The Light company
Houston Lighting & Power South Texas Project Electric Generating Station P. O. Box 289 Wadsworth, Texas 77483

March 28, 1994
ST-HL-AE-4751
File No.: G9.18
G25
10CFR50 App A

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498; STN 50-499
Additional Information Regarding Performance of
Main Cooling Reservoir and Essential Cooling Pond During and After Filling to Elevation + 45 Feet (TAC Nos. M86279 and M86280)

Reference: NRC Request for Addition Information Letter from Mr. Lawrence Kokajko of the NRC Staff to Mr. William T. Cottle dated February 10, 1994. (ST-AE-HL-93712)

Houston Lighting & Power Company (HL&P) herein submits additional information regarding performance on Main Cooling Rerervoir (MCR) and Essential Cooling Pond (ECP) during and after filling to elevation + 45 feet as requested by Mr. Lawrence Kokajko of the NRC Staff in the referenced letter of February 10, 1994.

The attachment includes HL&P's response to the questions of the referenced letter, profile cross sections of the MCR embankment,and a plot of South Texas Project Electric Generating Station (STPEGS)Main Cooling Reservoir "Seepage Gradient vs Thickness of Top Clay Layer", and a table of stability calculations.

If there are further questions regarding this matter, please contact Mr. A. W. Harrison at (512) 972-7298 or me at (512) 972-8787.

T. H. Cloninger
Vice President,
Nuclear Engineering

HRP/eg

IR:94194-084.001

Project Manager on Behalf of the Participants in the South Texas Project

A001

Attachment: Response to the NRC Request For Additional Information letter of February 10, 1994 from Mr. Lawrence Kokajko of the NRC Staff to Mr. William T. Cottle.

c:

Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011

Lawrence E. Kokajko
Project Manager
U. S. Nuclear Regulatory Commission
Washington, DC 20555 13H15

David P. Loveless
Sr. Resident Inspector
c/o U.S. Nuclear Regulatory Comm.
P. O. Box 910
Bay City, TX 77404-910

J. R. Newman, Esquire
Newman & Holtzinger, P.C., STE 1000
1615 L Street, N.W.
Washington, DC 20036

K. J. Fiedler/M. T. Hardt
City Public Service
P. O. Box 1771
San Antonio, TX 78296

J. C. Lanier/M. B. Lee
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

G. E. Vaughn/T. M. Puckett
Central Power and Light Company
P. O. Box 2121
Corpus Christi, TX 78403

Rufus S. Scott
Associate General Counsel
Houston Lighting & Power Company
P. O. Box 61867
Houston, TX 77208

Institute of Nuclear Power
Operations - Records Center
700 Galleria Parkway
Atlanta, GA 30339-5957

Dr. Joseph M. Hendrie
50 Bellport Lane
Bellport, NY 11713

D. K. Lacker
Bureau of Radiation Control
Texas Department of Health
1100 West 49th Street
Austin, TX 78756-3189

U. S. Nuclear Regulatory Comm.
Attn: Document Control Desk
Washington, D.C. 20555

Attachment
ST-HL-AE-4751

RESPONSE TO
NRC REQUEST FOR ADDITIONAL INFORMATION
LETTER DATED FEBRUARY 10, 1994

Requested information:

1. Perform necessary investigations to determine if the high water table in the Main Cooling Reservoir (MCR) embankment sand core is a temporary phenomenon. If it is not a temporary phenomenon, plot the phreatic surface across the embankment section at a few representative locations and compare them with that assumed in the original embankment stability analysis, and determine the factor of safety of the embankment against failure for the high water table condition.

2. Determine the cause for the high seepage gradients across three cross sections of the MCR embankment. Evaluate the effects of such high gradients on the stability of the embankment and take suitable measures to reduce the high seepage gradients to acceptable levels.

Response to item 1:

Attached profiles 3, 19, and 31 are cross sections of the MCR embankment at locations with relatively high water tables in the sand core. The water table in the sand core has been remarkably stable since completion of construction.

The original embankment stability analysis assumed a phreatic surface extending from the maximum design reservoir elevation of +49 feet to the top of the +35 foot berm on the down-stream side of the embankment ("Evaluation of Strength Parameters and Stability, Main Cooling Reservoir Embankment", Harza Engineering Co., September, 1984, ST-XH-YB-013). As shown on the Profiles, the assumed phreatic surface for the stability analysis is conservatively above the water level in the sand core.

Factors of safety based on assumed piezometric levels are presented on attached table 2 from the above referenced report, ST-HX-YB-060. Although the phreatic surface in the sand core is higher than expected, it remains below the design parameters selected.

Response to item 2:

Attached Profile 9, is a MCR embankment cross section at an area with the highest seepage gradient, 7.4% overall (measured between piezometers P38 and P40). This seepage gradient was calculated with a reservoir pool elevation of 43.5 feet. The seepage gradient at the operating reservoir level of 45 feet has been calculated at 8.3%. The drained embankment core and seepage blanket under the down-stream half of the embankment effectively reduced this gradient to a maximum calculated value of 3.8% outside the down-stream toe of the embankment, (measured between piezometers P39 and P40).

Attached is plot "STPEGS Main Cooling Reservoir, Seepage Gradient vs Thickness of Top Clay Layer" showing a very rough inverse correlation between the thickness of the surfical impermeable zone and seepage gradient. The stratigraphic information used in this plot is from information derived along the dam axis. The highly variable nature of the stratigraphy masks what should be a good inverse correlation. The 7.4% seepage gradient is probably in an area with a near surface permeable zone in the reservoir. This zone does not extend under the embankment.

With respect to embankment stability, piezometeric levels used to determine stability factors of safety are higher than measured piezometric levels. Therefore, there is no reason to recalculate factors of safety based on measured piezometeric levels.

Table 2. Summary of Stability Analysis Results

Section	Factor of Safety: Steady State	Drawdown from El. 49 to El. 39	Seismic
Station 20+00			
Upstream	1.82	1.50≠	1.34 ≠ (0.1g)
Downstream	1.72	---	1.25 (0.1g)
Station 105+00			
Upstream	1.76	1.41≠	1.46 ≠ (0.05g)
Downstream	1.72	---	1.25 (0.05g)
Station 250+00			
Upstream	1.81	1.48≠	1.49 (0.05g)
Downstream	1.71	---	1.42 (0.05g)
Station 365+00			
Upstream	1.89	1.54≠	1.52 (0.05g)
Downstream	1.77	---	1.49 (0.05g)

≠ Same failure surface as critical surface using steady state conditions.

PROFILE 3

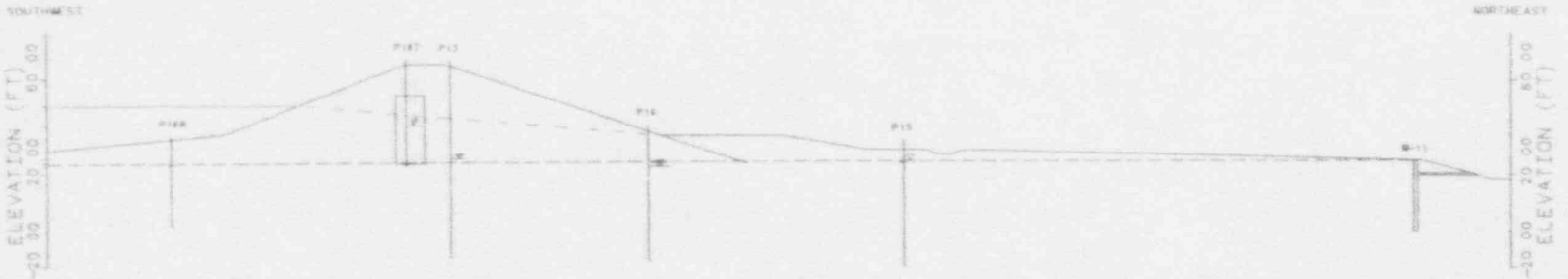
EMBANKMENT STATION 20+00

SOUTH TEXAS PROJECT

14926-001

0.00 40.00 80.00 120.00

SCALE IN FEET



C0225.001
C0225.C1T

PROFILE 9

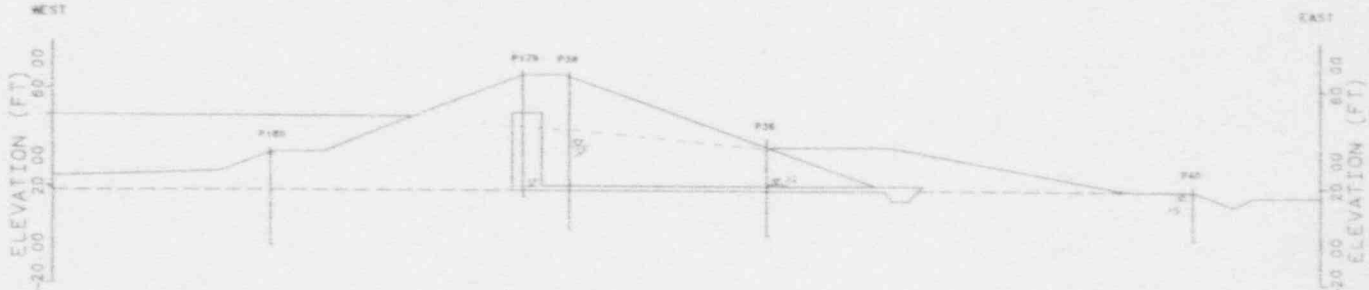
EMBANKMENT STATION 160+00

SOUTH TEXAS PROJECT

1492E-001

0.00 40.00 80.00 120.00

SCALE IN FEET

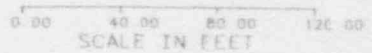


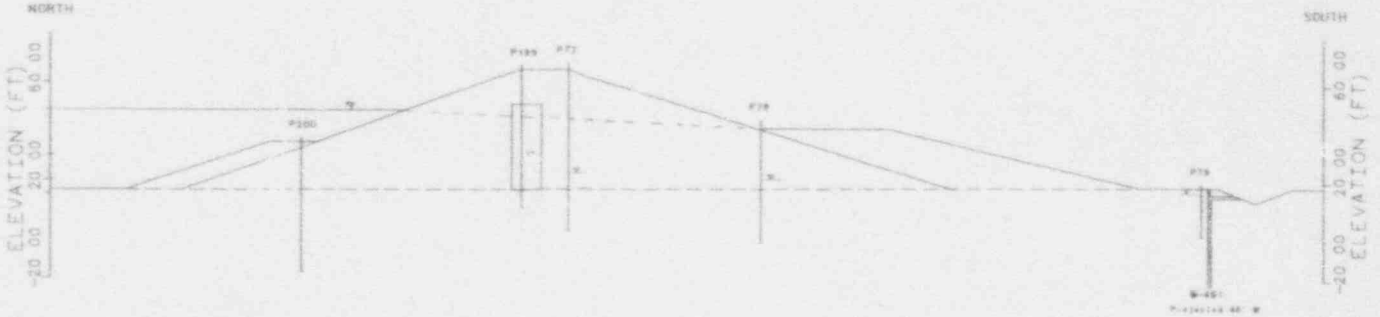
PROFILE 19

EMBANKMENT STATION 359+60

SOUTH TEXAS PROJECT

74926-001



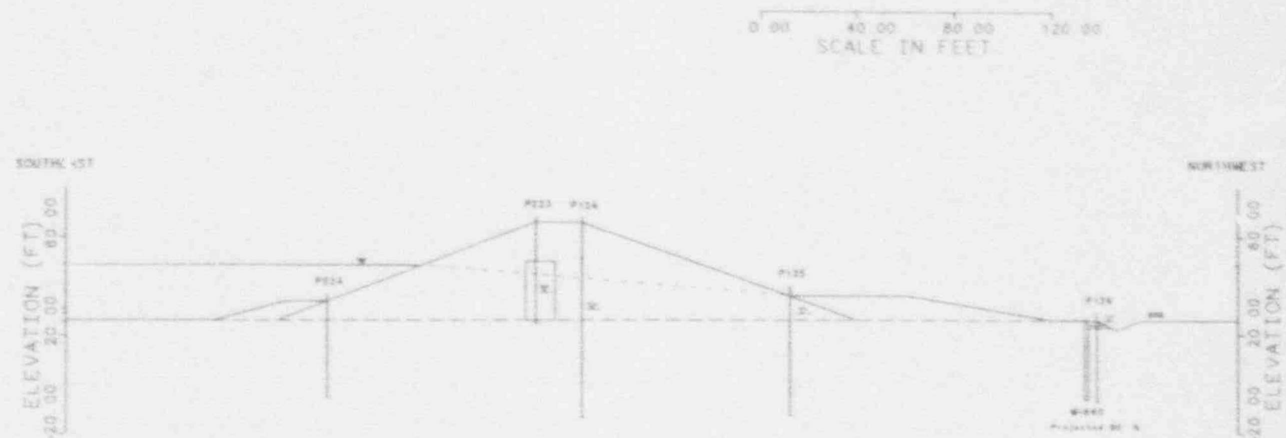


PROFILE 31

EMBANKMENT STATION 610+00

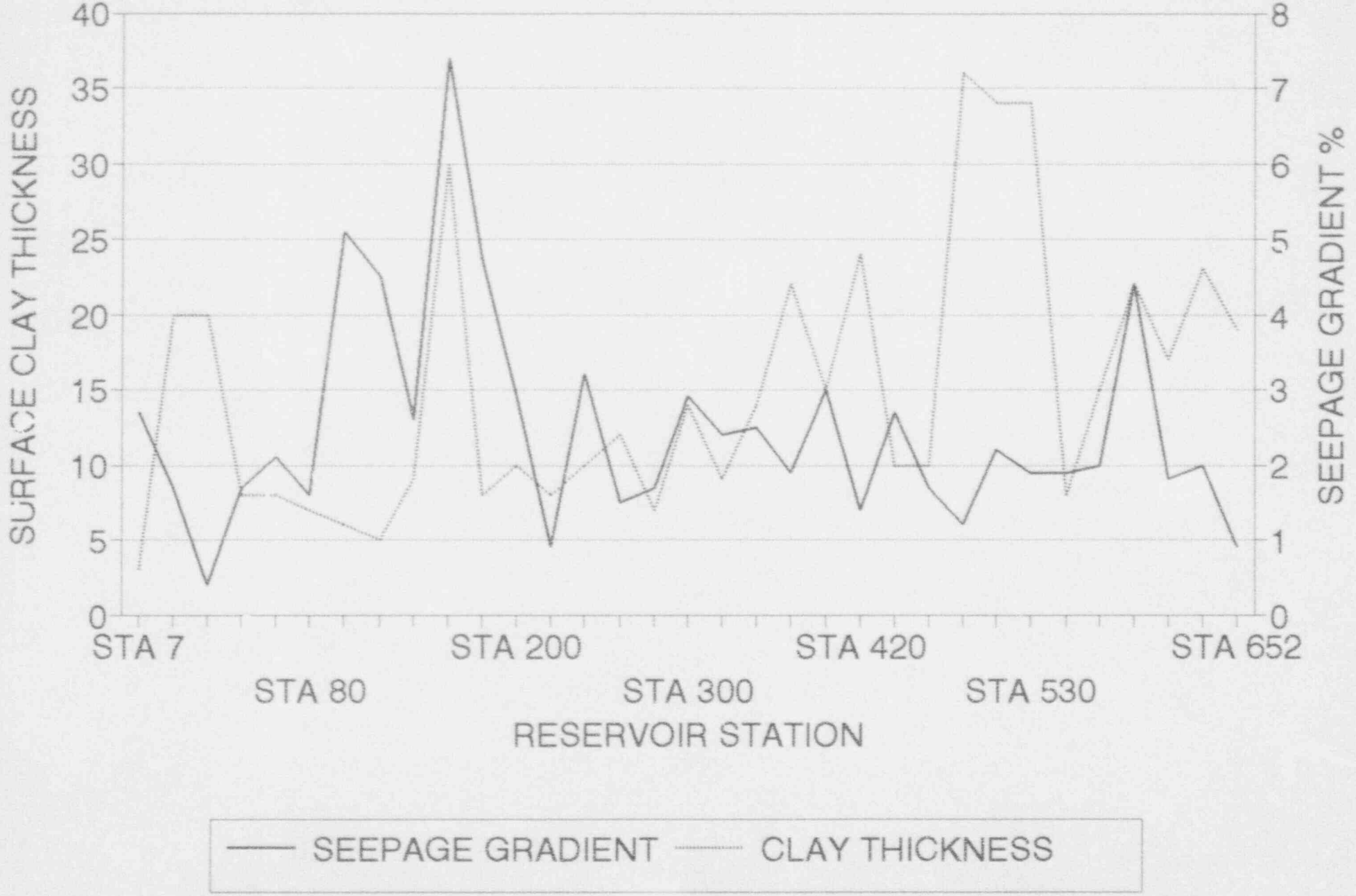
SOUTH TEXAS PROJECT

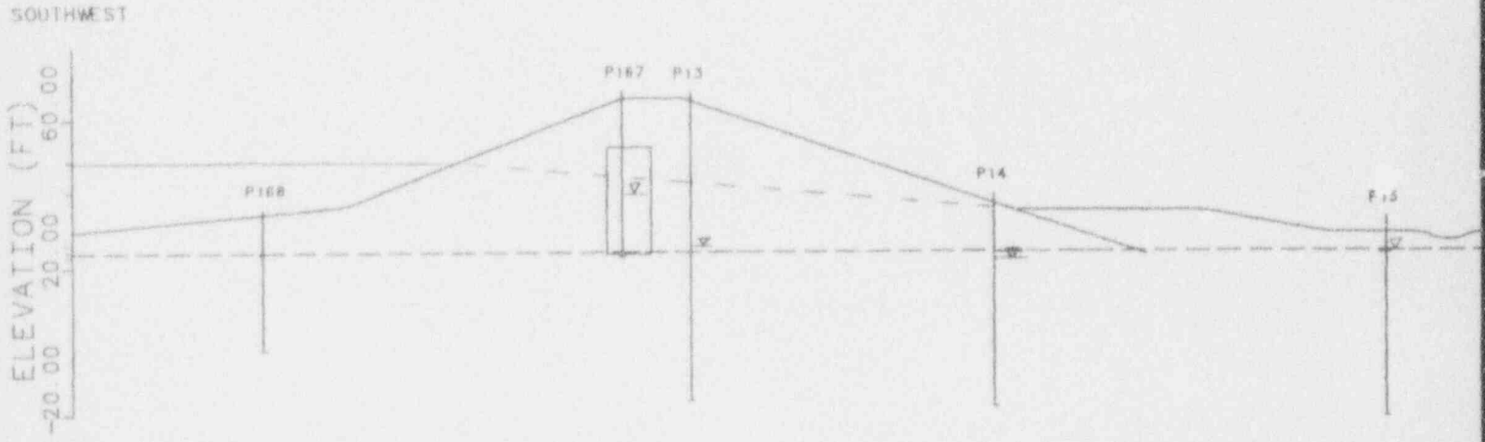
14926-001



STPEGS MAIN COOLING RESERVOIR

SEEPAGE GRADIENT VS THICKNESS OF TOP CLAY LAYER




SOUTHWEST
ELEVATION (FT)
60.00
20.00
-20.00
P168
P167
P13
P14
P15

PROFILE 3

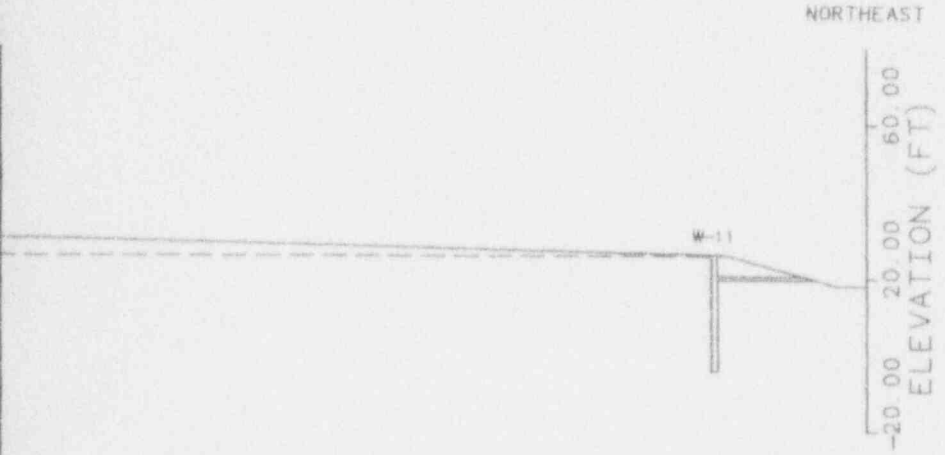
EMBANKMENT STATION 20+00

SOUTH TEXAS PROJECT

14926-001

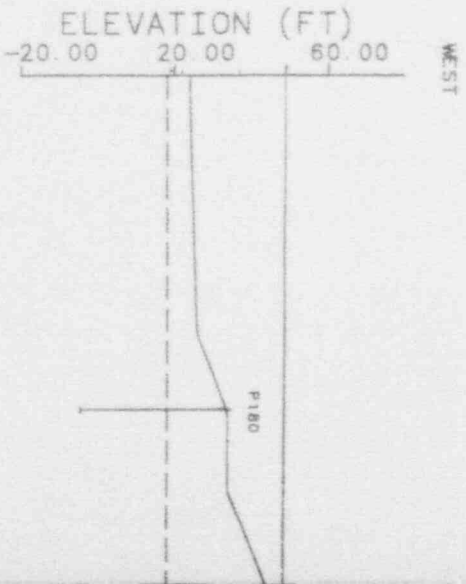
0.00 40.00 80.00 120.00

SCALE IN FEET



9404040105-01

C0225.001
C0225.CIT


ELEVATION (FT)
-20.00
20.00
60.00
WEST
P180

PROFILE 9

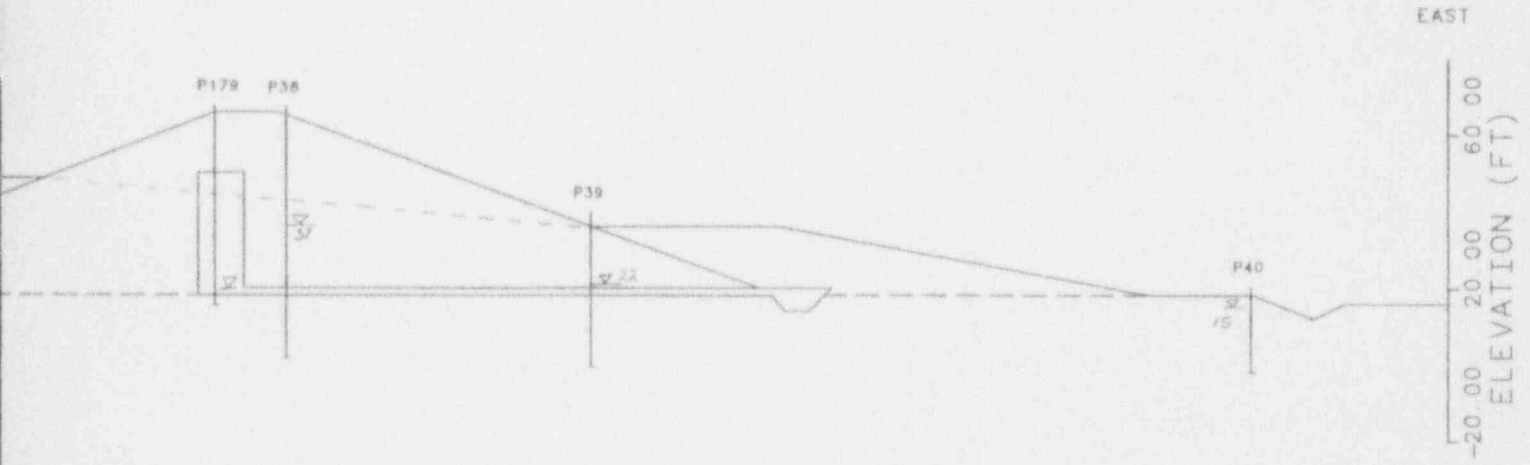
EMBANKMENT STATION 160+00

SOUTH TEXAS PROJECT

14926-001

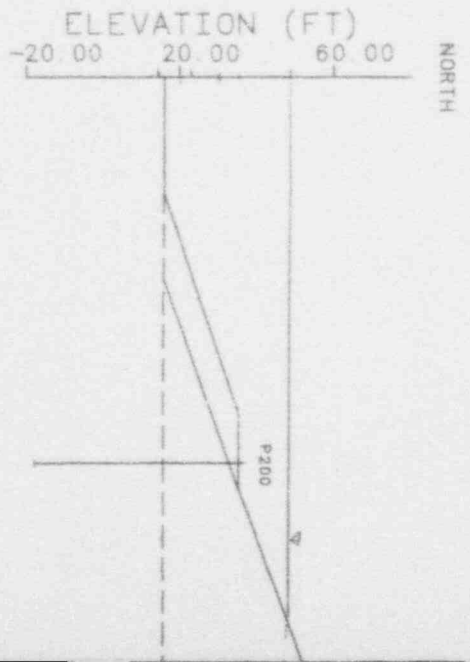
0.00 40.00 80.00 120.00

SCALE IN FEET



C0227.001
C0227.C1T

9404040105-02

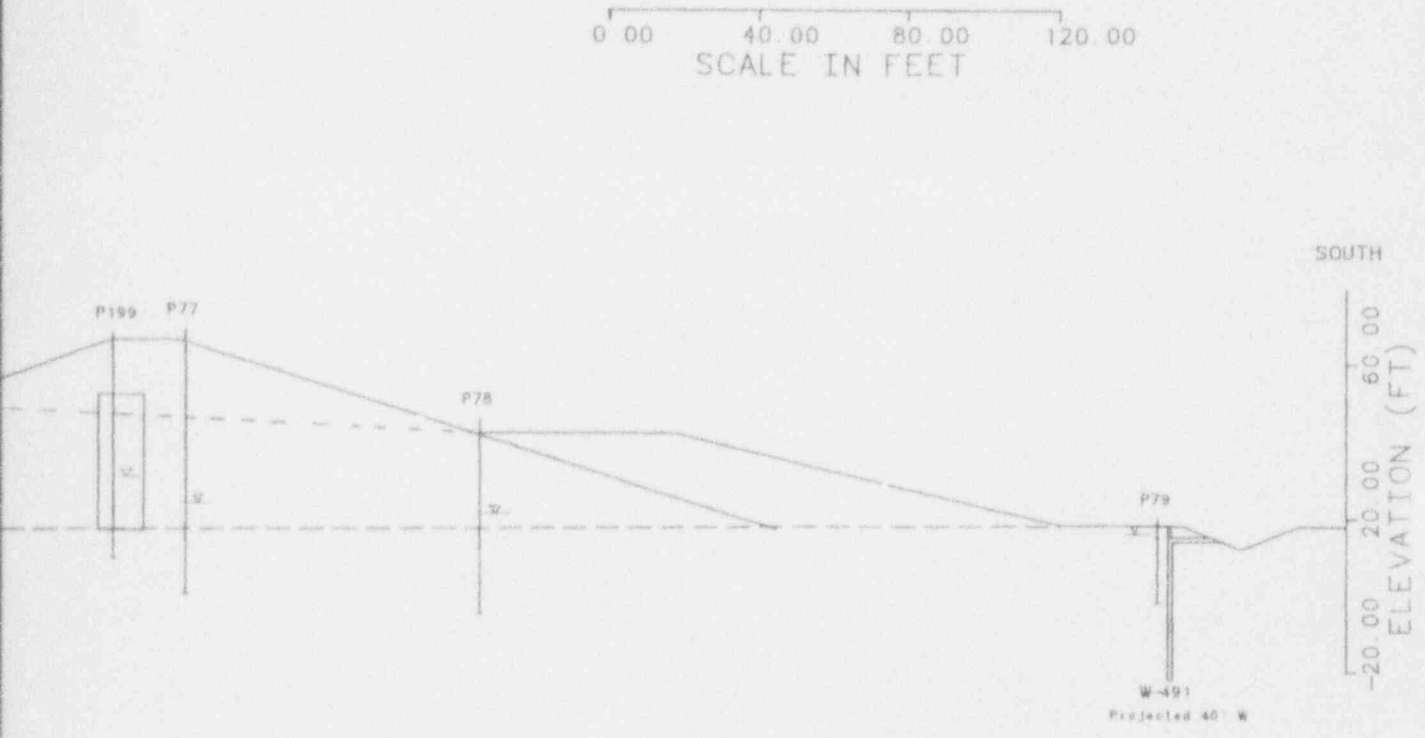

ELEVATION (FT)
-20.00
20.00
60.00
NORTH
P200

PROFILE 19

EMBANKMENT STATION 359+60

SOUTH TEXAS PROJECT

14926-001



9404040105-03

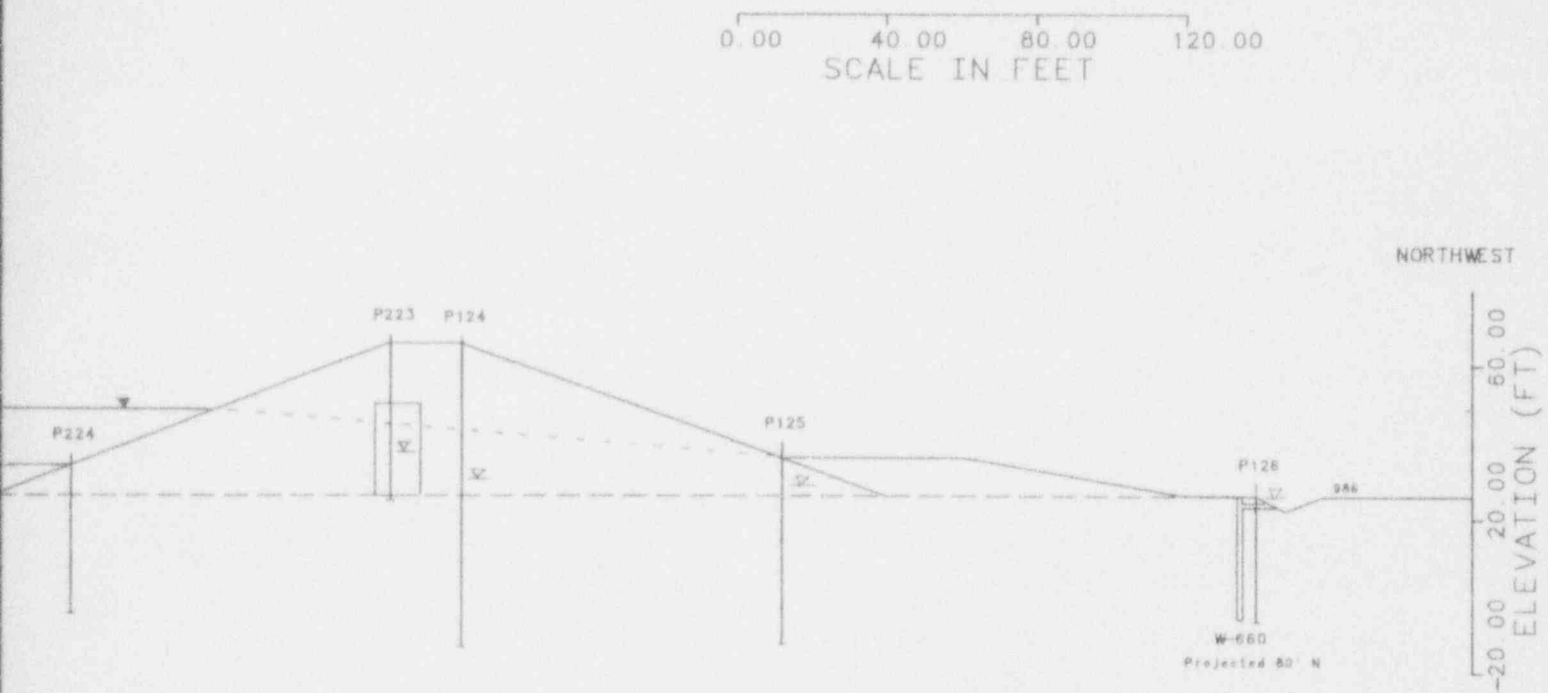

ELEVATION (FT)
-20.00
20.00
60.00
SOUTHEAST

PROFILE 31

EMBANKMENT STATION 610+00

SOUTH TEXAS PROJECT

14926-001



C0226-001
C0226-C1T

9404040105-04