

University of Alberta
Department of Civil &
Environmental Engineering



Structural Engineering Report No. 56

**An Elastic Stress Analysis of a
Gentilly Type Containment Structure
Volume 2 (Appendices B to F)**

by
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and
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April, 1976

University of Alberta
Department of Civil Engineering

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of a Gentilly Type Containment
Structure

- Volume 2 -

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A Technical Report to the
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This document contains Appendices B, C, D, E and F of the report "An Elastic Stress Analysis of a Gentilly Type Containment Structure". Volume 1 contains the text of the report together with Appendices A, G, H, I, J, K, L and M.

Each of the appendices contained herein consists solely of a set of figures preceded by a list of the figures included in that particular appendix.

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APPENDIX B

Stress Resultants for Dead Loads of Portions
of the Structure

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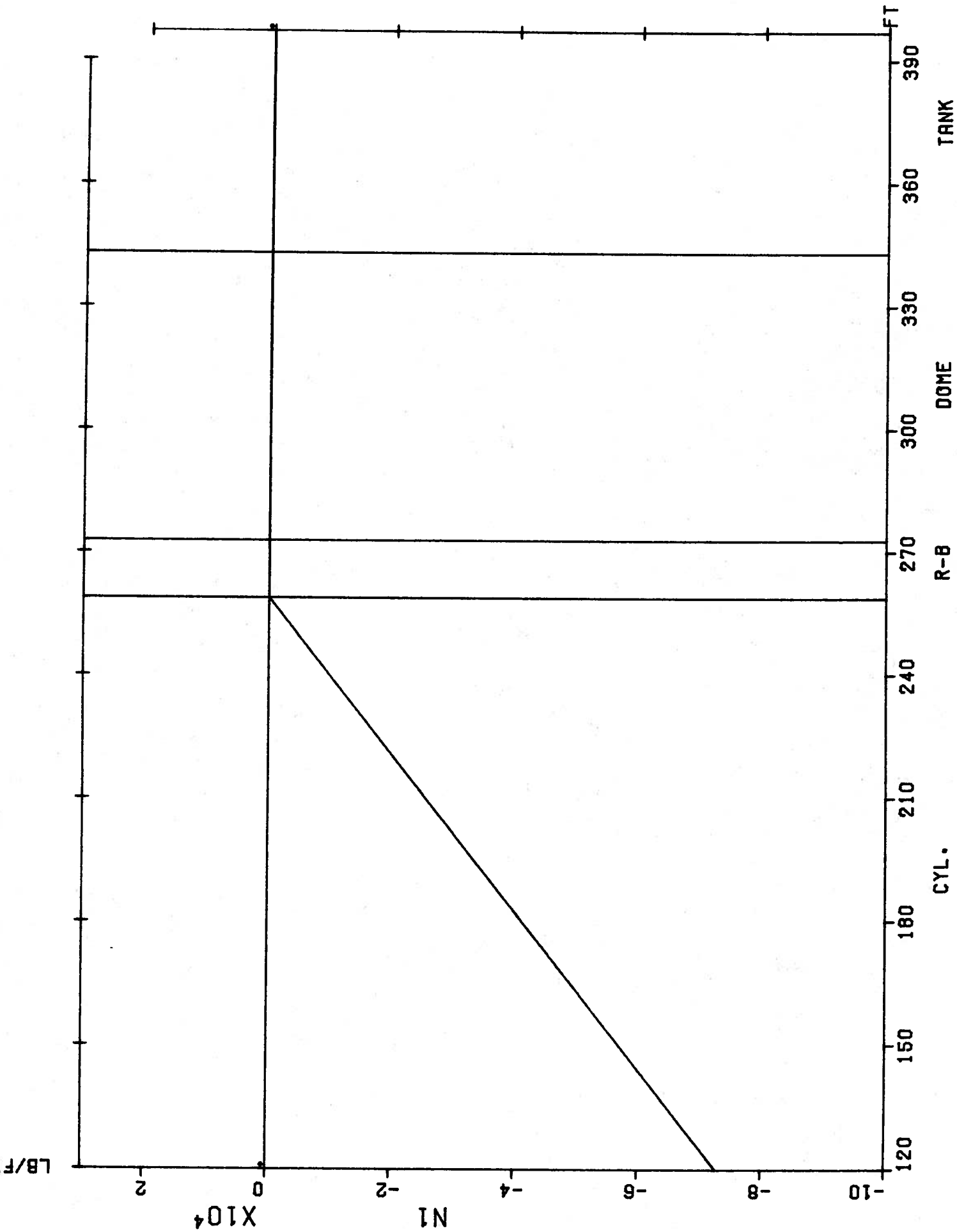


FIGURE B1 N_1 for Loading Case BW:Wd

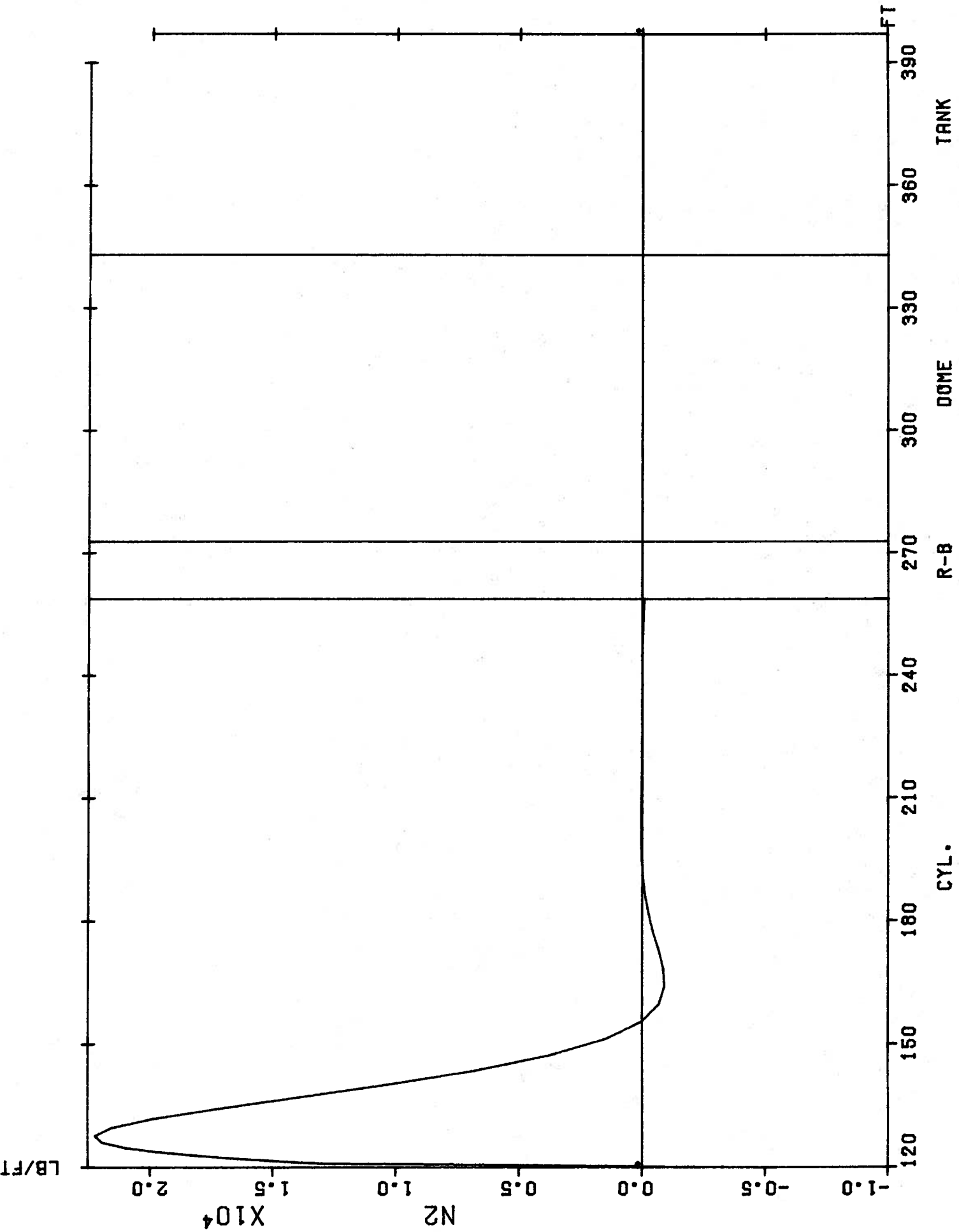


FIGURE B2 N2 for Loading Case BW:Wd

CYL.

R-B

DOME

TANK

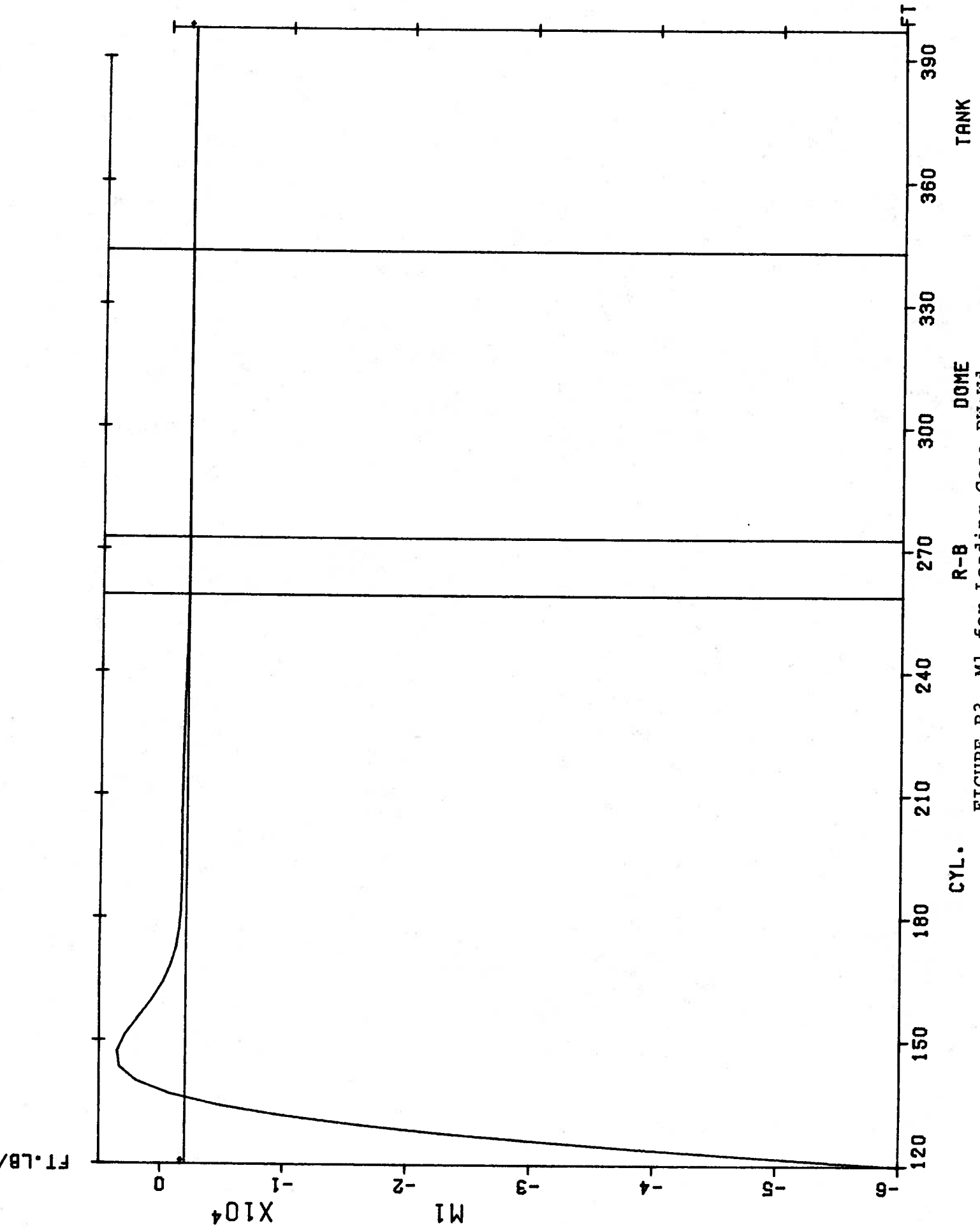


FIGURE B3 M1 for Loading Case BW:Wd
CYL. R-B DOME TANK

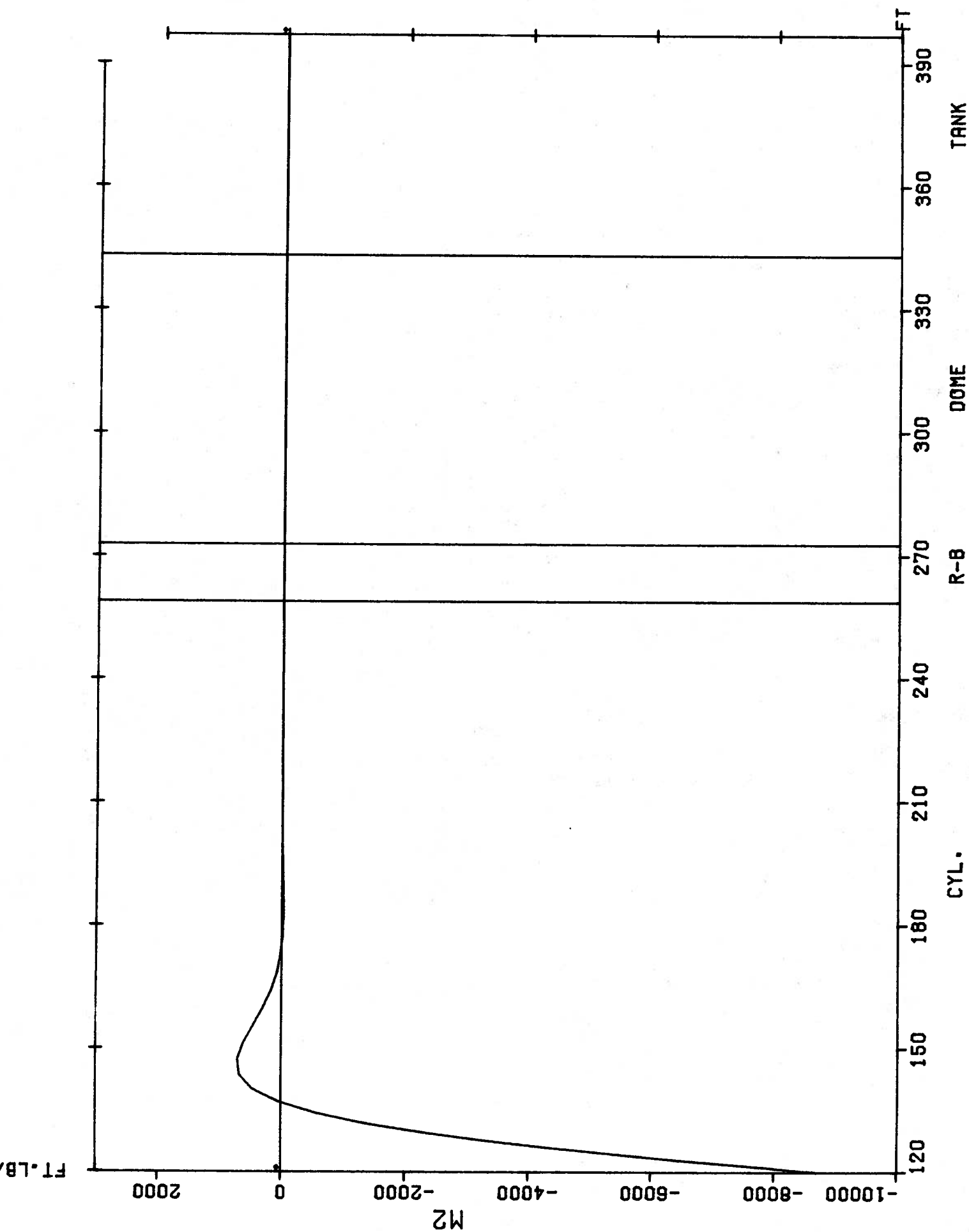


FIGURE B4 M_2 for Loading Case BW:Wd

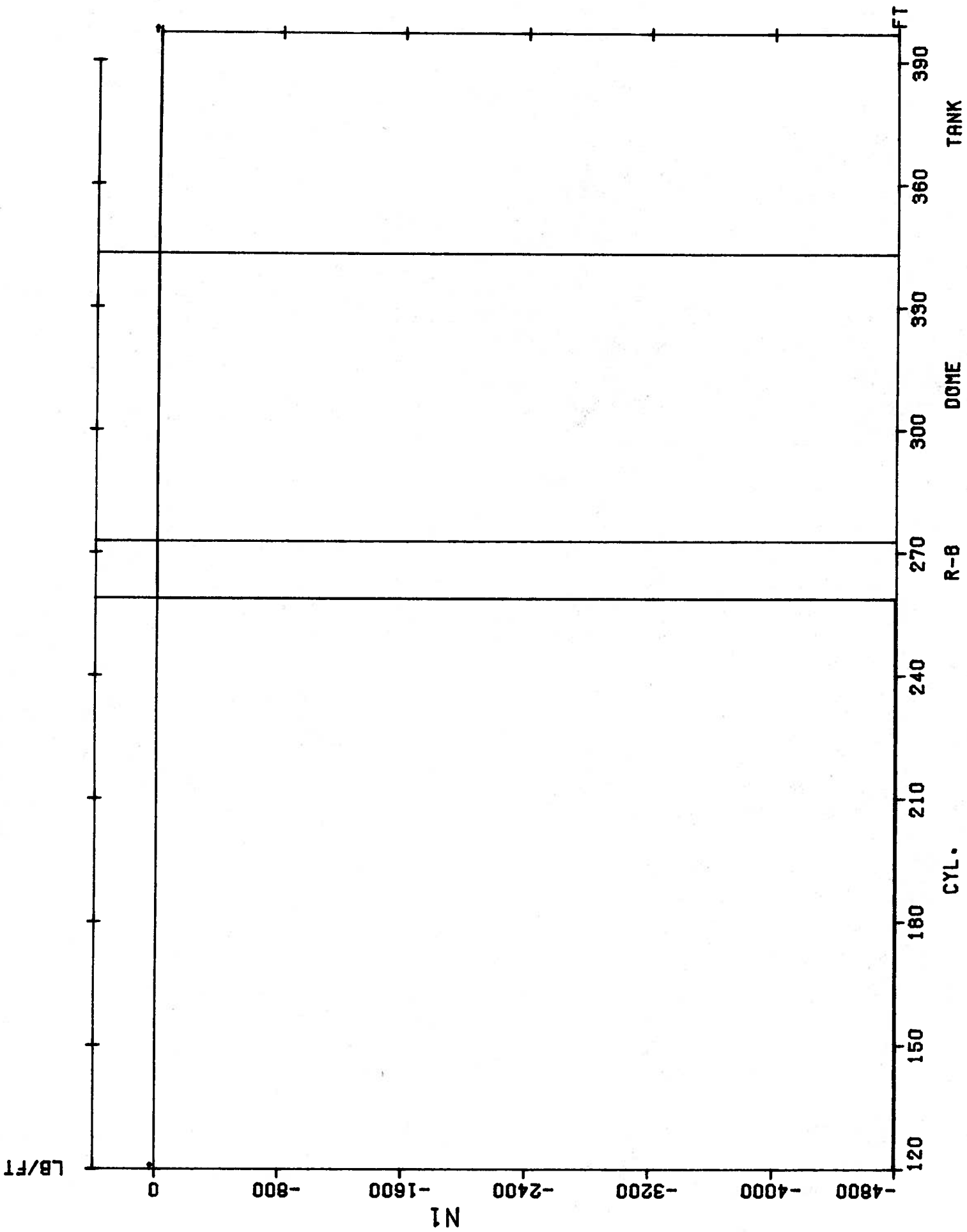


FIGURE B5 N1 for Loading Case RW: I.Rd

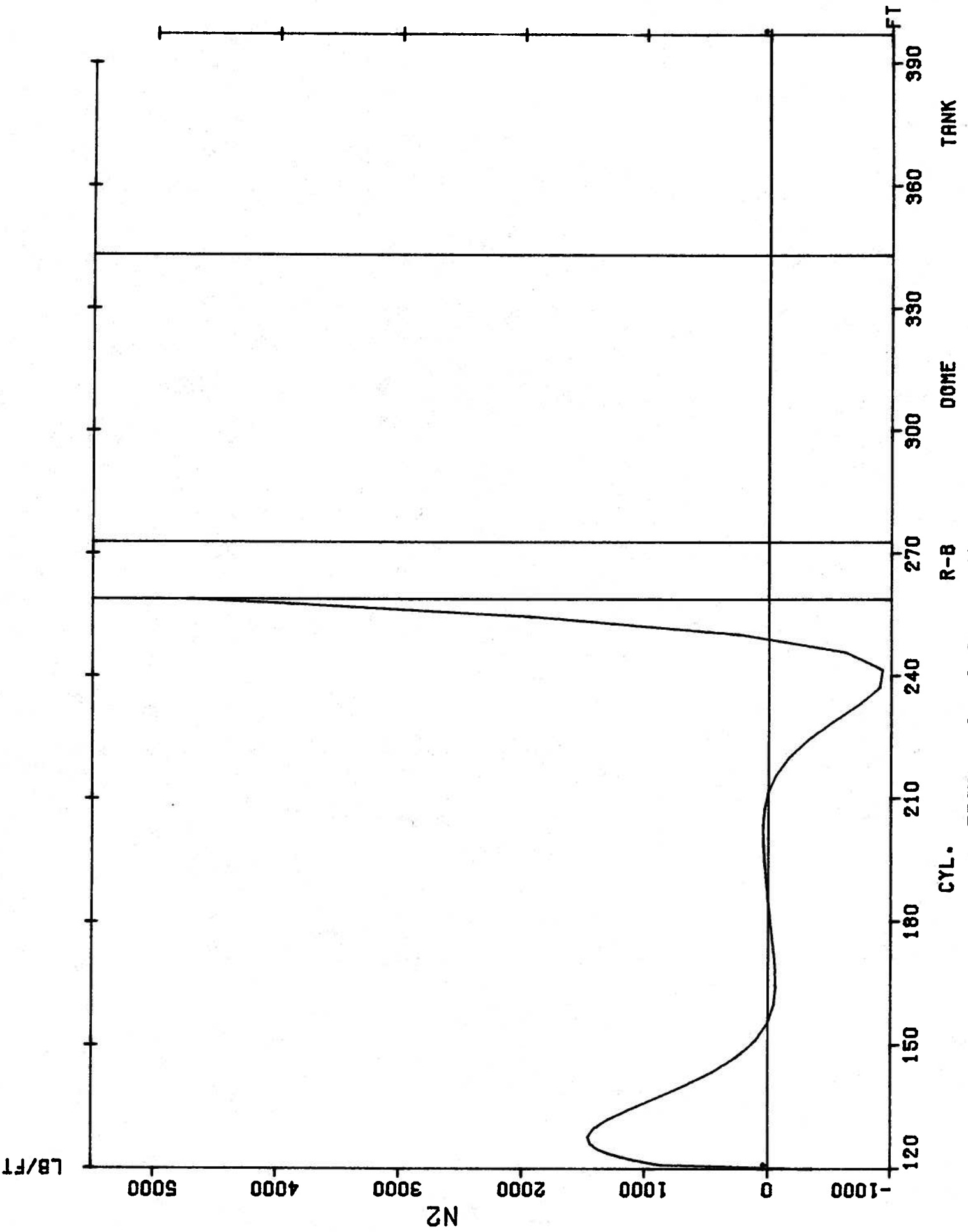


FIGURE B6 N2 for Loading Case BW:LBd

CYL.

R-B

DOME

TANK

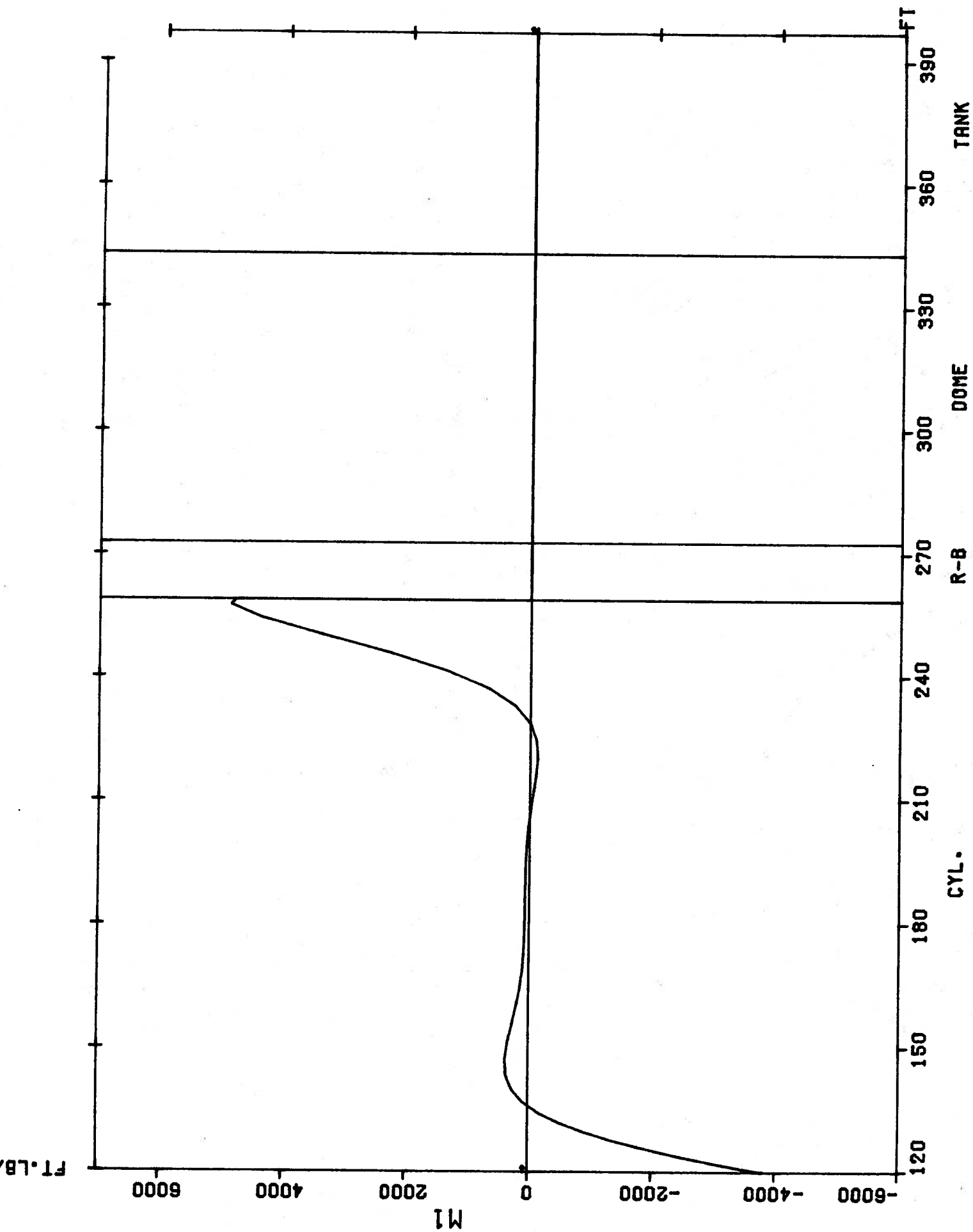


FIGURE B7 M1 for Loading Case BW:LBD

CYL.

R-B

DOME

TANK

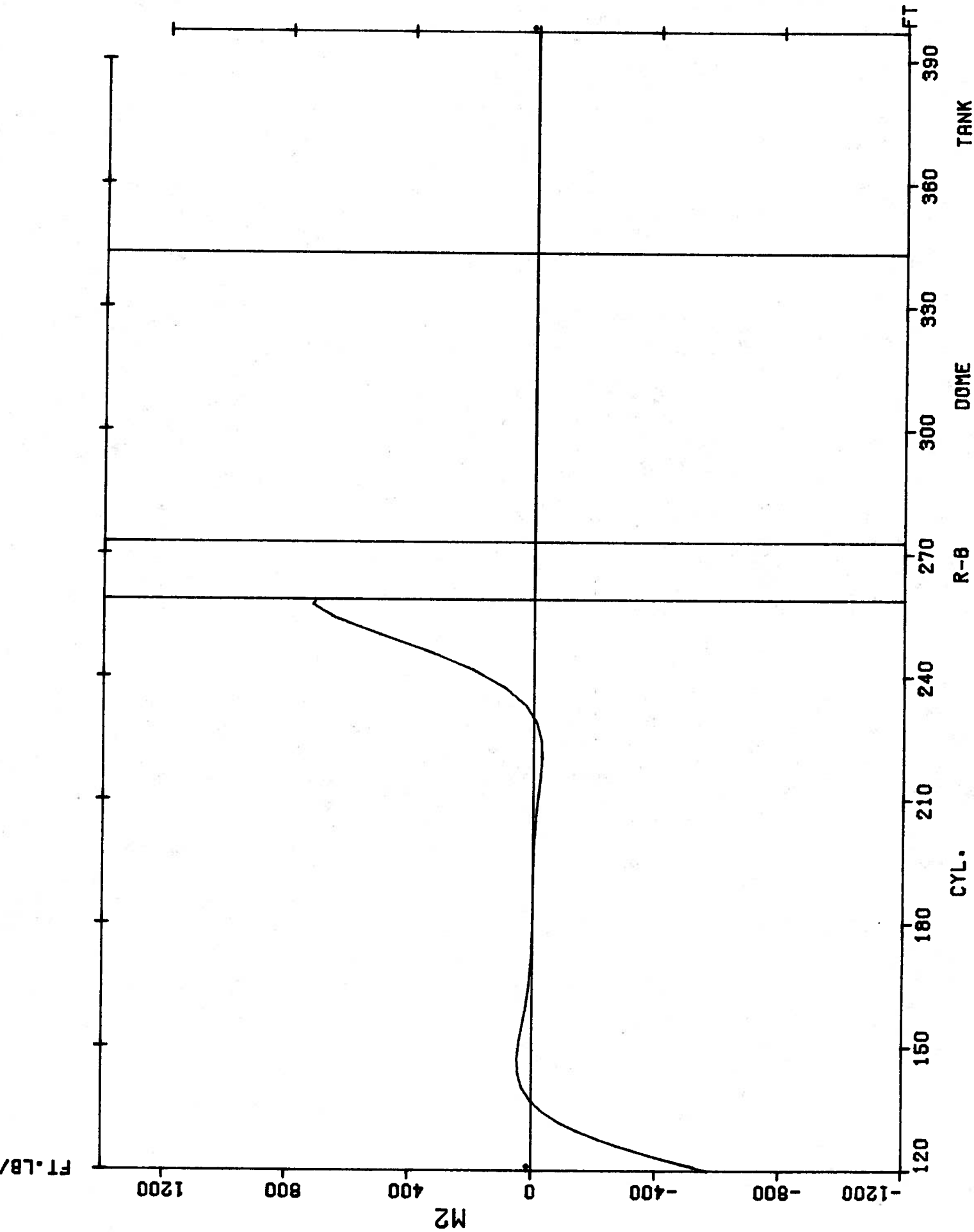
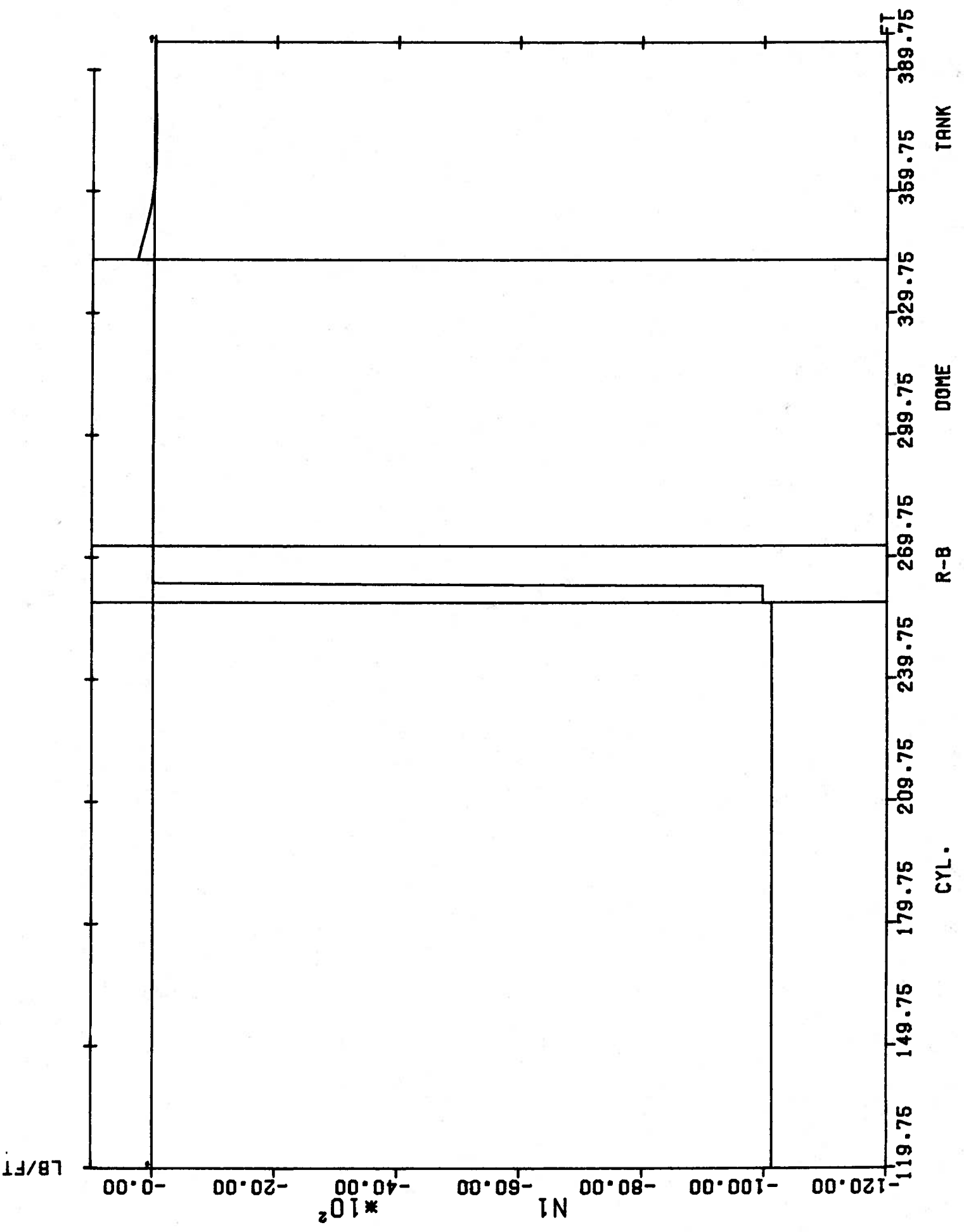


FIGURE B8 M_2 for Loading Case BW:LBd



STRESS IN N1 * 10² VS. HEIGHT IN FT

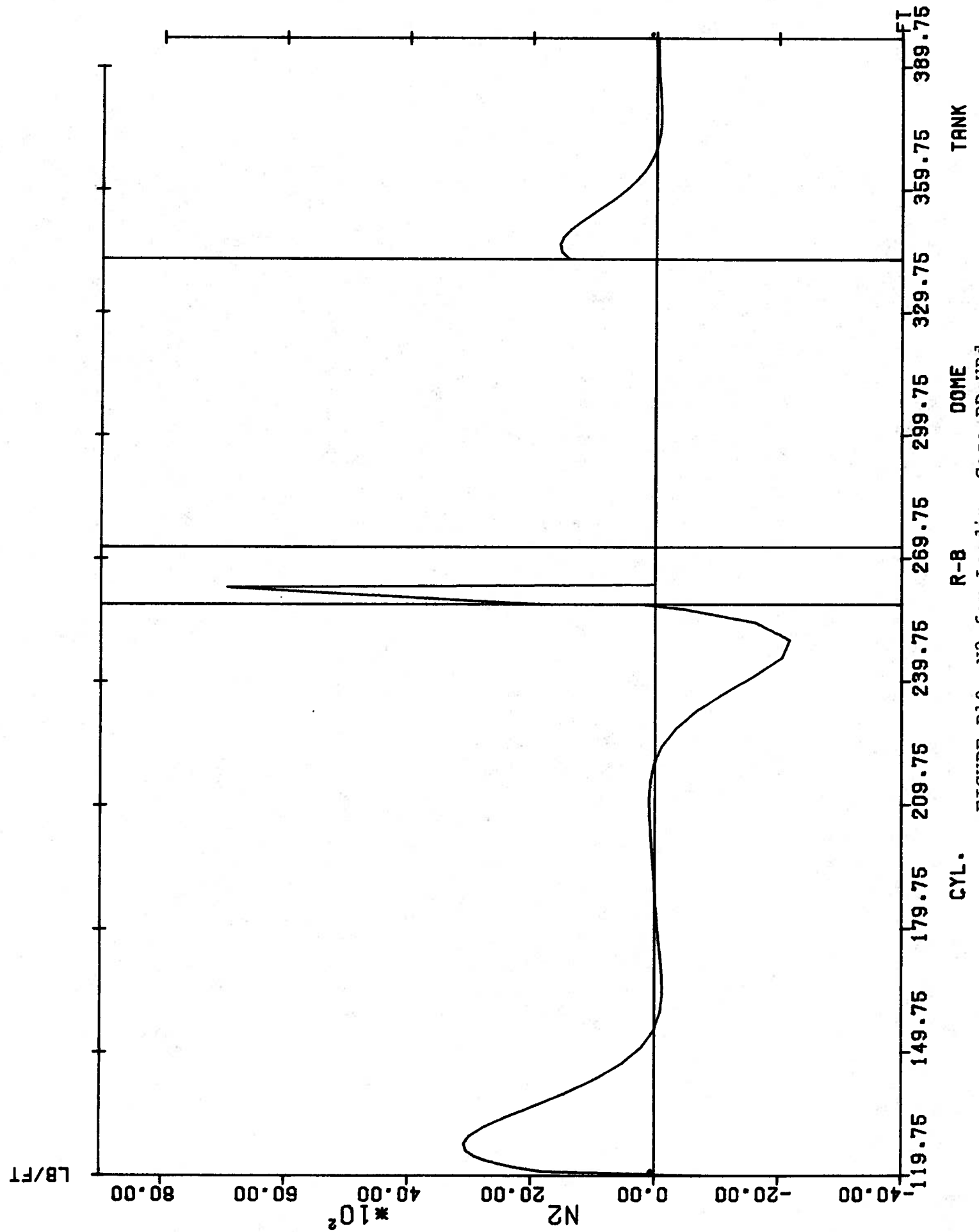


FIGURE B10 N2 for Loading Case BD:UBd

CYL. R-B DOME TANK

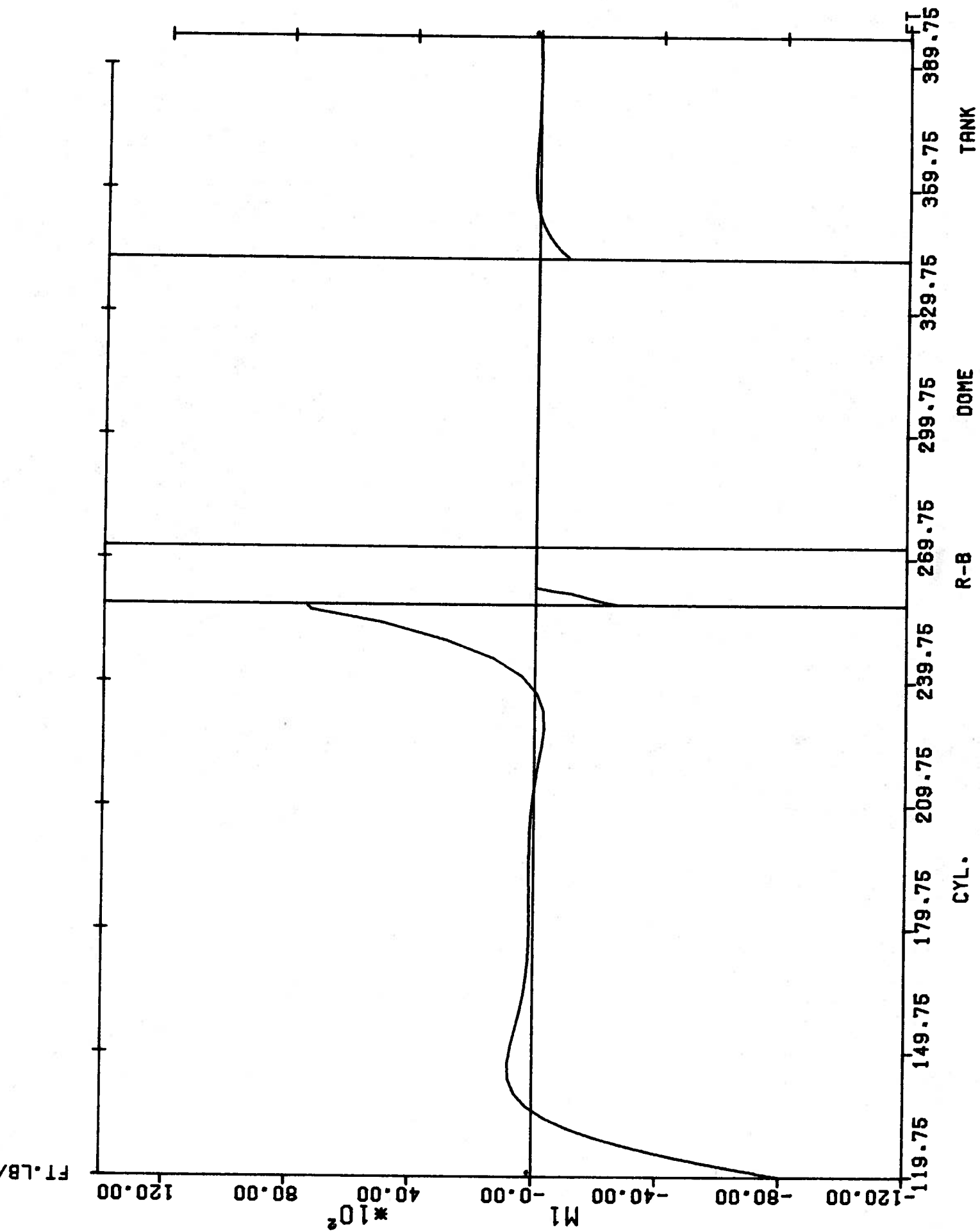


FIGURE B11 M1 for Loading Case BD:UBd

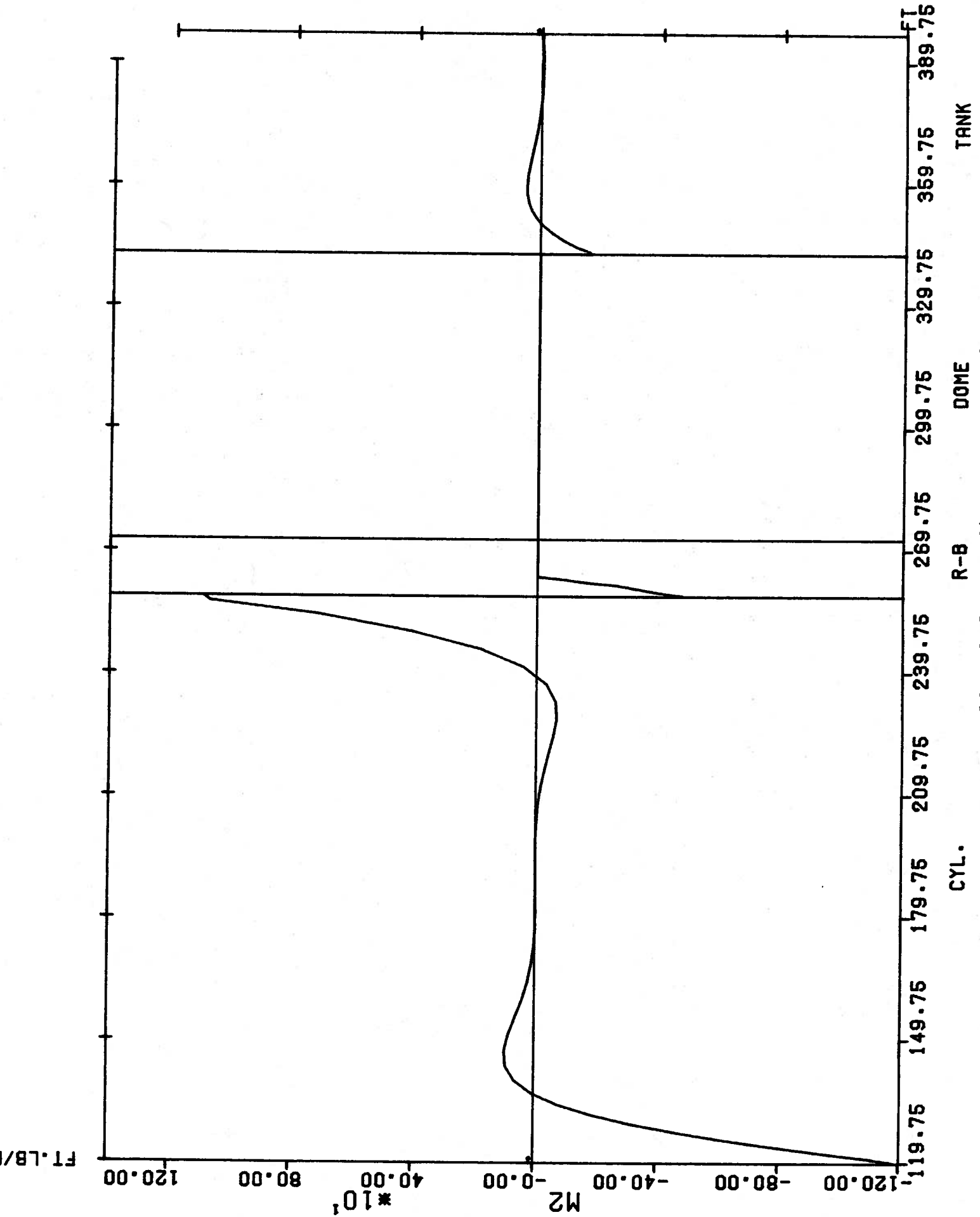


FIGURE B12 M_2 for Loading Case RD:URD

TANK

DOME

R-B

CYL.

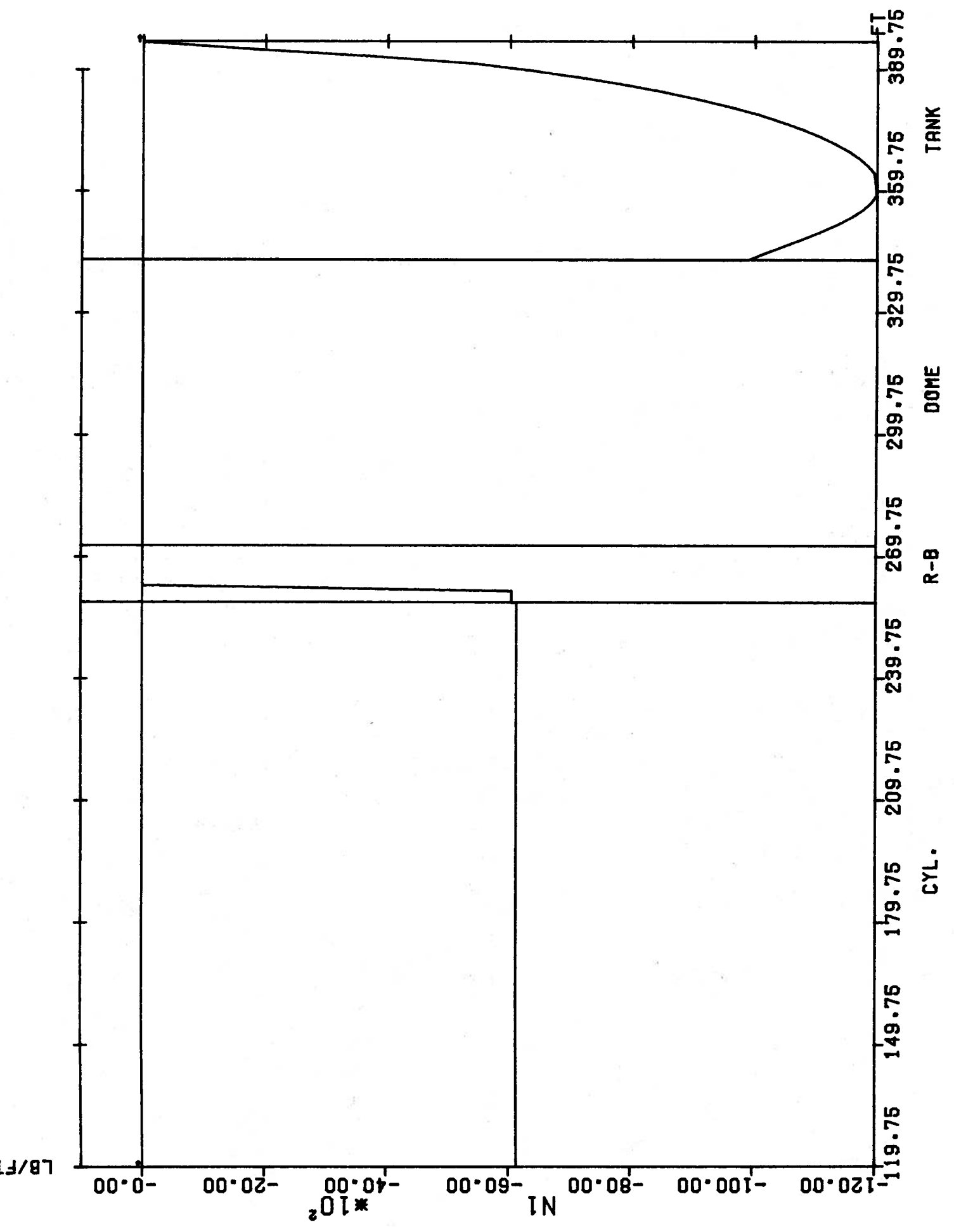


FIGURE B13 N1 for Loading Case BD:Ldd

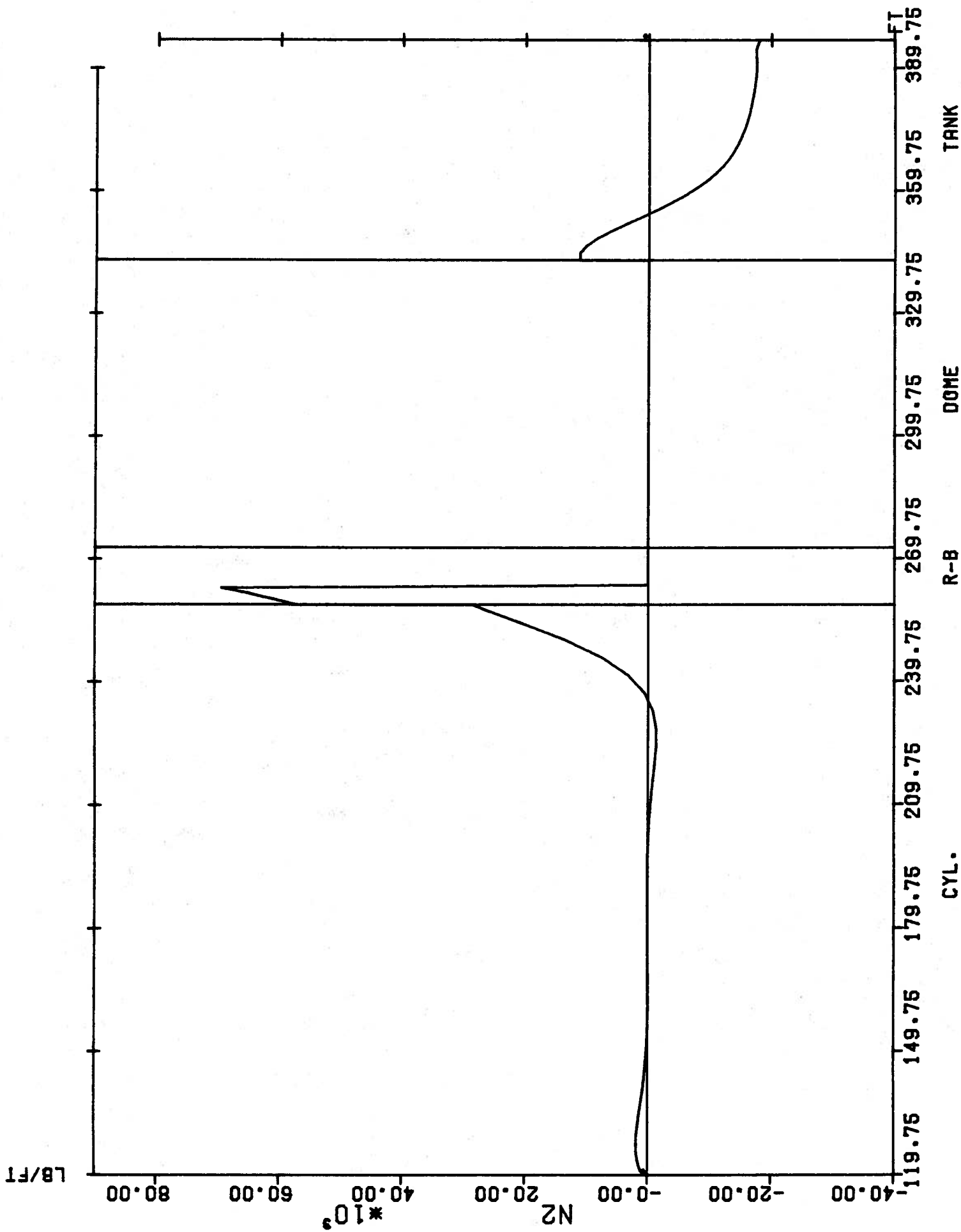


FIGURE B14 N2 for Loading Case BD:LDD

CYL.

R-B

DOME

TANK

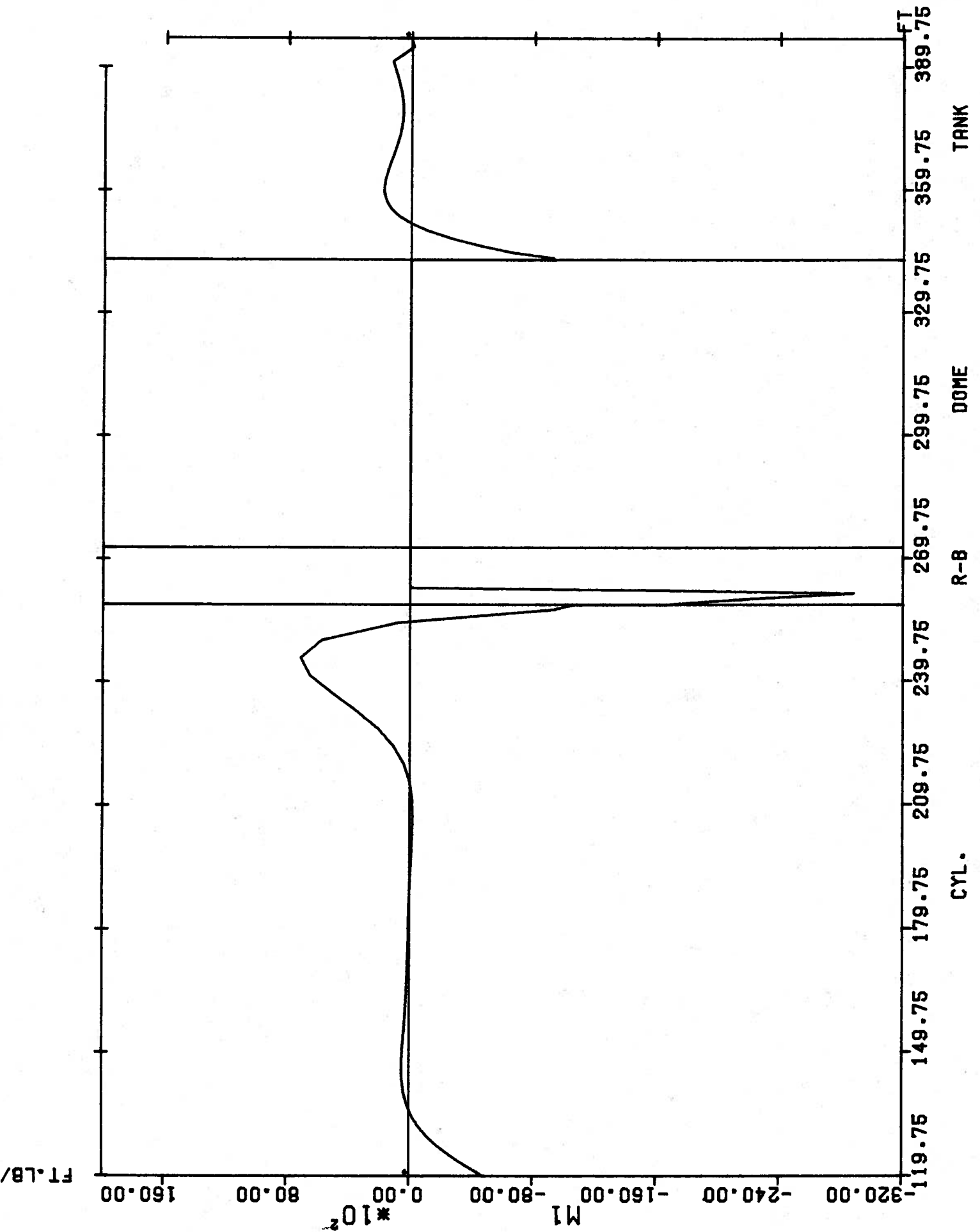


FIGURE B15 M1 for Loading Case BD:LDD

CYL.

R-B

DOME

TANK

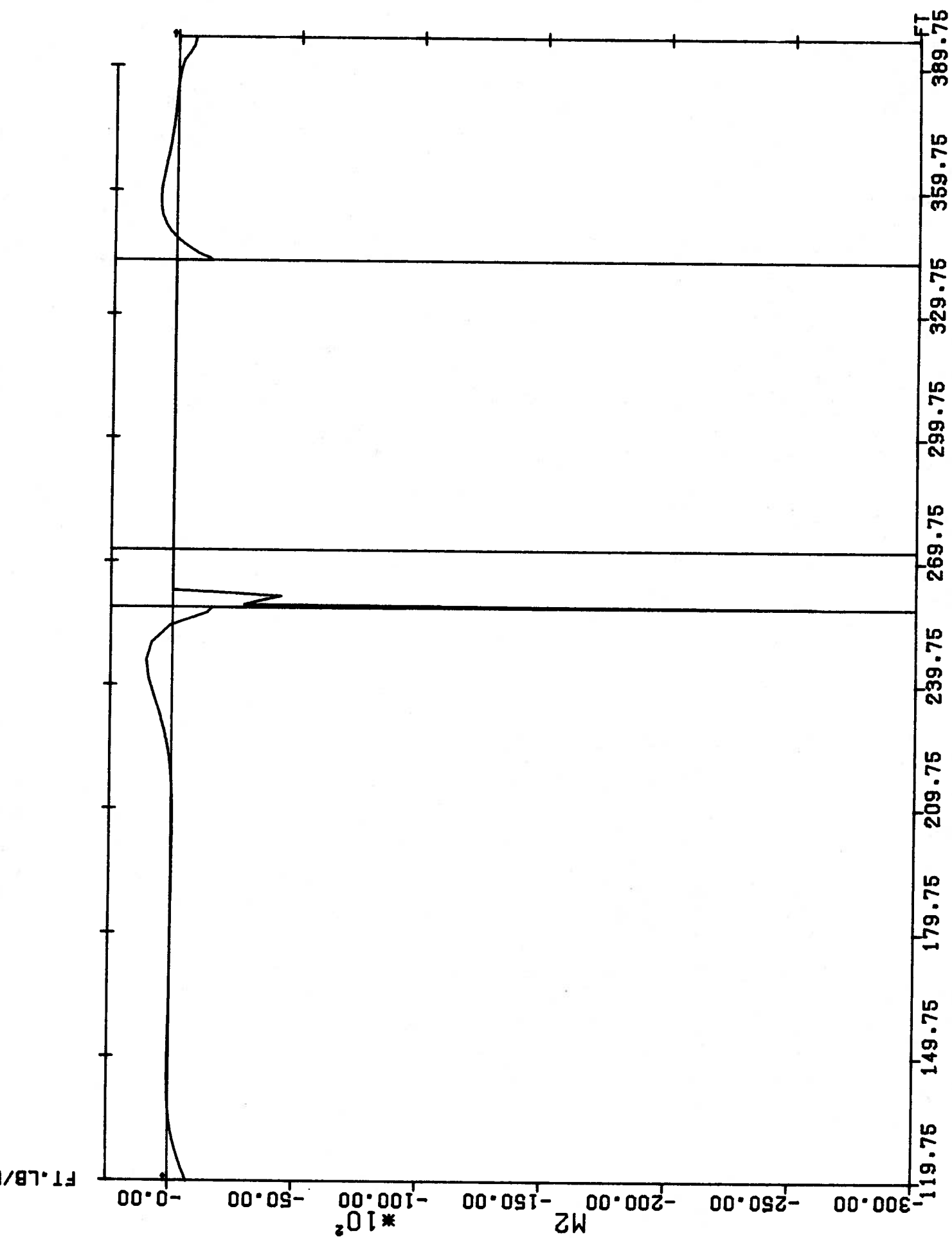


FIGURE B16 M_2 for Loading Case BD:LDD

CYL.

R-B

DOME

TANK

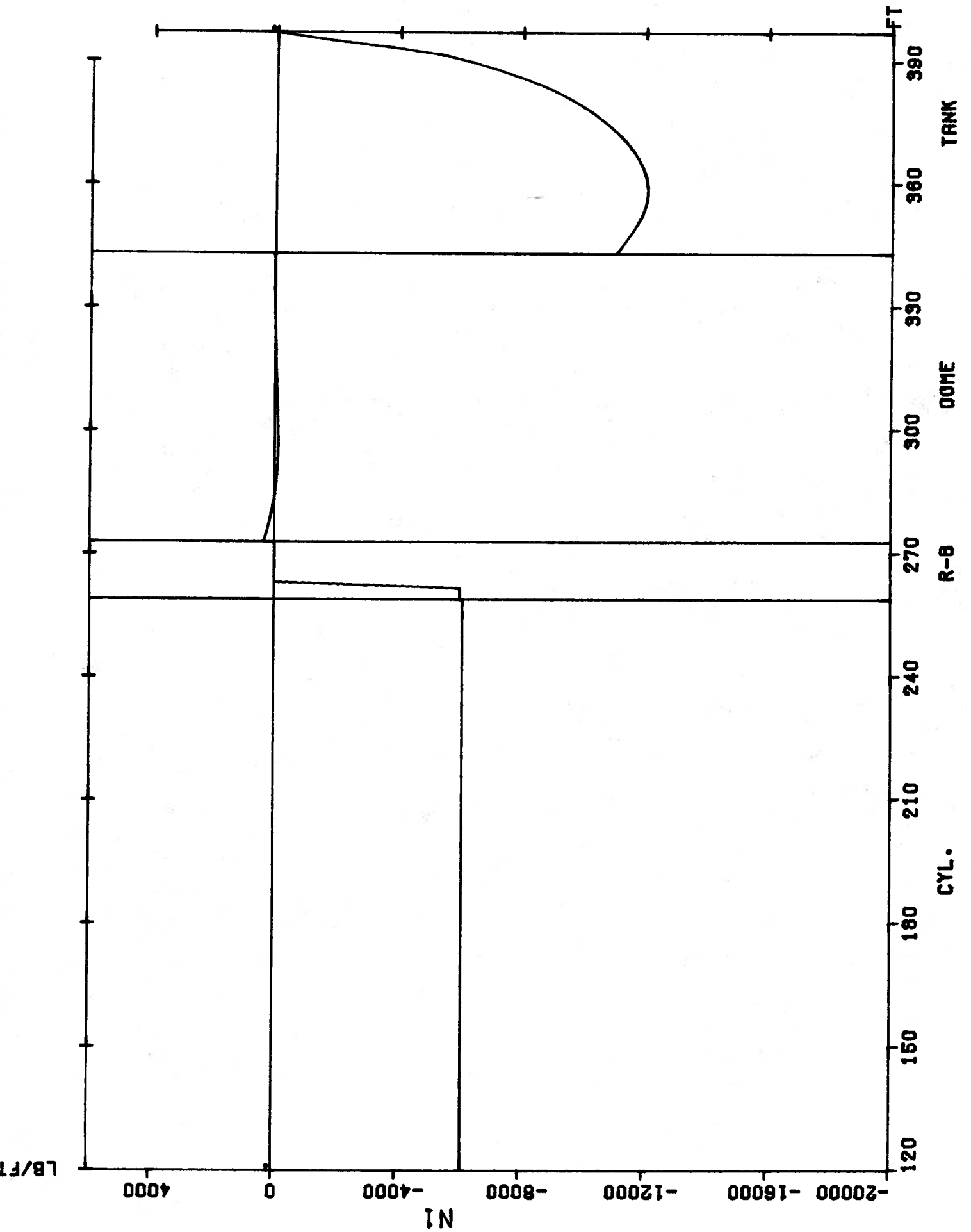


FIGURE B17 N_1 for Loading Case C:LDD

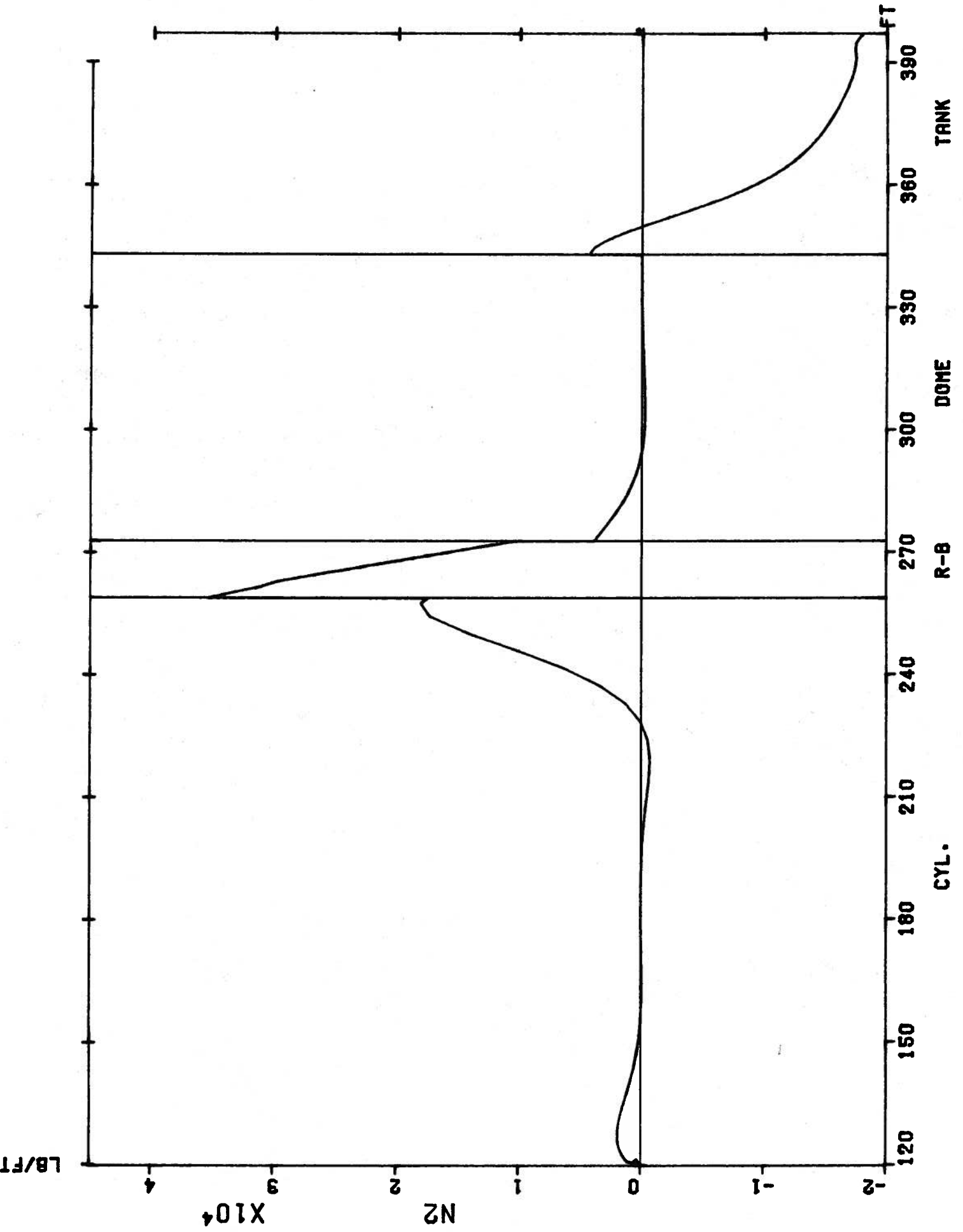


FIGURE B18 N2 for Loading Case C:LDd

CYL.

R-B

DOME

TANK

120 150 180 210 240 270 300 330 360 390 FT

N2
X10⁴

LB/FT

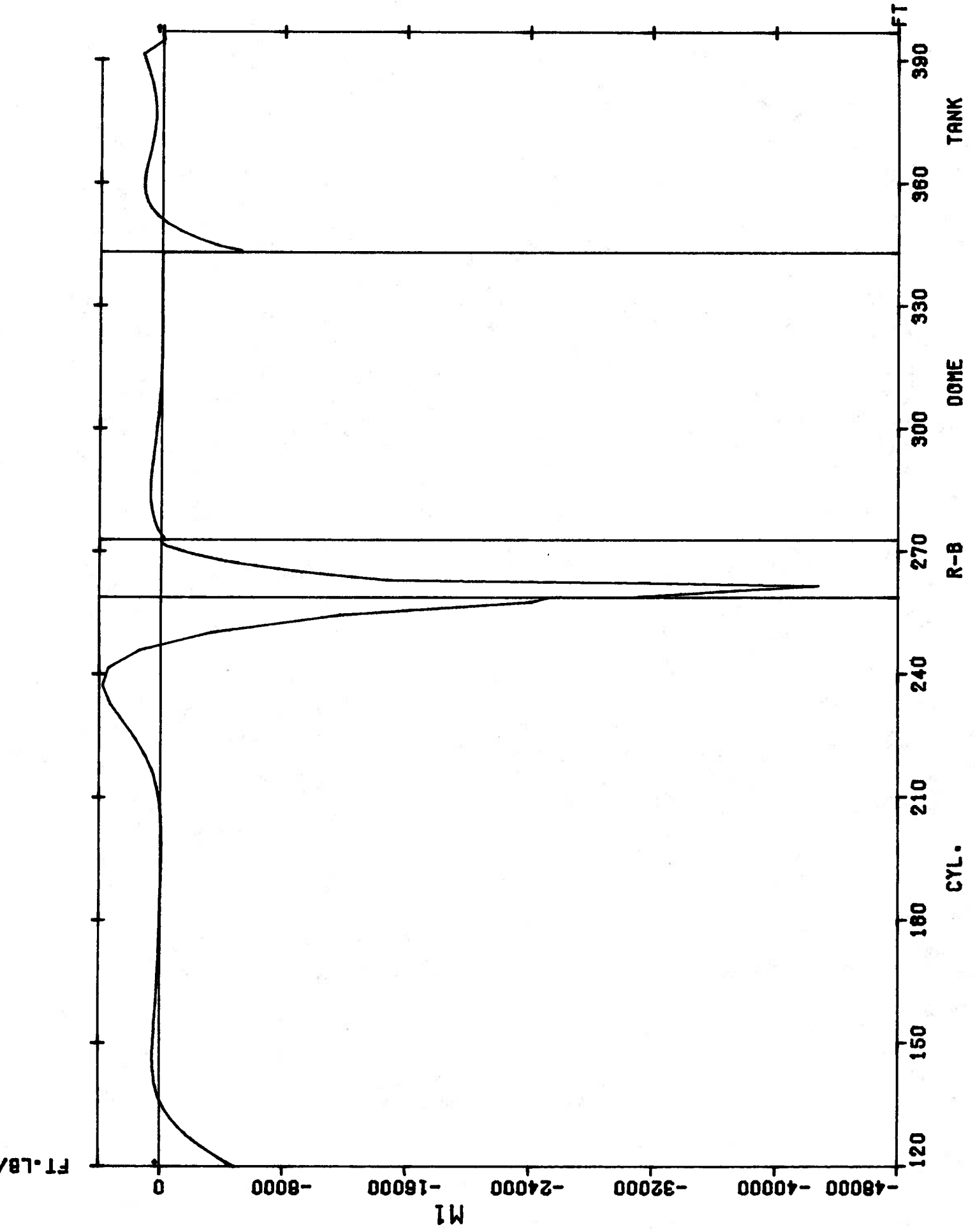


FIGURE B19 M_1 for Loading Case C: I.Dd

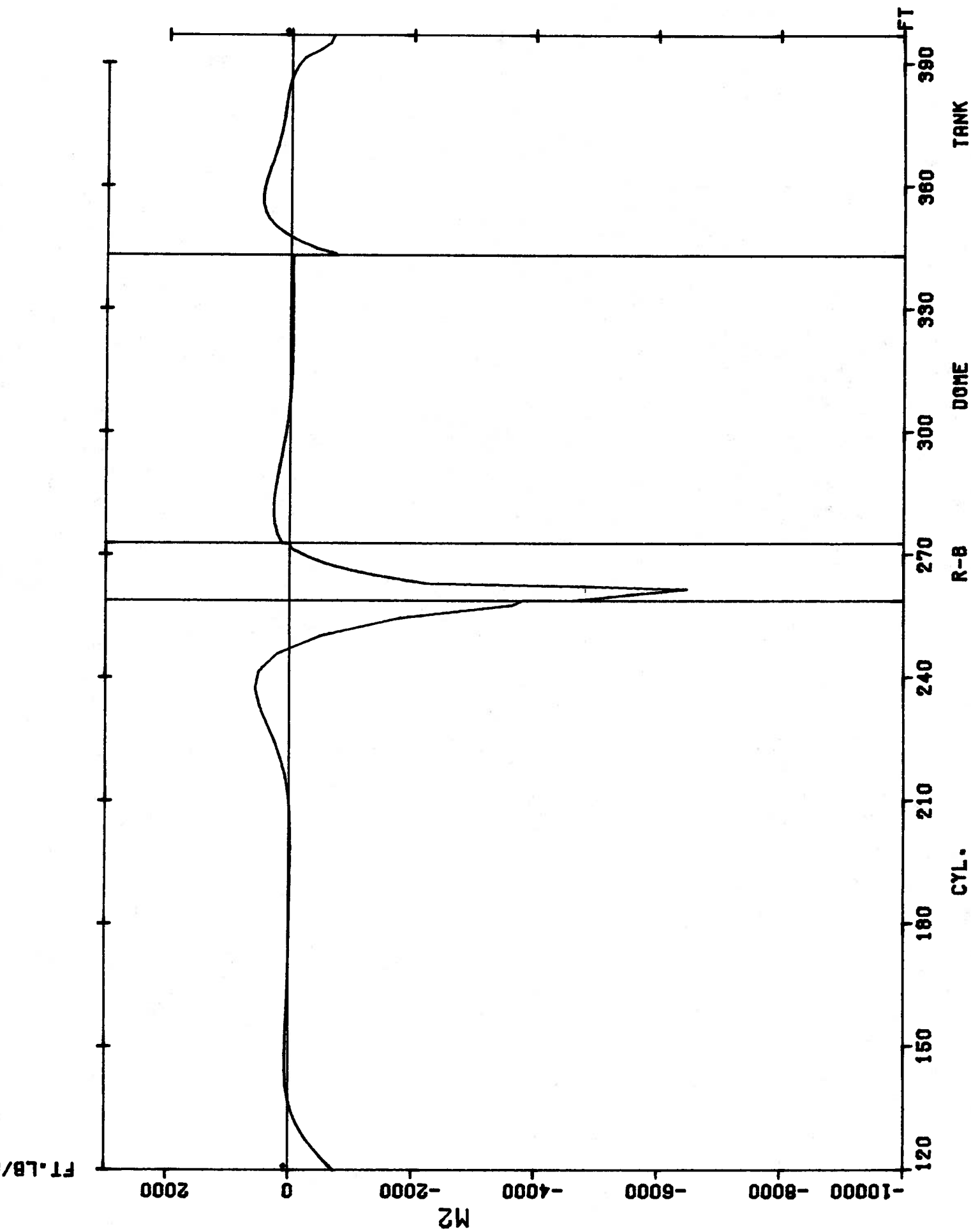


FIGURE B20 M_2 for Loading Case C:LDd

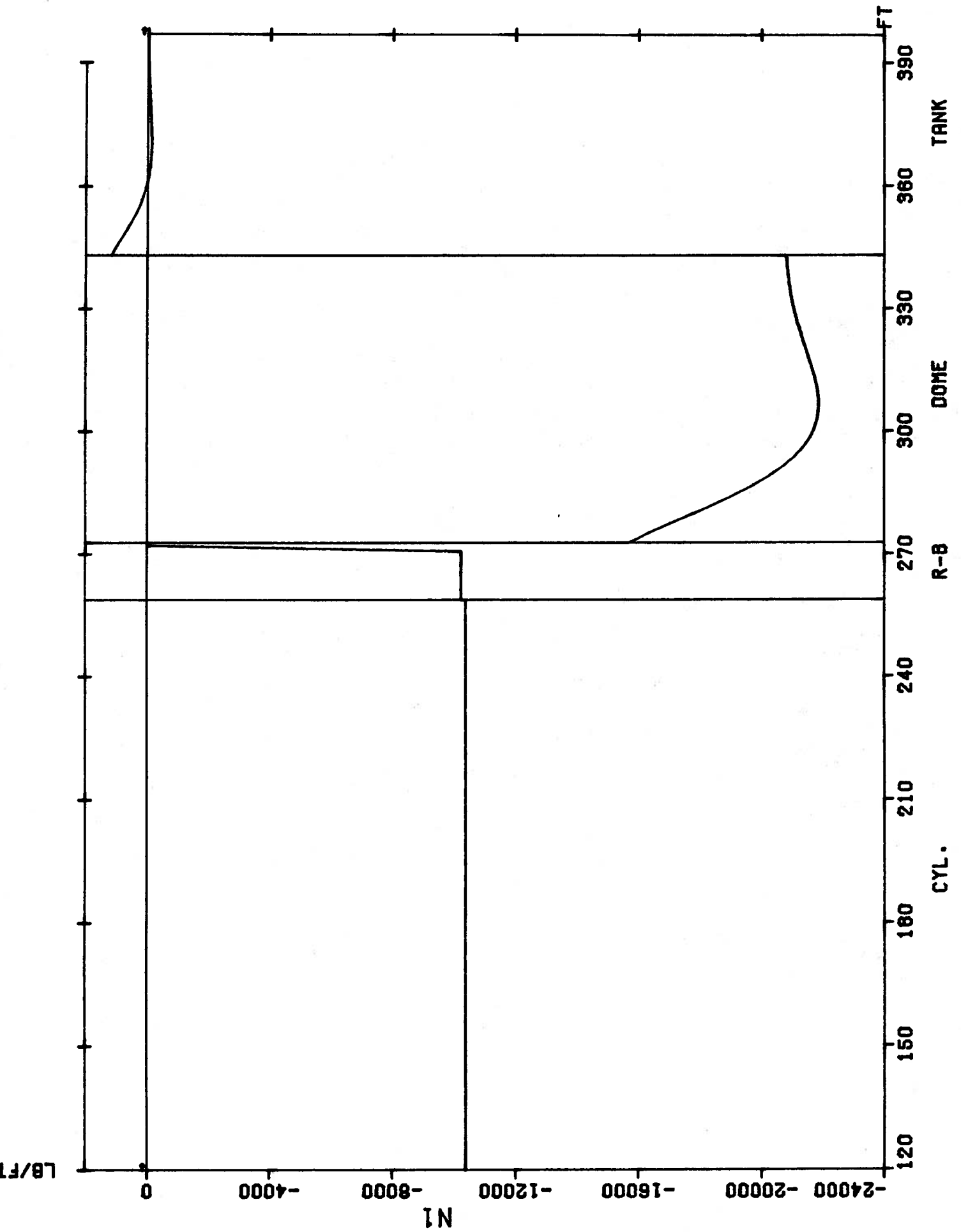


FIGURE B21 N1 for Loading Case C:Udd

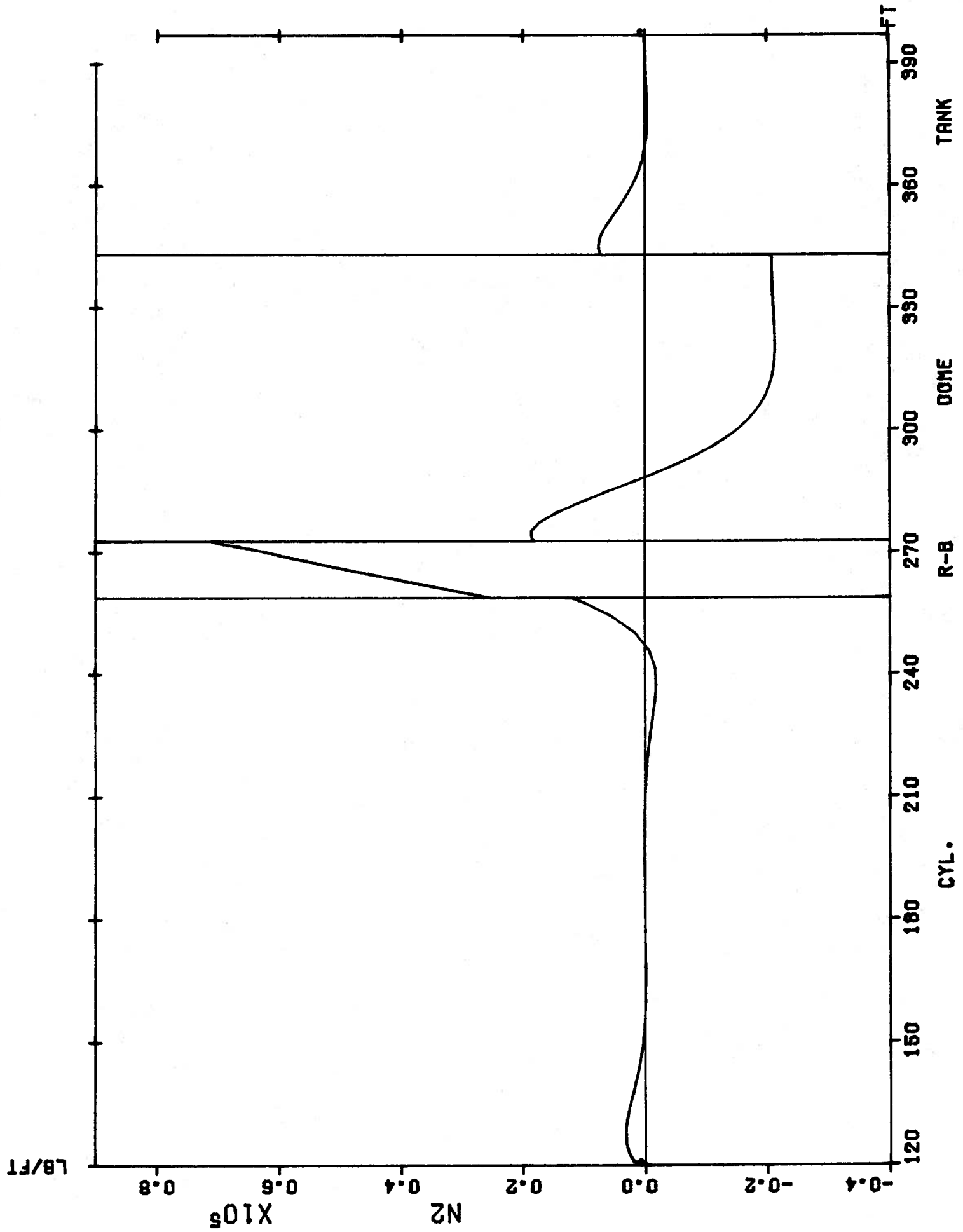


FIGURE B22 N_2 for Loading Case C:UDd

CYL.

TANK

DOME

R-B

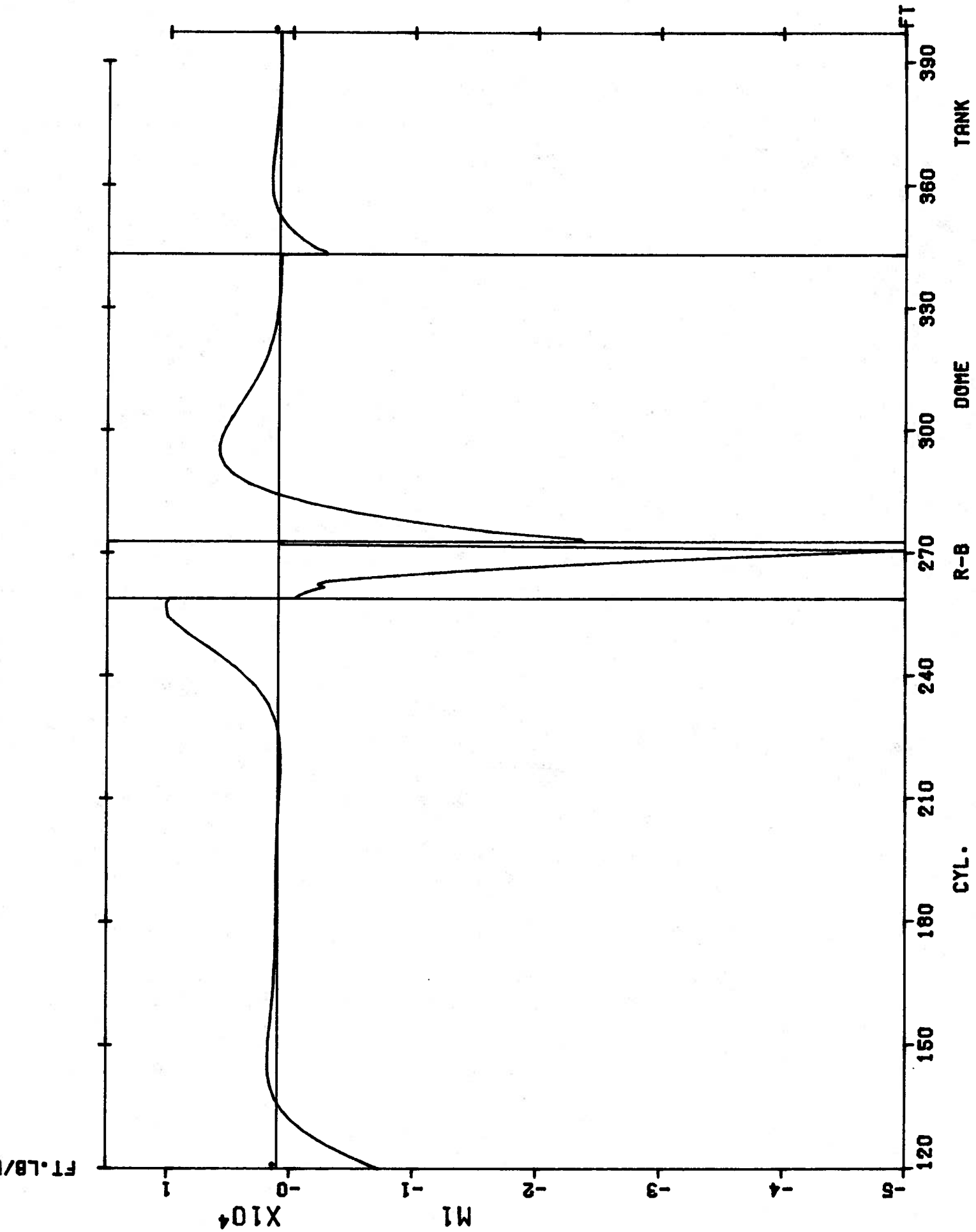


FIGURE B23 M_1 for Loading Case C:UDD

CYL.

R-B

DOME

TANK

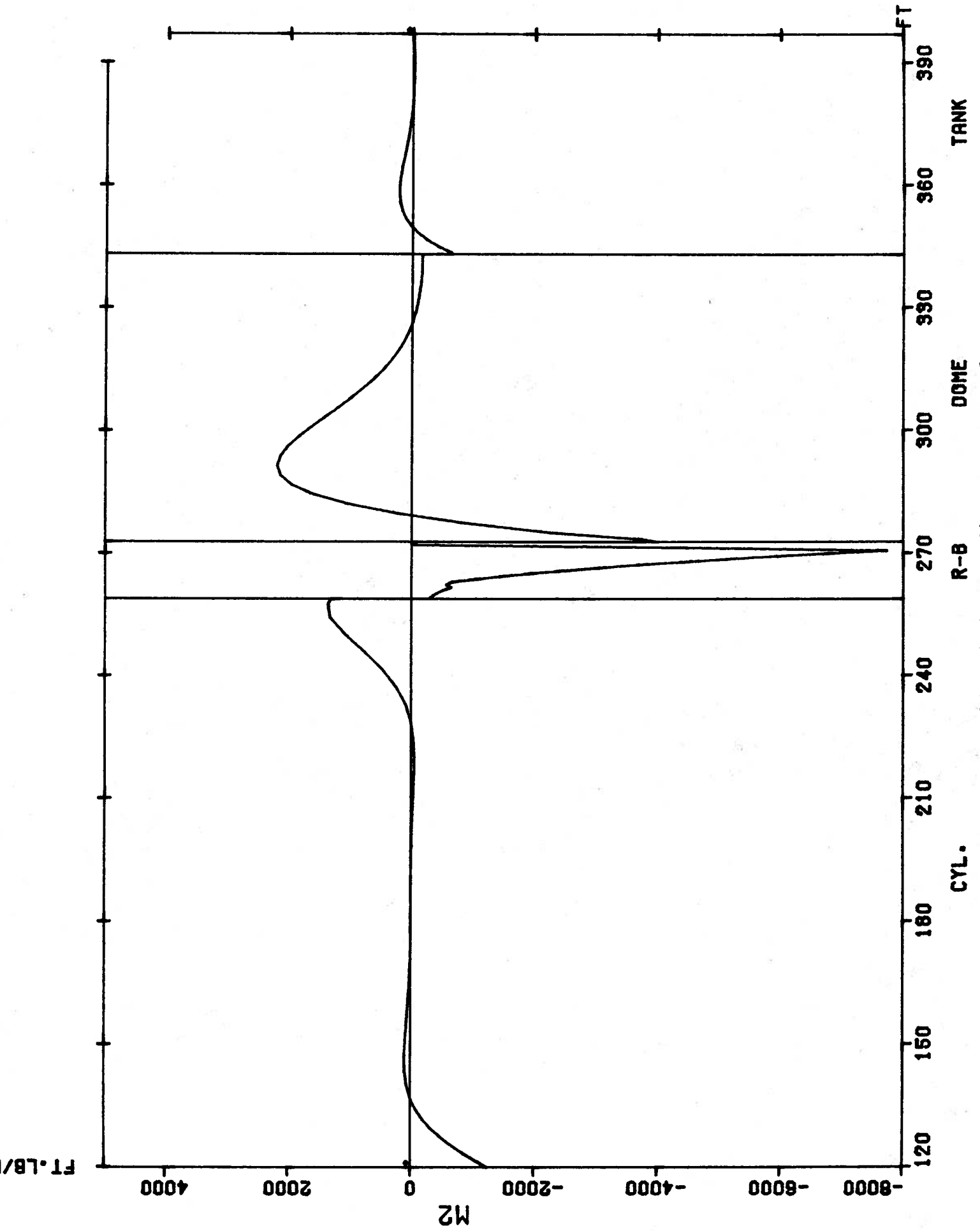


FIGURE B24 M2 for Loading Case C:UDD

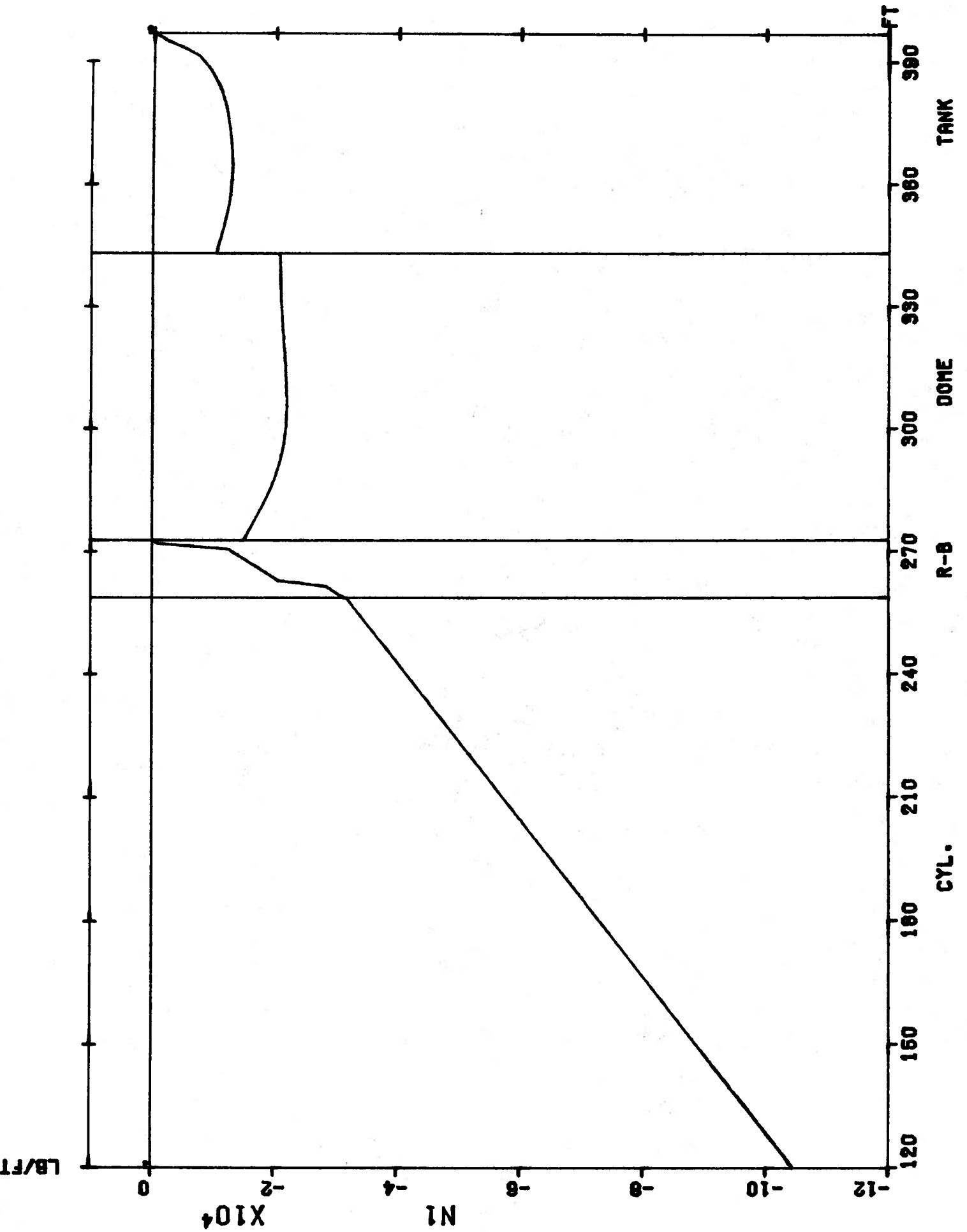


FIGURE B25 N_1 for Loading Case CH:Hd

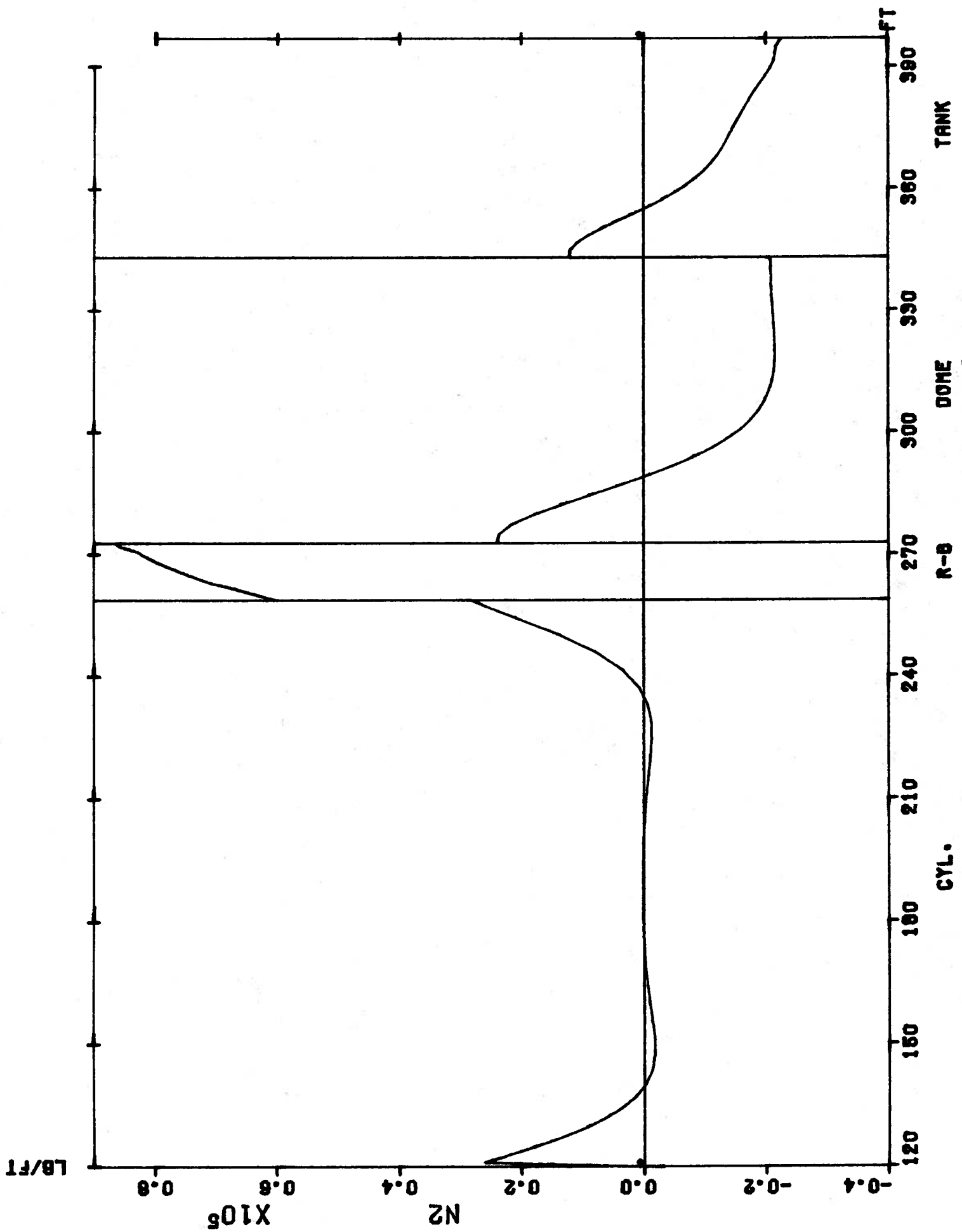


FIGURE B26 N2 for Loading Case CH:Hd

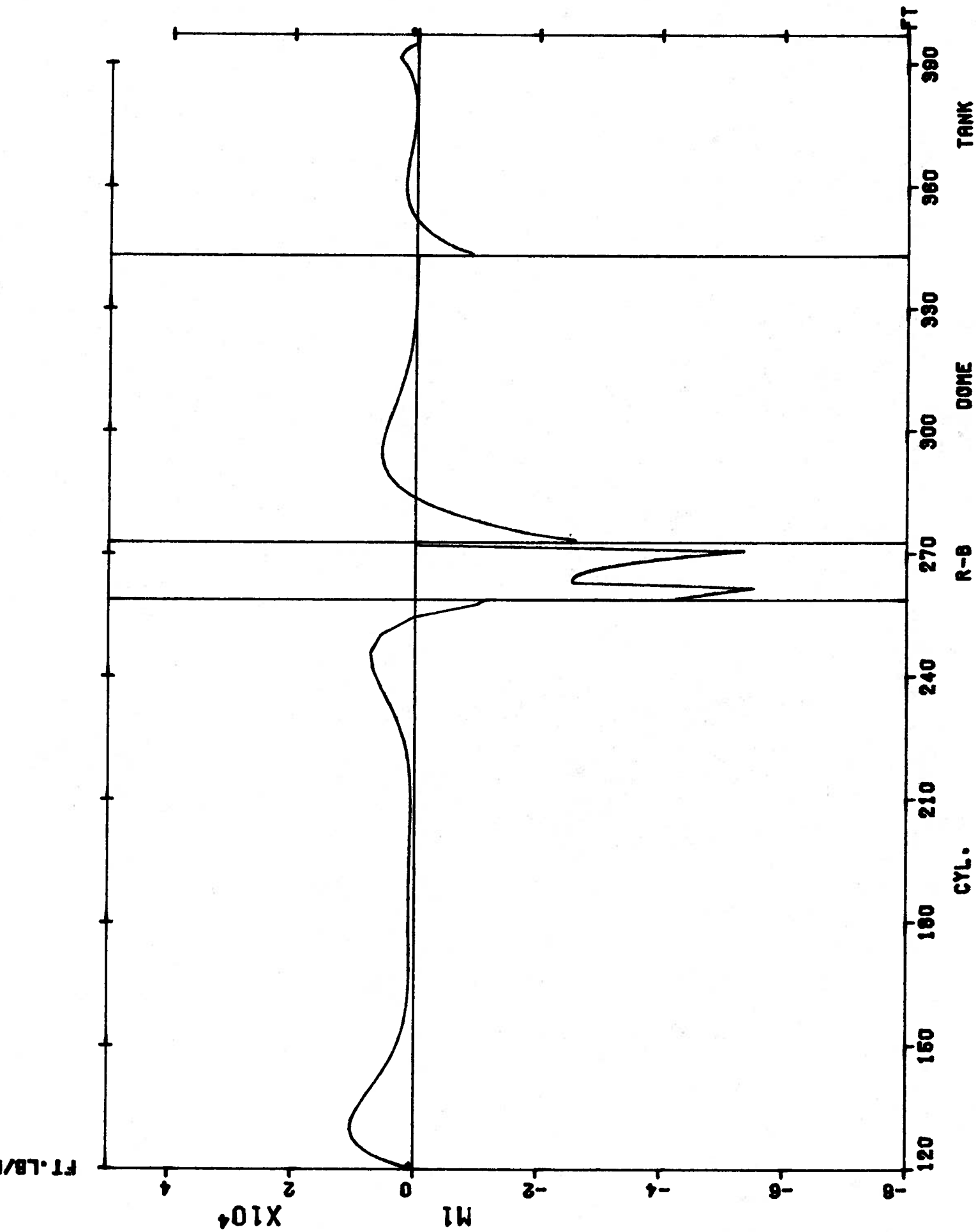


FIGURE B27 M1 for Loading Case CH:Hd

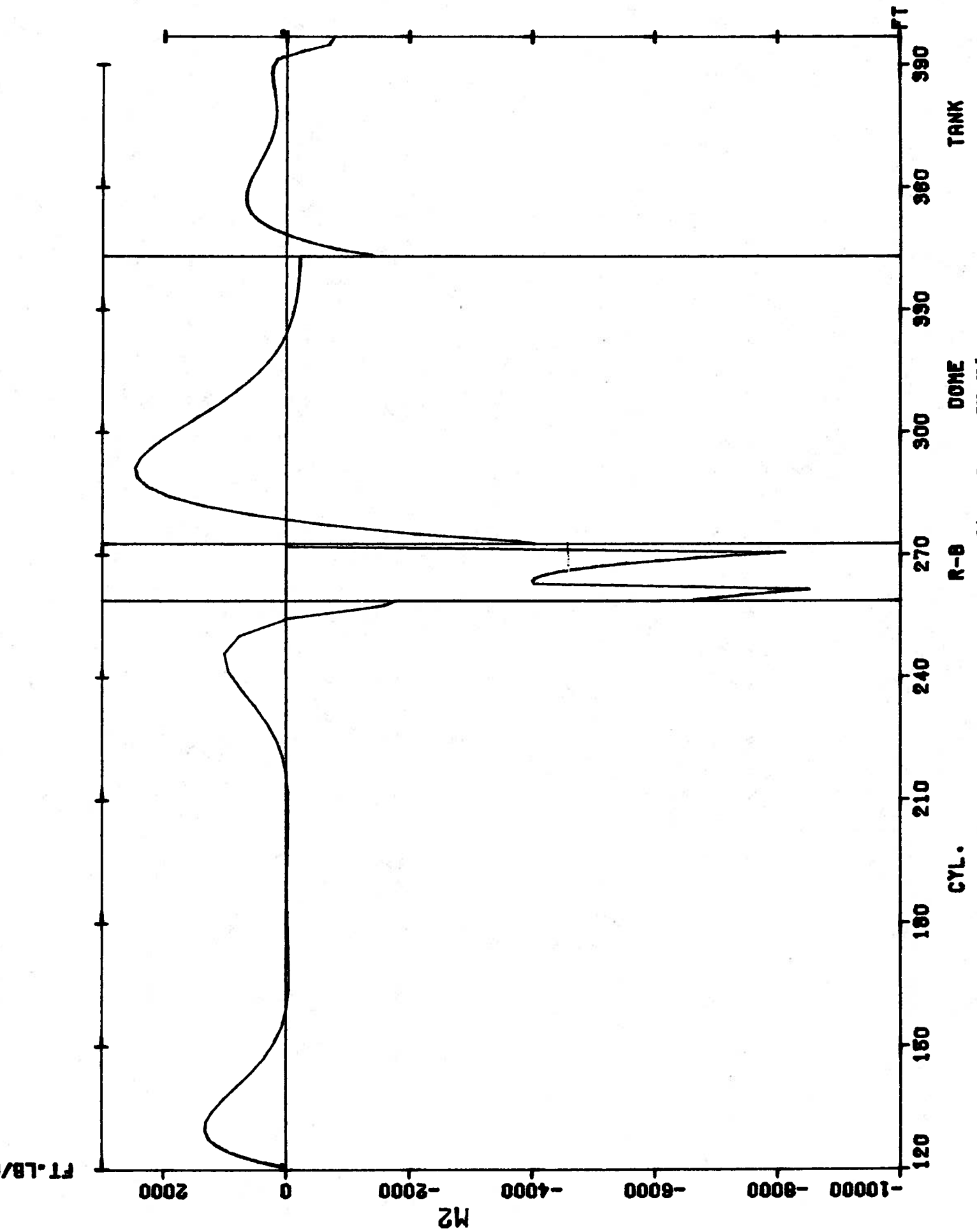


FIGURE B28 M2 for Loading Case CH:Hd

CYL.

R-8

DOME

TANK

APPENDIX C

Stress Resultants for Prestress Influence Loadings

List of Figures for Appendix C

(Note: See Sect. 2.4 for load case designations)

Figure	Title
C1	N2 for Loading Case BW:Bf
C2	M1 for Loading Case BW:Bf
C3	M2 for Loading Case BW:Bf
C4	N2 for Loading Case BW:Whf
C5	M1 for Loading Case BW:Whf
C6	M2 for Loading Case BW:Whf
C7	N1 for Loading Case BD:LBf
C8	N2 for Loading Case BD:LBf
C9	M1 for Loading Case BD:LBf
C10	M2 for Loading Case BD:LBf
C11	N2 for Loading Case C:Bf
C12	M1 for Loading Case C:Bf
C13	M2 for Loading Case C:Bf
C14	N1 for Loading Case C:LBf
C15	N2 for Loading Case C:LBf
C16	M1 for Loading Case C:LBf
C17	M2 for Loading Case C:LBf
C18	N1 for Loading Case C:UBf
C19	N2 for Loading Case C:UBf
C20	M1 for Loading Case C:UBf
C21	M2 for Loading Case C:UBf
C22	N1 for Loading Case C:UDf
C23	N2 for Loading Case C:UDf
C24	M1 for Loading Case C:UDf
C25	M2 for Loading Case C:UDf

C26	N1	for Loading Case C:Wvf
C27	N2	for Loading Case C:Wvf
C28	M1	for Loading Case C:Wvf
C29	M2	for Loading Case C:Wvf
C30	N1	for Loading Case C:Whf
C31	N2	for Loading Case C:Whf
C32	M1	for Loading Case C:Whf
C33	M2	for Loading Case C:Whf

C1

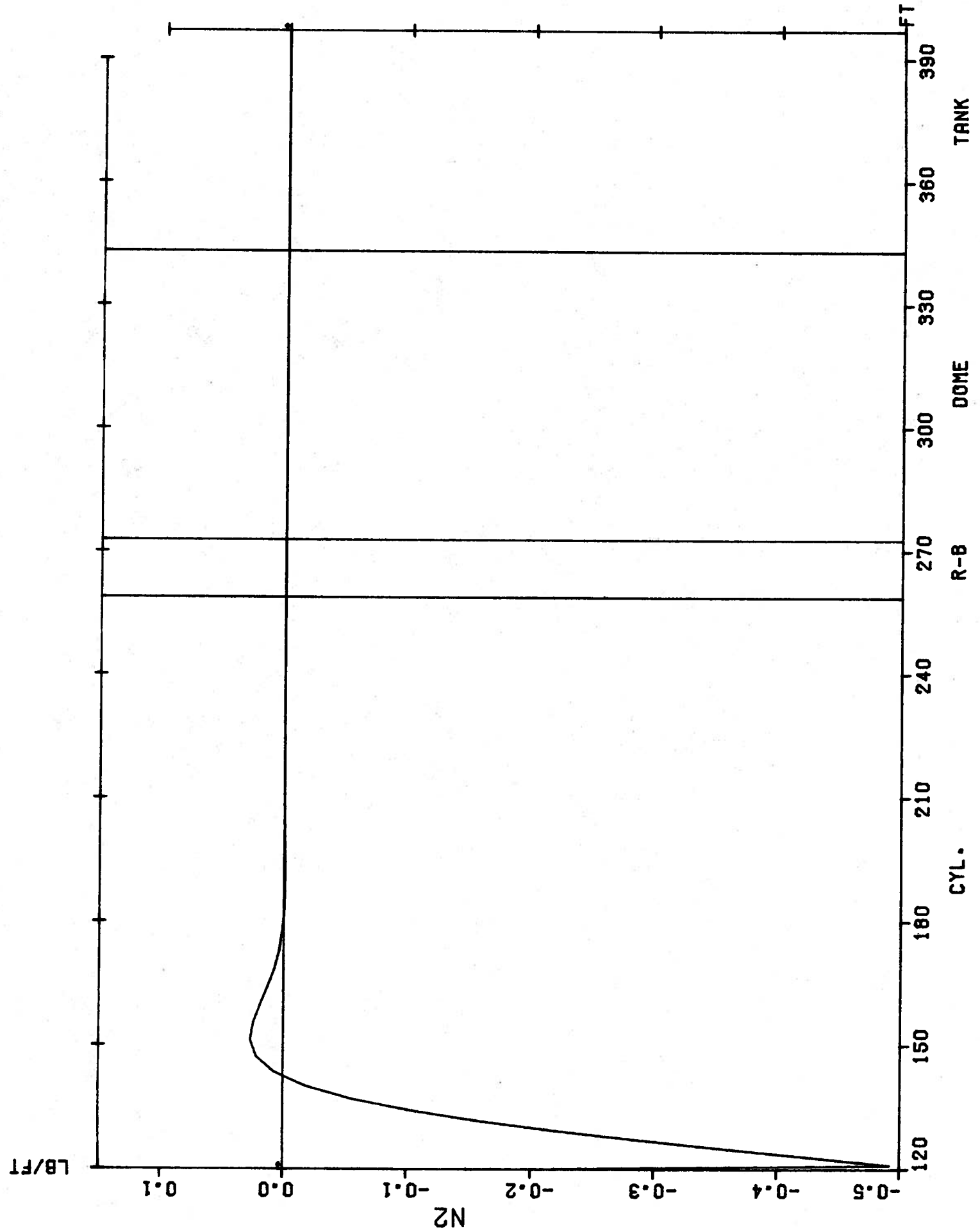


FIGURE C1 N_2 for Loading Case BW:Bf

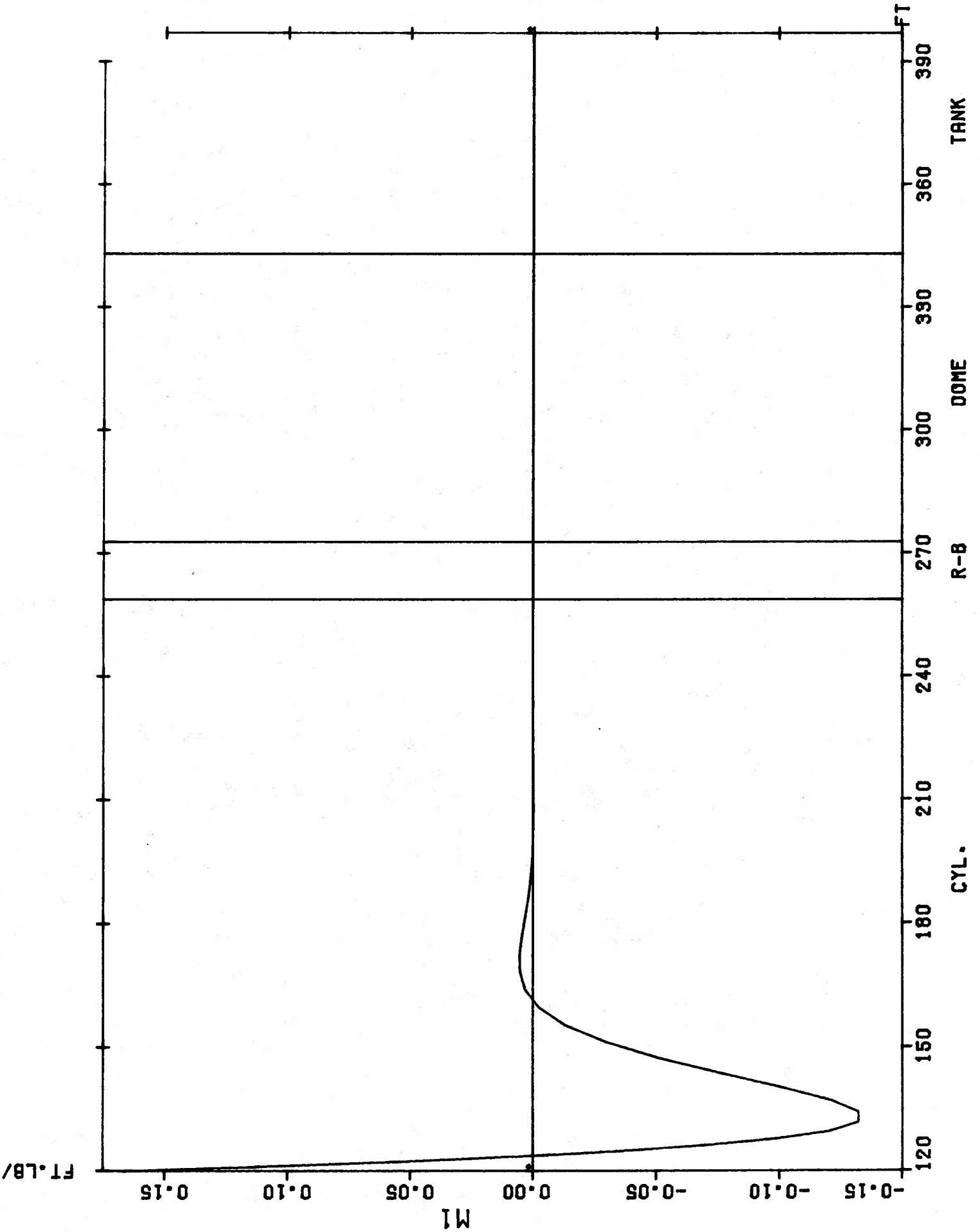


FIGURE C2 M1 for Loading Case BW:Bf

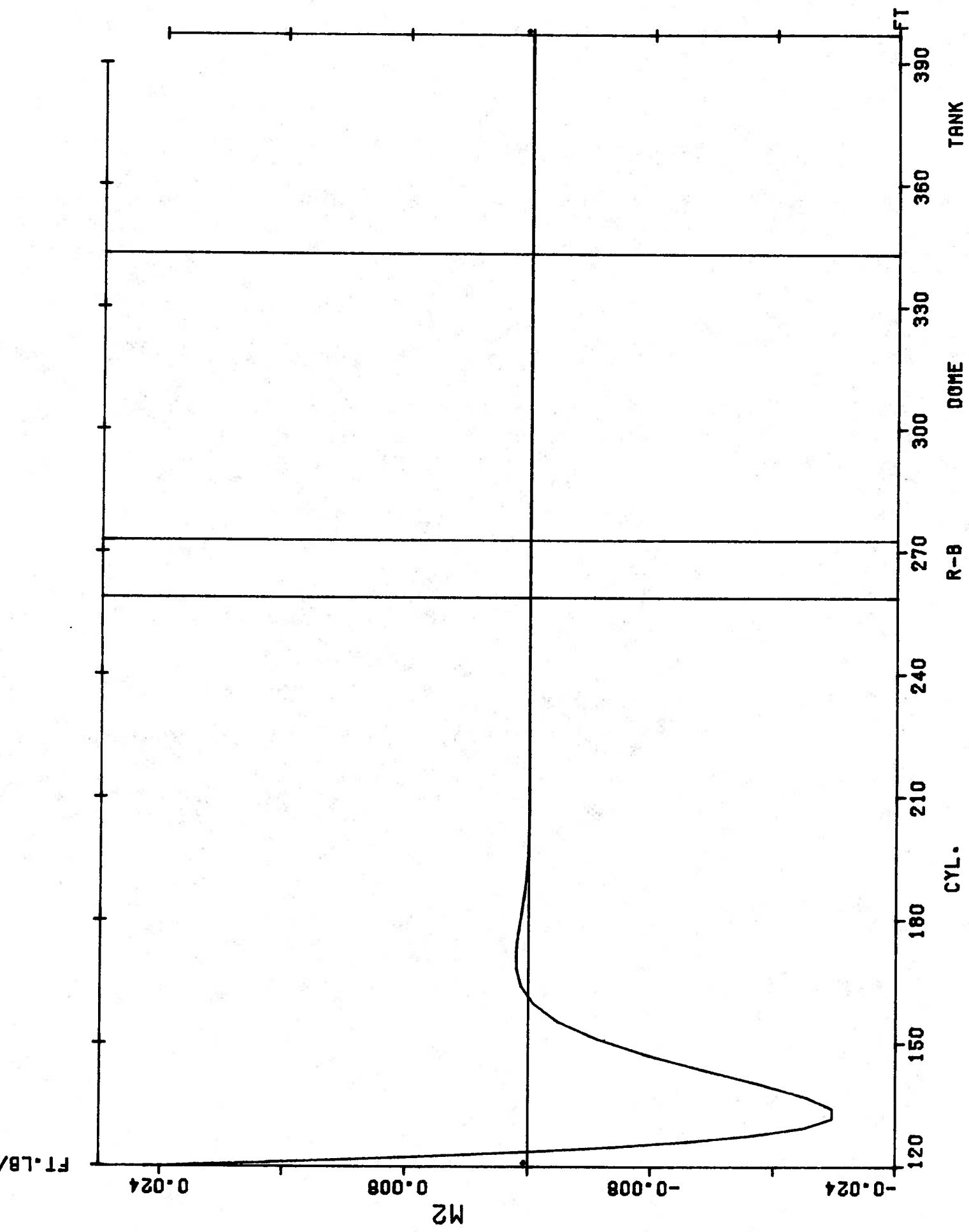


FIGURE C3 M2 for Loading Case BW:Bf

CYL.

R-B

DOME

TANK

120 150 180 210 240 270 300 330 360 390 FT

M2

-0.024 -0.008 0.008 0.024 FT.LB/FT

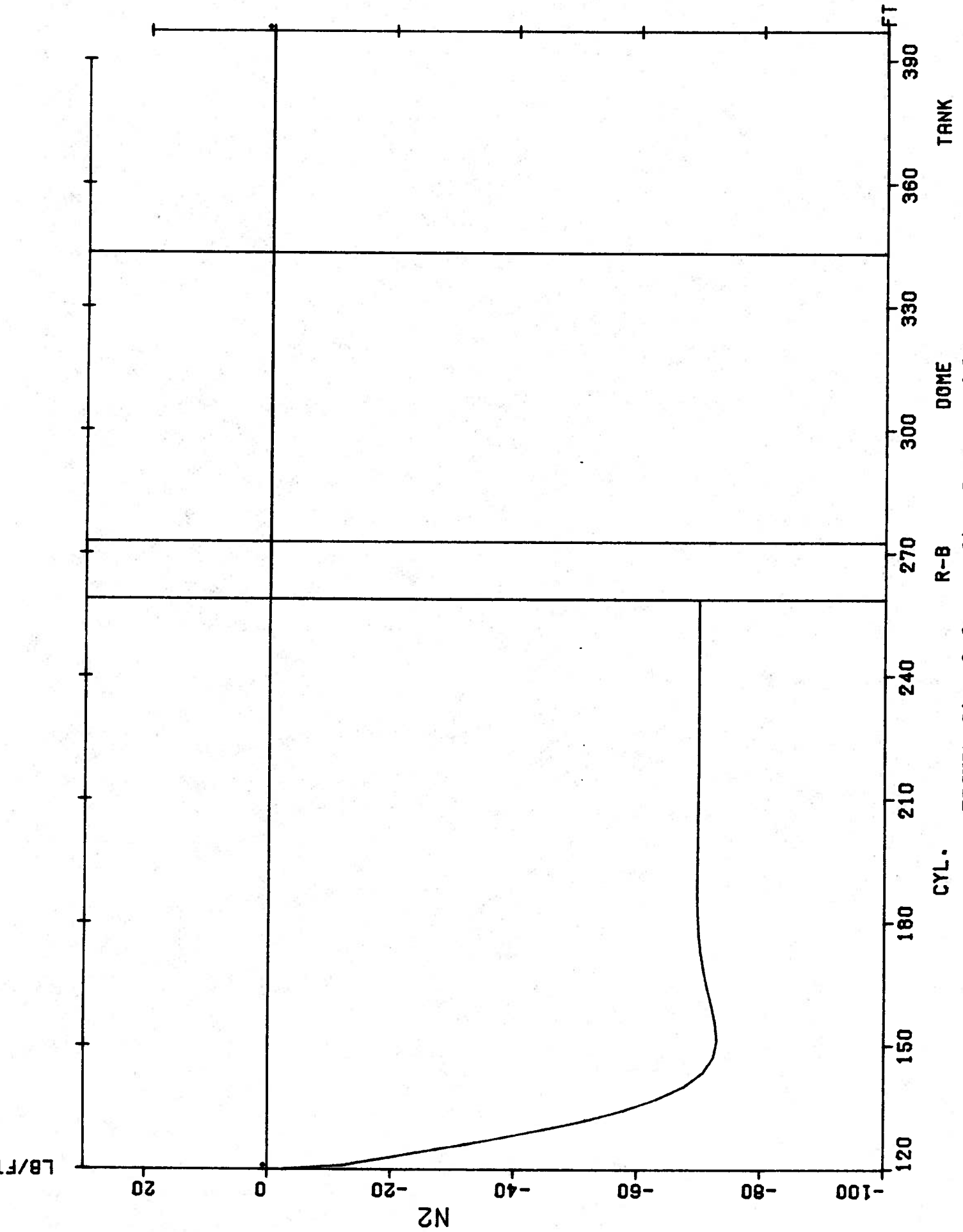
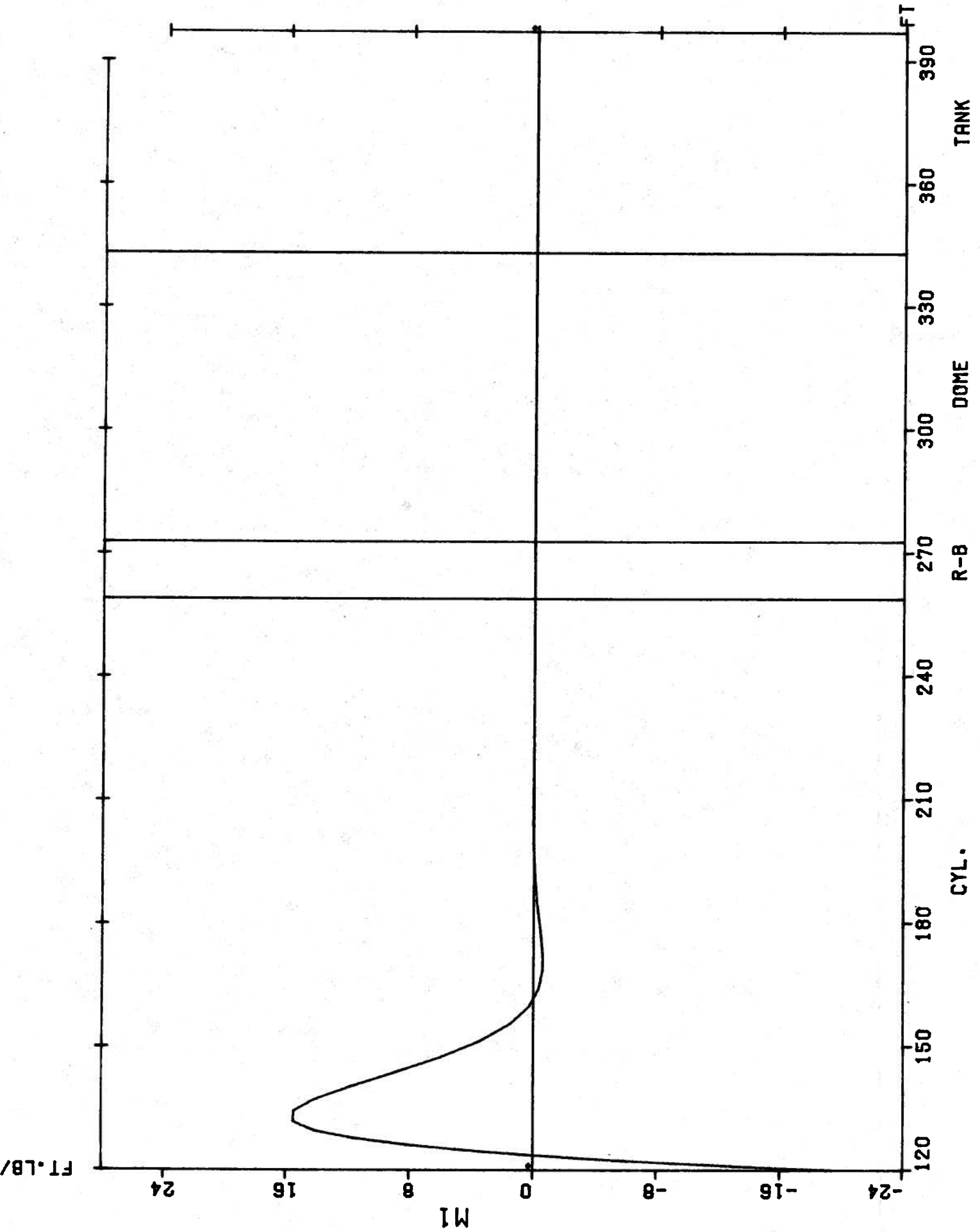


FIGURE C4 N2 for Loading Case BW:Whf
CYL. R-B DOME TANK



SECTION OF ...

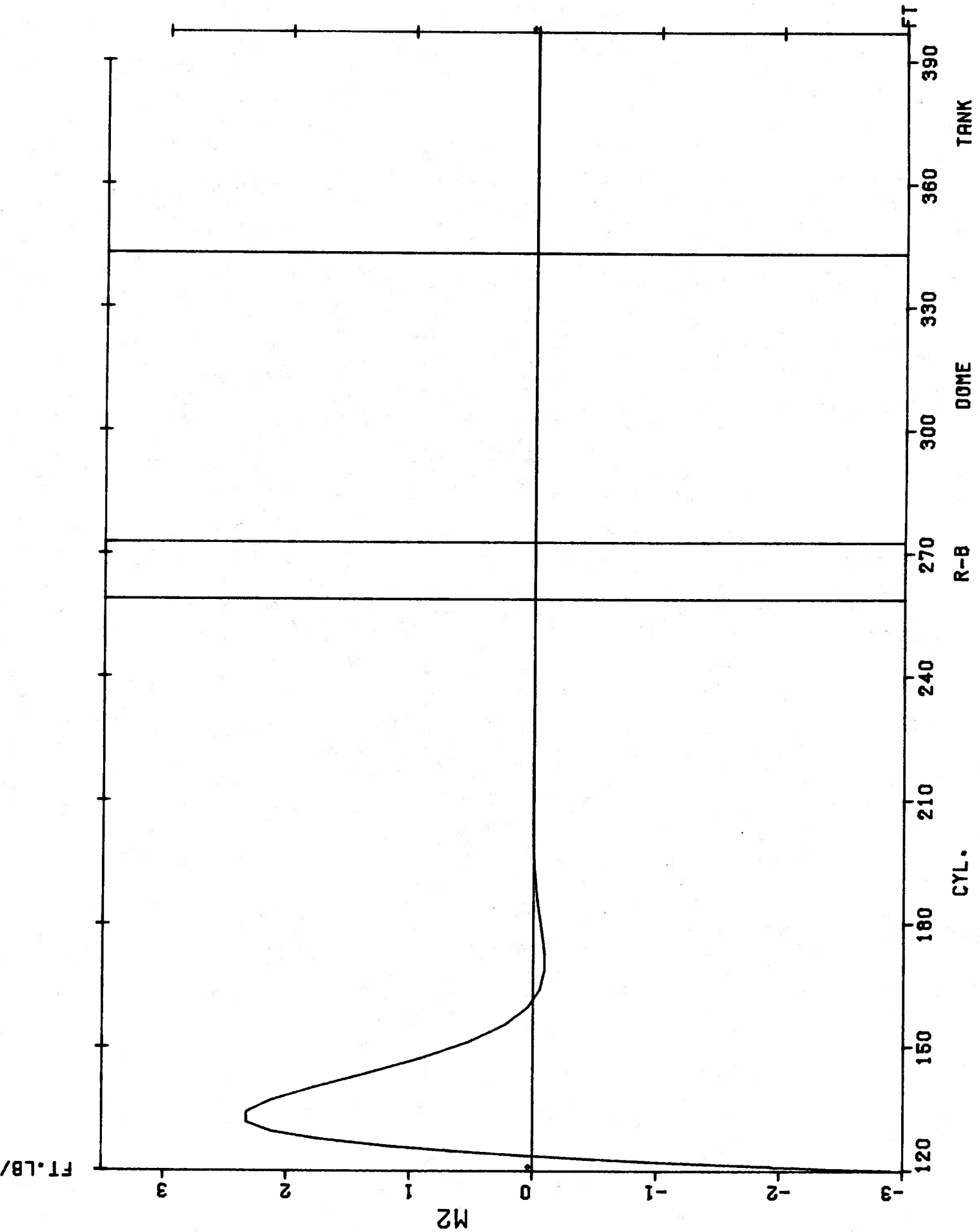


FIGURE C6 M2 for Loading Case BW:Whf

CYL.

R-B

DOME

TANK

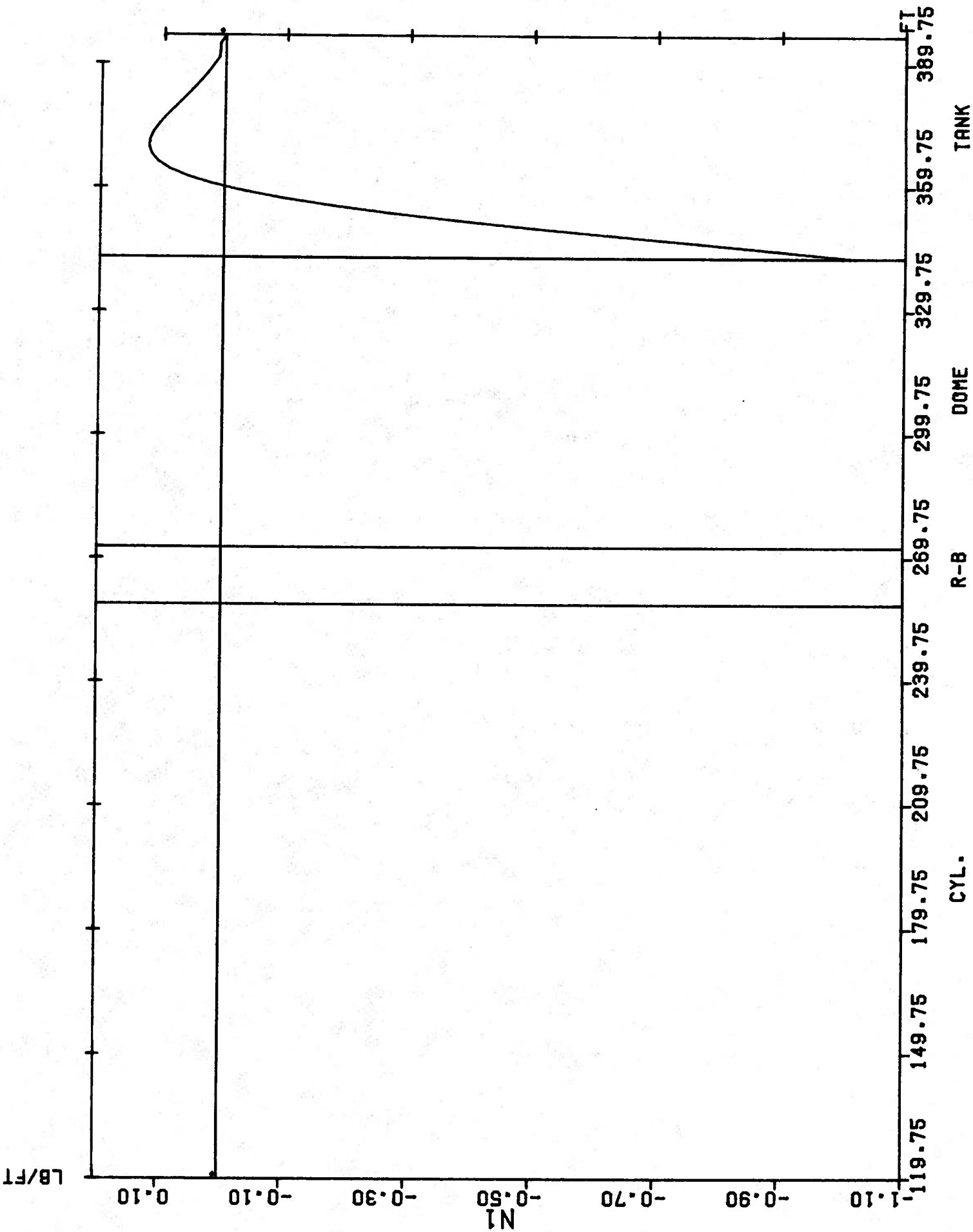
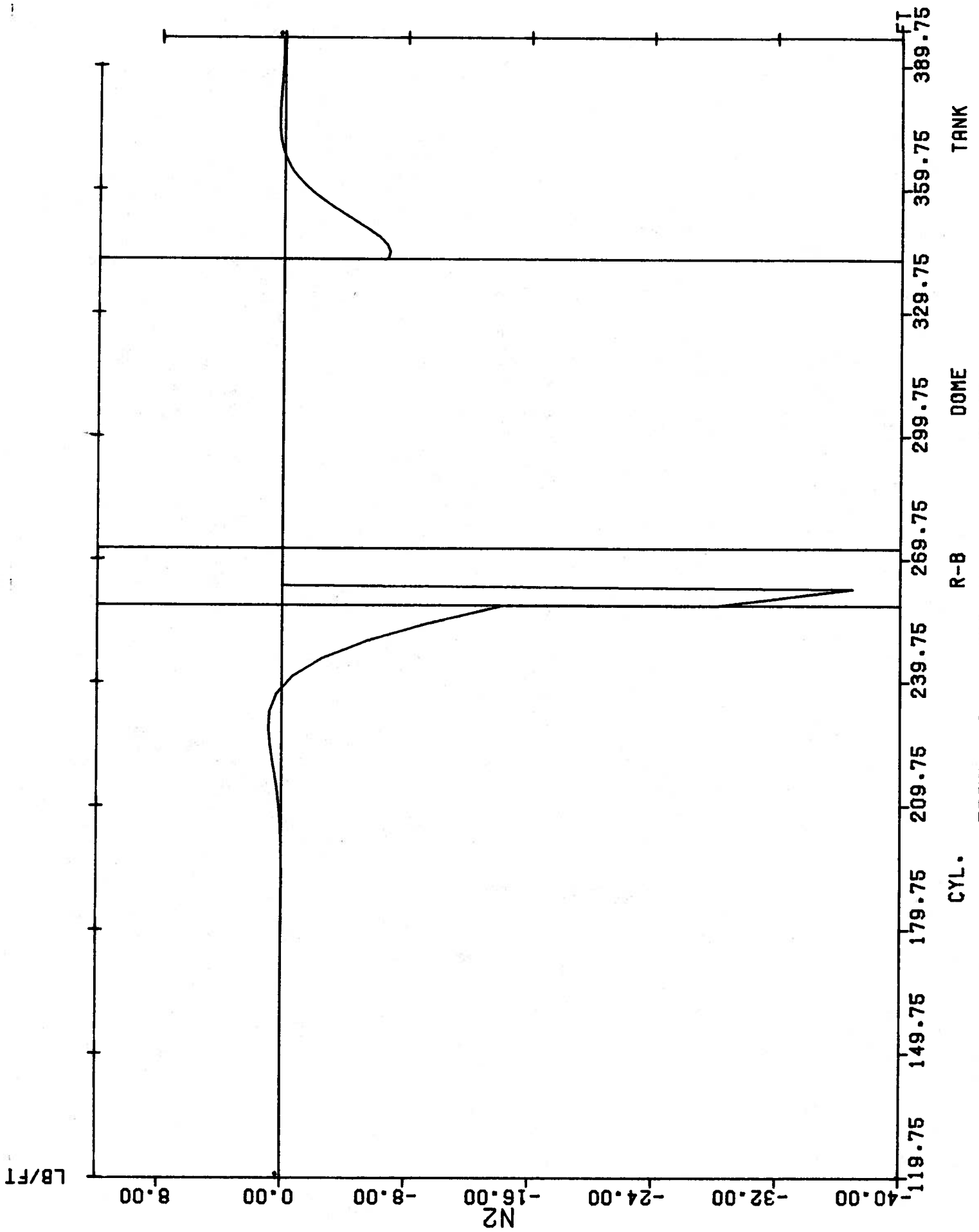
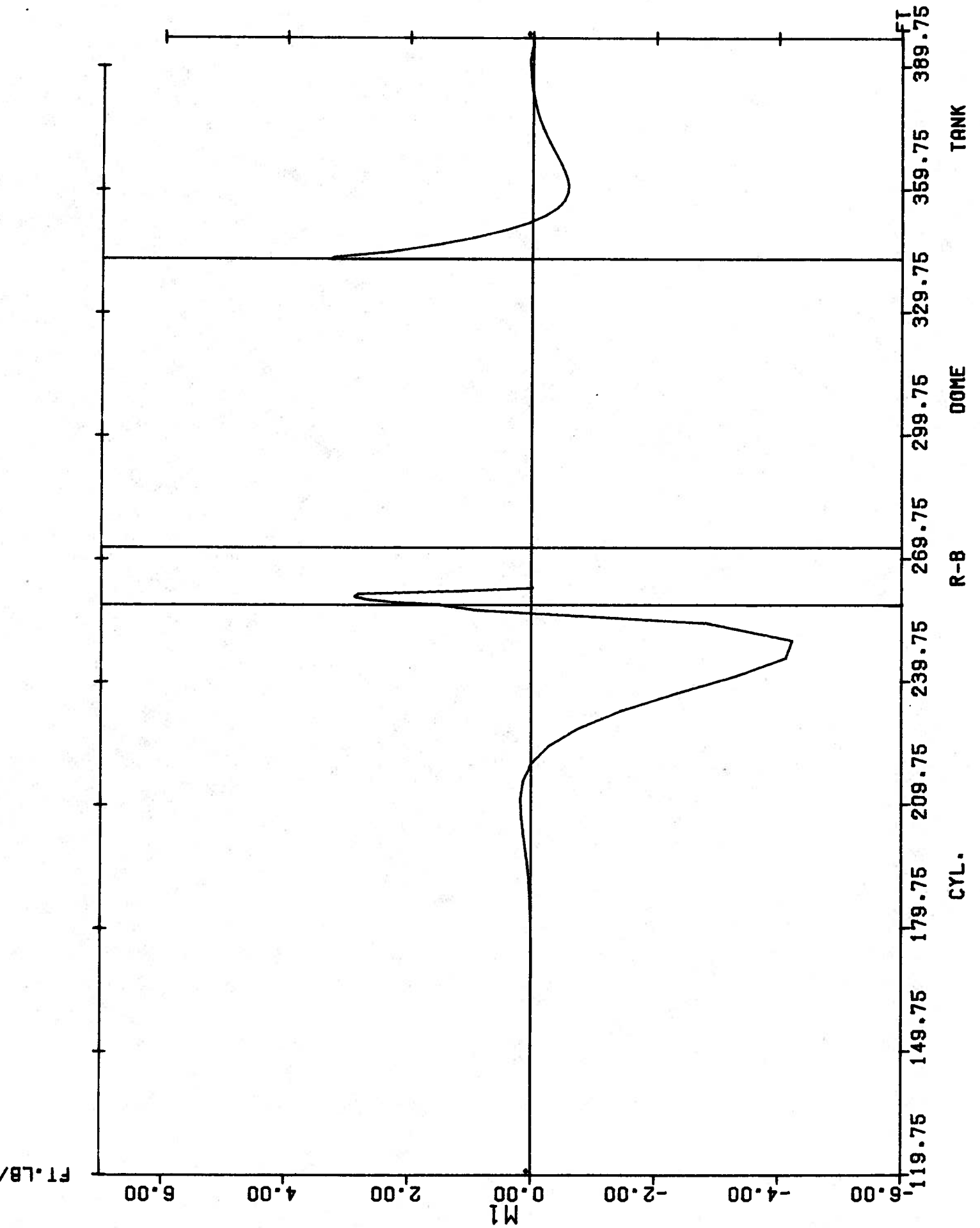


FIGURE C7 N_1 for Loading Case BD:LBf



CYL. R-B DOME TANK

FIGURE C8



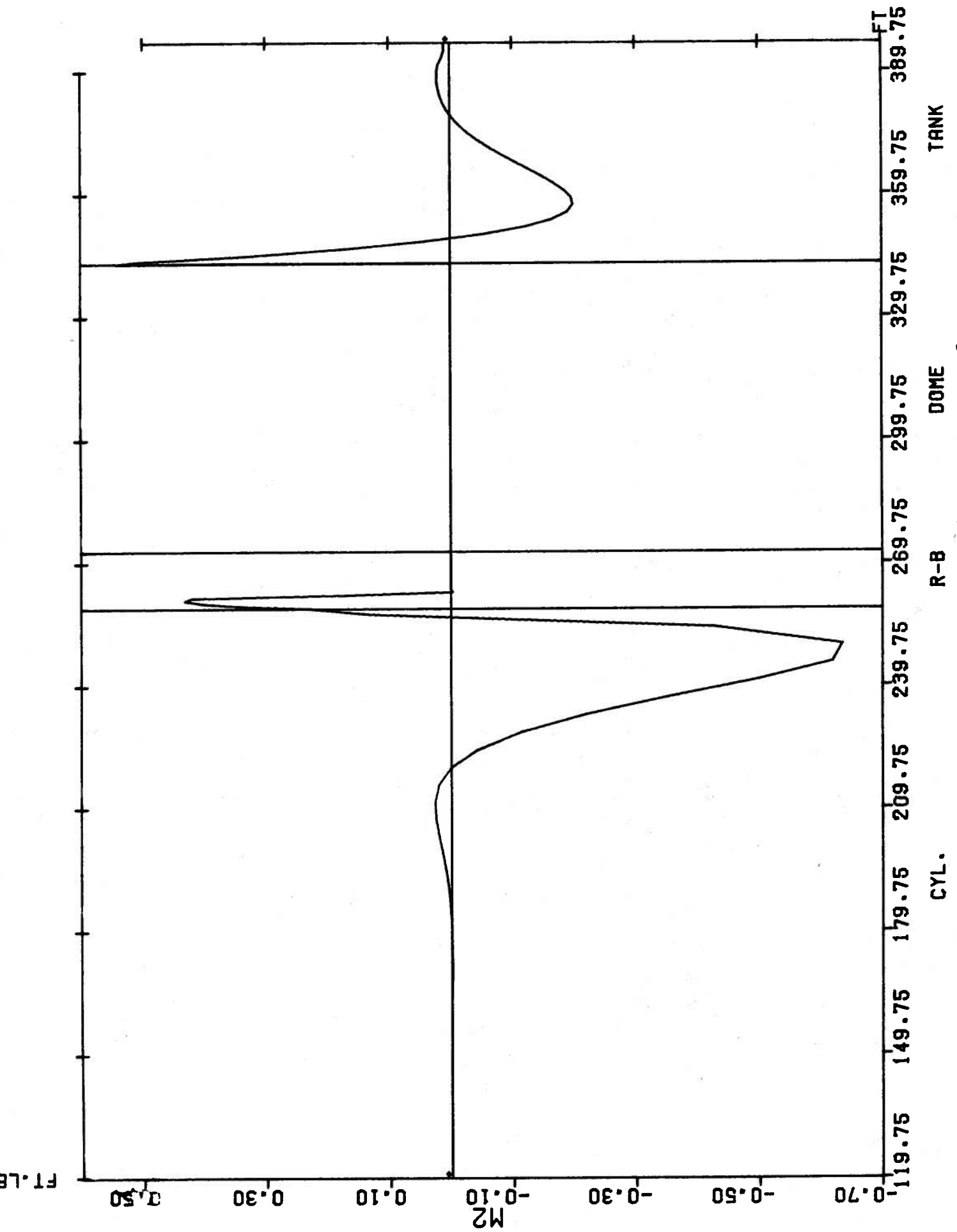


FIGURE C10 M2 for Loading Case BD:LBF

CYL.

R-B

DOME

TANK

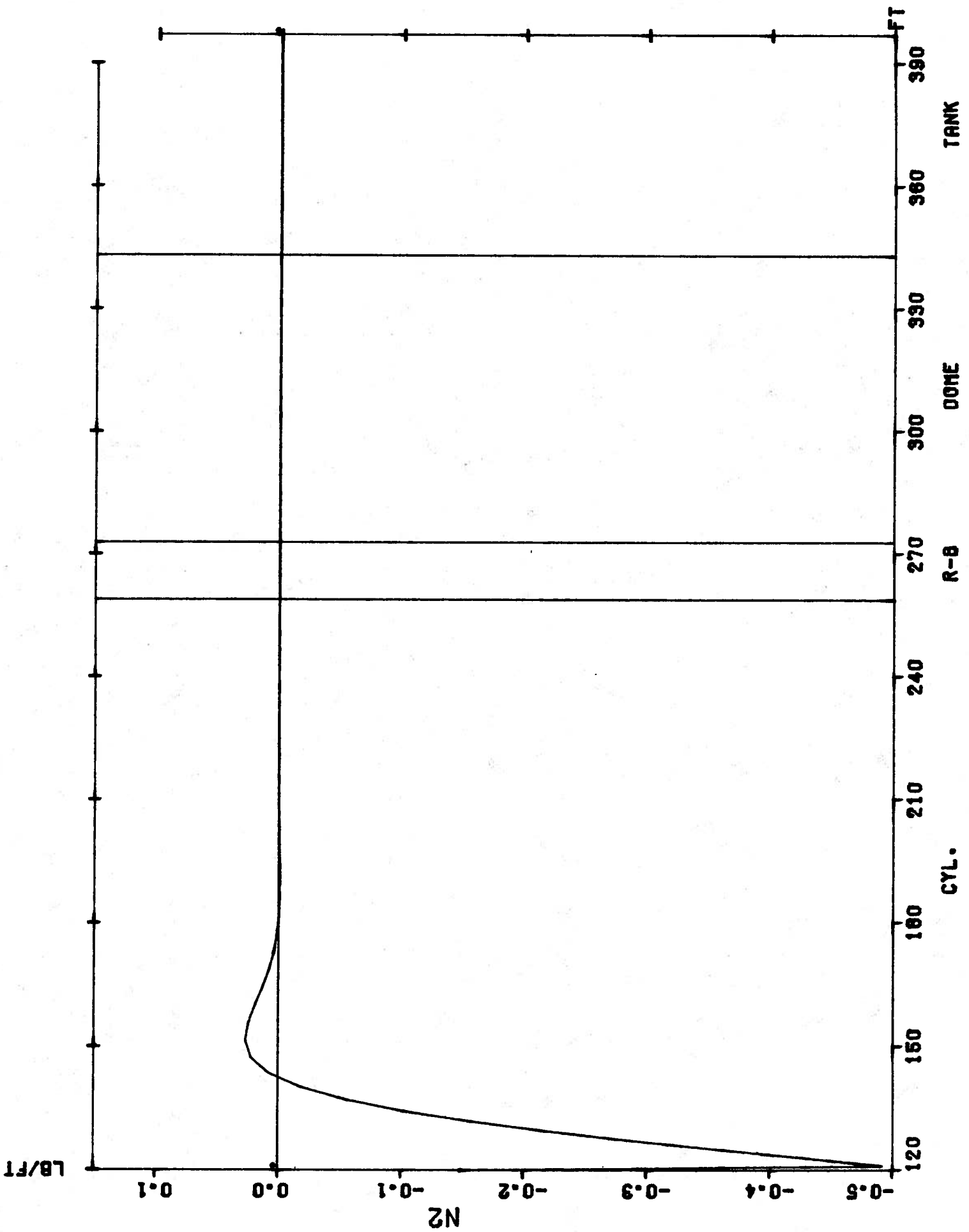


FIGURE C11 N2 for Loading Case C:Bf

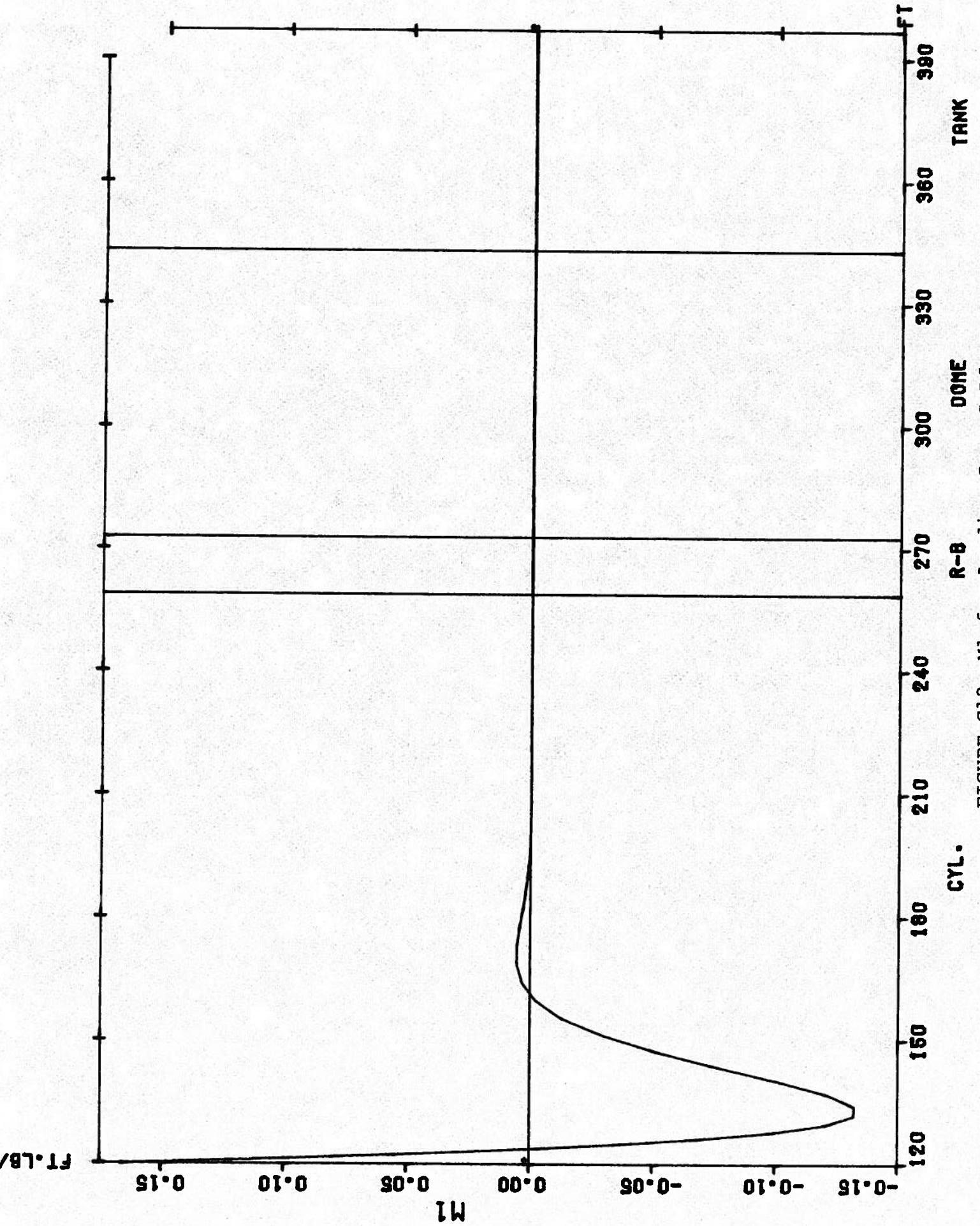


FIGURE C12 M_1 for Loading Case C:Bf

CYL.

R-B

DOME

TANK

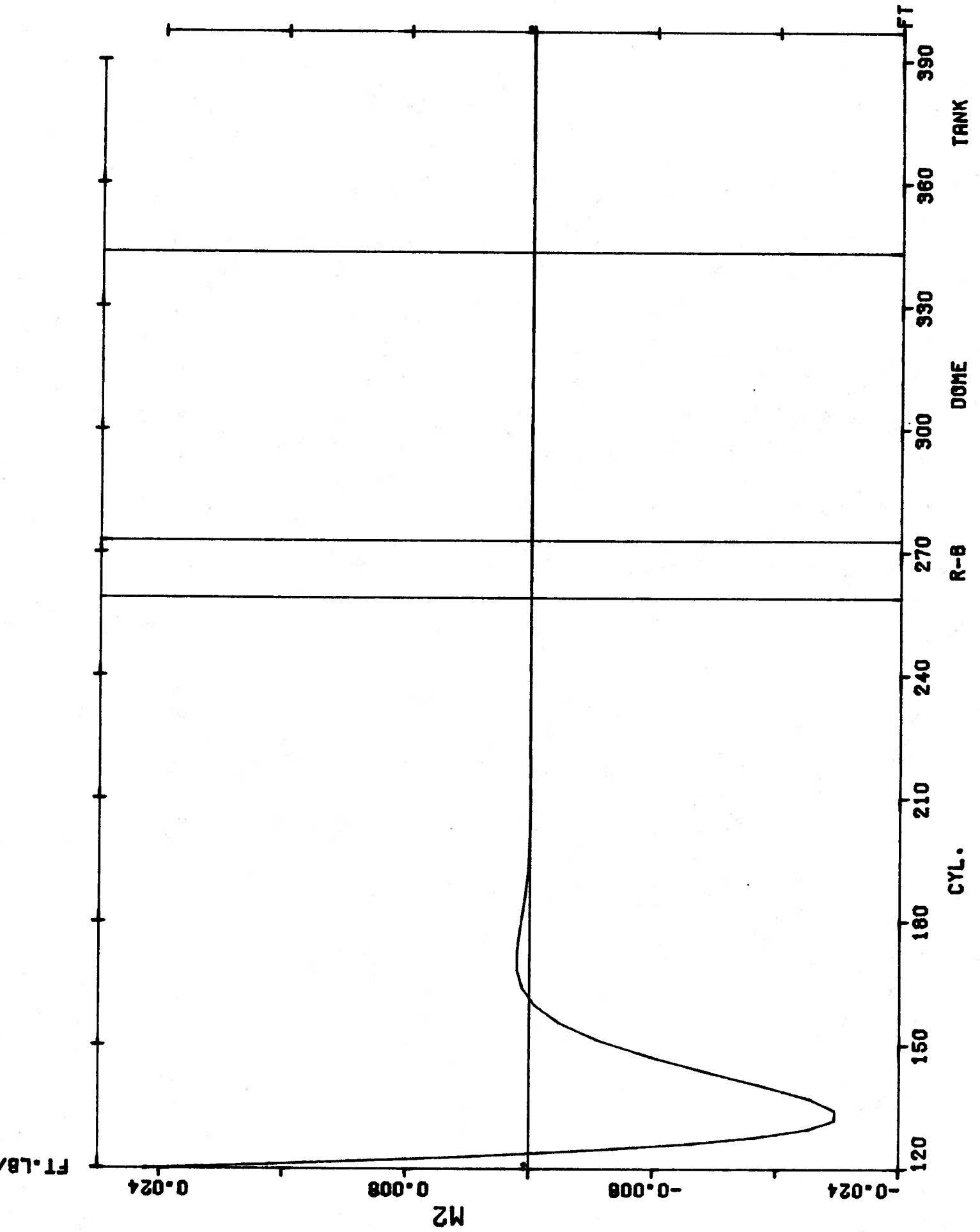


FIGURE C13 M2 for Loading Case C:Bf

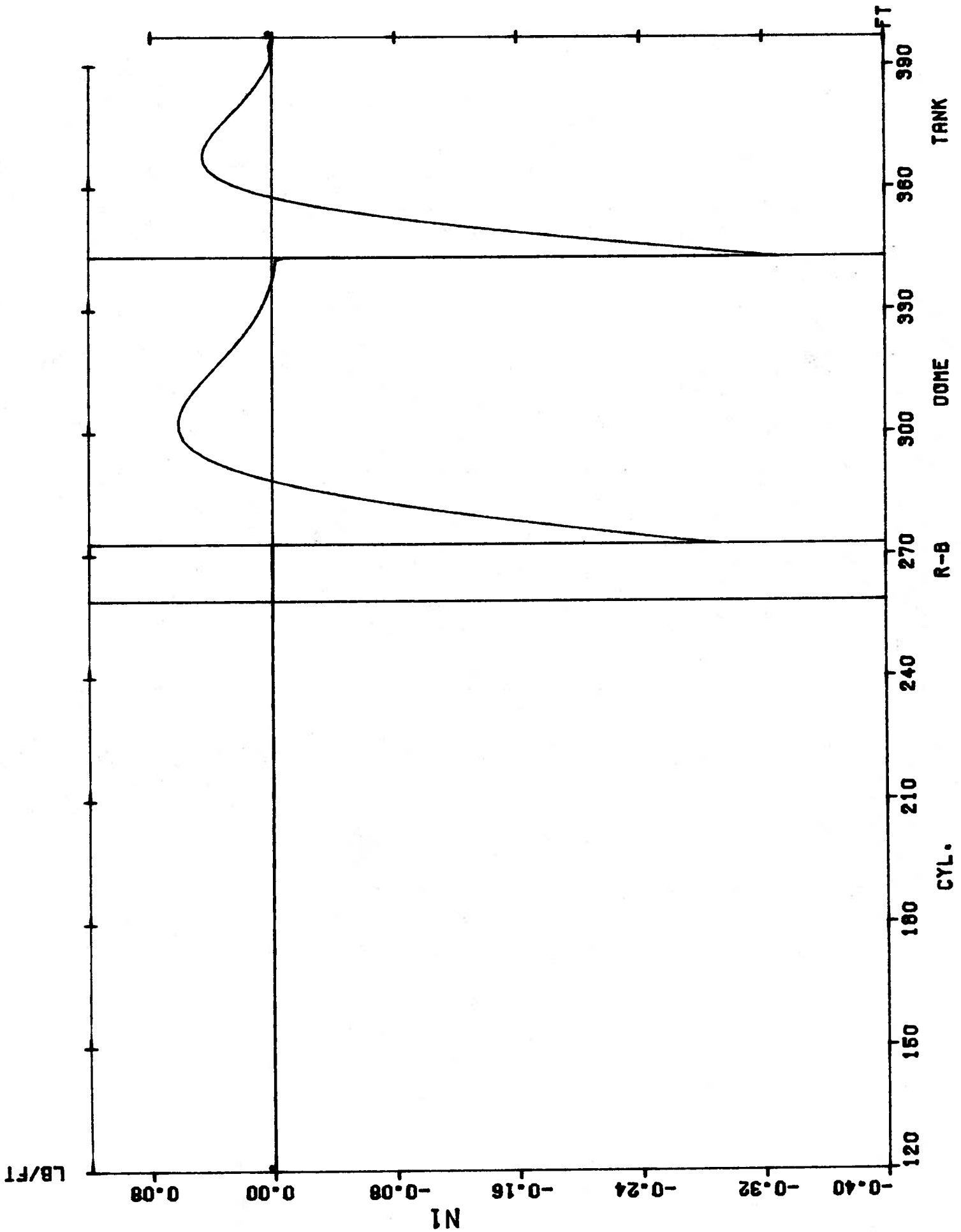


FIGURE C14 N_1 for Loading Case C:LBf

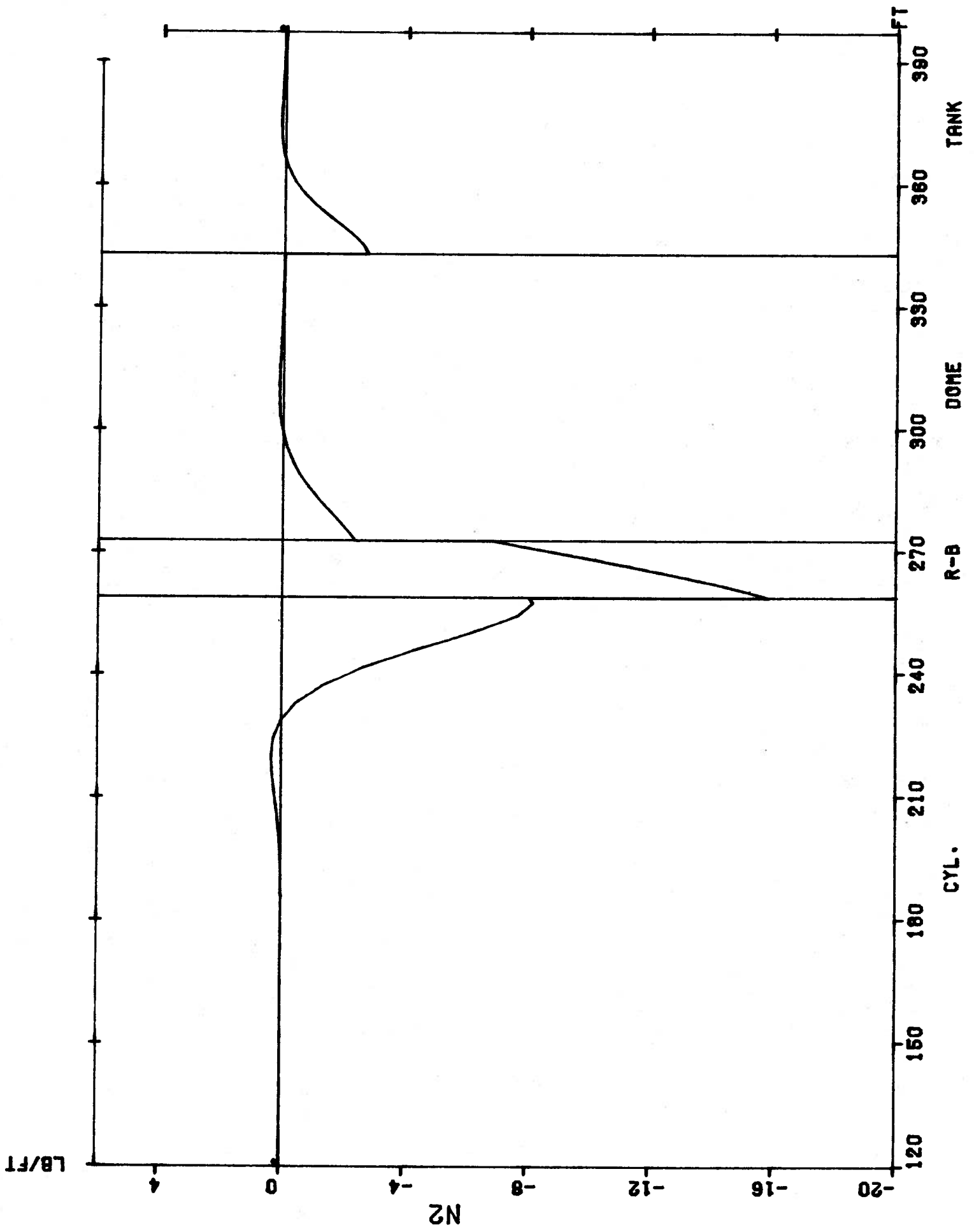


FIGURE C15 N2 for Loading Case C:LBF

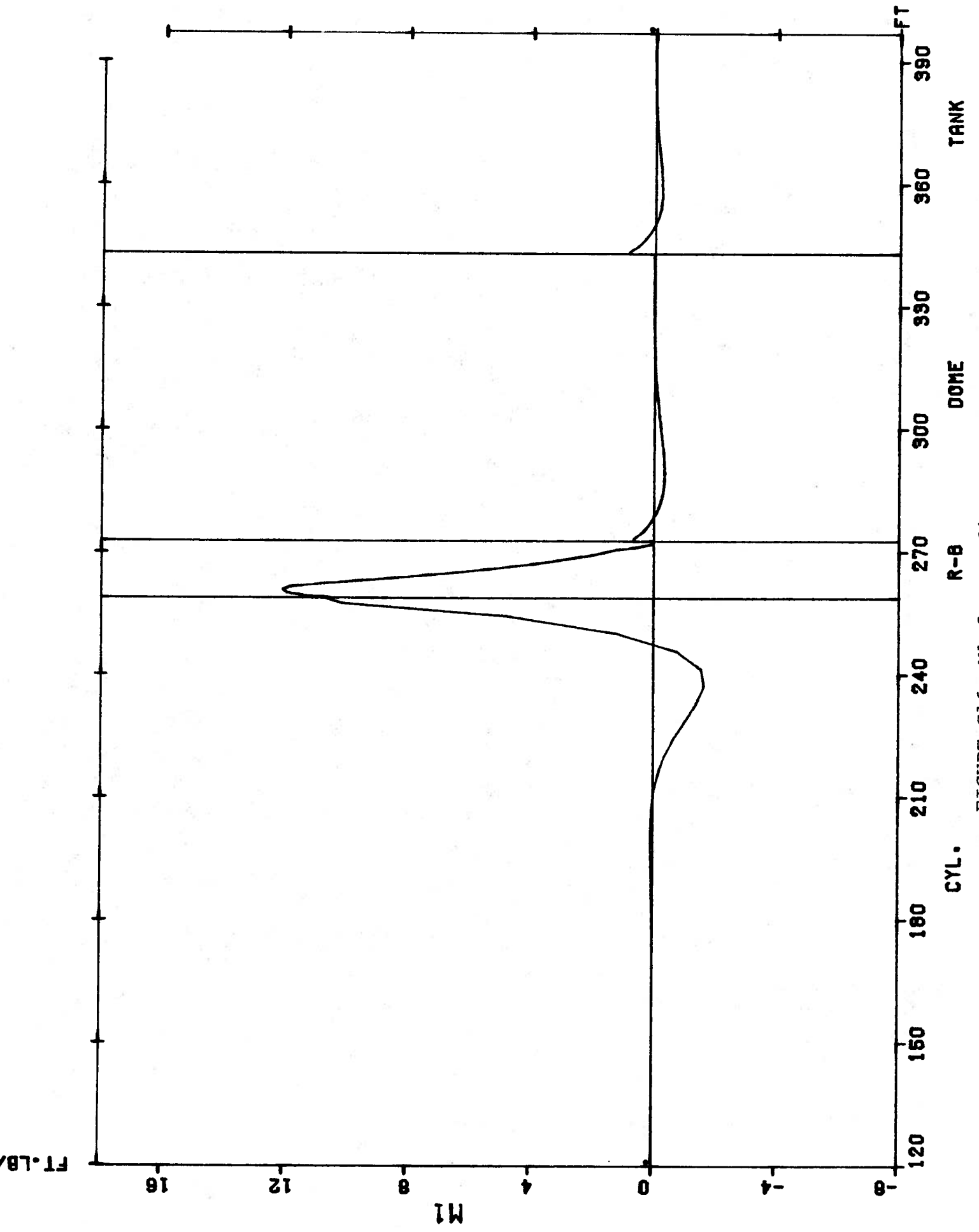


FIGURE C16 M1 for Loading Case C:LBf

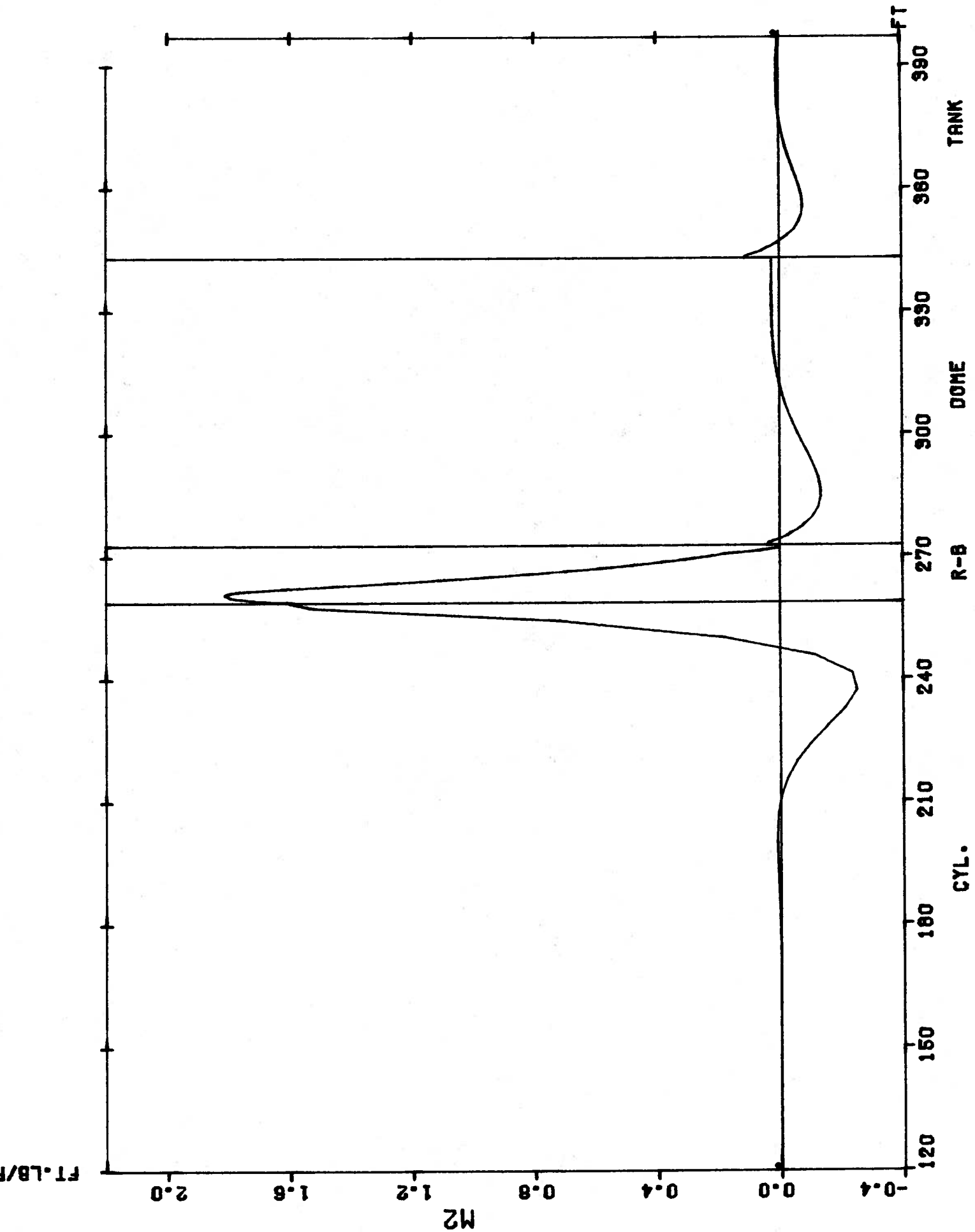


FIGURE C17 M2 for Loading Case C:LBf

CYL.

R-B

DOME

TANK

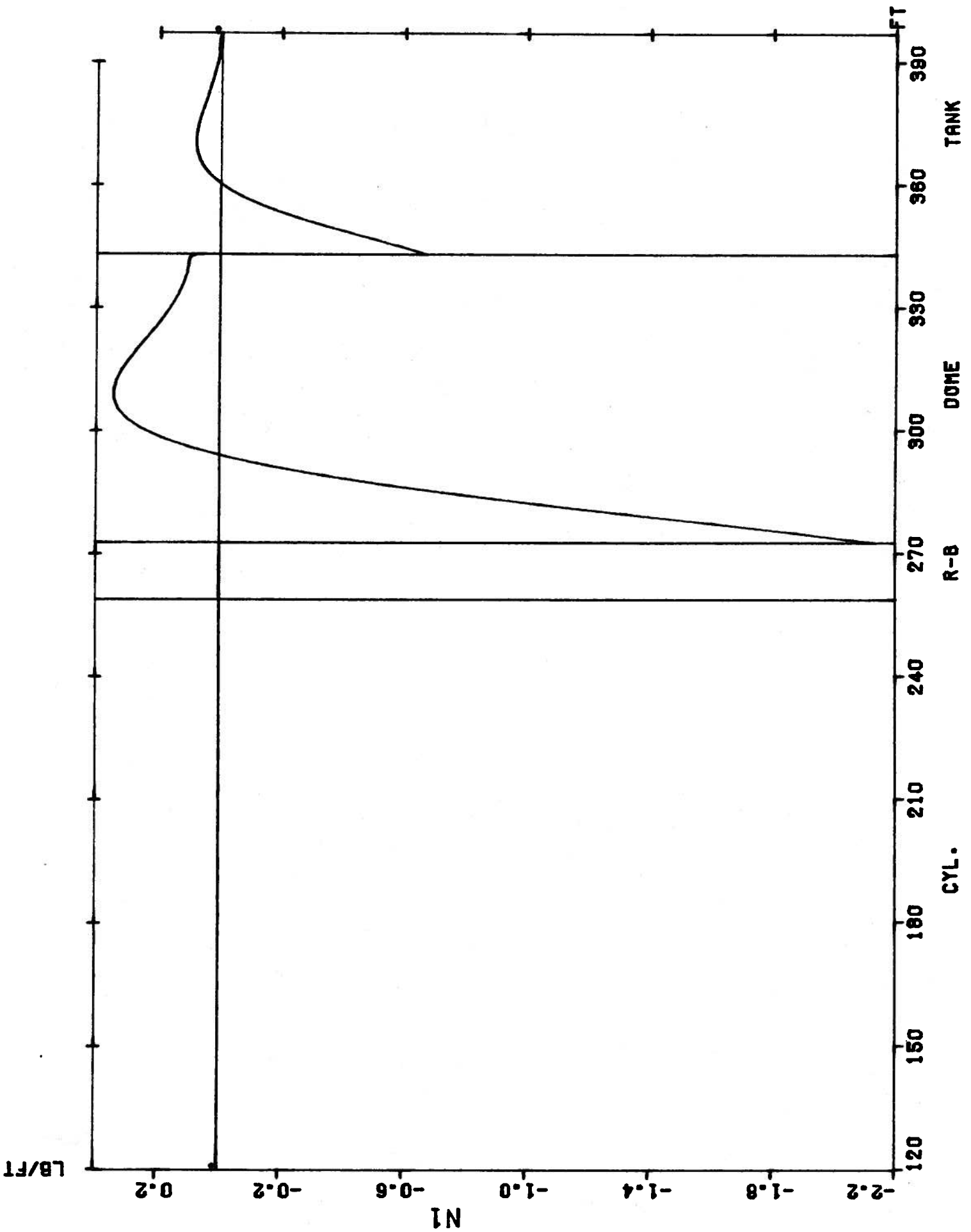


FIGURE C18 N_1 for Loading Case C:UBf

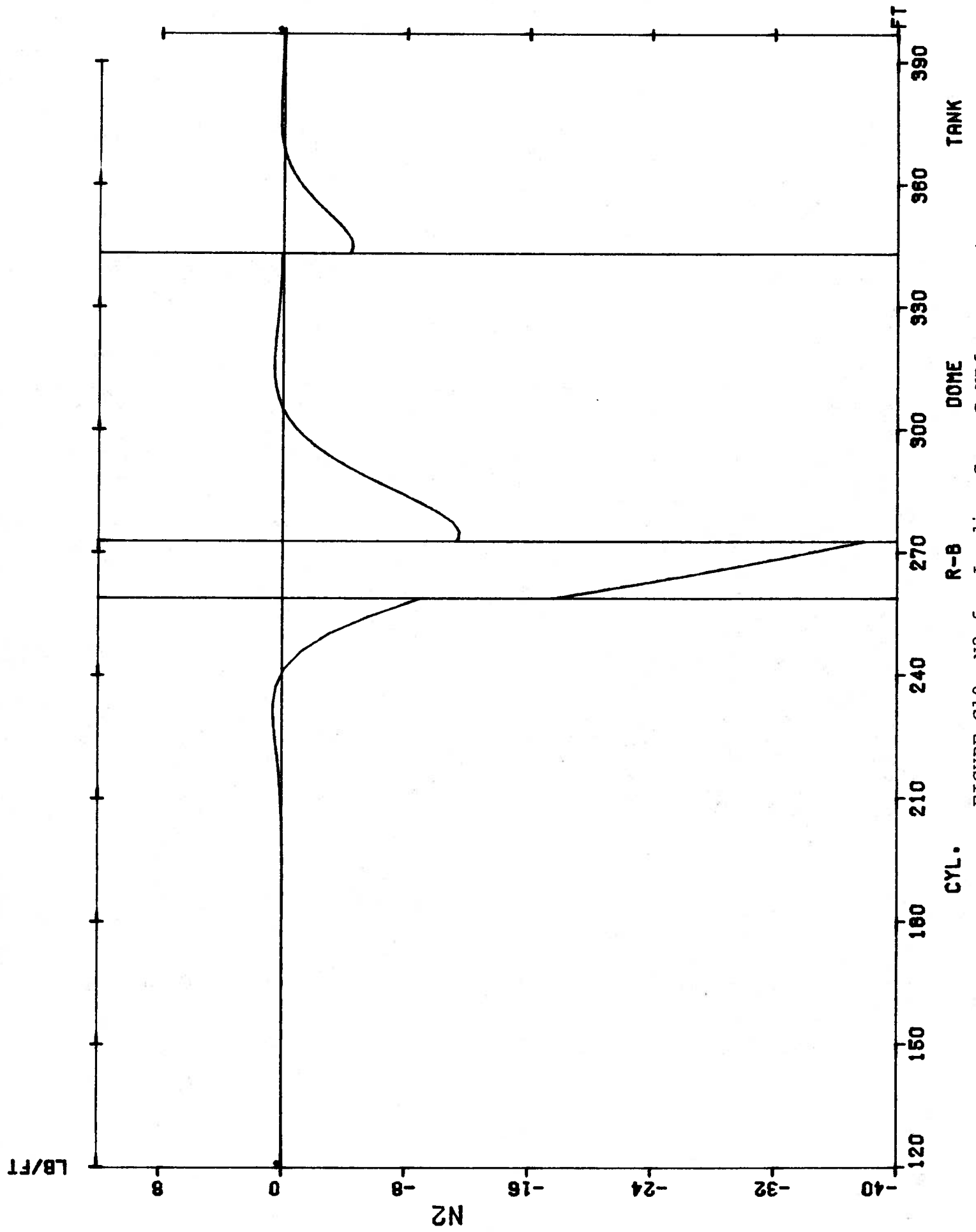


FIGURE C19 N2 for Loading Case C:UBf

CYL.

R-B

DOME

TANK

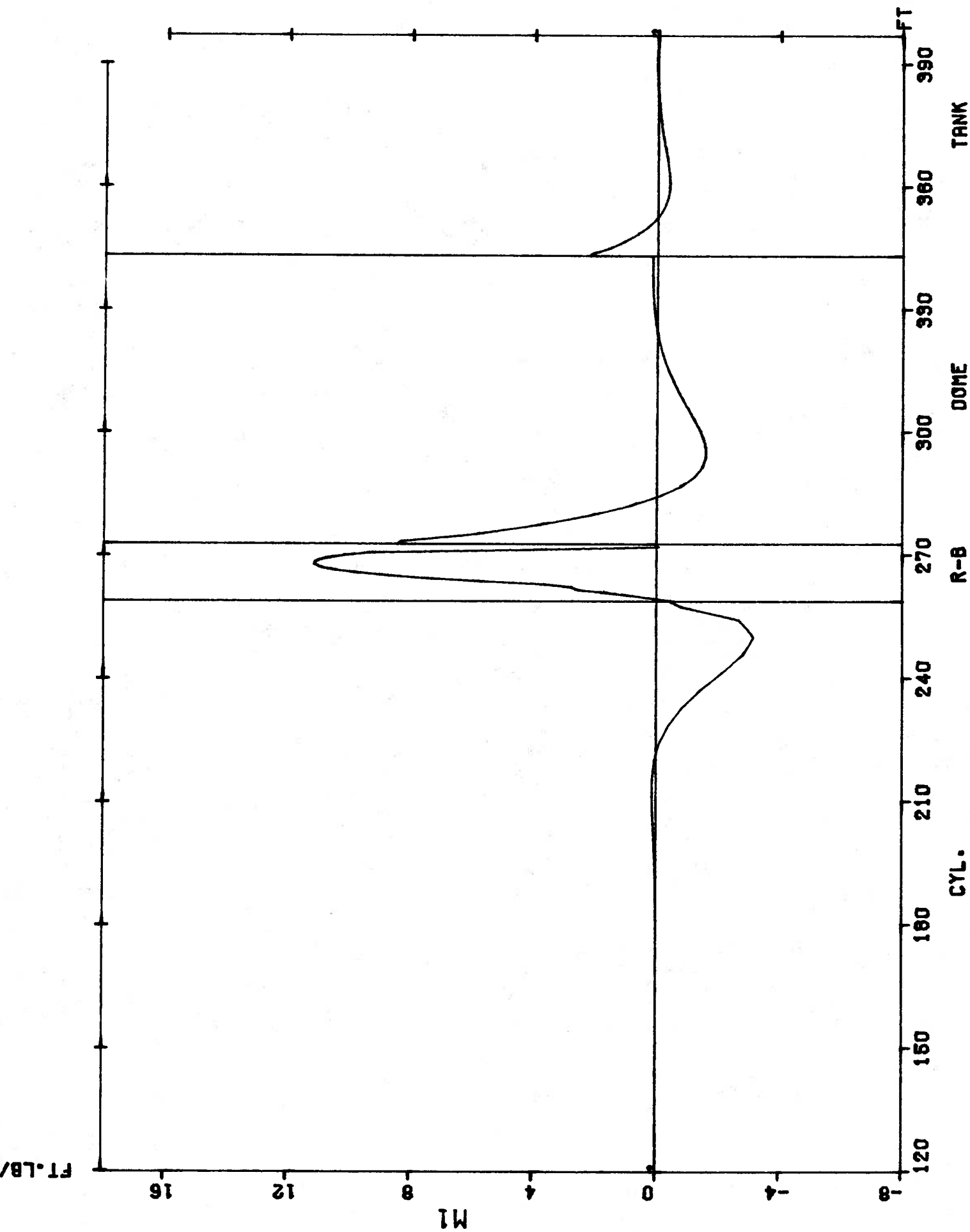
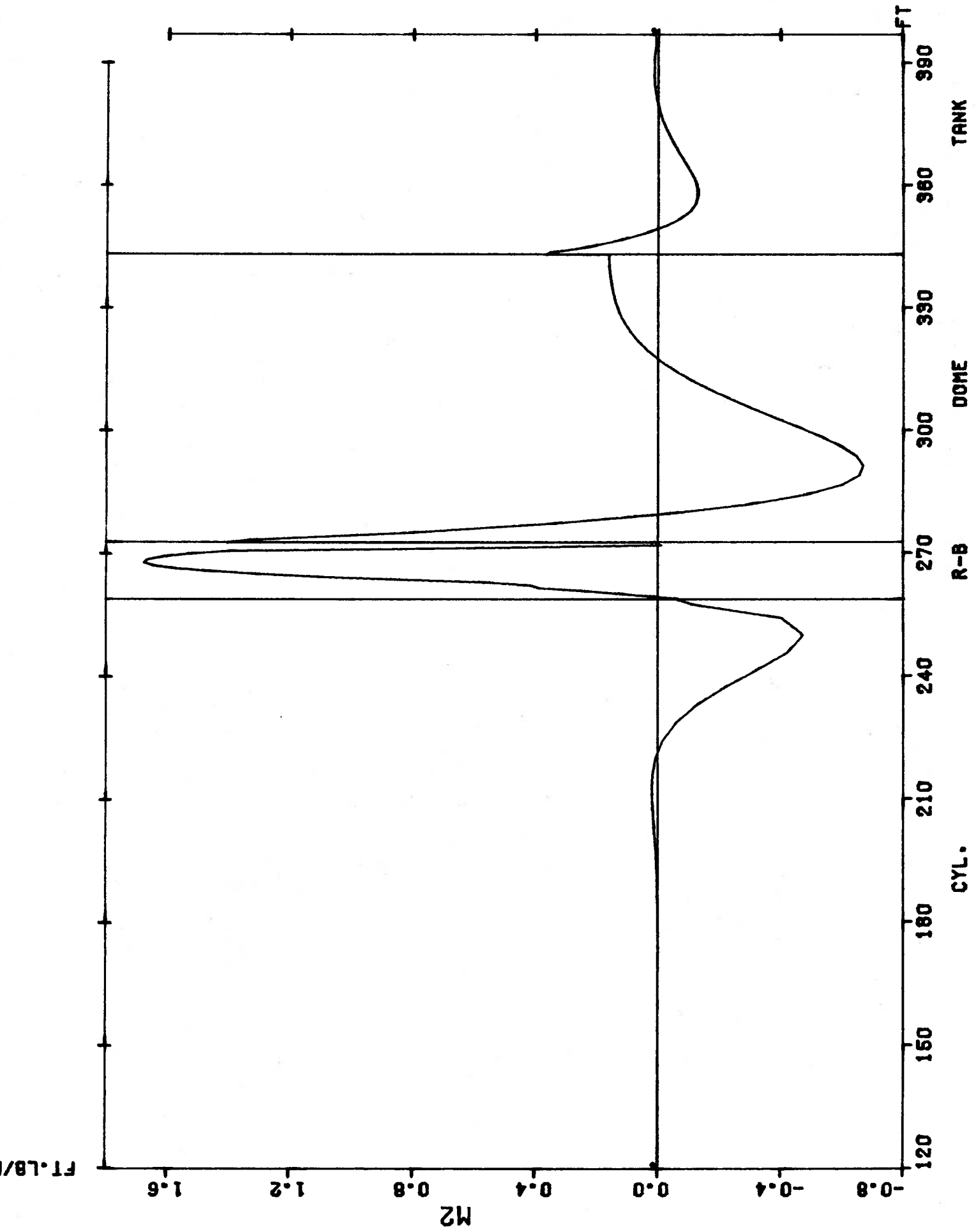


FIGURE C20 M_1 for Loading Case C:UBf



STATION 001 50 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500 7000 7500 8000 8500 9000 9500 10000

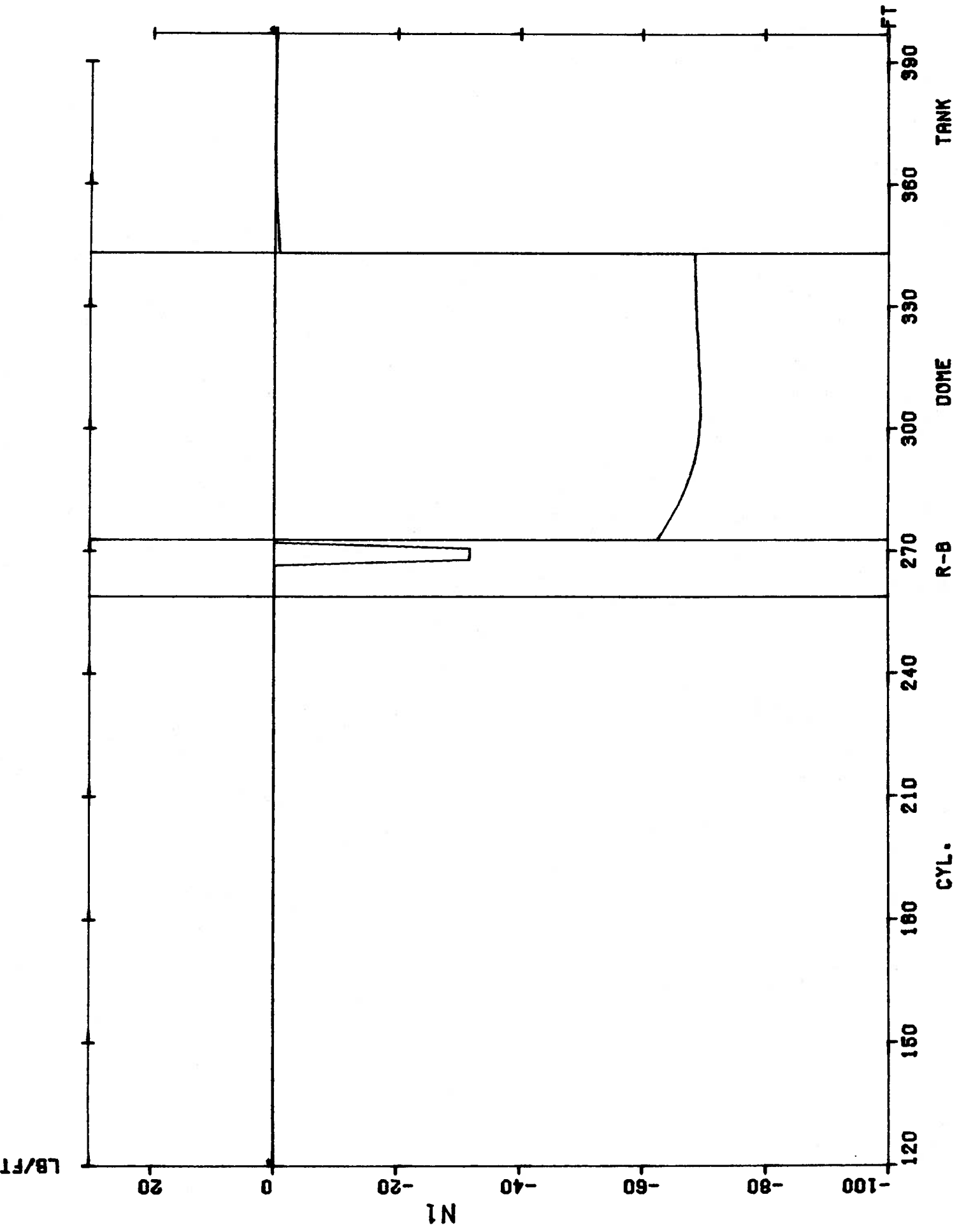


FIGURE C22 N1 for Loading Case C-INDF

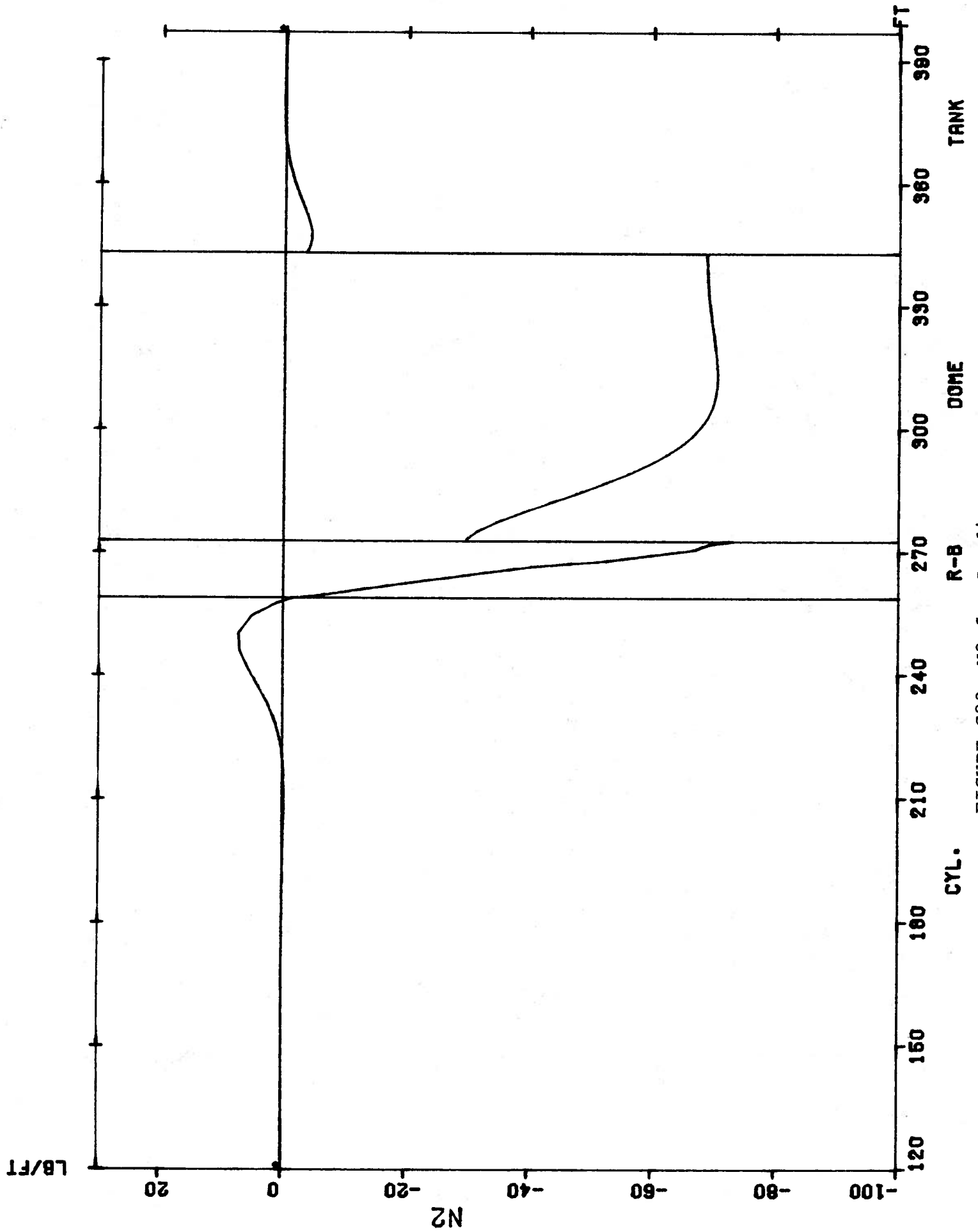


FIGURE C23 N2 for Loading Case C:UDF

CYL.

R-B

DOME

TANK

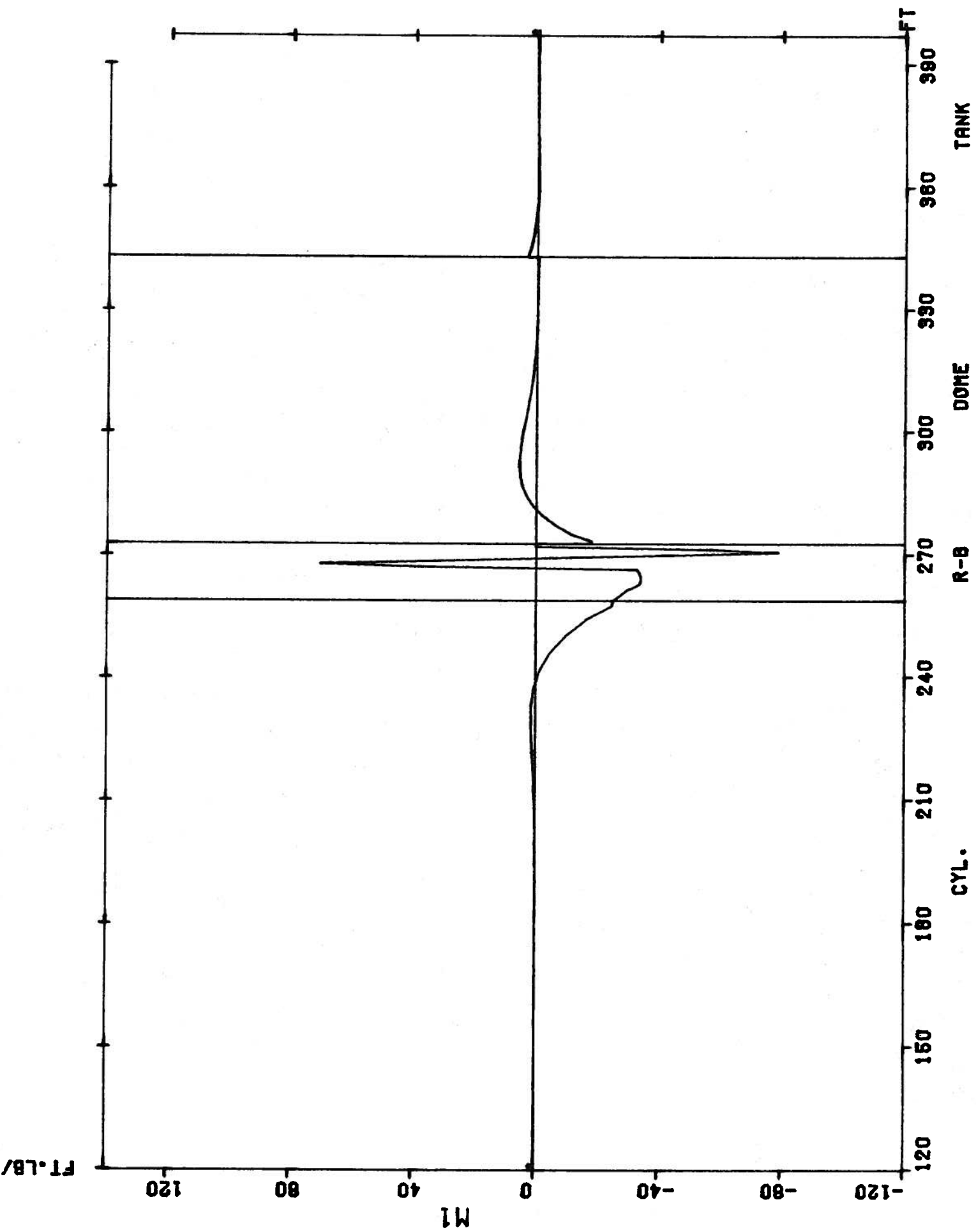


FIGURE C24 M_1 for Loading Case C:UDf

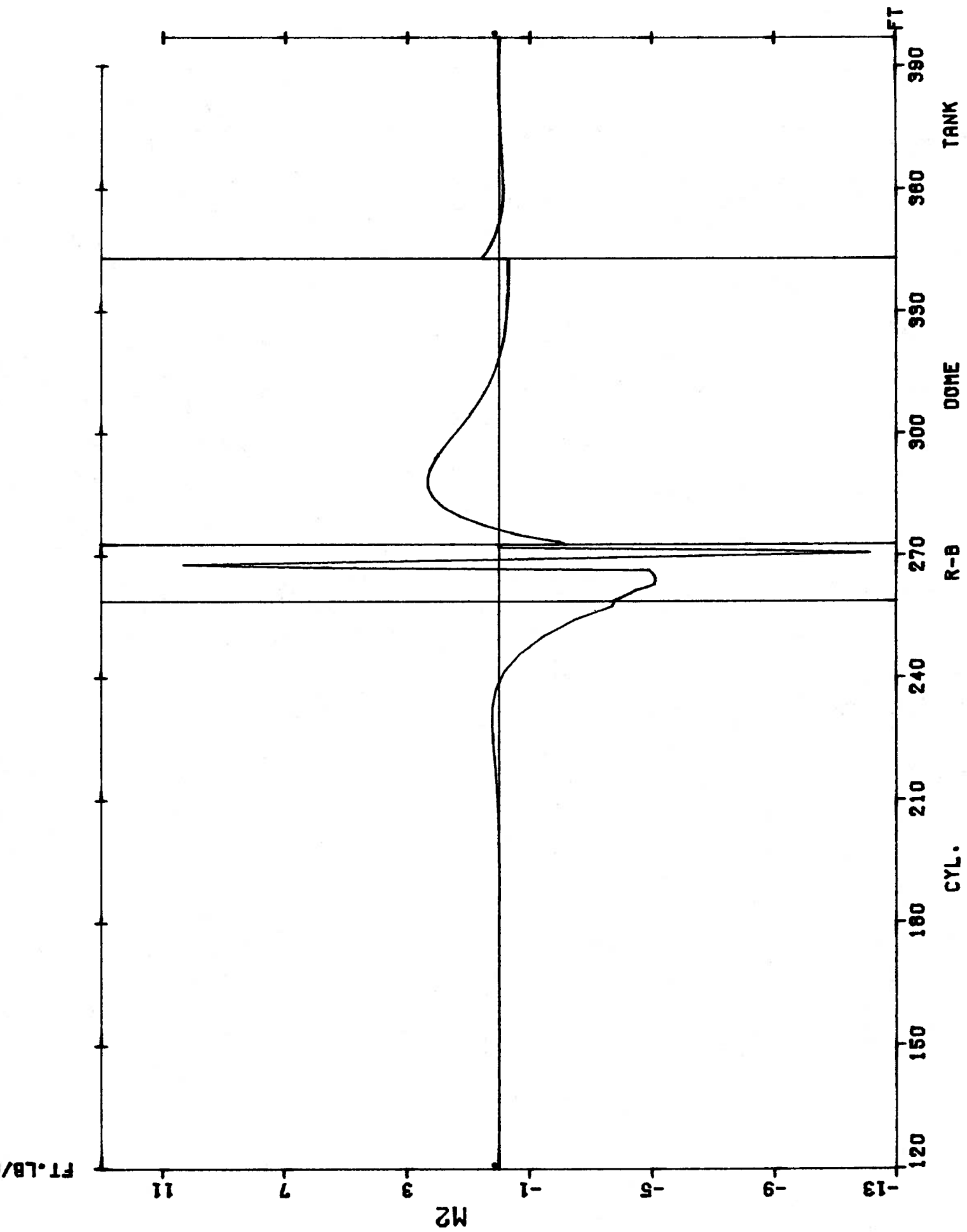


FIGURE C25 M2 for Loading Case C.INDF

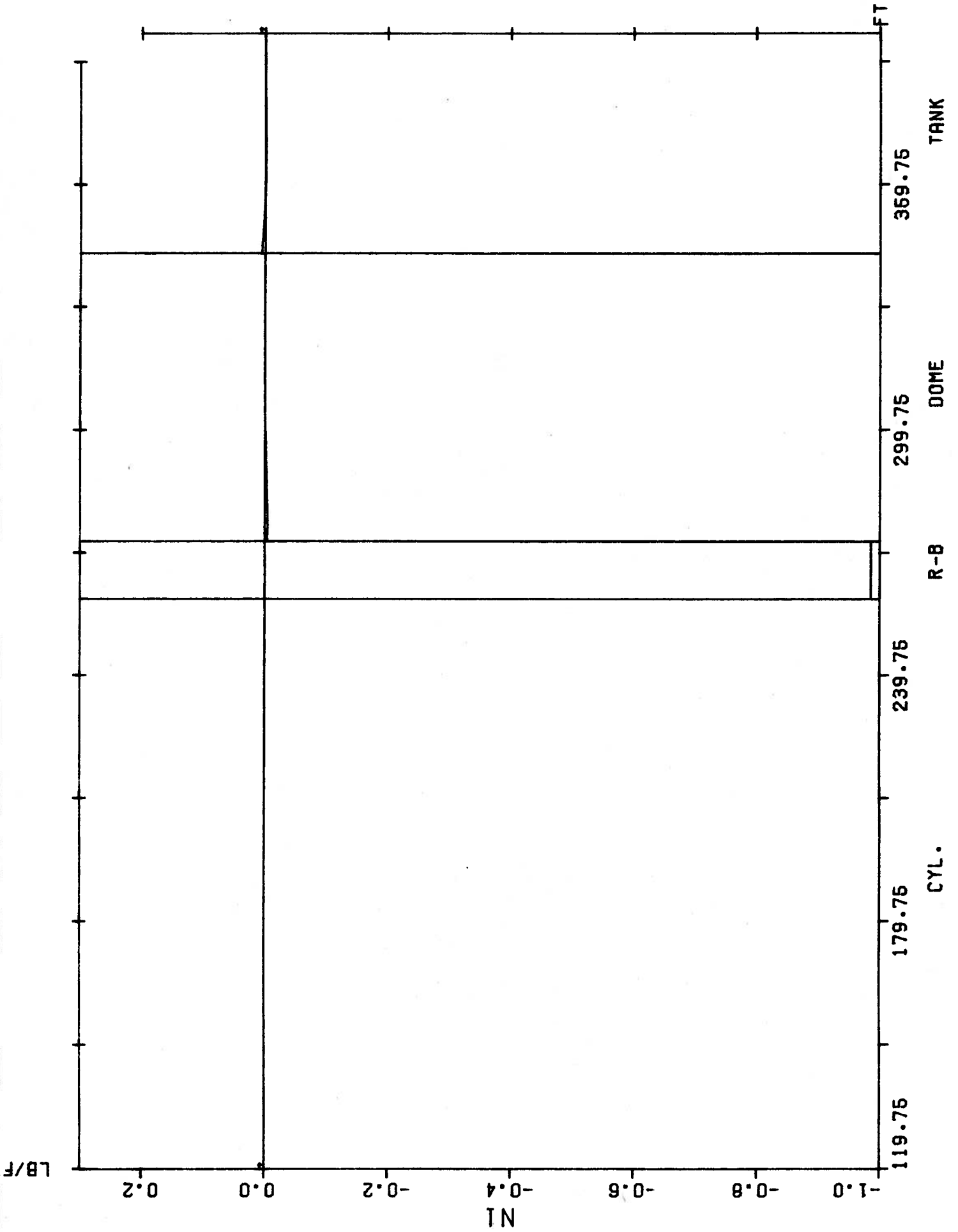


FIGURE C26 NI for Loading Case C:wvf

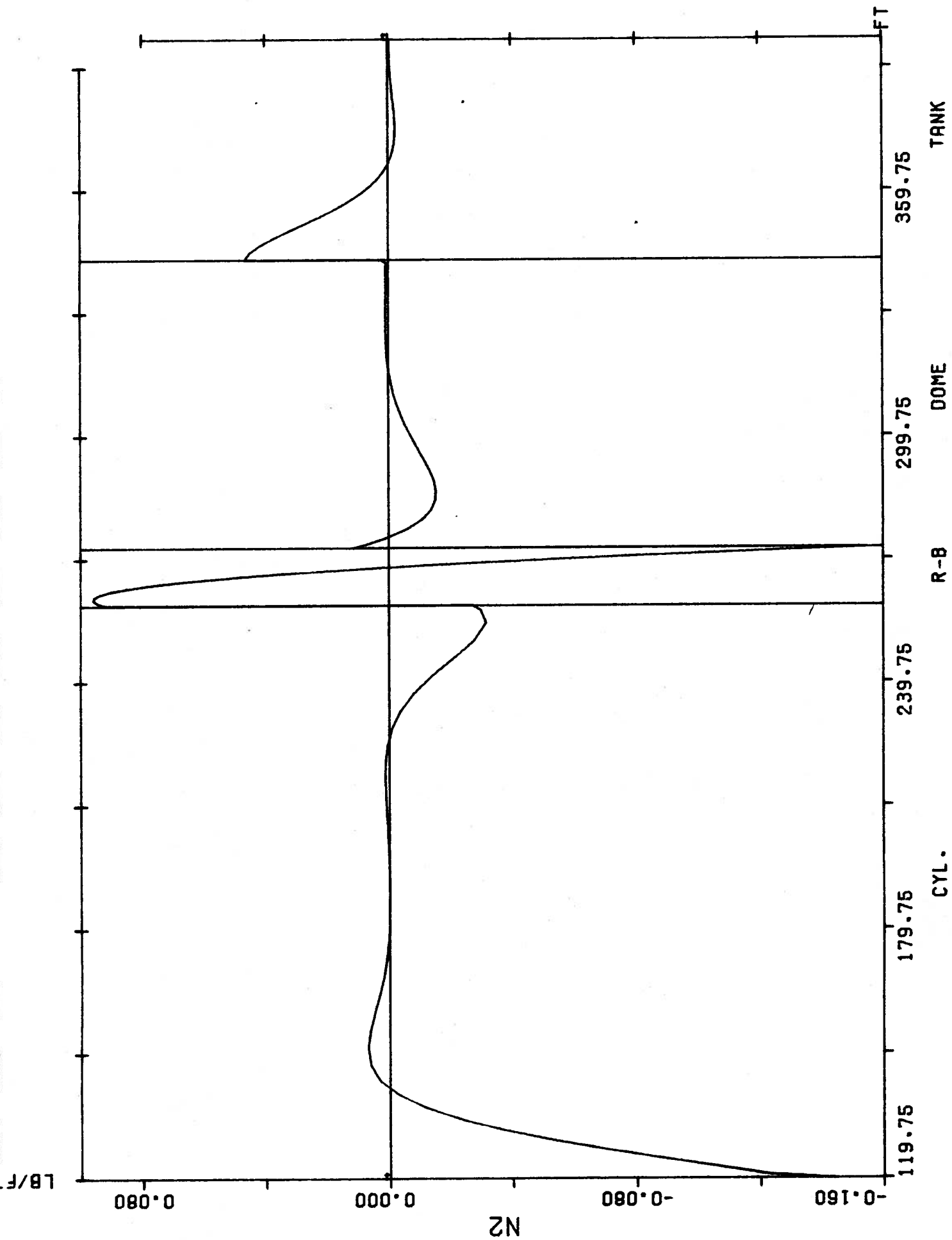


FIGURE C27 N2 for Loading Case C:Wvf

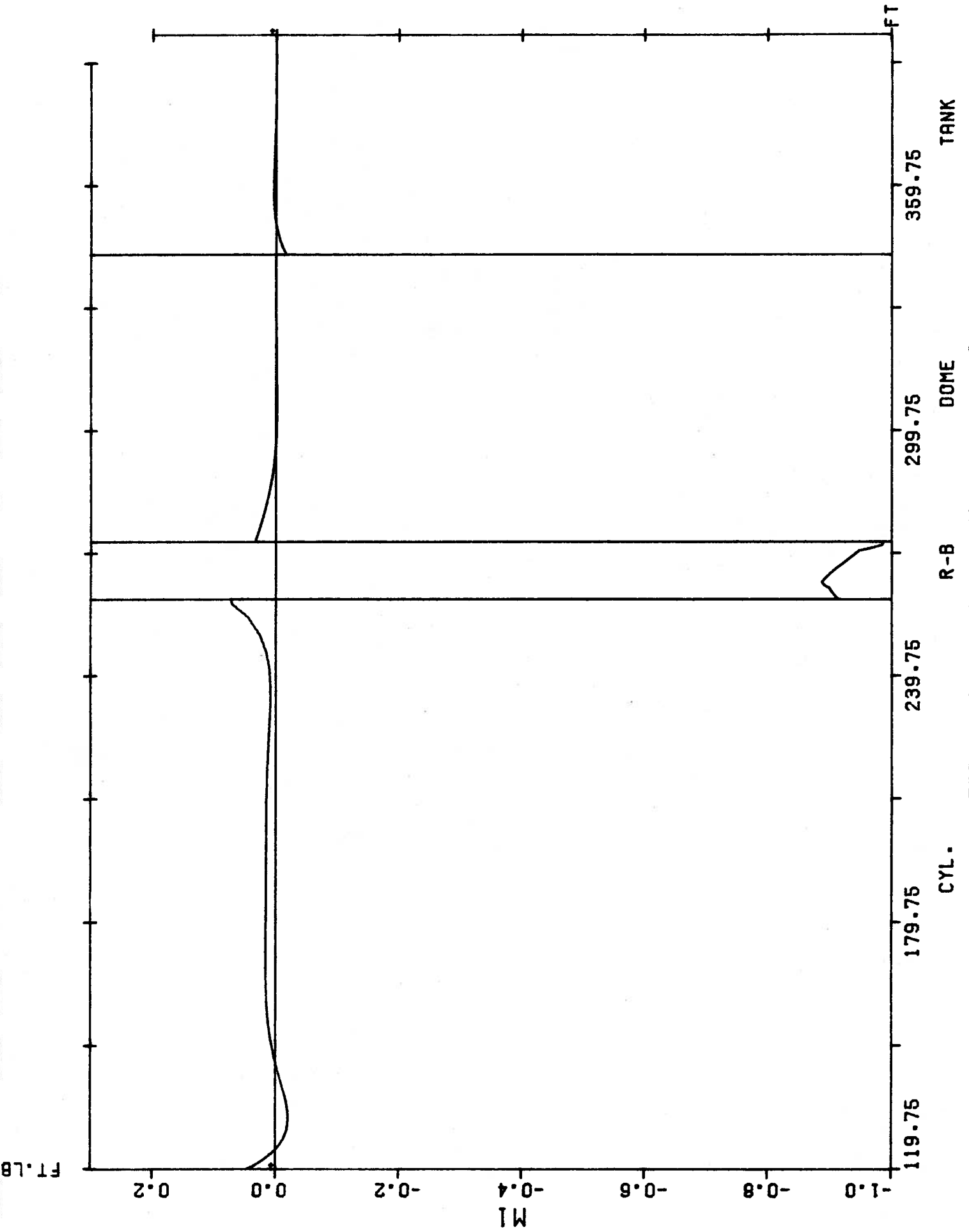


FIGURE C28 M1 for Loading Case C:Wvf

CYL.

R-B

DOME

TANK

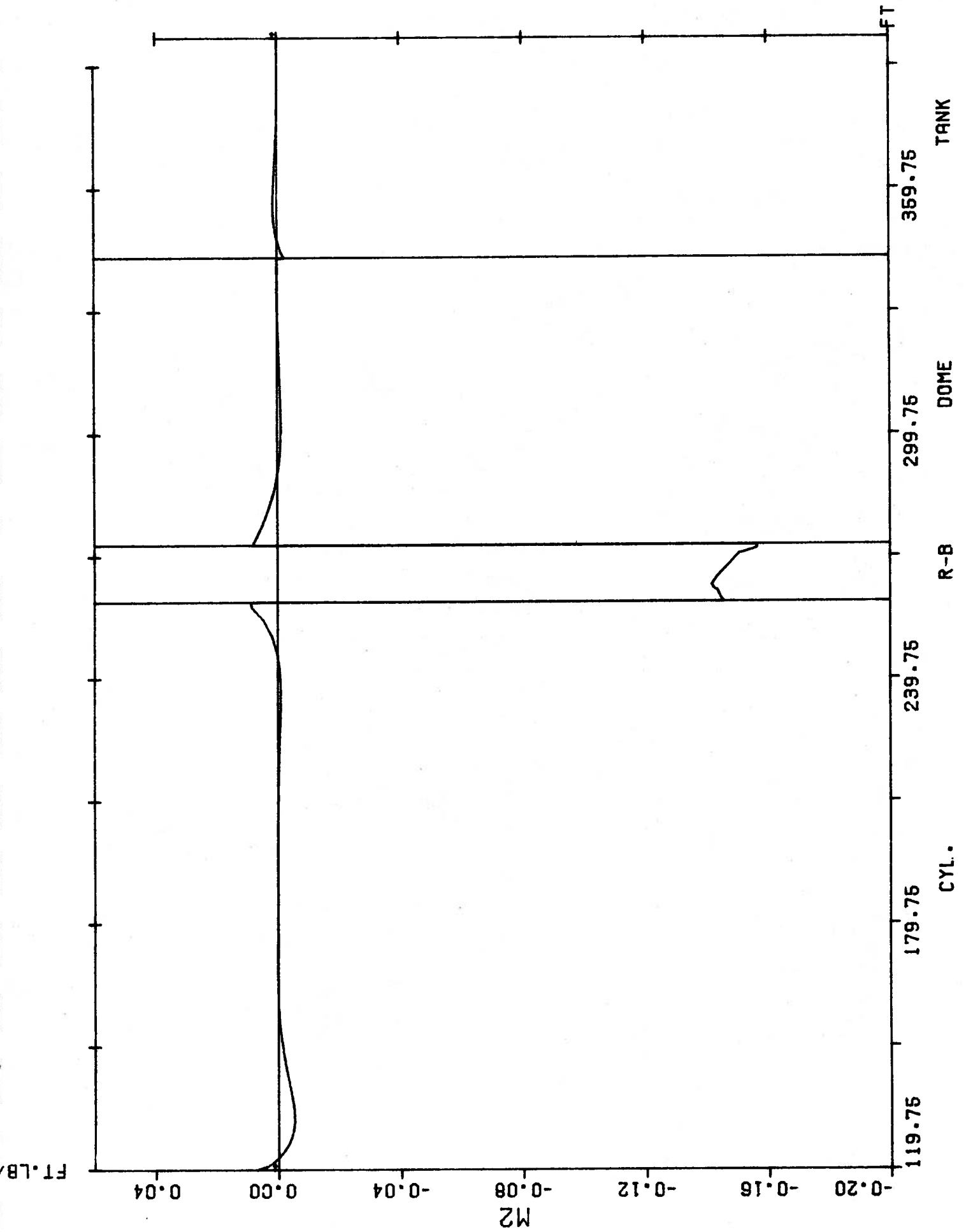
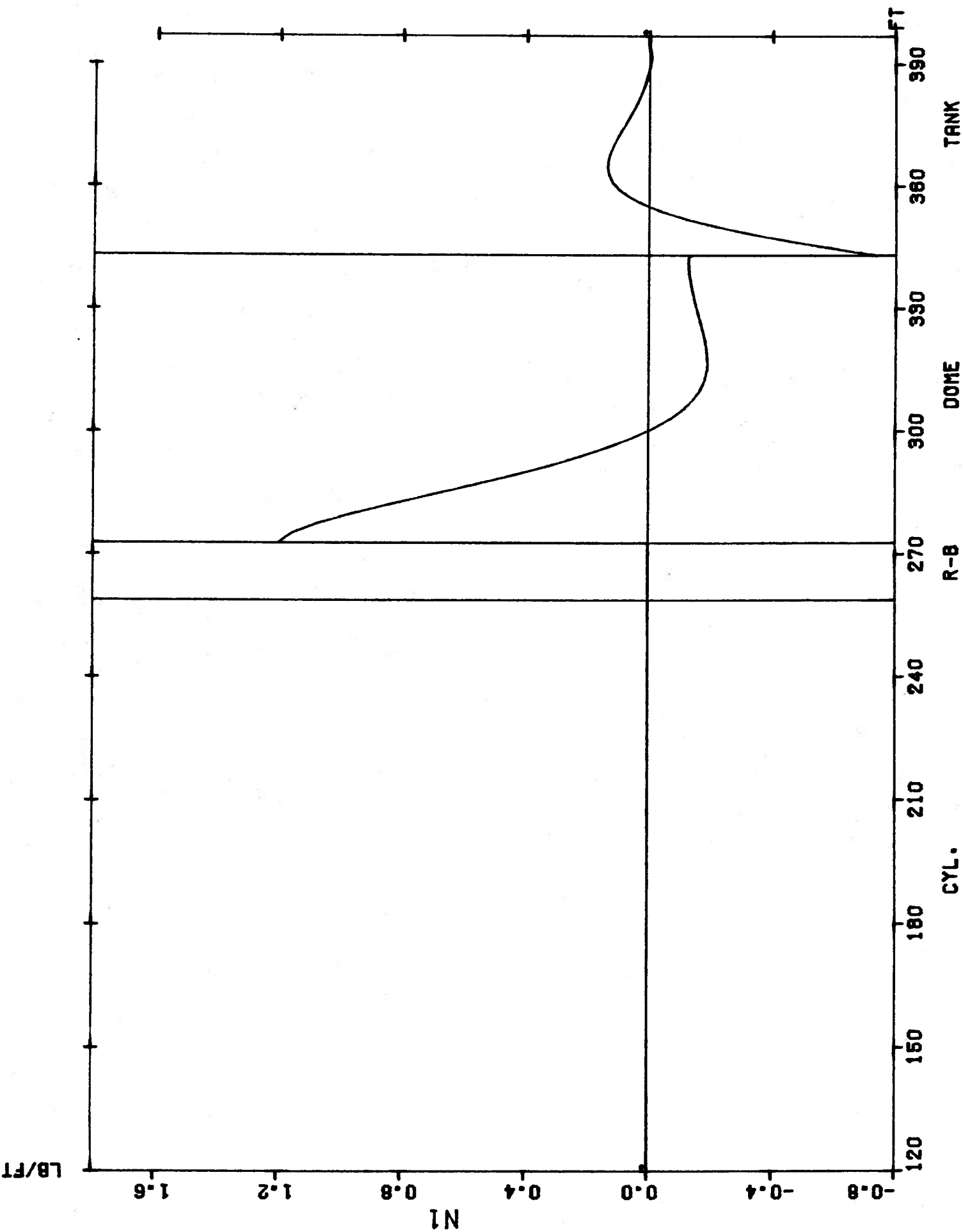


FIGURE C29 M2 for Loading Case C:WVF



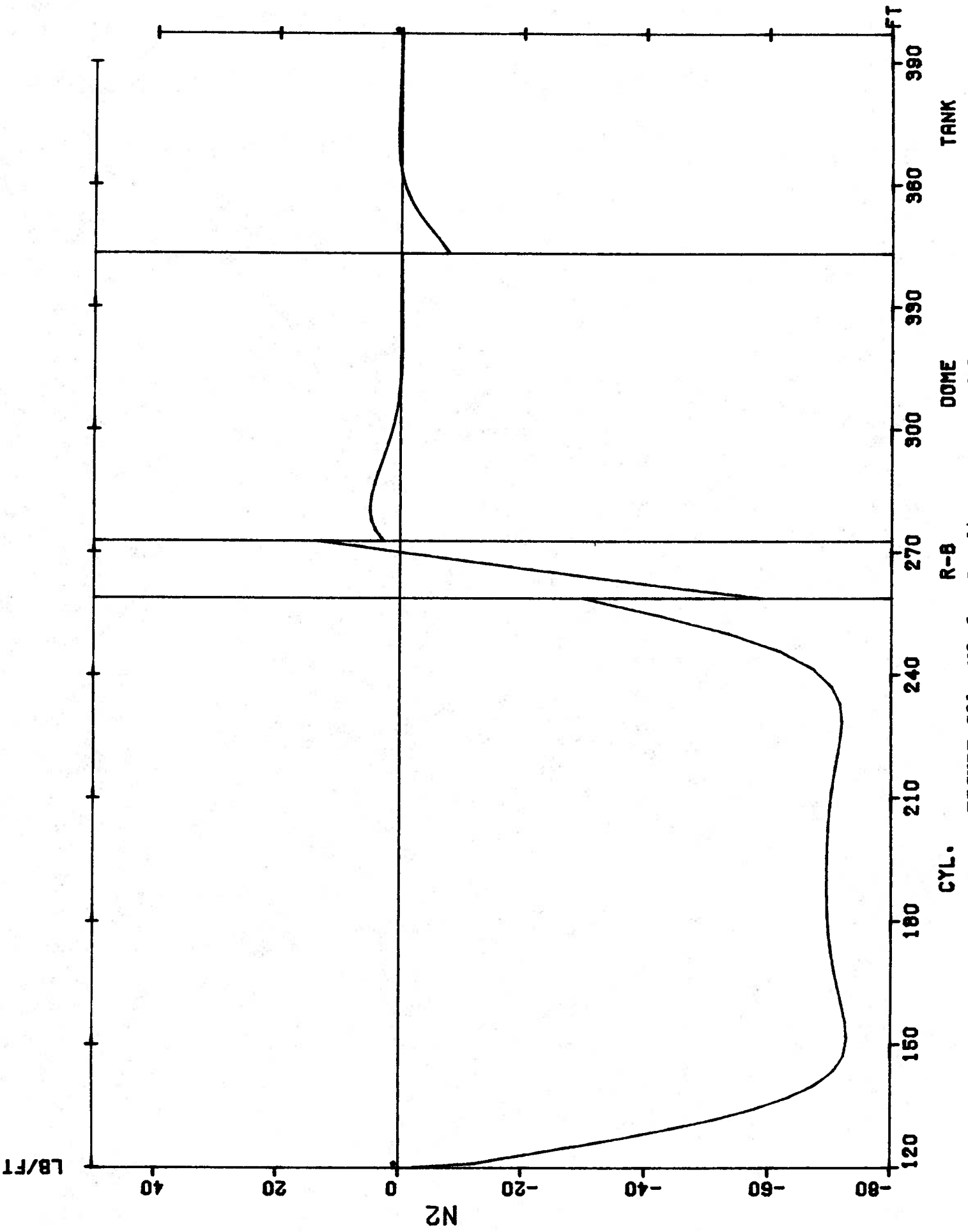


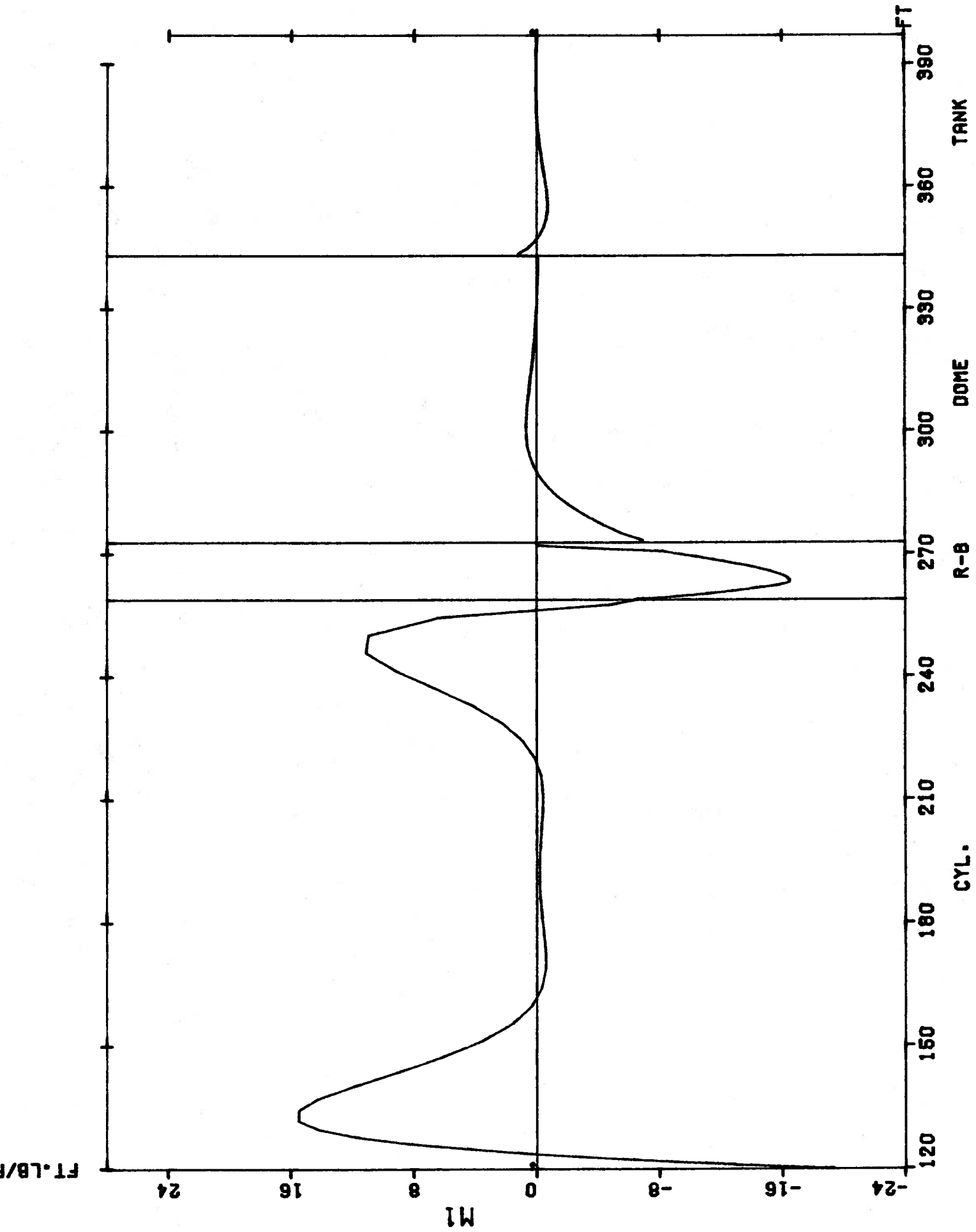
FIGURE C31 N2 for Loading Case C:Whf

CYL.

R-B

DOME

TANK



STAIRS 000 M1 FOR TANKING DOME CYL. & R-B

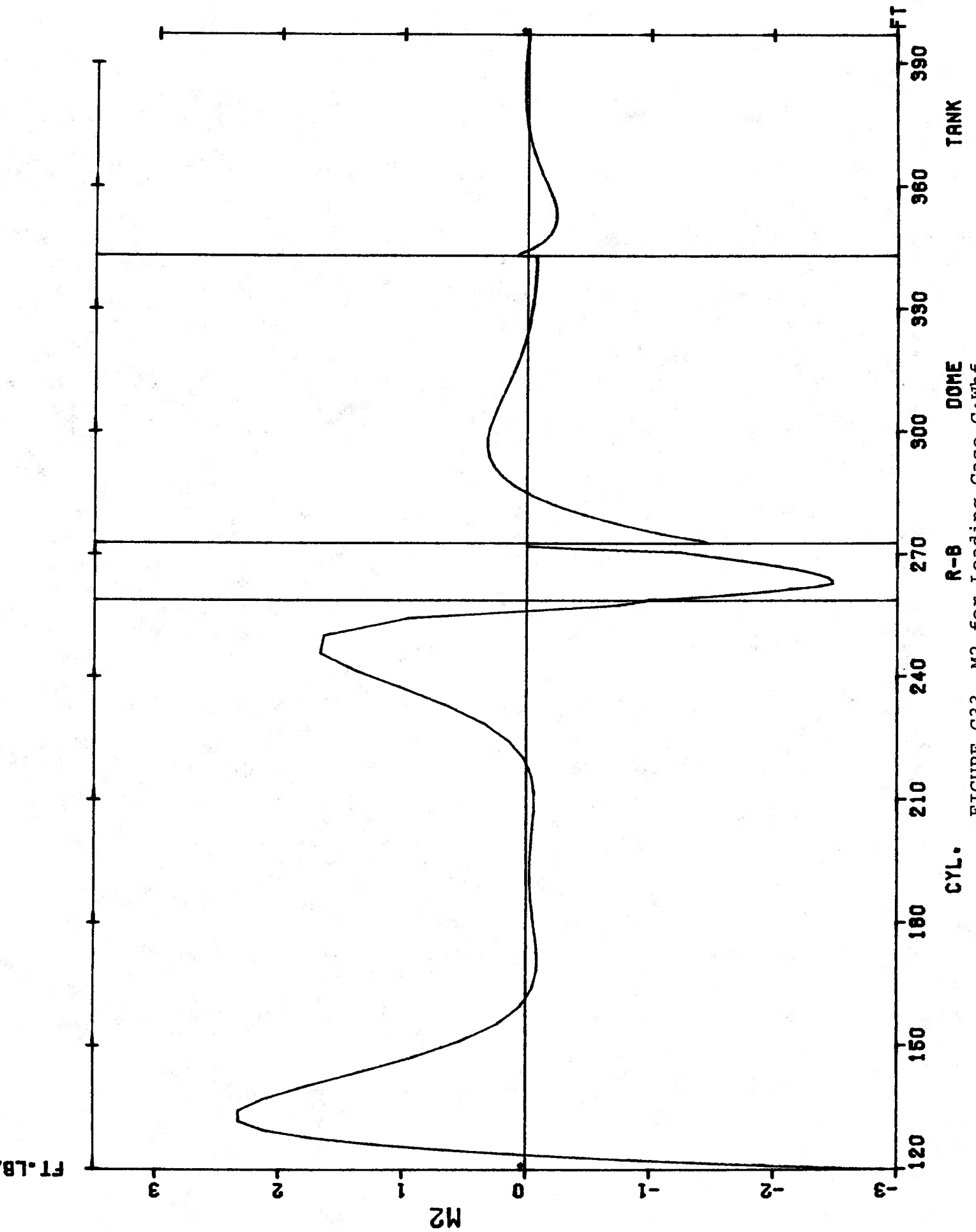


FIGURE C33 M_2 for Loading Case C:Whf

CYL.

R-B

DOME

TANK

APPENDIX D

Stress Resultants for Uniform Influence Strains

List of Figures for Appendix D

(Note: See Sect. 2.4 for load case designations)

Figure	Title
D1	N2 for Loading Case BW:Bu
D2	M1 for Loading Case BW:Bu
D3	M2 for Loading Case BW:Bu
D4	N2 for Loading Case BW:Wu
D5	M1 for Loading Case BW:Wu
D6	M2 for Loading Case BW:Wu
D7	N1 for Loading Case BD:Bu
D8	N2 for Loading Case BD:Bu
D9	M1 for Loading Case BD:Bu
D10	M2 for Loading Case BD:Bu
D11	N1 for Loading Case BD:Wu
D12	N2 for Loading Case BD:Wu
D13	M1 for Loading Case BD:Wu
D14	M2 for Loading Case BD:Wu
D15	N1 for Loading Case BD:LBu
D16	N2 for Loading Case BD:LBu
D17	M1 for Loading Case BD:LBu
D18	M2 for Loading Case BD:LBu
D19	N1 for Loading Case BD:LDu
D20	N2 for Loading Case BD:LDu
D21	M1 for Loading Case BD:LDu
D22	M2 for Loading Case BD:LDu
D23	N1 for Loading Case C:Bu
D24	N2 for Loading Case C:Bu
D25	M1 for Loading Case C:Bu
D26	M2 for Loading Case C:Bu

D27	N1	for Loading Case C:Wu
D28	N2	for Loading Case C:Wu
D29	M1	for Loading Case C:Wu
D30	M2	for Loading Case C:Wu
D31	N1	for Loading Case C:RBU
D32	N2	for Loading Case C:RBU
D33	M1	for Loading Case C:RBU
D34	M2	for Loading Case C:RBU
D35	N1	for Loading Case C:LDu
D36	N2	for Loading Case C:LDu
D37	M1	for Loading Case C:LDu
D38	M2	for Loading Case C:LDu
D39	N1	for Loading Case C:UDu
D40	N2	for Loading Case C:UDu
D41	M1	for Loading Case C:UDu
D42	M2	for Loading Case C:UDu
D43	N1	for Loading Case C:UBu
D44	N2	for Loading Case C:UBu
D45	M1	for Loading Case C:UBu
D46	M2	for Loading Case C:UBu

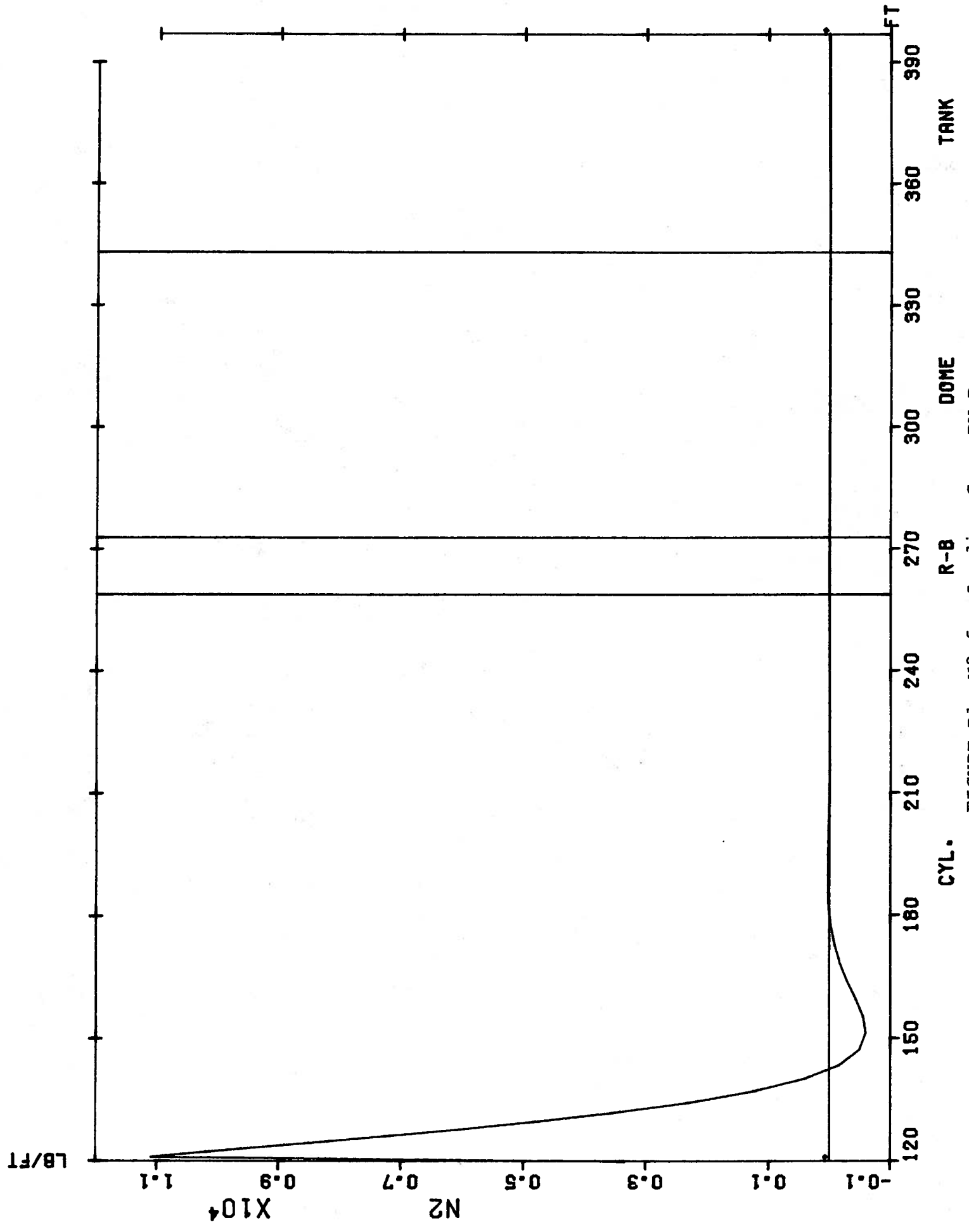


FIGURE D1 N2 for Loading Case BW:Bu

CYL.

TANK

DOME

R-B

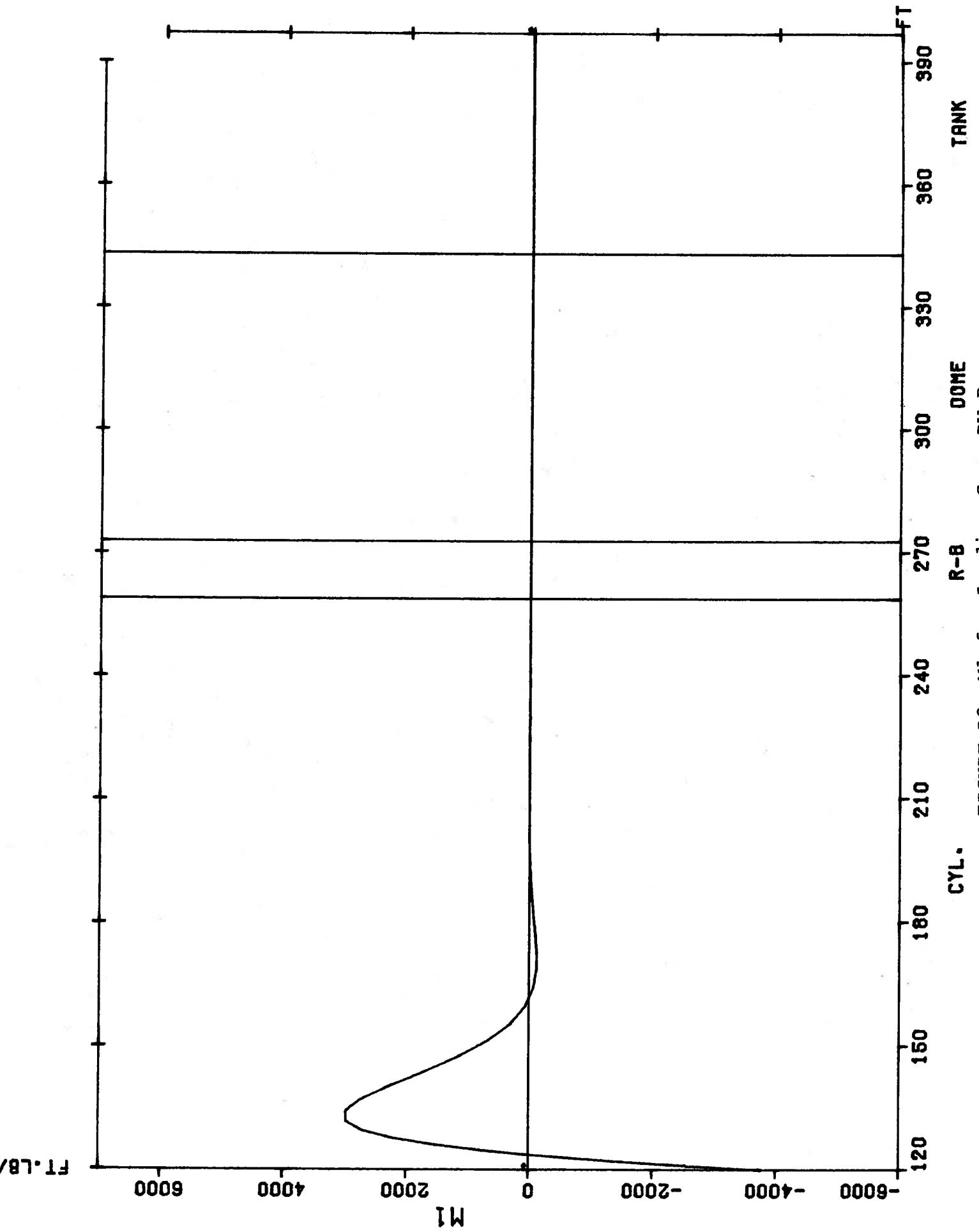


FIGURE D2 M1 for Loading Case BW:Bu

CYL.

R-B

DOME

TANK

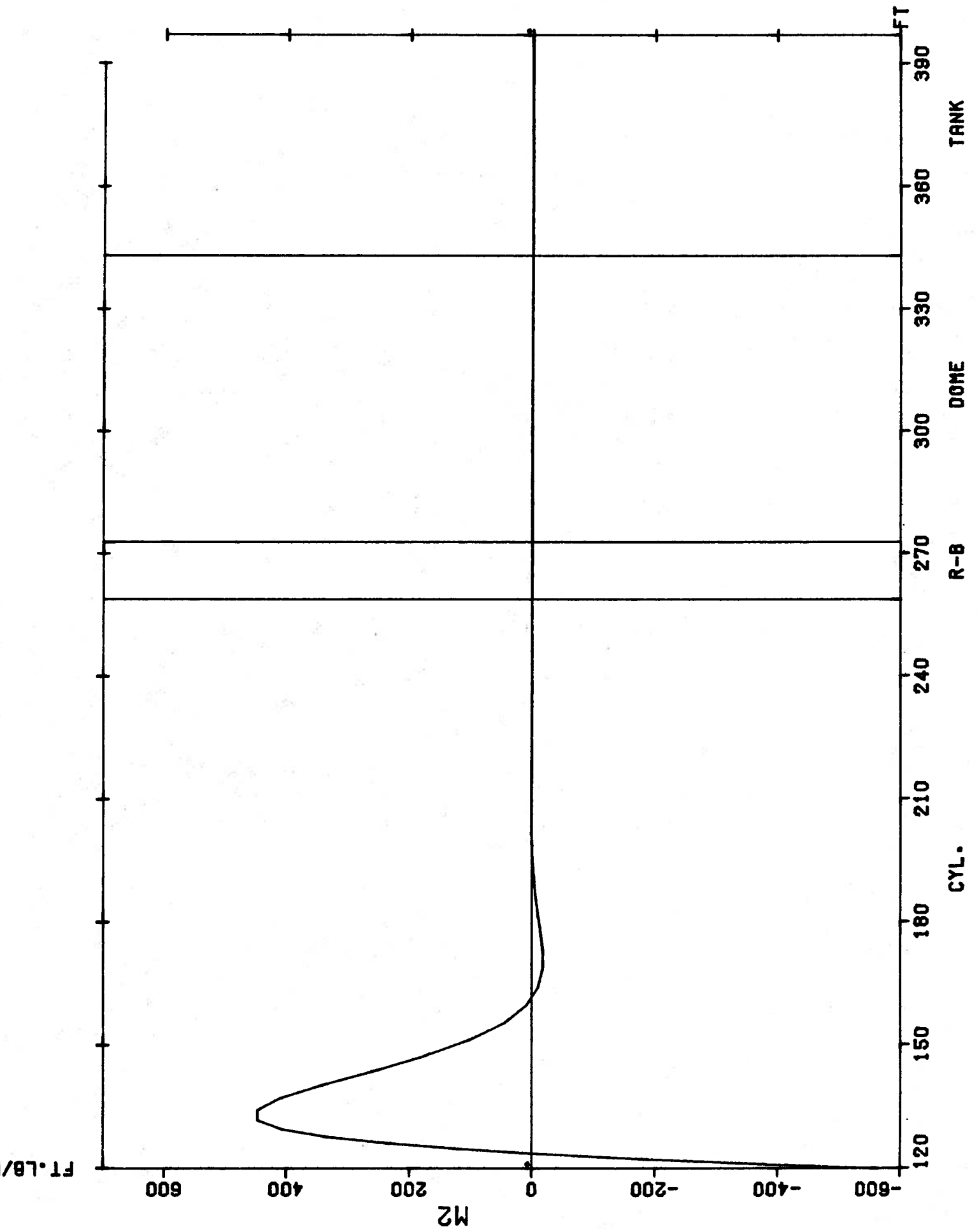


FIGURE D3 M_2 for Loading Case BW:Bu

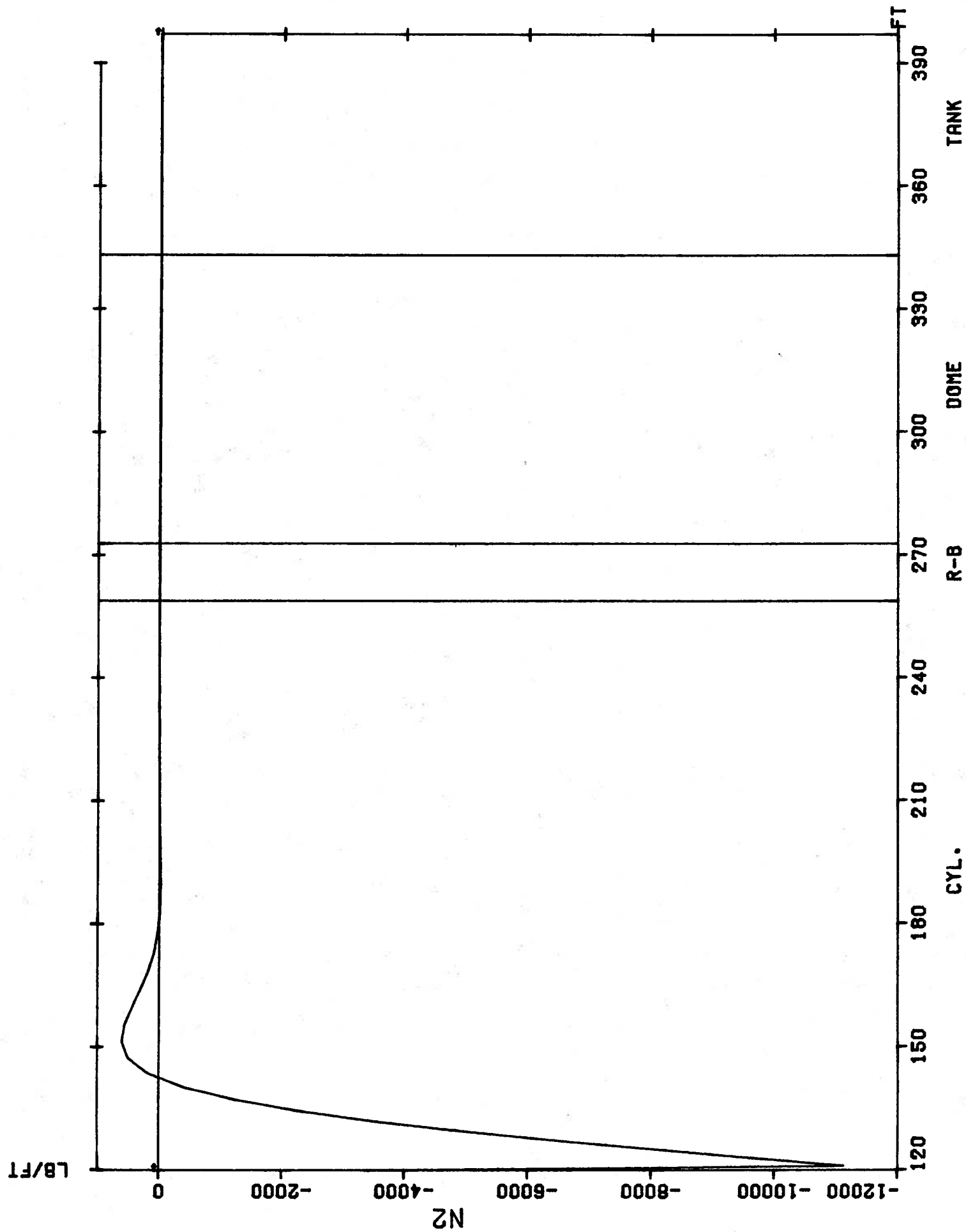


FIGURE D4 N2 for Loading Case BW:Wu

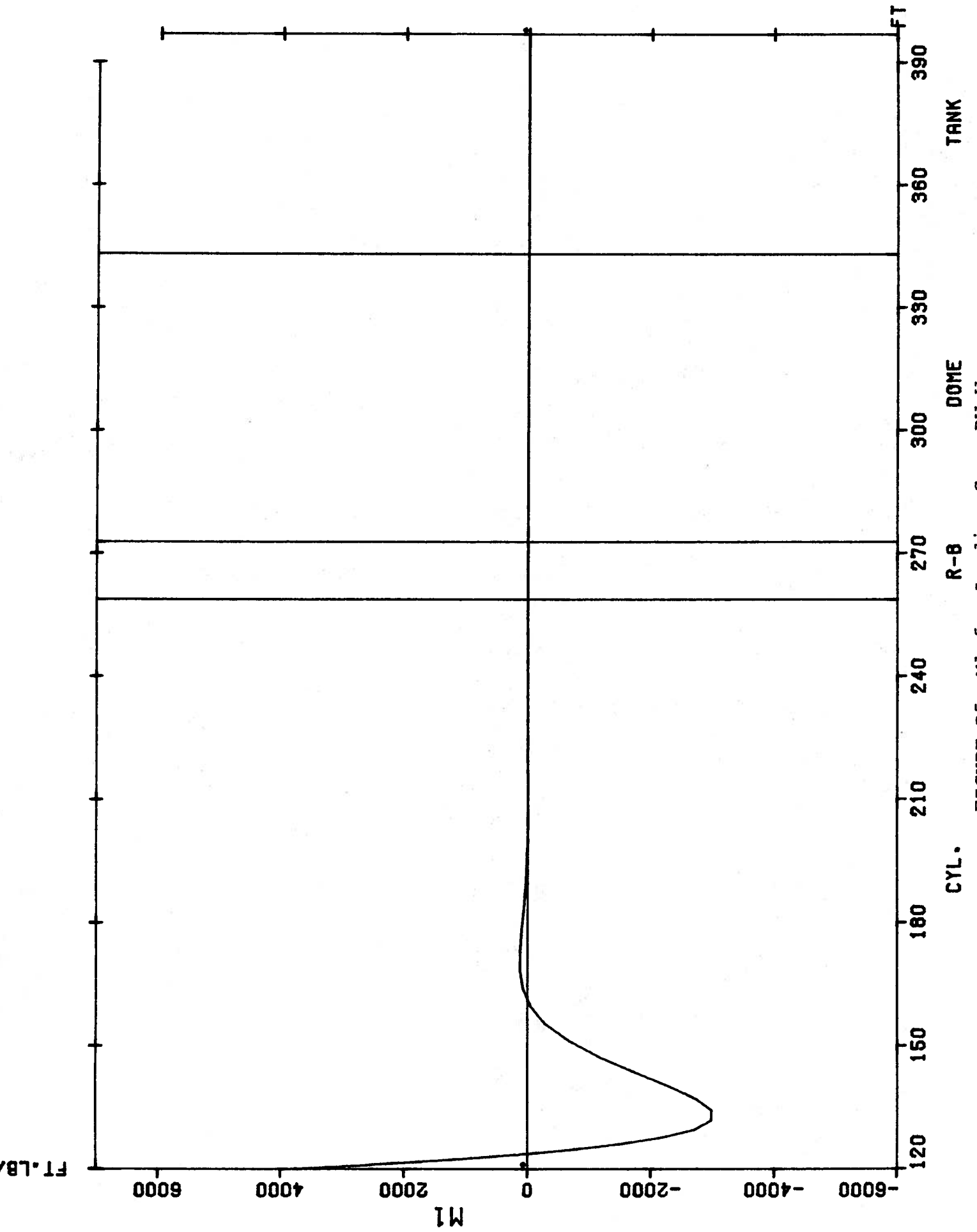


FIGURE D5 M1 for Loading Case BW:Wu

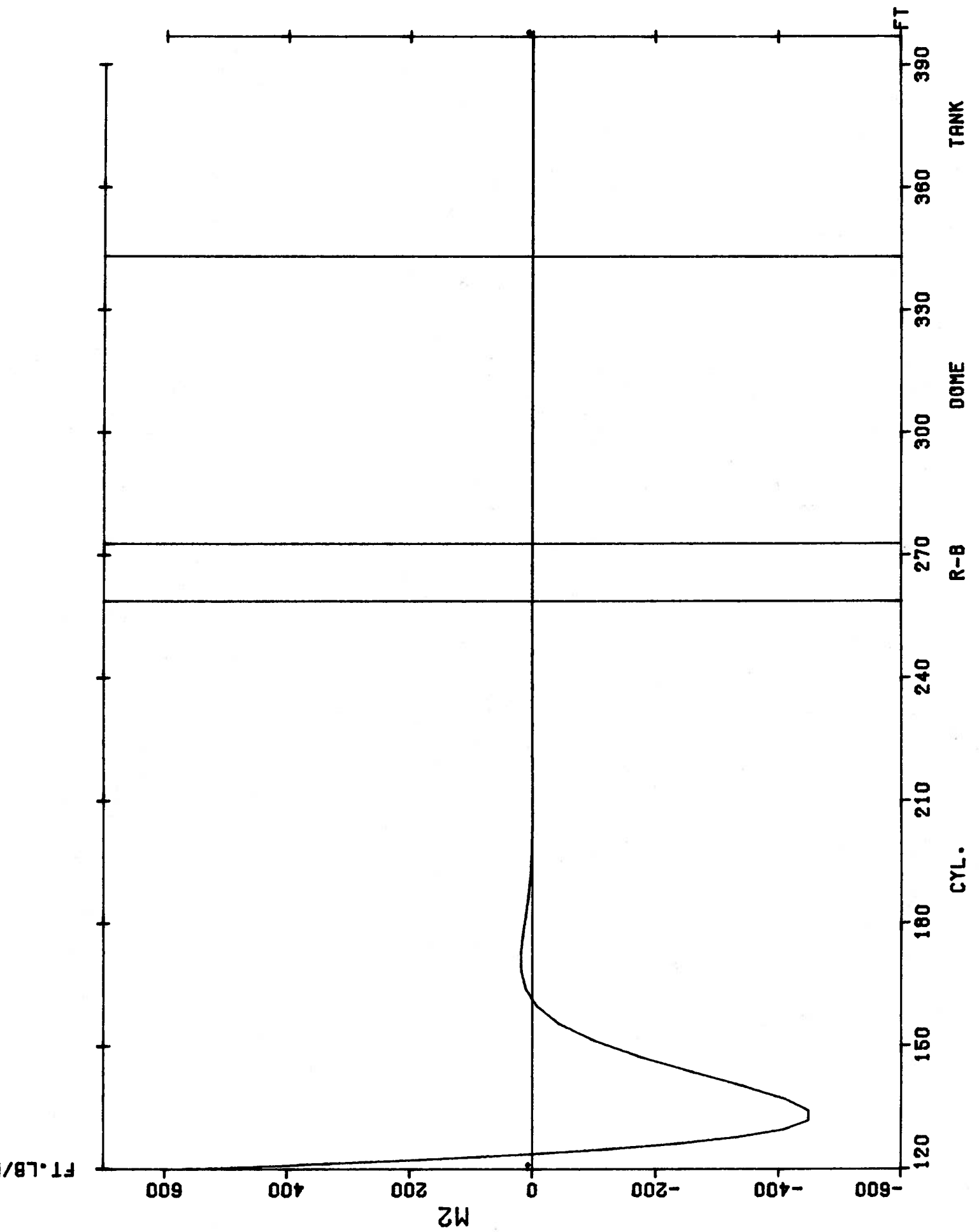


FIGURE D6 M_2 for Loading Case BW:Wu

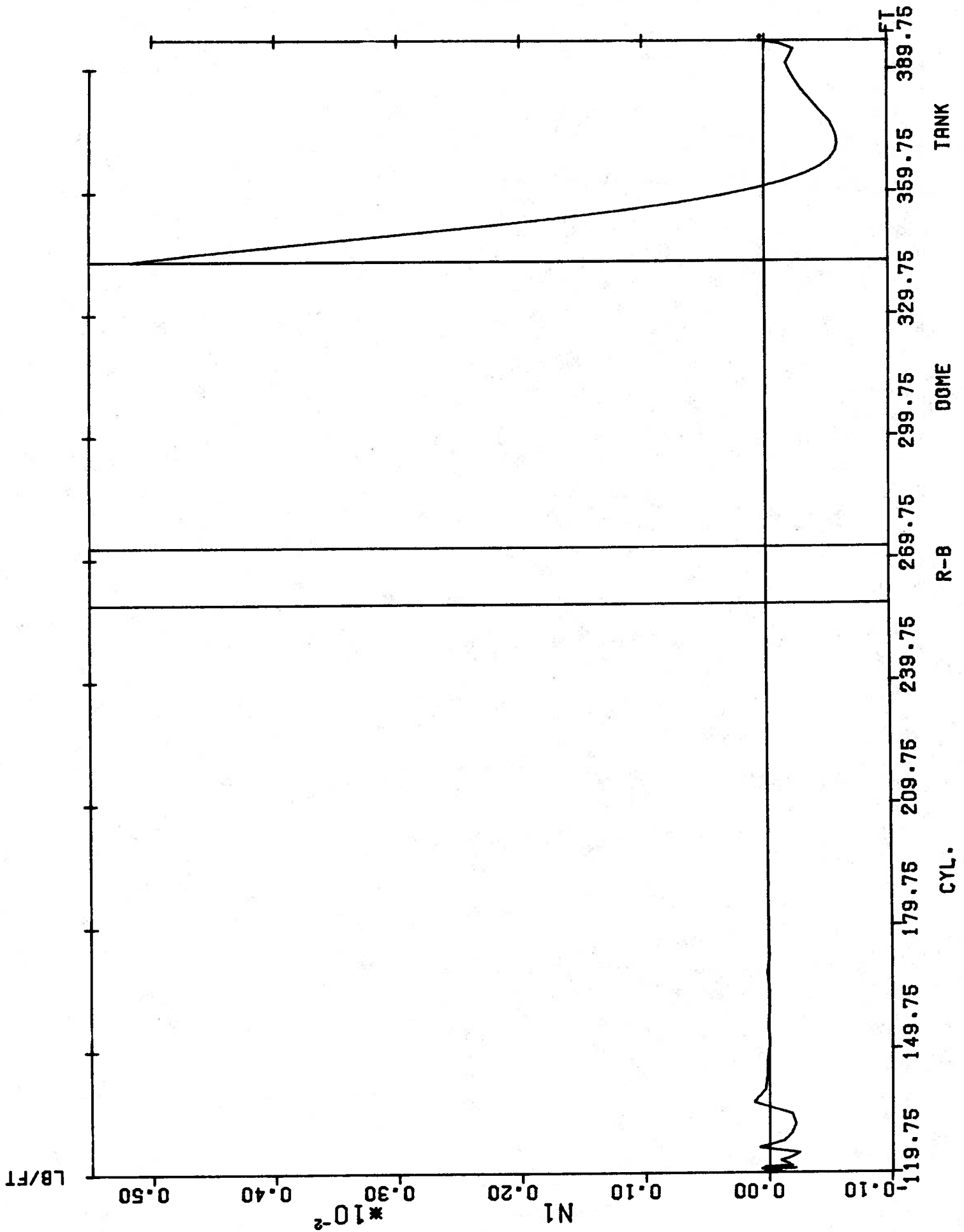


FIGURE D7 N1 for Loading Case BD:Bu

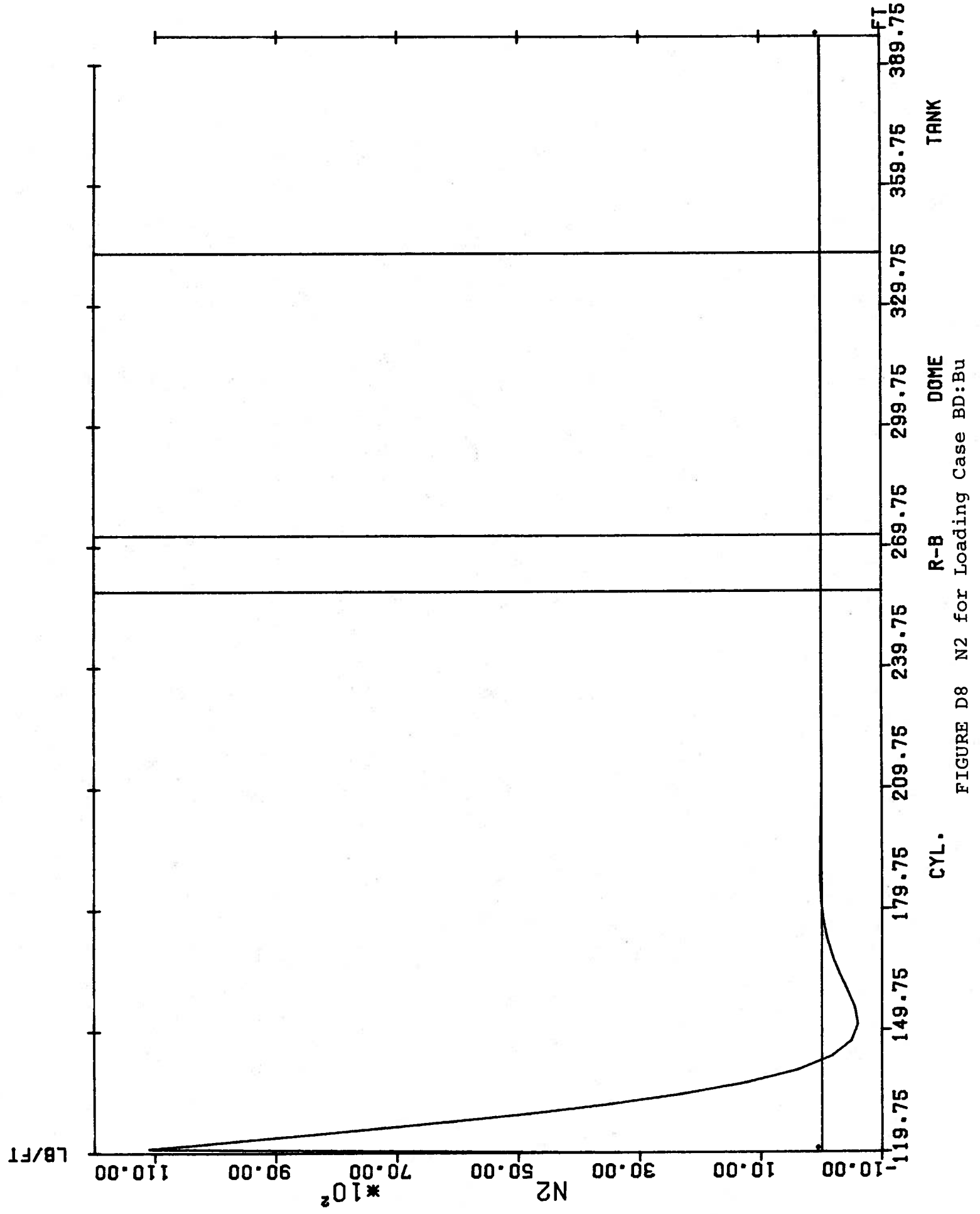


FIGURE D8 N2 for Loading Case BD:Bu

CYL.

R-B

DOME

TANK

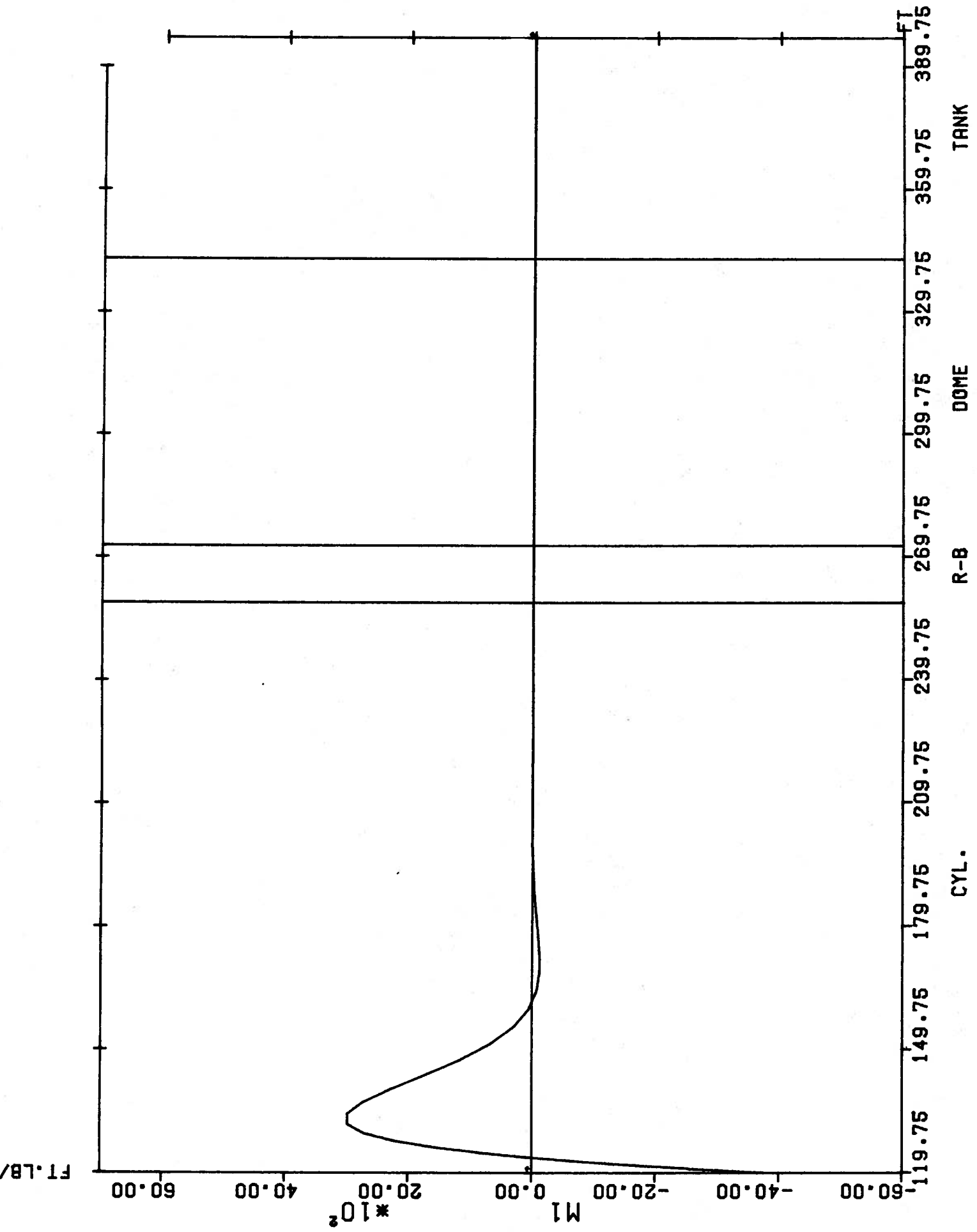


FIGURE D9 MI for Loading Case BD:Bu

CYL.

R-B

DOME

TANK

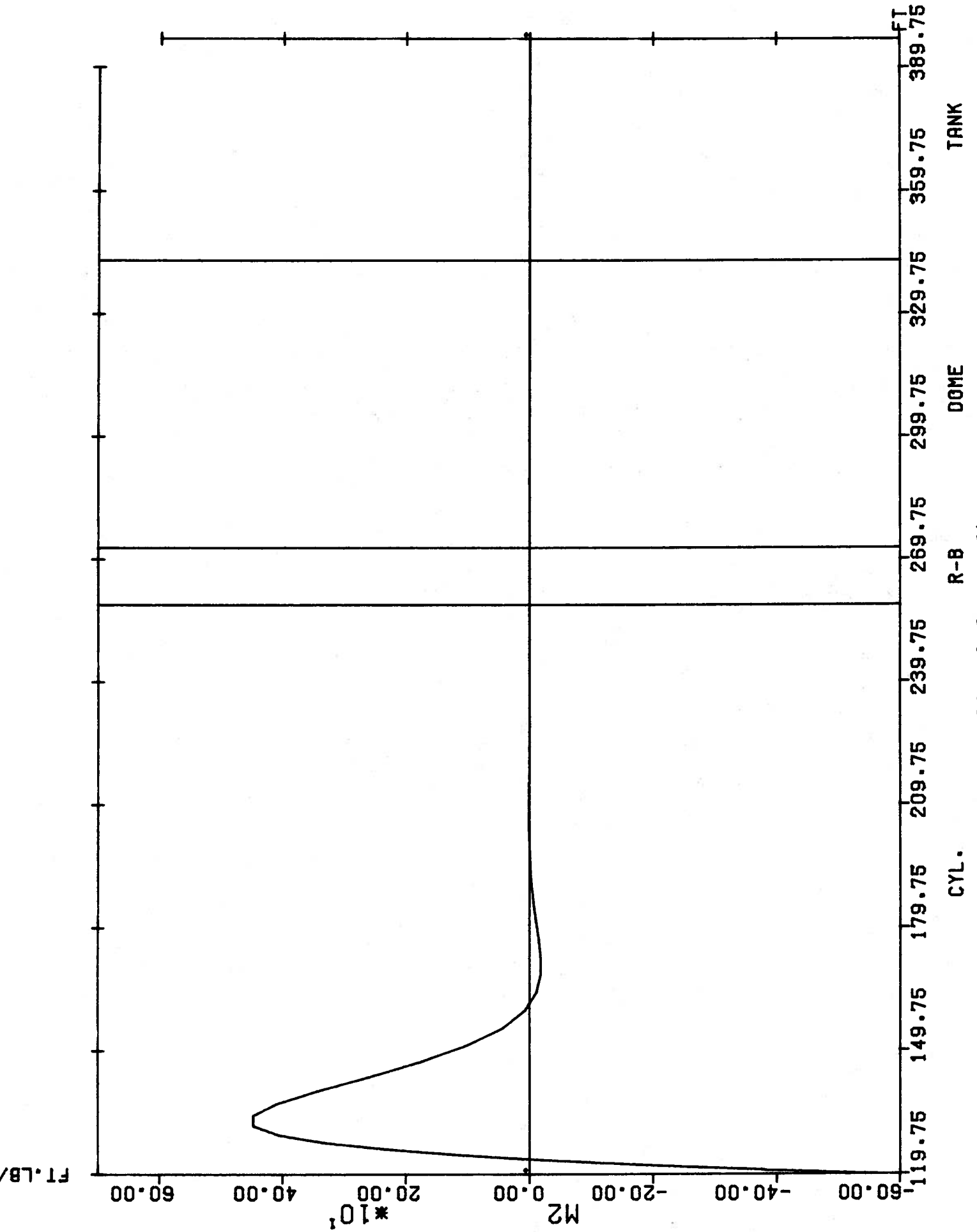


FIGURE D10 M2 for Loading Case BD:Bu

CYL.

R-B

DOME

TANK

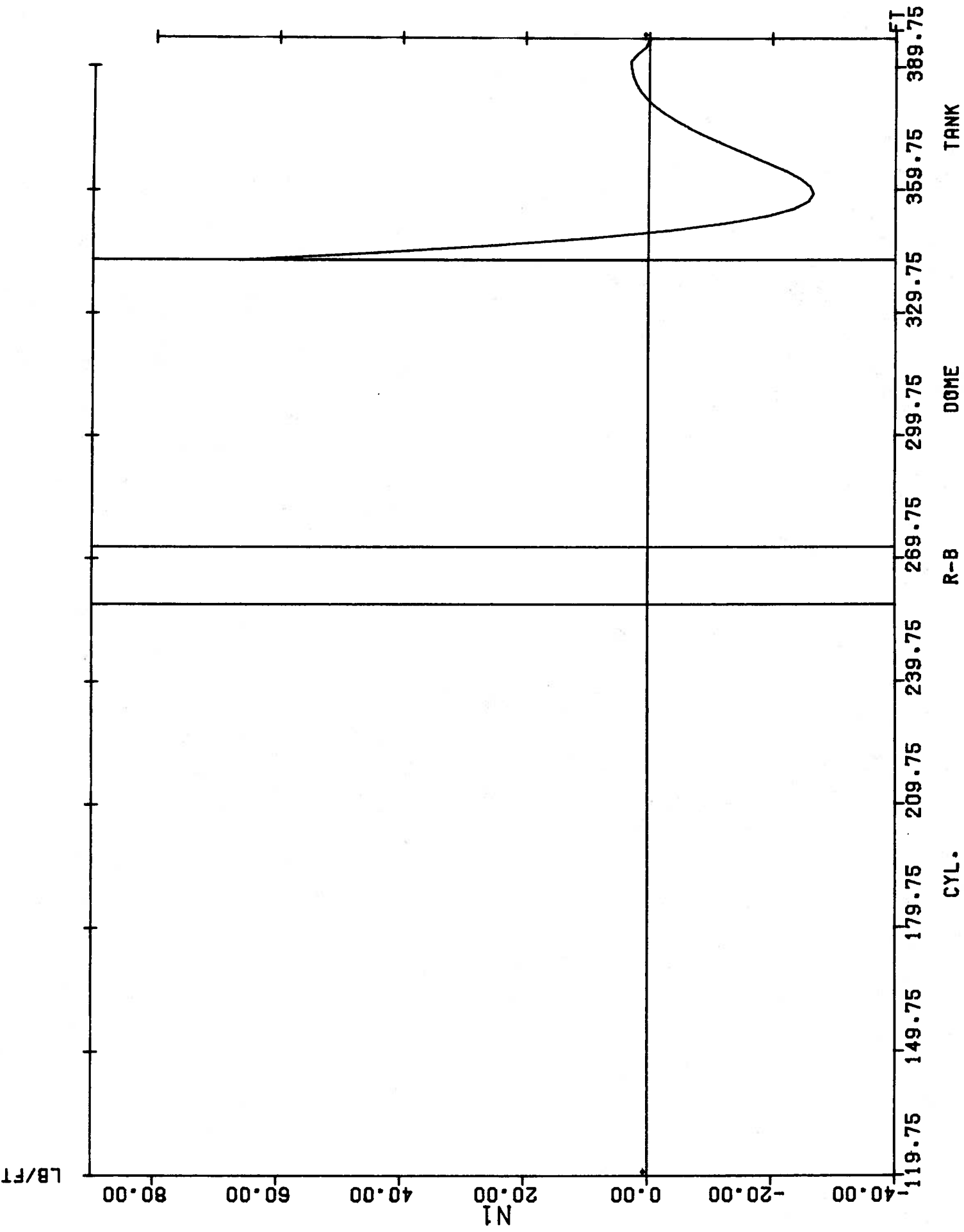


FIGURE D11 N_1 for Loading Case BD:Wu

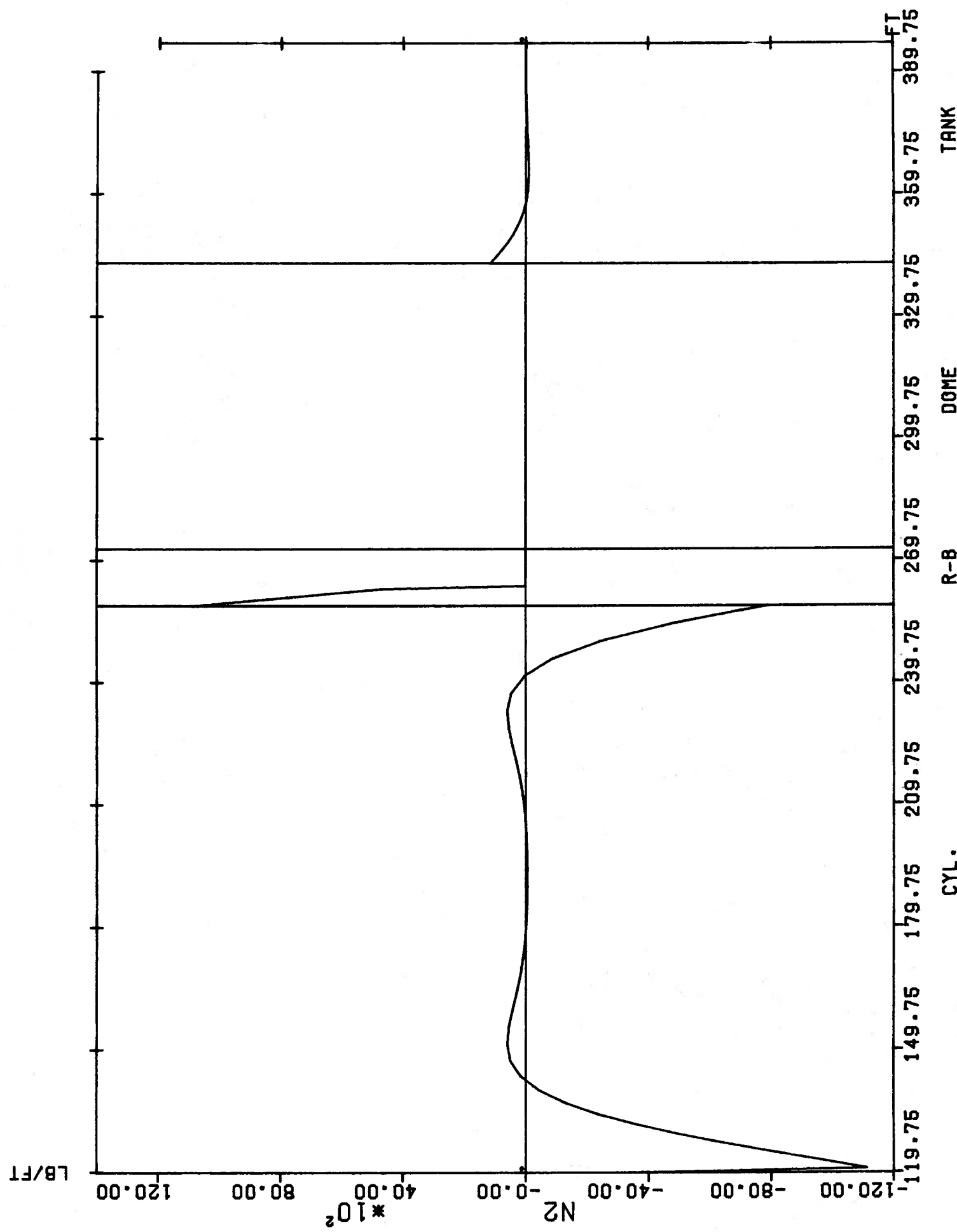


FIGURE D12 N2 for Loading Case BD:Wu

CYL.

R-B

DOME

TANK

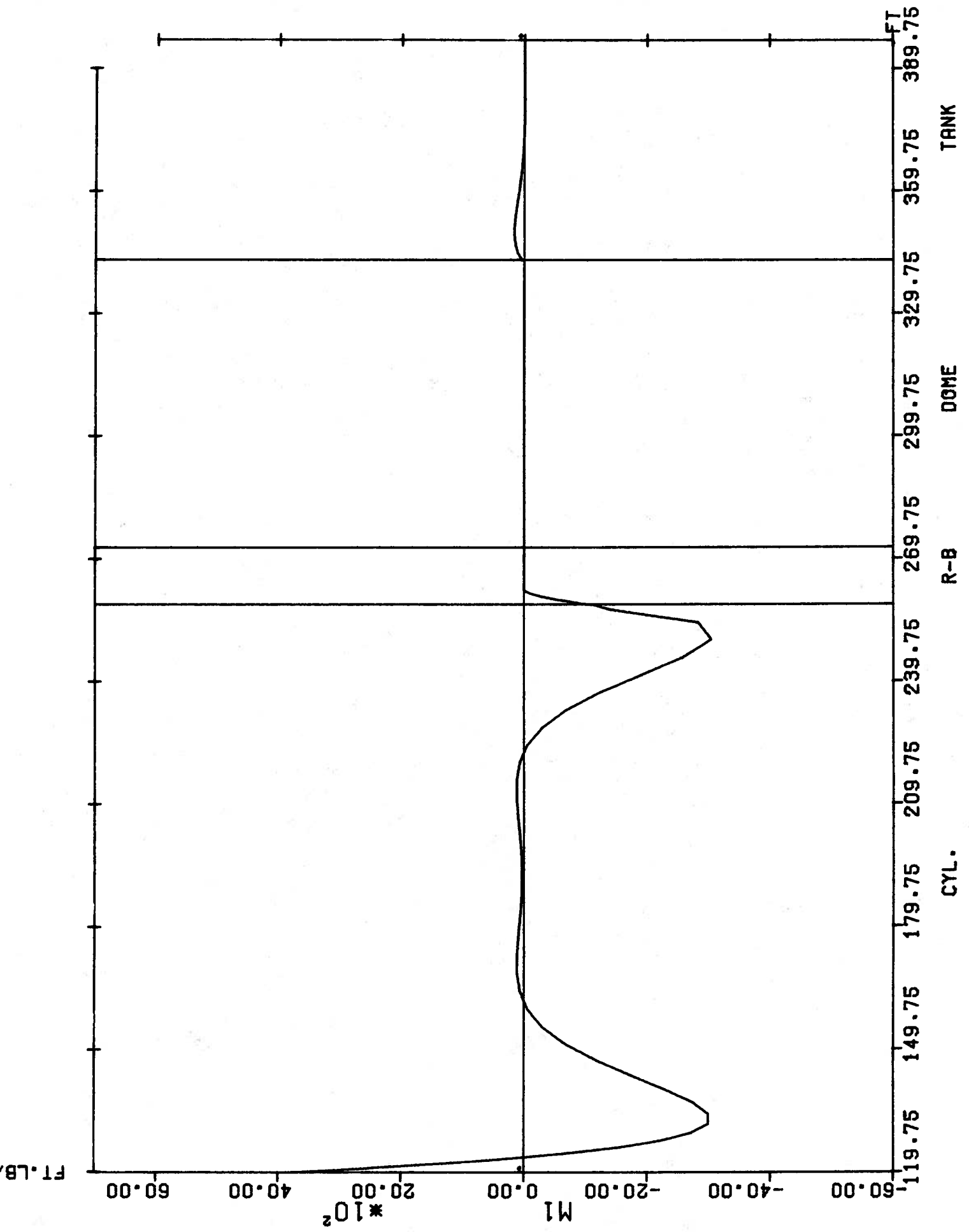


FIGURE D13 M1 for Loading Case BD:Wu

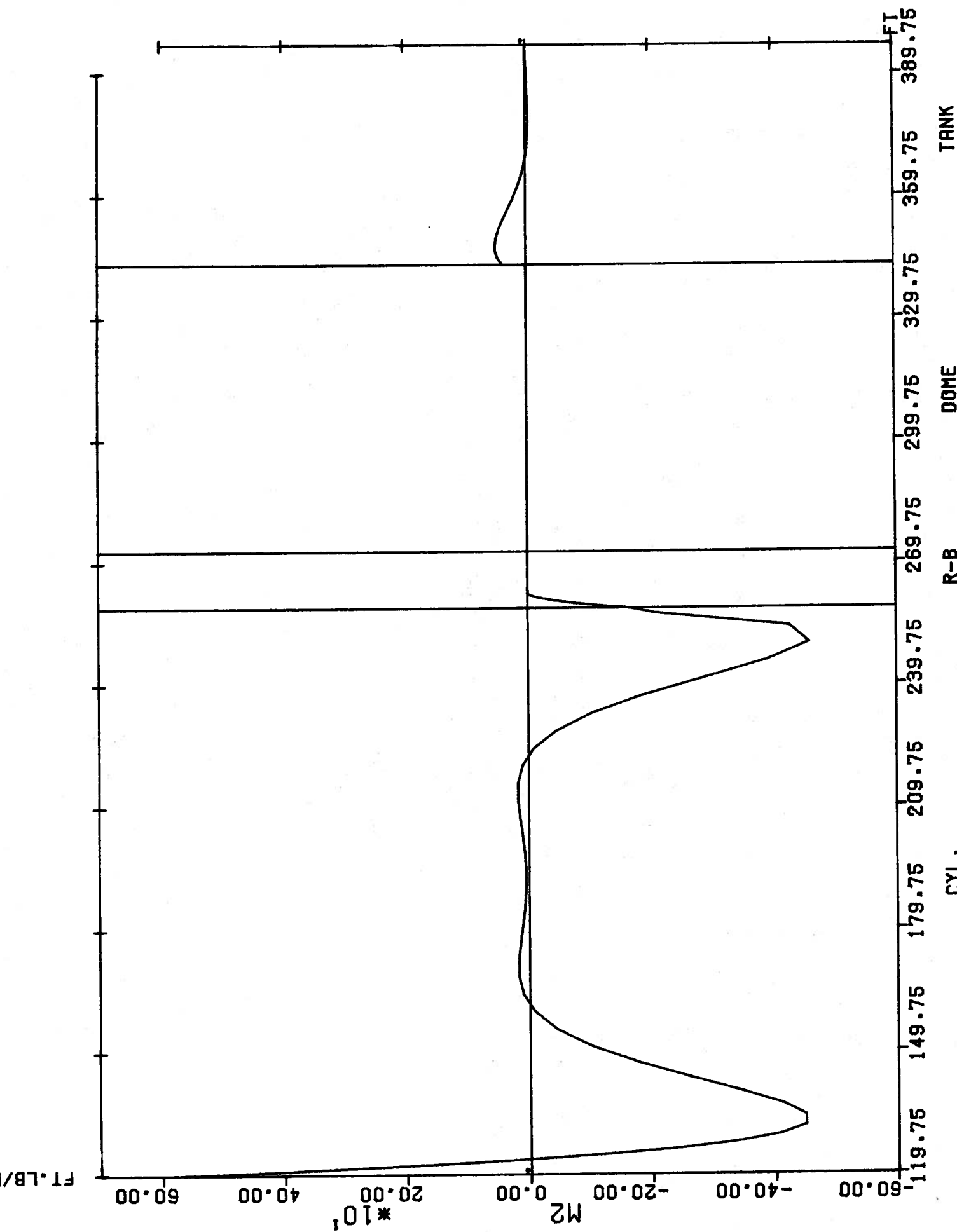


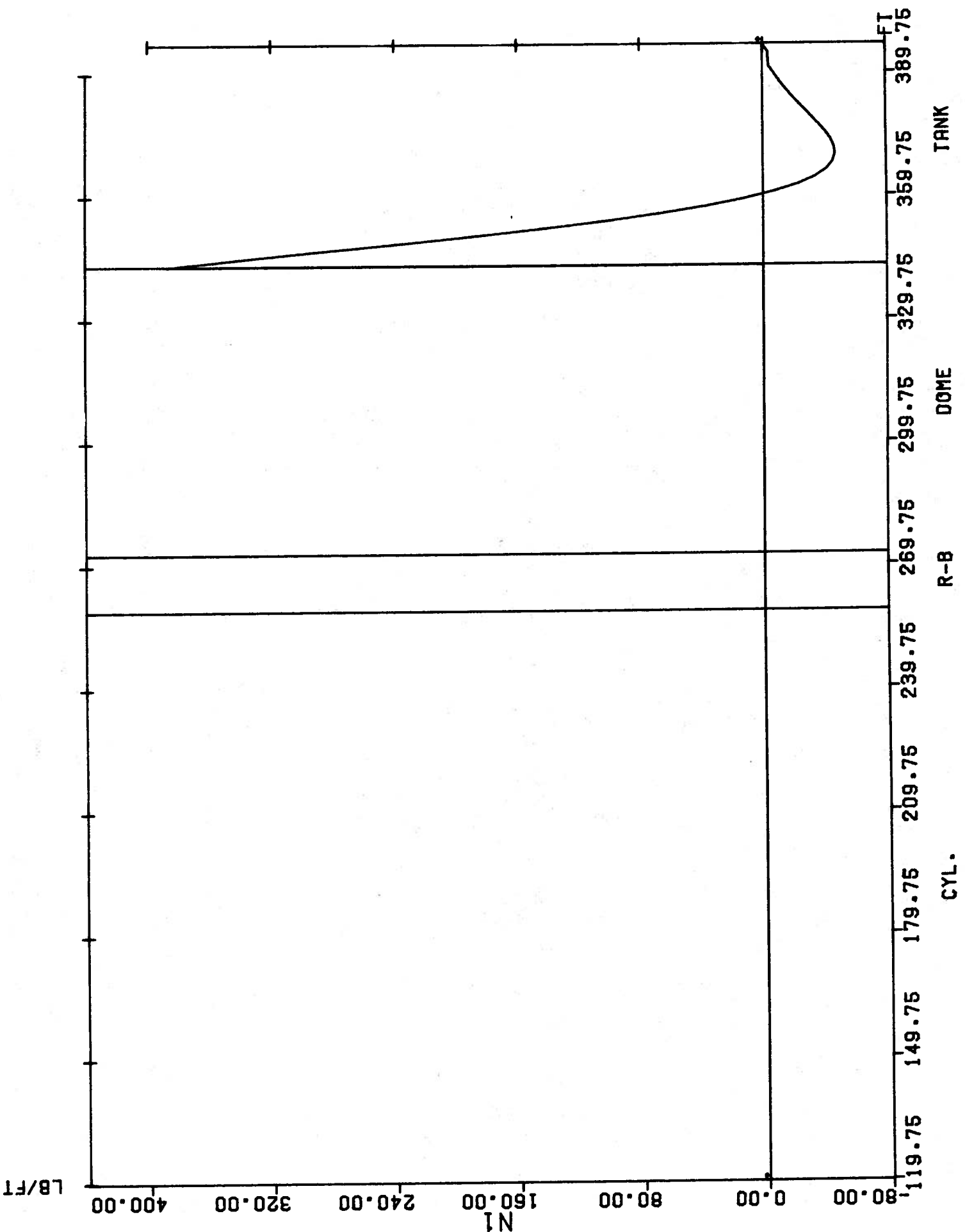
FIGURE D14 M2 for Loading Case BD:Wu

CYL.

R-B

DOME

TANK



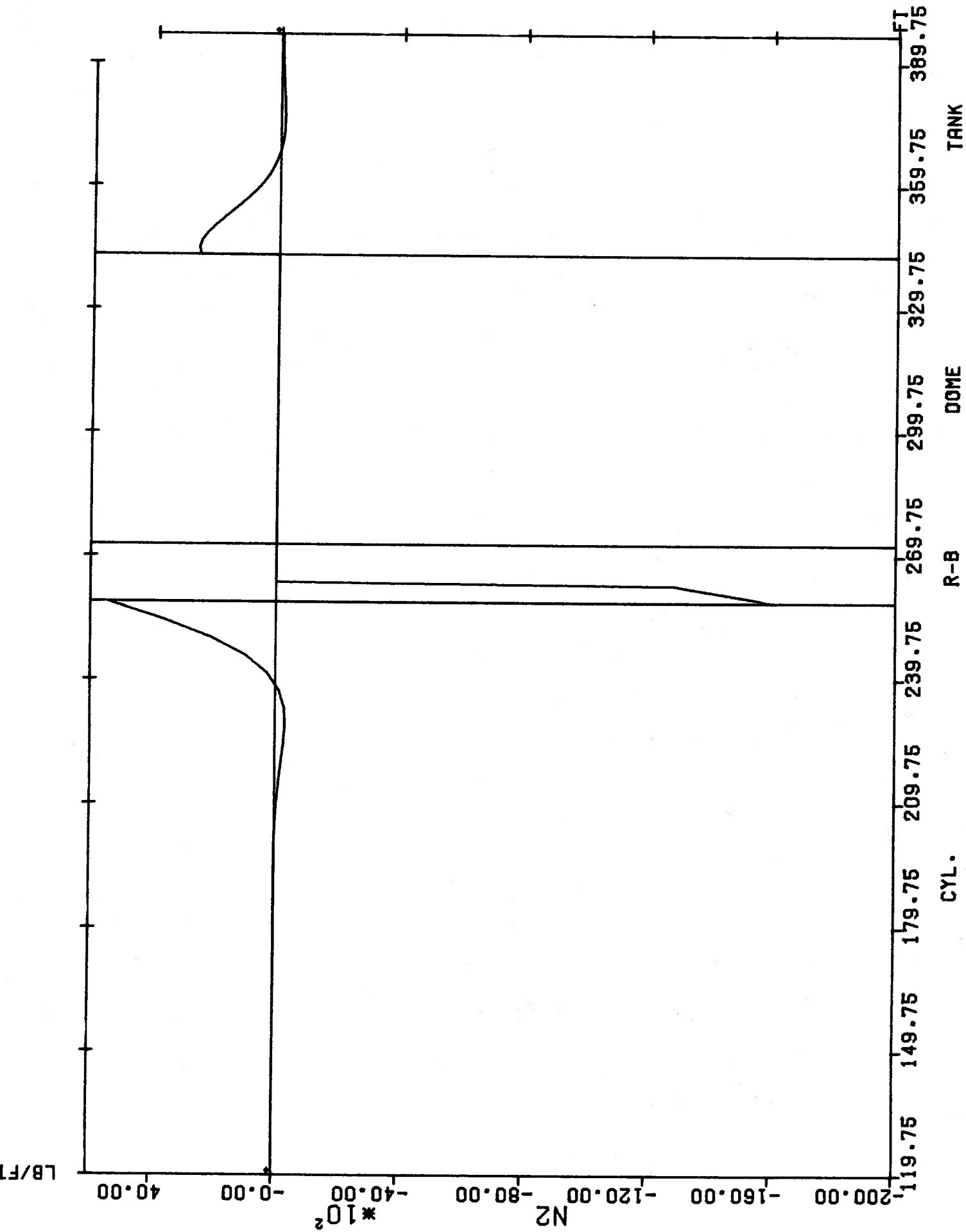


FIGURE D16 N2 for Loading Case BD:LBu
CYL. R-B DOME TANK

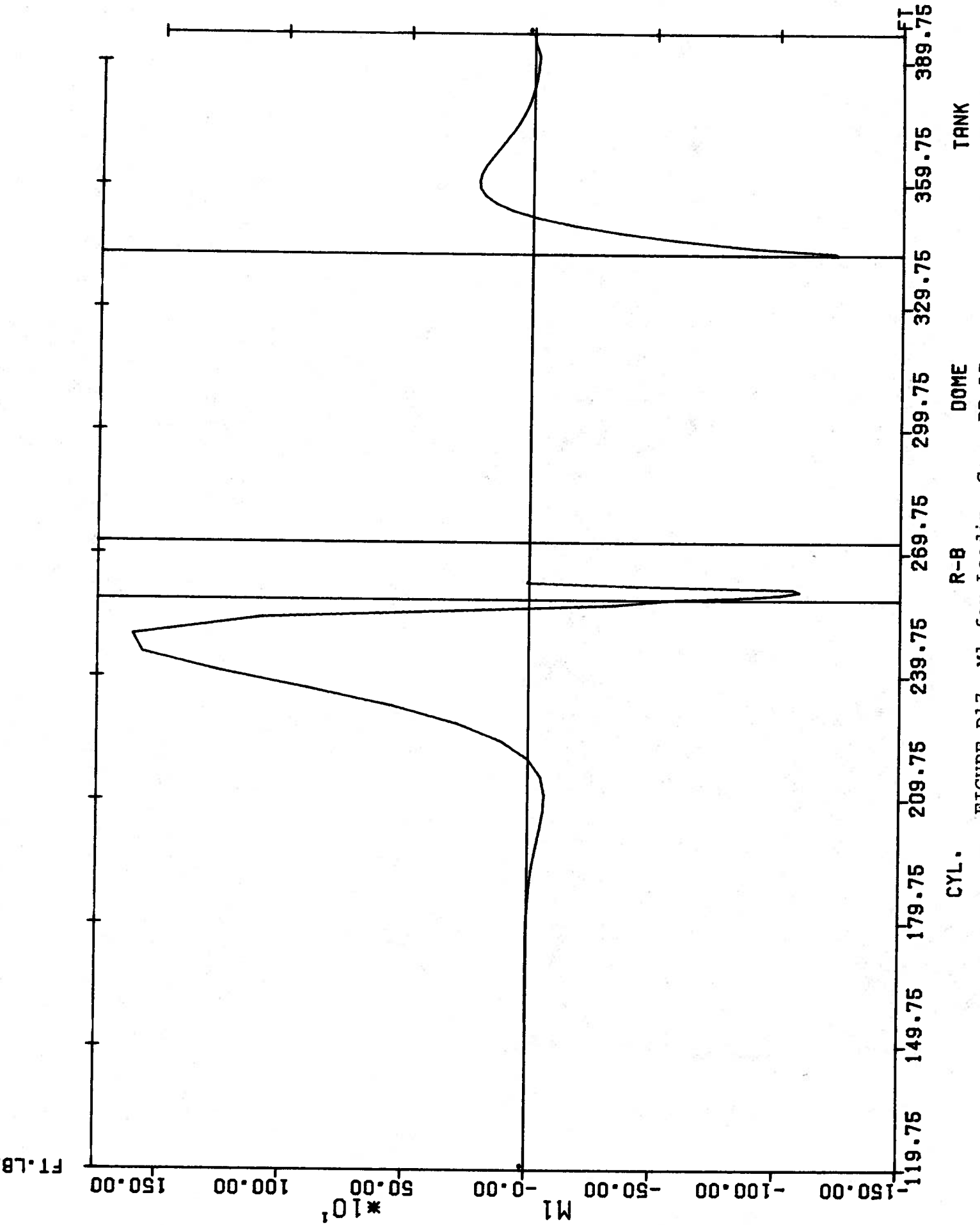


FIGURE D17 MI for Loading Case BD:LBu

CYL.

R-B

DOME

TANK

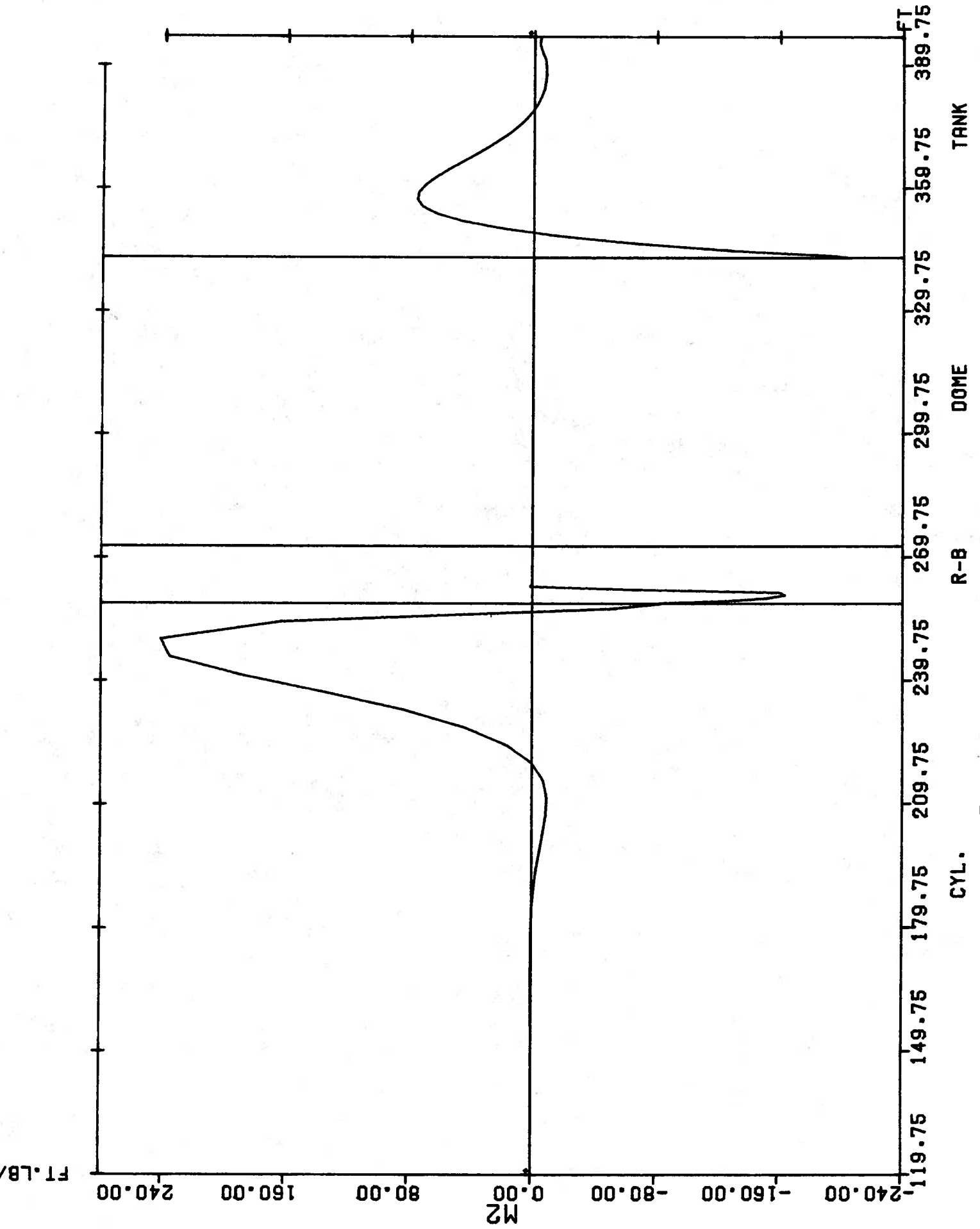


FIGURE D18 M_2 for Loading Case BD:LBu

CYL.

R-B

DOME

TANK

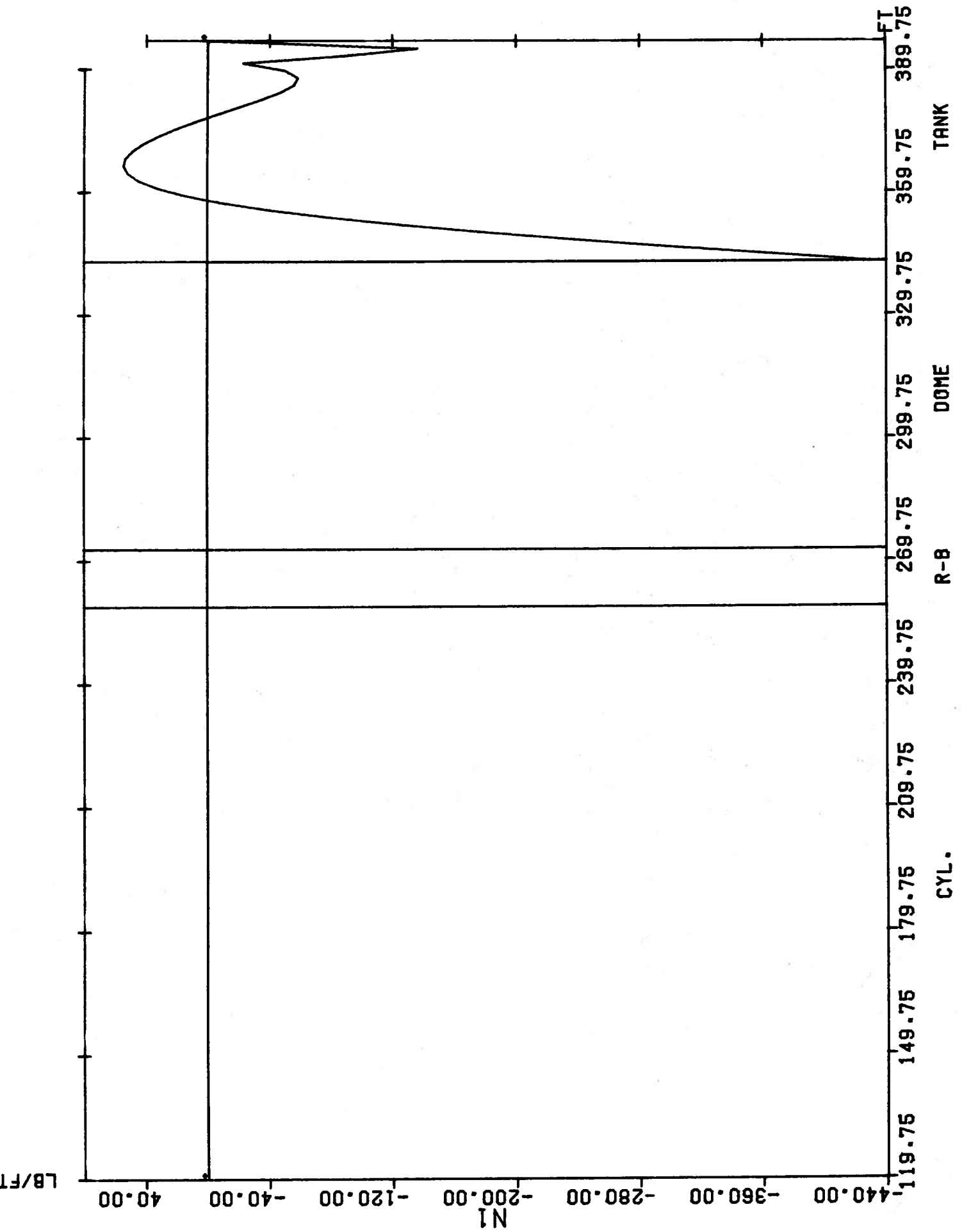


FIGURE D19 N_1 for Loading Case BD:LDu

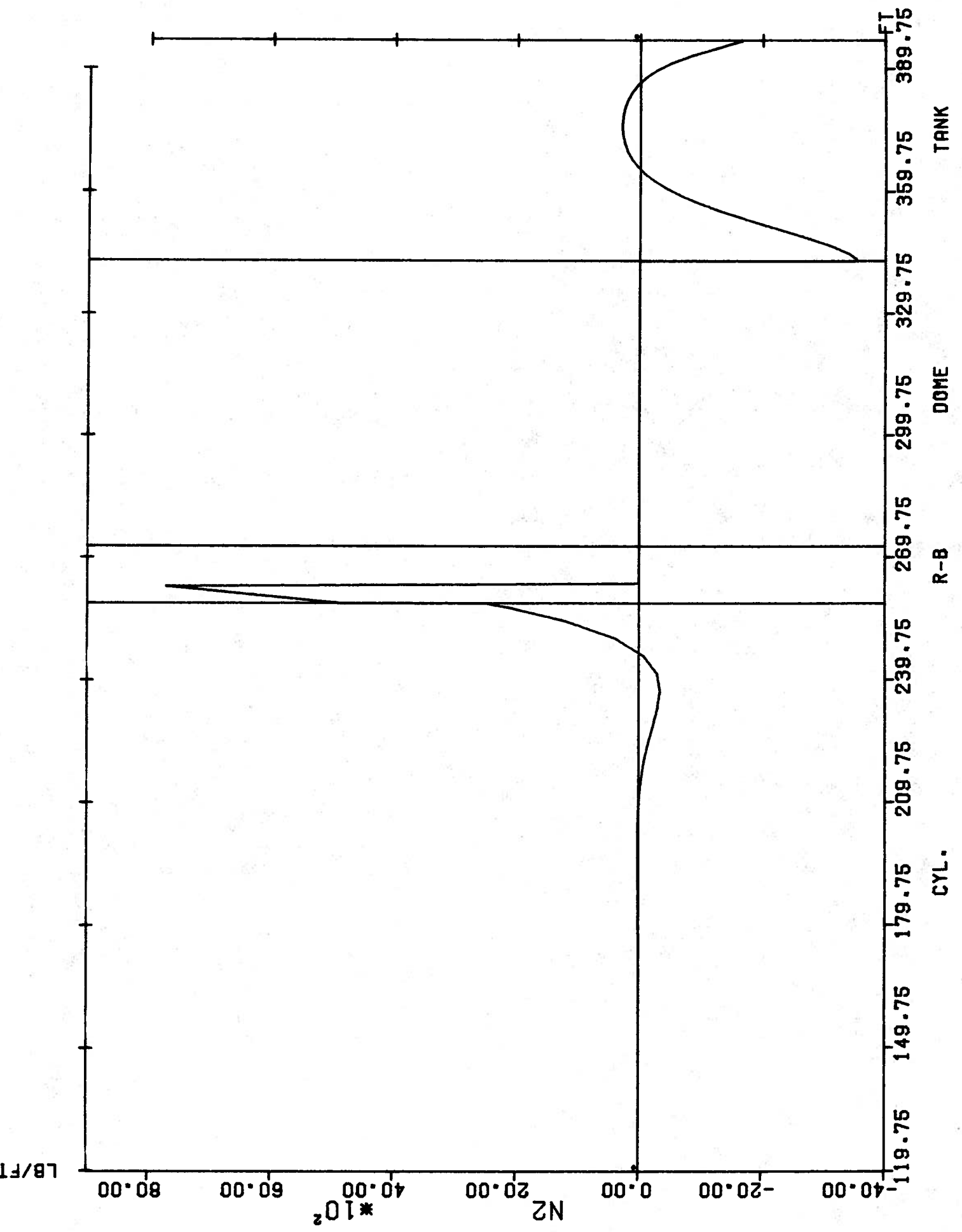


FIGURE D20 N2 for Loading Case BD:LDu

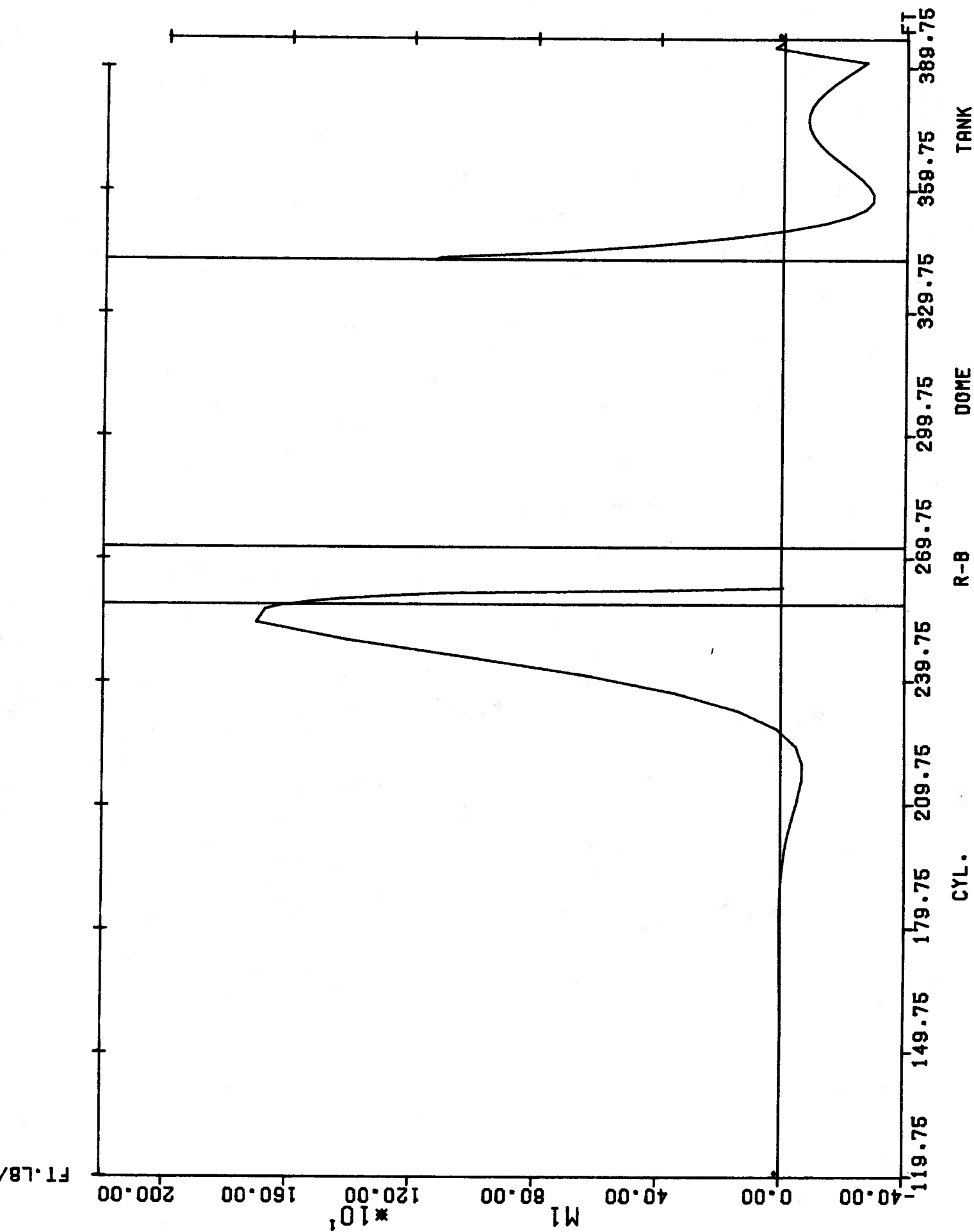


FIGURE D21 M1 for Loading Case RD.TD

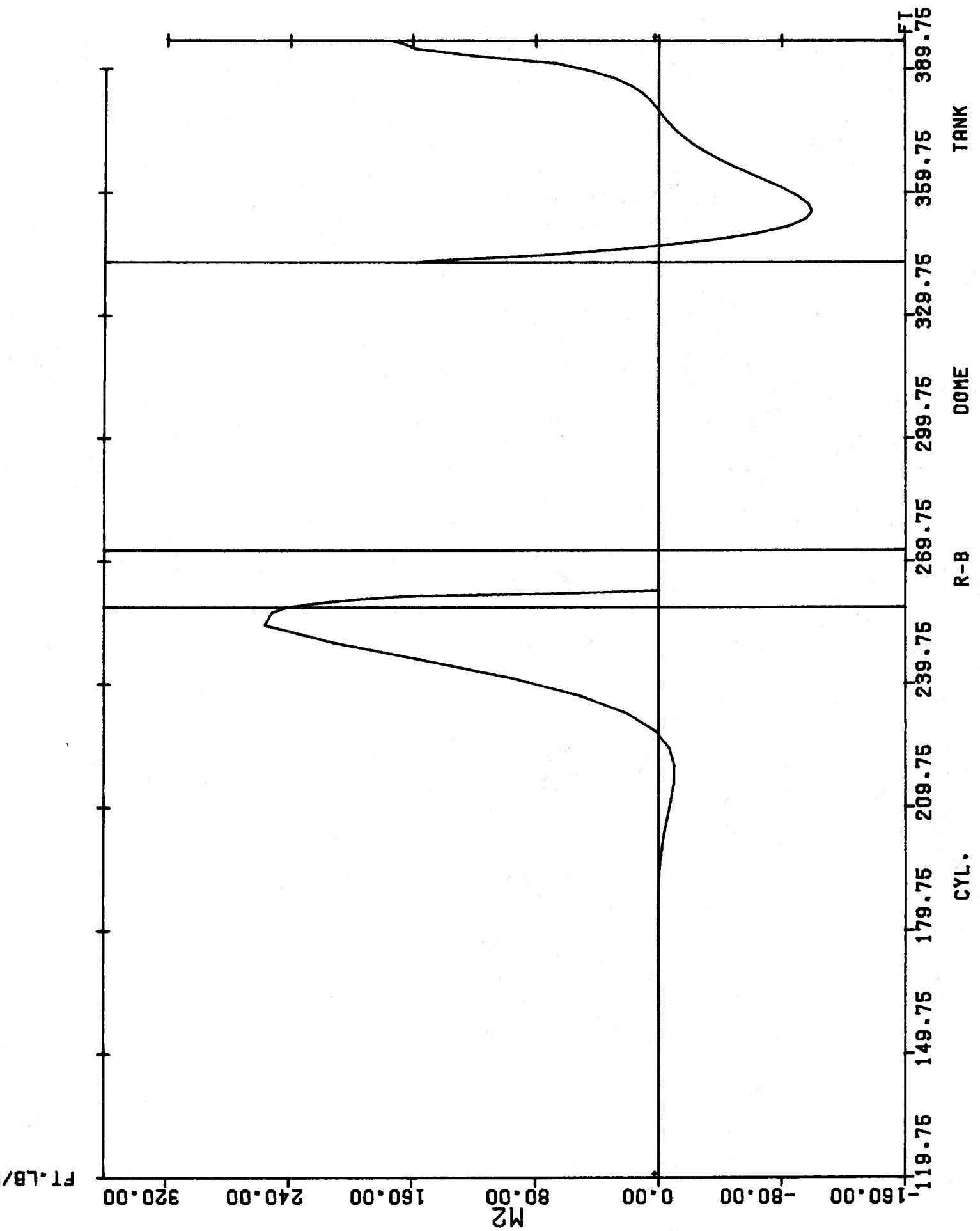


FIGURE D22 M2 for Loading Case RD: I.Dm

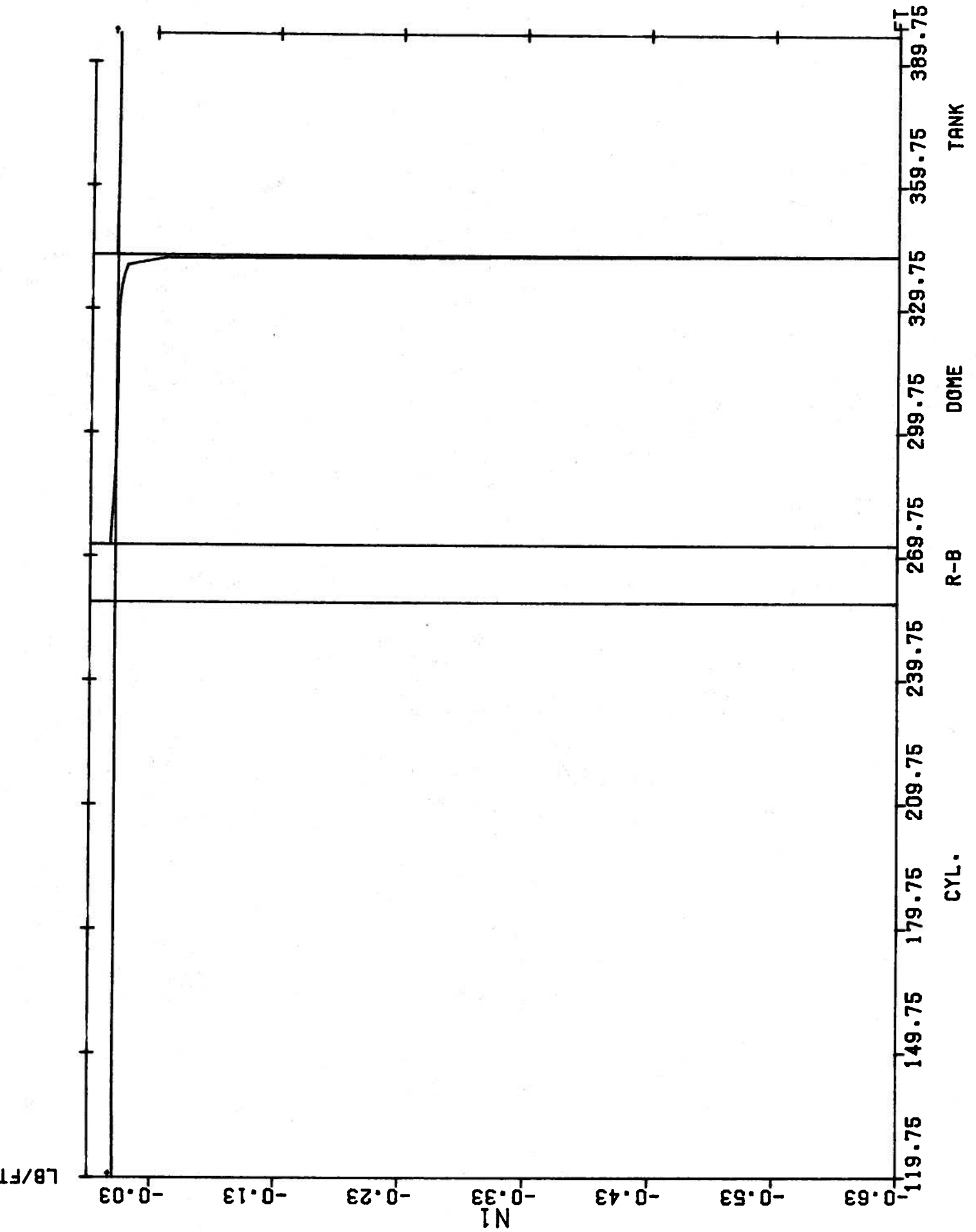


FIGURE D23 N_1 for Loading Case C:Rn

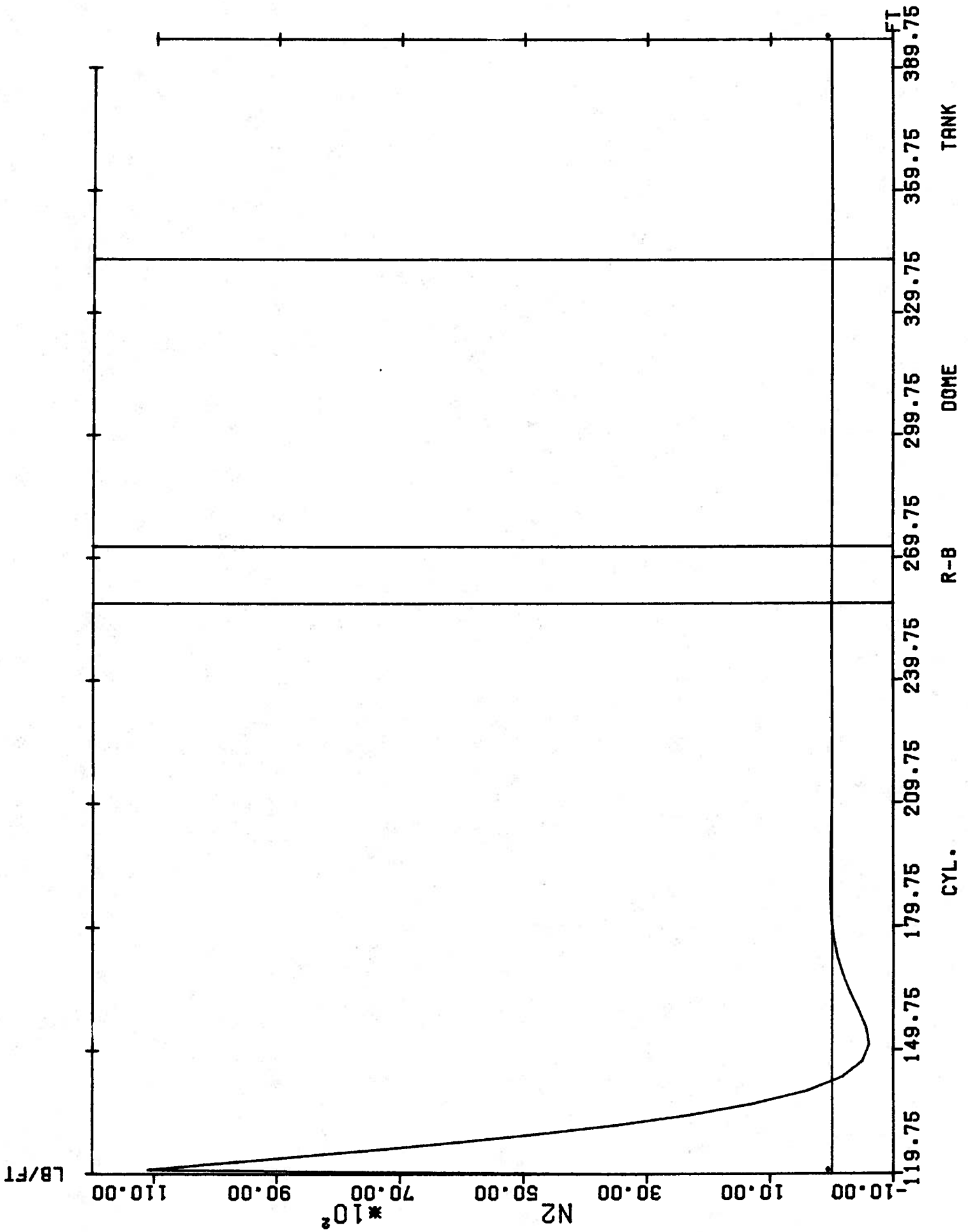


FIGURE D24 N₂ for Loading Case C:Bu

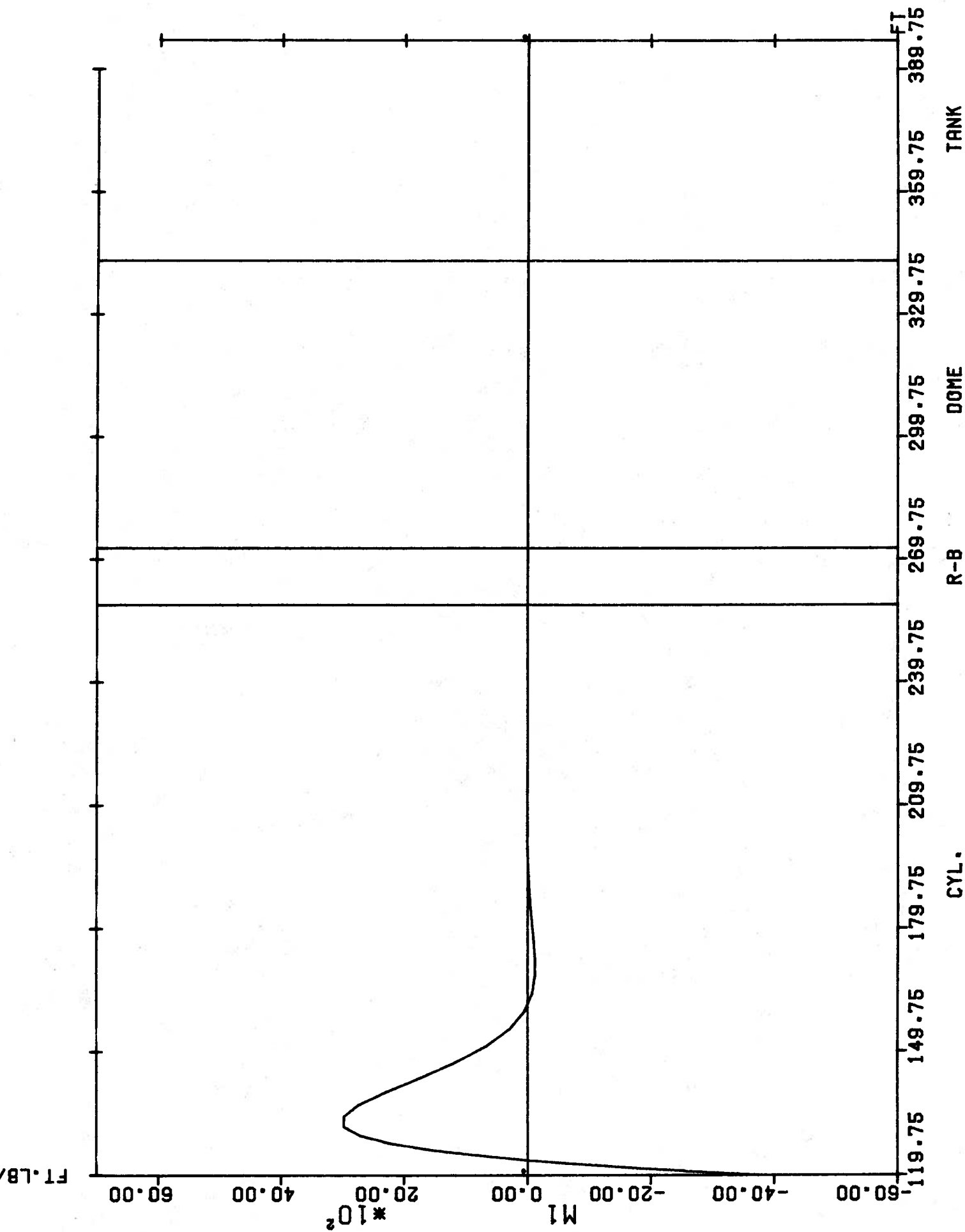


FIGURE D25 M1 for Loading Case C:Rn

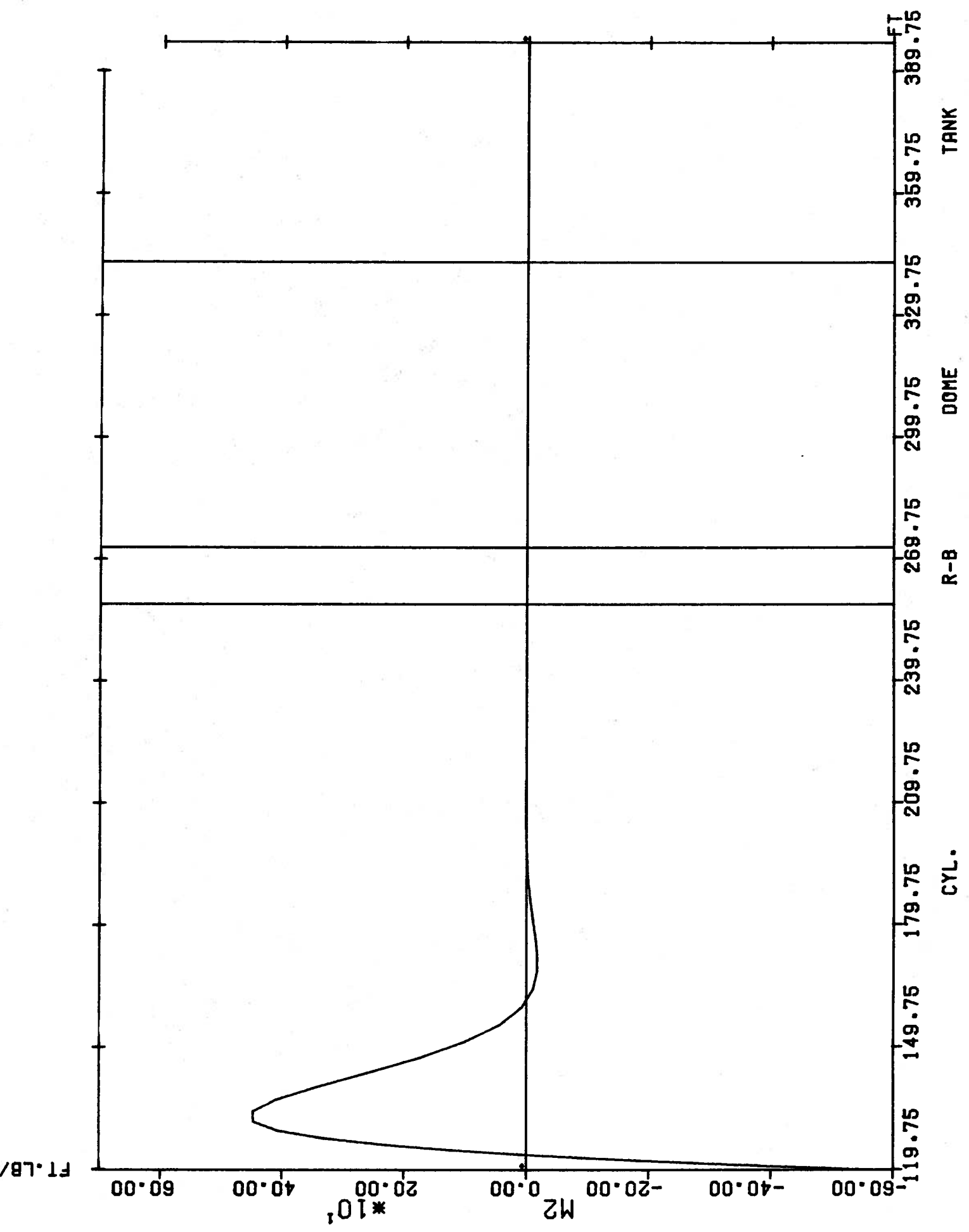


FIGURE D26 M_2 for Loading Case C:Bu

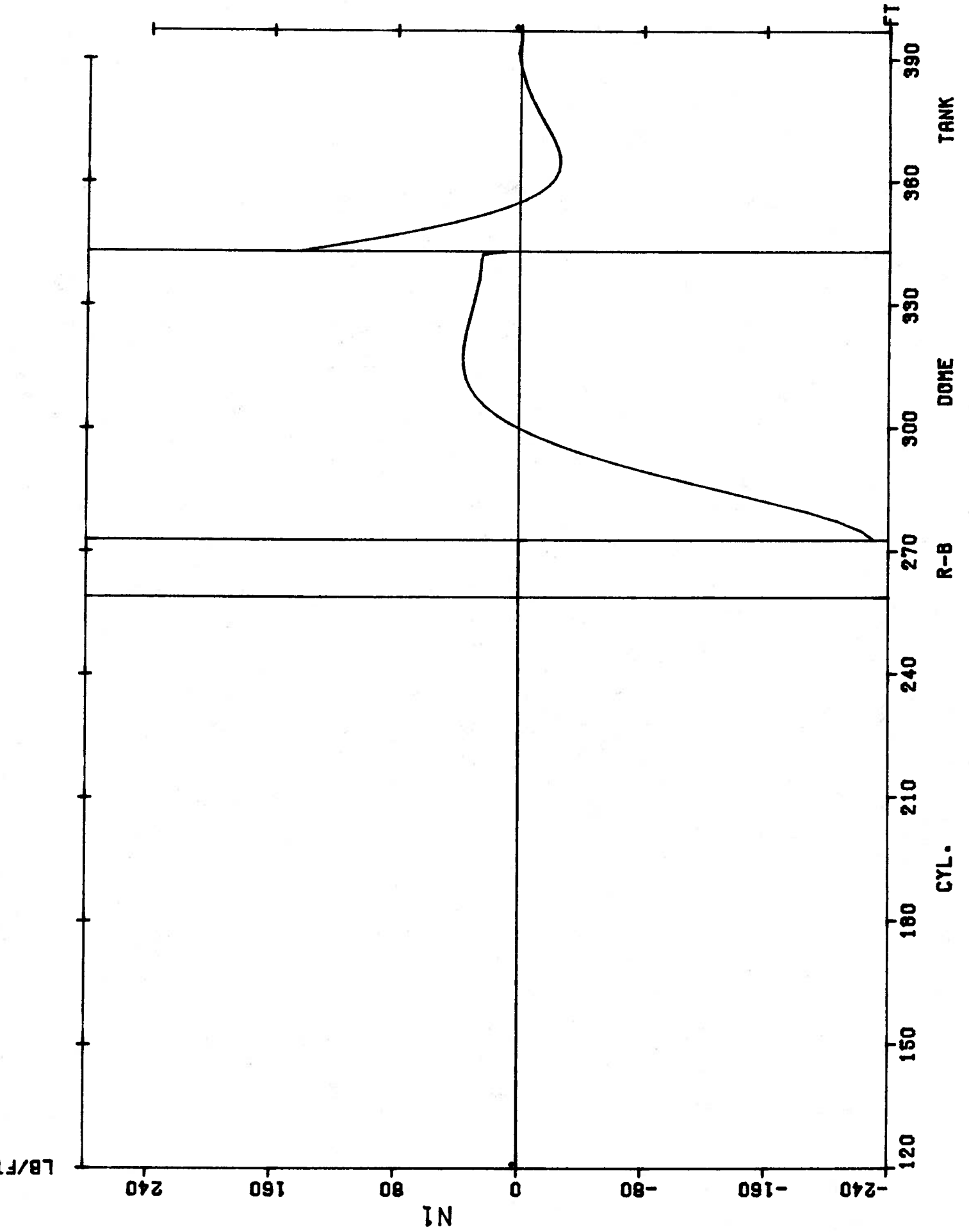


FIGURE D27 N_1 for Loading Case C:Wu

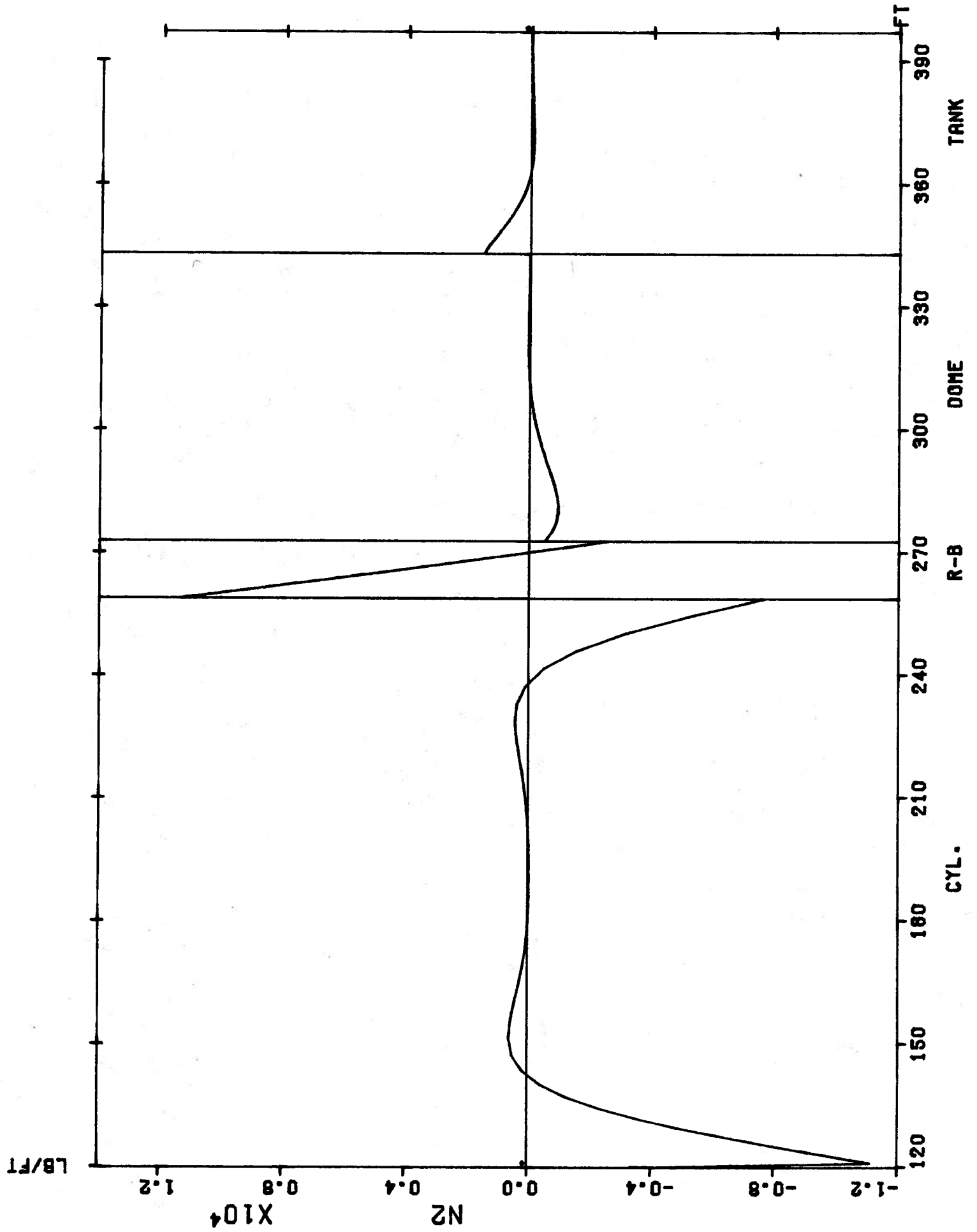


FIGURE D28 N2 for Loading Case C:Wu

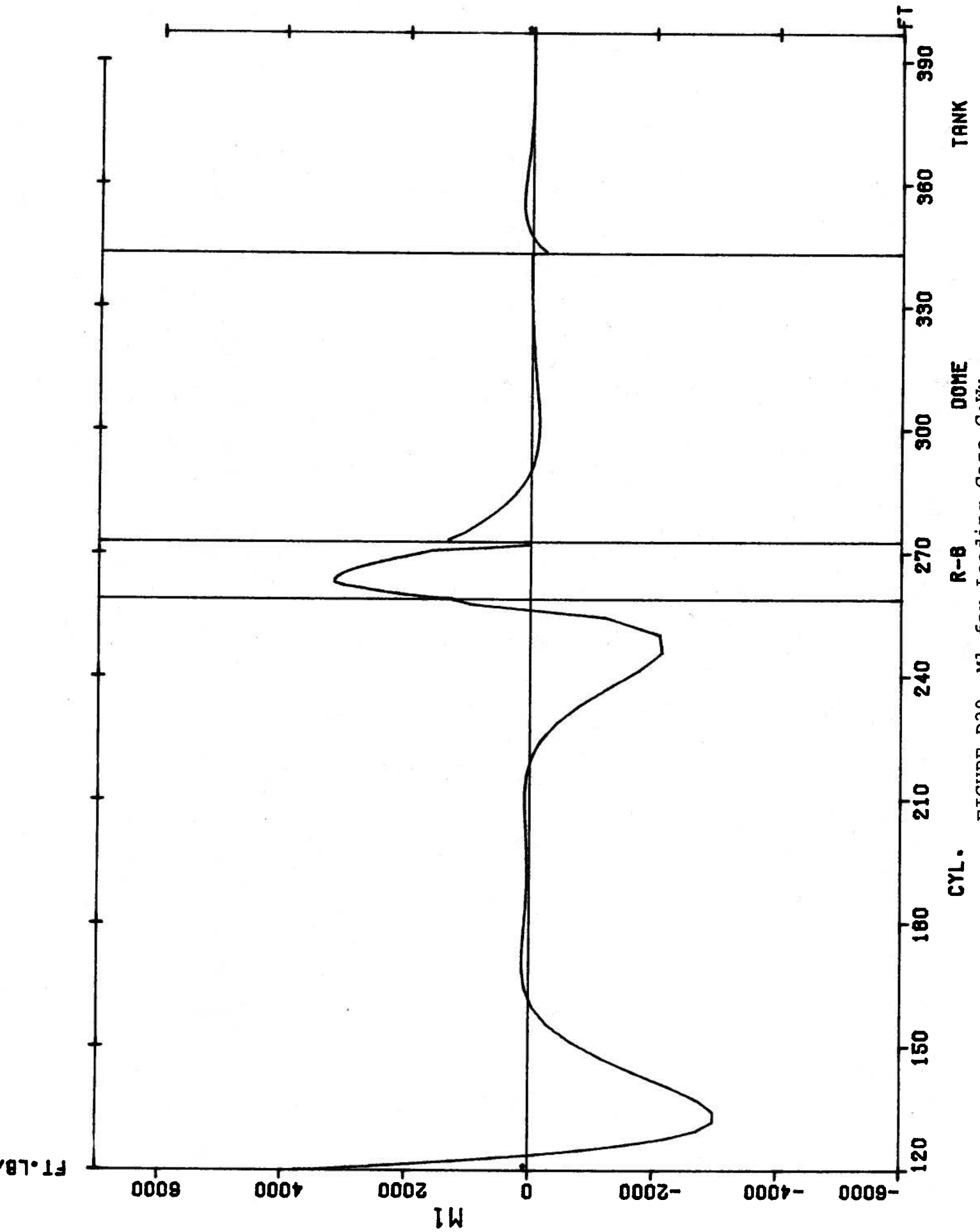


FIGURE D29 M_1 for Loading Case C:Wu

CYL.

R-B

DOME

TANK

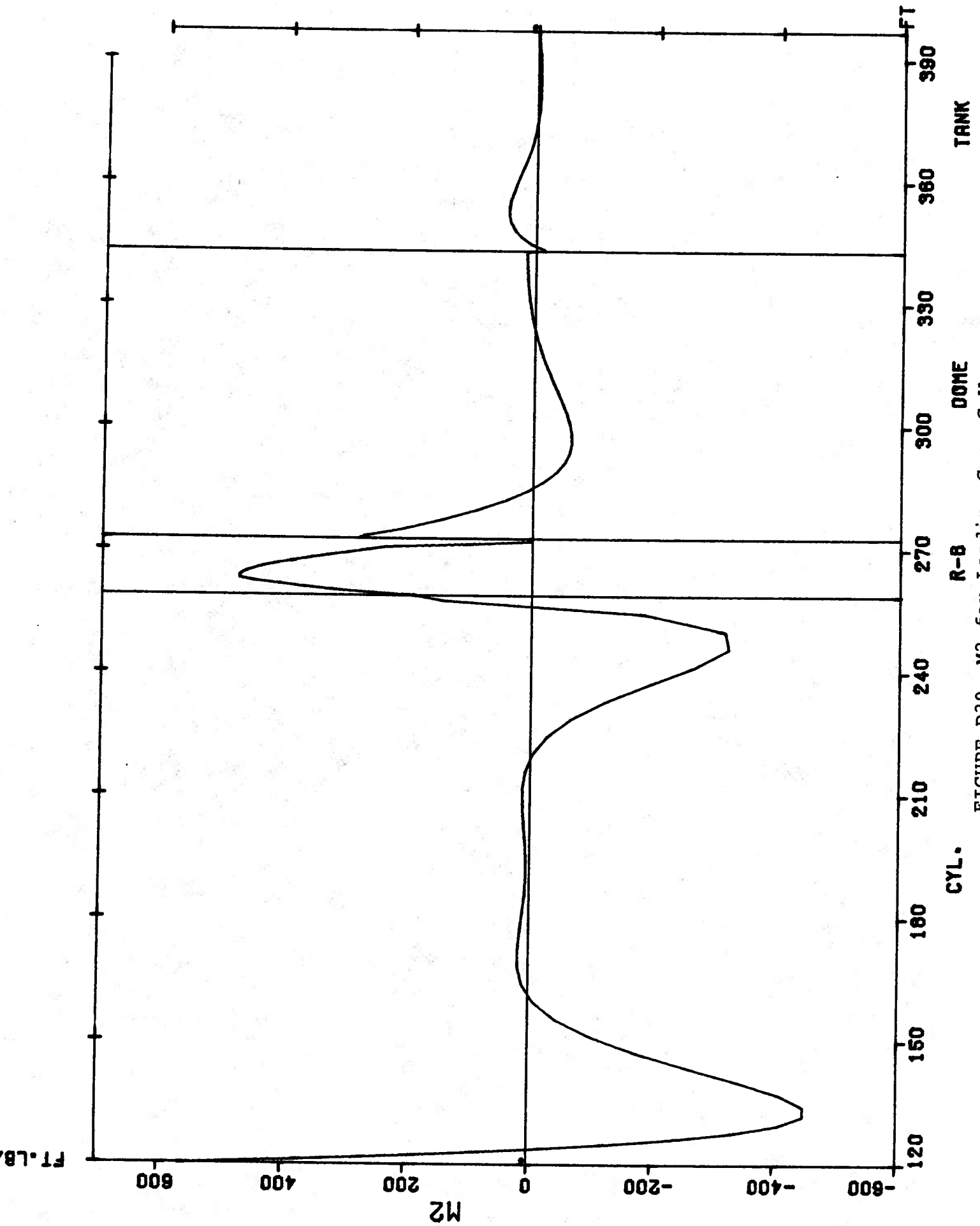


FIGURE D30 M_2 for Loading Case C:Wu

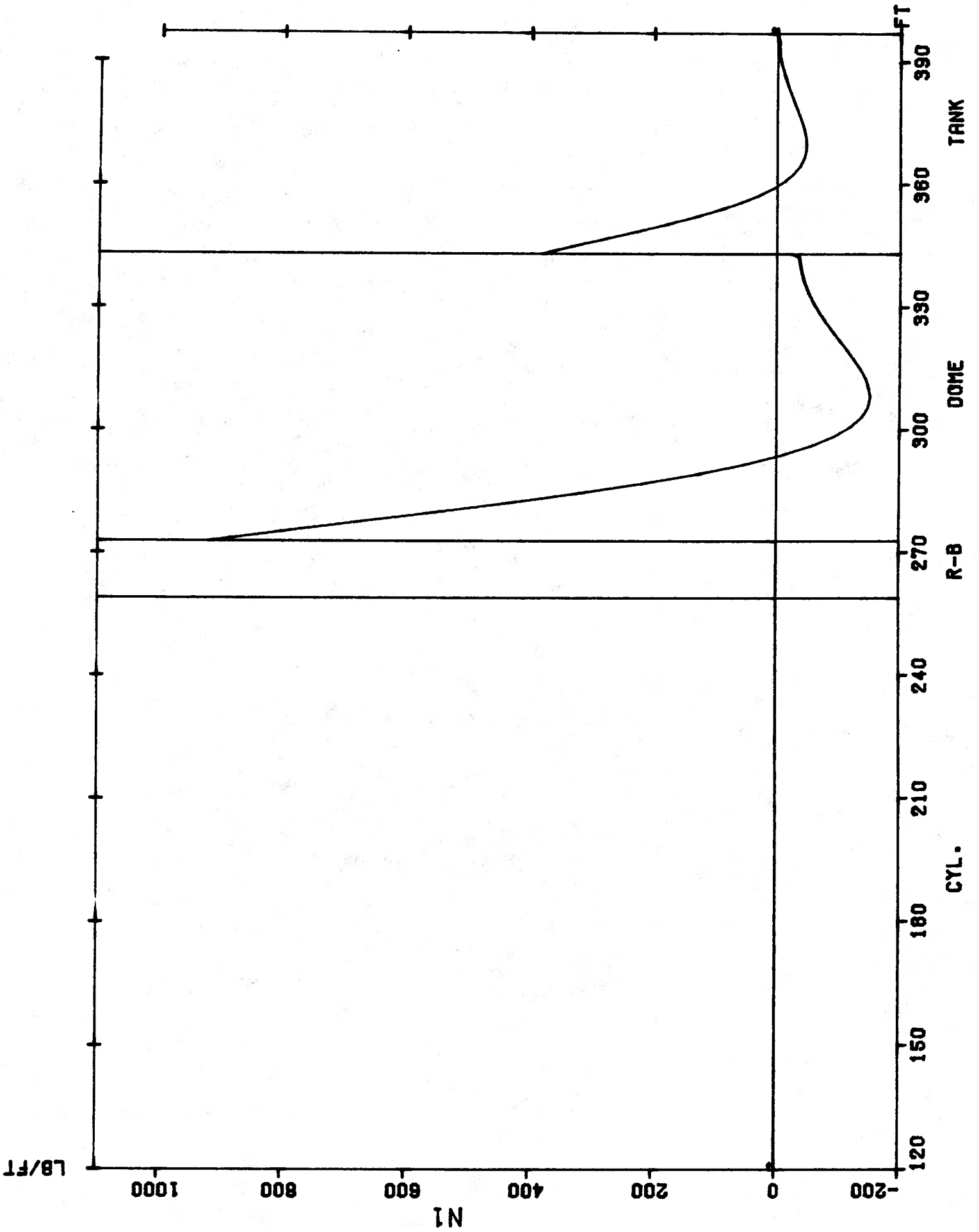


FIGURE D31 N_1 for Loading Case C:RBu

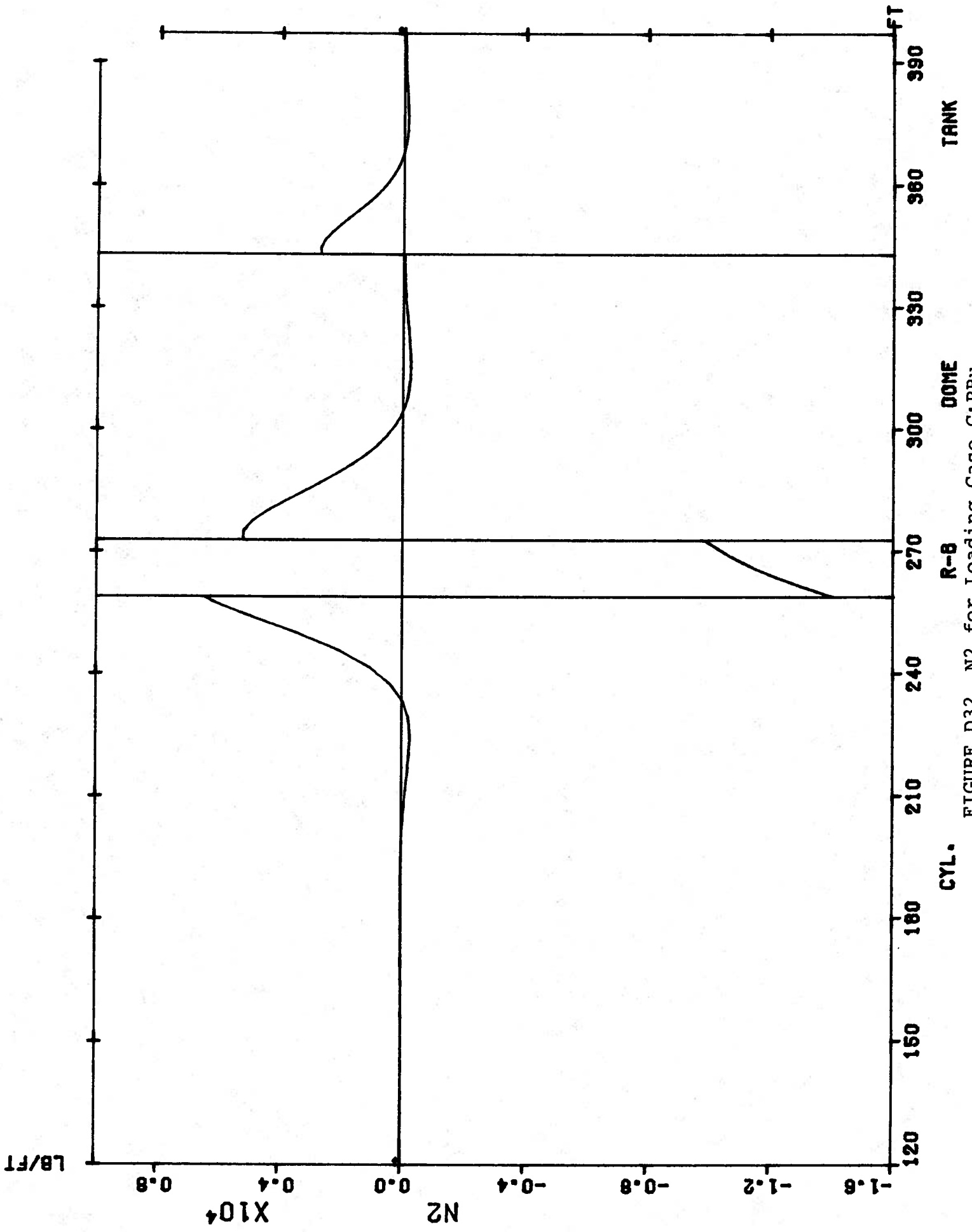


FIGURE D32 N_2 for Loading Case C:RBu

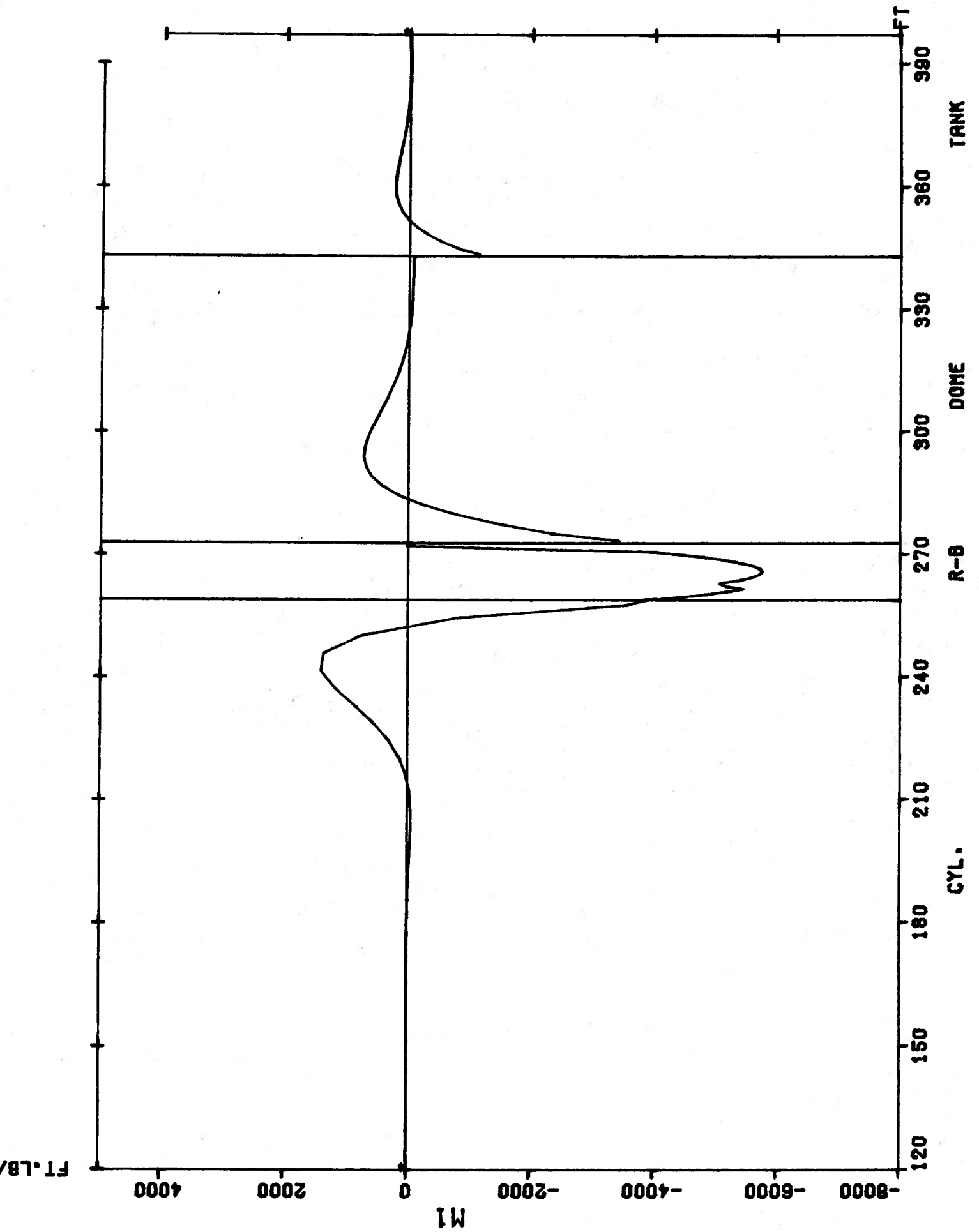


FIGURE D33 M1 for Loading Case C:RBu

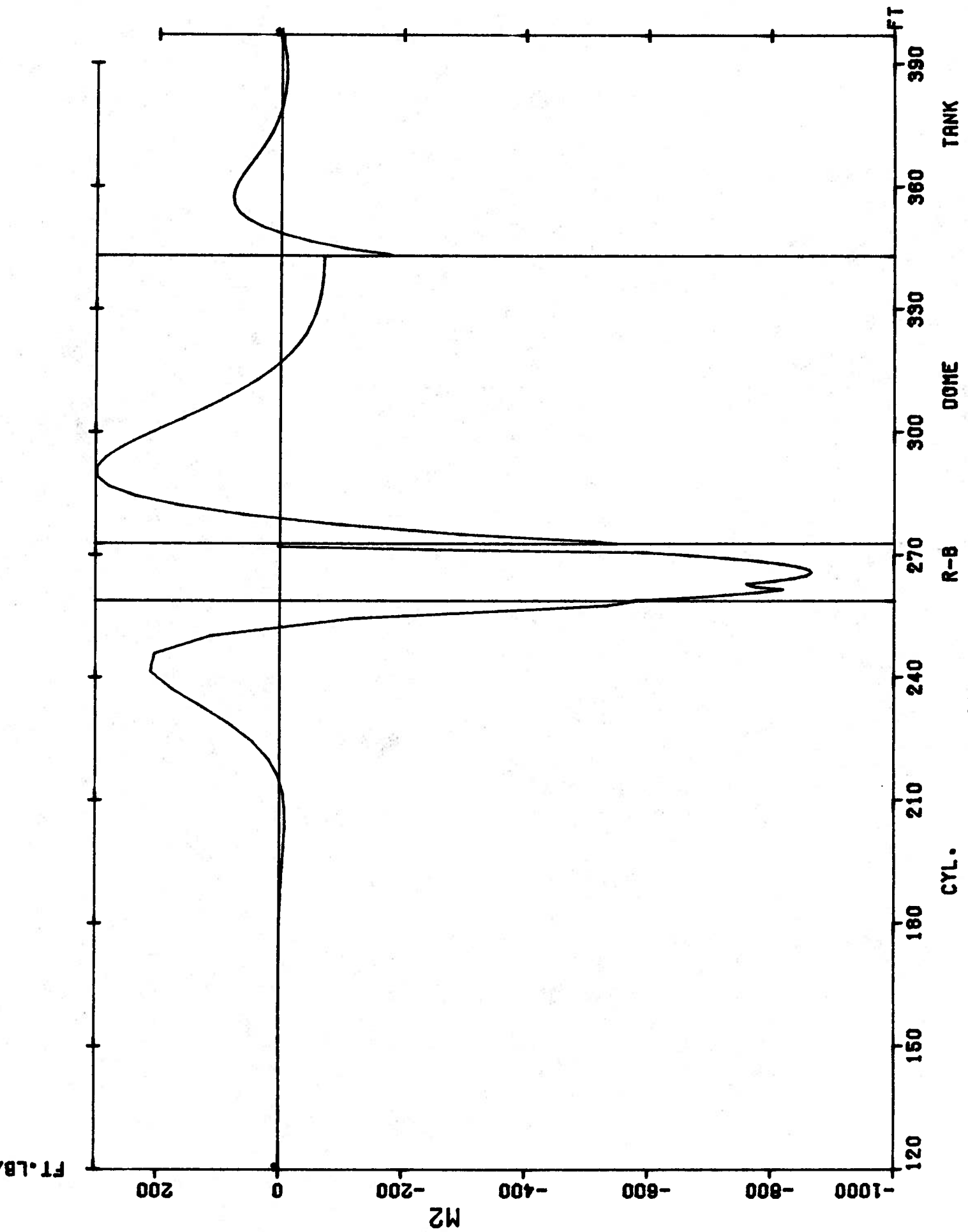


FIGURE D34 M2 for Loading Case C:RBu

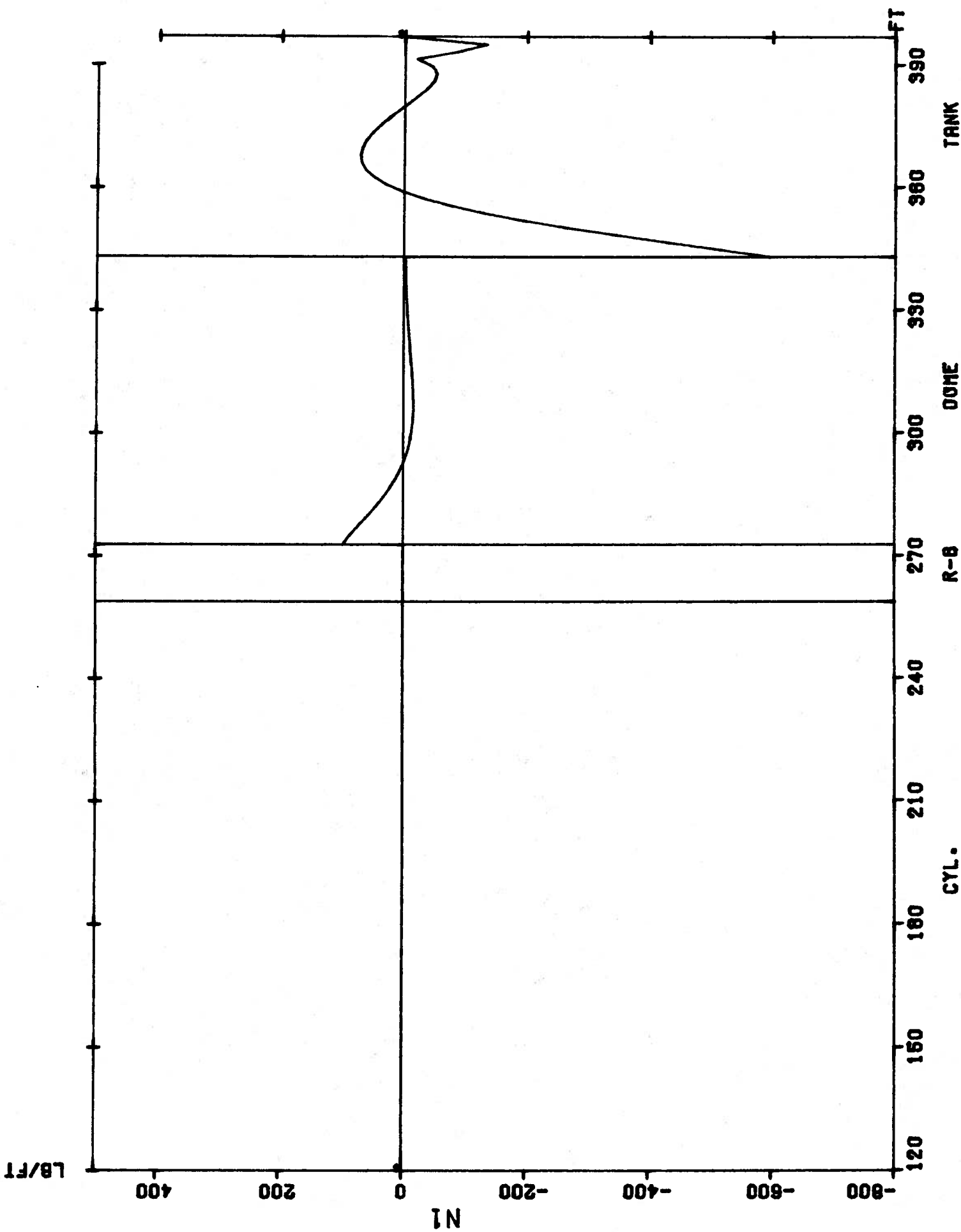


FIGURE D35 N_1 for Loading Case C: I.Dn

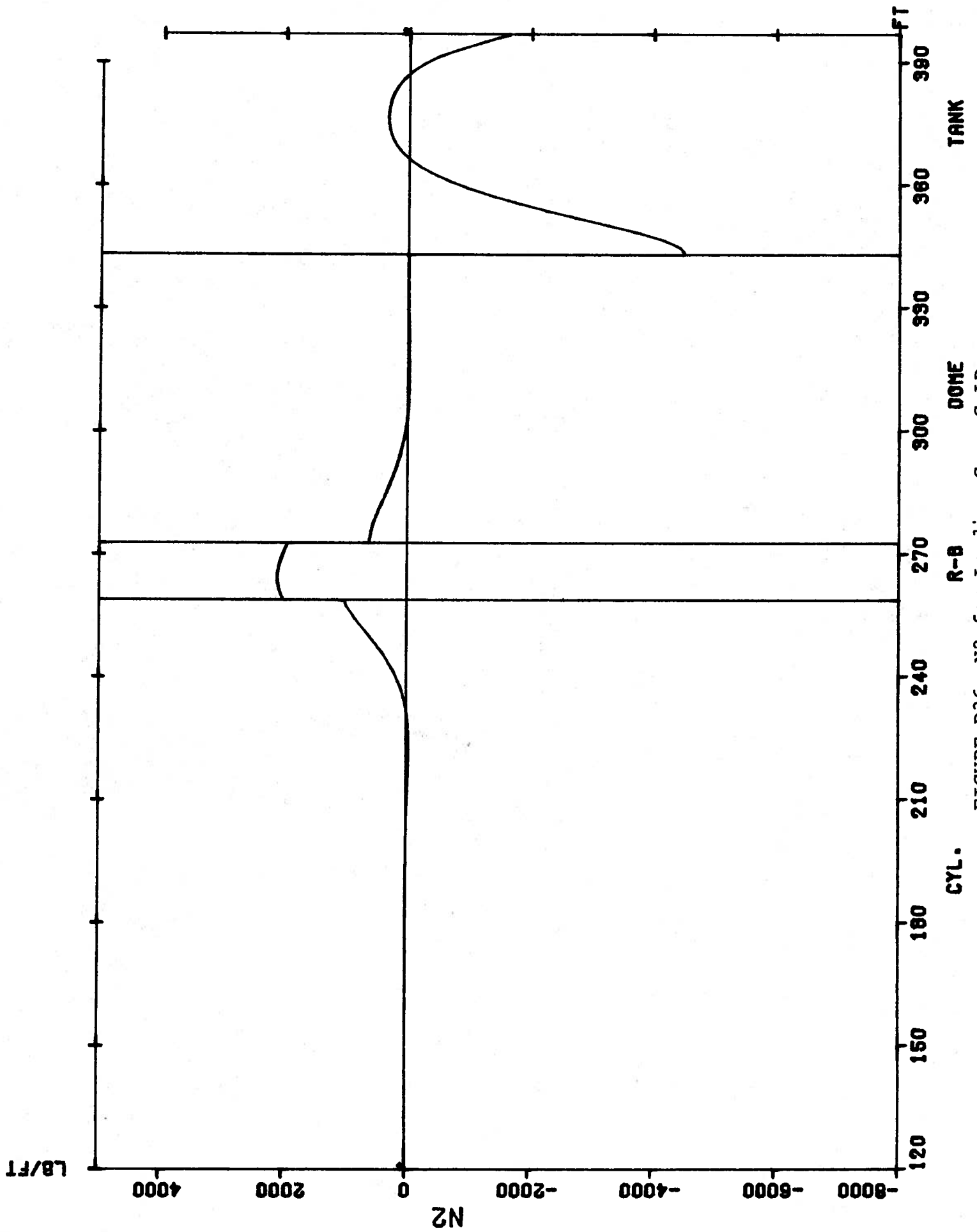


FIGURE D36 N2 for Loading Case C:IDu

CYL.

R-B

DOME

TANK

120 150 180 210 240 270 300 330 360 390 FT

-8000 -6000 -4000 -2000 0 2000 4000 LB/FT

N2

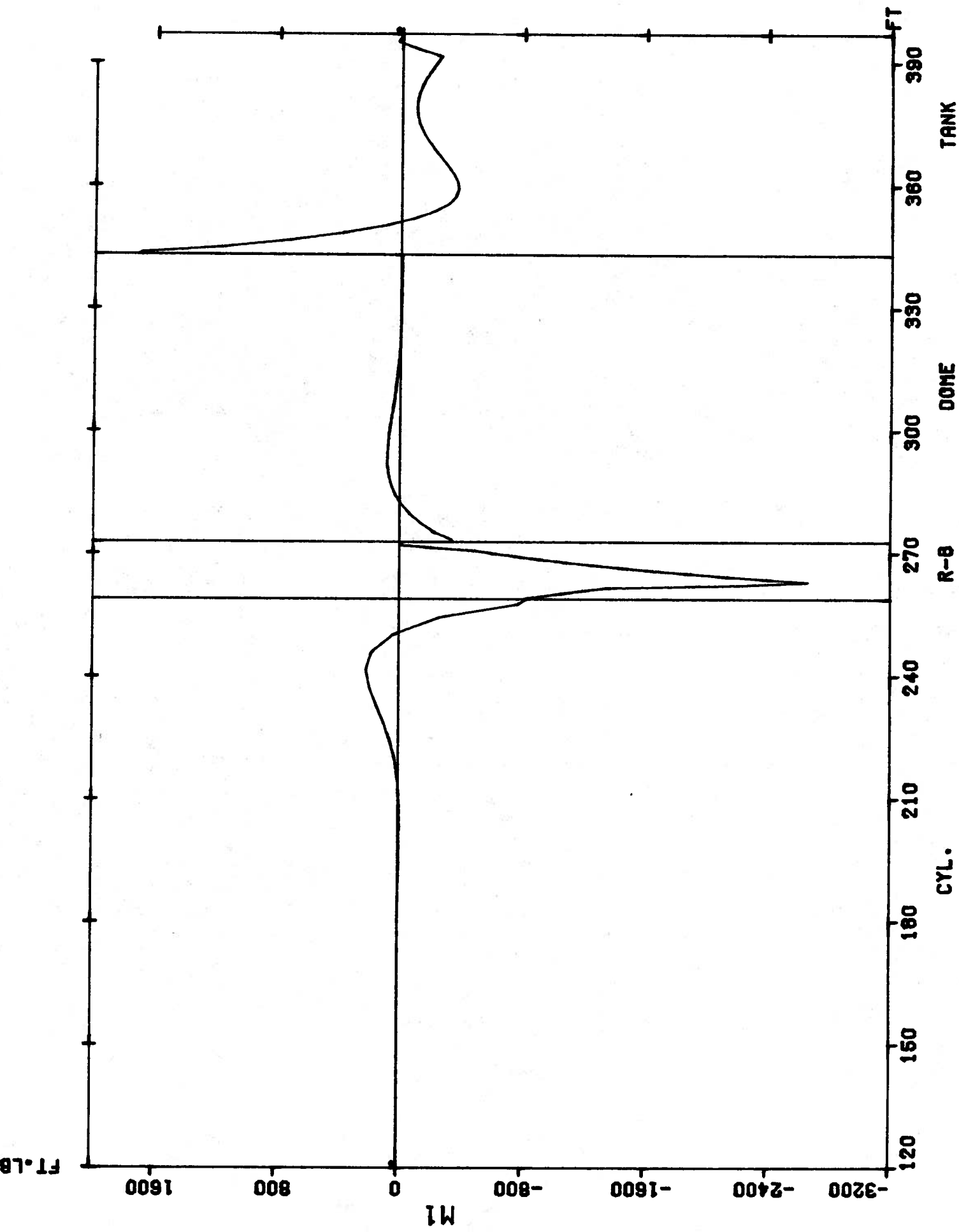


FIGURE D37 MI for Loading Case C:LDu

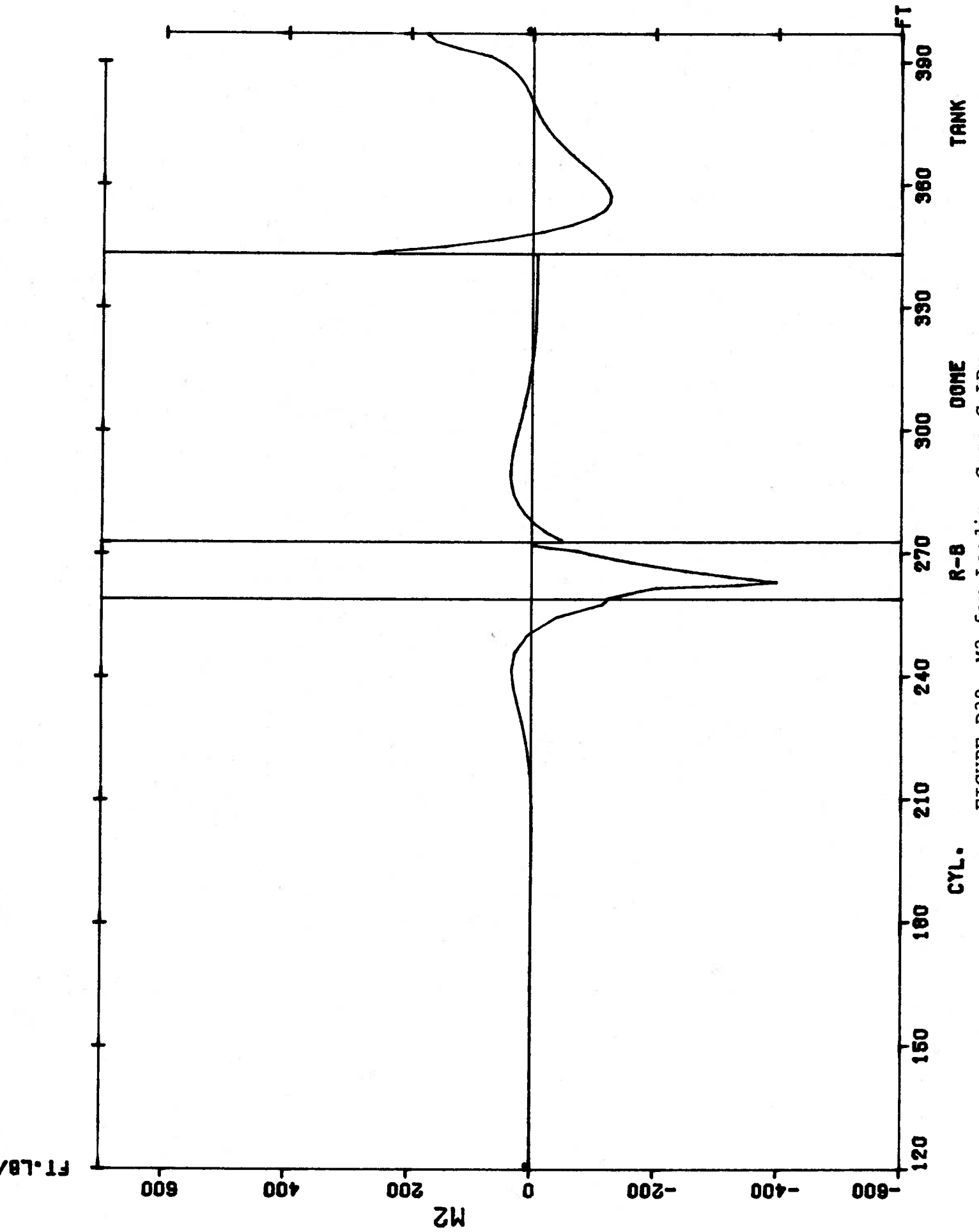
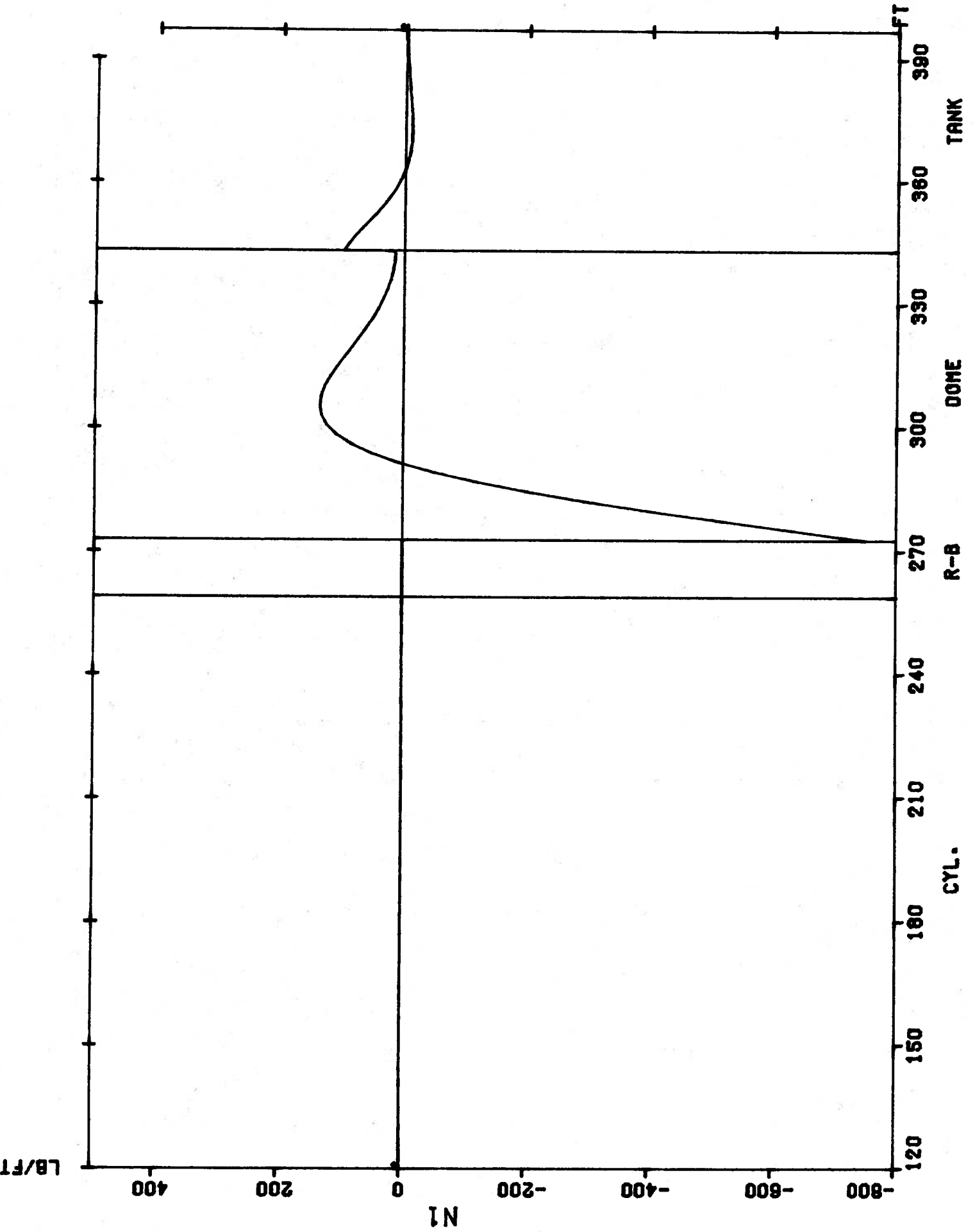


FIGURE D38 M2 for Loading Case C:LDu



STANDBY D39 N1 for Loading Case C.11111

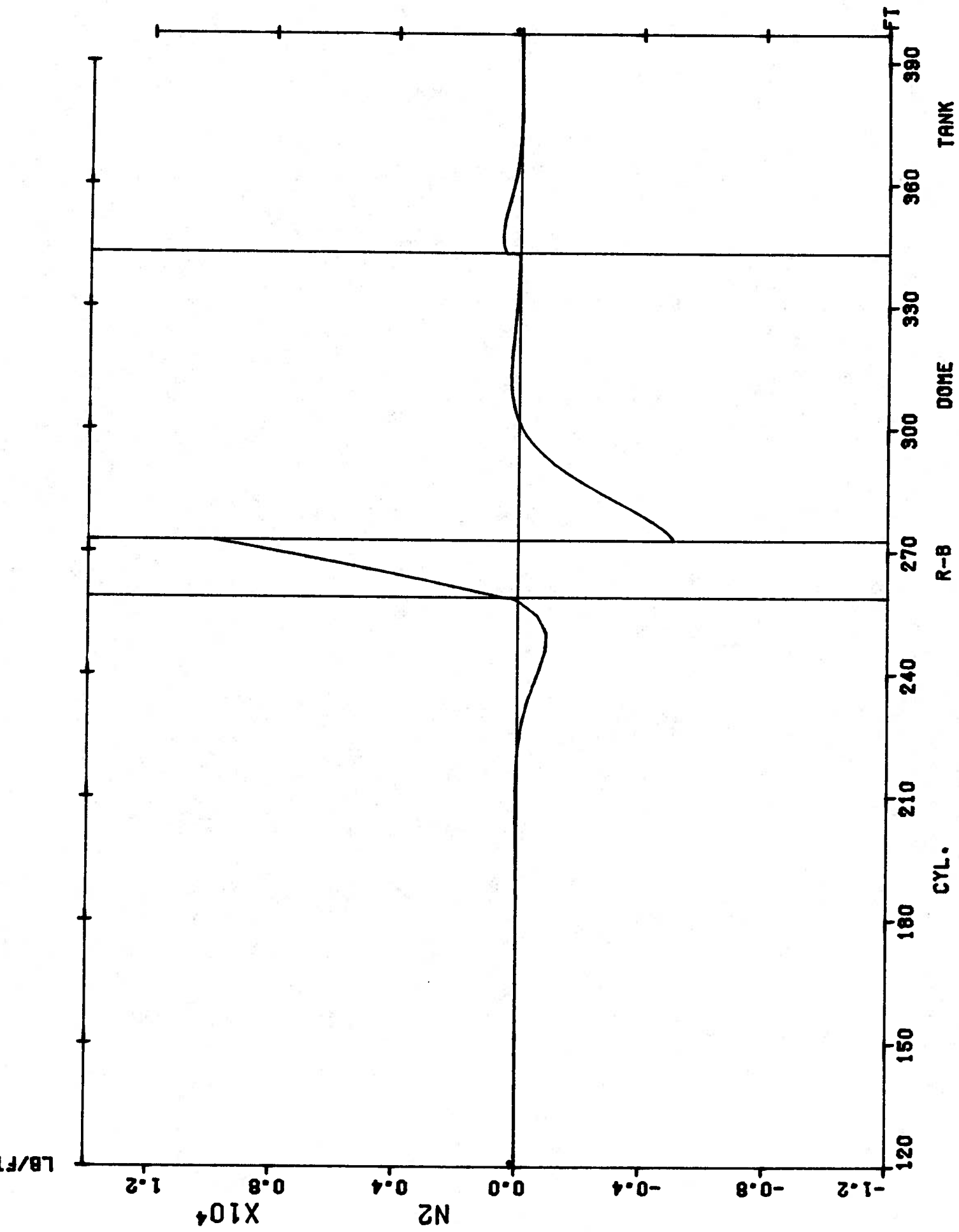


FIGURE D40 N2 for Loading Case C:UDu

CYL.

R-B

DOME

TANK

D41

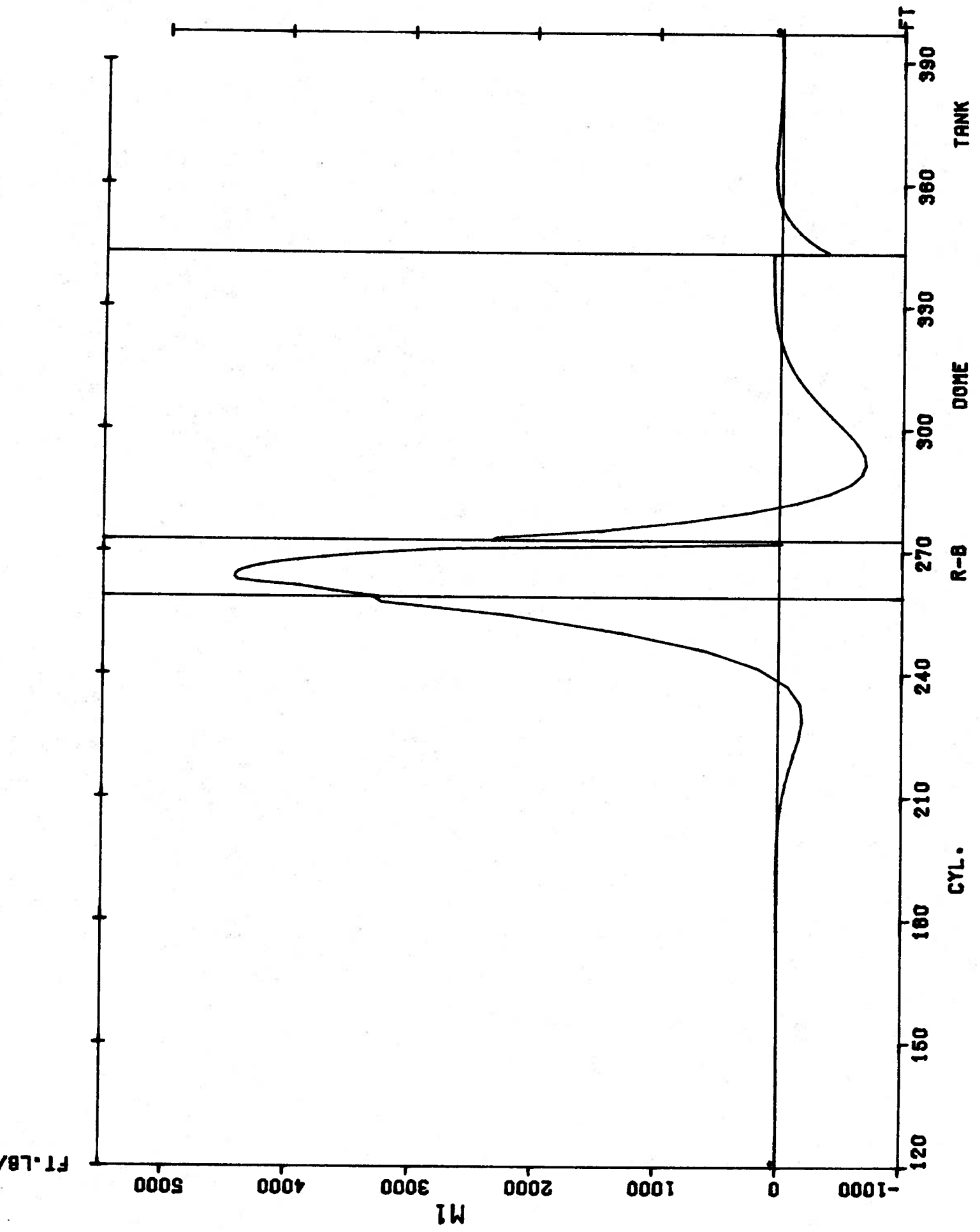


FIGURE D41 M1 FOR TANK, DOME, R-B, CYL.

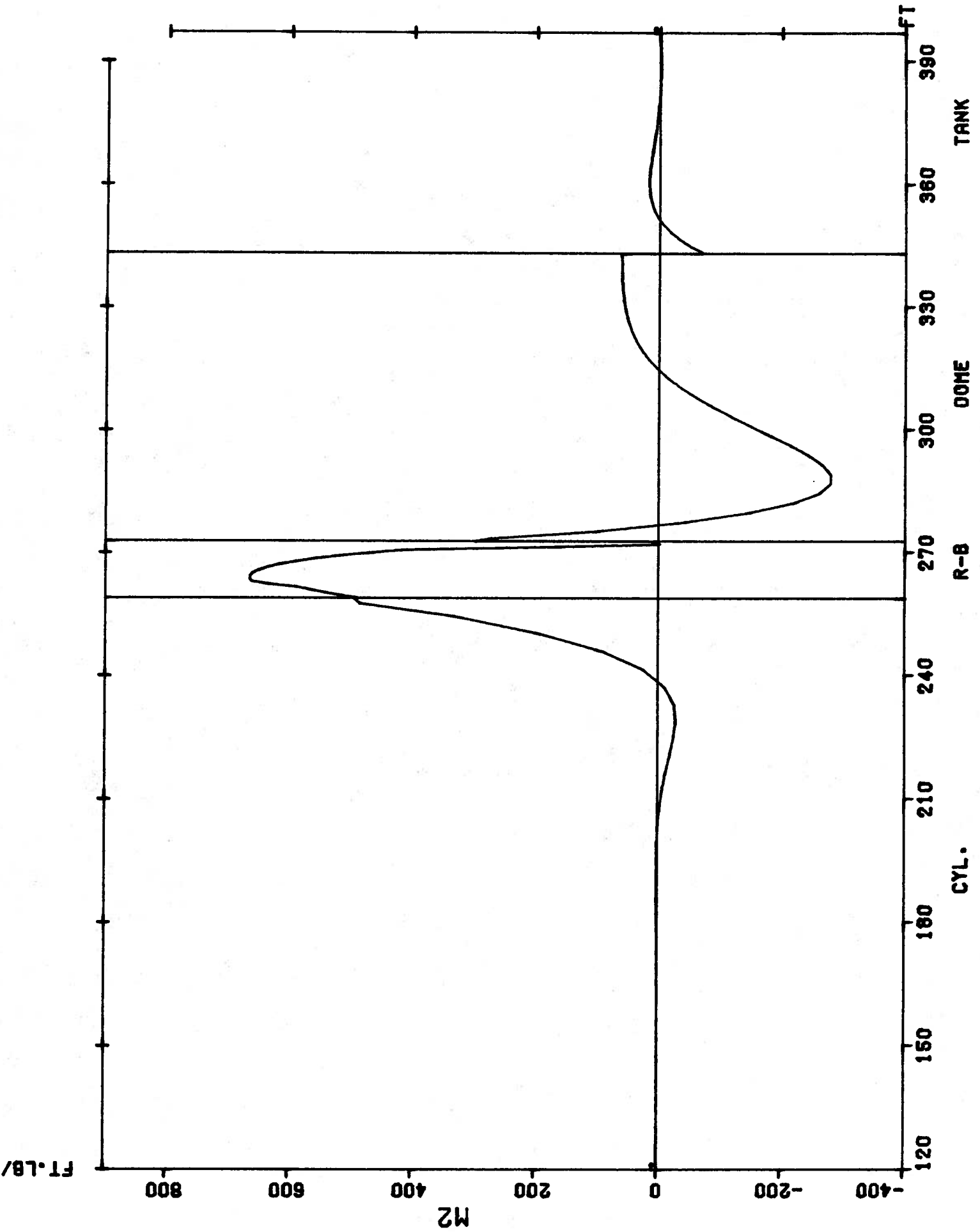


FIGURE D42 M2 for Loading Case C:UDn

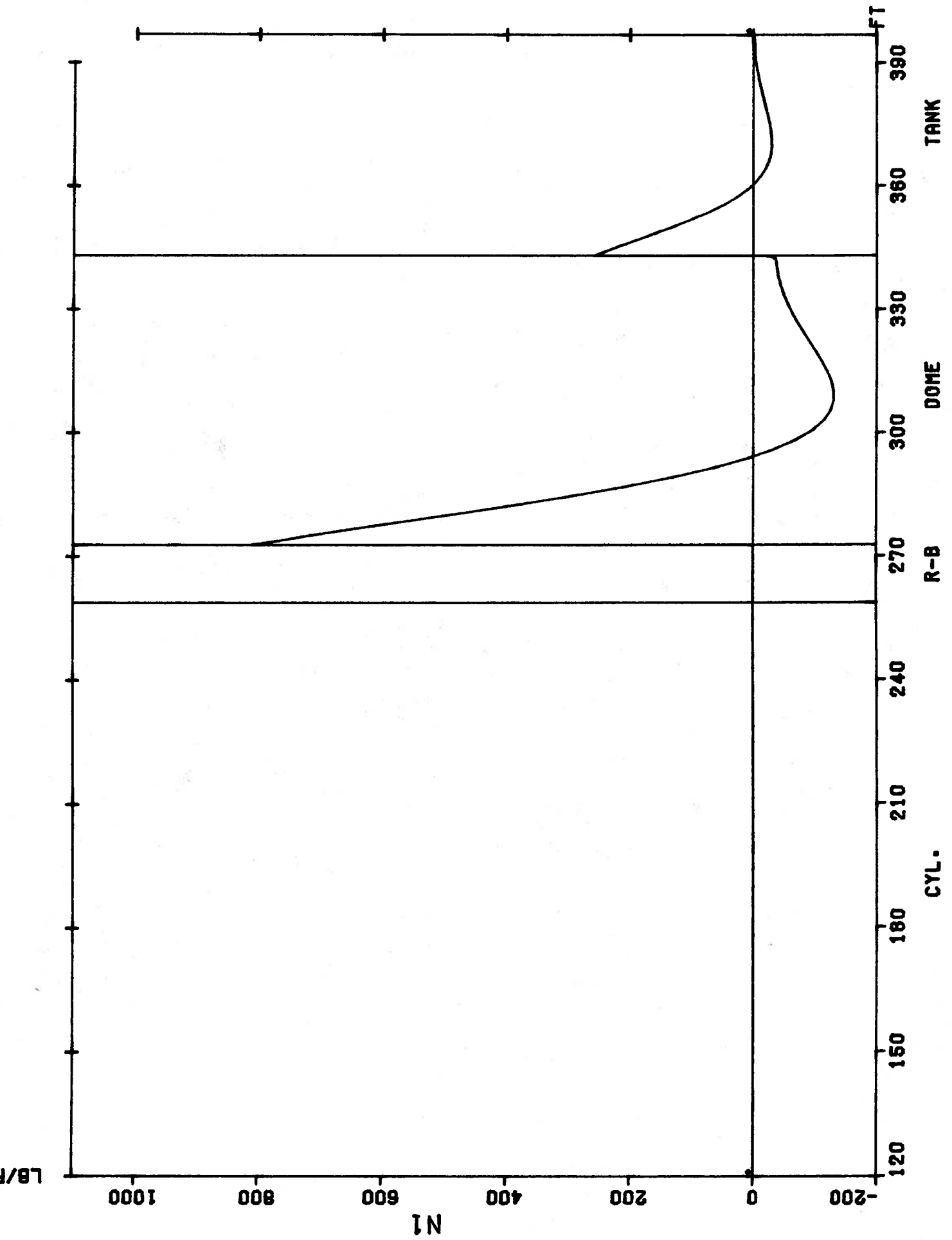


FIGURE D43 N_1 for Loading Case C:UBu

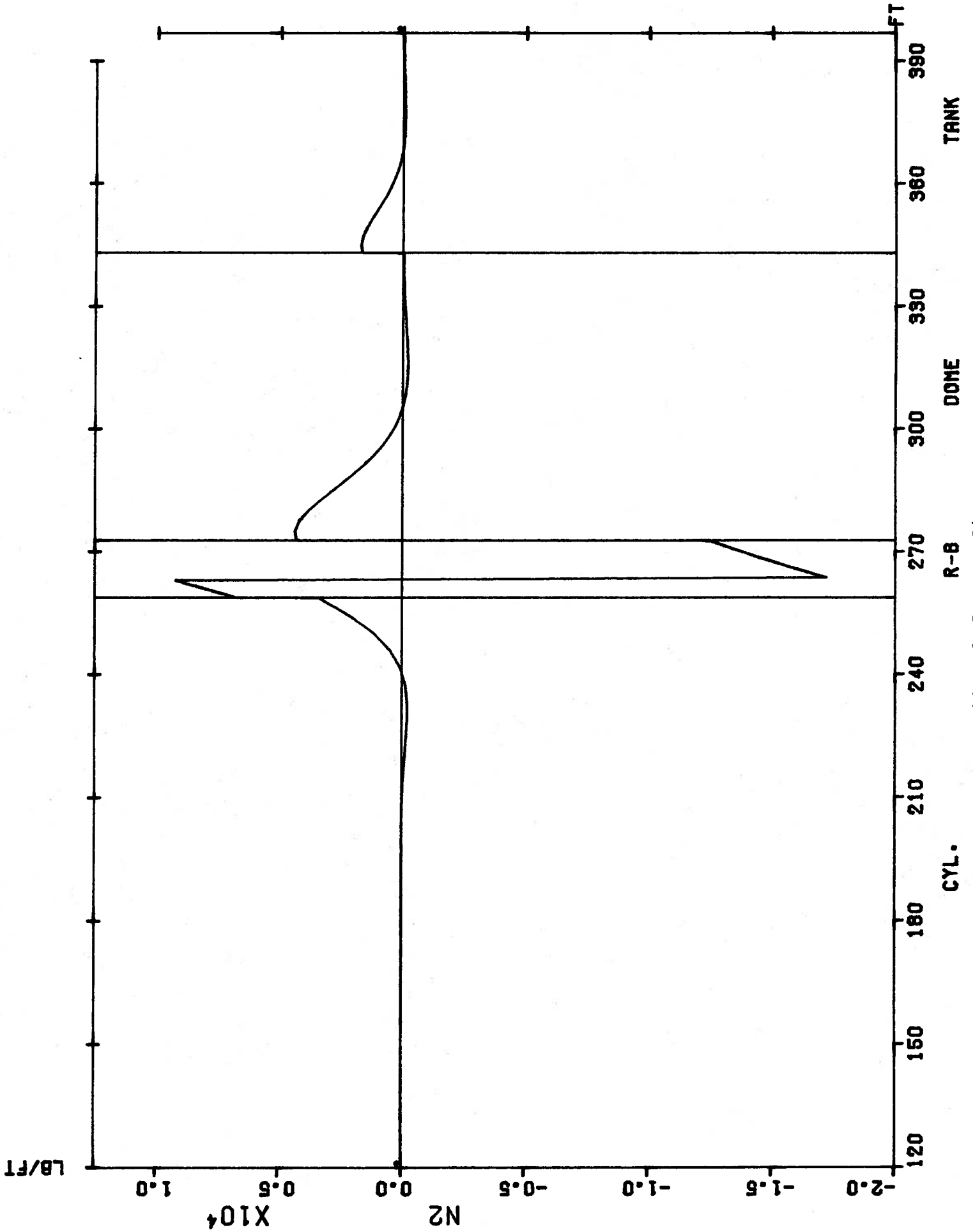


FIGURE D44 N2 for Loading Case C:111111
CYL. R-B DOME TANK

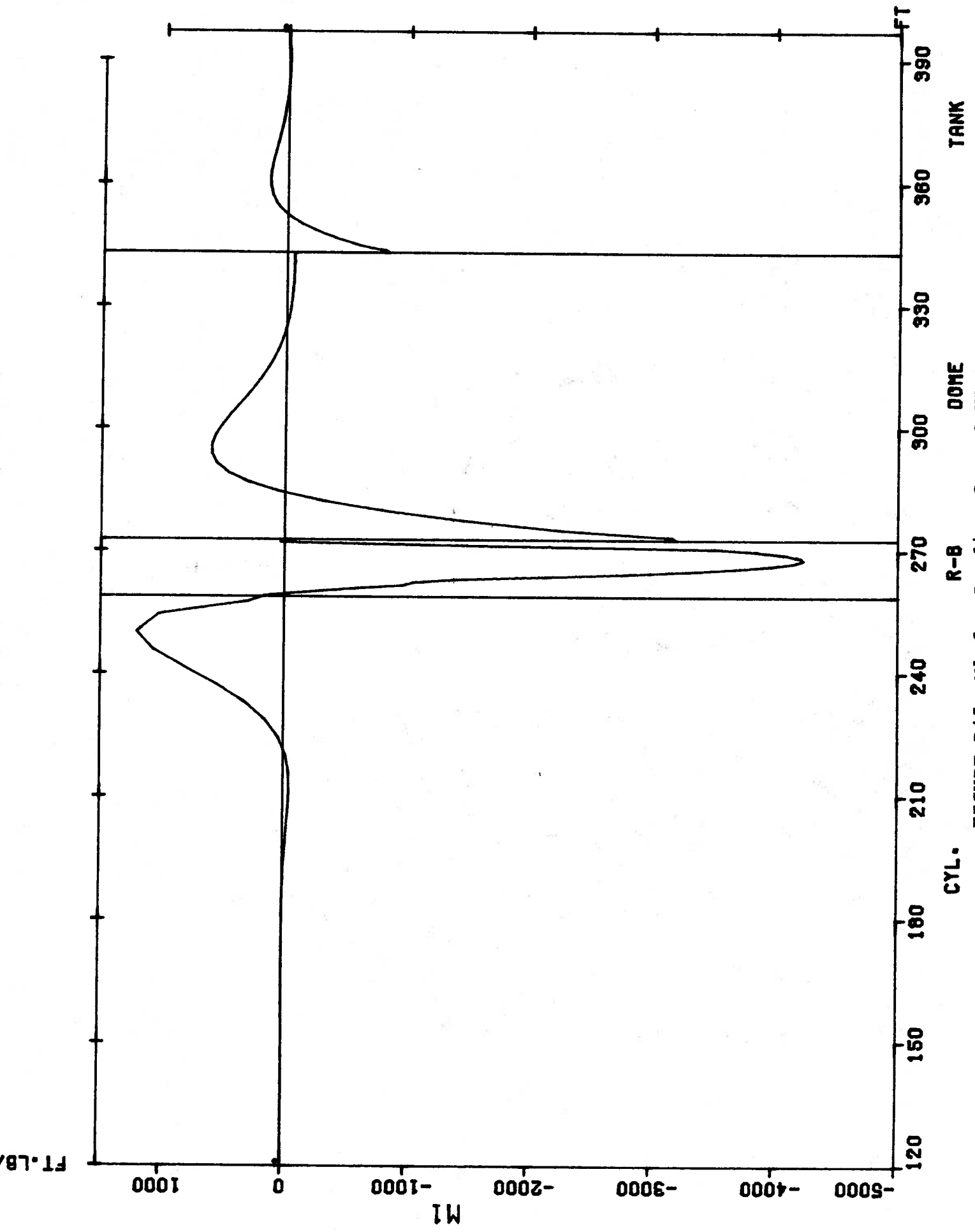


FIGURE D45 M_1 for Loading Case C:UBu

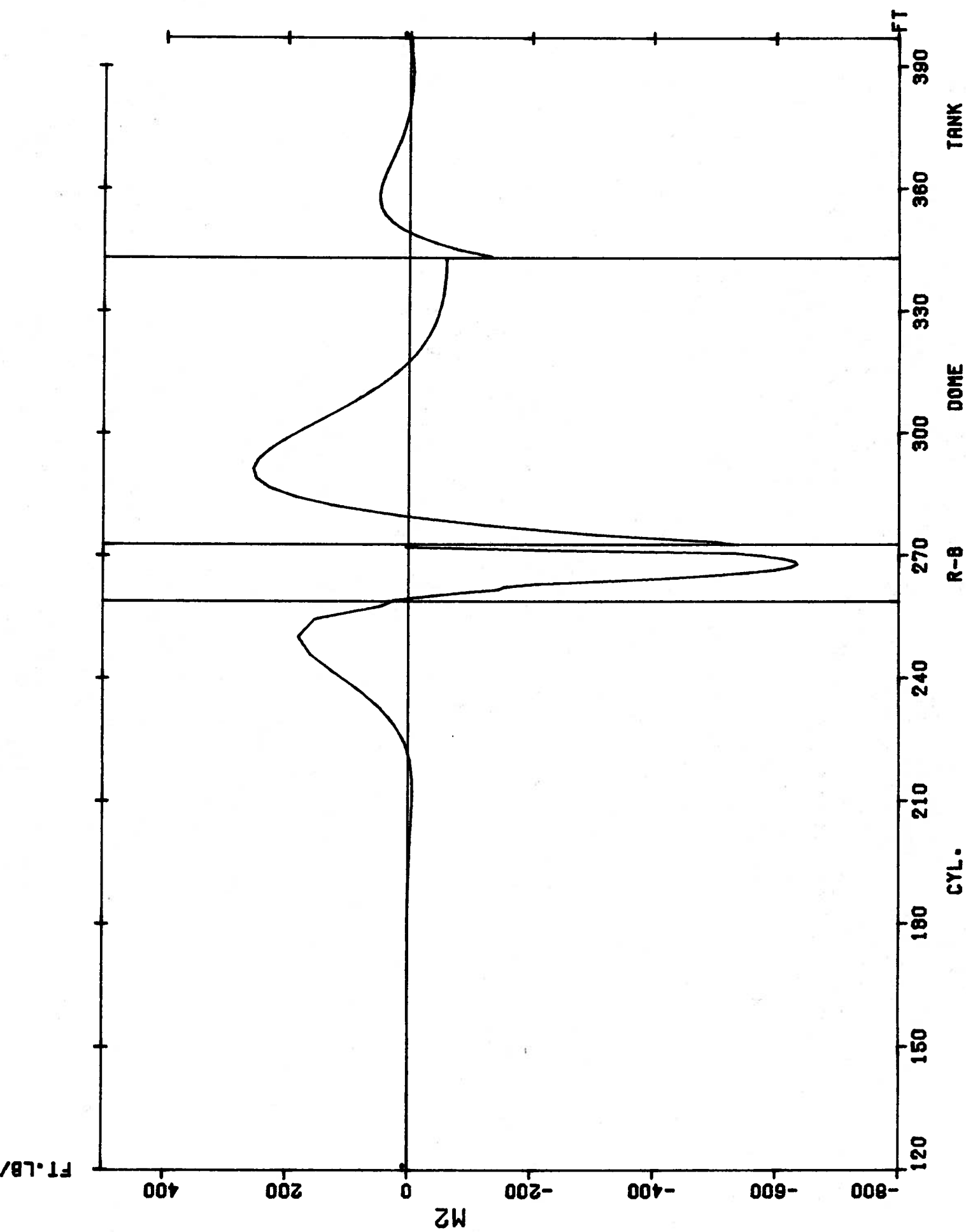


FIGURE D46 M2 for Loading Case C. (FT.-LB/)

List of Figures for Appendix E

(Note: See Sect. 2.4 for load case designations)

Figure		Title
E1	N2	for Loading Case C:Bg
E2	M1	for Loading Case C:Bg
E3	M2	for Loading Case C:Bg
E4	N1	for Loading Case C:Wg
E5	N2	for Loading Case C:Wg
E6	M1	for Loading Case C:Wg
E7	M2	for Loading Case C:Wg
E8	N1	for Loading Case C:RBg
E9	N2	for Loading Case C:RBg
E10	M1	for Loading Case C:RBg
E11	M2	for Loading Case C:RBg
E12	N1	for Loading Case C:LDg
E13	N2	for Loading Case C:LDg
E14	M1	for Loading Case C:LDg
E15	M2	for Loading Case C:LDg
E16	N1	for Loading Case C:UDg
E17	N2	for Loading Case C:UDg
E18	M1	for Loading Case C:UDg
E19	M2	for Loading Case C:UDg

APPENDIX E

Stress Resultants for Gradient Influence Strains

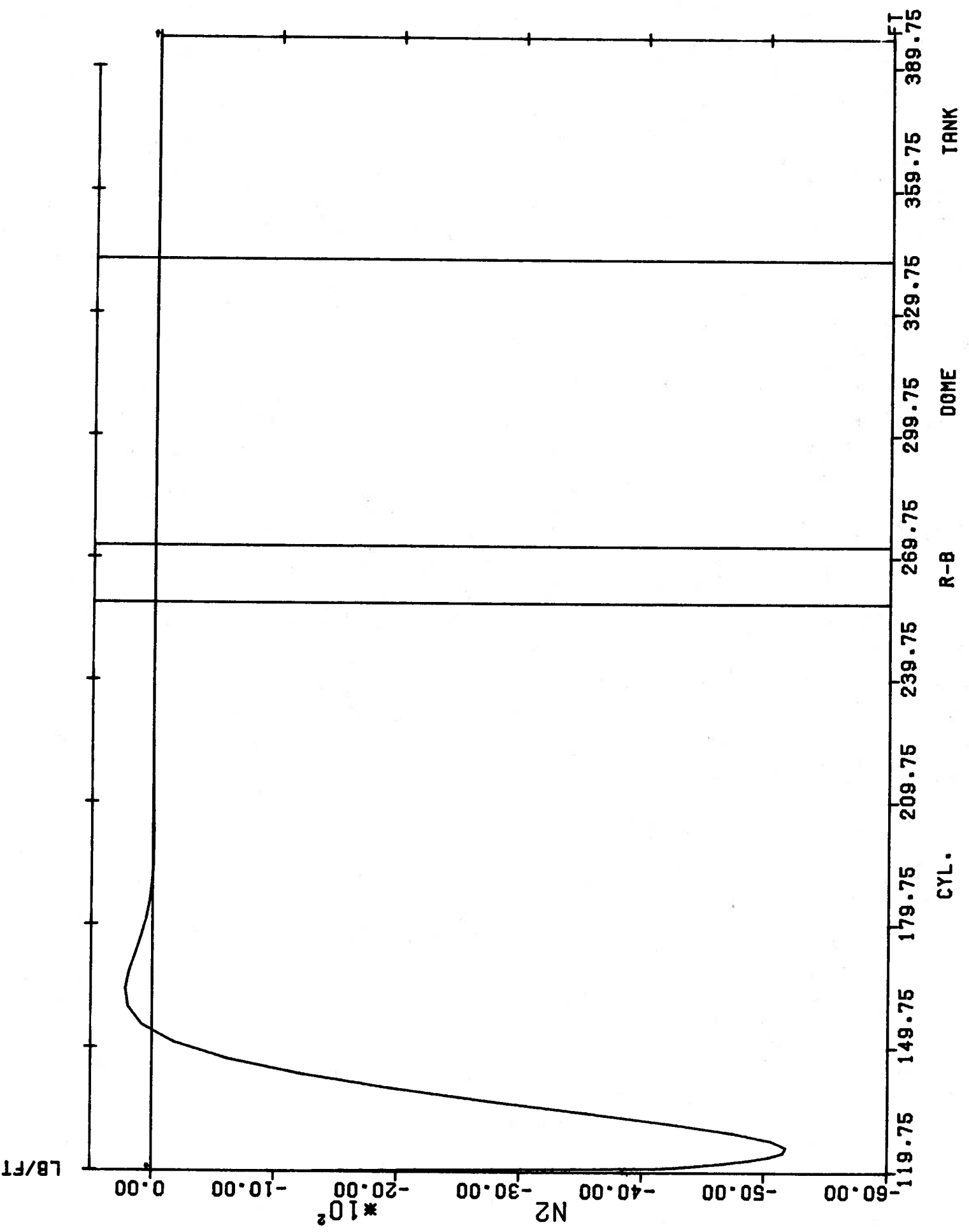


FIGURE E1 N2 for Loading Case C:Bg

CYL.

R-B

DOME

TANK

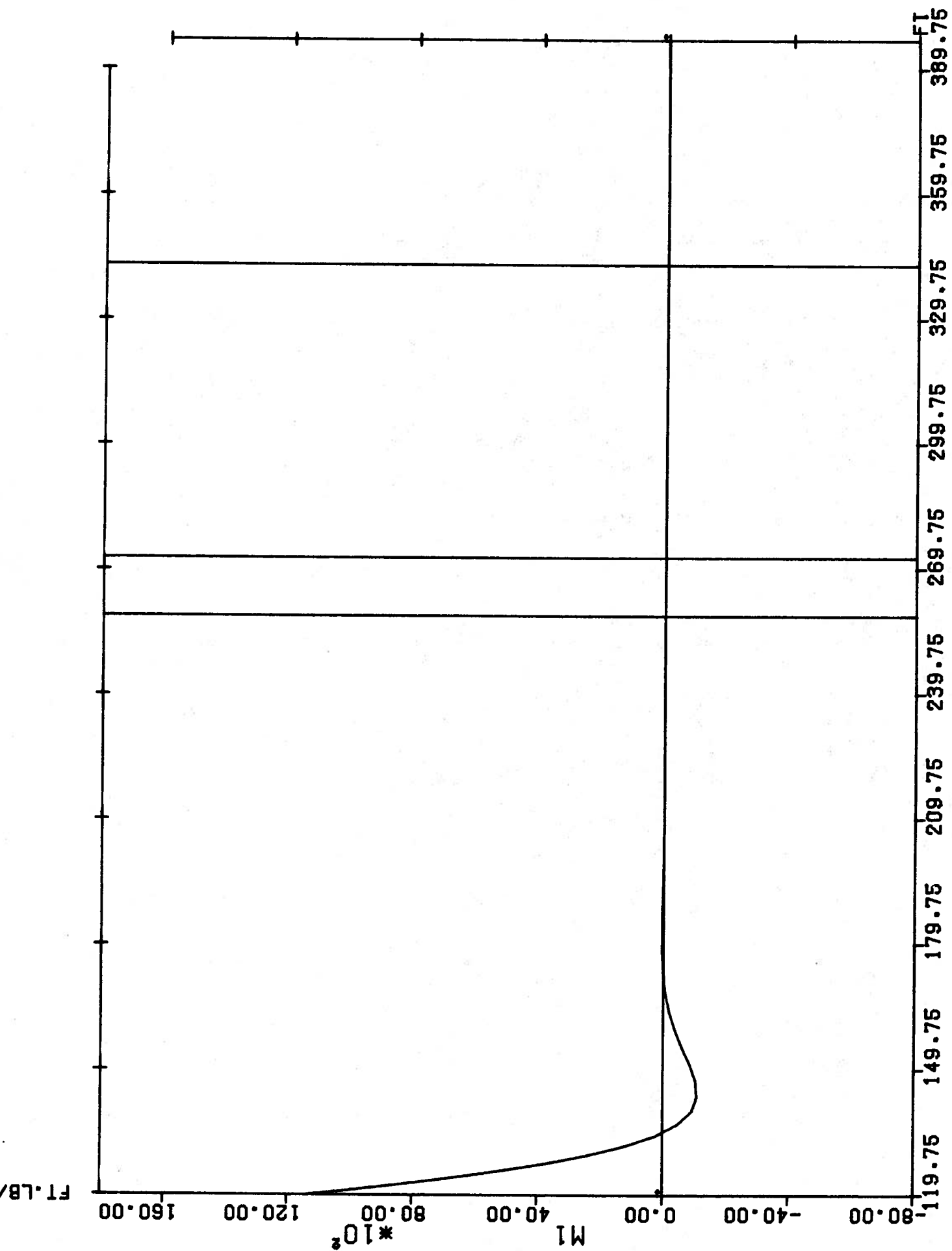
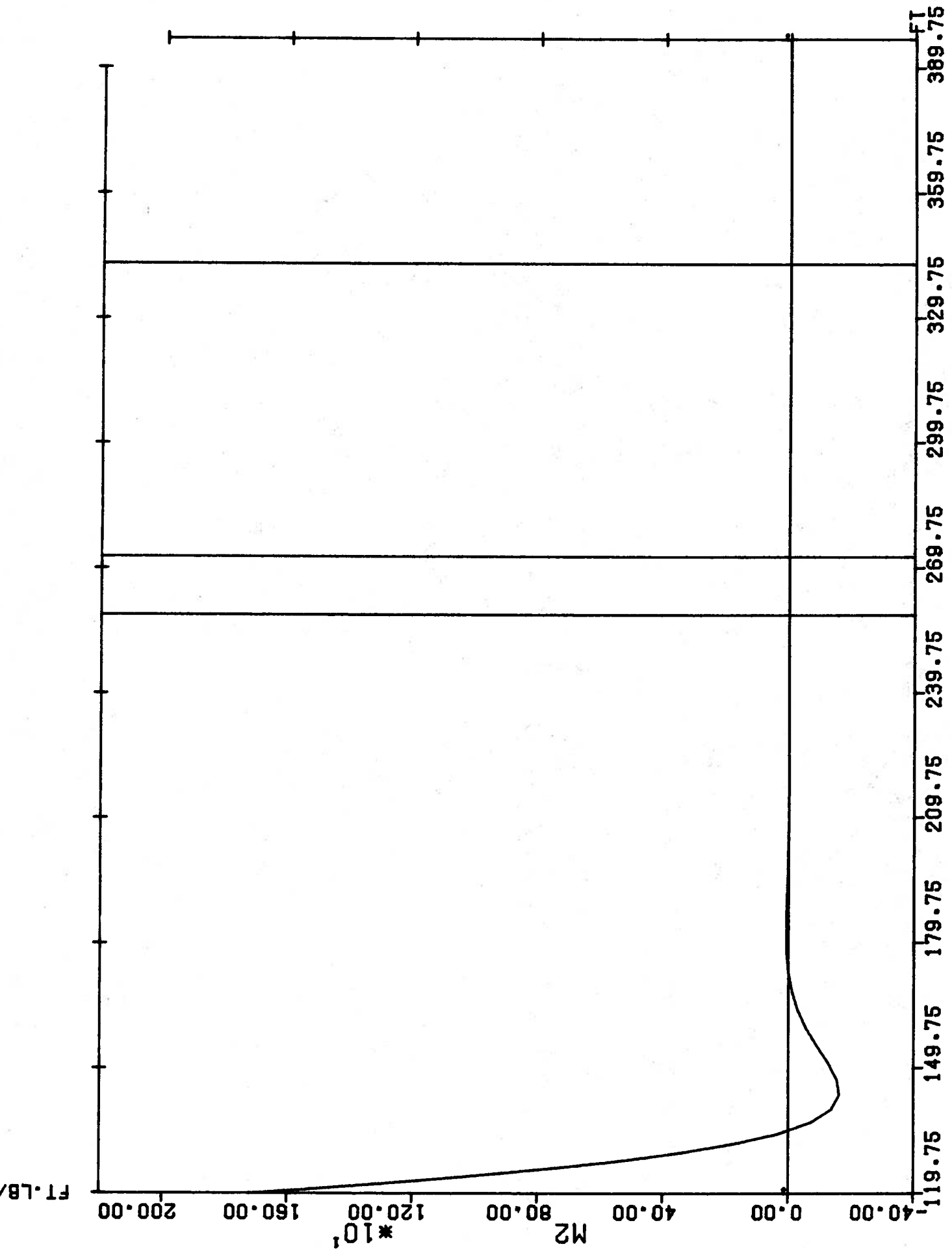


FIGURE E2 MI for Loading Case C:Bq
CYL. R-B DOME TANK



TANK

DOME

R-B

CYL.

FIGURE E3 M2 for Loading Case C:Bg

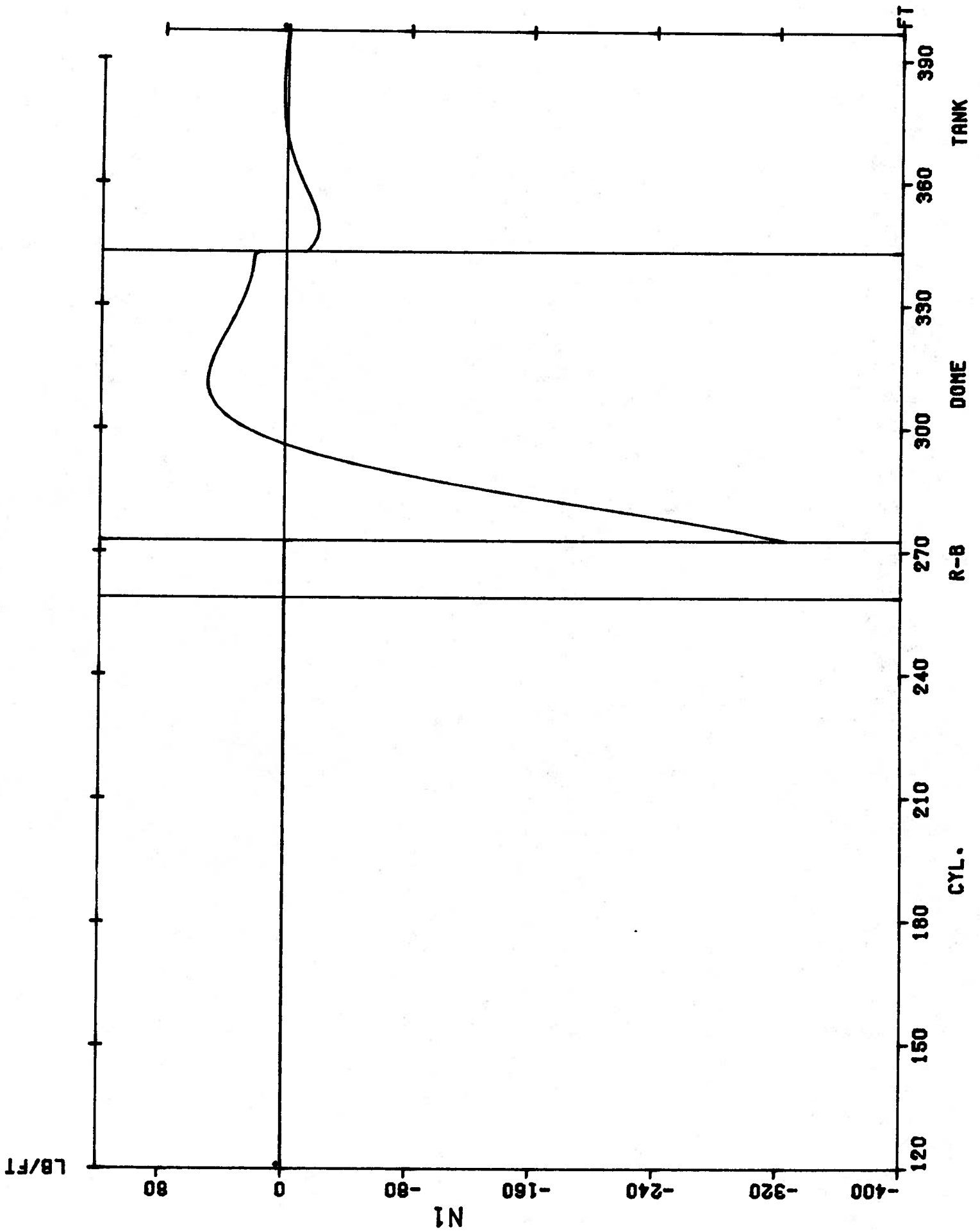


FIGURE E4 N_1 for Loading Case C:Wd

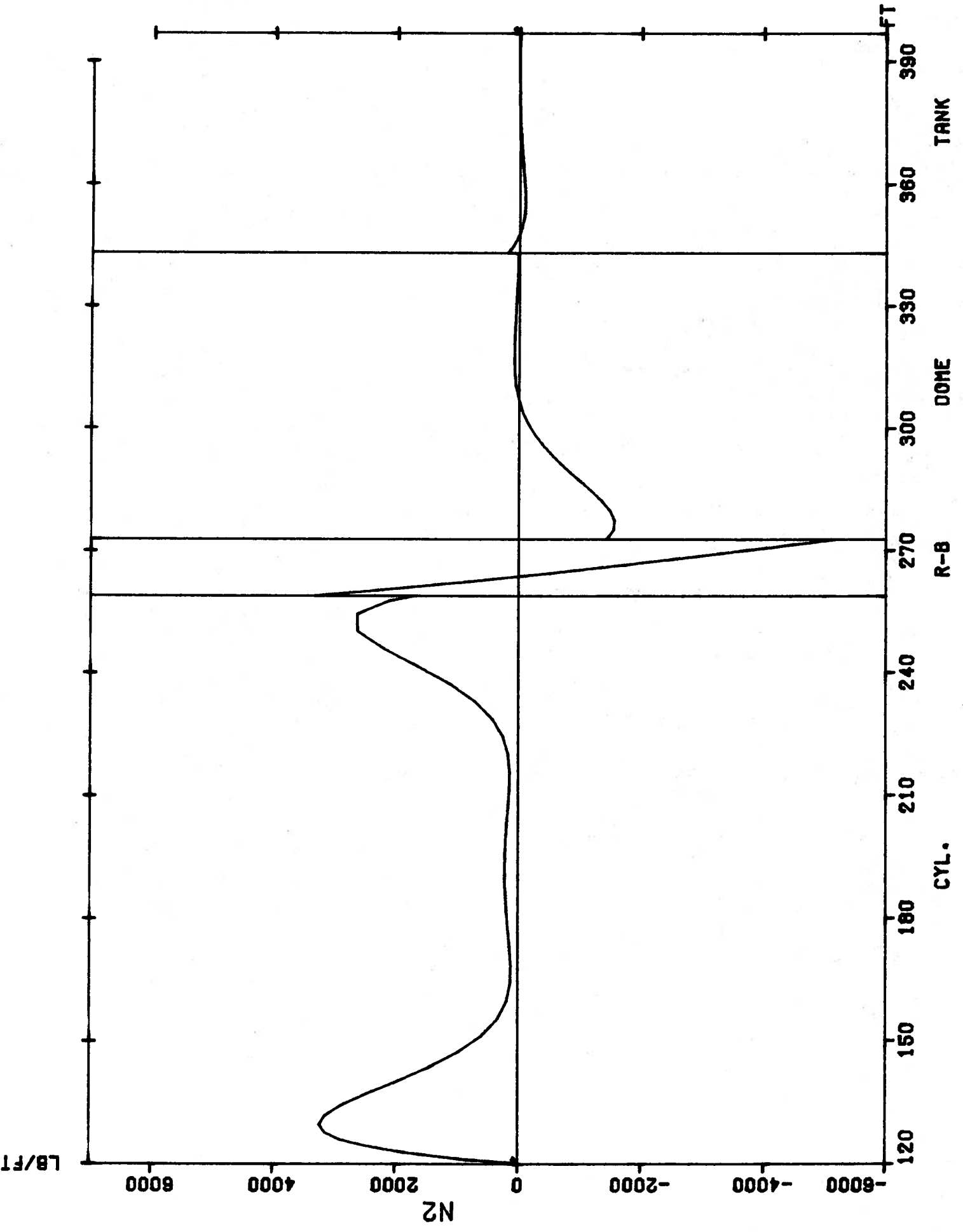


FIGURE E5 N2 for Loading Case C:Wg

CYL.

R-B

DOME

TANK

FT

LB/FT

N2

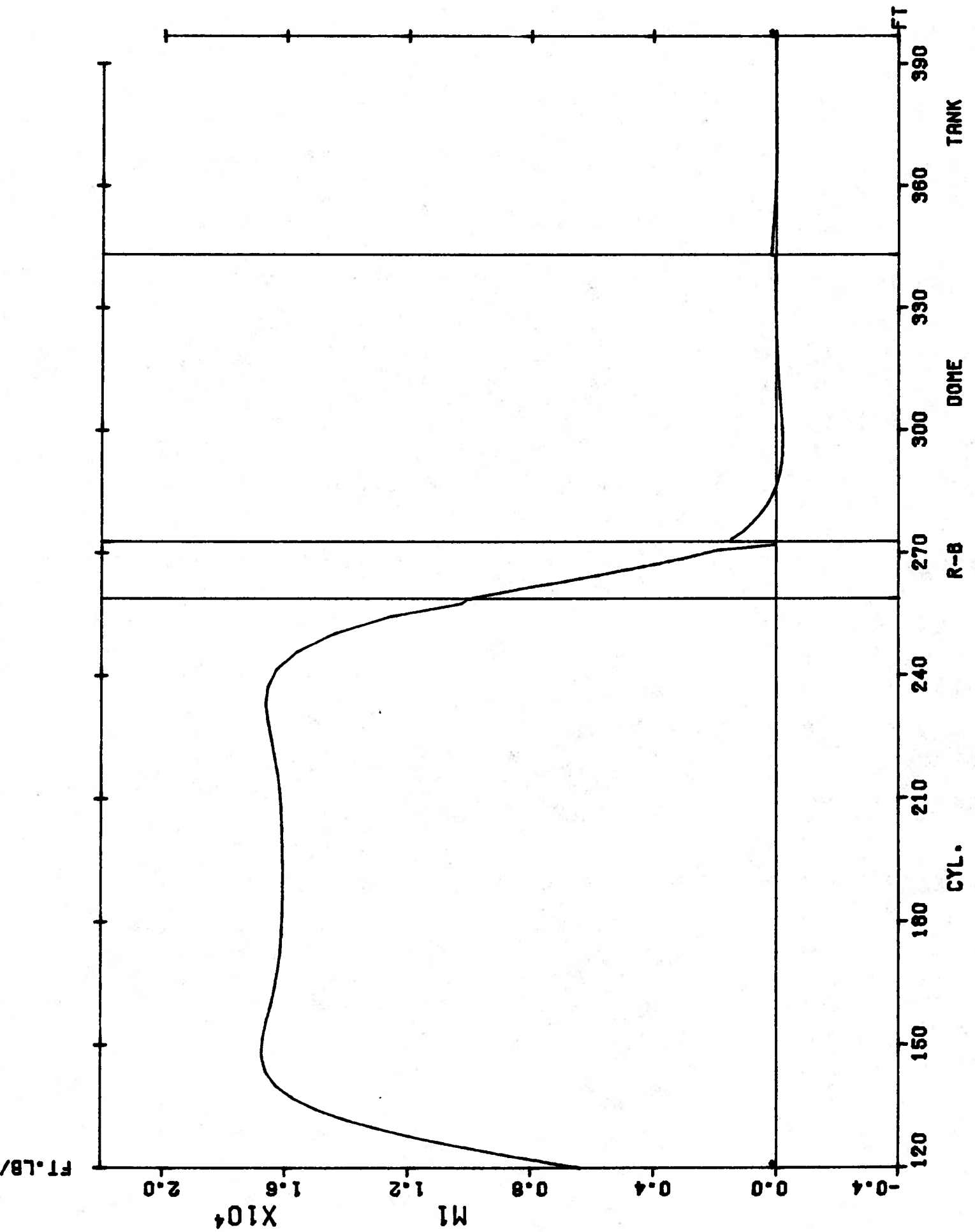
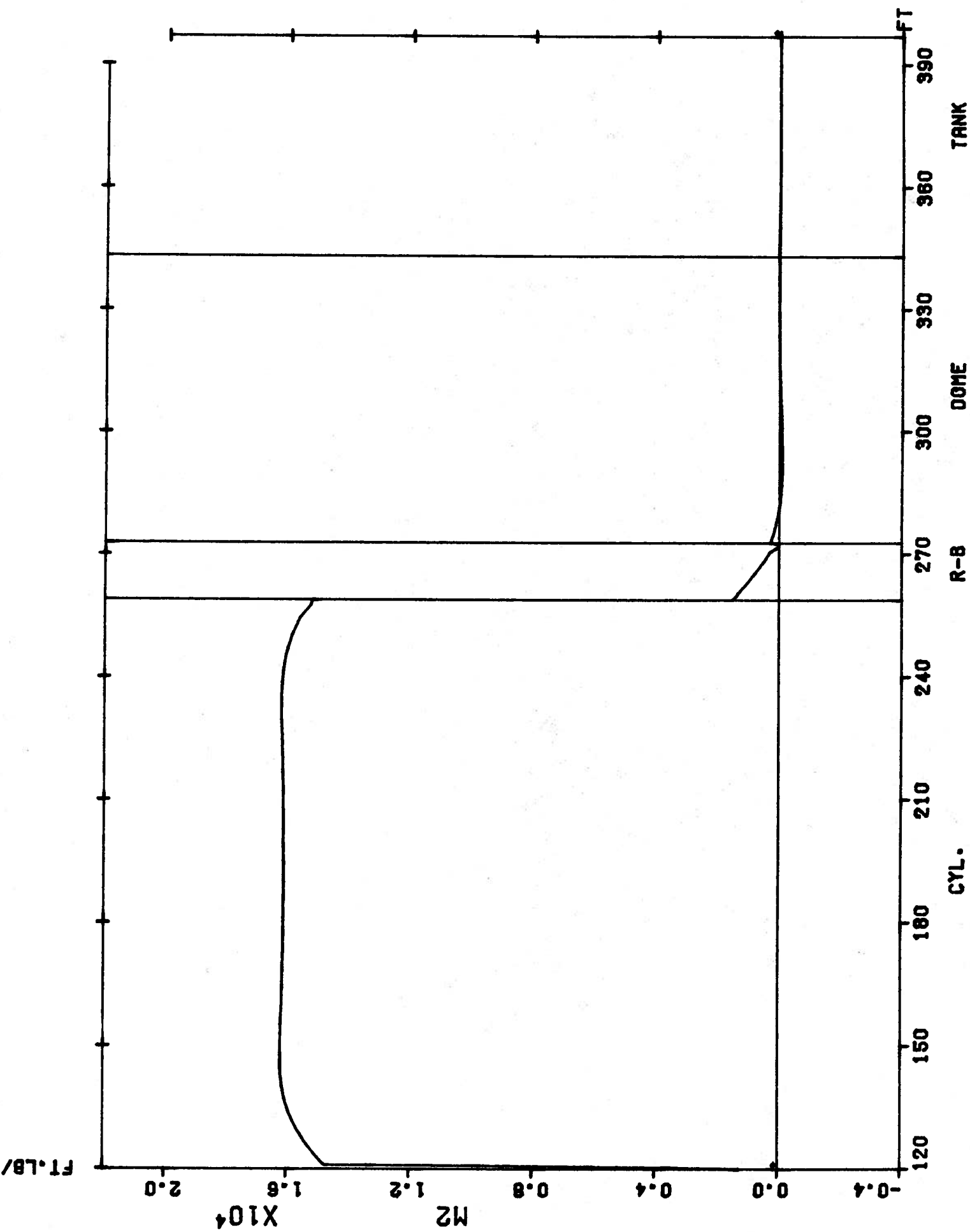


FIGURE E6 M1 for Loading Case C:Wg



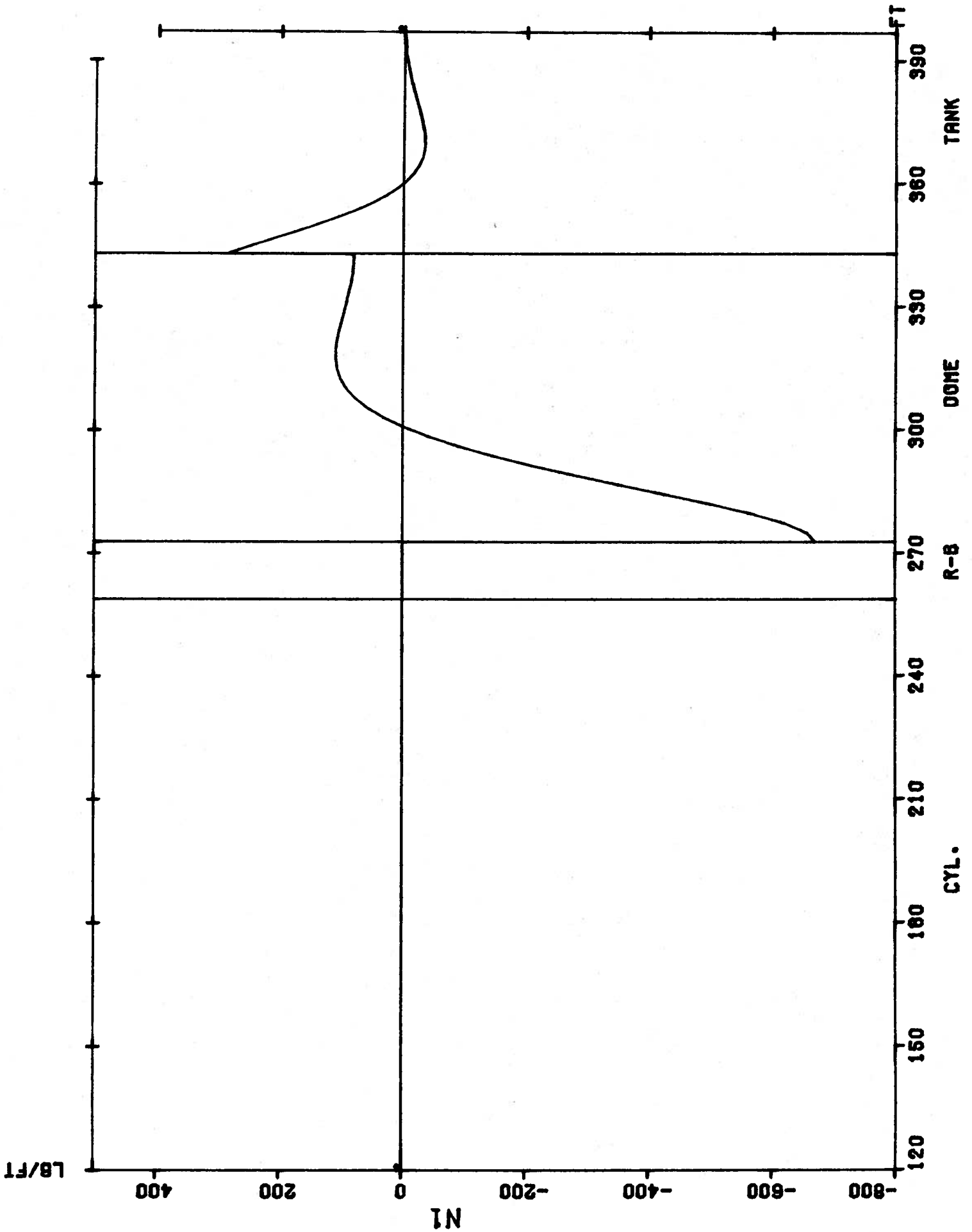


FIGURE NO. 13 FOR TANKS AND DOME

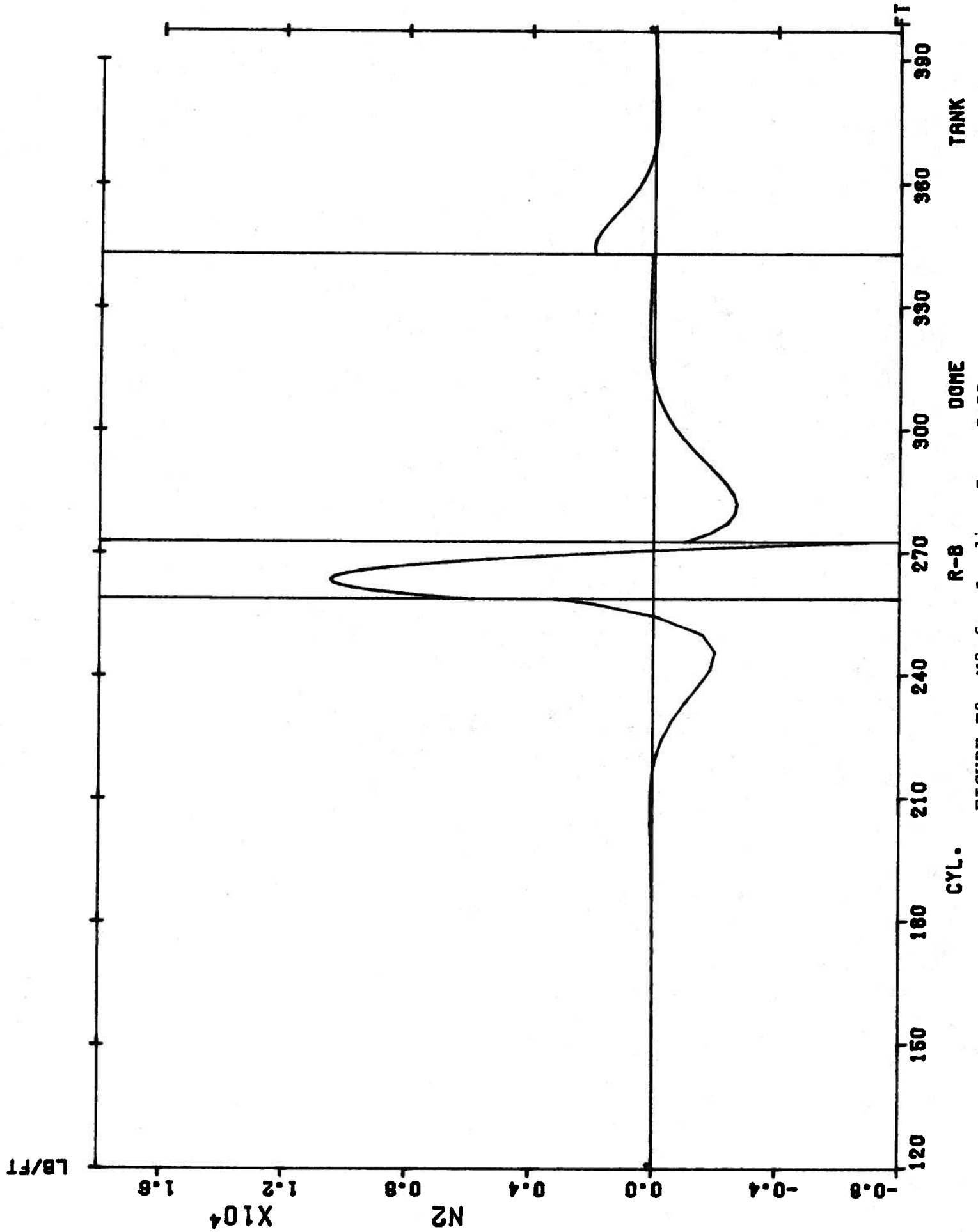


FIGURE E9 N_2 for Loading Case C:RBg

CYL.

R-B

DOME

TANK

E10

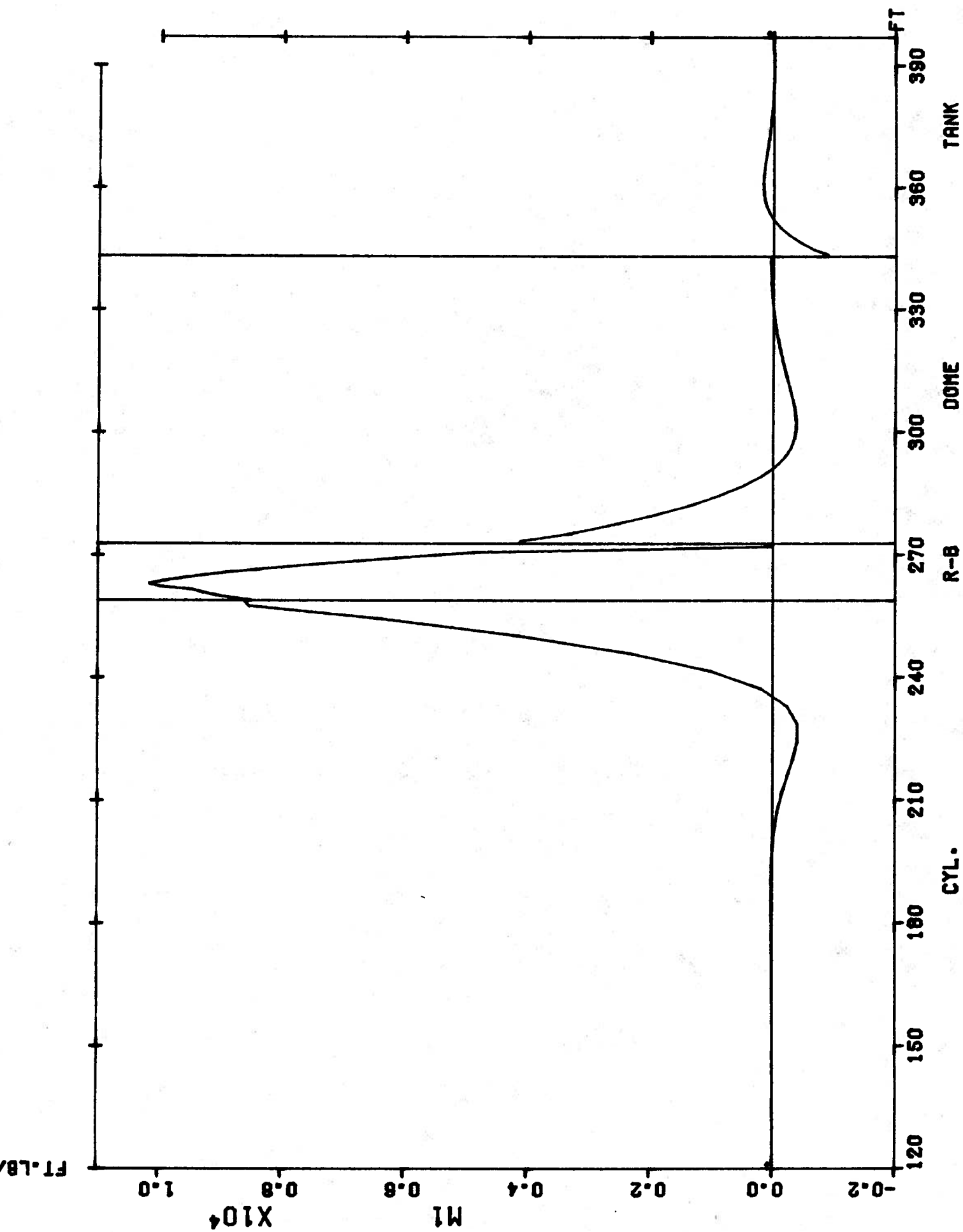


FIGURE E10 M1 for Loading Case C:RBg

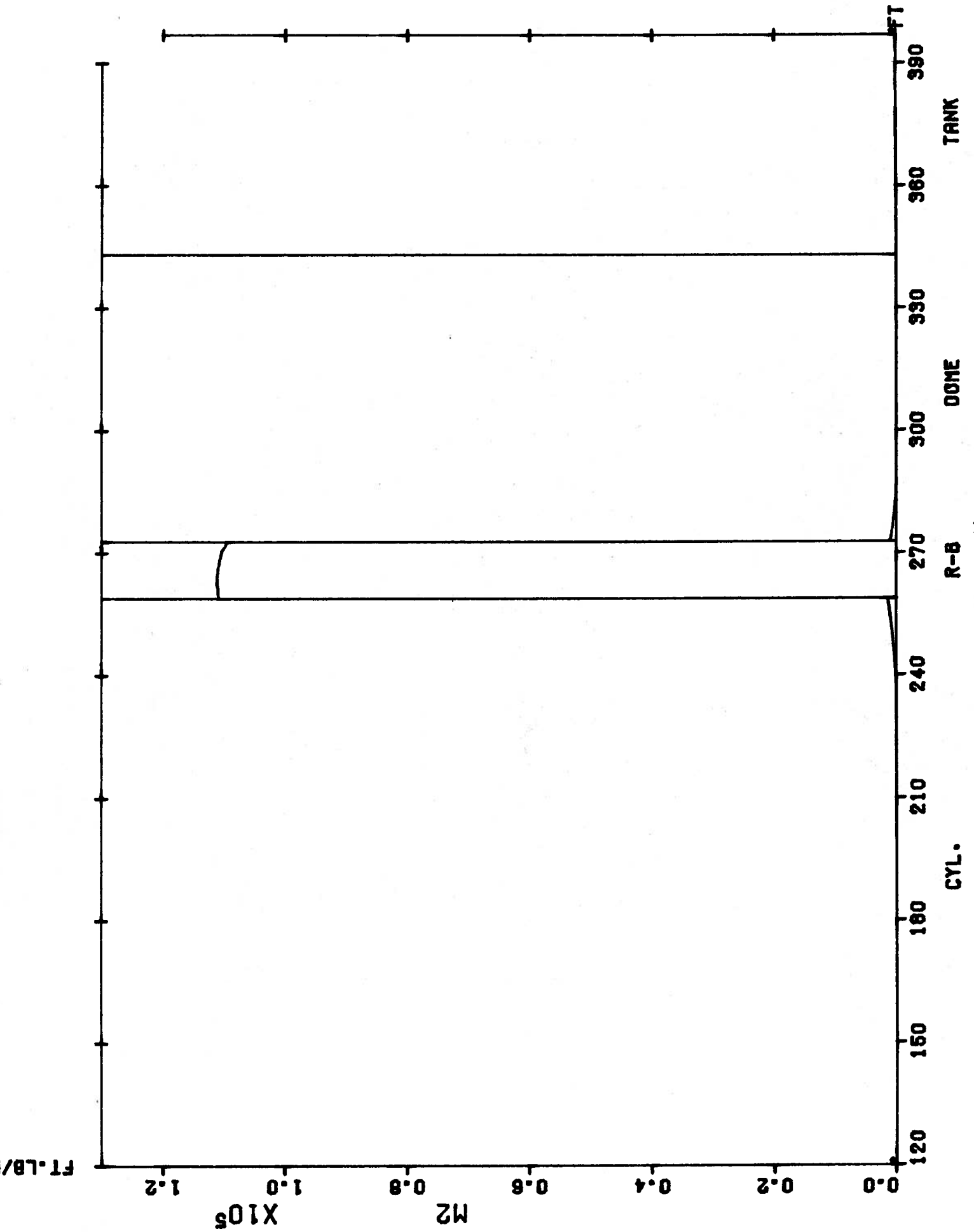


FIGURE E11 M2 for Loading Case C:RBg

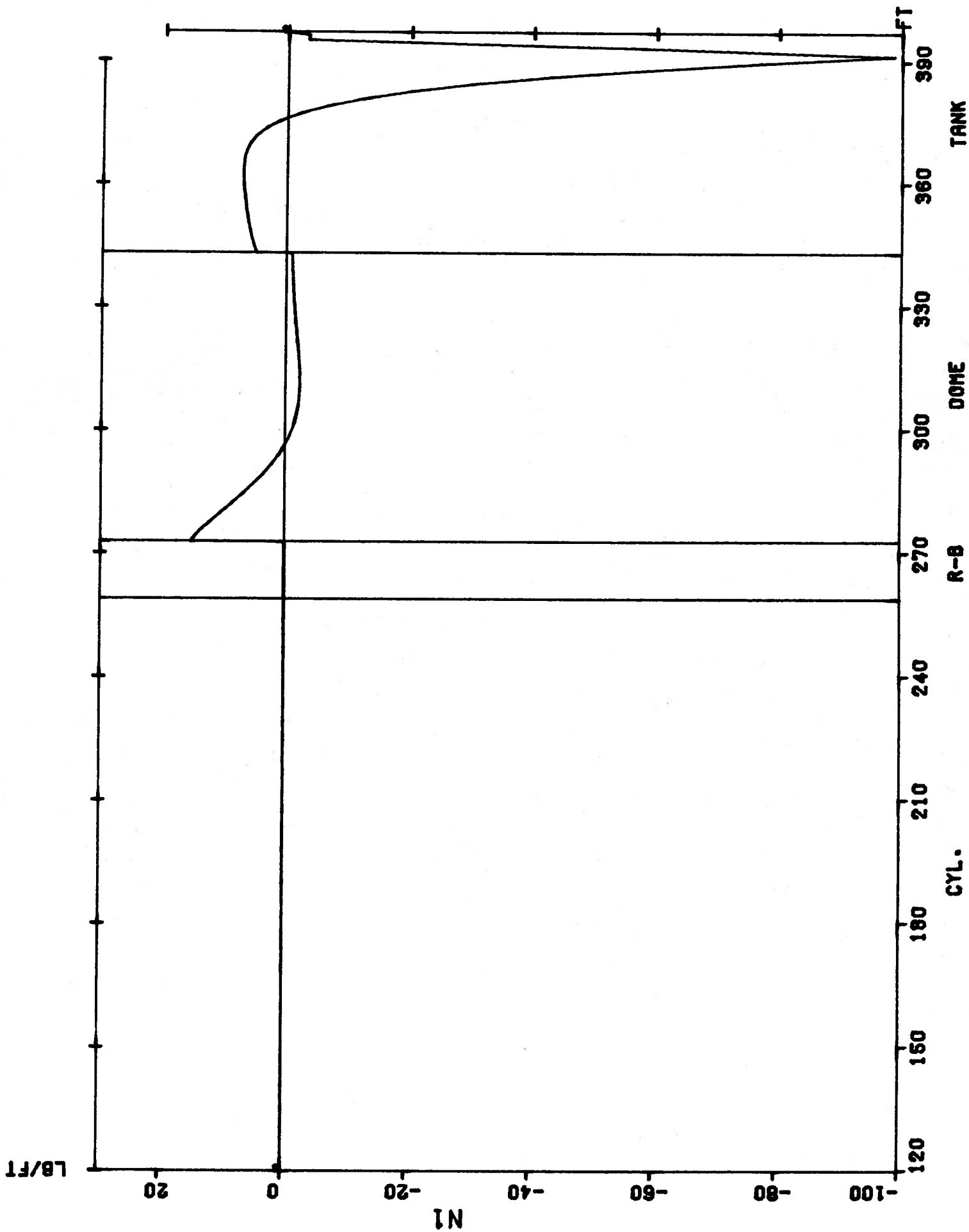


FIGURE E12 N1 for Loading Case C:LDg

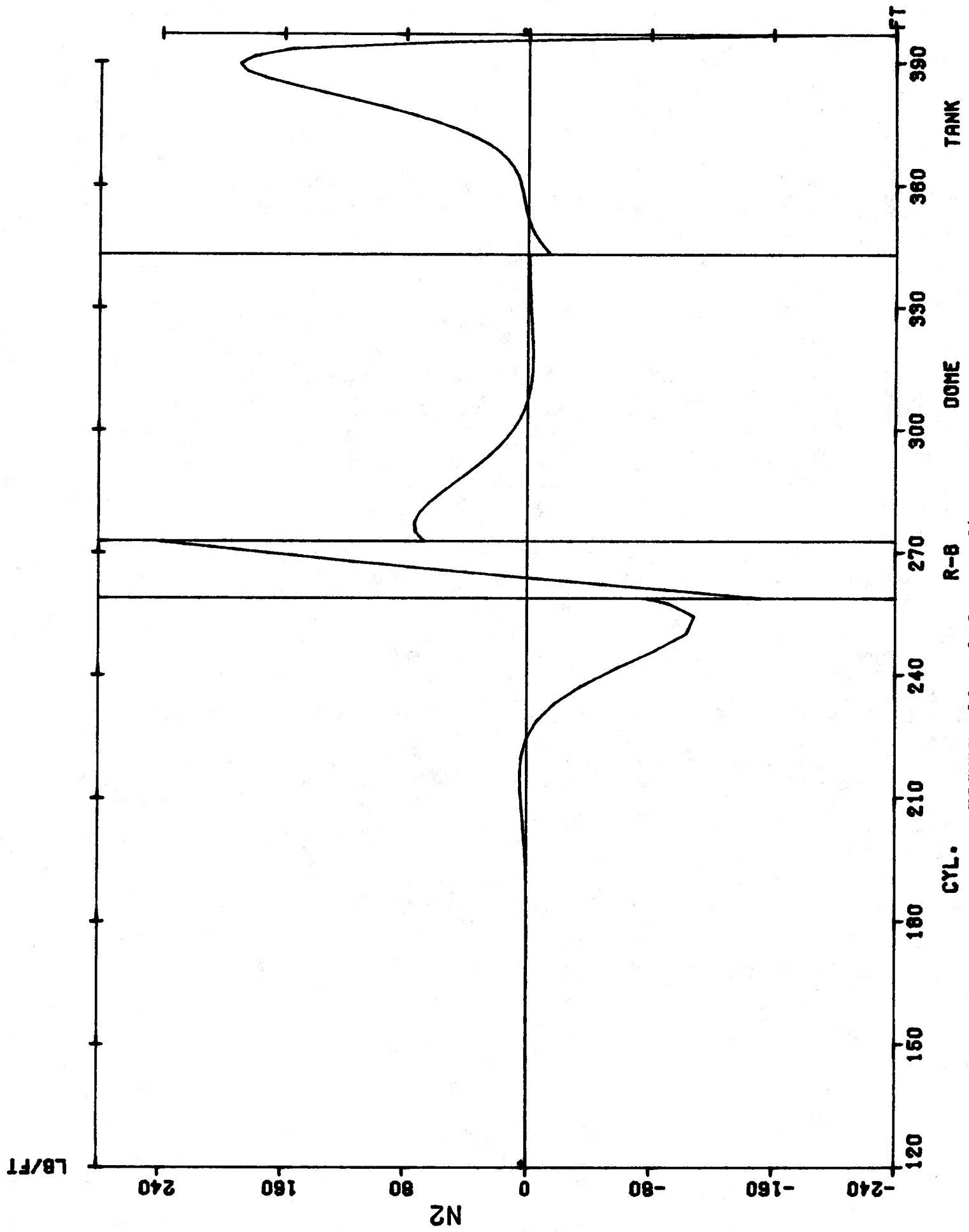


FIGURE E13 N2 for Loading Case C:LDg

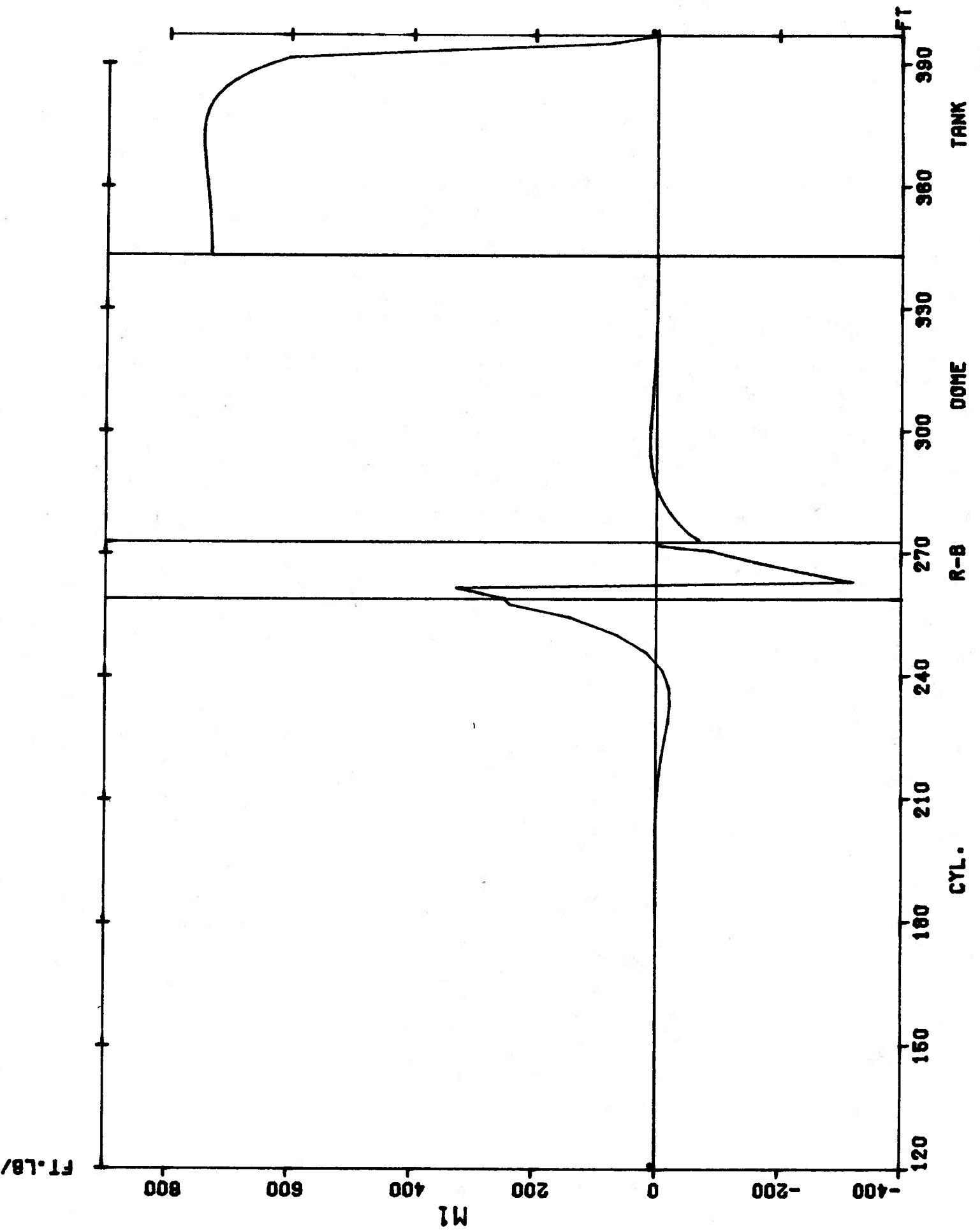
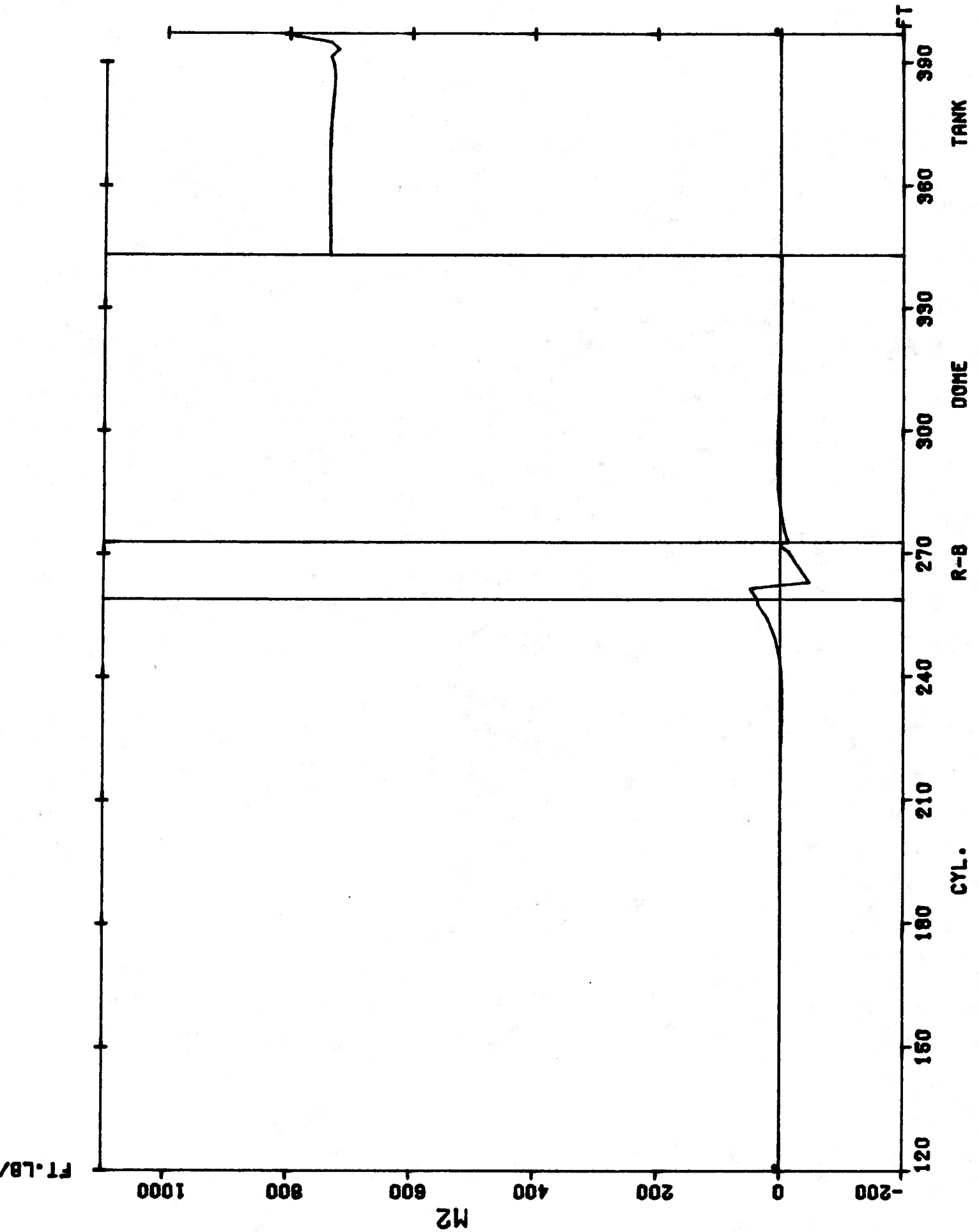


FIGURE E14 M1 for Loading Case C.T.D.



ETCHED E15 M2 for Loading Case C.I.Da

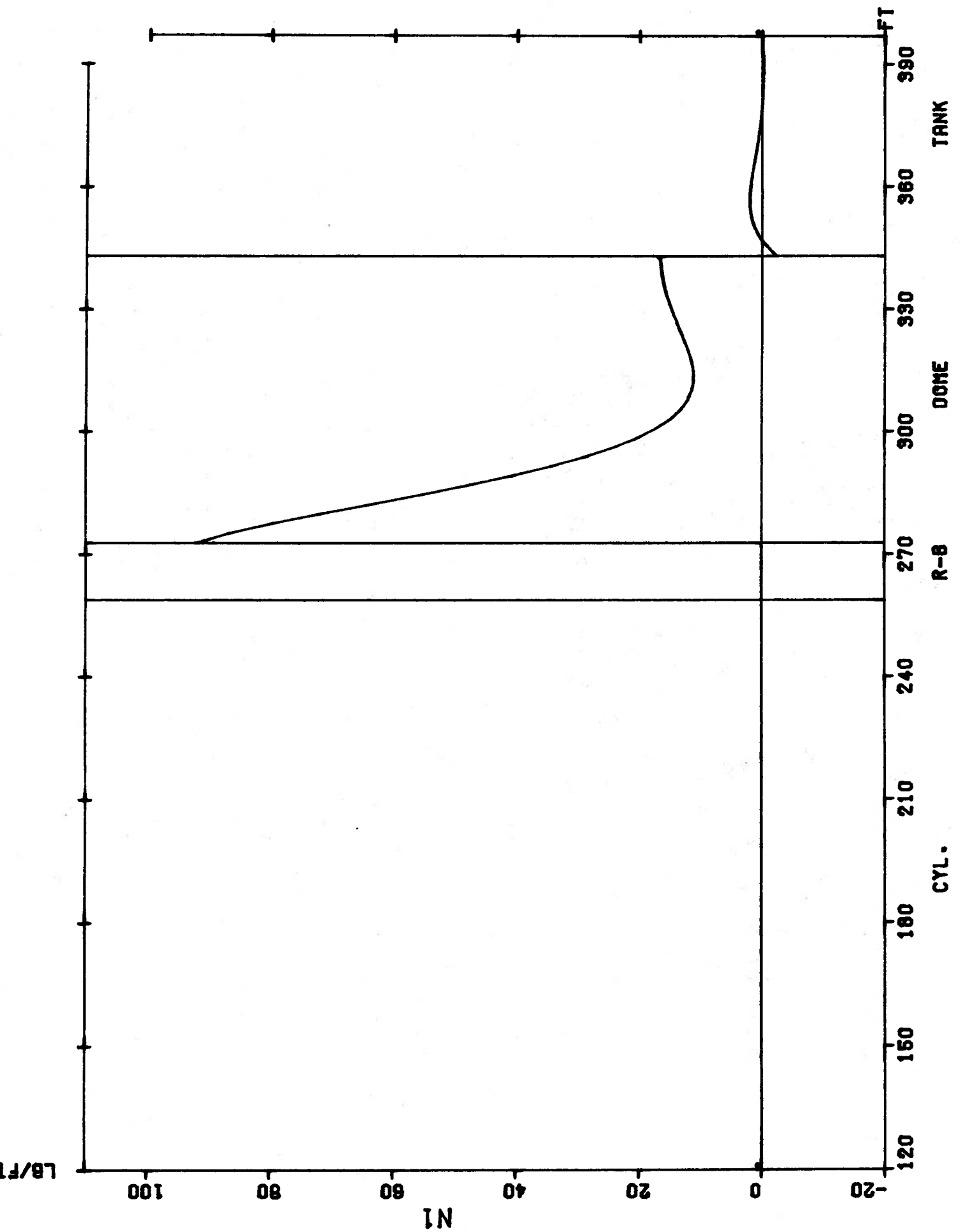


FIGURE E16 N_1 for Loading Case C:UD α

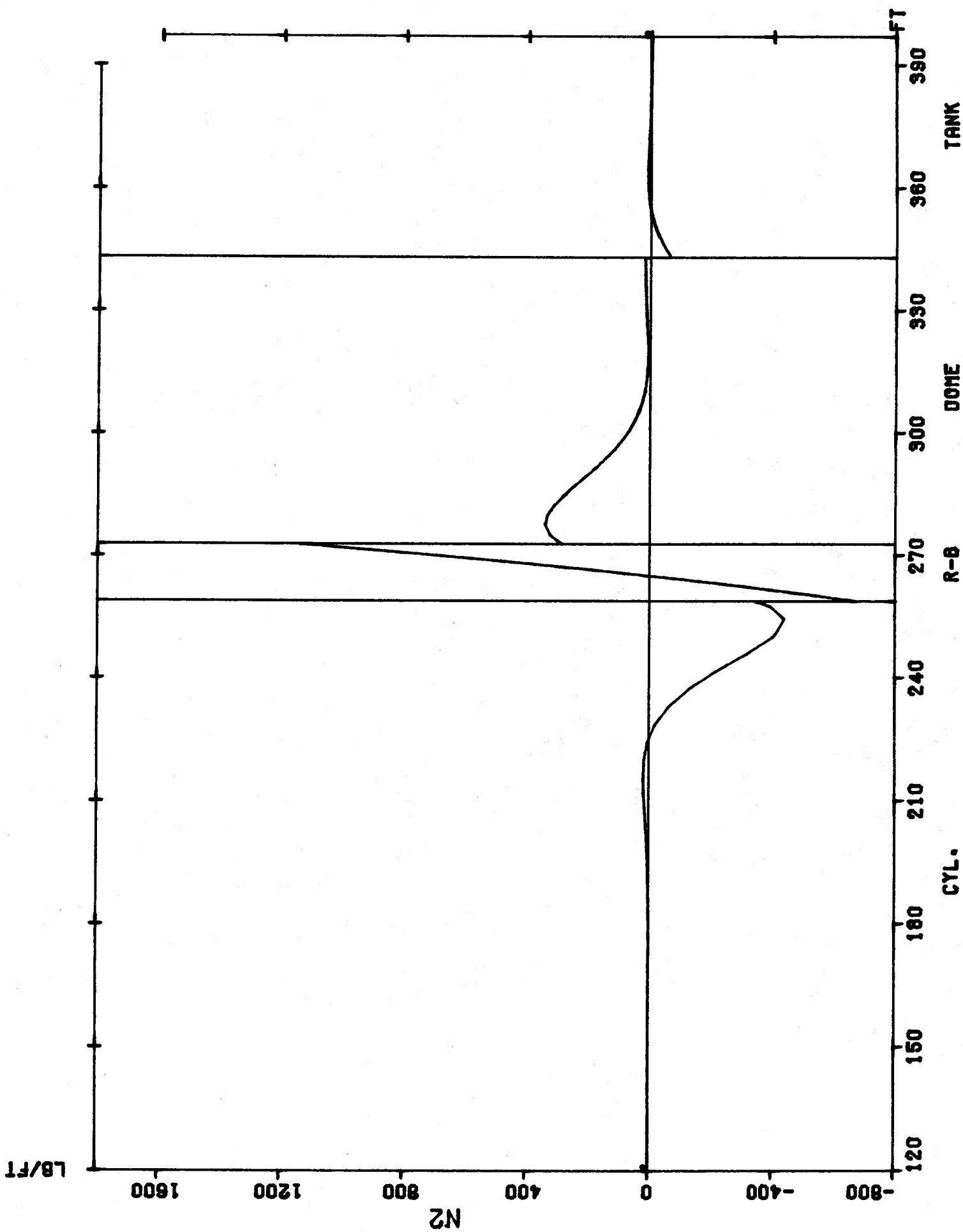


FIGURE E17 N2 for Loading Case C:UDg

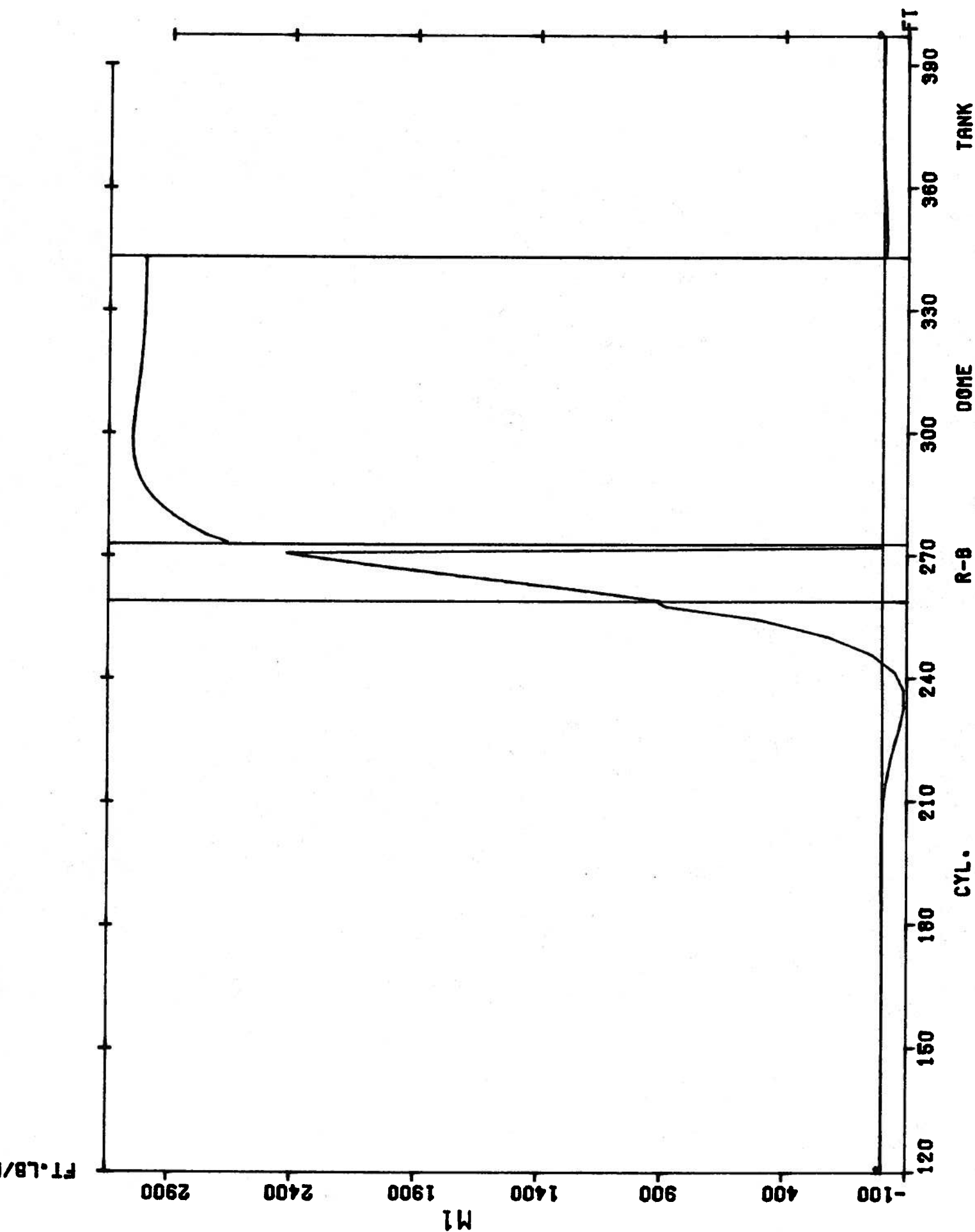


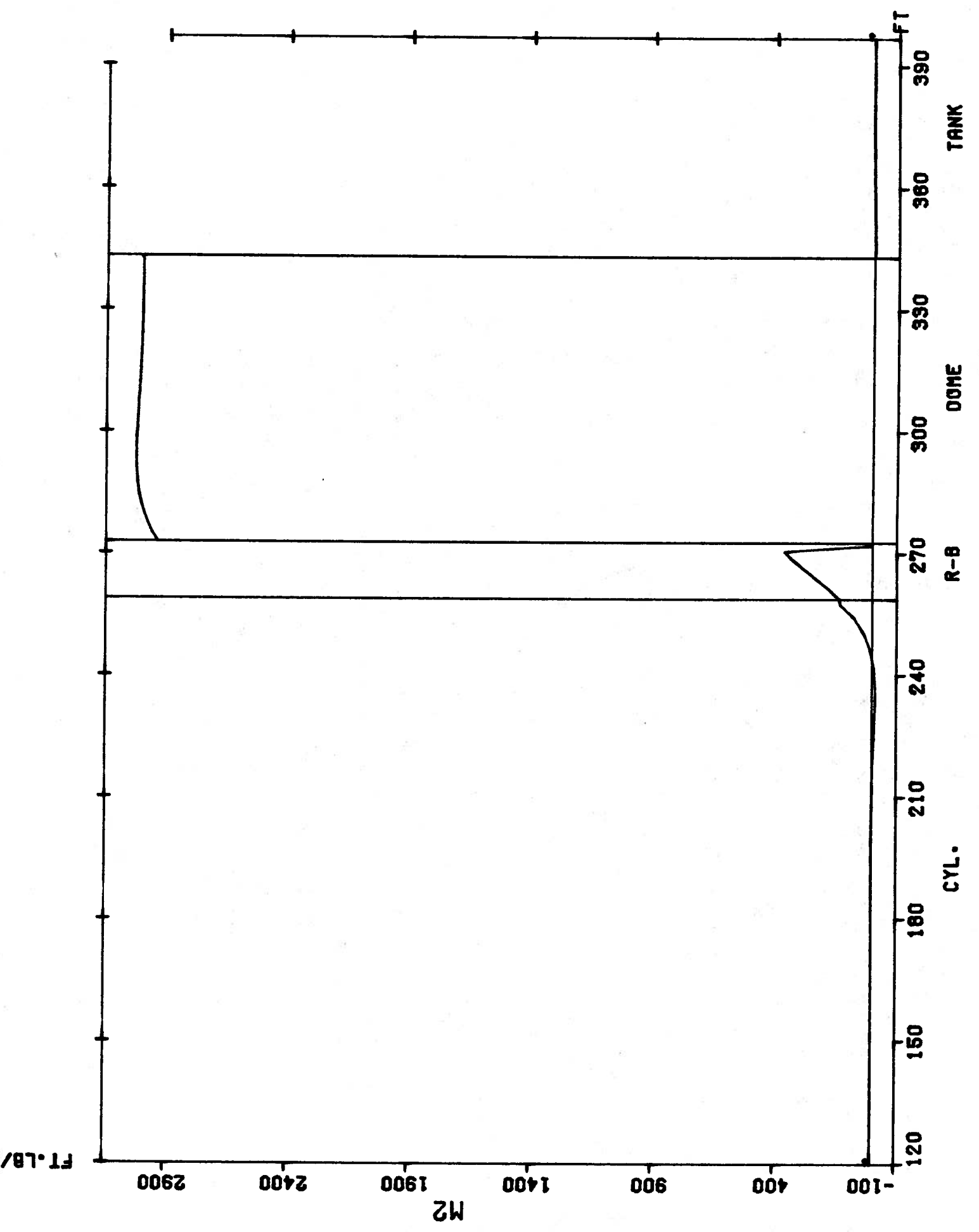
FIGURE E18 M_1 for Loading Case C:UDq

CYL.

R-B

DOME

TANK



ETCHING E19 M2 for Loading Case 0.1mm

APPENDIX F

Stress Resultants for Live Loads

List of Figures for Appendix F

(Note: See Sect. 2.4 for load case designations)

Figure	Title
F1	N1 for Loading Case C:Cp
F2	N2 for Loading Case C:Cp
F3	M1 for Loading Case C:Cp
F4	M2 for Loading Case C:Cp
F5	N1 for Loading Case CH:Hp
F6	N2 for Loading Case CH:Hp
F7	M1 for Loading Case CH:Hp
F8	M2 for Loading Case CH:Hp
F9	N1 for Loading Case SST
F10	N2 for Loading Case SST
F11	M1 for Loading Case SST
F12	M2 for Loading Case SST
F13	N1 for Loading Case WOT
F14	N2 for Loading Case WOT
F15	M1 for Loading Case WOT
F16	M2 for Loading Case WOT
F17	N1 for Loading Case SOT
F18	N2 for Loading Case SOT
F19	M1 for Loading Case SOT
F20	M2 for Loading Case SOT
F21	N1 for Loading Case C:Cw
F22	N2 for Loading Case C:Cw
F23	M1 for Loading Case C:Cw
F24	M2 for Loading Case C:Cw
F25	N1 for Loading Case CH:Hw
F26	N2 for Loading Case CH:Hw
F27	M1 for Loading Case CH:Hw
F28	M2 for Loading Case CH:Hw

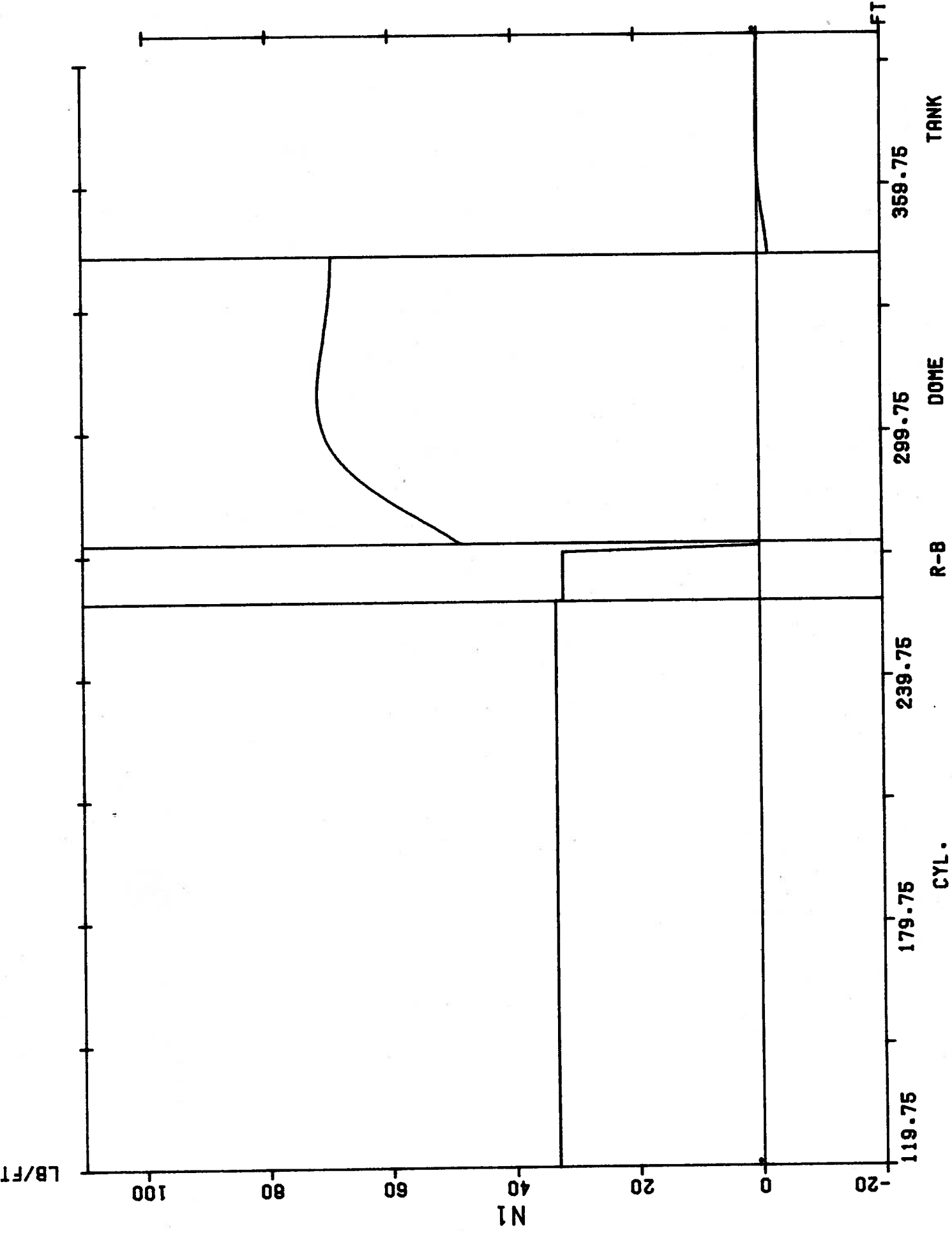


FIGURE F1 N1 for Loading Case C:Cp

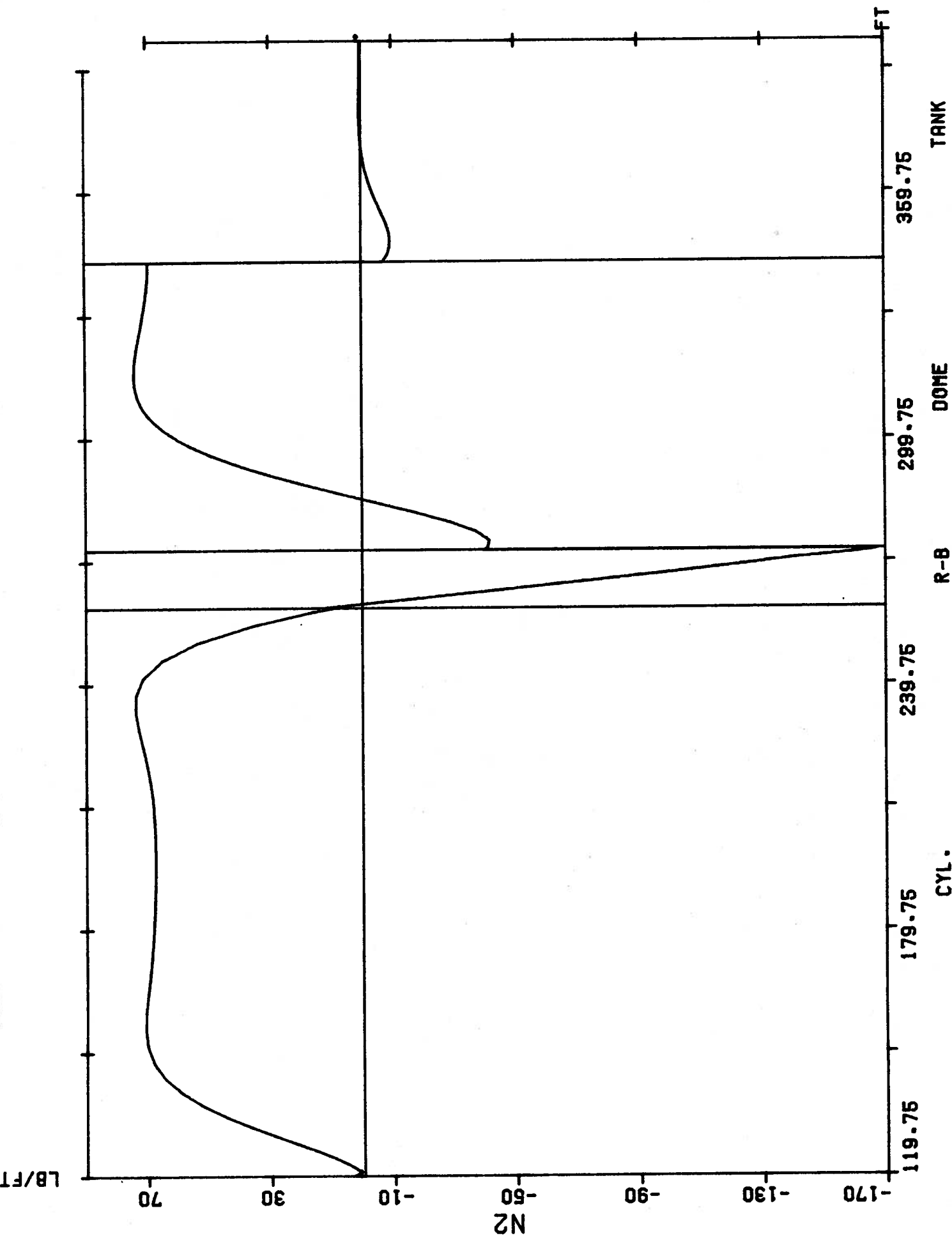


FIGURE F2 N2 for Loading Case C:Cp

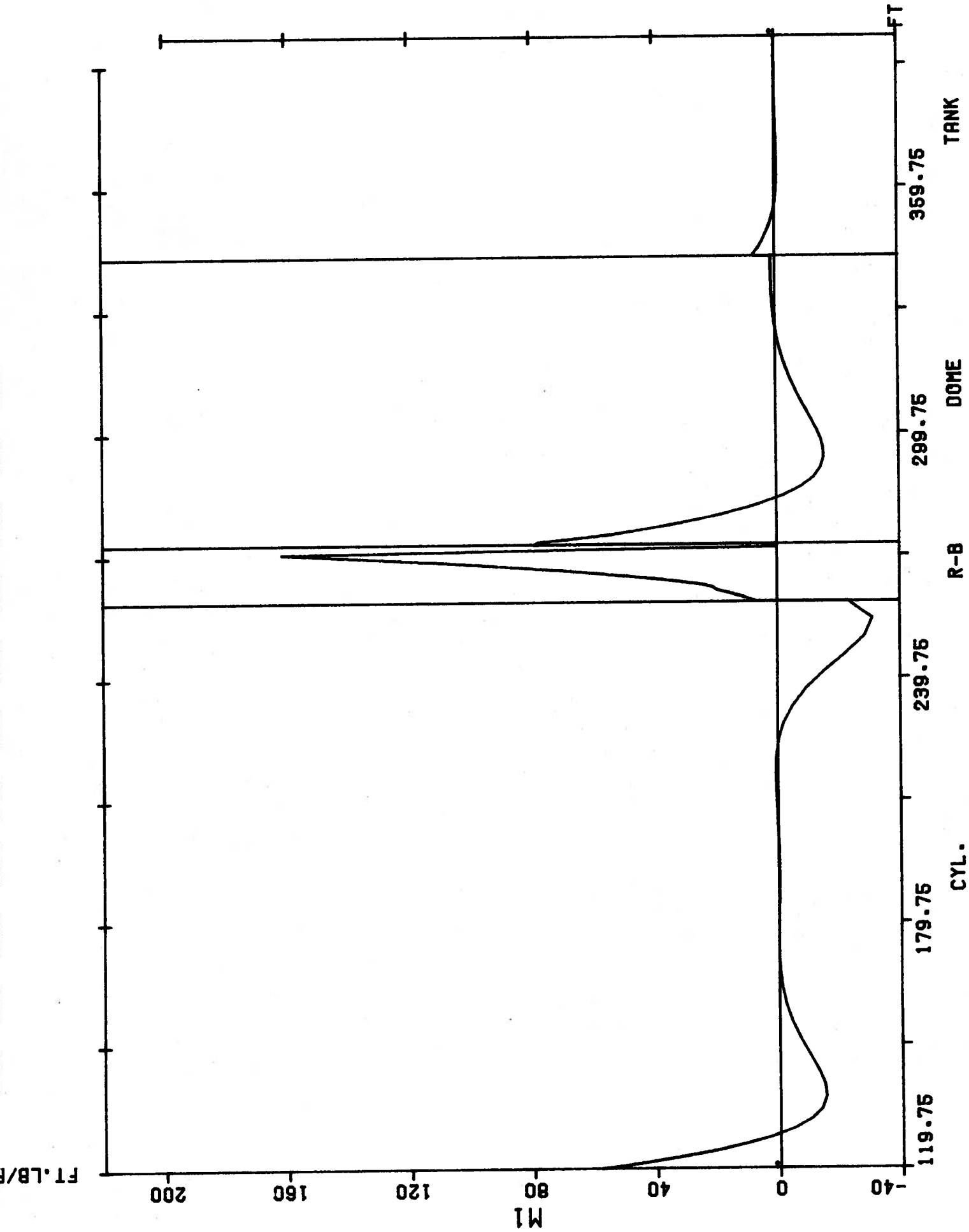


FIGURE F3 M1 for Loading Case C: Cp

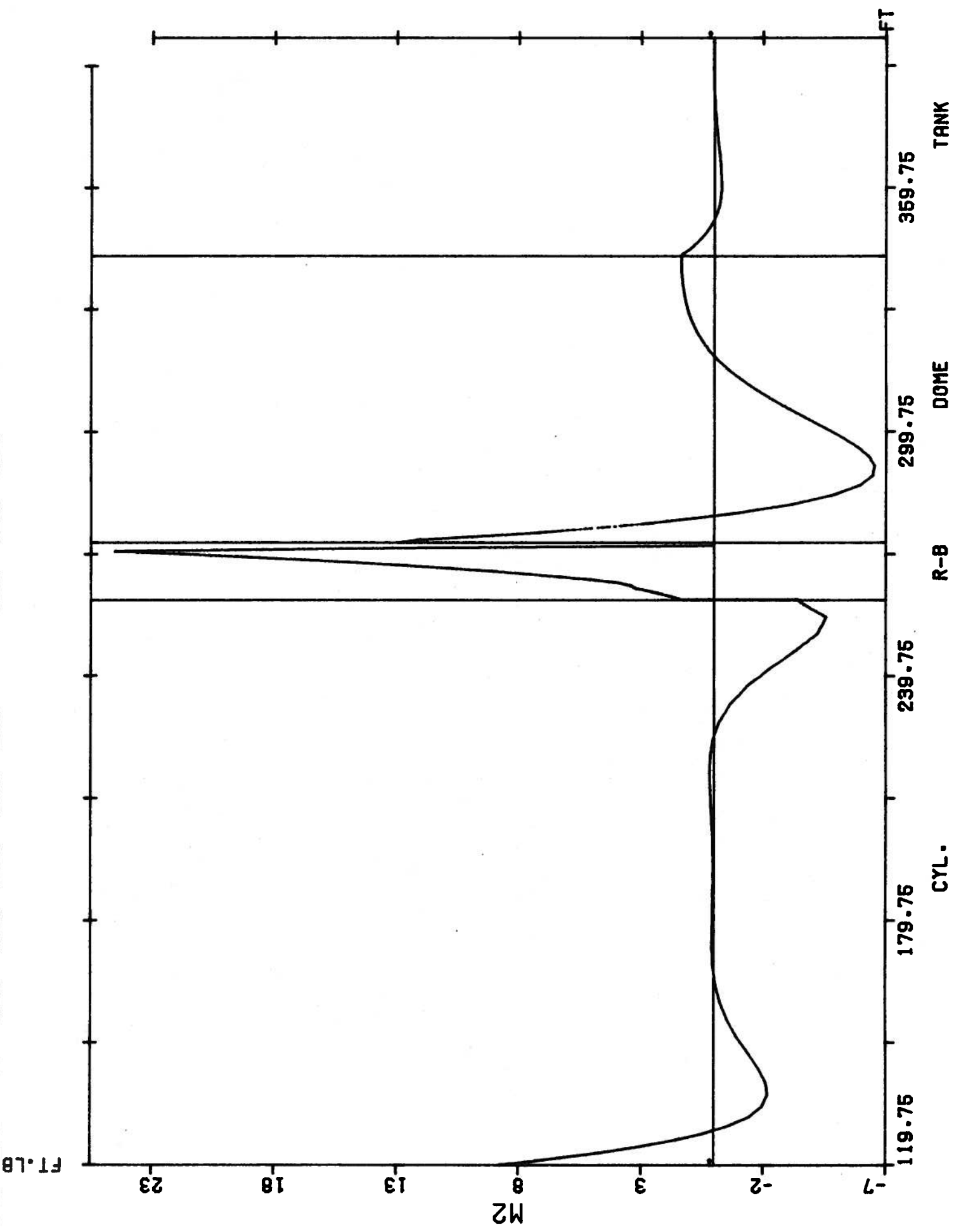


FIGURE F4 M2 for Loading Case C:Cp

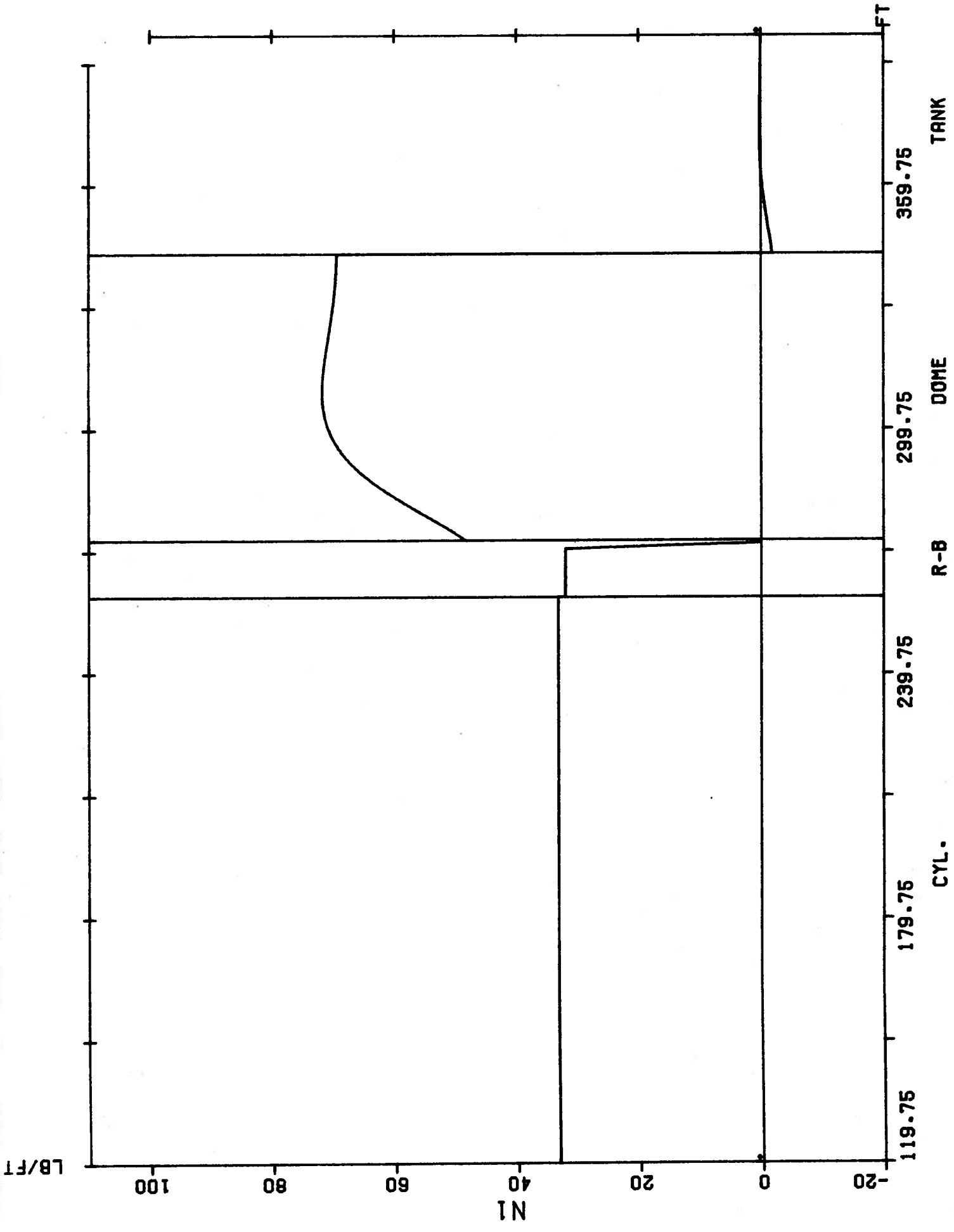


FIGURE F5 N1 for Loading Case CH:Hp

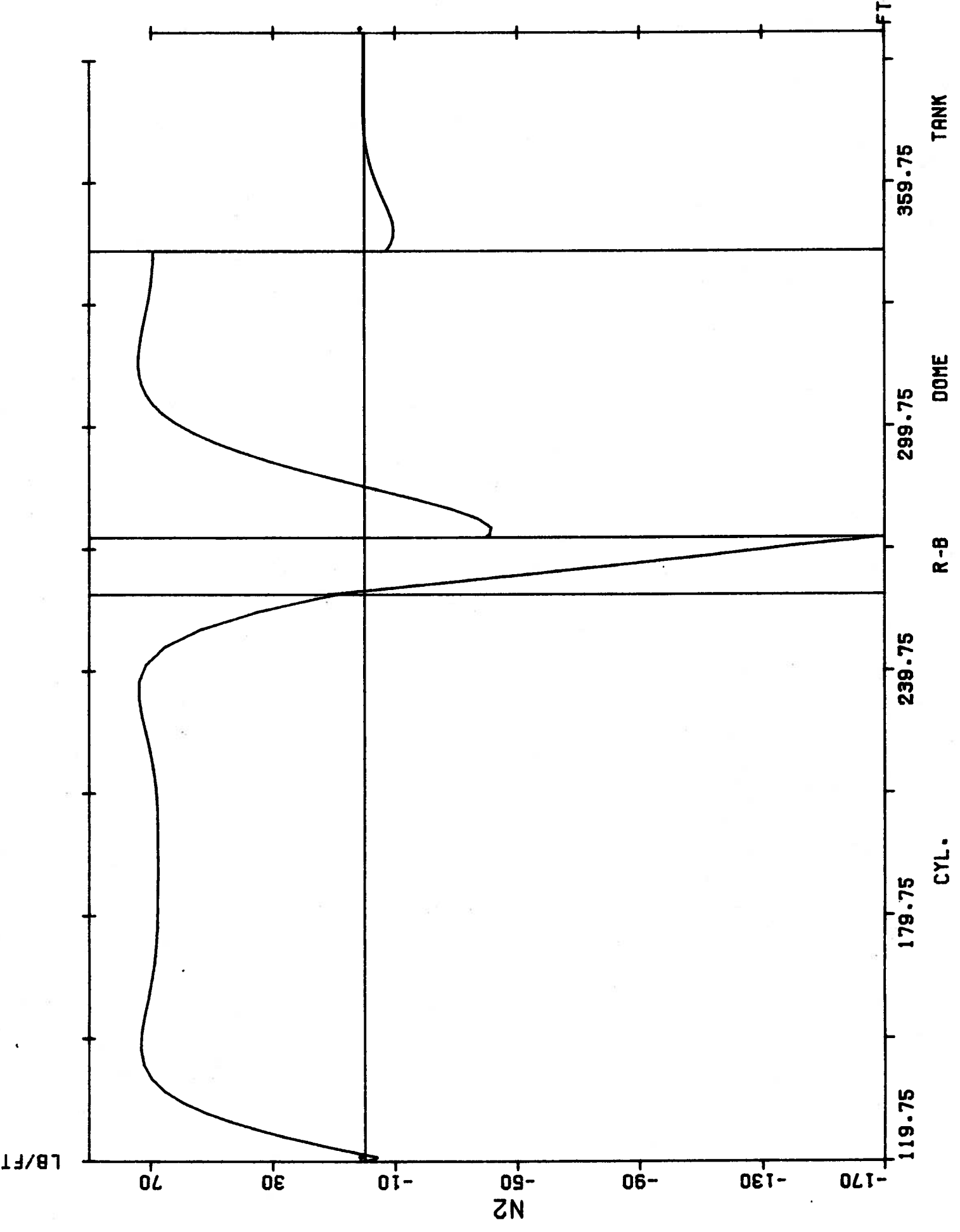
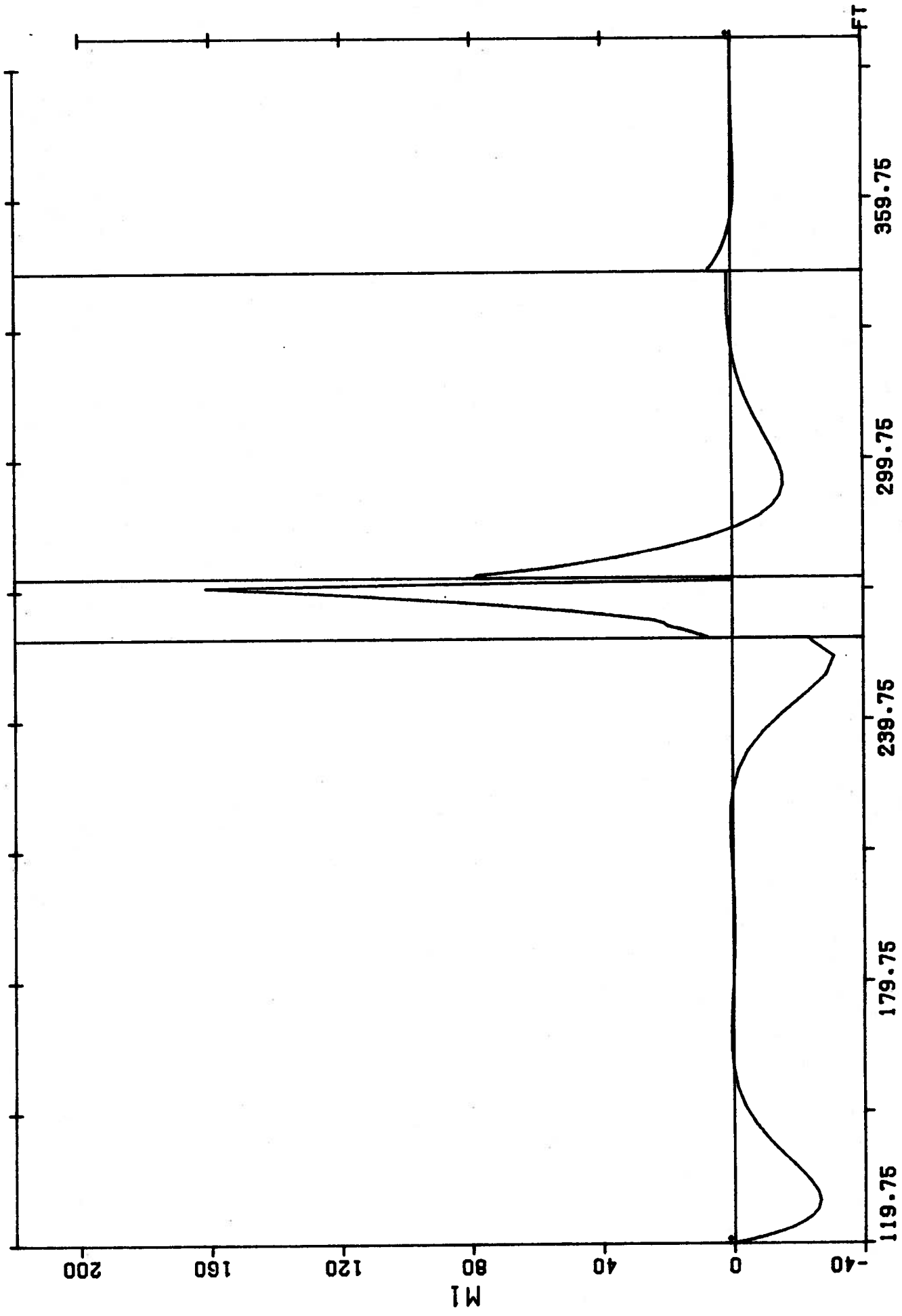


FIGURE F6 N2 for Loading Case CH:Hp

FT.LB/



CYL.

R-B

DOME

TANK

FIGURE F7 M1 for Loading Case CH:Hp

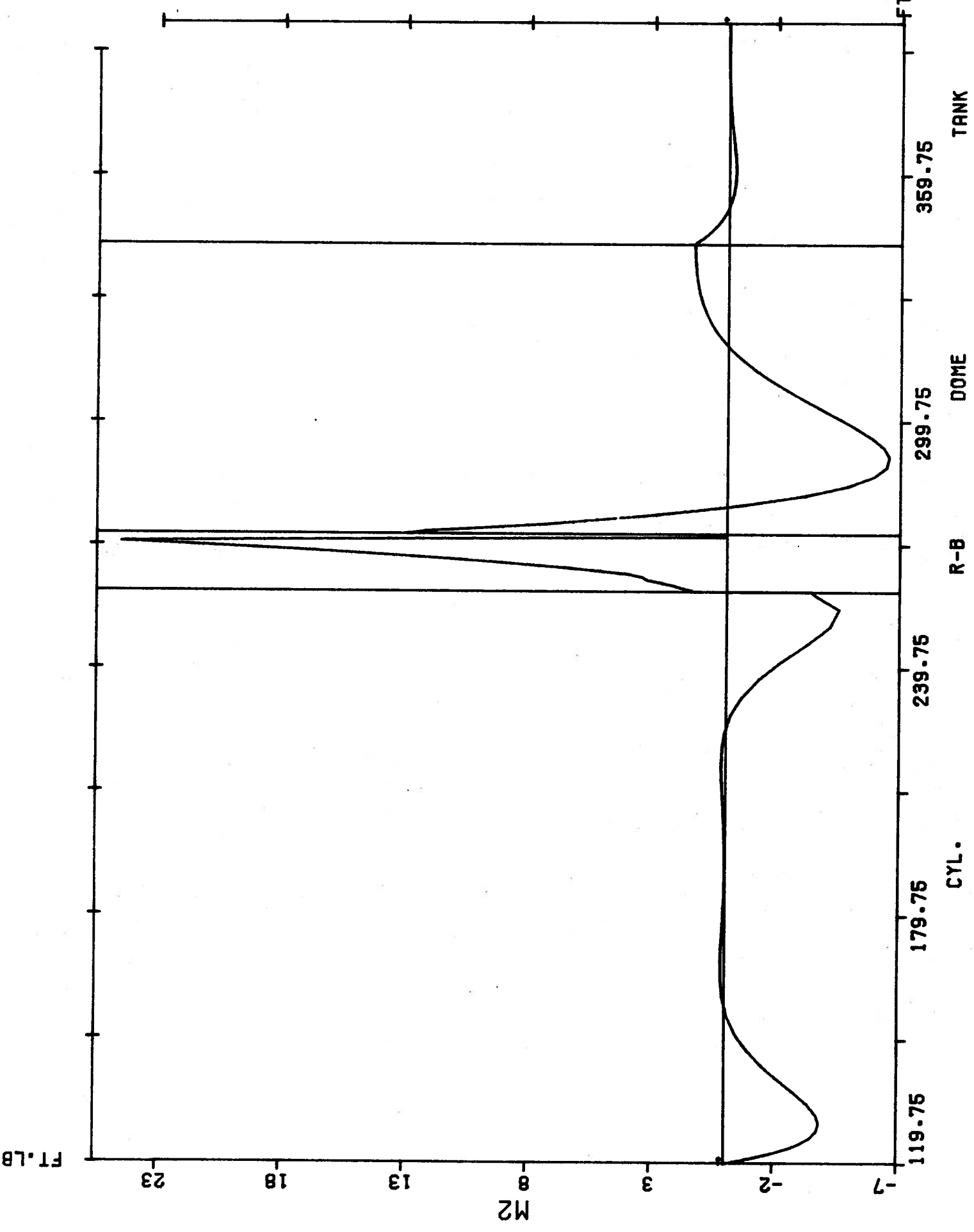


FIGURE F8 M2 for Loading Case CH:Hp

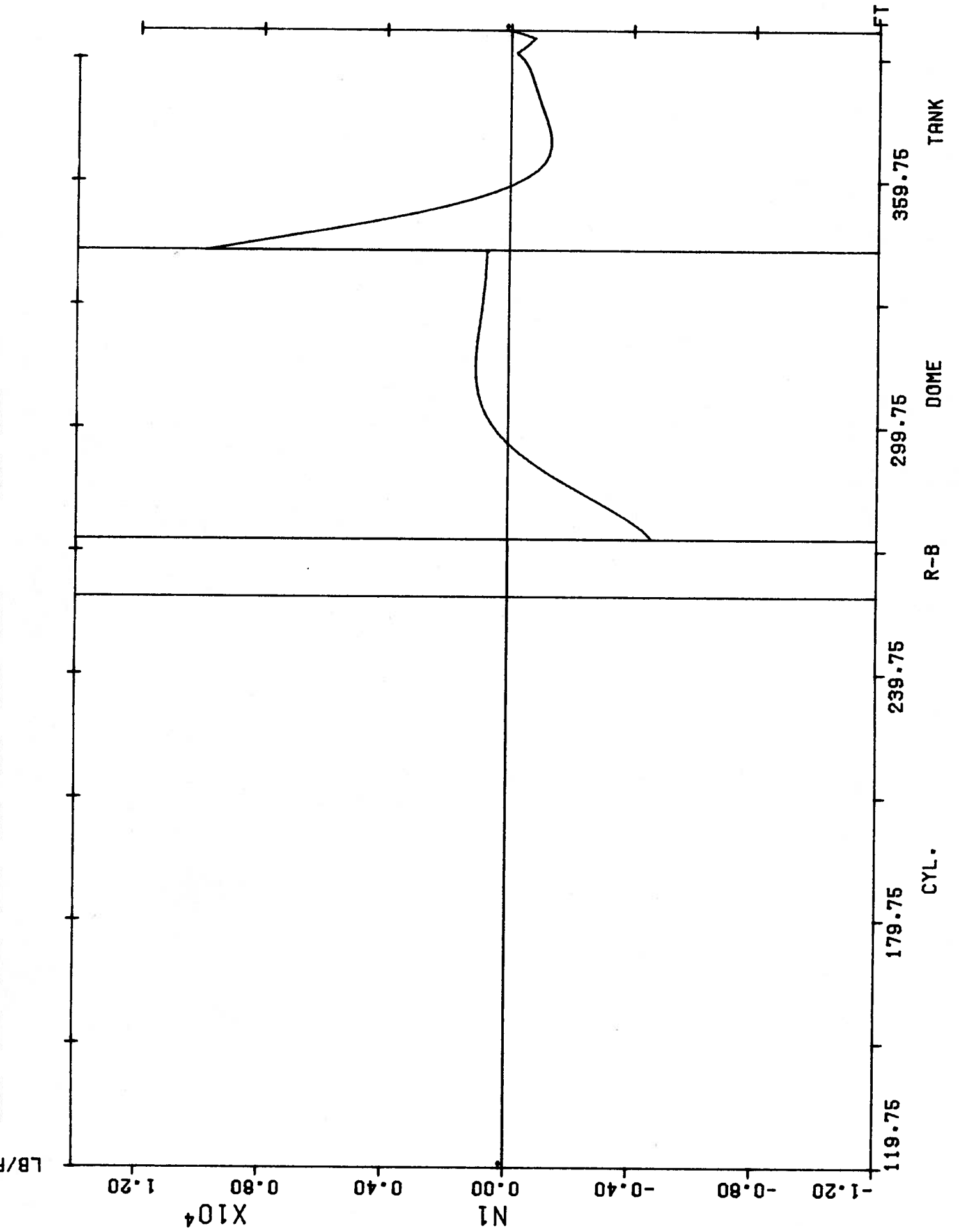


FIGURE F9 N1 for Loading Case SST

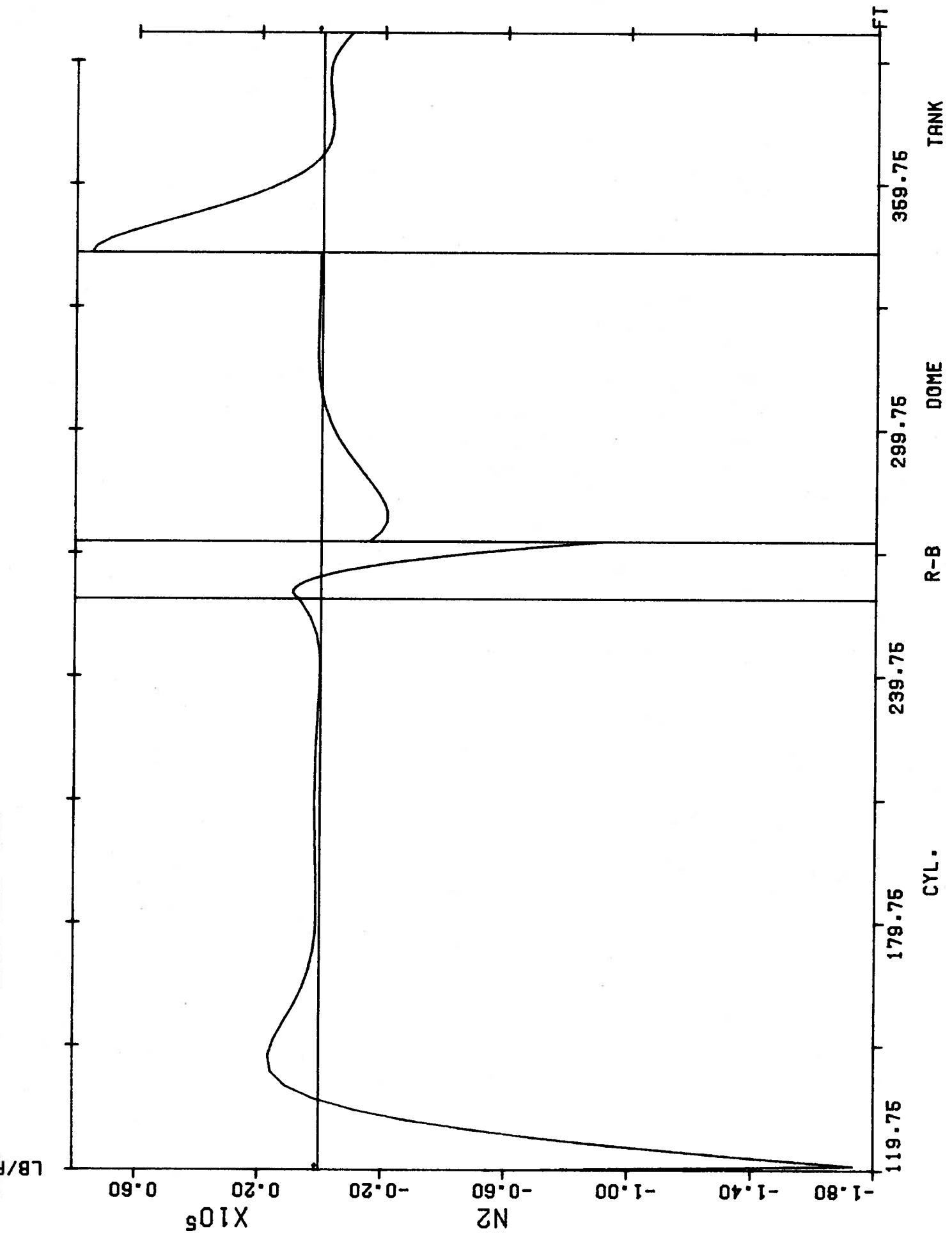


FIGURE F10 N2 for Loading Case SST

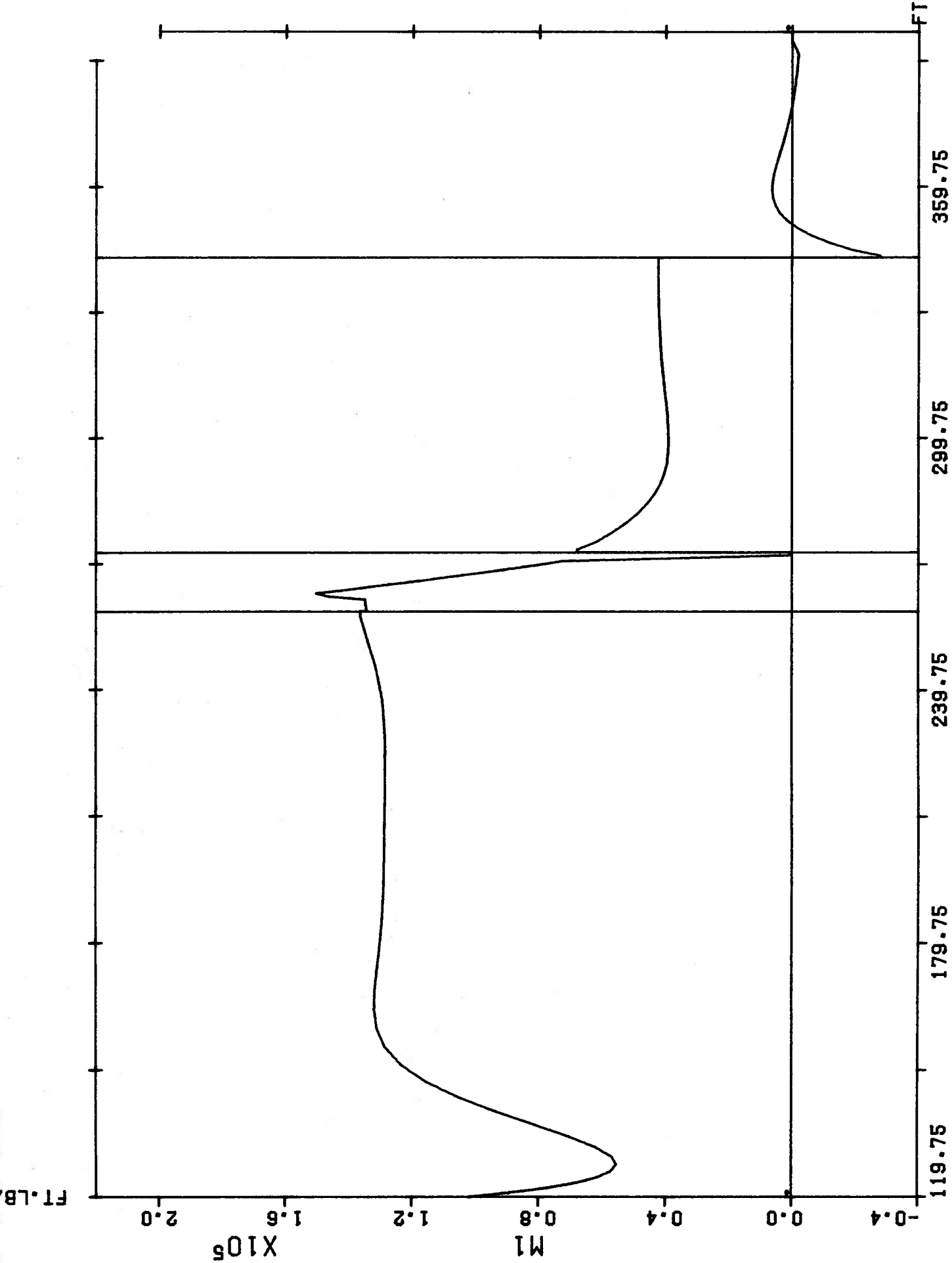


FIGURE F11 M1 for Loading Case SST

TANK

DOME

R-B

CYL.

FT.LB

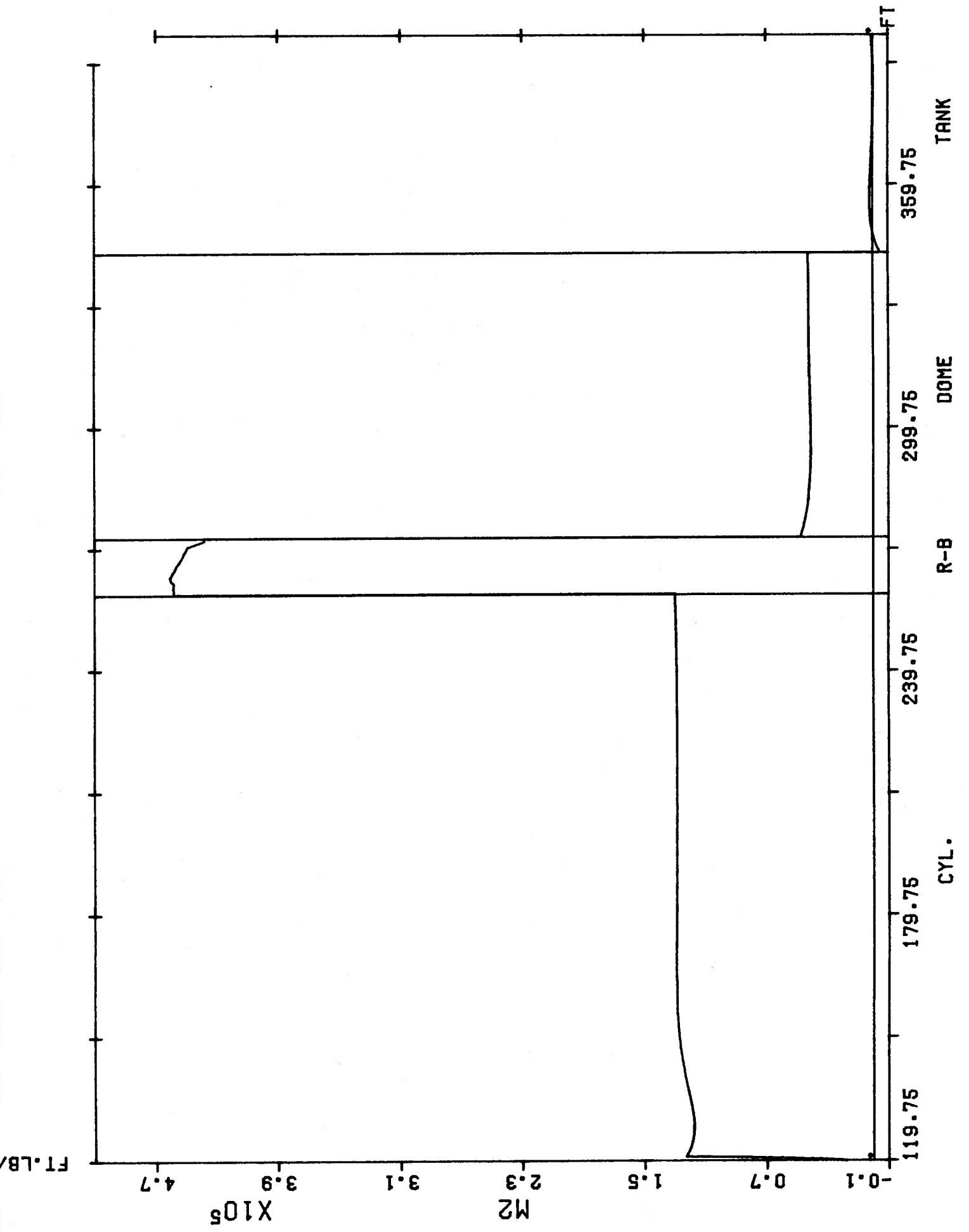


FIGURE F12 M2 for Loading Case SST

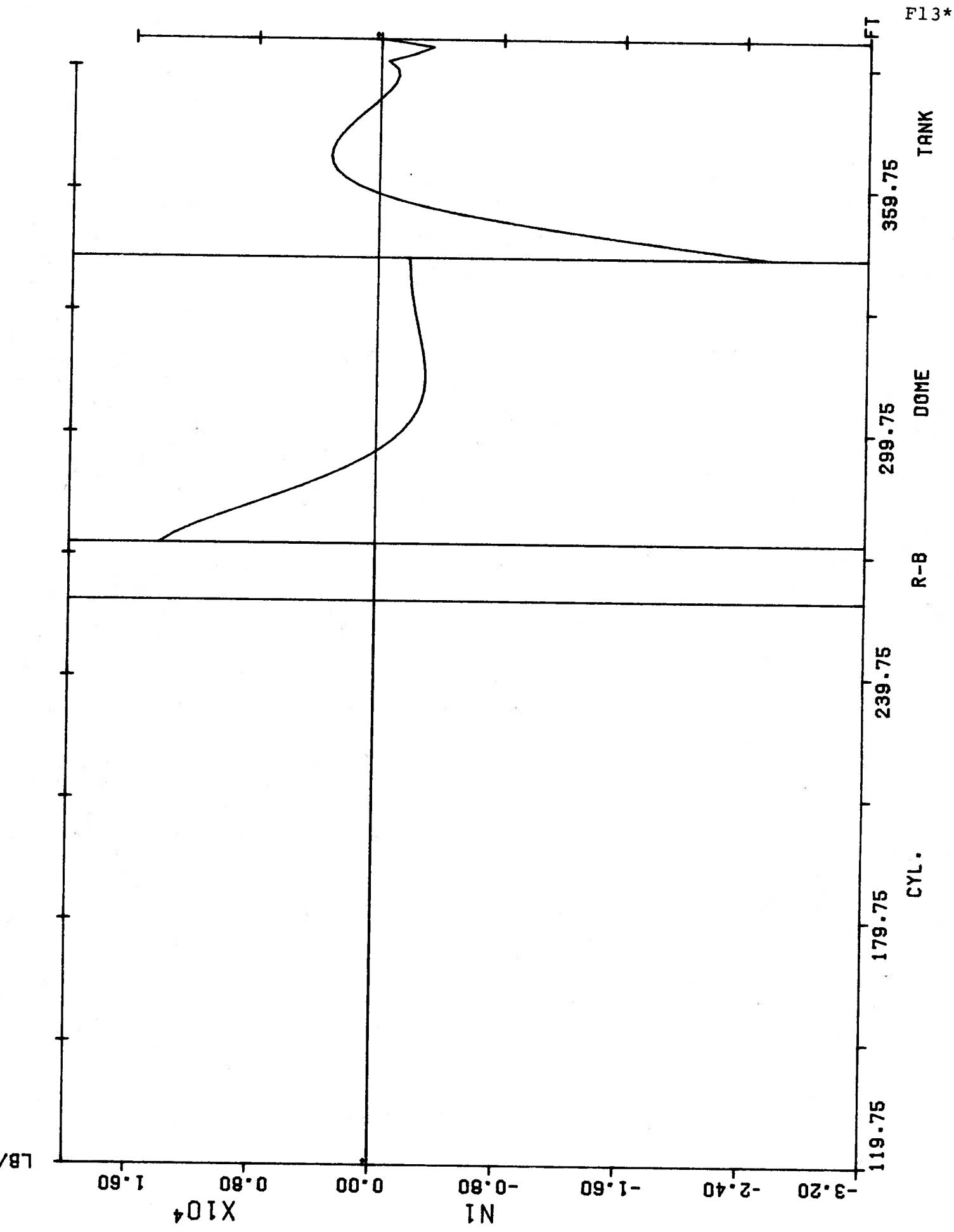


FIGURE F13 N1 for Loading Case VOT

F13*

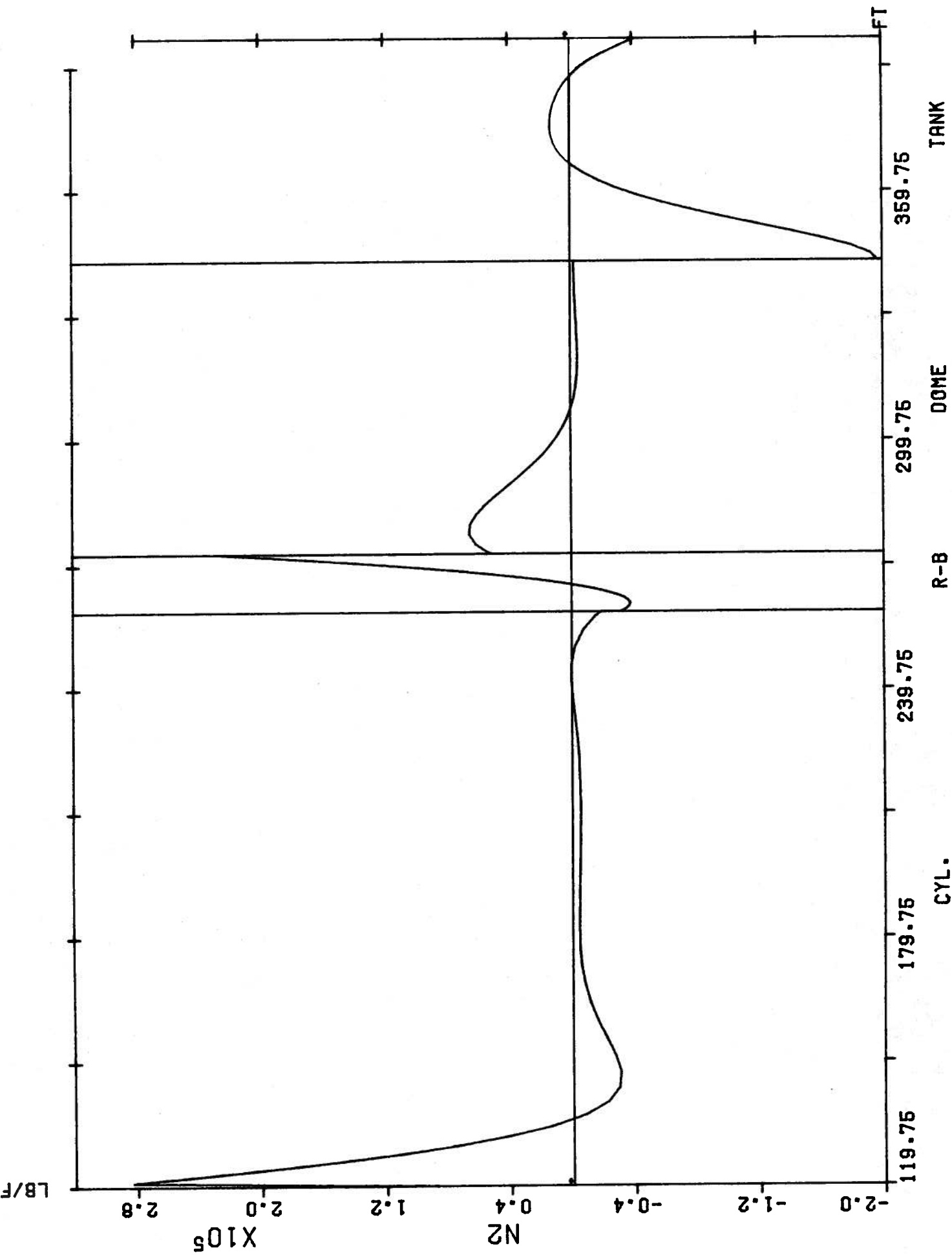


FIGURE F14 N1 for Loading Case WOT

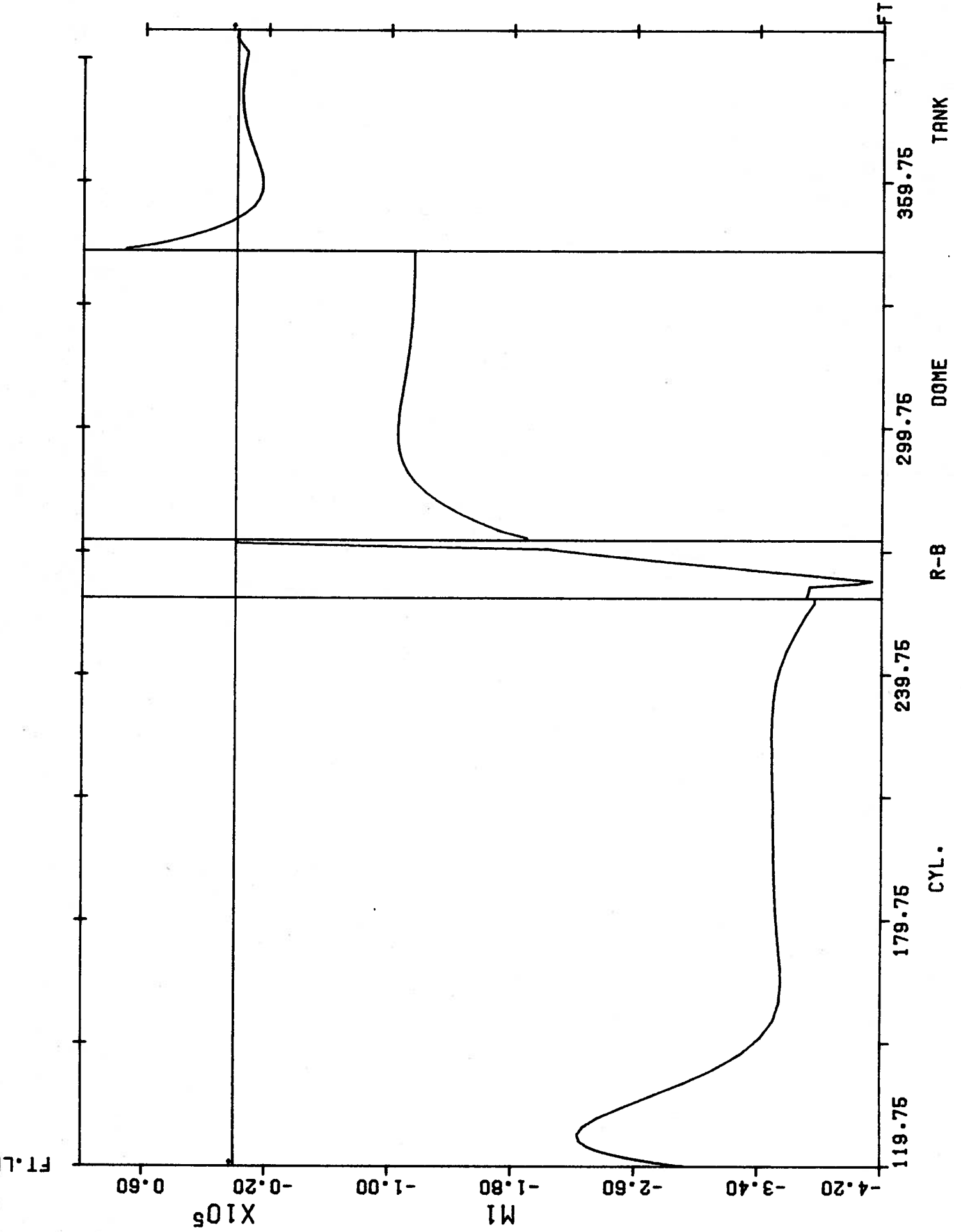
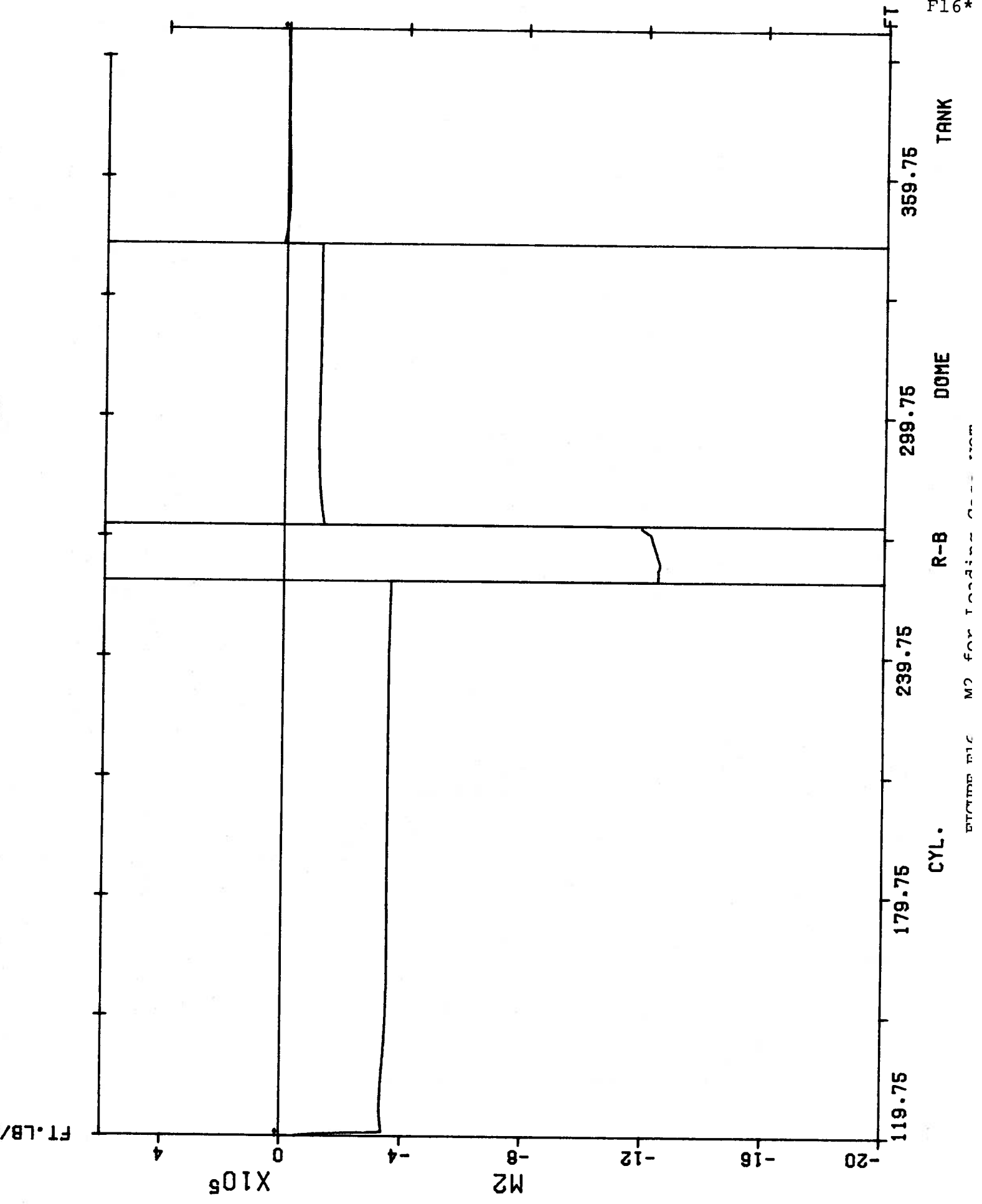


FIGURE F15 M_1 for Loading Case WOT



TANK

DOME

R-B

CYL.

EXTREME MIC M2 FOR TANKING CYL. FROM

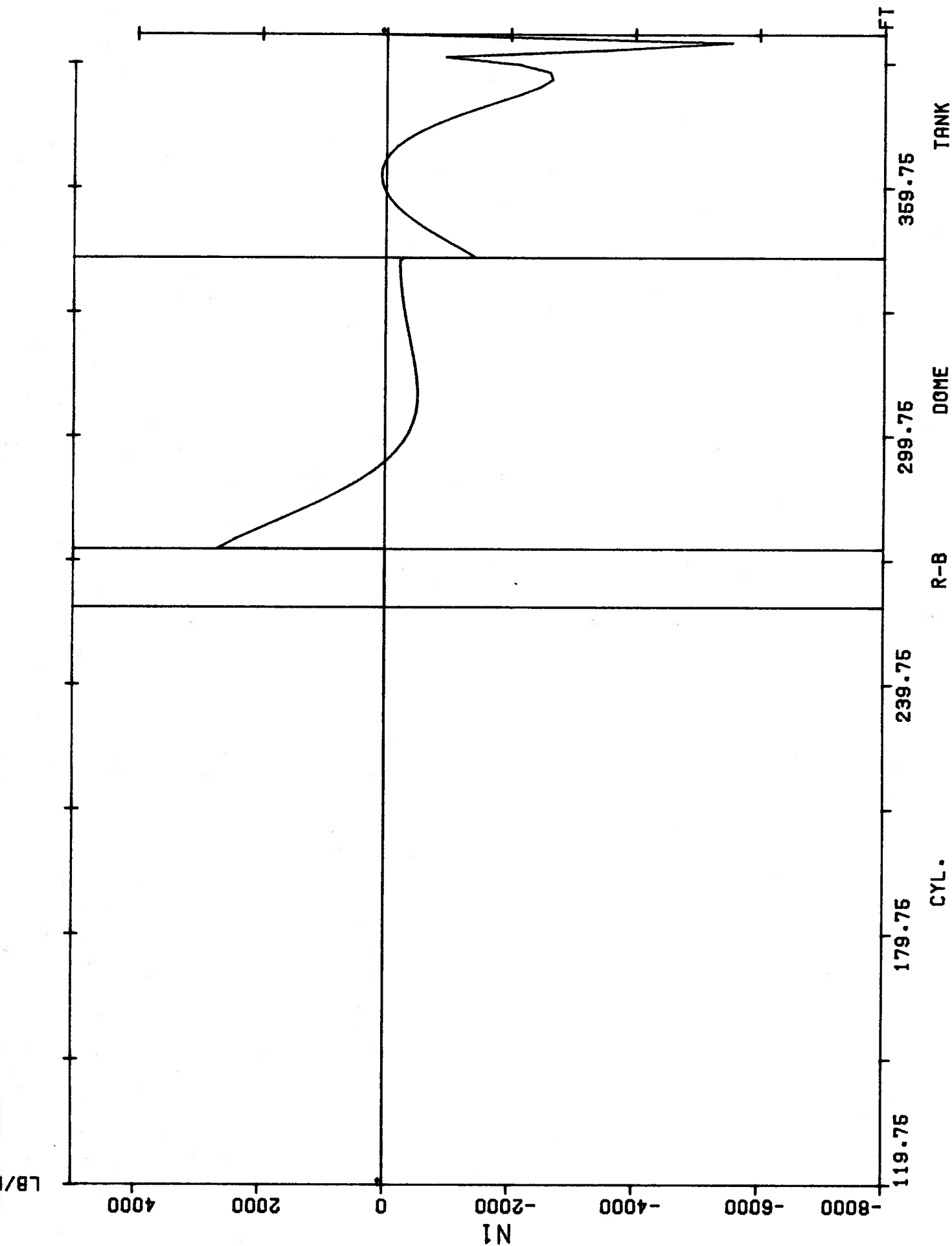


FIGURE F17 N_1 for Loading Case SOT

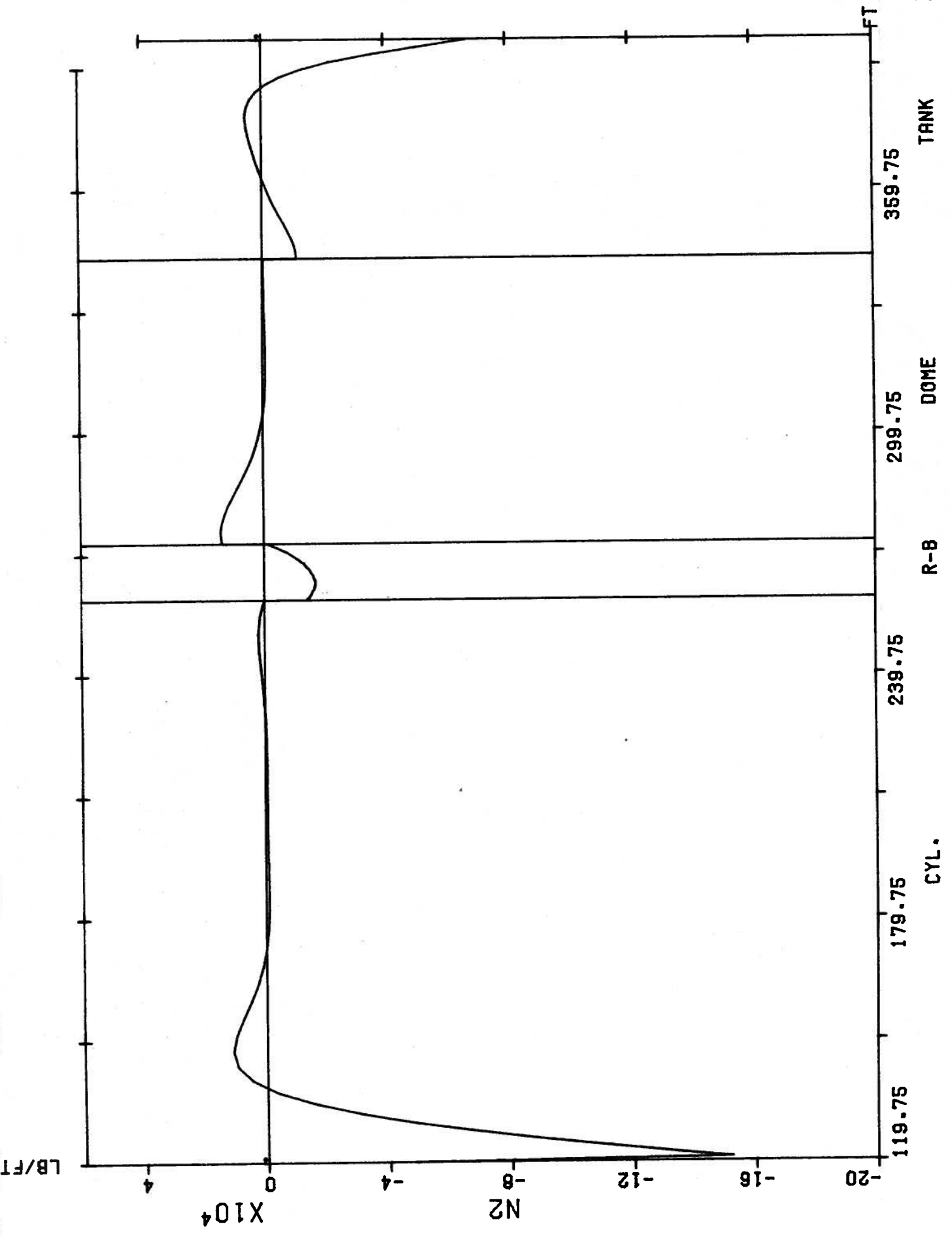


FIGURE F18 N2 for Loading Case SOT

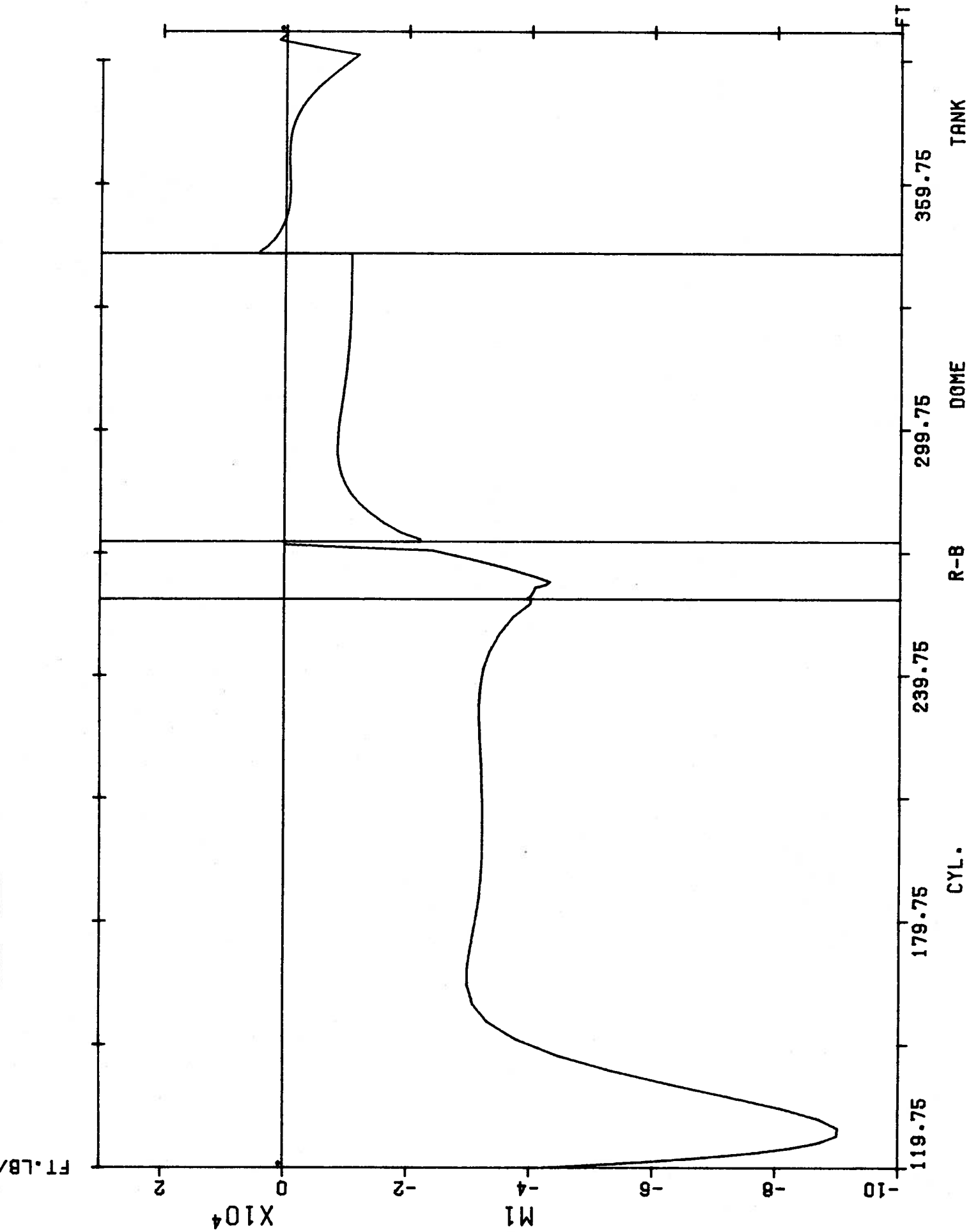


FIGURE F19 M1 for Loading Case SOT

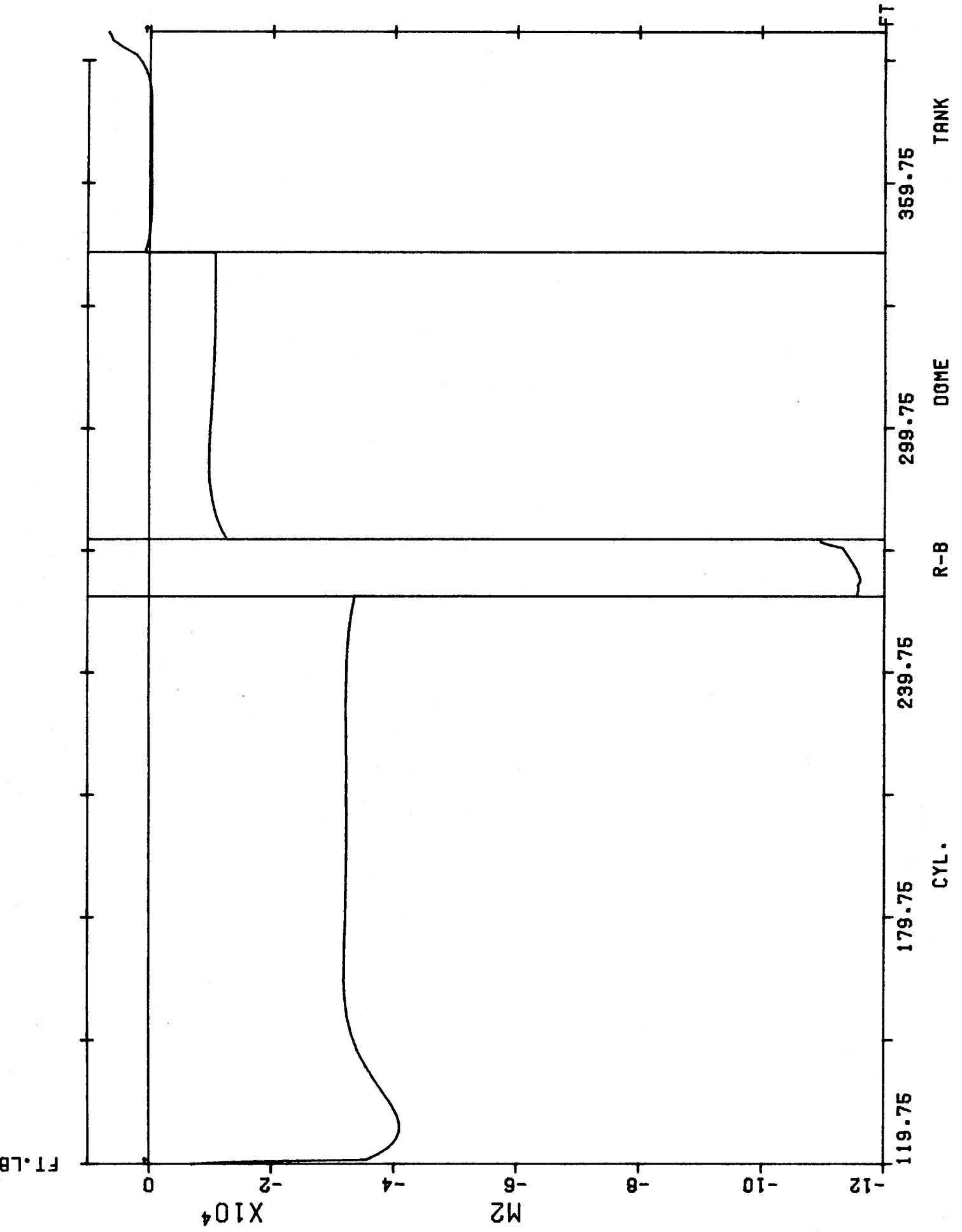


FIGURE F20 M2 for Loading Case SOT

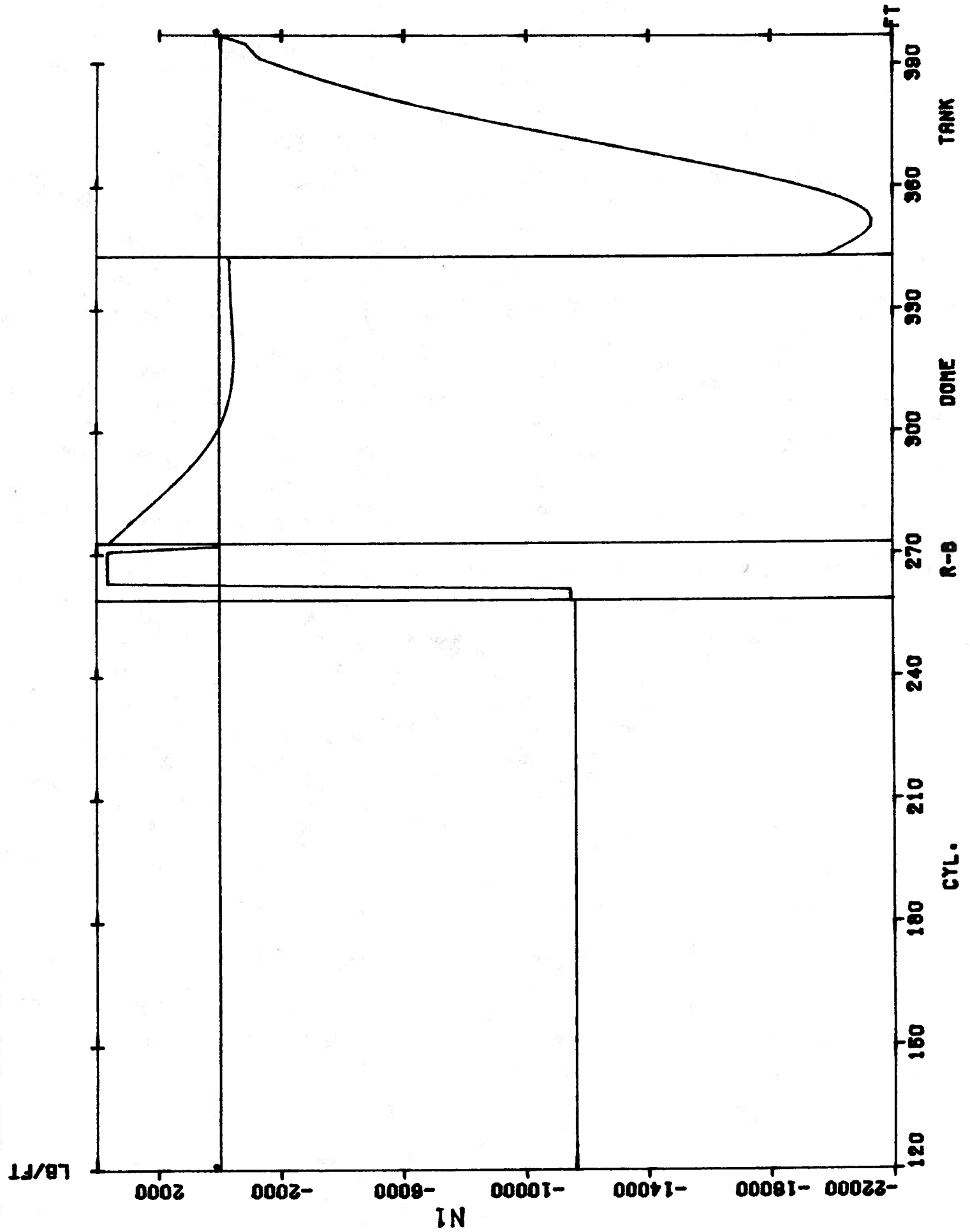


FIGURE F21 N_1 for Loading Case C:Cw

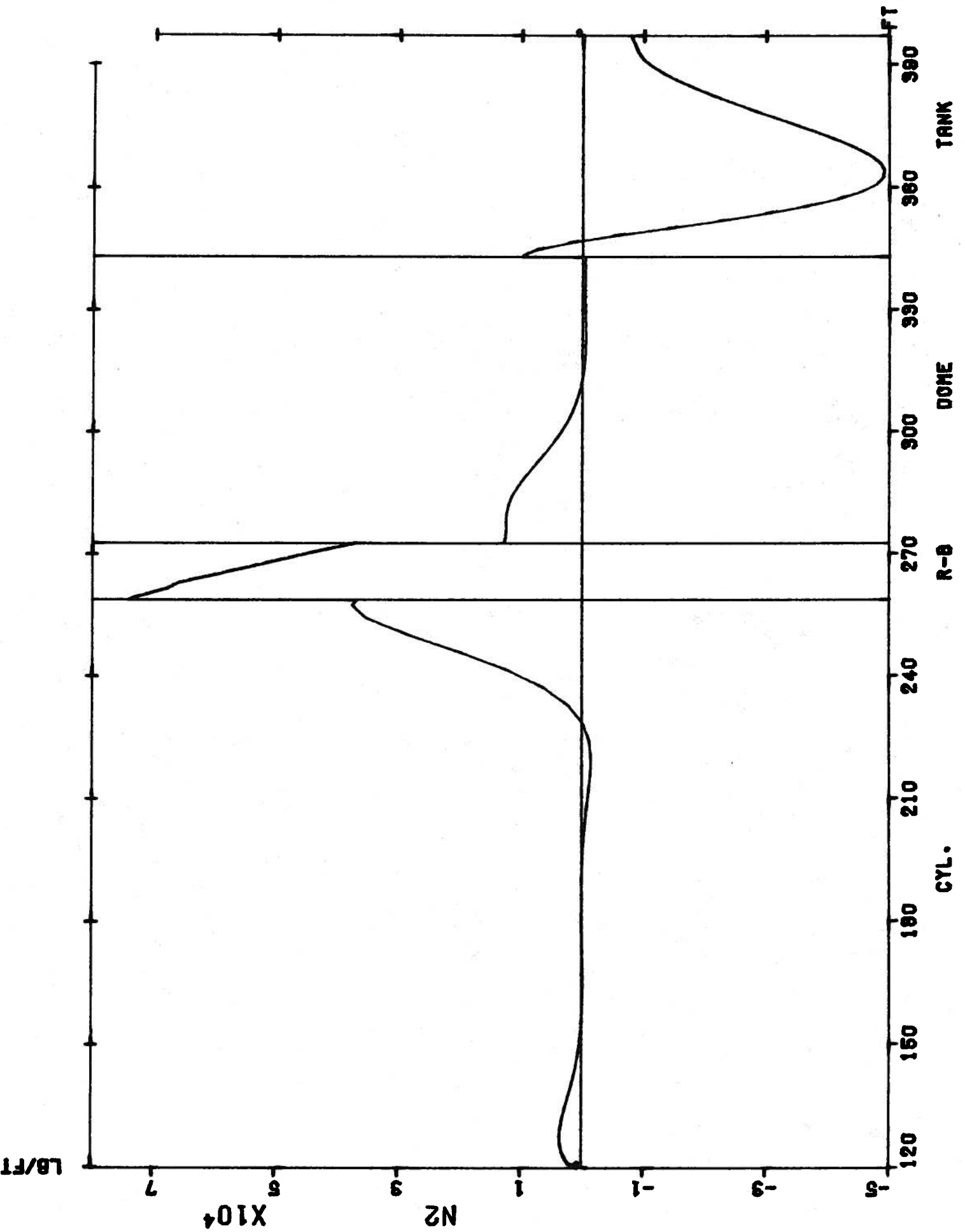


FIGURE F22 N₂ for Loading Case C:Cw

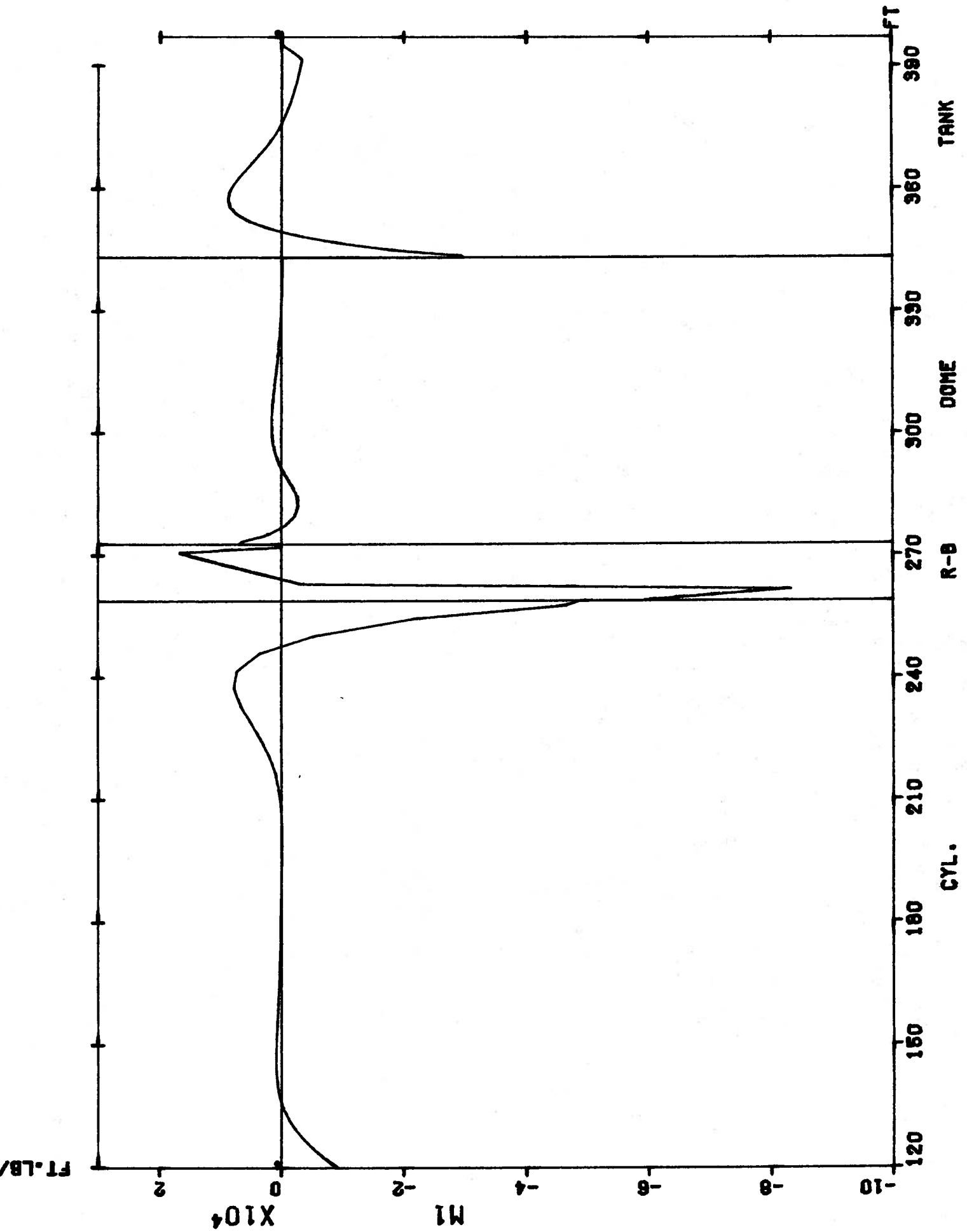


FIGURE F23 M_1 for Loading Case C:Cw

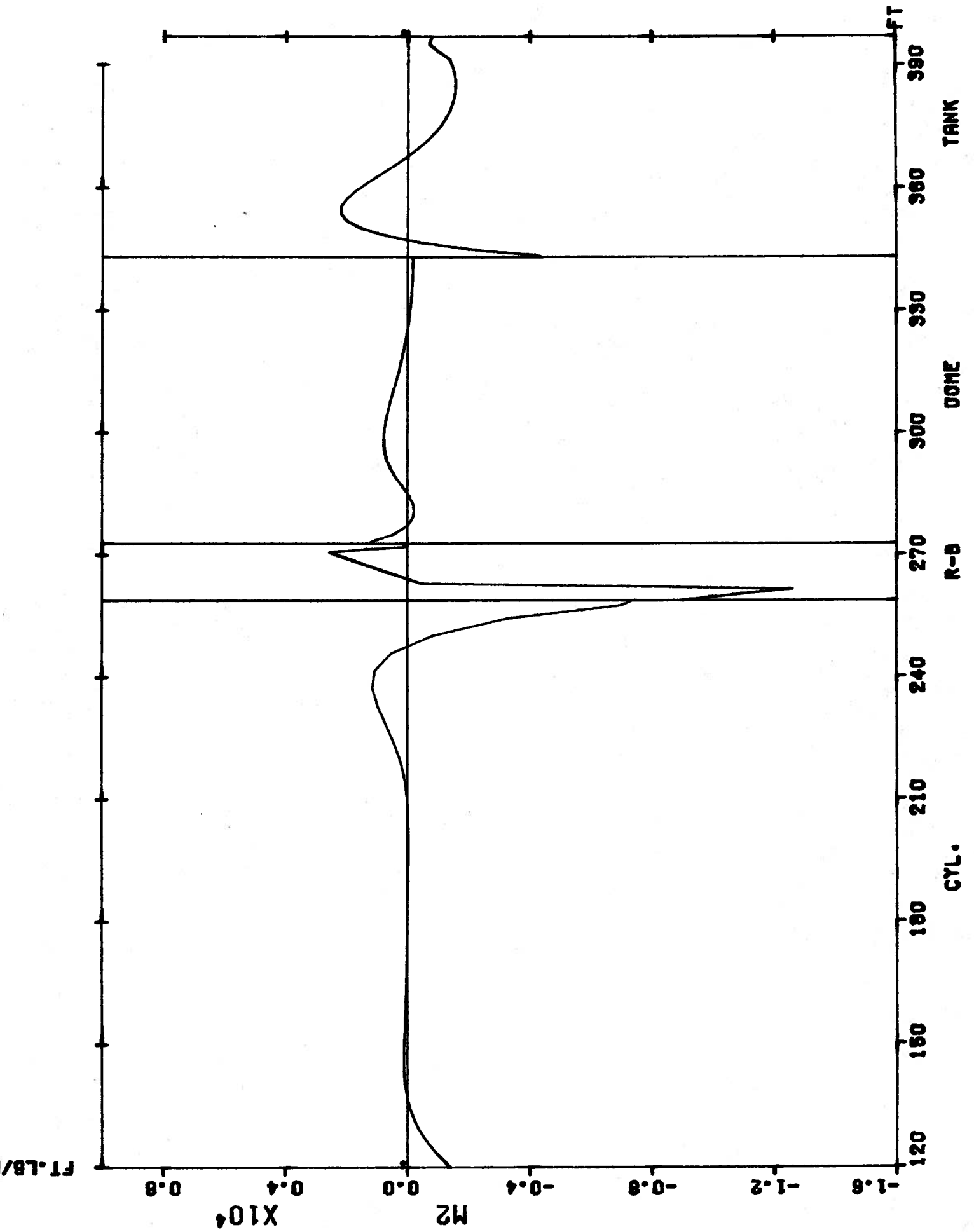


FIGURE F24 M2 for Loading Case C:Gw

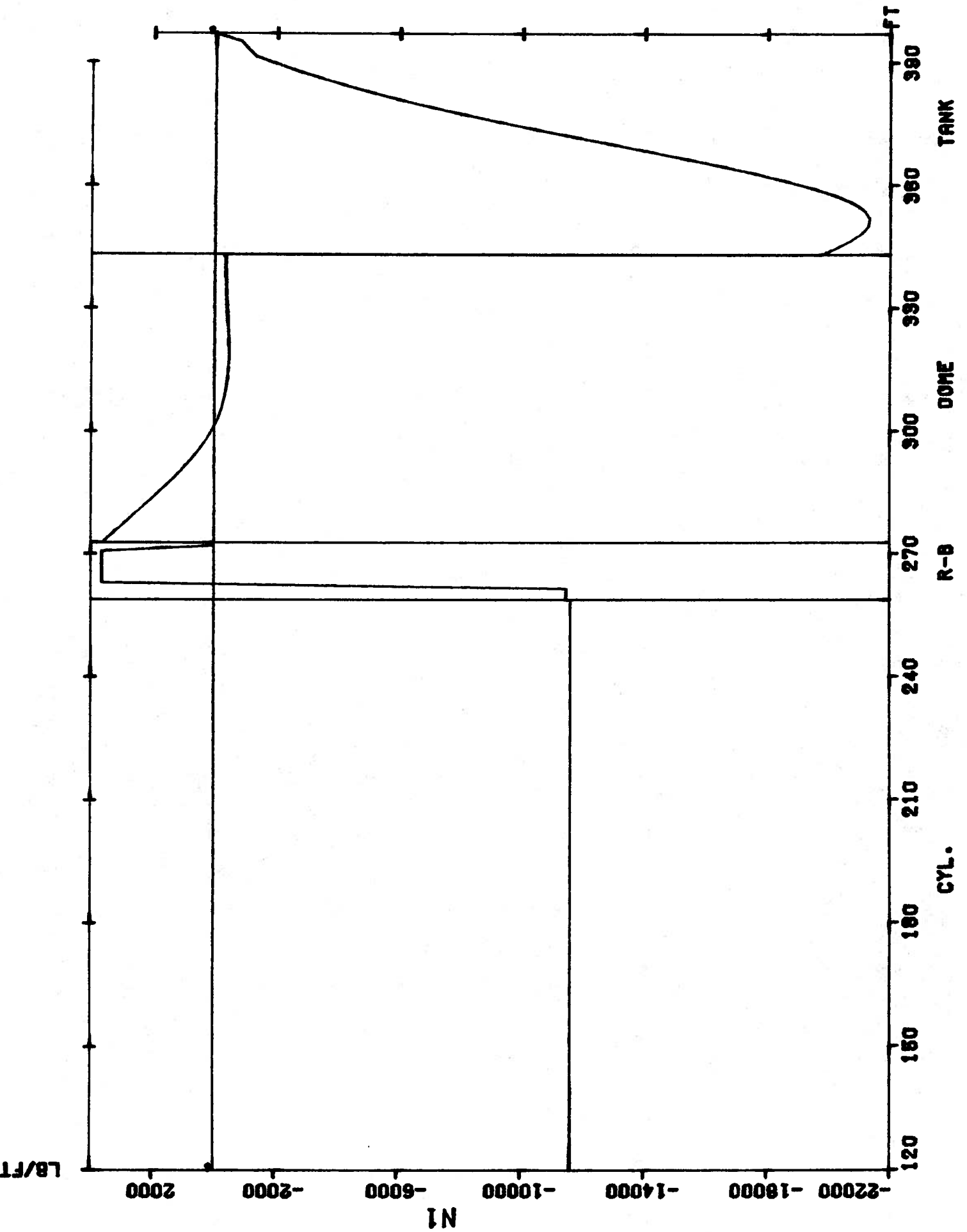


FIGURE F25 N_1 for Loading Case CH:HW

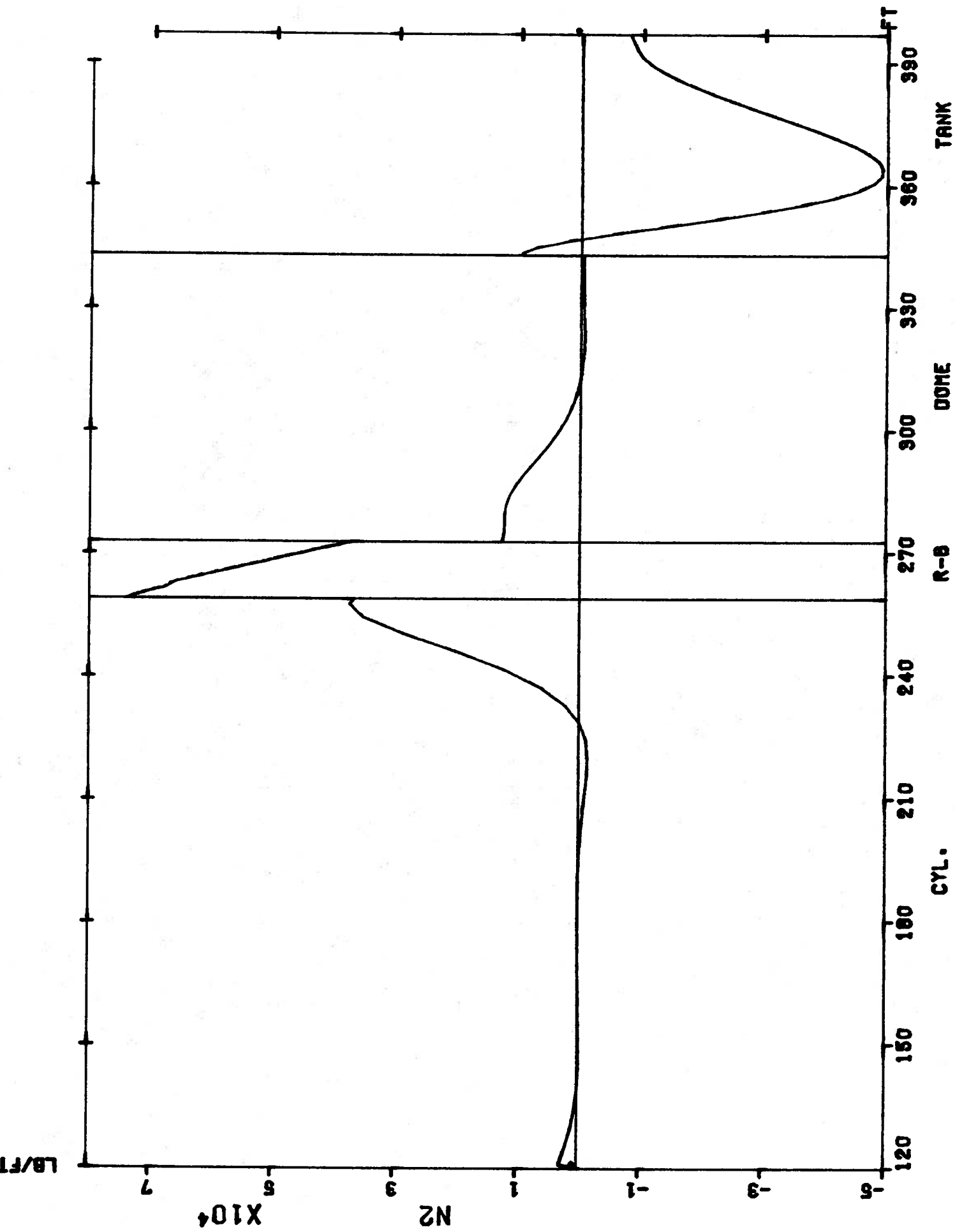


FIGURE F26 N2 for Loading Case CH:HW

CYL.

R-B

DOME

TANK

FT

LB/FT

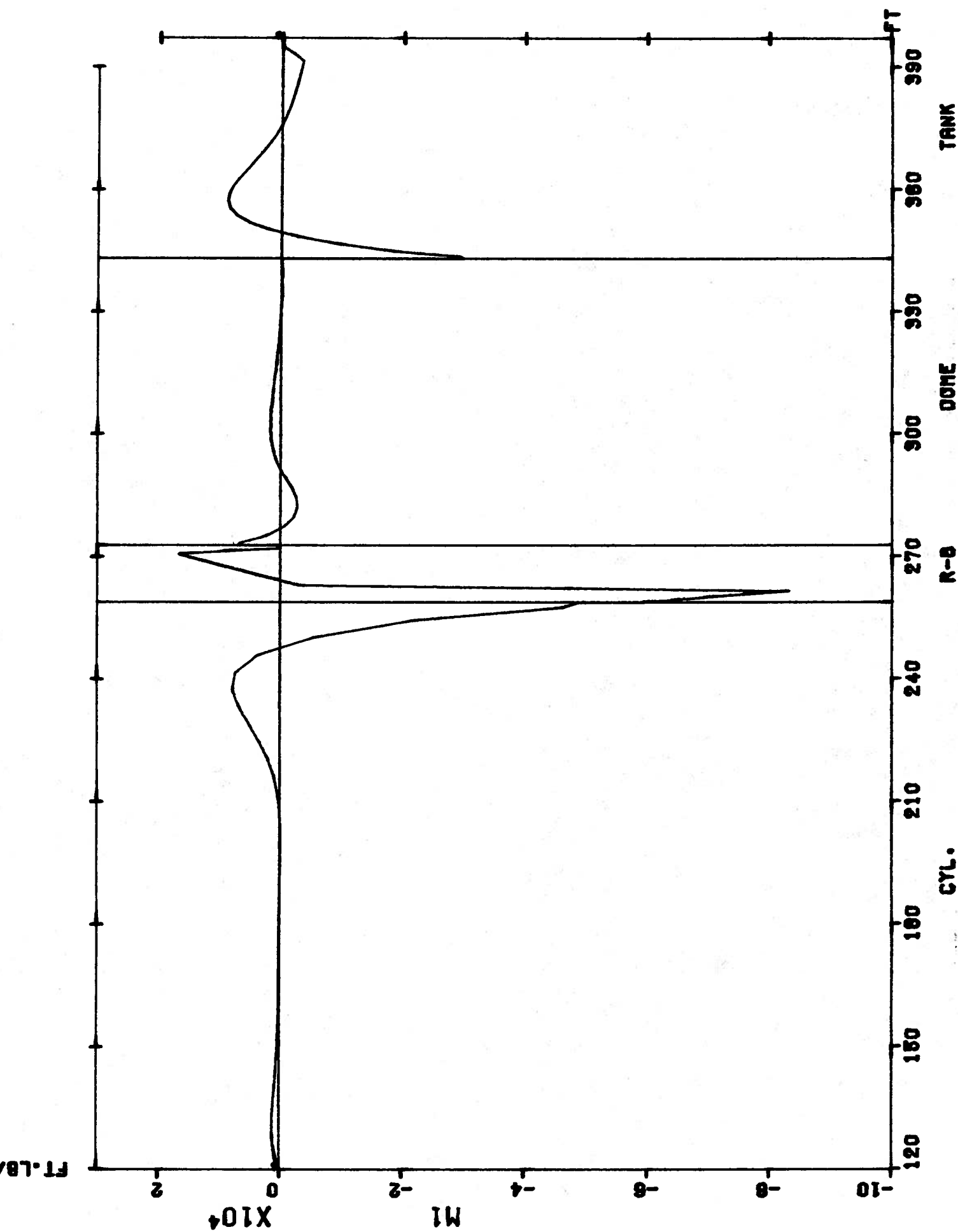


FIGURE F27 M1 for Loading Case CH:Hw

CYL.

R-8

DOME

TANK

