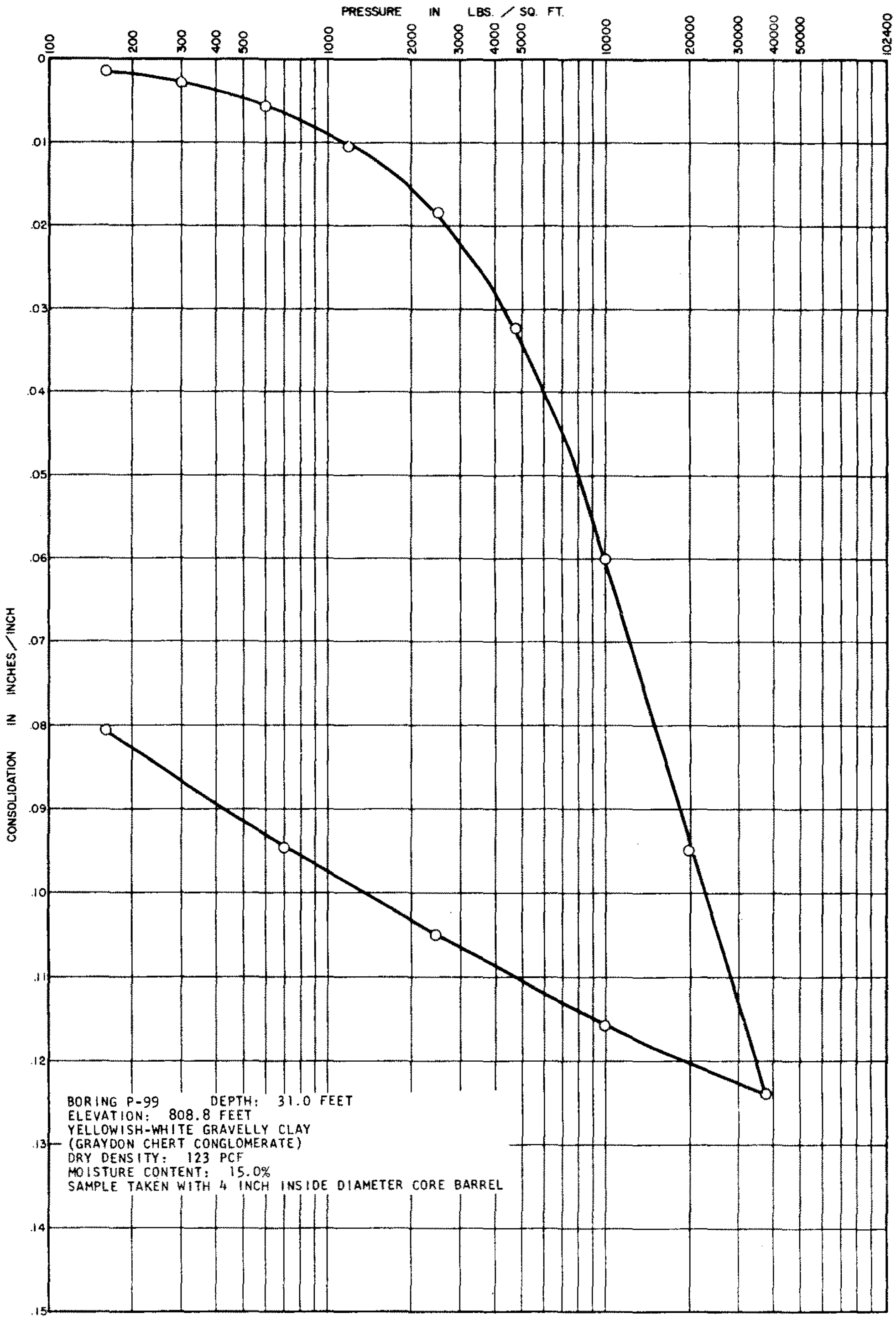

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FIGURE 2.5-421

CONSOLIDATION TEST DATA

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FIGURE 2.5-422

CONSOLIDATION TEST DATA

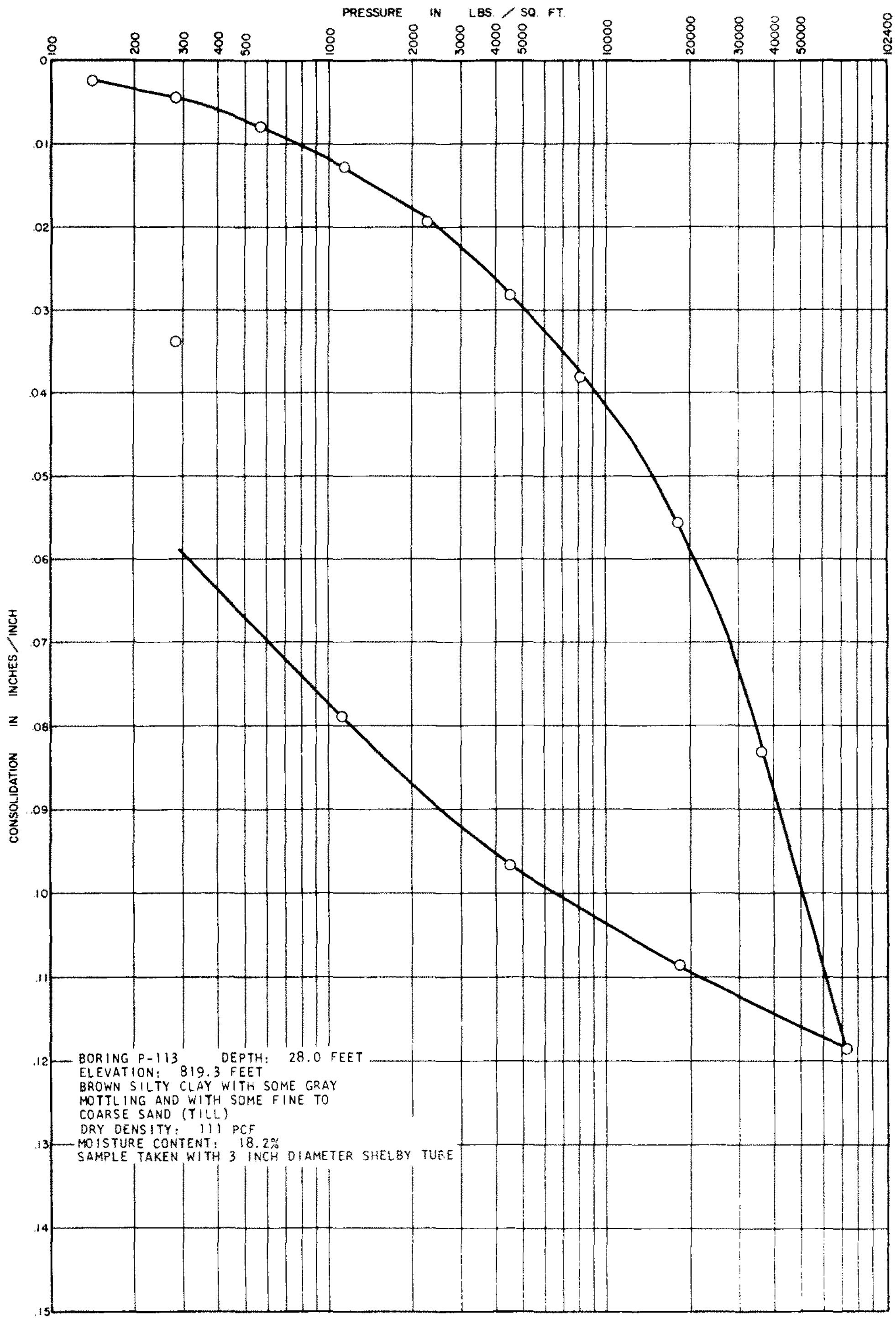

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FIGURE 2.5-423

CONSOLIDATION TEST DATA

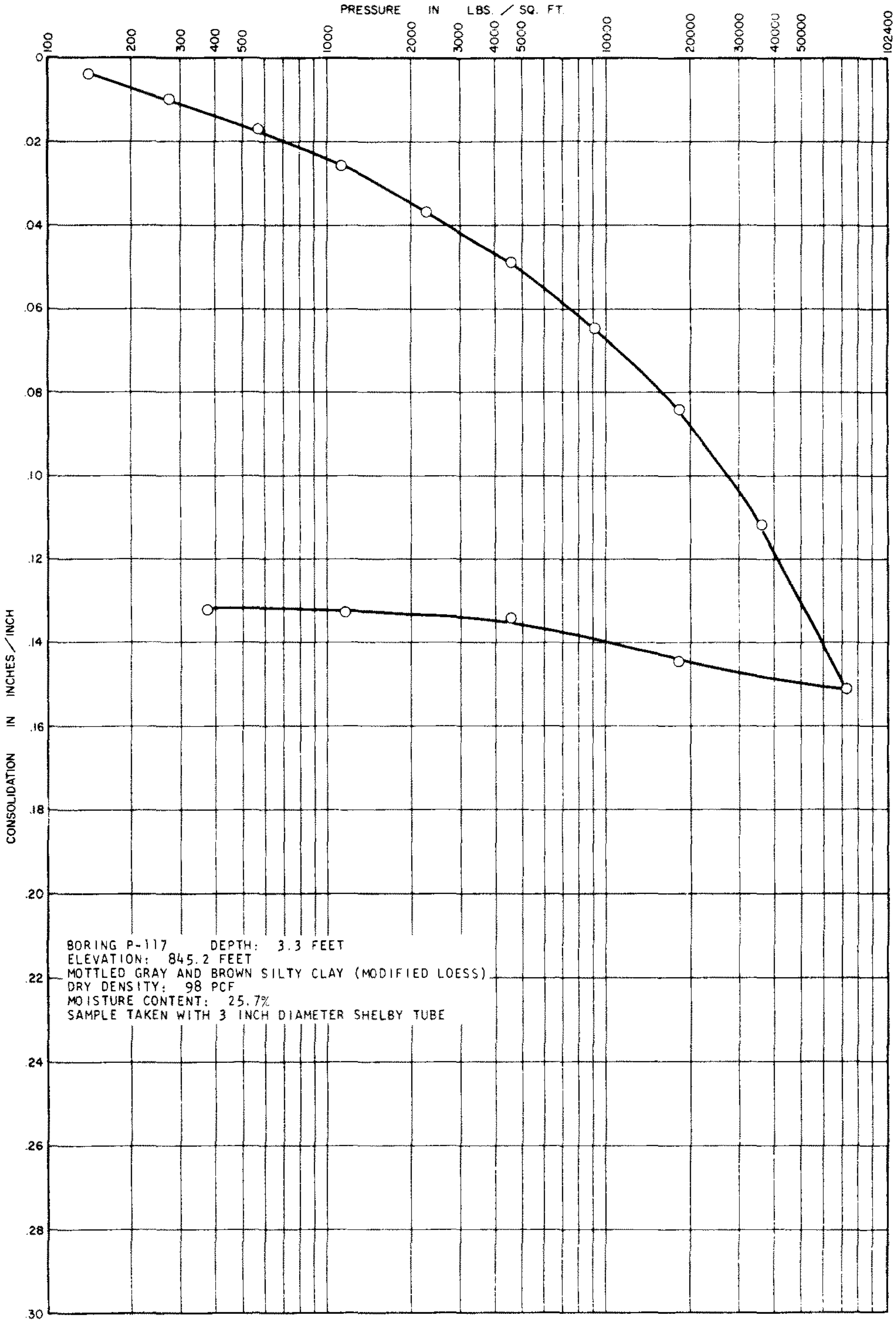

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FIGURE 2.5-424

CONSOLIDATION TEST DATA

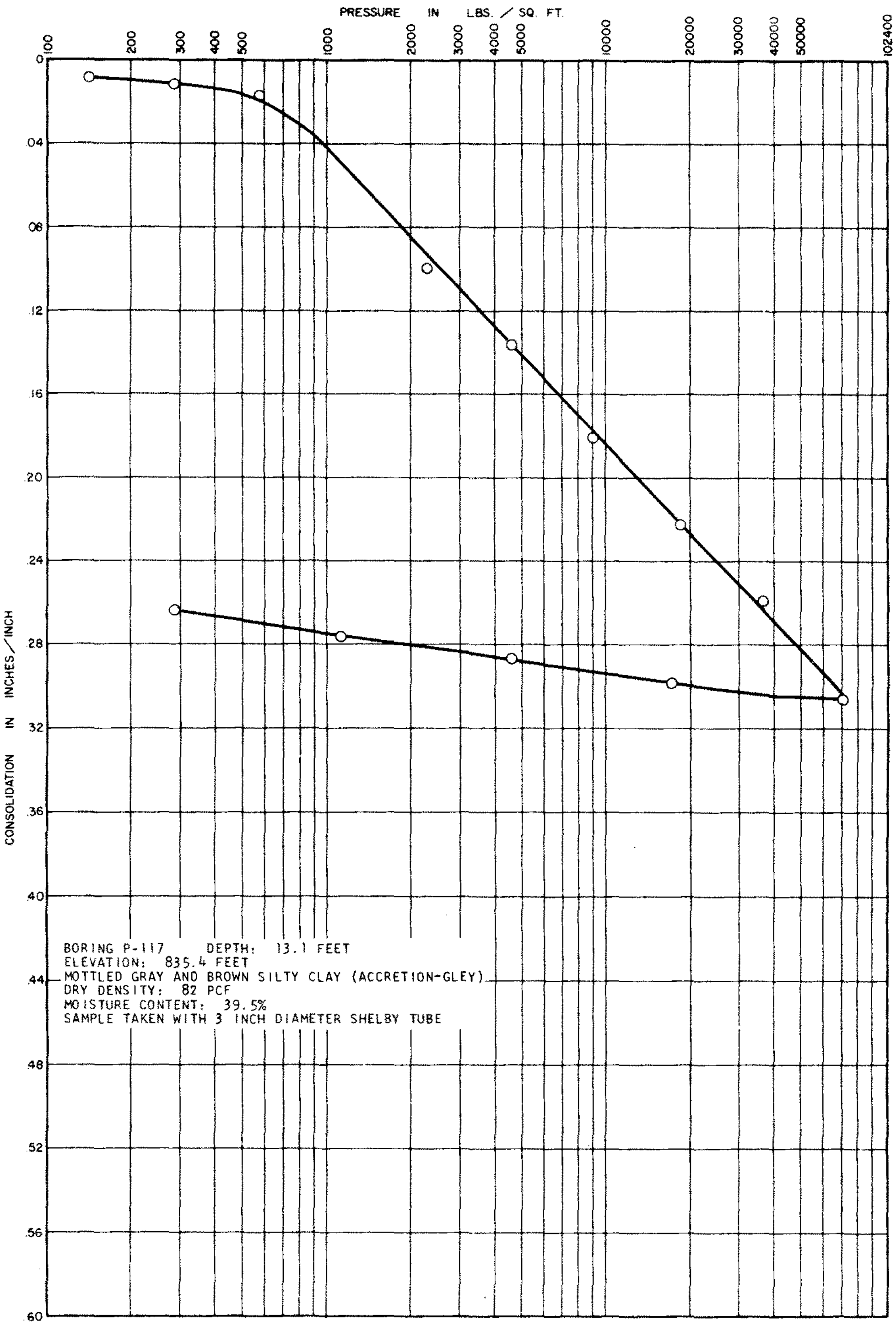

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FIGURE 2.5-425

CONSOLIDATION TEST DATA

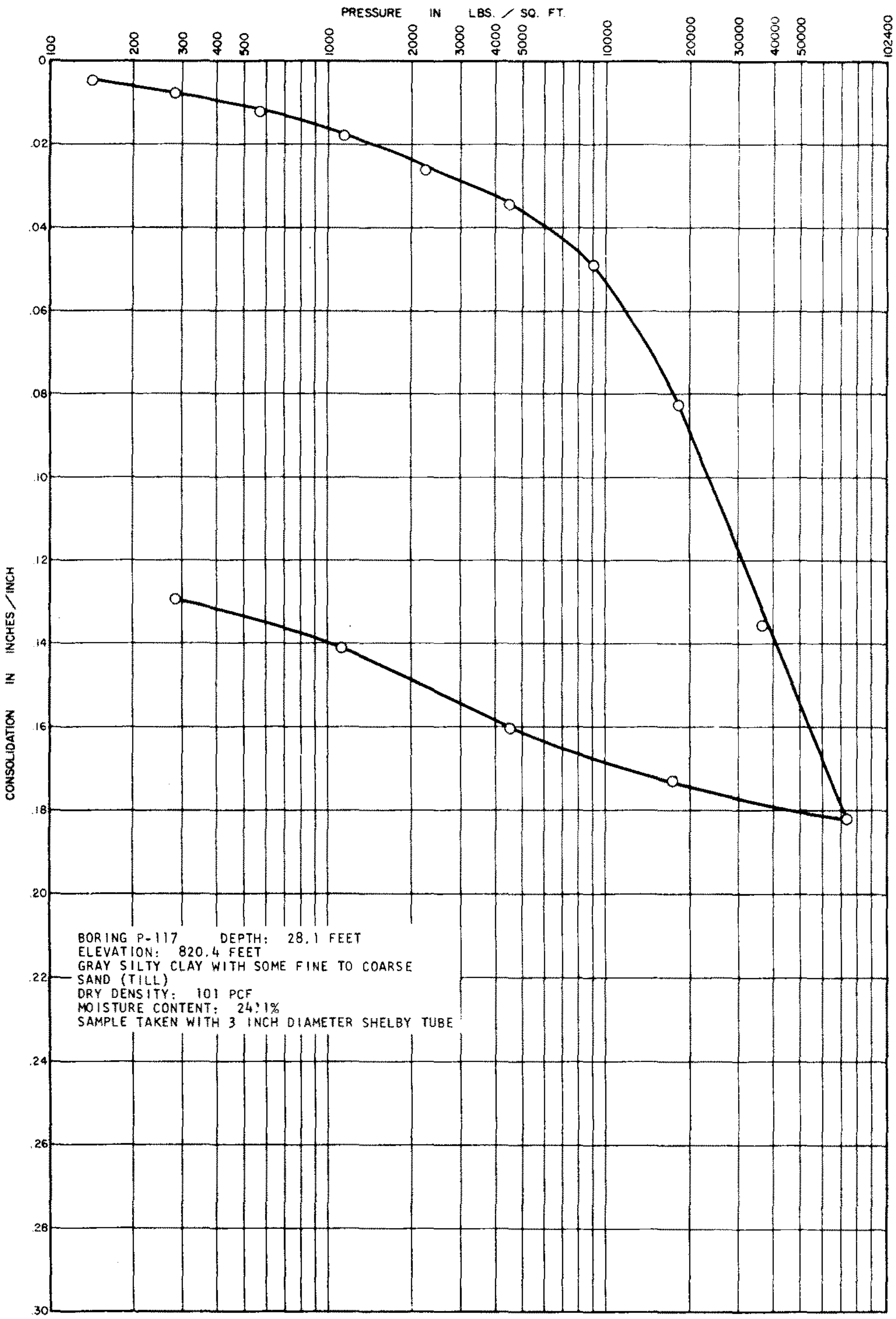

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FIGURE 2.5-426

CONSOLIDATION TEST DATA

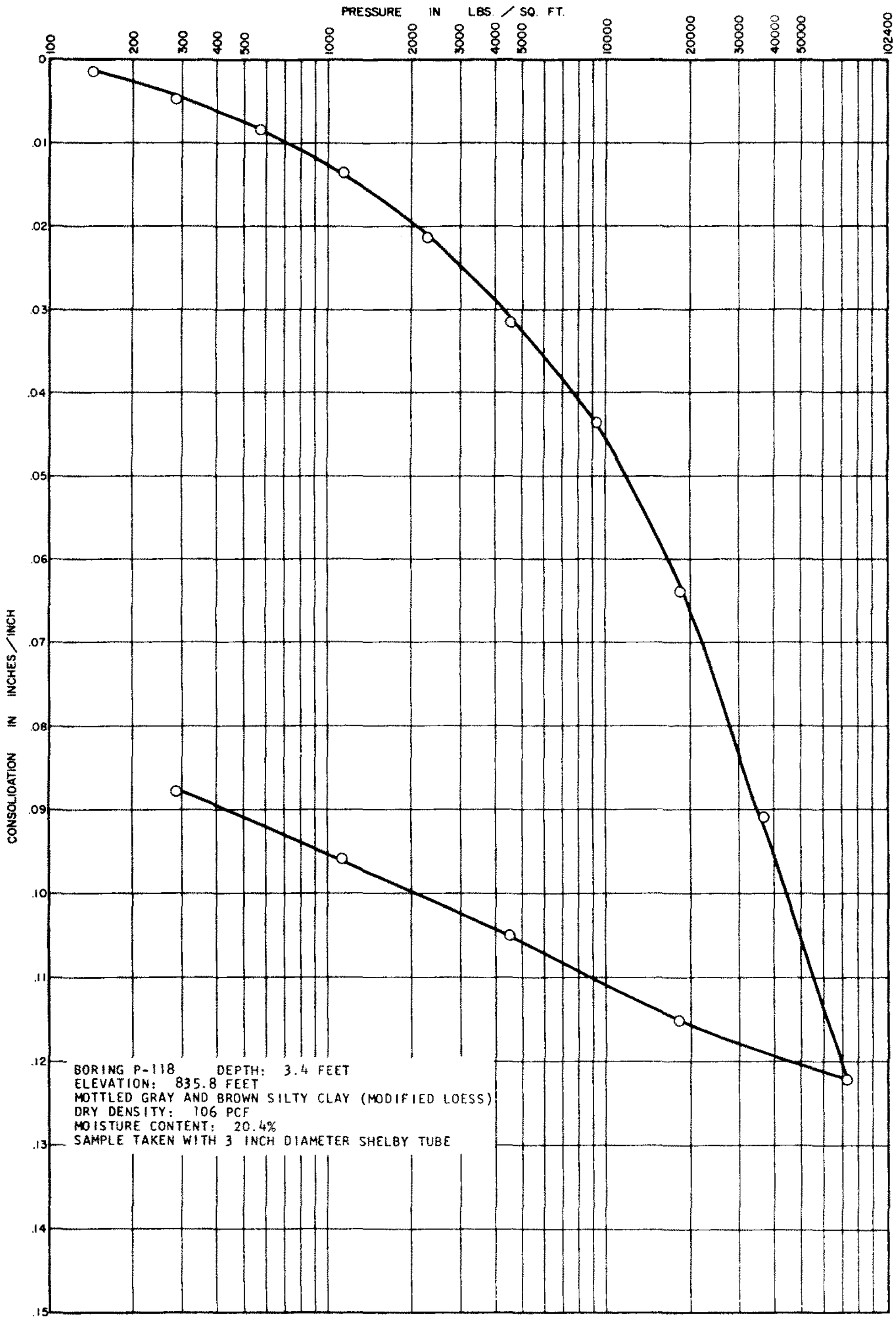

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FIGURE 2.5-427

CONSOLIDATION TEST DATA

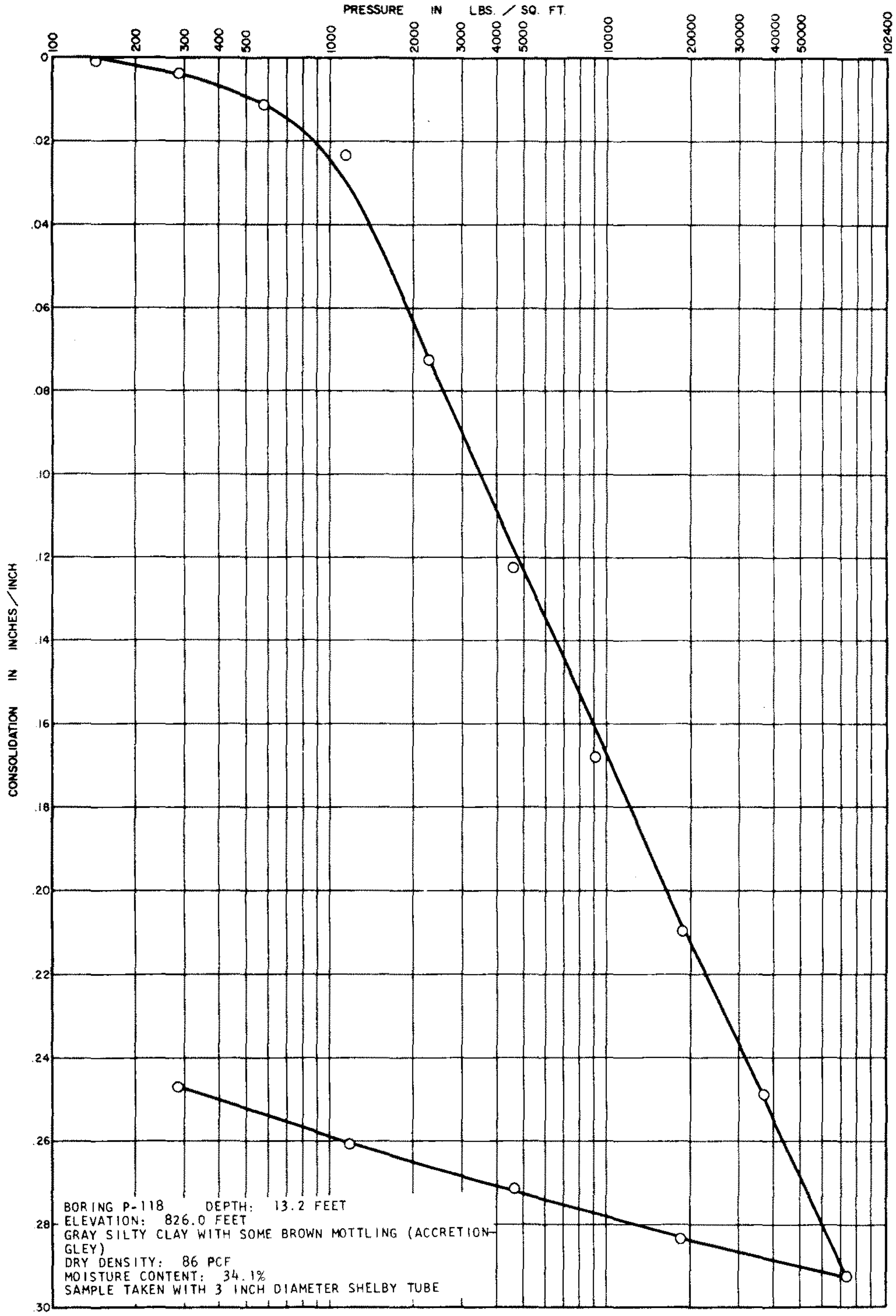

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FIGURE 2.5-428

CONSOLIDATION TEST DATA

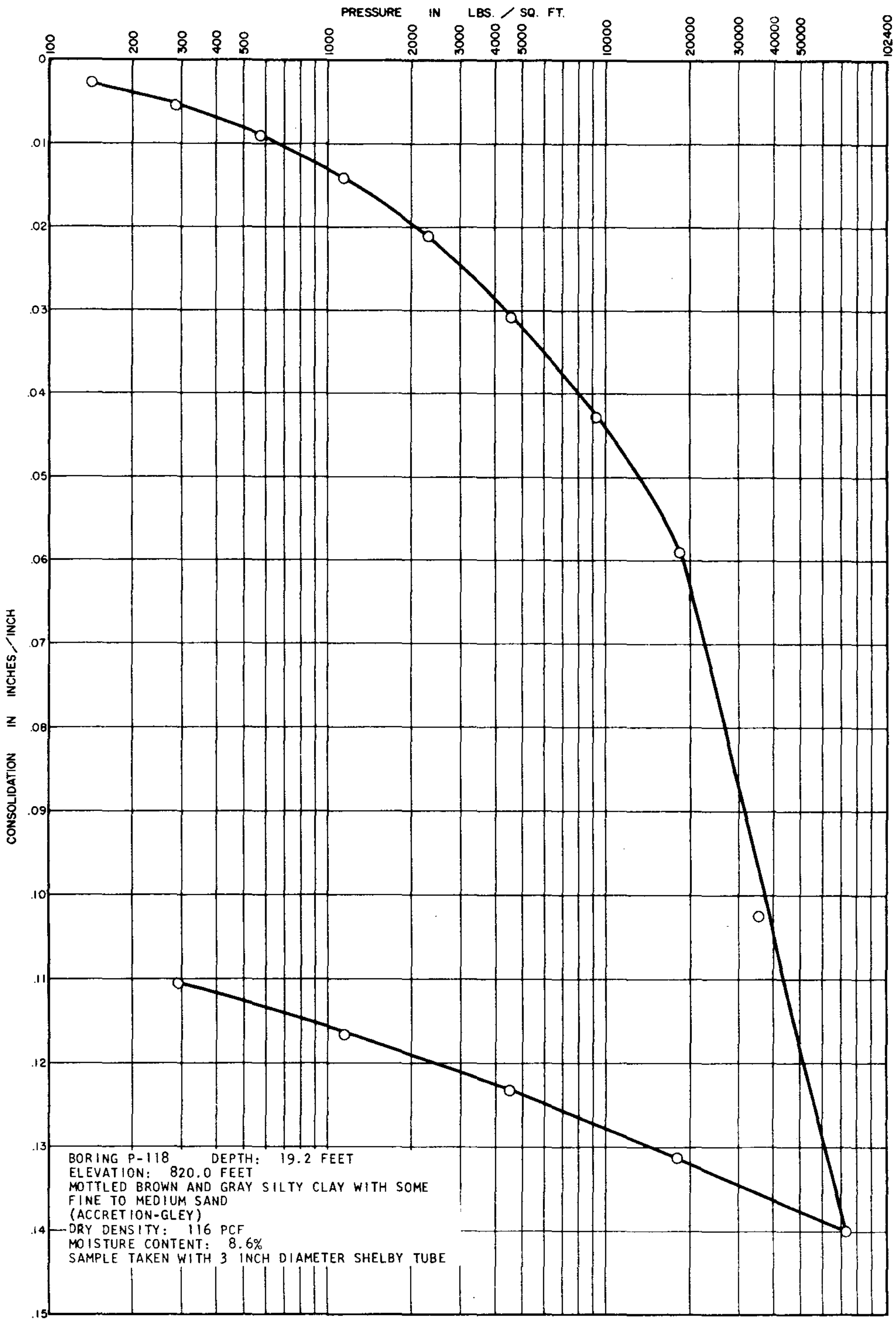

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FIGURE 2.5-429

CONSOLIDATION TEST DATA

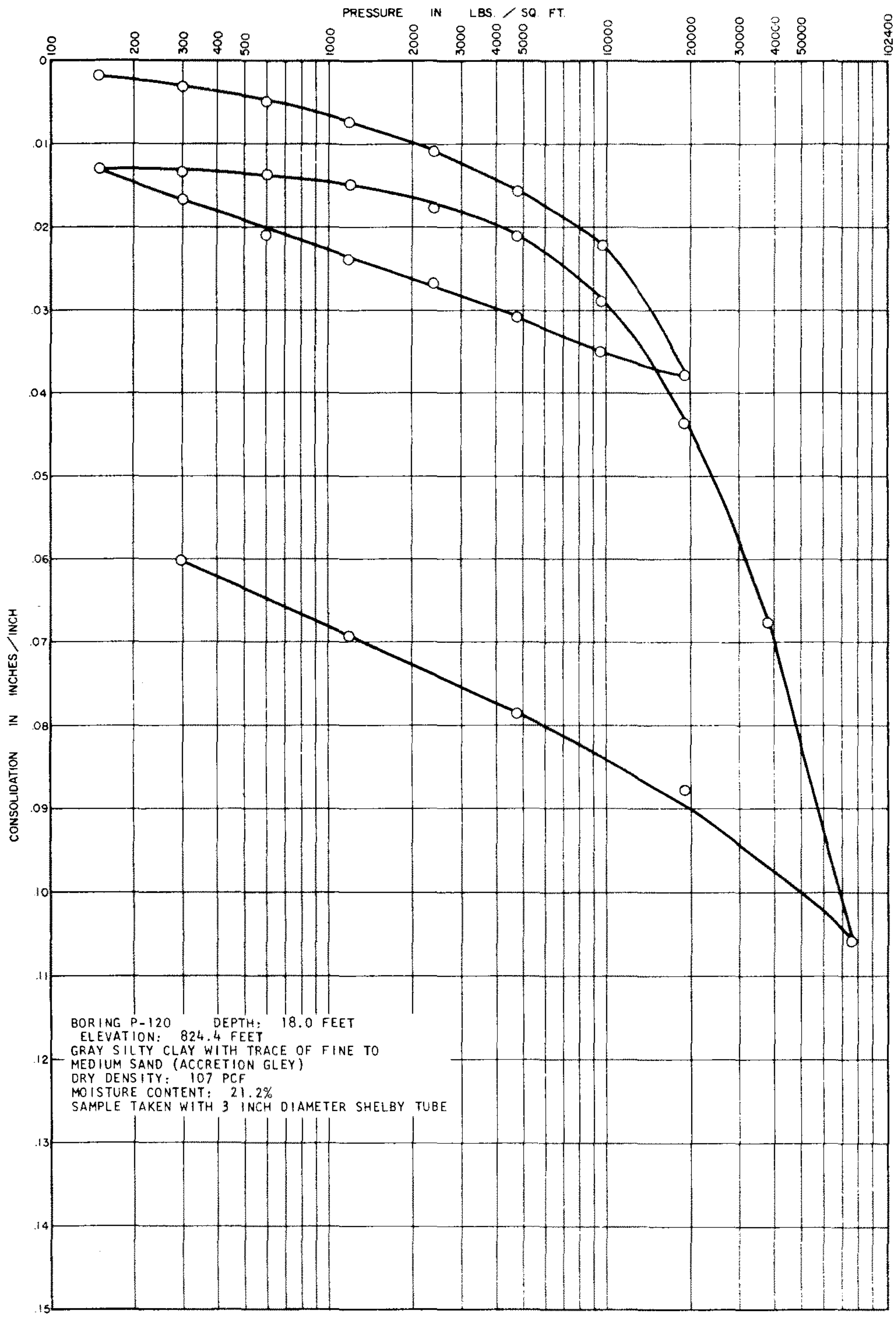

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FIGURE 2.5-430

CONSOLIDATION TEST DATA

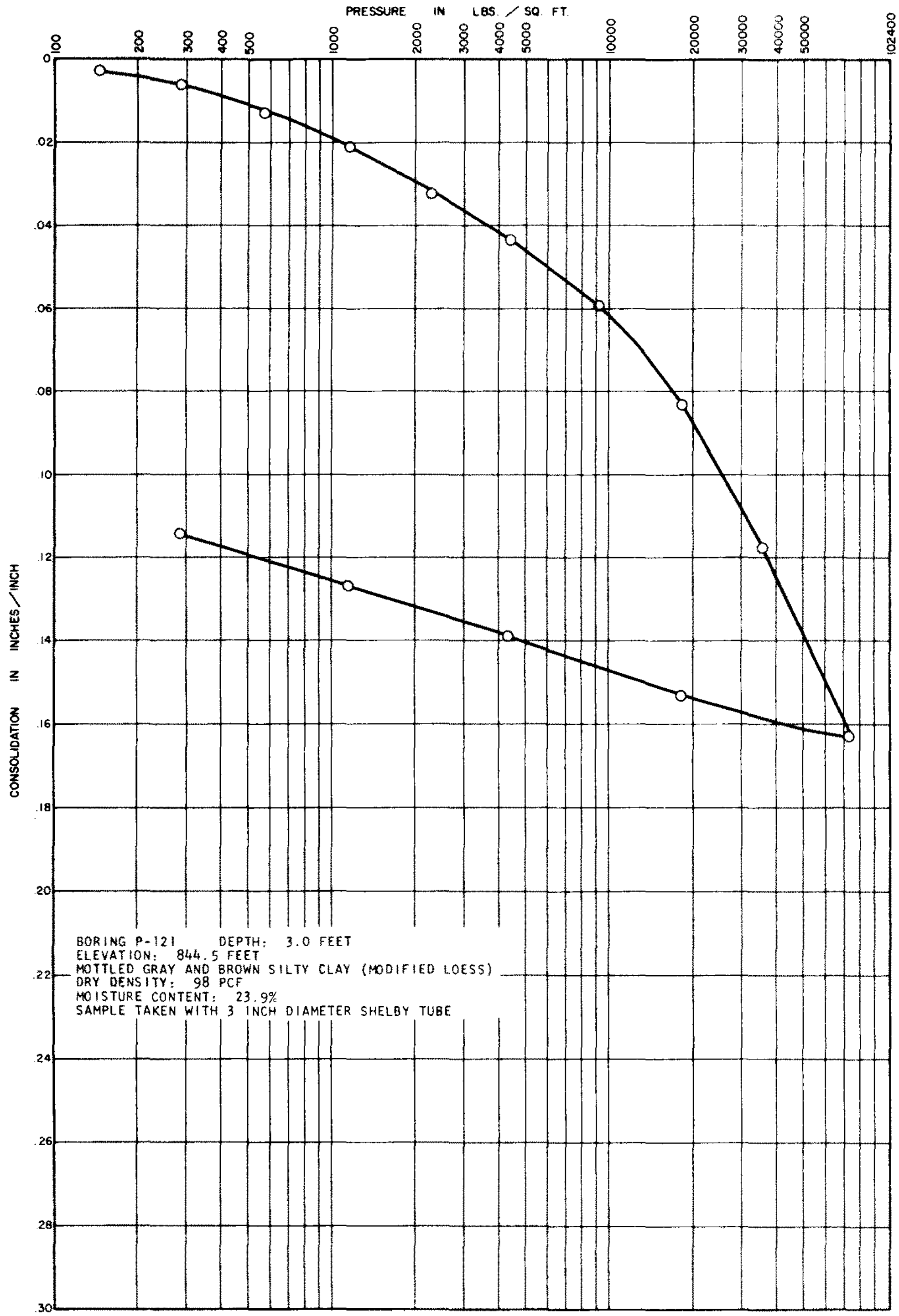

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FIGURE 2.5-431

CONSOLIDATION TEST DATA

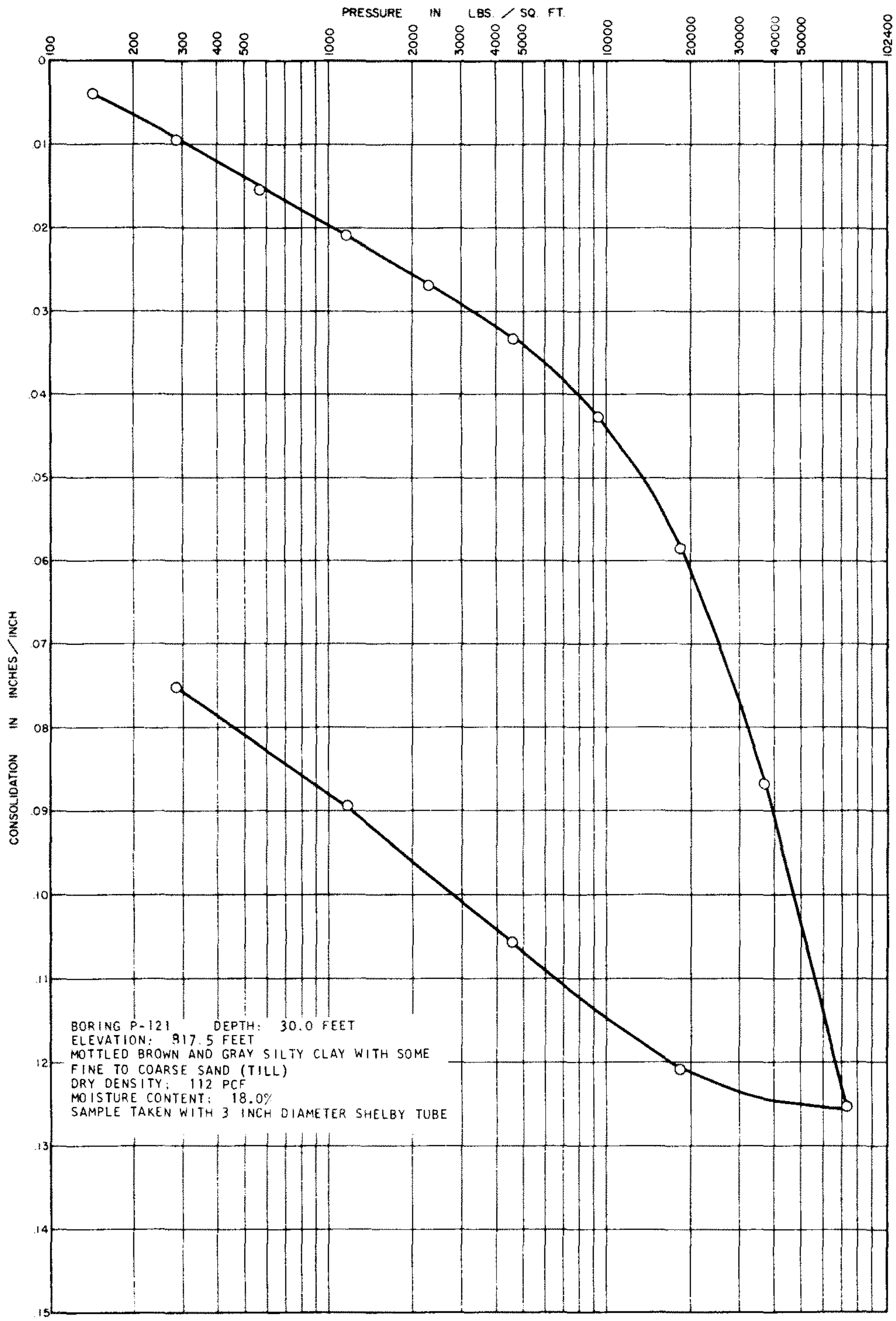

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FIGURE 2.5-432

CONSOLIDATION TEST DATA

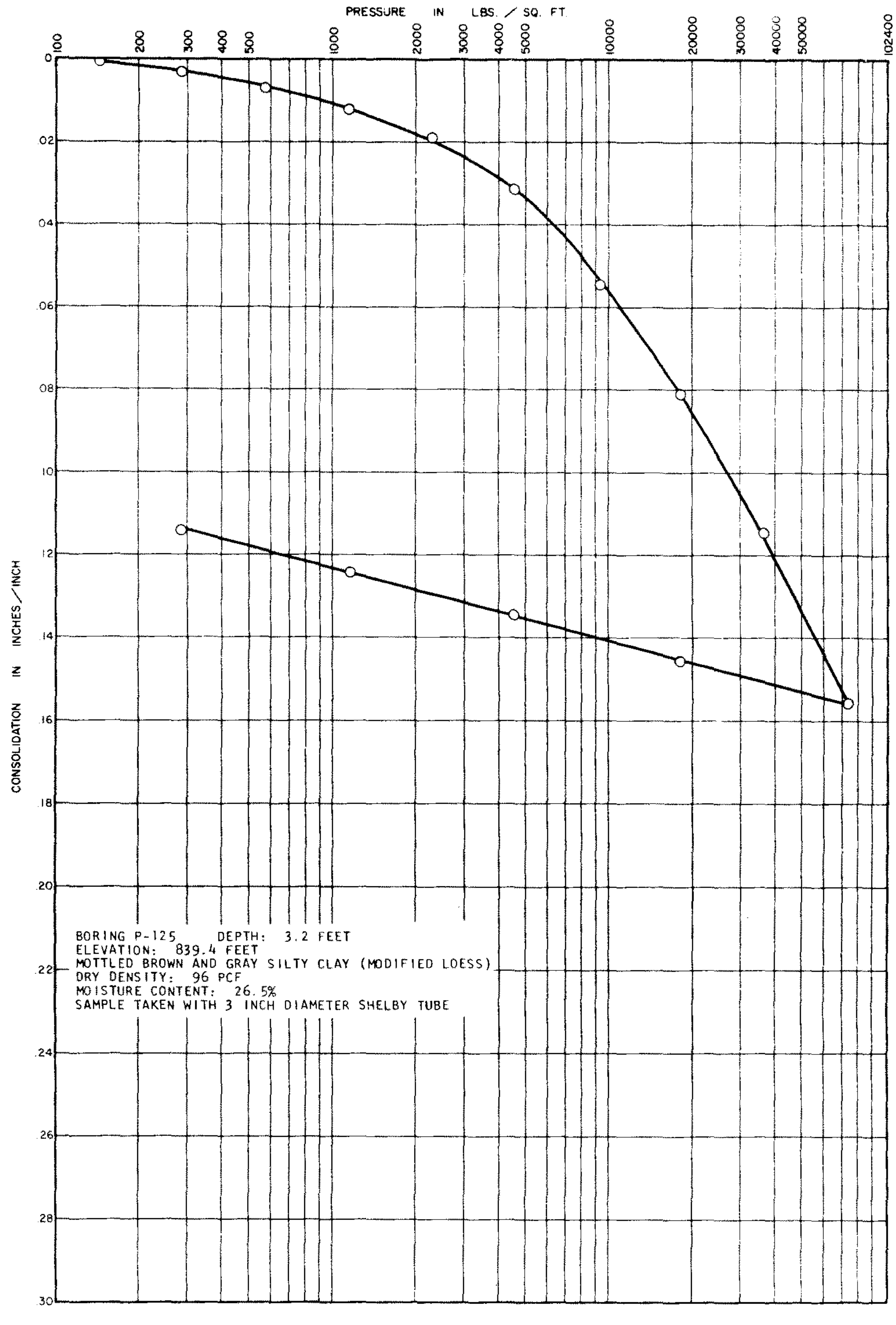

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FIGURE 2.5-433

CONSOLIDATION TEST DATA

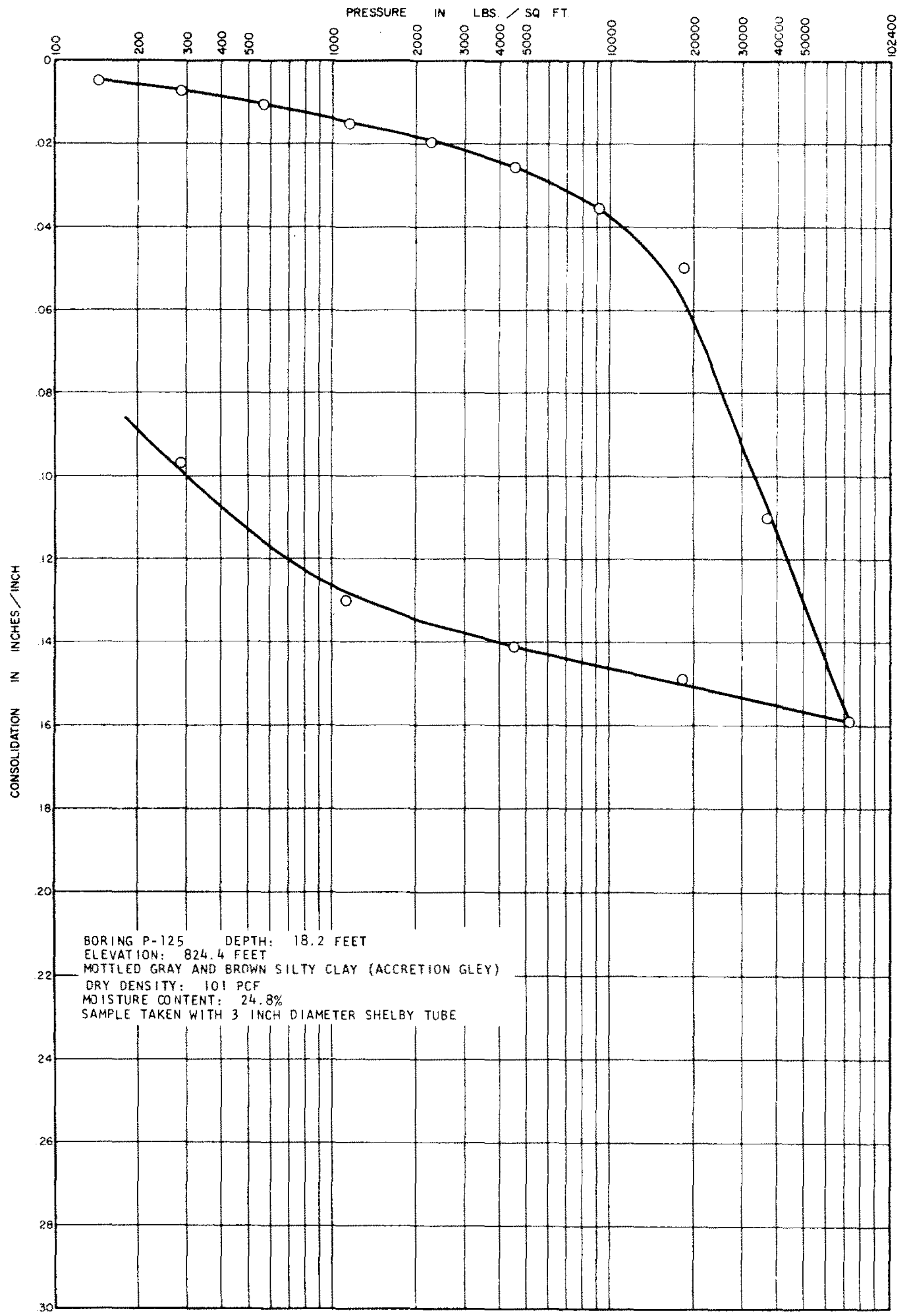

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FIGURE 2.5-434

CONSOLIDATION TEST DATA

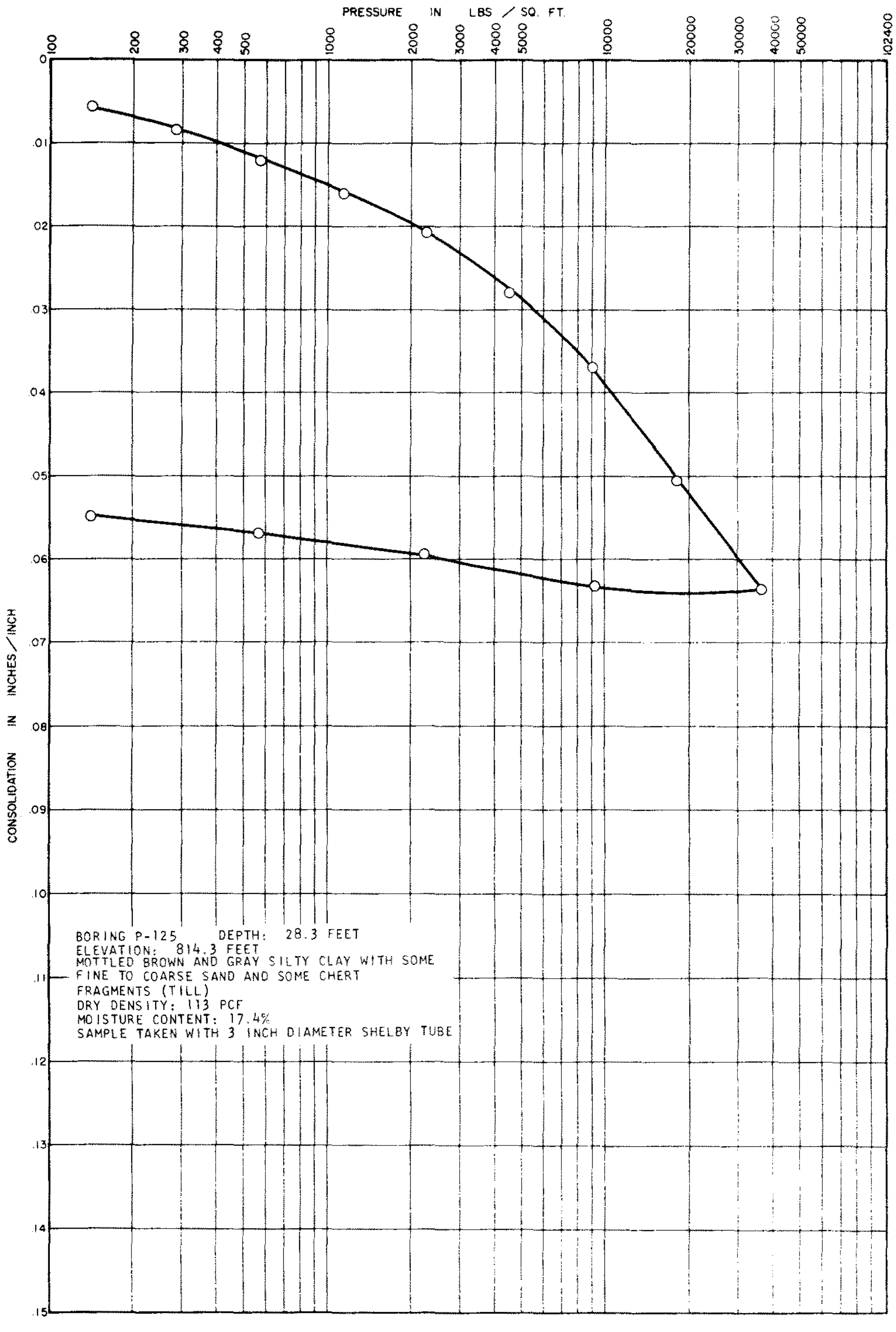

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FIGURE 2.5-435

CONSOLIDATION TEST DATA

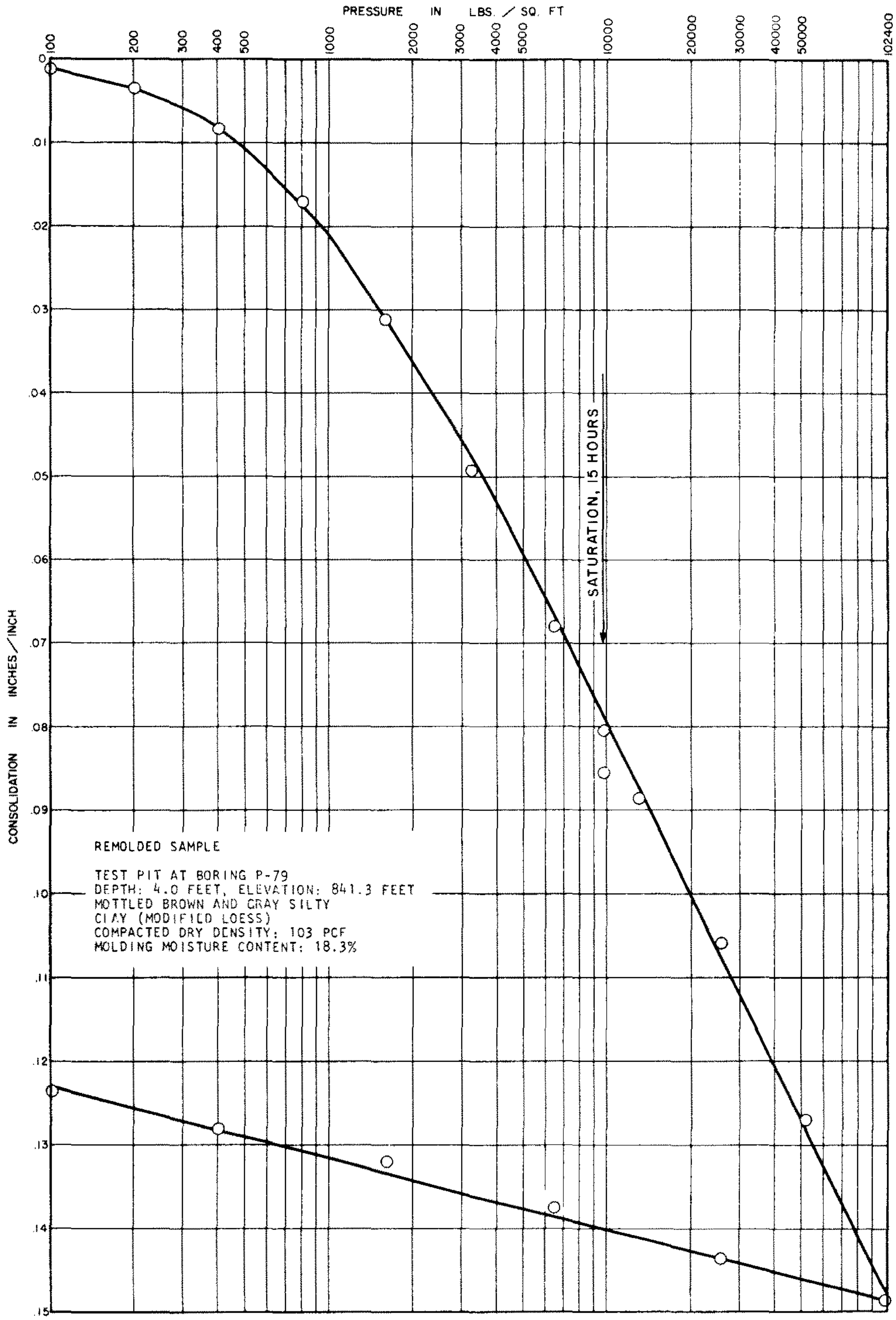

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FIGURE 2.5-436

CONSOLIDATION TEST DATA

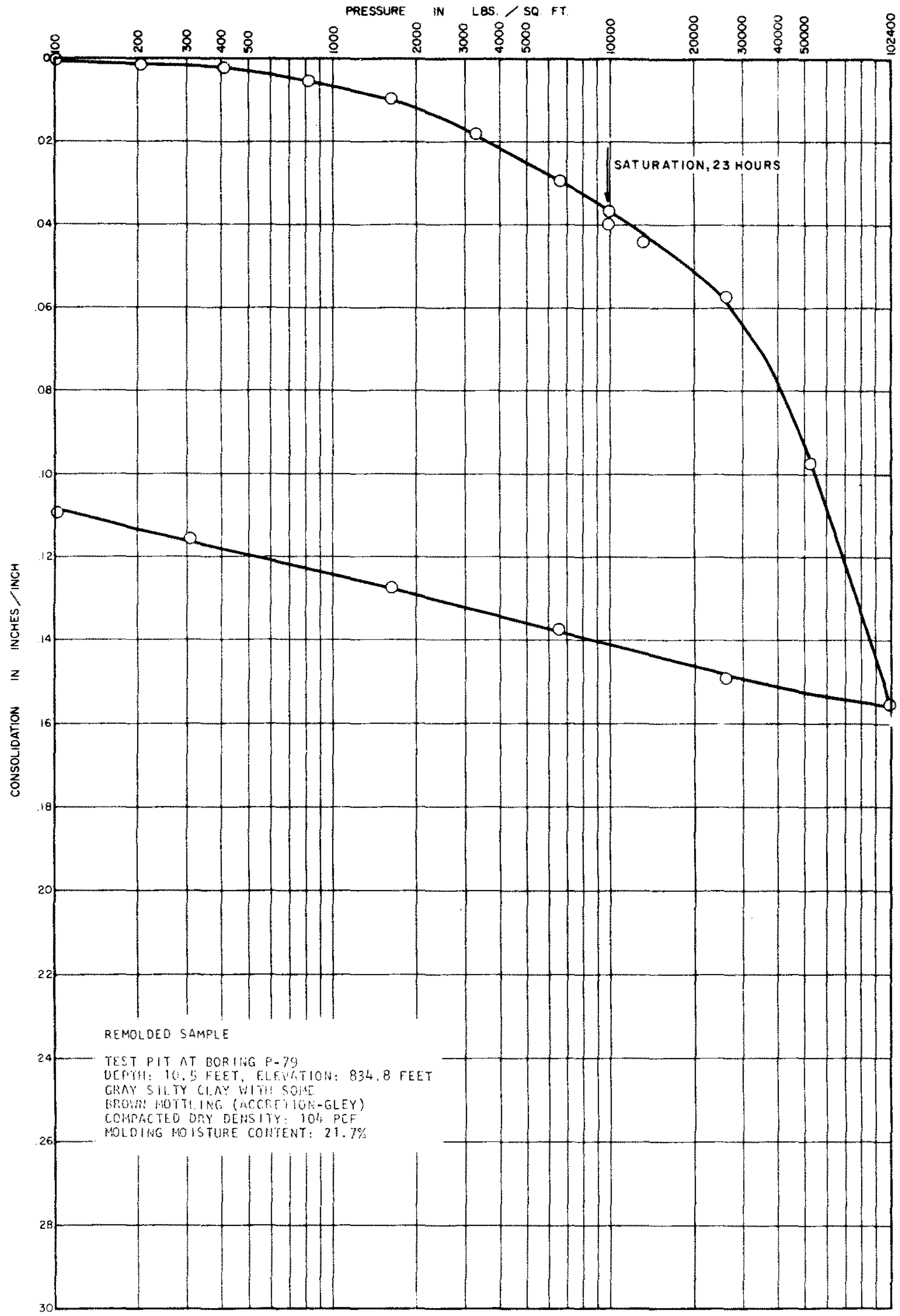

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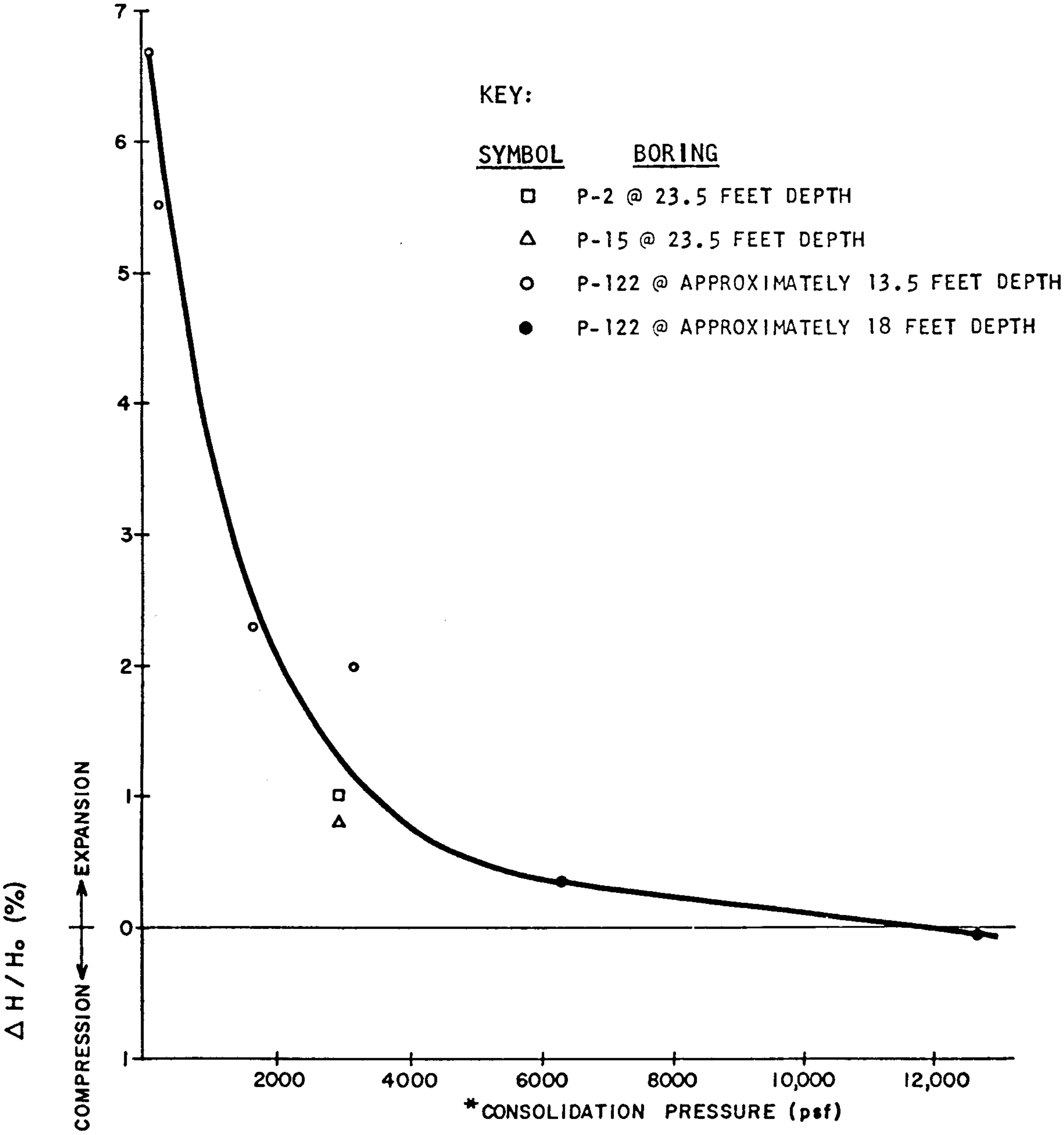
FIGURE 2.5-437

CONSOLIDATION TEST DATA



* SAMPLES ARE CONSOLIDATED TO GIVEN PRESSURE, INUNDATED, AND THEN EXPANSION OR COMPRESSION MEASURED.

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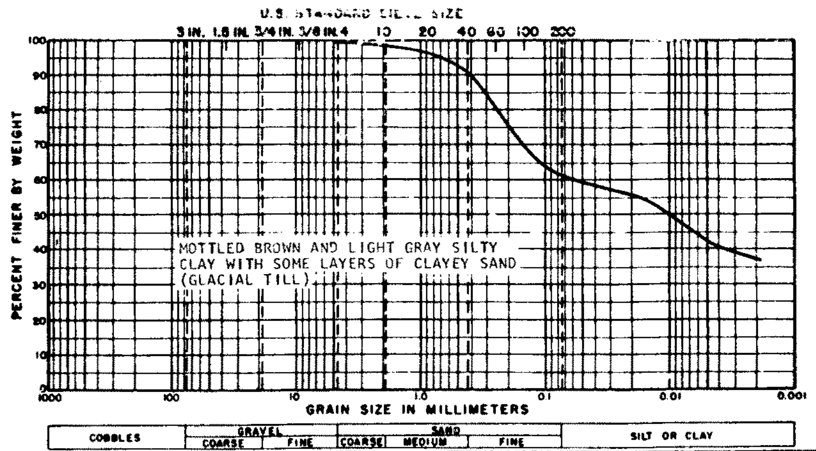
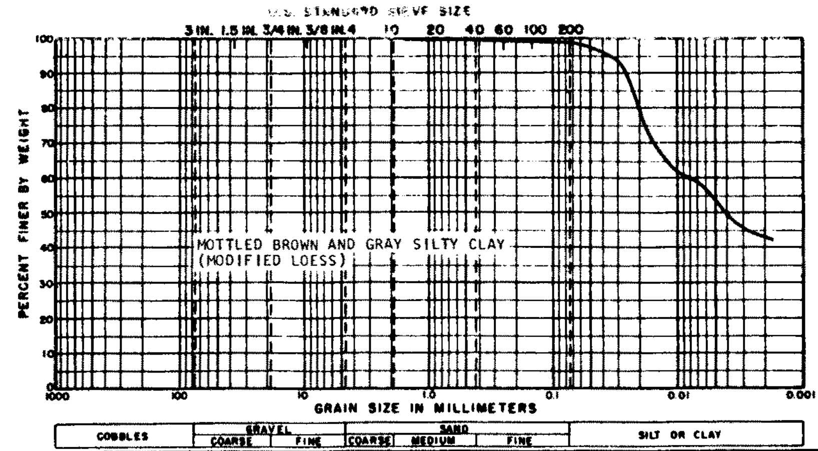
FIGURE 2.5-438

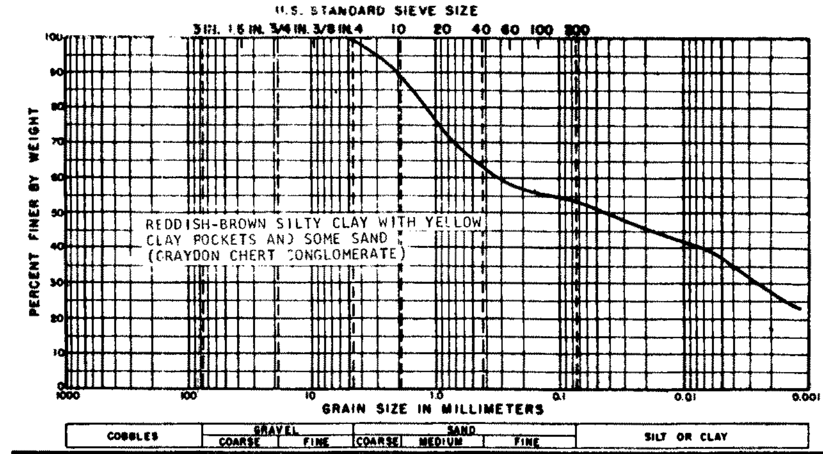
SWELLING TEST RESULTS
ACCRETION-GLEY



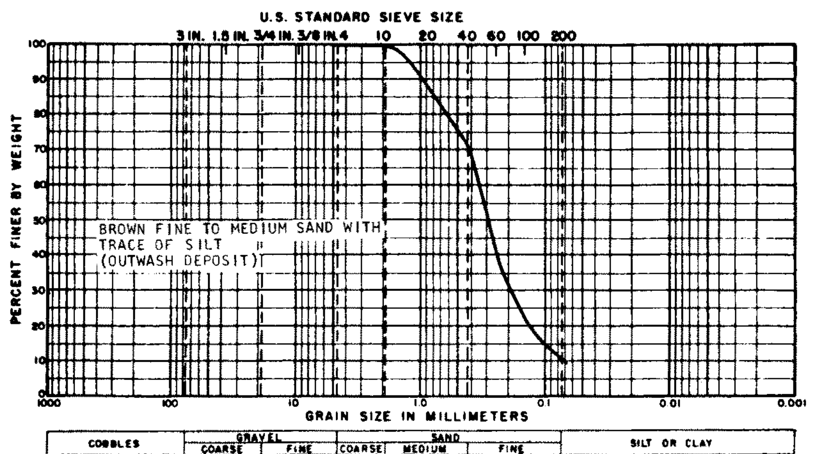
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
R-4	19.0'	CL	11.2			



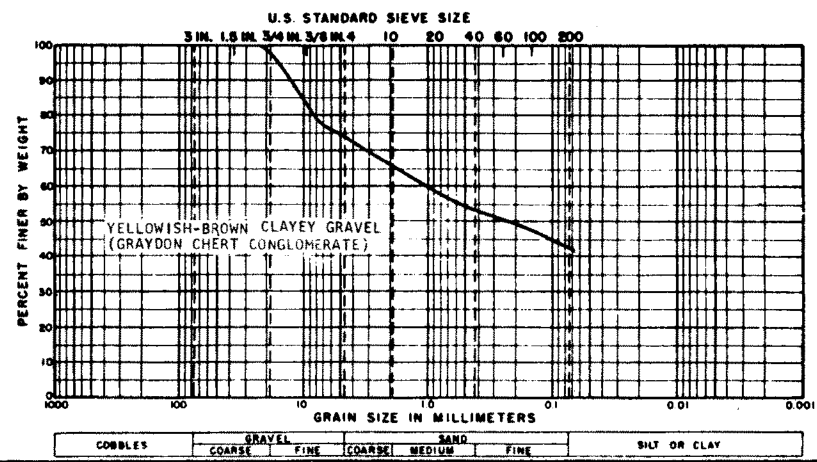
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
R-6	8.5'	CL	21.0			



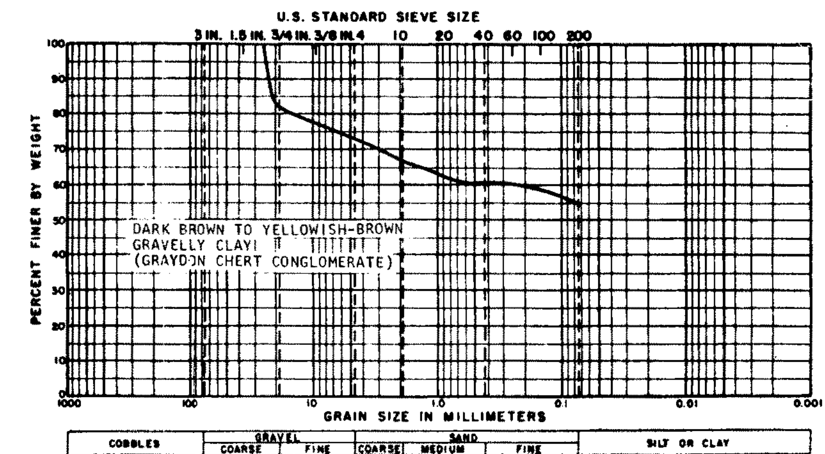
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
R-7	33.5'	CL	14.4			



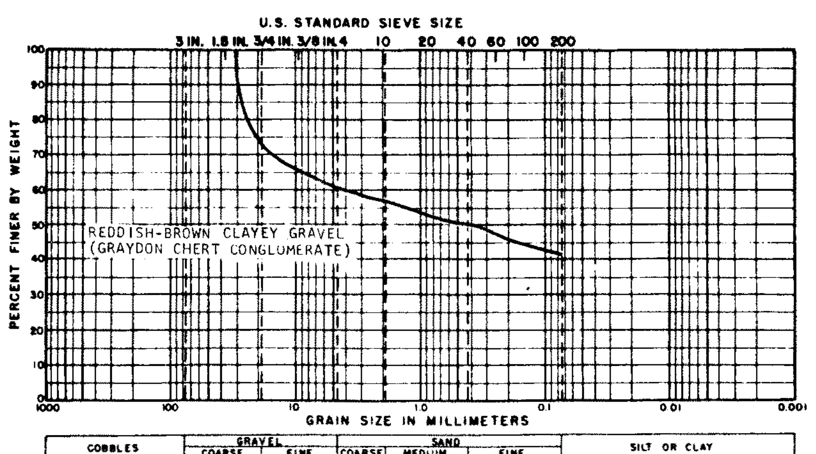
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
R-8	34.0'	SP	5.2			



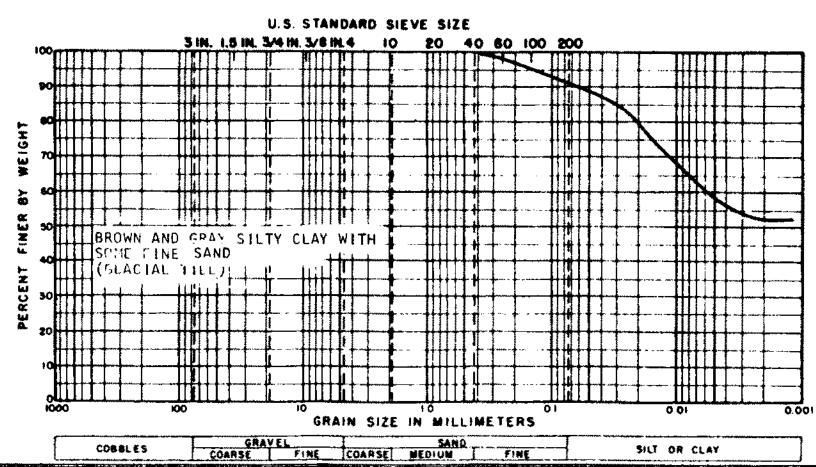
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
R-8	38.5'	GC	11.5			



BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
P-2	43.0	CL	6.7			



BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
P-4	63.0	GC	20.9			



BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
P-6	22.0	CL	18.6			

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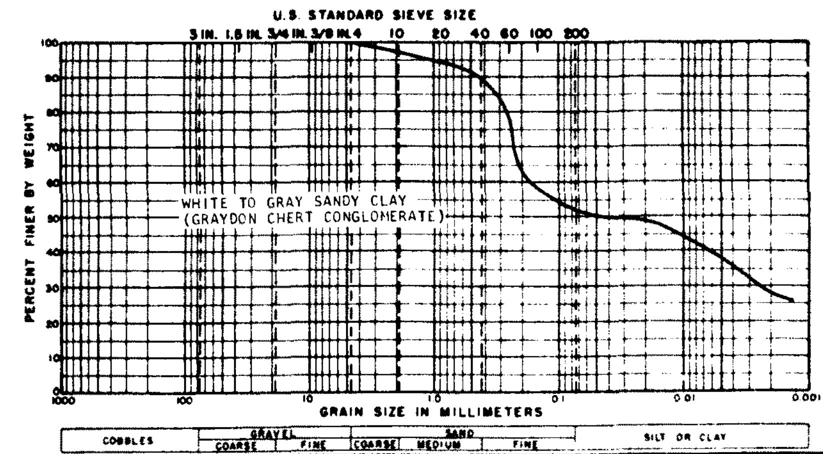
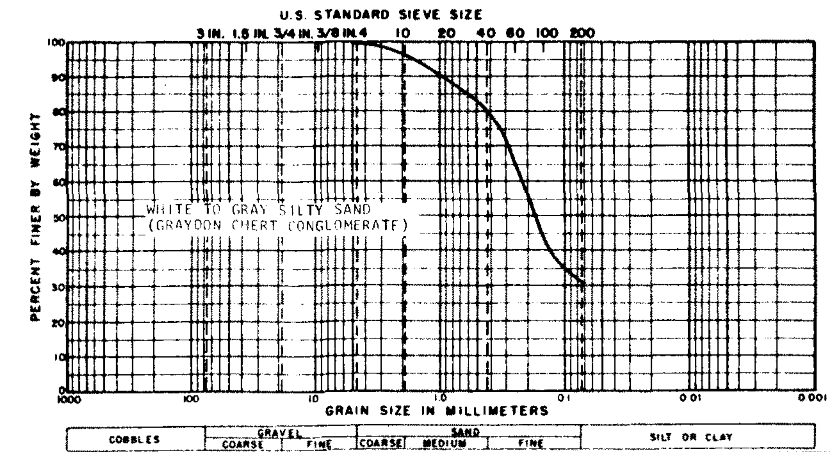
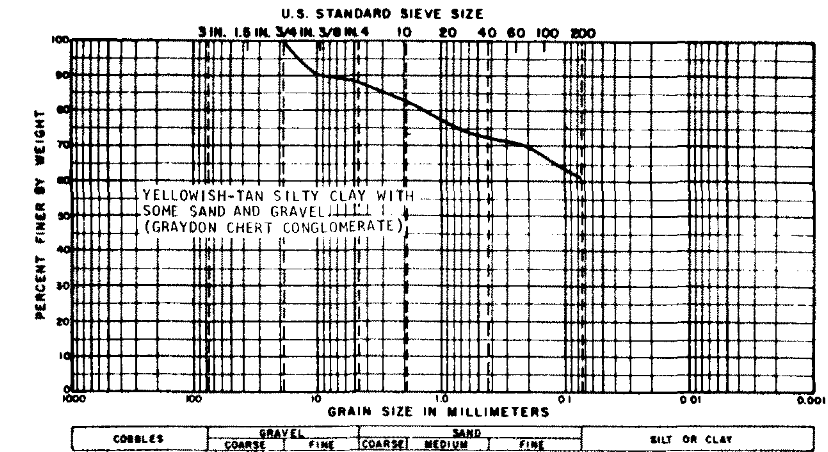
FIGURE 2.5-439
GRAIN SIZE DISTRIBUTION



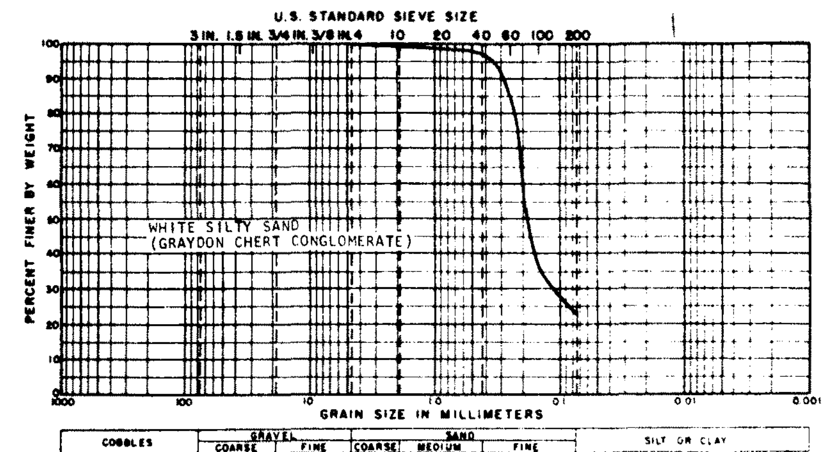
BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-8	48.5'	CL				



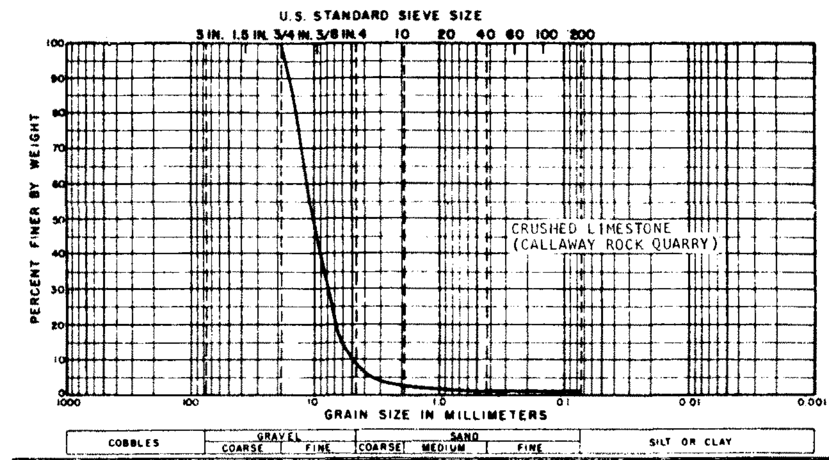
BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-10	43.0'	SM	11.0			



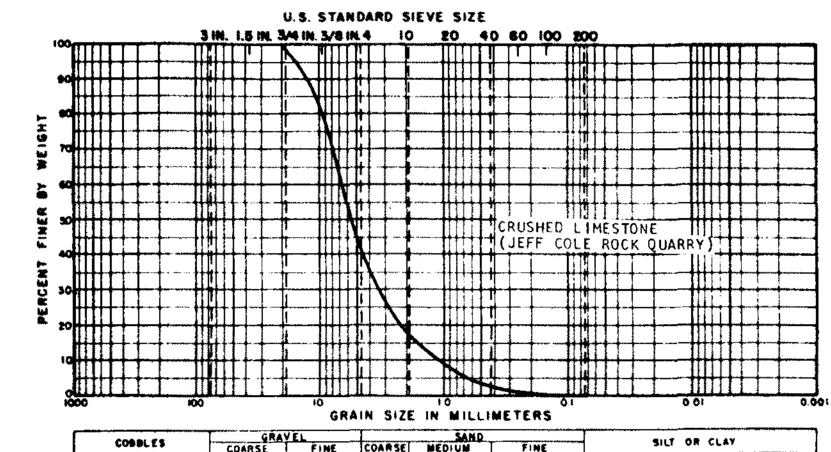
BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-12	41.5'	CL	8.3			



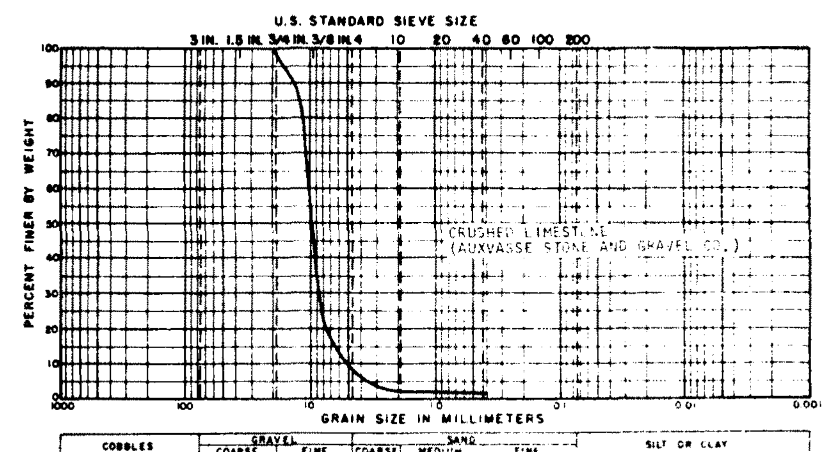
BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-15	43.0'	SM	6.5			



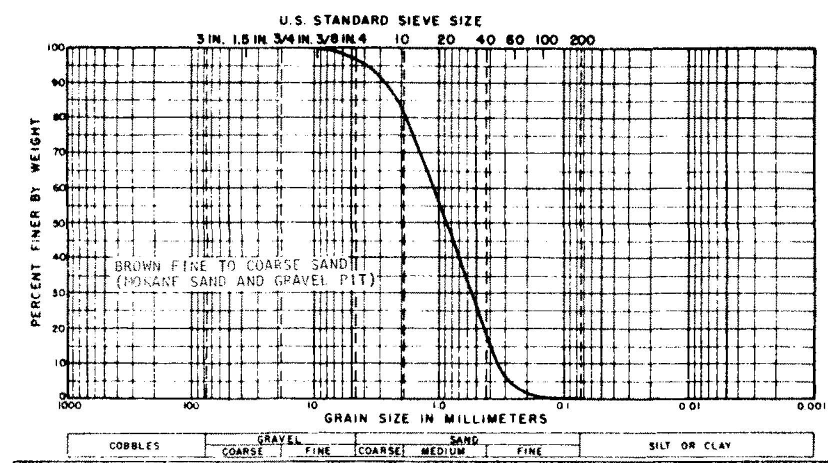
SAMPLE	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
A		GP				



SAMPLE	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
B		GW				



SAMPLE	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
C		GP				



	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
		SP				

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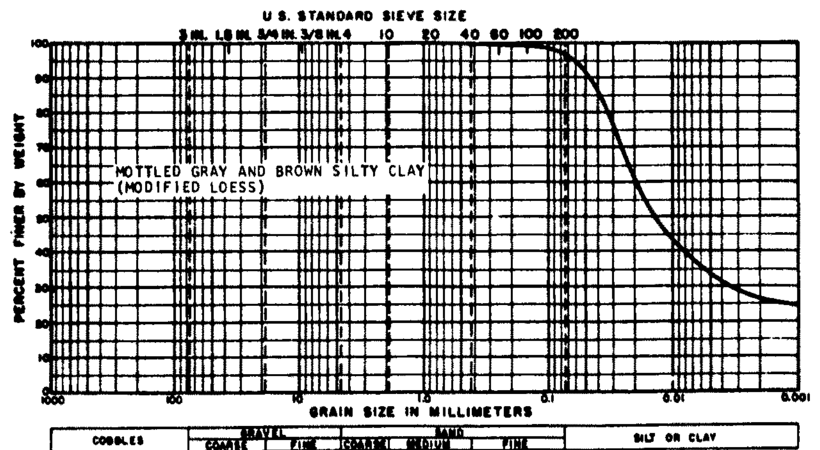
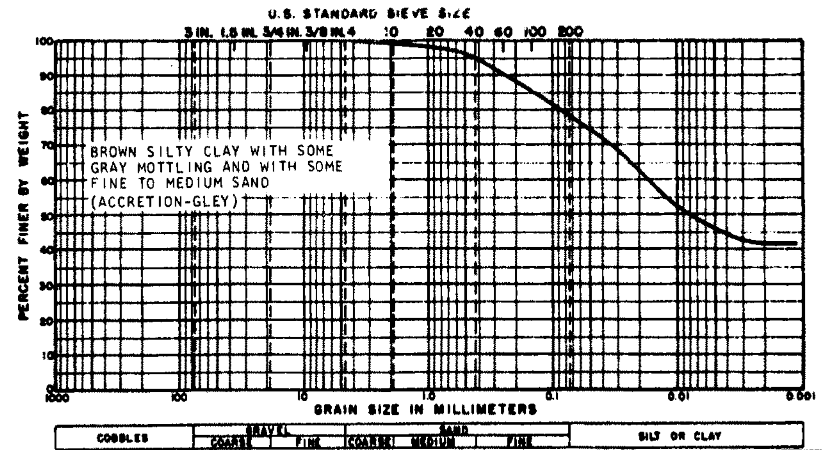
FIGURE 2.5-440

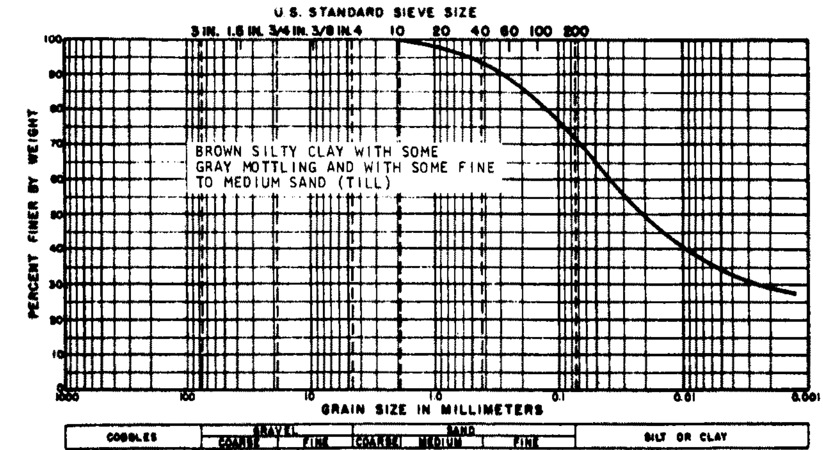
GRAIN SIZE DISTRIBUTION



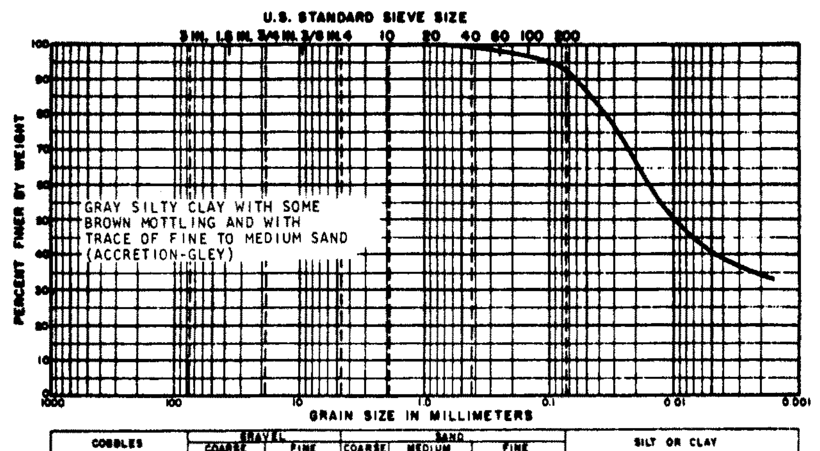
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
P-75	5.0'	CL	23.2	39	18	21



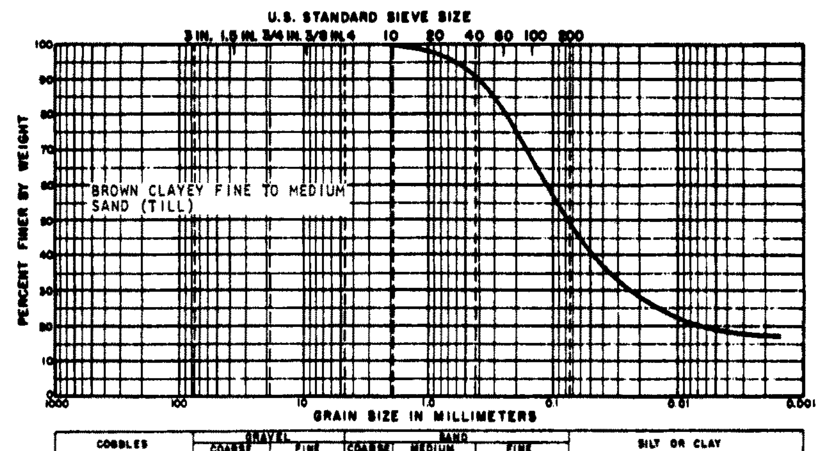
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
P-75	15.5'	CH	21.1	50	21	29



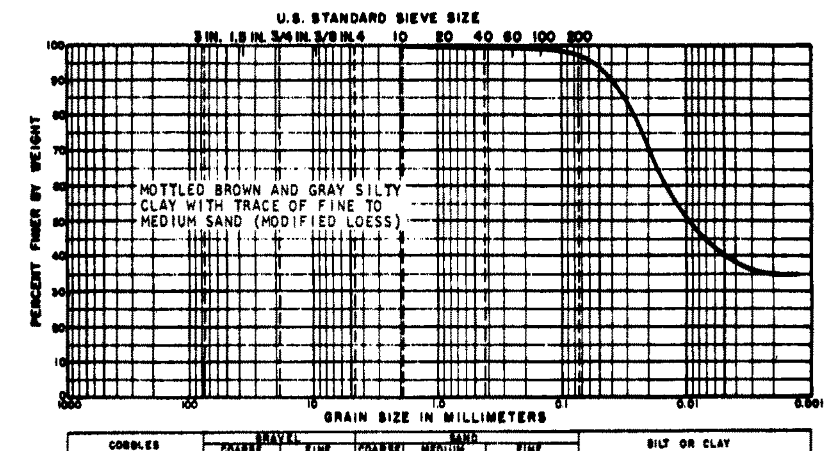
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
P-75	22.5'	CL		35	14	21



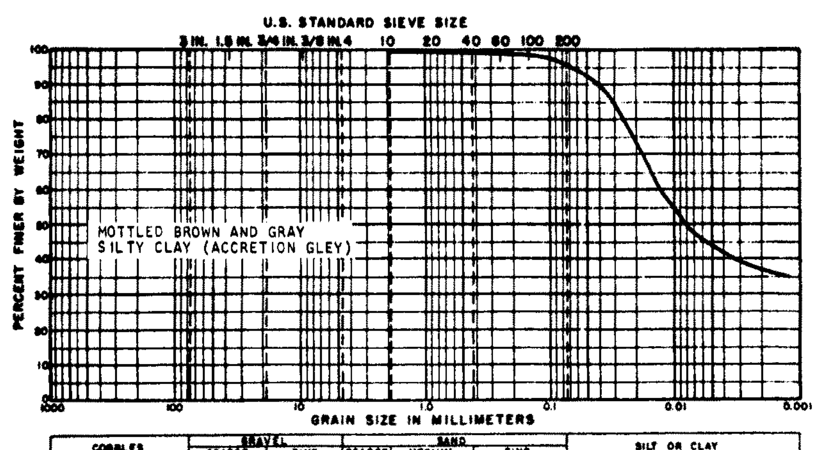
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
P-76	16.0'	CH	22.8	51	18	33



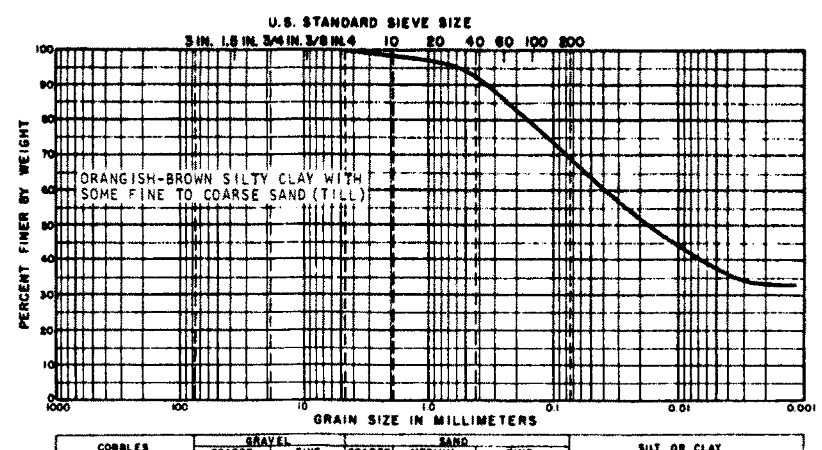
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
P-76	25.5'	SC	20.5	31	15	16



BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
P-77	4.5'	CL	26.0	47	21	26



BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
P-77	15.0'	CH	21.3	50	17	33



BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
P-77	25.5'	CL	18.6	39	17	22

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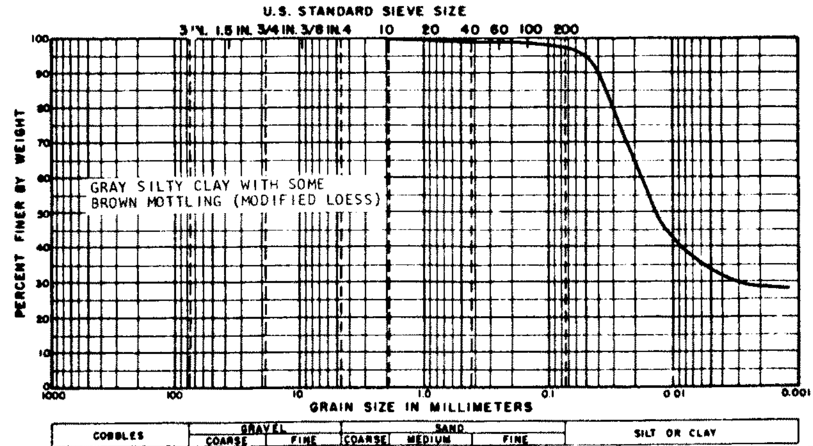
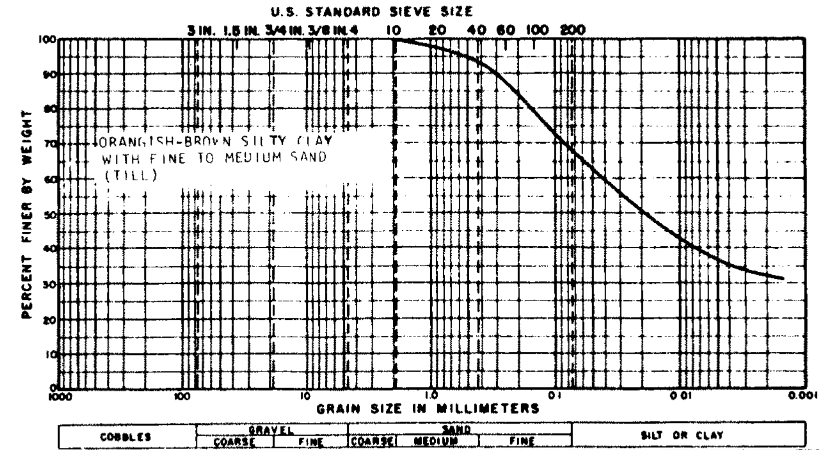
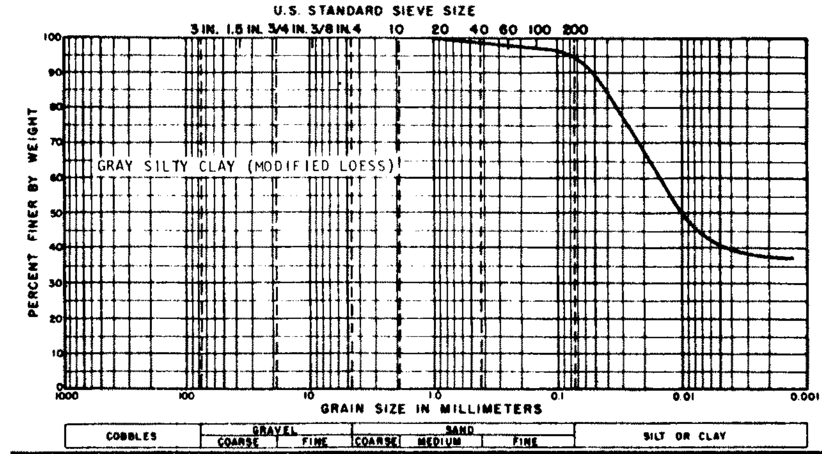
FIGURE 2.5-441
GRAIN SIZE DISTRIBUTION



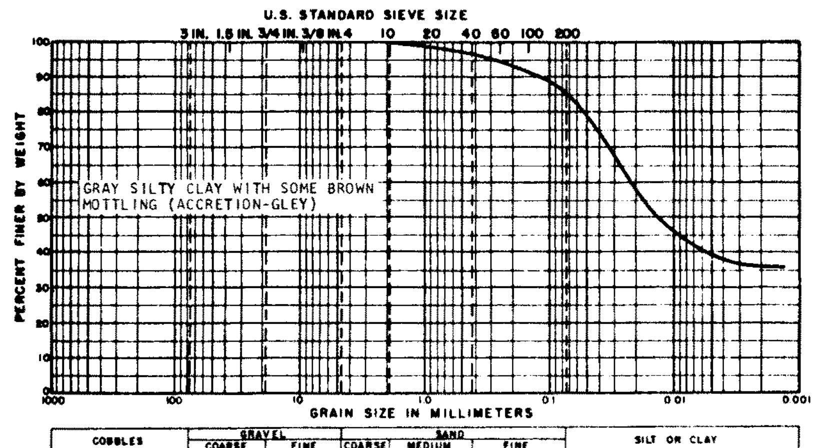
BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-78	5.0'	CL	22.4			



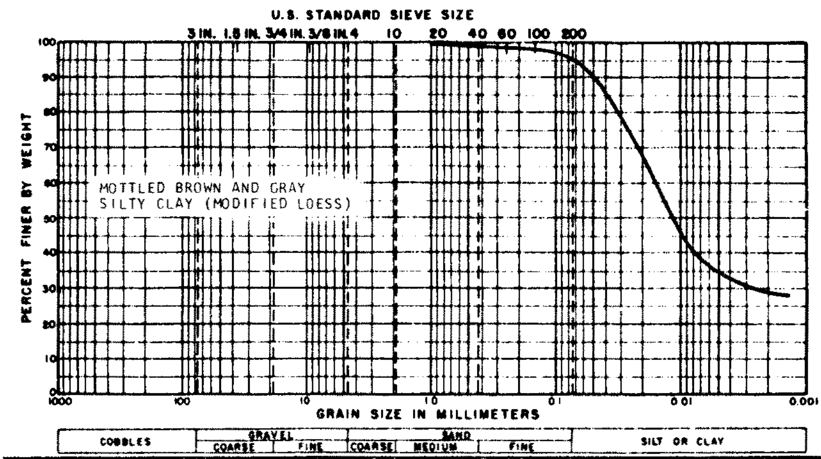
BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-80	23.0'	CL	18.3	42	16	26



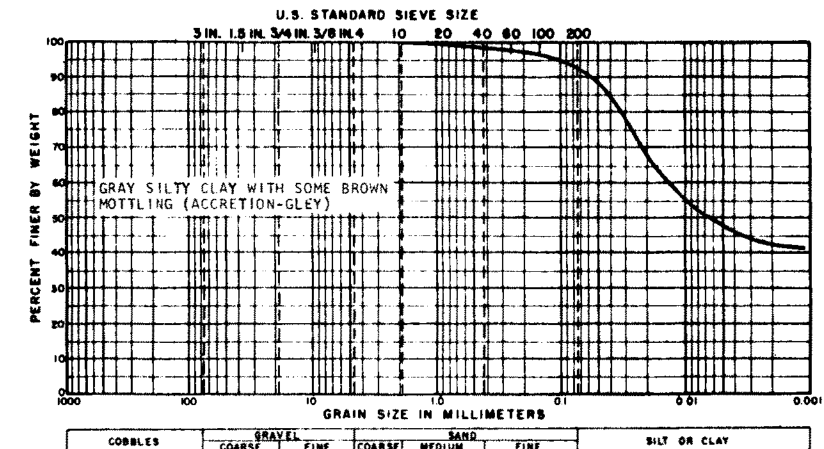
BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-83	4.5'	CL	22.2	48	17	31



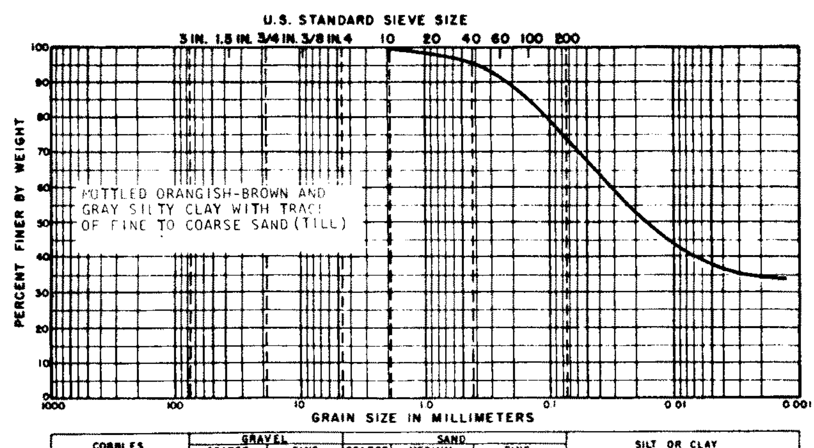
BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-83	12.5'	CL	21.6	43	18	25



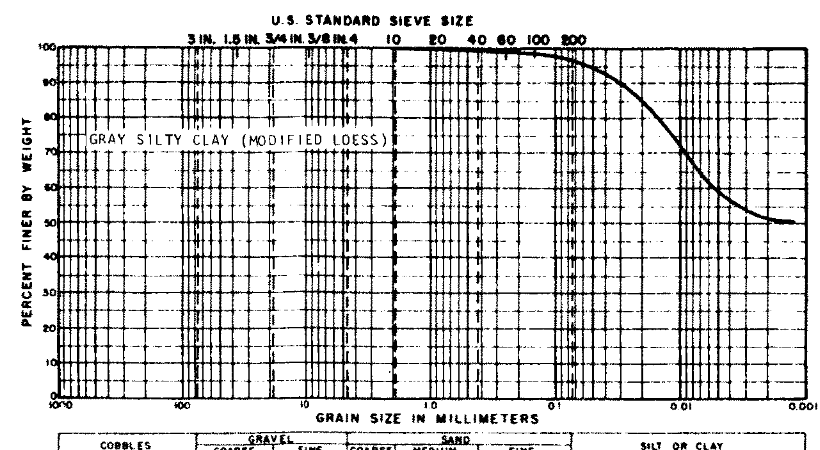
BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-87	5.0'	CL	21.3	38	17	21



BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-87	15.5'	CH	23.9	53	17	36



BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-87	26.0'	CL	20.1	43	12	31



BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-88	1.5'	CH	32.4	80	29	51

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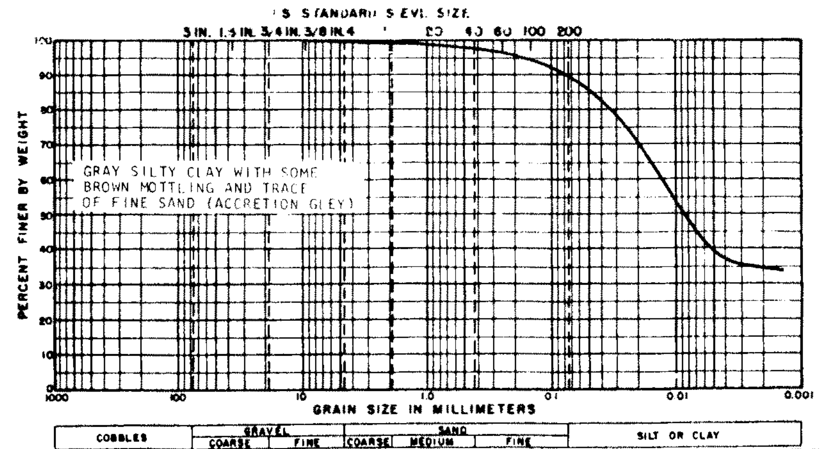
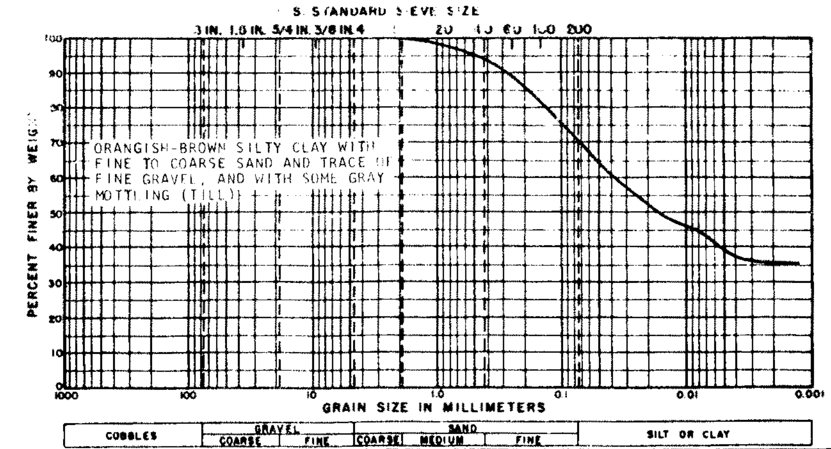
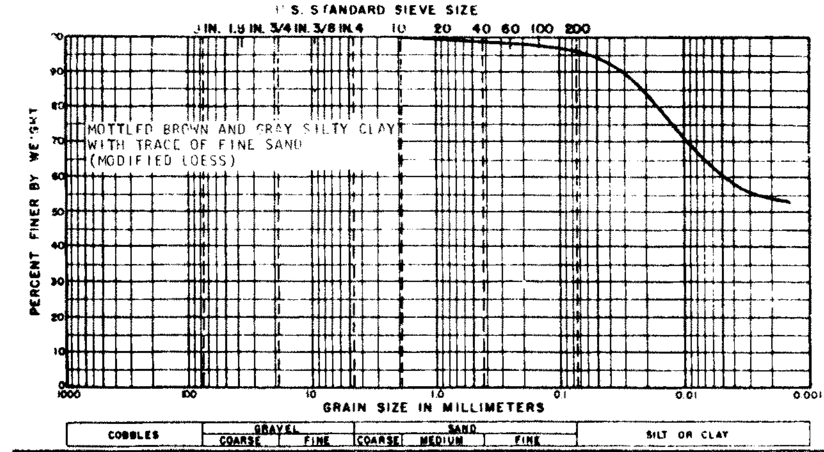
FIGURE 2.5-442
GRAIN SIZE DISTRIBUTION



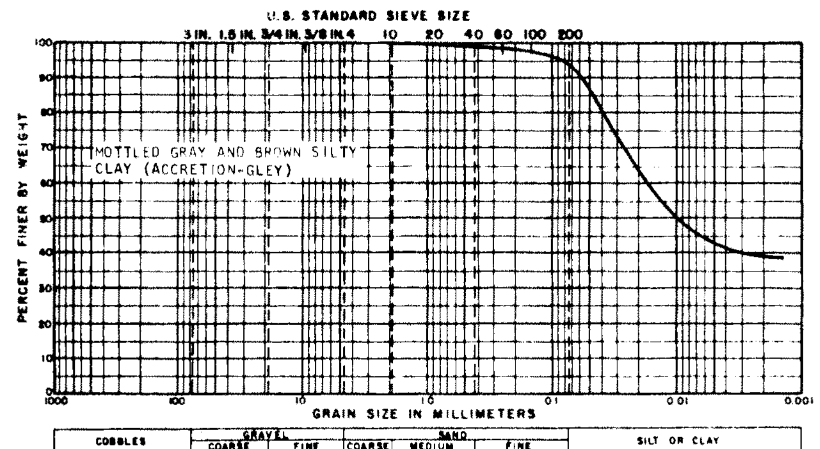
BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-88	12.0'	CL		20.7	49	14	35	



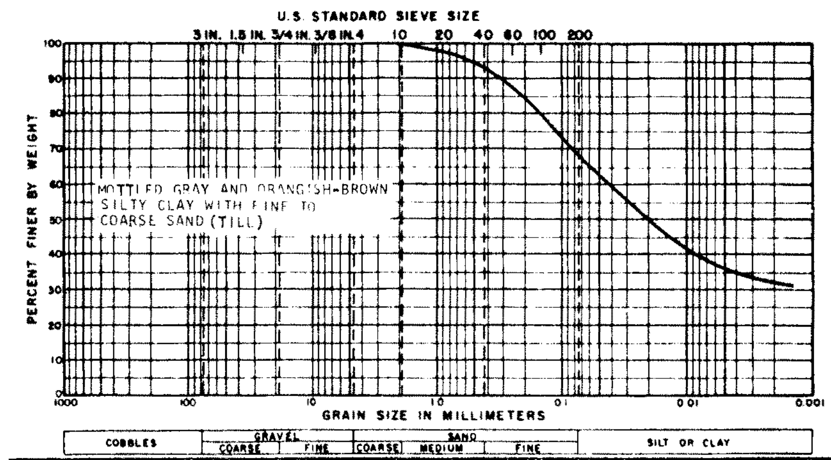
BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-88	19.0'	CL		17.5	40	17	23	



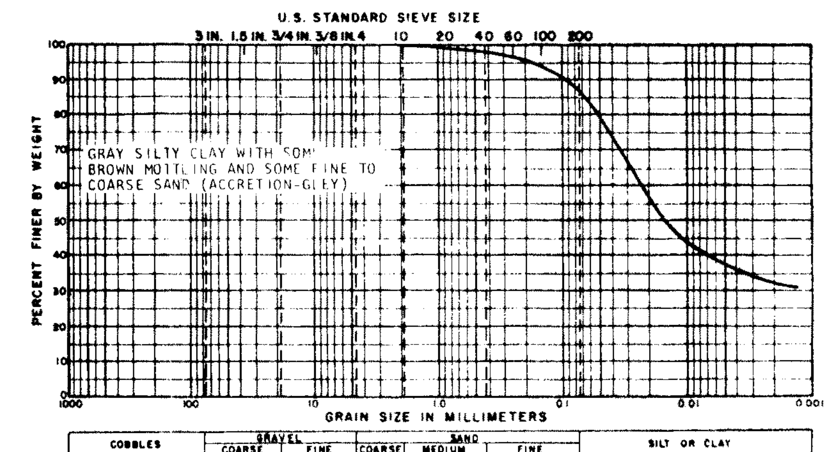
BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-90	2.0'	CH		34.0	75	26	49	



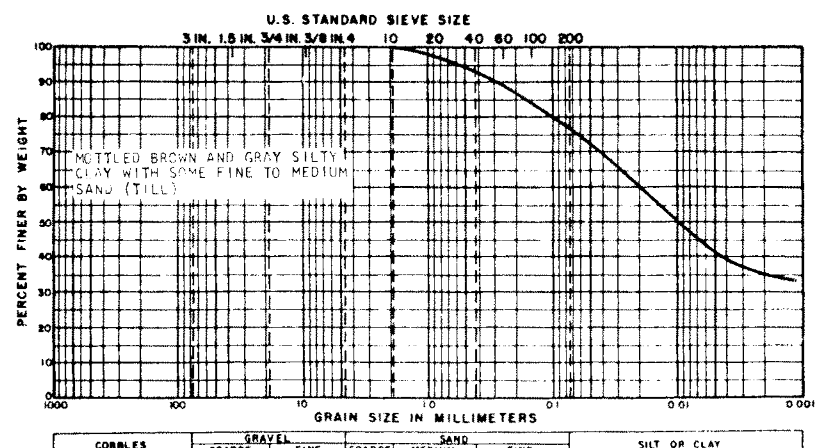
BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-90	9.0'	CH		21.7	54	18	36	



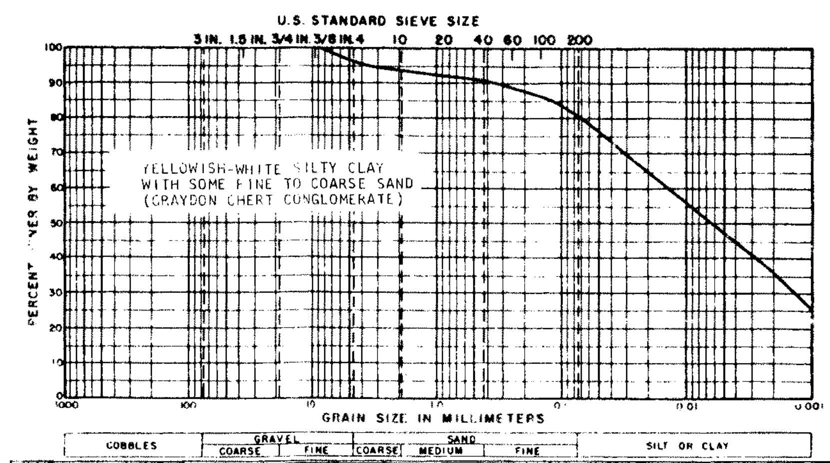
BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-90	19.5'	CL		18.1	36	16	20	



BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-92	12.0'	CL		20.6	48	17	31	



BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-92	19.0'	CL		19.9	44	16	28	



BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-95	47.0'	[illegible]		14.4	33	[illegible]	12	

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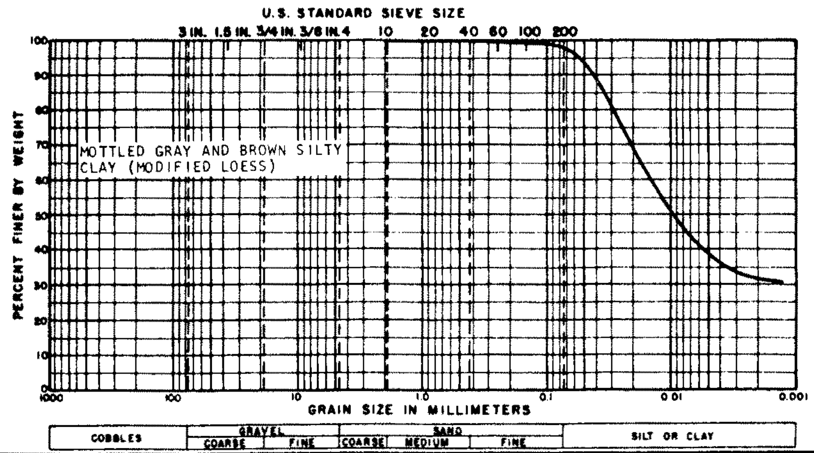
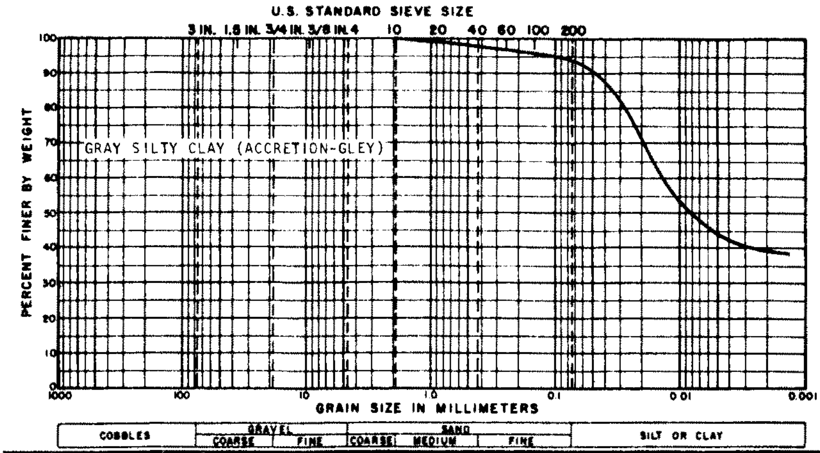
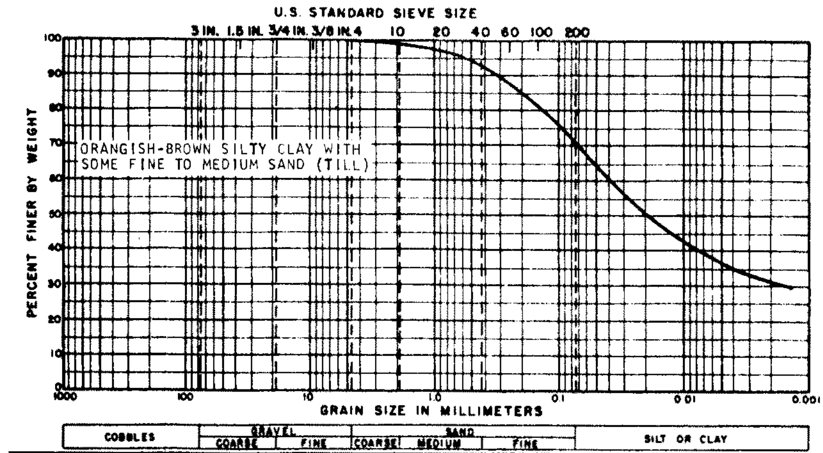
FIGURE 2.5-443
GRAIN SIZE DISTRIBUTION



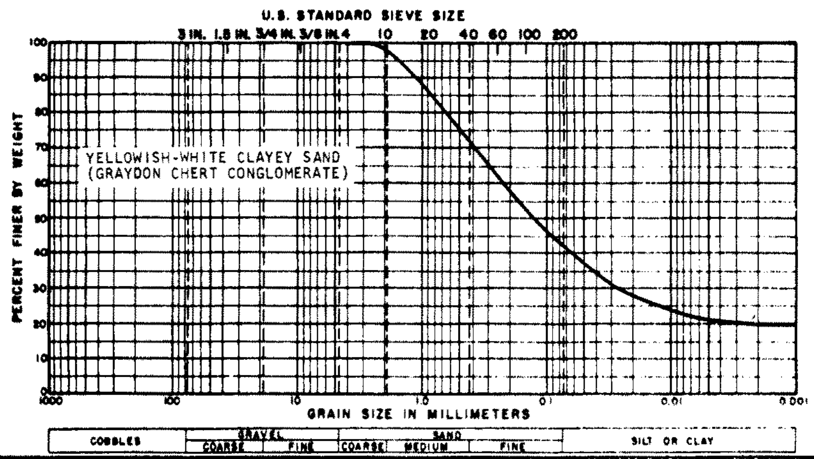
BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-101	5.5'	CL	20.6	39	17	22



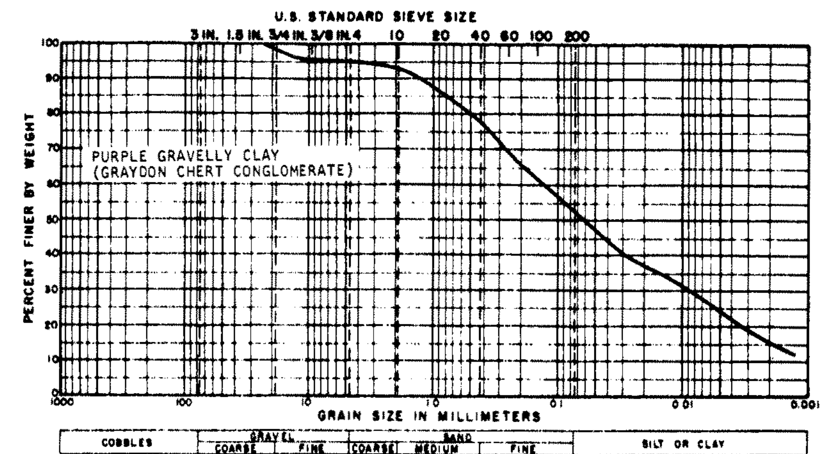
BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-101	12.5'	CH	20.9	53	20	33



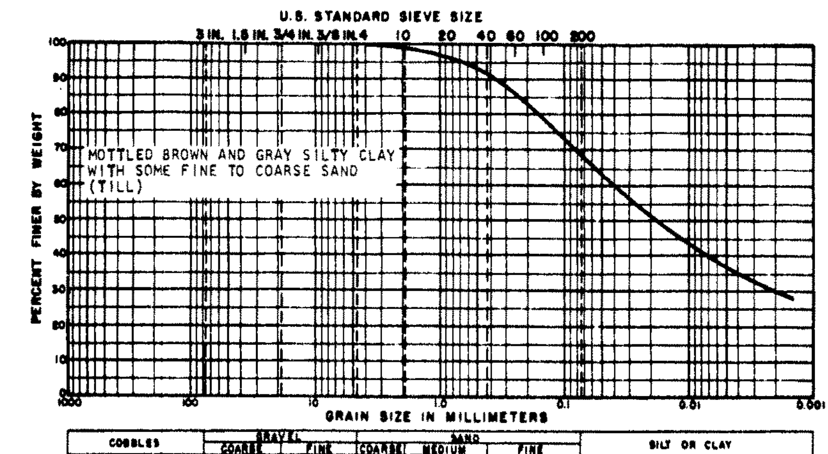
BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-101	26.0'	CL	18.6	41	17	24



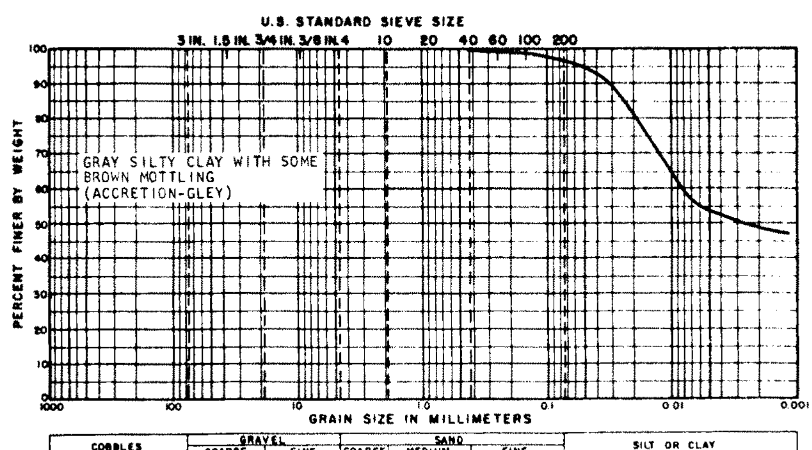
BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-101	29.0'	SC	13.4	22	18	4



BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-105	31.0'	CL	15.0	34	21	13



BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-113	28.0'	CL	18.2	38	14	24



BORING	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
P-116	13.0'	CH	24.4	56	16	40

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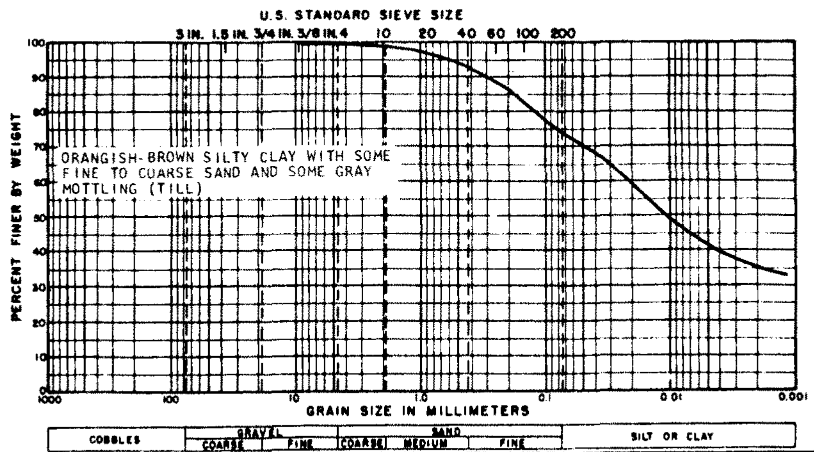
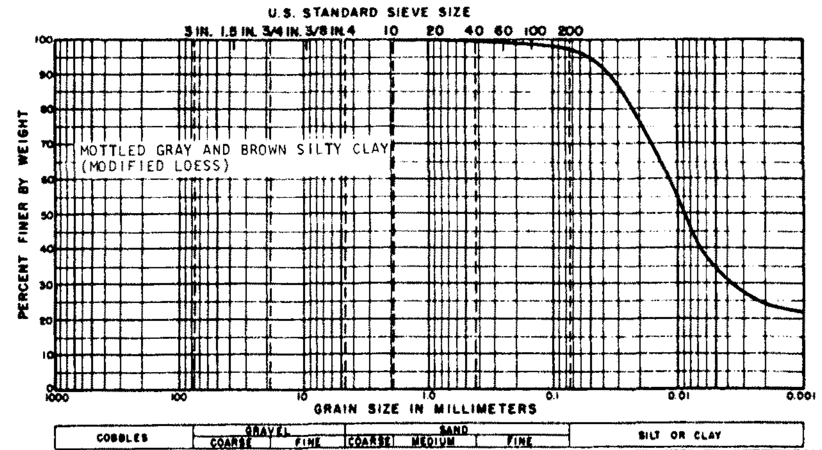
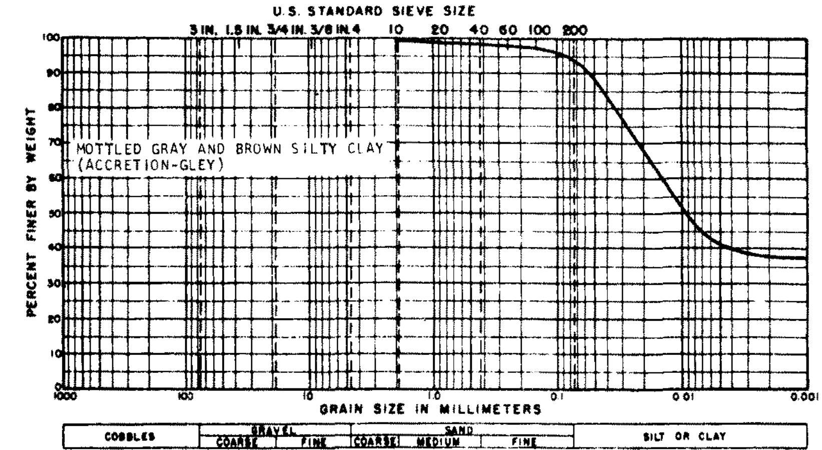
FIGURE 2.5-444
GRAIN SIZE DISTRIBUTION



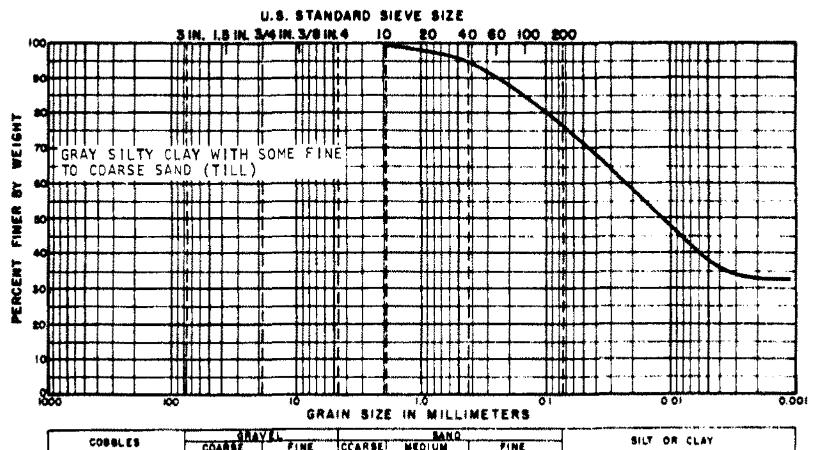
BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-116	28.0'	CL		21.0	39	17	22	



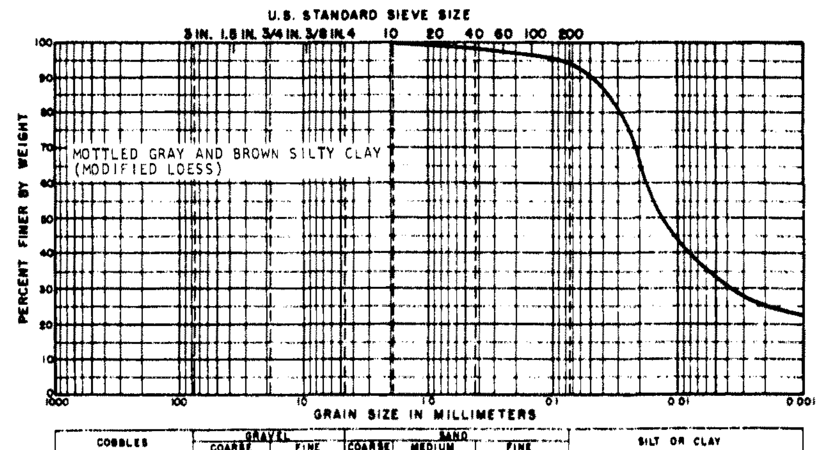
BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-117	3.0'	CL		25.7	37	17	20	



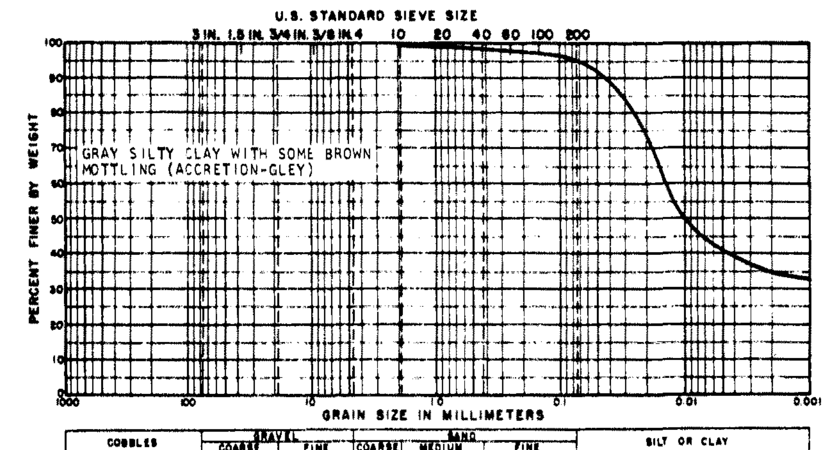
BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-117	13.0'	CH		39.5	58	17	41	



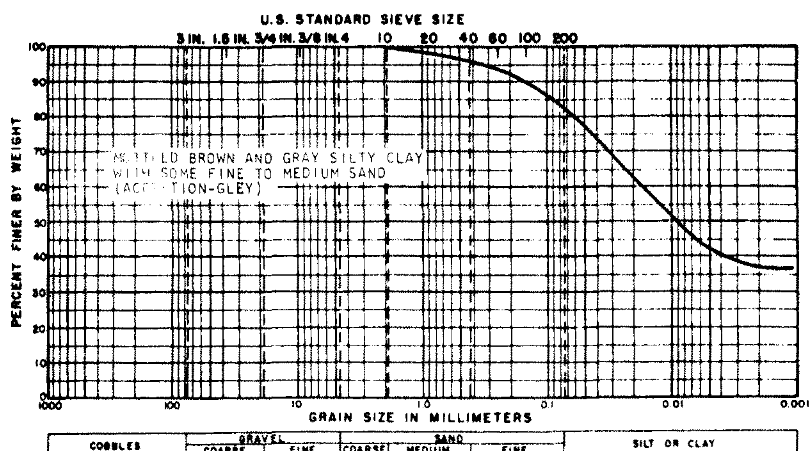
BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-117	23.0'	CL		24.1	45	15	30	



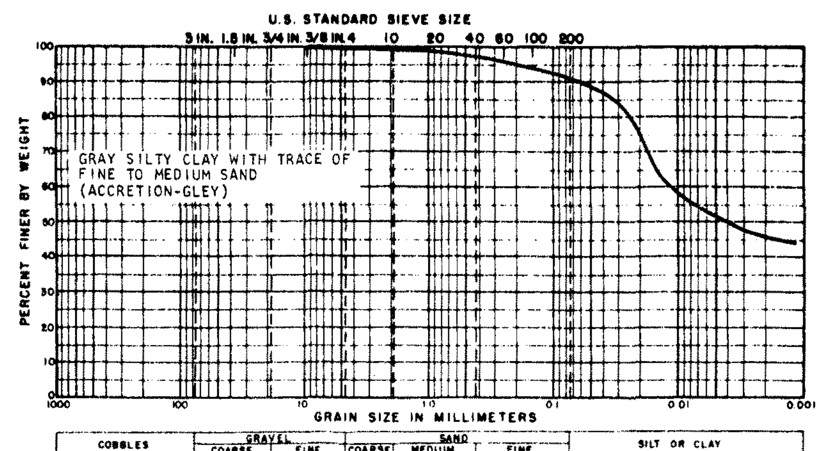
BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-118	3.0'	CL		20.4	38	16	22	



BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-118	13.0'	CH		34.1	50	16	34	



BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-118	18.0'	CH		8.6	52	14	38	



BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-120	18.0'	CH		21.2	51	18	33	

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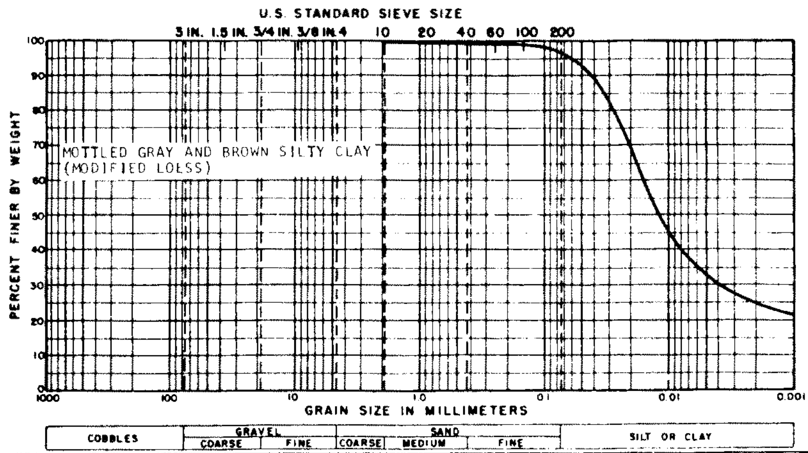
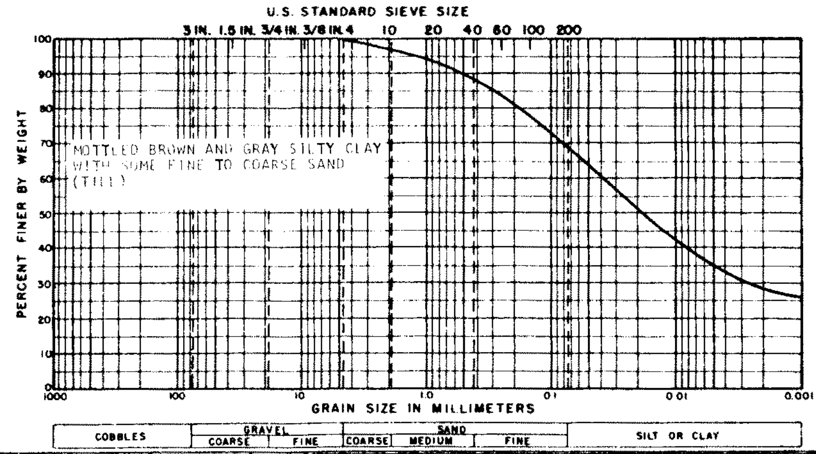
FIGURE 2.5-445

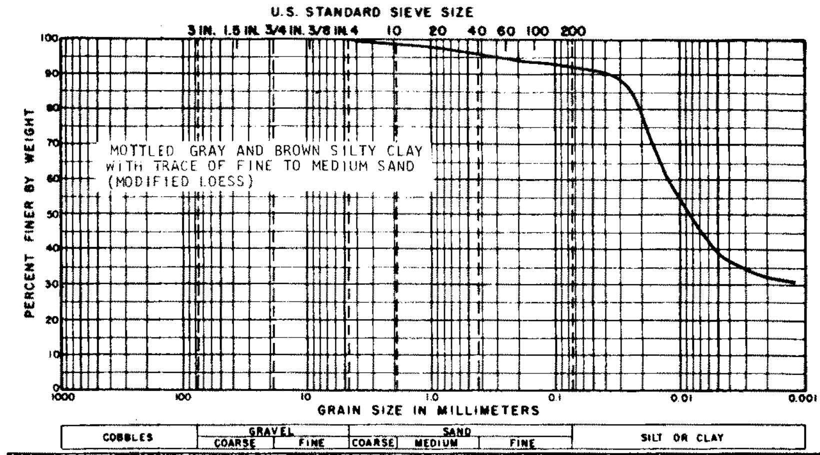
GRAIN SIZE DISTRIBUTION



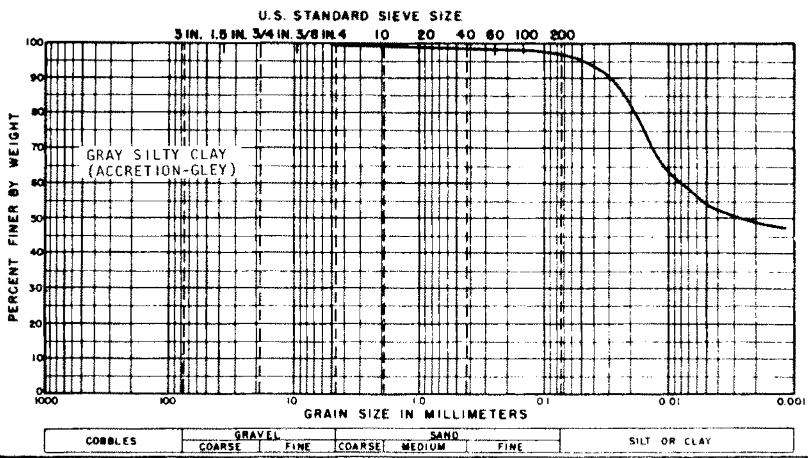
BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-121	3.0'	CL		23.4	39	19	20	



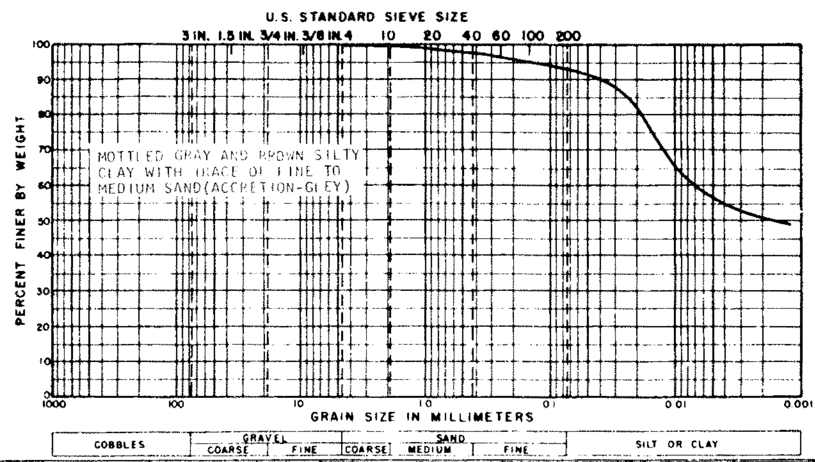
BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-121	30.0'	CL		18.0	37	15	22	



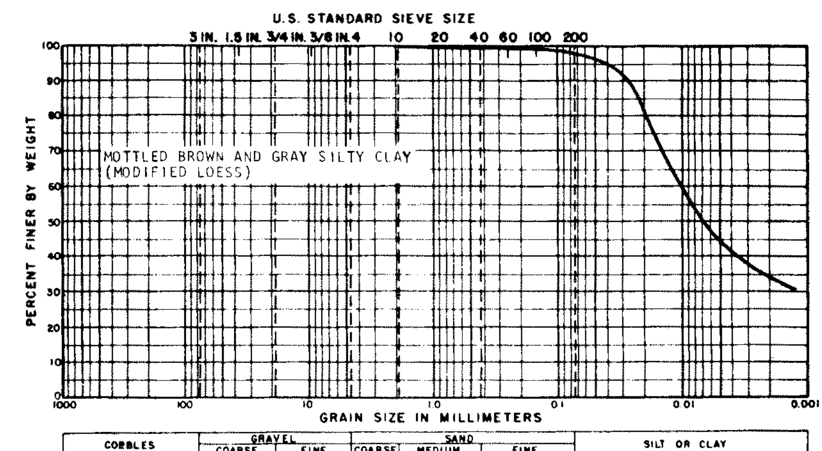
BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-122	3.0'	CL		23.4				



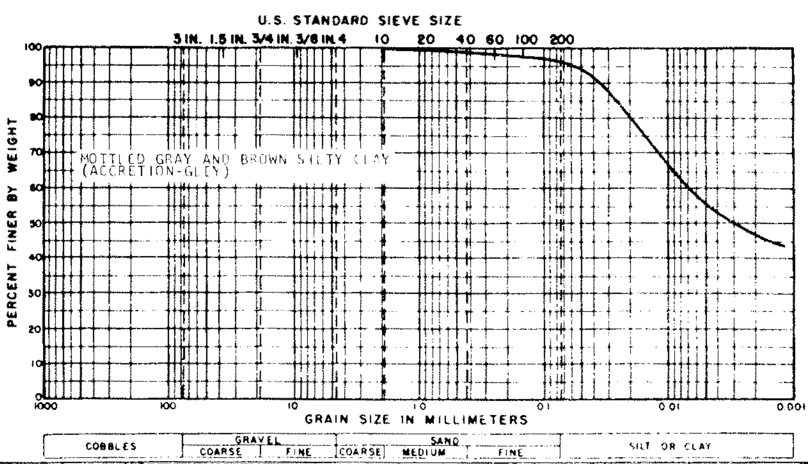
BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-122	13.0'	CH		23.1				



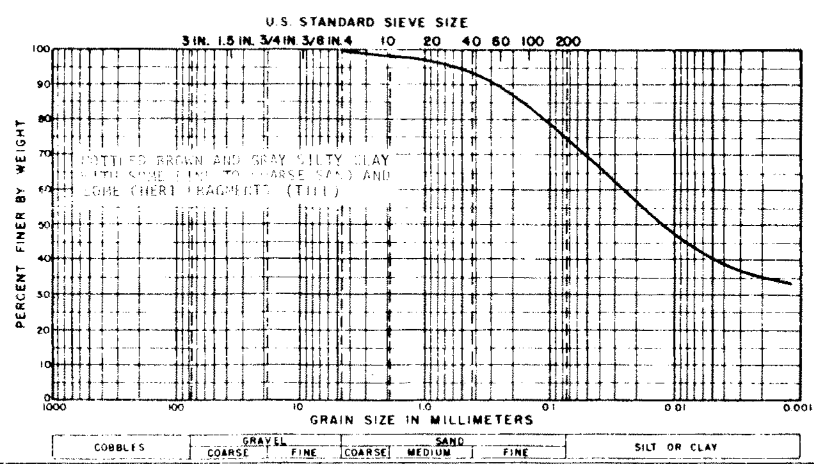
BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-123	15.0'	CH		21.8	52	17	35	



BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-125	3.0'	CH		26.5	52	23	29	



BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-125	18.0'	CH		24.9				



BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
P-125	28.0'	CL		17.4	41	14	27	

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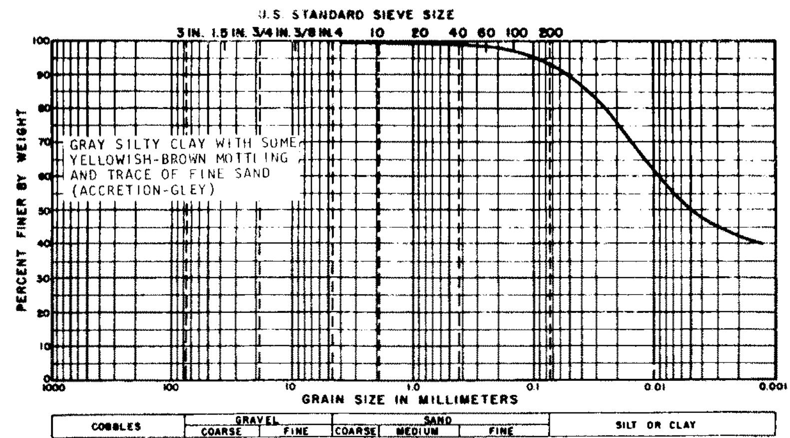
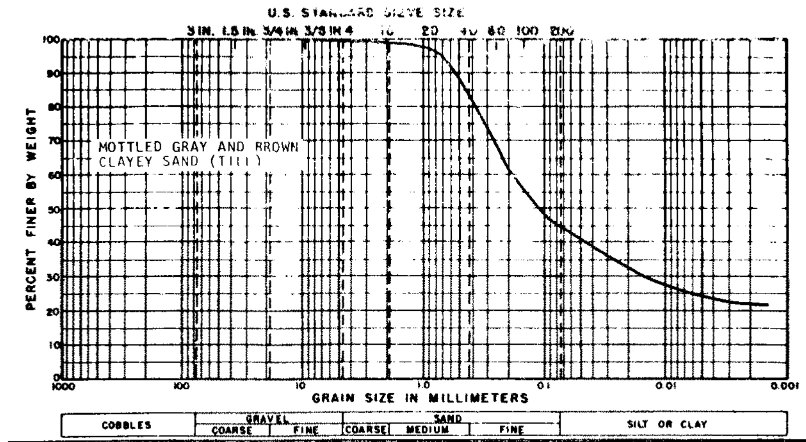
FIGURE 2.5-446

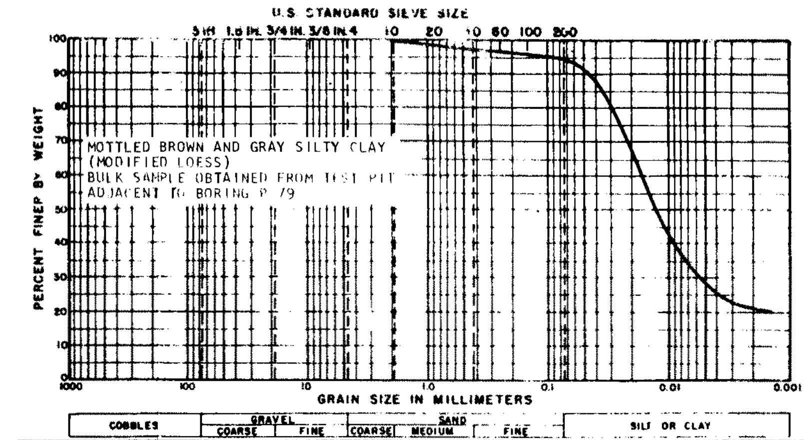
GRAIN SIZE DISTRIBUTION



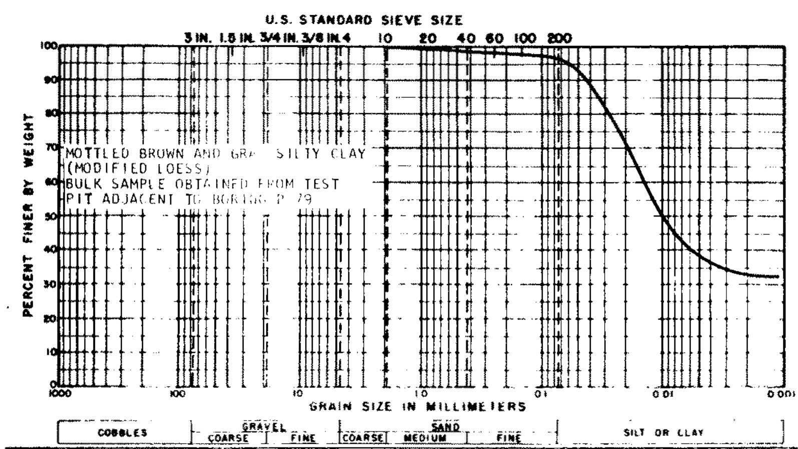
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
P-129	18.0'	CH	21.9	57	16	41



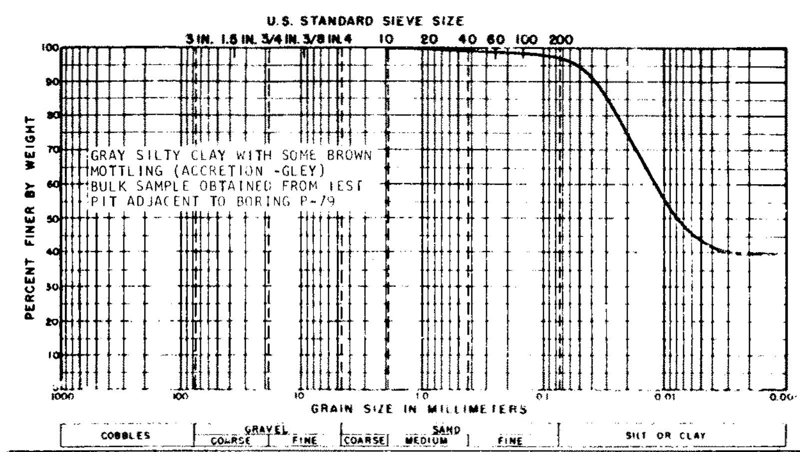
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
P-129	33.0'	SC	15.8	35	13	22



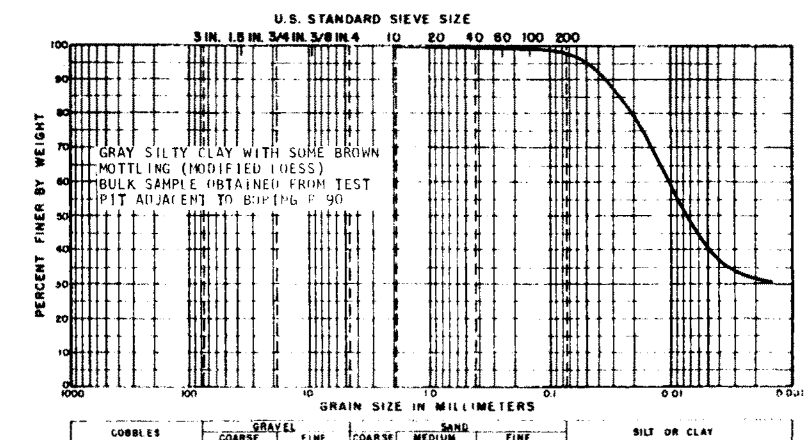
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
	4.0'	CL		28	18	10



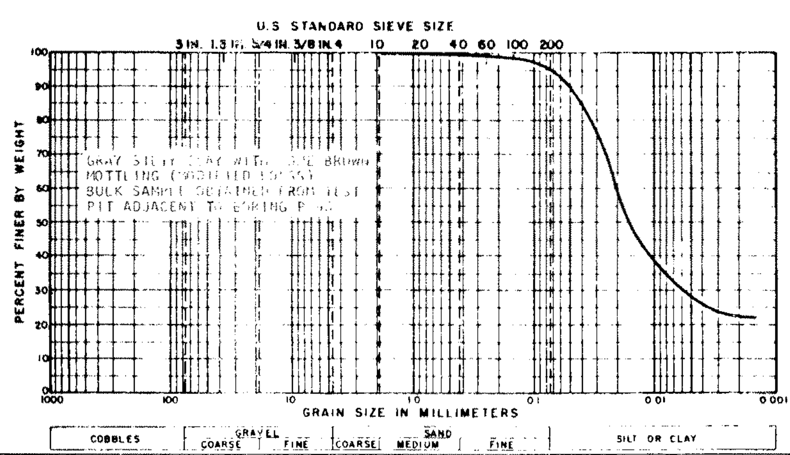
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
	6.0'	CL		48	16	32



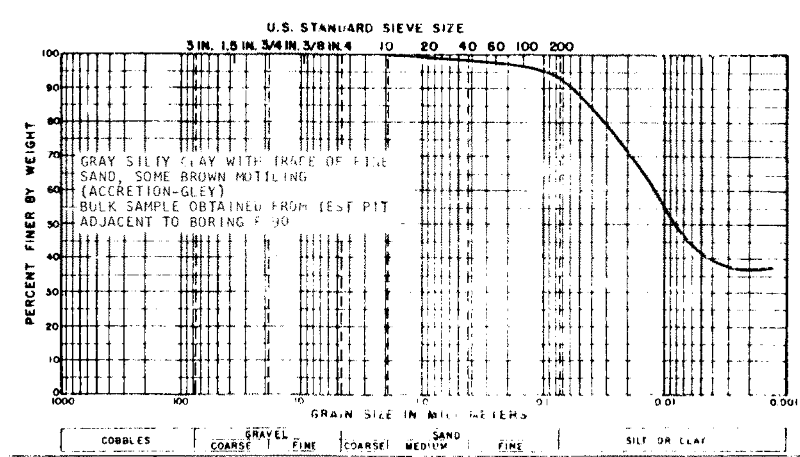
BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
	10.5	CH		52	16	36



BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
	3.5'	CH		52	17	35



BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
	7.5'	CL		33	17	16



BORING	DEPTH	CLASSIFICATION	NAT WC	LL	PL	PI
	11.5'	CH		[illegible]	[illegible]	[illegible]

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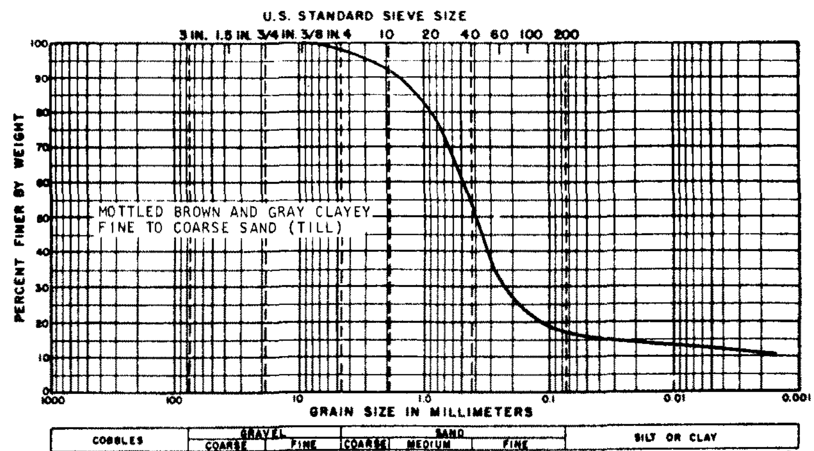
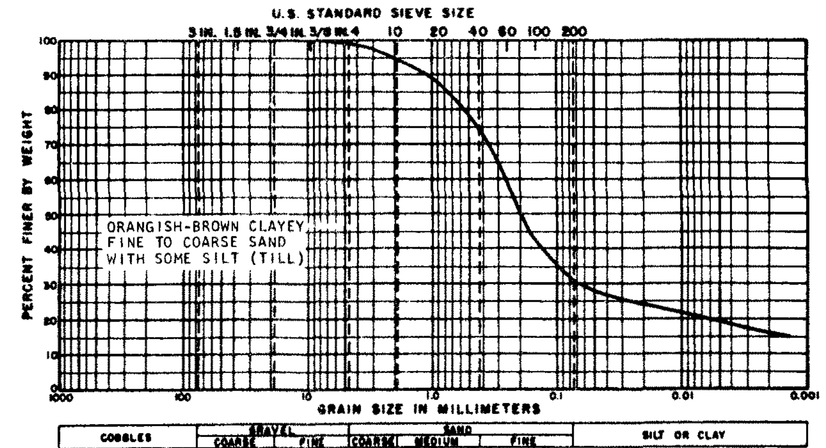
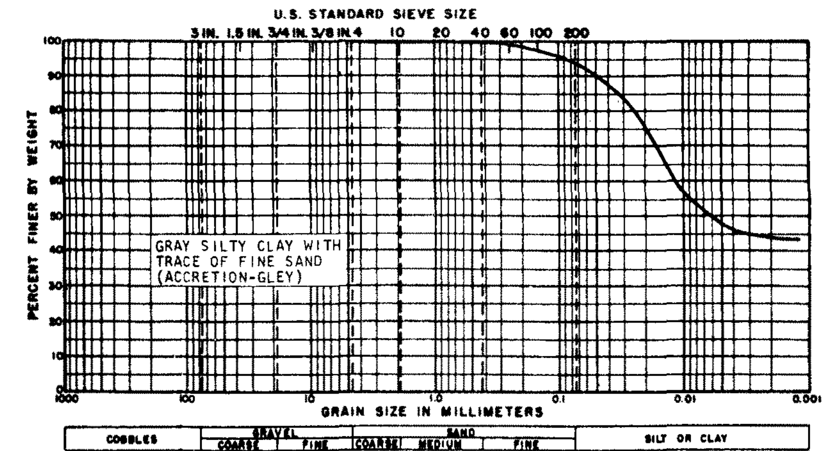
FIGURE 2.5-447
GRAIN SIZE DISTRIBUTION



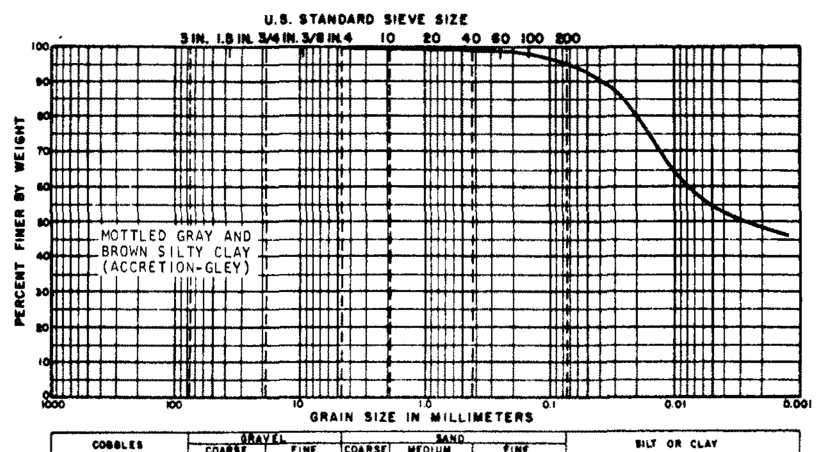
BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-72	27.0'	SC		13.3				



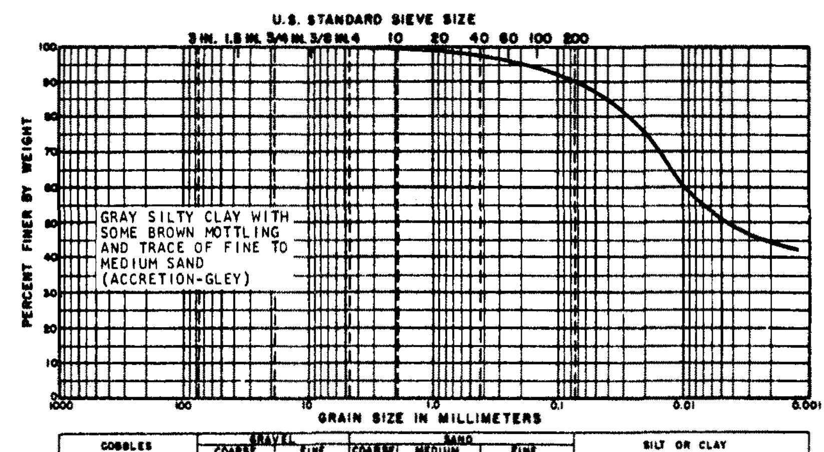
BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-77	32.5'	SC		17.2				



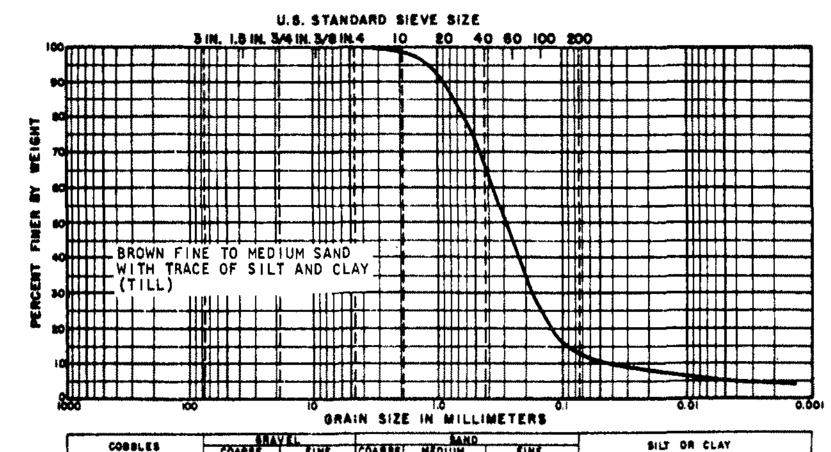
BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-78	12.0'	CH		23.4	57	18	39	



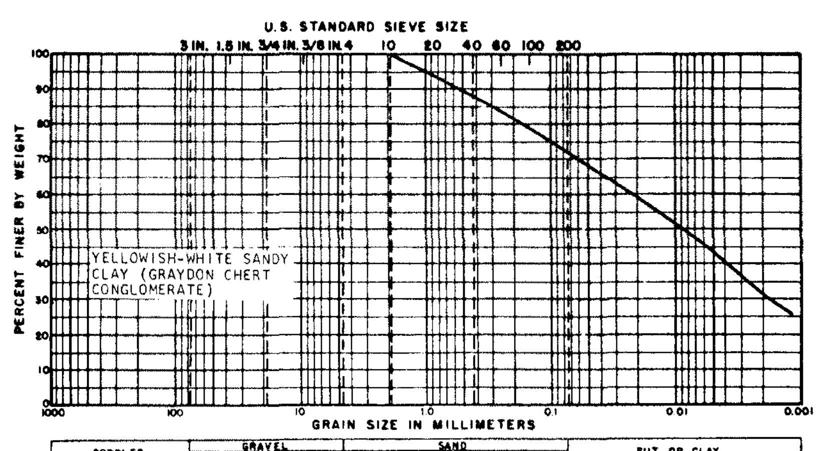
BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-80	12.5'	CH		25.5	56	21	35	



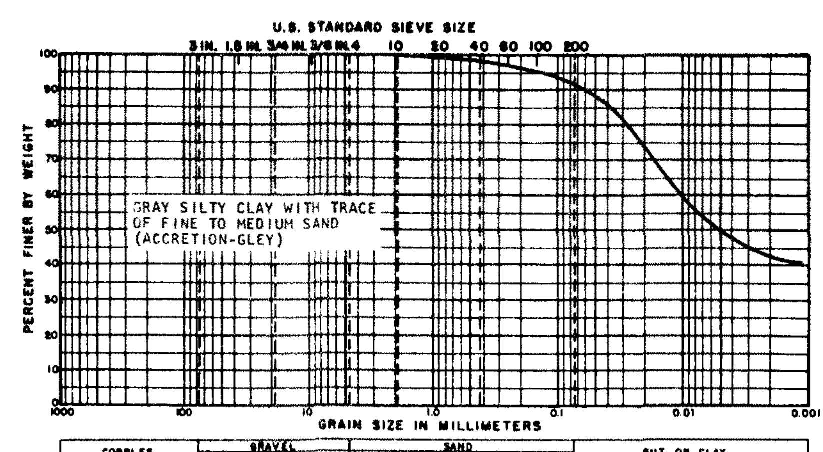
BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-81	12.2'	CH		24.1	57	16	41	



BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-88	28.0'	SM		14.0				



BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-99	31.0'	CL		18.6	40	23	17	



BORING	DEPTH	CLASSIFICATION		NAT WC	LL	PL	PI	
P-122	18.0'	CH		18.4	50	18	32	

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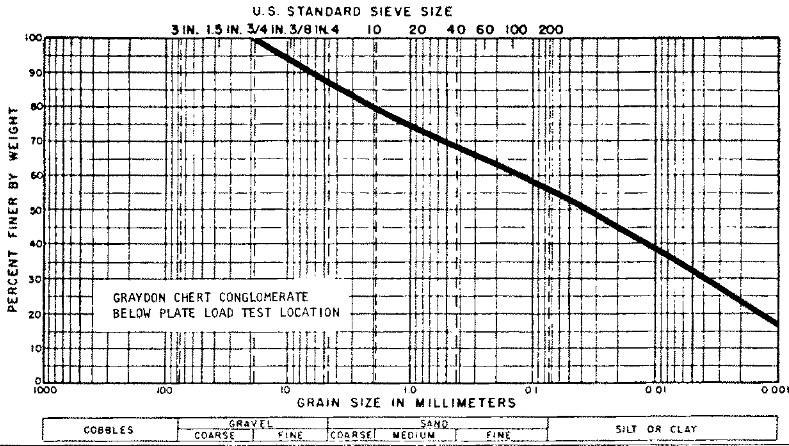
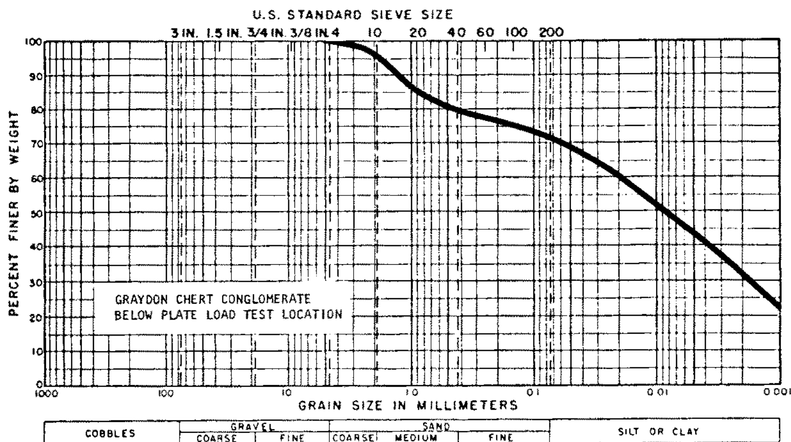
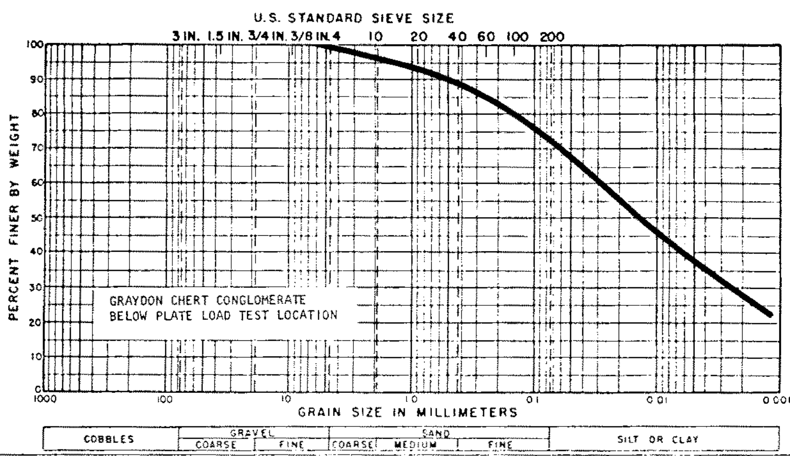
FIGURE 2.5-448
GRAIN SIZE DISTRIBUTION



TEST	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
I		CL		10.8	30	20	10	



TEST	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
III		CL		18.2	33	21	12	



TEST	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
X		CL		13.9	30	19	11	

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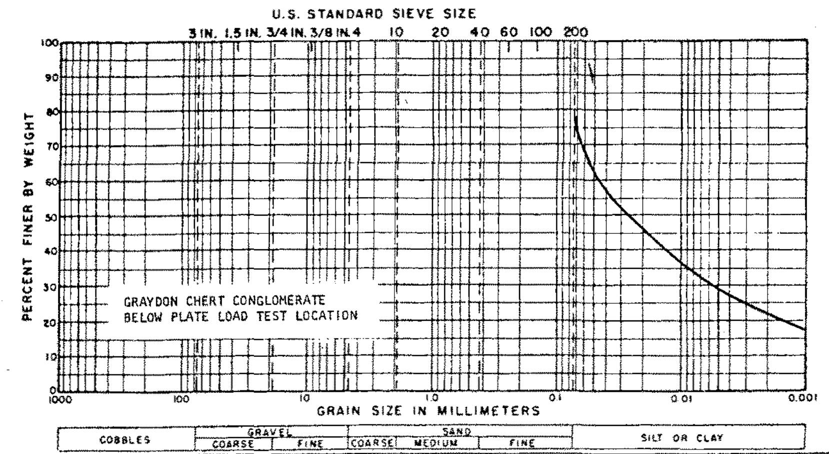
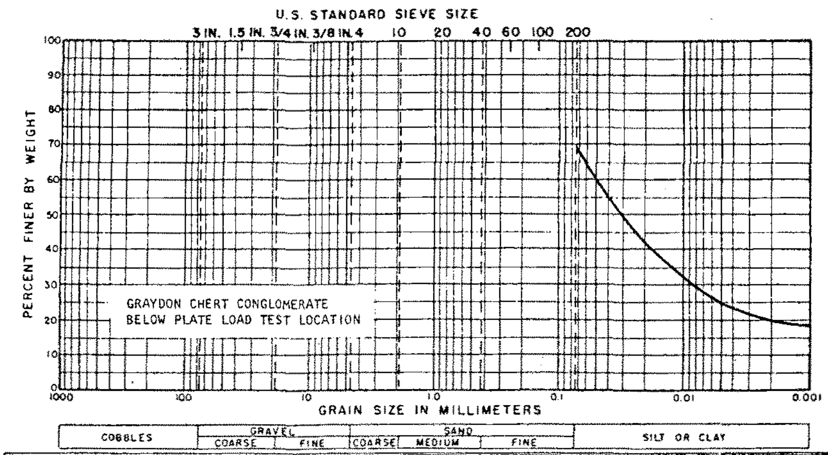
FIGURE 2.5-449

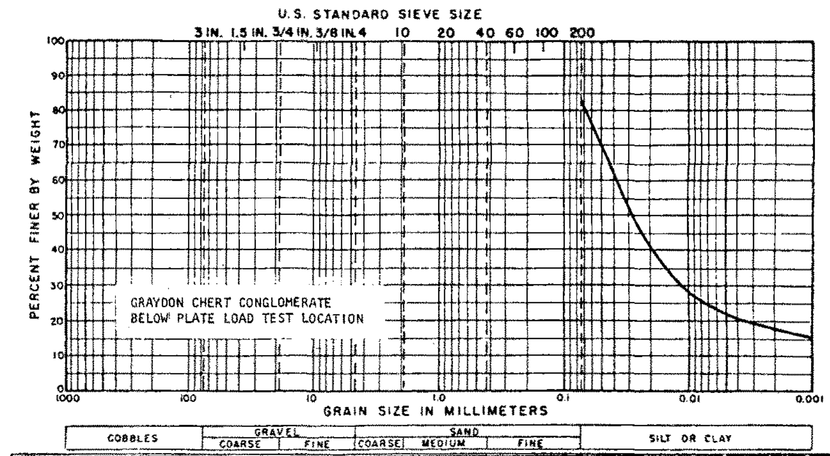
PARTICLE SIZE ANALYSES



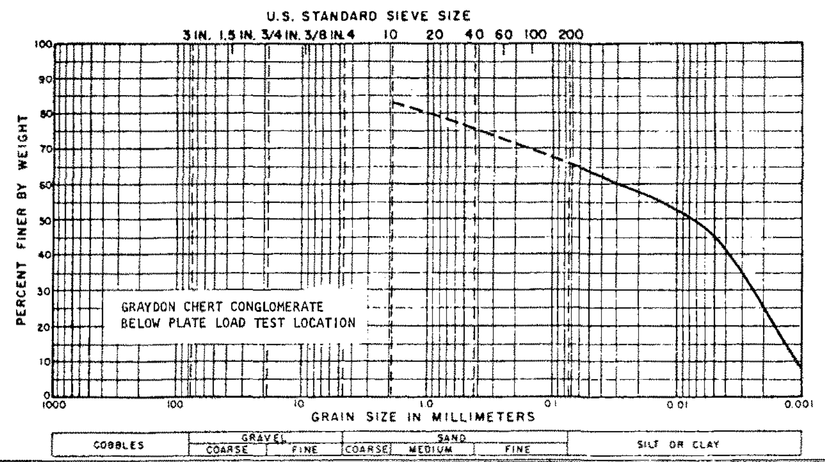
TEST	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
VI	0"-9"	ML-CL	9.9	–	–	–



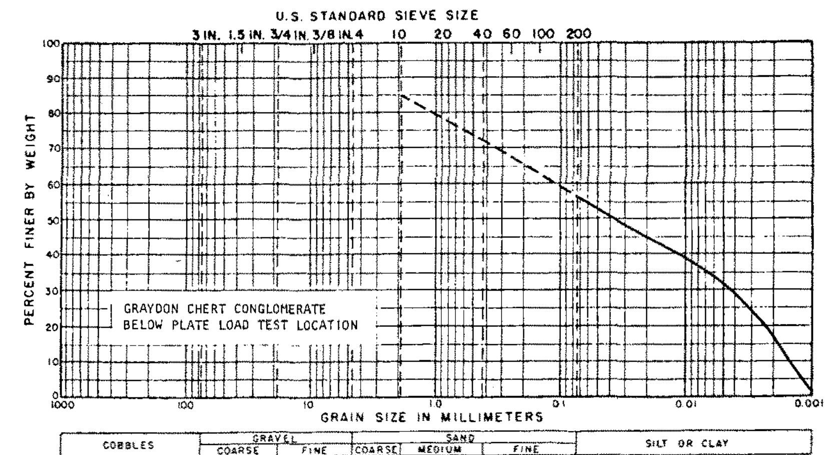
TEST	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
VI	9"-15"	ML-CL	12.6	–	–	–



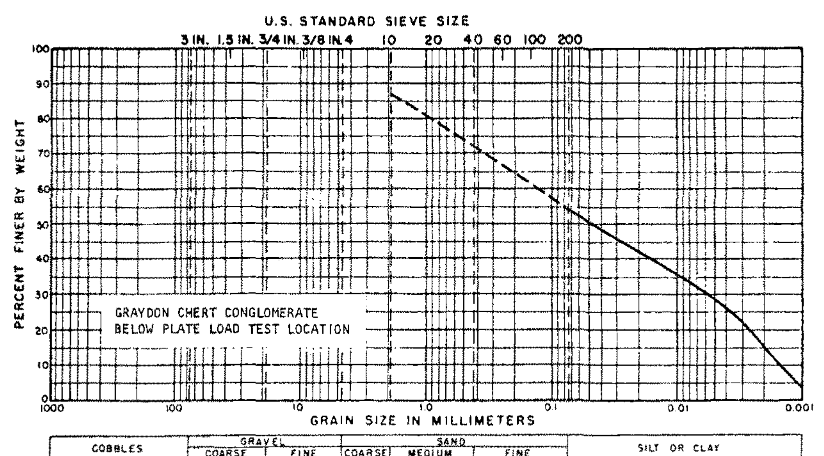
TEST	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
VI	17"-30"	ML-CL	8.3	–	–	–



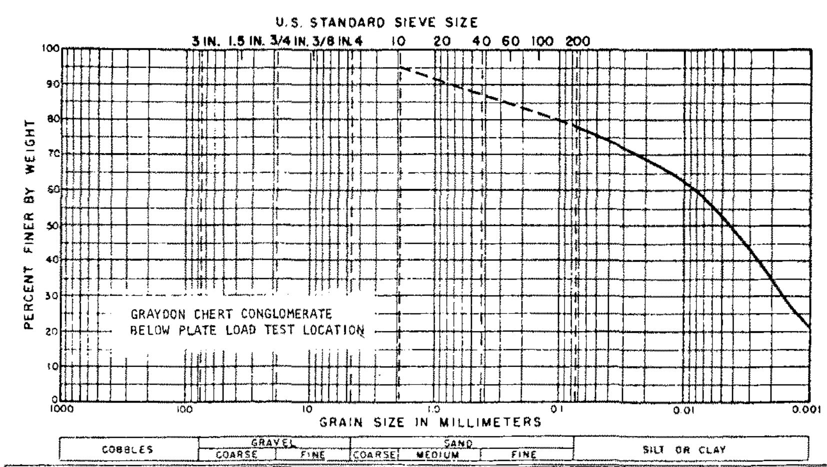
TEST	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
VII	2"-3"	CL	16.7	–	23	–



TEST	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
VII	6"-12"	CL	13.9	39	22	17



TEST	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
VII	20"	CL	13.0	36	22	14



TEST	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI
VII	30"-36"	CL	18.3	47	24	23

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FIGURE 2.5-450
PARTICLE SIZE ANALYSES

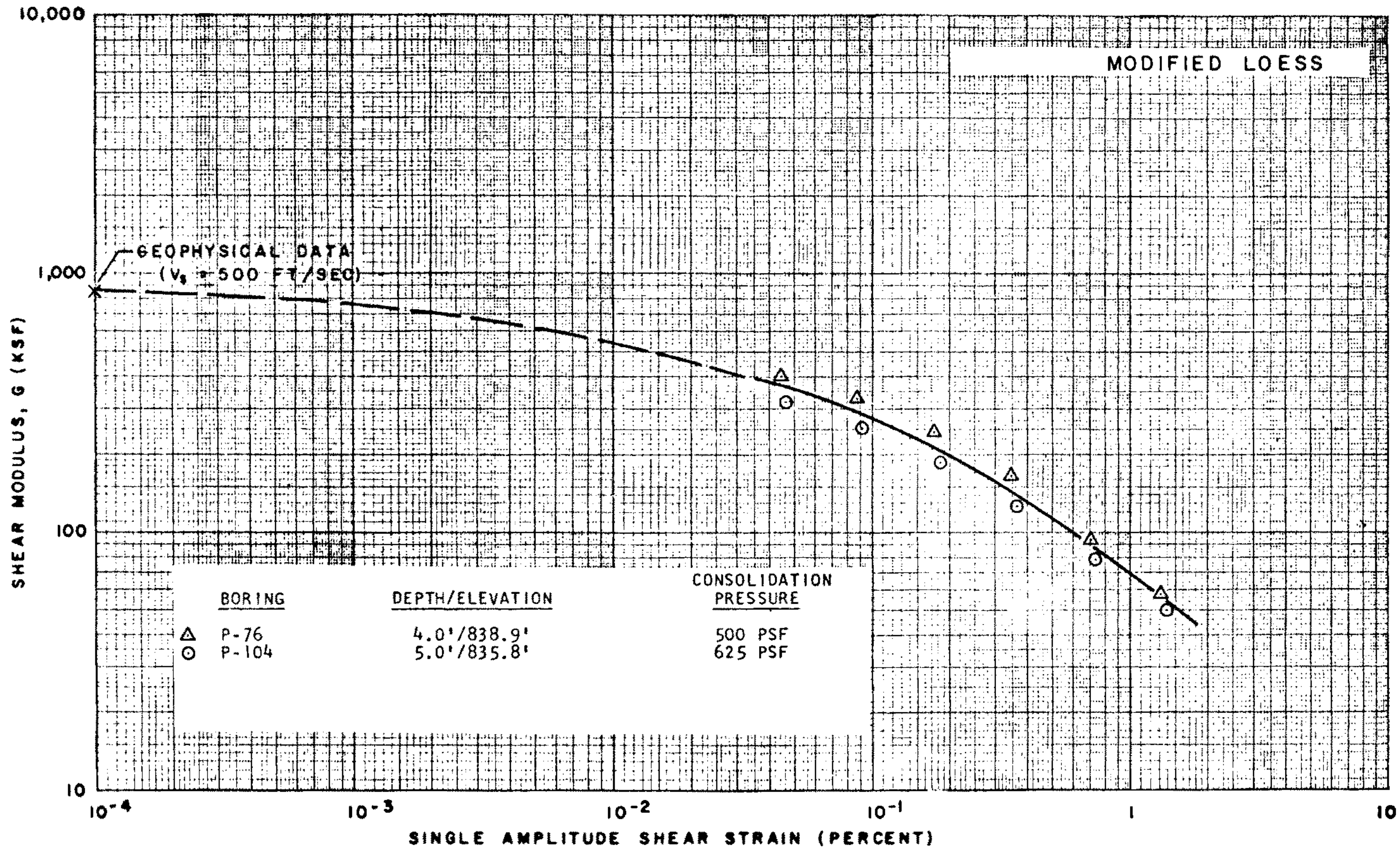

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FIGURE 2.5-451

RESULTS OF STRAIN-CONTROLLED DYNAMIC TRIAXIAL TESTS, SHEAR MODULUS VS. SHEAR STRAIN

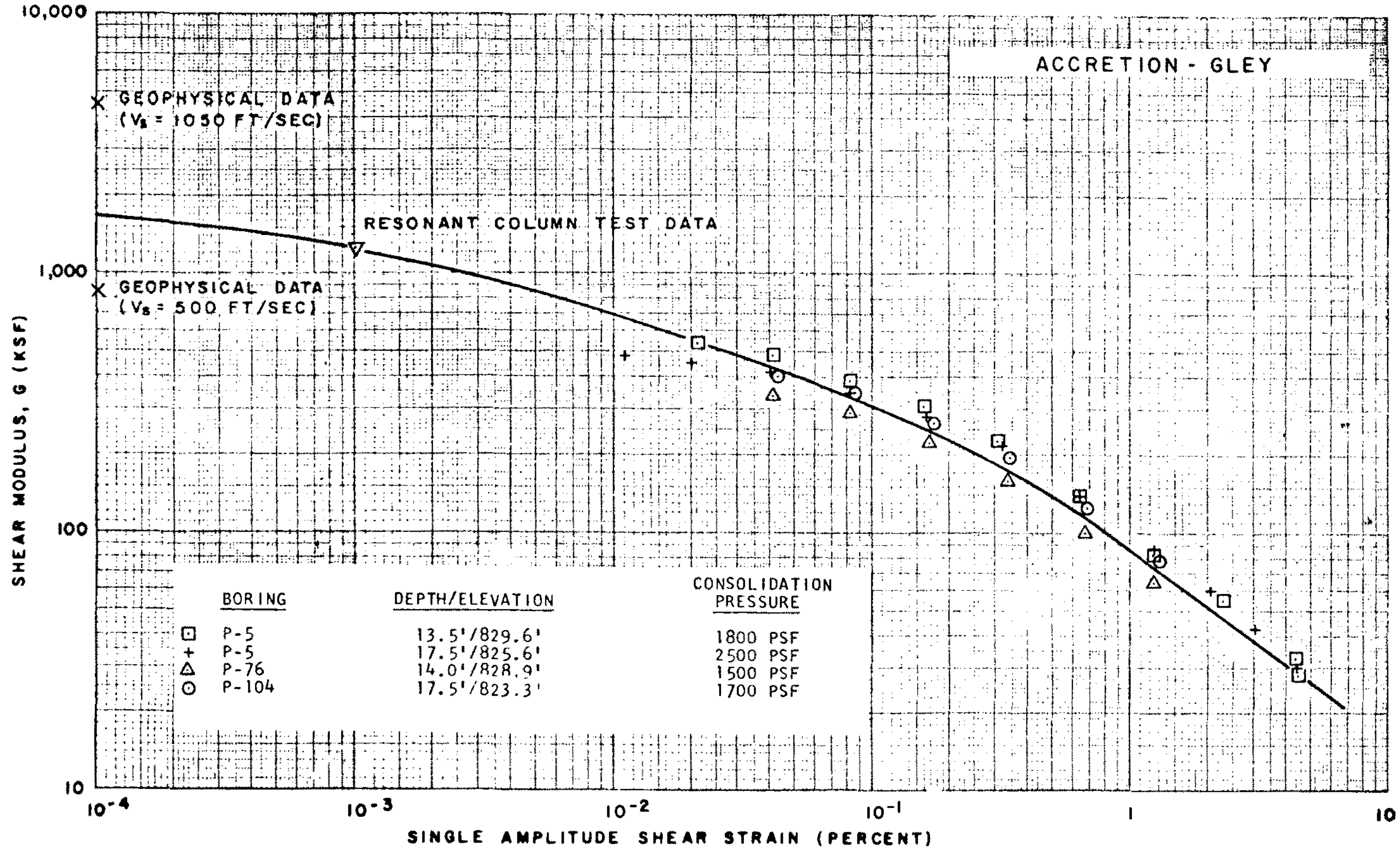

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FIGURE 2.5-452

RESULTS OF STRAIN-CONTROLLED DYNAMIC TRIAXIAL TESTS, SHEAR MODULUS VS. SHEAR STRAIN

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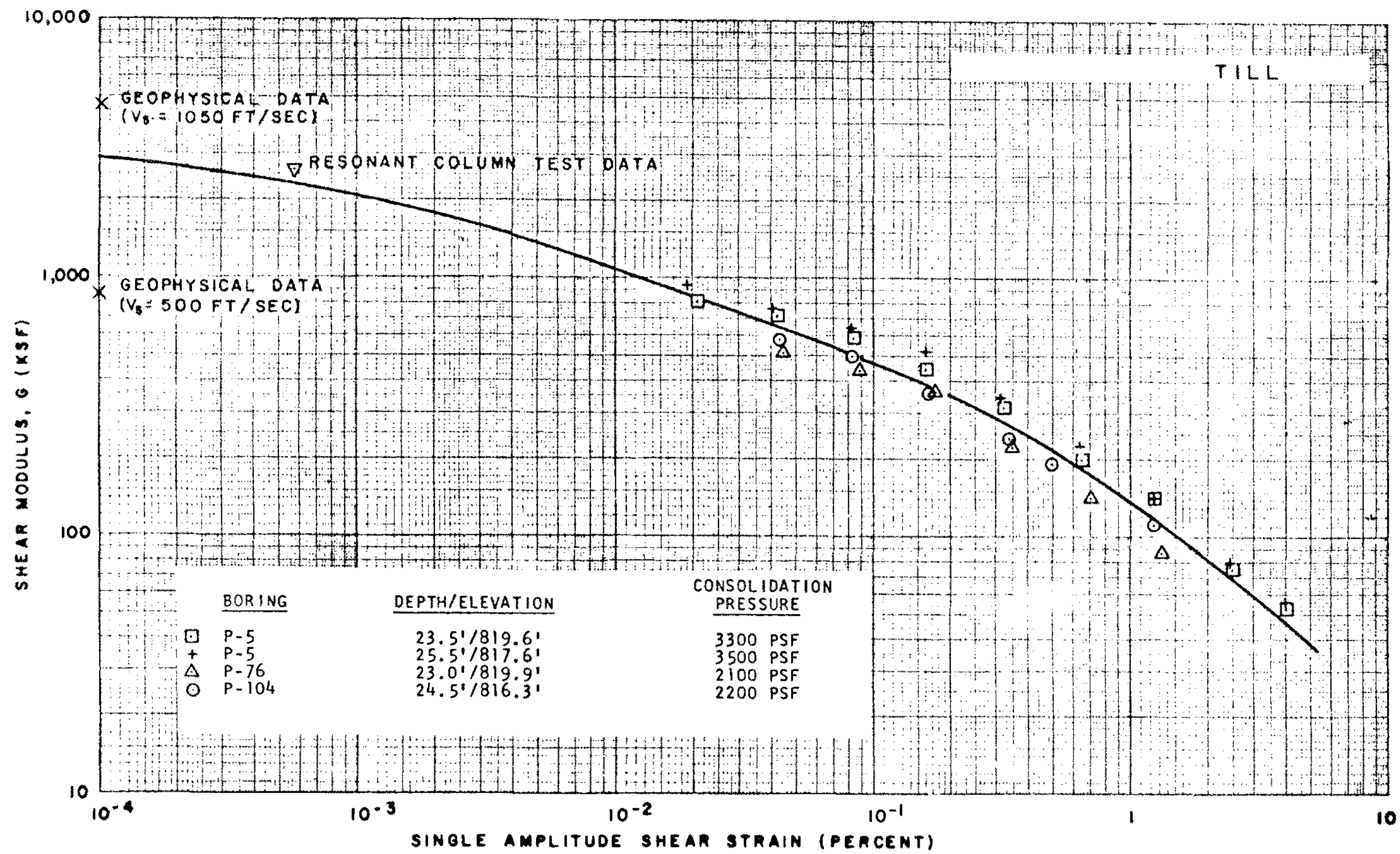

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FIGURE 2.5-453

RESULTS OF STRAIN-CONTROLLED DYNAMIC TRIAXIAL TESTS, SHEAR MODULUS VS. SHEAR STRAIN

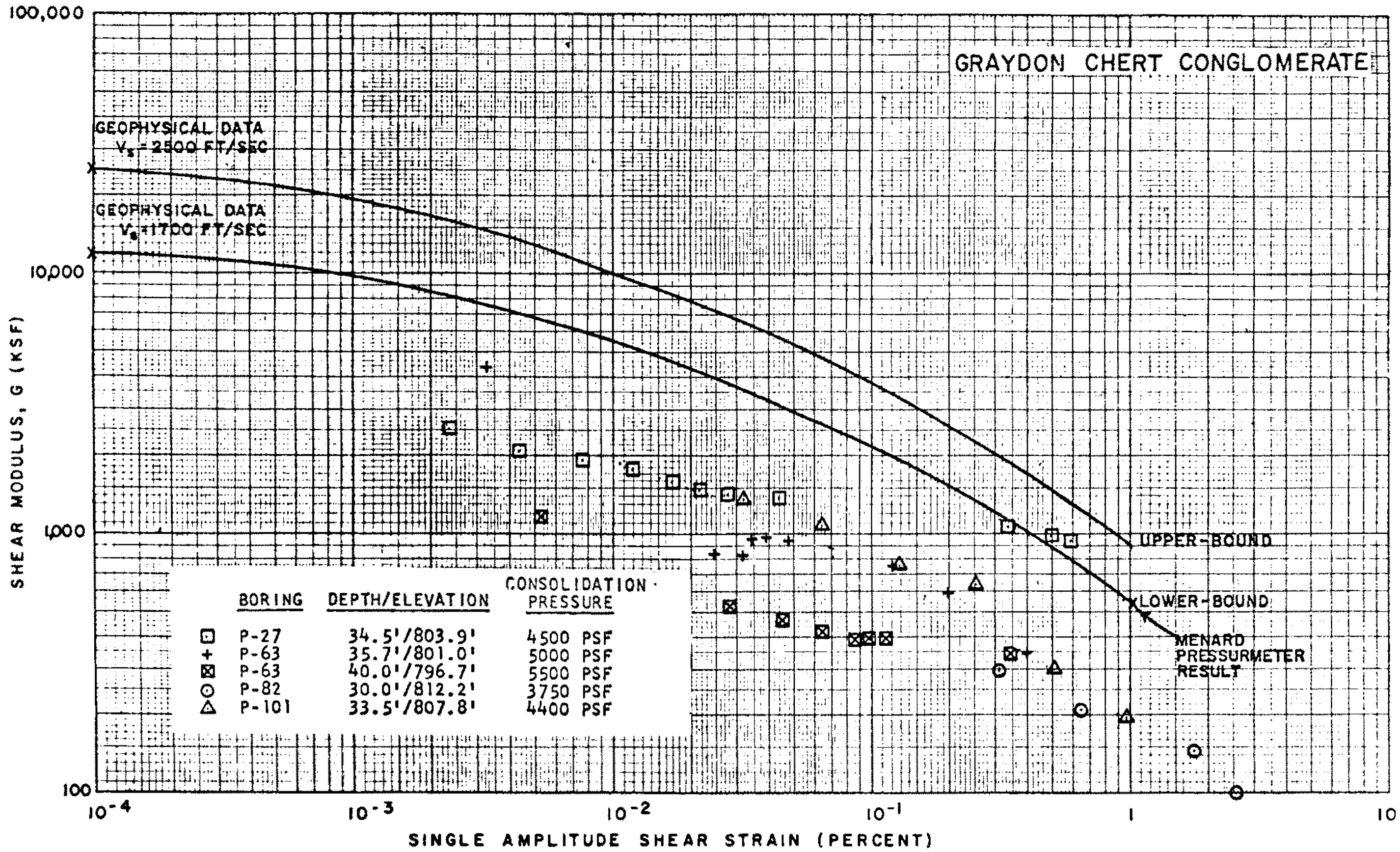

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FIGURE 2.5-454
RESULTS OF STRAIN-CONTROLLED
DYNAMIC TRIAXIAL TESTS,
SHEAR MODULUS VS. SHEAR STRAIN

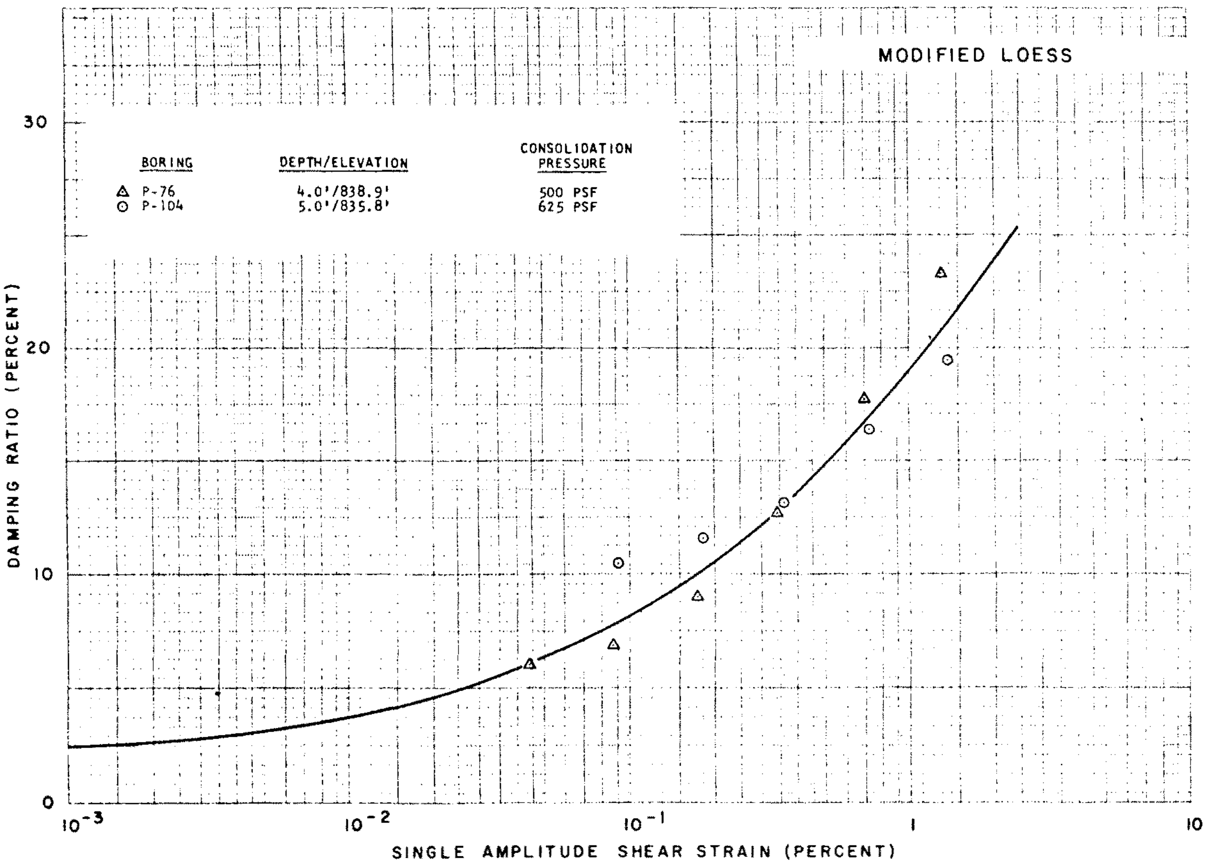

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FIGURE 2.5-455

RESULTS OF STRAIN-CONTROLLED DYNAMIC TRIAXIAL TESTS, DAMPING RATIO VS. SHEAR STRAIN

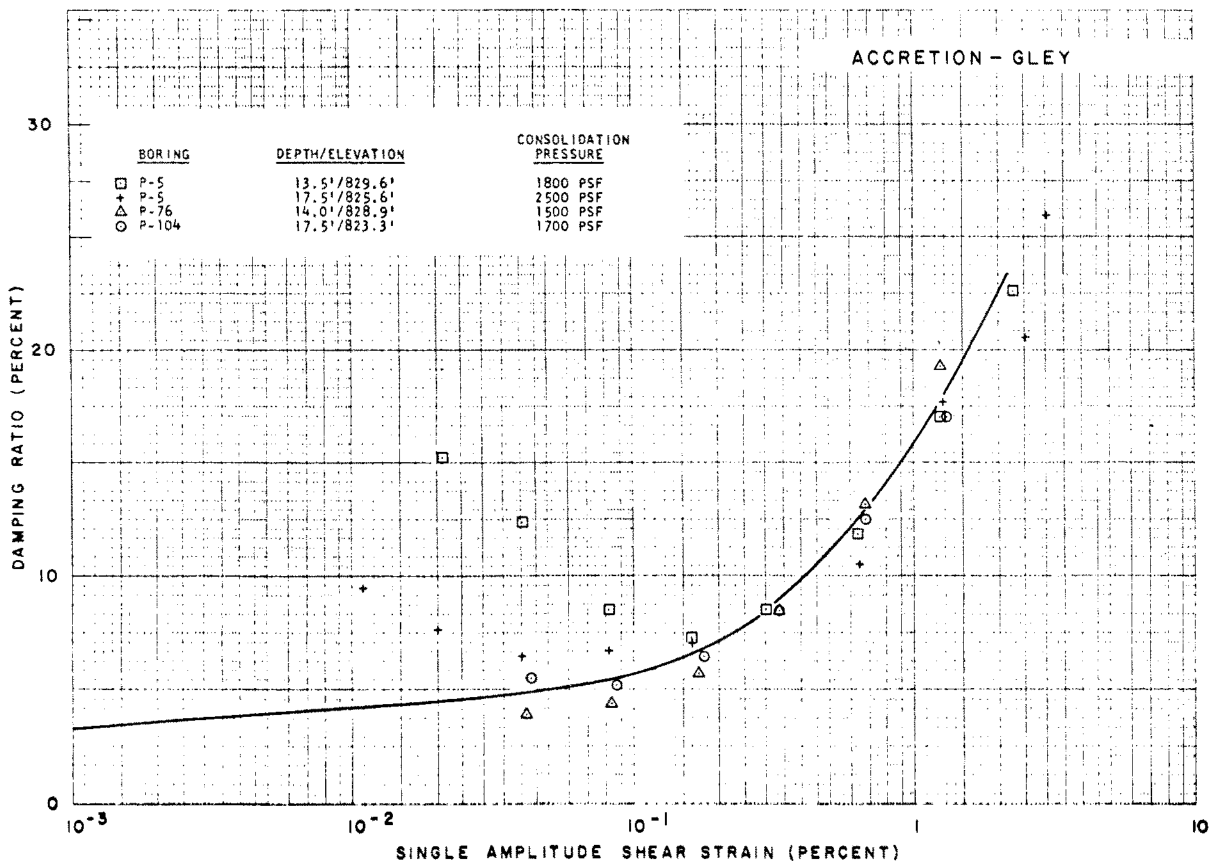

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FIGURE 2.5-456

RESULTS OF STRAIN-CONTROLLED DYNAMIC TRIAXIAL TESTS, DAMPING RATIO VS. SHEAR STRAIN

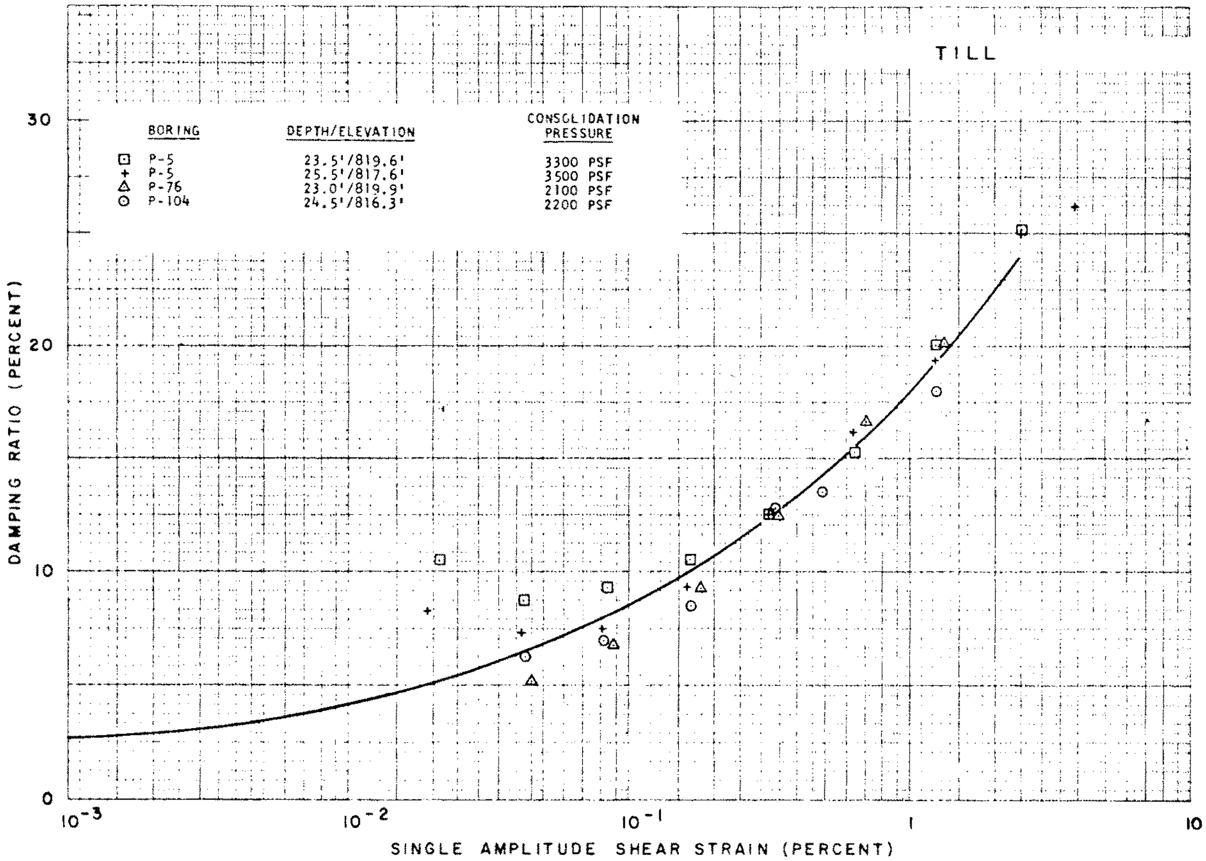

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FIGURE 2.5-457

RESULTS OF STRAIN-CONTROLLED DYNAMIC TRIAXIAL TESTS, DAMPING RATIO VS. SHEAR STRAIN

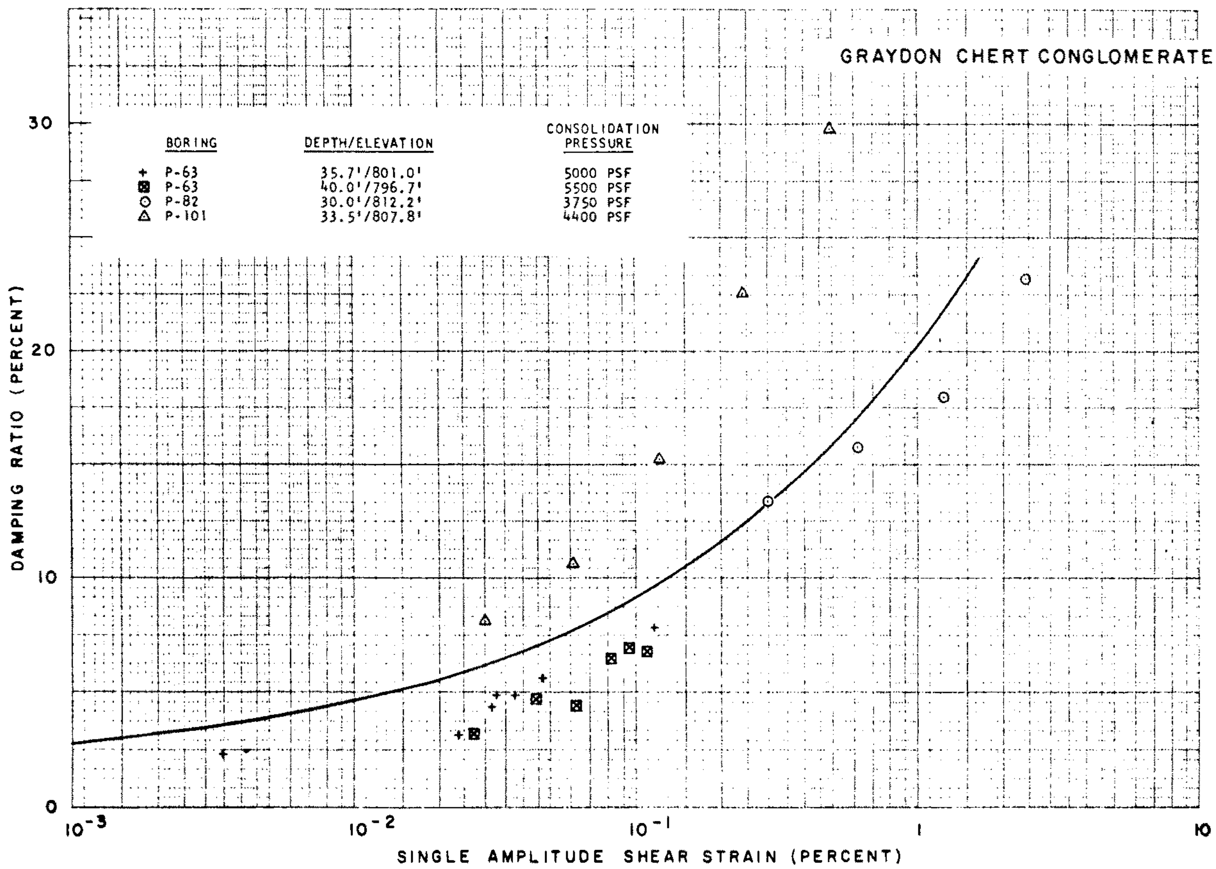

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FIGURE 2.5-458

RESULTS OF STRAIN-CONTROLLED DYNAMIC TRIAXIAL TESTS, DAMPING RATIO VS. SHEAR STRAIN

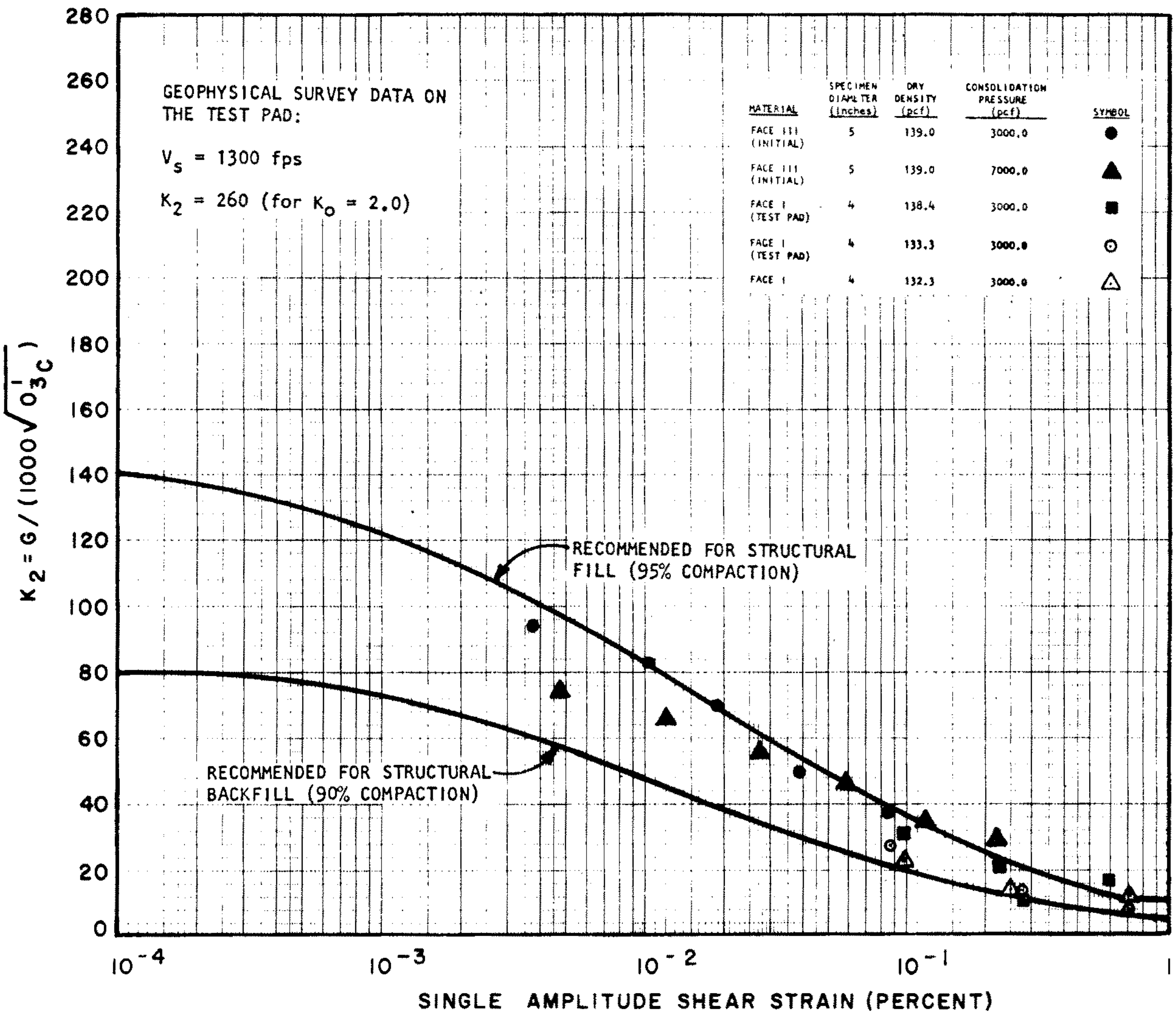

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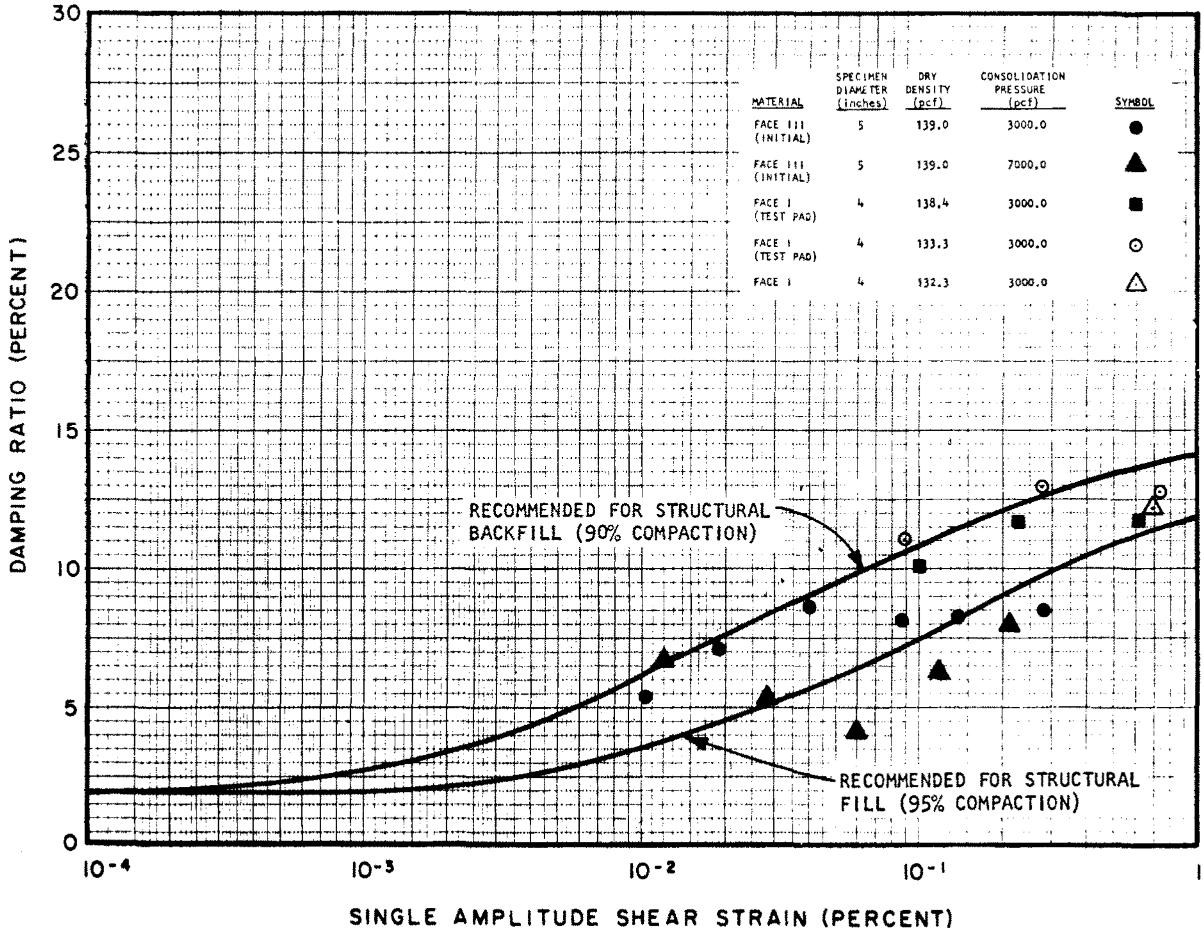
FIGURE 2.5-459

RESULTS OF STRAIN-CONTROLLED DYNAMIC TRIAXIAL TESTS CRUSHED STONE FILL AND BACKFILL

NOTES:

FACE I, FACE III: ON-SITE MINE TEST FACES.
INITIAL: SAMPLE OBTAINED PRIOR TO CONSTRUCTION OF THE STRUCTURAL FILL TEST PAD.
TEST PAD: SAMPLE OBTAINED DURING CONSTRUCTION OF THE STRUCTURAL FILL TEST PAD.



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NOTES:

FACE I, FACE III: ON-SITE MINE TEST FACES.
INITIAL: SAMPLE OBTAINED PRIOR TO CONSTRUCTION OF THE STRUCTURAL FILL TEST PAD.
TEST PAD: SAMPLE OBTAINED DURING CONSTRUCTION OF THE STRUCTURAL FILL TEST PAD.

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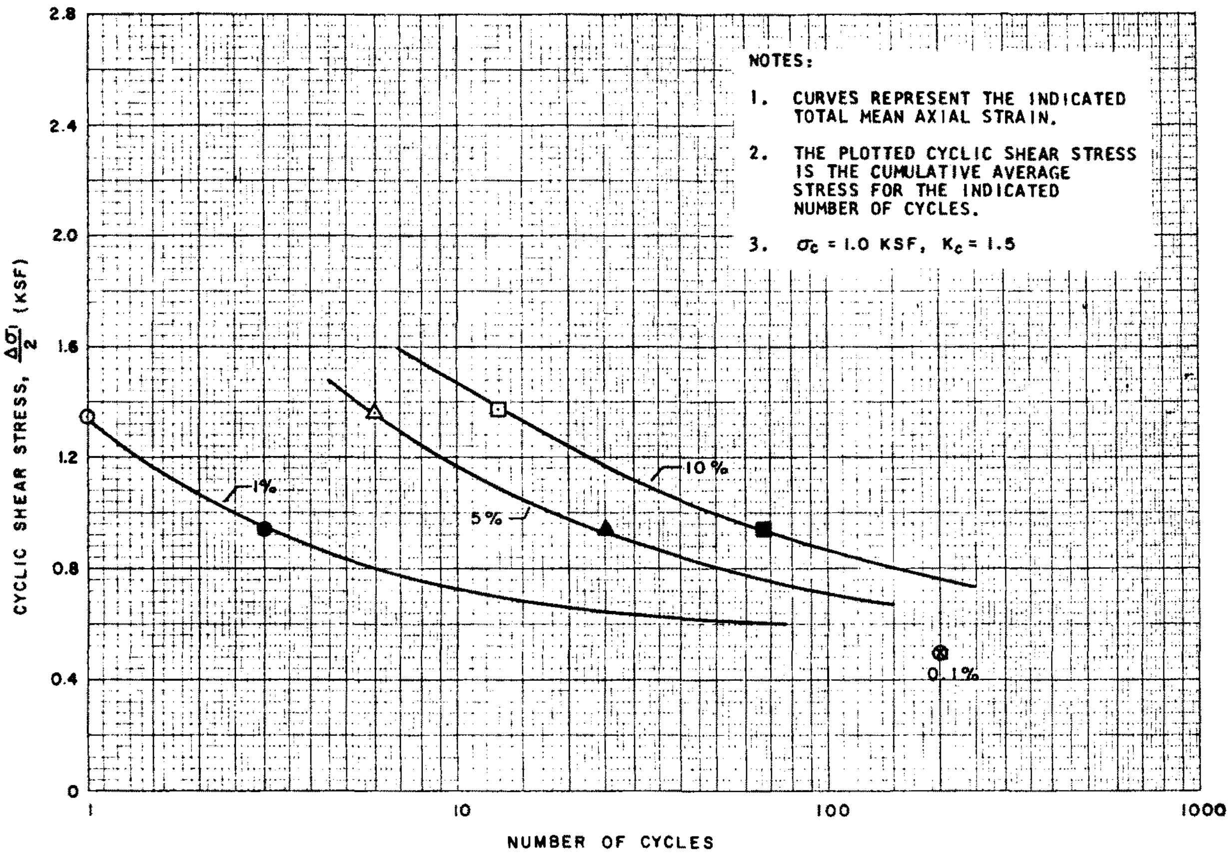
FIGURE 2.5-460

RESULTS OF STRAIN-CONTROLLED DYNAMIC TRIAXIAL TESTS CRUSHED STONE FILL AND BACKFILL



KEY:

SYMBOLS	SAMPLES
⊙,△,⊡	BORING P-87, 13.0' DEPTH
●,▲,■	BORING P-76, 17.5' DEPTH
⊗	BORING P-83, 14.0' DEPTH

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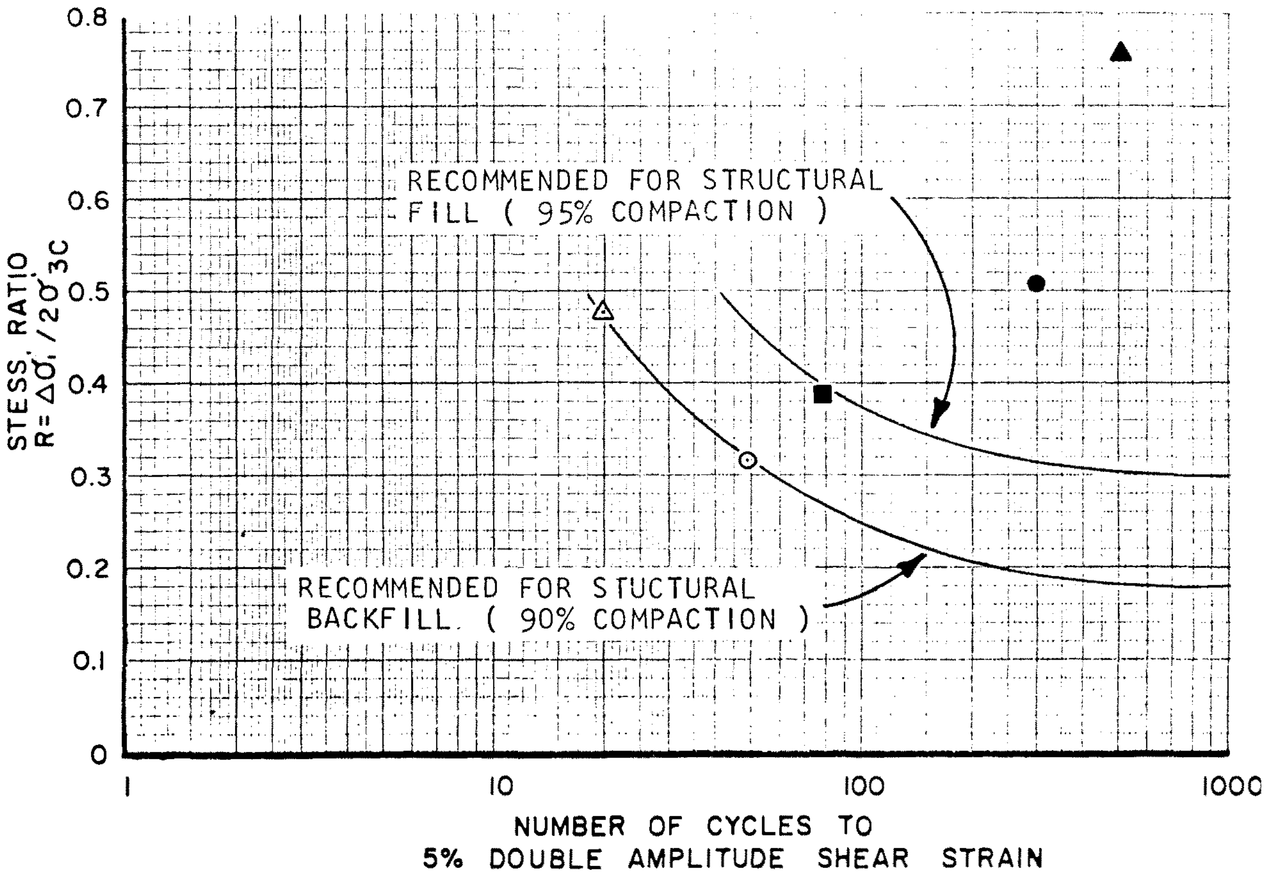
FIGURE 2.5-461

RESULTS OF STRESS-CONTROLLED DYNAMIC TRIAXIAL TESTS, ACCRECTION-GLEY



Material Source	Specimen Diameter (inches)	Dry Density (pcf)	Consolidation Pressure, $\Delta \sigma'_{3c}$ (psf)	
Face III (Initial)	5	139.1	3400	●
Face III (Initial)	5	139.2	2100	▲
Face I (Test Pad)	4	139.8	6000	■
Face I (Test Pad)	4	135.1	6000	⊙
Face I (Test Pad)	4	131.7	6000	△

FACE I, FACE III: ON-SITE MINE TEST FACES.

INITIAL: SAMPLE OBTAINED PRIOR TO CONSTRUCTION OF THE STRUCTURAL FILL TEST PAD.

TEST PAD: SAMPLE OBTAINED DURING CONSTRUCTION OF THE STRUCTURAL FILL TEST PAD.

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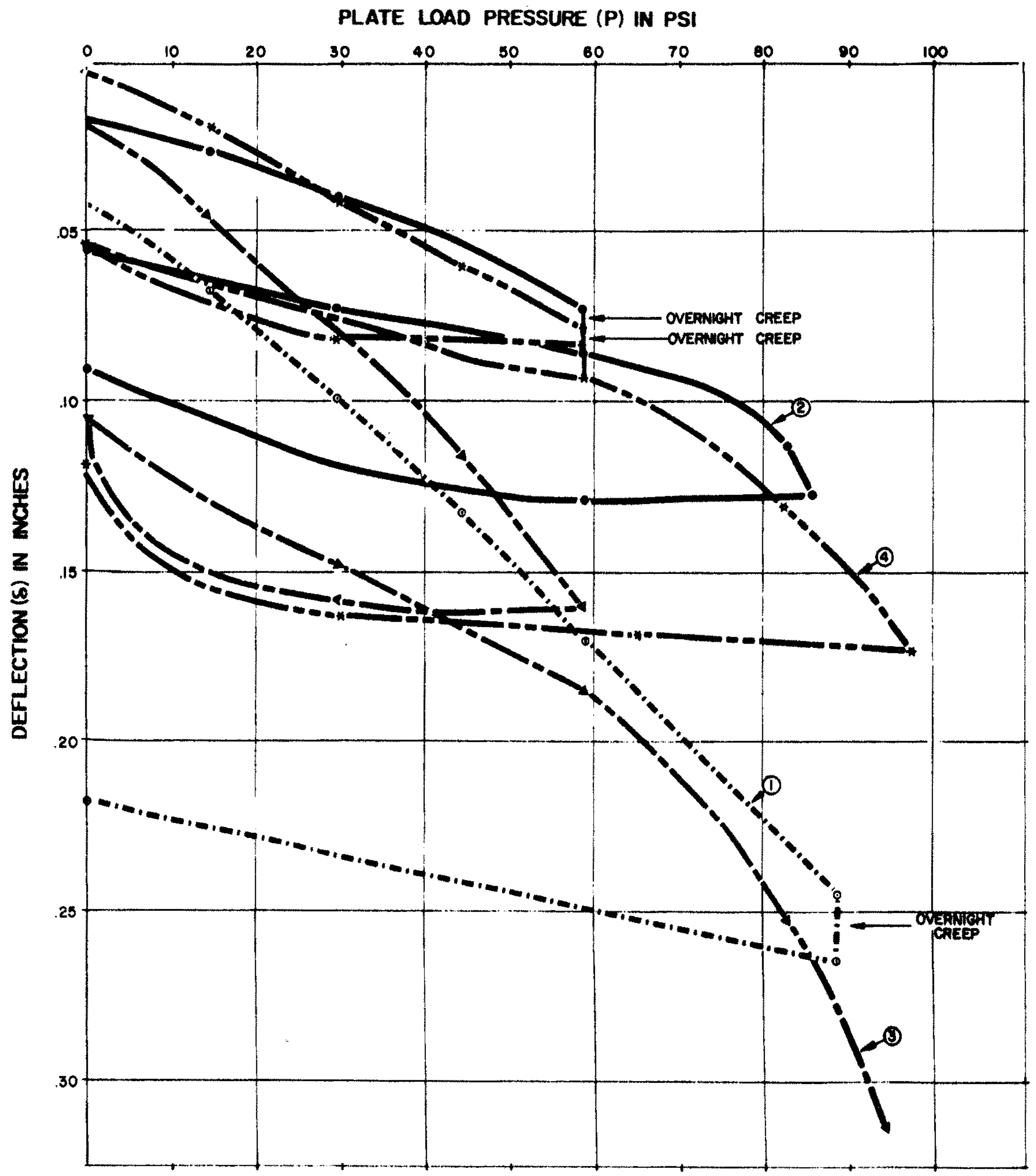
FIGURE 2.5-462
RESULTS OF STRESS-CONTROLLED DYNAMIC TRIAXIAL TESTS, STRUCTUAL FILL AND BACKFILL



SUMMARY OF PLATE LOAD TEST DATA									
TEST NO.	GRAPH SYMBOL	DEPTH BELOW GROUND SURFACE (FT)	DEPTH BELOW TOP OF GRAYDON CHERT CONGLOMERATE (FT)	γ_W (PCF)	γ_D (PCF)	ω %	$\Delta P / \Delta\delta$ (PCI)	SUBGRADE MODULUS, K CONVERTED TO 12" PLATE (PCI) $\times 10^3$	MODULUS OF ELASTICITY, E (PSF) $\times 10^6$
1	⊙ –·–·–	4.5	0.0	114.0	84.1	35.4	667.	12.	1.4
2	● ———	5.5	1.0	113.6	94.0	20.7	1275.	22.	2.6
3	▲ – – –	6.0	0.0	122.1	99.4	22.8	519.	9.3	1.1
4	* – – – –	7.0	1.0	126.4	105.7	19.7	895.	16.1	1.8

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PLATE 2.5-463
PLATE LOAD TEST

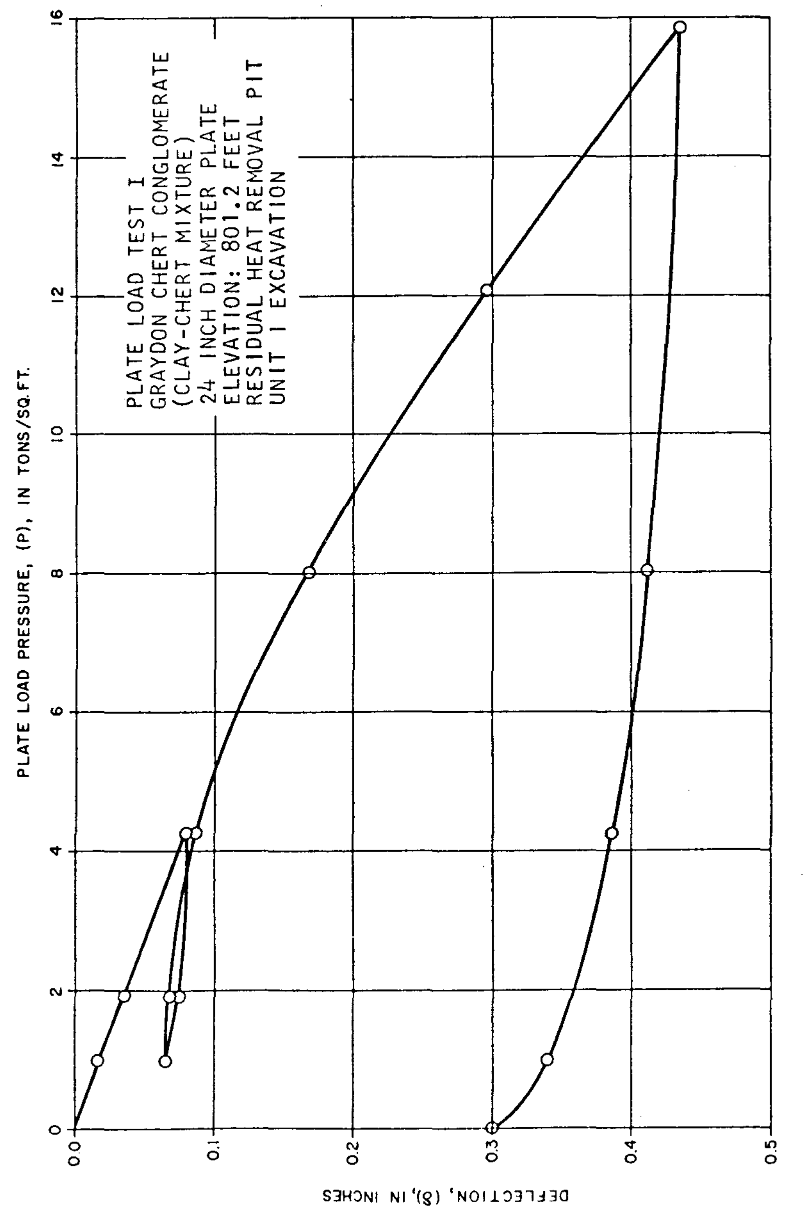

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FIGURE 2.5-464
PLATE LOAD TEST RESULTS

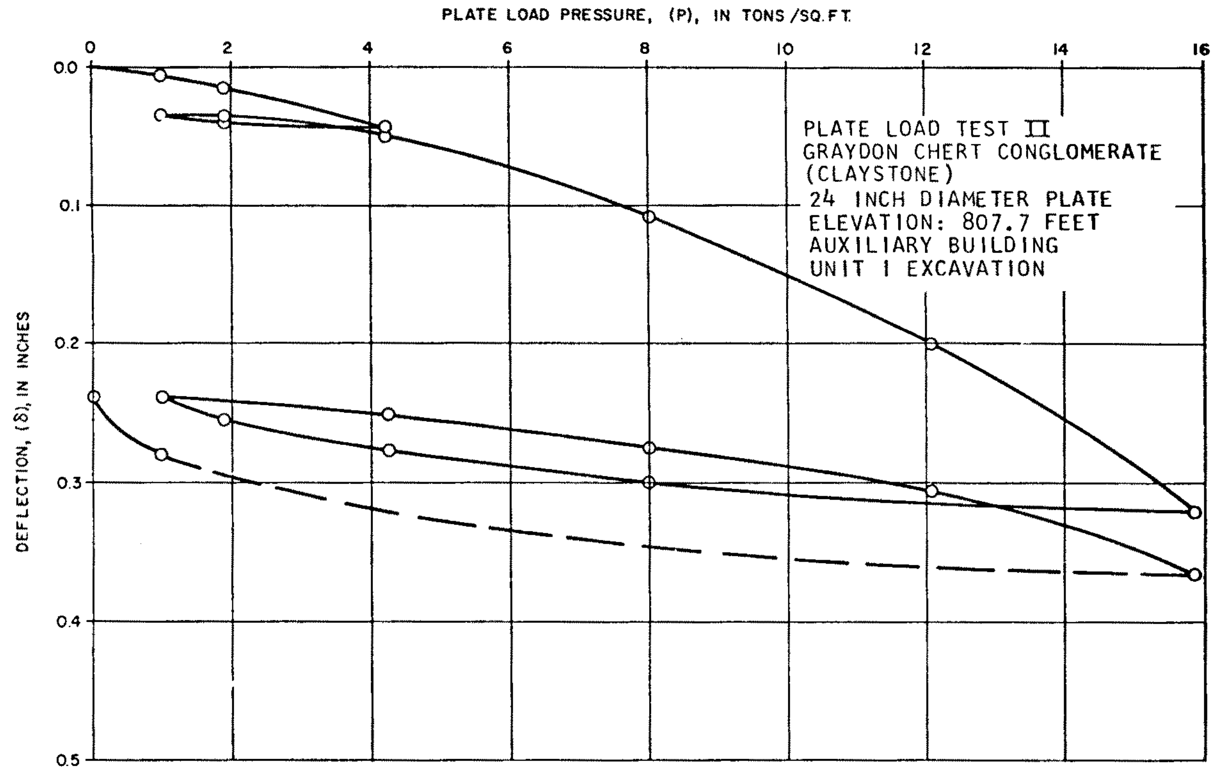

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FIGURE 2.5-465
PLATE LOAD TEST RESULTS

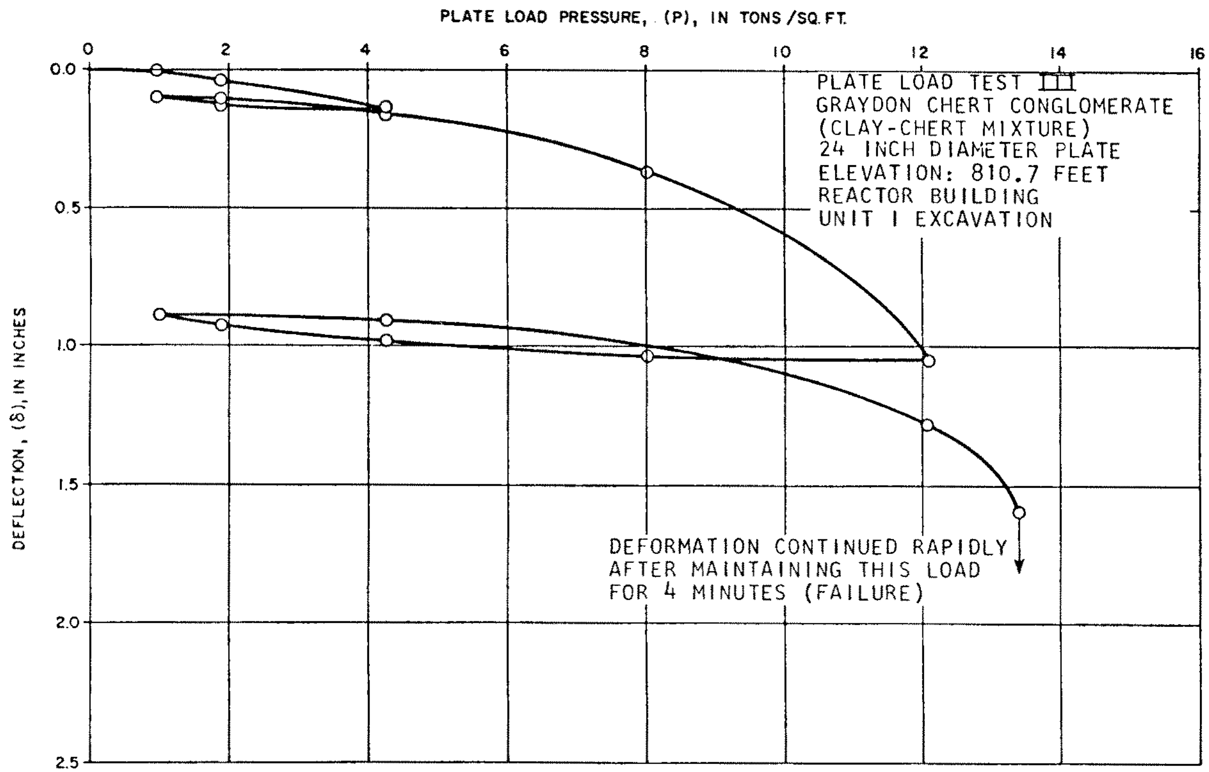

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FIGURE 2.5-466
PLATE LOAD TEST RESULTS

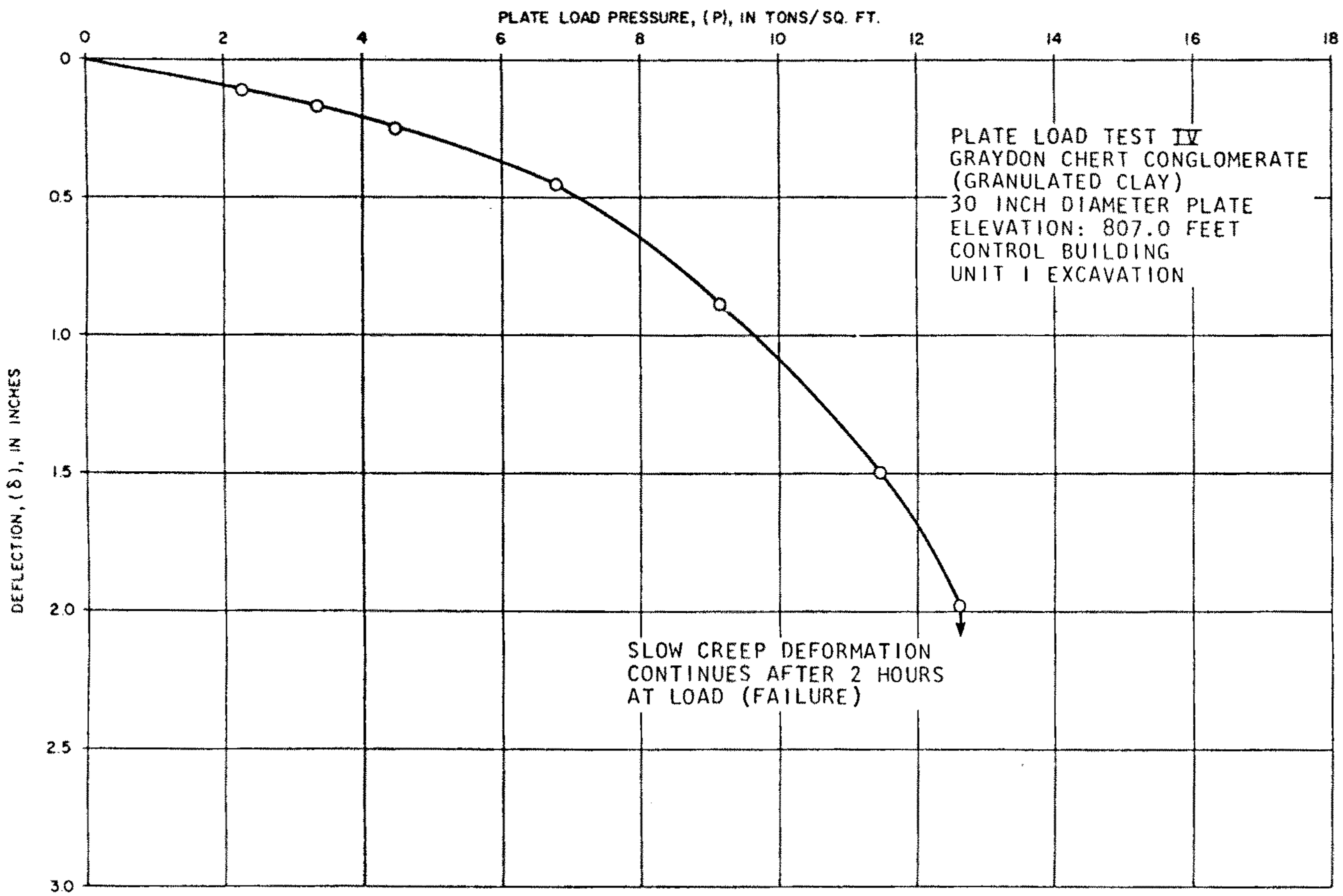

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FIGURE 2.5-467
PLATE LOAD TEST RESULTS

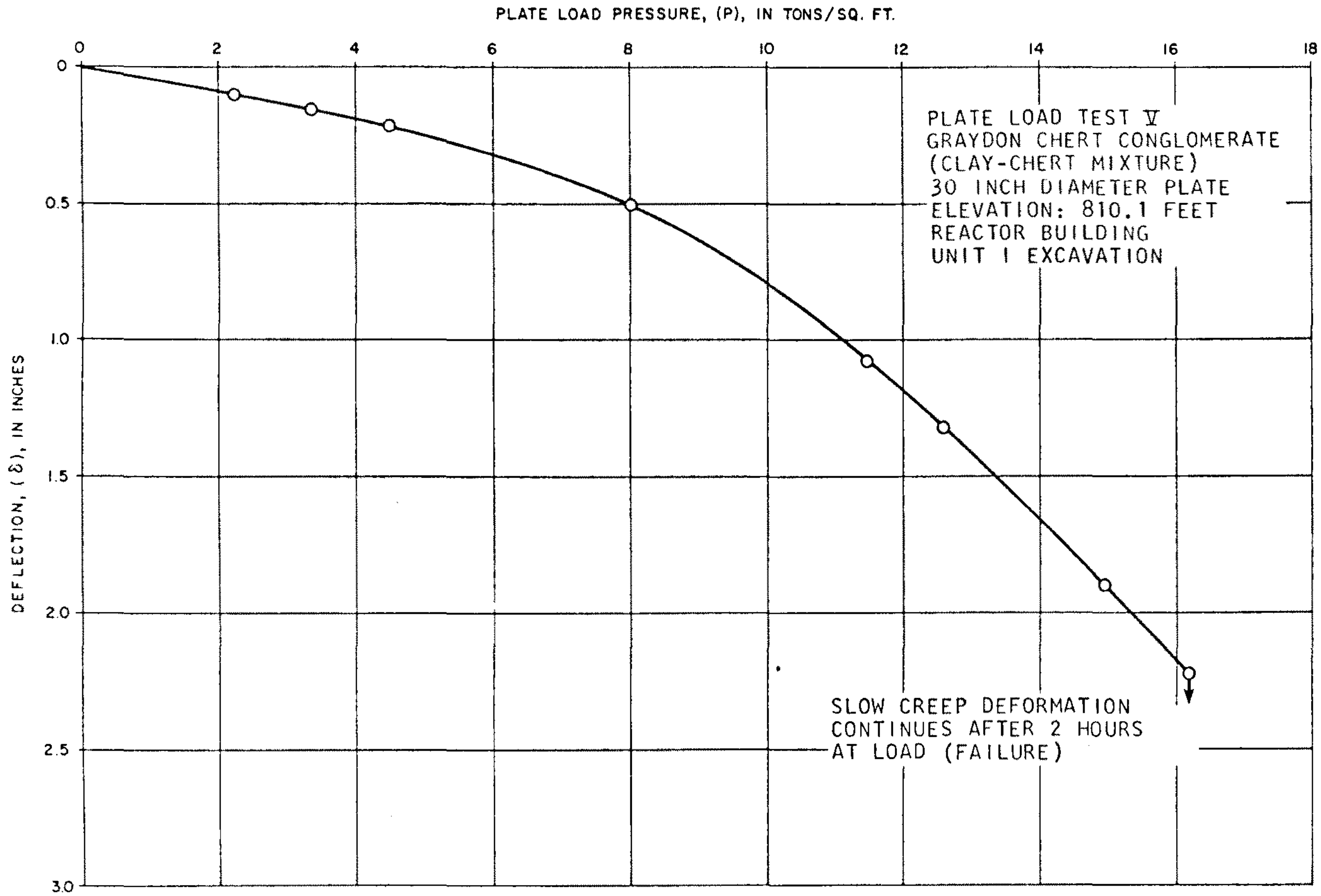

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FIGURE 2.5-468
PLATE LOAD TEST RESULTS

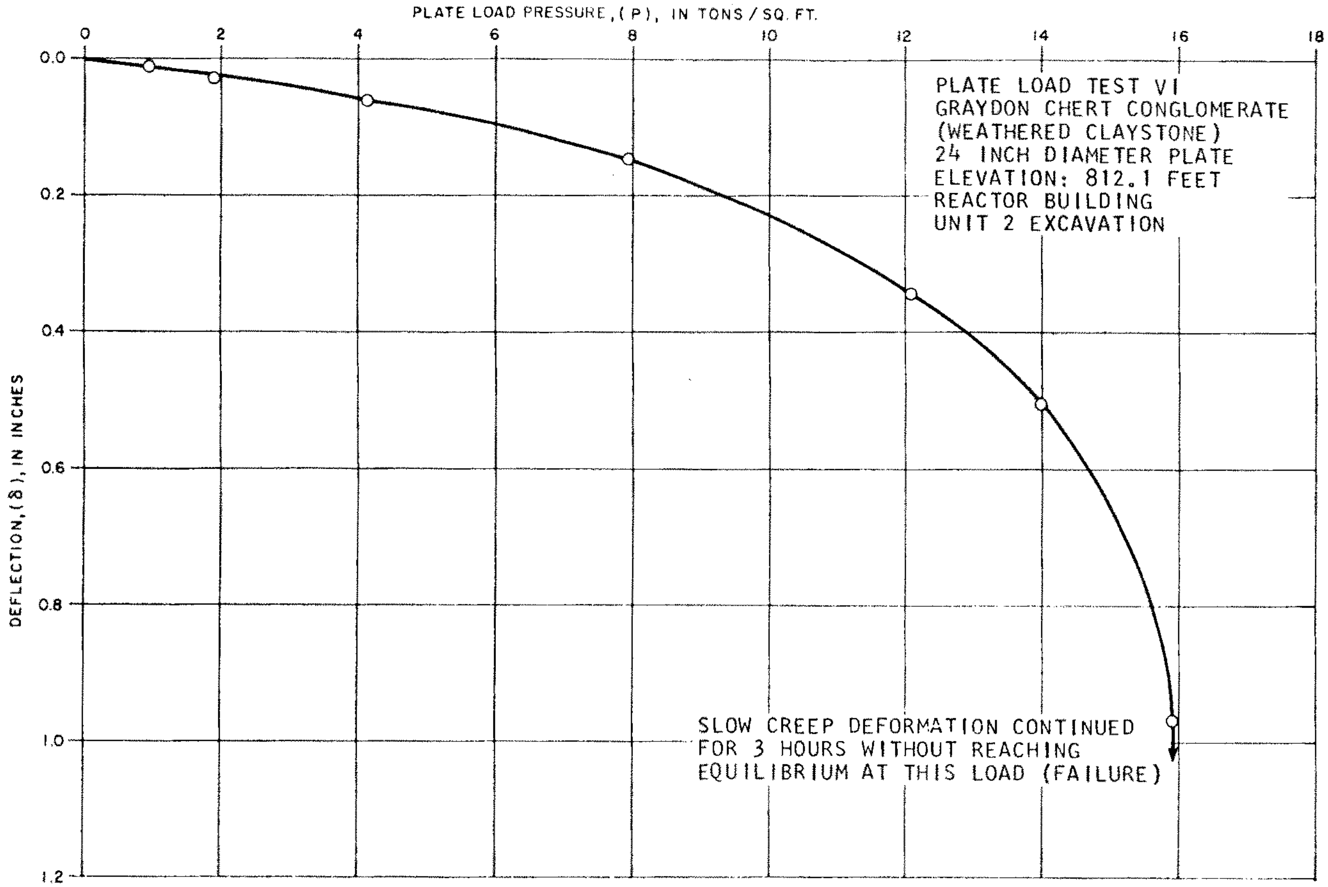

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FIGURE 2.5-469
PLATE LOAD TEST RESULTS

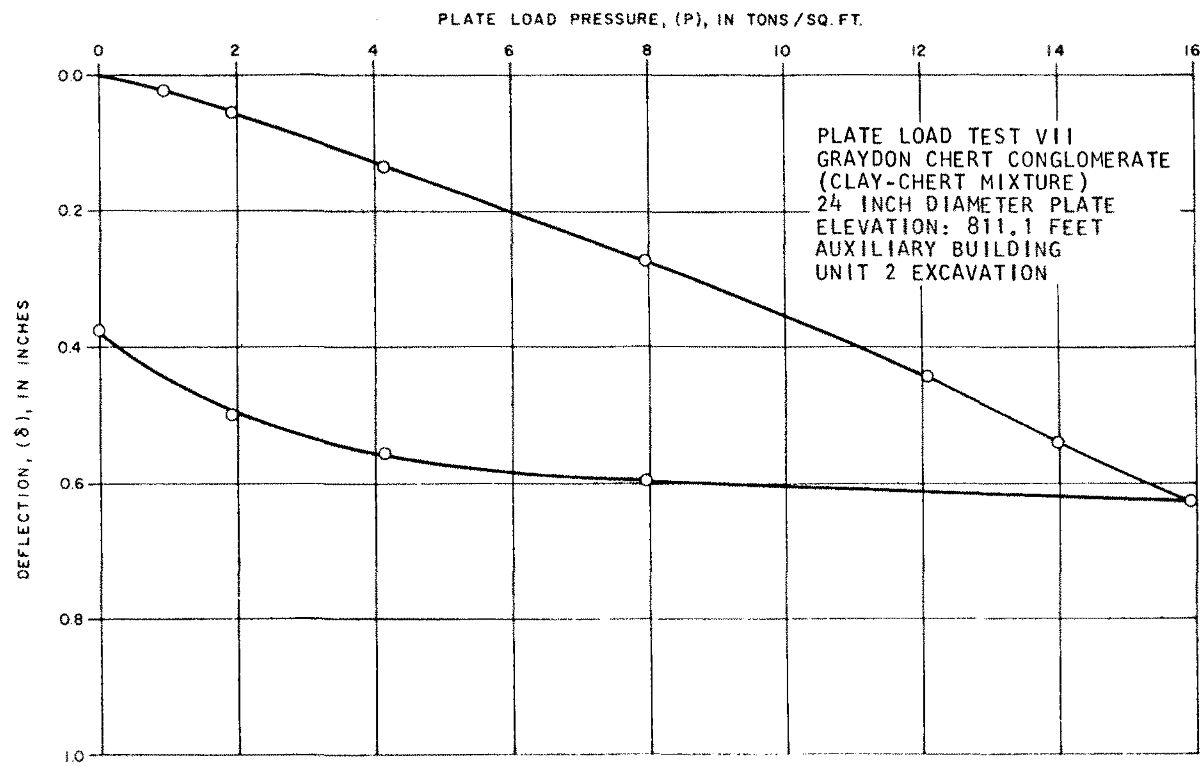

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FIGURE 2.5-470
PLATE LOAD TEST RESULTS

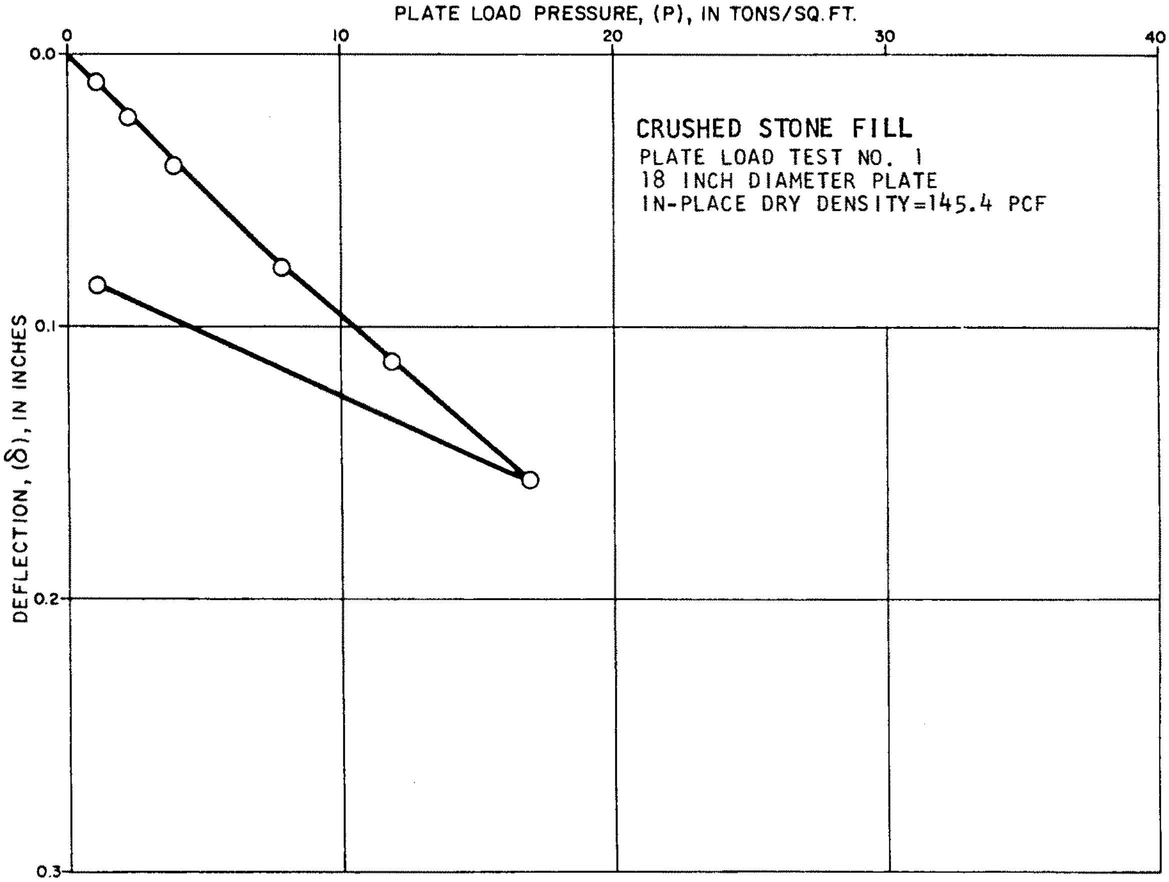

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FIGURE 2.5-471

PLATE LOAD TEST RESULTS
STRUCTURAL FILL TEST PAD

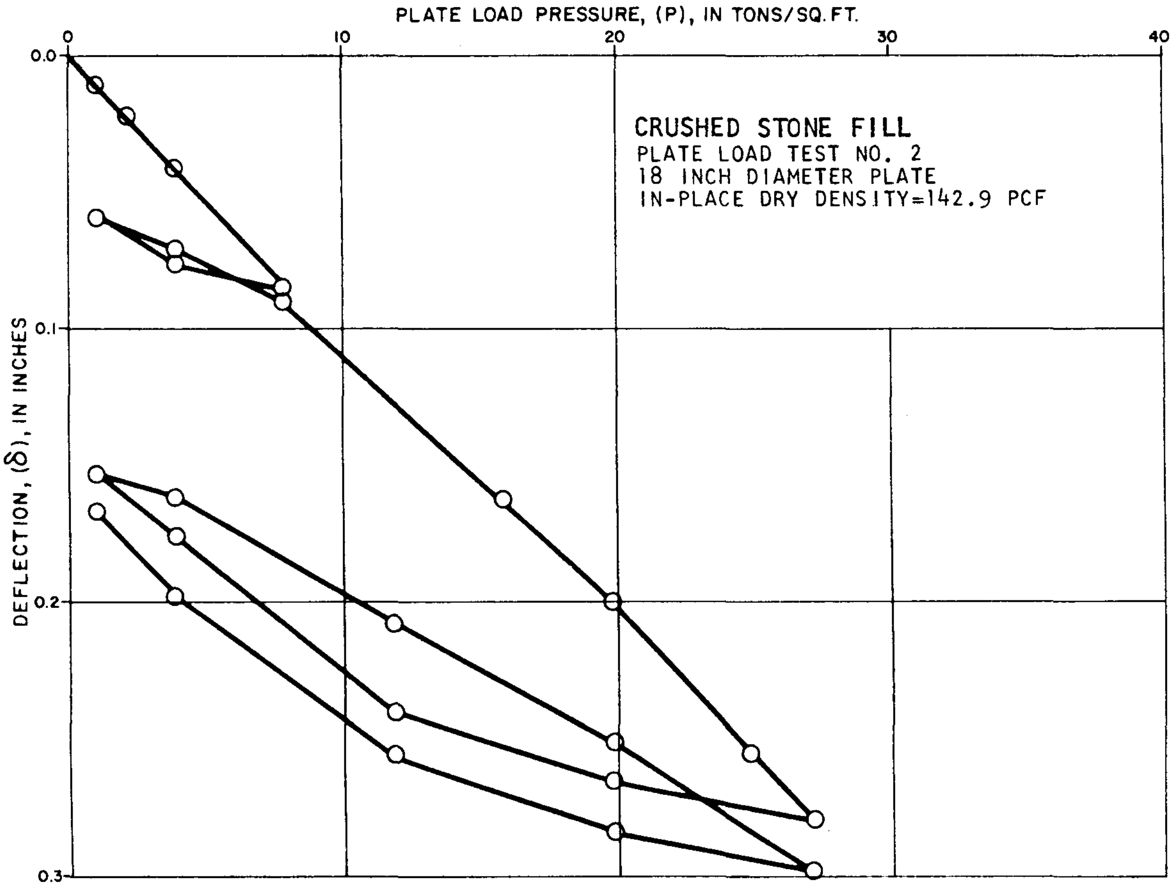

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FIGURE 2.5-472

PLATE LOAD TEST RESULTS
STRUCTURAL FILL TEST PAD

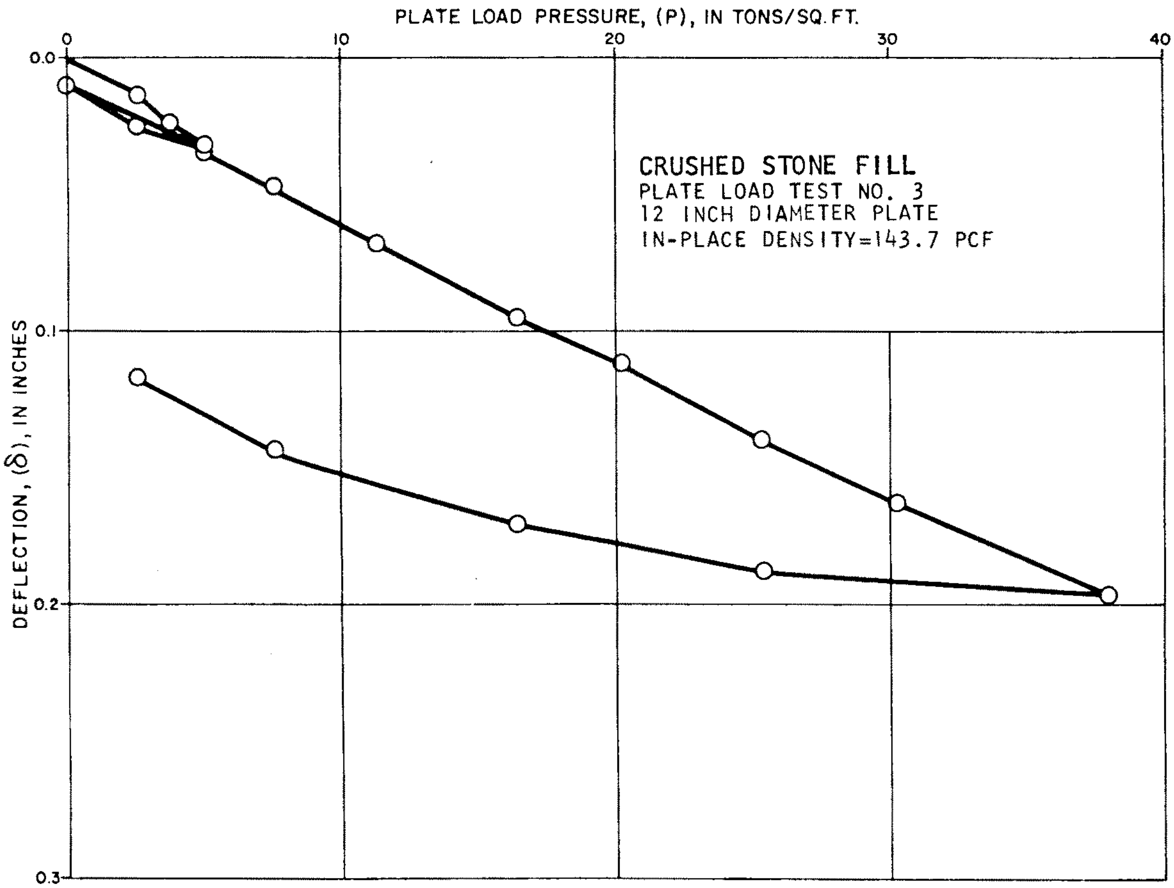

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FIGURE 2.5-473

PLATE LOAD TEST RESULTS
STRUCTURAL FILL TEST PAD

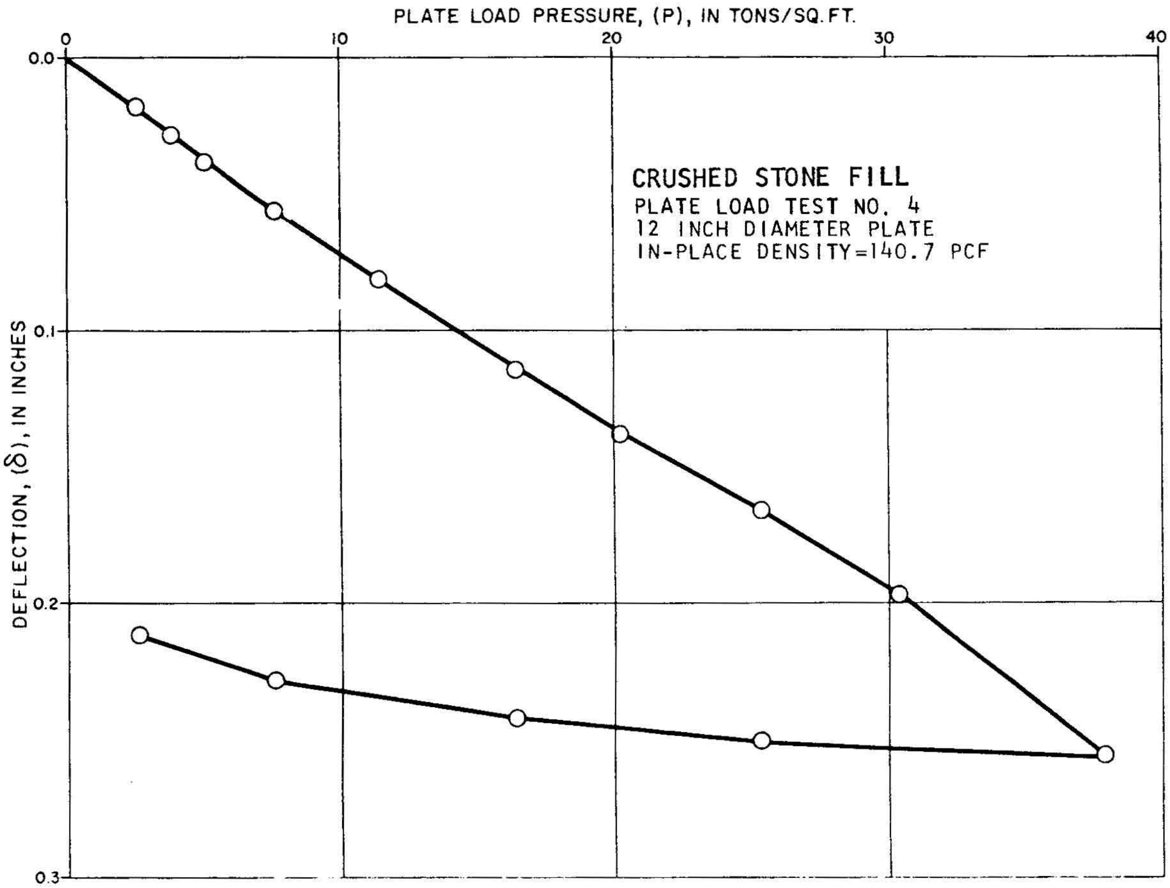

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FIGURE 2.5-474

PLATE LOAD TEST RESULTS
STRUCTURAL FILL TEST PAD

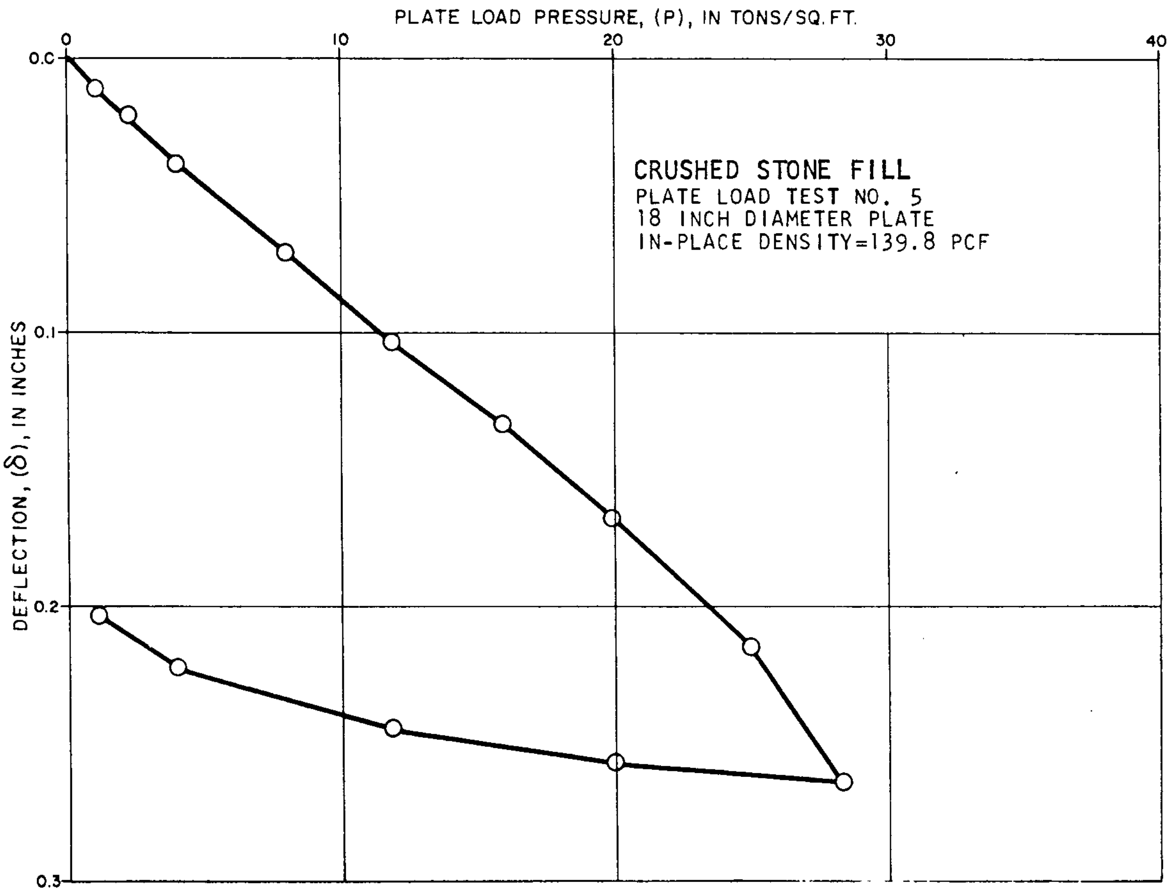

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FIGURE 2.5-475

PLATE LOAD TEST RESULTS
STRUCTURAL FILL TEST PAD

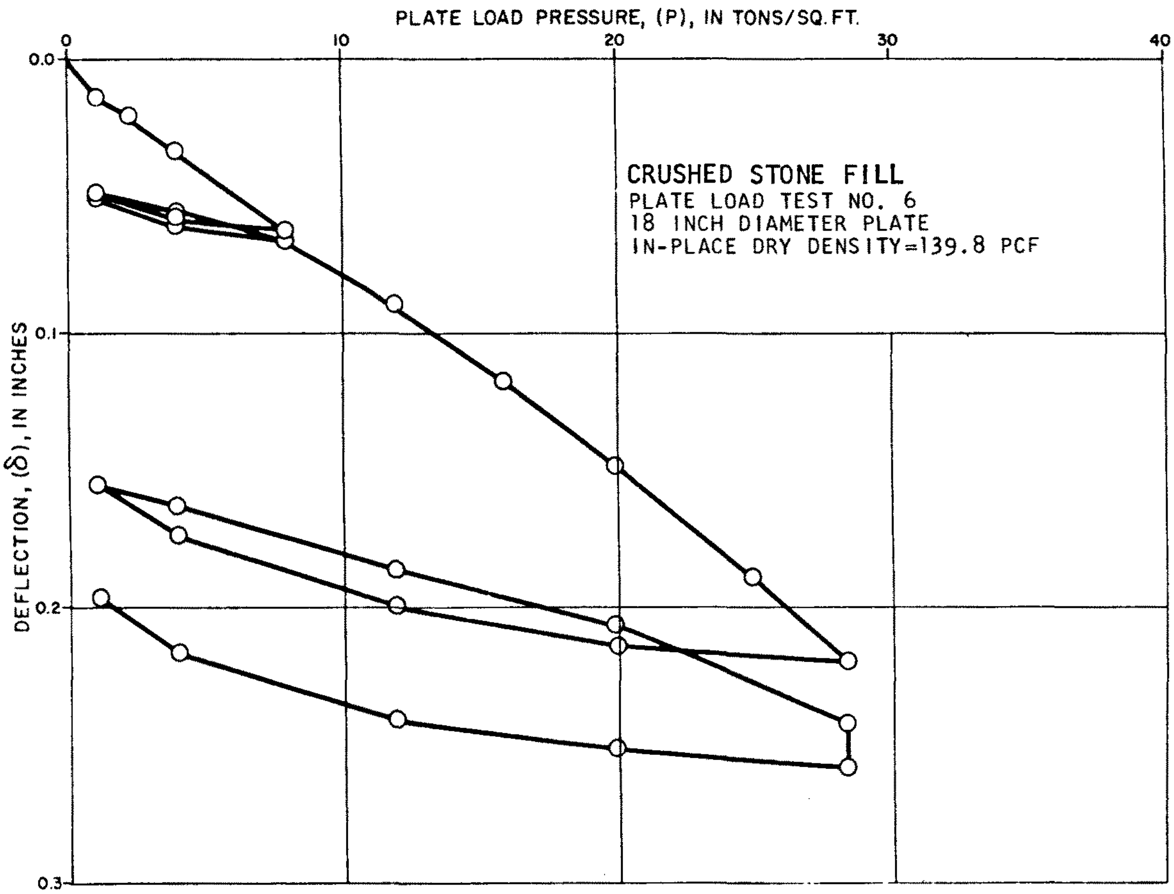

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FIGURE 2.5-476

PLATE LOAD TEST RESULTS
STRUCTURAL FILL TEST PAD

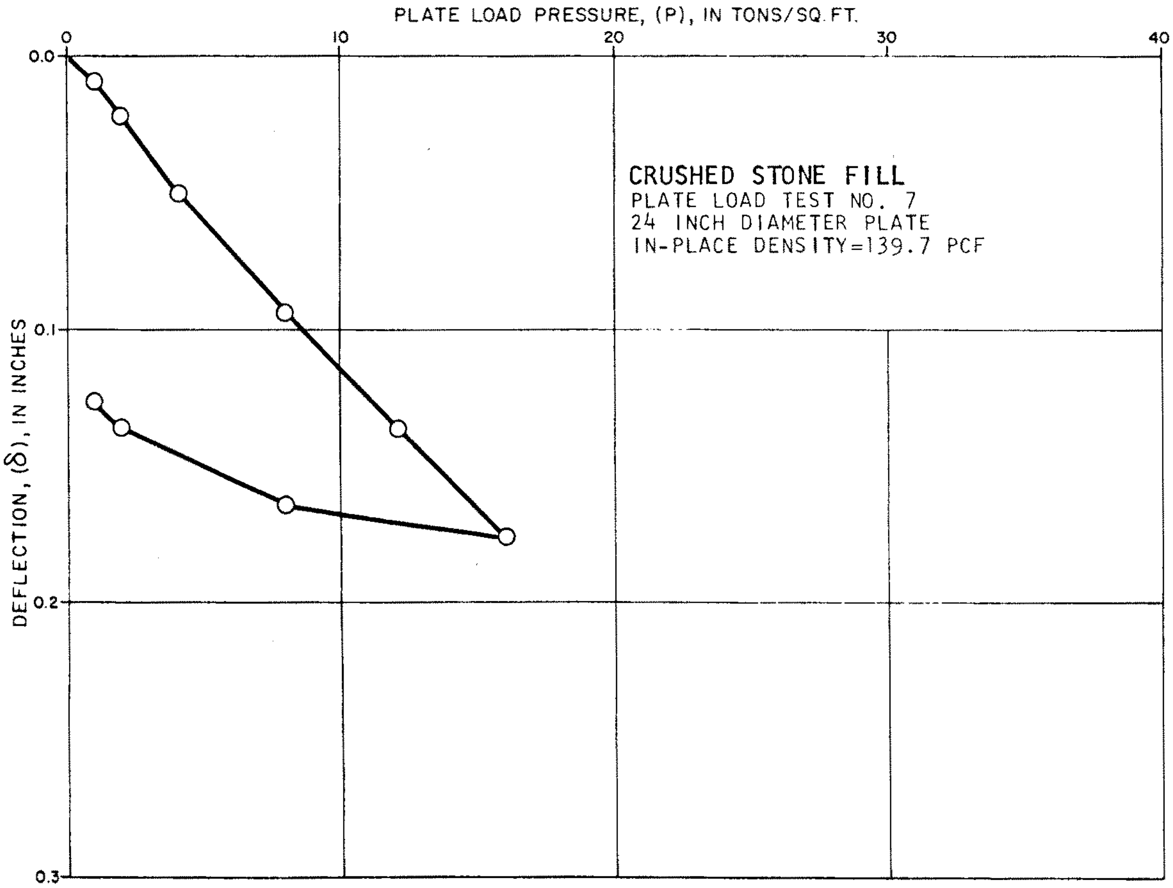

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FIGURE 2.5-477

PLATE LOAD TEST RESULTS
STRUCTURAL FILL TEST PAD

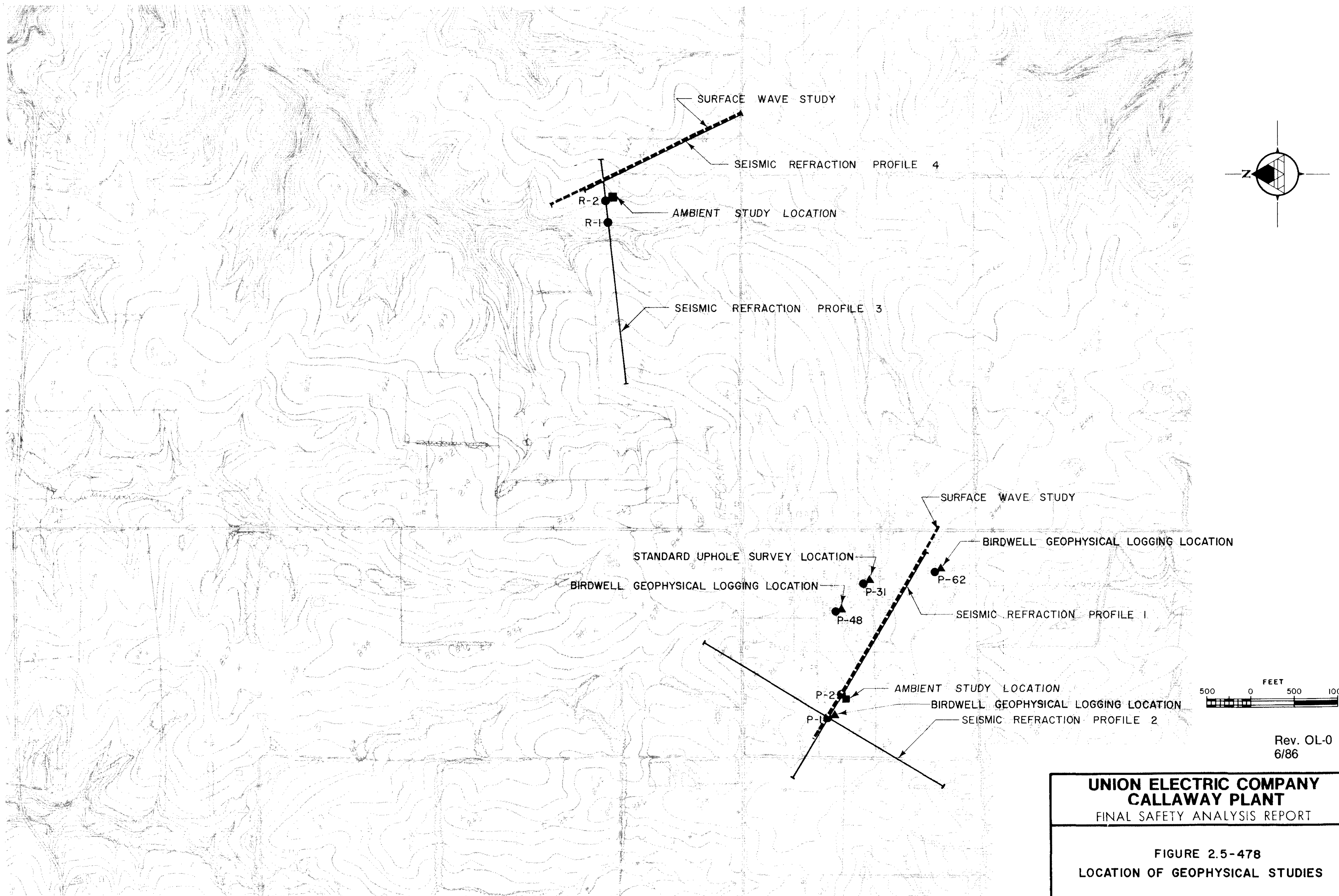

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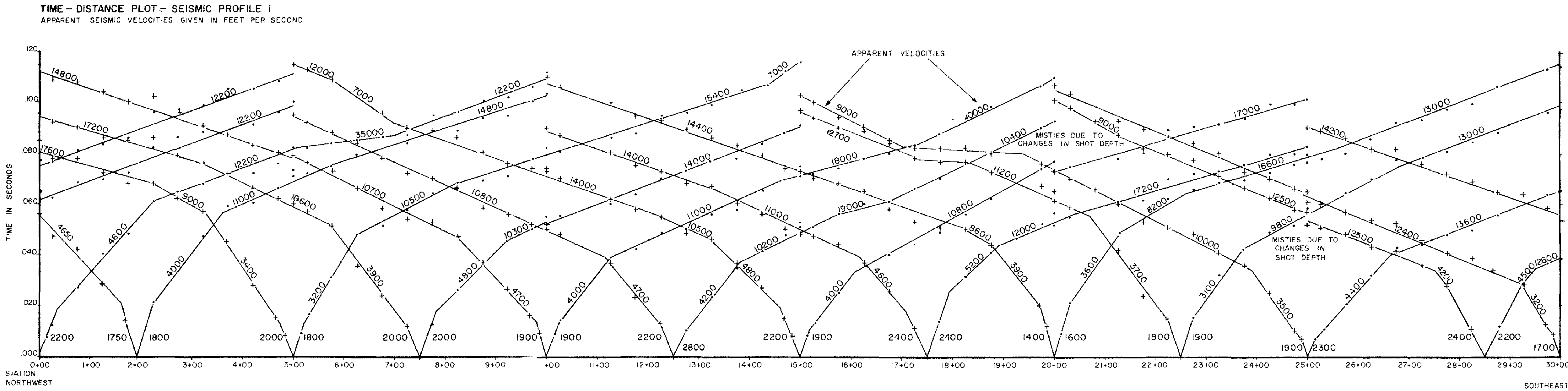
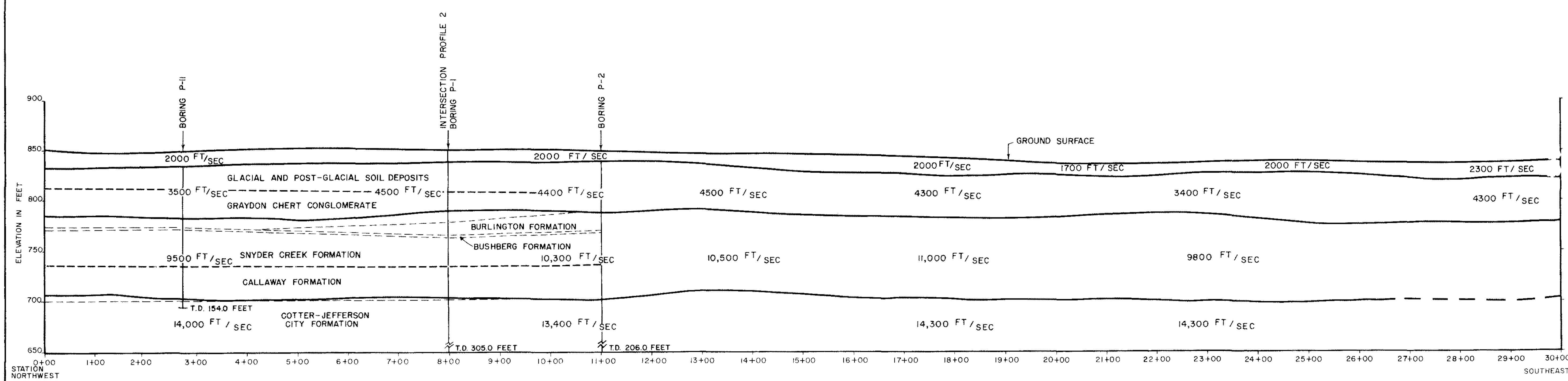
FIGURE 2.5-478
LOCATION OF GEOPHYSICAL STUDIES





VERTICAL EXAGGERATION 2X

NOTES

1. TIME DISTANCE PLOTS REFLECT INFORMATION COLLECTED FROM SHOT POINTS MADE AT SEVERAL LOCATIONS ALONG A SEISMIC LINE. FOR CLARIFICATION, TWO PLOT SYMBOLS HAVE BEEN USED TO INDICATE THE ORIGIN OF THE SHOCK: FROM THE LEFT (.) FROM THE RIGHT (+).

2. THE SUBSURFACE SECTIONS SHOWN REPRESENT OUR EVALUATION OF THE MOST PROBABLE CONDITIONS BASED UPON INTERPRETATIONS OF PRESENTLY AVAILABLE DATA. SOME VARIATIONS FROM THESE CONDITIONS MUST BE EXPECTED.

3. ALL THE COMPRESSIONAL WAVE VELOCITIES SHOWN ON THE TIME-DISTANCE PLOTS ARE APPARENT VELOCITIES. THESE VELOCITIES HAVE BEEN COMPUTED DIRECTLY FROM THE PLOTS. WHEN THE APPARENT COMPRESSIONAL WAVE VELOCITIES HAVE BEEN CORRECTED FOR SURFACE TOPOGRAPHY AND SUBSURFACE VARIATIONS, THE ACTUAL COMPRESSIONAL WAVE VELOCITY RESULTS, AS SHOWN IN THE SUBSURFACE CROSS-SECTIONS.

LEGEND:

——— CONTACT FROM SEISMIC REFRACTION DATA ONLY

– – – CONTACT FROM BOREHOLE DATA ONLY

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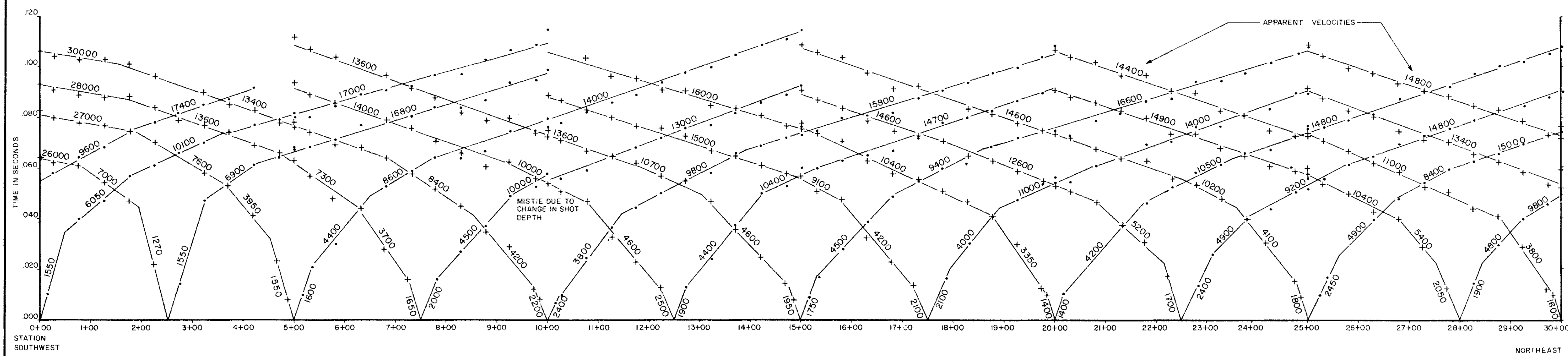
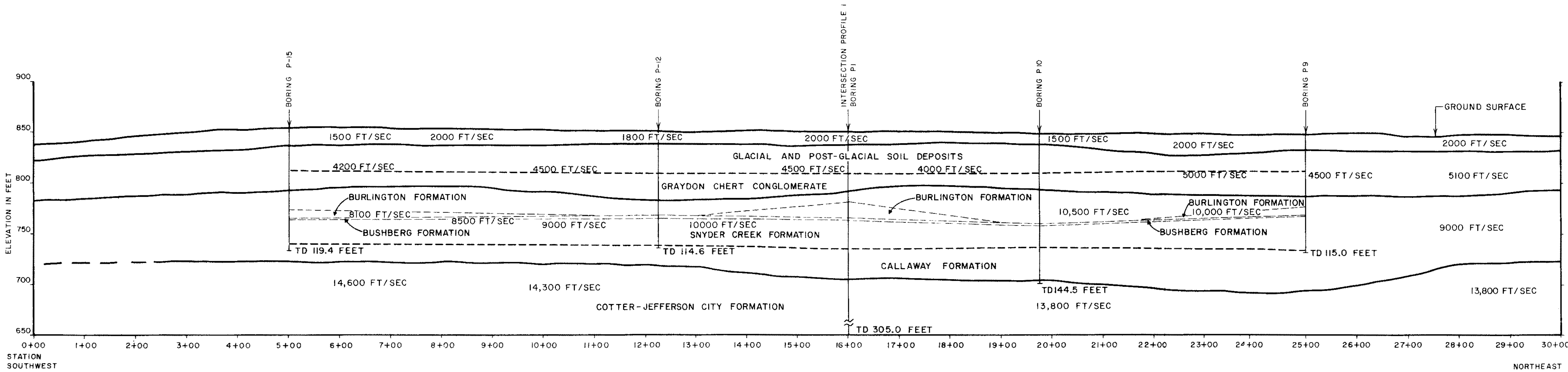
FIGURE 2.5-479
TIME-DISTANCE PLOT
SEISMIC PROFILE I

TIME-DISTANCE PLOTS — SEISMIC PROFILE 2
APPARENT SEISMIC VELOCITIES GIVEN IN FEET PER SECOND





VERTICAL EXAGGERATION 2X

NOTES

1. TIME DISTANCE PLOTS REFLECT INFORMATION COLLECTED FROM SHOT POINTS MADE AT SEVERAL LOCATIONS ALONG A SEISMIC LINE. FOR CLARIFICATION, TWO PLOT SYMBOLS HAVE BEEN USED TO INDICATE THE ORIGIN OF THE SHOCK: FROM THE LEFT (.) FROM THE RIGHT (+).
2. THE SUBSURFACE SECTIONS SHOWN REPRESENT OUR EVALUATION OF THE MOST PROBABLE CONDITIONS BASED UPON INTERPRETATIONS OF PRESENTLY AVAILABLE DATA. SOME VARIATIONS FROM THESE CONDITIONS MUST BE EXPECTED.
3. ALL THE COMPRESSIONAL WAVE VELOCITIES SHOWN ON THE TIME-DISTANCE PLOTS ARE APPARENT VELOCITIES. THESE VELOCITIES HAVE BEEN COMPUTED DIRECTLY FROM THE PLOTS WHEN THE APPARENT COMPRESSIONAL WAVE VELOCITIES HAVE BEEN CORRECTED FOR SURFACE TOPOGRAPHY AND SUBSURFACE VARIATIONS, THE ACTUAL COMPRESSIONAL WAVE VELOCITY RESULTS, AS SHOWN IN THE SUBSURFACE CROSS-SECTIONS.

LEGEND:

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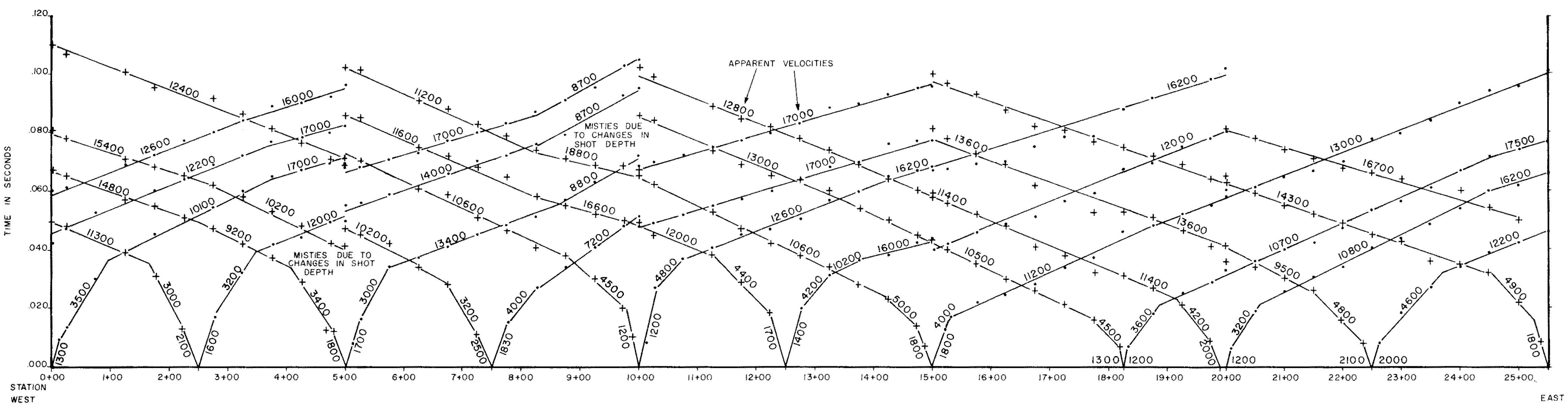
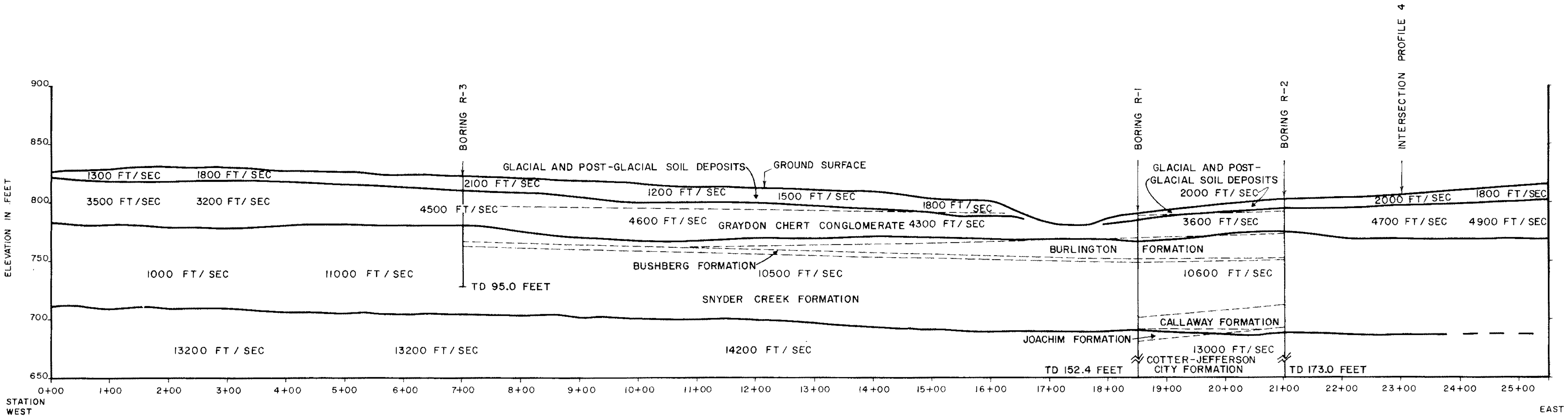
FIGURE 2.5-480
TIME-DISTANCE PLOT
SEISMIC PROFILE 2

TIME- DISTANCE PLOT- SEISMIC PROFILE 3

APPARENT SEISMIC VELOCITIES GIVEN IN FEET PER SECOND





VERTICAL EXAGGERATION 2X

NOTES

1. TIME DISTANCE PLOTS REFLECT INFORMATION COLLECTED FROM SHOT POINTS MADE AT SEVERAL LOCATIONS ALONG A SEISMIC LINE. FOR CLARIFICATION, TWO PLOT SYMBOLS HAVE BEEN USED TO INDICATE THE ORIGIN OF THE SHOCK: FROM THE LEFT (.) FROM THE RIGHT (+).

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LEGEND:

——— CONTACT FROM SEISMIC REFRACTION DATA ONLY

– – – CONTACT FROM BOREHOLE DATA ONLY

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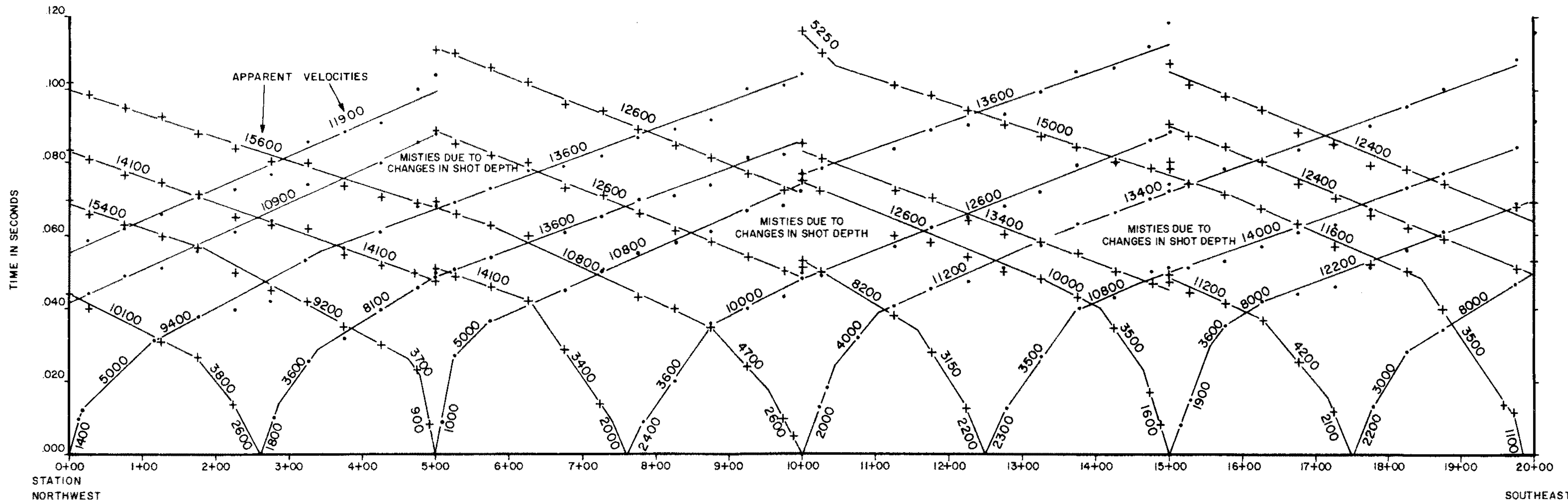
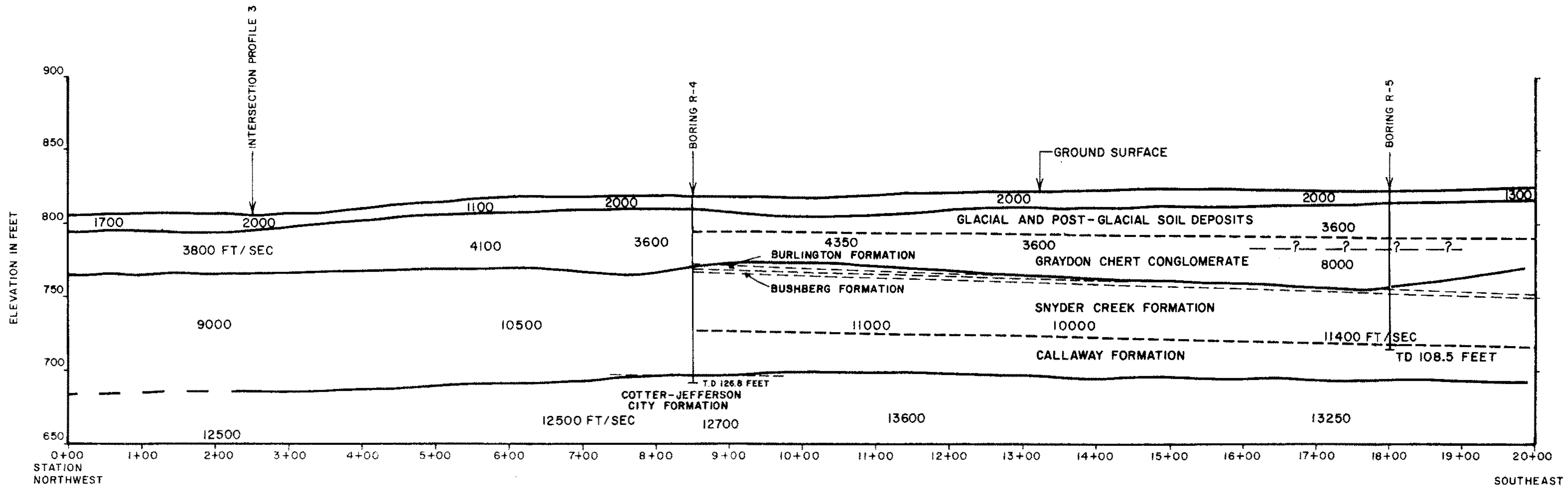
FIGURE 2.5-481
TIME-DISTANCE PLOT
SEISMIC PROFILE 3

TIME-DISTANCE PLOT - SEISMIC PROFILE 4
APPARENT SEISMIC VELOCITIES GIVEN IN FEET PER SECOND





VERTICAL EXAGGERATION 2X

NOTES

1. TIME DISTANCE PLOTS REFLECT INFORMATION COLLECTED FROM SHOT POINTS MADE AT SEVERAL LOCATIONS ALONG A SEISMIC LINE. FOR CLARIFICATION, TWO PLOT SYMBOLS HAVE BEEN USED TO INDICATE THE ORIGIN OF THE SHOCK: FROM THE LEFT (.) FROM THE RIGHT (+).

2. THE SUBSURFACE SECTIONS SHOWN REPRESENT OUR EVALUATION OF THE MOST PROBABLE CONDITIONS BASED UPON INTERPRETATIONS OF PRESENTLY AVAILABLE DATA. SOME VARIATIONS FROM THESE CONDITIONS MUST BE EXPECTED.

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LEGEND:

——— CONTACT FROM SEISMIC REFRACTION DATA ONLY

– – – CONTACT FROM BOREHOLE DATA ONLY

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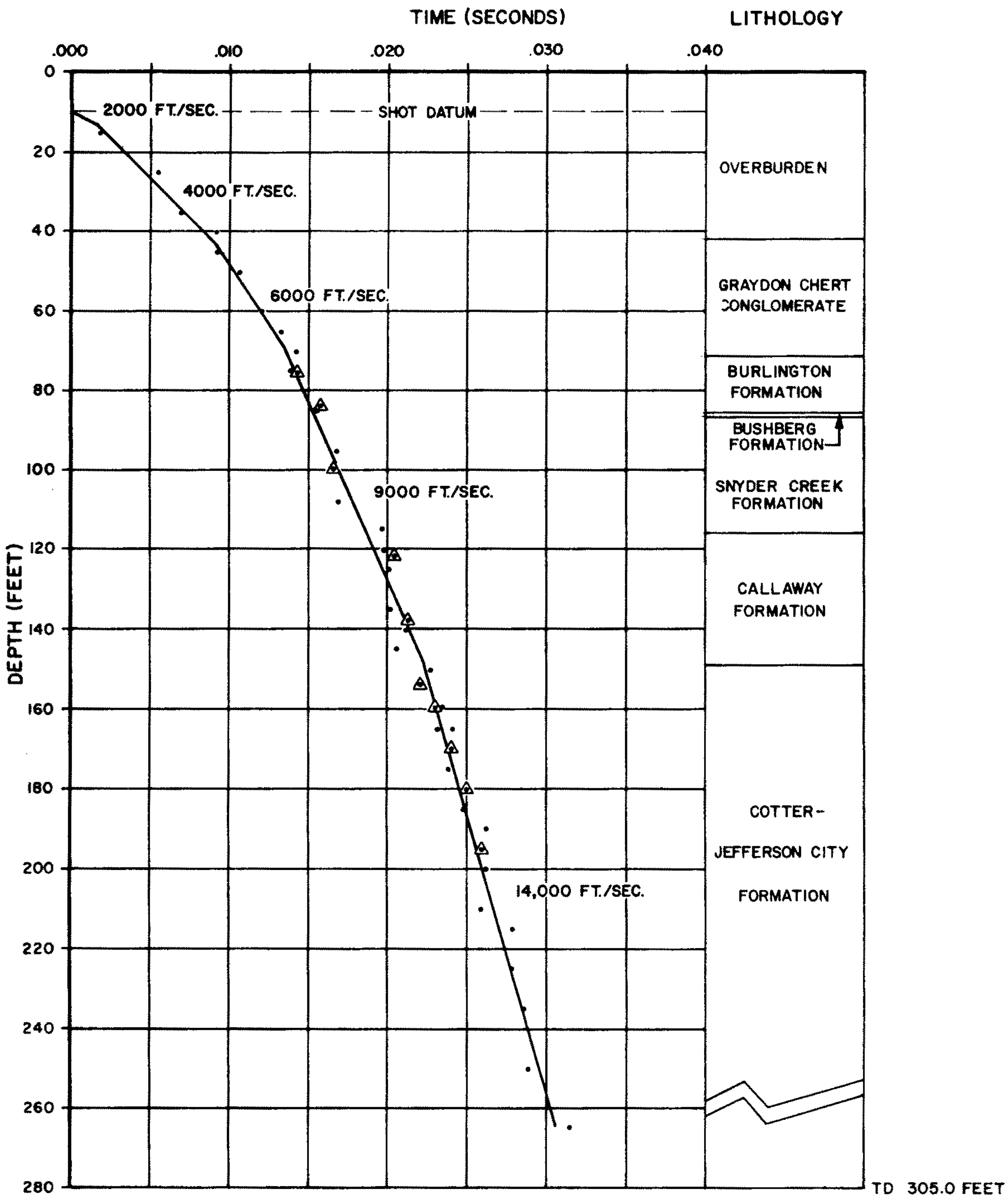
FIGURE 2.5-482
TIME-DISTANCE PLOT
SEISMIC PROFILE 4



NOTES :

- • ORIGINAL TRAVEL TIME DATA
- △ INTEGRATED TRAVEL TIME FROM BIRDWELL LOGS

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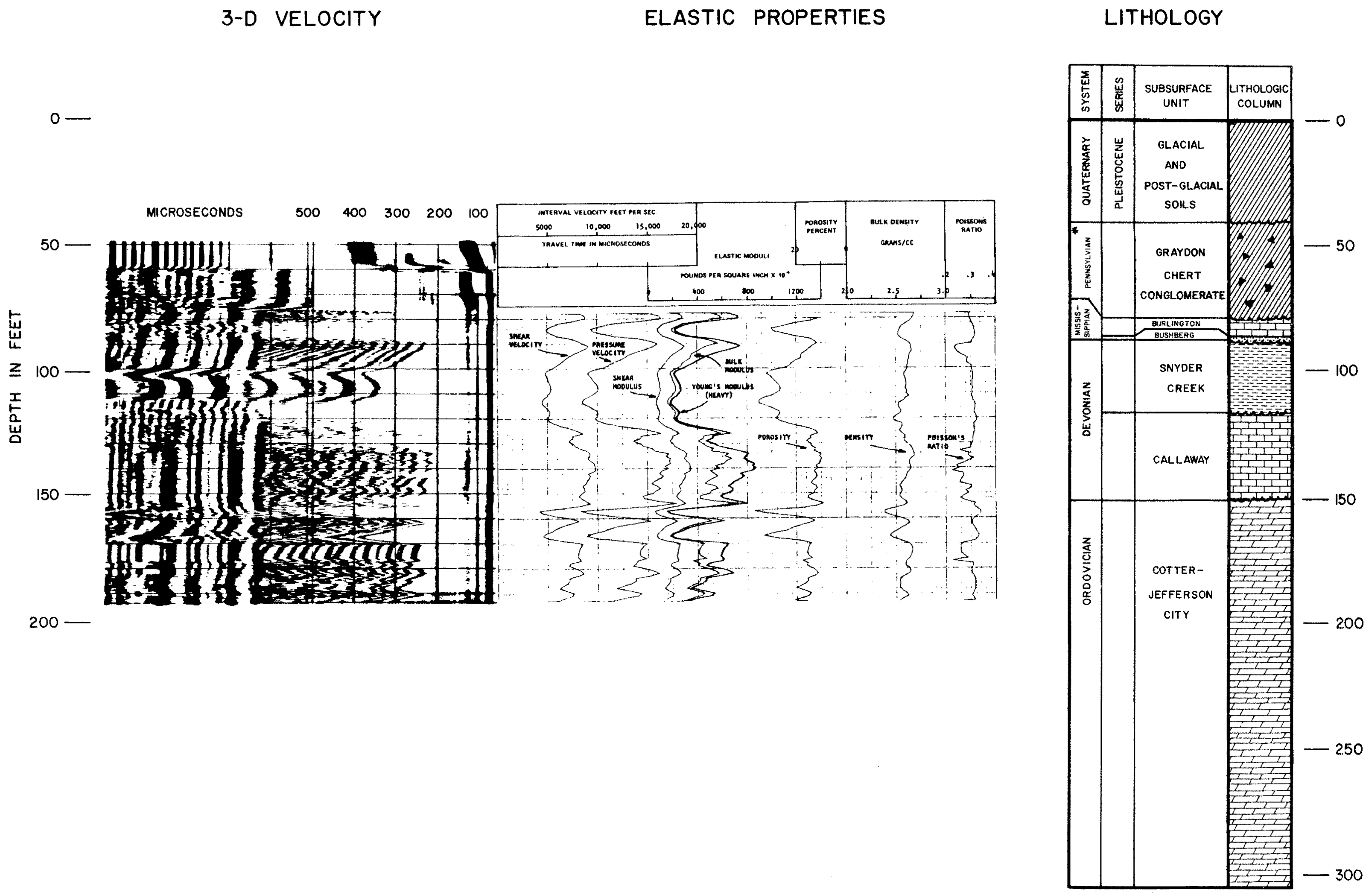
FIGURE 2.5-483
UPHOLE COMPRESSIONAL
WAVE VELOCITY SURVEY
BORING P-1

BORING P-I



*AGE OF THE GRAYDON CHERT CONGLOMERATE IS TENTATIVE

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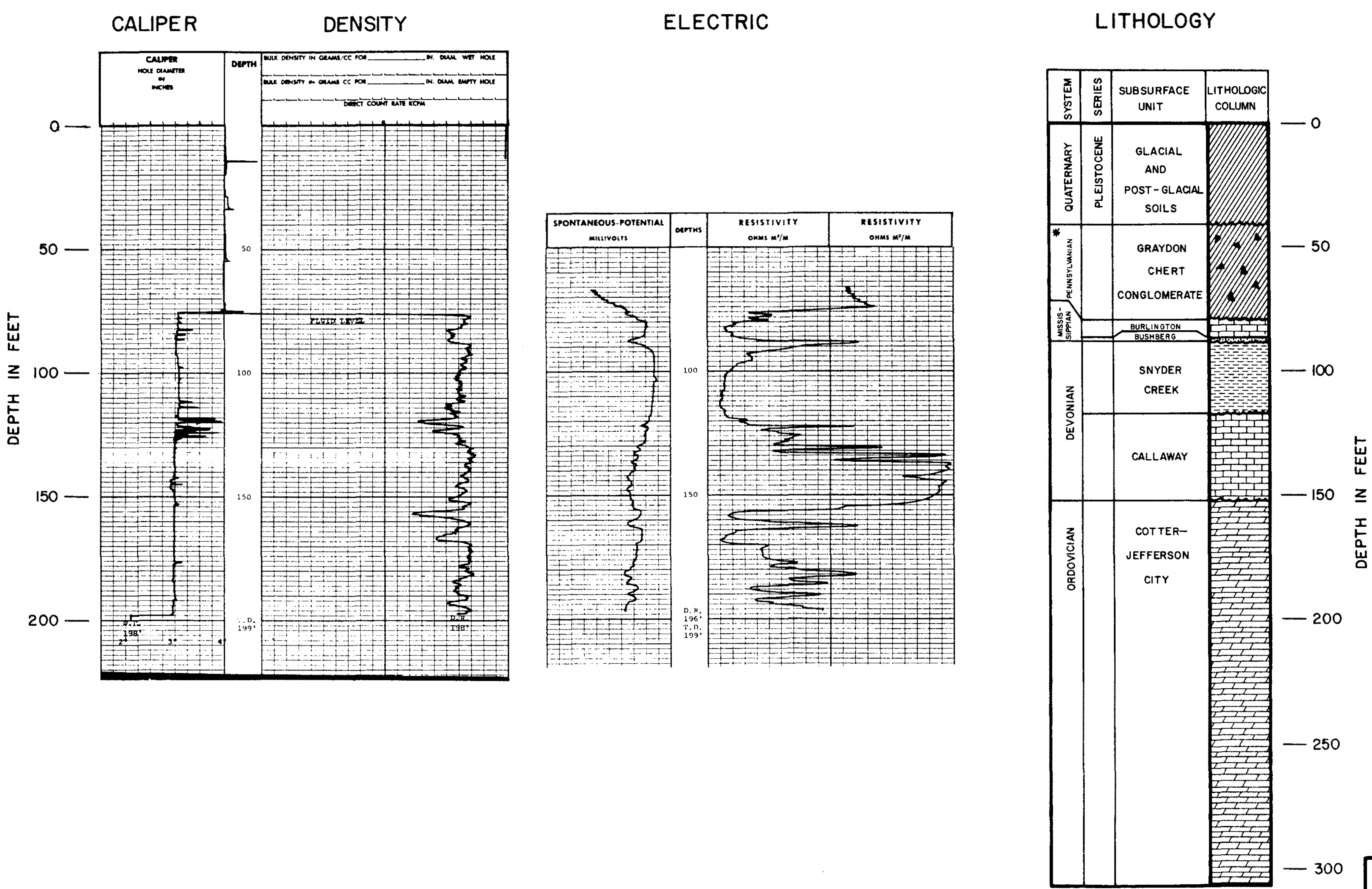
FIGURE 2.5-484

BIRDWELL GEOPHYSICAL LOGS OF BORING P-I
3-D VELOCITY AND ELASTIC PROPERTIES

BORING P-I



* AGE OF GRAYDON CHERT CONGLOMERATE IS TENTATIVE

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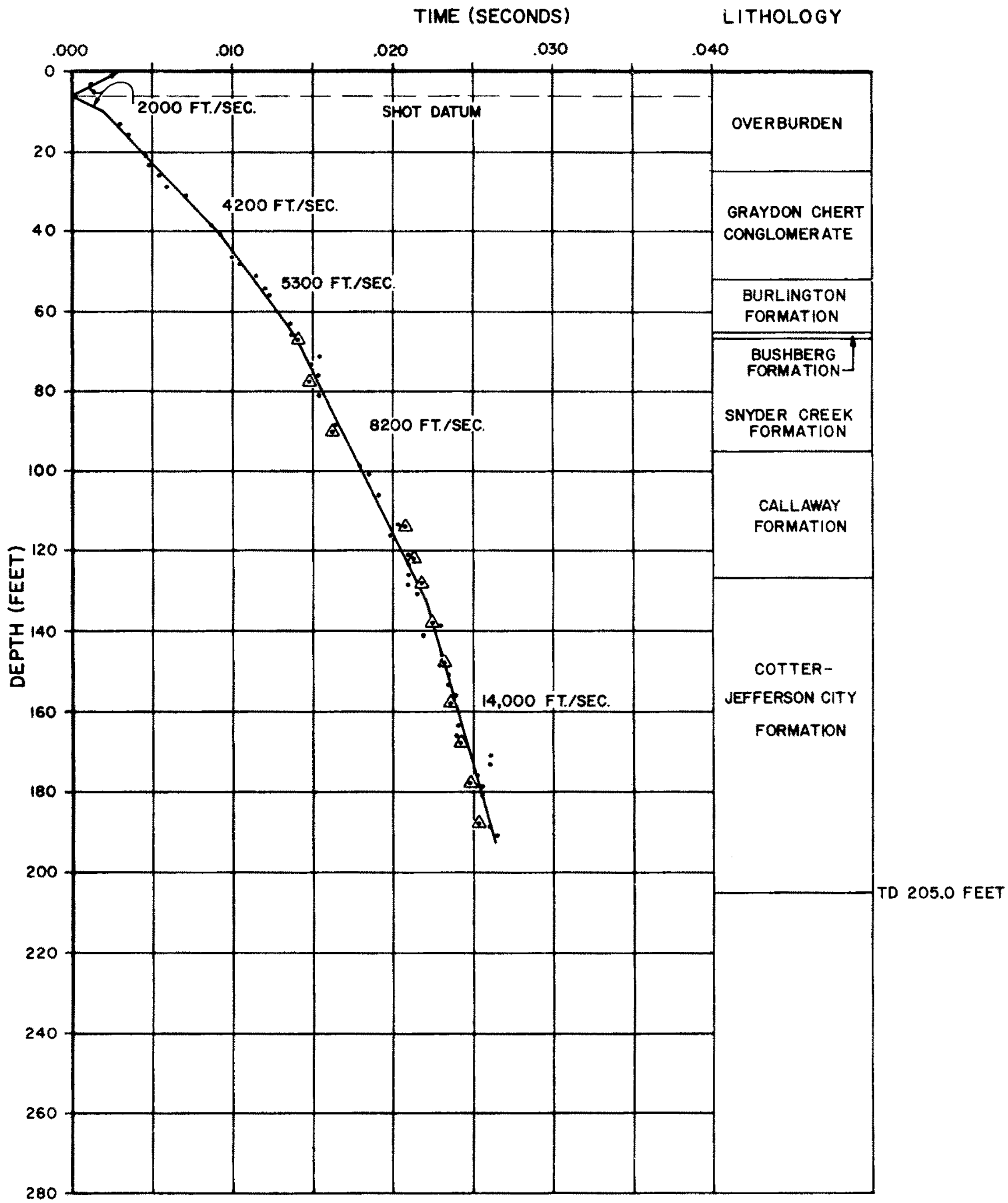
FIGURE 2.5-485

BIRDWELL GEOPHYSICAL LOGS OF BORING P-I
CALIPER, DENSITY AND ELECTRIC LOGS



NOTES :

- · ORIGINAL TRAVEL TIME DATA
- △ INTEGRATED TRAVEL TIME FROM BIRDWELL LOGS

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FIGURE 2.5-486

UPHOLE COMPRESSIONAL WAVE VELOCITY SURVEY BORING P-31

BORING P-31

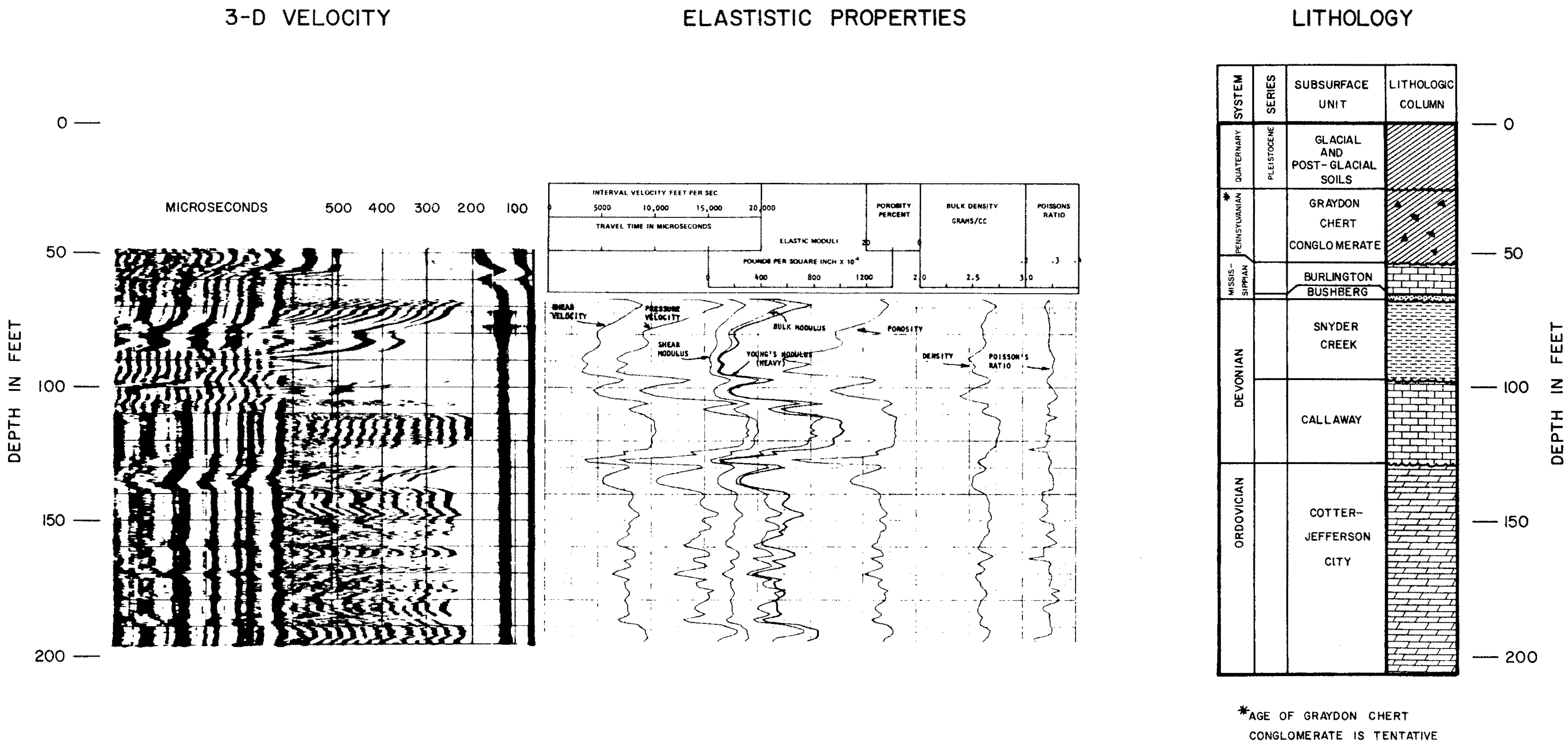

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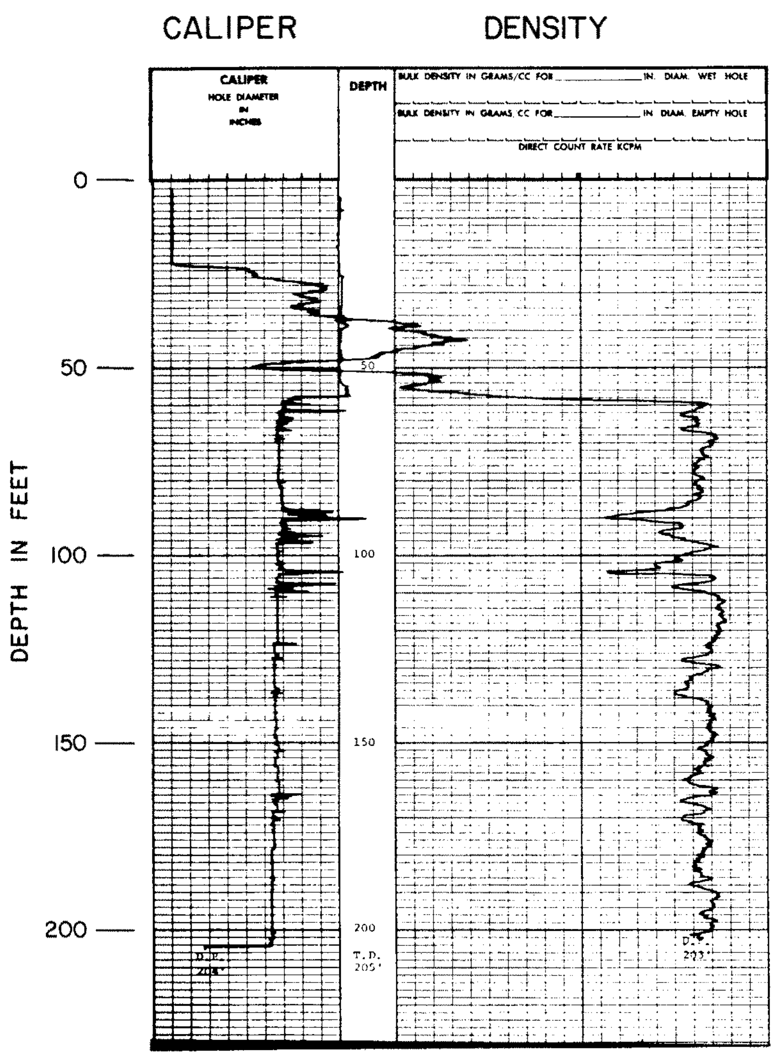
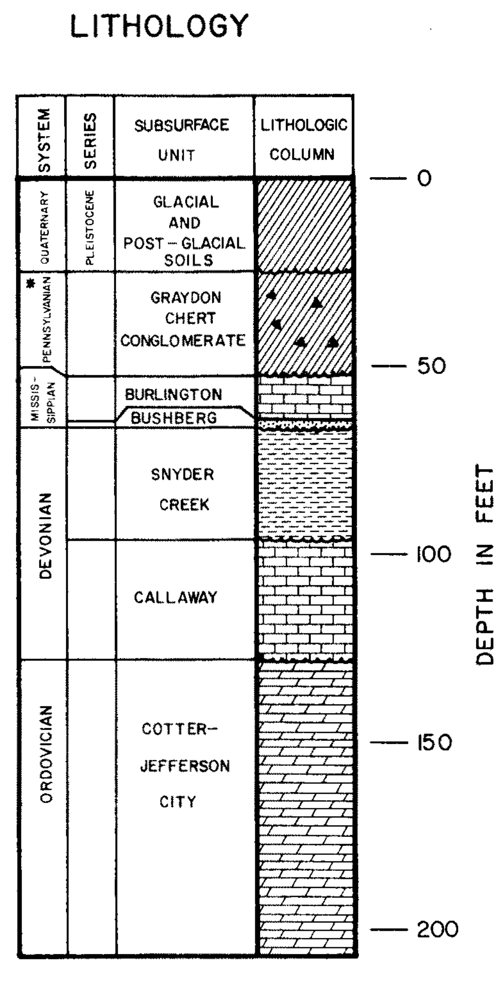
FIGURE 2.5-487

BIRDWELL GEOPHYSICAL LOGS OF BORING P-31
3-D VELOCITY AND ELASTIC PROPERTIES

BORING P-31





*AGE OF GRAYDON CHERT CONGLOMERATE IS TENTATIVE

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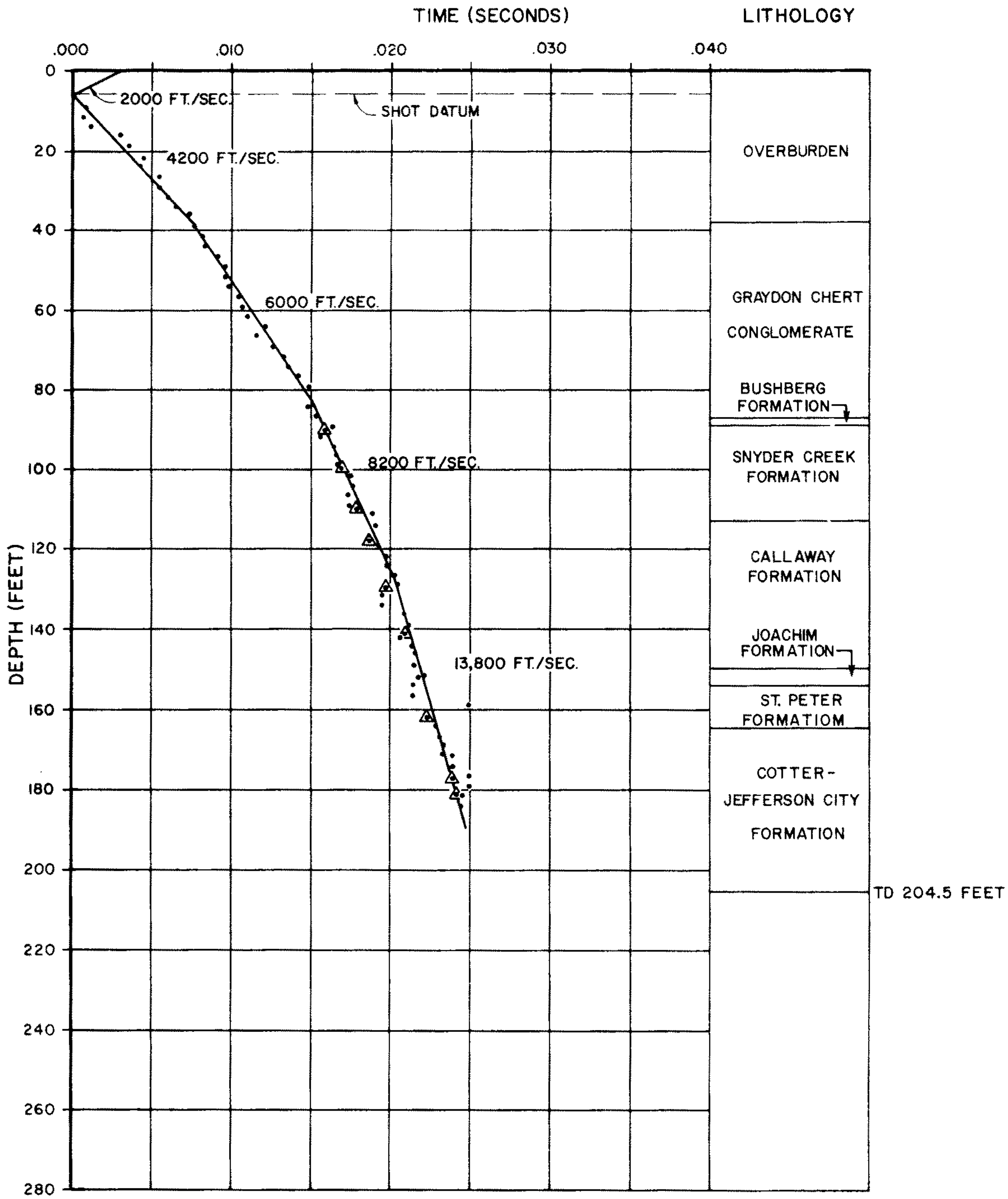
FIGURE 2.5-488

BIRDWELL GEOPHYSICAL LOGS OF BORING P-31
CALIPER AND DENSITY LOG



NOTES :

- ORIGINAL TRAVEL TIME DATA
- △ INTEGRATED TRAVEL TIME FROM BIRDWELL LOGS

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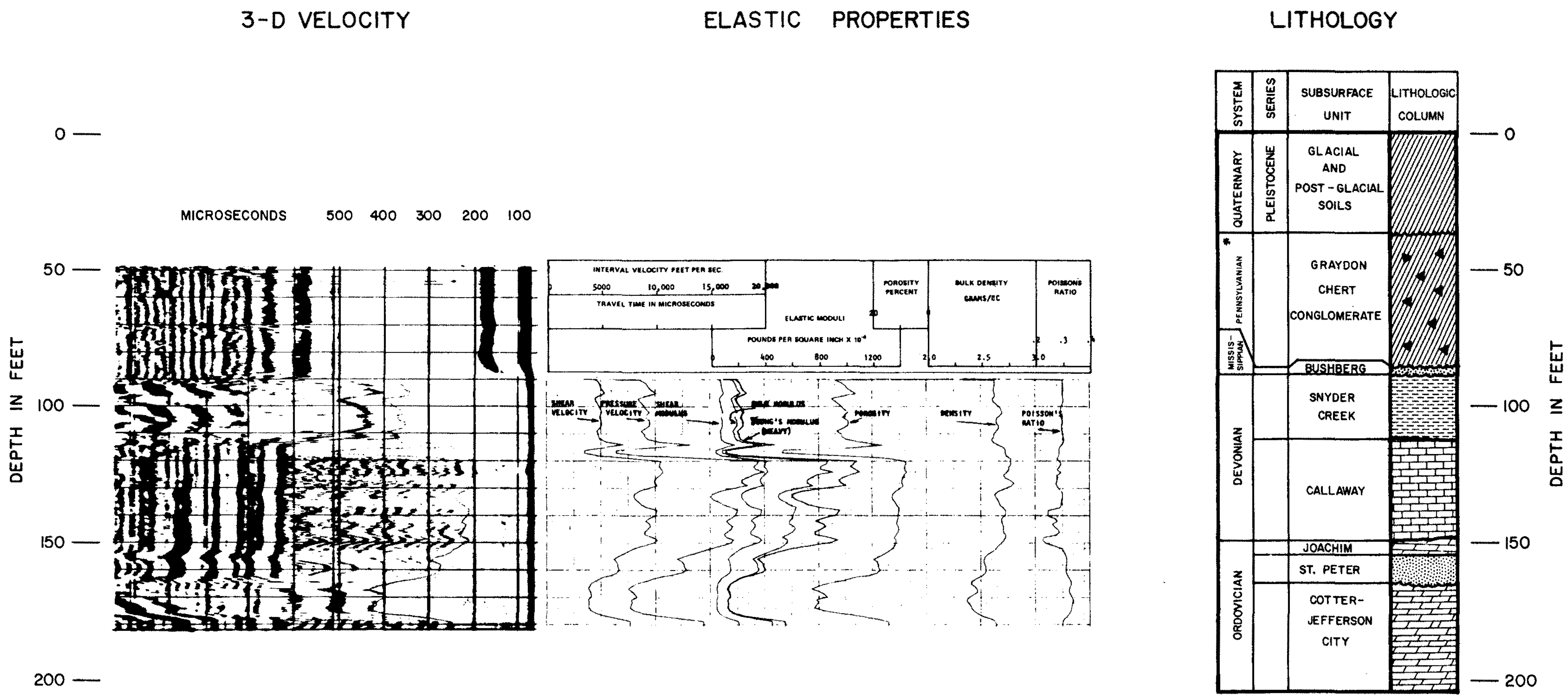
FIGURE 2.5-489

UPHOLE COMPRESSIONAL
WAVE VELOCITY SURVEY
BORING P-48

BORING P-48



*AGE OF GRAYDON CHERT CONGLOMERATE IS TENTATIVE

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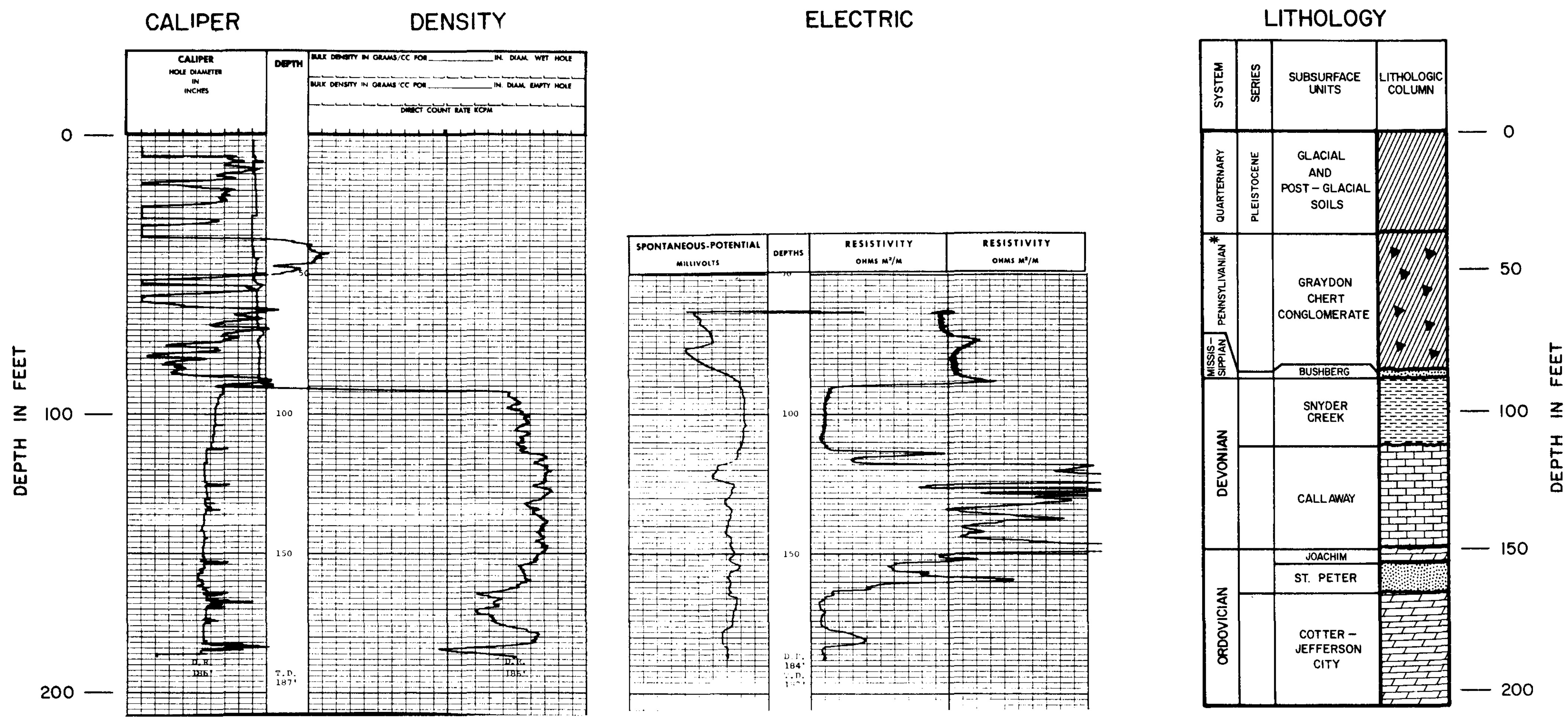
FIGURE 2.5-490

BIRDWELL GEOPHYSICAL LOGS OF BORING P-48
3-D VELOCITY AND ELASTIC PROPERTIES

BORING P-48



* AGE OF GRAYDON CHERT CONGLOMERATE IS TENTATIVE.

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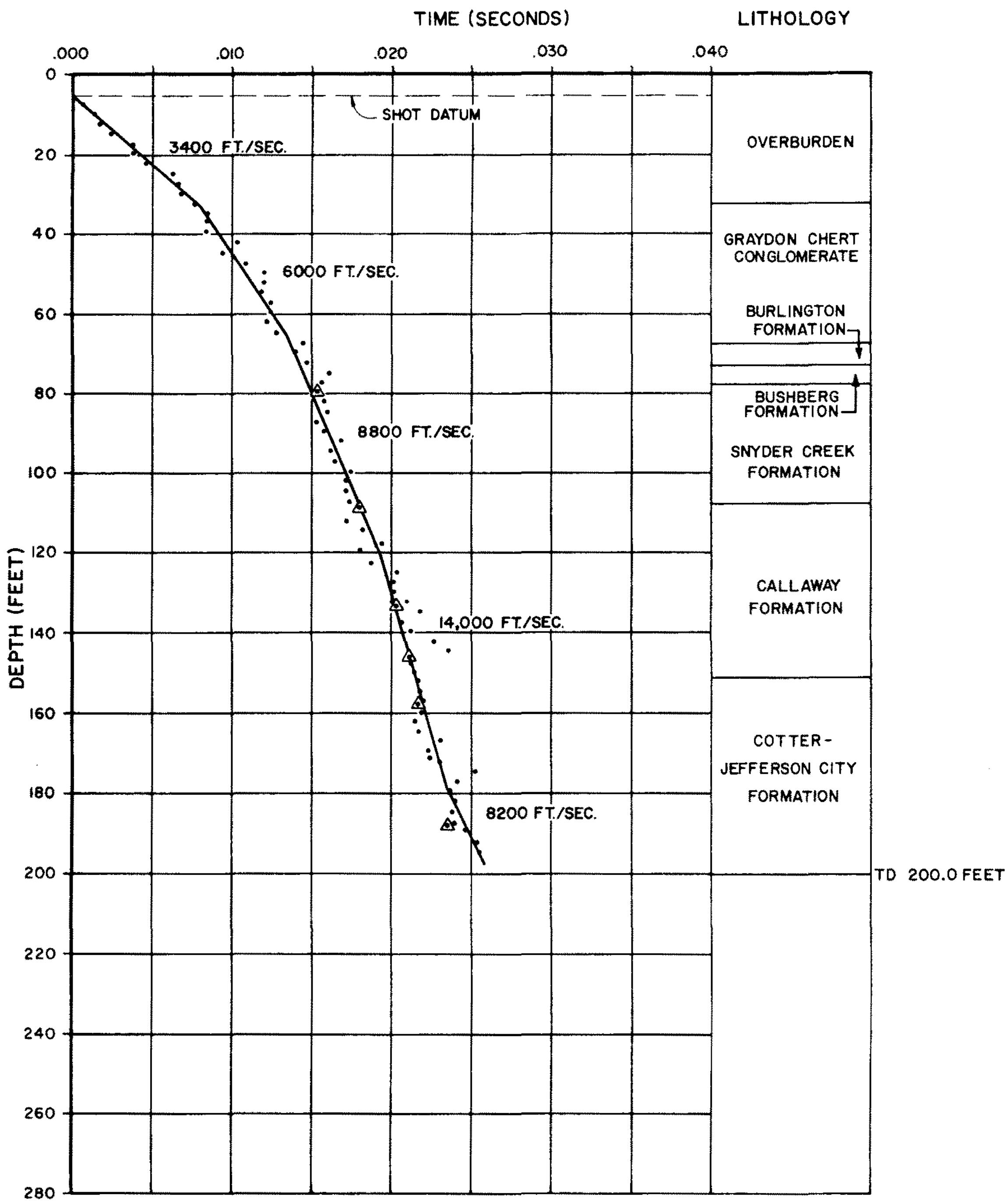
FIGURE 2.5-491

BIRDWELL GEOPHYSICAL LOGS OF BORING P-48
CALIPER, DENSITY AND ELECTRIC LOGS



NOTES :

- · ORIGINAL TRAVEL TIME DATA
- △ INTEGRATED TRAVEL TIME FROM BIRDWELL LOGS

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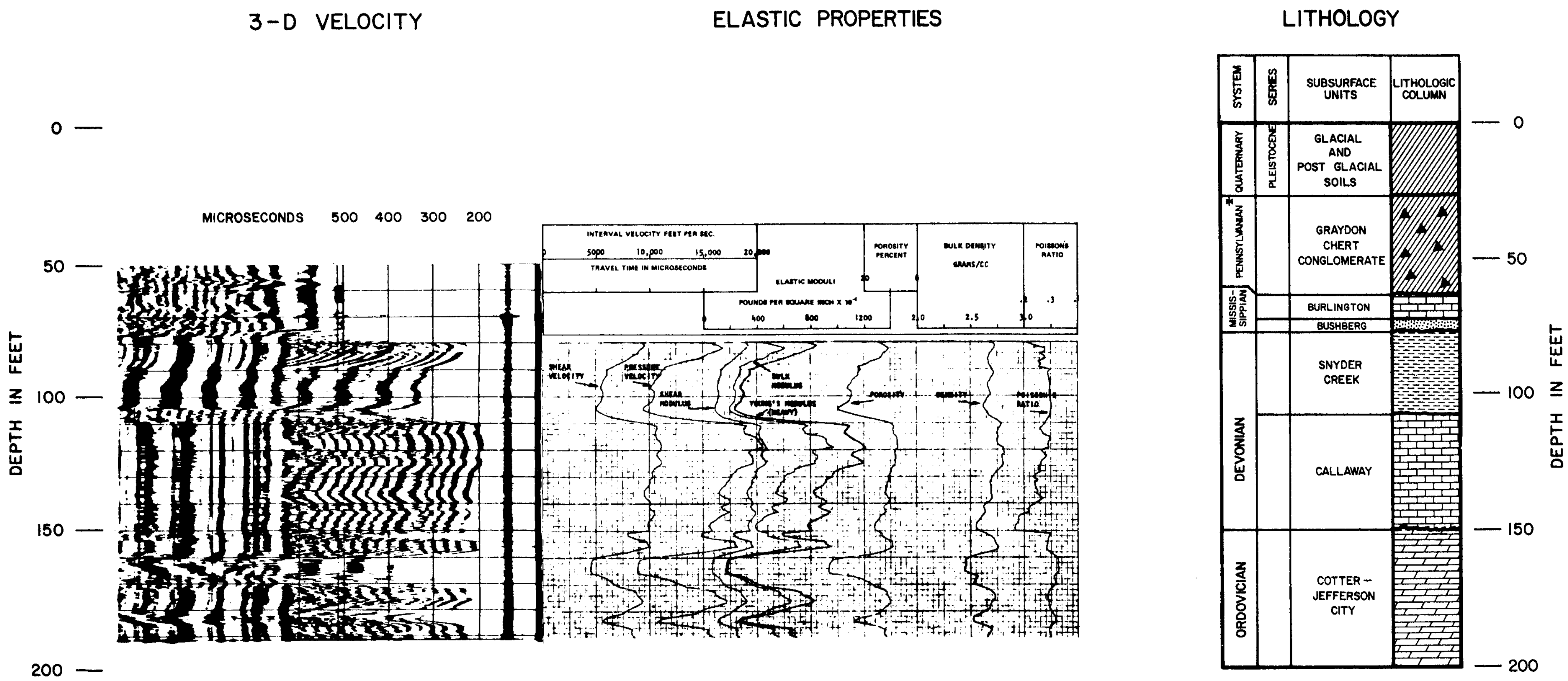
FIGURE 2.5-492

UPHOLE COMPRESSIONAL WAVE VELOCITY SURVEY BORING P-62

BORING P-62



*AGE OF GRAYDON CHERT CONGLOMERATE IS TENTATIVE.

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FIGURE 2.5-493

BIRDWELL GEOPHYSICAL LOGS OF BORING P-62
3-D VELOCITY AND ELASTIC PROPERTIES

BORING P-62

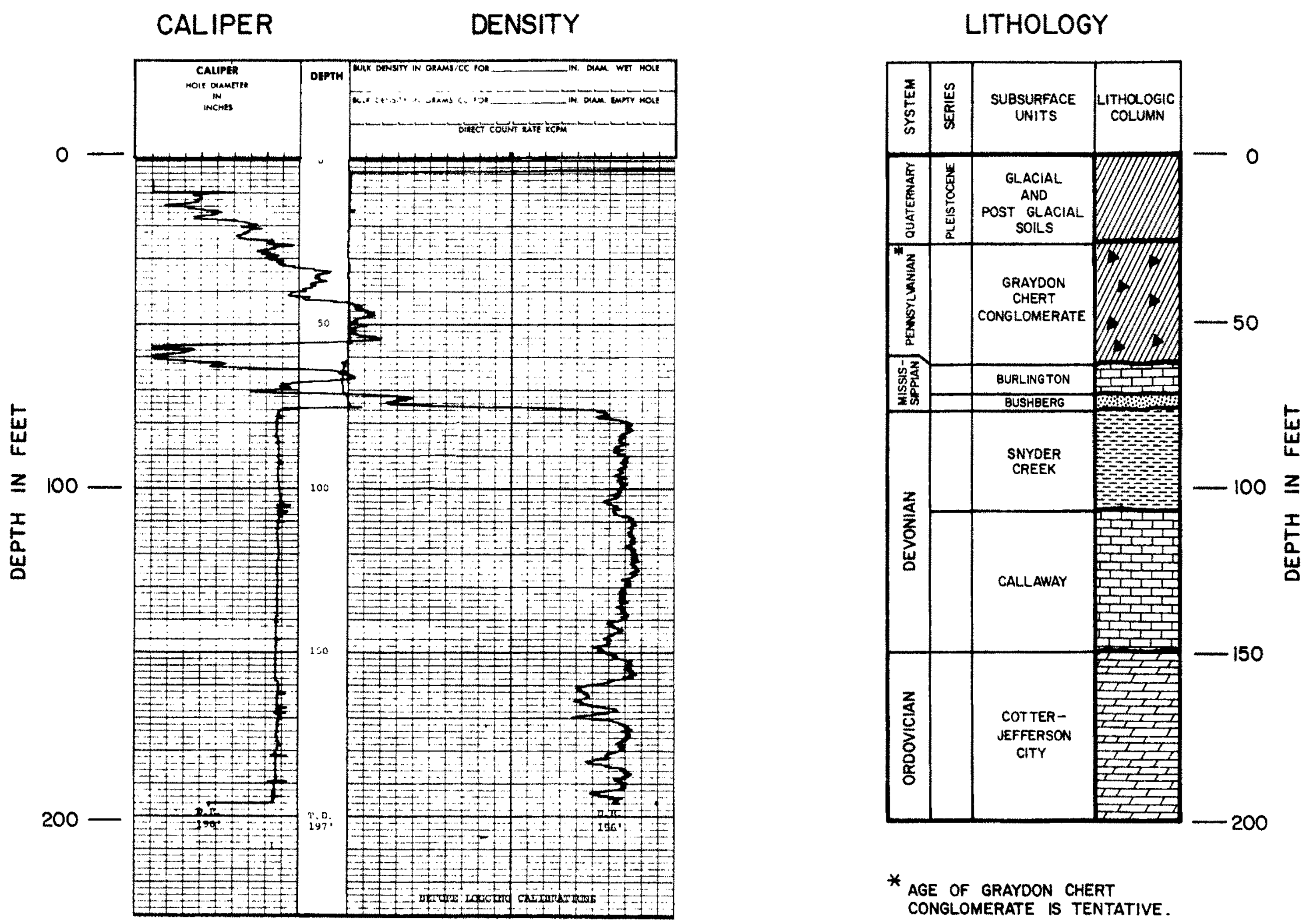

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FIGURE 2.5-494

BIRDWELL GEOPHYSICAL LOGS OF BORING P-62
CALIPER AND DENSITY LOG

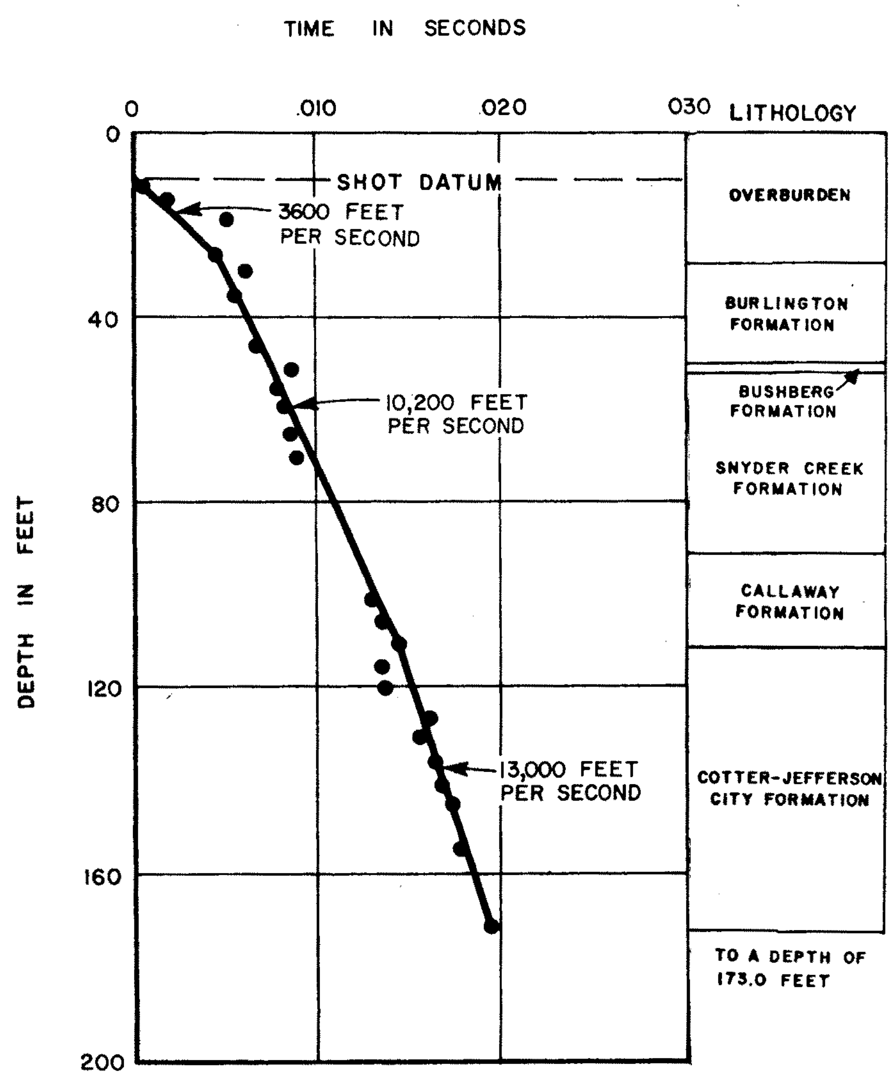

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FIGURE 2.5-495

UPHOLE COMPRESSIONAL WAVE VELOCITY SURVEY BORING R-2

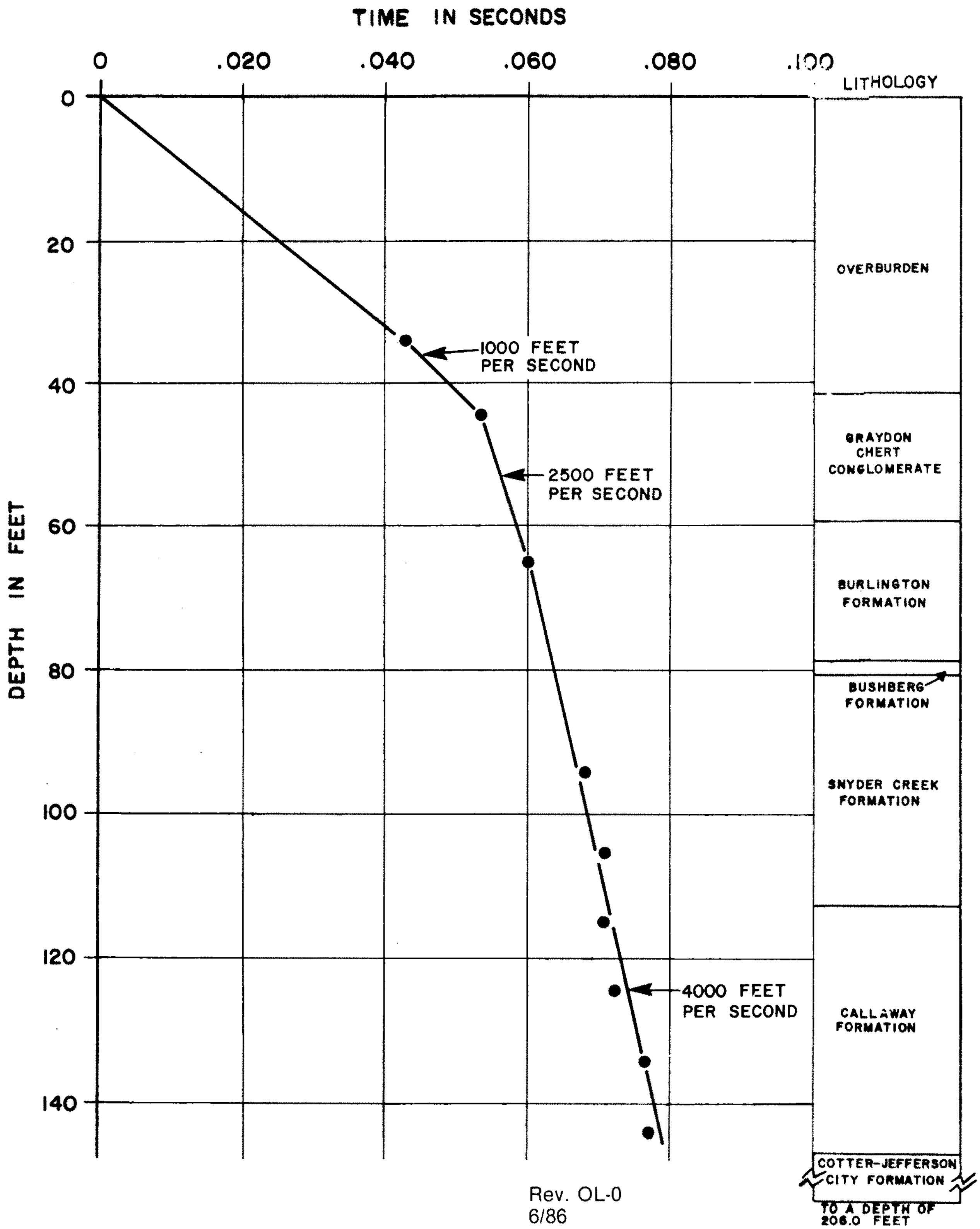

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FIGURE 2.5-496

UPHOLE SHEAR WAVE VELOCITY SURVEY, BORING P-2

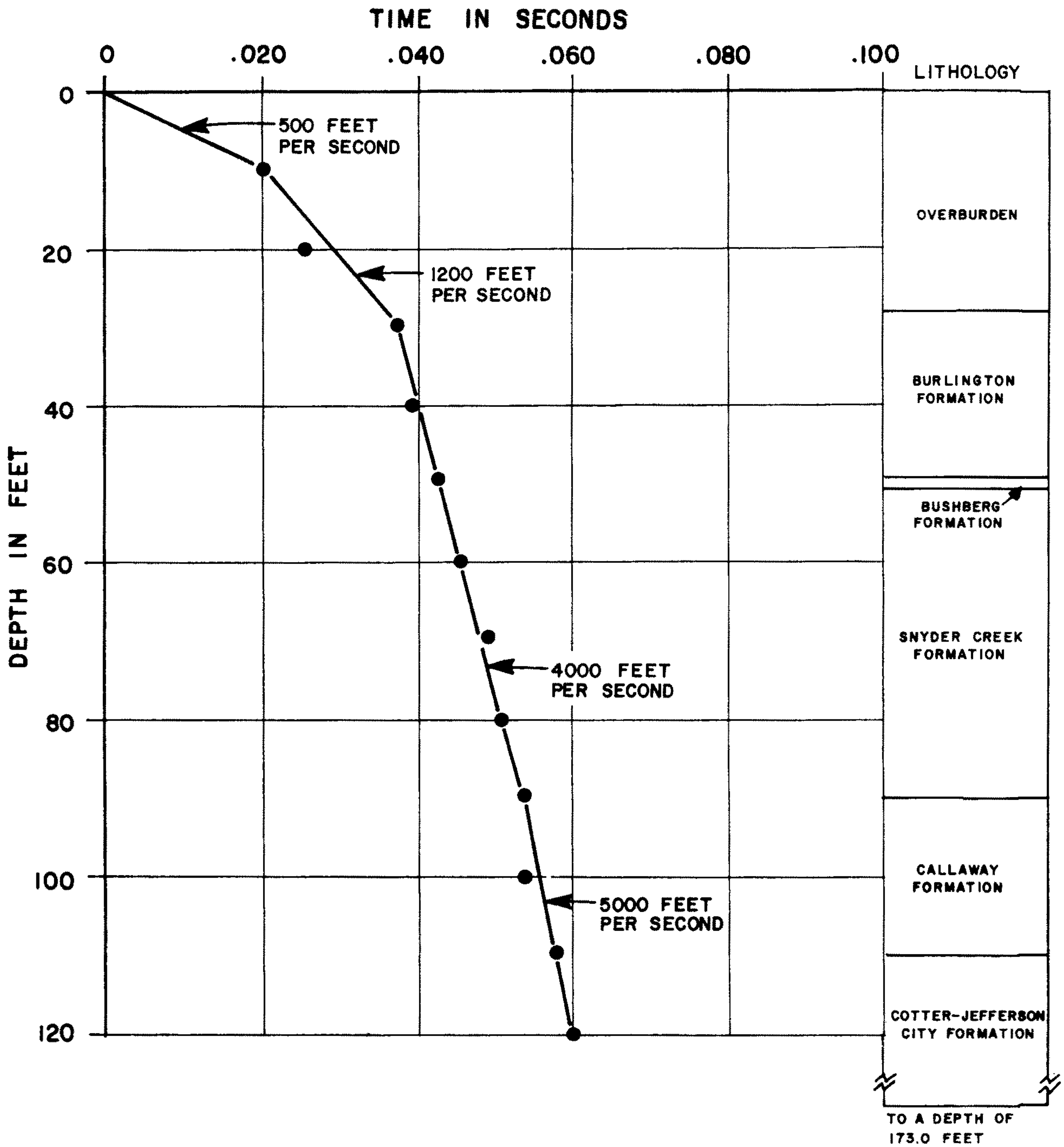

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FIGURE 2.5-497

UPHOLE SHEAR WAVE VELOCITY SURVEY, BORING R-2

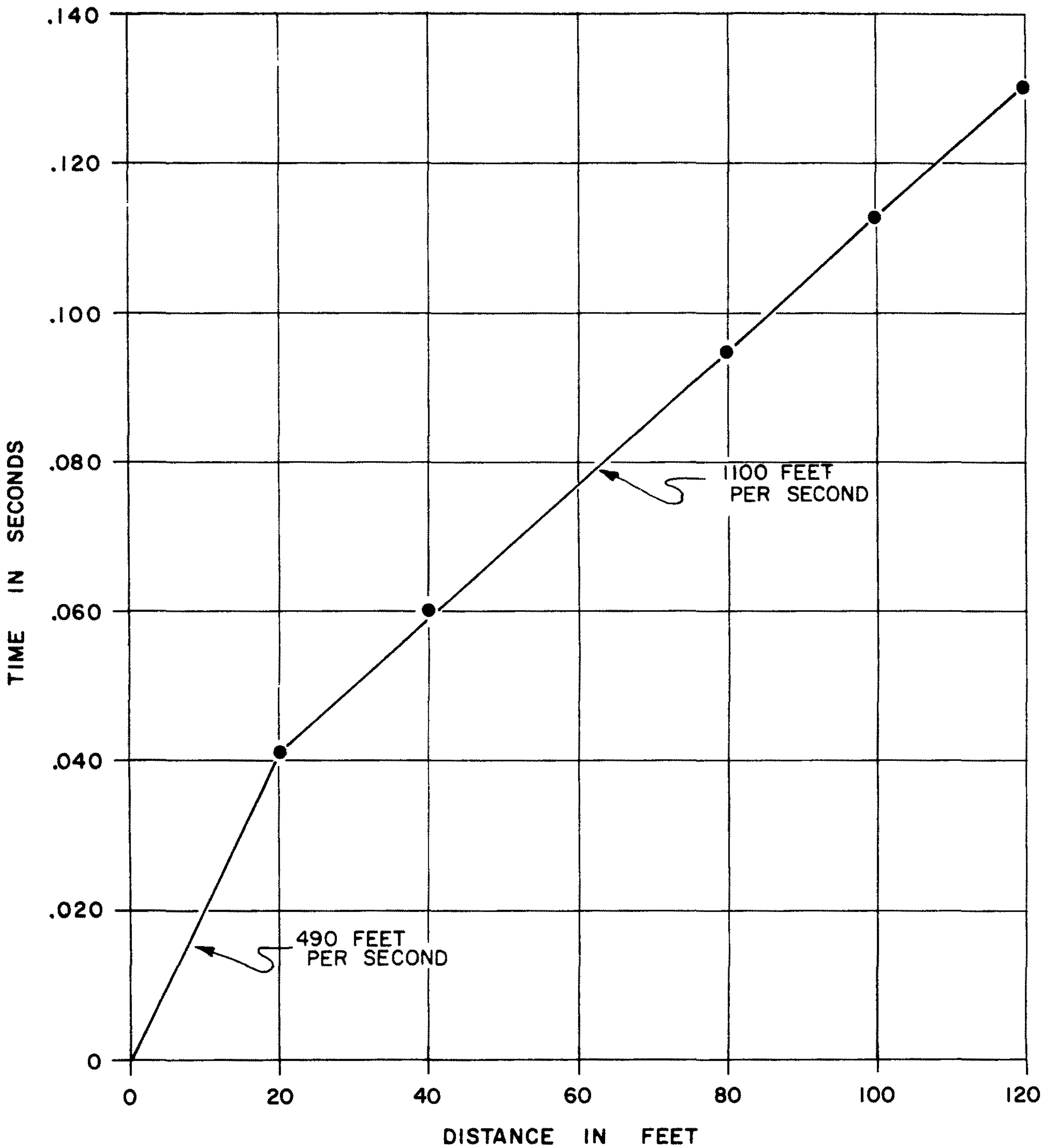

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FIGURE 2.5-498
SURFACE SHEAR WAVE SURVEY
BORING P-2

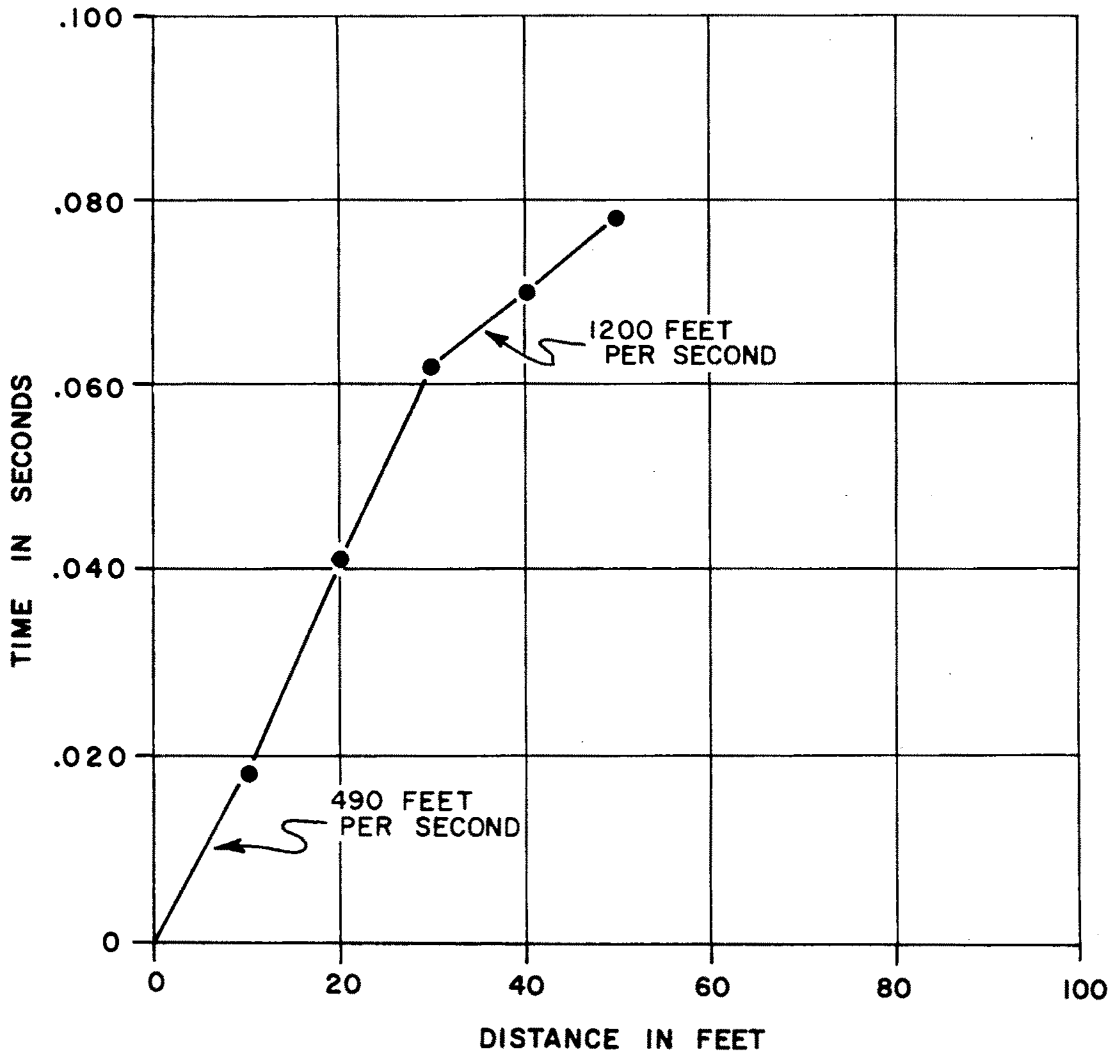

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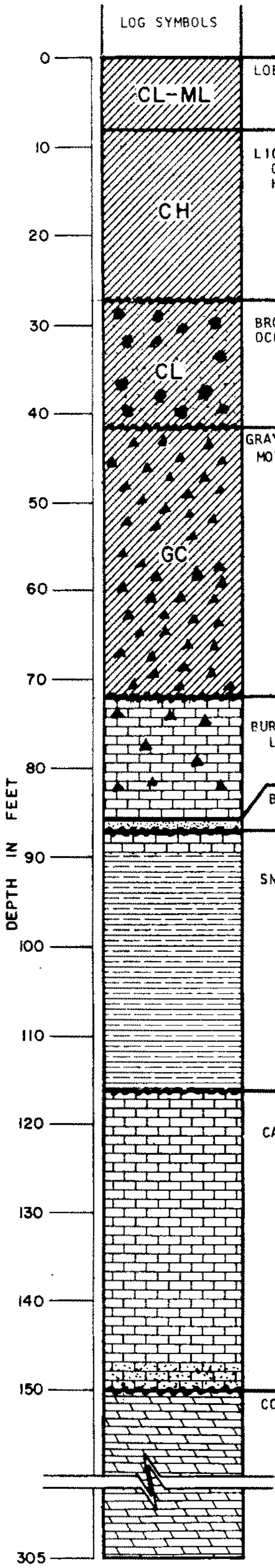
FIGURE 2.5-499
SURFACE SHEAR WAVE SURVEY
BORING R-2



LOG SYMBOLS	DESCRIPTION	COMPRESSIONAL WAVE VELOCITY (FT/SEC)	POISSON'S RATIO	SHEAR WAVE VELOCITY (FT/SEC)	UNIT WEIGHT (LBS/CU FT)
CL-ML	LOESS: ALTERED TO BROWN CLAYEY SILT AND SILTY CLAY BY WEATHERING	2000	.47	500	126
CH	LIGHT GRAY CLAY WITH SOME SILT; TRACE OF SAND NEAR BASE; WEATHERED TO 15; HIGHLY PLASTIC; ACCRETION GLEY				127 127
CL	BROWN SILTY CLAY WITH SOME SAND AND OCCASIONAL GRAVEL; GLACIAL TILL	4000 4500	.47	950- 1150	134
GC	GRAYDON CHERT CONGLOMERATE MOTTLED RED TO YELLOW CLAY WITH ABUNDANT CHERT DEBRIS	6000	.39	2500	138
	BURLINGTON FORMATION: LIGHT BROWN CHERTY LIMESTONE; ARGILLACEOUS AT BASE	10,000	.40-.44	3350- 4000	166
	BUSHBERG FORMATION: LIGHT GREEN TO BUFF SANDSTONE; FINE TO MEDIUM; FRIABLE				
	SNYDER CREEK FORMATION: LIGHT BROWN LIMESTONE UNDERLAIN BY GREEN, PURPLE, AND GRAY SHALES; CALCAREOUS				154
	CALLAWAY FORMATION: LIGHT GRAY TO BROWN LIMESTONE; FINE TO COARSE-GRAINED; SANDY AT BASE				167
	COTTER - JEFFERSON CITY FORMATION: LIGHT GRAY DOLOMITE; FINE TO MEDIUM-GRAINED; DOLOMITE; FINE TO MEDIUM-GRAINED; OCCASIONAL GREEN SHALE LAYERS	13,300 14,300	.26- .31	7500	157

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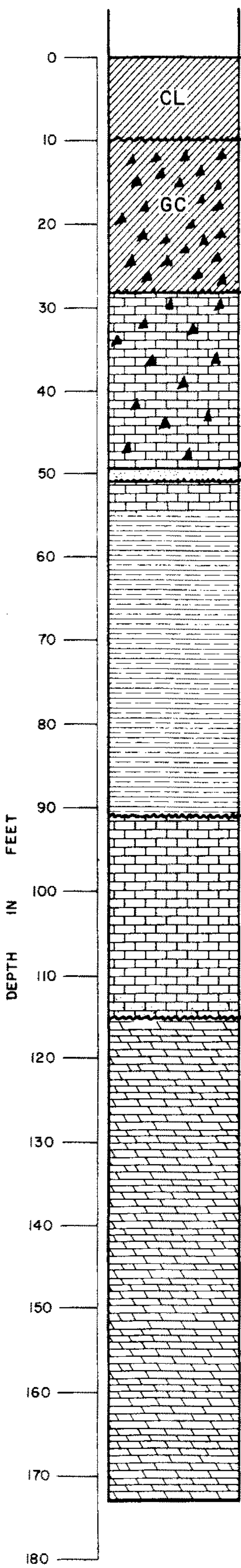
FIGURE 2.5-500
TYPICAL GEOLOGIC COLUMN
BORING P-1

NOTE:

THE GEOPHYSICAL VALUES SHOWN ARE THOSE OBTAINED FROM THE SEISMIC MODELING OF THE SITE WHICH INCORPORATES ALL OF THE GEOPHYSICAL TECHNIQUES.



DESCRIPTION	COMPRESSIONAL WAVE VELOCITY (FT/SEC)	POISSON'S RATIO	SHEAR WAVE VELOCITY (FT/SEC)	UNIT WEIGHT (LBS/CU FT)
MOTTLED RED AND YELLOW SILTY CLAY WITH SOME SAND; COLLUVIAL SOIL	2000	.47	500	
GRAYDON CHERT CONGLOMERATE MOTTLED RED TO YELLOW CLAY WITH ABUNDANT CHERT DEBRIS	3600	.43	1200	138
BURLINGTON FORMATION: LIGHT BROWN CHERTY LIMESTONE; ARGILLACEOUS AT BASE	10,300	.41	4000	166
BUSHBERG FORMATION: LIGHT GREEN TO BUFF SANDSTONE; FINE TO MEDIUM; FRIABLE				
SNYDER CREEK FORMATION: LIGHT BROWN LIMESTONE UNDERLAIN BY GREEN, PURPLE, AND GRAY SILTY SHALES; CALCAREOUS				154
CALLAWAY FORMATION: LIGHT GRAY TO BROWN LIMESTONE; FINE TO COARSE-GRAINED; SANDY AT BASE				16[illegible]
COTTER - JEFFERSON CITY FORMATION: LIGHT GRAY DOLOMITE; FINE TO MEDIUM-GRAINED; OCCASIONAL GREEN SHALE LAYERS	1[illegible],000	.24	[illegible]600	15[illegible]

NOTE:

THE GEOPHYSICAL VALUES SHOWN ARE THOSE OBTAINED FROM THE SEISMIC MODELING OF THE SITE WHICH INCORPORATES ALL OF THE GEOPHYSICAL TECHNIQUES.

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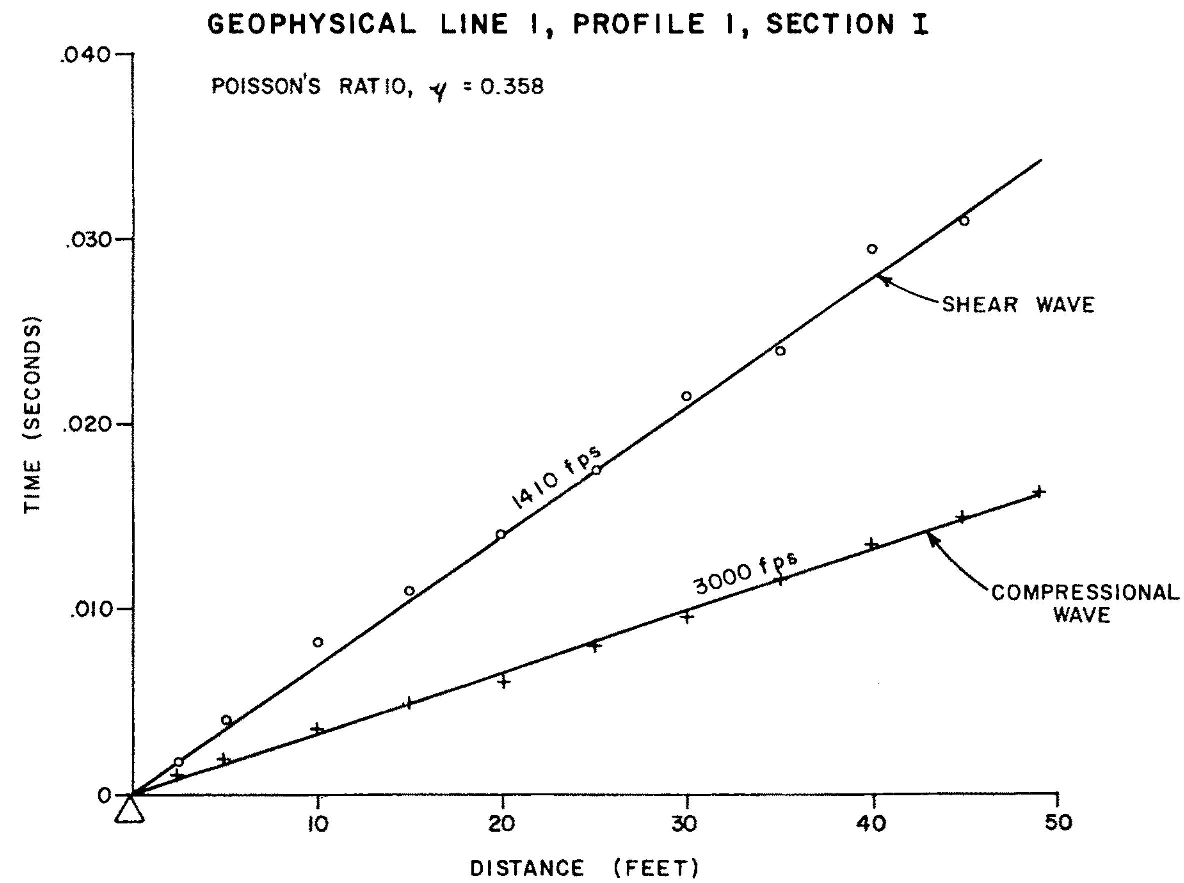
FIGURE 2.5-501

TYPICAL GEOLOGIC COLUMN

BORING R-2



NOTES

△ DENOTES ENERGY SOURCE.

+ DENOTES COMPRESSIONAL WAVE ARRIVAL TIMES.

o DENOTES SHEAR WAVE ARRIVAL TIMES.

THE COMPRESSIONAL AND SHEAR WAVE VELOCITIES SHOWN ON THE TIME-DISTANCE PLOT ARE APPARENT VELOCITIES, GIVEN IN FEET PER SECOND, AND HAVE BEEN DETERMINED DIRECTLY FROM THE PLOT.

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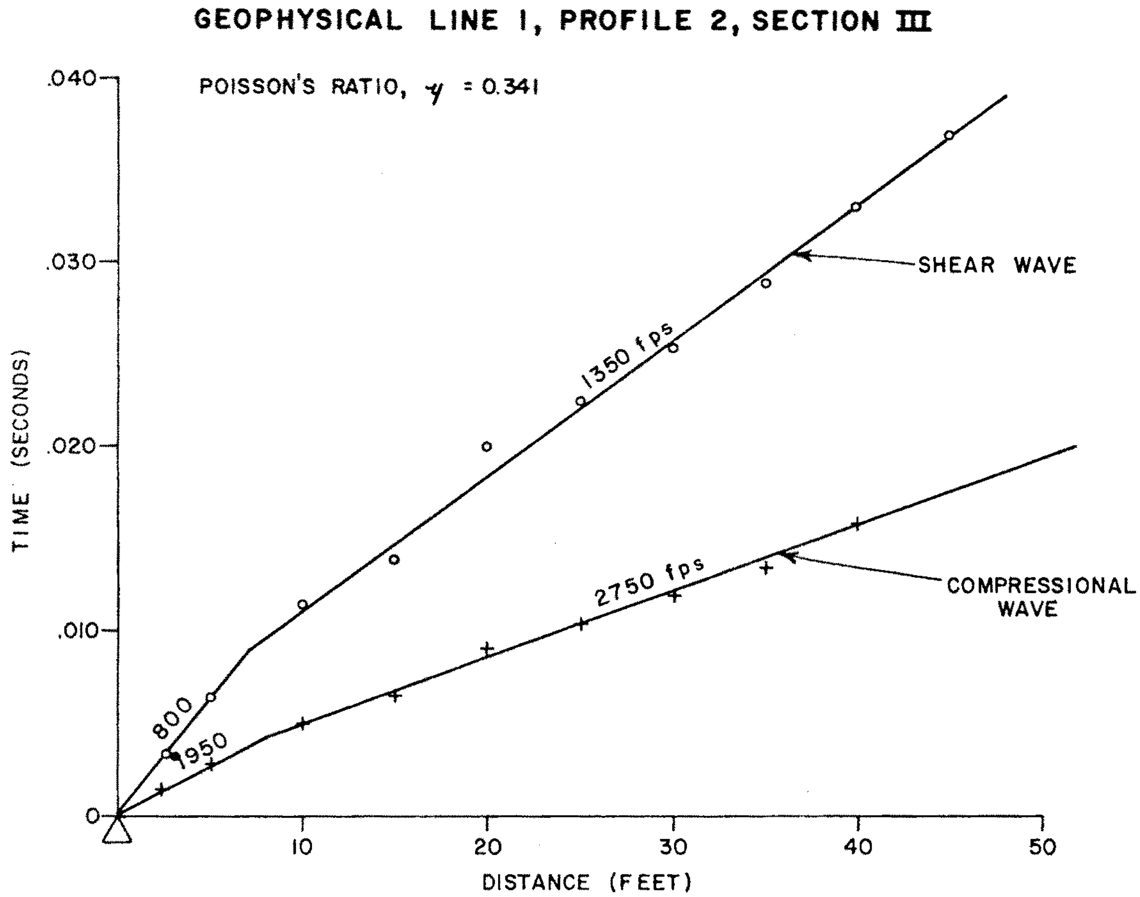
FIGURE 2.5-502
GEOPHYSICAL TEST RESULTS
STRUCTURAL FILL
TEST PAD



NOTES

△ DENOTES ENERGY SOURCE.

+ DENOTES COMPRESSIONAL WAVE ARRIVAL TIMES.

o DENOTES SHEAR WAVE ARRIVAL TIMES.

THE COMPRESSIONAL AND SHEAR WAVE VELOCITIES SHOWN ON THE TIME-DISTANCE PLOT ARE APPARENT VELOCITIES, GIVEN IN FEET PER SECOND, AND HAVE BEEN DETERMINED DIRECTLY FROM THE PLOT.

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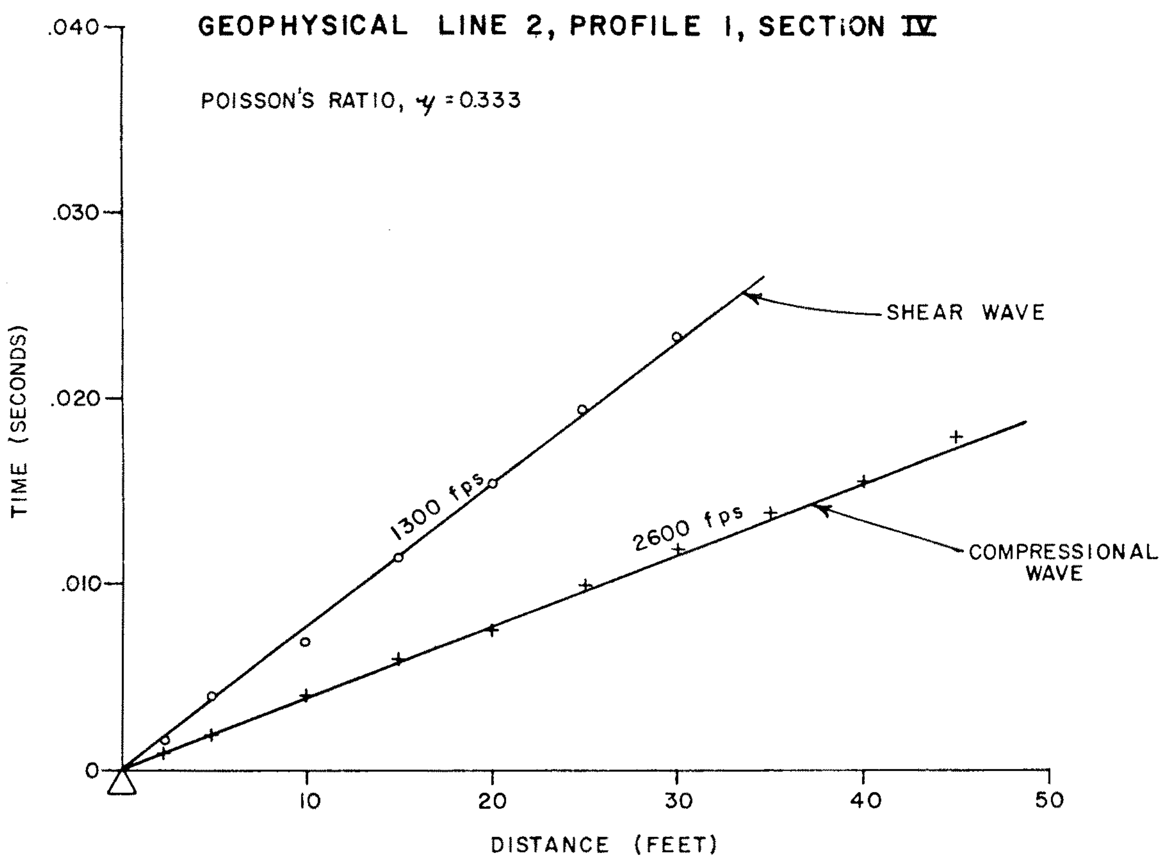
FIGURE 2.5-503
GEOPHYSICAL TEST RESULTS
STRUCTURAL FILL
TEST PAD



NOTES

△ DENOTES ENERGY SOURCE.

+ DENOTES COMPRESSIONAL WAVE ARRIVAL TIMES.

o DENOTES SHEAR WAVE ARRIVAL TIMES.

THE COMPRESSIONAL AND SHEAR WAVE VELOCITIES SHOWN ON THE TIME-DISTANCE PLOT ARE APPARENT VELOCITIES, GIVEN IN FEET PER SECOND, AND HAVE BEEN DETERMINED DIRECTLY FROM THE PLOT.

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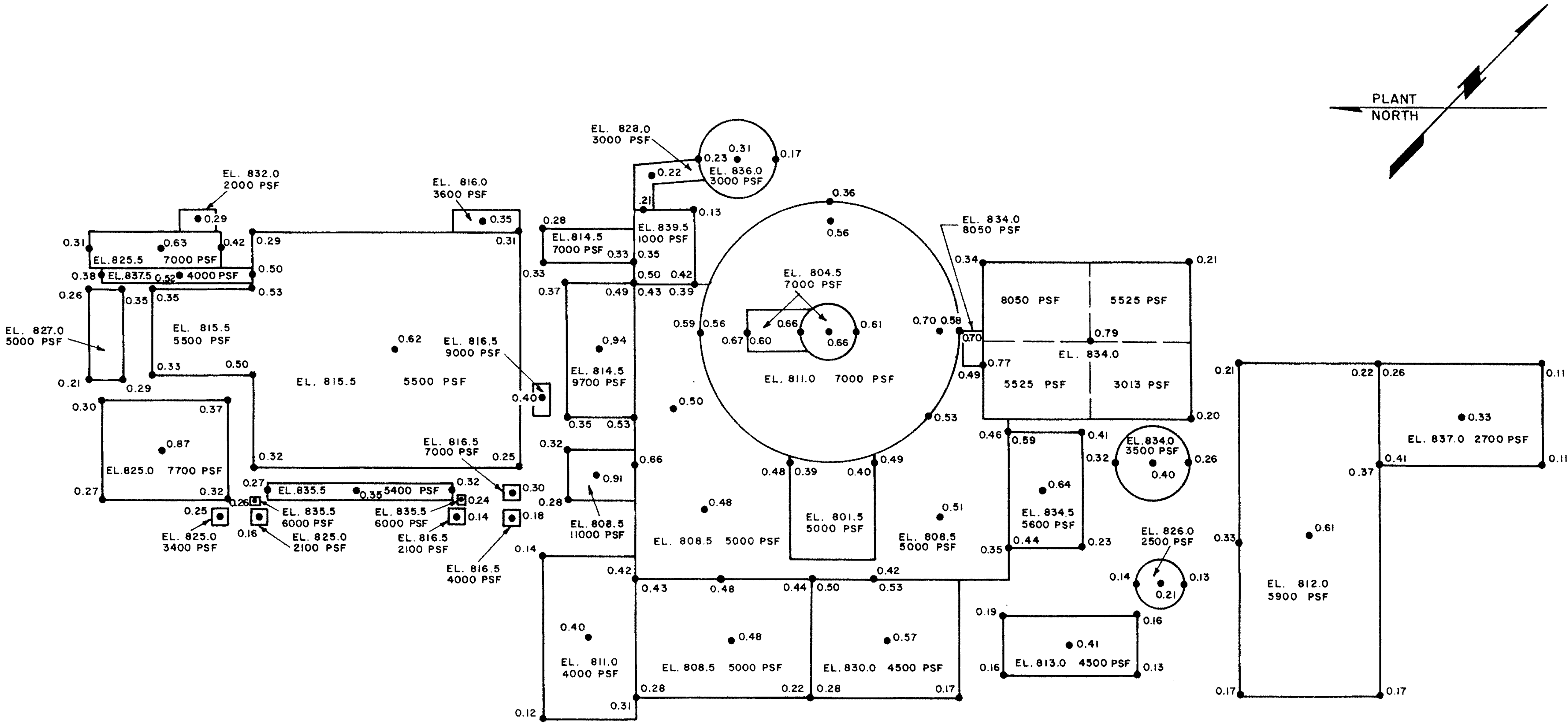
FIGURE 2.5-504
GEOPHYSICAL TEST RESULTS
STRUCTURAL FILL
TEST PAD



LEGEND:

● 0.48 LOCATION OF SETTLEMENT POINT AND COMPUTED SETTLEMENT IN INCHES. WHERE MORE THAN ONE VALUE IS GIVEN FOR A POINT, EACH VALUE WAS PLACED IN THE BUILDING FOR WHICH THAT SETTLEMENT WAS CALCULATED.

NOTES:

1. BASE ELEVATION AND APPLIED PRESSURE IS SHOWN FOR EACH FOUNDATION.
2. REACTOR BUILDING WAS MODELED WITH BASE AT ELEVATION 811.0 BECAUSE STABILIZED BACKFILL WAS USED TO FILL BELOW THE BASE MAT AND TENDON GALLERY ACCESS SHAFT DOWN TO THE GRAYDON CHERT CONGLOMERATE AT ELEVATION 811.0 .
3. FUEL BUILDING APPLIED PRESSURE DISTRIBUTION WAS AVERAGED INTO FOUR QUADRANTS.
4. THE DISCUSSION IN SECTION 2.5.4.10.2 IS NECESSARY FOR PROPER INTERPRETATION OF THE COMPUTED SETTLEMENTS.

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FEET

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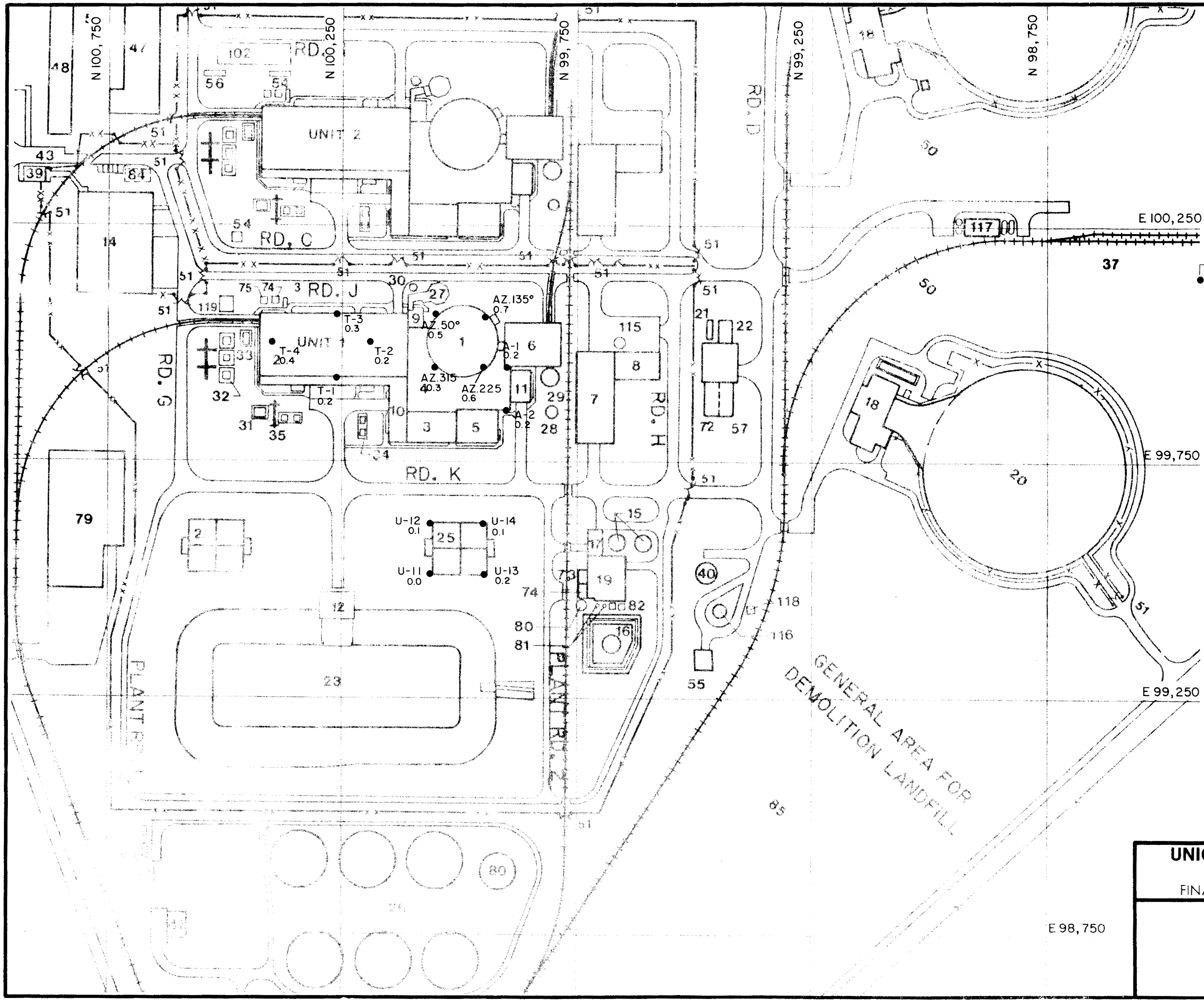
FIGURE 2.5-505

COMPUTED SETTLEMENTS



PLANT NORTH

LEGEND:

● T-1 — SETTLEMENT MONITORING PLATE LOCATION / SETTLEMENT MONITORING PLATE NUMBER
0.1 — MEASURED SETTLEMENT IN INCHES AS OF MAY 22, 1979

SETTLEMENT PLATE	APPROXIMATE ELEVATION (FEET, MSL DATUM)	DATE OF FIRST SURVEY
TURBINE BUILDING		
T-1	840	JUNE 13, 1977
T-2	823	APRIL 11, 1977
T-3	840	JUNE 13, 1977
T-4	840	JULY 12, 1977
REACTOR BUILDING		
AZ. 50°	842	JANUARY 31, 1978
AZ. 135°	842	JANUARY 31, 1978
AZ. 225°	842	JANUARY 31, 1978
AZ. 315°	842	JANUARY 31, 1978
AUXILIARY BUILDING		
A-1	842	OCTOBER 25, 1978
A-2	842	OCTOBER 25, 1978
UHS COOLING TOWER 1		
U-11	842	OCTOBER 25, 1978
U-12	842	OCTOBER 25, 1978
U-13	842	OCTOBER 25, 1978
U-14	842	OCTOBER 25, 1978

FIFTEEN ADDITONAL SETTLEMENT PLATES IN THE UNIT 1 POWER BLOCK AND ESWS PUMPHOUSE WERE EITHER SURVEYED ONLY FOR INITIAL READINGS OR WERE NOT SURVEYED AS OF MAY 22, 1979. THESE FIFTEEN ADDITIONAL SETTLEMENT PLATES ARE NOT SHOWN.

REFERENCES:

1. SETTLEMENT PLATE LOCATIONS TAKEN FROM BECHTEL DRAWINGS C-0C1903(Q) (UNO), REV. 7; C-0C2903(Q) (UNO), REV. 4; C-0C2904(Q) (UNO), REV. 4; C-0C4221, REV. 14; C-0C2414, REV. 12; C-0C4251, REV. 12; C-0C4261, REV. 15; C-UC501 (Q) (UNO), REV. 5.
2. SVERDRUP & PARCEL AND ASSOCIATES, INC.; DRAWING NO. 8600-X-88100 REV. 5; DATED APRIL 2, 1976.

NOTE: Unit 2 was cancelled in 1981.

100 0 100 300
FEET

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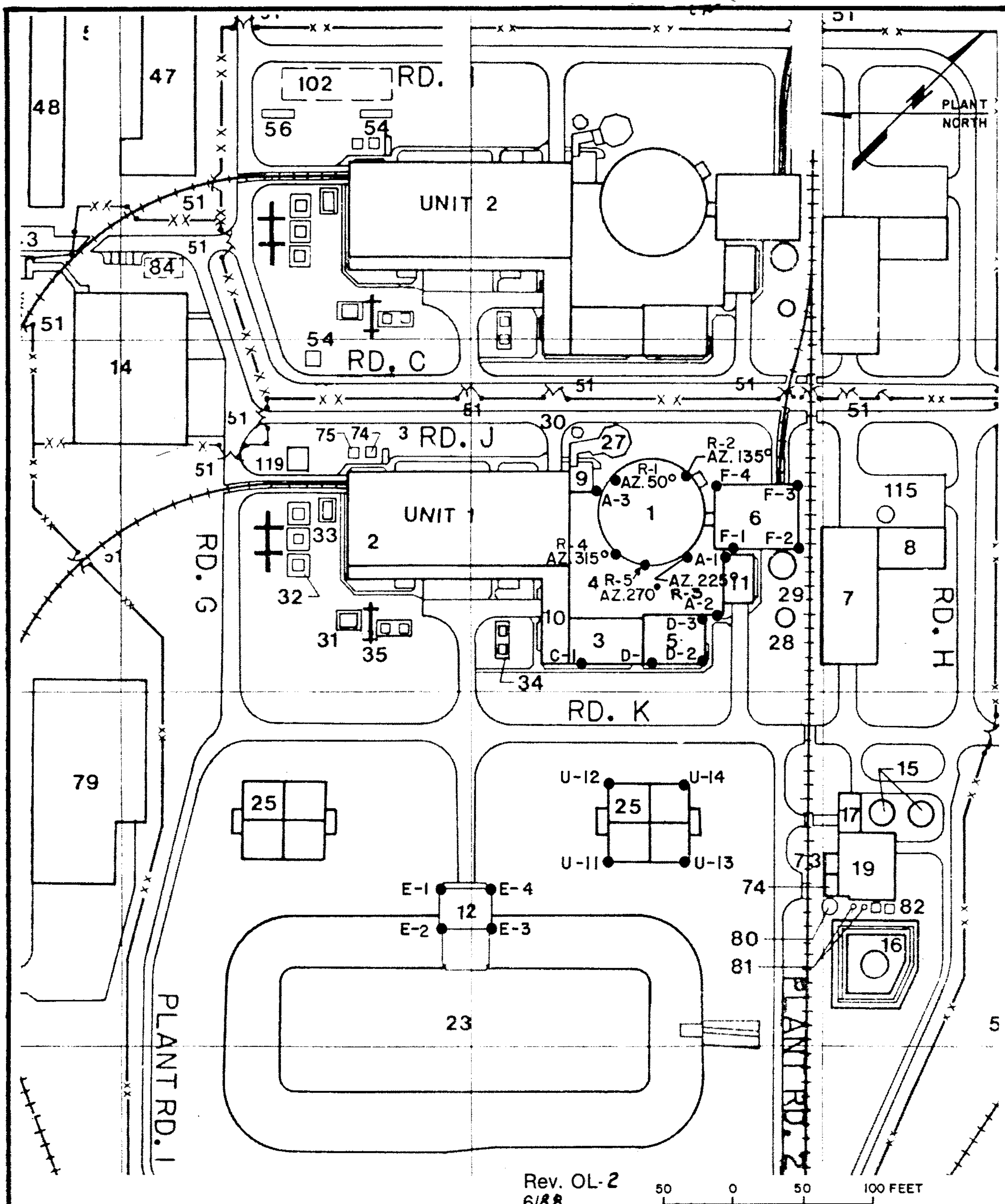
FIGURE 2.5-506
MEASURED SETTLEMENT



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NOTE: Unit 2 was cancelled in 1981.

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FIGURE 2.5-507
SETTLEMENT MONITORING
PLATE LOCATIONS
CATEGORY I STRUCTURES

FIGURES 2.5-508 THRU 2.5-530 HAVE BEEN DELETED

FIGURES 2.5-508 THRU 2.5-530 HAVE BEEN DELETED

FIGURES 2.5-508 THRU 2.5-530 HAVE BEEN DELETED

FIGURES 2.5-508 THRU 2.5-530 HAVE BEEN DELETED

FIGURES 2.5-508 THRU 2.5-530 HAVE BEEN DELETED

FIGURES 2.5-508 THRU 2.5-530 HAVE BEEN DELETED

FIGURES 2.5-508 THRU 2.5-530 HAVE BEEN DELETED

FIGURES 2.5-508 THRU 2.5-530 HAVE BEEN DELETED

FIGURES 2.5-508 THRU 2.5-530 HAVE BEEN DELETED

FIGURES 2.5-508 THRU 2.5-530 HAVE BEEN DELETED

FIGURES 2.5-508 THRU 2.5-530 HAVE BEEN DELETED

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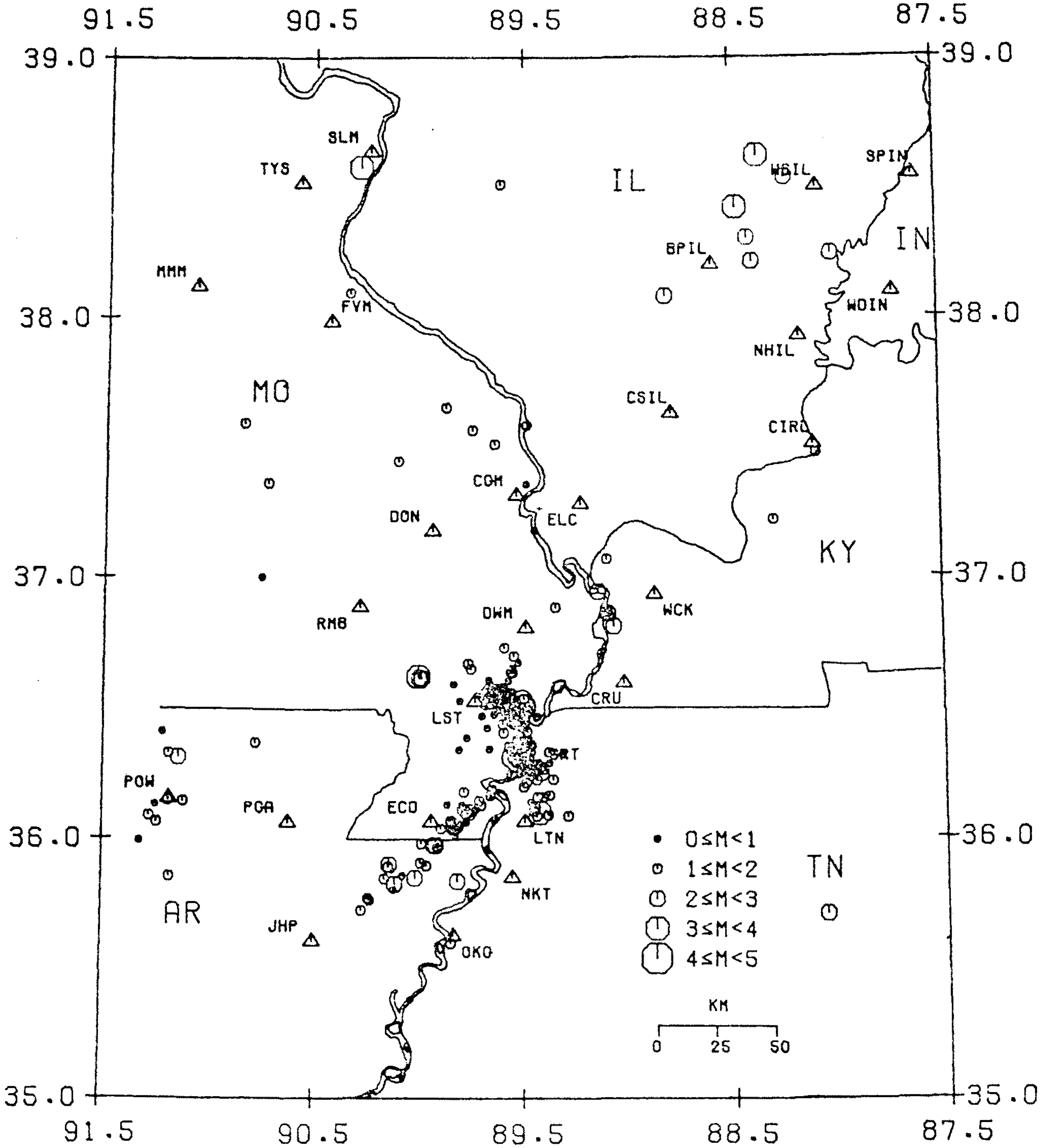
FIGURES 2.5-508 THRU 2.5-530 HAVE BEEN DELETED

FIGURES 2.5-508 THRU 2.5-530 HAVE BEEN DELETED



1978

CUMULATIVE EVENTS 01 JAN 1978 TO 31 DEC 1978

LEGEND . △ STATION ⊙ EPICENTER

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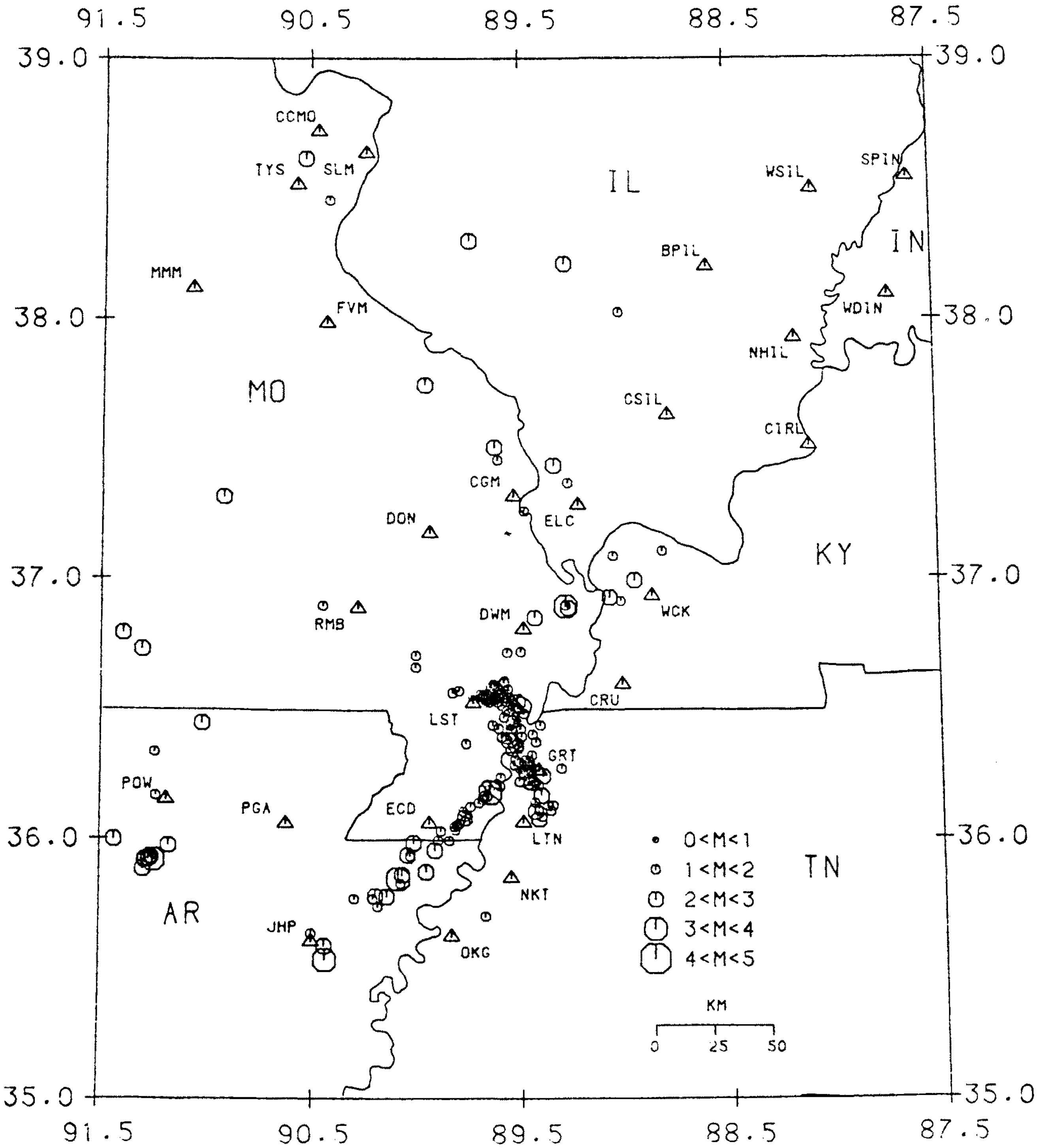
FIGURE 2.5-74.1
REGIONAL EPICENTER LOCATIONS
CUMULATIVE EVENTS
01 JAN 1978 TO 31 DEC 1978

REFERENCE:

STAUDER & OTHERS, 1981



1979

CUMULATIVE EVENTS 01 JAN 1979 TO 31 DEC 1979

LEGEND △ STATION ⊙ EPICENTER

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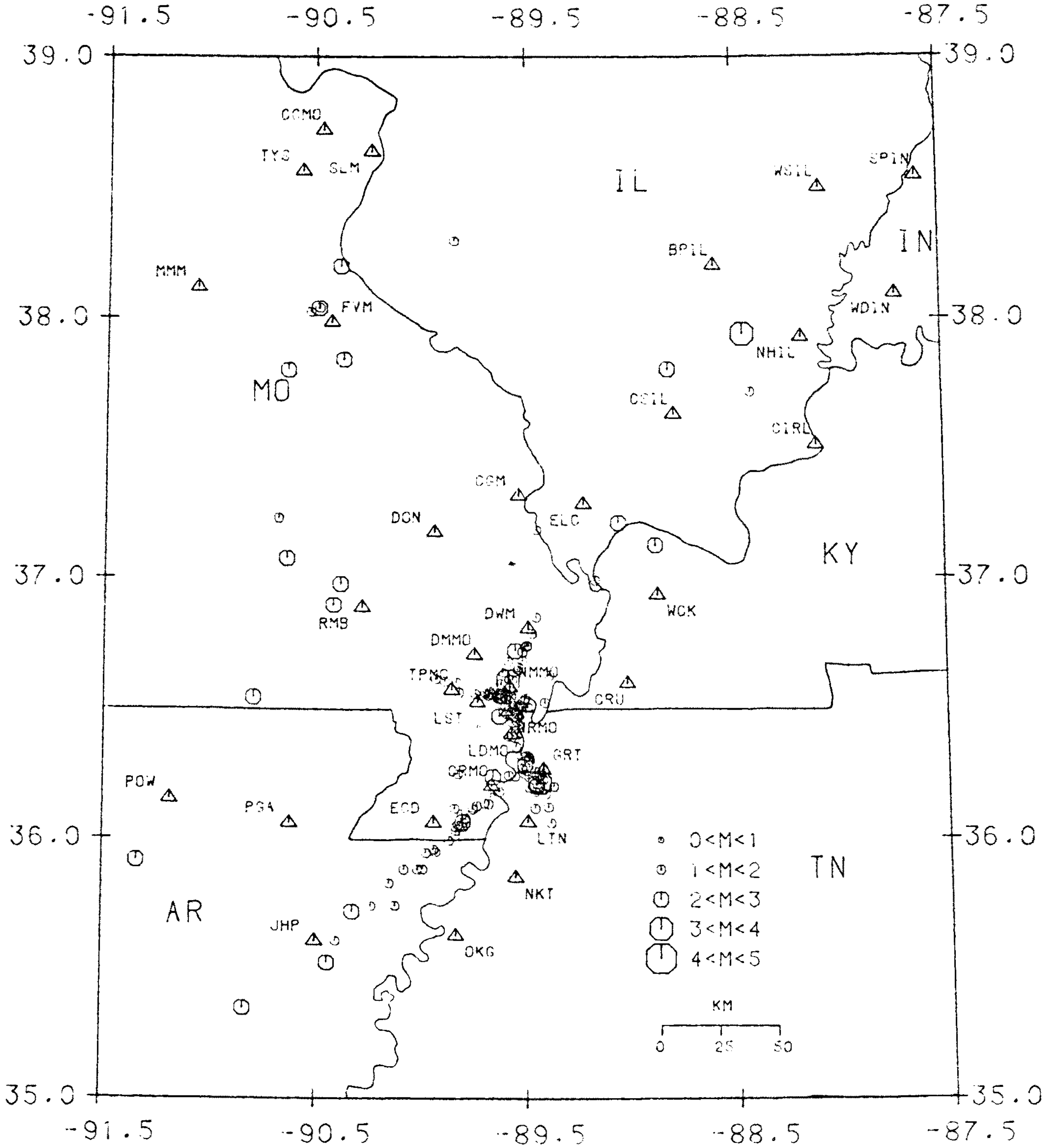
FIGURE 2.5-74.2
REGIONAL EPICENTER LOCATIONS
CUMULATIVE EVENTS
01 JAN 1979 TO 31 DEC 1979

REFERENCE:

STAUDER & OTHERS, 1981



1980

CUMULATIVE EVENTS 01 JAN 1980 TO 31 DEC 1980

LEGEND △ STATION ⊙ EPICENTER

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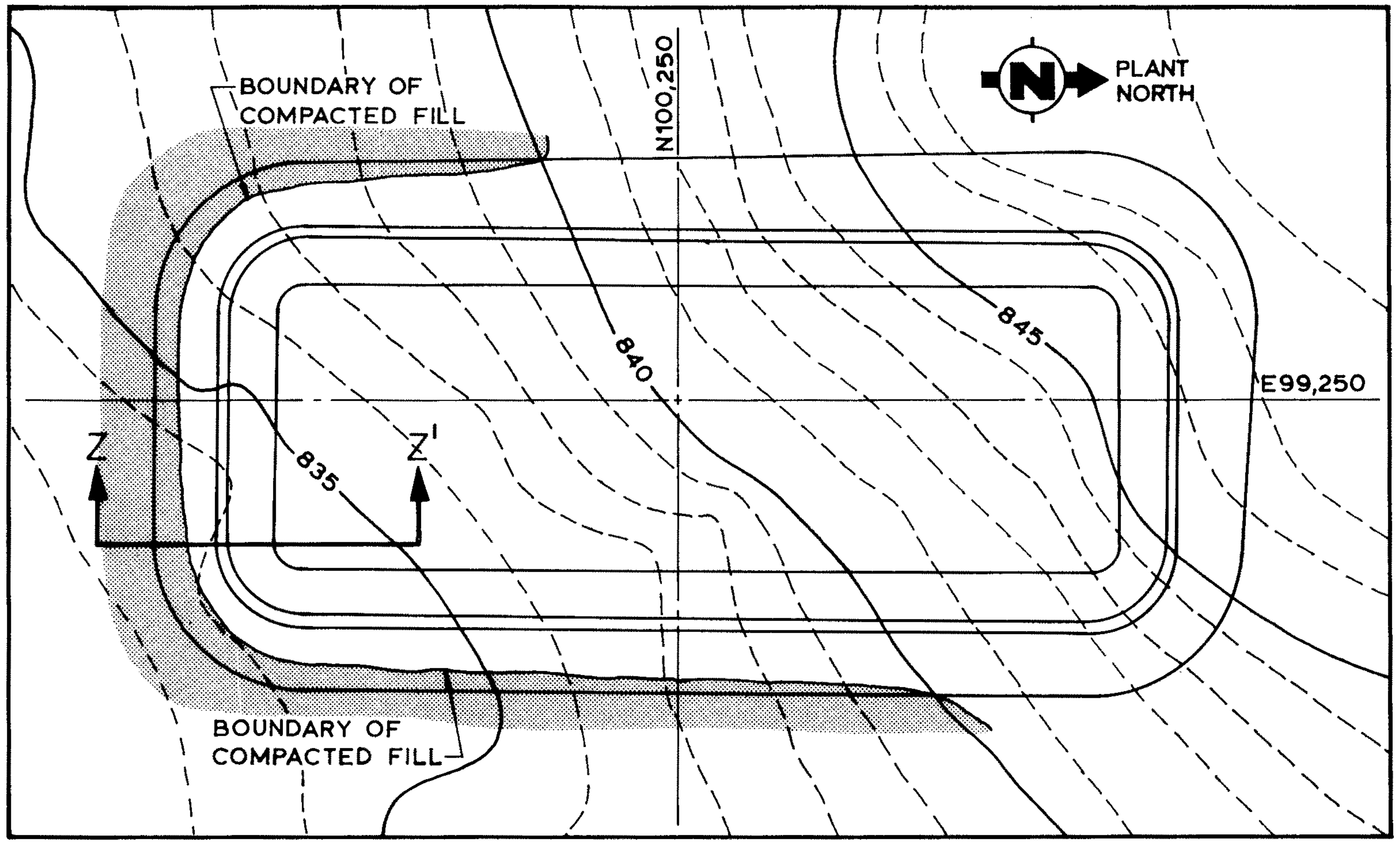
FIGURE 2.5-74.3
REGIONAL EPICENTER LOCATIONS
CUMULATIVE EVENTS
01 JAN 1980 TO 31 DEC 1980

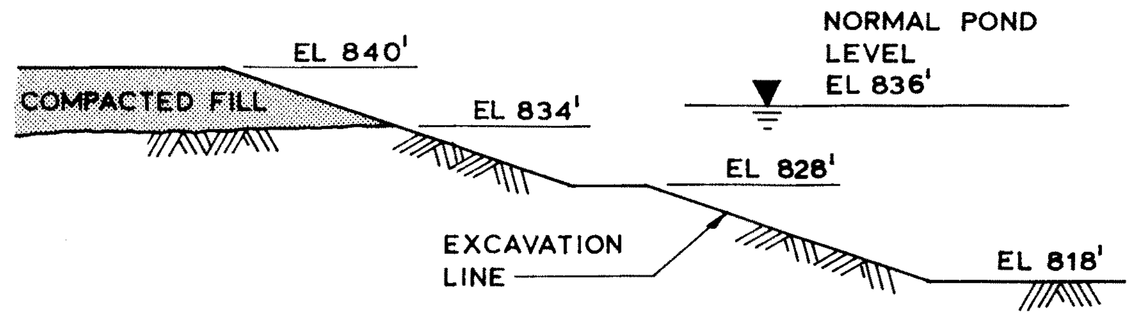
REFERENCE:

STAUDER & OTHERS, 1981



LOCATION PLAN

0 100 200
SCALE IN FEET



SECTION Z-Z'

EXCAVATION AND COMPACTED FILL

0 10 20
SCALE IN FEET

1. SHADED PORTION DENOTES COMPACTED FILL AREA.
2. CONTOURS INDICATE ELEVATIONS PRIOR TO CONSTRUCTION, FROM SVERDRUP PARCEL AND ASSOCIATES, DWG'S SK-102974C01 AND SK-102974C02.
3. STRIPPING PRIOR TO COMPACTED FILL PLACEMENT NOT TAKEN INTO ACCOUNT IN DRAWING.
4. ASSOCIATED STRUCTURES, ie. ESWS PUMPHOUSE, OUTLET STRUCTURE AND MAKEUP WATER LINE NOT SHOWN OR TAKEN INTO ACCOUNT IN DRAWING.
5. FOR POND, ASSOCIATED STRUCTURES, FILTER AND RIPRAP DETAILS, SEE FIGURE 2.5-106.
6. FILL CONSISTS OF MODIFIED LOESS SOIL TAKEN FROM ONSITE AND COMPACTED TO A MINIMUM OF 90 PERCENT OF MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D 1557.

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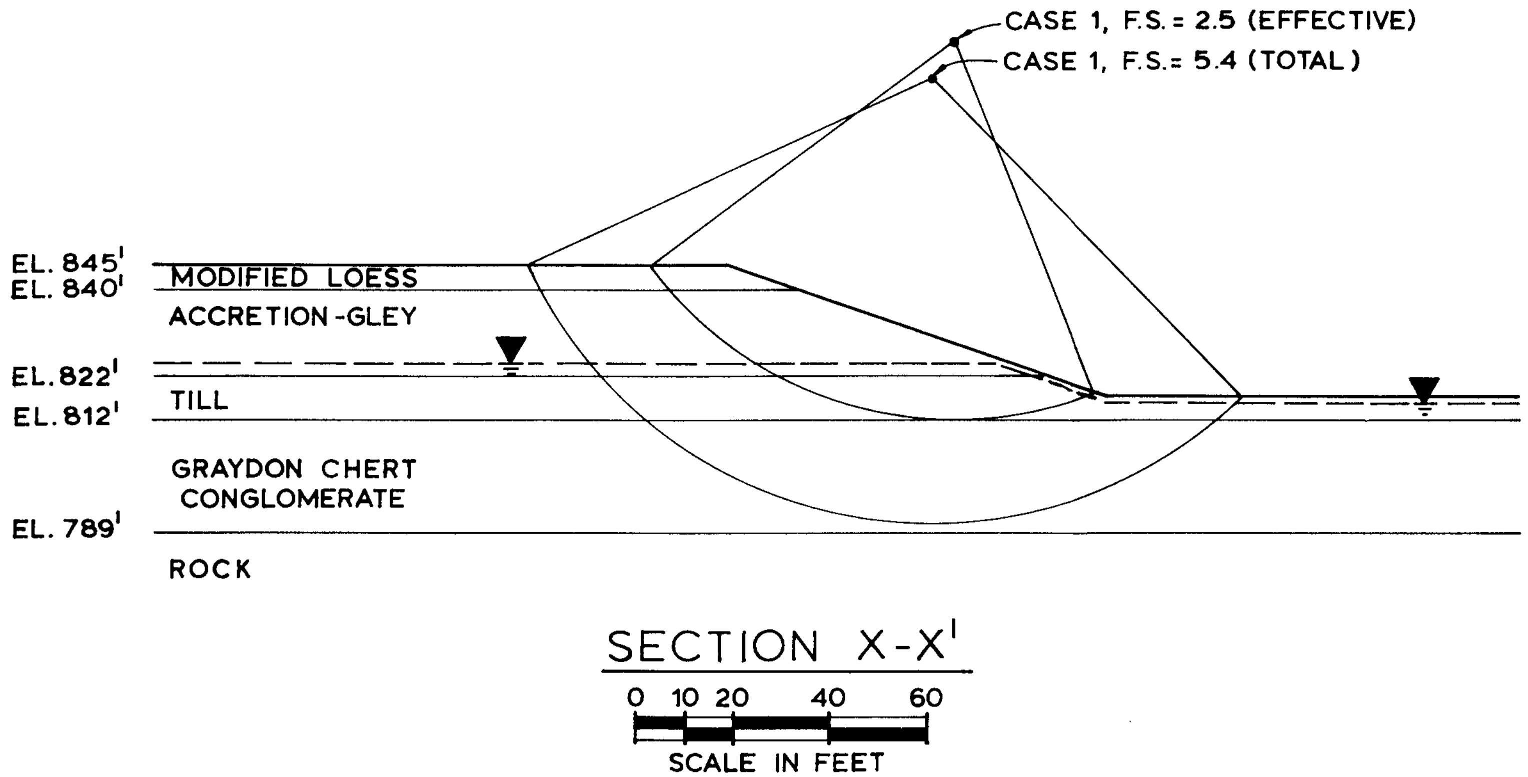
FIGURE 2.5-106.1

ULTIMATE HEAT SINK
RETENTION POND
PLAN AND SECTION OF COMPACTED FILL



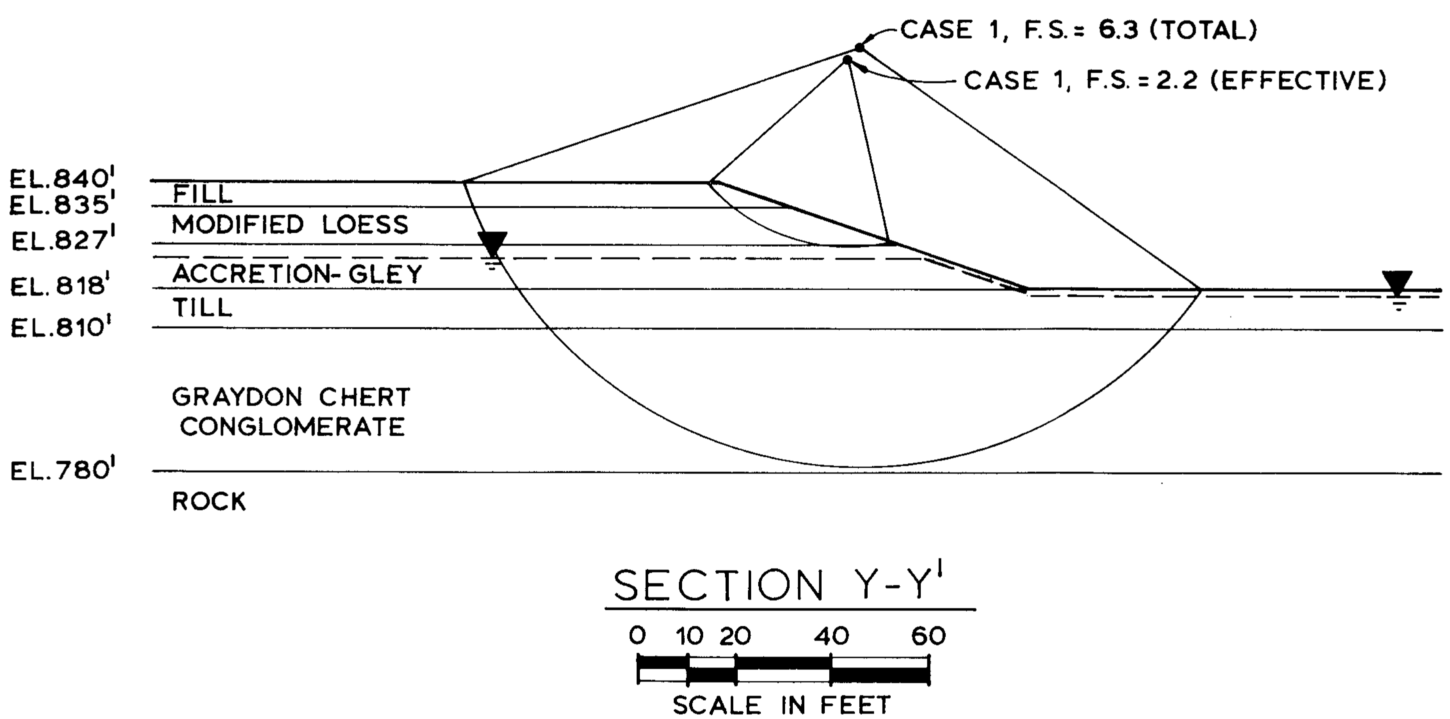


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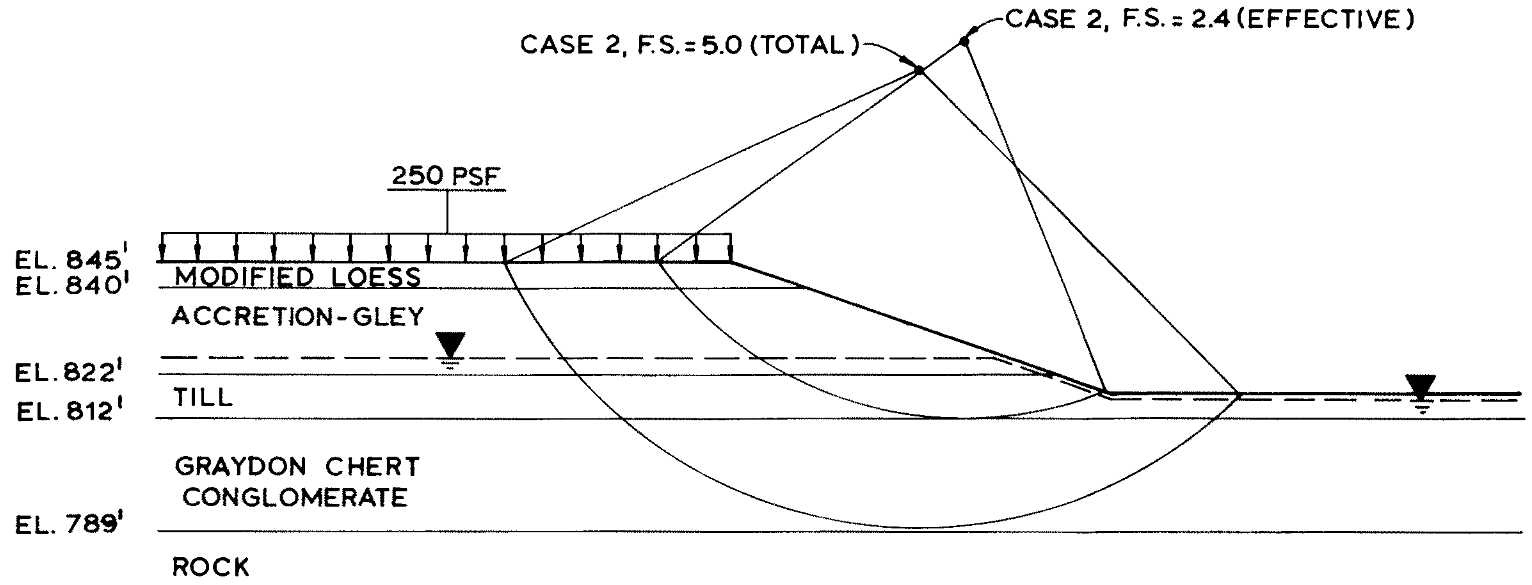
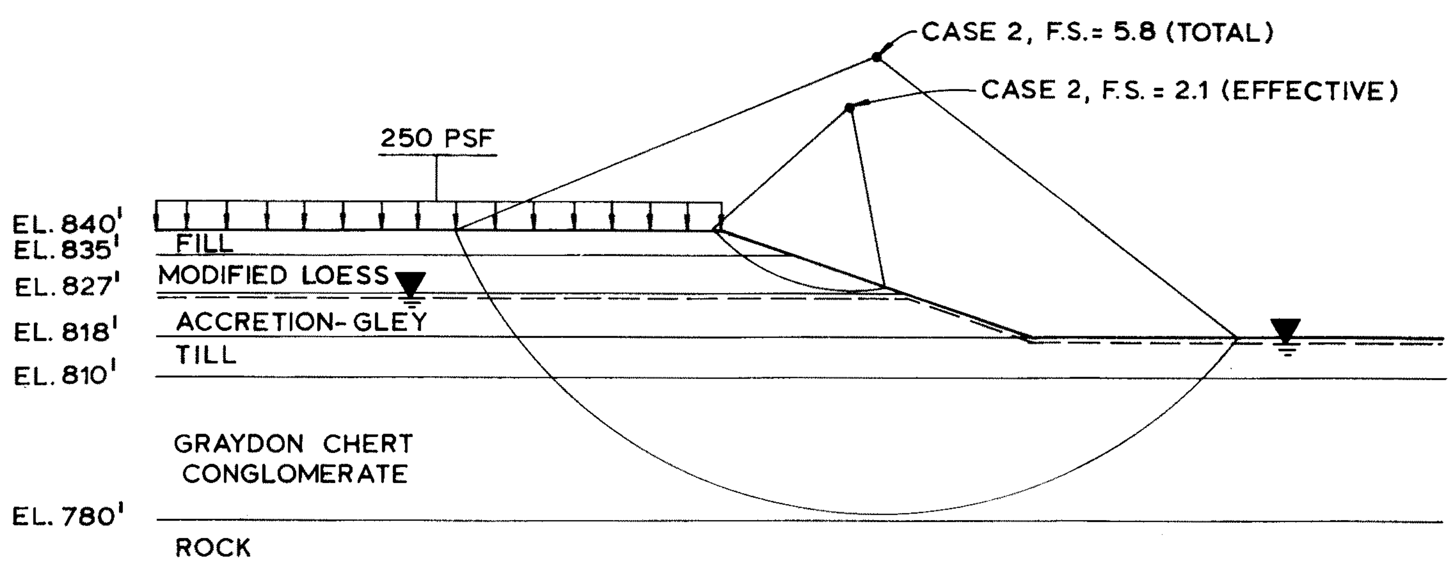
FIGURE 2.5-115.1

UHS RETENTION POND
STABILITY ANALYSES, CRITICAL CIRCLES
CASE 1, END OF EXCAVATION



SECTION X-X'

0 10 20 40 60
SCALE IN FEET



SECTION Y-Y'

0 10 20 40 60
SCALE IN FEET

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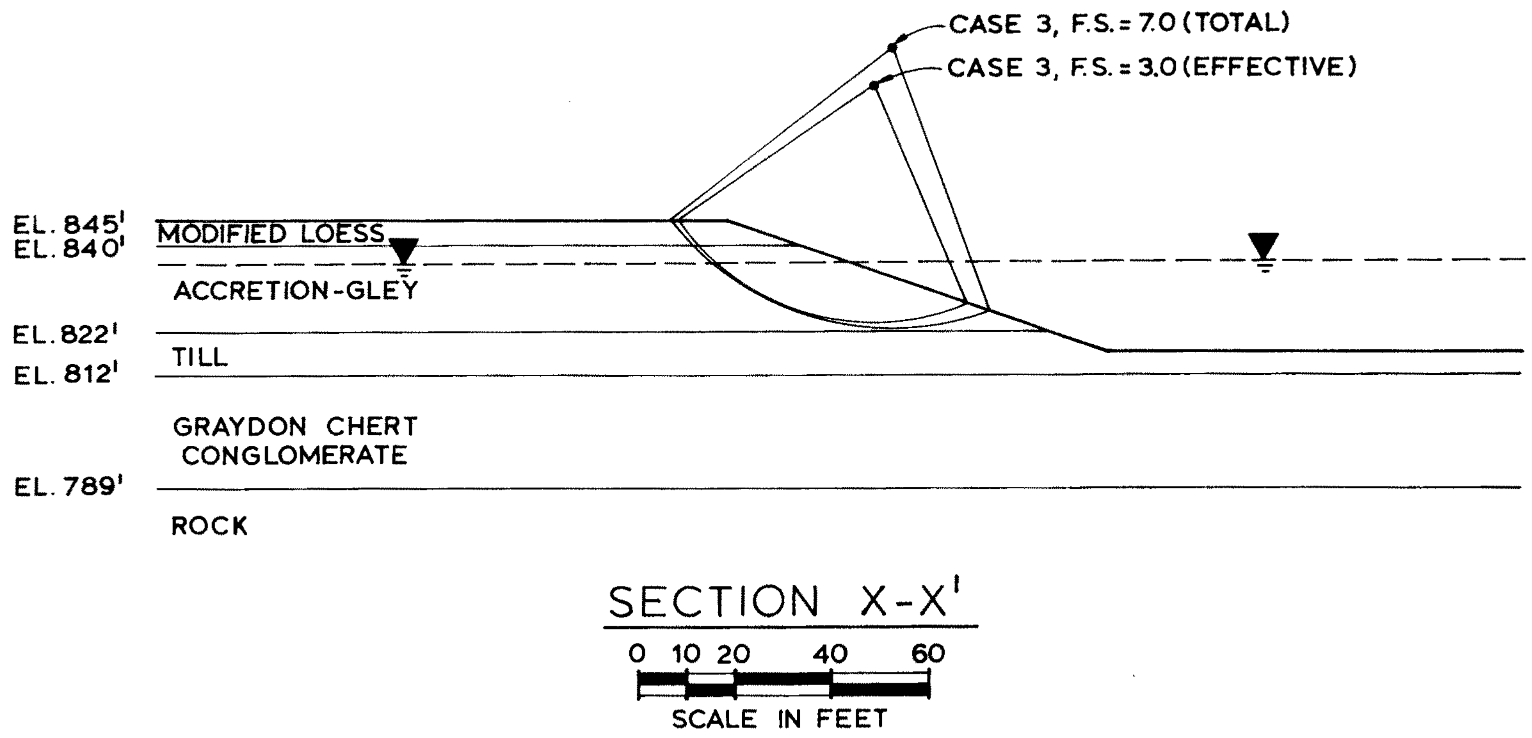
FIGURE 2.5-115.2

UHS RETENTION POND
STABILITY ANALYSES, CRITICAL CIRCLES
CASE 2, EXCAVATION, 250 PSF SURCHARGE



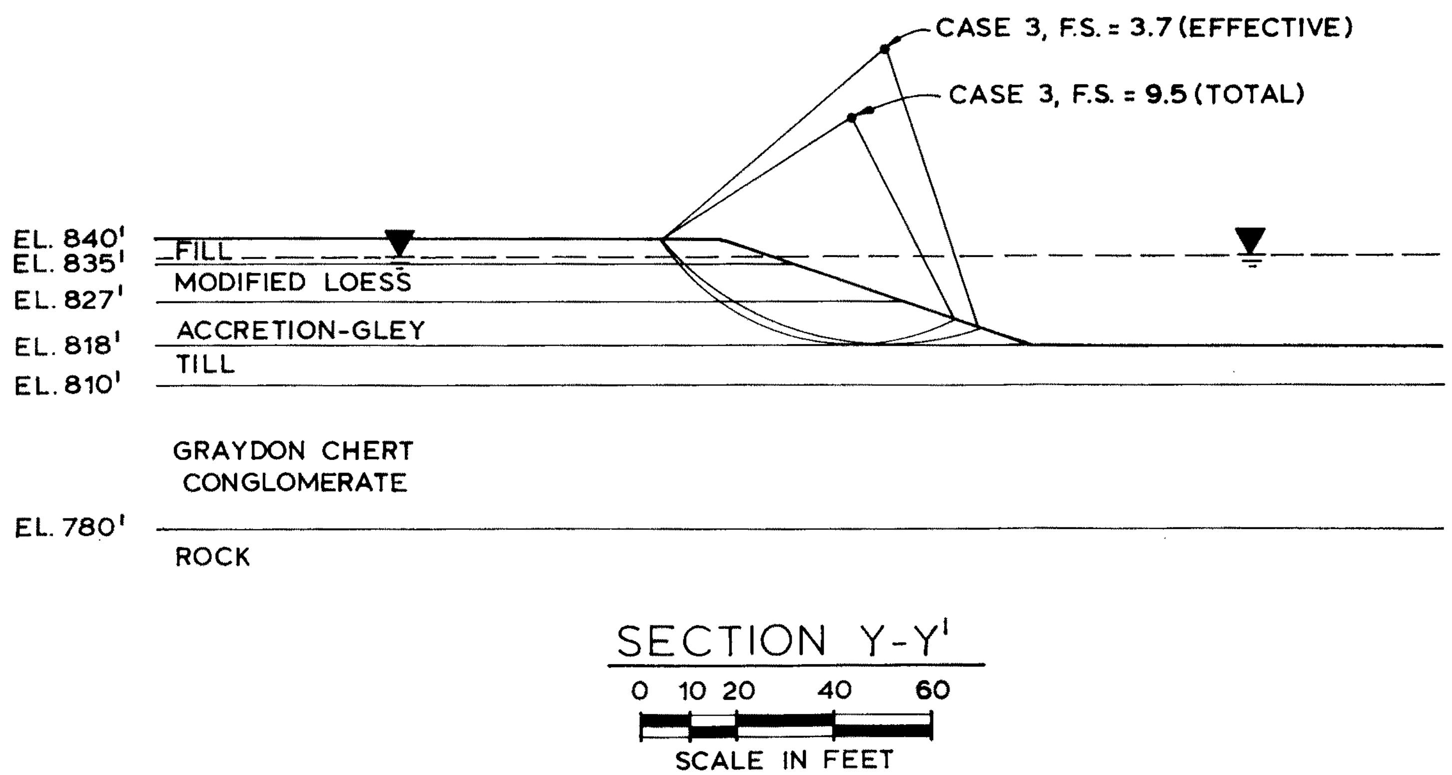


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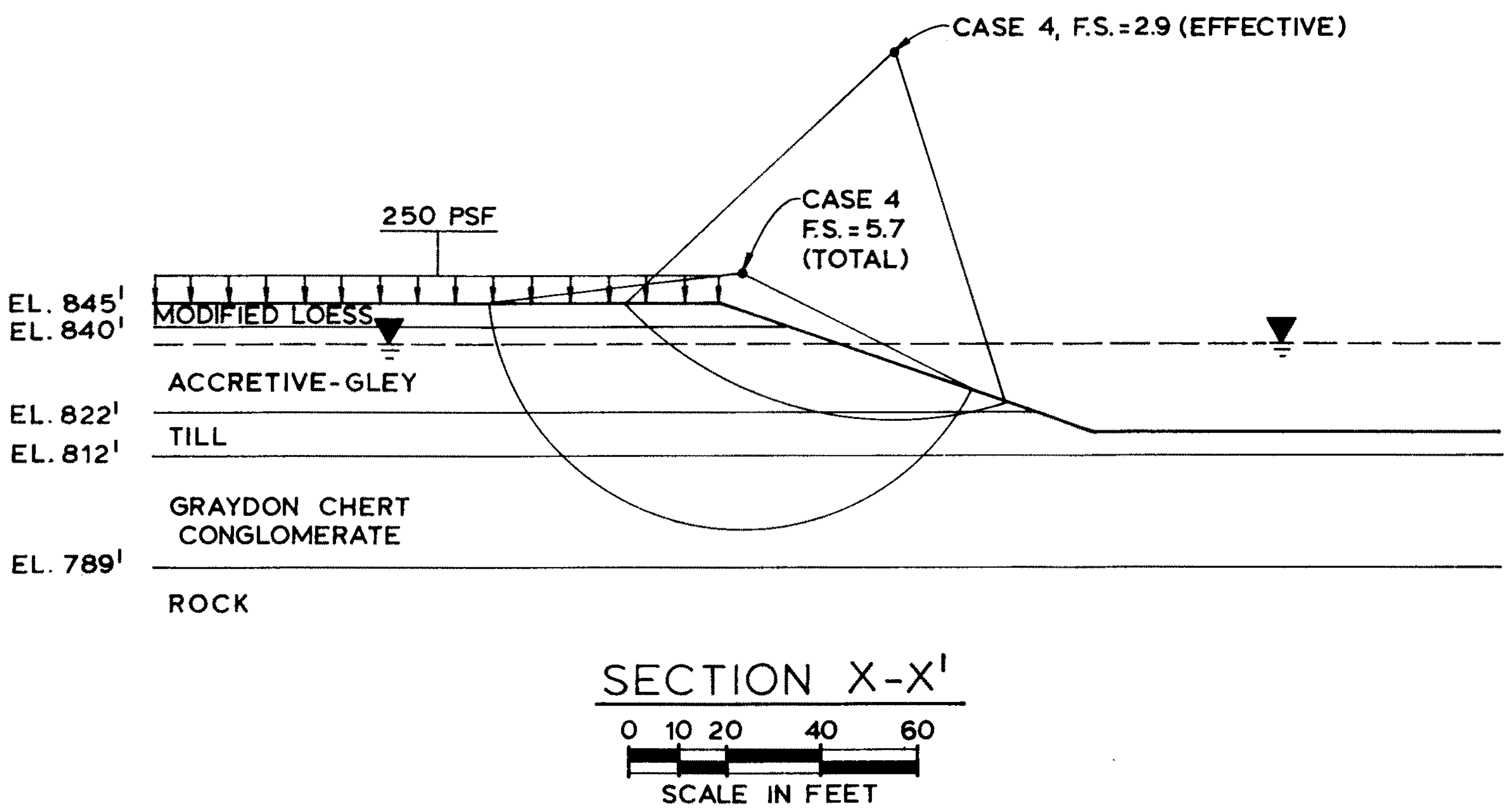
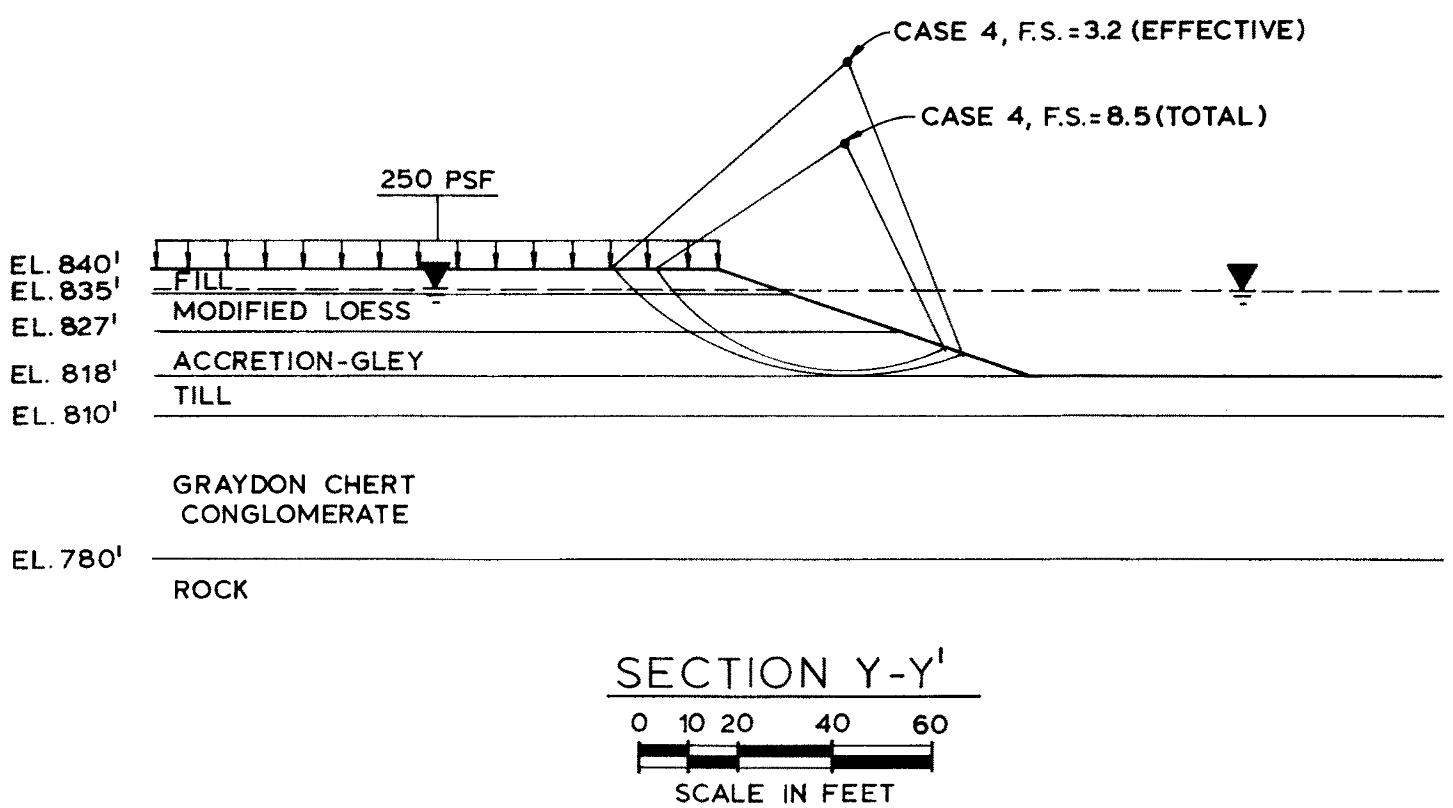
FIGURE 2.5-115.3

UHS RETENTION POND
STABILITY ANALYSES, CRITICAL CIRCLES
CASE 3, MAXIMUM POND LEVEL



SECTION X-X'



SECTION Y-Y'

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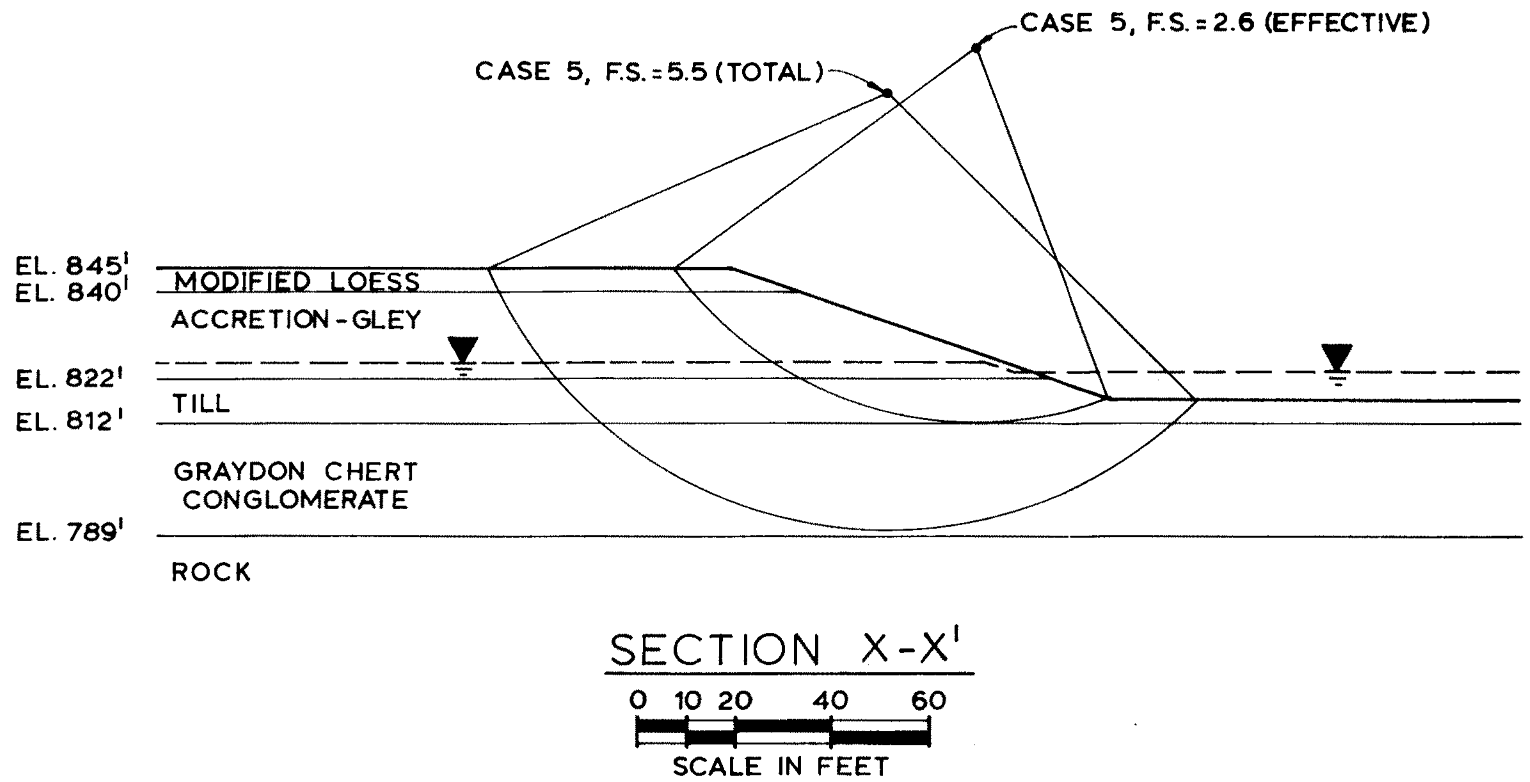
FIGURE 2.5-115.4

UHS RETENTION POND
STABILITY ANALYSES, CRITICAL CIRCLES
CASE 4, MAX. POND, 250 PSF SURCHARGE



SECTION X-X'

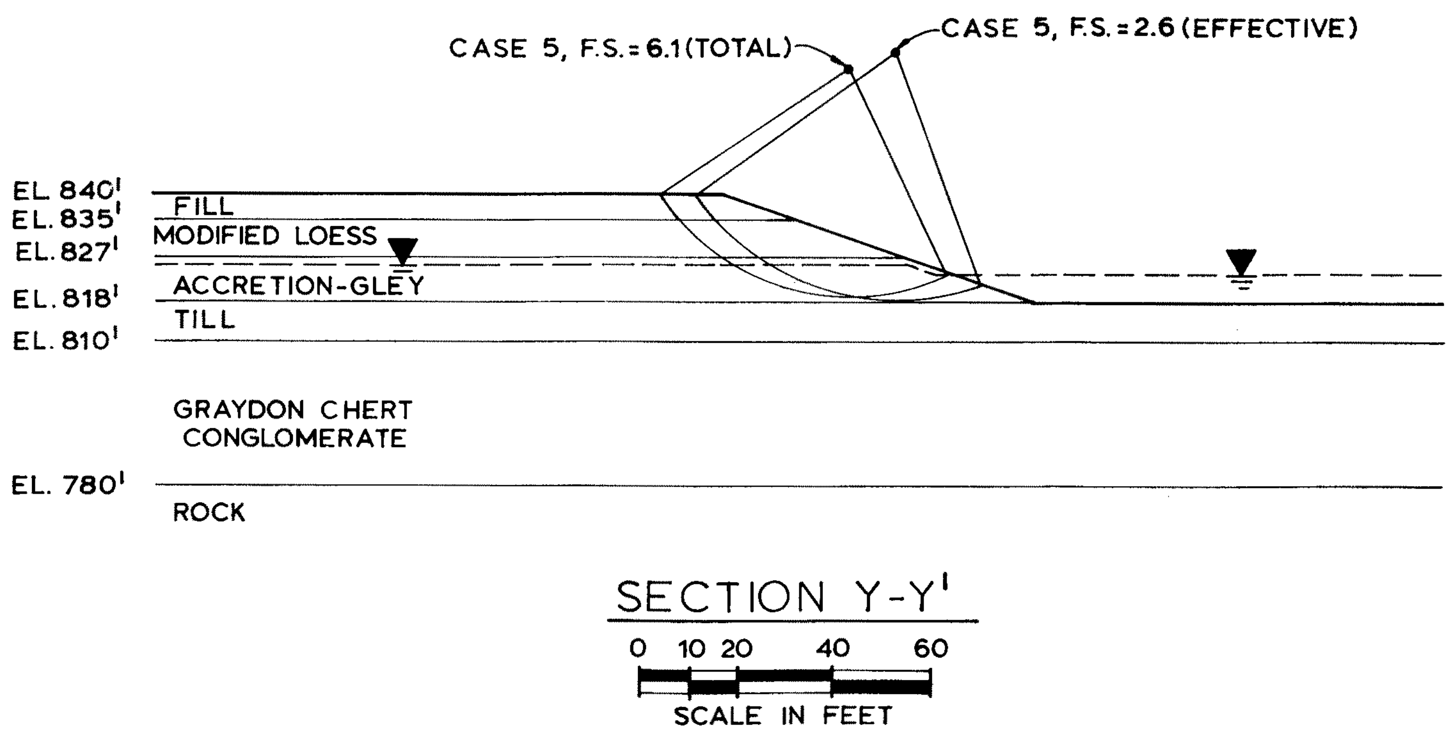


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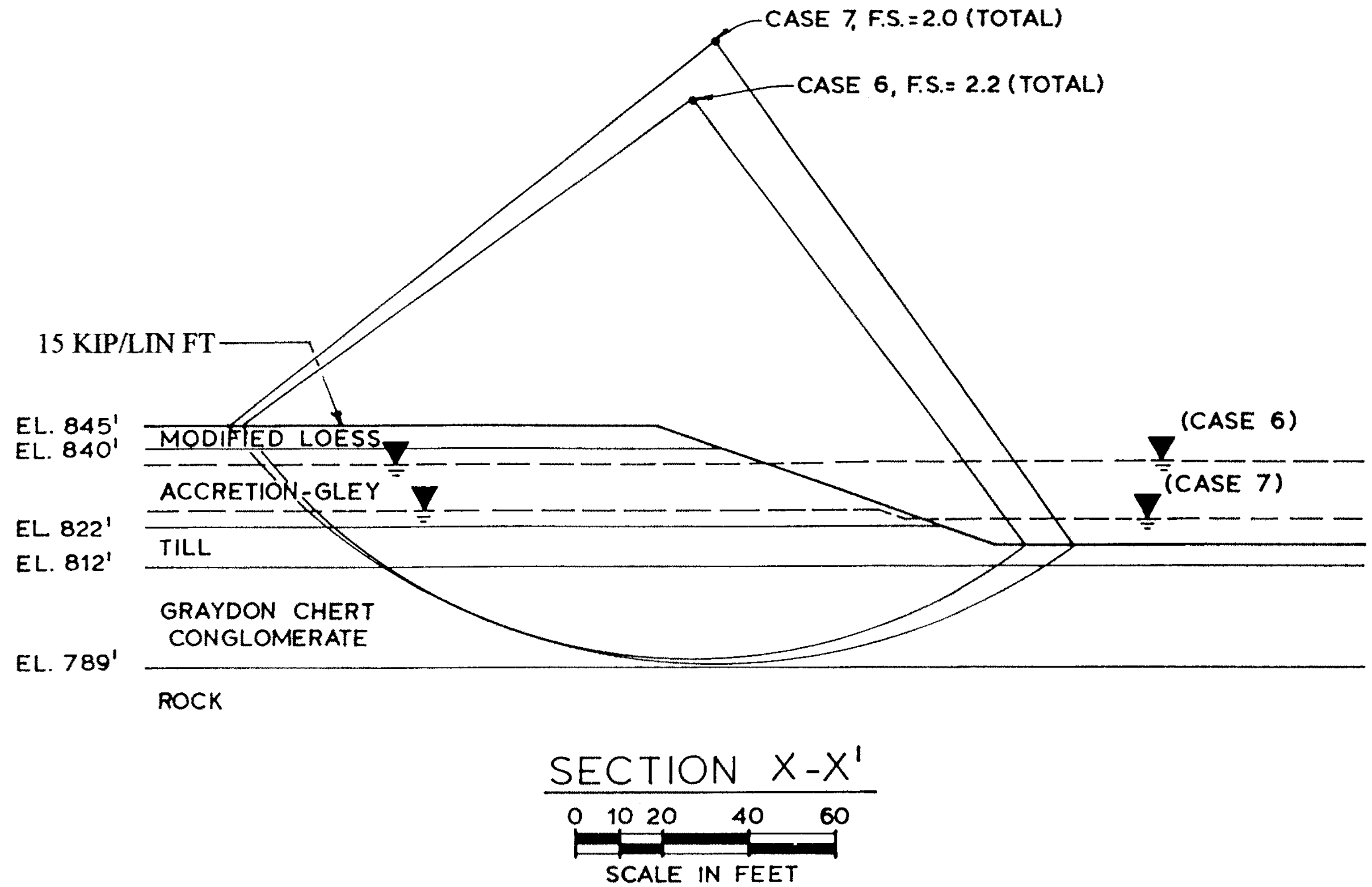
FIGURE 2.5-115.5

UHS RETENTION POND
STABILITY ANALYSES, CRITICAL CIRCLES
CASE 5, PARTIAL POND LEVEL



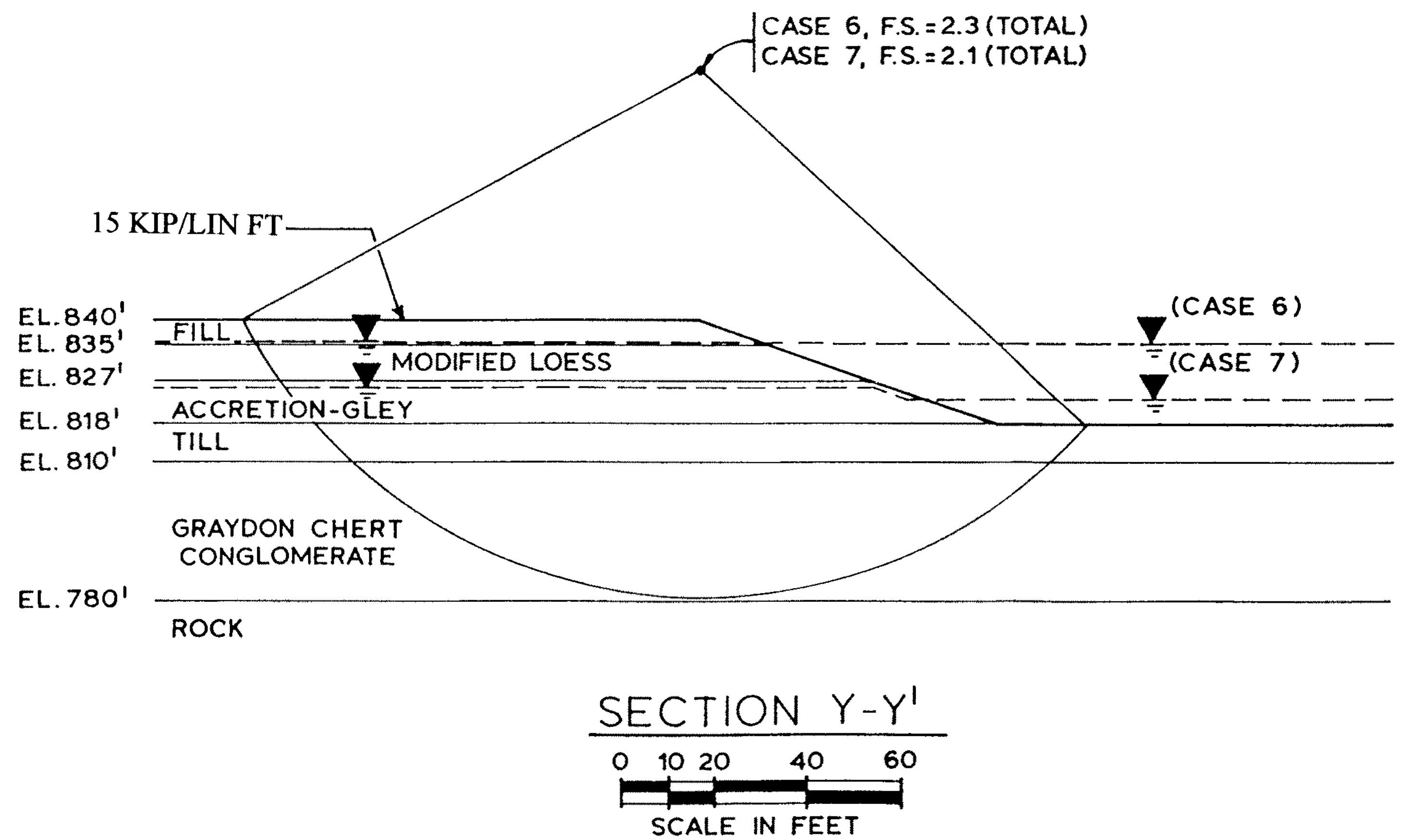


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FIGURE 2.5-115.6

UHS RETENTION POND
STABILITY ANALYSES, CRITICAL CIRCLES
CASES 6 & 7, EARTHQUAKE CONDITIONS