US Army Corps
of Engineers
Memphis District

Mississippi River Commission

REELFOOT LAKE
TENNESSEE AND KENTUCKY

VOLUME 4

APPENDIX B:

SECTION 3A: WATERWAYS EXPERIMENT STATION TEST DATA RESULTS

SECTION 4: COST ENGINEERING

APPENDIX C: REAL ESTATE

APPENDIX D: ECONOMIC AND SOCIAL ANALYSIS

SEPTEMBER 1999

APPENDIX B

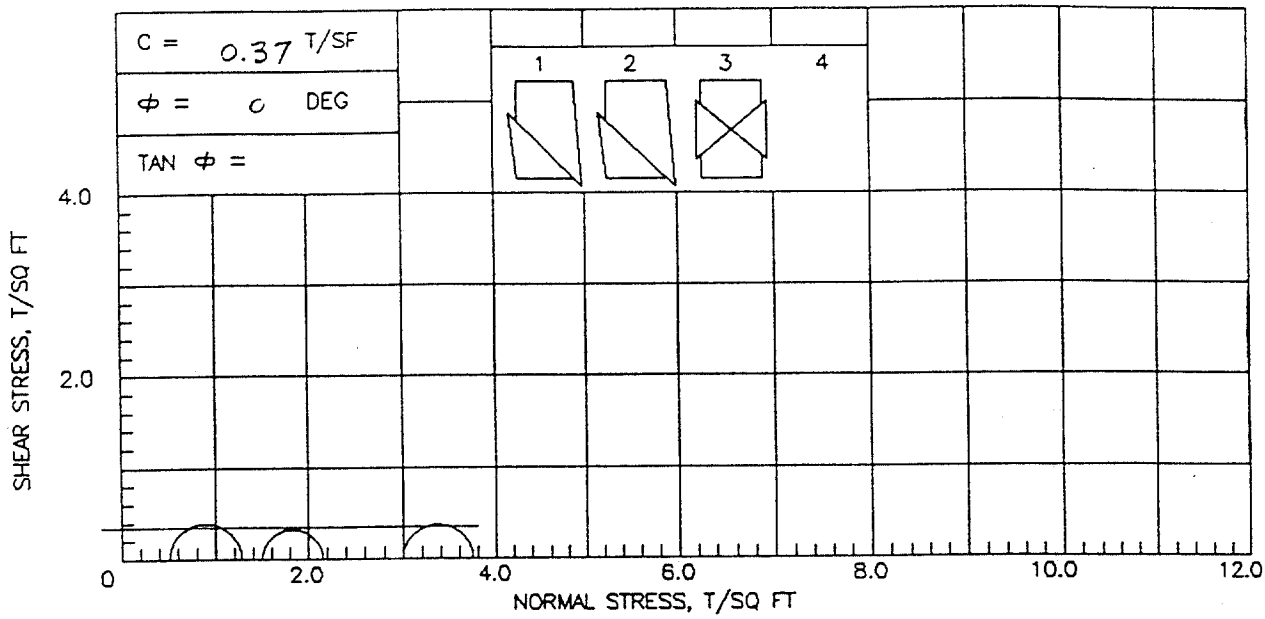
SECTION III-A

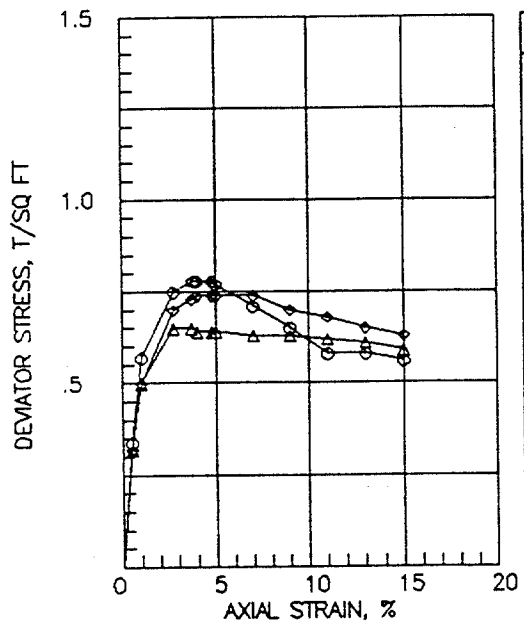
WATERWAYS EXPERIMENT STATION
Triaxial (Q), Direct Shear (S), & Consolidation (C)
Test Data Results

C = 0.37 T/SF

ϕ = 0 DEG

TAN ϕ =





SPECIMEN NO.		○ 1	△ 2	◇ 3	4
INITIAL	WATER CONTENT, %	48.3	50.0	49.6	
	DRY DENSITY, PCF	73.3	71.5	71.6	
	SATURATION, %	100+	99.4	98.9	
	VOID RATIO	1.298	1.358	1.353	
BEFORE SHEAR	WATER CONTENT, %				
	DRY DENSITY, PCF				
	SATURATION, %				
	VOID RATIO				
	BACK PRESSURE, TSF				
CHAMBER PRESSURE, TSF		.50	1.50	3.00	
MAX. DEV. STRESS, TSF		.78	.65	.74	
TIME TO FAILURE, MIN.		7	8	15	
STRAIN RATE INCR., %					
INITIAL DIAMETER, IN.		1.36	1.36	1.36	
INITIAL HEIGHT, IN.		3.00	3.00	3.00	

CONTROLLED-STRAIN TEST

DESCRIPTION OF SPECIMENS: CLAY (CH), GRAY

LL 79	PL 24	PI 55	GS 2.70 (ESTIMATED)	UNDISTURBED SPECIMEN	Q TEST

REMARKS:

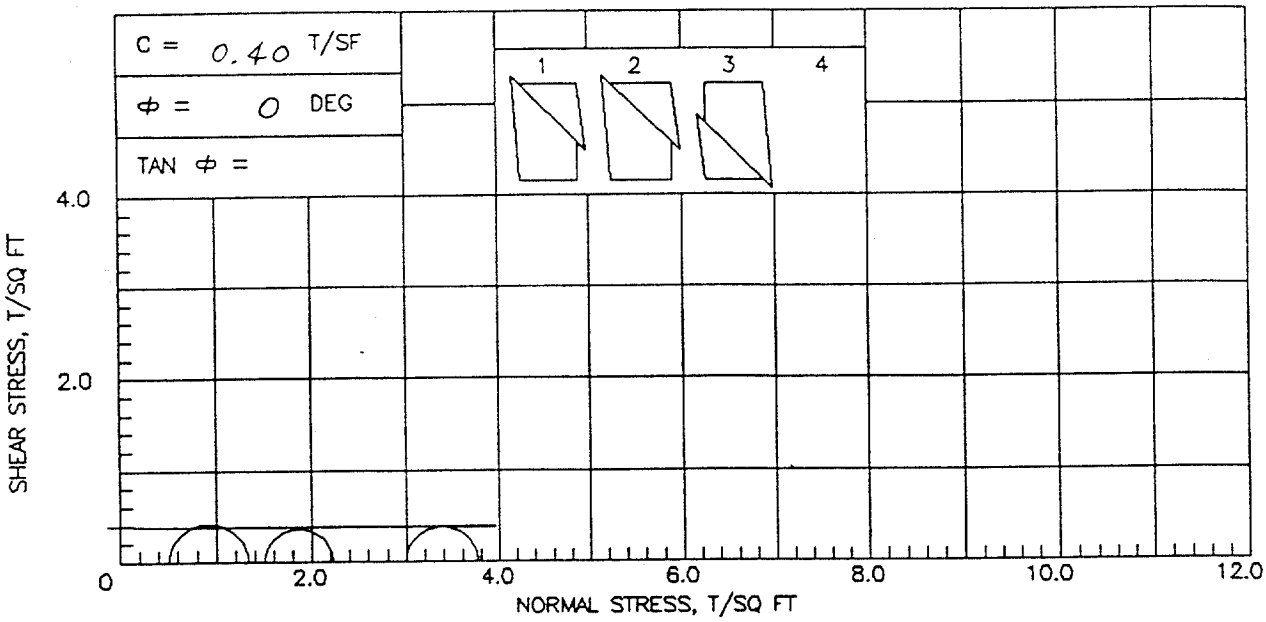
PROJECT REELFOOT LAKE FEASIBILITY STUDY

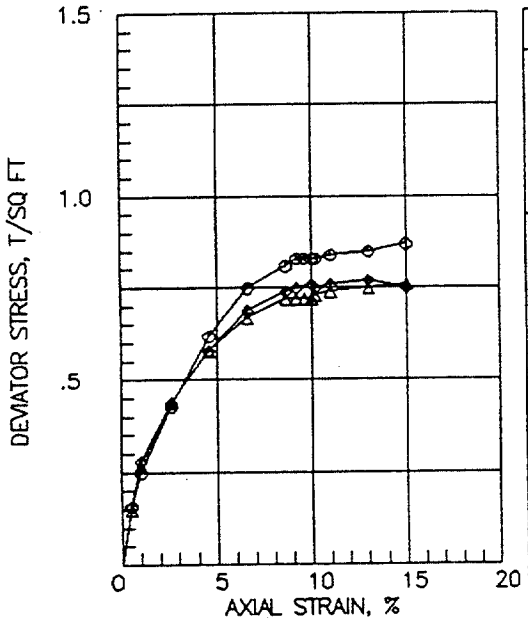
BORING NO. 1-RLBU-95 SAMPLE NO. 12

DEPTH/ELEV 33.5-34.5 TECH. JH

LABORATORY USAE WES - STF/GL DATE 31 OCT 95

TRIAXIAL COMPRESSION TEST REPORT





SPECIMEN NO.		○ 1	△ 2	◇ 3	4
INITIAL	WATER CONTENT, %	36.1	38.3	37.6	
	DRY DENSITY, PCF	85.7	82.5	83.6	
	SATURATION, %	100+	99.0	100+	
	VOID RATIO	.967	1.044	1.016	
BEFORE SHEAR	WATER CONTENT, %				
	DRY DENSITY, PCF				
	SATURATION, %				
	VOID RATIO				
	BACK PRESSURE, TSF				
CHAMBER PRESSURE, TSF		.50	1.50	3.00	
MAX. DEV. STRESS, TSF		.83	.72	.76	
TIME TO FAILURE, MIN.		18	17	19	
STRAIN RATE INCR., %					
INITIAL DIAMETER, IN.		1.36	1.37	1.36	
INITIAL HEIGHT, IN.		3.00	3.00	3.00	

CONTROLLED-STRAIN TEST

DESCRIPTION OF SPECIMENS: CLAY (CH), GRAY

LL 58	PL 21	PI 37	GS 2.70 (ESTIMATED)	UNDISTURBED SPECIMEN	Q TEST

REMARKS:

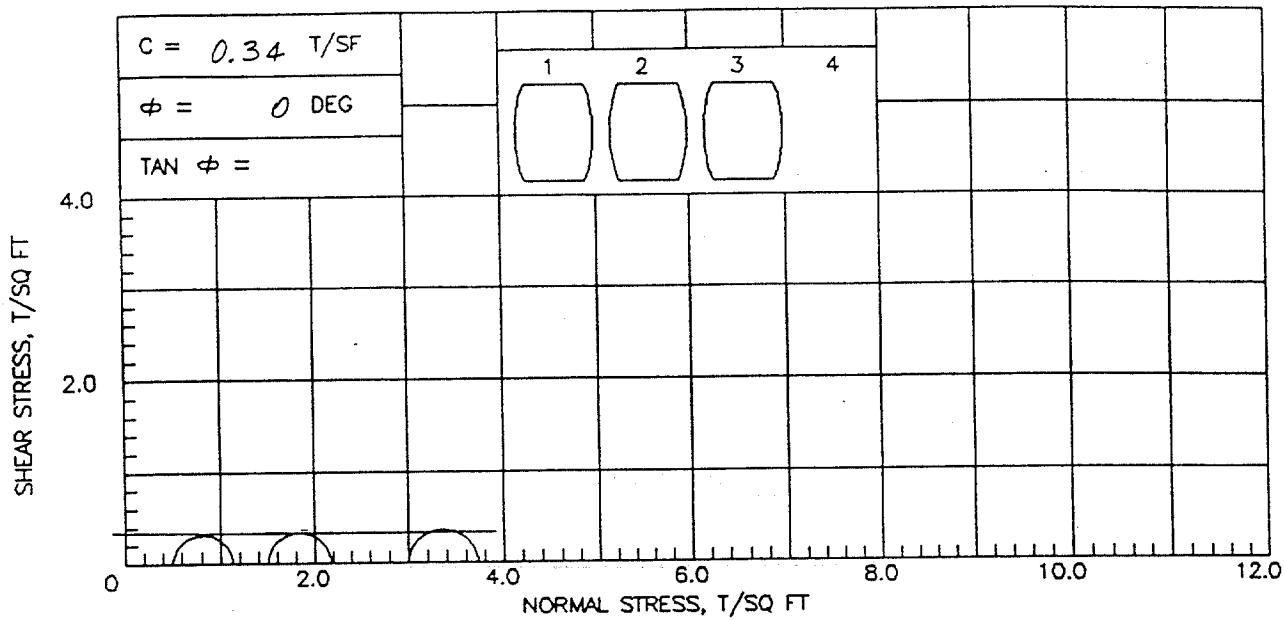
PROJECT REELFOOT LAKE FEASIBILITY STUDY

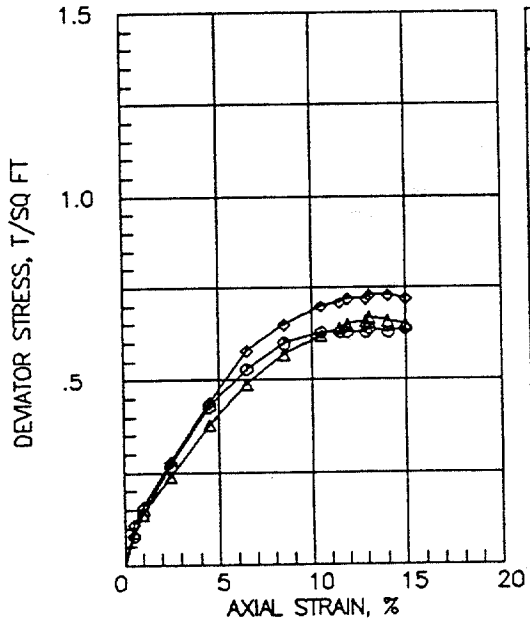
BORING NO. 2-RLST-95 | SAMPLE NO. 9

DEPTH/ELEV 23.0-24.5 | TECH. JH

LABORATORY USAE WES - STF/GL | DATE 31 OCT 95

TRIAXIAL COMPRESSION TEST REPORT





SPECIMEN NO.		○ 1	△ 2	◇ 3	4
INITIAL	WATER CONTENT, %	37.5	36.8	37.6	
	DRY DENSITY, PCF	83.9	84.9	84.4	
	SATURATION, %	100+	100+	100+	
	VOID RATIO	1.009	.985	.996	
BEFORE SHEAR	WATER CONTENT, %				
	DRY DENSITY, PCF				
	SATURATION, %				
	VOID RATIO				
	BACK PRESSURE, TSF				
CHAMBER PRESSURE, TSF		.50	1.50	3.00	
MAX. DEV. STRESS, TSF		.63	.67	.72	
TIME TO FAILURE, MIN.		20	25	23	
STRAIN RATE INCR., %					
INITIAL DIAMETER, IN.		1.35	1.35	1.35	
INITIAL HEIGHT, IN.		3.00	3.00	3.00	

CONTROLLED-STRAIN TEST

DESCRIPTION OF SPECIMENS: CLAY (CL), GRAY

LL 45	PL 22	PI 23	GS 2.70 (ESTIMATED)	UNDISTURBED SPECIMEN	Q TEST

REMARKS:

PROJECT REELFOOT LAKE FEASIBILITY STUDY

BORING NO. 2-RLST-95 | SAMPLE NO. 11

DEPTH/ELEV 29.0-30.5 | TECH. JH

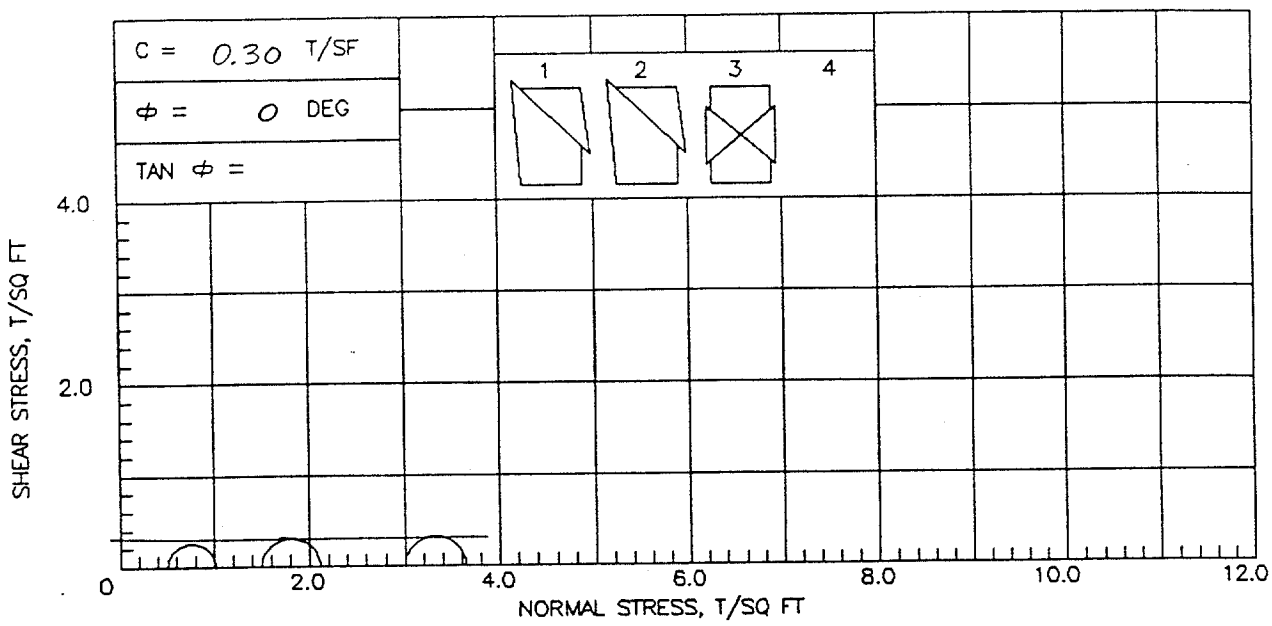
LABORATORY USAE WES - STF/GL | DATE 01 NOV 95

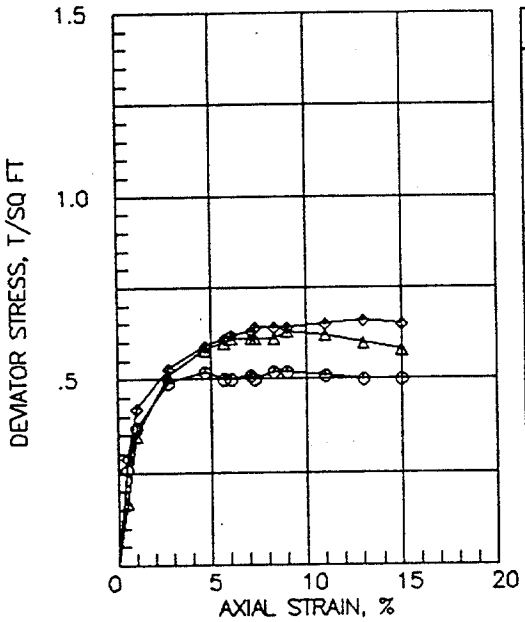
TRIAXIAL COMPRESSION TEST REPORT

C = 0.30 T/SF

ϕ = 0 DEG

TAN ϕ =





SPECIMEN NO.		○ 1	△ 2	◇ 3	4
INITIAL	WATER CONTENT, %	46.1	44.6	46.4	
	DRY DENSITY, PCF	75.3	77.0	74.9	
	SATURATION, %	100+	100+	100+	
	VOID RATIO	1.239	1.190	1.250	
BEFORE SHEAR	WATER CONTENT, %				
	DRY DENSITY, PCF				
	SATURATION, %				
	VOID RATIO				
	BACK PRESSURE, TSF				
CHAMBER PRESSURE, TSF		.50	1.50	3.00	
MAX. DEV. STRESS, TSF		.52	.61	.64	
TIME TO FAILURE, MIN.		9	23	25	
STRAIN RATE INCR., %			8		
INITIAL DIAMETER, IN.		1.37	1.36	1.36	
INITIAL HEIGHT, IN.		3.00	3.00	3.00	

CONTROLLED-STRAIN TEST

DESCRIPTION OF SPECIMENS: CLAY (CH), GRAY; SLICKENSIDED

LL 85	PL 25	PI 60	GS 2.70 (ESTIMATED)	UNDISTURBED SPECIMEN	Q TEST

REMARKS:

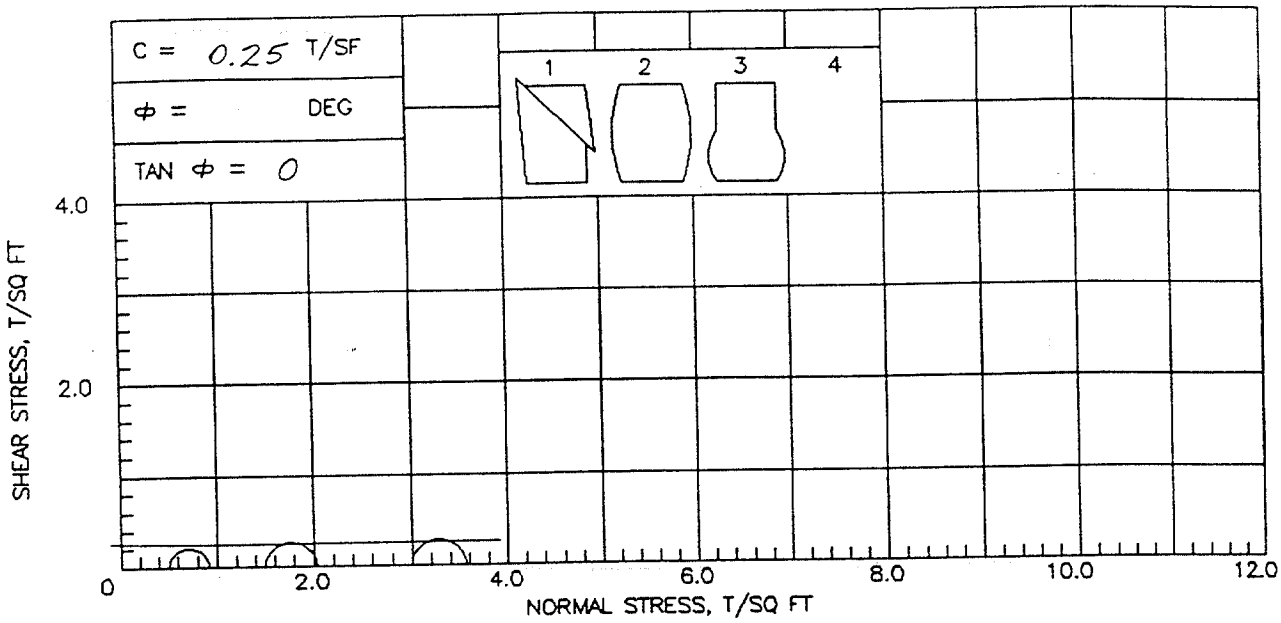
PROJECT REELFOOT LAKE FEASIBILITY STUDY

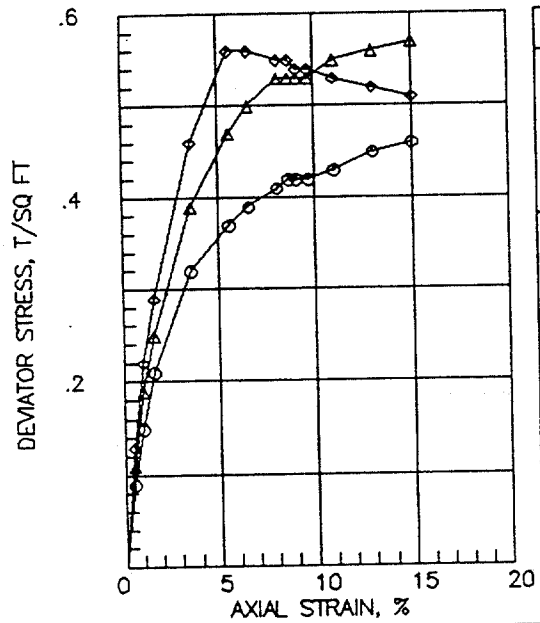
BORING NO. 4-RLU-95 | SAMPLE NO. 8

DEPTH/ELEV 20.0-21.5 | TECH. JH

LABORATORY USAE WES - STF/GL | DATE 01 NOV 95

TRIAXIAL COMPRESSION TEST REPORT





SPECIMEN NO.		○ 1	△ 2	◇ 3	4
INITIAL	WATER CONTENT, %	32.9	32.6	31.8	
	DRY DENSITY, PCF	90.7	90.0	90.9	
	SATURATION, %	100+	100+	100+	
	VOID RATIO	.859	.872	.855	
BEFORE SHEAR	WATER CONTENT, %				
	DRY DENSITY, PCF				
	SATURATION, %				
	VOID RATIO				
	BACK PRESSURE, TSF				
CHAMBER PRESSURE, TSF		.50	1.50	3.00	
MAX. DEV. STRESS, TSF		.42	.53	.56	
TIME TO FAILURE, MIN.		16	15	18	
STRAIN RATE INCR., %					
INITIAL DIAMETER, IN.		1.35	1.35	1.35	
INITIAL HEIGHT, IN.		3.00	3.00	3.00	

CONTROLLED-STRAIN TEST

DESCRIPTION OF SPECIMENS: CLAY (CL), GRAY; IRON OXIDE PARTICLES

LL 37	PL 19	PI 18	GS 2.70 (ESTIMATED)	UNDISTURBED SPECIMEN	Q TEST

REMARKS:

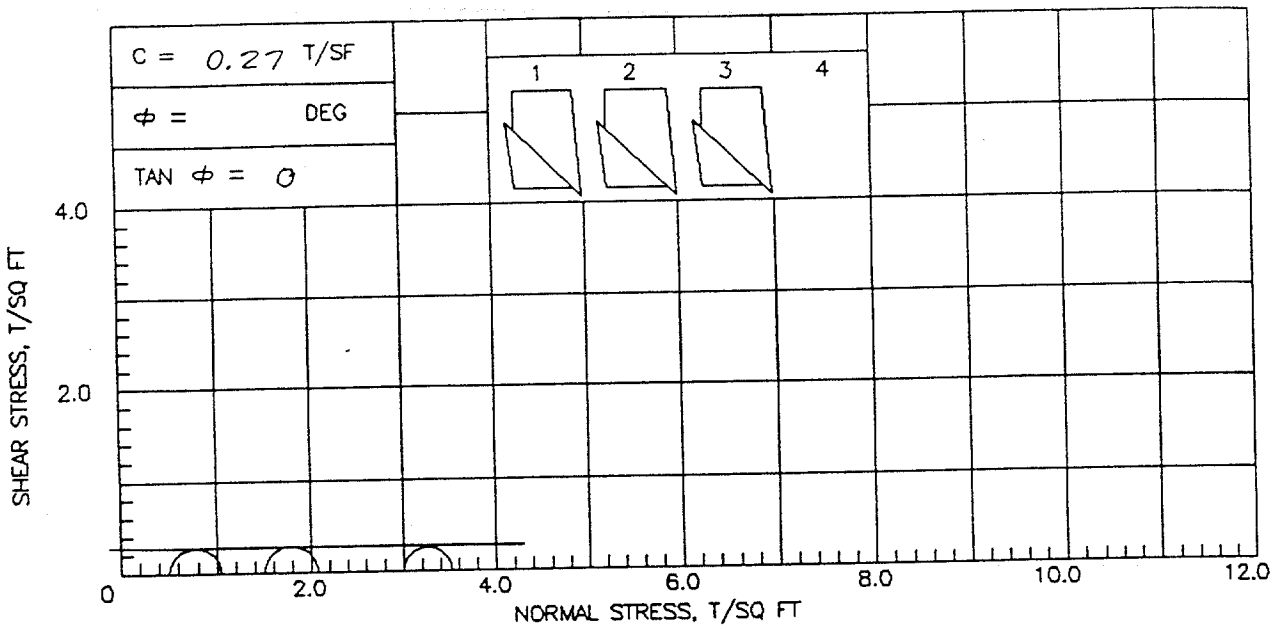
PROJECT REELFOOT LAKE FEASIBILITY STUDY

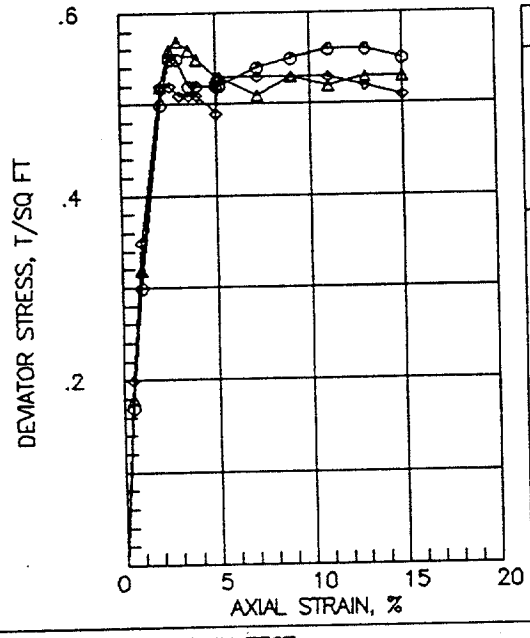
BORING NO. 1-LIT-95 | SAMPLE NO. 7

DEPTH/ELEV 17.0-18.3 | TECH. JH

LABORATORY USAE WES - STF/GL | DATE 03 NOV 95

TRIAXIAL COMPRESSION TEST REPORT





SPECIMEN NO.		○ 1	△ 2	◇ 3	4
INITIAL	WATER CONTENT, %	50.5	52.6	54.2	
	DRY DENSITY, PCF	71.8	70.2	68.9	
	SATURATION, %	100+	100+	100+	
	VOID RATIO	1.348	1.402	1.445	
BEFORE SHEAR	WATER CONTENT, %				
	DRY DENSITY, PCF				
	SATURATION, %				
	VOID RATIO				
	BACK PRESSURE, TSF				
CHAMBER PRESSURE, TSF		.50	1.50	3.00	
MAX. DEV. STRESS, TSF		.55	.57	.52	
TIME TO FAILURE, MIN.		5	13	12	
STRAIN RATE INCR., %			7	5	
INITIAL DIAMETER, IN.		1.36	1.36	1.36	
INITIAL HEIGHT, IN.		3.00	3.00	3.00	

CONTROLLED-STRAIN TEST

DESCRIPTION OF SPECIMENS: CLAY (CH), GRAY

LL 68	PL 22	PI 46	GS 2.70 (ESTIMATED)	UNDISTURBED SPECIMEN	Q TEST

REMARKS:

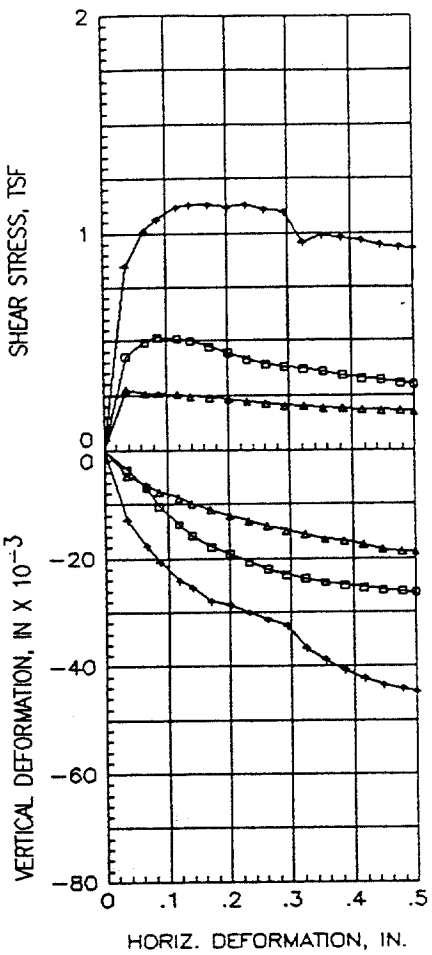
PROJECT REELFOOT LAKE FEASIBILITY STUDY

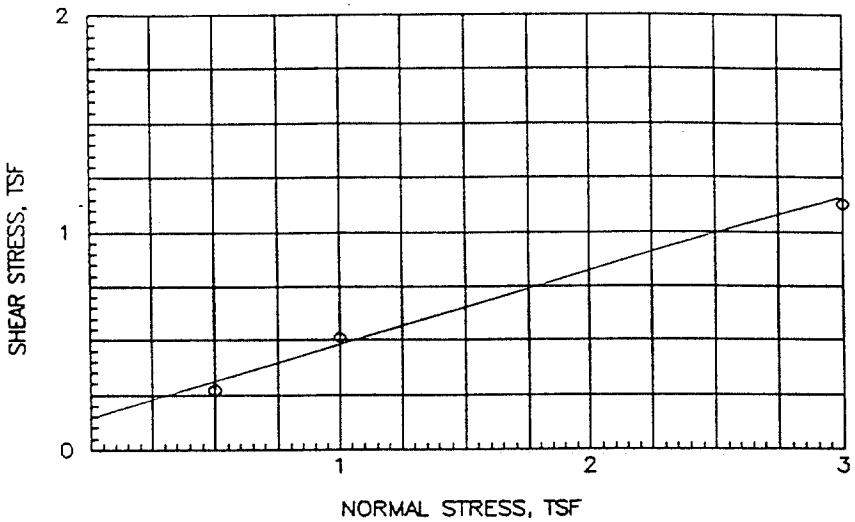
BORING NO. 1-LIT-95 | SAMPLE NO. 12

DEPTH/ELEV 32.0-33.0 | TECH. JH

LABORATORY USAE WES - STF/GL | DATE 03 NOV 95

TRIAXIAL COMPRESSION TEST REPORT





		TEST NO.	1 △	2 □	3 +
INITAL		WATER CONTENT, %	50.5	45.5	43.0
		VOID RATIO	1.444	1.378	1.248
		SATURATION, %	94.3	89.2	93.1
		DRY DENSITY, PCF	68.9	70.9	74.9
VOID RATIO AFTER CONSOL					
FIFTY PERCENT CONSOL, MIN			< 1	< 1	< 1
FINAL		WATER CONTENT, %	52.6	51.4	33.8
		VOID RATIO			
		SATURATION, %			
NORMAL STRESS, TSF			.50	1.00	3.00
MAXIMUM SHEAR STRESS, TSF			.28	.52	1.13
TIME TO FAILURE, MIN			189	461	733
RATE OF STRAIN, IN/MIN			.00019	.00019	.00019
ULTIMATE SHEAR STRESS, TSF			.17	.30	.92

ϕ = 18.3 DEG

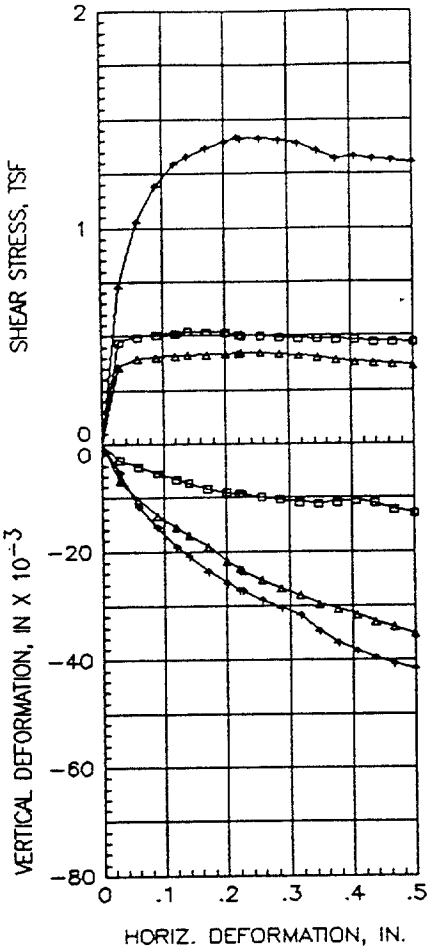
TAN ϕ = 0.330

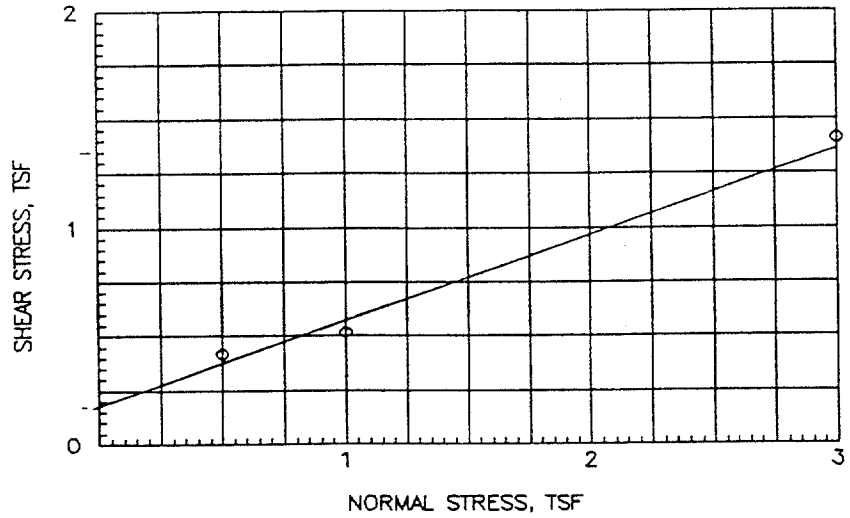
C = .150 T/SF

TYPE SPECIMEN	UNDISTURBED	3.00 IN. SQUARE	.552 IN. THICK
CLASSIFICATION	CLAY (CH), GRAY		

LL 79	PL 24	PI 55		GS 2.70 (EST)

REMARKS;	PROJECT REELFOOT LAKE FEASIBILITY STUDY	
	BORING NO. 1-RLBU-95	SAMPLE 12
	DEPTH/ELEV 33.5-34.5	TECH. US
	LABORATORY USAE WES - STF/GL	DATE 02 NOV 95
	DIRECT SHEAR TEST REPORT	





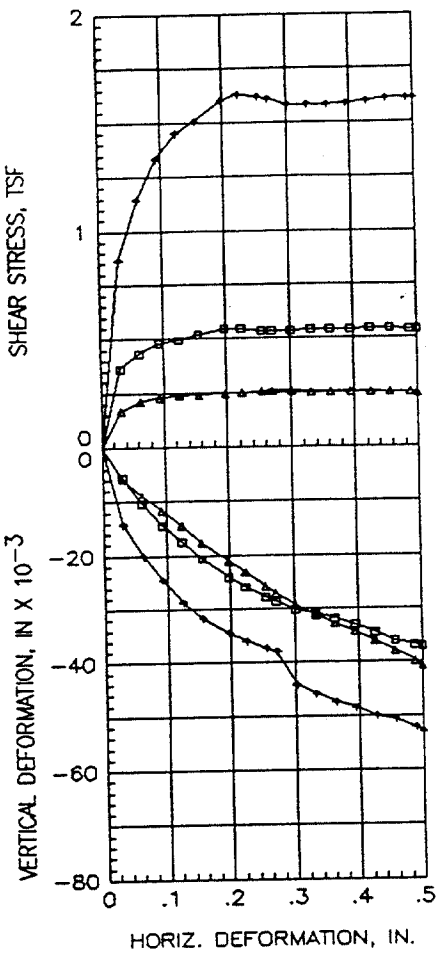
ϕ = 21.4 DEG

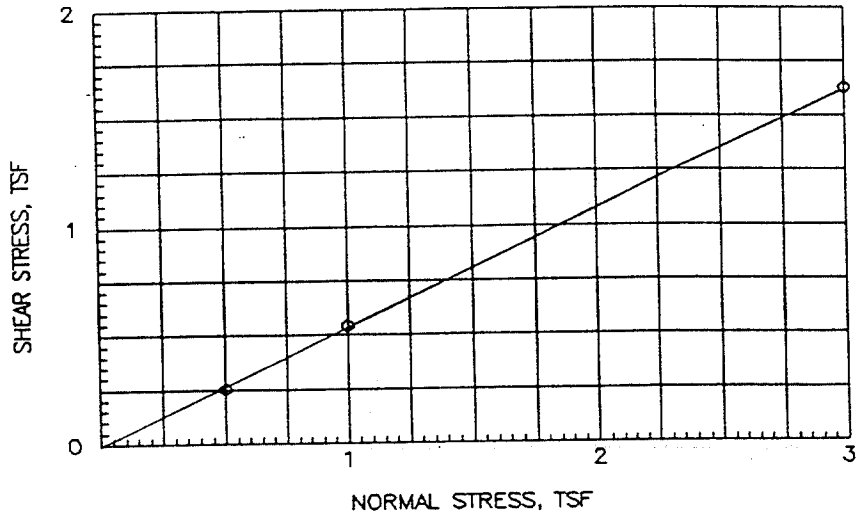
TAN ϕ = 0.392

C = .175 T/SF

	TEST NO.	1 ▲	2 □	3 ✦	
INITIAL	WATER CONTENT, %	36.6	36.4	37.4	
	VOID RATIO	1.065	1.002	1.038	
	SATURATION, %	92.9	98.0	97.3	
	DRY DENSITY, PCF	81.6	84.2	82.7	
VOID RATIO AFTER CONSOL					
FIFTY PERCENT CONSOL, MIN		< 1	< 1	< 1	
FINAL	WATER CONTENT, %	36.7	33.5	28.5	
	VOID RATIO				
	SATURATION, %				
NORMAL STRESS, TSF		.50	1.00	3.00	
MAXIMUM SHEAR STRESS, TSF		.42	.52	1.41	
TIME TO FAILURE, MIN		1208	751	1181	
RATE OF STRAIN, IN/MIN		.00019	.00019	.00019	
ULTIMATE SHEAR STRESS, TSF		.36	.47	1.30	

TYPE SPECIMEN UNDISTURBED	3.00 IN. SQUARE	.552 IN. THICK
CLASSIFICATION CLAY (CH), GRAY		
LL 58	PL 21	PI 37	GS 2.70 (EST)
REMARKS;	PROJECT REELFOOT LAKE FEASIBILITY STUDY	
	BORING NO. 2-RLST-95	SAMPLE 9
	DEPTH/ELEV 23.0-24.5	TECH. US
	LABORATORY USAE WES - STF/GL	DATE 03 NOV 95
	DIRECT SHEAR TEST REPORT	





ϕ = 28.5 DEG

TAN ϕ = 0.5433

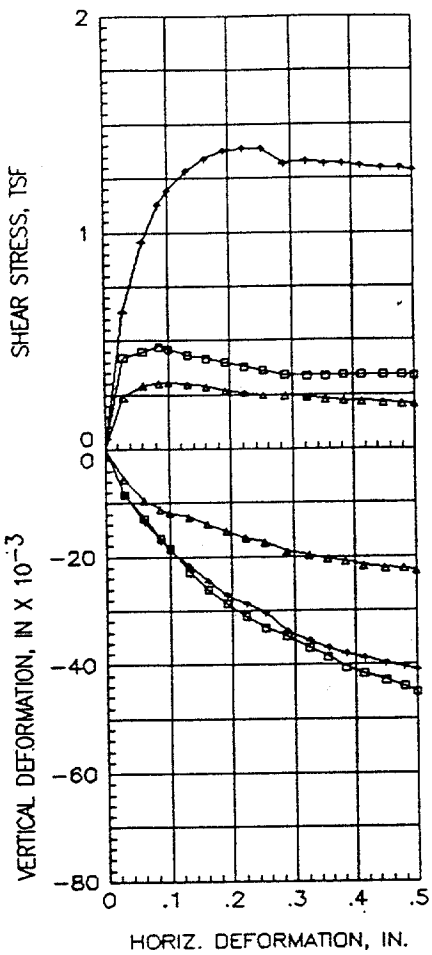
C = 0 T/SF

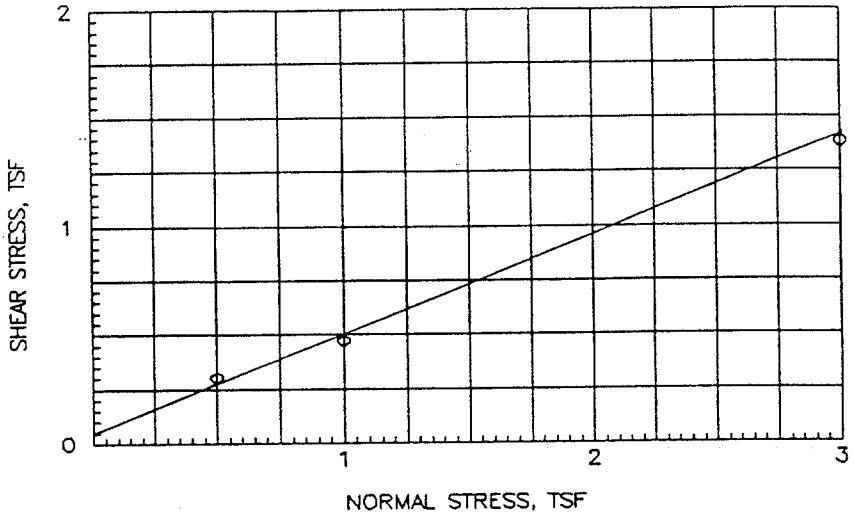
	TEST NO.	1 ▲	2 □	3 +
INITAL	WATER CONTENT, %	37.2	36.9	35.9
	VOID RATIO	1.113	1.078	1.058
	SATURATION, %	90.3	92.5	91.7
	DRY DENSITY, PCF	79.7	81.1	81.9
VOID RATIO AFTER CONSOL				
FIFTY PERCENT CONSOL, MIN		< 1	< 1	< 1
FINAL	WATER CONTENT, %	36.2	33.0	26.8
	VOID RATIO			
	SATURATION, %			
NORMAL STRESS, TSF		.50	1.00	3.00
MAXIMUM SHEAR STRESS, TSF		.26	.55	1.63
TIME TO FAILURE, MIN		1504	1099	1244
RATE OF STRAIN, IN/MIN		.00018	.00018	.00018
ULTIMATE SHEAR STRESS, TSF		.24	.53	1.58

TYPE SPECIMEN UNDISTURBED	3.00 IN. SQUARE	.628 IN. THICK
CLASSIFICATION CLAY (CL), GRAY		

LL 45	PL 22	PI 23		GS 2.70 (EST)

REMARKS;	PROJECT REELFOOT LAKE FEASIBILITY STUDY	
	BORING NO. 2-RLST-95	SAMPLE 11
	DEPTH/ELEV 29.0-30.5	TECH. US
	LABORATORY USAE WES - STF/GL	DATE 02 NOV 95
	DIRECT SHEAR TEST REPORT	





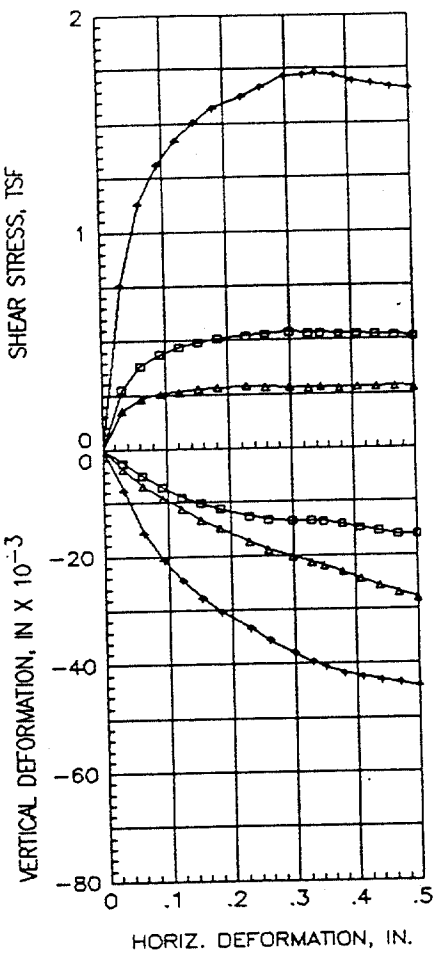
	TEST NO.	1 ▲	2 ▫	3 +	
INITAL	WATER CONTENT, %	41.0	39.5	39.0	
	VOID RATIO	1.169	1.139	1.125	
	SATURATION, %	94.6	93.7	93.6	
	DRY DENSITY, PCF	77.7	78.8	79.3	
VOID RATIO AFTER CONSOL					
FIFTY PERCENT CONSOL, MIN		< 1	< 1	< 1	
FINAL	WATER CONTENT, %	42.6	39.5	30.8	
	VOID RATIO				
	SATURATION, %				
NORMAL STRESS, TSF		.50	1.00	3.00	
MAXIMUM SHEAR STRESS, TSF		.31	.47	1.39	
TIME TO FAILURE, MIN		558	474	1231	
RATE OF STRAIN, IN/MIN		.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, TSF		.21	.34	1.29	

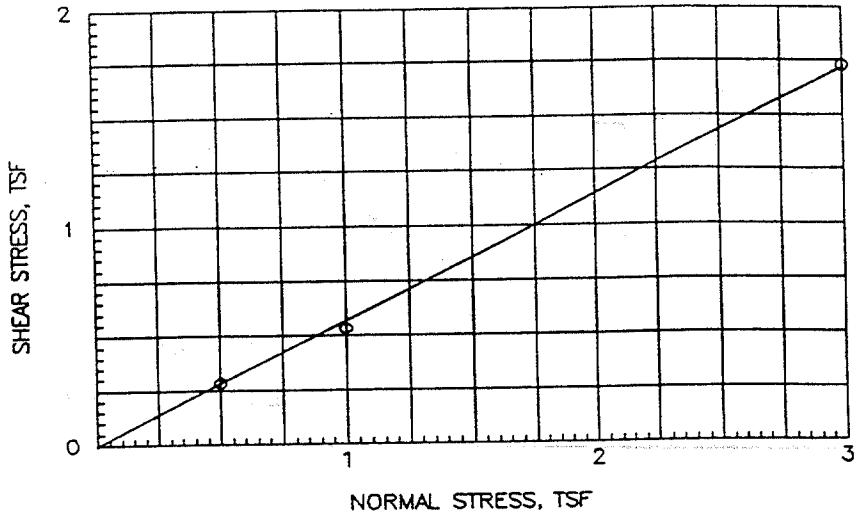
ϕ = 23.6 DEG

TAN ϕ = 0.437

C = .05 T/SF

TYPE SPECIMEN UNDISTURBED	3.00 IN. SQUARE	.628 IN. THICK
CLASSIFICATION CLAY (CH), GRAY; SLICKENSIDED; FRIABLE		
LL 85	PL 25	PI 60	GS 2.70 (EST)
REMARKS:	PROJECT REELFOOT LAKE FEASIBILITY STUDY	
	BORING NO. 4-RLU-95	SAMPLE 8
	DEPTH/ELEV 20.0-21.5	TECH. US
	LABORATORY USAE WES - STF/GL	DATE 02 NOV 95
	DIRECT SHEAR TEST REPORT	





		TEST NO.	1 ▲	2 ▫	3 ✦	
INITAL		WATER CONTENT, %	31.4	32.9	32.6	
		VOID RATIO	.931	.948	.969	
		SATURATION, %	91.1	93.5	90.9	
		DRY DENSITY, PCF	87.2	86.5	85.6	
VOID RATIO AFTER CONSOL						
FIFTY PERCENT CONSOL, MIN			< 1	< 1	< 1	
FINAL		WATER CONTENT, %	29.6	29.0	26.2	
		VOID RATIO				
		SATURATION, %				
NORMAL STRESS, TSF			.50	1.00	3.00	
MAXIMUM SHEAR STRESS, TSF			.29	.54	1.73	
TIME TO FAILURE, MIN			1212	1585	1852	
RATE OF STRAIN, IN/MIN			.00019	.00019	.00019	
ULTIMATE SHEAR STRESS, TSF			.28	.51	1.66	

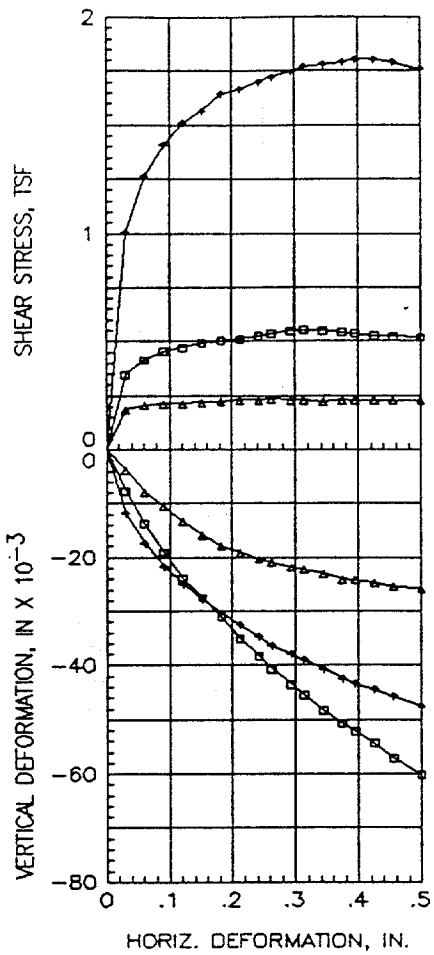
ϕ = 30 DEG

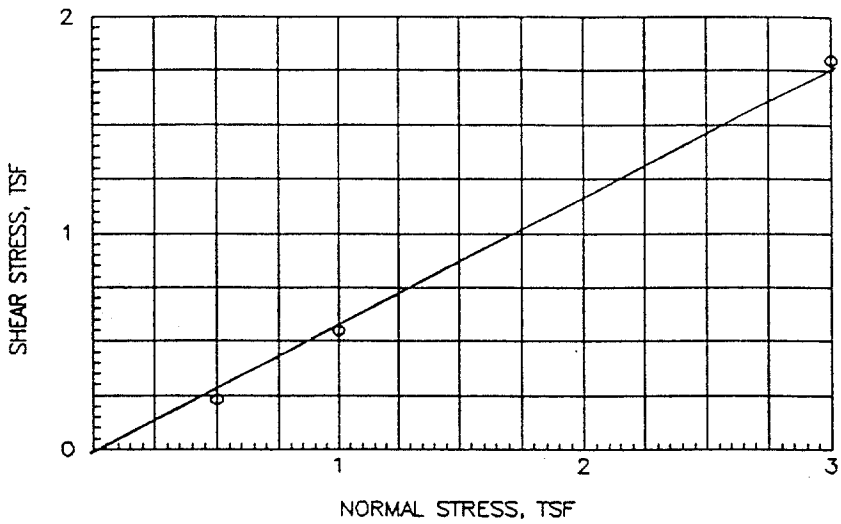
TAN ϕ = .5767

C = 0 T/SF

TYPE SPECIMEN	UNDISTURBED		3.00 IN. SQUARE	.628 IN. THICK	
CLASSIFICATION	CLAY (CL), GRAY; IRON OXIDE PARTICLES				
LL	PL	PI		GS 2.70 (EST)	

REMARKS:	PROJECT REELFOOT LAKE FEASIBILITY STUDY
	BORING NO. 1-LIT-95 / SAMPLE 7
	DEPTH/ELEV 17.0-18.3 / TECH. US
	LABORATORY USAE WES - STF/GL / DATE 09 NOV 95
	DIRECT SHEAR TEST REPORT





		TEST NO.	1 ▲	2 □	3 ✦	
INITAL		WATER CONTENT, %	41.2	35.5	36.5	
		VOID RATIO	1.210	1.055	1.064	
		SATURATION, %	91.8	91.0	92.6	
		DRY DENSITY, PCF	76.2	82.0	81.6	
VOID RATIO AFTER CONSOL						
FIFTY PERCENT CONSOL, MIN			< 1	< 1	< 1	
FINAL		WATER CONTENT, %	41.0	31.3	28.3	
		VOID RATIO				
		SATURATION, %				
NORMAL STRESS, TSF			.50	1.00	3.00	
MAXIMUM SHEAR STRESS, TSF			.23	.55	1.80	
TIME TO FAILURE, MIN			1477	1761	2216	
RATE OF STRAIN, IN/MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, TSF			.22	.52	1.76	

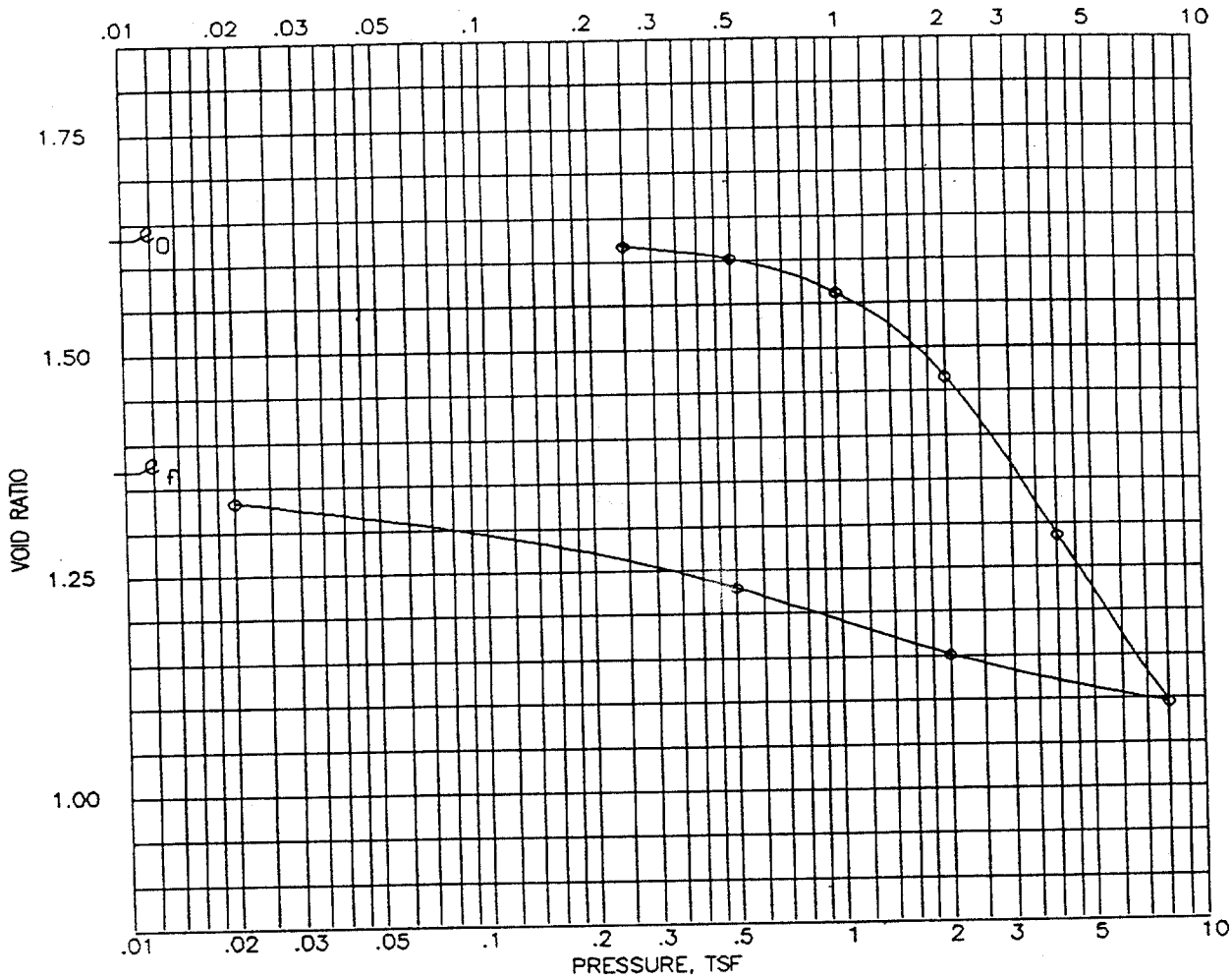
ϕ = 30 DEG

TAN ϕ = .5833

C = 0 T/SF

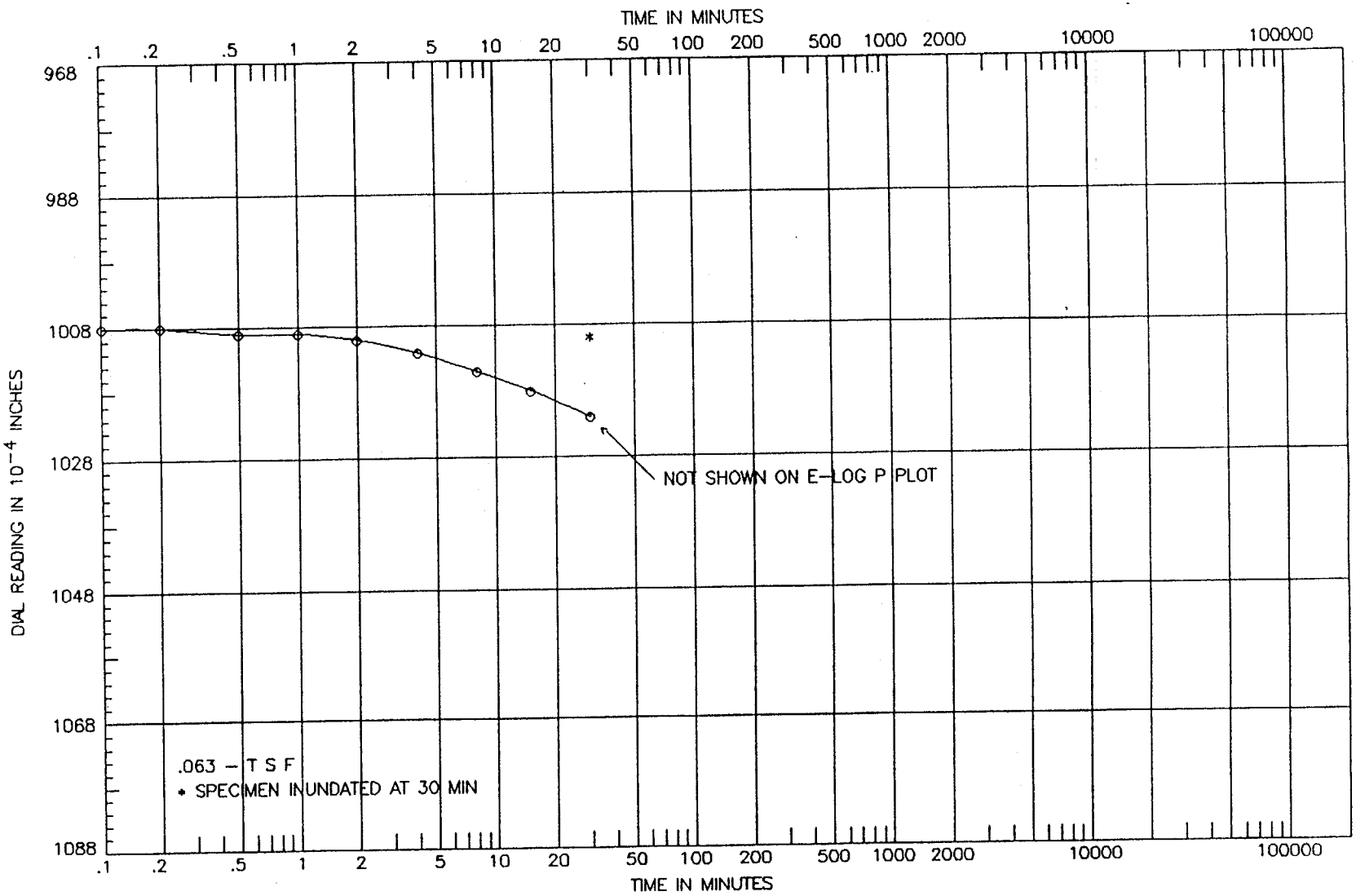
TYPE SPECIMEN	UNDISTURBED	3.00 IN. SQUARE	.628 IN. THICK
CLASSIFICATION	CLAY (CH), GRAY		
LL 68	PL 22	PI 46	GS 2.70 (EST)

REMARKS:	PROJECT REELFOOT LAKE FEASIBILITY STUDY	
	BORING NO. 1-LIT-95	SAMPLE 12
	DEPTH/ELEV 32.0-33.0	TECH. US
	LABORATORY USAE WES - STF/GL	DATE 09 NOV 95
	DIRECT SHEAR TEST REPORT	



			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	58.7	50.6
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	64.1	71.2
COMPRESSION INDEX		SATURATION, %	97.3	99.9
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	1.630	1.368
DIA. IN 4.44	HT. IN 1.118	BACK PRESSURE, TSF		
CLASSIFICATION	CLAY (CH), GRAY			
LL 79	PL 24	PI 55	PROJECT REELFOOT LAKE FEASIBILITY STUDY	
GS 2.70 (EST)	D_{10}			
REMARKS:		BORING NO. 1-RLBU-95	SAMPLE NO. 12	
		DEPTH/ELEV 33.5-34.5	TECH. JL	
		LABORATORY USAE WES - STF/GL	DATE 26 OCT 95	
		CONSOLIDATION TEST REPORT		

SHEET 1 OF 11

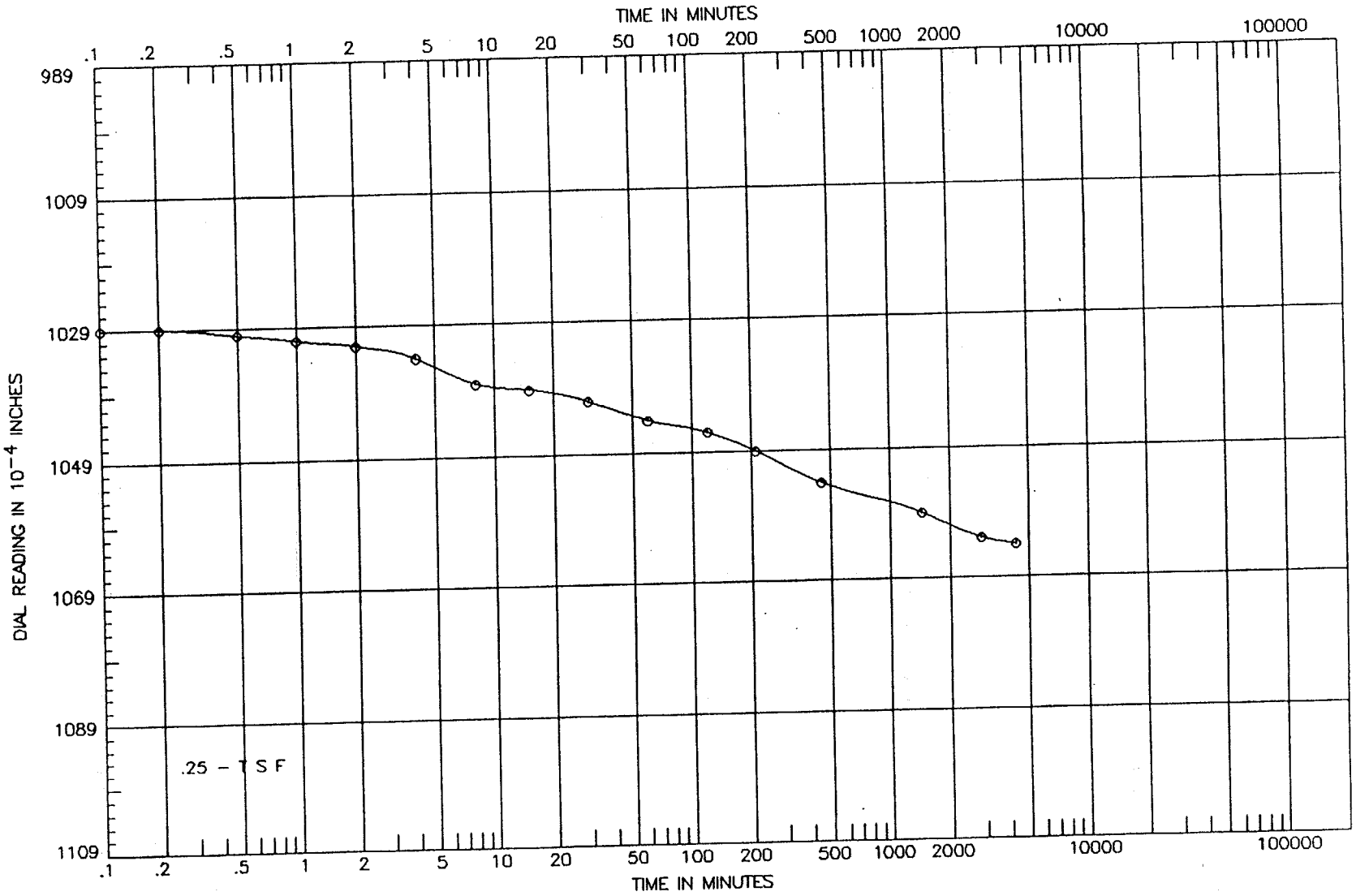


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-RLBU-95	SAMPLE NO.	12
DEPTH/ELEV	33.5-34.5	DATE	26 OCT 95

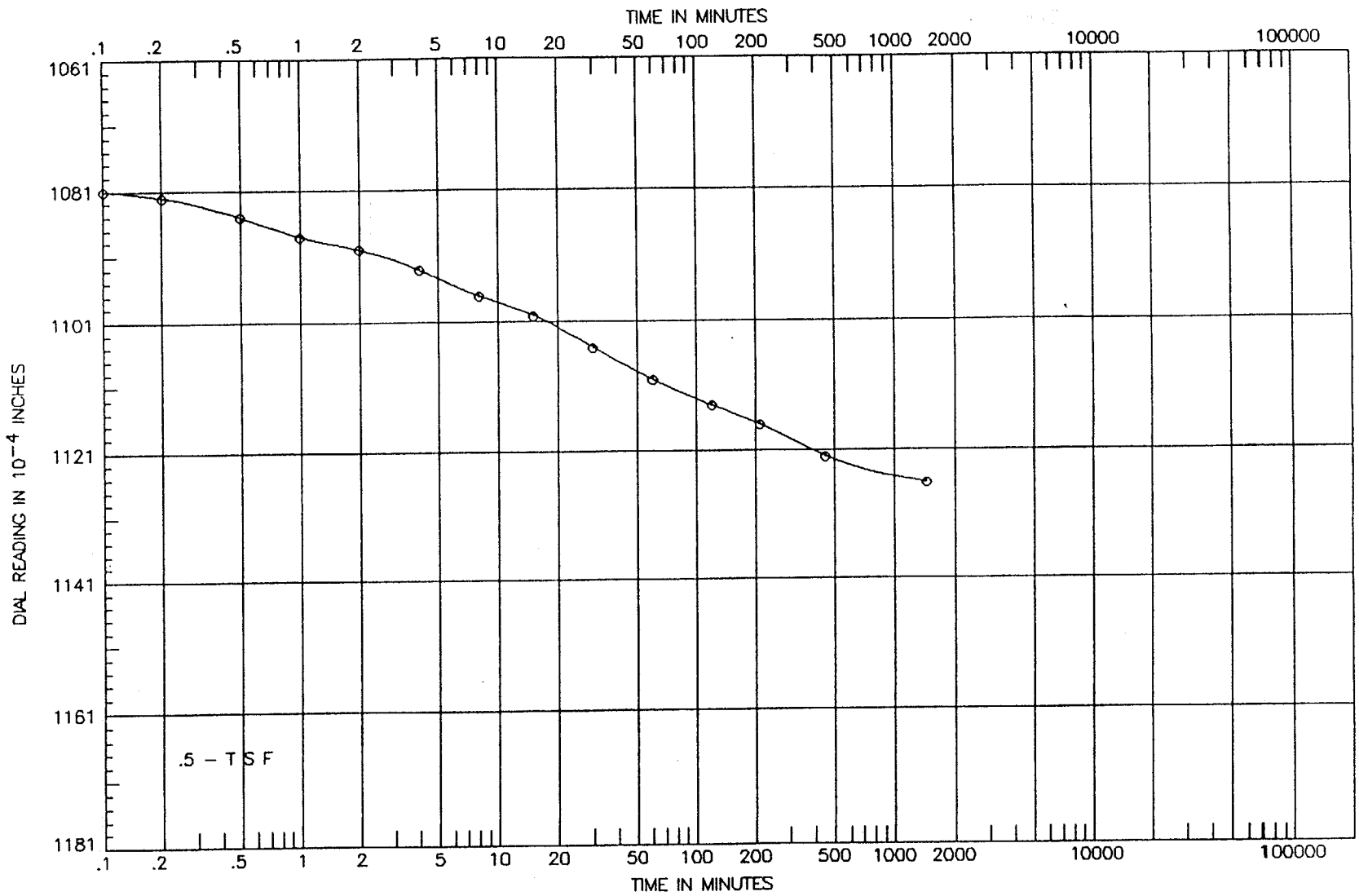
CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES - STF/GL

SHEET 2 OF 11



PROJECT	REELFOOT LAKE FEASIBILITY STUDY		CONSOLIDATION TEST TIME CURVES LABORATORY USAE WES – STF/GL
BORING	1-RLBU-95	SAMPLE NO. 12	
DEPTH/ELEV	33.5-34.5	DATE 26 OCT 95	

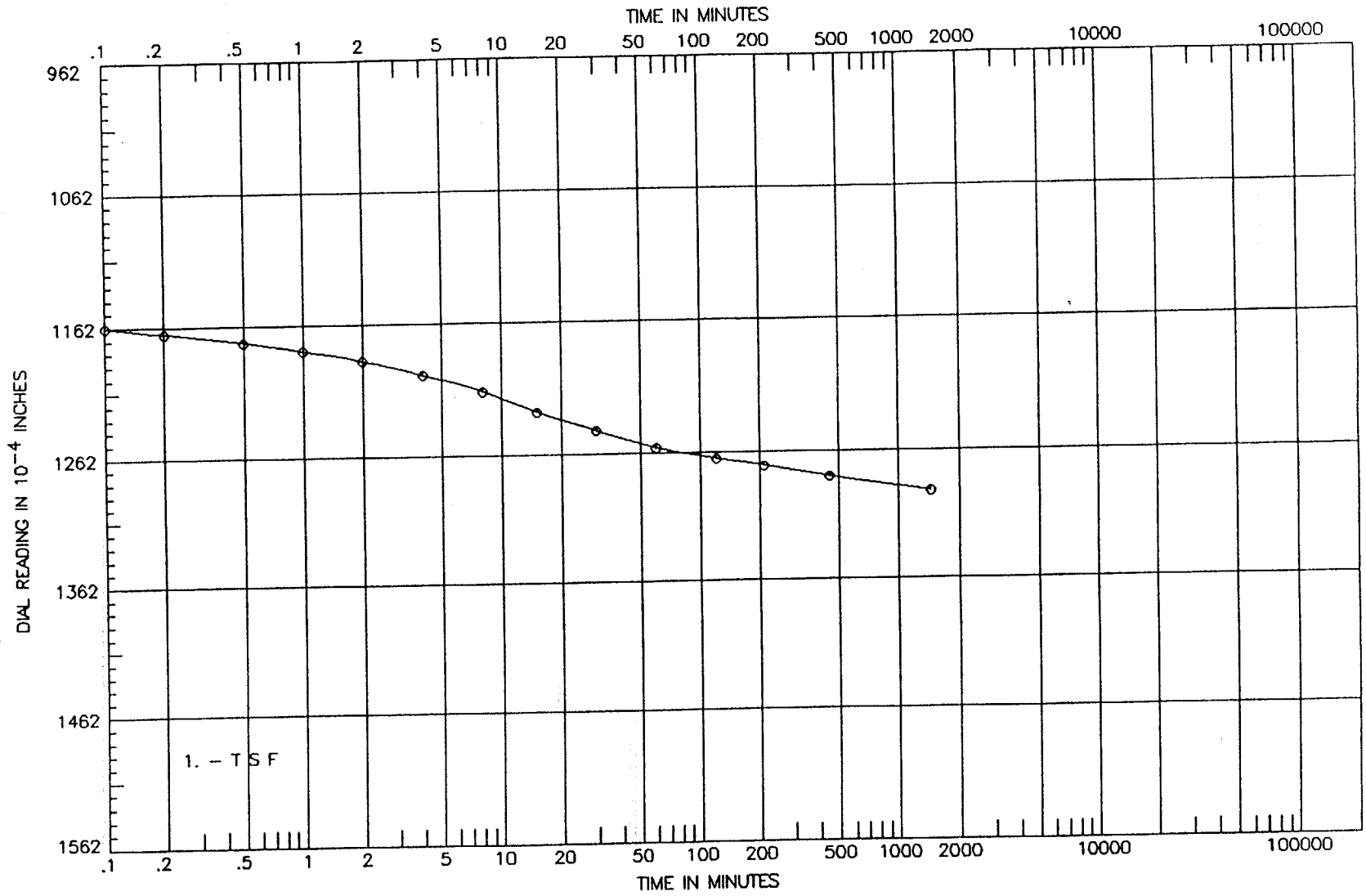


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-RLBU-95	SAMPLE NO.	12
DEPTH/ELEV	33.5-34.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

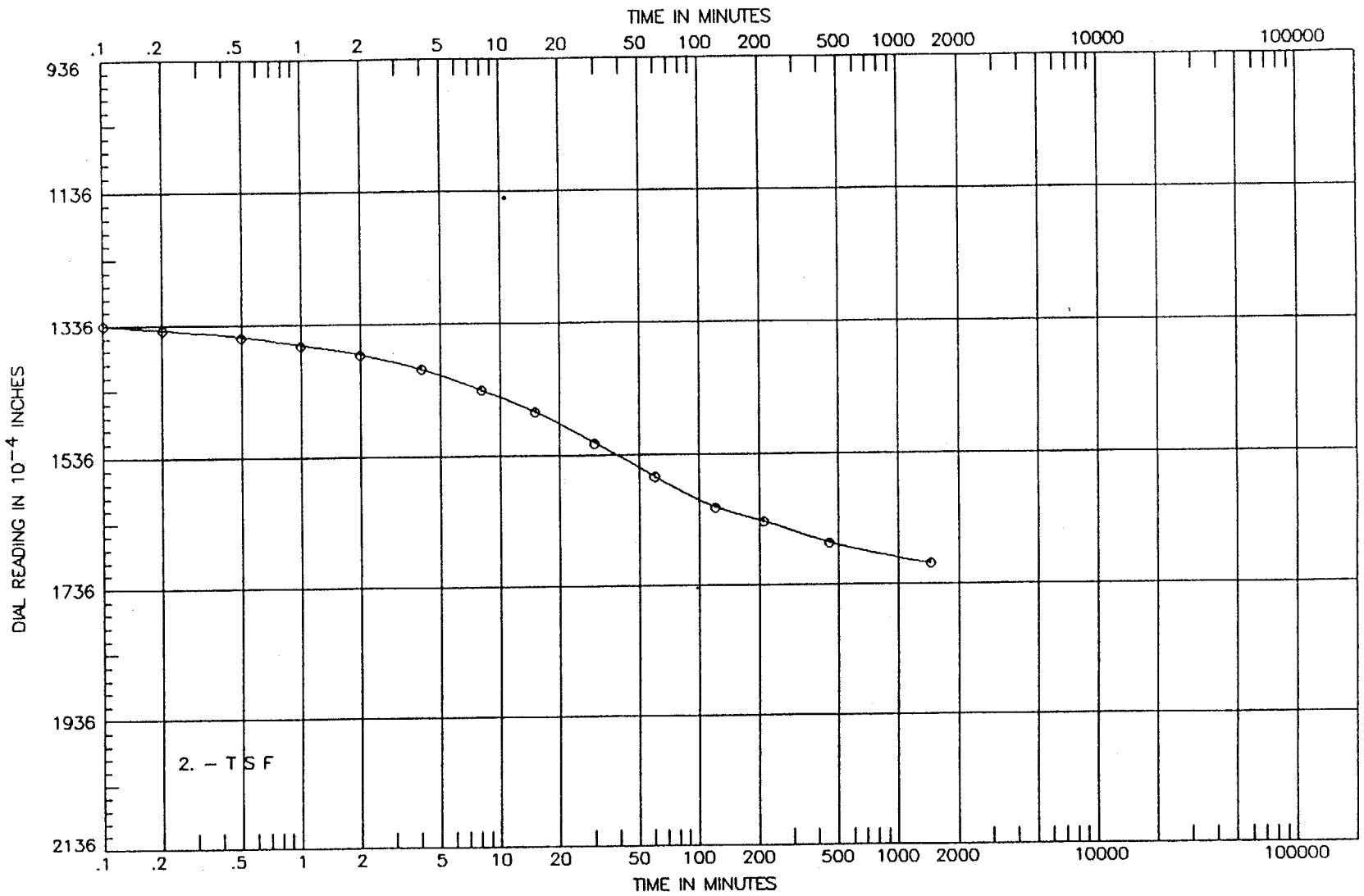
LABORATORY USAE WES – STF/GL

SHEET 4 OF 11



PROJECT	REELFOOT LAKE FEASIBILITY STUDY		CONSOLIDATION TEST TIME CURVES LABORATORY USAE WES – STF/GL
BORING	1–RLBU–95	SAMPLE NO. 12	
DEPTH/ELEV	33.5–34.5	DATE 26 OCT 95	

SHEET 5 OF 11

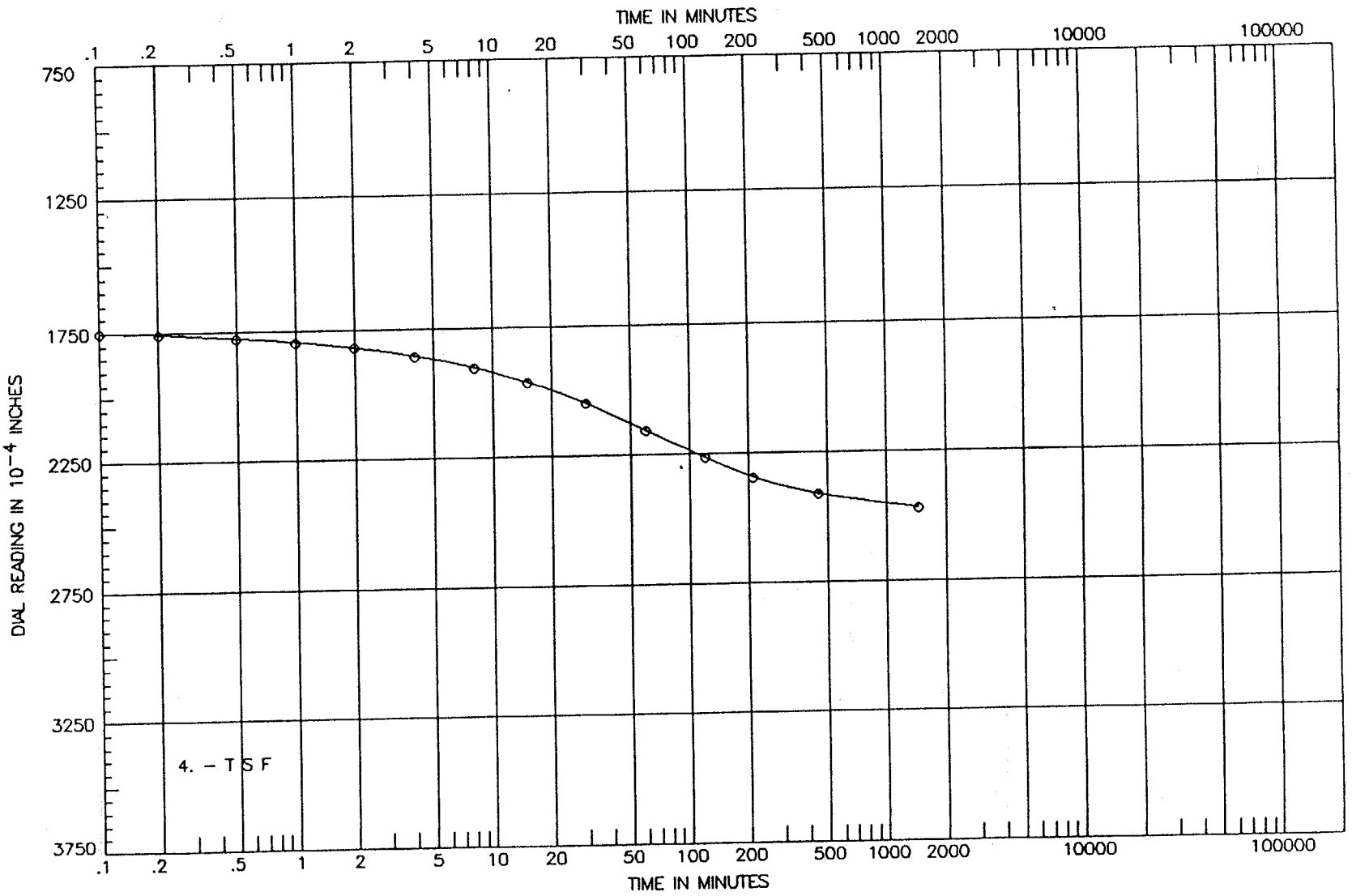


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1–RLBU–95	SAMPLE NO.	12
DEPTH/ELEV	33.5–34.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 6 OF 11

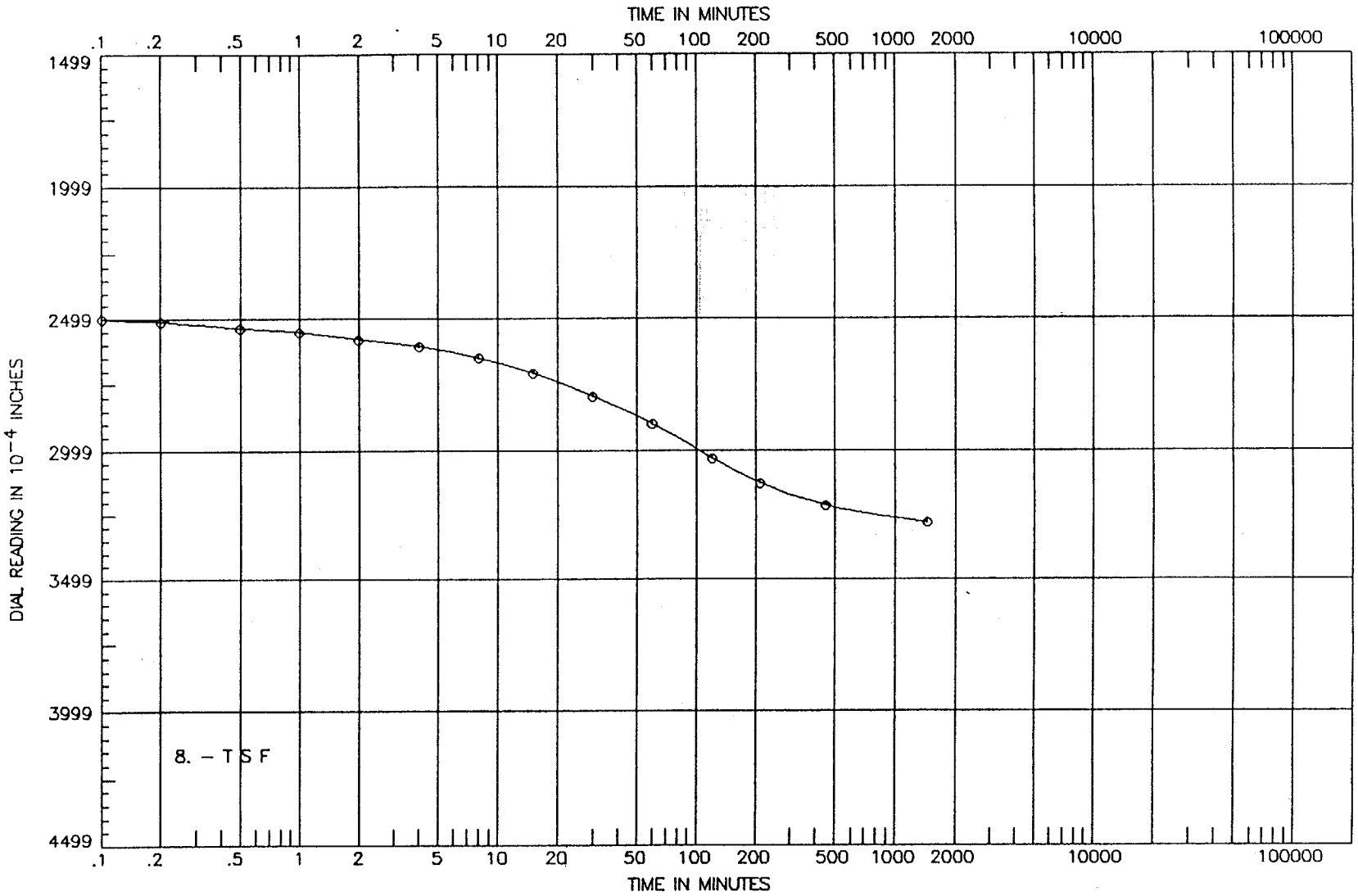


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-RLBU-95	SAMPLE NO.	12
DEPTH/ELEV	33.5-34.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

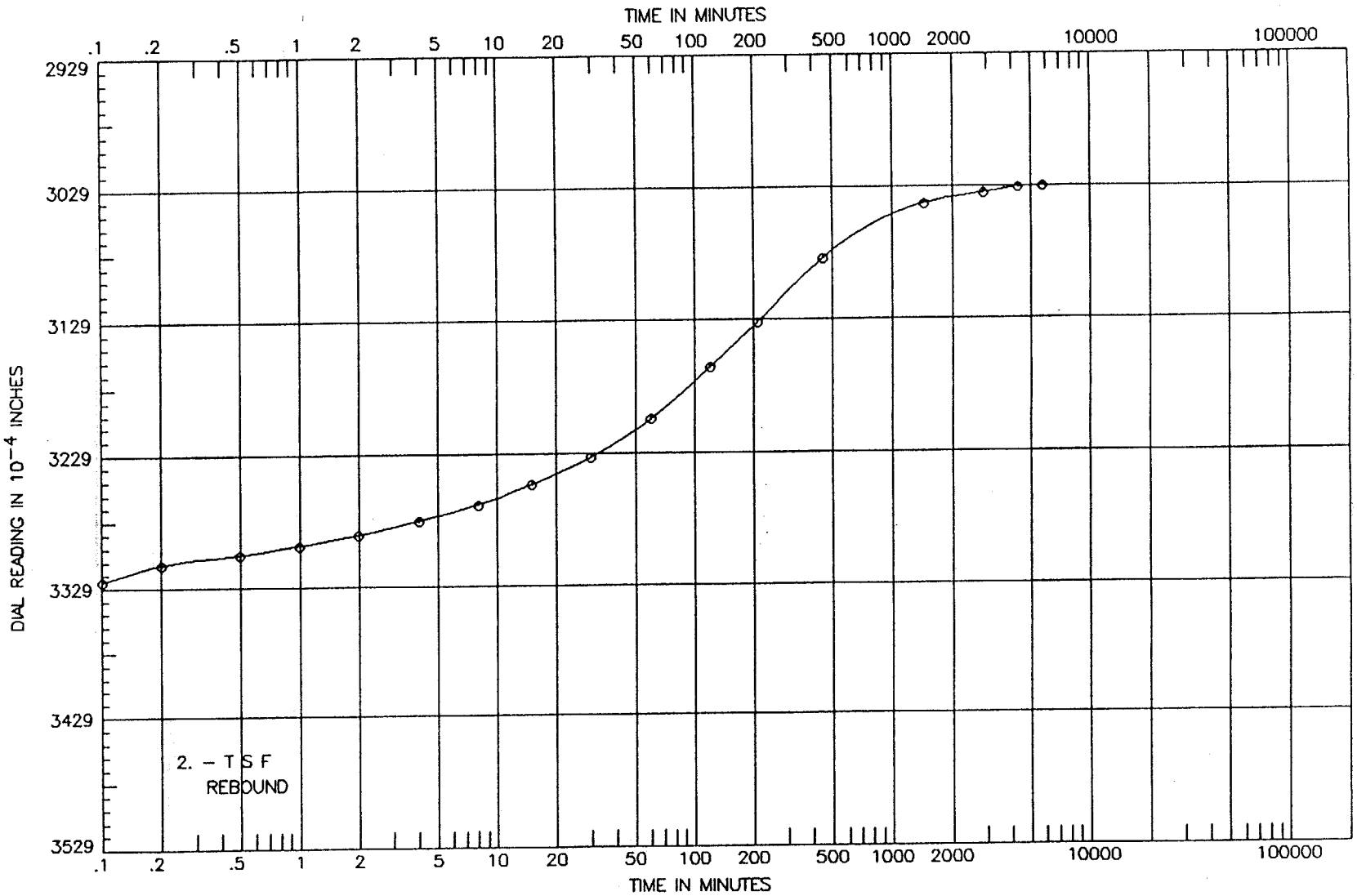
LABORATORY USAE WES - STF/GL

SHEET 7 OF 11



PROJECT	REELFOOT LAKE FEASIBILITY STUDY		CONSOLIDATION TEST TIME CURVES LABORATORY USAE WES – STF/GL
BORING	1-RLBU-95	SAMPLE NO.	12
DEPTH/ELEV	33.5-34.5	DATE	26 OCT 95

SHEET 8 OF 11

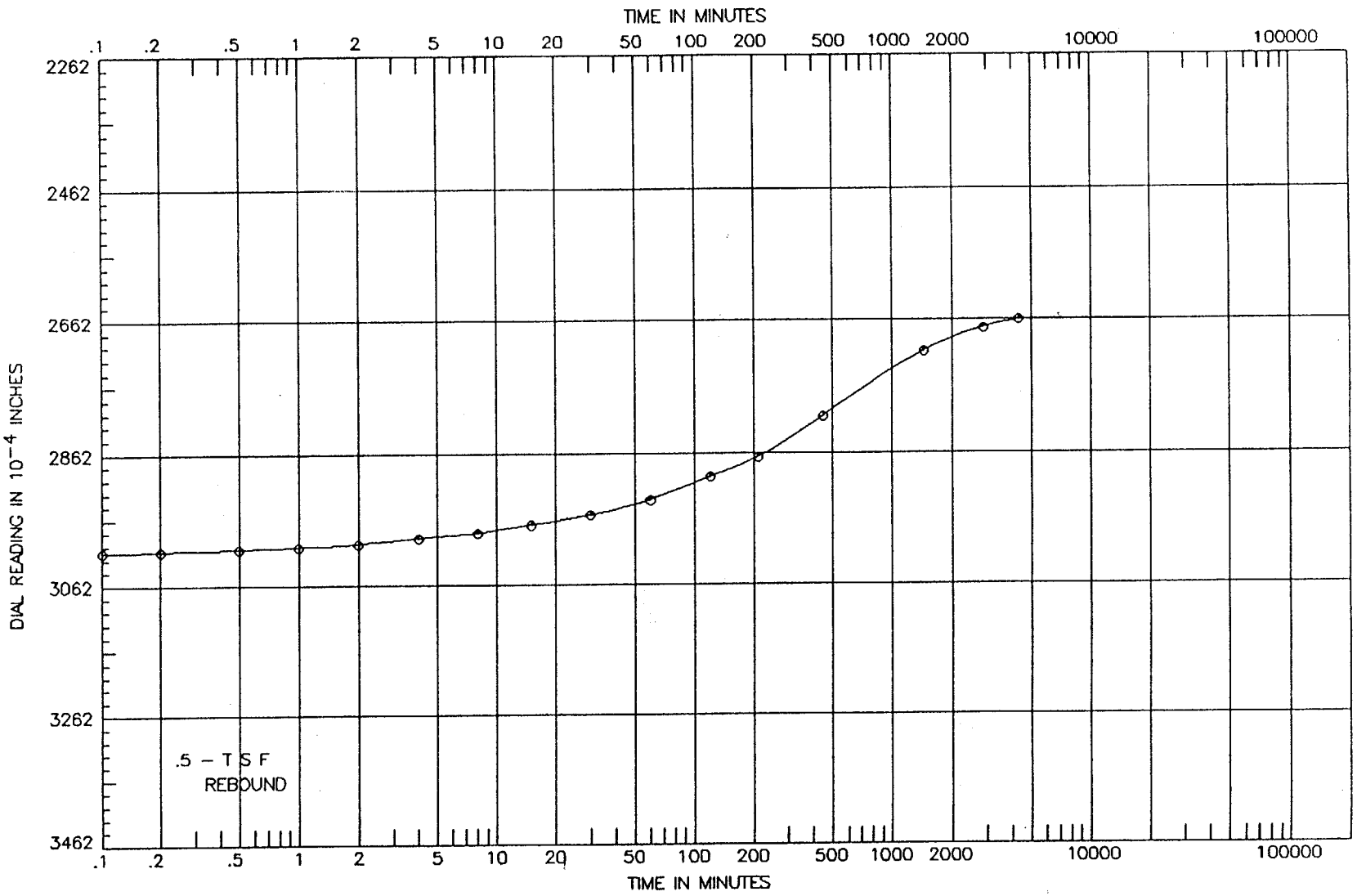


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-RLBU-95	SAMPLE NO.	12
DEPTH/ELEV	33.5-34.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES - STF/GL

SHEET 9 OF 11

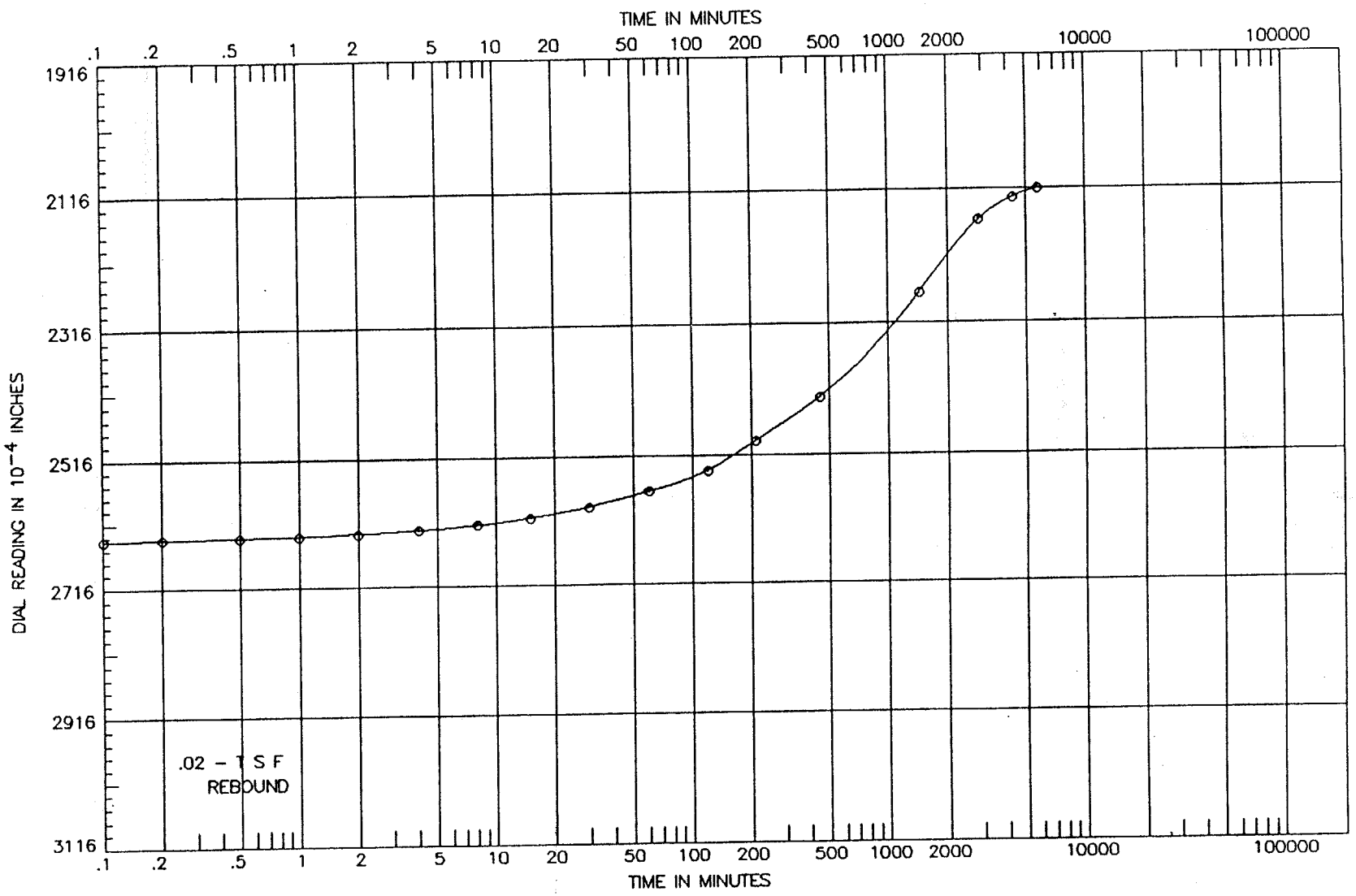


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-RLBU-95	SAMPLE NO.	12
DEPTH/ELEV	33.5-34.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 10 OF 11

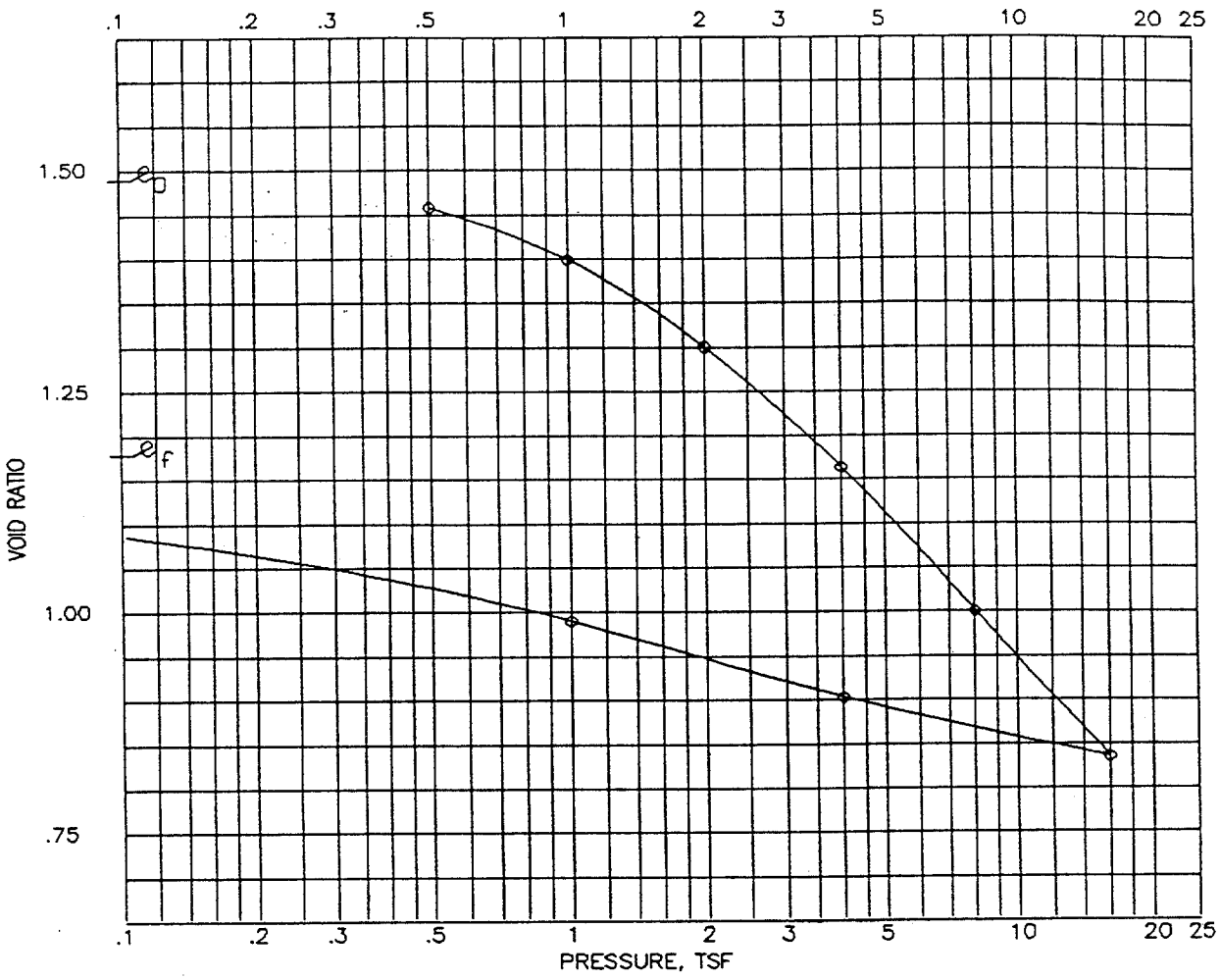


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-RLBU-95	SAMPLE NO.	12
DEPTH/ELEV	33.5-34.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

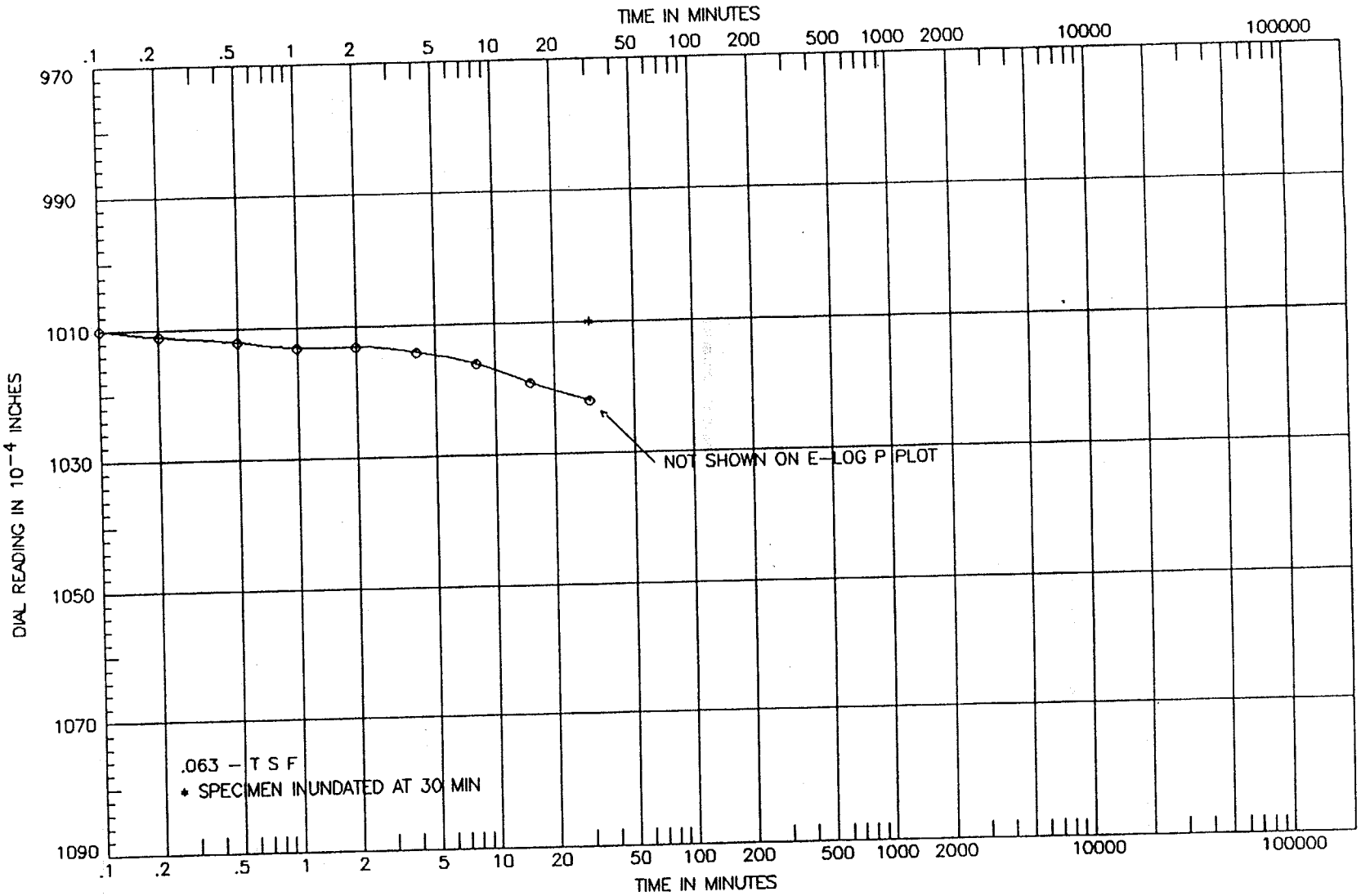
LABORATORY USAE WES - STF/GL

SHEET 11 OF 11



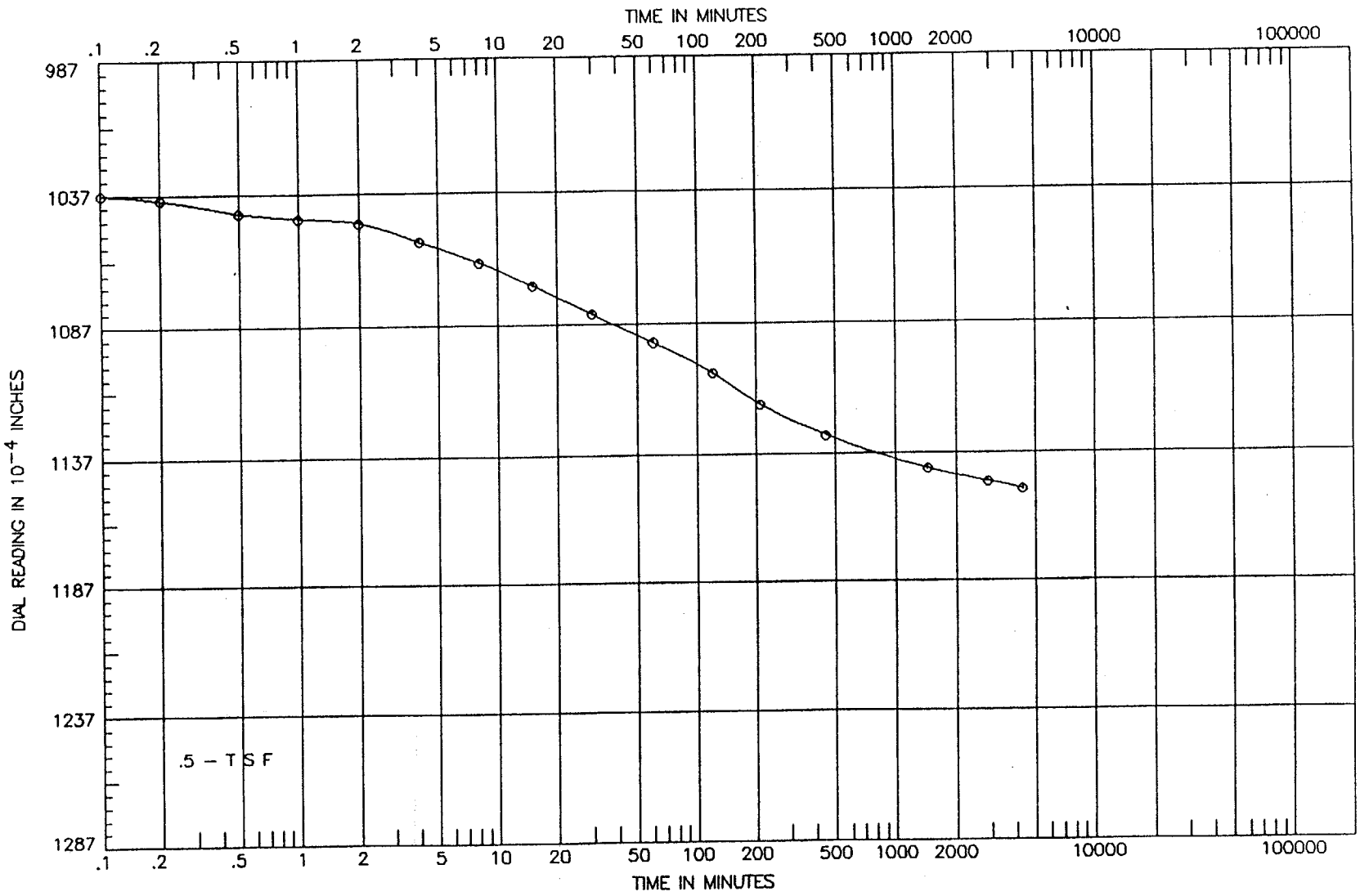
			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	54.2	43.3
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	67.7	77.4
COMPRESSION INDEX		SATURATION, %	98.4	99.4
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	1.488	1.177
DIA. IN 4.44	HT. IN 1.128	BACK PRESSURE, TSF		
CLASSIFICATION	CLAY (CH), GRAY			
LL 58	PL 21	PI 37	PROJECT REELFOOT LAKE FEASIBILITY STUDY	
GS 2.70 (EST)	D_{10}			
REMARKS:		BORING NO. 2-RLST-95	SAMPLE NO. 9	
		DEPTH/ELEV 23.0-24.5	TECH. JL	
		LABORATORY USAE WES - STF/GL	DATE 26 OCT 95	
		CONSOLIDATION TEST REPORT		

SHEET 1 OF 11



PROJECT	REELFOOT LAKE FEASIBILITY STUDY		CONSOLIDATION TEST TIME CURVES LABORATORY USAE WES – STF/GL
BORING	2-RLST-95	SAMPLE NO. 9	
DEPTH/ELEV	23.0-24.5	DATE 26 OCT 95	

SHEET 2 OF 11

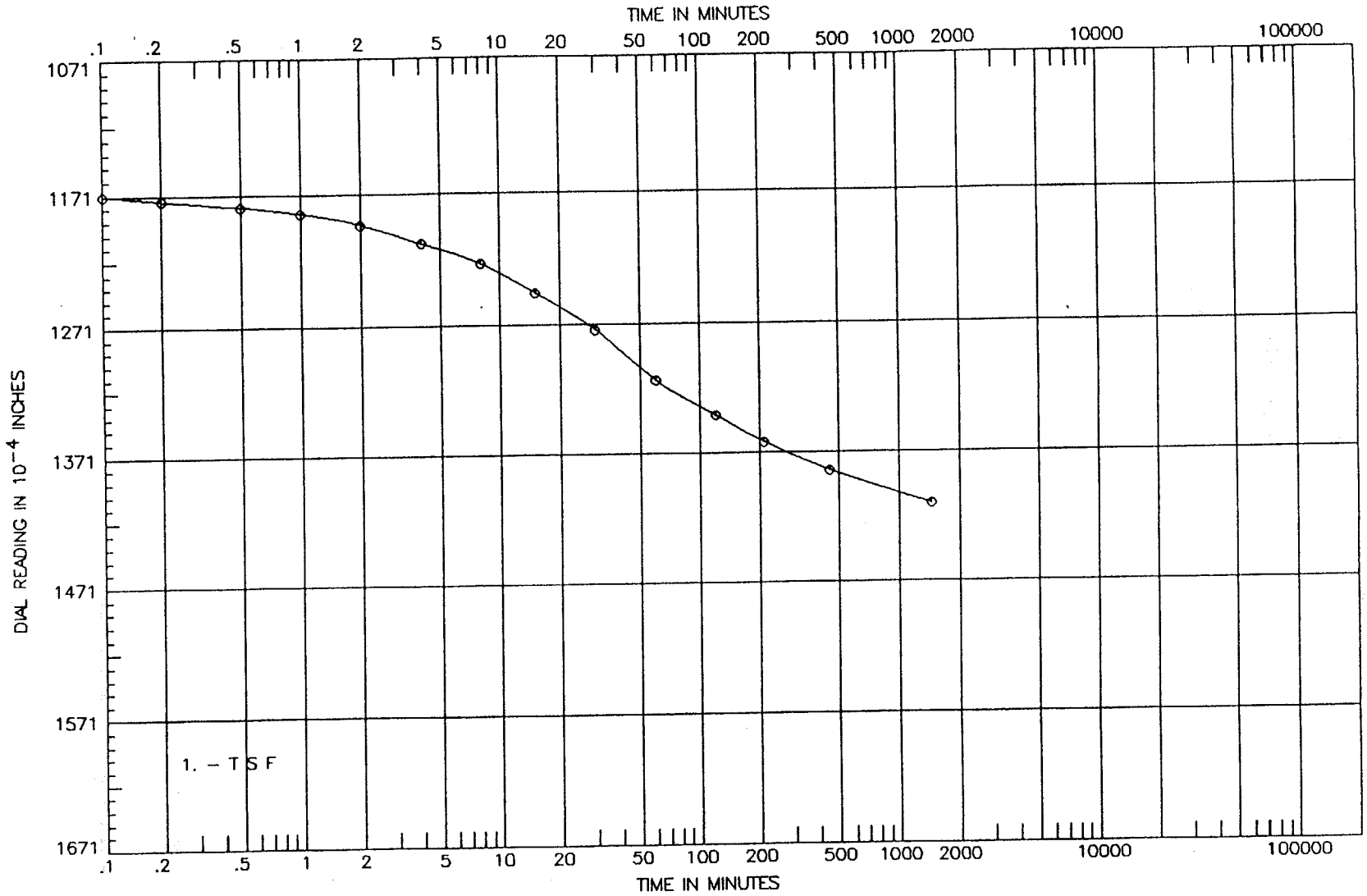


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 2-RLST-95	SAMPLE NO. 9
DEPTH/ELEV 23.0-24.5	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 3 OF 11

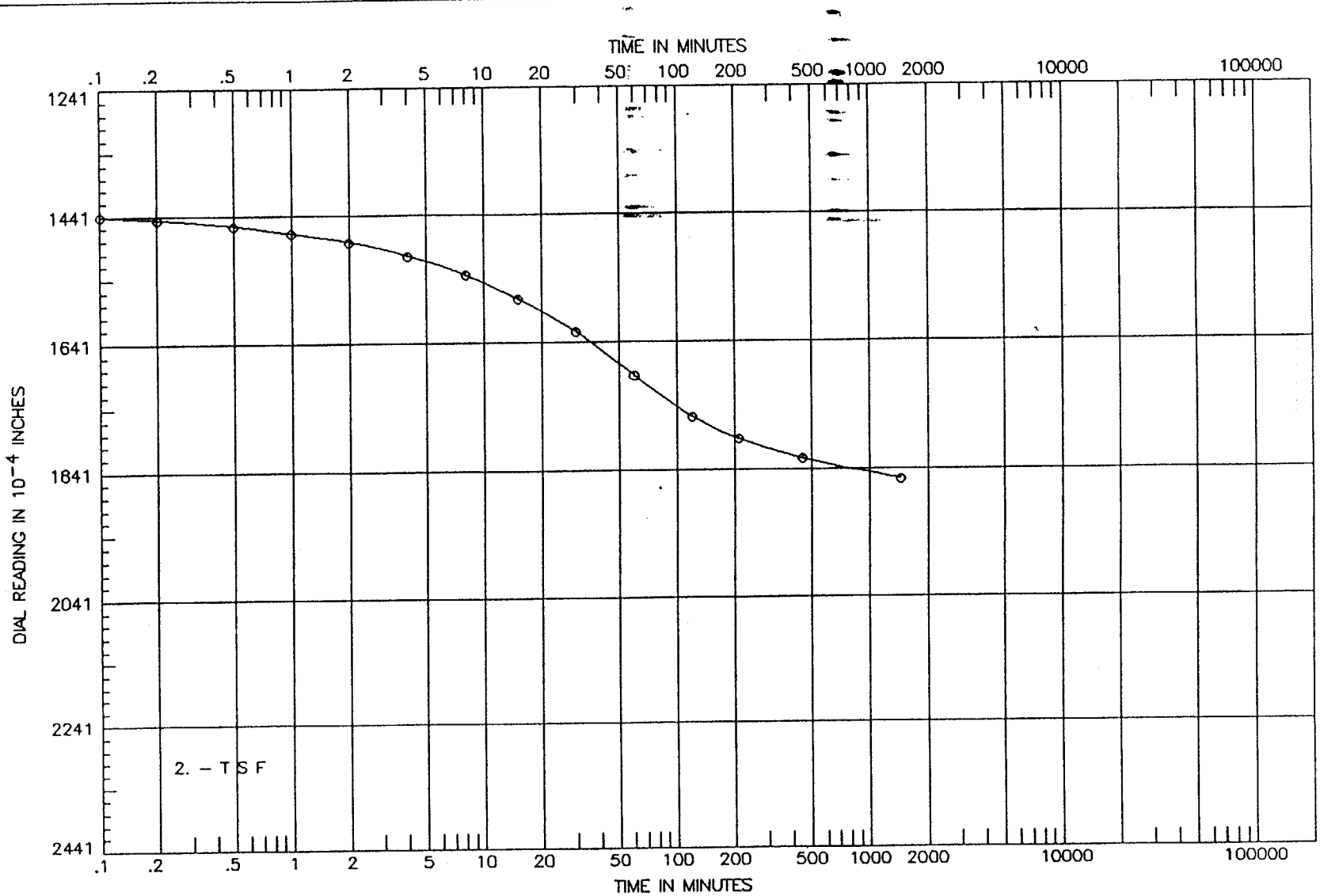


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 2-RLST-95	SAMPLE NO. 9
DEPTH/ELEV 23.0-24.5	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 4 OF 11

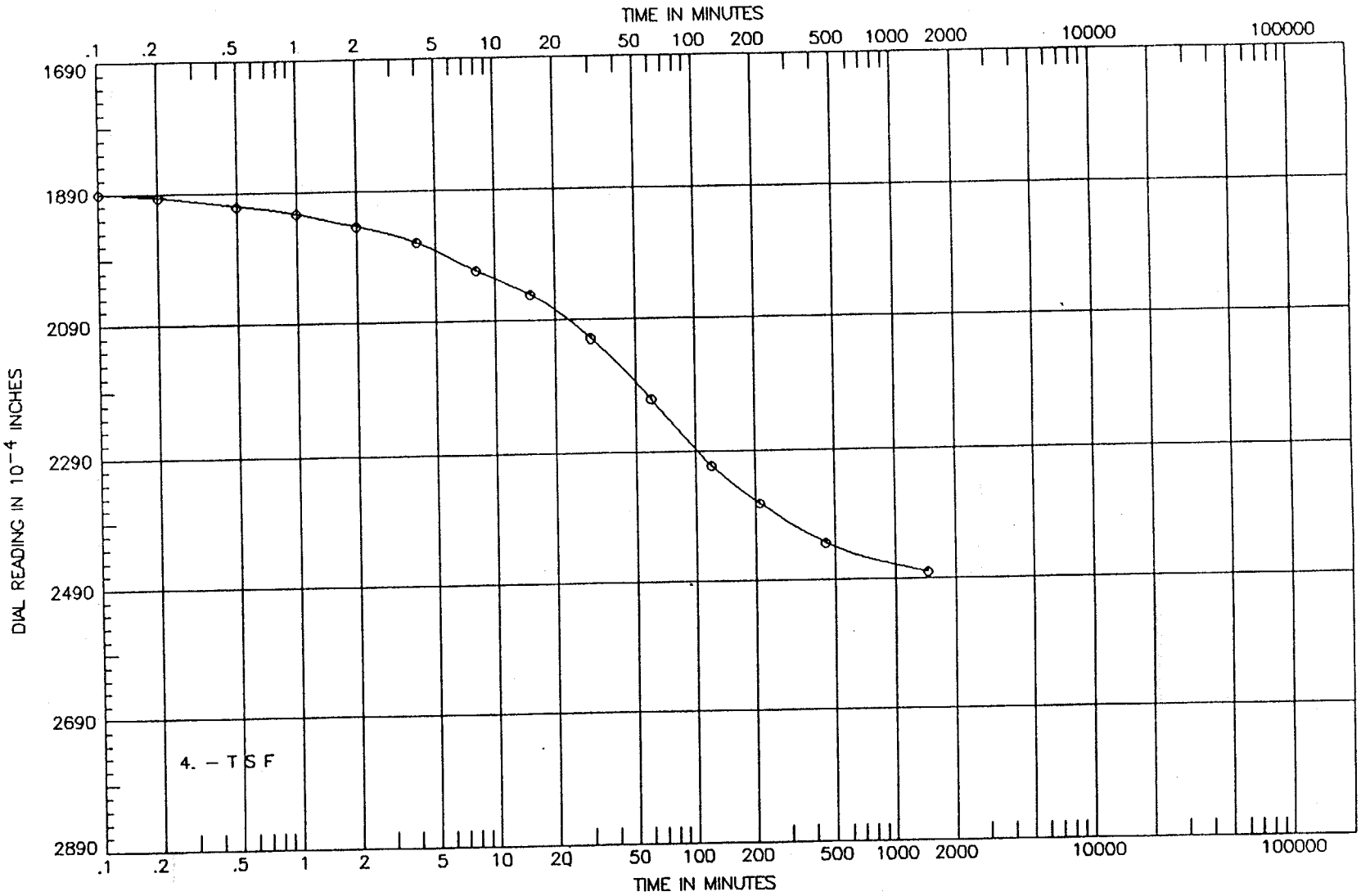


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	2-RLST-95	SAMPLE NO.	9
DEPTH/ELEV	23.0-24.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

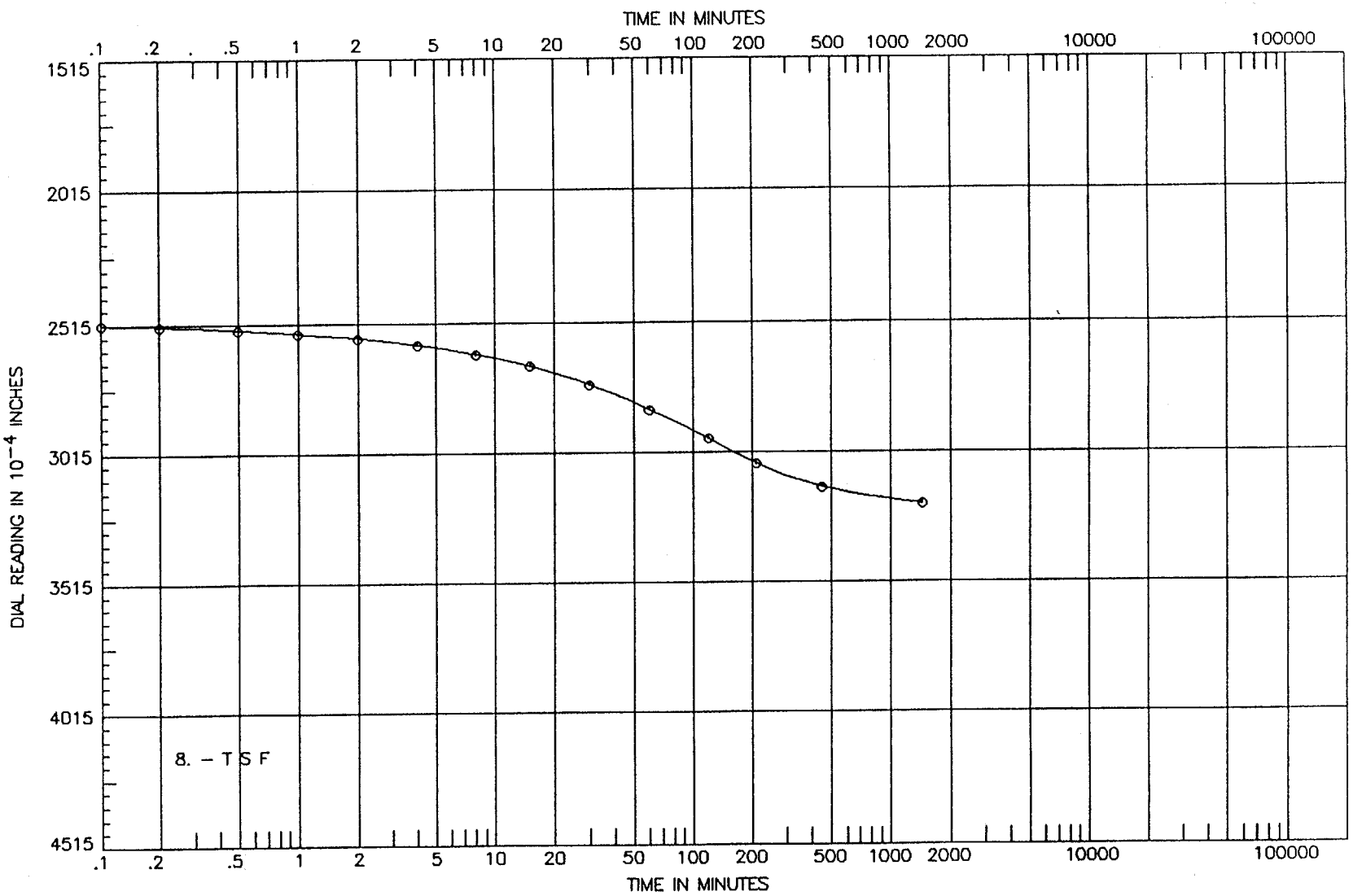
LABORATORY USAE WES – STF/GL

SHEET 5 OF 11



PROJECT	REELFOOT LAKE FEASIBILITY STUDY		CONSOLIDATION TEST TIME CURVES
BORING	2-RLST-95	SAMPLE NO. 9	LABORATORY USAE WES – STF/GL
DEPTH/ELEV	23.0–24.5	DATE 26 OCT 95	

SHEET 6 OF 11

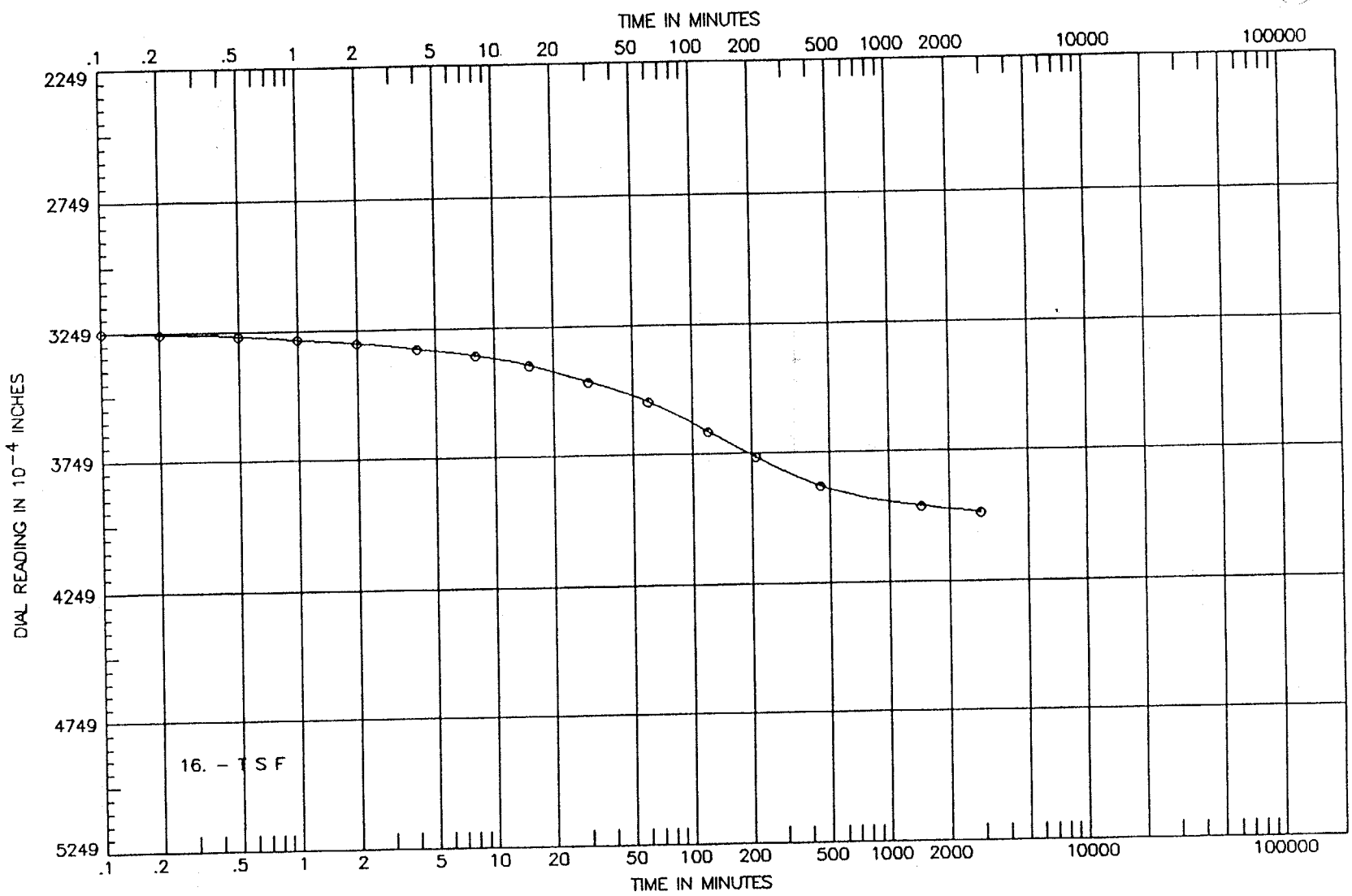


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	2-RLST-95	SAMPLE NO.	9
DEPTH/ELEV	23.0-24.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 7 OF 11

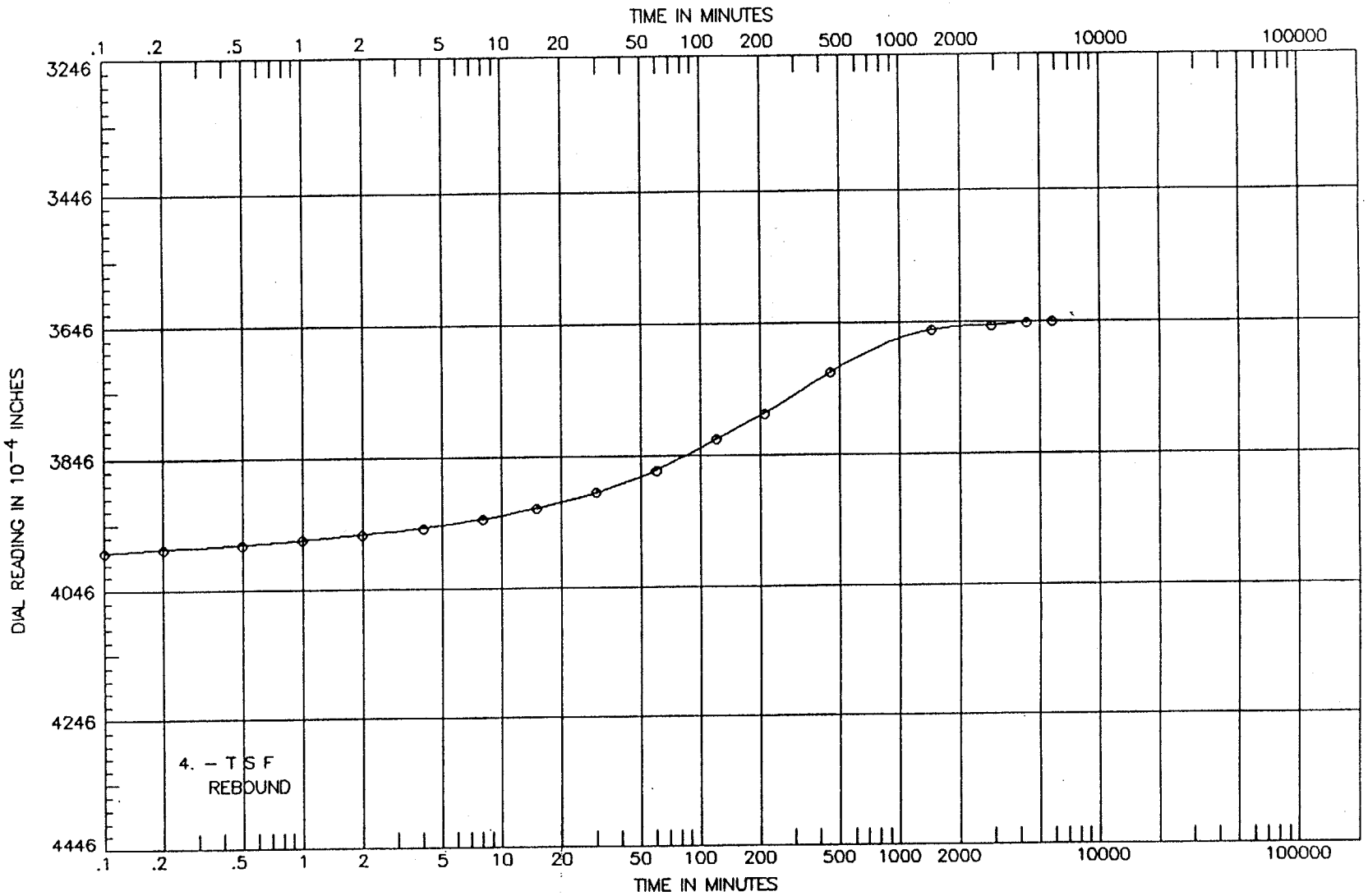


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 2-RLST-95	SAMPLE NO. 9
DEPTH/ELEV 23.0-24.5	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES - STF/GL

SHEET 8 OF 11

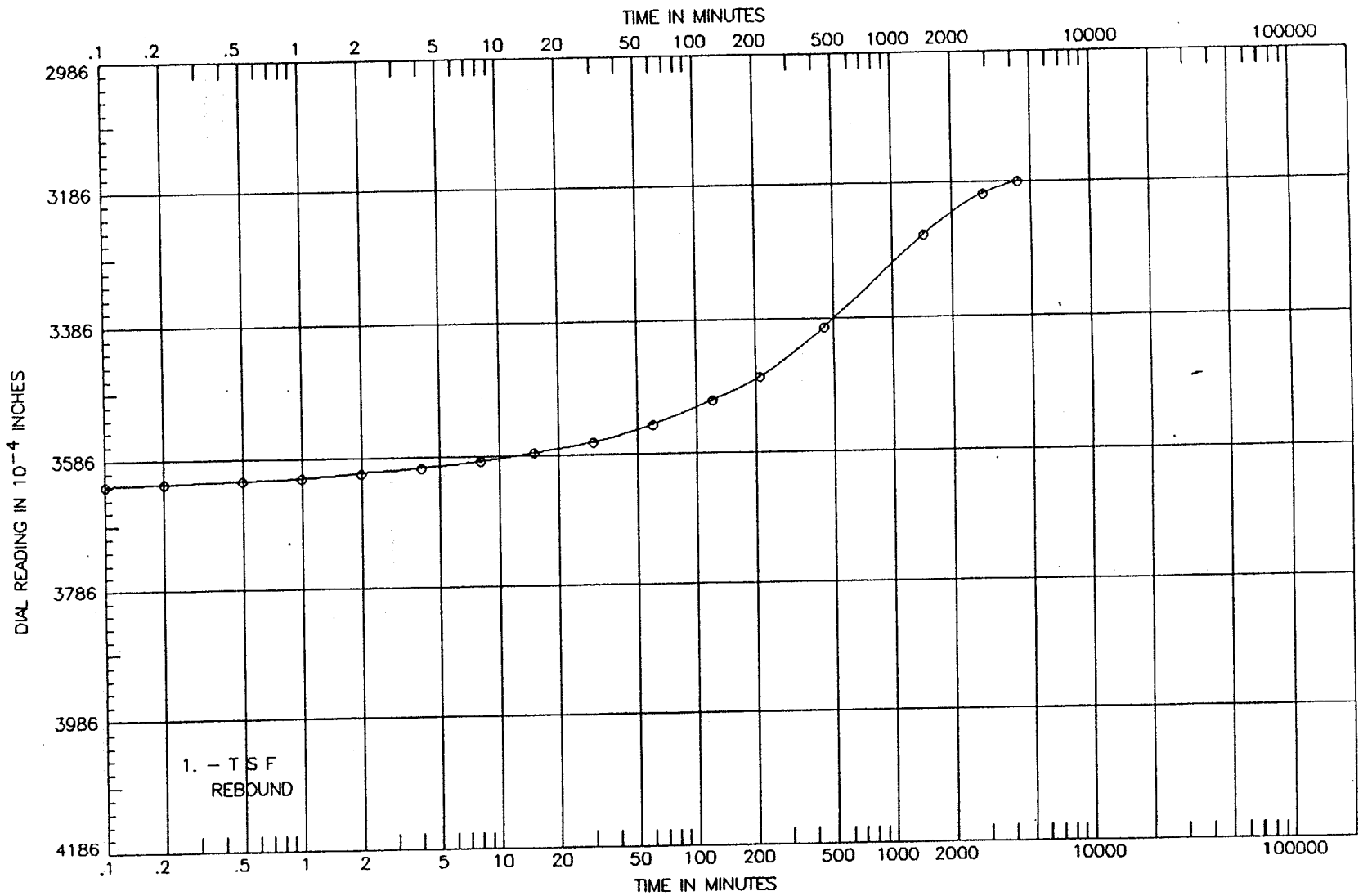


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 2-RLST-95	SAMPLE NO. 9
DEPTH/ELEV 23.0-24.5	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 9 OF 11

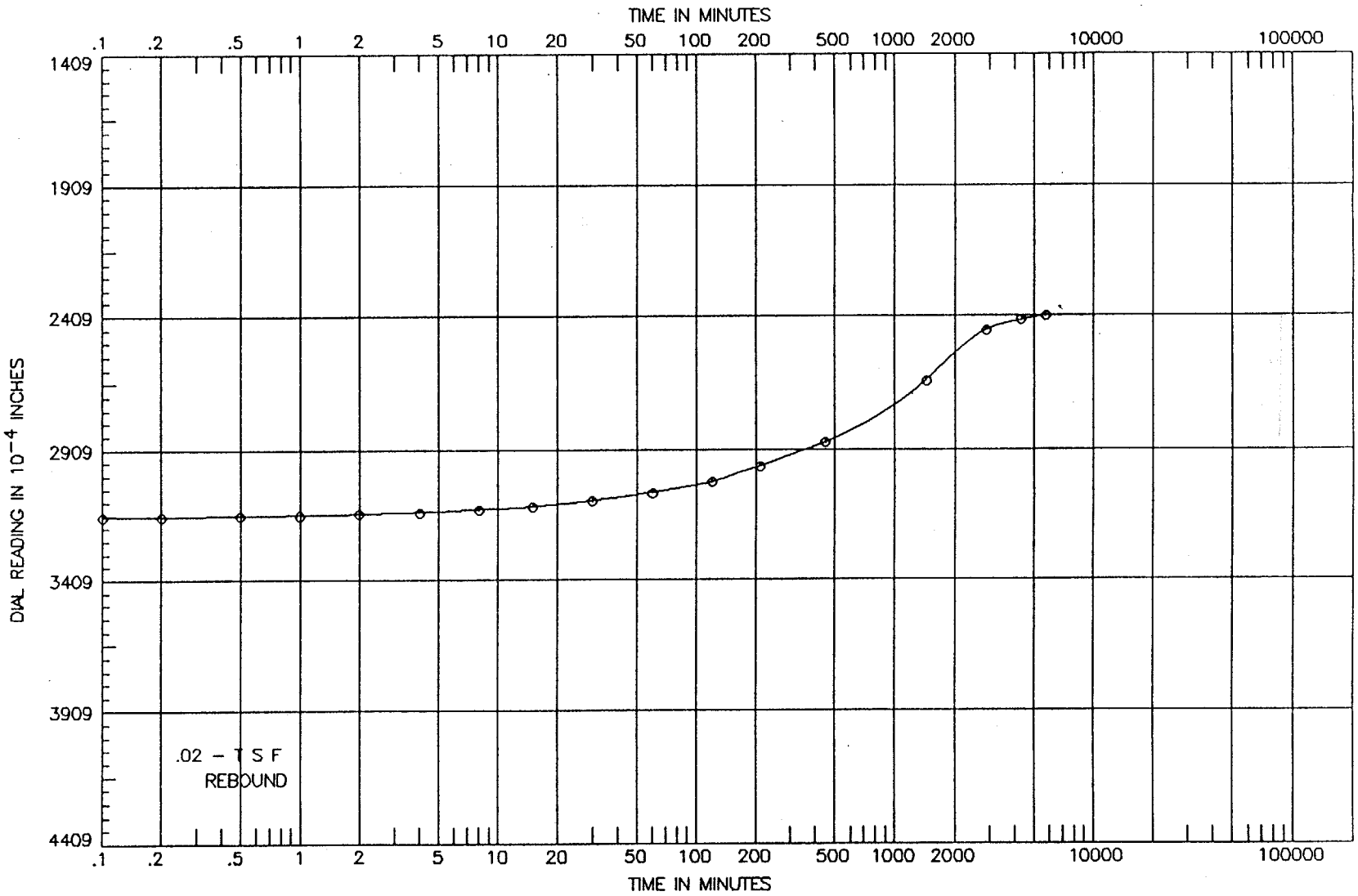


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	2-RLST-95	SAMPLE NO.	9
DEPTH/ELEV	23.0-24.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 10 OF 11

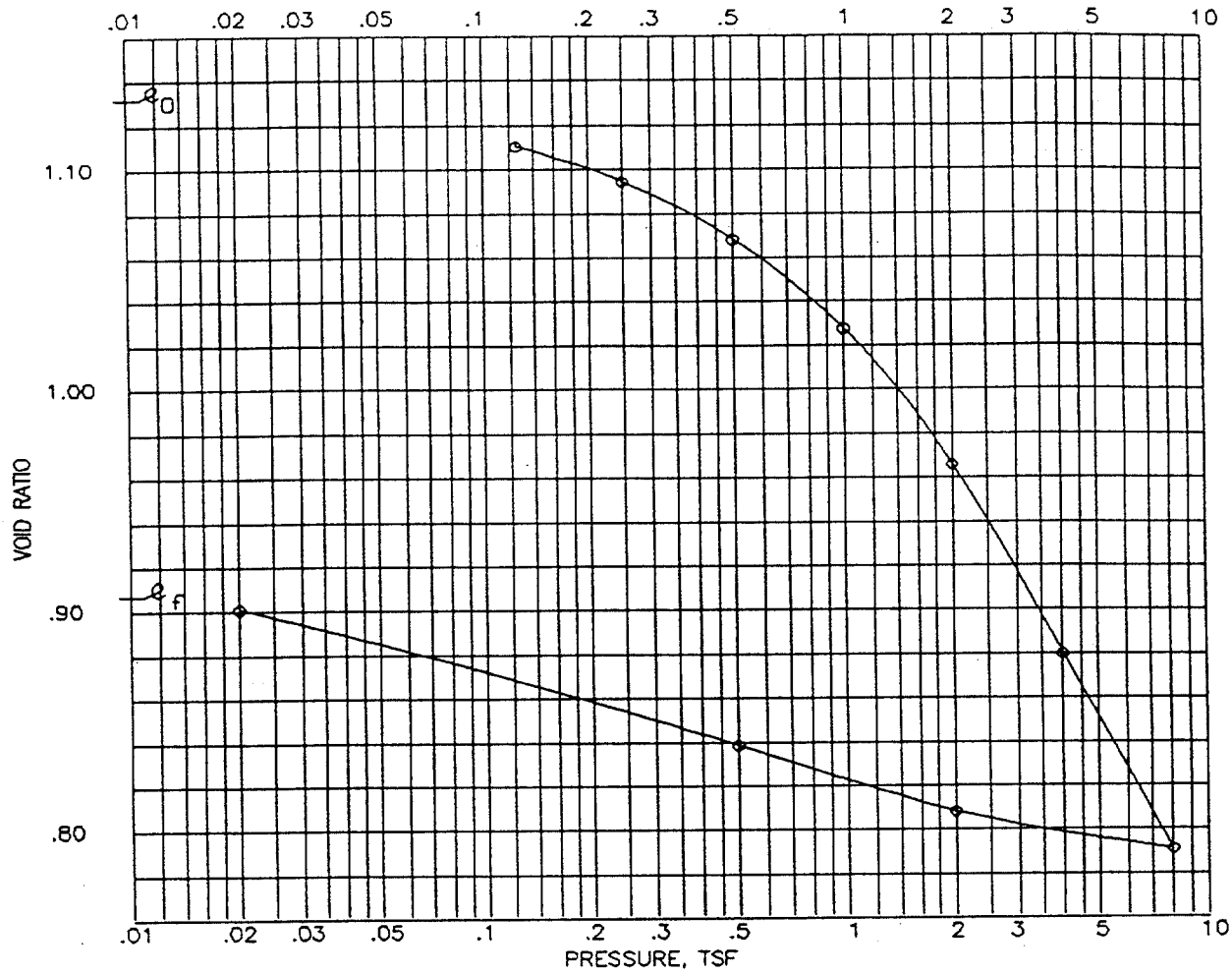


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 2-RLST-95	SAMPLE NO. 9
DEPTH/ELEV 23.0-24.5	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

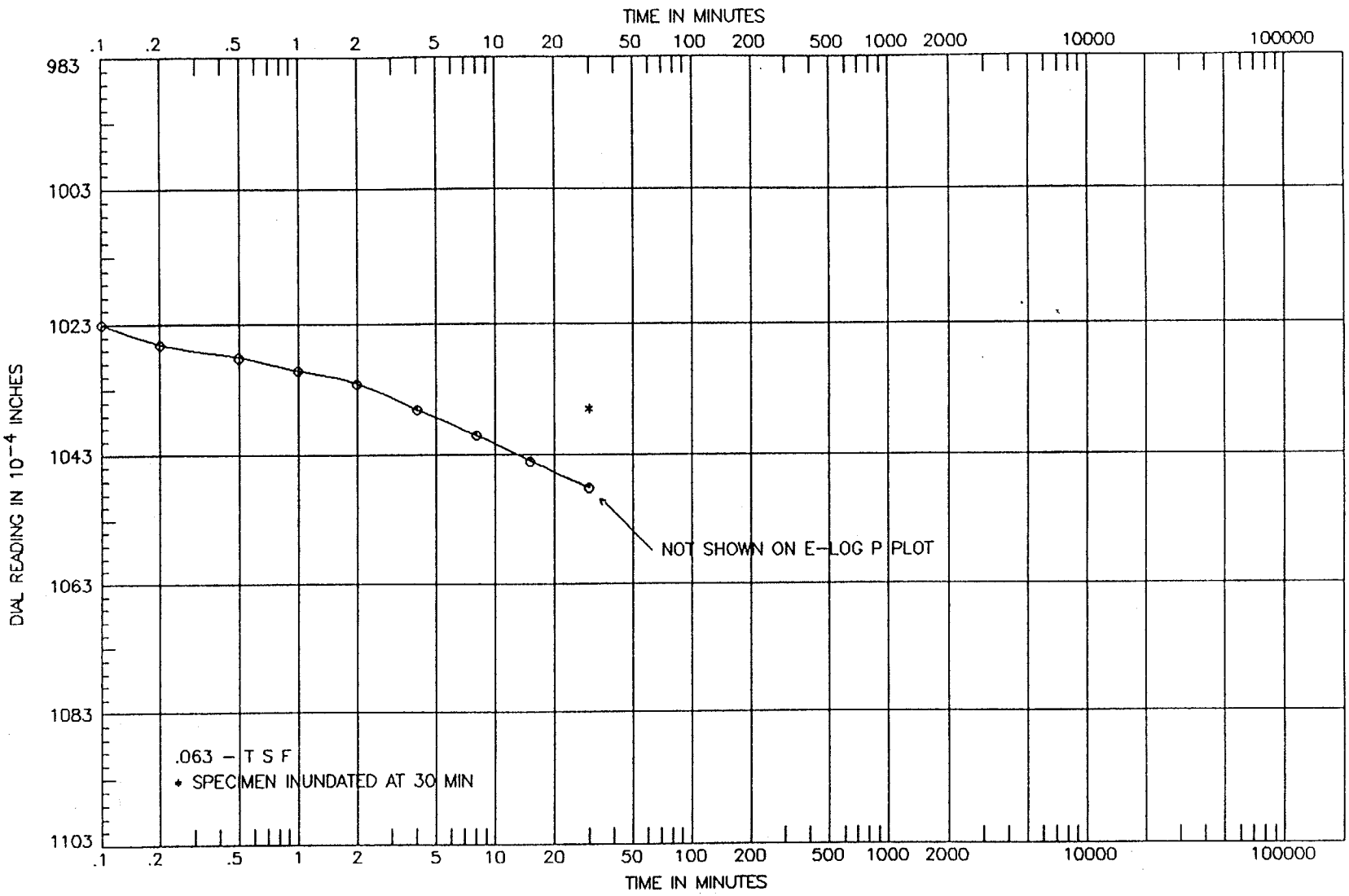
LABORATORY USAE WES - STF/GL

SHEET 11 OF 11



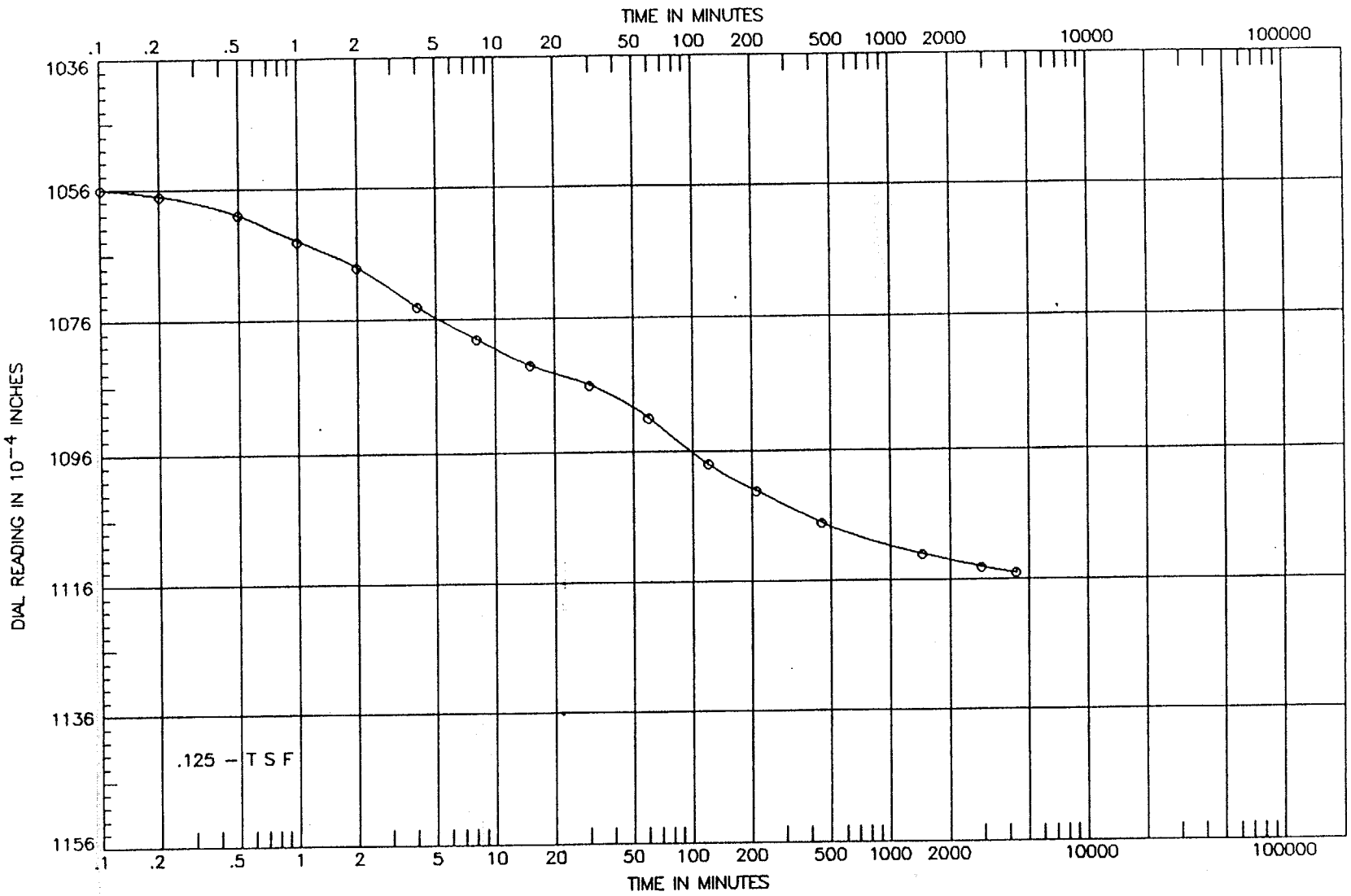
			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	41.2	32.8
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	79.1	88.4
COMPRESSION INDEX		SATURATION, %	98.4	97.6
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	1.131	.906
DIA. IN 4.44	HT. IN 1.130	BACK PRESSURE, TSF		
CLASSIFICATION	CLAY (CL), GRAY			
LL 45	PL 22	PI 23	PROJECT REELFOOT LAKE FEASIBILITY STUDY	
GS 2.70 (EST)	D_{10}			
REMARKS:		BORING NO. 2-RLST-95	SAMPLE NO. 11	
		DEPTH/ELEV 29.0-30.5	TECH. JL	
		LABORATORY USAE WES - STF/GL	DATE 26 OCT 95	
		CONSOLIDATION TEST REPORT		

SHEET 1 OF 12



PROJECT	REELFOOT LAKE FEASIBILITY STUDY		CONSOLIDATION TEST TIME CURVES LABORATORY USAE WES - STF/GL
BORING	2-RLST-95	SAMPLE NO. 11	
DEPTH/ELEV	29.0-30.5	DATE 26 OCT 95	

SHEET 2 OF 12

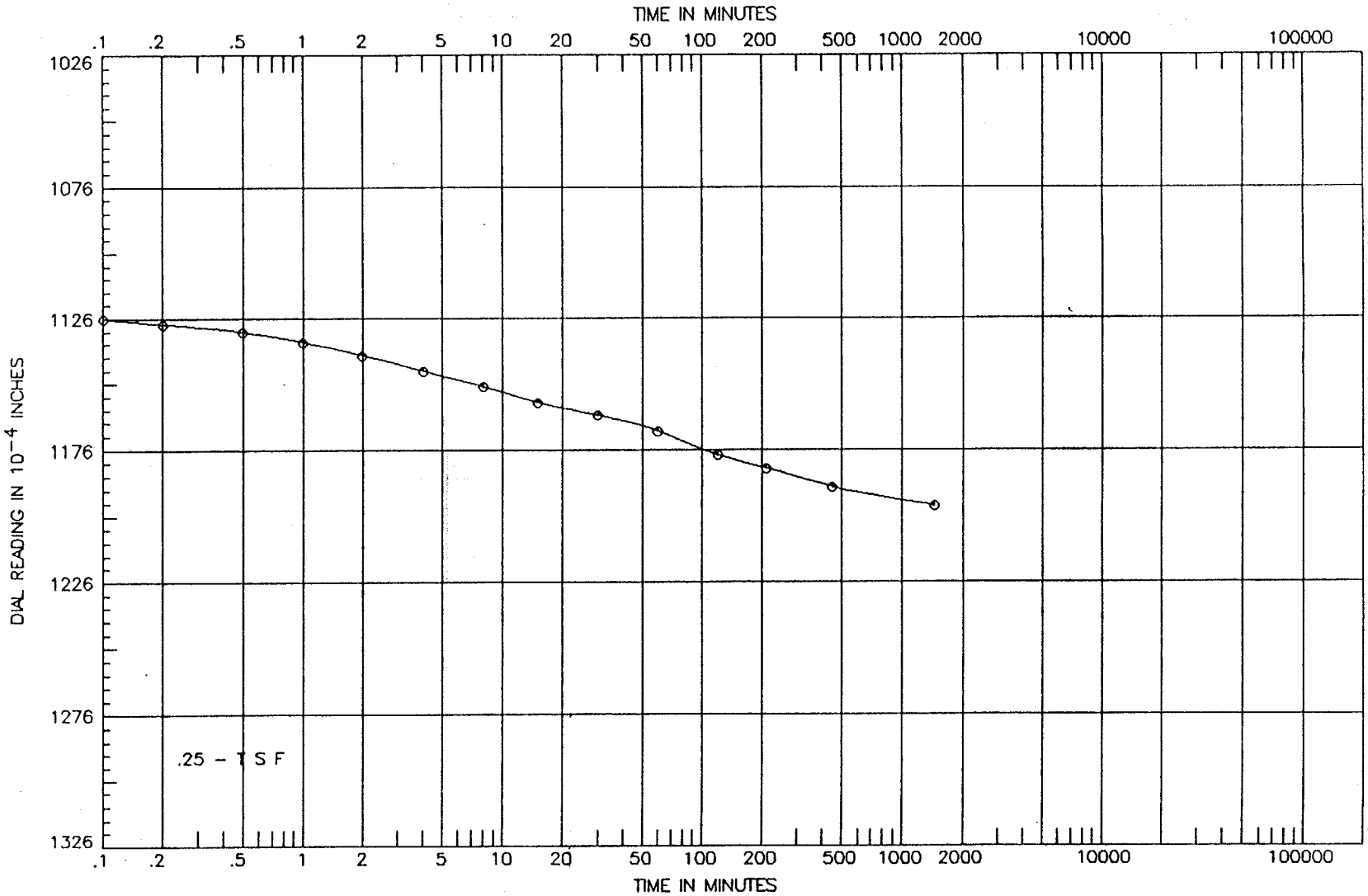


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	2-RLST-95	SAMPLE NO.	11
DEPTH/ELEV	29.0-30.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 3 OF 12

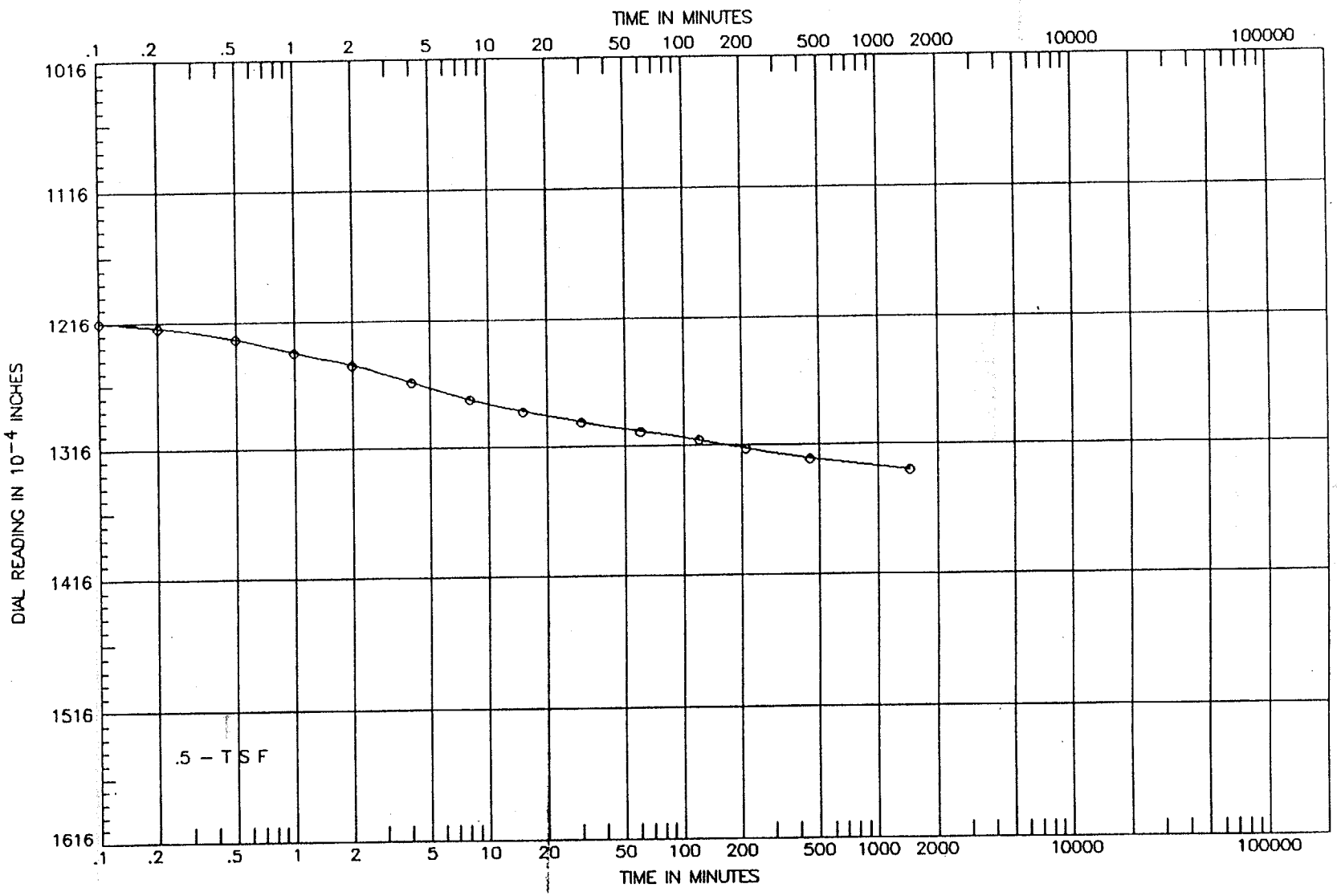


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	2-RLST-95	SAMPLE NO.	11
DEPTH/ELEV	29.0-30.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 4 OF 12

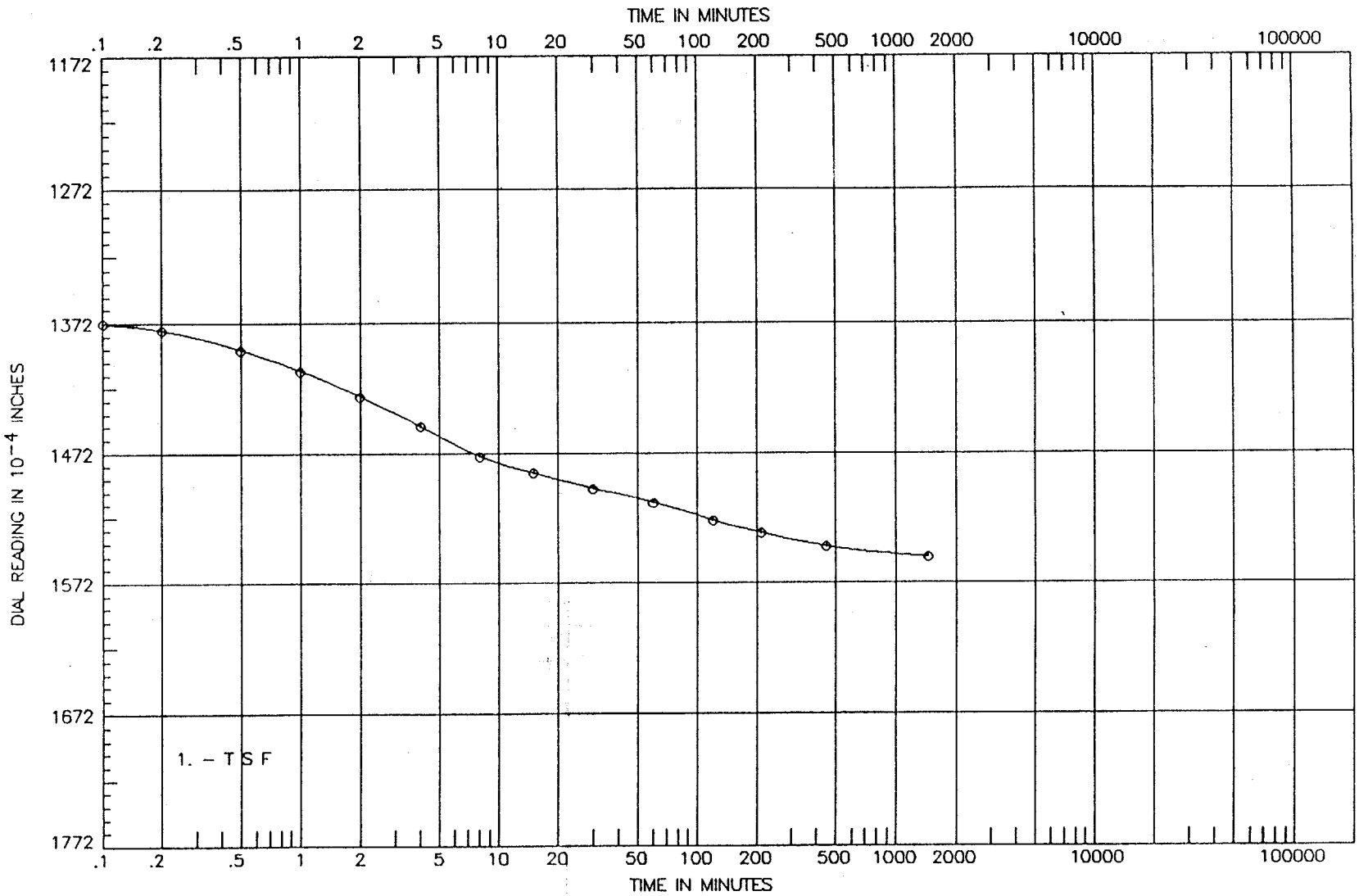


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 2-RLST-95	SAMPLE NO. 11
DEPTH/ELEV 29.0-30.5	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 5 OF 12

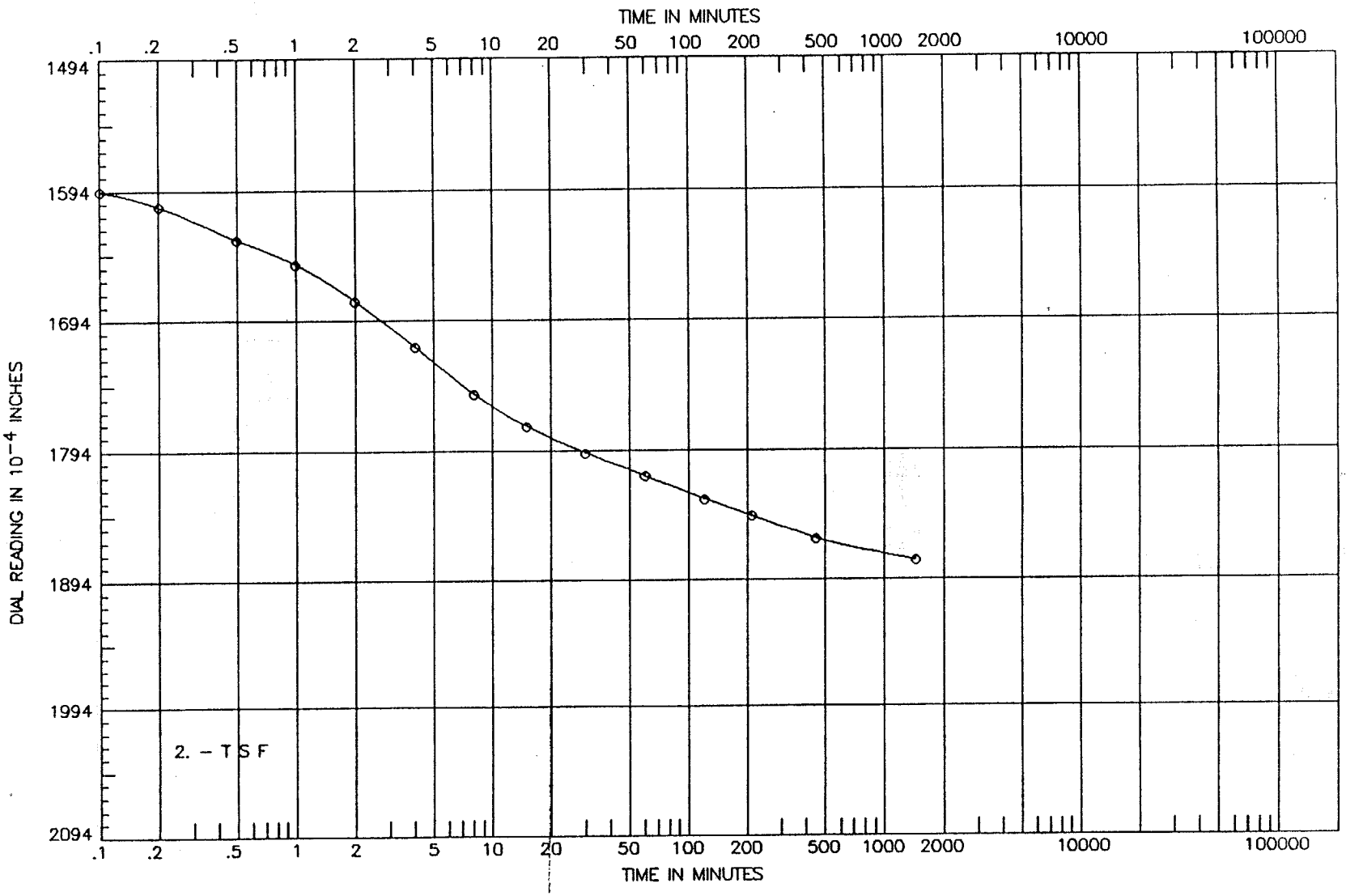


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	2-RLST-95	SAMPLE NO.	11
DEPTH/ELEV	29.0-30.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

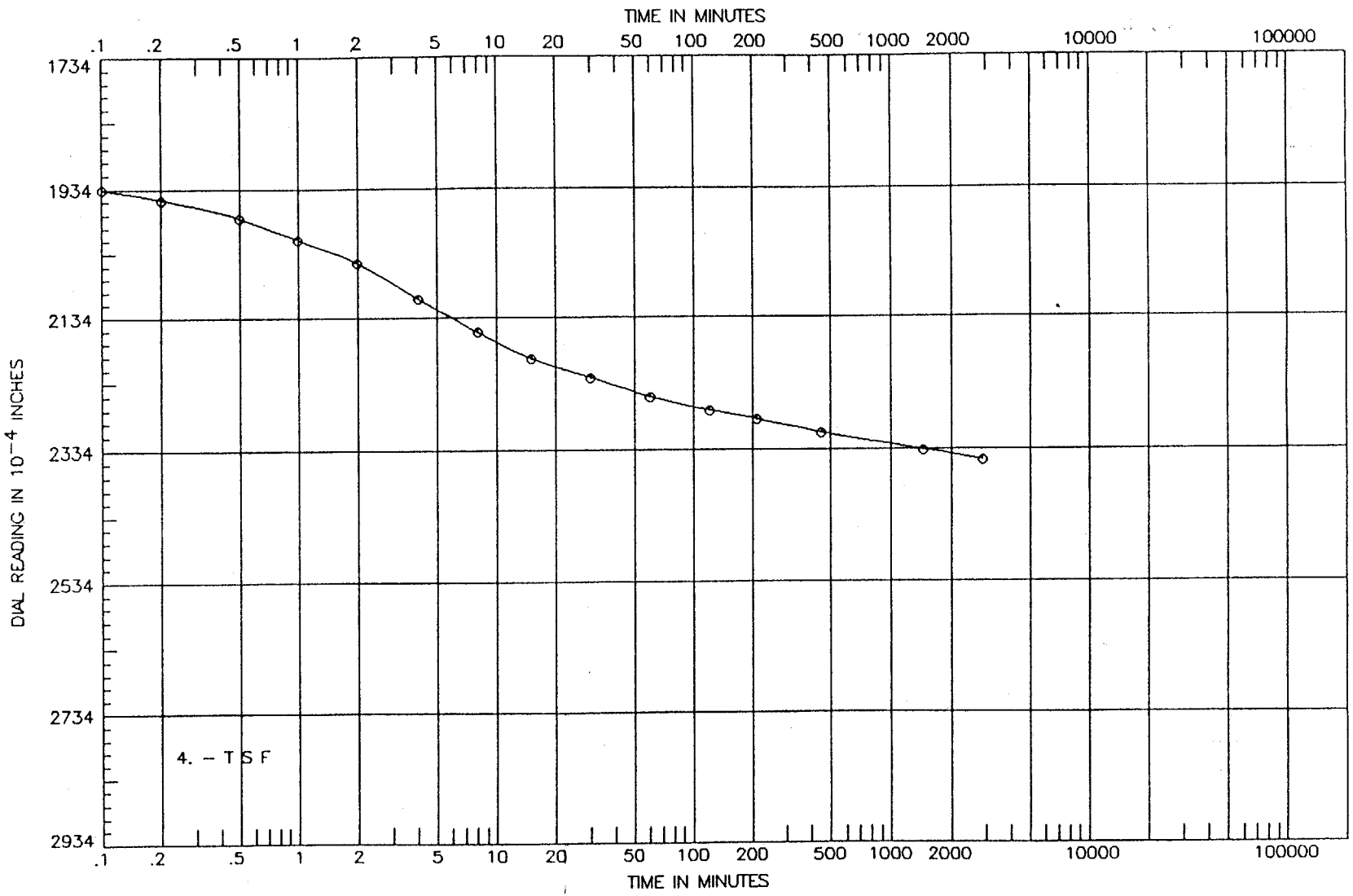
LABORATORY USAE WES - STF/GL

SHEET 6 OF 12



PROJECT	REELFOOT LAKE FEASIBILITY STUDY		CONSOLIDATION TEST TIME CURVES
			LABORATORY USAE WES – STF/GL
BORING	2-RLST-95	SAMPLE NO. 11	
DEPTH/ELEV	29.0-30.5	DATE 26 OCT 95	

SHEET 7 OF 12

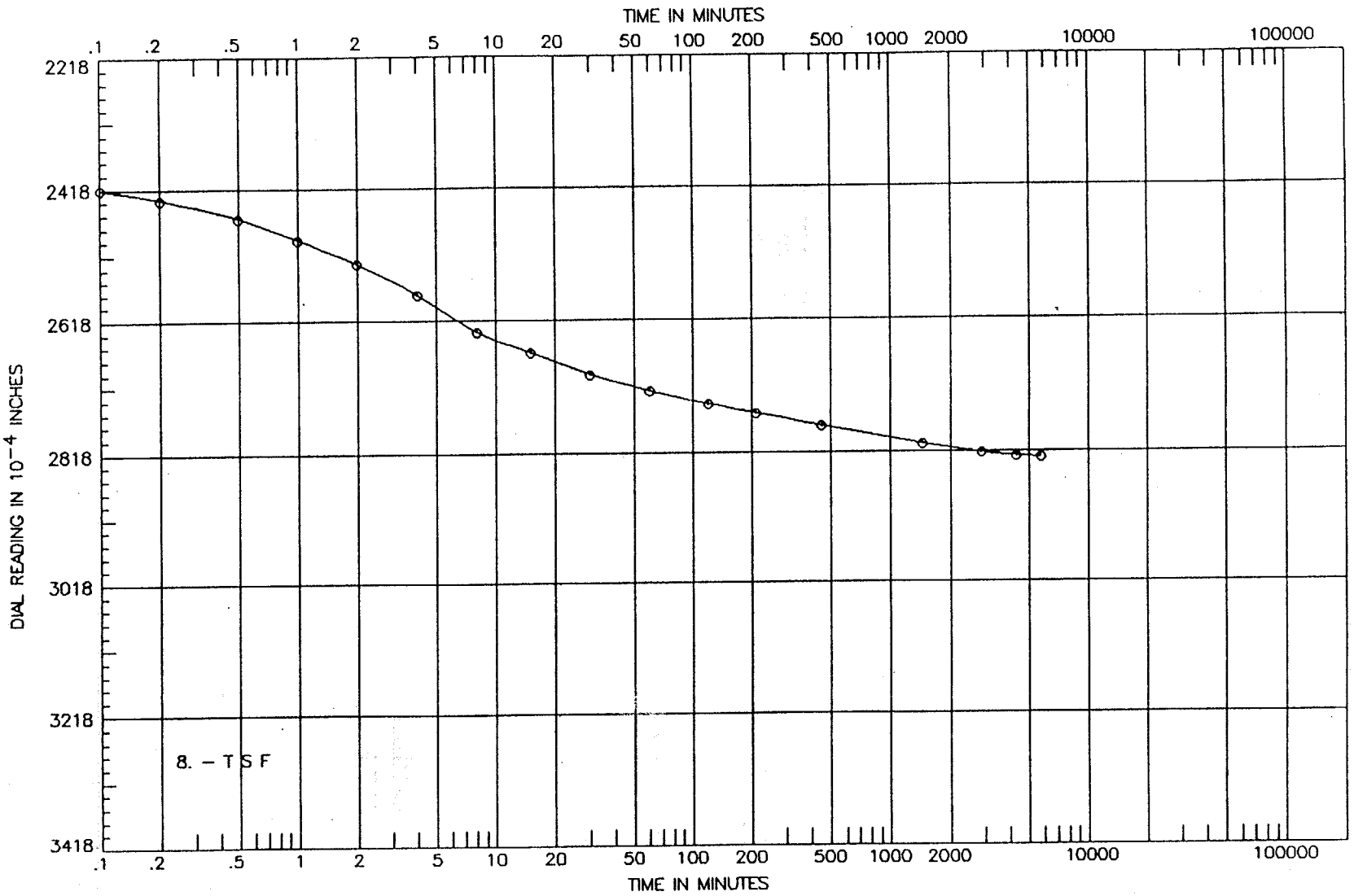


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	2-RLST-95	SAMPLE NO.	11
DEPTH/ELEV	29.0-30.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES - STF/GL

SHEET 8 OF 12

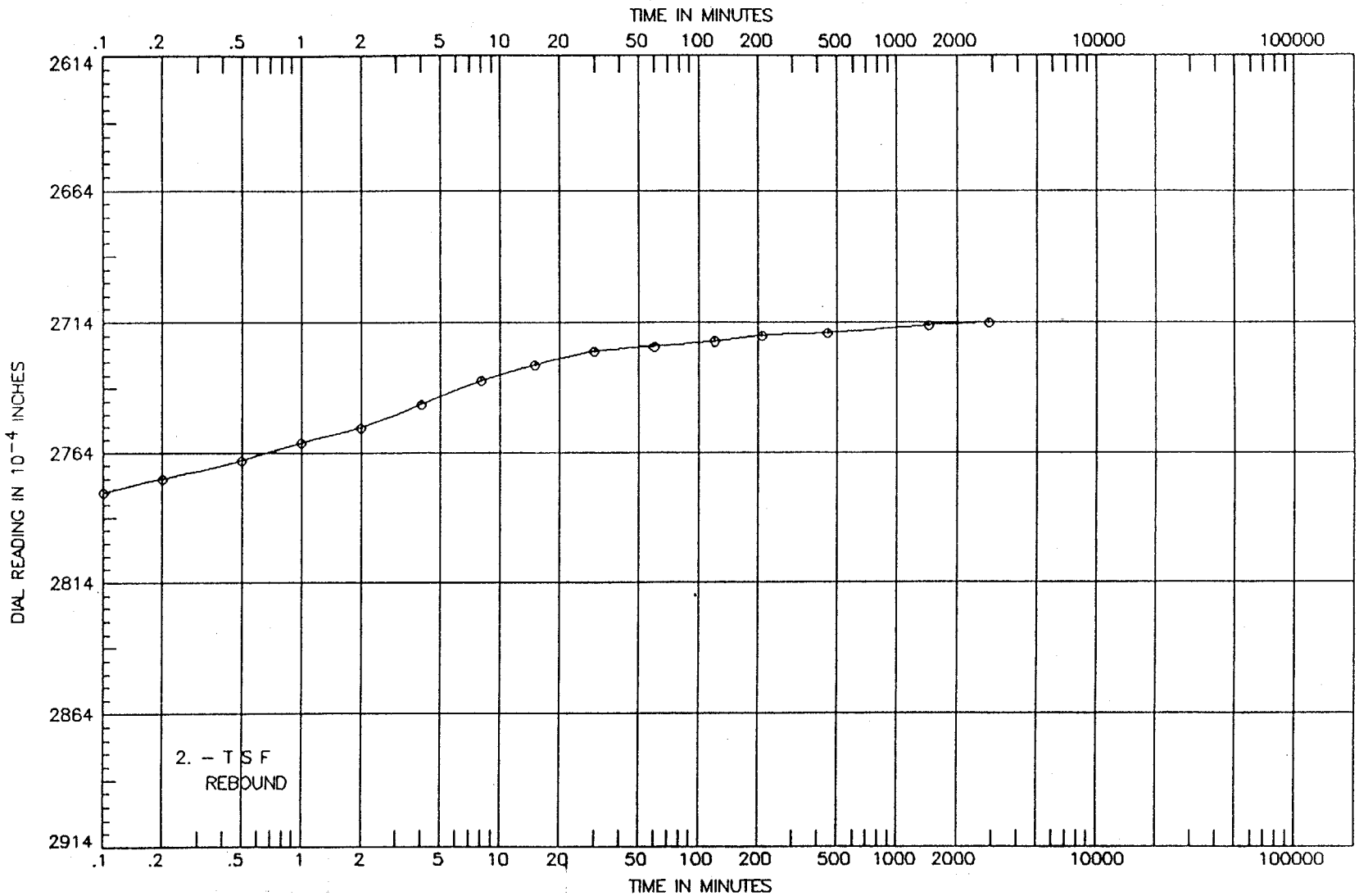


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	2-RLST-95	SAMPLE NO.	11
DEPTH/ELEV	29.0-30.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 9 OF 12

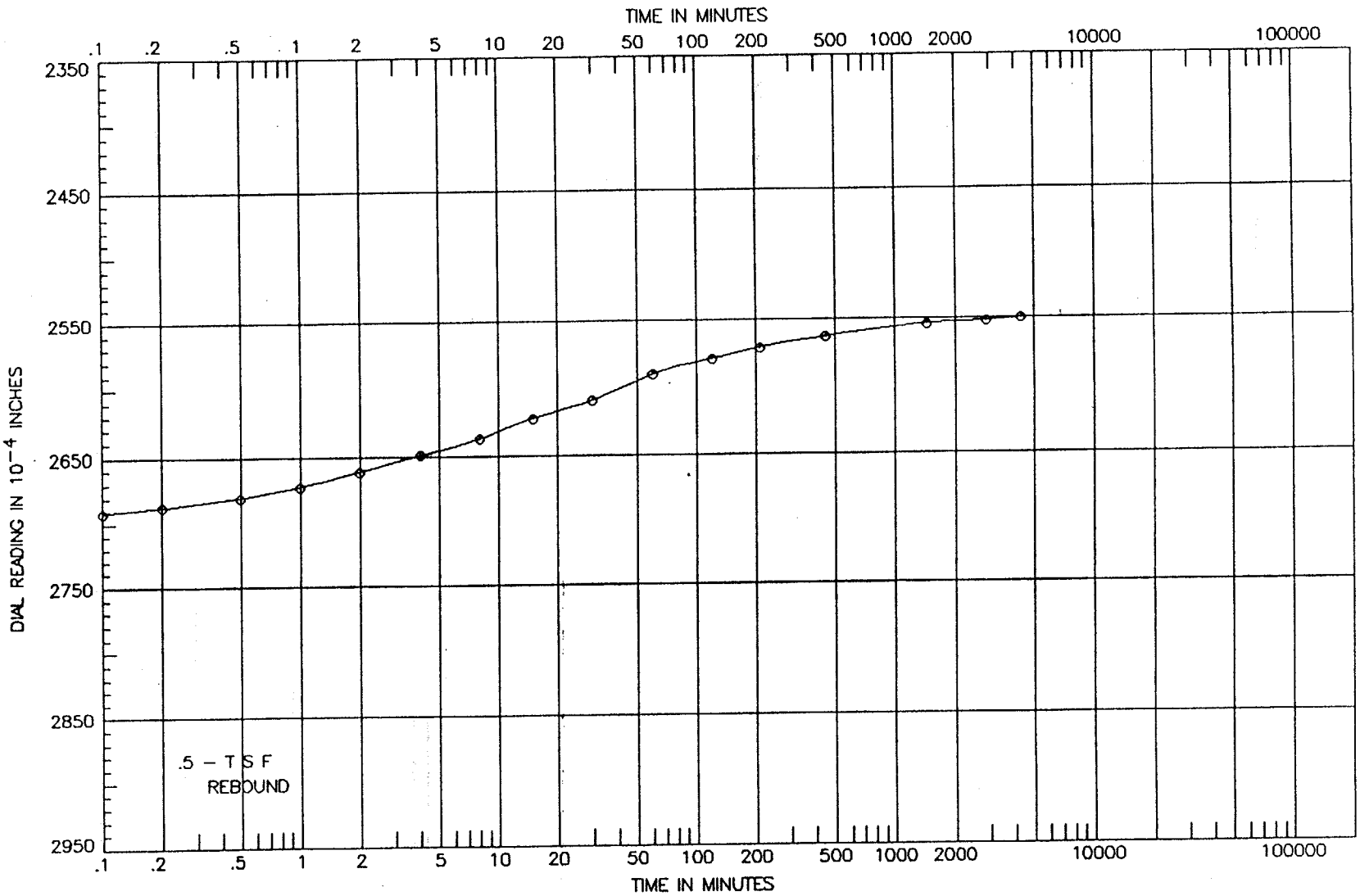


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	2–RLST–95	SAMPLE NO.	11
DEPTH/ELEV	29.0–30.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 10 OF 12

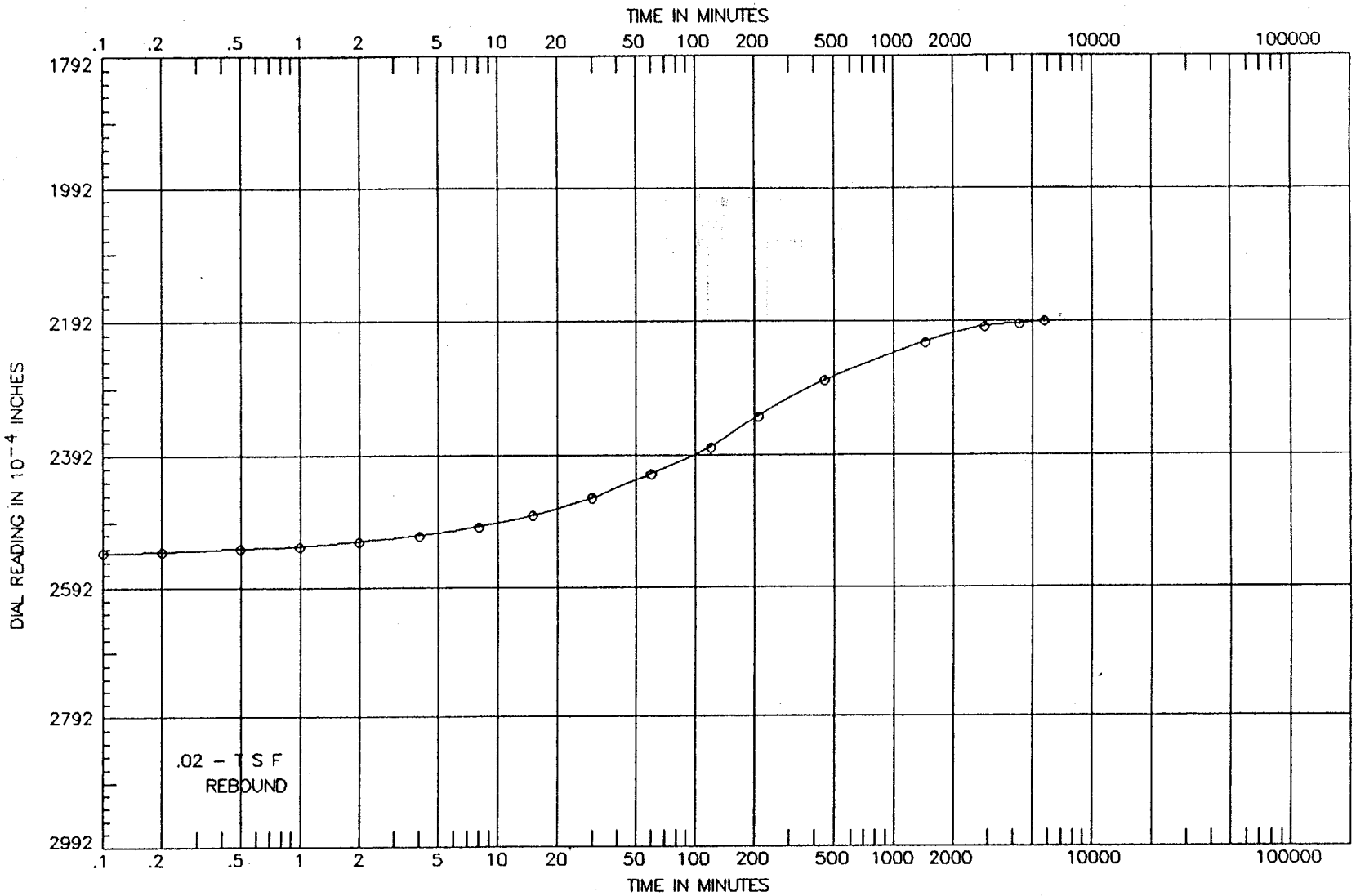


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	2-RLST-95	SAMPLE NO.	11
DEPTH/ELEV	29.0-30.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 11 OF 12

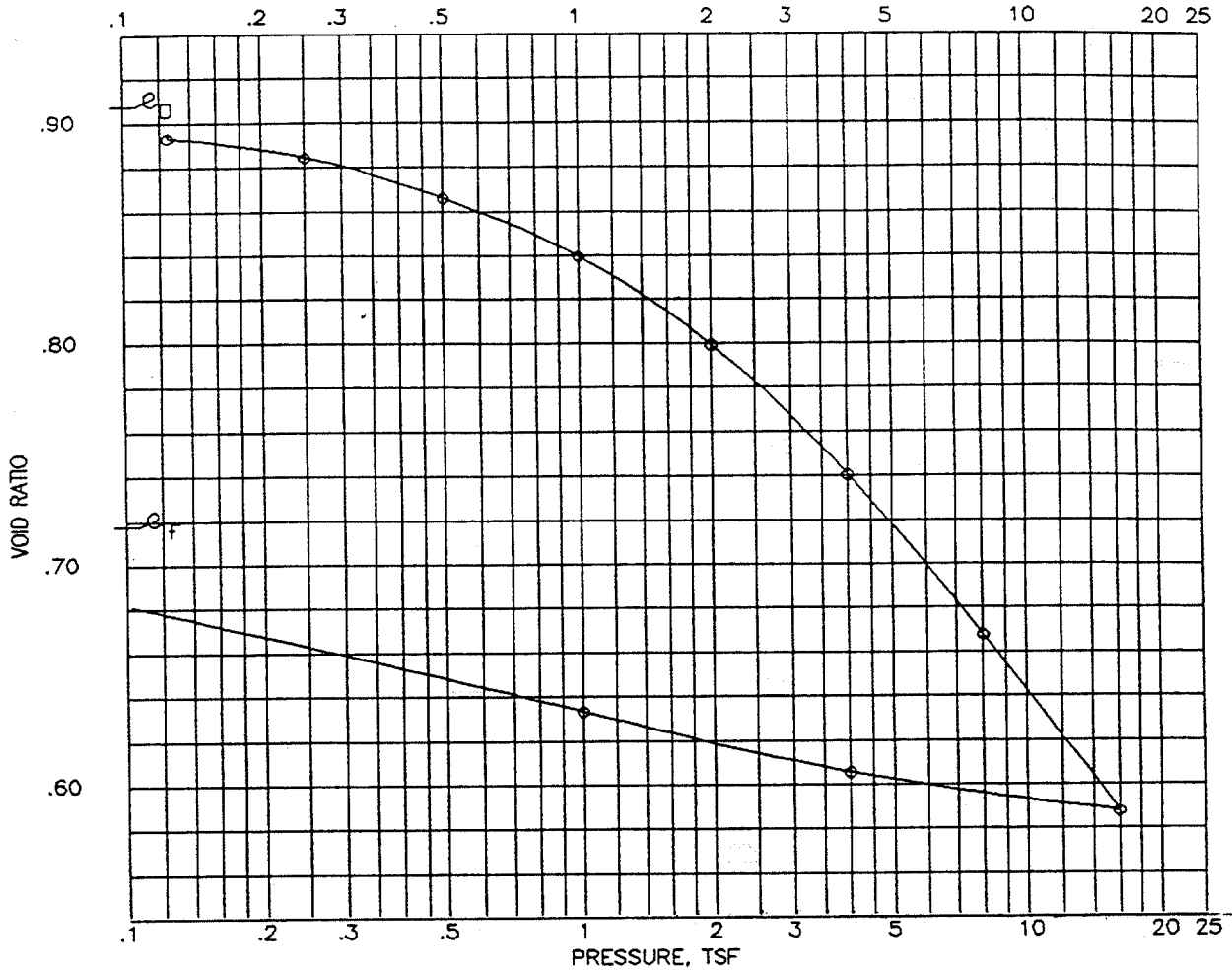


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	2-RLST-95	SAMPLE NO.	11
DEPTH/ELEV	29.0-30.5	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

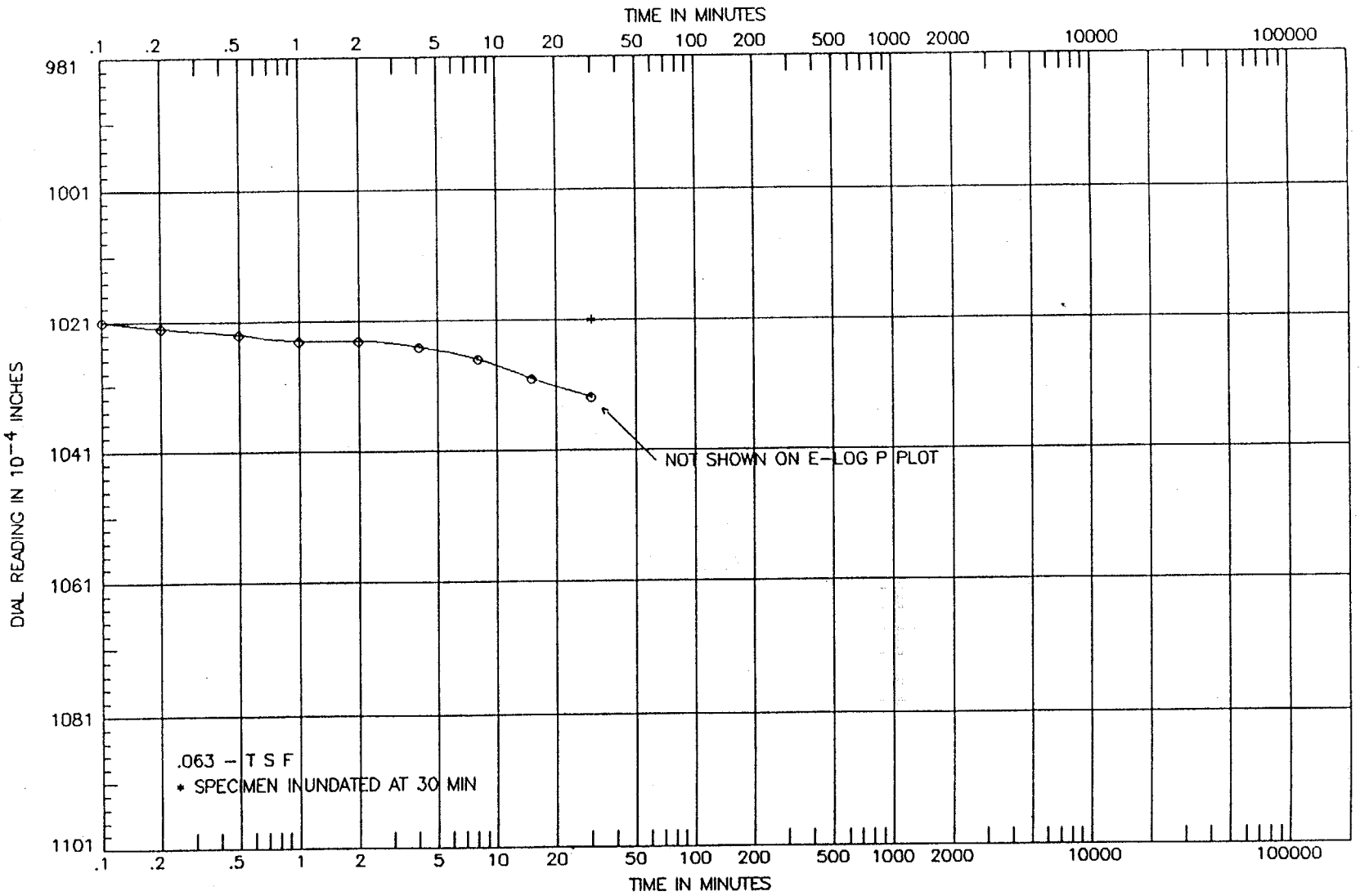
LABORATORY USAE WES – STF/GL

SHEET 12 OF 12



			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	32.9	26.4
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	88.4	98.2
COMPRESSION INDEX		SATURATION, %	98.0	99.3
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	.907	.717
DIA. IN 4.44	HT. IN 1.125	BACK PRESSURE, TSF		
CLASSIFICATION	CLAY (CL), GRAY; IRON OXIDE PARTICLES			
LL 37	PL 19	PI 18	PROJECT REELFOOT LAKE FEASIBILITY STUDY	
GS 2.70 (EST)	D_{10}			
REMARKS:		BORING NO. 1-LIT-95	SAMPLE NO. 7	
		DEPTH/ELEV 17.0-18.3	TECH. JL	
		LABORATORY USAE WES - STF/GL	DATE 26 OCT 95	
		CONSOLIDATION TEST REPORT		

SHEET 1 OF 13

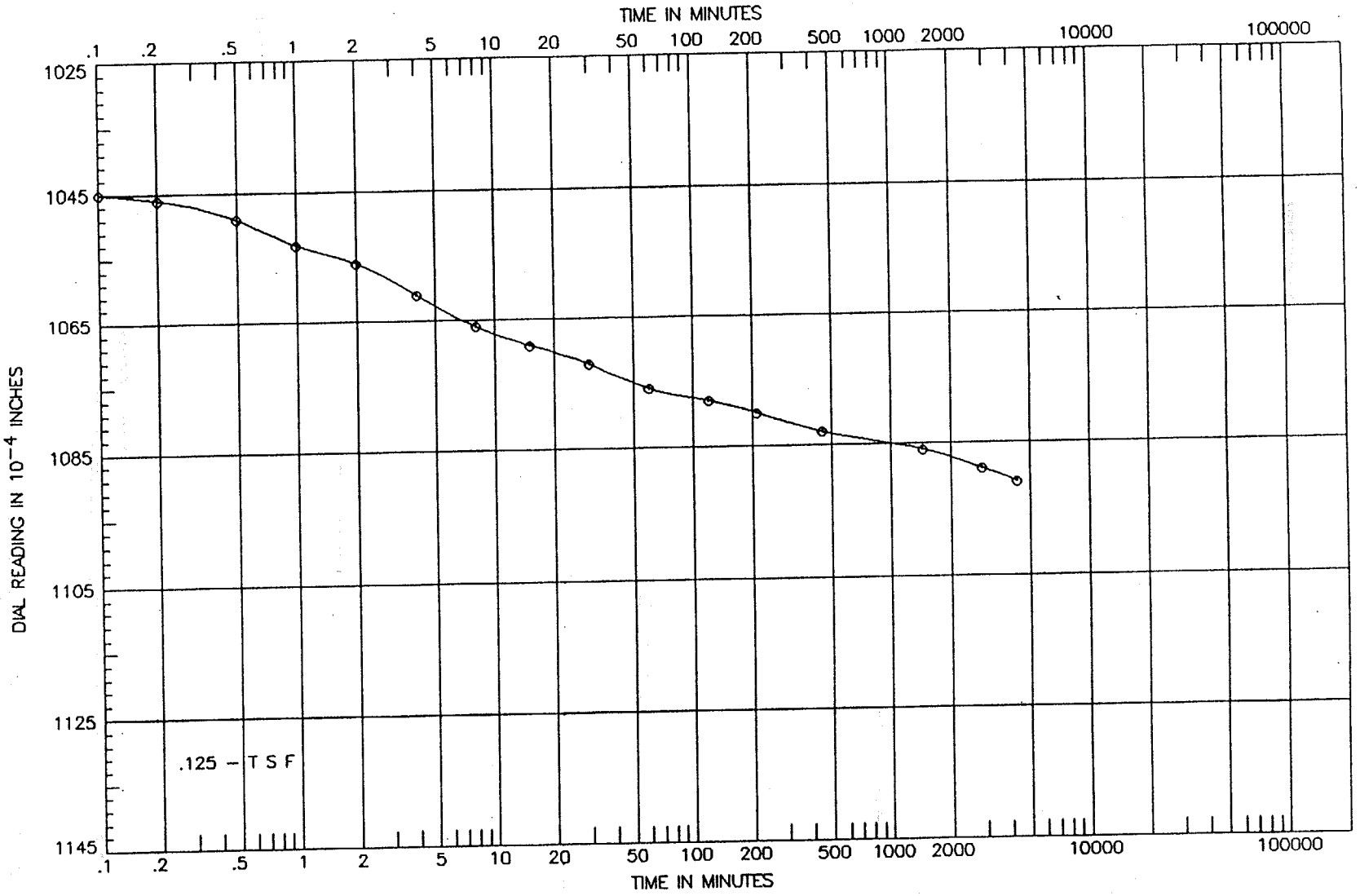


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 1-LIT-95	SAMPLE NO. 7
DEPTH/ELEV 17.0-18.3	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES - STF/GL

SHEET 2 OF 13

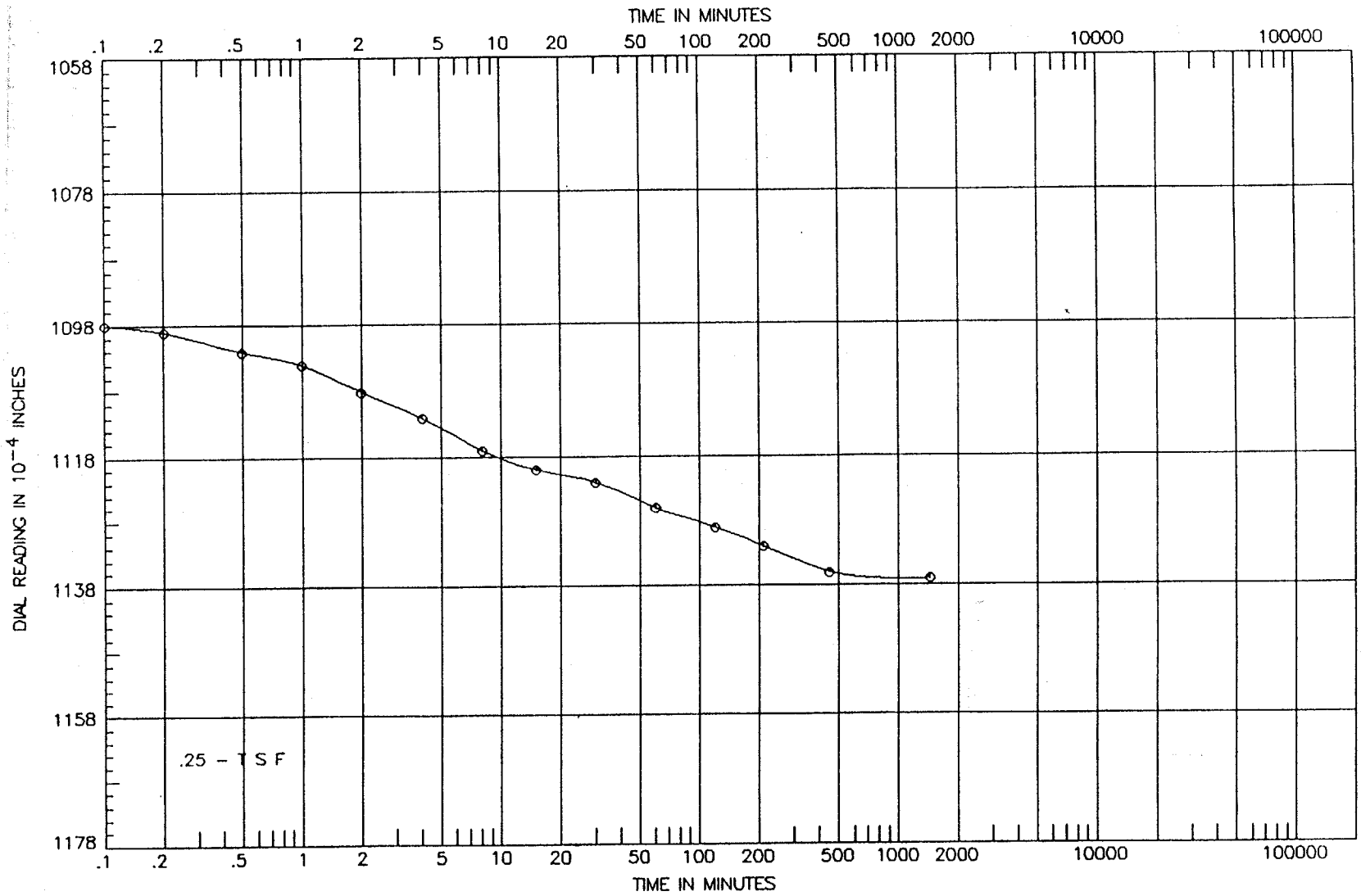


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-LIT-95	SAMPLE NO.	7
DEPTH/ELEV	17.0-18.3	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 3 OF 13

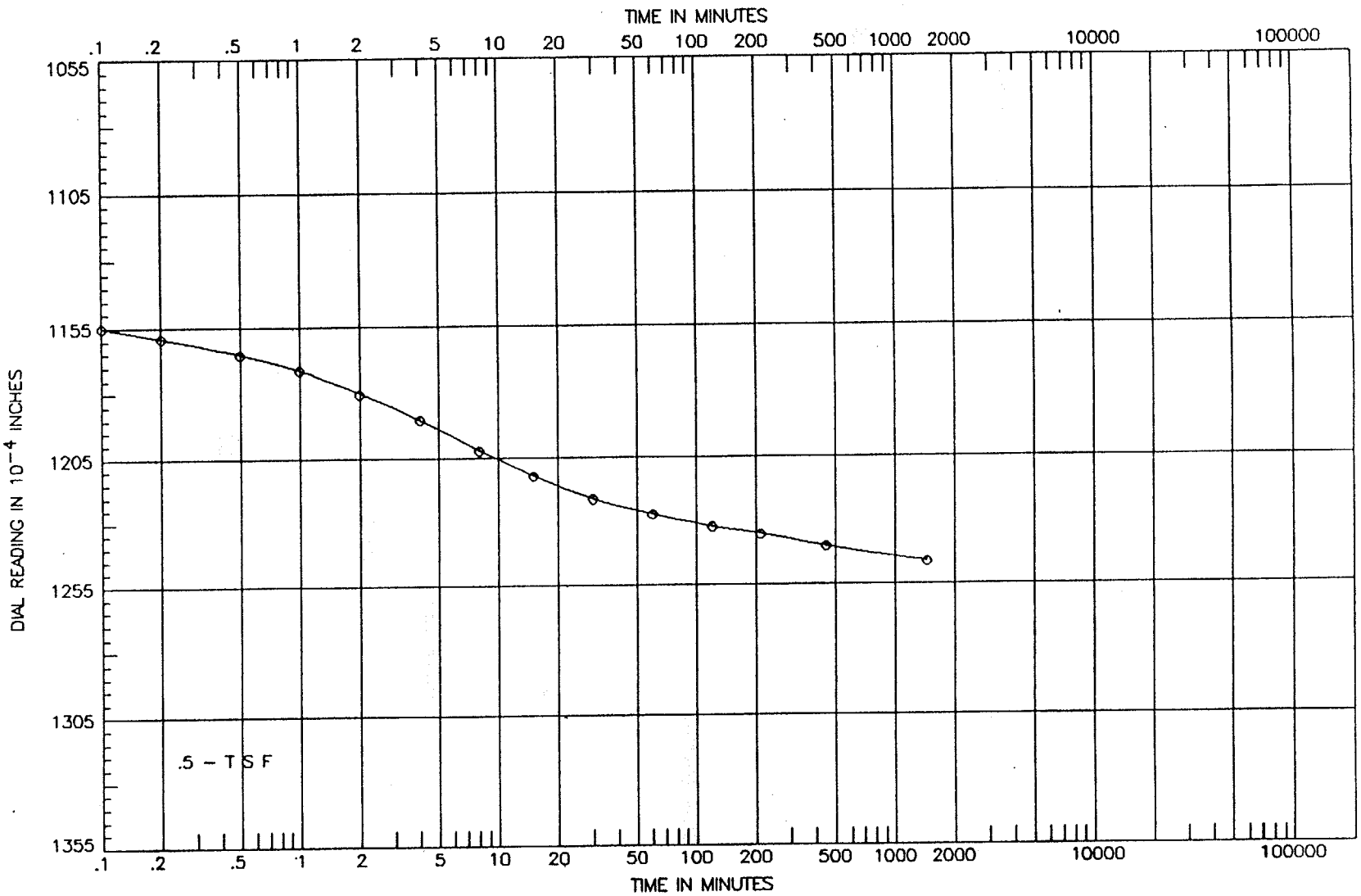


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-LIT-95	SAMPLE NO.	7
DEPTH/ELEV	17.0-18.3	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 4 OF 13

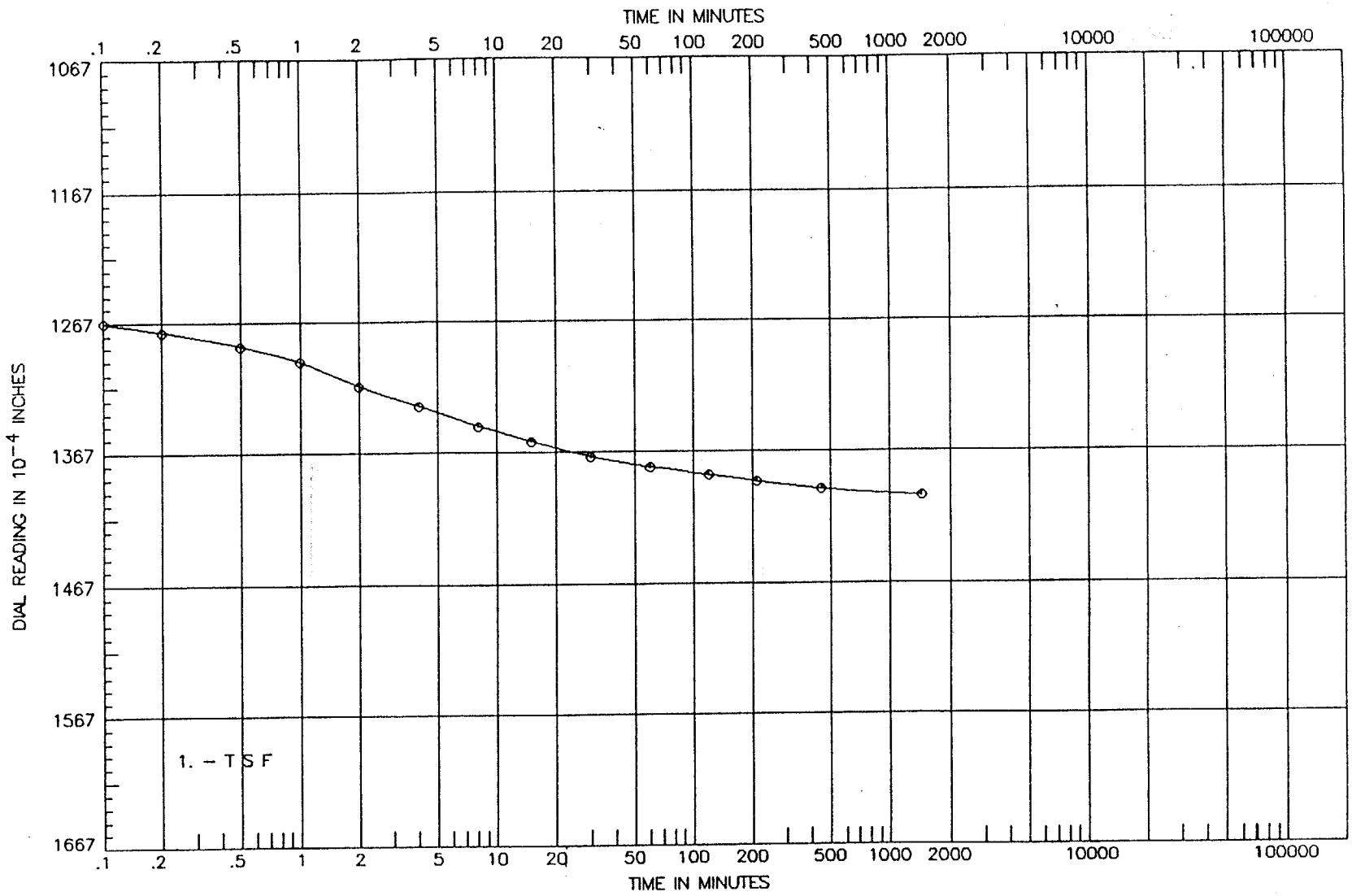


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 1-LIT-95	SAMPLE NO. 7
DEPTH/ELEV 17.0-18.3	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

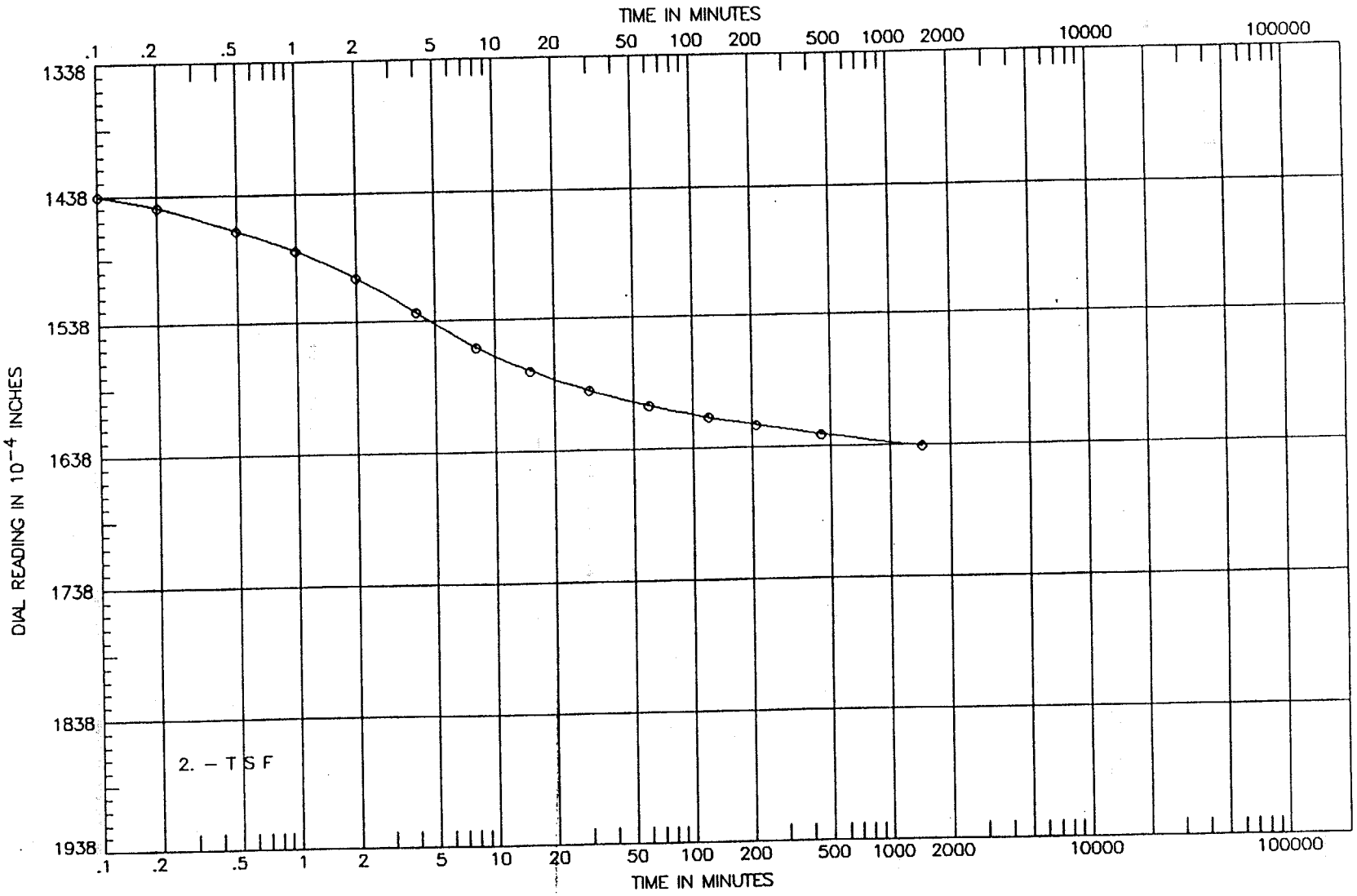
LABORATORY USAE WES – STF/GL

SHEET 5 OF 13

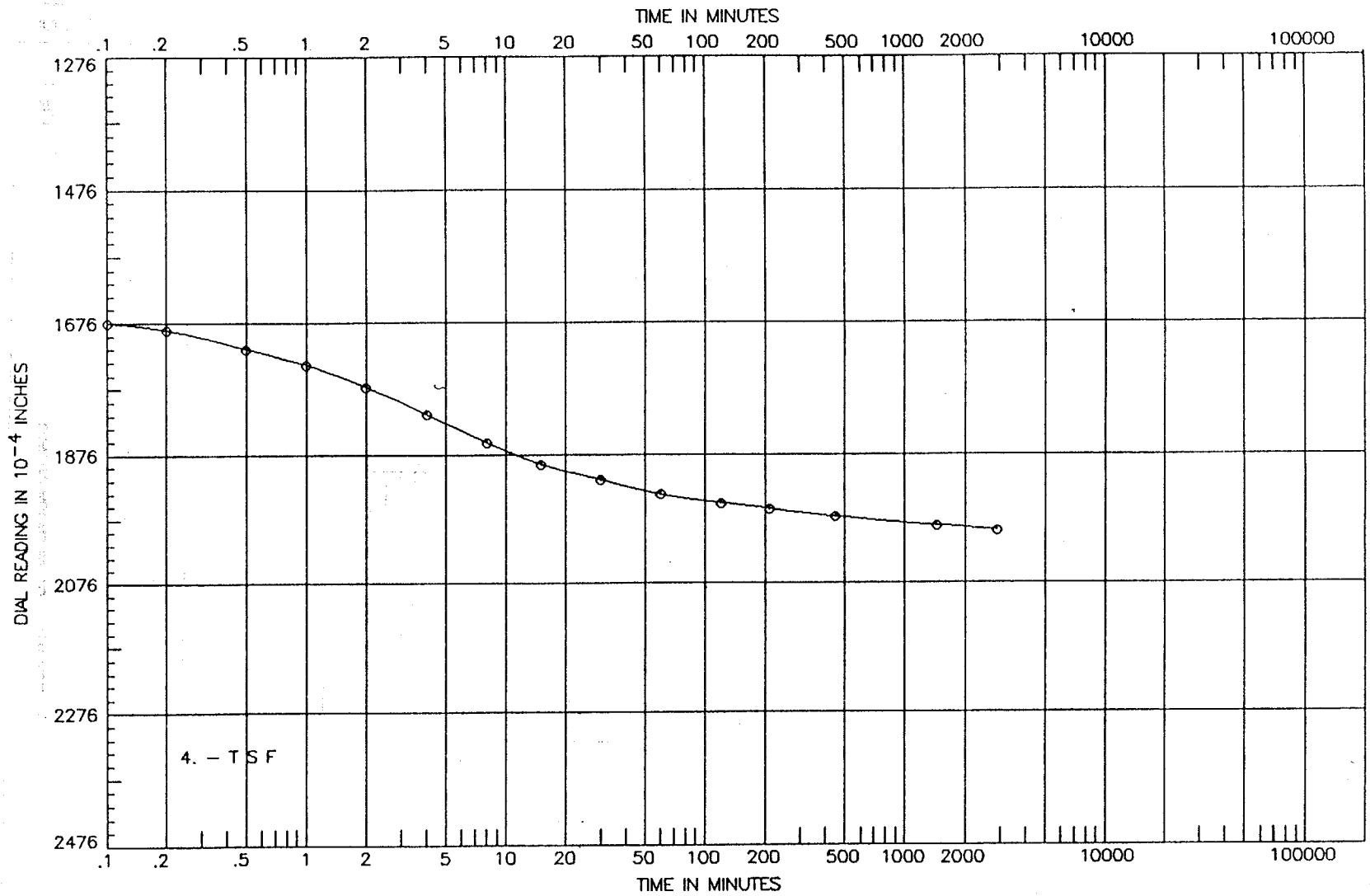


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		CONSOLIDATION TEST TIME CURVES LABORATORY USAE WES – STF/GL
BORING	1-LIT-95	SAMPLE NO. 7	
DEPTH/ELEV	17.0-18.3	DATE 26 OCT 95	

SHEET 6 OF 13



PROJECT	REELFOOT LAKE FEASIBILITY STUDY		CONSOLIDATION TEST TIME CURVES LABORATORY USAE WES – STF/GL
BORING	1-LIT-95	SAMPLE NO. 7	
DEPTH/ELEV	17.0–18.3	DATE 26 OCT 95	

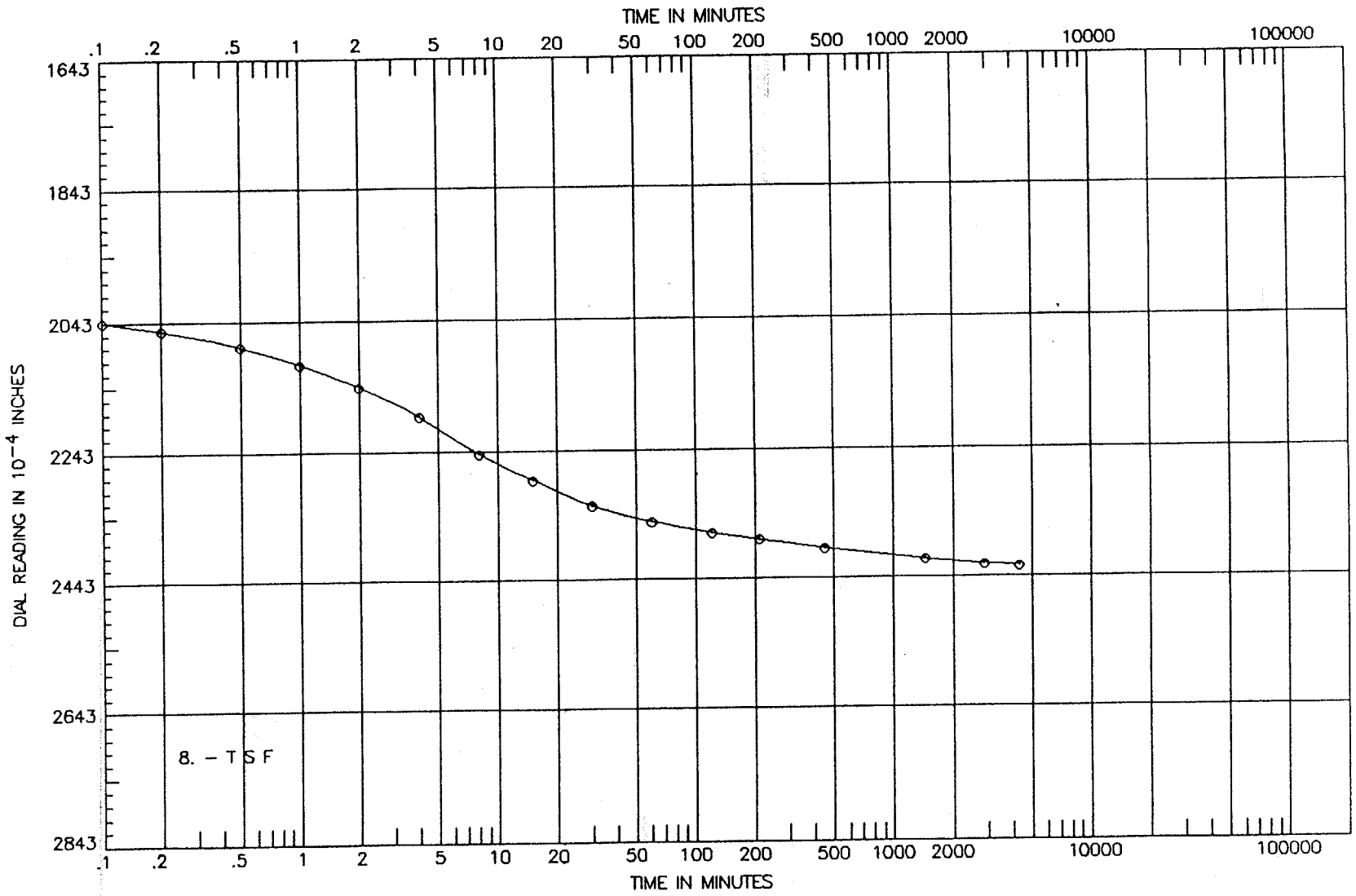


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-LIT-95	SAMPLE NO.	7
DEPTH/ELEV	17.0-18.3	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 8 OF 13

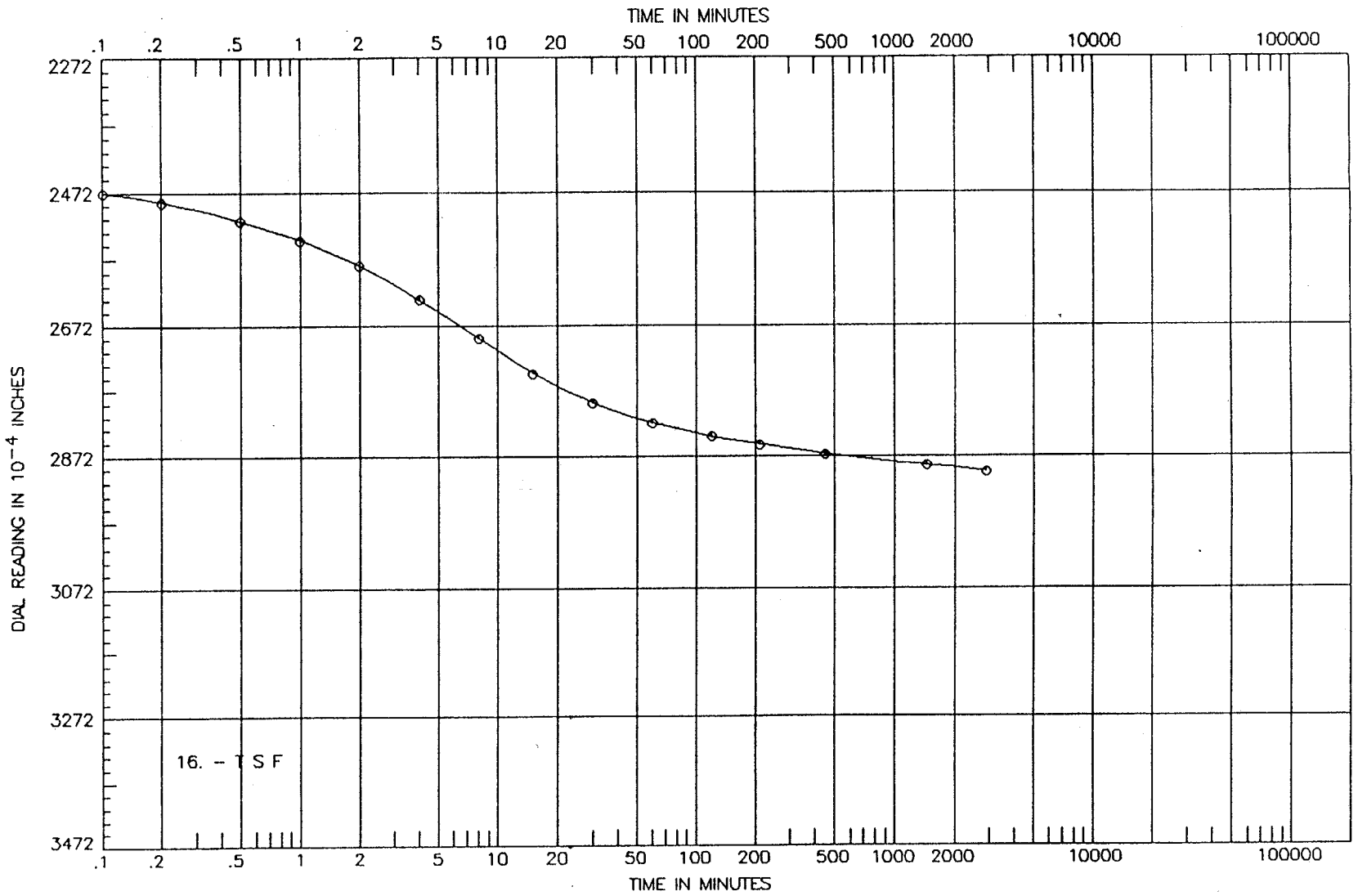


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 1-LIT-95	SAMPLE NO. 7
DEPTH/ELEV 17.0-18.3	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

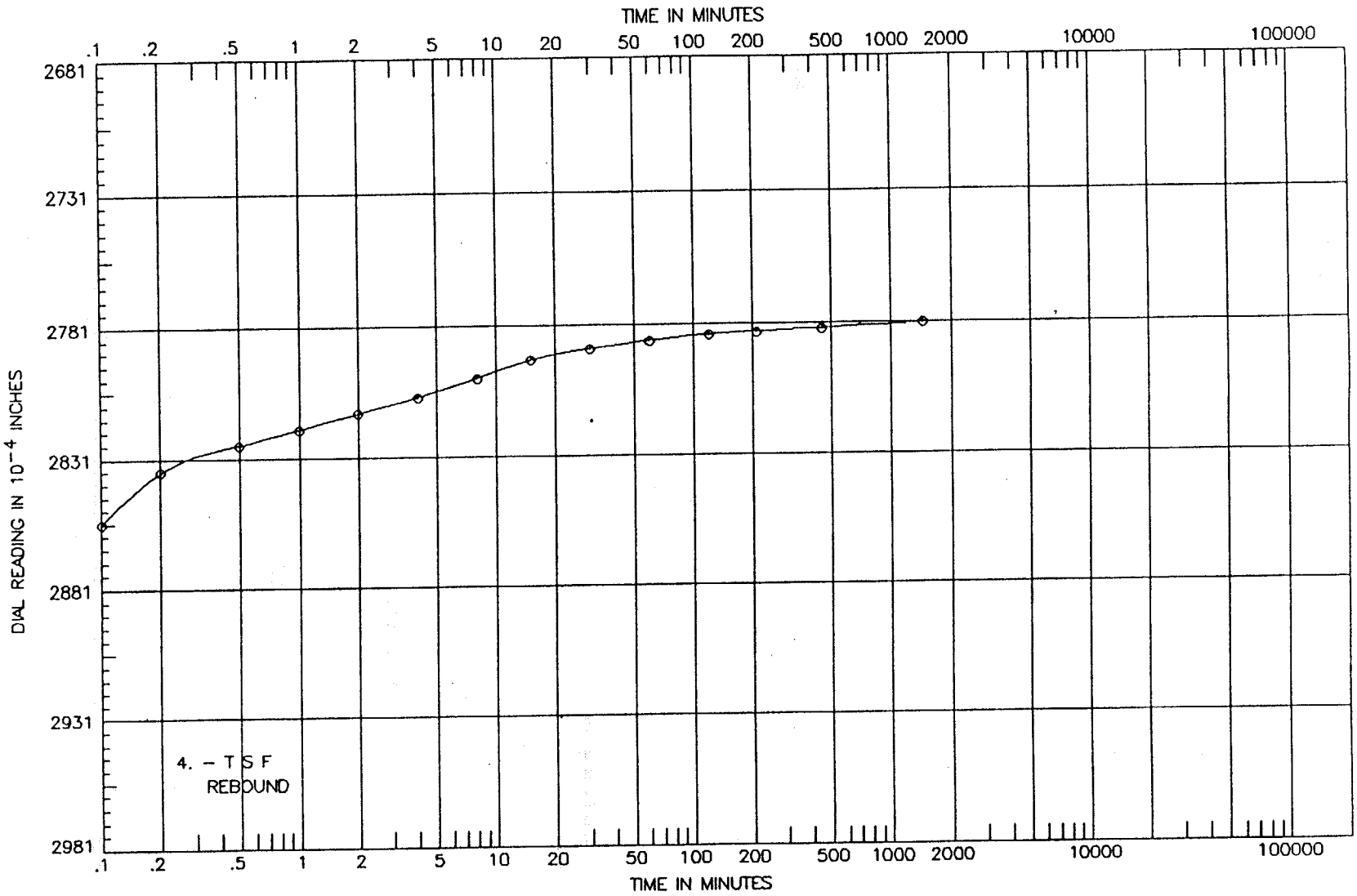
LABORATORY USAE WES – STF/GL

SHEET 9 OF 13



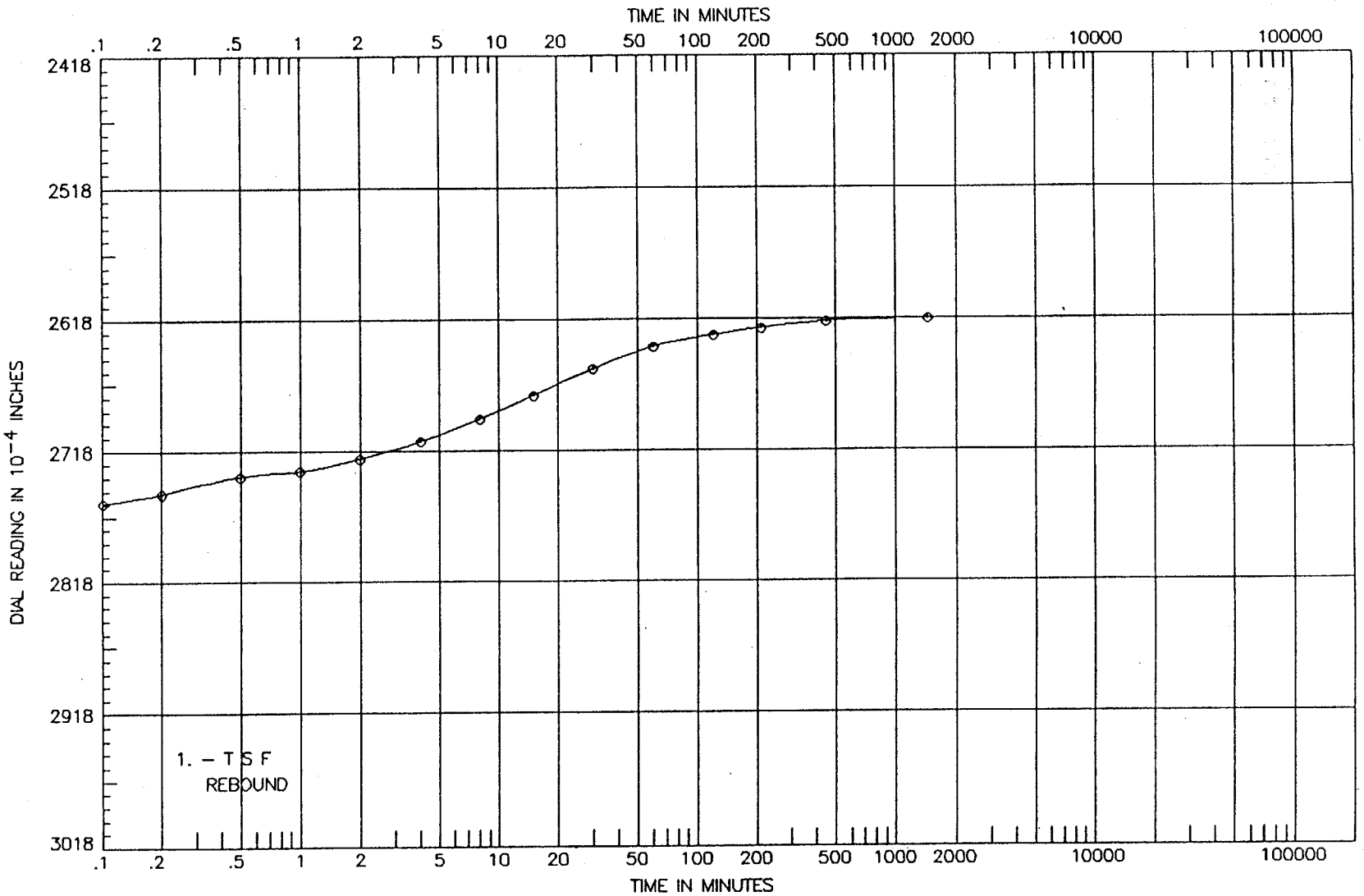
PROJECT	REELFOOT LAKE FEASIBILITY STUDY		CONSOLIDATION TEST TIME CURVES LABORATORY USAE WES – STF/GL
BORING	1-LIT-95	SAMPLE NO. 7	
DEPTH/ELEV	17.0-18.3	DATE 26 OCT 95	

SHEET 10 OF 13



PROJECT	REELFOOT LAKE FEASIBILITY STUDY		CONSOLIDATION TEST TIME CURVES
			LABORATORY USAE WES – STF/GL
BORING	1-LIT-95	SAMPLE NO. 7	
DEPTH/ELEV	17.0-18.3	DATE 26 OCT 95	

SHEET 11 OF 13

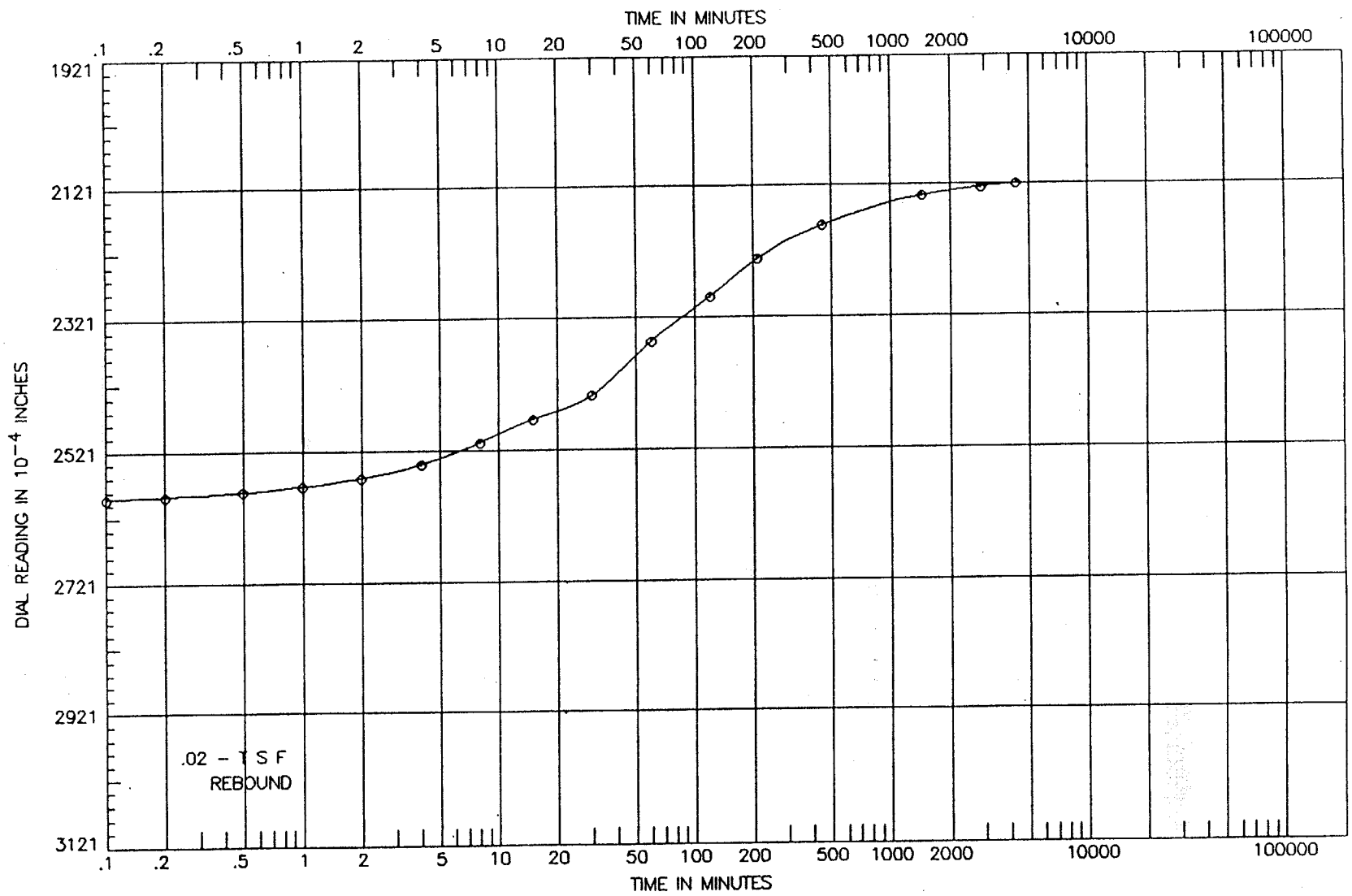


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 1-LIT-95	SAMPLE NO. 7
DEPTH/ELEV 17.0-18.3	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 12 OF 13

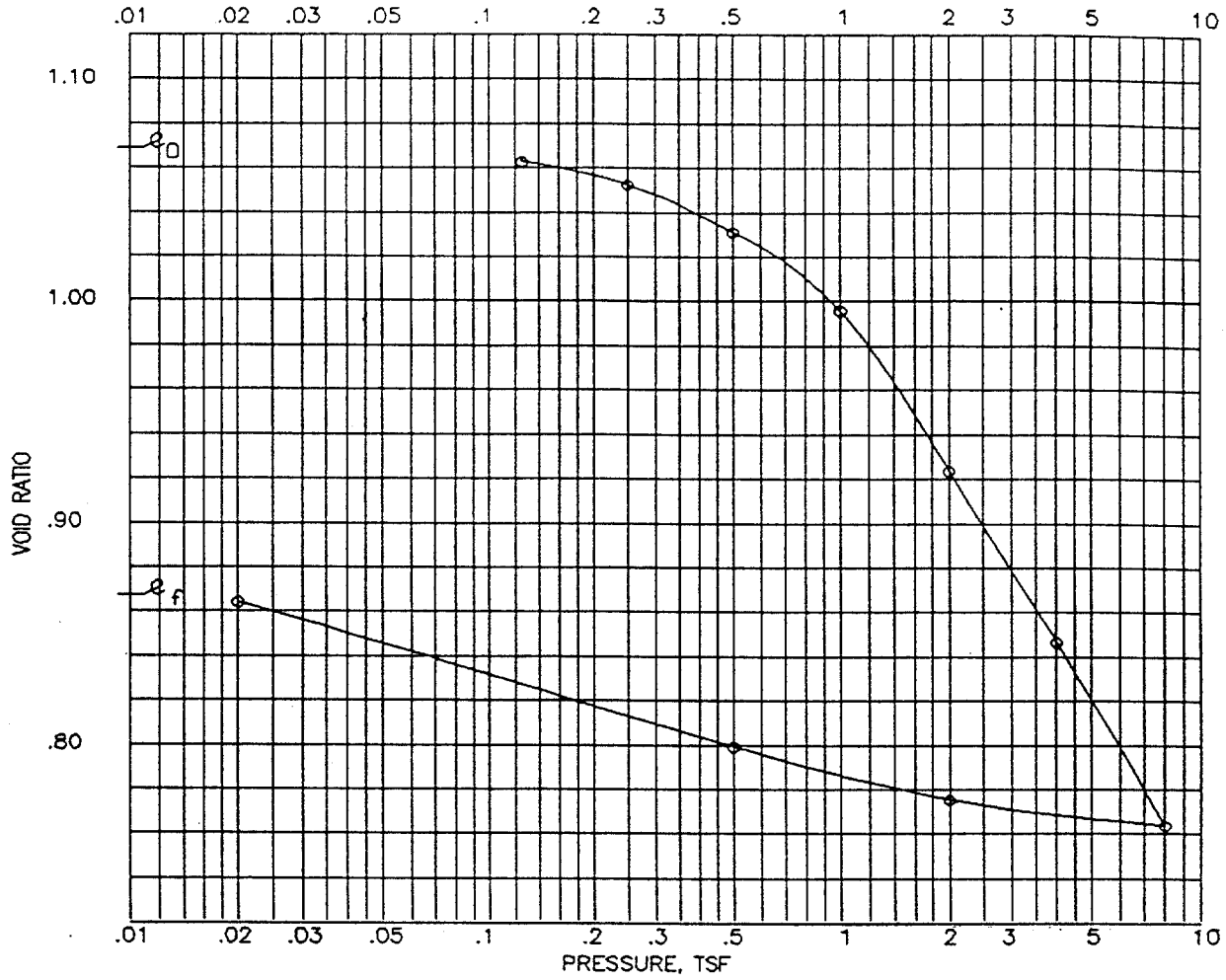


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 1-LIT-95	SAMPLE NO. 7
DEPTH/ELEV 17.0-18.3	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

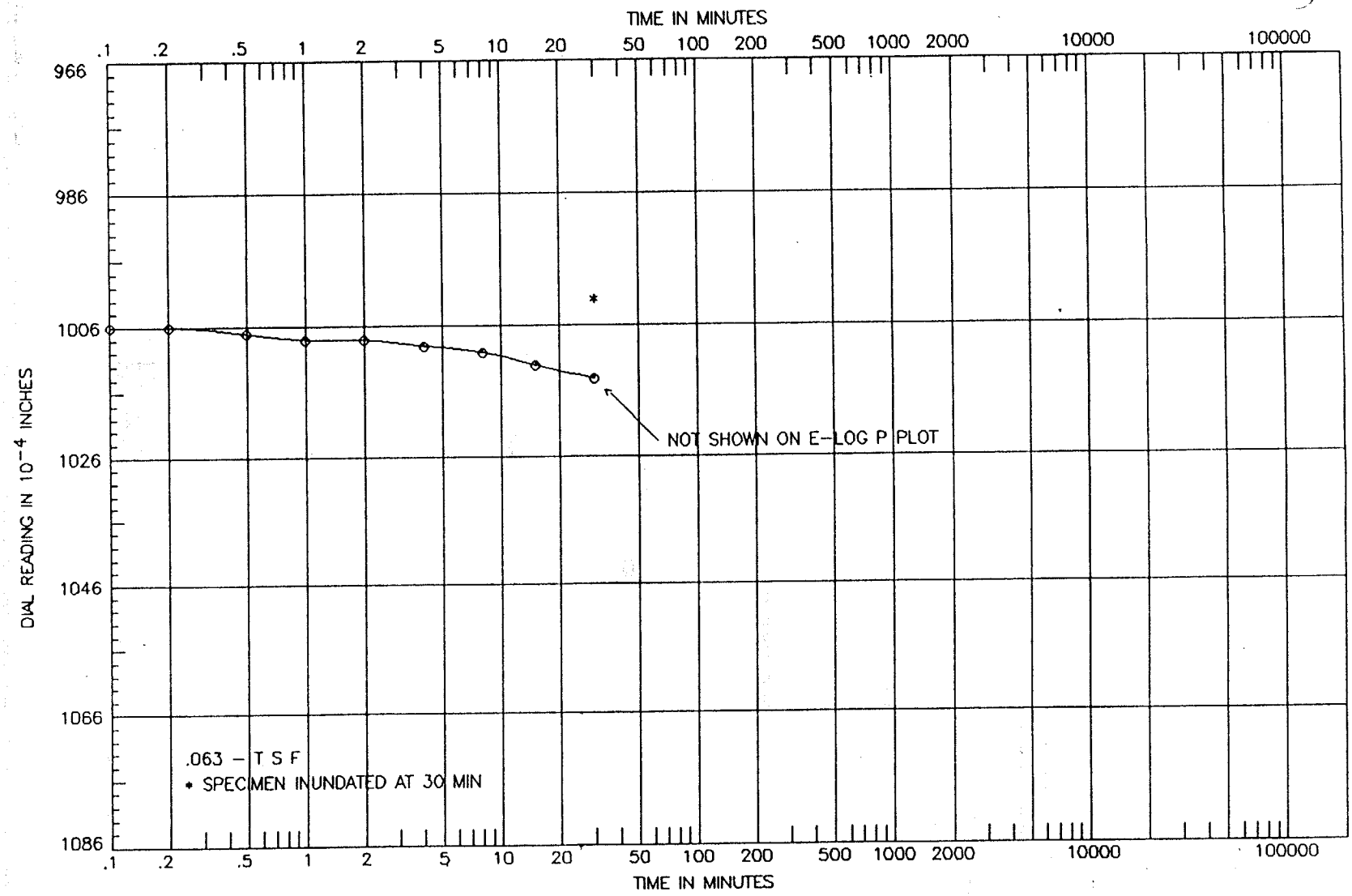
LABORATORY USAE WES – STF/GL

SHEET 11 OF 13



			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	37.6	31.2
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	81.5	90.3
COMPRESSION INDEX		SATURATION, %	95.1	97.3
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	1.068	.867
DIA. IN 4.44	HT. IN 1.107	BACK PRESSURE, TSF		
CLASSIFICATION	CLAY (CH), GRAY			
LL 68	PL 22	PI 46	PROJECT REELFOOT LAKE FEASIBILITY STUDY	
GS 2.70 (EST)	D_{10}			
REMARKS:		BORING NO. 1-LIT-95	SAMPLE NO. 12	
		DEPTH/ELEV 32.0-33.0	TECH. JL	
		LABORATORY USAE WES - STF/GL	DATE 26 OCT 95	
		CONSOLIDATION TEST REPORT		

SHEET 1 OF 12

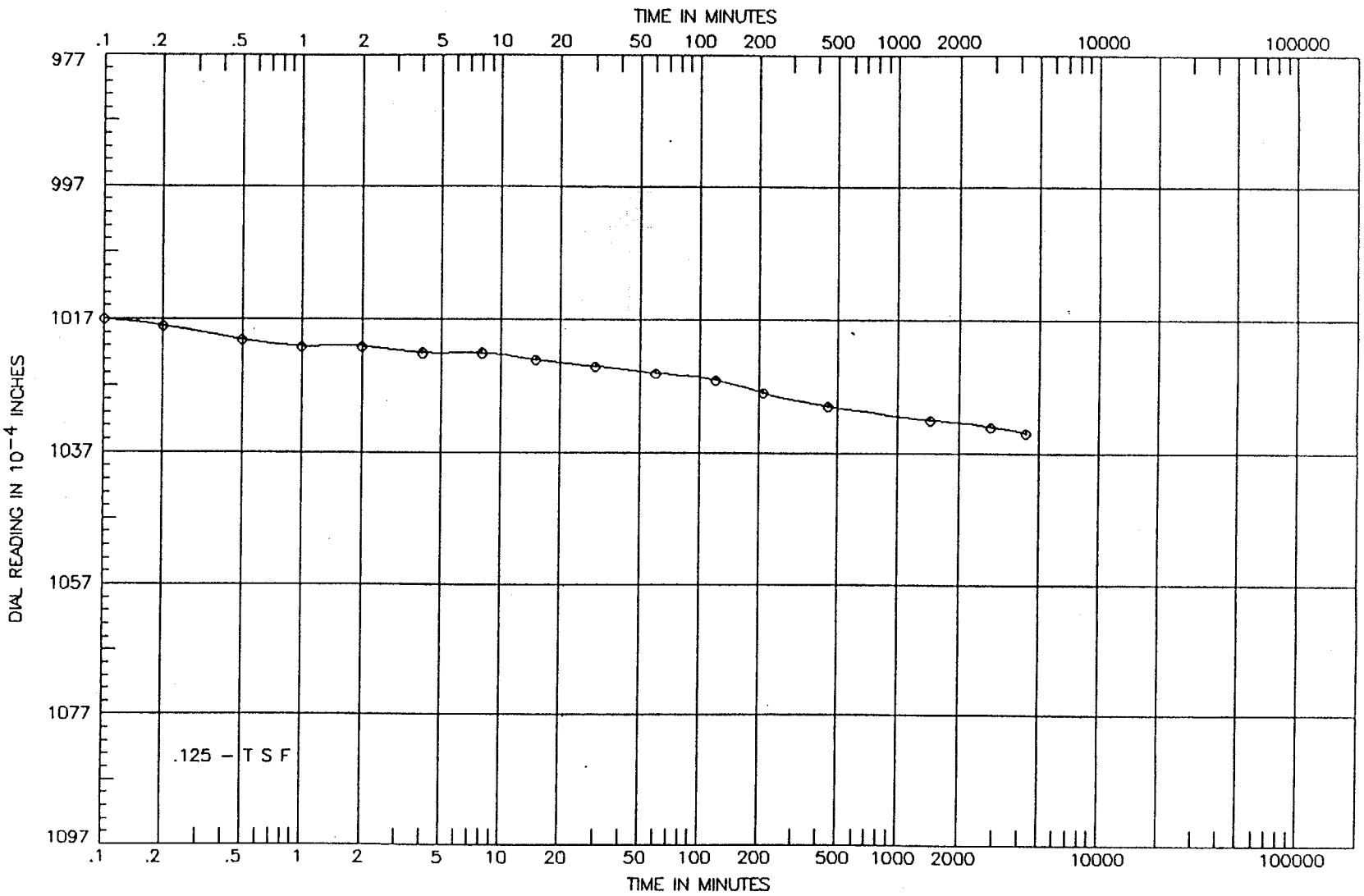


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-LIT-95	SAMPLE NO.	12
DEPTH/ELEV	32.0-33.0	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 2 OF 12

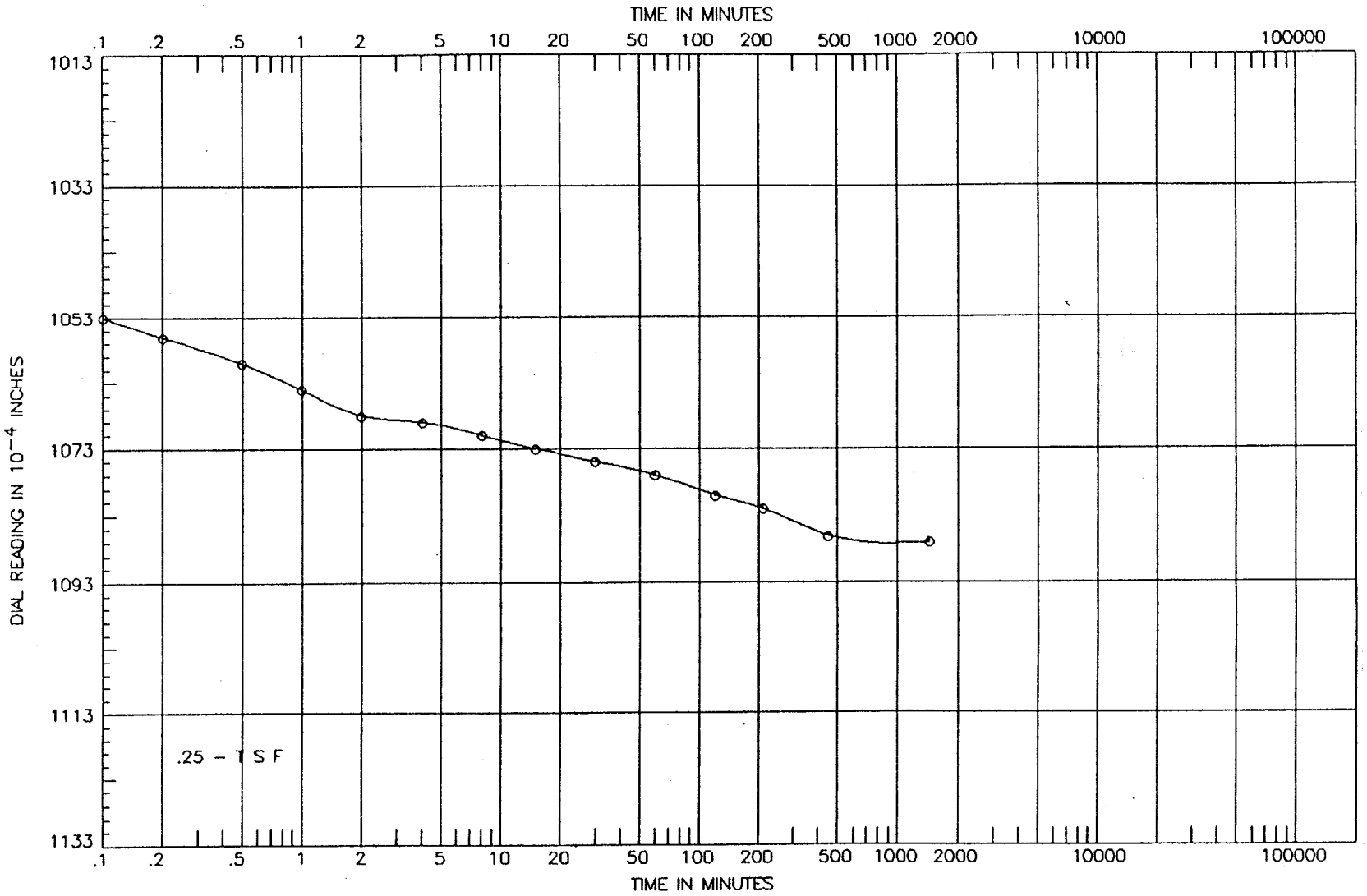


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 1-LIT-95	SAMPLE NO. 12
DEPTH/ELEV 32.0-33.0	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

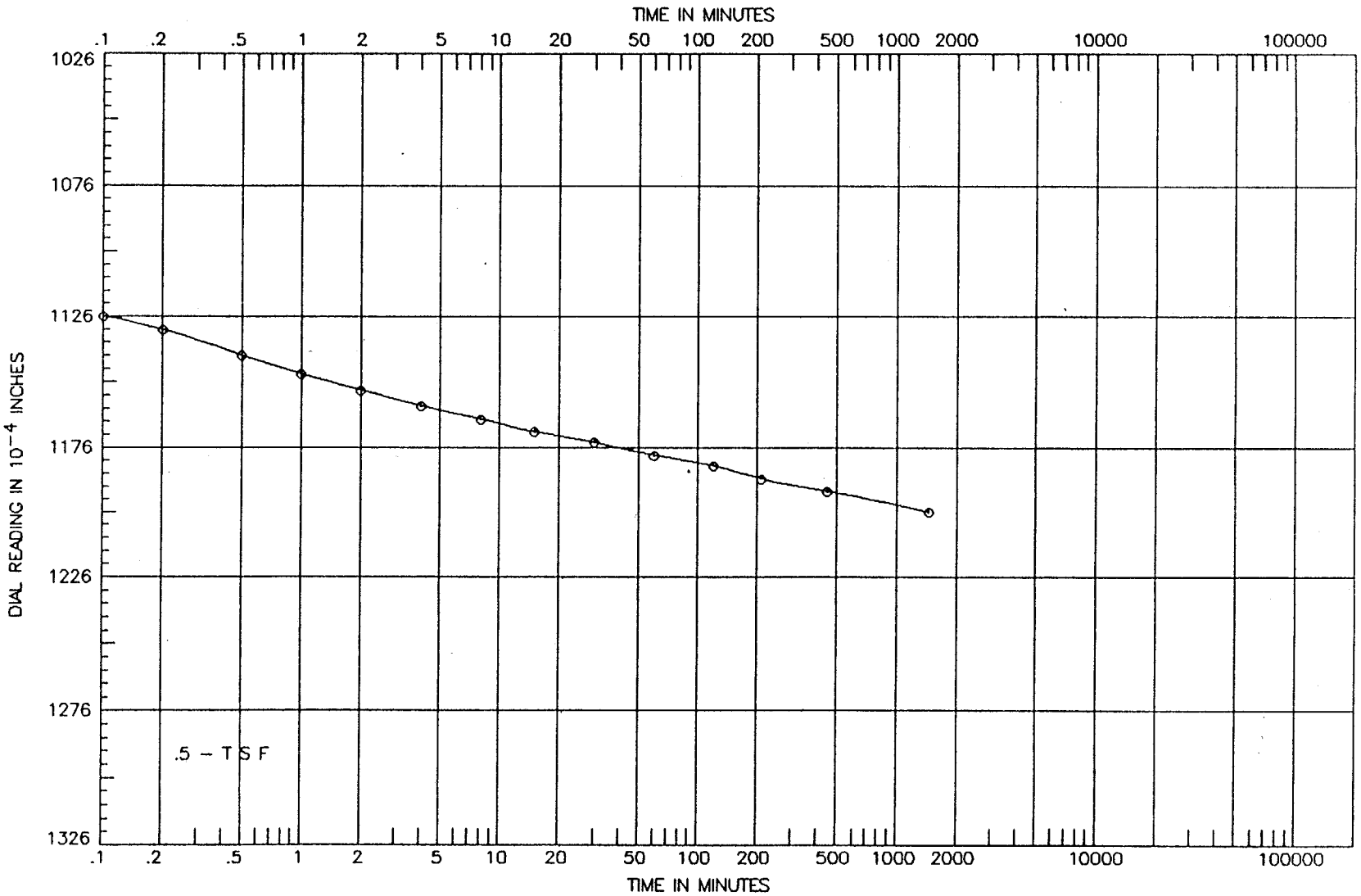
LABORATORY USAE WES – STF/GL

SHEET 3 OF 12



PROJECT	REELFOOT LAKE FEASIBILITY STUDY		CONSOLIDATION TEST TIME CURVES LABORATORY USAE WES – STF/GL
BORING	1-LIT-95	SAMPLE NO. 12	
DEPTH/ELEV	32.0-33.0	DATE 26 OCT 95	

SHEET 4 OF 12

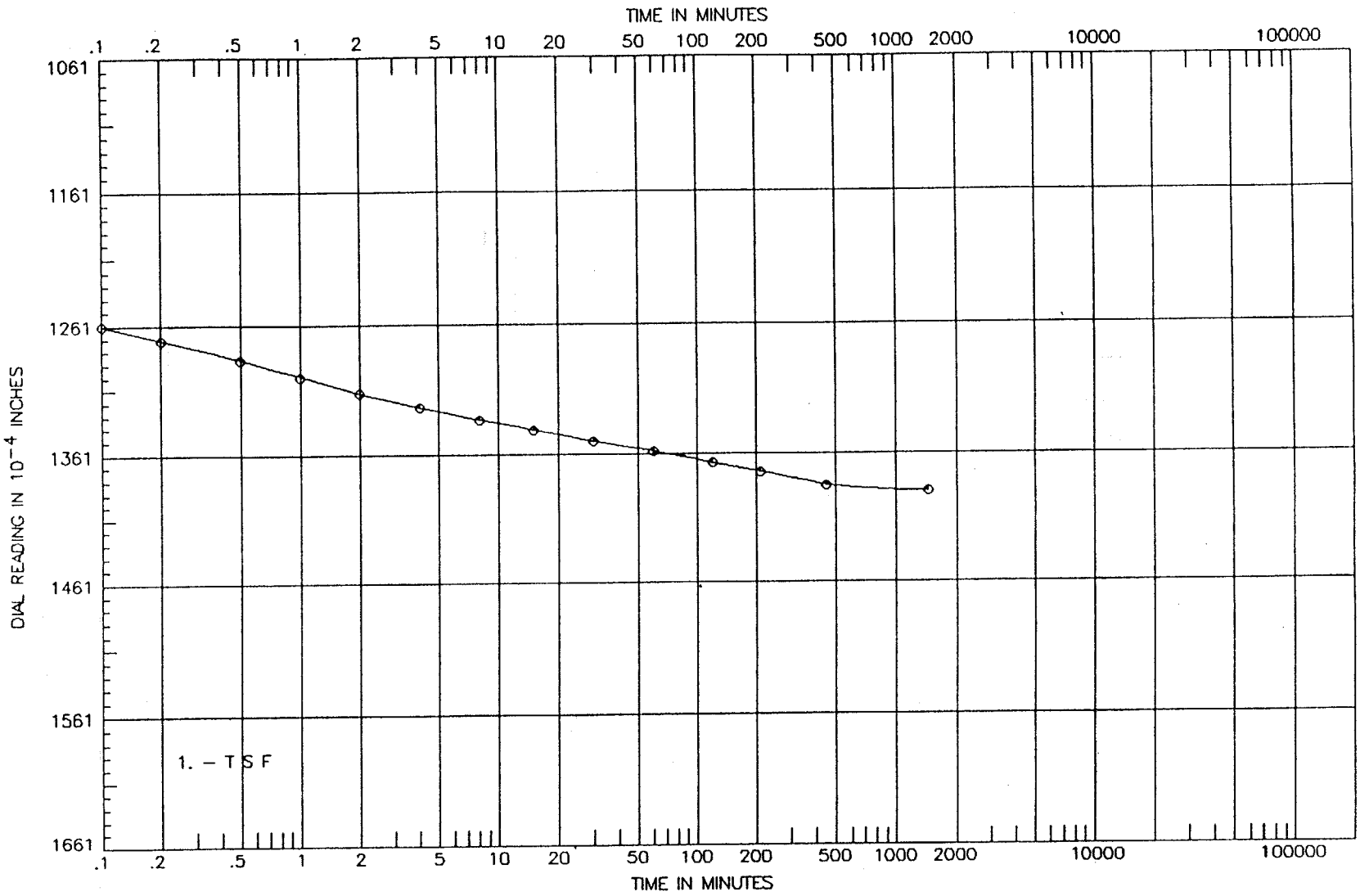


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 1-LIT-95	SAMPLE NO. 12
DEPTH/ELEV 32.0-33.0	DATE 26 OCT 95

SHEET 5 OF 12

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES - STF/GL

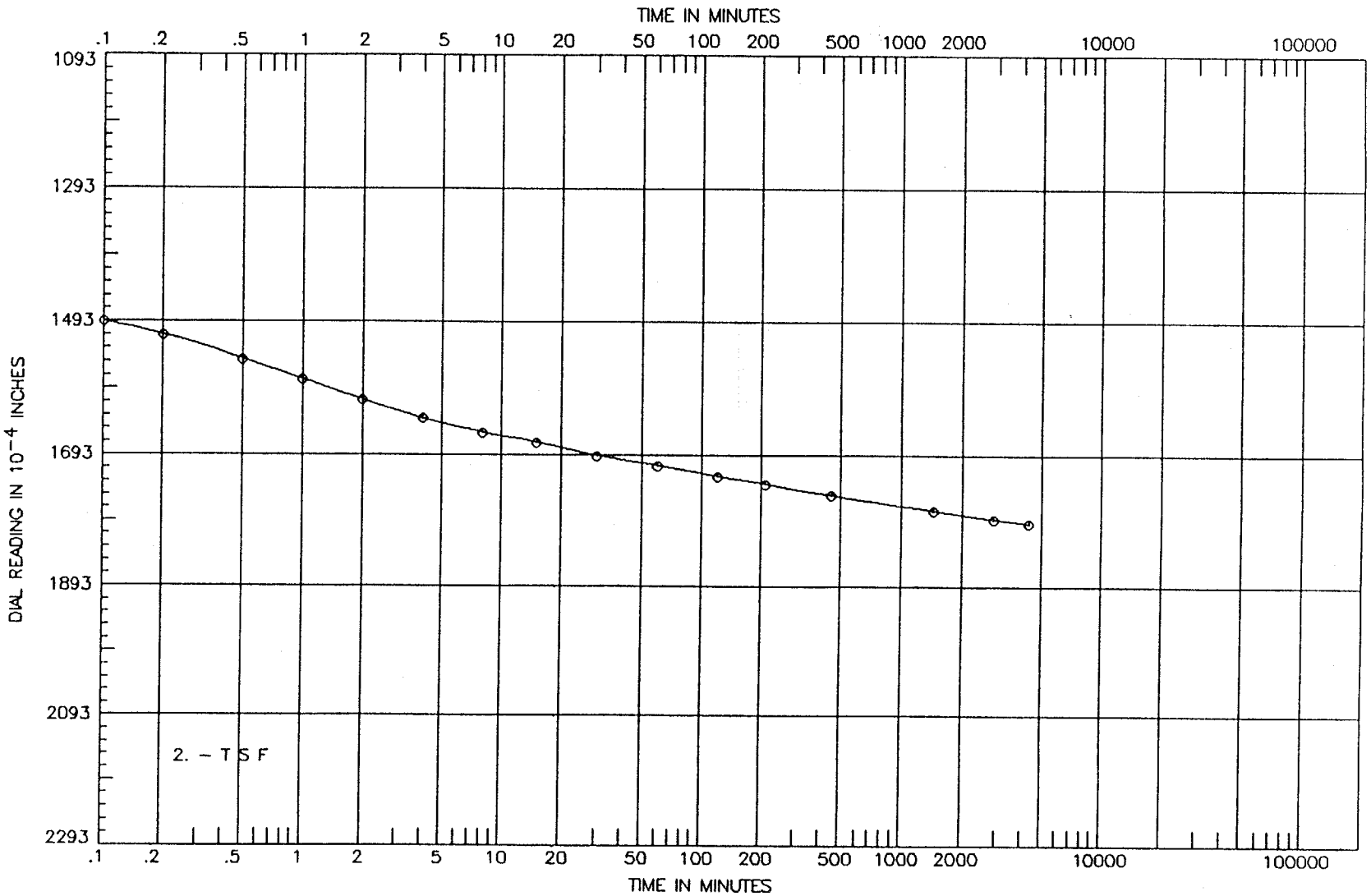


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-LIT-95	SAMPLE NO.	12
DEPTH/ELEV	32.0-33.0	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 6 OF 12

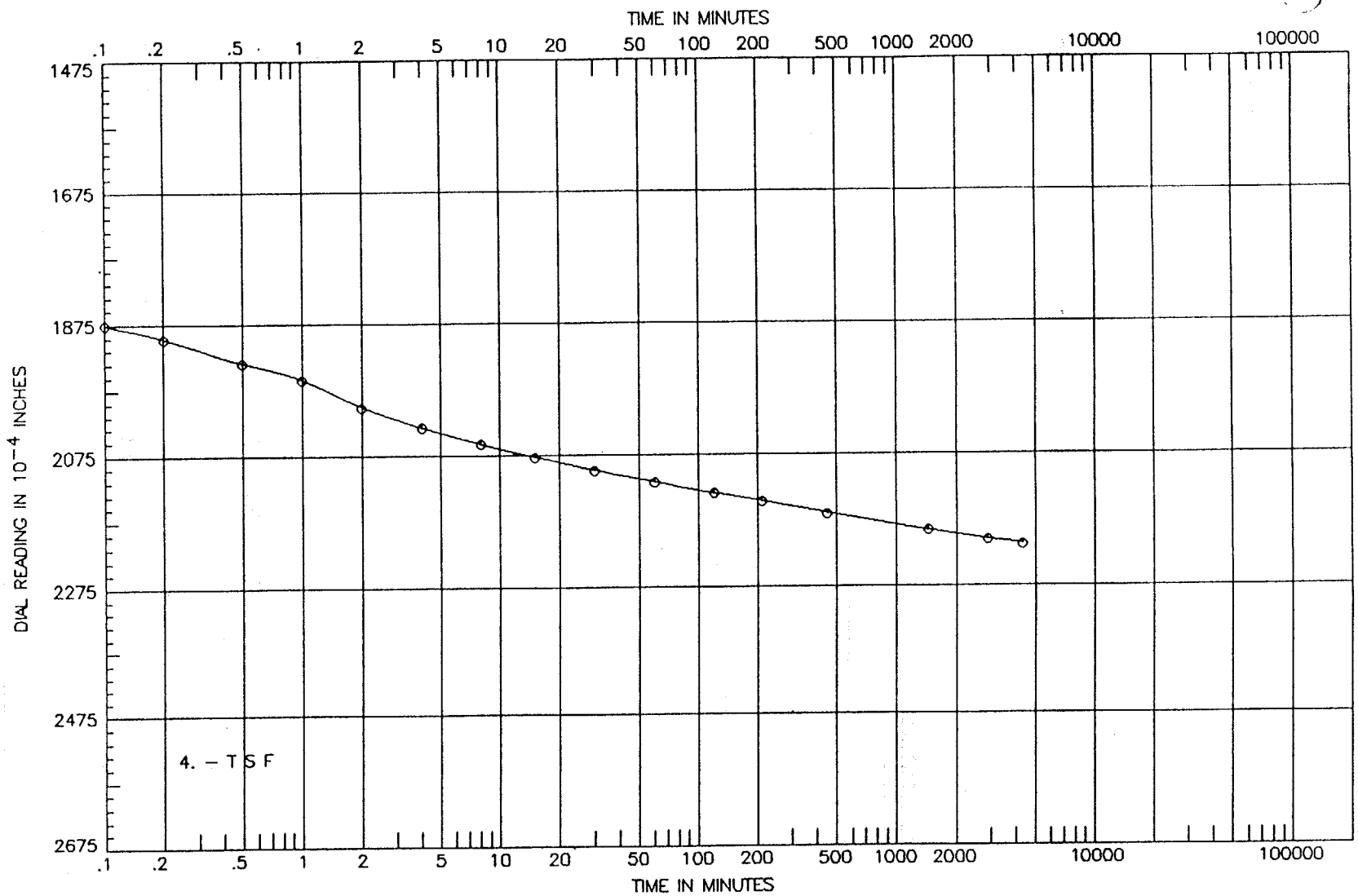


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-LIT-95	SAMPLE NO.	12
DEPTH/ELEV	32.0-33.0	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 7 OF 12

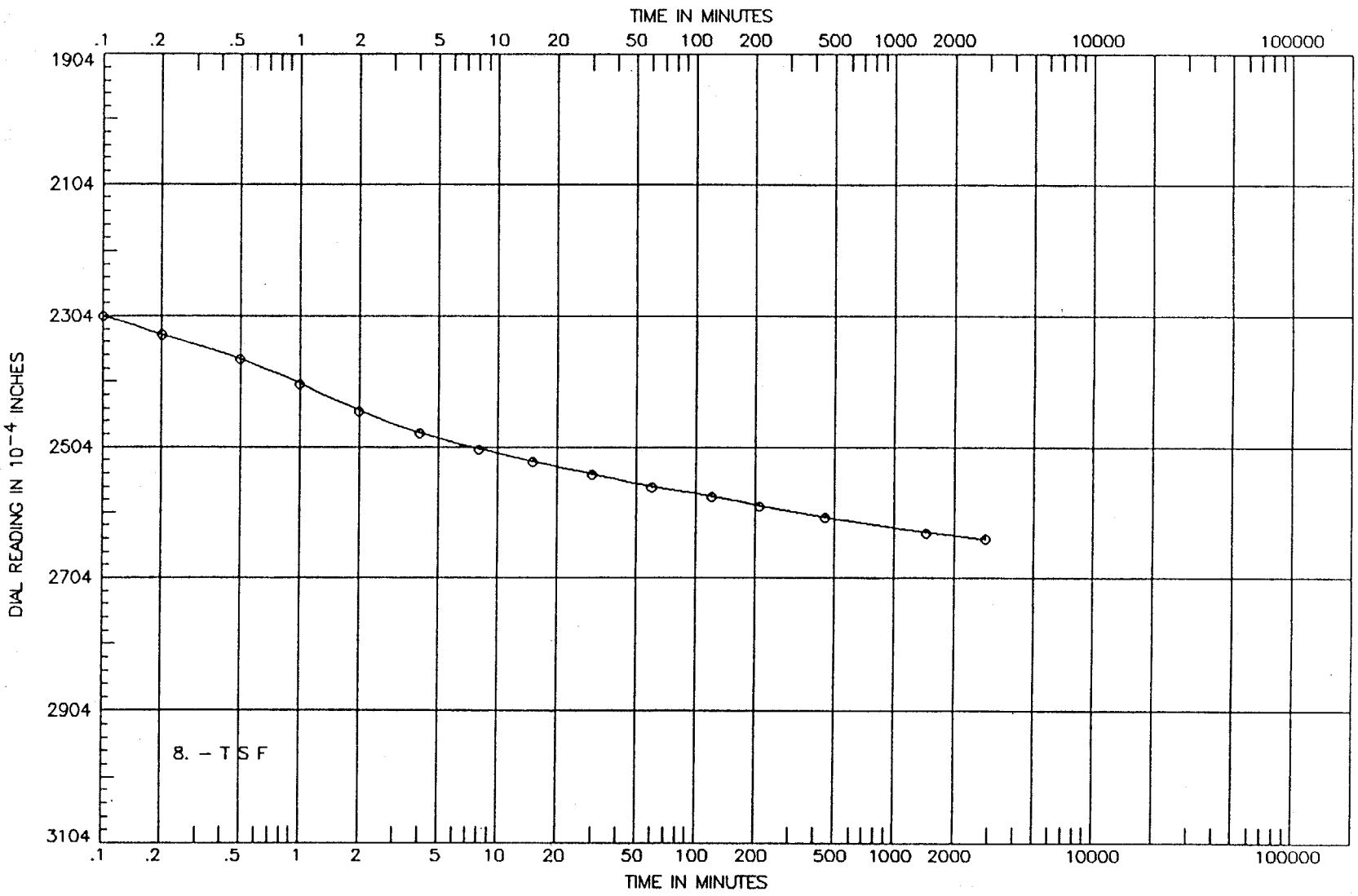


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-LIT-95	SAMPLE NO.	12
DEPTH/ELEV	32.0-33.0	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 8 OF 12

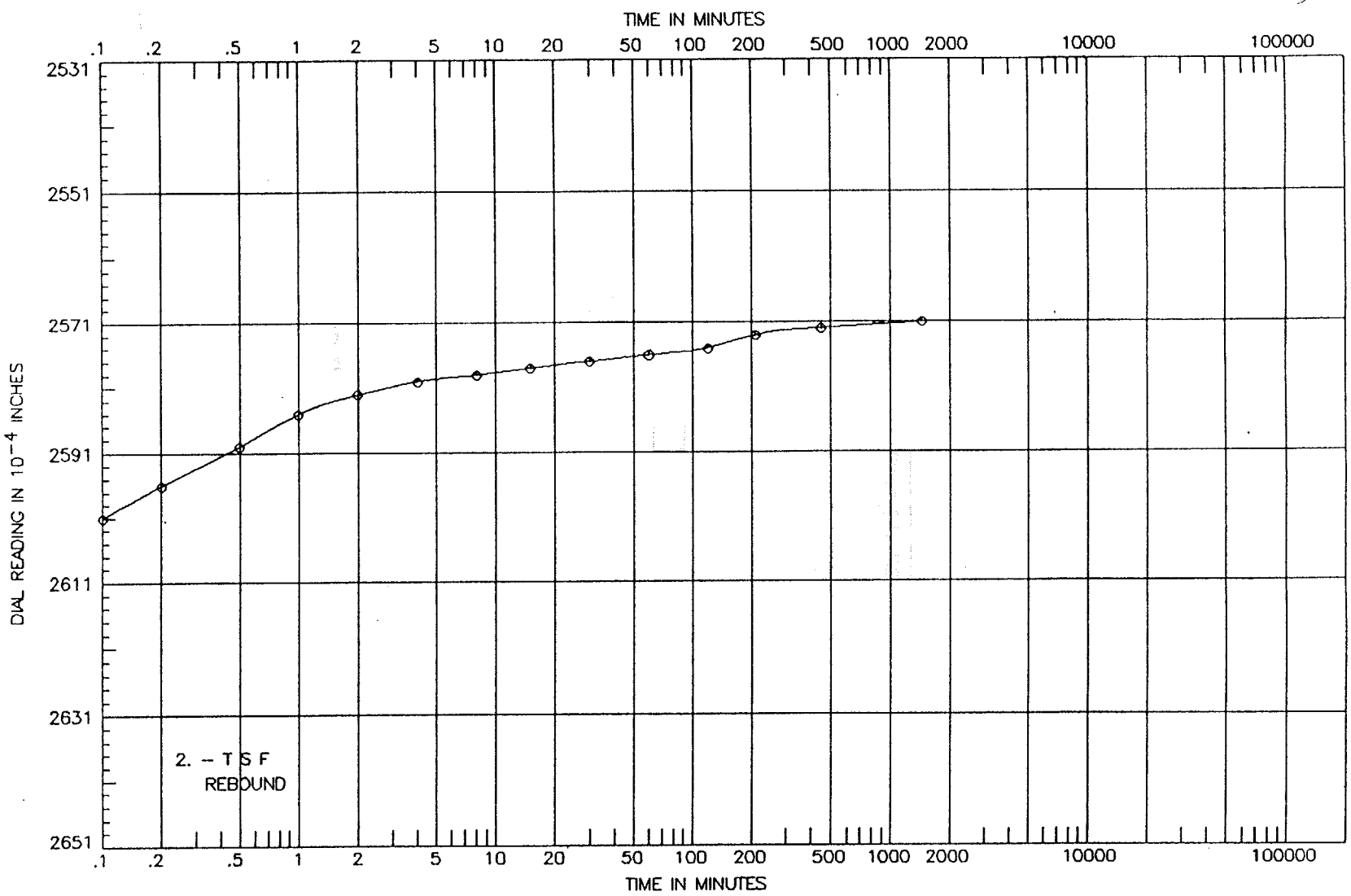


PROJECT	REELFOOT LAKE FEASIBILITY STUDY		
BORING	1-LIT-95	SAMPLE NO.	12
DEPTH/ELEV	32.0-33.0	DATE	26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 9 OF 12

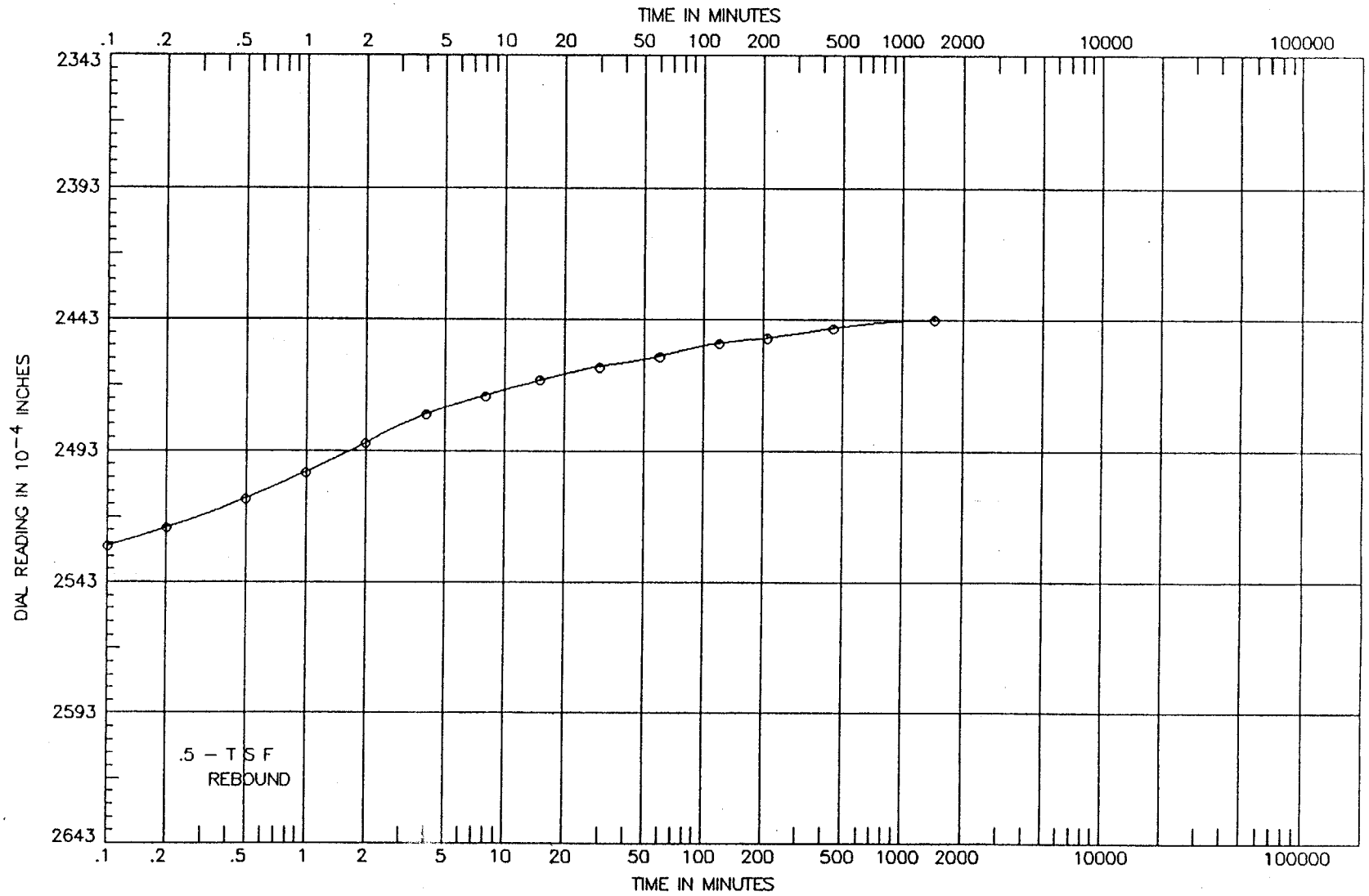


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 1-LIT-95	SAMPLE NO. 12
DEPTH/ELEV 32.0-33.0	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 10 OF 12

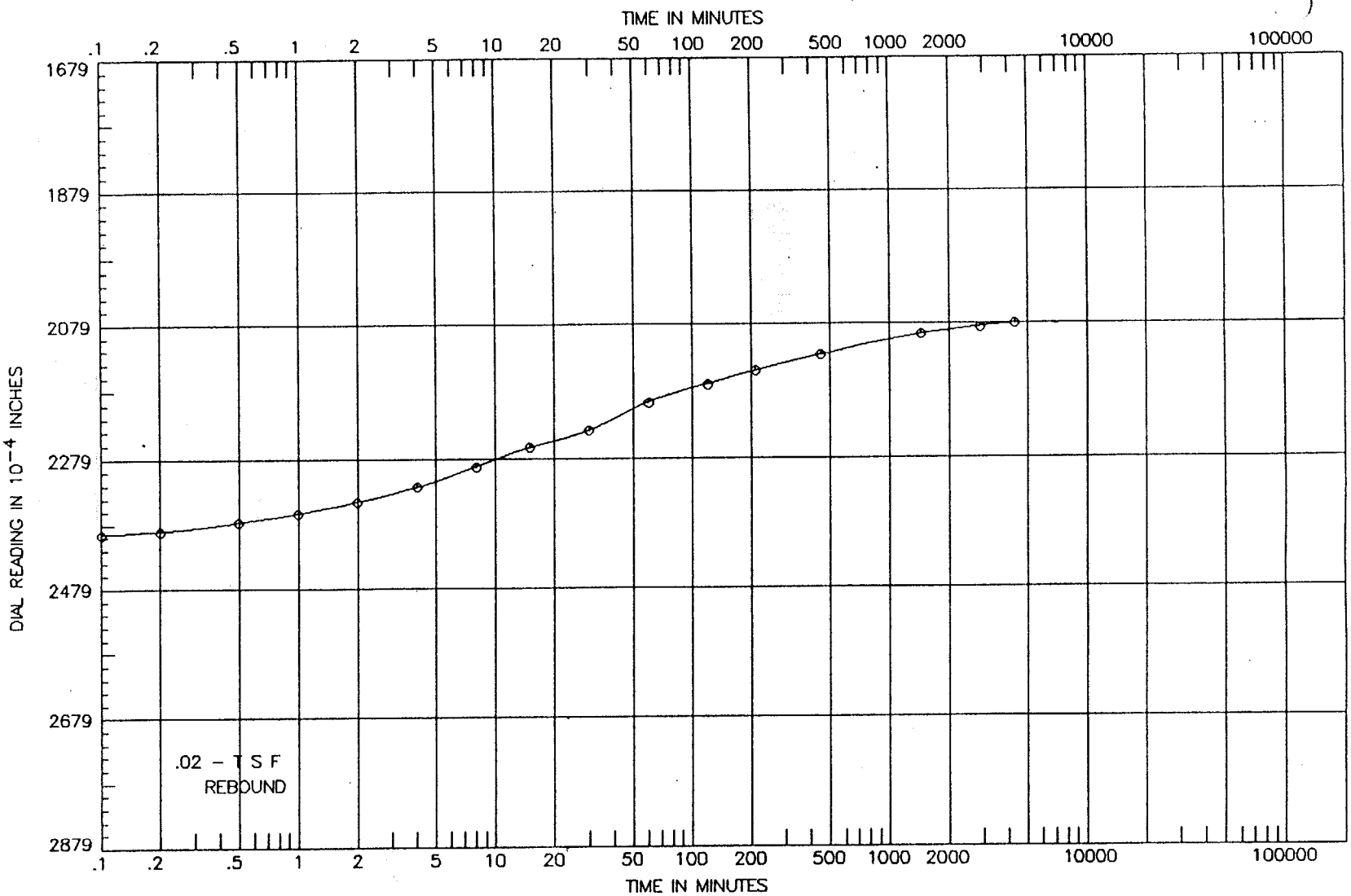


PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 1-LIT-95	SAMPLE NO. 12
DEPTH/ELEV 32.0-33.0	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 11 OF 12



PROJECT REELFOOT LAKE FEASIBILITY STUDY	
BORING 1--LIT-95	SAMPLE NO. 12
DEPTH/ELEV 32.0-33.0	DATE 26 OCT 95

CONSOLIDATION TEST TIME CURVES

LABORATORY USAE WES – STF/GL

SHEET 12 OF 12

TEST DATA SUMMARY

REELFOOT LAKE STUDY

SHEET 1 OF 1

PROJECT 2

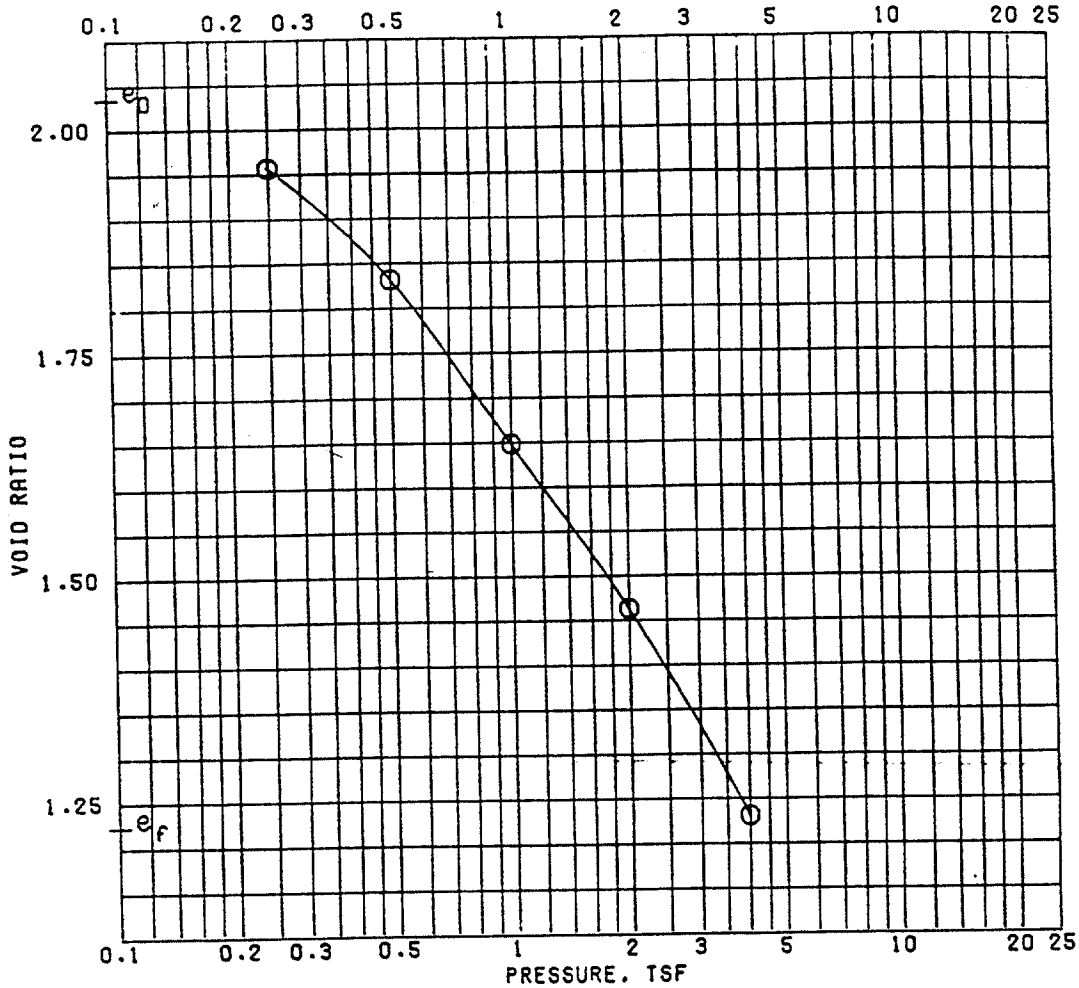
VW8121GM870001A

30 JANUARY 1987

BORING NO.	SAM. NO.	DEPTH OR ELEV. OF SAMPLE	LABORATORY CLASSIFICATION	MECHANICAL ANALYSIS: GRAVEL %	SAND %	FINES %	D_{10}	ATTERBERG LIMITS: LL	PL	SPECIFIC GRAVITY G	NAT. WATER CONT. %	NATURAL DRY DENSITY LBS/CU FT	COMPACTION DATA: OPT. WATER %	MAXIMUM DRY DENSITY LBS/CU FT	UNDISTURBED: INITIAL e	DRY DENSITY LBS/CU FT	W_i %	W_F %	S_i %	SHEAR DATA: TYPE TEST	SPECIMEN SIZE INCHES	TEST	σ_m T/SQ FT	σ_1 T/SQ FT	c T/SQ FT	ϕ DEGREES	PERMEABILITY: e	K FT/MIN.	CONSOLIDATION DATA: P_O T/SQ FT	P_C T/SQ FT	C_C	t_{50}	REMARKS
1-RU-86	2	6.0/ 7.0	CLAY (CH), GRAY					83	23	2.70	(EST)				2.033	55.6	73.4	42.3	97.5	CONS	2.50 x 1.292												
	4	14.5/ 16.0	CLAY (CH), GRAY					104	26	2.70	(EST)				2.733	45.2	100.0	50.8	99.8	CONS	2.50 x 1.239												
2-RU-86	2	5.8/ 6.5	CLAY (CH), GRAY					61	20	2.70	(EST)				1.037	82.8	38.5	24.9	100+	CONS	2.50 x 1.241												
	3	11.2/ 12.0	CLAY (CH), GRAY: DECAYED WOOD					68	20	2.70	(EST)				1.060	81.8	38.2	26.2	97.4	CONS	2.50 x 1.264												
3-RU-86	4	15.0/ 17.0	CLAY (CH), GRAY					58	21	2.70	(EST)				1.975	71.0	50.6	27.1	99.4	CONS	2.50 x 1.215												
5-RU-86	2	5.9/ 6.7	CLAYEY SILT (ML), GRAY					34	24	2.70	(EST)				1.004	84.1	35.7	26.8	95.9	CONS	2.50 x 1.243												
6-RU-86	2	6.5/ 8.0	CLAY (CH), GRAY					51	22	2.70	(EST)				1.009	83.9	37.1	25.6	99.2	CONS	2.50 x 1.241												
	4	16.5/ 18.5	CLAY (CH), GRAY: FISSURED					70	24	2.70	(EST)				1.291	73.6	47.3	33.3	98.9	CONS	2.50 x 1.215												
7-RU-86	4	9.8/	CLAY (CH), GRAY					73	20	2.70	(EST)				0.961	86.0	30.9	24.3	86.8	CONS	2.50 x 1.124												

ENG FORM 1 JAN 73 2086 EDITION OF 1 MAR 58 IS OBSOLETE.

T – TRIAXIAL COMPRESSION
UC– UNCONFINED COMPRESSION
DS– DIRECT SHEAR
Q – UNCONSOLIDATED UNDRAINED
S – CONSOLIDATED DRAINED
R – CONSOLIDATED UNDRAINE



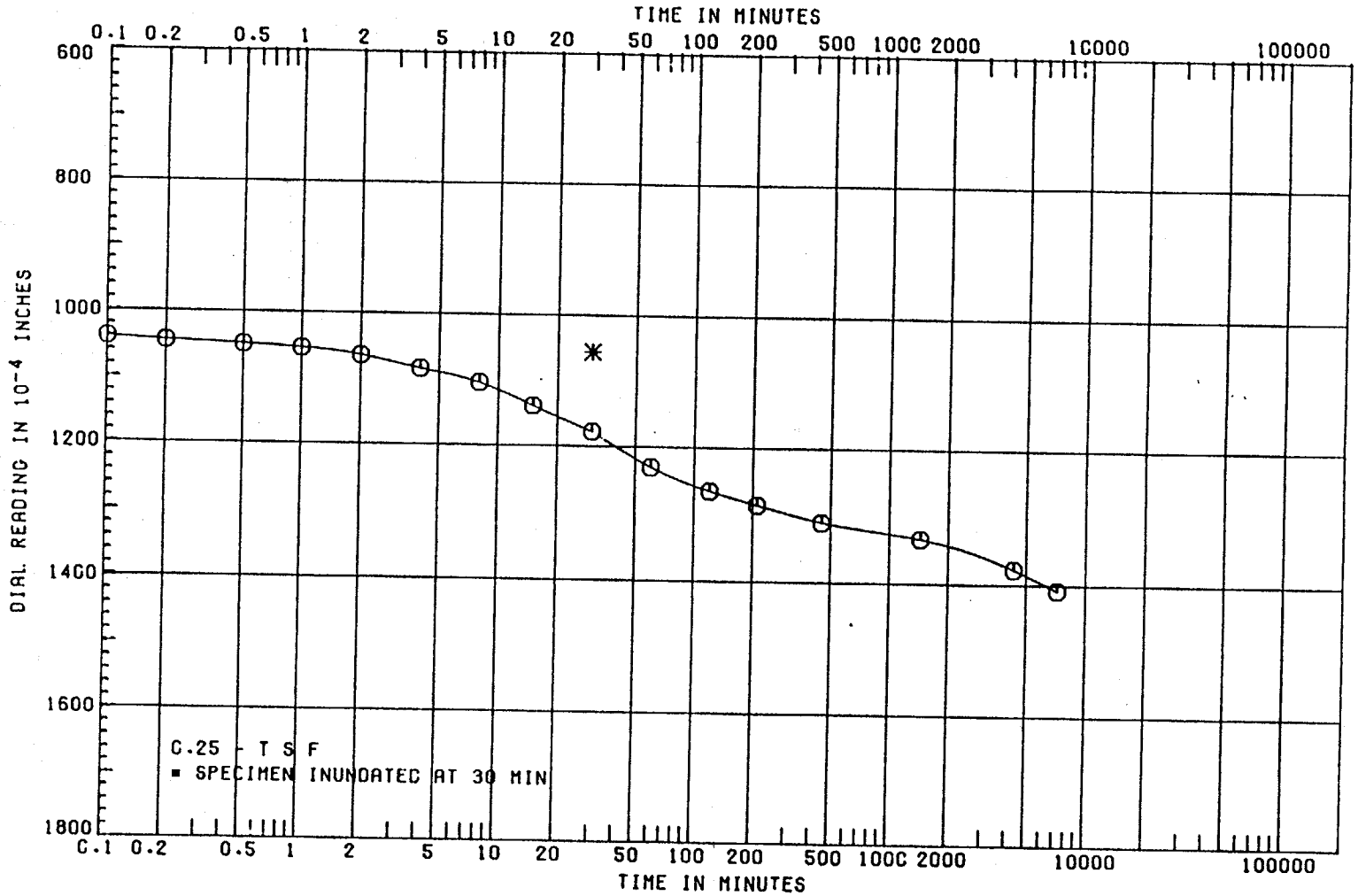
			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	73.4	42.3
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	55.6	75.9
COMPRESSION INDEX		SATURATION, %	97.5	93.4
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	2.033	1.222
DIA. IN 2.50	HT. IN 1.292	BACK PRESSURE, TSF		

CLASSIFICATION CLAY (CH), GRAY

LL 83	PL 23	PI 60	PROJECT REELFOOT LAKE STUDY
GS 2.70 (EST)	D_{10}		
REMARKS		BORING NO. 1-RU-86	SAMPLE NO. 2
		DEPTH/ELEV 6.0/7.0	DATE 12 NOV 86

CONSOLIDATION TEST REPORT

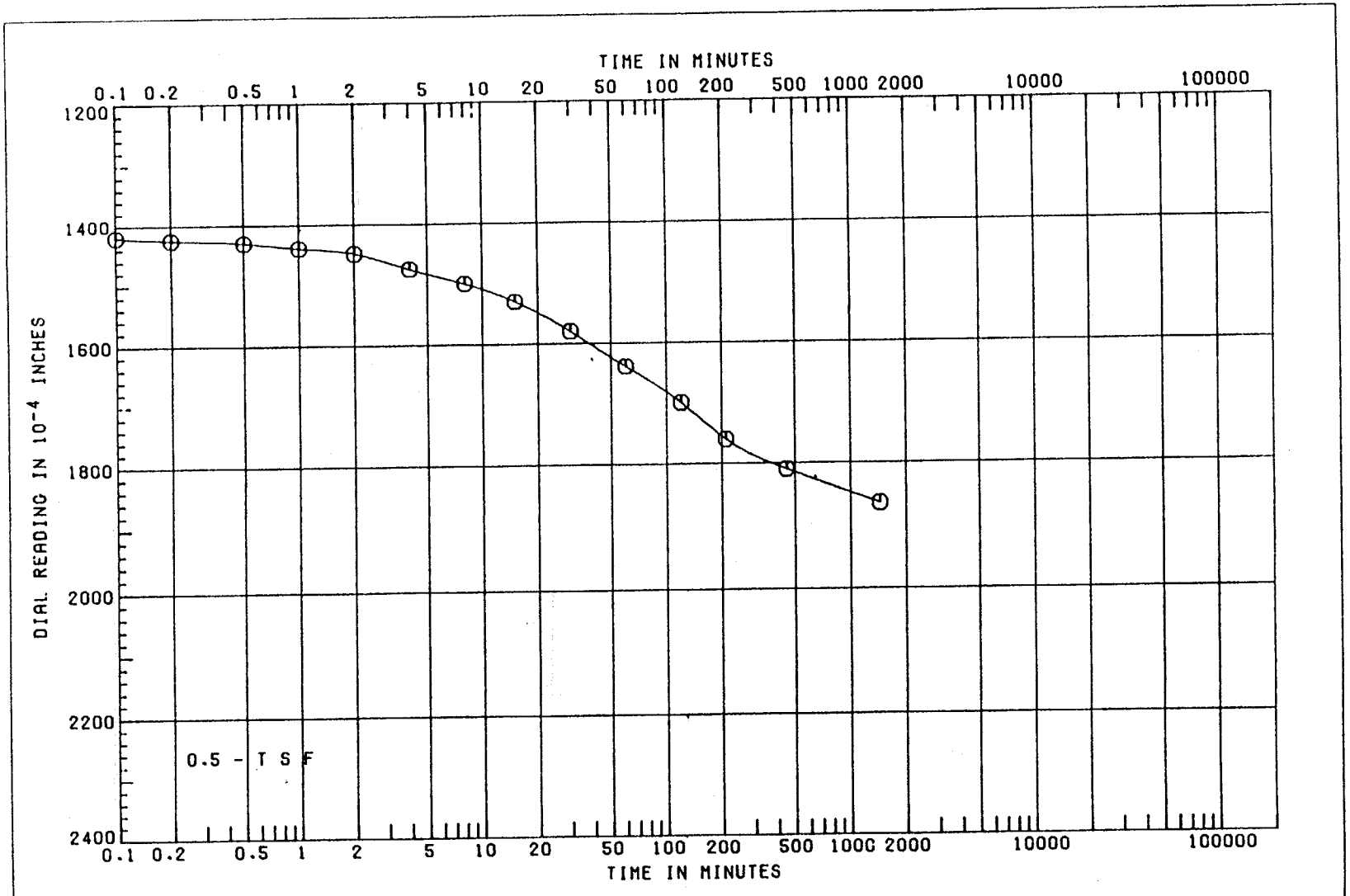
SHEET 1 OF 6



PROJECT REELFOOT LAKE STUDY	
BORING 1-RU-86	SAMPLE NO. 2
DEPTH/ELEV 6.0/7.0	DATE 12 NOV 86

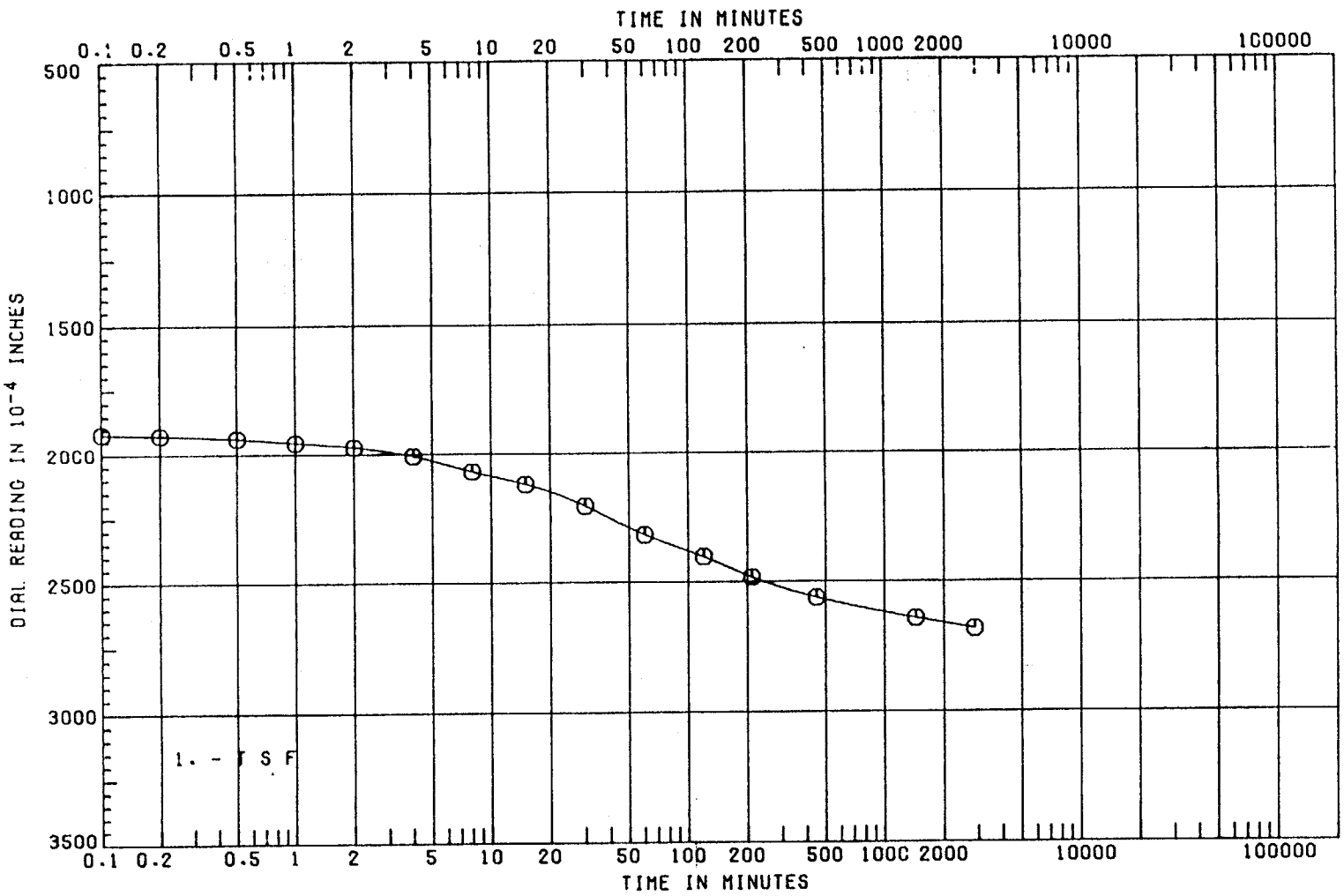
CONSOLIDATION TEST
TIME CURVES

SHEET 2 OF 6



PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 1-RU-86	SAMPLE NO. 2	
DEPTH/ELEV 6.0/7.0	DATE 12 NOV 86	

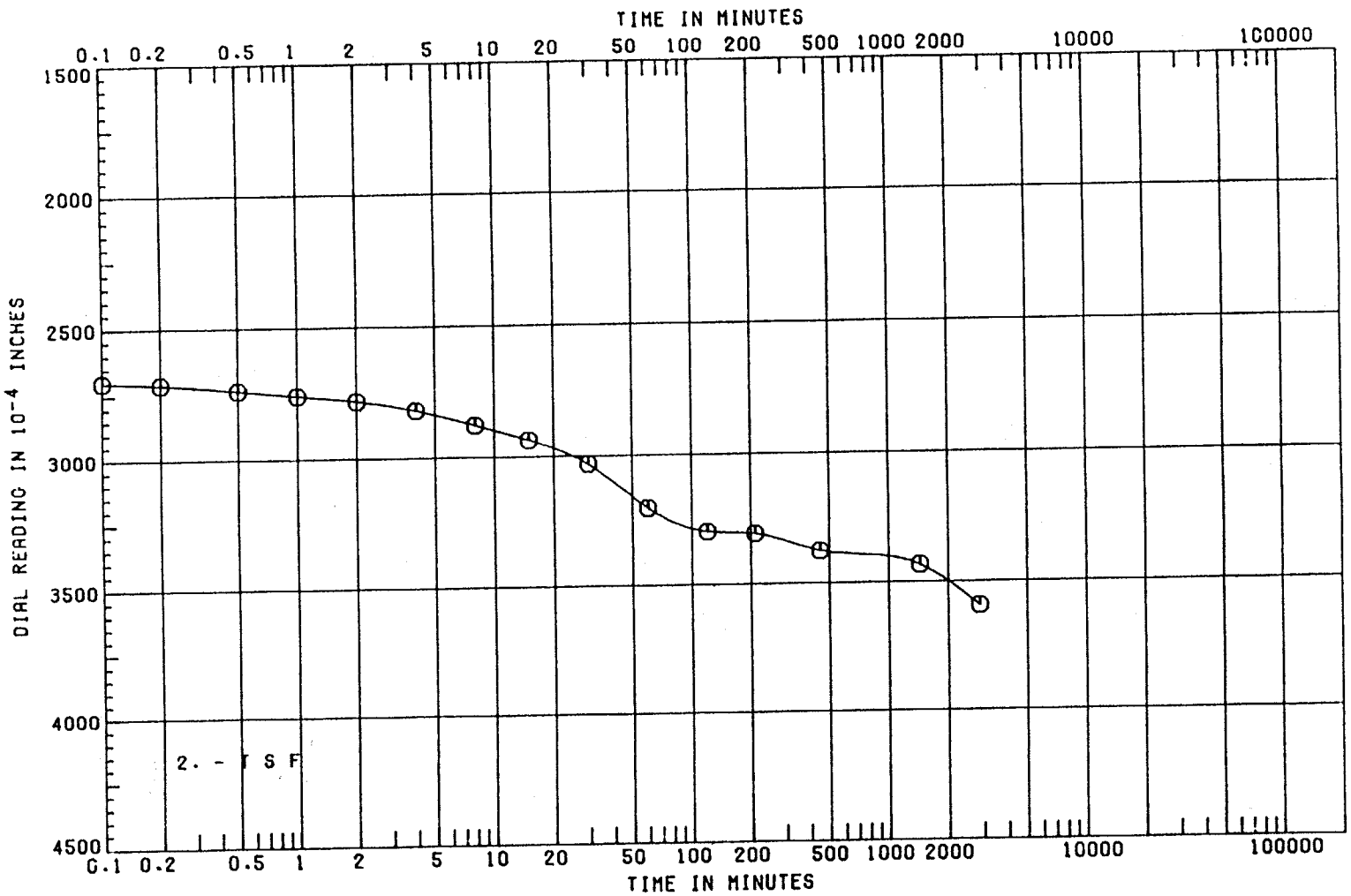
SHEET 3 OF 6



PROJECT REELFOOT LAKE STUDY	
BORING 1-RU-86	SAMPLE NO. 2
DEPTH/ELEV 6.0/7.0	DATE 12 NOV 86

CONSOLIDATION TEST
TIME CURVES

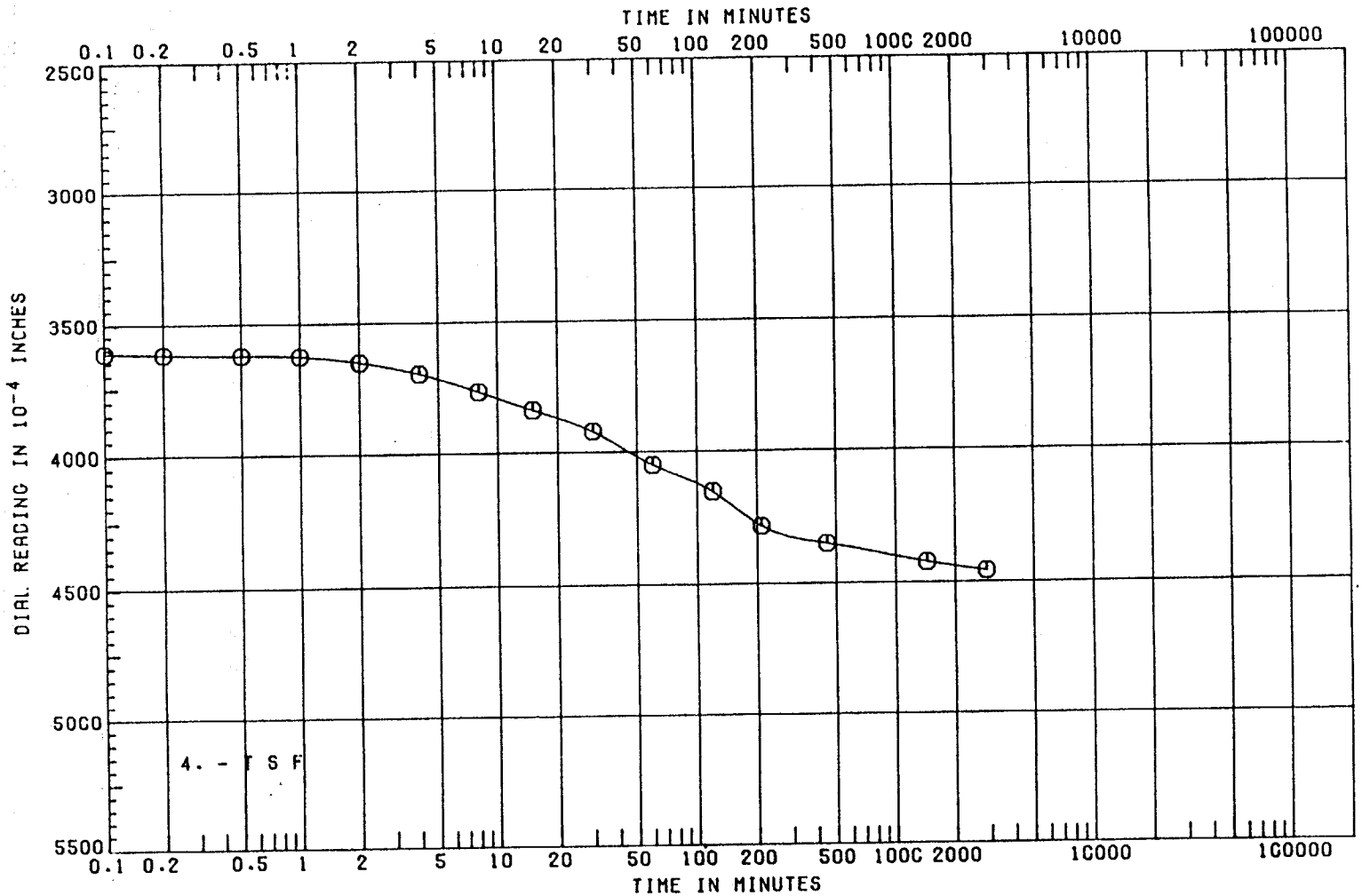
SHEET 4 OF 6



PROJECT REELFOOT LAKE STUDY	
BORING 1-RU-86	SAMPLE NO. 2
DEPTH/ELEV 6.0/7.0	DATE 12 NOV 86

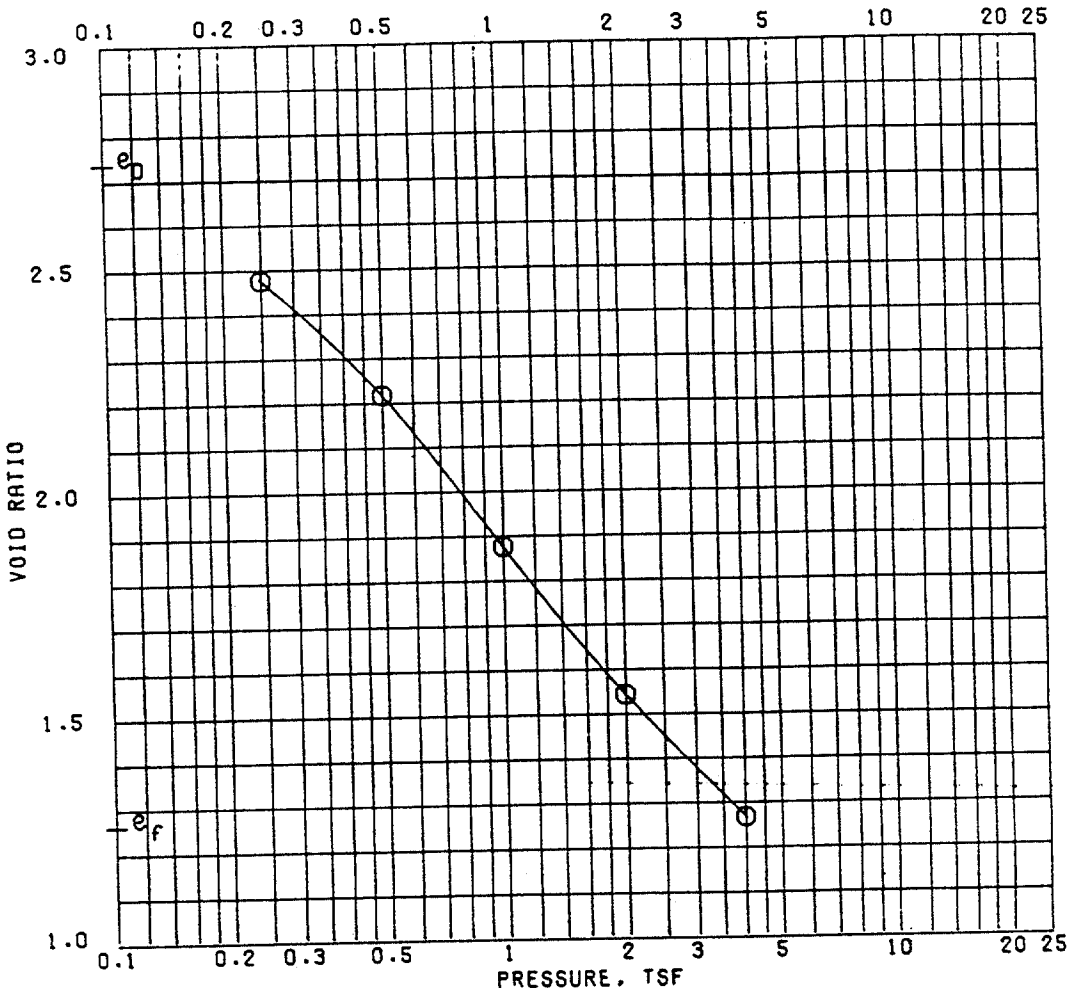
CONSOLIDATION TEST
TIME CURVES

SHEET 5 OF 6



PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 1-RU-86	SAMPLE NO. 2	
DEPTH/ELEV 6.0/7.0	DATE 12 NOV 86	

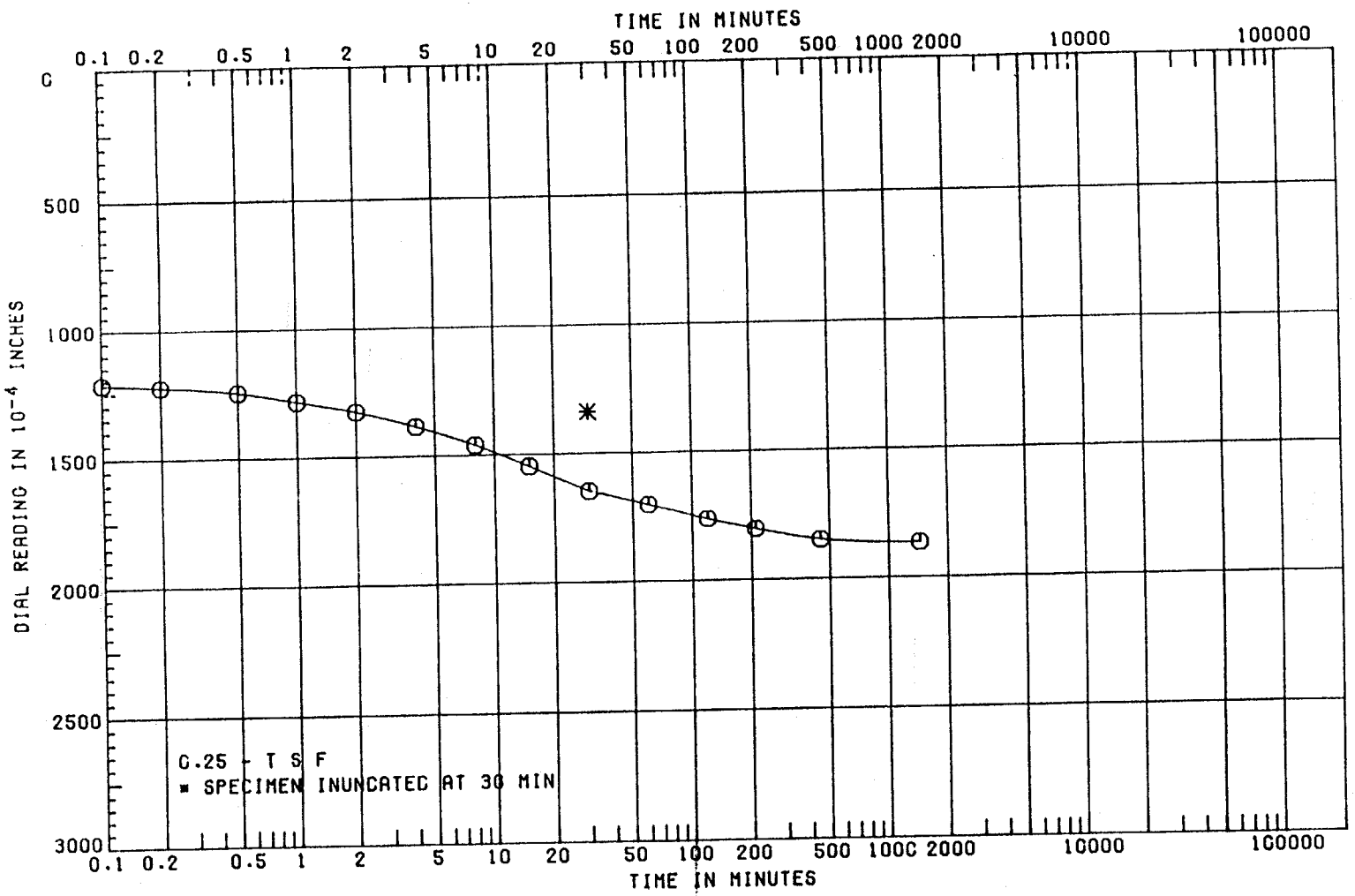
SHEET 6 OF 6



			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	100.0	50.8
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	45.2	74.6
COMPRESSION INDEX		SATURATION, %	99.8	100 +
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	2.733	1.258
DIA. IN 2.50	HT. IN 1.239	BACK PRESSURE, TSF		

CLASSIFICATION CLAY (CH), GRAY			
LL 104	PL 26	PI 78	PROJECT REELFOOT LAKE STUDY
GS 2.70 (EST)	D_{10}		
REMARKS		BORING NO. 1-RU-86	SAMPLE NO. 4
		DEPTH/ELEV 14.5/16.0	DATE 12 NOV 86
		CONSOLIDATION TEST REPORT	

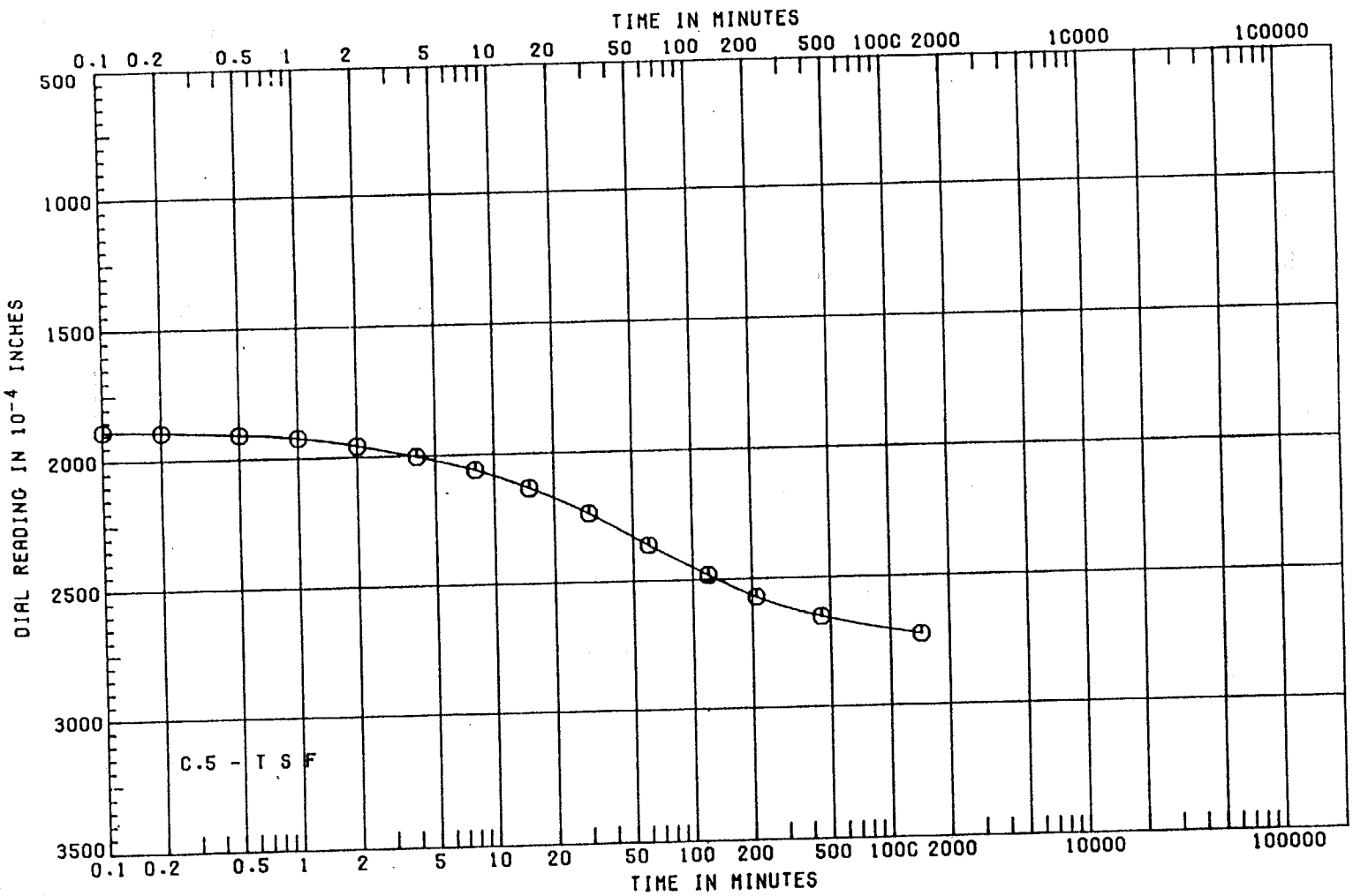
SHEET 1 OF 6



PROJECT REELFOOT LAKE STUDY	
BORING 1-RU-86	SAMPLE NO. 4
DEPTH/ELEV 14.5/16.0	DATE 12 NOV 86

CONSOLIDATION TEST
TIME CURVES

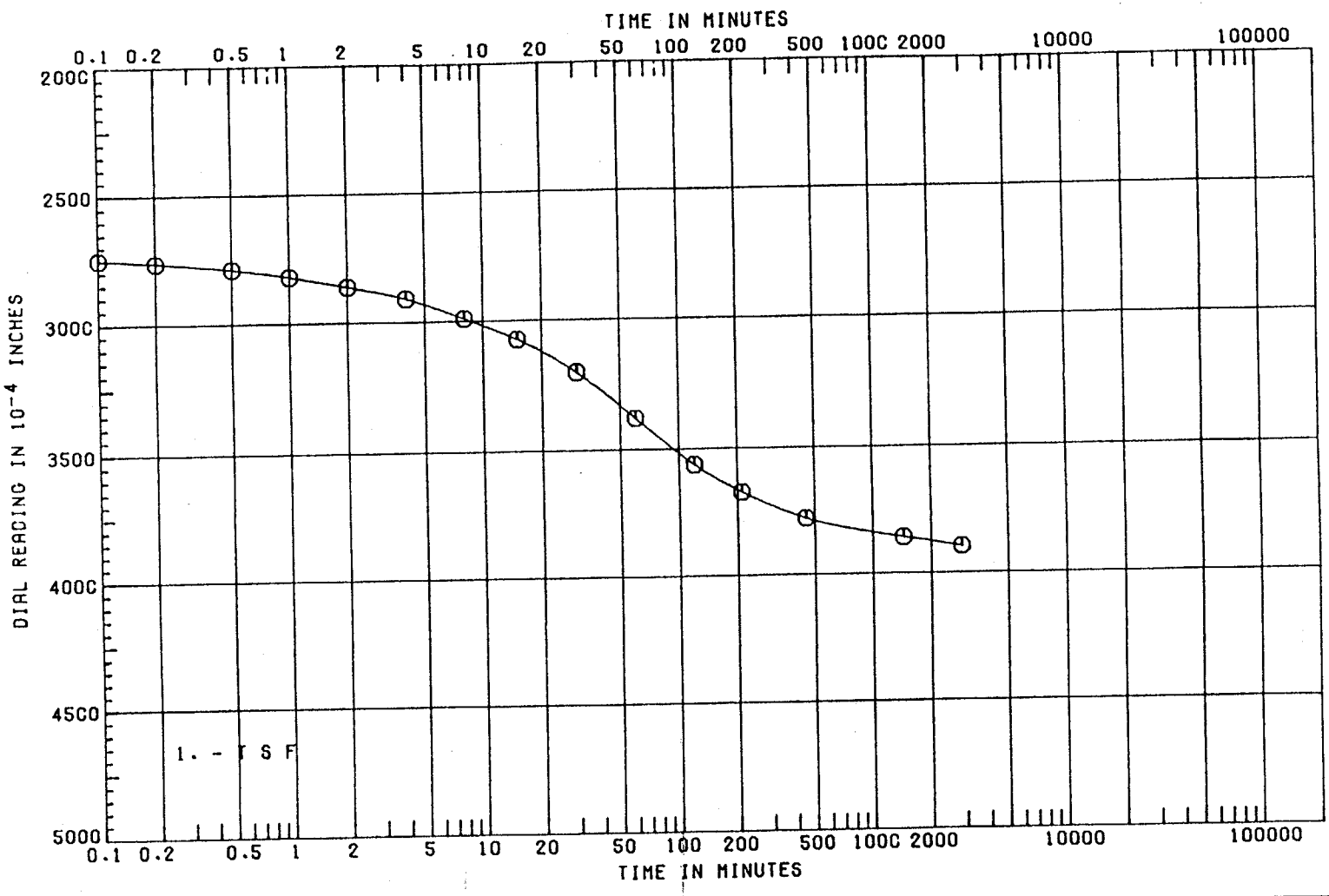
SHEET 2 OF 6



PROJECT REELFOOT LAKE STUDY	
BORING 1-RU-86	SAMPLE NO. 4
DEPTH/ELEV 14.5/16.0	DATE 12 NOV 86

CONSOLIDATION TEST
TIME CURVES

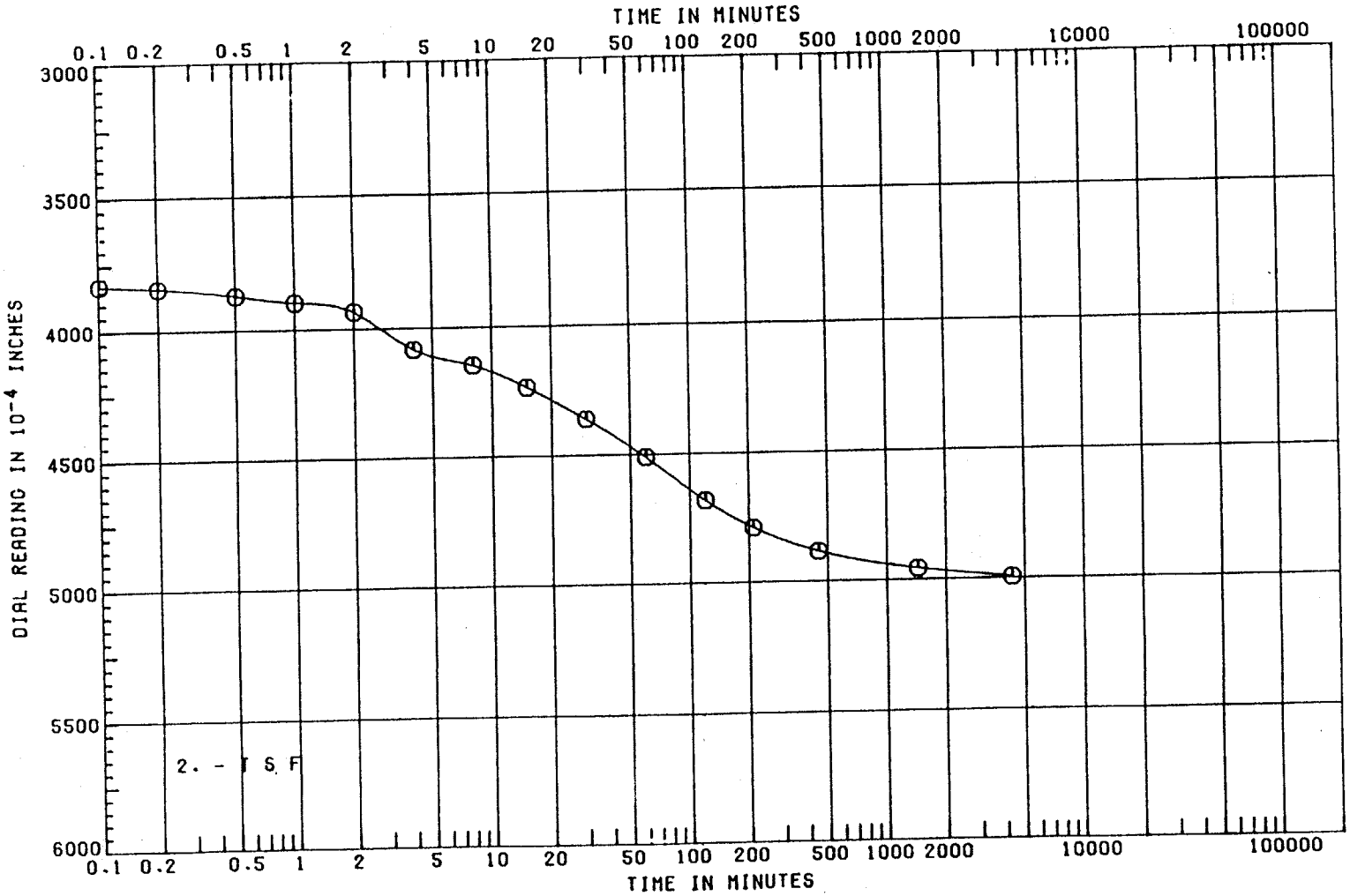
SHEET 3 OF 6



PROJECT REELFOOT LAKE STUDY	
BORING 1-RU-86	SAMPLE NO. 4
DEPTH/ELEV 14.5/16.0	DATE 12 NOV 86

CONSOLIDATION TEST
TIME CURVES

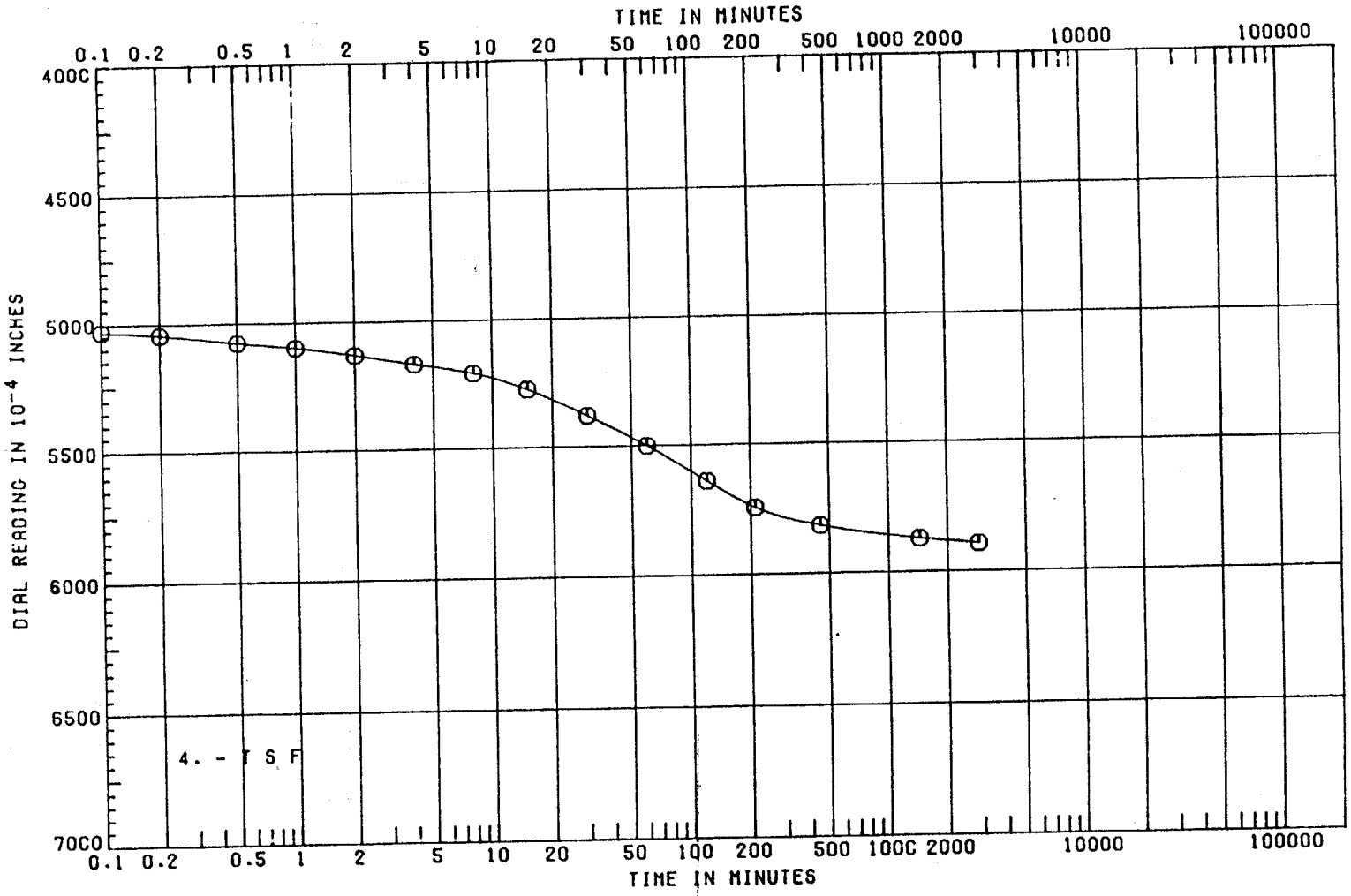
SHEET 4 OF 6



PROJECT REELFOOT LAKE STUDY	
BORING 1-RU-86	SAMPLE NO. 4
DEPTH/ELEV 14.5/16.0	DATE 12 NOV 86

CONSOLIDATION TEST
TIME CURVES

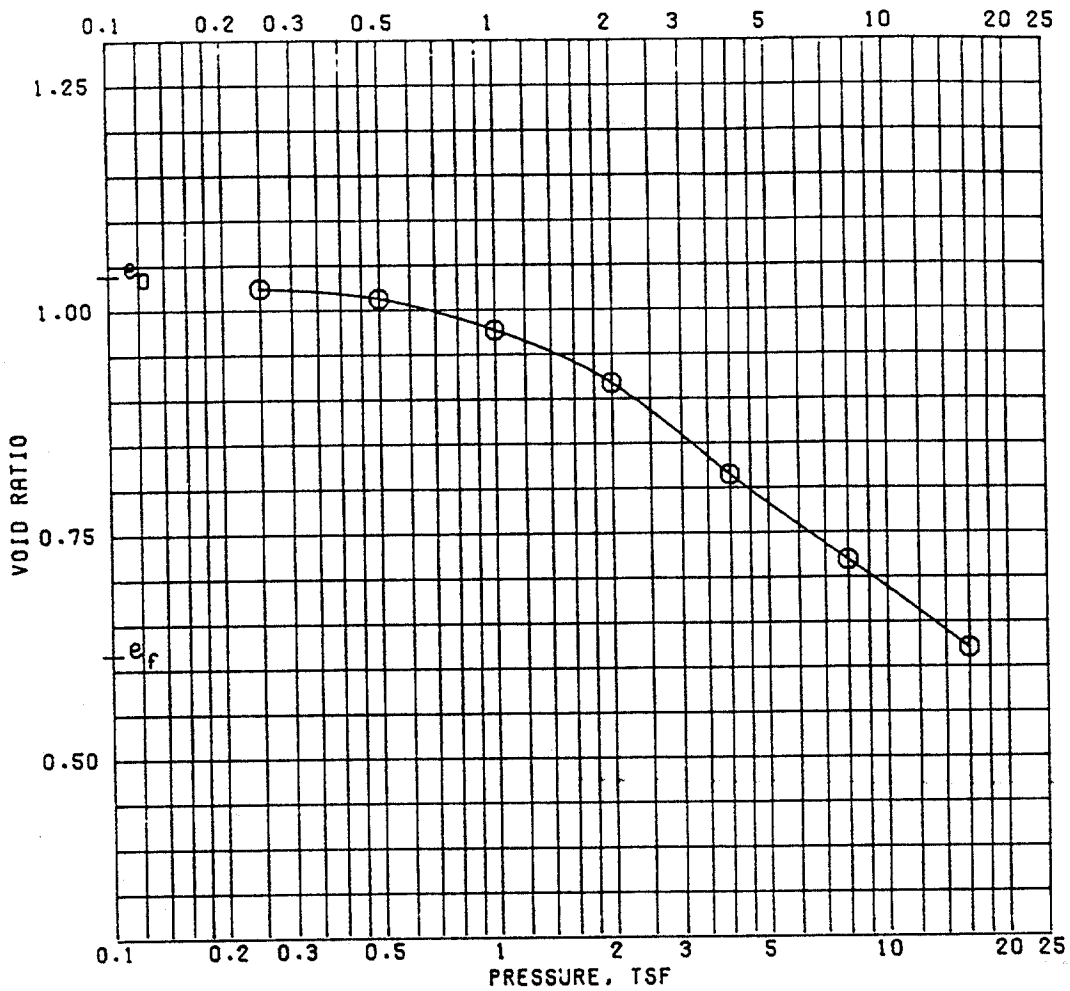
SHEET 5 OF 6



PROJECT REELFOOT LAKE STUDY	
BORING 1-RU-86	SAMPLE NO. 4
DEPTH/ELEV 14.5/16.0	DATE 12 NOV 86

CONSOLIDATION TEST
TIME CURVES

SHEET 6 OF 6



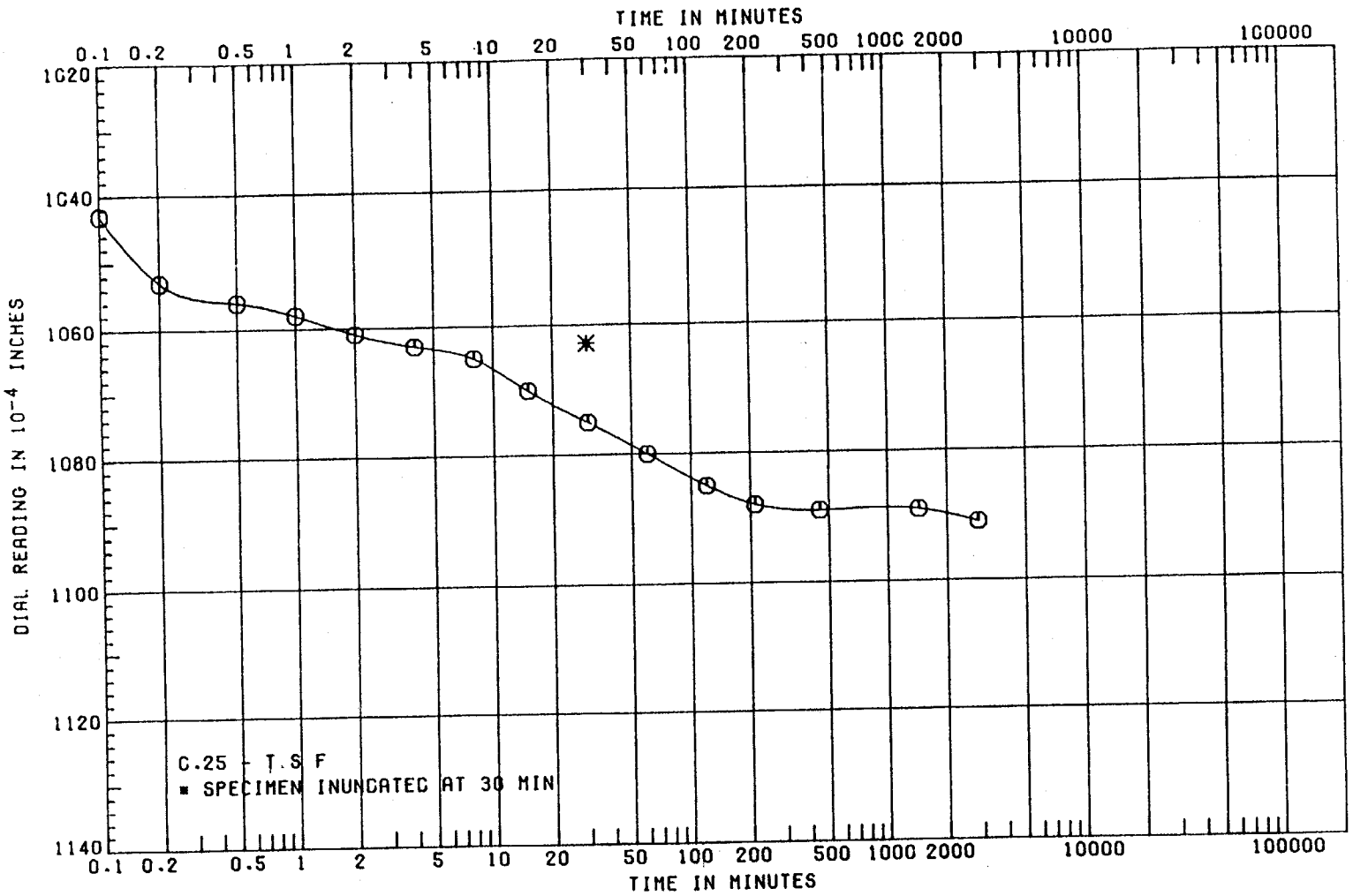
			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	38.5	24.9
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	82.8	104.4
COMPRESSION INDEX		SATURATION, %	100 +	100 +
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	1.037	0.615
DIA. IN 2.50	HT. IN 1.241	BACK PRESSURE, TSF		

CLASSIFICATION CLAY (CH), GRAY

LL 61	PL 20	PI 41	PROJECT REELFOOT LAKE STUDY
GS 2.70 (EST)	D_{10}		

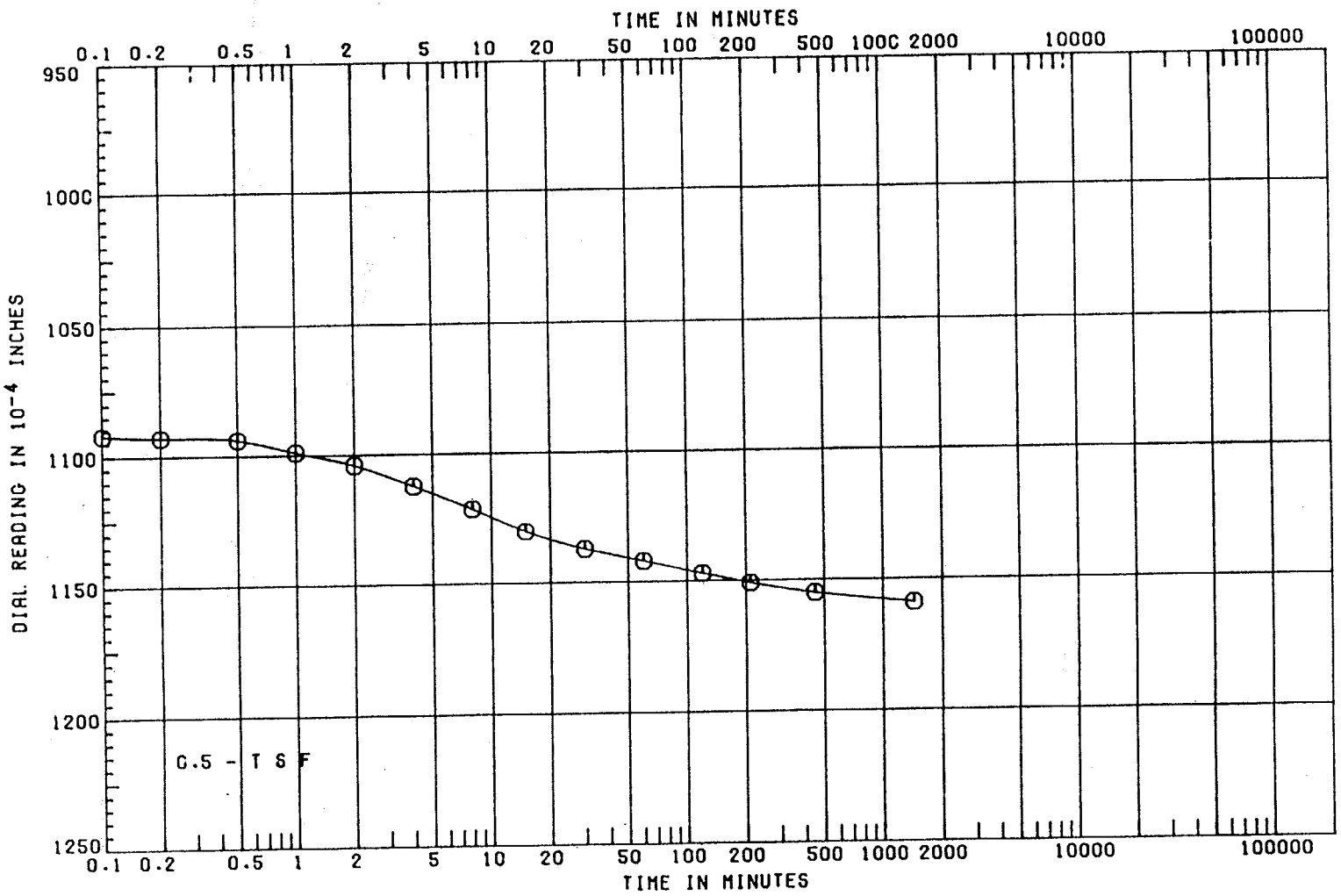
REMARKS	BORING NO. 2-RU-86	SAMPLE NO. 2
	DEPTH/ELEV 5.8/6.5	DATE 12 NOV 86
	CONSOLIDATION TEST REPORT	

SHEET 1 OF 8



PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 2-RU-86	SAMPLE NO. 2	
DEPTH/ELEV 5.8/6.5	DATE 12 NOV 86	

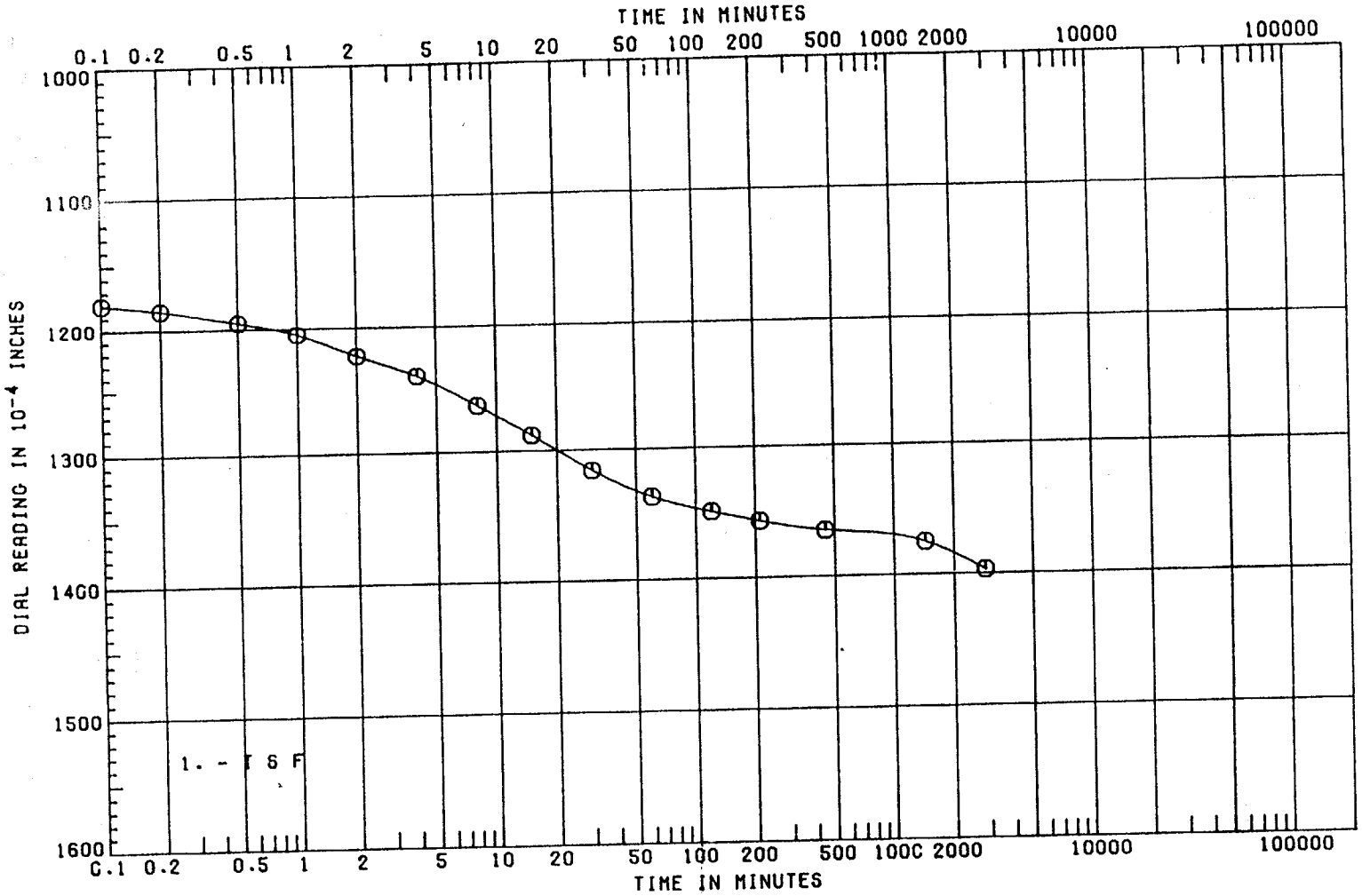
SHEET 2 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 2-RU-86	SAMPLE NO. 2
DEPTH/ELEV 5.8/6.5	DATE 12 NOV 86

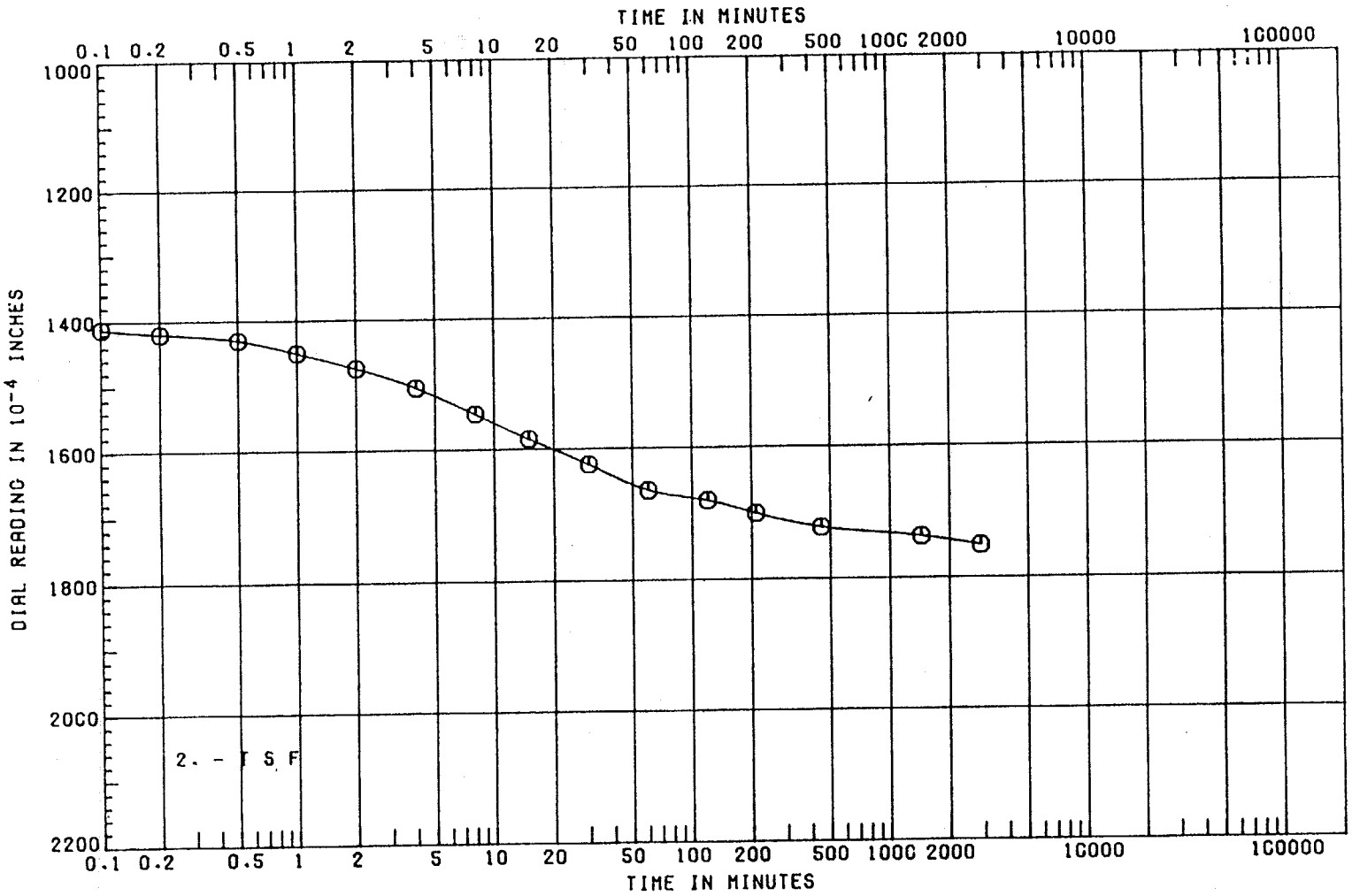
CONSOLIDATION TEST
TIME CURVES

SHEET 3 OF 8



PROJECT REELFOOT LAKE STUDY	CONSOLIDATION TEST TIME CURVES
BORING 2-RU-86	SAMPLE NO. 2
DEPTH/ELEV 5.8/6.5	DATE 12 NOV 86

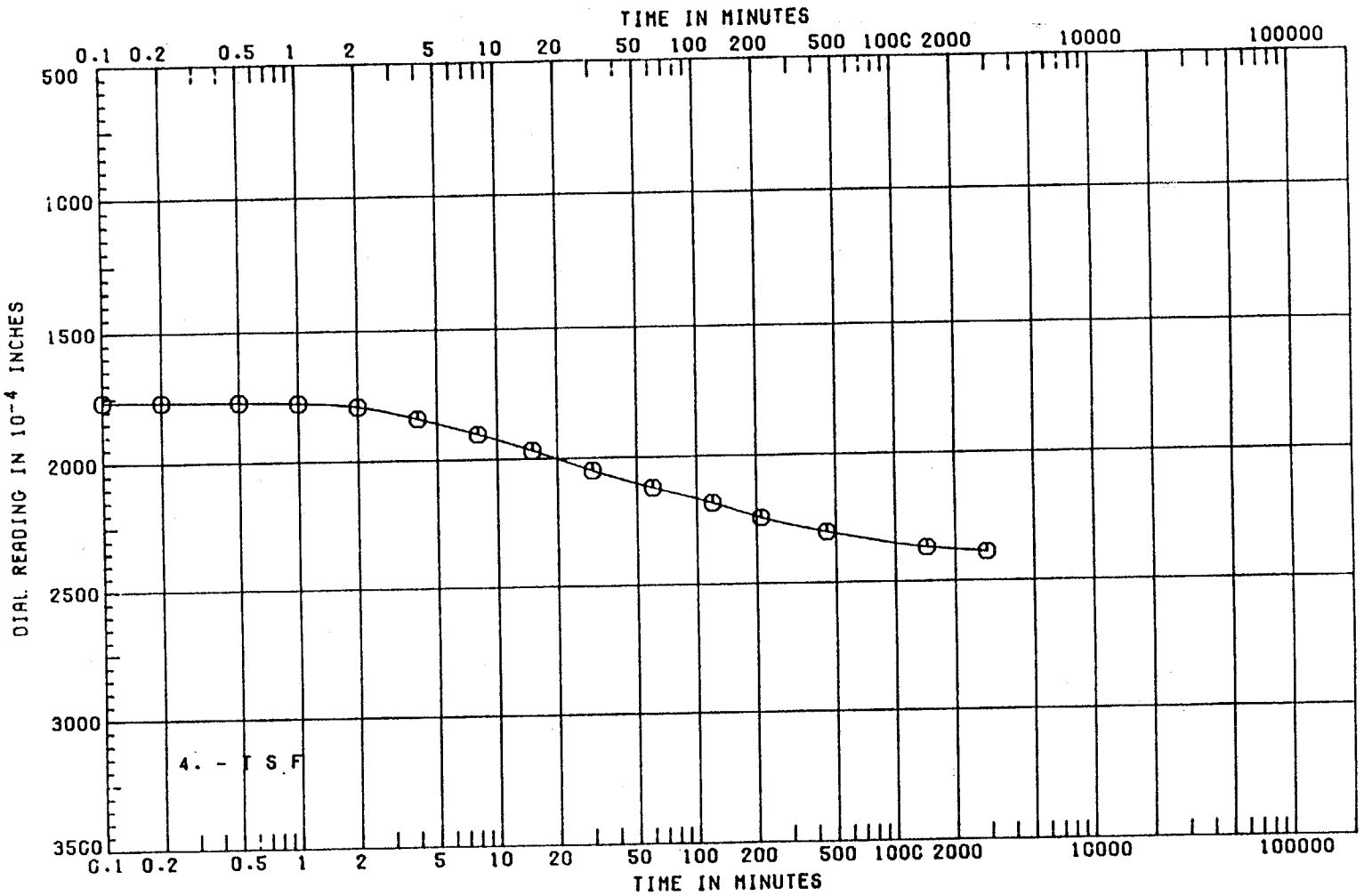
SHEET 4 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 2-RU-86	SAMPLE NO. 2
DEPTH/ELEV 5.8/6.5	DATE 12 NOV 86

CONSOLIDATION TEST
TIME CURVES

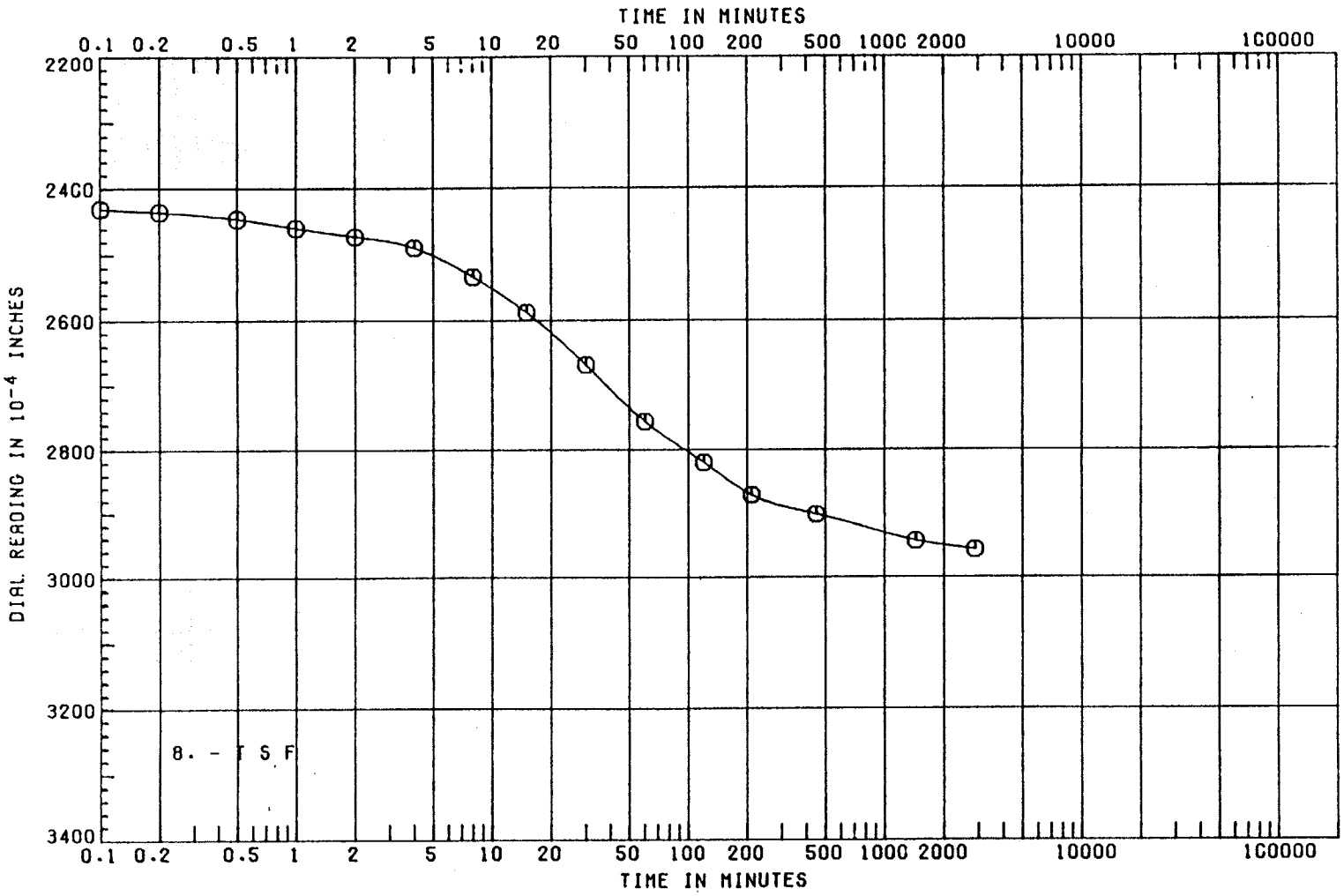
SHEET 5 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 2-RU-86	SAMPLE NO. 2
DEPTH/ELEV 5.8/6.5	DATE 12 NOV 86

CONSOLIDATION TEST
TIME CURVES

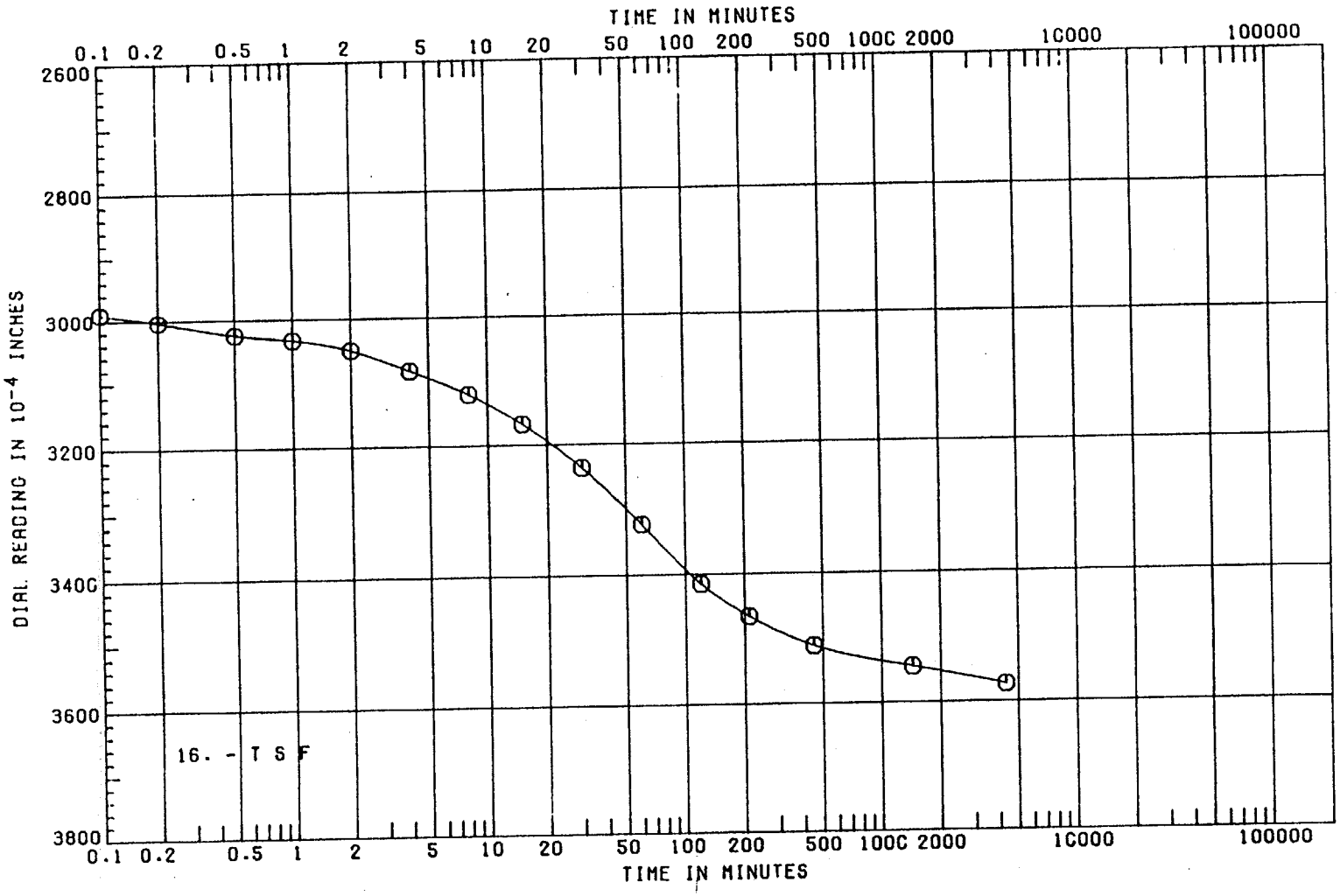
SHEET 6 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 2-RU-86	SAMPLE NO. 2
DEPTH/ELEV 5.8/6.5	DATE 12 NOV 86

CONSOLIDATION TEST
TIME CURVES

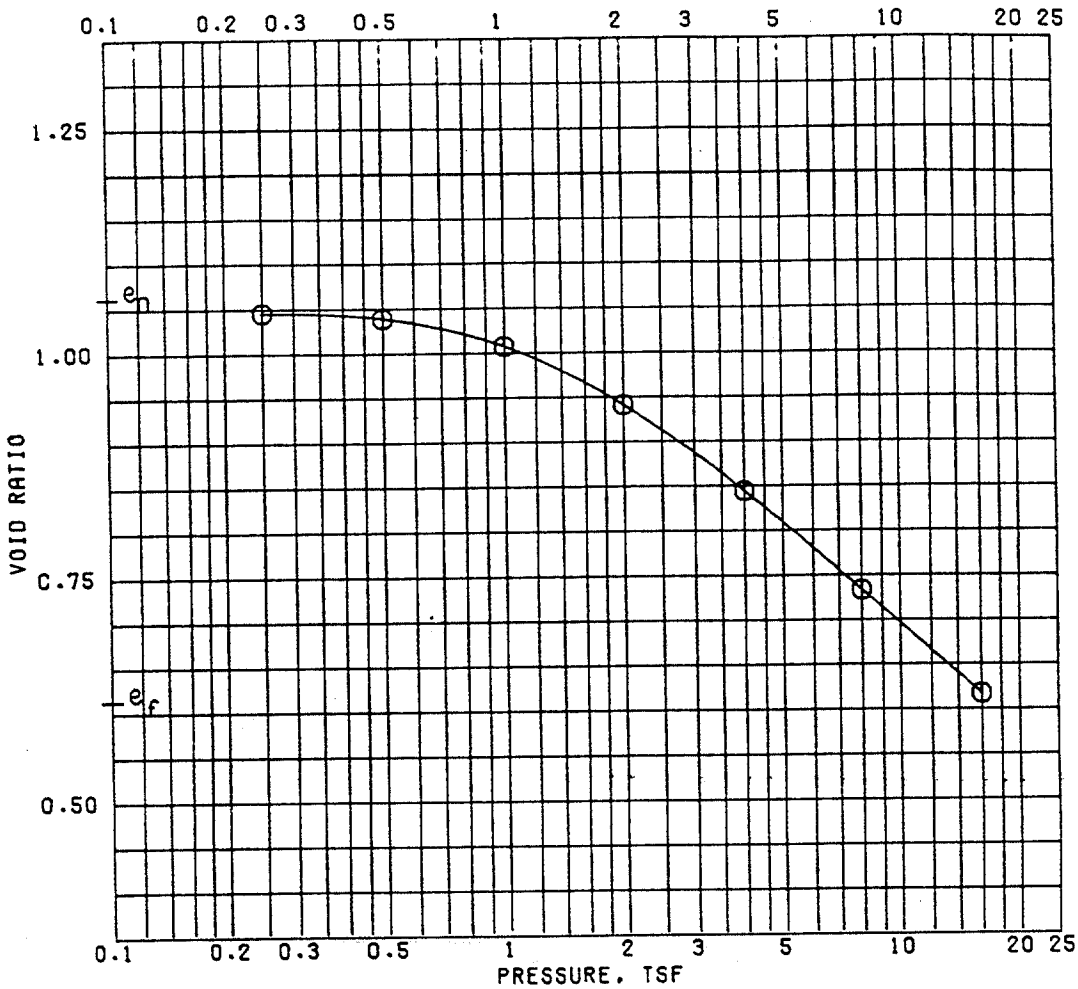
SHEET 7 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 2-RU-86	SAMPLE NO. 2
DEPTH/ELEV 5.8/6.5	DATE 12 NOV 86

CONSOLIDATION TEST
TIME CURVES

SHEET 8 OF 8



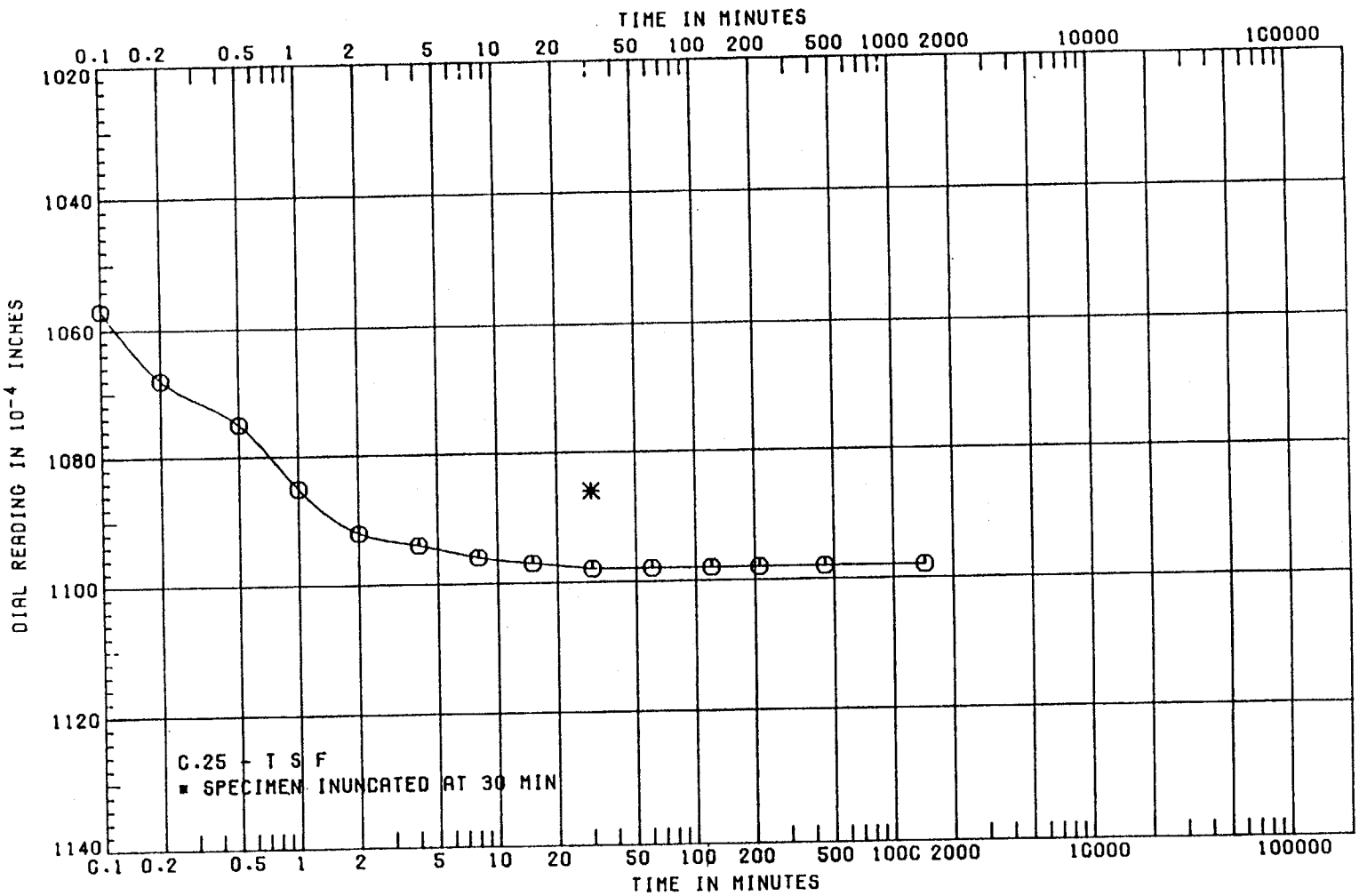
			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	38.2	26.2
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	81.8	104.6
COMPRESSION INDEX		SATURATION, %	97.4	100 +
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	1.060	0.611
DIA. IN 2.50	HT. IN 1.264	BACK PRESSURE, TSF		

CLASSIFICATION CLAY (CH), GRAY; DECAYED WOOD

LL 68	PL 20	PI 48	PROJECT REELFOOT LAKE STUDY
GS 2.70 (EST)	D_{10}		
REMARKS		BORING NO. 2-RU-86	SAMPLE NO. 3
		DEPTH/ELEV 11.2/12.0	DATE 12 NOV 86

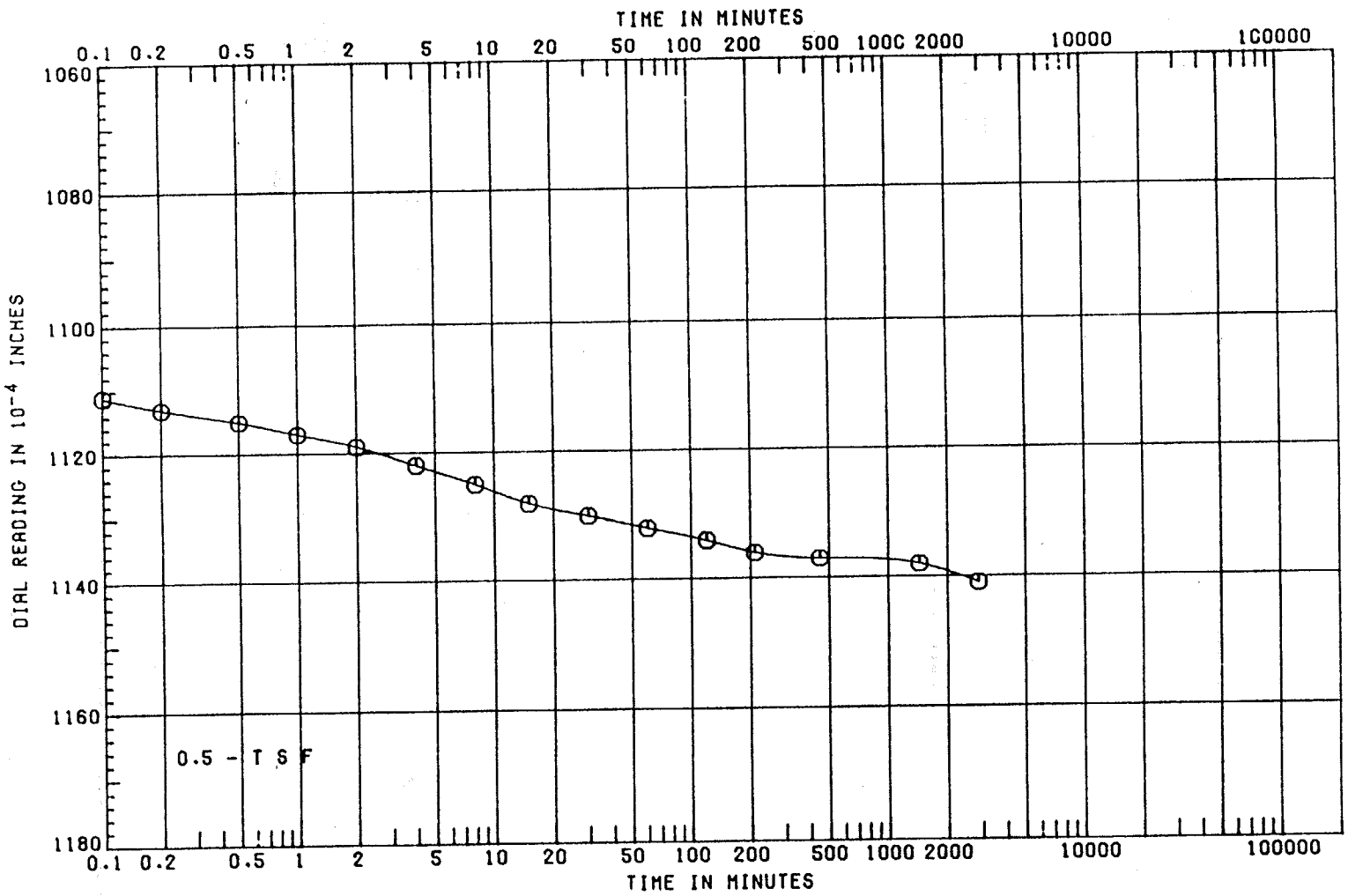
CONSOLIDATION TEST REPORT

SHEET 1 OF 8



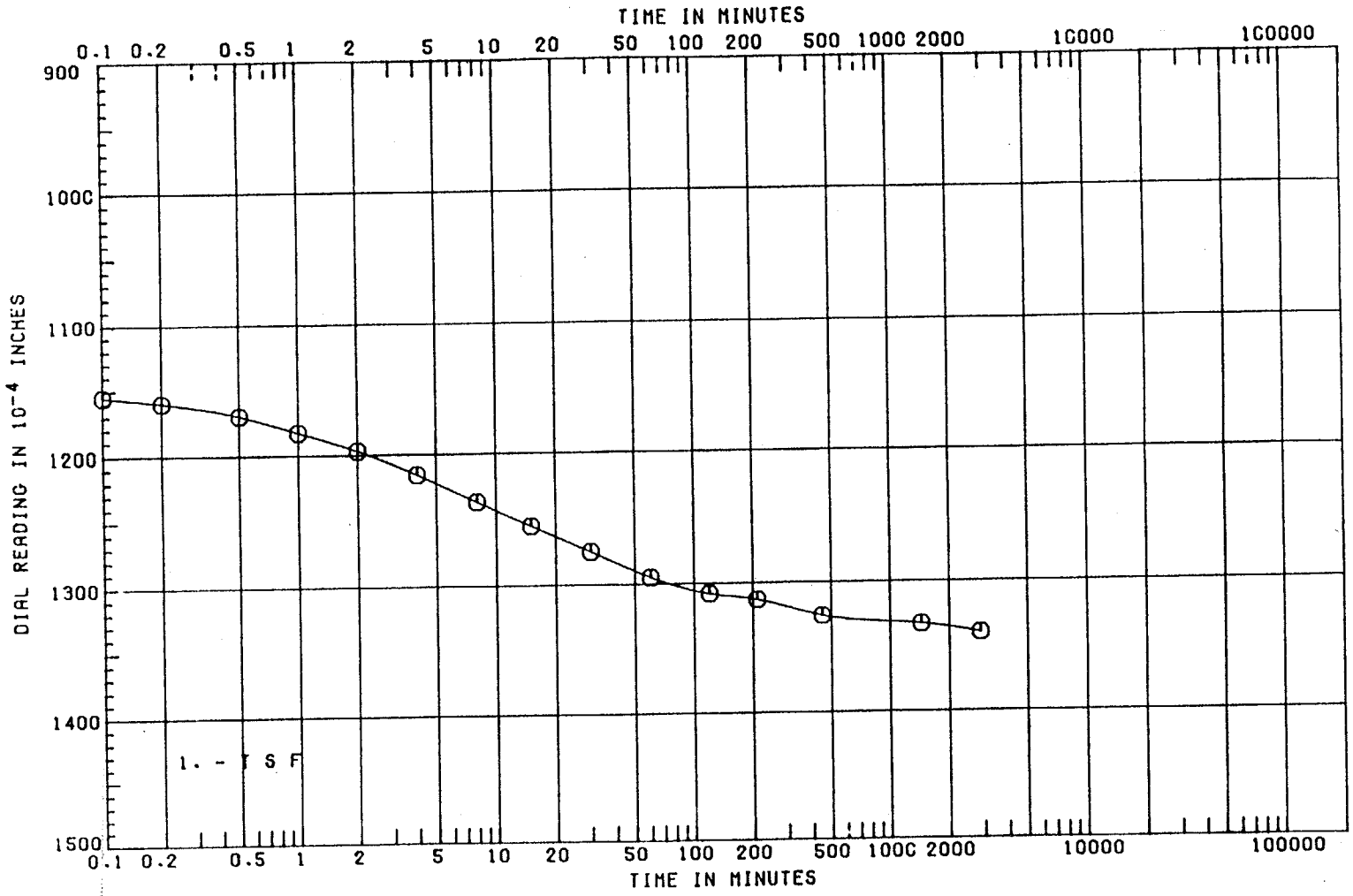
PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 2-RU-86	SAMPLE NO. 3	
DEPTH/ELEV 11.2/12.0	DATE 12 NOV 86	

SHEET 2 OF 8



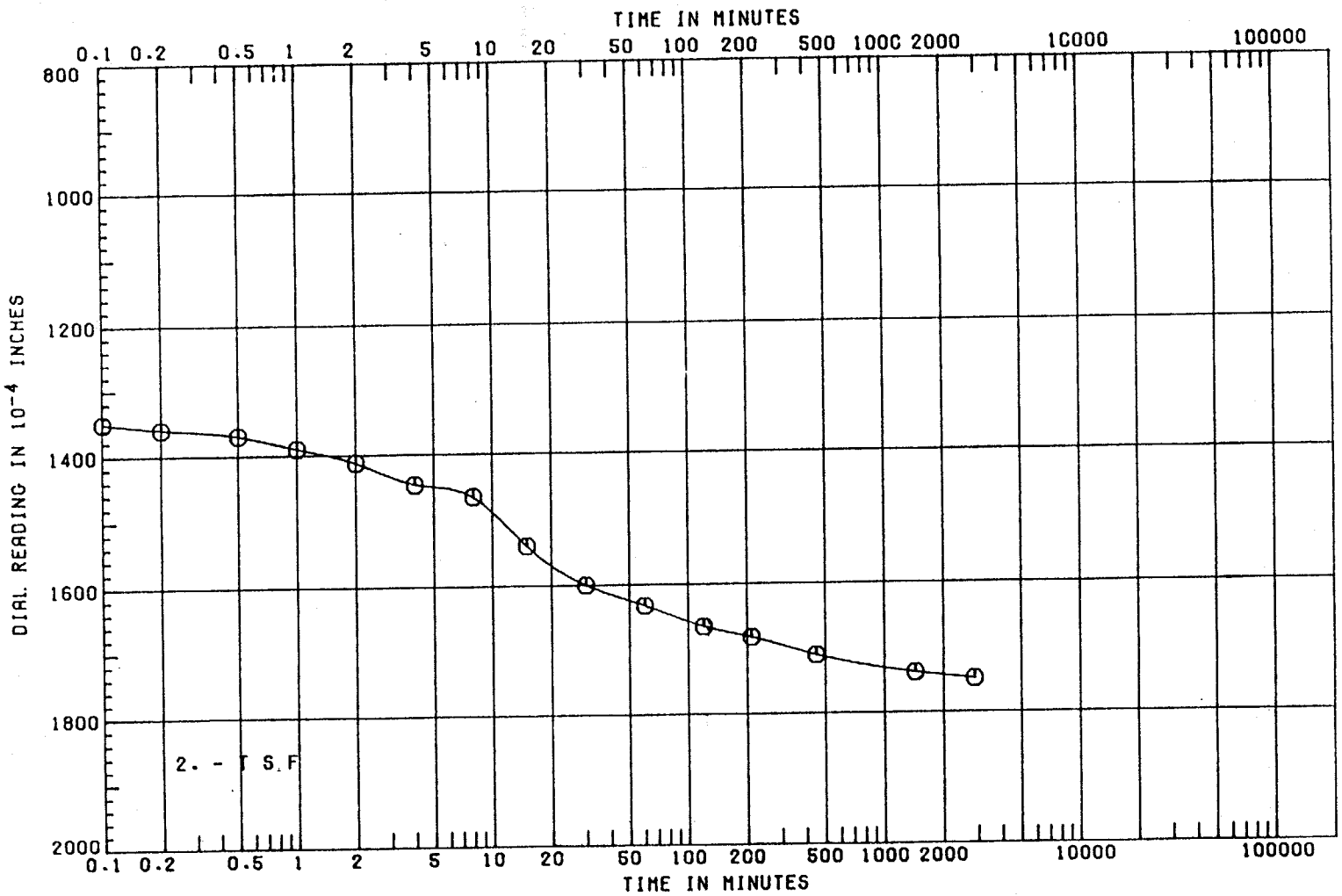
PROJECT REELFOOT LAKE STUDY	CONSOLIDATION TEST TIME CURVES
BORING 2-RU-86	SAMPLE NO. 3
DEPTH/ELEV 11.2/12.0	DATE 12 NOV 86

SHEET 3 OF 8



PROJECT REELFOOT LAKE STUDY	CONSOLIDATION TEST TIME CURVES
BORING 2-RU-86	SAMPLE NO. 3
DEPTH/ELEV 11.2/12.0	DATE 12 NOV 86

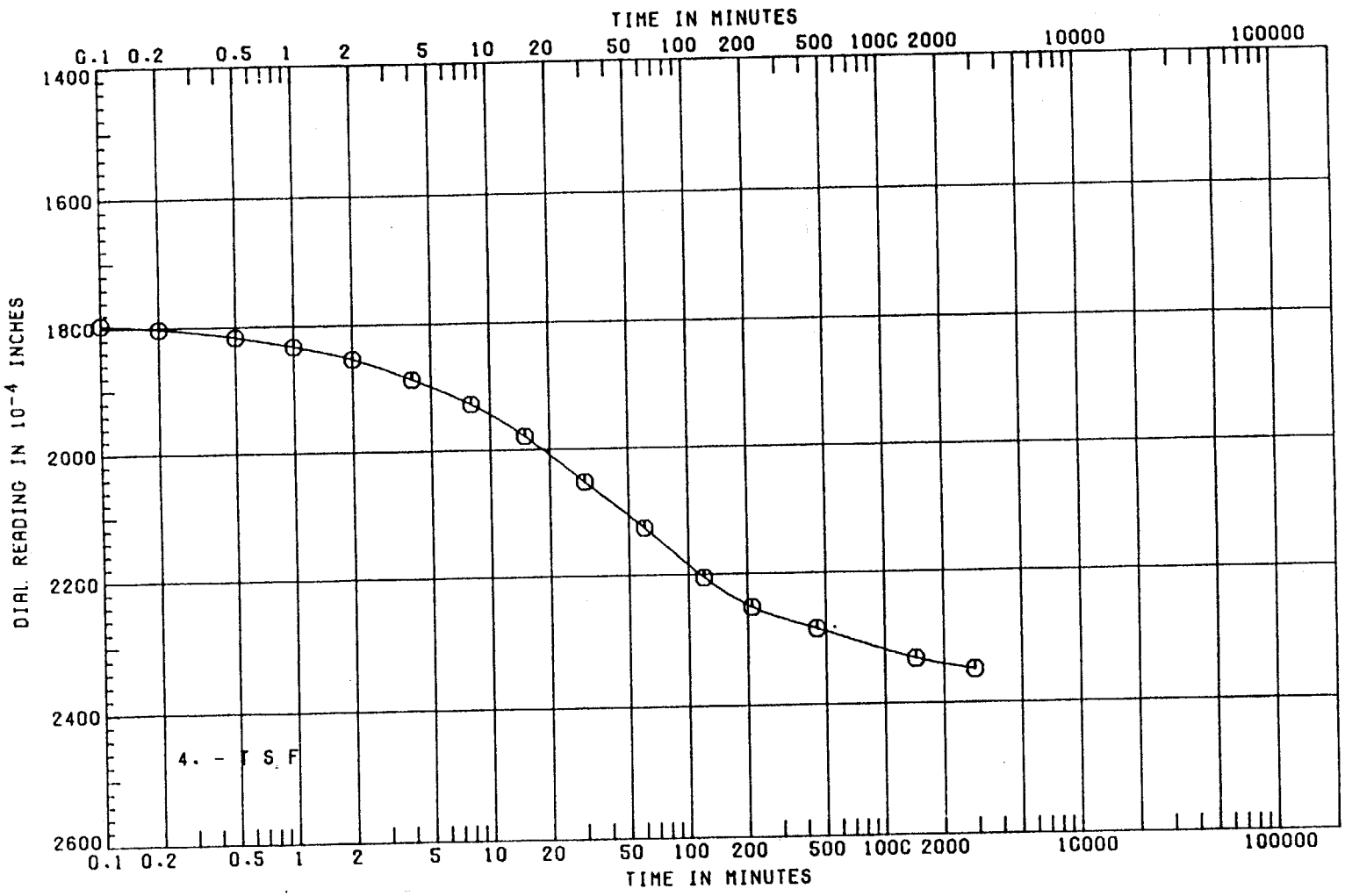
SHEET 4 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 2-RU-86	SAMPLE NO. 3
DEPTH/ELEV 11.2/12.0	DATE 12 NOV 86

CONSOLIDATION TEST
TIME CURVES

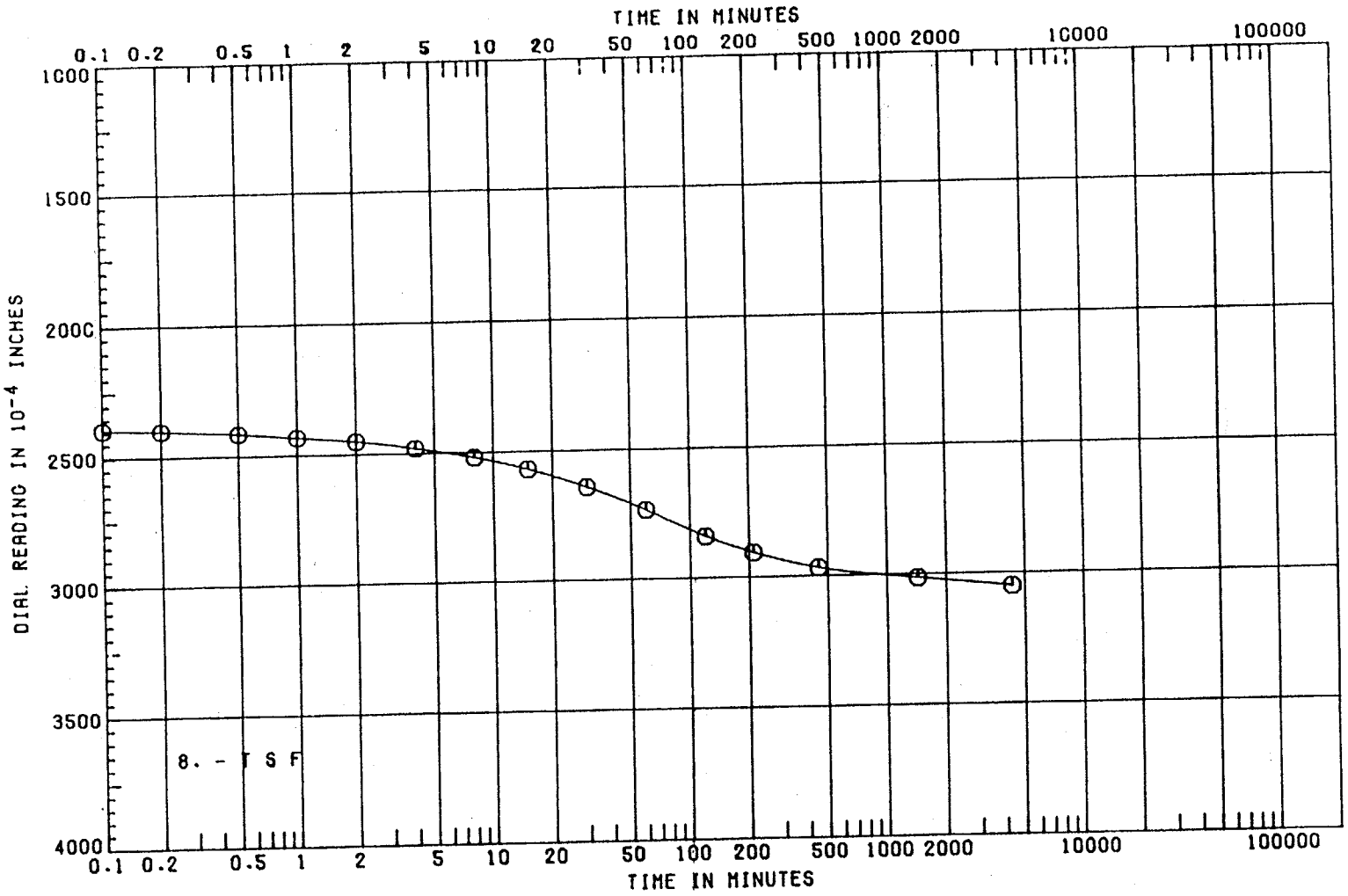
SHEET 5 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 2-RU-86	SAMPLE NO. 3
DEPTH/ELEV 11.2/12.0	DATE 12 NOV 86

CONSOLIDATION TEST
TIME CURVES

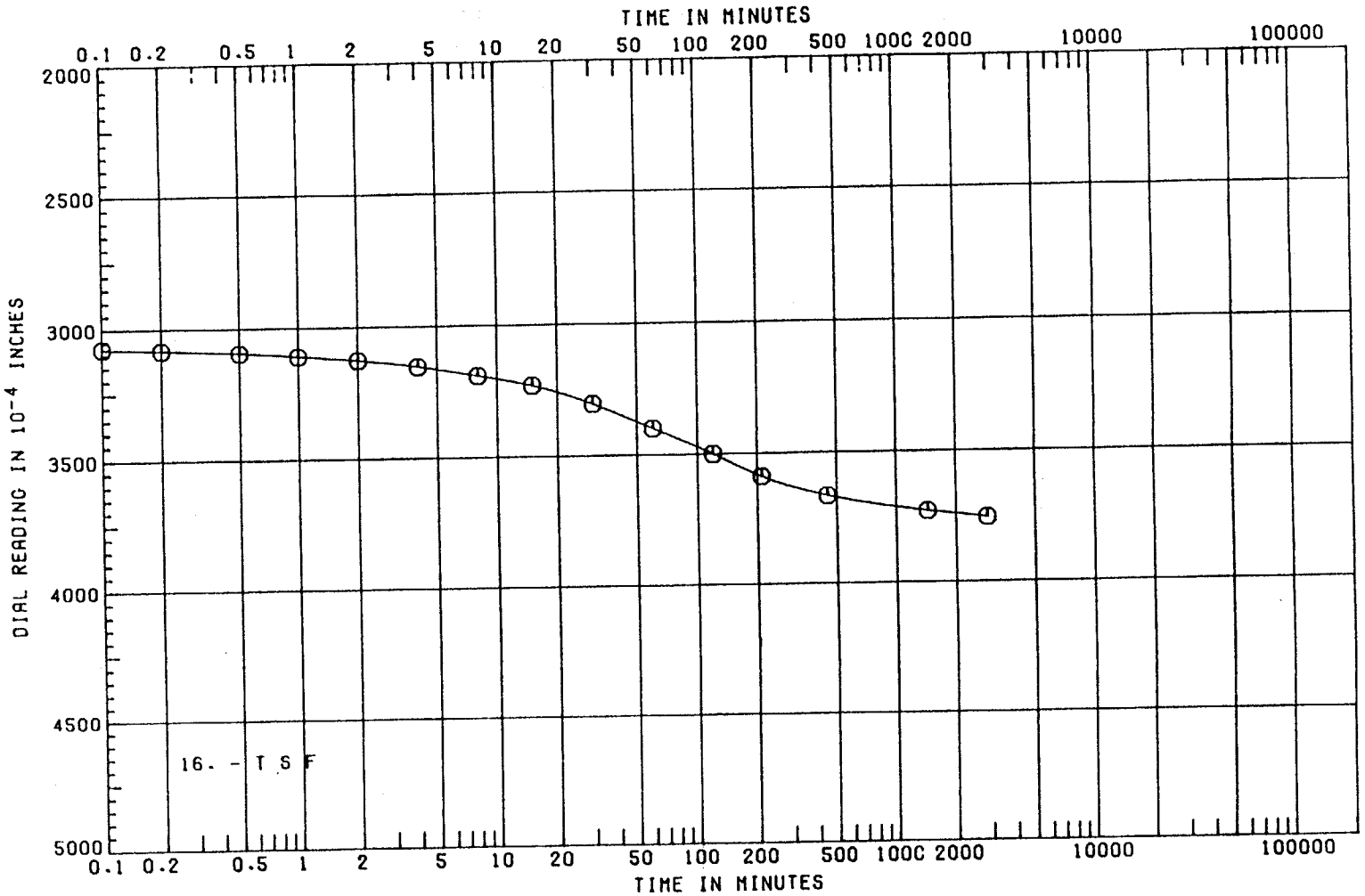
SHEET 6 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 2-RU-86	SAMPLE NO. 3
DEPTH/ELEV 11.2/12.0	DATE 12 NOV 86

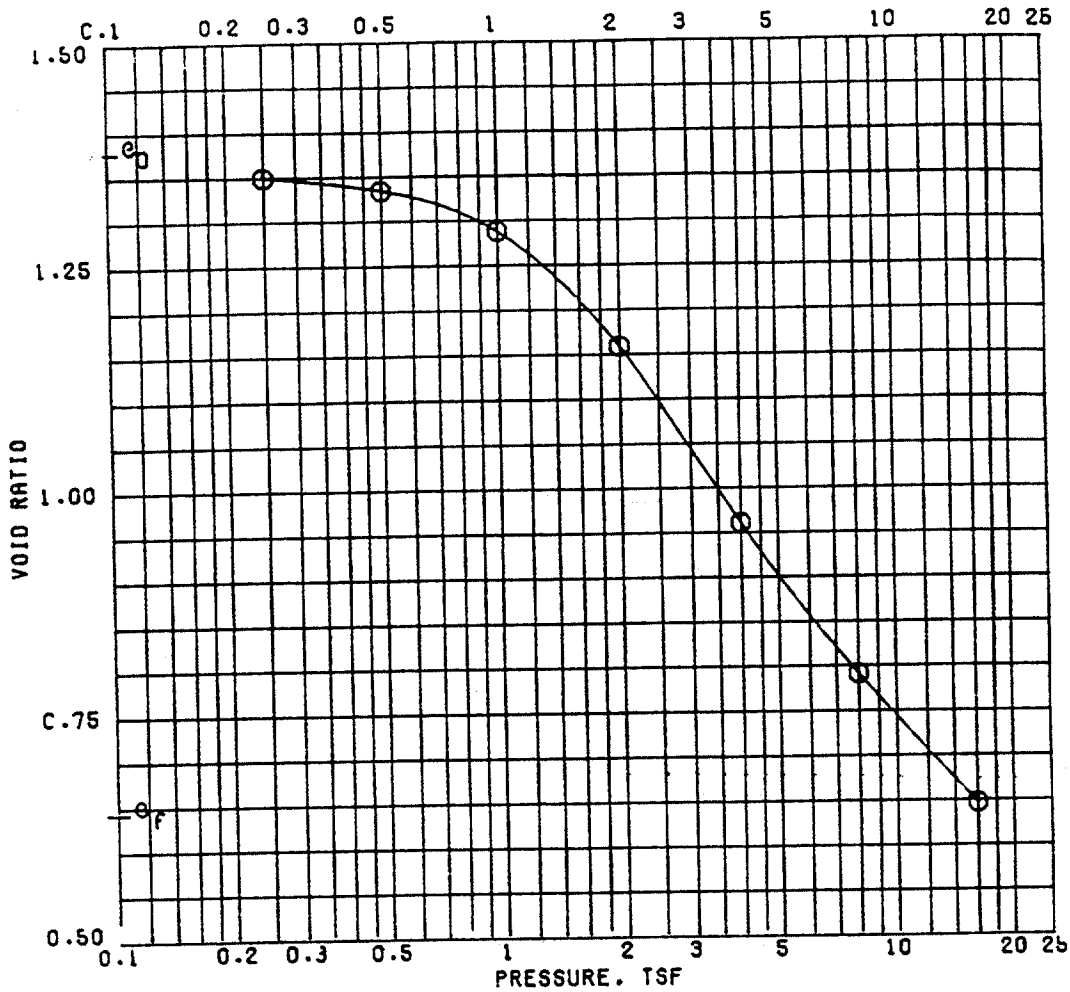
CONSOLIDATION TEST
TIME CURVES

SHEET 7 OF 8



PROJECT REELFOOT LAKE STUDY	CONSOLIDATION TEST TIME CURVES
BORING 2-RU-86	SAMPLE NO. 3
DEPTH/ELEV 11.2/12.0	DATE 12 NOV 86

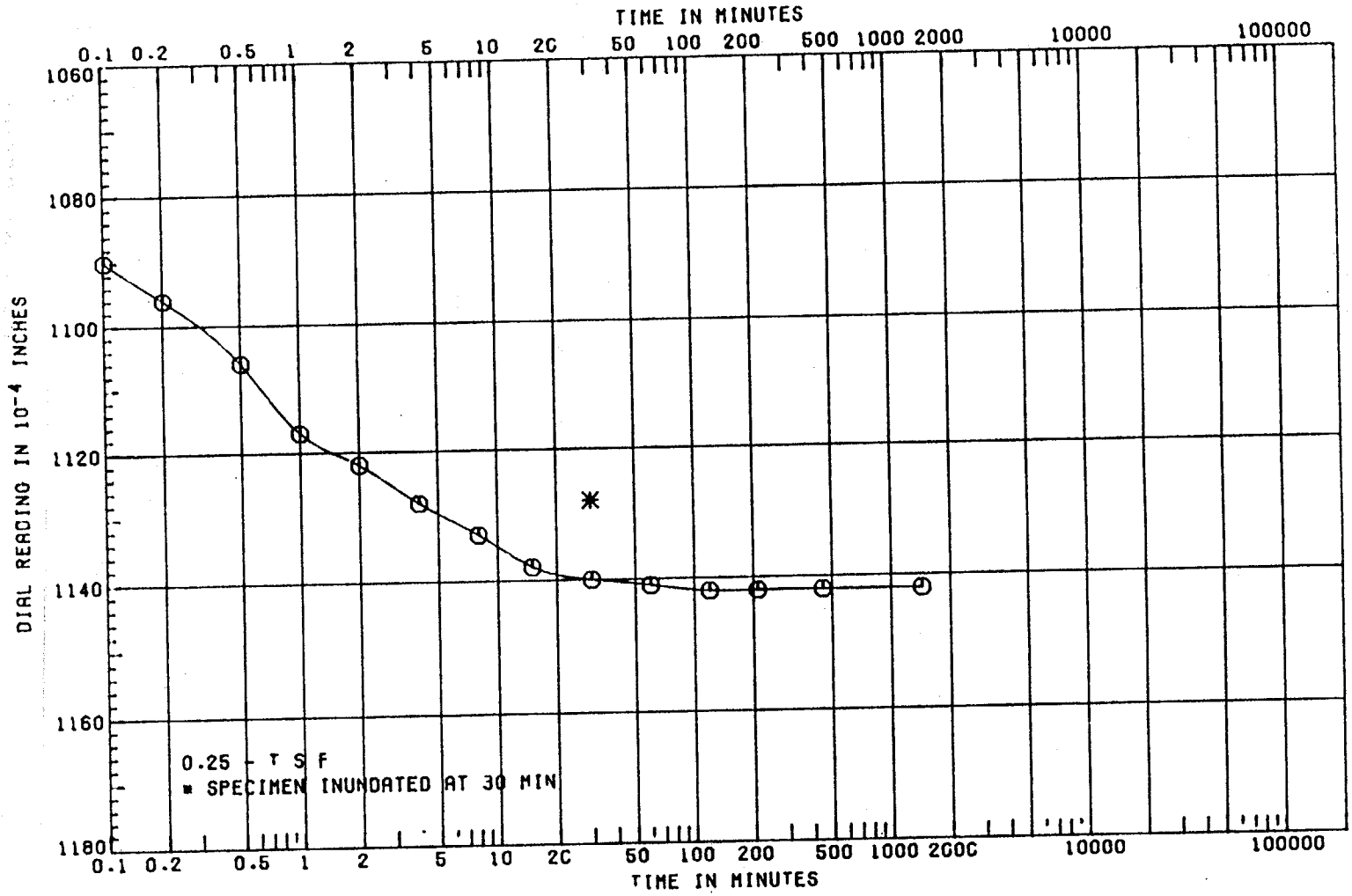
SHEET 8 OF 8



			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	50.6	27.1
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	71.0	102.7
COMPRESSION INDEX		SATURATION, %	99.4	76.4
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	1.375	0.641
DIA. IN 2.50	HT. IN 1.215	BACK PRESSURE, TSF		

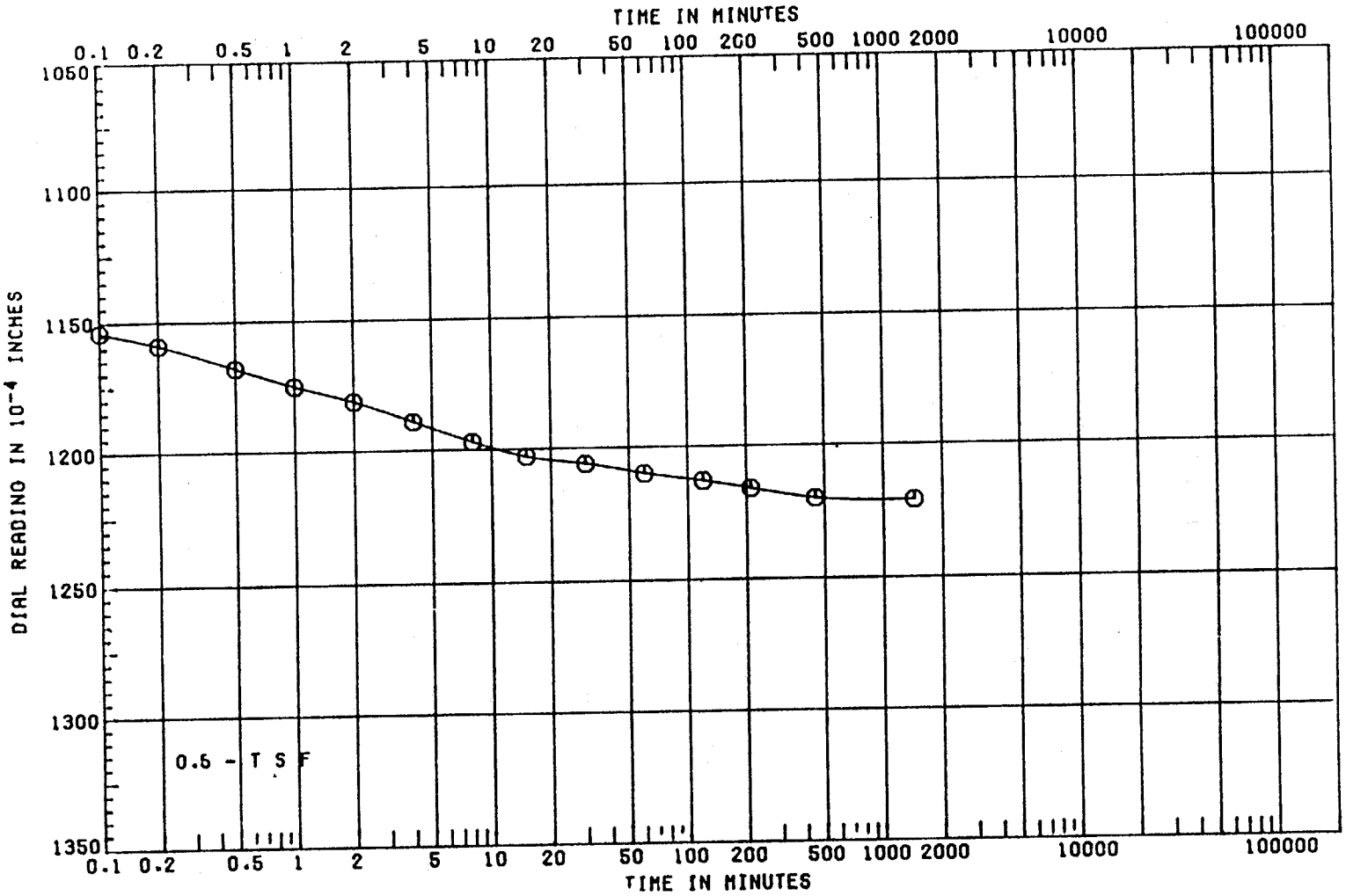
CLASSIFICATION CLAY (CH), GRAY			
LL 58	PL 21	PI 37	PROJECT REELFOOT LAKE STUDY
GS 2.70 (EST)	D_{10}		
REMARKS		BORING NO. 3-RU-86	SAMPLE NO. 4
		DEPTH/ELEV 15.0/17.0	DATE 02 DEC 86
		CONSOLIDATION TEST REPORT	

SHEET 1 OF 8



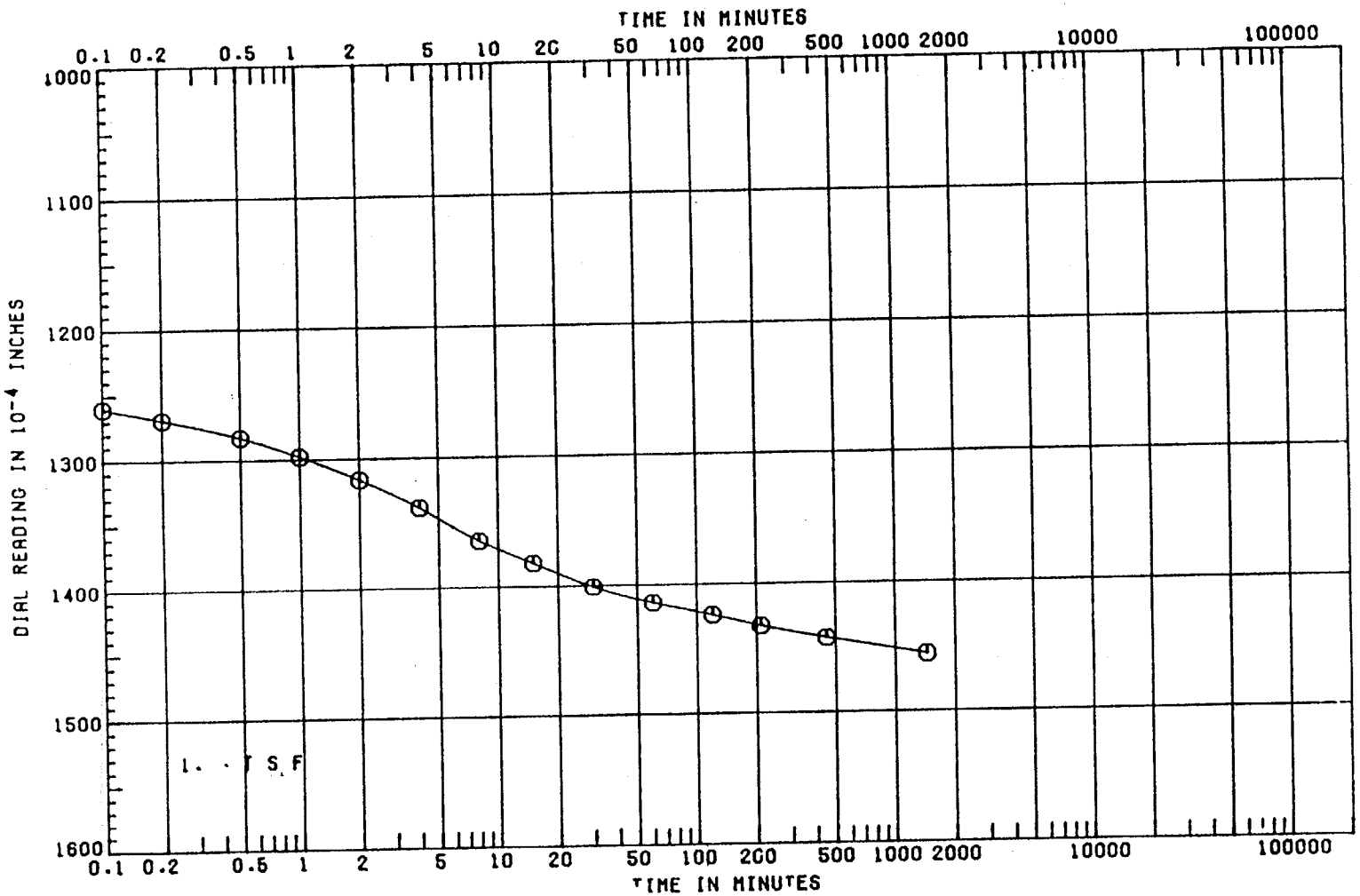
PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 3-RU-86	SAMPLE NO. 4	
DEPTH/ELEV 15.0/17.0	DATE 02 DEC 86	

SHEET 2 OF 8



PROJECT REELFOOT 'AKE STUDY	CONSOLIDATION TEST TIME CURVES
BORING 3-RU-86	SAMPLE NO. 4
DEPTH/ELEV 15.0/17.0	DATE 02 DEC 86

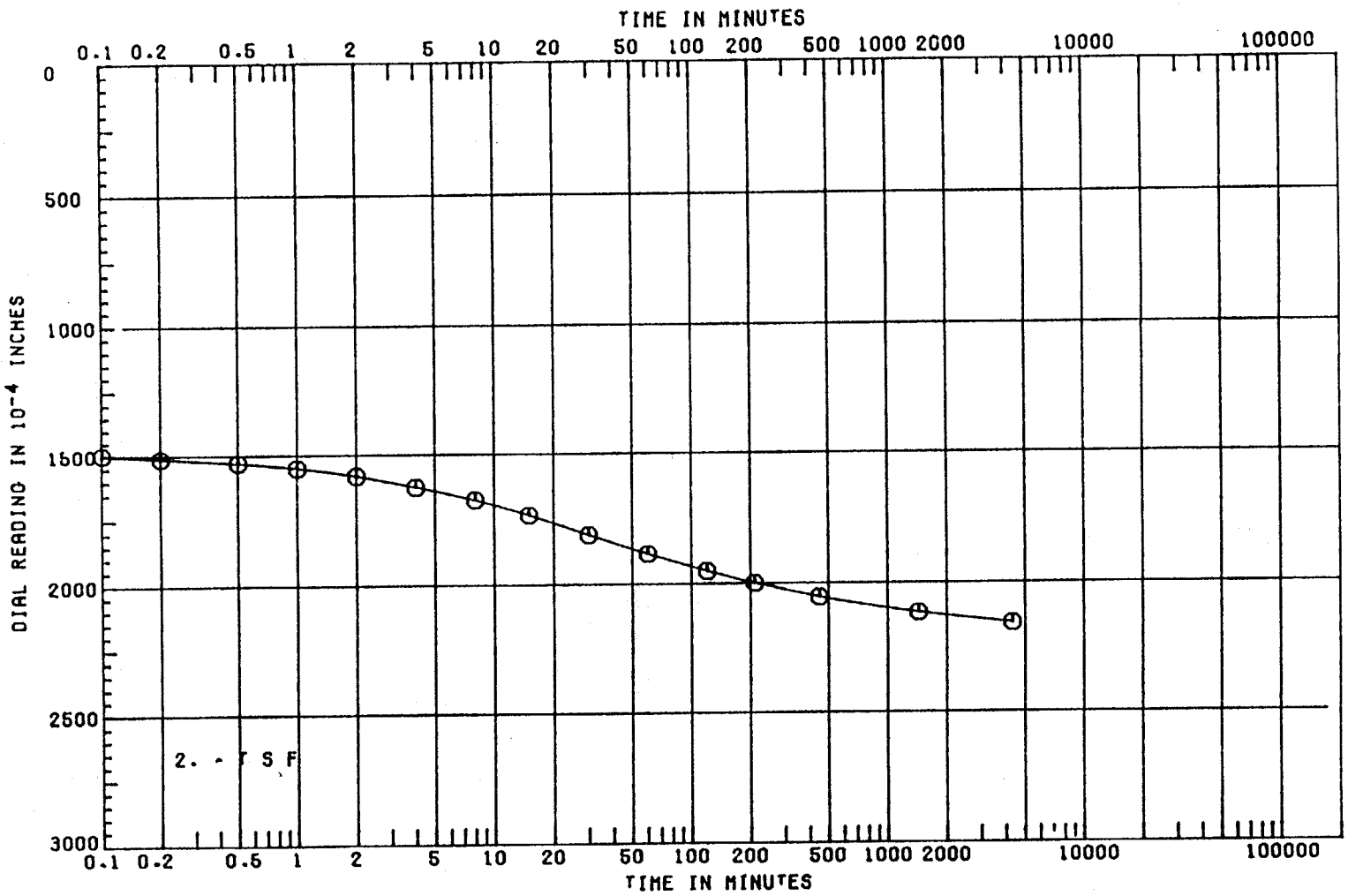
SHEET 3 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 3-RU-86	SAMPLE NO. 4
DEPTH/ELEV 15.0/17.0	DATE 02 DEC 86

CONSOLIDATION TEST
TIME CURVES

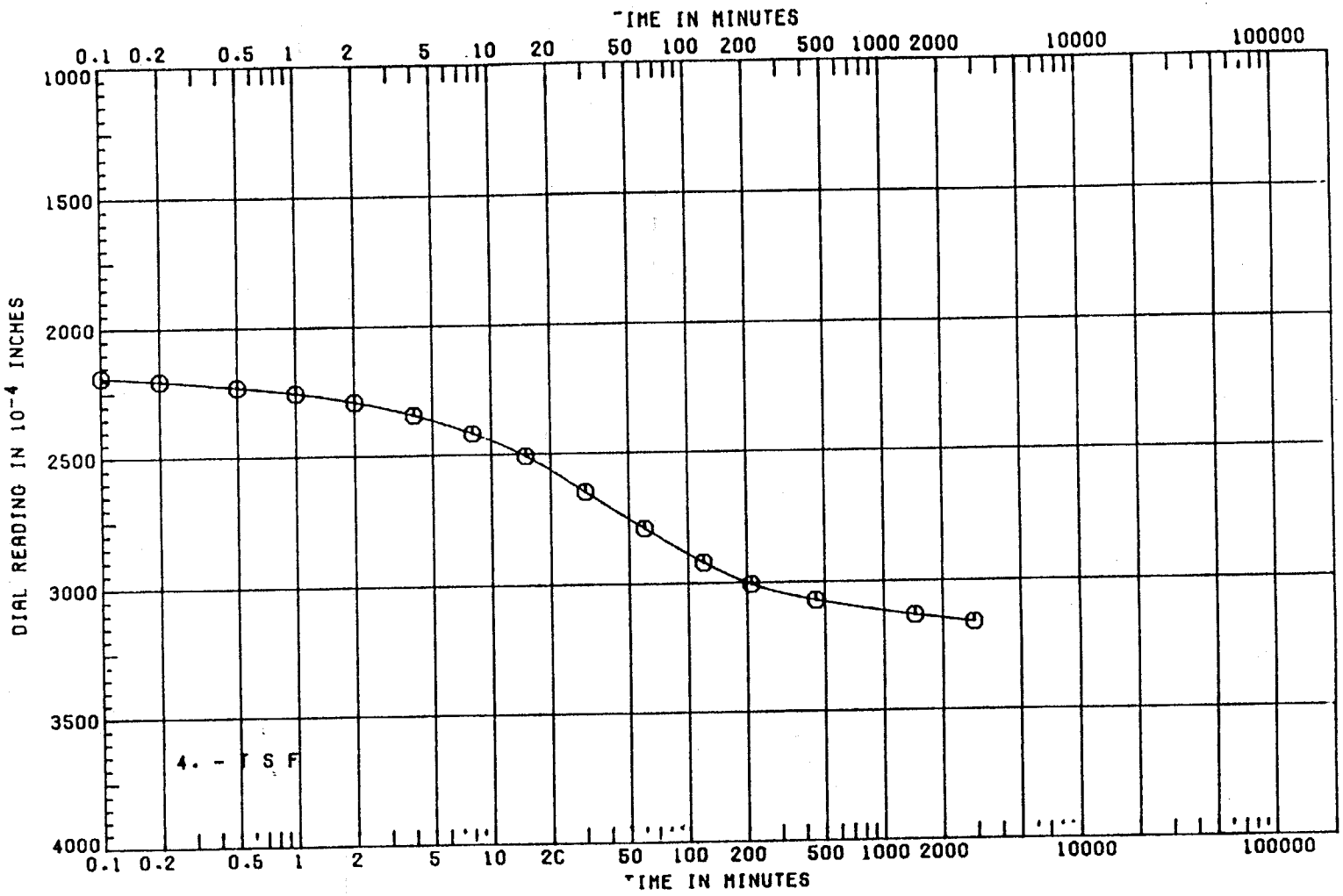
SHEET 4 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 3-RU-86	SAMPLE NO. 4
DEPTH/ELEV 15.0/17.0	DATE 02 DEC 86

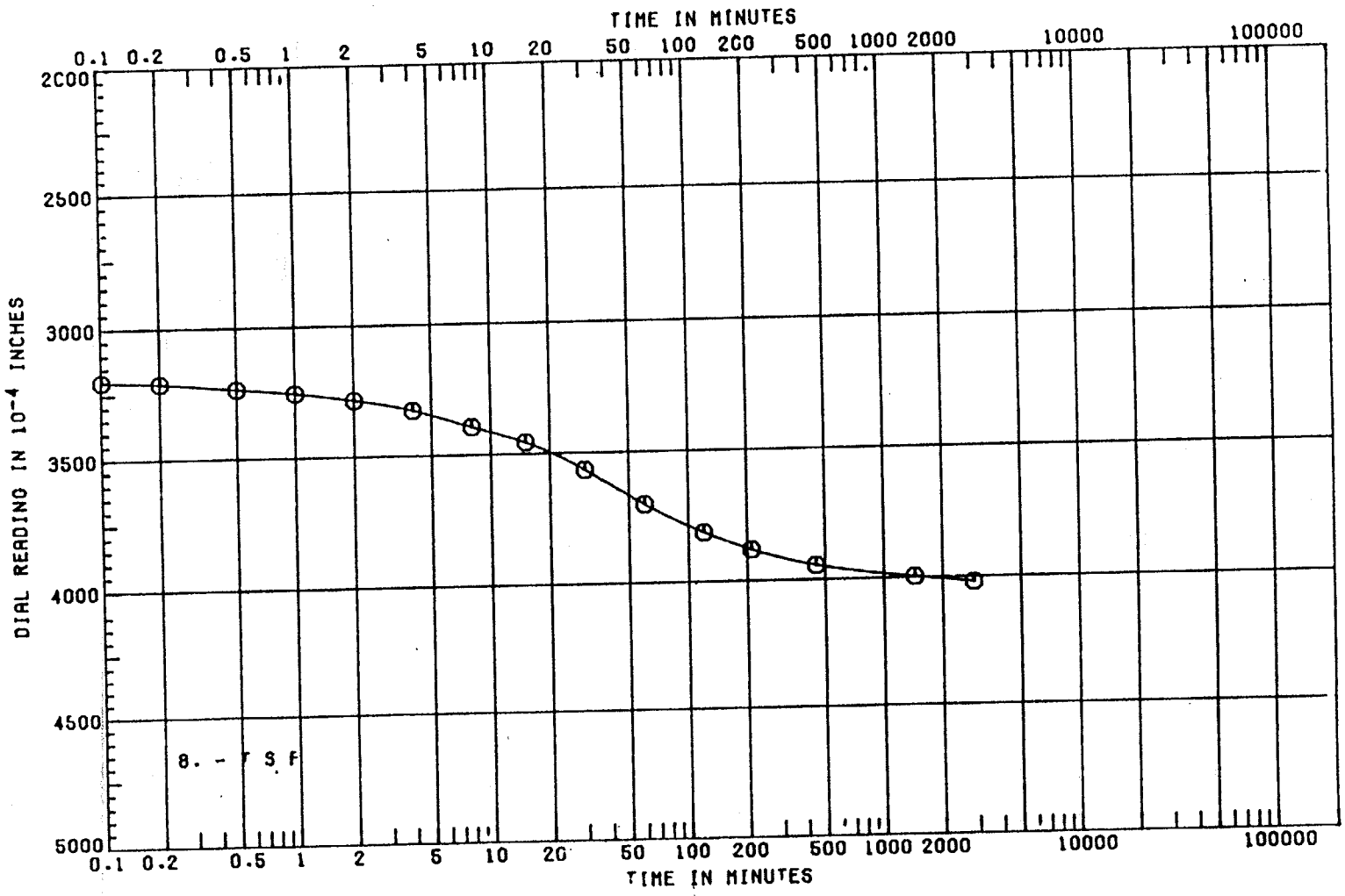
CONSOLIDATION TEST
TIME CURVES

SHEET 5 OF 8



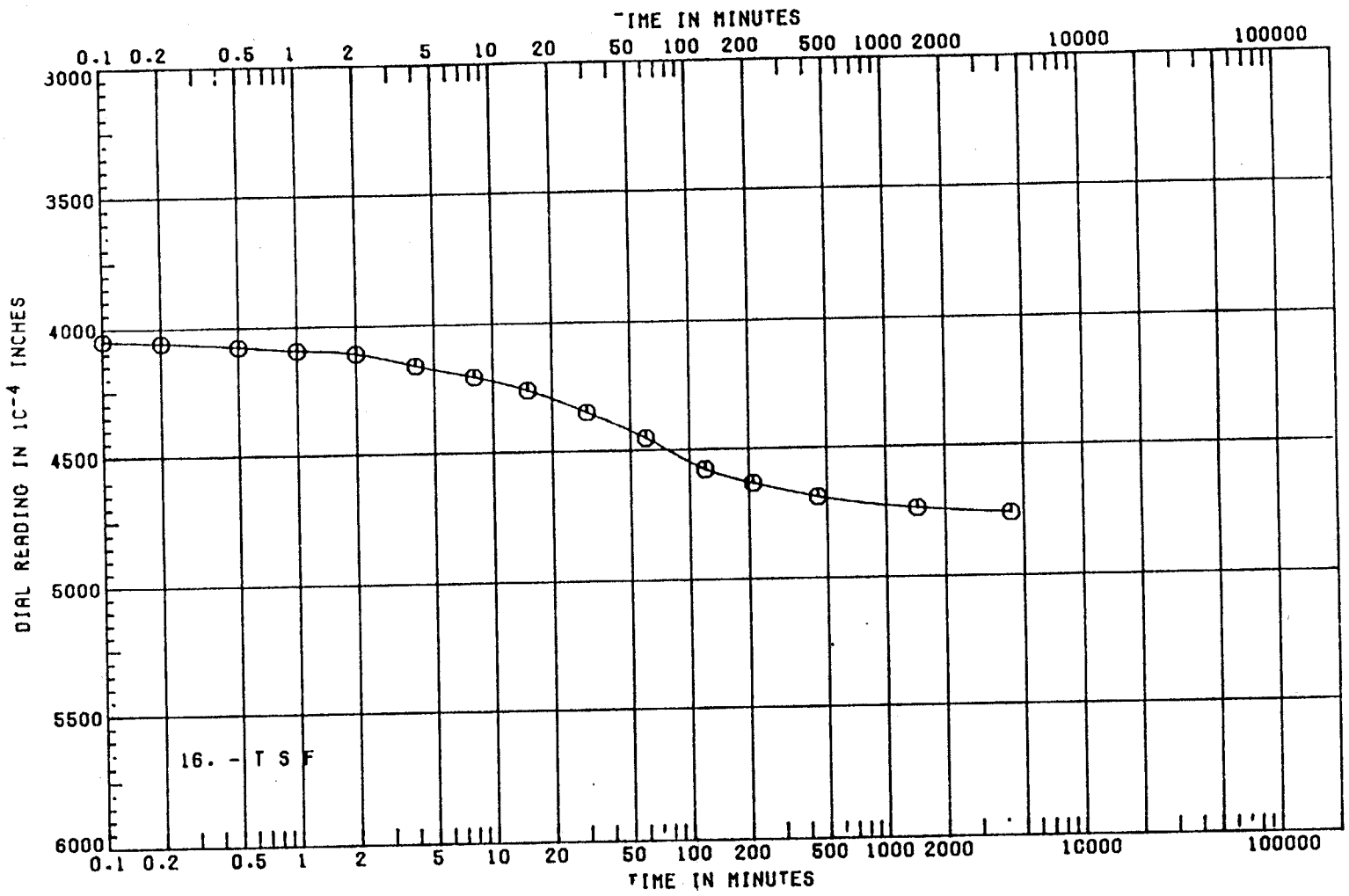
PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 3-RU-86	SAMPLE NO. 4	
DEPTH/ELEV 15.0/17.0	DATE 02 DEC 86	

SHEET 6 OF 8



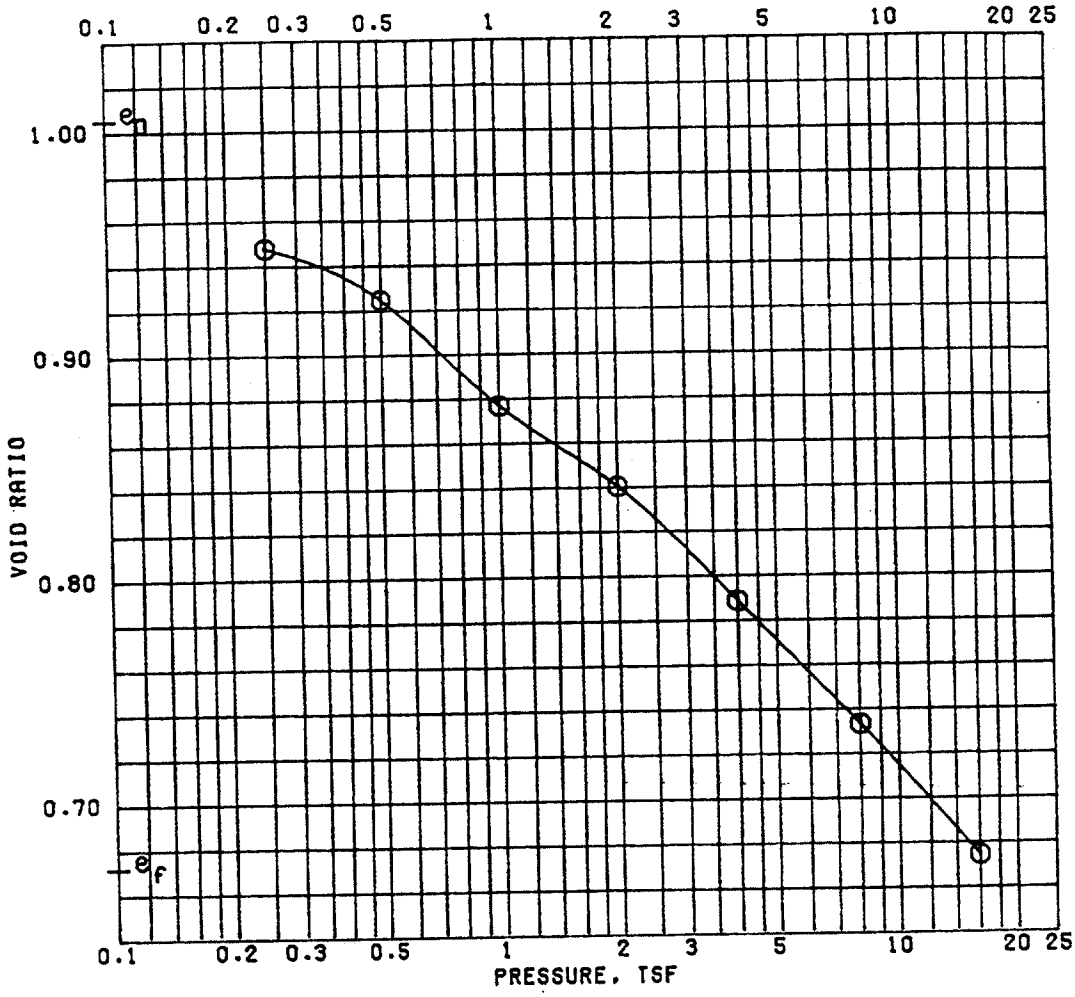
PROJECT REELFOOT LAKE STUDY	CONSOLIDATION TEST TIME CURVES
BORING 3-RU-86	SAMPLE NO. 4
DEPTH/ELEV 15.0/17.0	DATE 02 DEC 86

SHEET 7 OF 8



PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 3-RU-86	SAMPLE NO. 4	
DEPTH/ELEV 15.0/17.0	DATE 02 DEC 86	

SHEET 8 OF 8



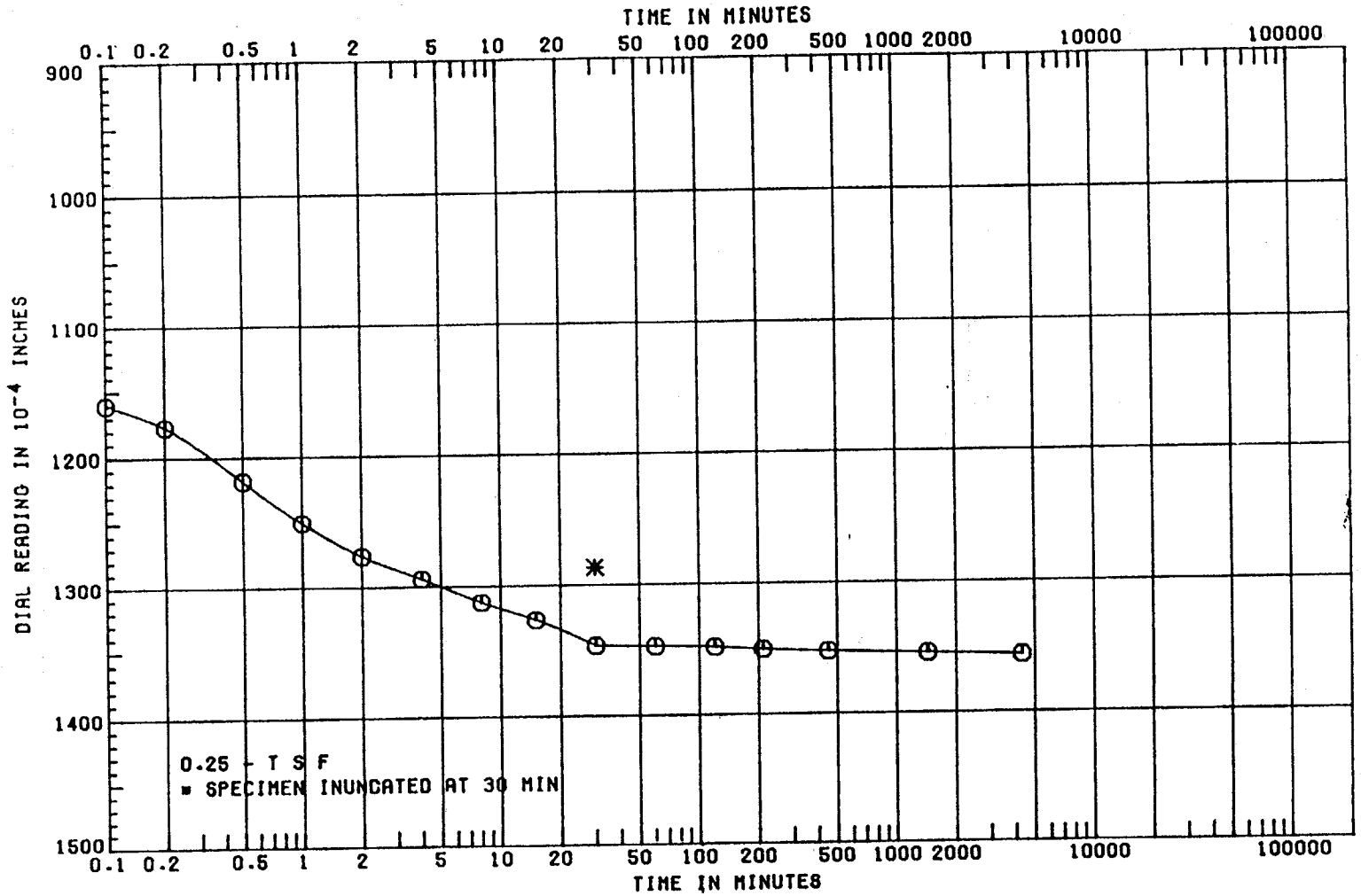
			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	35.7	26.8
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	84.1	100.9
COMPRESSION INDEX		SATURATION, %	95.9	100 +
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	1.004	0.671
DIA. IN 2.50	HT. IN 1.243	BACK PRESSURE, TSF		

CLASSIFICATION CLAYEY SILT (ML), GRAY

LL 34	PL 24	PI 10	PROJECT REELFOOT LAKE STUDY
GS 2.70 (EST)	D_{10}		
REMARKS		BORING NO. 5-RU-86	SAMPLE NO. 2
		DEPTH/ELEV 5.9/6.7	DATE 05 DEC 86

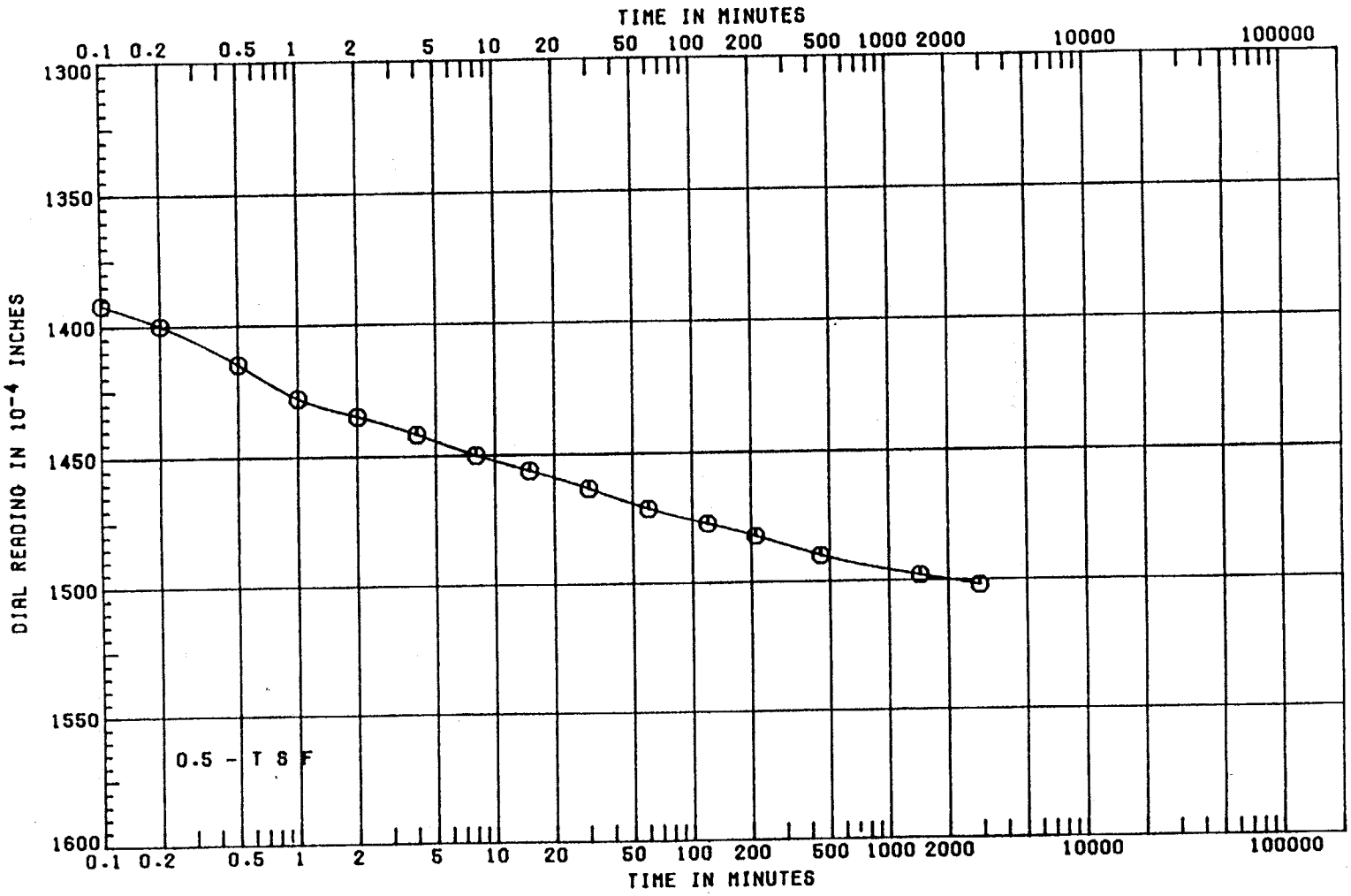
CONSOLIDATION TEST REPORT

SHEET 1 OF 8



PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 5-RU-86	SAMPLE NO. 2	
DEPTH/ELEV 5.9/6.7	DATE 05 DEC 86	

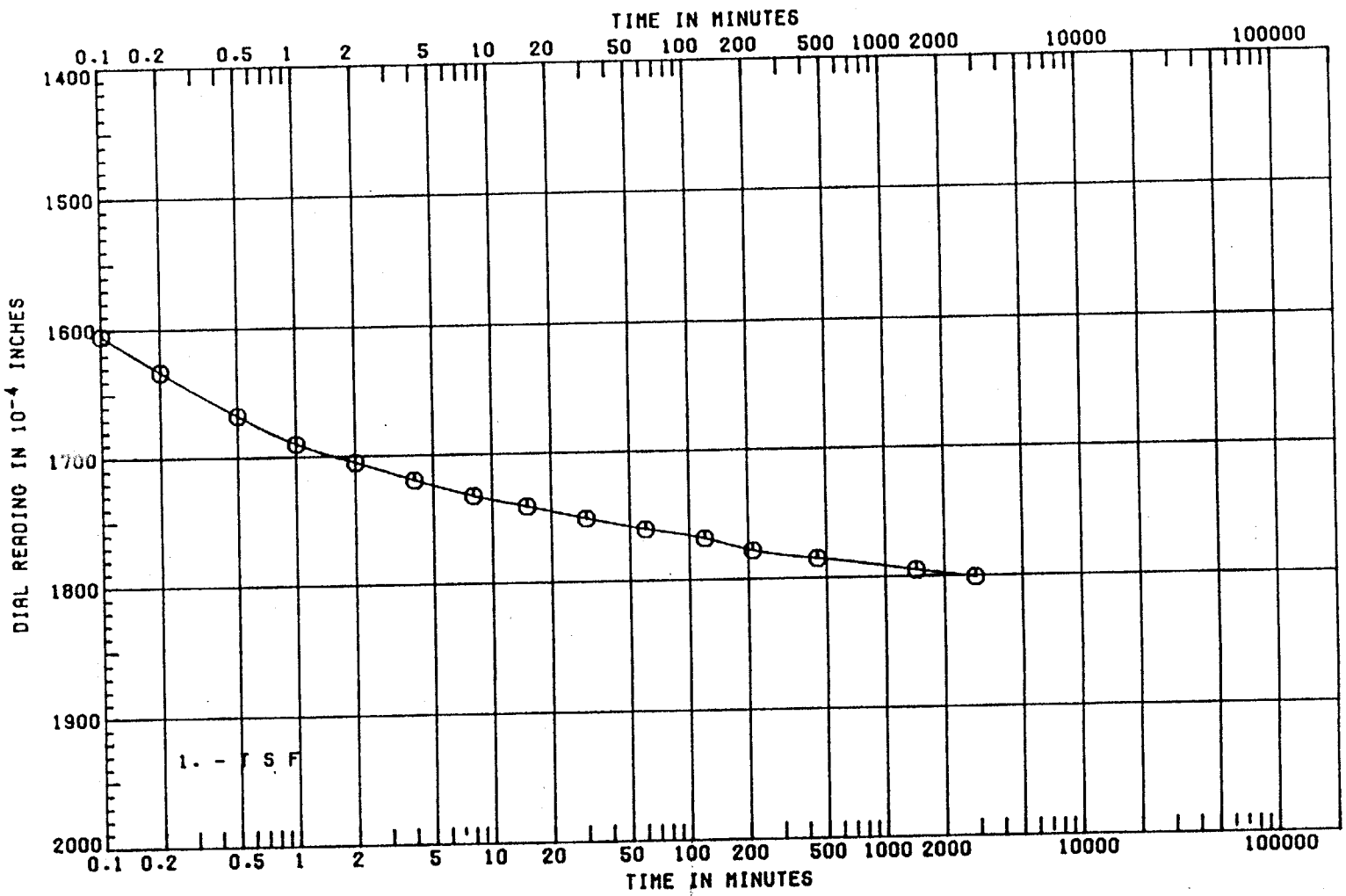
SHEET 2 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 5-RU-86	SAMPLE NO. 2
DEPTH/ELEV 5.9/6.7	DATE 05 DEC 86

CONSOLIDATION TEST
TIME CURVES

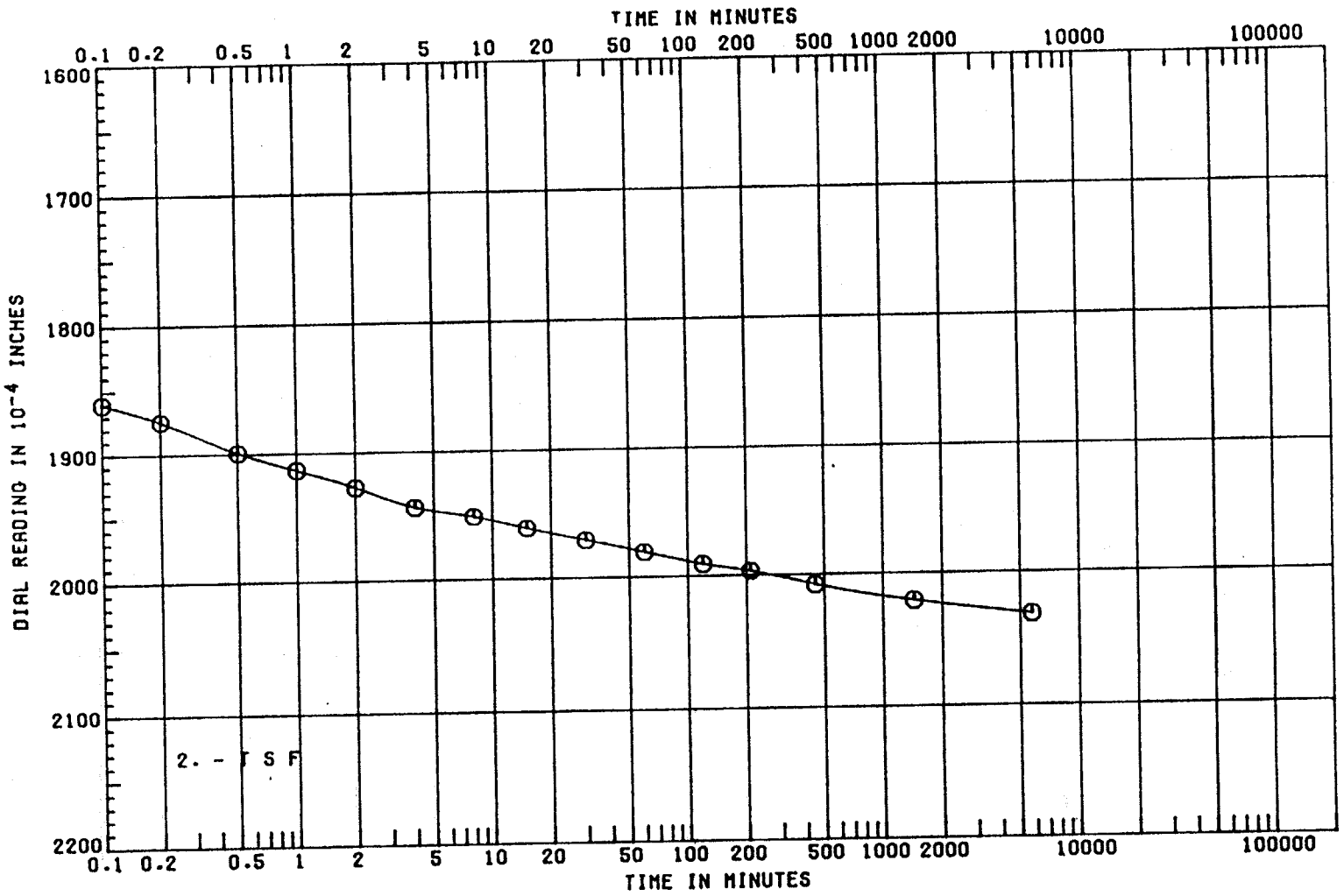
SHEET 3 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 5-RU-86	SAMPLE NO. 2
DEPTH/ELEV 5.9/6.7	DATE 05 DEC 86

CONSOLIDATION TEST
TIME CURVES

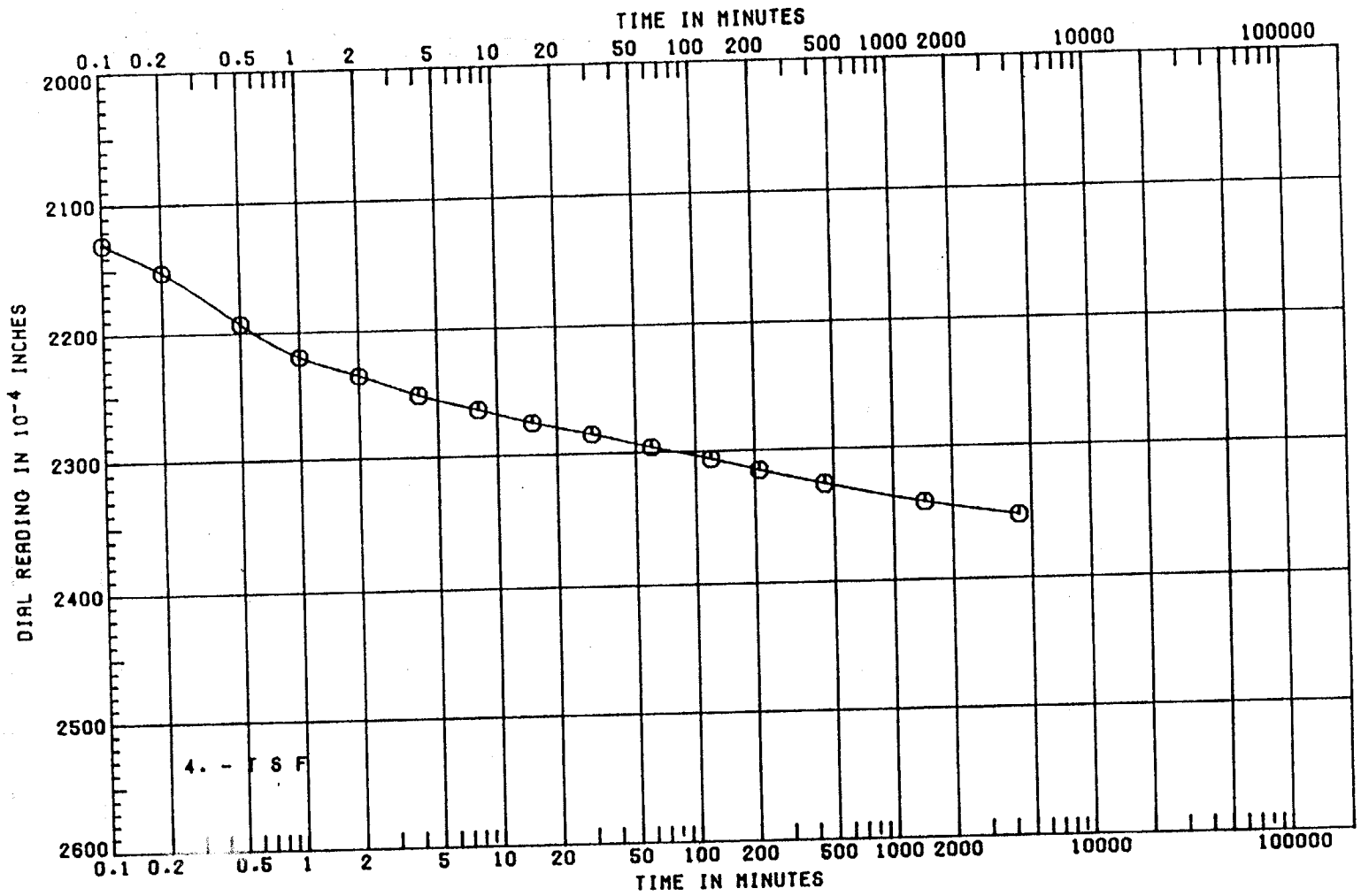
SHEET 4 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 5-RU-86	SAMPLE NO. 2
DEPTH/ELEV 5.9/6.7	DATE 05 DEC 86

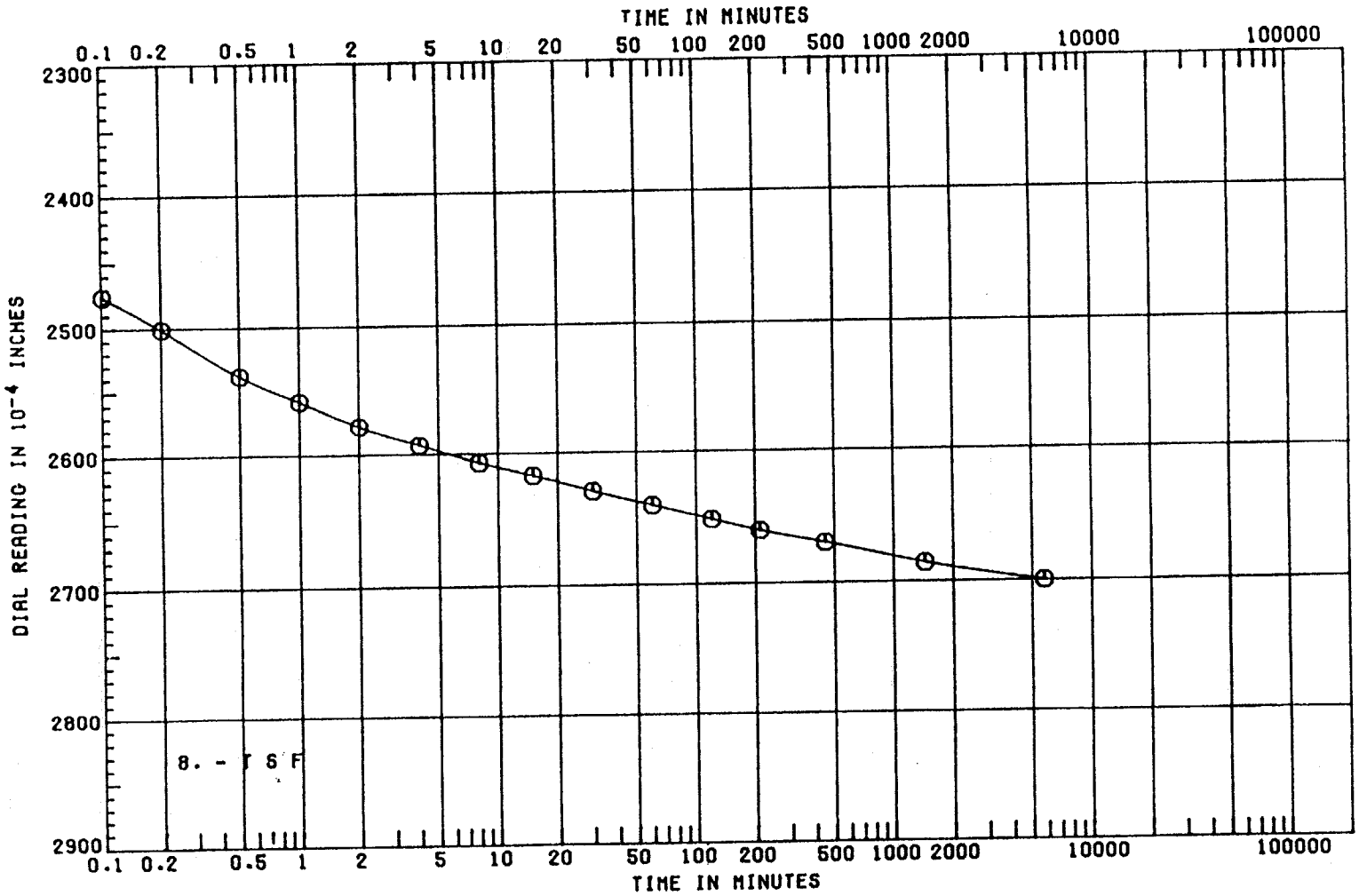
CONSOLIDATION TEST
TIME CURVES

SHEET 5 OF 8



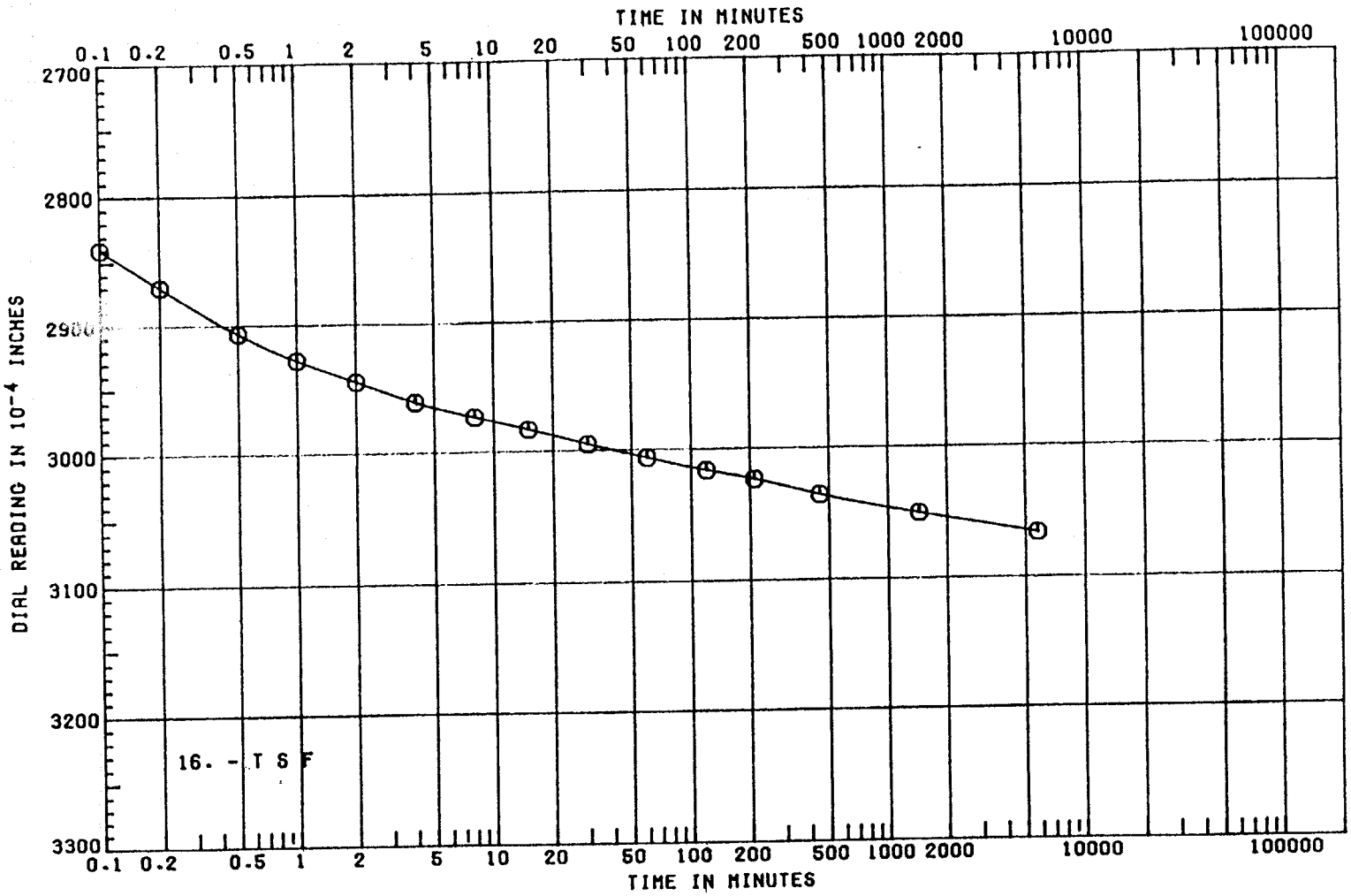
PROJECT REELFOOT LAKE STUDY	CONSOLIDATION TEST TIME CURVES
BORING 5-RU-86	SAMPLE NO. 2
DEPTH/ELEV 5.9/6.7	DATE 05 DEC 86

SHEET 6 OF 8



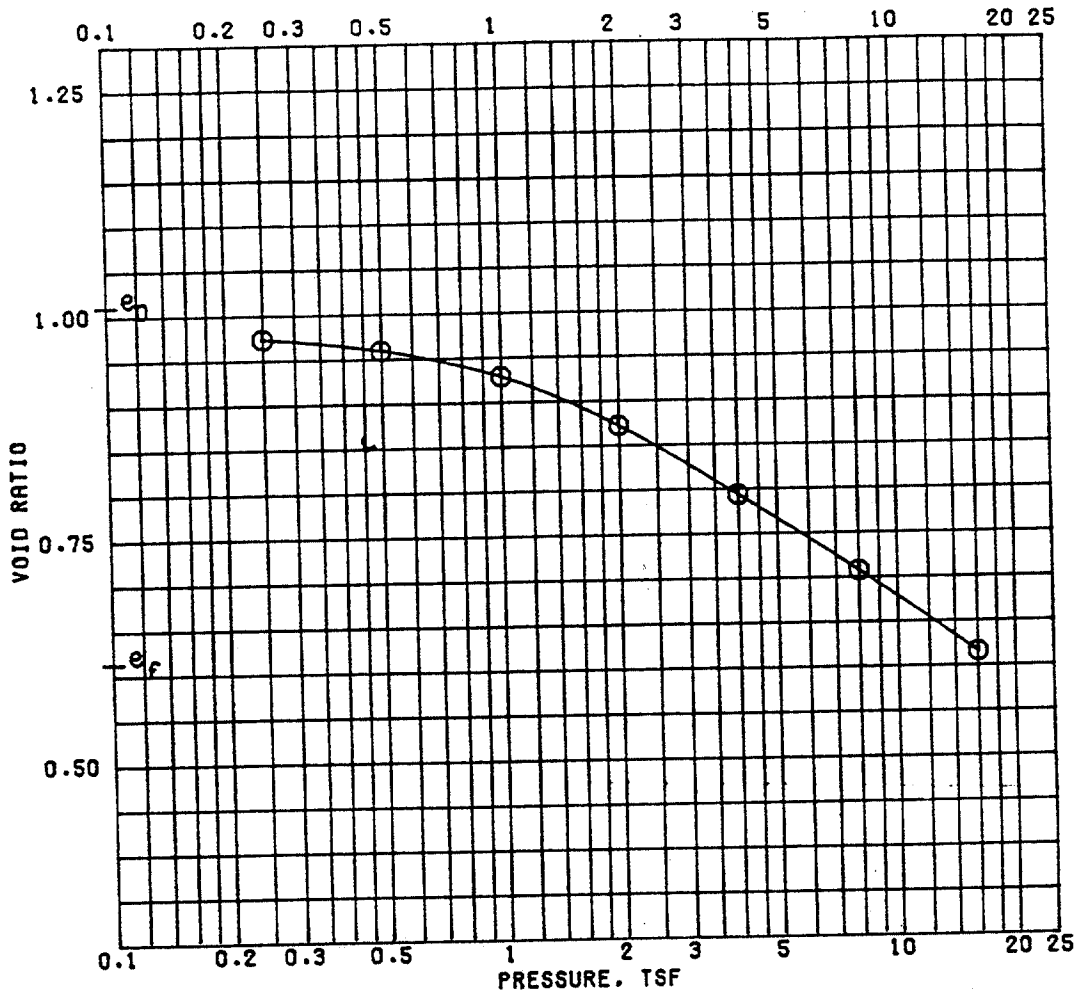
PROJECT REELFOOT LAKE STUDY	CONSOLIDATION TEST TIME CURVES
BORING 5-RU-86	SAMPLE NO. 2
DEPTH/ELEV 5.9/6.7	DATE 05 DEC 86

SHEET 7 OF 8



PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 5-RU-86	SAMPLE NO. 2	
DEPTH/ELEV 5.9/6.7	DATE 05 DEC 86	

SHEET 8 OF 8



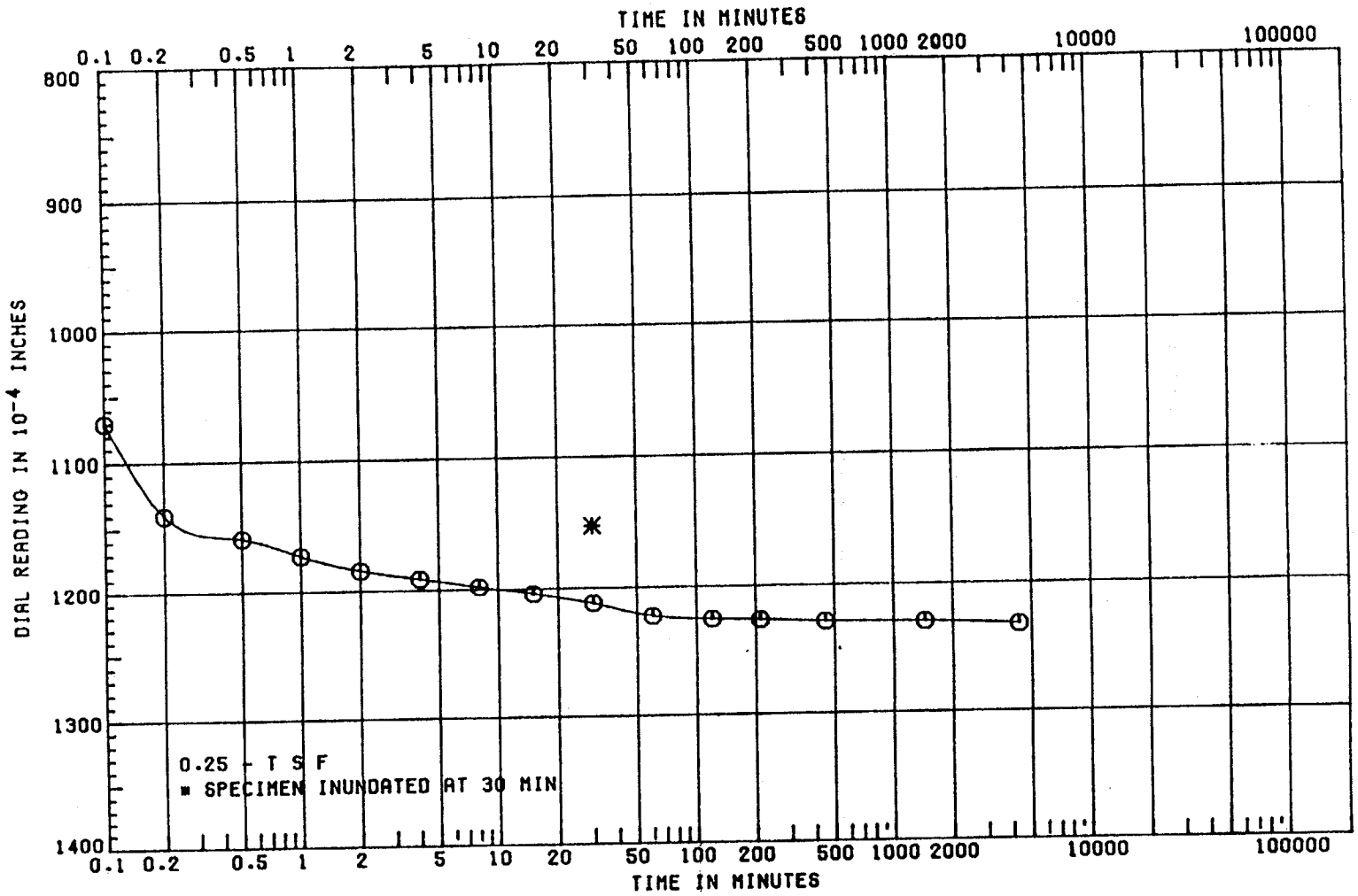
			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	37.1	25.6
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	83.9	104.6
COMPRESSION INDEX		SATURATION, %	99.2	100 +
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	1.009	0.612
DIA. IN 2.50	HT. IN 1.241	BACK PRESSURE, TSF		

CLASSIFICATION CLAY (CH), GRAY

LL 51	PL 22	PI 29	PROJECT REELFOOT LAKE STUDY
GS 2.70 (EST)	D_{10}		
REMARKS		BORING NO. 6-RU-86	SAMPLE NO. 2
		DEPTH/ELEV 6.5/8.0	DATE 12 DEC 86

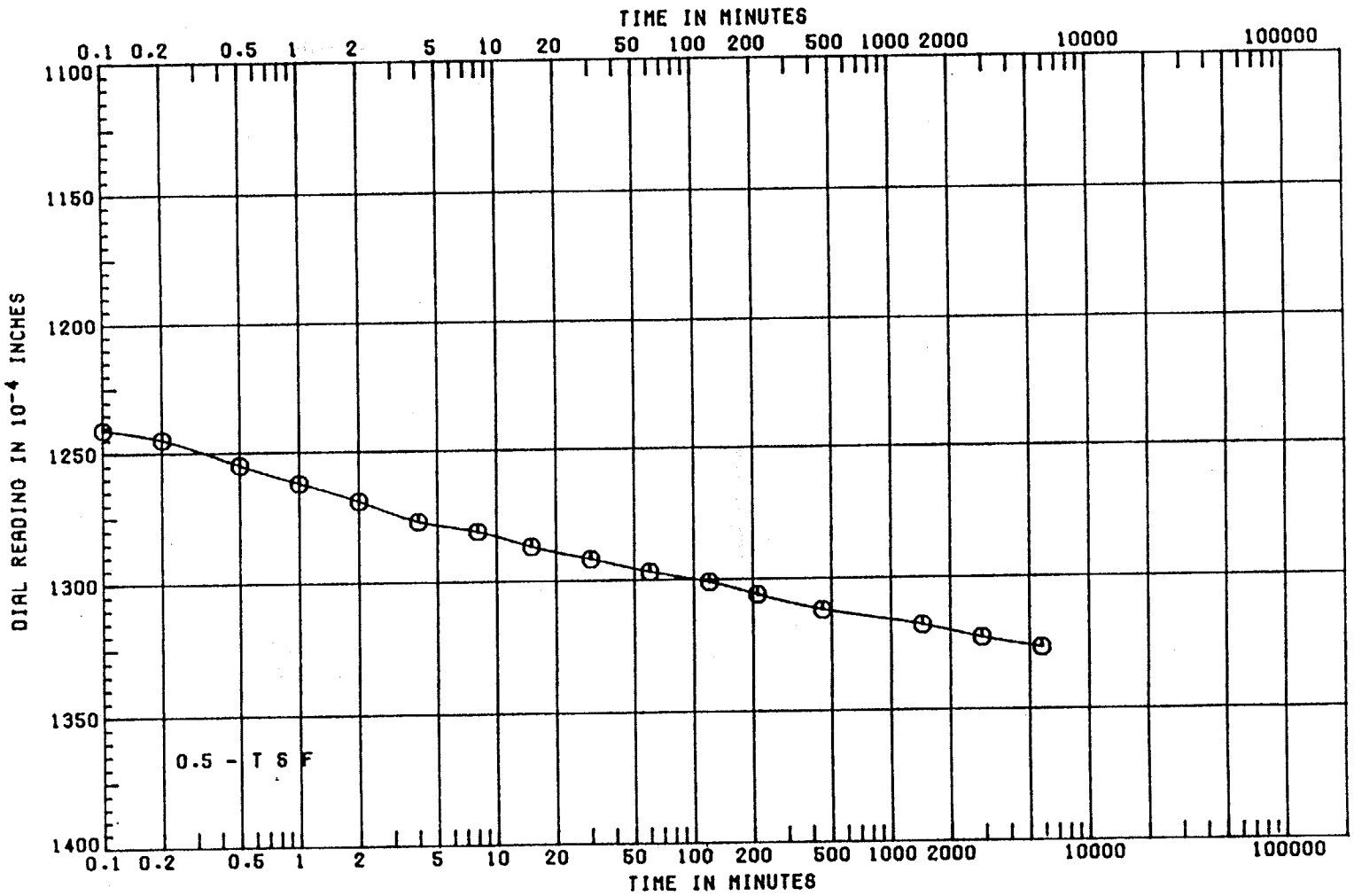
CONSOLIDATION TEST REPORT

SHEET 1 OF 8



PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 6-RU-86	SAMPLE NO. 2	
DEPTH/ELEV 6.5/8.0	DATE 12 DEC 86	

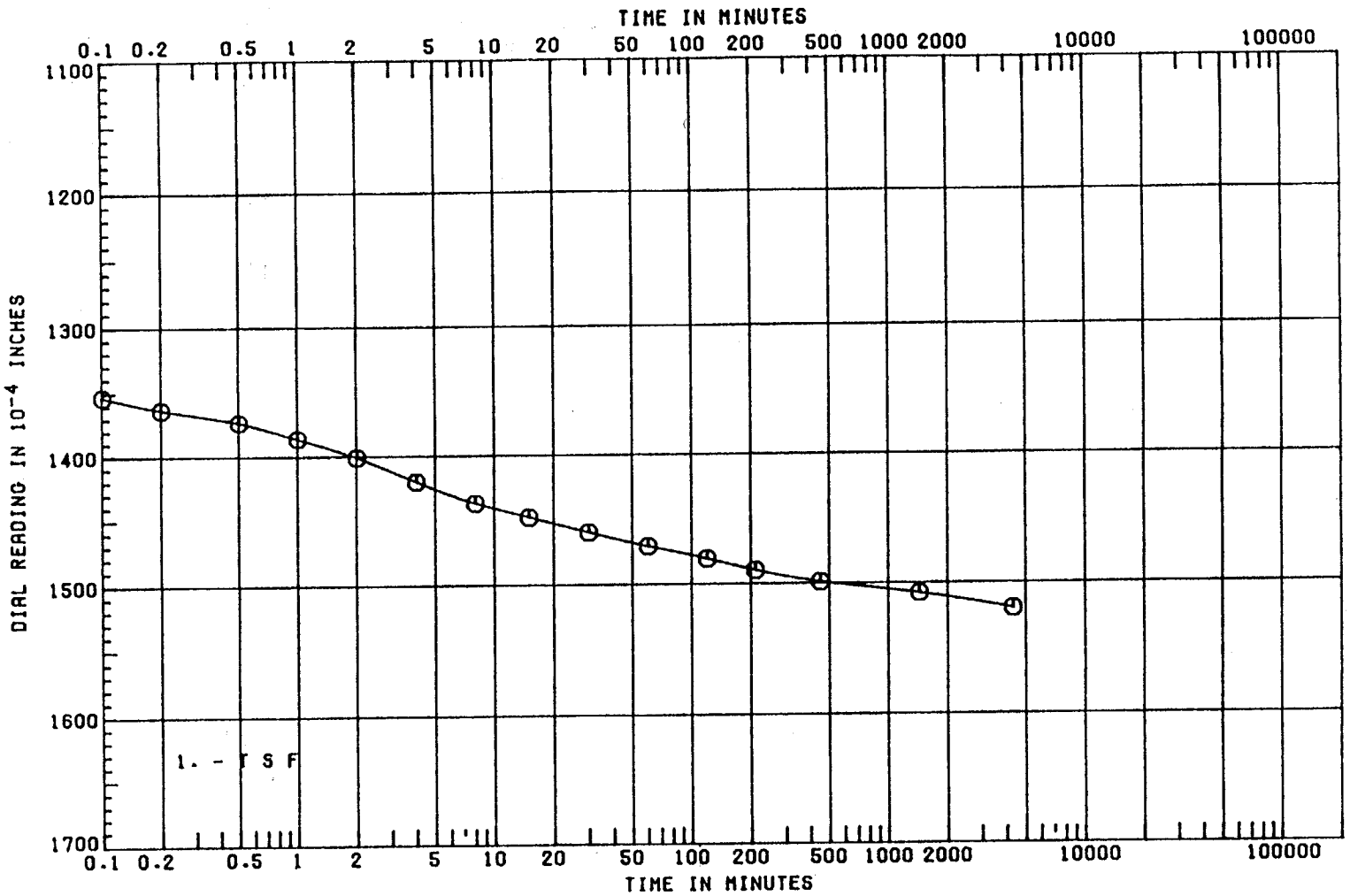
SHEET 2 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 6-RU-86	SAMPLE NO. 2
DEPTH/ELEV 6.5/8.0	DATE 12 DEC 86

CONSOLIDATION TEST
TIME CURVES

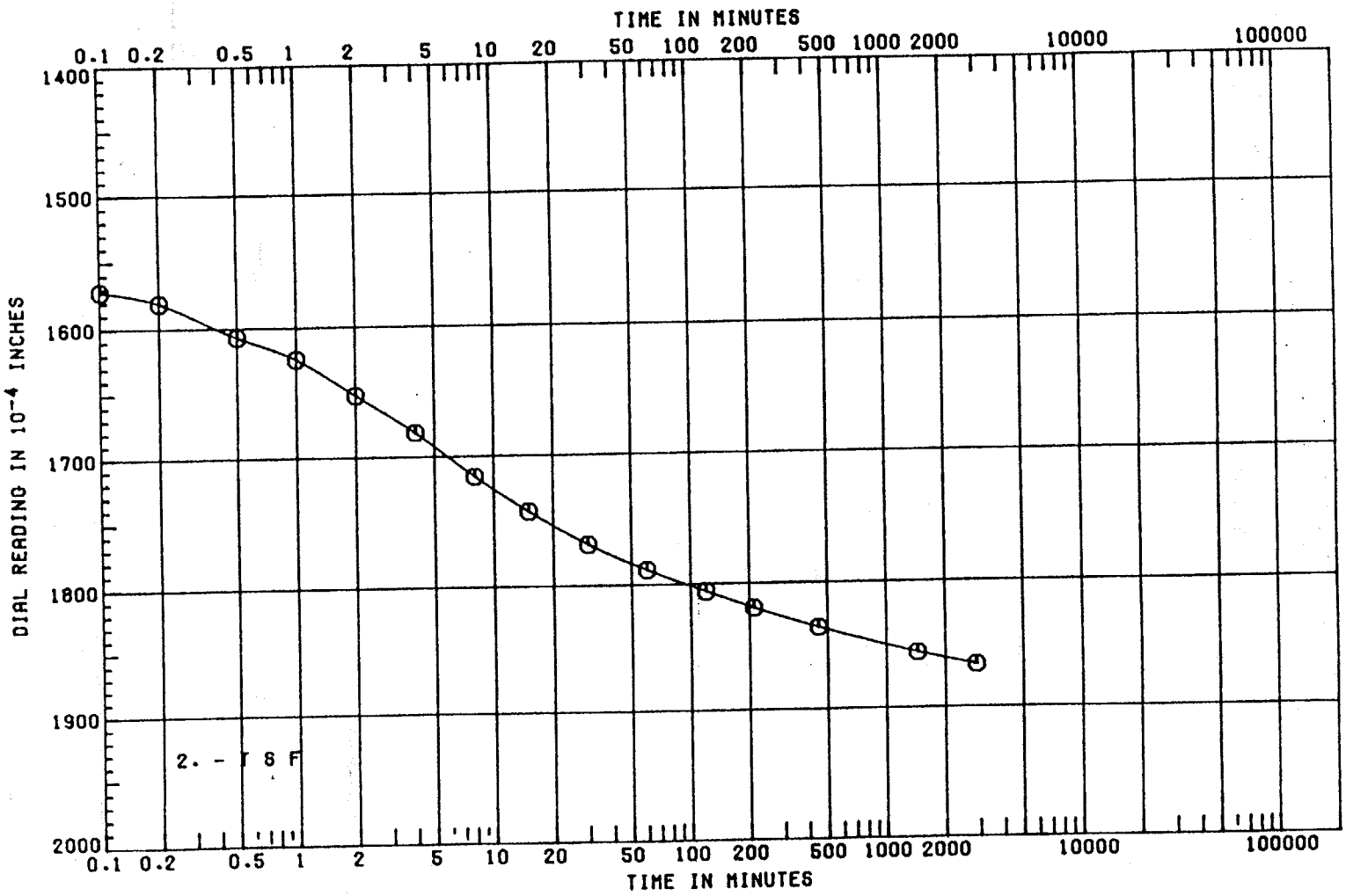
SHEET 3 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 6-RU-86	SAMPLE NO. 2
DEPTH/ELEV 6.5/8.0	DATE 12 DEC 86

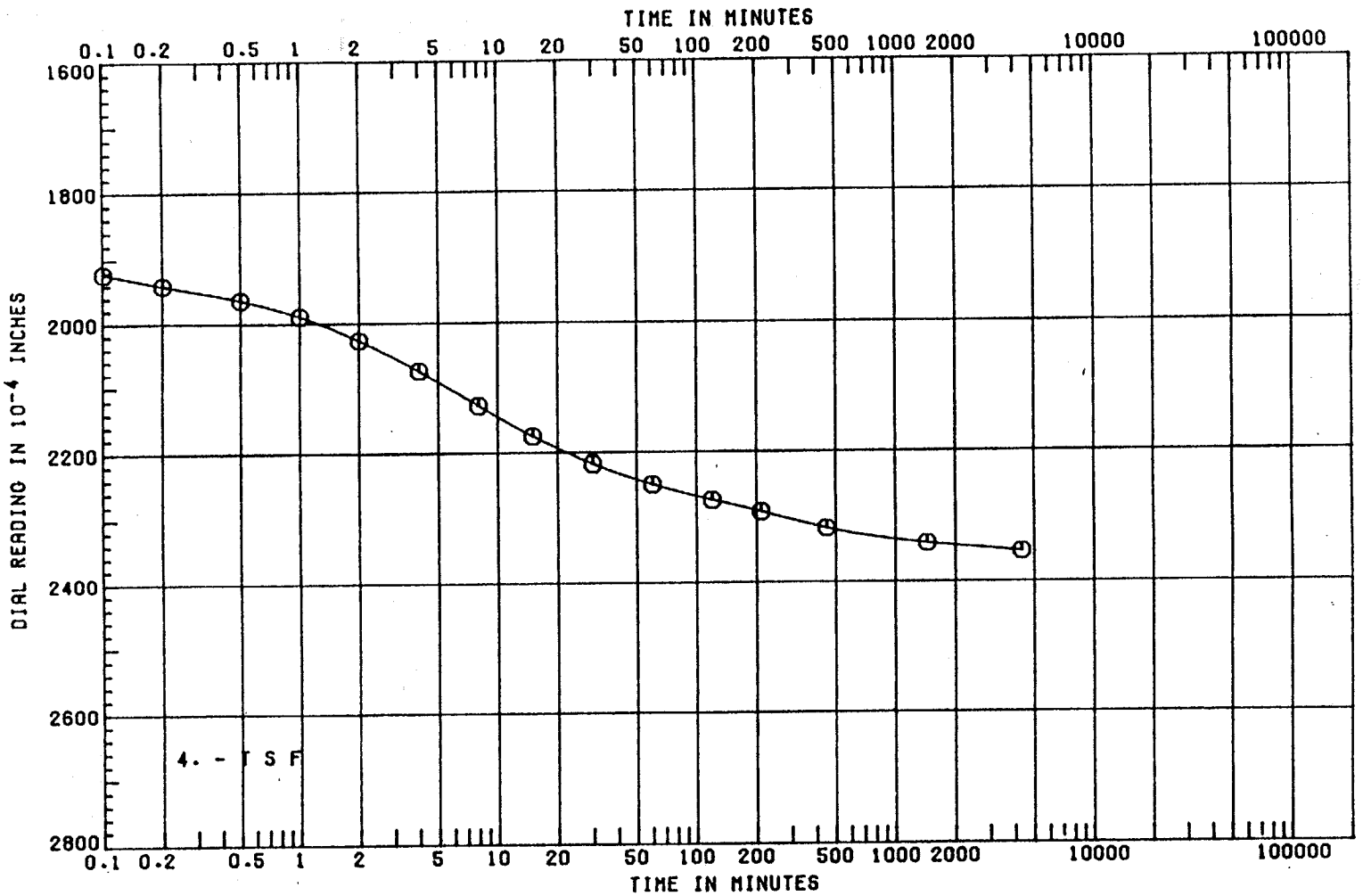
CONSOLIDATION TEST
TIME CURVES

SHEET 4 OF 8



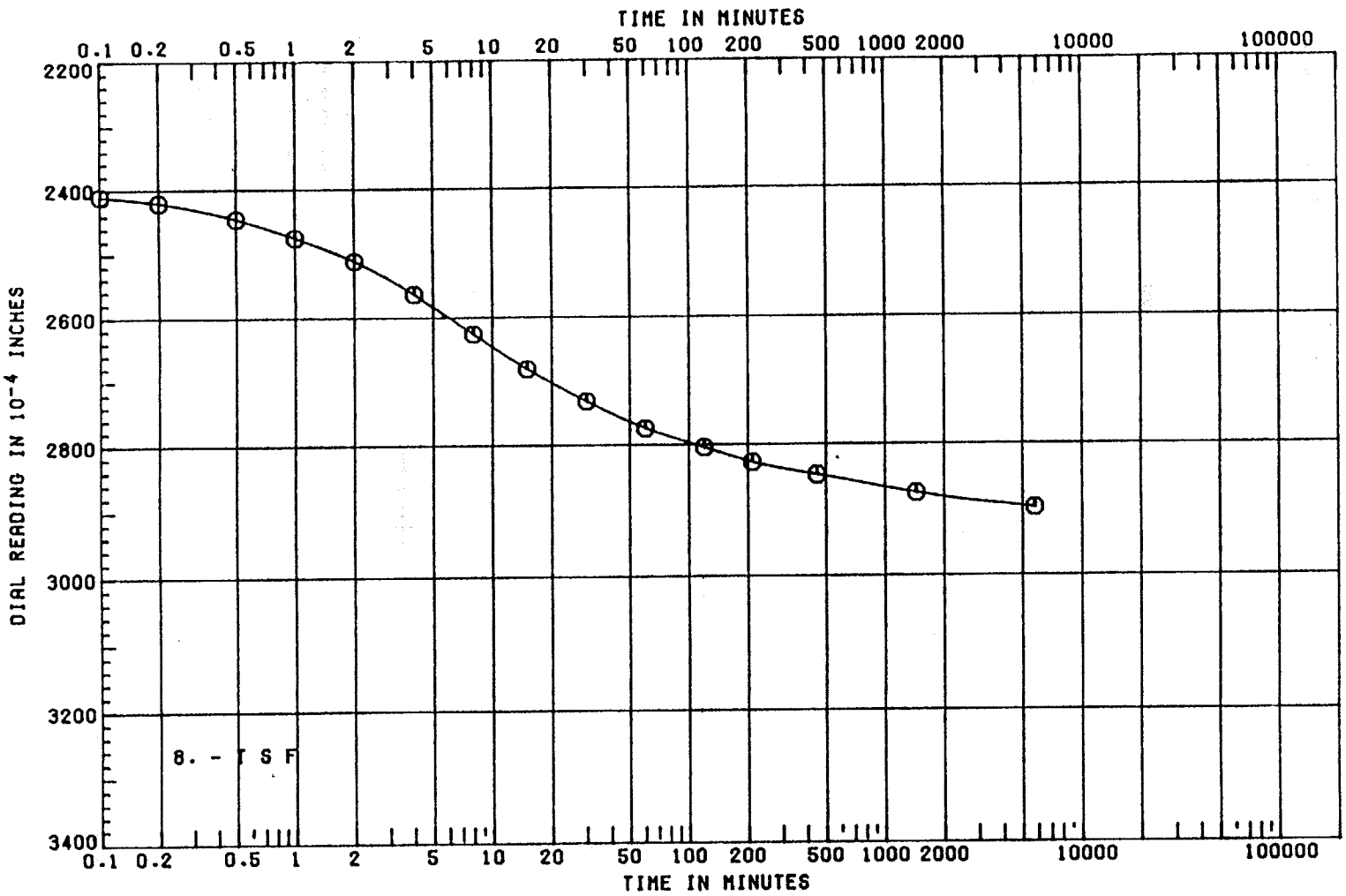
PROJECT REELFOOT LAKE STUDY	CONSOLIDATION TEST TIME CURVES
BORING 6-RU-86	SAMPLE NO. 2
DEPTH/ELEV 6.5/8.0	DATE 12 DEC 86

SHEET 5 OF 8



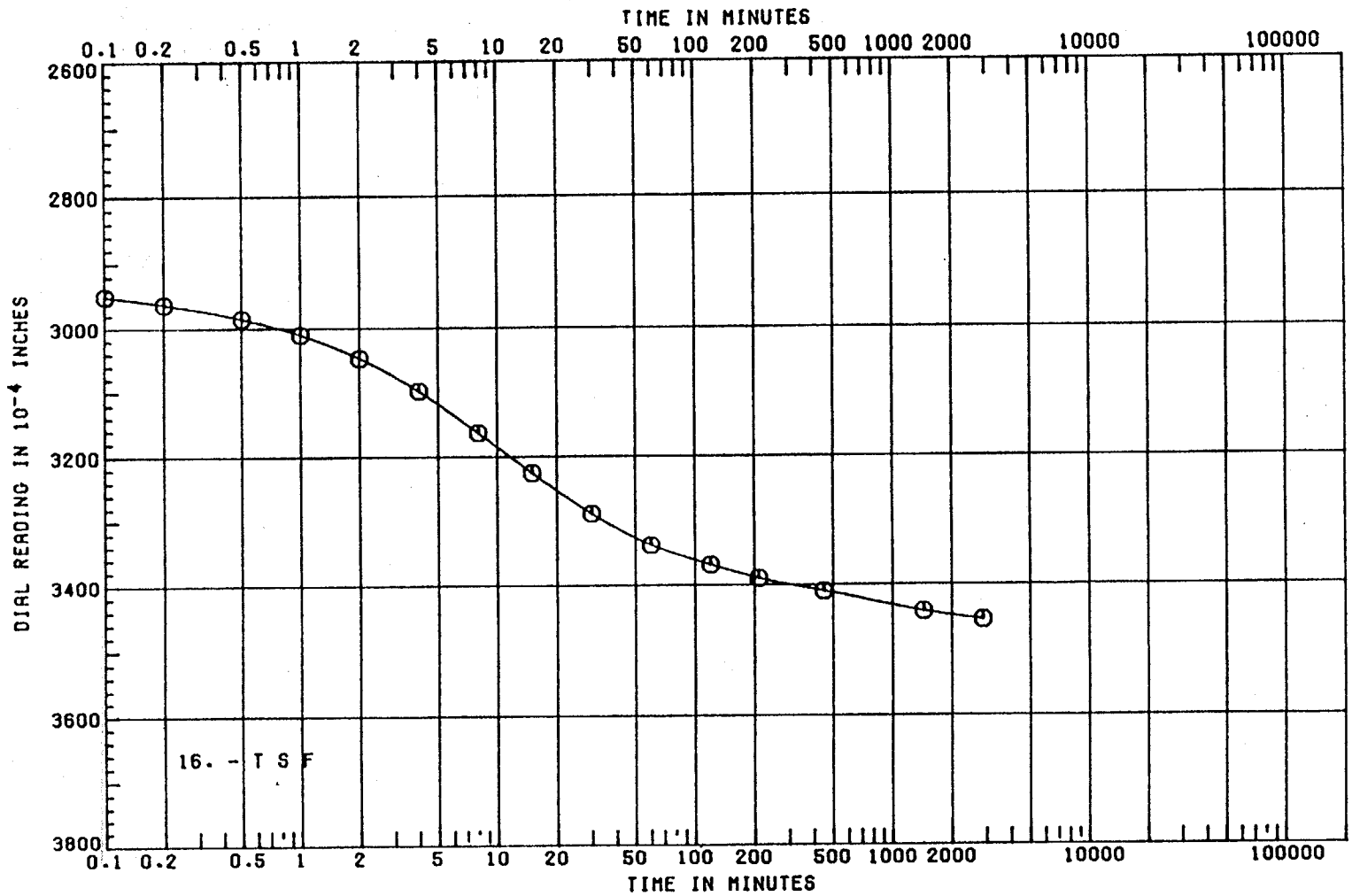
PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 6-RU-86	SAMPLE NO. 2	
DEPTH/ELEV 6.5/8.0	DATE 12 DEC 86	

SHEET 6 OF 8



PROJECT REELFOOT LAKE STUDY	CONSOLIDATION TEST TIME CURVES
BORING 6-RU-86	SAMPLE NO. 2
DEPTH/ELEV 6.5/8.0	DATE 12 DEC 86

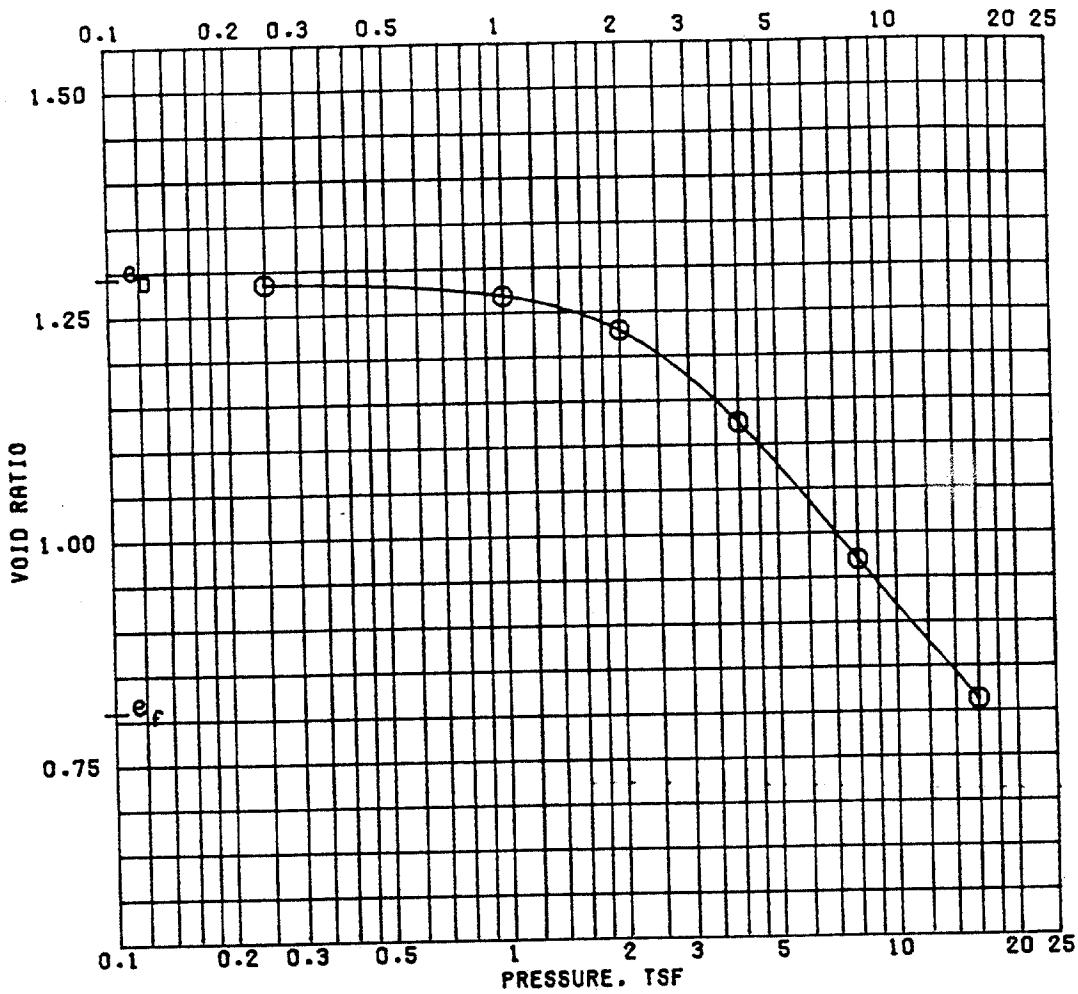
SHEET 7 OF 8



PROJECT REELFOOT LAKE STUDY	
BORING 6-RU-86	SAMPLE NO. 2
DEPTH/ELEV 6.5/8.0	DATE 12 DEC 86

CONSOLIDATION TEST
TIME CURVES

SHEET 8 OF 8



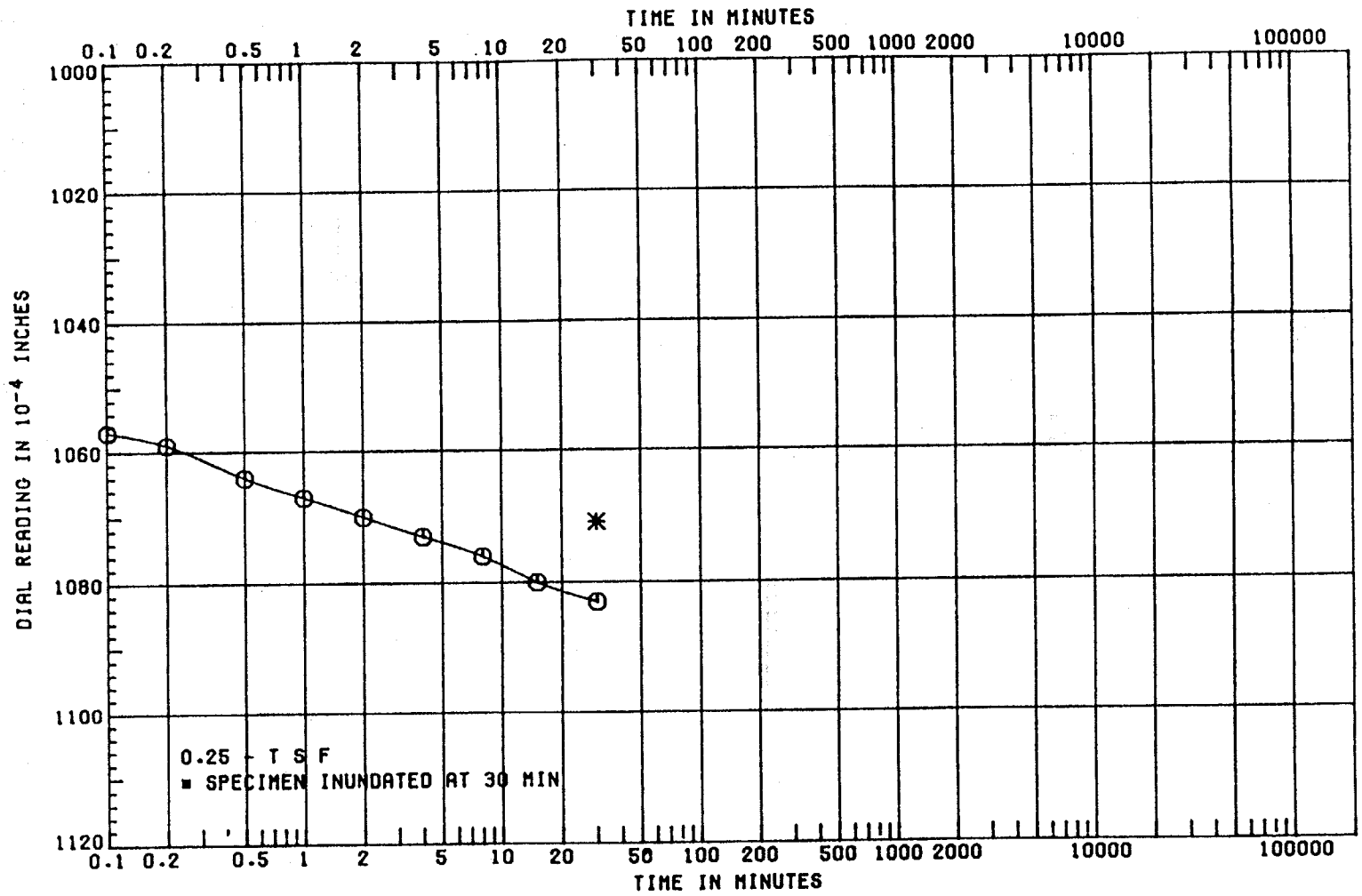
			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	47.3	33.3
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	73.6	93.2
COMPRESSION INDEX		SATURATION, %	98.9	100 +
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	1.291	0.808
DIA. IN 2.50	HT. IN 1.215	BACK PRESSURE, TSF		

CLASSIFICATION CLAY (CH), GRAY; FISSURED

LL 70	PL 24	PI 46	PROJECT REELFOOT LAKE STUDY
GS 2.70 (EST)	D_{10}		
REMARKS		BORING NO. 6-RU-86	SAMPLE NO. 4
		DEPTH/ELEV 16.5/18.5	DATE 16 DEC 86

CONSOLIDATION TEST REPORT

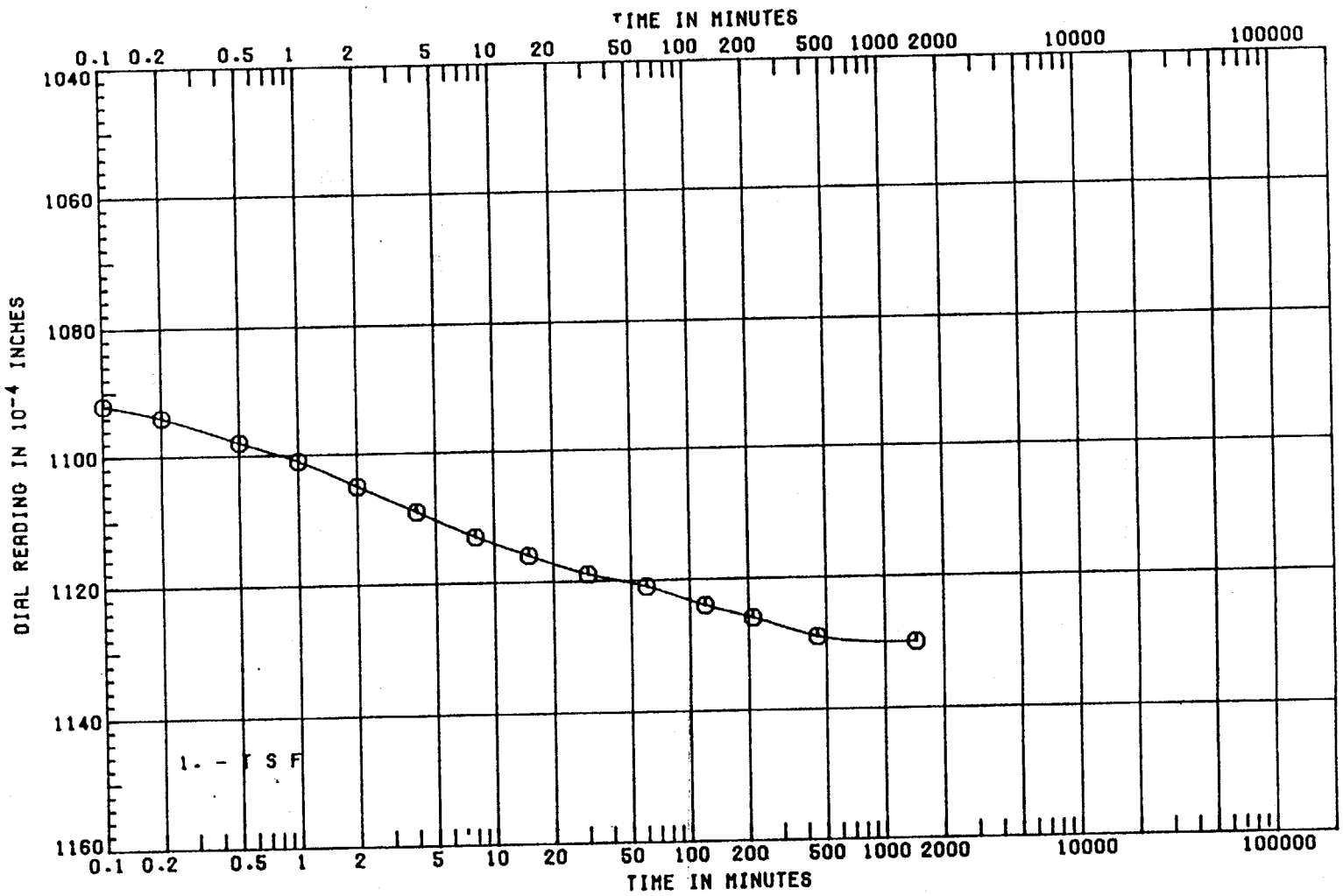
SHEET 1 OF 7



PROJECT REELFOOT LAKE STUDY	
BORING 6-RU-86	SAMPLE NO. 4
DEPTH/ELEV 16.5/18.5	DATE 16 DEC 86

CONSOLIDATION TEST
TIME CURVES

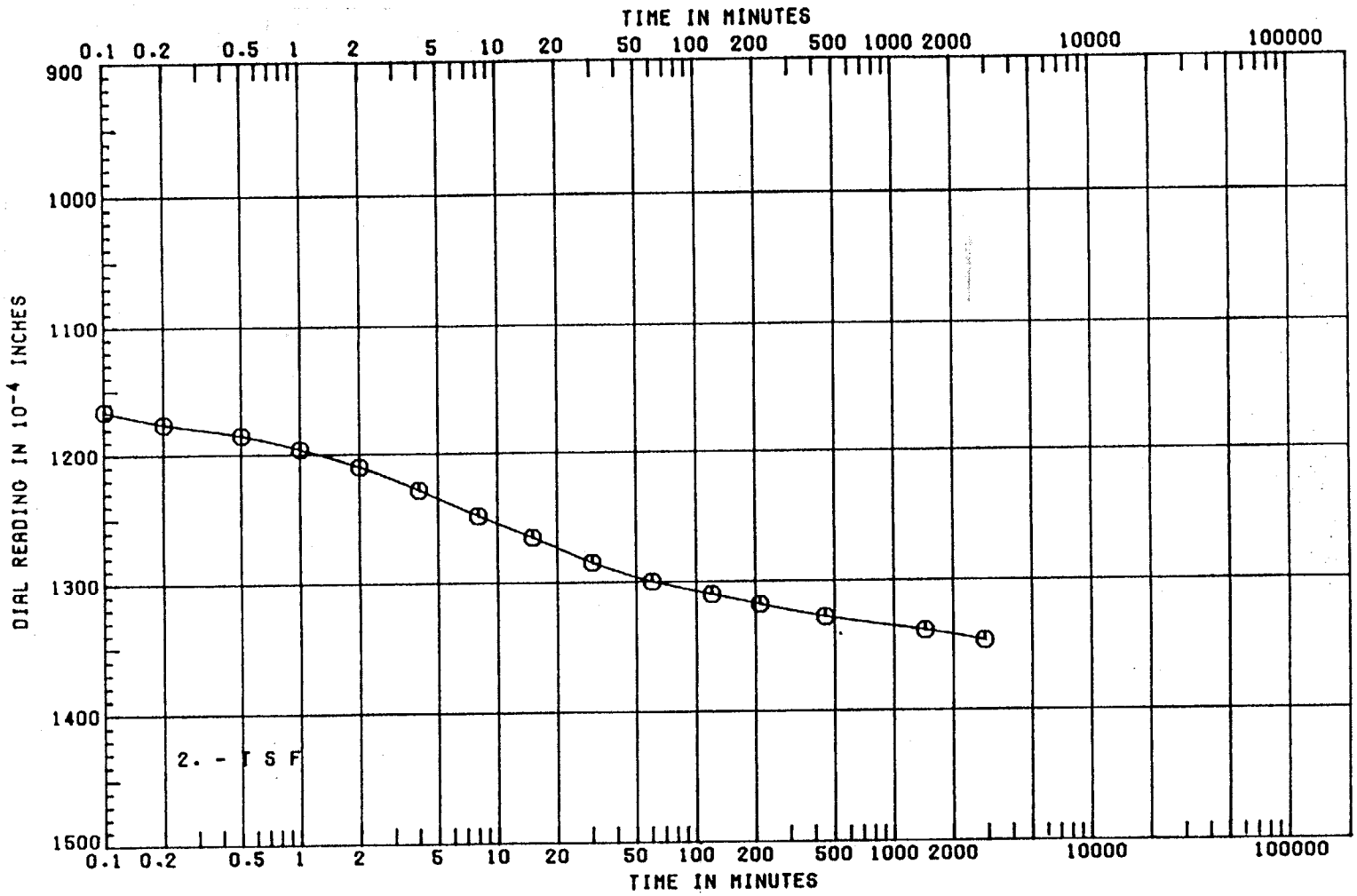
SHEET 2 OF 7



PROJECT REELFOOT LAKE STUDY	
BORING 6-RU-86	SAMPLE NO. 4
DEPTH/ELEV 16.5/18.5	DATE 16 DEC 86

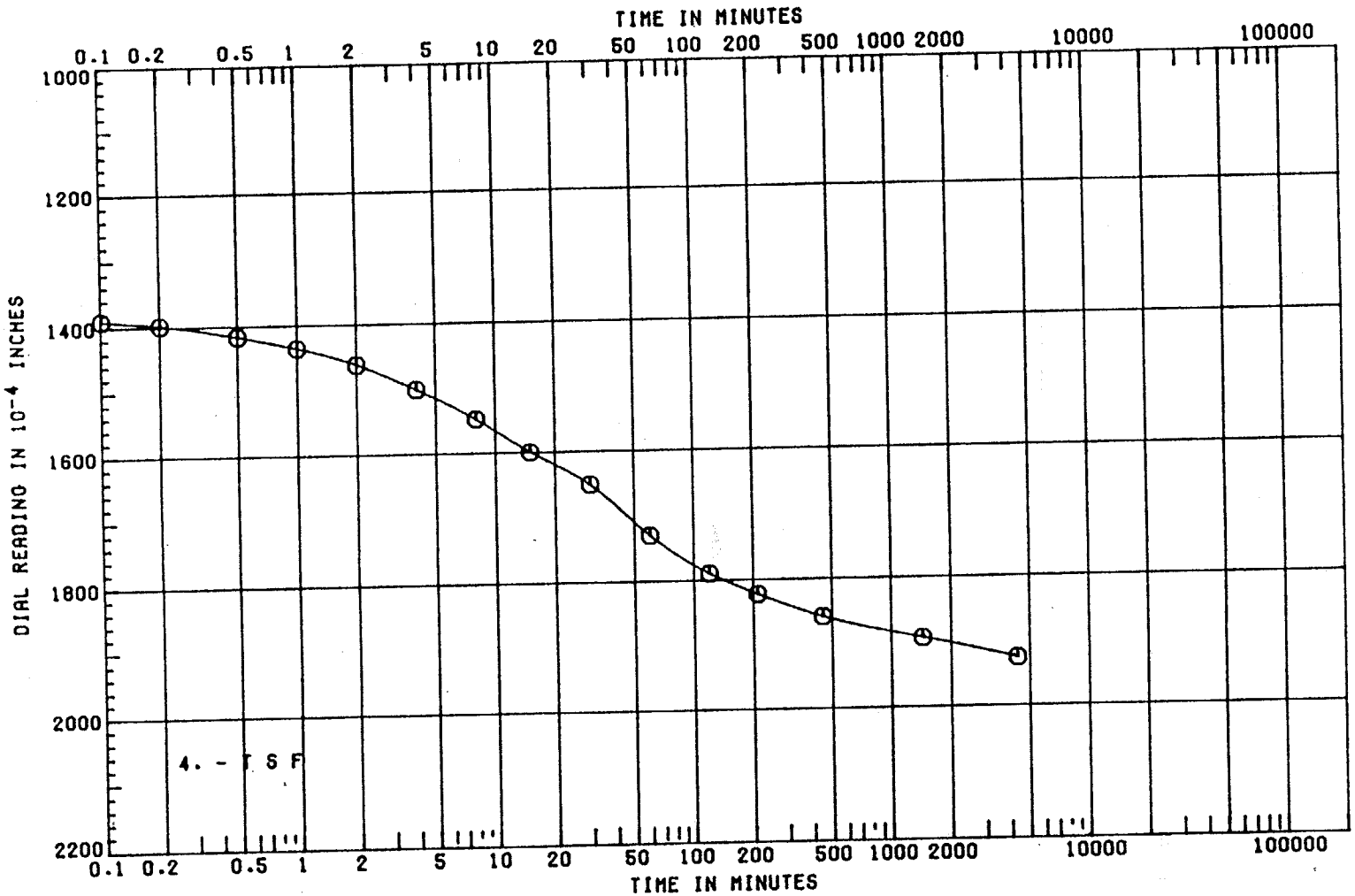
CONSOLIDATION TEST
TIME CURVES

SHEET 3 OF 7



PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 6-RU-86	SAMPLE NO. 4	
DEPTH/ELEV 16.5/18.5	DATE 16 DEC 86	

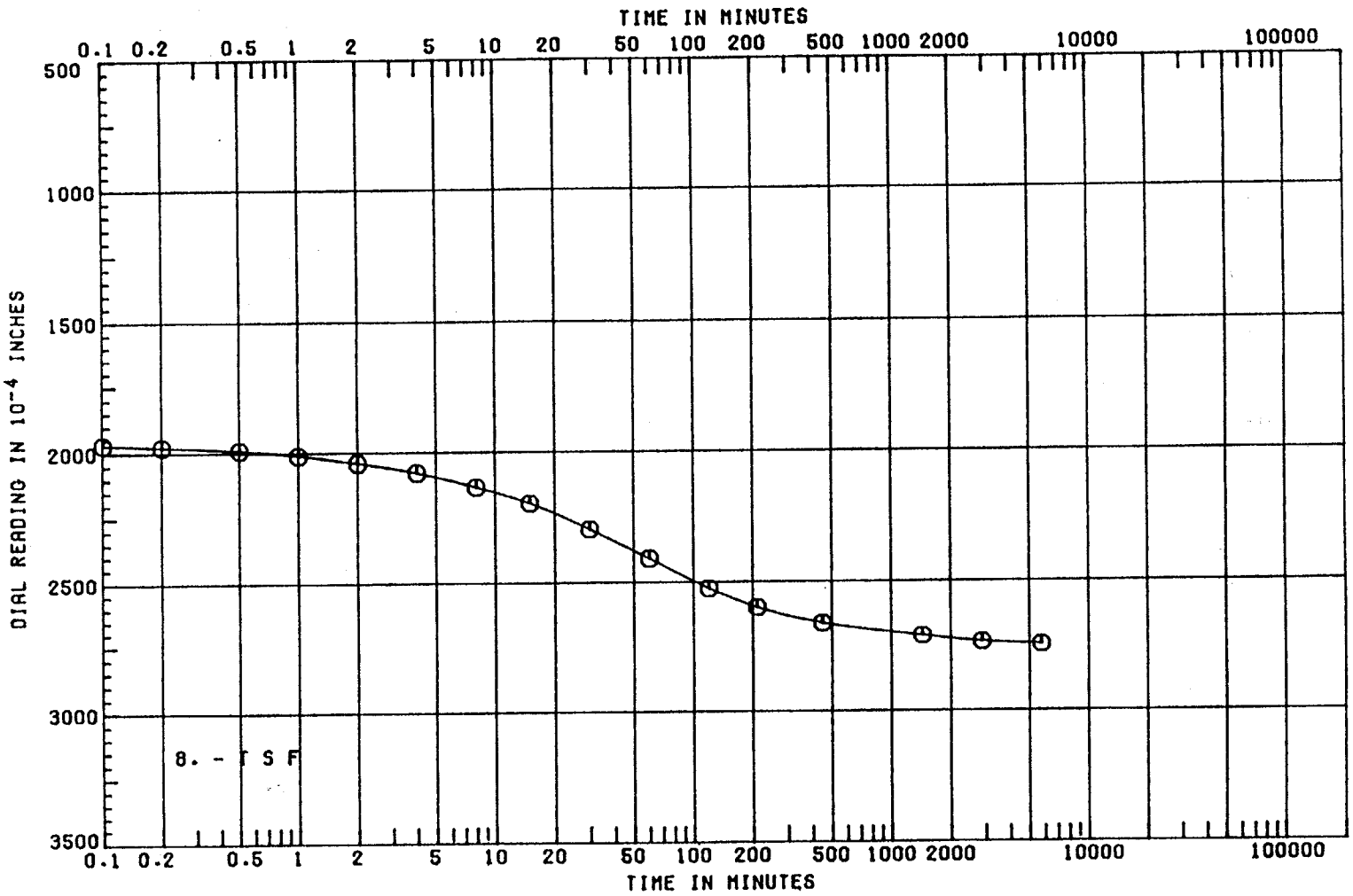
SHEET 4 OF 7



PROJECT REELFOOT LAKE STUDY	
BORING 6-RU-86	SAMPLE NO. 4
DEPTH/ELEV 16.5/18.5	DATE 16 DEC 86

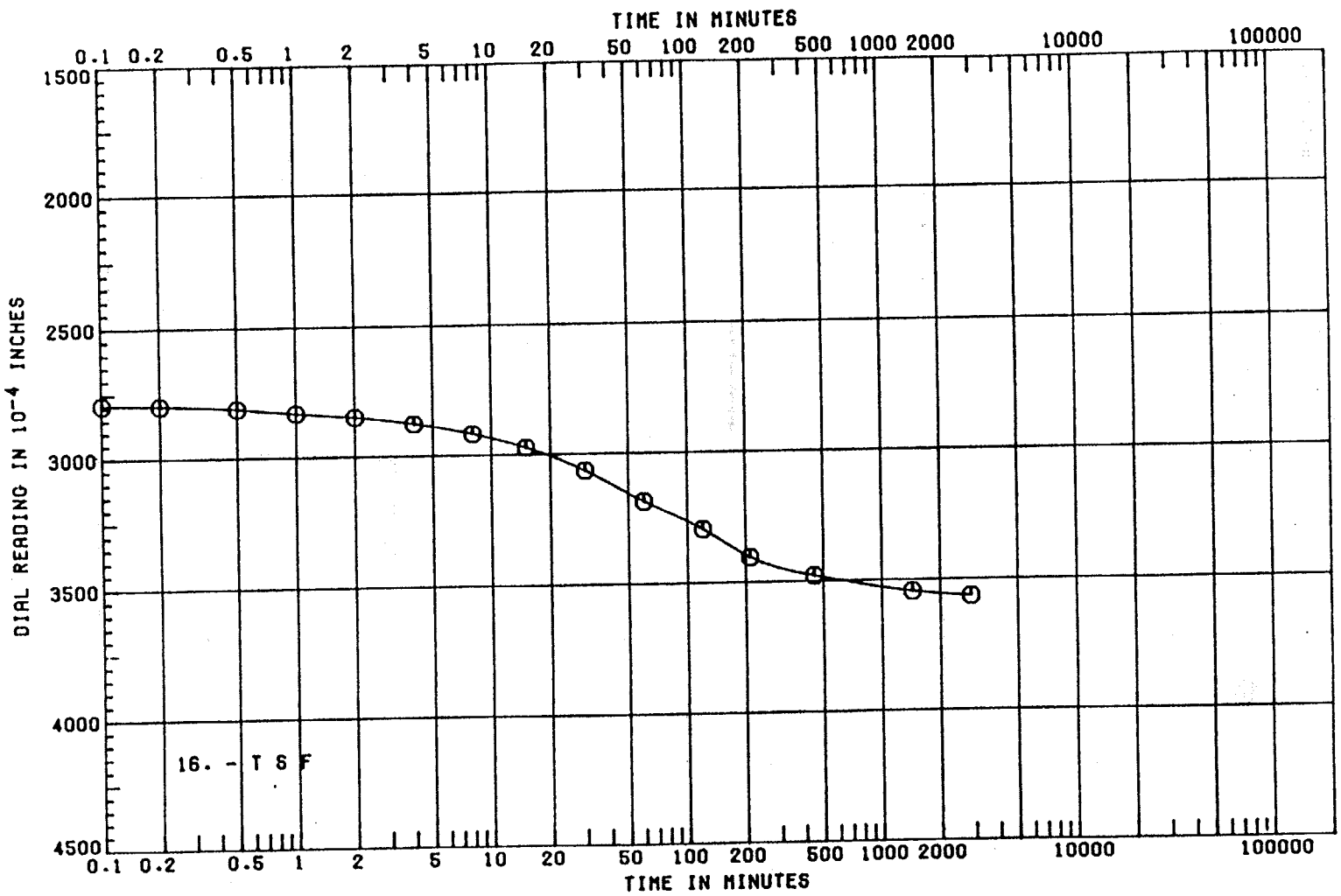
CONSOLIDATION TEST
TIME CURVES

SHEET 5 OF 7



PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 6-RU-86	SAMPLE NO. 4	
DEPTH/ELEV 16.5/18.5	DATE 16 DEC 86	

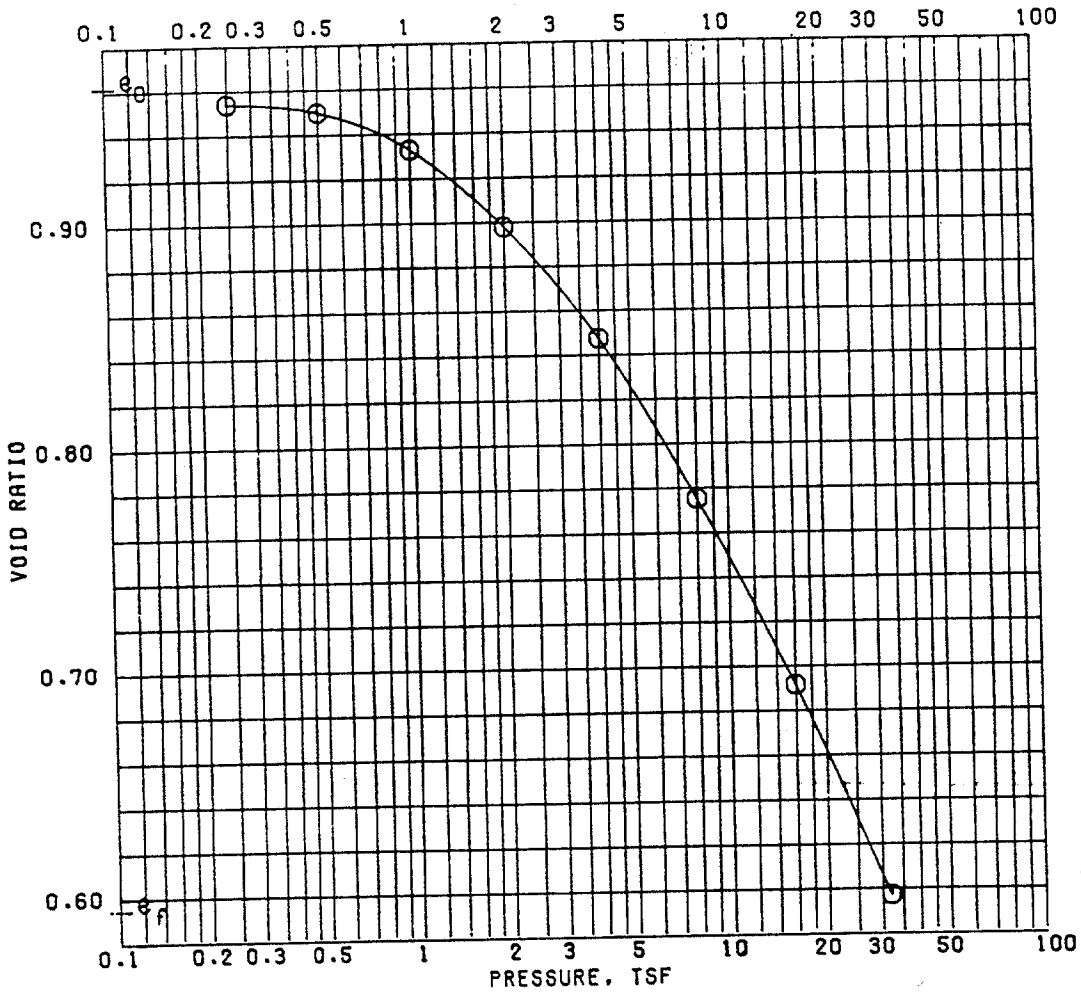
SHEET 6 OF 7



PROJECT REELFOOT LAKE STUDY	
BORING 6-RU-86	SAMPLE NO. 4
DEPTH/ELEV 16.5/18.5	DATE 16 DEC 86

CONSOLIDATION TEST
TIME CURVES

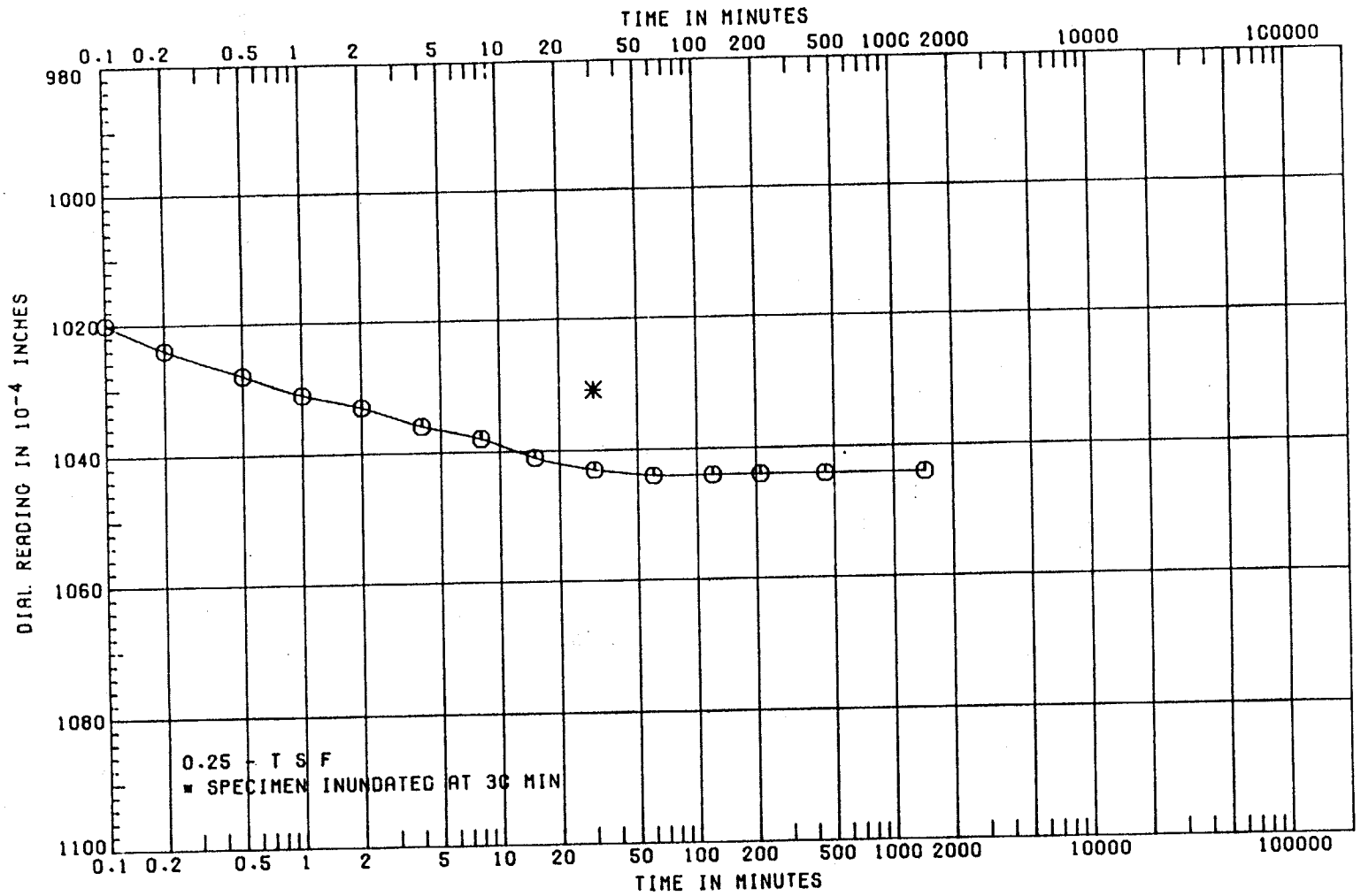
SHEET 7 OF 7



			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	30.9	24.3
PRECONSOL. PRESSURE, TSF		DRY DENSITY, PCF	86.0	105.8
COMPRESSION INDEX		SATURATION, %	86.8	100 +
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	0.961	0.594
DIA. IN 4.44	HT. IN 1.124	BACK PRESSURE, TSF		

CLASSIFICATION CLAY (CH), GRAY			
LL 73	PL 20	PI 53	PROJECT REELFOOT LAKE STUDY
GS 2.70 (EST)	D_{10}		
REMARKS		BORING NO. 7-RU-86	SAMPLE NO. 4
		DEPTH/ELEV 9.8/10.8	DATE 06 NOV 86
		CONSOLIDATION TEST REPORT	

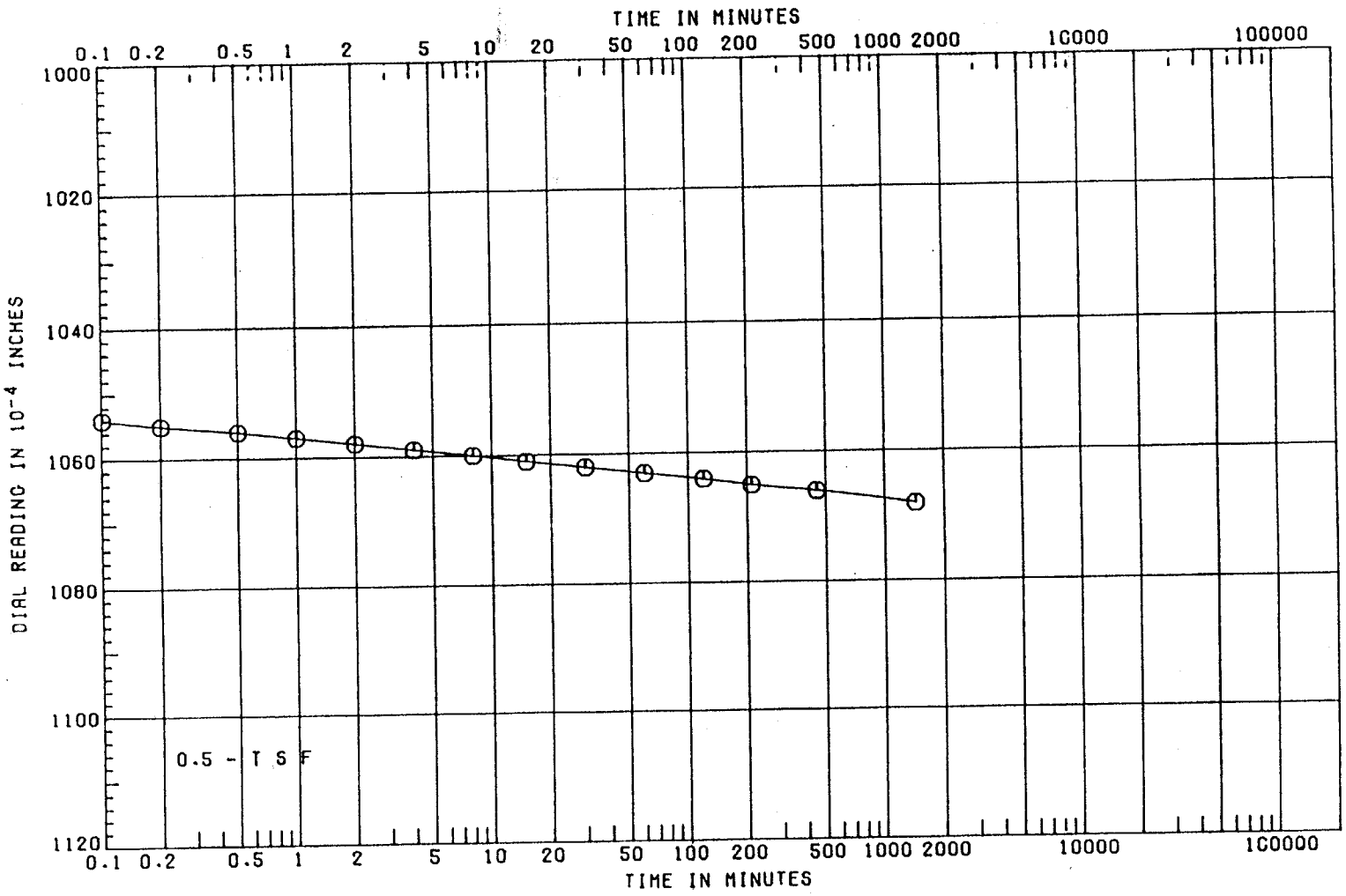
SHEET 1 OF 9



PROJECT REELFOOT LAKE STUDY	
BORING 7-RU-86	SAMPLE NO. 4
DEPTH/ELEV 9.8/10.8	DATE 06 NOV 86

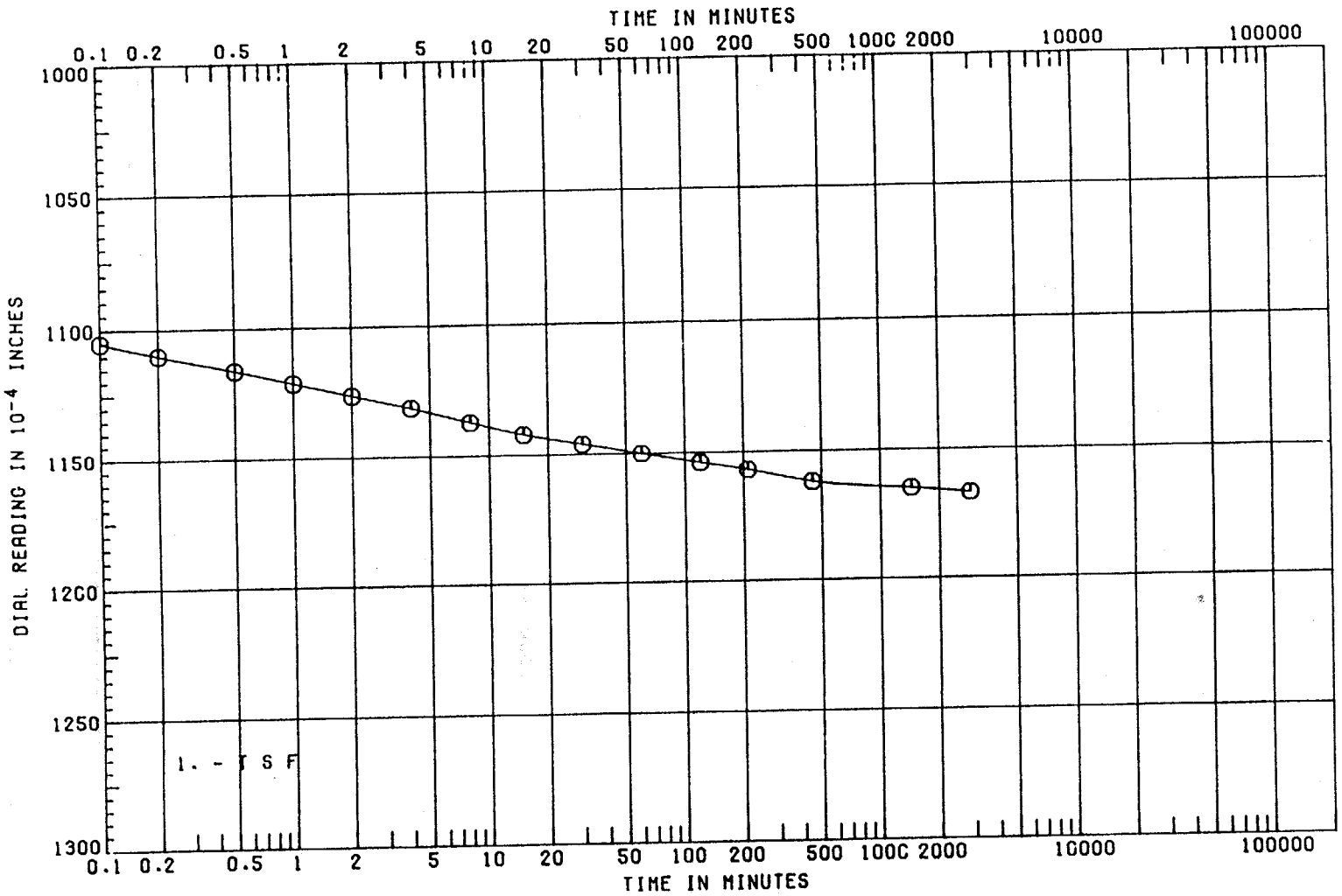
CONSOLIDATION TEST
TIME CURVES

SHEET 2 OF 9



PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 7-RU-86	SAMPLE NO. 4	
DEPTH/ELEV 9.8/10.8	DATE 06 NOV 86	

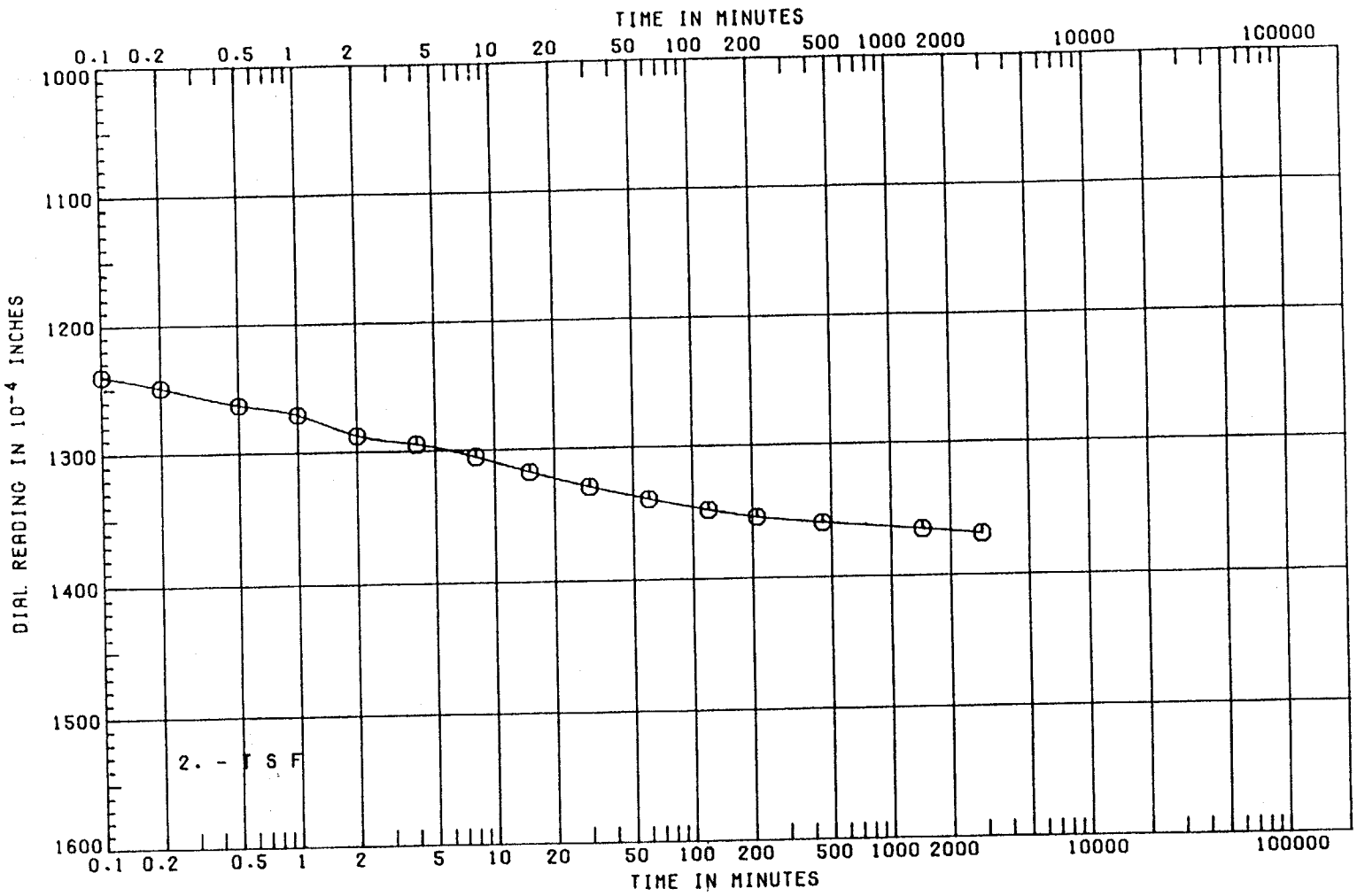
SHEET 3 OF 9



PROJECT REELFOOT LAKE STUDY	
BORING 7-RU-86	SAMPLE NO. 4
DEPTH/ELEV 9.8/10.8	DATE 06 NOV 86

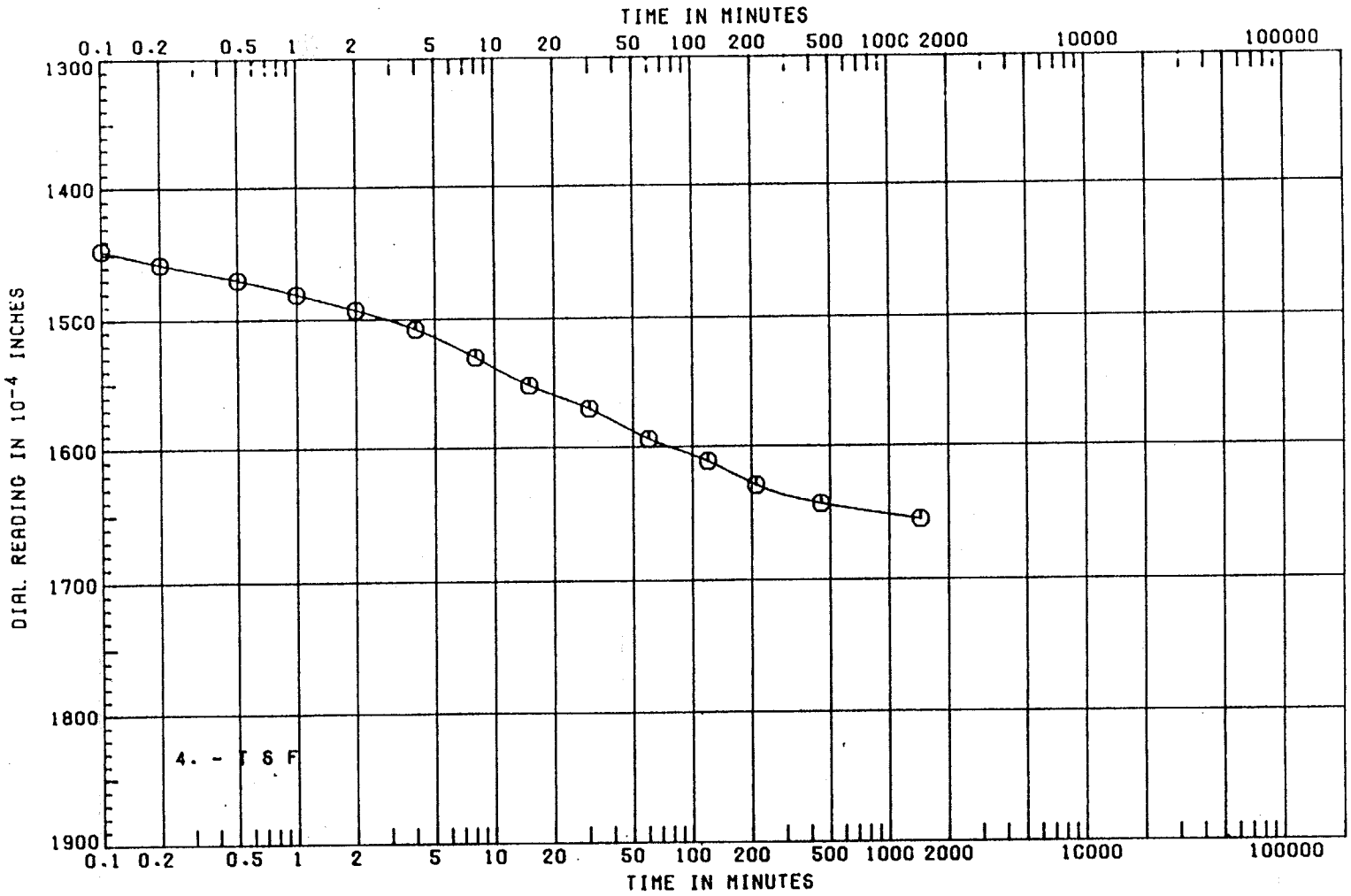
CONSOLIDATION TEST
TIME CURVES

SHEET 4 OF 9



PROJECT REELFOOT LAKE STUDY		CONSOLIDATION TEST TIME CURVES
BORING 7-RU-86	SAMPLE NO. 4	
DEPTH/ELEV 9.8/10.8	DATE 06 NOV 86	

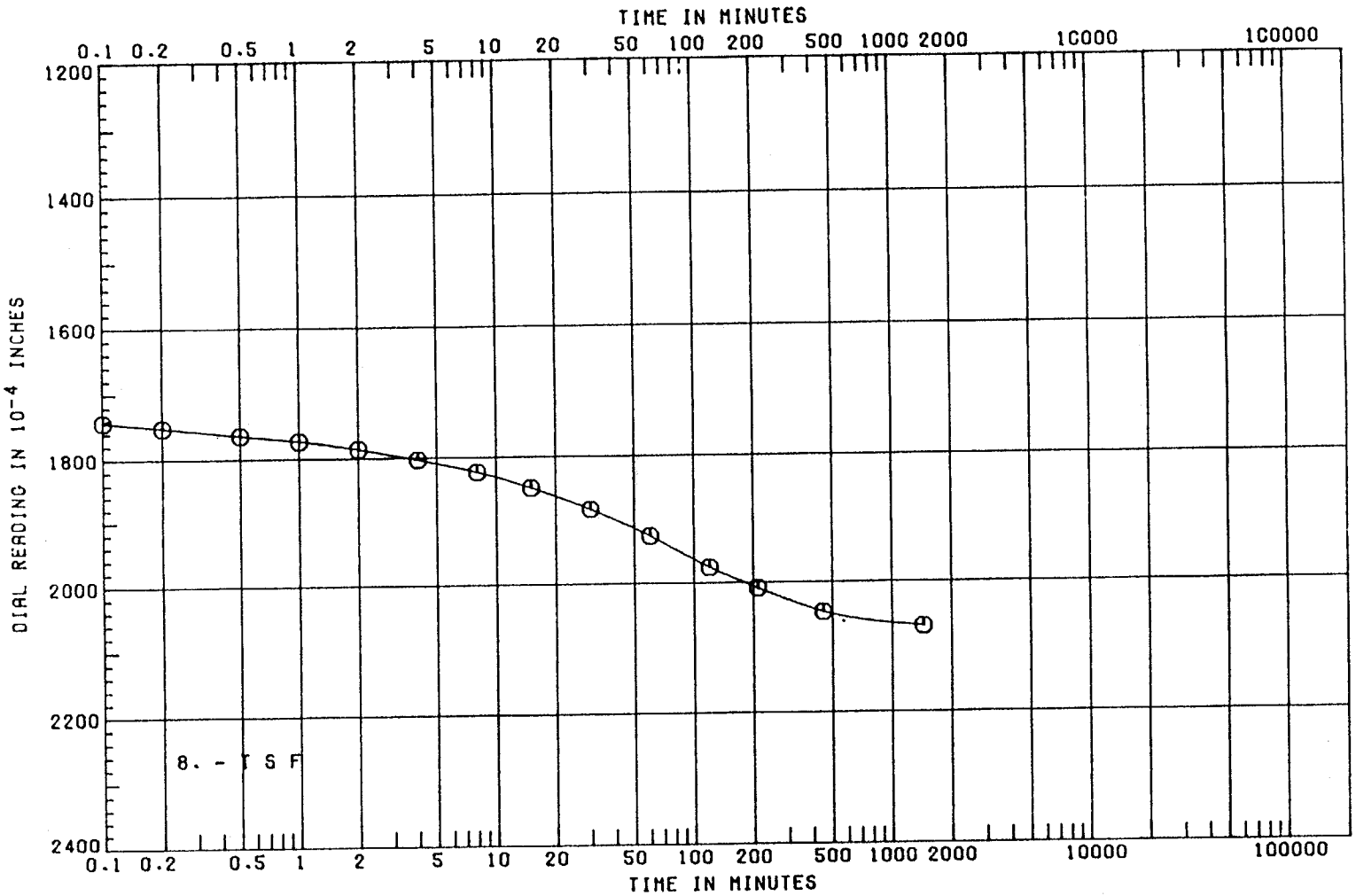
SHEET 5 OF 9



PROJECT REELFOOT LAKE STUDY	
BORING 7-RU-86	SAMPLE NO. 4
DEPTH/ELEV 9.8/10.8	DATE 06 NOV 86

CONSOLIDATION TEST
TIME CURVES

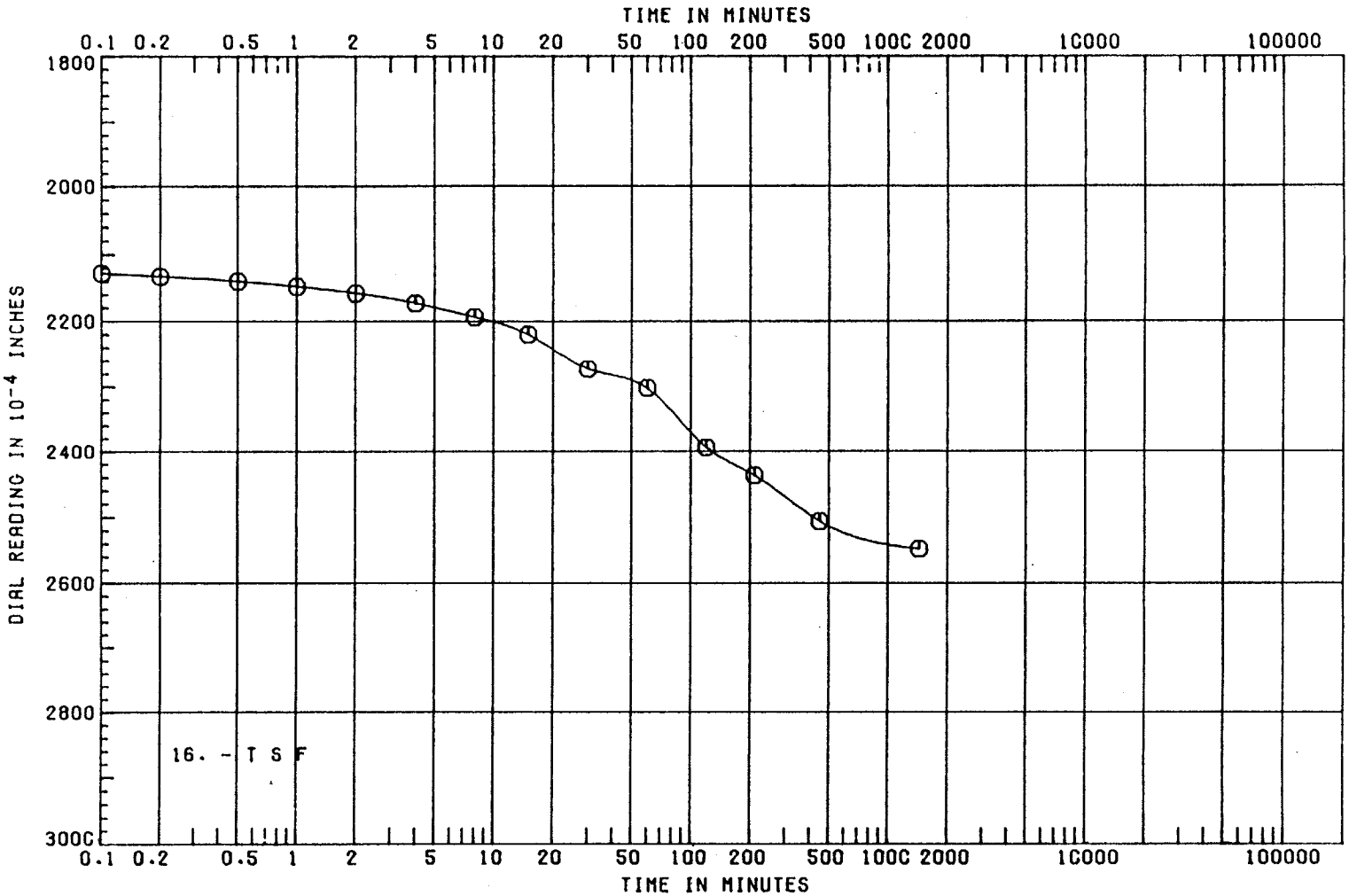
SHEET 6 OF 9



PROJECT REELFOOT LAKE STUDY	
BORING 7-RU-86	SAMPLE NO. 4
DEPTH/ELEV 9.8/10.8	DATE 06 NOV 86

CONSOLIDATION TEST
TIME CURVES

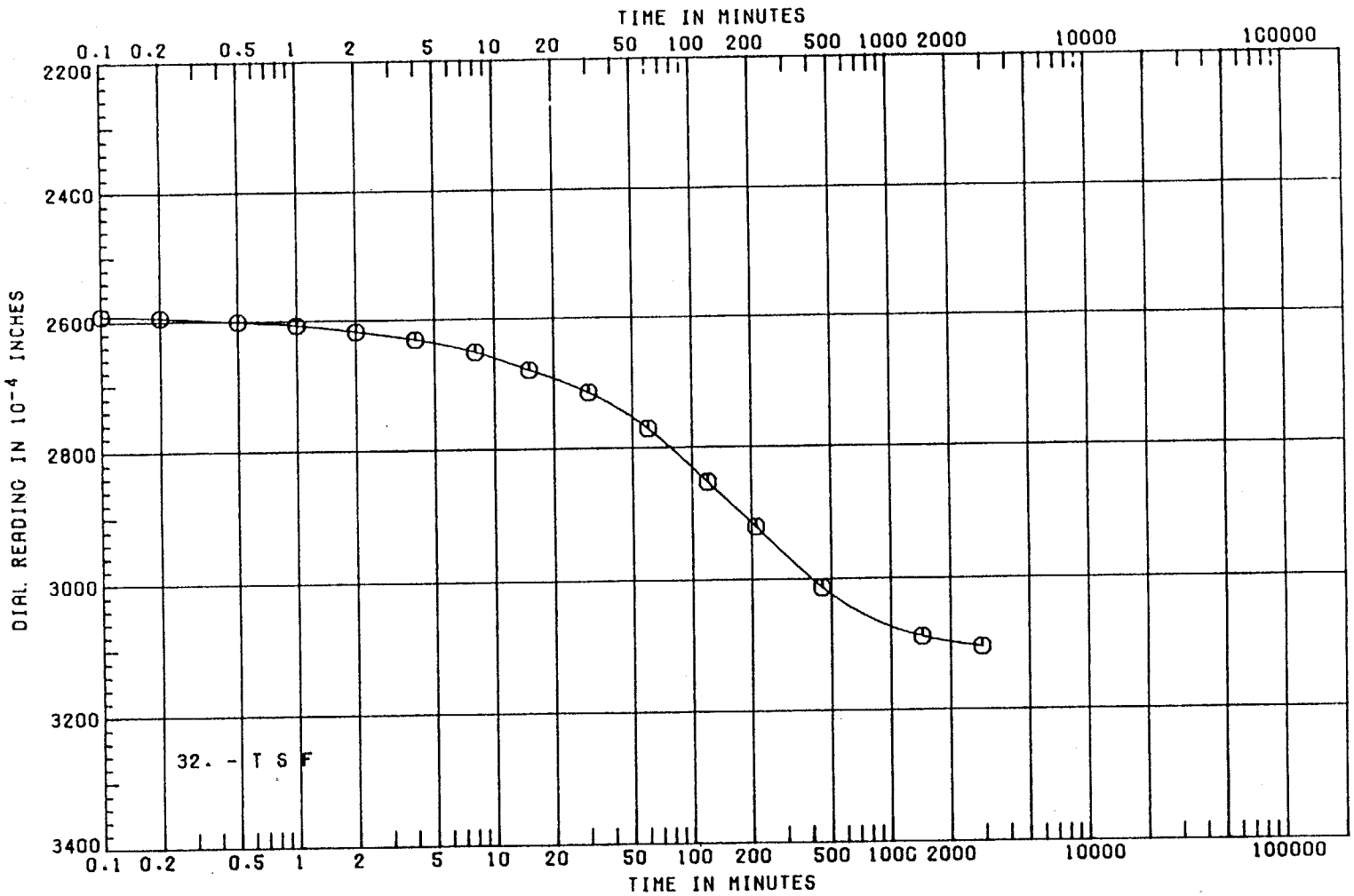
SHEET 7 OF 9



PROJECT REELFOOT LAKE STUDY	
BORING 7-RU-86	SAMPLE NO. 4
DEPTH/ELEV 9.8/10.8	DATE 06 NOV 86

CONSOLIDATION TEST
TIME CURVES

SHEET 8 OF 9



PROJECT REELFOOT LAKE STUDY	
BORING 7-RU-86	SAMPLE NO. 4
DEPTH/ELEV 9.8/10.8	DATE 06 NOV 86

CONSOLIDATION TEST
TIME CURVES

SHEET 9 OF 9

APPENDIX B

SECTION 4:
COST ANALYSIS

CONSTRUCTION COST ESTIMATE, 06 ACCOUNT.

A. *Methodology.*

ER 1110-2-1302 guides the methodology for this cost estimate. The cost detail presented here and in the MCACES cost reports was made to a level of detail commensurate with the design information provided. Since historically 80 percent of project cost is contained in 20 percent of the estimated work elements, efforts and detail were focused on those cost elements that had the greatest influence on cost. All previous pricing that was indexed used the Civil Works Construction Cost Index System, EM 1110-2-1304, and was brought up to October 1998 levels. The computer software used was MCACES Gold, Version 5.30, developed by Building Systems Design, Inc., of Atlanta, GA.

The major cost elements in this estimate were based upon current labor, equipment and material costs or subcontract/manufacturer quotes for the specific locality. Production rates were extracted from Memphis District contract field reports, the Memphis District Cost Item data base, in house calibrated production spreadsheet programs, various technical publications such as R.S. Means, and information from contractors, subcontractors and manufacturers. Production for draglines and excavators was calculated from a spreadsheet program based upon the Power Shovel Association method for dragline production and calibrated with Memphis District historic production data. The labor rates are based upon the Mississippi Valley open shop prevailing rates that usually exceed the minimum 1998 Davis Bacon labor rates for the counties involved. Labor overburden was calculated at 25.0 per cent by weighted averaging worker's compensation for concrete construction and earthwork classifications (NCCI assigned risk) and adding social security and state/federal unemployment. Overtime was added as applicable and calculated as a percentage of straight time hours. Work hours per week per shift vary from 40 to 60 hours per week. Equipment costs were calculated using the Corps of Engineers MCACES equipment database adjusted for age, current fuel costs, and shift hours based upon EP 1110-1-8, Volume 3, dated September 1997. Site visits were made to all the construction areas and photographs were studied to obtain access, obstruction, and clearing information.

Prime contractor overhead costs for the environmental structural measures were entered at 10 percent of the direct costs calculated, with 15 percent used for small contracts. This value was obtained from supervision and miscellaneous costs calculated from Official Government Estimates for similar jobs. Home Office costs were entered at 6 to 7 percent with profit at 9 percent for prime contractor applications based upon the weighted guideline method. Subcontractor markups were similar. Dredging subcontractor overheads and profit percentages were based upon Memphis District experience with these contracts. Contract bond was figured at 1.2 percent for the prime only, which is typical. Mobilization and demobilization costs were calculated as a construction contract bid item and were therefore included as a direct cost and not included as an indirect cost. The construction cost portions of the project estimate was structured after the CSI standard work break down.

The MCACES cost reports included in this appendix were those determined to be most

applicable to the majority of users. They consist of the cost summaries down to the cost "element" level. Detail task notes, production, and crew information are available at the "detail" level and contain valuable descriptions of exactly what is planned or envisioned by the study team and local sponsor and costs applied accordingly. This data should be followed and considered when preparing final plans and specifications to insure that the authorized costs and PCA commitments are kept. Additional backup printouts are available for review or on floppy disk from the Memphis District Cost Engineering and Specifications Section . The "second view" report summary shows the percentage of each cost element as compared to the bottom line total. This can be valuable information in determining where project cost emphasis and management should be applied in keeping the project within budget.

B. *Contract Items*

The project is to be constructed using six construction contract items. A general overview of the project construction features is given here. The "detail" MCACES printout notes and documentation should be consulted if further information and documentation is desired. Also the other engineering appendixes offer detailed descriptions which would only be duplicated if presented here. Project contract items are listed as follows:

Item 1, Reelfoot Alternate Spillway. This is the replacement spillway for Reelfoot Lake and is located about 1200 feet west of the old spillway and bridge combination near Reelfoot Lake State Park on Highway 21/22. It will control water levels for the entire lake. It consists of a new separate highway bridge, a new inlet and outlet channel, a closure dam downstream of the old spillway and a rehabilitation of the old bridge-spillway. The planned spillway structure is to have six-twenty foot wide bays and gates with two of these being automatically operated. The site will be dewatered to allow proper construction. The inlet channel will possibly require a small cutterhead dredge to perform the needed excavation within the inlet channel area. A considerable tract of land is planned to be acquired for this construction and much of the farmland area will be converted to forestland by tree planting. The backfill created by the channels being constructed will be limited in their height at the owner's request.

Item 2, Sediment Retention Basin. This item consists of basically two parts, a dry type reservoir to trap the large sediment load coming in from Reelfoot Creek and its tributaries and a levee-waterfowl refuge (Reelfoot Creek Waterfowl Management Area) within the high water flooding pool of the reservoir. The earthen dam will have three cast-in-place (cip) concrete low water inlet/outlet structures, a high flow primary cip spillway and a "Conlock" concrete interlocking block emergency spillway. A portion of Highway 157 will need to be raised to prevent flooding during extreme pool levels which is a relocation cost but might be included in this contract item. The refuge area will consist of terrace machine constructed three to five foot high levees with 1 vertical on 4 horizontal turfed side slopes, corrugated metal pipe (CMP) control structures and three 2750 gallon per minute (gpm) irrigation wells to flood the area. The levees will have a ten-foot wide gravel road on their crown and the irrigation wells will have

gravel roads to allow access.

Item 3. Circulation Channels. This item is the clean out of sediment from channels within Reelfoot Lake which allow proper draw down of water levels throughout the lake and have the additional benefit of enhancing boat movement in the lake. This work is planned to be performed with an amphibious hydraulic excavator with the excavated material deposited to one side of the channel work. The channels generally will be about two feet deep with a 30-foot bottom width and 1 vertical on 4 horizontal side slopes.

Item 4A & 4B. Shelby Lake Waterfowl Management Area. Shelby Lake is south of Highway 22 and just west of the old spillway structure. This area will be flooded from two 24" diameter pipelines extending from Reelfoot Lake underneath Highway 22 and controlled by 24" gated structures just north of the Highway. A high ground area in the northeast portion of the land tract to be acquired will be flooded by a 2750 gpm irrigation well. A portion of the existing Shelby Lake low lying area will be deepened to about six feet in depth and the material used to construct levees to allow flooding to take place. This will be done with large agricultural tractors pulling pan type scrapers. The configuration of the levees, control structures and gravel access roads are similar to the Reelfoot Creek Wildlife Management area mentioned in Item 2. Excess material from the 0.4 million cubic yard excavation will be deposited in higher ground areas and forested. This separate forestry contract will be Item 4B.

Item 5. Lake Isom Improvements. Lake Isom National Wildlife Refuge is a wooded area about five miles south of the old Reelfoot Lake spillway adjacent and west of Running Reelfoot Bayou. The improvements consist of enlarging the dam, placing a new gravel road on the crown, constructing a new stop log cpi outlet structure and excavating a connector ditch from the borrow area to Isom Creek. A well field at the northwest corner of the refuge consisting of six-2750 gpm wells is planned for flooding the lake adequately.

C. *Recommendations to Moderate Cost Risk*

The cost estimate has a contingency of 20 percent applied to all items except real estate, which has a contingency of about 25%. This is considered to be appropriate for feasibility report levels according to District experience and adequate design and quantity detail and accuracy. The quantities and engineering design are considered to be generally good and spot-checking of the quantities was performed. A quality check of the cost estimate was performed according to the quality plan prepared. The construction costs estimated assume an average bidding climate, care in designing to cost, prudent construction procedures, and contract timing that takes advantage of the construction season. Average weather conditions were assumed. Specific recommendations for minimizing the construction cost risk are as follows:

1. Use the "detail" MCACES cost estimate as a guide to design and specification of

construction whenever possible. Past experience has shown that much communication is lost between the feasibility phase and the plans and specifications phase. This is especially true if the design is contracted to an AE. Every effort should be made to design to cost. The bid schedule for the construction contracts should follow the MCACES estimate outline as closely as possible, in order to track any project cost changes and to obtain bidding economy. Mixing English and metric units in the plans and specifications phase also makes it very difficult to track and compare costs through the final design process and should be avoided.

2. The alternate spillway construction and sedimentation basin contract should be bid in the January-February time frame to help assure notice to proceed can occur in March-April for the maximum use of the best construction weather possible. The alternate spillway will utilize expensive dewatering wells and the amount of time "in the hole" and the high water pumping head time needs to be minimized to reduce cost. Also the concrete needs to be in place before bad weather to reduce cost of placement. The sedimentation dam has areas that are planned to be preloaded with earth before the concrete structures can be placed. This will demand consideration as to the optimum contract times to prevent a "winter over" situation and the associated costs.

3. The cost estimate presently assumes that the Tennessee Department of Transportation bridge on HWY 21/22 will be built before the spillway is started. It also assumes they will obtain borrow from the new spillway "hole" to build the detour road embankment. Any other scenario should consider the complimentary use of dirt to minimize the cost to the project and to local interests since the bridge is a relocation cost.

4. It appears that 100 to 200 thousand dollars in first costs could be saved by placing a low water weir in Running Reelfoot Bayou near the Lake Isom dam and water "relifted" over the backfill embankment into the lake. The water in Reelfoot Bayou could be regulated by the new spillway and the 300 thousand-dollar well field eliminated. A major cost savings in operation cost to the local sponsor would occur through energy consumption savings and the time to flood the lake could be easily cut in half (effective pumping head reduced from 100 ft to 15 ft.). This was realized late in the process so the decision was made to pursue it latter. It is recommend this plan be given attention during future phases or value engineered.

REELFOOT OPERATION AND MAINTENANCE

PROJECT FEATURE	COMMENTS	INTERVAL YRS	DESIGN QUANT	PERCENT OF DESIGN	QUANT	UNIT	UNIT PRICE	COST
SEDIMENTATION BASIN								
Mowing	Mow grass, twice a year	1	94	200%	188.00	ACR	$ 25	$ 4,700
Maintenance of Inlet Structures	Replace stoplogs	10	225	20%	45.00	BF	$ 2	$ 90
Cleanout of Reelfoot Creek	Excavation of deposited mat'l	1	8600	100%	8600.00	BCY	$ 4	$ 34,400
Shaping of Deposited Material	Shape excavated material	1	30000	50%	15000.00	BCY	$ 1	$ 15,000
Periodic Maintenance of Concrete Structures	Unit Price is first cost of structures	25	1	20%	0.20	JOB	$ 520,000	$ 104,000
Riprap/Filter Replacement	Replacing damage after major events	25	13131	20%	2626.20	TON	$ 25	$ 65,655
REELFOOT CR MGT AREA (Sed. Basin)								
Operation, Mowing, Levee Repair, Planting	From TWRA Annual Estimate	1	1	100%	1.00	JOB	$ 35,000	$ 35,000
Grading of Road	Grade road once annually	1	7.20	100%	7.20	MILE	$ 100	$ 720
Stoplog Structure Replacement		15	25	100%	25.00	BF	$ 2.00	$ 50
XX Pumps/Wells								
Rehab Pump/Motors	Rebuild Pump & Motors.	15	3	25%	0.75	EA	$ 15,000	$ 11,250
Rehab Well	Clean Screens, Pull replace	25	3	50%	1.50	EA	$ 25,000	$ 37,500
Operating Cost (for 63 days a year)	Electricity (xx hours run time)	1	145152	100%	145152.00	KW-HR	$ 0.060	$ 8,709
Shelby Lake								
Operation, Mowing, Levee Repair, Planting	Form TWRA Annual Estimate	1	1	100%	1.00	JOB	$ 35,000	$ 35,000
Grading of Road	Grade road once annually	1	3.92	100%	3.92	MILE	$ 100	$ 392
Stoplog Structure Replacement	Replace stoplogs/Structure as needed	15	10	100%	10.00	BF	$ 2.00	$ 20
XX Pumps/Wells								
Rehab Pump/Motors	Rebuild Pump & Motors.	15	1	25%	0.25	EA	$ 15,000	$ 3,750
Rehab Well	Clean Screens, Pull replace	25	1	50%	0.50	EA	$ 25,000	$ 12,500
Operating Cost (for 35 days a year)	Electricity (xx hours run time)	1	80640	100%	80640.00	KW-HR	$ 0.060	$ 4,838
Concrete Inlet Structure & Gates		25	1	50%	0.50	JOB	$ 15,000	$ 7,500

REELFOOT OPERATION AND MAINTENANCE

PROJECT FEATURE	COMMENTS	INTERVAL YRS	DESIGN QUANT	PERCENT OF DESIGN	QUANT	UNIT	UNIT PRICE	COST
Alternate Spillway								
Grading of Road	Grade road 3 times annually	1	0.68	300%	2.05	MILE	$ 100	$ 205
Concrete Outlet Structure & Stoplogs	Unit Price is first cost of structures	25	1	20%	0.20	JOB	$ 75,000	$ 15,000
Mowing	ow grass, 9 times a year, finish dres	1	16	900%	144.00	ACR	$ 25	$ 3,600
Relief Wells								
Inspections	Piezometers, High Water	5	1	100%	1.00	EA	$ 2,500	$ 2,500
Rehab Well	Clean Screens, Pull replace	25	12	50%	6.00	EA	$ 14,000	$ 84,000
Pump Test		5	1	50%	0.50	EA	$ 25,000	$ 12,500
Rehab of Concrete Structure	Unit Price is first cost of structures	25	1	10%	0.10	JOB	$1,400,000	$ 140,000
Rehab of Mechanical /Electrical Componets		25	1	50%	0.50	JOB	$ 435,000	$ 217,500
Channel Maintenance	Inlet/out Chan, remove 2' of sediment	25	40000	100%	40000	BCY	$ 3.00	$ 120,000
Operation	Regulate, Clean, Greeze	1	100	100%	100.00	MHR	$ 30	$ 3,000
Circulation Channels								
Channel Cleanout	Excavate 50% of initial construction quantities	25	62555	50%	31277.5	BCY	$ 3.50	$ 109,471
Lake Isom	Assumed for Whole Site, Not just improvements							
Grading of Road	Grade road once annually	1	0.68	100%	0.68	MILE	$ 100	$ 68
Concrete Outlet Structure & Stoplogs	Unit Price is first cost of structures	25	1	20%	0.20	JOB	$ 75,000	$ 15,000
Mowing	Mow grass, three times a year	1	53	300%	159.00	ACR	$ 25	$ 3,975
XX Pumps/Wells								
Rehab Pump/Motors	Rebuild Pump & Motors.	15	6	25%	1.50	EA	$ 15,000	$ 22,500
Rehab Well	Clean Screens, Pull replace	25	6	50%	3.00	EA	$ 25,000	$ 75,000
Operating Cost (for 45 days a year)	Electricity (xx hours run time)	1	207360	100%	207360.00	KW-HR	$ 0.060	$ 12,442
Operation	Pumps, Oversite, Regulation, Planting	1	250	100%	250.00	MHR	$ 30	$ 7,500
Riprap/Filter Replacement	Replacing damage after major events	25	920	20%	184.00	TON	$ 30	$ 5,520

REELFOOT LAKE TN & KY FIESIB STY

Designed By: ENGR DIV, MEMPHIS DISTR COE
Estimated By: JERRY R. WELCH, CCC

Prepared By: COST ENGINEERING SECTION
QUAL CHECK BY RICHARD HURST,CCC

Preparation Date: 05/11/99
Effective Date of Pricing: 10/01/98

Sales Tax: 0.00%

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This project is for the enviornmental enhancement of Reelfoot Lake, TN., near Tiptonville and Samburg, TN. This lake was formed during an earthquake in the early 1800's due to the land surface sinking and the Mississippi River reportedly running backwards to fill it up. It is now basically protected from Mississippi River flooding and is fed by rainfall runoff from surrounding agricultural lands in Kentucky and Tennessee. The project plan consists of five major construction items currently. It will be constructed by six contracts with one contract consisting of a tree planting contract for acquired lands around the new spillway. The Water Management Plan, Item 1B, is a plan to vary water levels in the lake using the new spillway. Its costs are associated mainly with obtaining the flowage easements necessary to raise the lake pool level about 0.8 feet.

** PROJECT OWNER SUMMARY - Contract **

		QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
10	ITEM 1A REELFOOT ALTERN SPILLWAY	1.00	JB	8,075,690	1,633,338	0	9,709,028	9709028
20	ITEM 2, SEDIMENT RETENTION BASIN	1.00	JB	9,202,418	2,045,684	0	11,248,102	11248102
30	ITEM 3, CIRCULATION CHANNELS	1.00	JB	447,894	91,179	0	539,073	539073.31
40	ITEM 4A, SHELBY LAKE/WATERFWL AR	1.00	JB	3,992,889	889,578	0	4,882,467	4882467
45	ITEM 4B, TREE PLANTING SHELBY LA	1.00	JB	67,300	13,460	0	80,760	80760.00
50	ITEM 5, LAKE ISOM IMPROVEMENTS	1.00	JB	1,114,096	228,419	0	1,342,515	1342515
	TOTAL REELFOOT LAKE TN & KY FIESIB STY	1.00	EA	22,900,288	4,901,658	0	27,801,946	27801946

** PROJECT OWNER SUMMARY - Feature **

	QUANTITY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
10 ITEM 1A REELFOOT ALTERN SPILLWAY						
10/ 10 01 LANDS AND DAMAGES	1.00 EA	439,000	106,000	0	545,000	545000.00
10/ 20 02 RELOCATIONS	1.00 JB	1,521,120	304,224	0	1,825,344	1825344
10/ 30 06 REELFOOT SPILLWAY & OUTLET CH	1.00 JB	4,761,070	952,214	0	5,713,284	5713284
10/ 40 30 PLANNING, ENGINEERING & DES	1.00 JB	950,500	190,100	0	1,140,600	1140600
10/ 50 31 SUPERVISION & ADMINISTRATION	1.00 JB	404,000	80,800	0	484,800	484800.00
TOTAL ITEM 1A REELFOOT ALTERN SPILLWAY	1.00 JB	8,075,690	1,633,338	0	9,709,028	9709028
20 ITEM 2, SEDIMENT RETENTION BASIN						
20/ 10 01 LANDS AND DAMAGES	1.00 EA	4,274,000	1,060,000	0	5,334,000	5334000
20/ 20 02 RELOCATIONS	1.00 JB	176,343	35,269	0	211,611	211611.24
20/ 30 06 SEDIMENT RETENTION BASIN	1.00 JB	3,739,576	747,915	0	4,487,491	4487491
20/ 40 18 CULTURAL RESOURCE PRESERVATIN	1.00 JB	125,000	25,000	0	150,000	150000.00
20/ 50 30 PLANNING, ENGINEERING & DES	1.00 JB	771,500	154,300	0	925,800	925800.00
20/ 60 31 SUPERVISION & ADMINISTRATION	1.00 JB	116,000	23,200	0	139,200	139200.00
TOTAL ITEM 2, SEDIMENT RETENTION BASIN	1.00 JB	9,202,418	2,045,684	0	11,248,102	11248102
30 ITEM 3, CIRCULATION CHANNELS						
30/ 10 01 LANDS AND DAMAGES	1.00 EA	12,000	4,000	0	16,000	16000.00
30/ 30 06 CIRCULATION CHANNELS	1.00 JB	207,894	41,579	0	249,473	249473.31
30/ 50 30 PLANNING, ENGINEERING & DES	1.00 JB	198,000	39,600	0	237,600	237600.00
30/ 60 31 SUPERVISION & ADMINISTRATION	1.00 JB	30,000	6,000	0	36,000	36000.00
TOTAL ITEM 3, CIRCULATION CHANNELS	1.00 JB	447,894	91,179	0	539,073	539073.31
40 ITEM 4A, SHELBY LAKE/WATERFWL AR						
40/ 10 01 LANDS AND DAMAGES	1.00 EA	1,810,000	453,000	0	2,263,000	2263000
40/ 20 02 RELOCATIONS	1.00 JB	7,000	1,400	0	8,400	8400.00
40/ 30 06 SHELBY LAKE WATERFOWL MG AREA	1.00 JB	1,545,889	309,178	0	1,855,067	1855067
40/ 40 18 CULTURAL RESOURCE PRESERVATIN	1.00 JB	125,000	25,000	0	150,000	150000.00
40/ 50 30 PLANNING, ENGINEERING & DES	1.00 JB	431,000	86,200	0	517,200	517200.00
40/ 60 31 SUPERVISION & ADMINISTRATION	1.00 JB	74,000	14,800	0	88,800	88800.00
TOTAL ITEM 4A, SHELBY LAKE/WATERFWL AR	1.00 JB	3,992,889	889,578	0	4,882,467	4882467
45 ITEM 4B, TREE PLANTING SHELBY LA						
45/ 10 06 TREE PLANTING	282.00 ACR	42,300	8,460	0	50,760	180.00
45/ 50 30 PLANNING, ENGINEERING & DES	1.00 JB	11,000	2,200	0	13,200	13200.00

** PROJECT OWNER SUMMARY - Feature **

	QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
45/ 60 31 SUPERVISION & ADMINISTRATION	1.00	JB	14,000	2,800	0	16,800	16800.00
TOTAL ITEM 4B, TREE PLANTING SHELBY LA	1.00	JB	67,300	13,460	0	80,760	80760.00
50 ITEM 5, LAKE ISOM IMPROVEMENTS							
50/ 10 01 LANDS AND DAMAGES	1.00	EA	87,000	23,000	0	110,000	110000.00
50/ 25 06 LAKE ISOM IMPROVEMENTS	1.00	JB	677,096	135,419	0	812,515	812515.33
50/ 40 30 PLANNING, ENGINEERING & DES	1.00	JB	313,000	62,600	0	375,600	375600.00
50/ 50 31 SUPERVISION & ADMINISTRATION	1.00	JB	37,000	7,400	0	44,400	44400.00
TOTAL ITEM 5, LAKE ISOM IMPROVEMENTS	1.00	JB	1,114,096	228,419	0	1,342,515	1342515
TOTAL REELFOOT LAKE TN & KY FIESIB STY	1.00	EA	22,900,288	4,901,658	0	27,801,946	27801946

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
10 ITEM 1A REELFOOT ALTERN SPILLWAY							
10/ 10 01 LANDS AND DAMAGES							
10/ 10. 1 LANDS AND DAMAGES	220.90	ACR	439,000	106,000	0	545,000	2467.18
TOTAL 01 LANDS AND DAMAGES	1.00	EA	439,000	106,000	0	545,000	545000.00
10/ 20 02 RELOCATIONS							
10/ 20. 10 HWY 22 Bridge Relocation	13850.00	SF	795,920	159,184	0	955,104	68.96
10/ 20. 20 Utilities, Hwy 22 Bridge	1.00	JB	512,700	102,540	0	615,240	615240.00
10/ 20. 30 New Spillway	1.00	JB	111,000	22,200	0	133,200	133200.00
10/ 20. 40 Old Spillway	1.00	JB	101,500	20,300	0	121,800	121800.00
TOTAL 02 RELOCATIONS	1.00	JB	1,521,120	304,224	0	1,825,344	1825344
10/ 30 06 REELFOOT SPILLWAY & OUTLET CH							
10/ 30. 10 GENERAL CONDITIONS							
10/ 30. 10. 10 MOBILIZATION/DEMOBILIZATION	1.00	EA	85,101	17,020	0	102,121	102121.24
10/ 30. 10. 20 CONCRETE LAB TESTING	1.00	EA	3,215	643	0	3,859	3858.57
10/ 30. 10. 30 SOIL COMPACTION TESTING	1.00	EA	1,929	386	0	2,315	2315.14
TOTAL GENERAL CONDITIONS	1.00	JB	90,246	18,049	0	108,295	108294.96
10/ 30. 20 SITEWORK							
10/ 30. 20. 10 CLEARING	64.50	AC	140,165	28,033	0	168,198	2607.72
10/ 30. 20. 20 EXCAVATION, STRUCTURAL ROUGH	112200.00	BCY	196,609	39,322	0	235,931	2.10
10/ 30. 20. 30 EXCAVATION, STRUCTURAL FINISH	1370.00	BCY	5,898	1,180	0	7,078	5.17
10/ 30. 20. 31 EXCAVATION, INLET/OUTLET CHANNEL	323920.00	BCY	413,326	82,665	0	495,991	1.53
10/ 30. 20. 35 EMBANKMENT, COFFERDAM	24000.00	ECY	23,816	4,763	0	28,579	1.19
10/ 30. 20. 41 EMBANKMENT, STRUC PERVIOUS WASH	4600.00	TN	61,249	12,250	0	73,499	15.98
10/ 30. 20. 43 EMBANKMENT, FOUNDATION GRAVEL	27720.00	TN	350,197	70,039	0	420,236	15.16
10/ 30. 20. 50 EMBANKMENT, STRUC IMPERVIOUS	64600.00	ECY	135,045	27,009	0	162,053	2.51
10/ 30. 20. 52 EMBANKMENT, CLOSURE LEVEE	34200.00	ECY	50,910	10,182	0	61,092	1.79
10/ 30. 20. 55 IMPERMEABLE MEMBRANE	33000.00	SF	7,083	1,417	0	8,499	0.26
10/ 30. 20. 60 RELIEF WELLS	12.00	EA	169,777	33,955	0	203,733	16977.72
10/ 30. 20. 70 DEWATERING	1.00	JB	710,957	142,191	0	853,148	853147.84
10/ 30. 20. 95 TURFING	44.00	AC	28,605	5,721	0	34,326	780.13
10/ 30. 20.100 TREE PLANTING	115.00	AC	23,808	4,762	0	28,570	248.43
10/ 30. 20.110 AGGREGATE SURFACING	513.00	CCY	10,496	2,099	0	12,596	24.55
10/ 30. 20.115 FILTER MATERIAL	900.00	TN	17,074	3,415	0	20,488	22.76
10/ 30. 20.125 PILING; SHEET PSA 23	7200.00	SF	105,780	21,156	0	126,936	17.63
10/ 30. 20.130 RIPRAP	6375.00	TN	142,421	28,484	0	170,905	26.81

** PROJECT OWNER SUMMARY - Element **

	QUANTITY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
10/ 30. 20.140 FENCE, CHAIN LINK	400.00 LF	5,634	1,127	0	6,760	16.90
TOTAL SITEWORK	1.00 JB	2,598,848	519,770	0	3,118,617	3118617
10/ 30. 30 CONCRETE						
10/ 30. 30. 5 FOOTINGS	943.00 CY	181,522	36,304	0	217,827	230.99
10/ 30. 30. 10 SLAB ON GRADE(Outlet Bas Slab)	548.00 CY	115,819	23,164	0	138,982	253.62
10/ 30. 30. 20 WALLS(Bay walls/outlet bas wall)	914.00 CY	299,831	59,966	0	359,797	393.65
10/ 30. 30. 40 RETAINING WALLS(Out/In Wingwall)	356.00 CY	127,230	25,446	0	152,676	428.86
10/ 30. 30. 50 ELEV SLAB(Operating Platform)	86.00 CY	32,313	6,463	0	38,775	450.87
10/ 30. 30. 55 COMPLEX Spill Floor	1653.00 CY	345,609	69,122	0	414,731	250.90
10/ 30. 30.100 WATERSTOP	2000.00 LF	20,156	4,031	0	24,188	12.09
10/ 30. 30.110 WALL DRAINS	400.00 LF	13,734	2,747	0	16,480	41.20
10/ 30. 30.120 OLD SPILLWAY Grouting/Closure	2719.00 CY	291,517	58,303	0	349,821	128.66
TOTAL CONCRETE	4497.00 CY	1,427,730	285,546	0	1,713,276	380.98
10/ 30. 50 METALS	1.00 JB	158,720	31,744	0	190,464	190464.27
10/ 30. 70 THERMAL/MOISTURE PROTECTION						
10/ 30. 70. 30 SEALANTS	1.00 JB	2,187	437	0	2,625	2624.98
TOTAL THERMAL/MOISTURE PROTECTION	1.00 JB	2,187	437	0	2,625	2624.98
10/ 30. 90 FINISHES	5000.00 SF	13,827	2,765	0	16,592	3.32
10/ 30.150 MECHANICAL						
10/ 30.150. 10 3 TON STOPLOG HOIST	1.00 JB	4,952	990	0	5,942	5942.20
10/ 30.150. 20 ROLLER GATE 12'X 20'& ASSESSOR	6.00 EA	380,957	76,191	0	457,149	76191.44
TOTAL MECHANICAL	1.00 JB	385,909	77,182	0	463,091	463090.81
10/ 30.160 ELECTRICAL						
10/ 30.160. 10 Primary Service	1.00 JB	25,724	5,145	0	30,869	30868.59
10/ 30.160. 20 Secondary Service	1.00 JB	32,155	6,431	0	38,586	38585.74
10/ 30.160. 30 Automatic Gate Operation Equip.	2.00 EA	25,724	5,145	0	30,869	15434.30
TOTAL ELECTRICAL	1.00 JB	83,602	16,720	0	100,323	100322.92
TOTAL 06 REELFOOT SPILLWAY & OUTLET CH	1.00 JB	4,761,070	952,214	0	5,713,284	5713284
10/ 40 30 PLANNING, ENGINEERING & DES						

** PROJECT OWNER SUMMARY - Element **

	QUANTITY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
10/ 40. 1 30 PLANNING, ENGINEERING & DES	1.00 JB	950,500	190,100	0	1,140,600	1140600
TOTAL 30 PLANNING, ENGINEERING & DES	1.00 JB	950,500	190,100	0	1,140,600	1140600
10/ 50 31 SUPERVISION & ADMINISTRATION						
10/ 50. 1 SUPERVISION & ADMINISTRATION	1.00 JB	404,000	80,800	0	484,800	484800.00
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00 JB	404,000	80,800	0	484,800	484800.00
TOTAL ITEM 1A REELFOOT ALTERN SPILLWAY	1.00 JB	8,075,690	1,633,338	0	9,709,028	9709028
20 ITEM 2, SEDIMENT RETENTION BASIN						
20/ 10 01 LANDS AND DAMAGES						
20/ 10. 1 LANDS AND DAMAGES	2197.00 ACR	4,274,000	1,060,000	0	5,334,000	2427.86
TOTAL 01 LANDS AND DAMAGES	1.00 EA	4,274,000	1,060,000	0	5,334,000	5334000
20/ 20 02 RELOCATIONS						
20/ 20. 1 Telephone Cable	1.00 JB	7,000	1,400	0	8,400	8400.00
20/ 20. 2 Highway 157 Grade Raise	1.00 JB	169,343	33,869	0	203,211	203211.24
TOTAL 02 RELOCATIONS	1.00 JB	176,343	35,269	0	211,611	211611.24
20/ 30 06 SEDIMENT RETENTION BASIN						
20/ 30. 10 GENERAL CONDITIONS						
20/ 30. 10. 10 MOBILIZATION/DEMOBILIZATION	1.00 EA	29,523	5,905	0	35,427	35427.38
20/ 30. 10. 20 CONCRETE LAB TESTING	1.00 EA	3,215	643	0	3,859	3858.57
20/ 30. 10. 30 SOIL COMPACTION TESTING	1.00 EA	3,859	772	0	4,630	4630.29
TOTAL GENERAL CONDITIONS	1.00 JB	36,597	7,319	0	43,916	43916.24
20/ 30. 20 SITEWORK, REELFOOT CR MGT AREA						
20/ 30. 20. 10 AGGREGATE SURFACING	12667.00 TN	153,425	30,685	0	184,110	14.53
20/ 30. 20. 20 CORRUGATED METAL PIPE, 30-INCH	1650.00 LF	51,143	10,229	0	61,371	37.19
20/ 30. 20. 30 EMBANKMENT, LEVEES	126667.00 ECY	36,917	7,383	0	44,301	0.35
20/ 30. 20. 40 IRRIGATION WELLS	3.00 EA	154,343	30,869	0	185,212	61737.18
20/ 30. 20. 50 STOPLOG STRUCTURES	25.00 EA	33,629	6,726	0	40,355	1614.19
20/ 30. 20. 60 TURFING, FERT, SEED, & MULCH	50.00 ACR	51,448	10,290	0	61,737	1234.74

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
20/ 30. 20. 70 TREE PLANTING	250.00	ACR	48,232	9,646	0	57,879	231.51
TOTAL SITEWORK, REELFOOT CR MGT AREA	1.00	JB	529,137	105,827	0	634,964	634964.23
20/ 30. 21 SITEWORK, DAM							
20/ 30. 21. 10 Clearing	105.00	ACR	30,127	6,025	0	36,152	344.30
20/ 30. 21. 15 Embankment, Dam	370933.00	ECY	500,641	100,128	0	600,769	1.62
20/ 30. 21. 20 Riprap, R650	7194.00	TN	178,910	35,782	0	214,692	29.84
20/ 30. 21. 25 Riprap, R250	3605.00	TN	89,654	17,931	0	107,585	29.84
20/ 30. 21. 30 Filter Material	2332.00	TN	49,507	9,901	0	59,408	25.48
20/ 30. 21. 35 Turfing	94.00	AC	108,812	21,762	0	130,574	1389.09
20/ 30. 21. 40 Excavation, Low Water Inlets/Out	11000.00	BCY	9,604	1,921	0	11,524	1.05
20/ 30. 21. 45 Embankment, Backfill Old Ditches	11000.00	ECY	37,858	7,572	0	45,429	4.13
20/ 30. 21. 50 Excavation, 3 Outlet Ditches	2313.00	BCY	1,563	313	0	1,875	0.81
20/ 30. 21. 55 Excavation, Outlet Structures	12144.00	BCY	32,885	6,577	0	39,462	3.25
20/ 30. 21. 60 Embankment, Outlets, Backfill	1800.00	ECY	6,869	1,374	0	8,243	4.58
20/ 30. 21. 65 RCP, 72" Diameter, Class IV	720.00	LF	395,701	79,140	0	474,841	659.50
20/ 30. 21. 70 Excav, Primary Spillway Struc	10700.00	BCY	27,835	5,567	0	33,403	3.12
20/ 30. 21. 75 Sheet Piling, Type PSA 23	4200.00	SF	65,766	13,153	0	78,919	18.79
20/ 30. 21. 80 Conlock, 8" Block, Emerg. SpWay	116300.00	SF	1,009,692	201,938	0	1,211,631	10.42
20/ 30. 21. 85 Embank, Emer SW, Random Backfill	2400.00	ECY	7,964	1,593	0	9,557	3.98
20/ 30. 21. 90 Excav, Emer Spillway, Structure	19406.00	BCY	50,486	10,097	0	60,583	3.12
20/ 30. 21. 91 Security Fence	497.00	LF	6,392	1,278	0	7,671	15.43
TOTAL SITEWORK, DAM	1.00	JB	2,610,265	522,053	0	3,132,317	3132317
20/ 30. 30 CONCRETE							
20/ 30. 30. 10 3 INLET/OUTLET STRUCTURES	553.00	CY	204,202	40,840	0	245,042	443.11
20/ 30. 30. 20 PRIMARY SPILLWAY	1233.00	CY	327,221	65,444	0	392,665	318.46
TOTAL CONCRETE	1786.00	CY	531,423	106,285	0	637,707	357.06
20/ 30.160 ELECTRICAL	1.00	JB	32,155	6,431	0	38,586	38585.74
TOTAL 06 SEDIMENT RETENTION BASIN	1.00	JB	3,739,576	747,915	0	4,487,491	4487491
20/ 40 18 CULTURAL RESOURCE PRESERVATIN	1.00	JB	125,000	25,000	0	150,000	150000.00
20/ 50 30 PLANNING, ENGINEERING & DES							
20/ 50. 1 30 PLANNING, ENGINEERING & DES	1.00	JB	771,500	154,300	0	925,800	925800.00
TOTAL 30 PLANNING, ENGINEERING & DES	1.00	JB	771,500	154,300	0	925,800	925800.00
20/ 60 31 SUPERVISION & ADMINISTRATION							

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
20/ 60. 1 SUPERVISION & ADMINISTRATION	1.00	JB	116,000	23,200	0	139,200	139200.00
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00	JB	116,000	23,200	0	139,200	139200.00
TOTAL ITEM 2, SEDIMENT RETENTION BASIN	1.00	JB	9,202,418	2,045,684	0	11,248,102	11248102
30 ITEM 3, CIRCULATION CHANNELS							
30/ 10 01 LANDS AND DAMAGES							
30/ 10. 1 LANDS AND DAMAGES	23.00	ACR	12,000	4,000	0	16,000	695.65
TOTAL 01 LANDS AND DAMAGES	1.00	EA	12,000	4,000	0	16,000	16000.00
30/ 20 02 RELOCATIONS							
30/ 30 06 CIRCULATION CHANNELS							
30/ 30. 10 01 GENERAL CONDITIONS							
30/ 30. 10. 10 MOBILIZATION/DEMOBILATION	1.00	JB	9,846	1,969	0	11,815	11814.70
TOTAL 01 GENERAL CONDITIONS	1.00	JB	9,846	1,969	0	11,815	11814.70
30/ 30. 20 02 SITE WORK							
30/ 30. 20. 10 Clearing & Excavation	62555.00	BCY	198,049	39,610	0	237,659	3.80
TOTAL 02 SITE WORK	1.00	JB	198,049	39,610	0	237,659	237658.61
TOTAL 06 CIRCULATION CHANNELS	1.00	JB	207,894	41,579	0	249,473	249473.31
30/ 40 18 CULTURAL RESOURCE PRESERVATIN							
30/ 50 30 PLANNING, ENGINEERING & DES							
30/ 50. 1 30 PLANNING, ENGINEERING & DES	1.00	JB	198,000	39,600	0	237,600	237600.00
TOTAL 30 PLANNING, ENGINEERING & DES	1.00	JB	198,000	39,600	0	237,600	237600.00
30/ 60 31 SUPERVISION & ADMINISTRATION							
30/ 60. 1 SUPERVISION & ADMINISTRATION	1.00	JB	30,000	6,000	0	36,000	36000.00
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00	JB	30,000	6,000	0	36,000	36000.00

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
TOTAL ITEM 3, CIRCULATION CHANNELS	1.00	JB	447,894	91,179	0	539,073	539073.31
40 ITEM 4A, SHELBY LAKE/WATERFWL AR							
40/ 10 01 LANDS AND DAMAGES							
40/ 10. 1 LANDS AND DAMAGES	965.64	ACR	1,810,000	453,000	0	2,263,000	2343.52
TOTAL 01 LANDS AND DAMAGES	1.00	EA	1,810,000	453,000	0	2,263,000	2263000
40/ 20 02 RELOCATIONS							
40/ 20. 1 4" and 6" Gas Lines	1.00	JB	7,000	1,400	0	8,400	8400.00
TOTAL 02 RELOCATIONS	1.00	JB	7,000	1,400	0	8,400	8400.00
40/ 30 06 SHELBY LAKE WATERFOWL MG AREA							
40/ 30. 10 GENERAL CONDITIONS							
40/ 30. 10. 10 MOBILIZATION/DEMOBILIZATION	1.00	EA	15,353	3,071	0	18,424	18424.10
40/ 30. 10. 20 CONCRETE LAB TESTING	1.00	EA	1,929	386	0	2,315	2315.14
40/ 30. 10. 30 SOIL COMPACTION TESTING	1.00	EA	2,572	514	0	3,087	3086.86
TOTAL GENERAL CONDITIONS	1.00	JB	19,855	3,971	0	23,826	23826.10
40/ 30. 20 SITEWORK							
40/ 30. 20. 10 Clearing	10.00	ACR	9,224	1,845	0	11,068	1106.84
40/ 30. 20. 15 Embankment, Levees	69000.00	ECY	214,182	42,836	0	257,019	3.72
40/ 30. 20. 20 Embank, CIP Struc, Backfill	90.00	ECY	345	69	0	414	4.60
40/ 30. 20. 25 Excavation, Shelby Lake	355650.00	BCY	959,974	191,995	0	1,151,969	3.24
40/ 30. 20. 30 Excavation, Outlet Structure	200.00	BCY	1,083	217	0	1,300	6.50
40/ 30. 20. 35 Aggregate Surfacing, 6"	6900.00	TN	83,574	16,715	0	100,289	14.53
40/ 30. 20. 40 Filter Material	145.00	TN	2,856	571	0	3,428	23.64
40/ 30. 20. 45 Riprap, R90	775.00	TN	17,878	3,576	0	21,454	27.68
40/ 30. 20. 51 Irrigation Wells	1.00	EA	51,448	10,290	0	61,737	61737.18
40/ 30. 20. 55 Pipe, CMP 24"	400.00	LF	9,907	1,981	0	11,889	29.72
40/ 30. 20. 60 Stoplog Structures	10.00	EA	13,706	2,741	0	16,447	1644.72
40/ 30. 20. 65 Pipe Jacking	180.00	LF	81,030	16,206	0	97,236	540.20
40/ 30. 20. 70 Gates, Manual, 24" Diameter	2.00	EA	6,063	1,213	0	7,276	3637.91
40/ 30. 20. 75 Corrugated Metal Pipe, 30"	320.00	LF	9,548	1,910	0	11,457	35.80
40/ 30. 20. 80 Turfing	40.00	AC	46,303	9,261	0	55,563	1389.09
TOTAL SITEWORK	1.00	JB	1,507,122	301,424	0	1,808,547	1808547

** PROJECT OWNER SUMMARY - Element **

	QUANTITY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
40/ 30. 30 CONCRETE						
40/ 30. 30. 10 OUTLET STRUCTURE	25.00 CY	10,229	2,046	0	12,275	490.99
TOTAL CONCRETE	25.00 CY	10,229	2,046	0	12,275	490.99
40/ 30.160 ELECTRICAL						
40/ 30.160. 10 Primary Service for Wells	1.00 JB	8,683	1,737	0	10,420	10419.69
TOTAL ELECTRICAL	1.00 JB	8,683	1,737	0	10,420	10419.69
TOTAL 06 SHELBY LAKE WATERFOWL MG AREA	1.00 JB	1,545,889	309,178	0	1,855,067	1855067
40/ 40 18 CULTURAL RESOURCE PRESERVATIN	1.00 JB	125,000	25,000	0	150,000	150000.00
40/ 50 30 PLANNING, ENGINEERING & DES						
40/ 50. 1 30 PLANNING, ENGINEERING & DES	1.00 JB	431,000	86,200	0	517,200	517200.00
TOTAL 30 PLANNING, ENGINEERING & DES	1.00 JB	431,000	86,200	0	517,200	517200.00
40/ 60 31 SUPERVISION & ADMINISTRATION						
40/ 60. 1 SUPERVISION & ADMINISTRATION	1.00 JB	74,000	14,800	0	88,800	88800.00
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00 JB	74,000	14,800	0	88,800	88800.00
TOTAL ITEM 4A, SHELBY LAKE/WATERFWL AR	1.00 JB	3,992,889	889,578	0	4,882,467	4882467
45 ITEM 4B, TREE PLANTING SHELBY LA						
45/ 10 06 TREE PLANTING	282.00 ACR	42,300	8,460	0	50,760	180.00
TOTAL 06 TREE PLANTING	282.00 ACR	42,300	8,460	0	50,760	180.00
45/ 50 30 PLANNING, ENGINEERING & DES						
45/ 50. 1 30 PLANNING, ENGINEERING & DES	1.00 JB	11,000	2,200	0	13,200	13200.00
TOTAL 30 PLANNING, ENGINEERING & DES	1.00 JB	11,000	2,200	0	13,200	13200.00
45/ 60 31 SUPERVISION & ADMINISTRATION						
45/ 60. 1 SUPERVISION & ADMINISTRATION	1.00 JB	14,000	2,800	0	16,800	16800.00

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00	JB	14,000	2,800	0	16,800	16800.00
TOTAL ITEM 4B, TREE PLANTING SHELBY LA	1.00	JB	67,300	13,460	0	80,760	80760.00
50 ITEM 5, LAKE ISOM IMPROVEMENTS							
50/ 10 01 LANDS AND DAMAGES							
50/ 10. 1 LANDS AND DAMAGES	104.70	ACR	87,000	23,000	0	110,000	1050.62
TOTAL 01 LANDS AND DAMAGES	1.00	EA	87,000	23,000	0	110,000	110000.00
50/ 20 02 RELOCATIONS							
50/ 25 06 LAKE ISOM IMPROVEMENTS							
50/ 25. 1 GENERAL CONDITIONS							
50/ 25. 1. 10 MOBILIZATION/DEMOBILIZATION	1.00	EA	30,691	6,138	0	36,830	36829.70
50/ 25. 1. 20 CONCRETE LAB TESTING	1.00	EA	3,393	679	0	4,072	4072.02
50/ 25. 1. 30 SOIL COMPACTION TESTING	1.00	EA	4,072	814	0	4,886	4886.42
TOTAL GENERAL CONDITIONS	1.00	JB	38,157	7,631	0	45,788	45788.15
50/ 25. 2 SITEWORK							
50/ 25. 2. 10 Clearing	4.50	ACR	6,653	1,331	0	7,984	1774.14
50/ 25. 2. 15 Concrete Demo, Old Structure	50.00	CY	9,339	1,868	0	11,207	224.14
50/ 25. 2. 20 Embankment	5056.00	ECY	13,969	2,794	0	16,763	3.32
50/ 25. 2. 25 Excavation, Primary Structure	200.00	BCY	537	107	0	645	3.22
50/ 25. 2. 30 Excavation, Outlet Ditch	1500.00	BCY	2,764	553	0	3,317	2.21
50/ 25. 2. 40 Embankment, Cofferdam	225.00	ECY	694	139	0	833	3.70
50/ 25. 2. 50 Embankment, Outlet, Backfill	200.00	ECY	1,074	215	0	1,289	6.44
50/ 25. 2. 60 Aggregate Surfacing 6" Compacted	480.00	TON	6,135	1,227	0	7,363	15.34
50/ 25. 2. 70 Filter Material	145.00	TN	3,038	608	0	3,646	25.14
50/ 25. 2. 80 Riprap, R650	775.00	TN	18,867	3,773	0	22,641	29.21
50/ 25. 2. 90 Security Fence	115.00	LF	1,873	375	0	2,248	19.55
50/ 25. 2. 95 Gates for Security Fence	2.00	EA	652	130	0	782	390.91
50/ 25. 2.105 Irrigation Wells, Pumps, Motors	6.00	EA	325,762	65,152	0	390,914	65152.32
50/ 25. 2.110 Sheet Piling, Type PSA 23	200.00	SF	8,217	1,643	0	9,861	49.30
50/ 25. 2.120 Turfing, Fert, Seed, & Mulch	53.00	ACR	57,551	11,510	0	69,061	1303.05
TOTAL SITEWORK	1.00	JB	457,126	91,425	0	548,551	548550.65
50/ 25. 3 CONCRETE							

** PROJECT OWNER SUMMARY - Element **

	QUANTITY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
50/ 25. 3. 10 OUTLET STRUCTURE	136.00 CY	59,226	11,845	0	71,071	522.58
TOTAL CONCRETE	136.00 CY	59,226	11,845	0	71,071	522.58
50/ 25. 4 METALS						
50/ 25. 4. 10 ALUMINUM STOPLOGS	160.00 SF	19,980	3,996	0	23,976	149.85
TOTAL METALS	1.00 JB	19,980	3,996	0	23,976	23976.05
50/ 25. 5 ELECTRICAL						
50/ 25. 5. 10 Primary Service for Wells	1.00 JB	102,608	20,522	0	123,130	123129.74
TOTAL ELECTRICAL	1.00 JB	102,608	20,522	0	123,130	123129.74
TOTAL 06 LAKE ISOM IMPROVEMENTS	1.00 JB	677,096	135,419	0	812,515	812515.33
50/ 35 18 CULTURAL RESOURCE PRESERVATIN						
50/ 40 30 PLANNING, ENGINEERING & DES						
50/ 40. 1 30 PLANNING, ENGINEERING & DES	1.00 JB	313,000	62,600	0	375,600	375600.00
TOTAL 30 PLANNING, ENGINEERING & DES	1.00 JB	313,000	62,600	0	375,600	375600.00
50/ 50 31 SUPERVISION & ADMINISTRATION						
50/ 50. 1 SUPERVISION & ADMINISTRATION	1.00 JB	37,000	7,400	0	44,400	44400.00
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00 JB	37,000	7,400	0	44,400	44400.00
TOTAL ITEM 5, LAKE ISOM IMPROVEMENTS	1.00 JB	1,114,096	228,419	0	1,342,515	1342515
TOTAL REELFOOT LAKE TN & KY FIESIB STY	1.00 EA	22,900,288	4,901,658	0	27,801,946	27801946

** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
10 ITEM 1, REELFOOT ALTERN SPILLWAY								
10. 10 01 LANDS AND DAMAGES								
10. 10. 1 LANDS AND DAMAGES	220.90	ACR	439,000	1987.32	106,000	479.86	545,000	100%
10. 10 01 LANDS AND DAMAGES	1.00	EA	439,000	439000	106,000	106000	545,000	5.6%
10. 20 02 RELOCATIONS								
10. 20. 10 HWY 22 Bridge Relocation	13850.00	SF	795,920	57.47	159,184	11.49	955,104	52.3%
10. 20. 20 Utilities, Hwy 22 Bridge	1.00	JB	512,700	512700	102,540	102540	615,240	33.7%
10. 20. 30 New Spillway	1.00	JB	111,000	111000	22,200	22200.00	133,200	7.3%
10. 20. 40 Old Spillway	1.00	JB	101,500	101500	20,300	20300.00	121,800	6.7%
10. 20 02 RELOCATIONS	1.00	JB	1,521,120	1521120	304,224	304224	1,825,344	18.8%
10. 30 06 REELFOOT SPILLWAY & OUTLET CH								
10. 30. 10 GENERAL CONDITIONS	1.00	JB	90,246	90245.80	18,049	18049.16	108,295	1.9%
10. 30. 20 SITEWORK	1.00	JB	2,598,848	2598848	519,770	519770	3,118,617	54.6%
10. 30. 30 CONCRETE	4497.00	CY	1,427,730	317.49	285,546	63.50	1,713,276	30.0%
10. 30. 50 METALS	1.00	JB	158,720	158720	31,744	31744.04	190,464	3.3%
10. 30. 70 THERMAL/MOISTURE PROTECTION	1.00	JB	2,187	2187.49	437	437.50	2,625	0.0%
10. 30. 90 FINISHES	5000.00	SF	13,827	2.77	2,765	0.55	16,592	0.3%
10. 30.150 MECHANICAL	1.00	JB	385,909	385909	77,182	77181.80	463,091	8.1%
10. 30.160 ELECTRICAL	1.00	JB	83,602	83602.43	16,720	16720.49	100,323	1.8%
10. 30 06 REELFOOT SPILLWAY & OUTLET CH	1.00	JB	4,761,070	4761070	952,214	952214	5,713,284	58.8%
10. 40 30 PLANNING, ENGINEERING & DES								
10. 40. 1 30 PLANNING, ENGINEERING & DES	1.00	JB	950,500	950500	190,100	190100	1,140,600	100%
10. 40 30 PLANNING, ENGINEERING & DES	1.00	JB	950,500	950500	190,100	190100	1,140,600	11.7%
10. 50 31 SUPERVISION & ADMINISTRATION								
10. 50. 1 SUPERVISION & ADMINISTRATION	1.00	JB	404,000	404000	80,800	80800.00	484,800	100%
10. 50 31 SUPERVISION & ADMINISTRATION	1.00	JB	404,000	404000	80,800	80800.00	484,800	5.0%
10 ITEM 1, REELFOOT ALTERN SPILLWAY	1.00	JB	8,075,690	8075690	1,633,338	1633338	9,709,028	34.9%
15 ITEM 1B WATER LEVEL MANAGEMT PLN								
15. 10 01 LANDS AND DAMAGES								
15. 10. 1 LANDS AND DAMAGES	6090.00	ACR	0		0		0	%
15. 10 01 LANDS AND DAMAGES	1.00	EA	0		0		0	%
15 ITEM 1B WATER LEVEL MANAGEMT PLN	1.00	JB	0		0		0	%
20 ITEM 2, SEDIMENT RETENTION BASIN								
20. 10 01 LANDS AND DAMAGES								

** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
20. 10. 1 LANDS AND DAMAGES	2197.00	ACR	4,274,000	1945.38	1,060,000	482.48	5,334,000	100%
20. 10 01 LANDS AND DAMAGES	1.00	EA	4,274,000	4274000	1,060,000	1060000	5,334,000	47.4%
20. 20 02 RELOCATIONS								
20. 20. 1 Telephone Cable	1.00	JB	7,000	7000.00	1,400	1400.00	8,400	4.0%
20. 20. 2 Highway 157 Grade Raise	1.00	JB	169,343	169343	33,869	33868.54	203,211	96.0%
20. 20 02 RELOCATIONS	1.00	JB	176,343	176343	35,269	35268.54	211,611	1.9%
20. 30 06 SEDIMENT RETENTION BASIN								
20. 30. 10 GENERAL CONDITIONS	1.00	JB	36,597	36596.87	7,319	7319.37	43,916	1.0%
20. 30. 20 SITEWORK, REELFOOT CR MGT AREA	1.00	JB	529,137	529137	105,827	105827	634,964	14.1%
20. 30. 21 SITEWORK, DAM	1.00	JB	2,610,265	2610265	522,053	522053	3,132,317	69.8%
20. 30. 30 CONCRETE	1786.00	CY	531,423	297.55	106,285	59.51	637,707	14.2%
20. 30.160 ELECTRICAL	1.00	JB	32,155	32154.78	6,431	6430.96	38,586	0.9%
20. 30 06 SEDIMENT RETENTION BASIN	1.00	JB	3,739,576	3739576	747,915	747915	4,487,491	39.9%
20. 40 18 CULTURAL RESOURCE PRESERVATIN								
20. 40.000 <<< Not Identified >>>	1.00	EA	125,000	125000	25,000	25000.00	150,000	100%
20. 40 18 CULTURAL RESOURCE PRESERVATIN	1.00	JB	125,000	125000	25,000	25000.00	150,000	1.3%
20. 50 30 PLANNING, ENGINEERING & DES								
20. 50. 1 30 PLANNING, ENGINEERING & DES	1.00	JB	771,500	771500	154,300	154300	925,800	100%
20. 50 30 PLANNING, ENGINEERING & DES	1.00	JB	771,500	771500	154,300	154300	925,800	8.2%
20. 60 31 SUPERVISION & ADMINISTRATION								
20. 60. 1 SUPERVISION & ADMINISTRATION	1.00	JB	116,000	116000	23,200	23200.00	139,200	100%
20. 60 31 SUPERVISION & ADMINISTRATION	1.00	JB	116,000	116000	23,200	23200.00	139,200	1.2%
20 ITEM 2, SEDIMENT RETENTION BASIN	1.00	JB	9,202,418	9202418	2,045,684	2045684	11,248,102	40.5%
30 ITEM 3, CIRCULATION CHANNELS								
30. 10 01 LANDS AND DAMAGES								
30. 10. 1 LANDS AND DAMAGES	23.00	ACR	12,000	521.74	4,000	173.91	16,000	100%
30. 10 01 LANDS AND DAMAGES	1.00	EA	12,000	12000.00	4,000	4000.00	16,000	3.0%
30. 20 02 RELOCATIONS								
30. 20.000 <<< Not Identified >>>	1.00	EA	0		0		0	%
30. 20 02 RELOCATIONS	1.00	JB	0		0		0	%
30. 30 06 CIRCULATION CHANNELS								
30. 30. 10 01 GENERAL CONDITIONS	1.00	JB	9,846	9845.58	1,969	1969.12	11,815	4.7%

** 2ND VIEW SUMMARY **

	QUANTITY UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
30. 30. 20 02 SITE WORK	1.00 JB	198,049	198049	39,610	39609.77	237,659	95.3%
30. 30 06 CIRCULATION CHANNELS	1.00 JB	207,894	207894	41,579	41578.89	249,473	46.3%
30. 40 18 CULTURAL RESOURCE PRESERVATIN							
30. 40.000 <<< Not Identified >>>	1.00 EA	0		0		0	%
30. 40 18 CULTURAL RESOURCE PRESERVATIN	1.00 JB	0		0		0	%
30. 50 30 PLANNING, ENGINEERING & DES							
30. 50. 1 30 PLANNING, ENGINEERING & DES	1.00 JB	198,000	198000	39,600	39600.00	237,600	100%
30. 50 30 PLANNING, ENGINEERING & DES	1.00 JB	198,000	198000	39,600	39600.00	237,600	44.1%
30. 60 31 SUPERVISION & ADMINISTRATION							
30. 60. 1 SUPERVISION & ADMINISTRATION	1.00 JB	30,000	30000.00	6,000	6000.00	36,000	100%
30. 60 31 SUPERVISION & ADMINISTRATION	1.00 JB	30,000	30000.00	6,000	6000.00	36,000	6.7%
30 ITEM 3, CIRCULATION CHANNELS	1.00 JB	447,894	447894	91,179	91178.89	539,073	1.9%
40 ITEM 4A, SHELBY LAKE/WATERFWL AR							
40. 10 01 LANDS AND DAMAGES							
40. 10. 1 LANDS AND DAMAGES	965.40 ACR	1,810,000	1874.87	453,000	469.24	2,263,000	100%
40. 10 01 LANDS AND DAMAGES	1.00 EA	1,810,000	1810000	453,000	453000	2,263,000	46.3%
40. 20 02 RELOCATIONS							
40. 20. 1 4" and 6" Gas Lines	1.00 JB	7,000	7000.00	1,400	1400.00	8,400	100%
40. 20 02 RELOCATIONS	1.00 JB	7,000	7000.00	1,400	1400.00	8,400	0.2%
40. 30 06 SHELBY LAKE WATERFOWL MG AREA							
40. 30. 10 GENERAL CONDITIONS	1.00 JB	19,855	19855.08	3,971	3971.02	23,826	1.3%
40. 30. 20 SITEWORK	1.00 JB	1,507,122	1507122	301,424	301424	1,808,547	97.5%
40. 30. 30 CONCRETE	1786.00 CY	10,229	5.73	2,046	1.15	12,275	0.7%
40. 30.160 ELECTRICAL	1.00 JB	8,683	8683.08	1,737	1736.62	10,420	0.6%
40. 30 06 SHELBY LAKE WATERFOWL MG AREA	1.00 JB	1,545,889	1545889	309,178	309178	1,855,067	38.0%
40. 40 18 CULTURAL RESOURCE PRESERVATIN							
40. 40.000 <<< Not Identified >>>	1.00 EA	125,000	125000	25,000	25000.00	150,000	100%
40. 40 18 CULTURAL RESOURCE PRESERVATIN	1.00 JB	125,000	125000	25,000	25000.00	150,000	3.1%
40. 50 30 PLANNING, ENGINEERING & DES							
40. 50. 1 30 PLANNING, ENGINEERING & DES	1.00 JB	431,000	431000	86,200	86200.00	517,200	100%
40. 50 30 PLANNING, ENGINEERING & DES	1.00 JB	431,000	431000	86,200	86200.00	517,200	10.6%

** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
40. 60 31 SUPERVISION & ADMINISTRATION								
40. 60. 1 SUPERVISION & ADMINISTRATION	1.00	JB	74,000	74000.00	14,800	14800.00	88,800	100%
40. 60 31 SUPERVISION & ADMINISTRATION	1.00	JB	74,000	74000.00	14,800	14800.00	88,800	1.8%
40 ITEM 4A, SHELBY LAKE/WATERFWL AR	1.00	JB	3,992,889	3992889	889,578	889578	4,882,467	17.6%
45 ITEM 4B, TREE PLANTING SHELBY LA								
45. 10 06 TREE PLANTING								
45. 10.000 <<< Not Identified >>>	1.00	EA	42,300	42300.00	8,460	8460.00	50,760	100%
45. 10 06 TREE PLANTING	282.00	ACR	42,300	150.00	8,460	30.00	50,760	62.9%
45. 50 30 PLANNING, ENGINEERING & DES								
45. 50. 1 30 PLANNING, ENGINEERING & DES	1.00	JB	11,000	11000.00	2,200	2200.00	13,200	100%
45. 50 30 PLANNING, ENGINEERING & DES	1.00	JB	11,000	11000.00	2,200	2200.00	13,200	16.3%
45. 60 31 SUPERVISION & ADMINISTRATION								
45. 60. 1 SUPERVISION & ADMINISTRATION	1.00	JB	14,000	14000.00	2,800	2800.00	16,800	100%
45. 60 31 SUPERVISION & ADMINISTRATION	1.00	JB	14,000	14000.00	2,800	2800.00	16,800	20.8%
45 ITEM 4B, TREE PLANTING SHELBY LA	1.00	JB	67,300	67300.00	13,460	13460.00	80,760	0.3%
50 ITEM 5, LAKE ISOM IMPROVEMENTS								
50. 10 01 LANDS AND DAMAGES								
50. 10. 1 LANDS AND DAMAGES	104.70	ACR	87,000	830.95	23,000	219.68	110,000	100%
50. 10 01 LANDS AND DAMAGES	1.00	EA	87,000	87000.00	23,000	23000.00	110,000	8.2%
50. 20 02 RELOCATIONS								
50. 20.000 <<< Not Identified >>>	1.00	EA	0		0		0	%
50. 20 02 RELOCATIONS	1.00	JB	0		0		0	%
50. 25 06 LAKE ISOM IMPROVEMENTS								
50. 25. 1 GENERAL CONDITIONS	1.00	JB	38,157	38156.79	7,631	7631.36	45,788	5.6%
50. 25. 2 SITEWORK	1.00	JB	457,126	457126	91,425	91425.11	548,551	67.5%
50. 25. 3 CONCRETE	136.00	CY	59,226	435.48	11,845	87.10	71,071	8.7%
50. 25. 4 METALS	1.00	JB	19,980	19980.04	3,996	3996.01	23,976	3.0%
50. 25. 5 ELECTRICAL	1.00	JB	102,608	102608	20,522	20521.62	123,130	15.2%
50. 25 06 LAKE ISOM IMPROVEMENTS	1.00	JB	677,096	677096	135,419	135419	812,515	60.5%
50. 35 18 CULTURAL RESOURCE PRESERVATIN								
50. 35.000 <<< Not Identified >>>	1.00	EA	0		0		0	%
50. 35 18 CULTURAL RESOURCE PRESERVATIN	1.00	JB	0		0		0	%

** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
50. 40 30 PLANNING, ENGINEERING & DES								
50. 40. 1 30 PLANNING, ENGINEERING & DES	1.00	JB	313,000	313000	62,600	62600.00	375,600	100%
50. 40 30 PLANNING, ENGINEERING & DES	1.00	JB	313,000	313000	62,600	62600.00	375,600	28.0%
50. 50 31 SUPERVISION & ADMINISTRATION								
50. 50. 1 SUPERVISION & ADMINISTRATION	1.00	JB	37,000	37000.00	7,400	7400.00	44,400	100%
50. 50 31 SUPERVISION & ADMINISTRATION	1.00	JB	37,000	37000.00	7,400	7400.00	44,400	3.3%
50 ITEM 5, LAKE ISOM IMPROVEMENTS	1.00	JB	1,114,096	1114096	228,419	228419	1,342,515	4.8%
REELFOOT LAKE TN & KY FIESIB STY	1.00	EA	22900288	22900288	4,901,658	4901658	27,801,946	100%

APPENDIX C

REAL ESTATE PLAN

APPENDIX C - REAL ESTATE PLAN

C-01. PURPOSE OF REAL ESTATE PLAN

This Real Estate Plan is prepared in support of the Feasibility Study of the Reelfoot Lake Environmental Restoration Project. The U. S. Senate and the House of Representatives by resolutions dated August 2 and 8, 1984, authorized a Reconnaissance Study. The Reconnaissance Study was completed in March 1994. A Real Estate Appendix was included in the Study.

C-02. DESCRIPTION OF FEATURES

In order to restore wetland habitat and reduce silting, five features are planned. The main feature of the project is the New Spillway, which will be constructed to provide better control of the lake elevation so that periodic drawdowns and dynamic water fluctuation can occur. In addition to the new spillway construction, the feature includes a new inlet channel and new outlet channel and their associated structures; a new highway bridge over the new inlet channel; stabilization of the existing spillway and the filling of a portion of the older outlet channel.

The restoration of Lake Isom is the second feature. The historic Lake Isom has been mostly drained. This feature will restore the lake and wetlands surrounding it by building a higher control structure and raising the levees. Since this feature is proposed on land owned by the United States and controlled by the U. S. Fish and Wildlife Service, this feature is expected to be fully funded by the Federal Government. Any real estate rights needed will be a Federal acquisition. The feature is included in the Real Estate Plan only as background information.

Feature three is restoration of the historic Shelby Lake by lowering the ground level. The disposal material will be used to construct low level levees that will periodically hold water for waterfowl. This feature will have areas planted to hardwood forest.

The fourth feature is the Sedimentation Basin. In order to slow runoff of sediment from North and South Branches of Reelfoot Creek, a long earthen dam with spillways is proposed. This should hold runoff long enough that the sediment drops out, but no permanent ponding of water is planned. The sediment is expected to eventually fill the basin to the 305' elevation.

The final feature is termed Reelfoot Lake. It contains the plan to improve existing Circulation Channels. During periodic drawdowns of the normal pool, aquatic animals are not able to migrate between pools. The circulation channels feature will deepen existing channels within the lake.

Another item included under the final feature is called the Water Level Management Plan. The current Water Level Management Plan is known as the Interim Plan. The proposed plan modifies the dates of the existing plan but does not change the elevations of the water. Beginning on November 15, the existing summer elevation of 282.7' will be increased to a winter level of 283.2'. The level will be held at 283.2' until March 1 when the level will be reduced. It is expected that the level will be 282.7' by March 15. It will be maintained at this level through the fish-spawning season, or until July 1. Between July 1 and November 15 the lake level will be allowed to fluctuate up to 282.7'. Periodic drawdowns are planned once in 5 -10 years. The first drawdown will be a partial drawdown to 279.7'. Depending upon the results of this drawdown, subsequent drawdowns to 278.7' may occur.

NEW (OR ALTERNATE) SPILLWAY

Estates and Acres

Fee Estate	
Private Parties	189.5 Acres
Sponsor	24.5 Acres
Channel Improvement Easement	
Sponsor	6.9 Acres
TOTAL ACRES	**220.9 Acres**

Ownerships and Tracts: Seven tracts will be involved. There are five tracts that are privately owned, but only three different owners.

Estimated costs for land and damages	**$441,000**
P. L. 91-646 Benefits	**$16,000**
TOTAL OF REAL ESTATE COSTS	**$457,000**

LAKE ISOM RESTORATION

Estates and Acres

Seasonal Flowage Easement

Private Parties	104.7 Acres
TOTAL	**104.7 ACRES**

Ownerships and Tracts: Most of the project acres are owned in fee by the Federal Government. This federal ownership is discussed further under the paragraph D.5 *Other Existing Federal Projects*. It is estimated that four privately owned tracts will be subject to flowage easements. Four separate owners are assumed. This feature is considered part of a federal project. If this feature is determined to be a federal project, the flowage easements will be acquired by the federal government and not creditable as a Non-federal sponsor's cost.

Estimated costs for land and damages	**$58,000**
P. L. 91-646 Benefits	**0**
TOTAL OF FEDERAL REAL ESTATE COSTS	**$58,000**

SHELBY LAKE RESTORATION

Estates and Acres

Fee Estate	
Private Parties	965.00 Acres
Water Pipeline Easement	
Private Parties	0.22 Acres
Sponsor	0.42 Acres
TOTAL	**965.64 ACRES**

Ownerships and Tracts: Approximately 6 tracts are involved. Five are privately owned and the sponsor owns one.

Estimated costs for land and damages	**$2,178,000**
P. L. 91-646 Benefits	**0**
TOTAL OF REAL ESTATE COSTS	**$2,178,000**

SEDIMENTATION BASIN

Estates and Acres

Fee Estate	
Private Parties	2,197 Acres
TOTAL	**2,197 ACRES**

Ownerships and Tracts: All tracts are privately owned. It is estimated that all or portions of 22 parcels will require acquisitions.

Estimated costs for land and damages	**$4,969,000**
P. L. 91-646 Benefits	**$23,000**
TOTAL REAL ESTATE COSTS	**$4,992,000**

REELFOOT LAKE CIRCULATION CHANNELS

Estates and Acres

Channel Improvement Easement Sponsor	23.0 Acres
TOTAL	**23.0 ACRES**

Ownerships and Tracts: The lake itself is considered one tract and it is owned by the sponsor.

Estimated costs for land and damages	**$2,000**
P. L. 91-646 Benefits	**0**
TOTAL OF REAL ESTATE COSTS	**$2,000**

C-03. SPONSOR-OWNED REAL ESTATE RIGHTS

The State of Tennessee is expected to be the sponsor. It has extensive fee holdings in this area in the Reelfoot State Park and the Reelfoot State Wildlife Management Area. The sponsor owns the fee estate for the 6.9-acre area of the inlet channel for the New Spillway. The State of Tennessee owns the Drainage Ditch Easement for Running Reelfoot Bayou Ditch. The land adjacent to, and land subject to, the existing easement will be acquired in fee by the sponsor so the existing ditch easement will be extinguished. The sponsor owns in fee 0.42 acres of the land needed for the water pipeline easement required for the Shelby Lake Feature. The features known as the Reelfoot Lake Circulation Channels are within Reelfoot Lake and are located on the bed of the Lake. The bed of the Reelfoot Lake located in Tennessee is owned by the State of Tennessee. A Channel Improvement Easement over 23 acres will be necessary for the Circulation Channels.

There are special value considerations or crediting principles apparent in this project. The sponsor is undertaking a construction feature that they will get credit for. A new highway bridge will be constructed by the State Highway Department to pass over the inlet channel to the New Spillway. All construction is to occur within the existing road right of way and no new right of way will be acquired according to the sponsor. According to the Uniform Appraisal Standards for Federal Land Acquisitions only token value is to be assigned to public road right of way so no value was estimated for the existing road right of way in the area of the new bridge.

C-04. PROPOSED ESTATES

Four estates are proposed for this project. The *Fee Estate, The Channel Improvement Easement,* and *The Water Pipeline Easement* are standard. The *Seasonal Flowage Easement for Lake Isom* is a non-standard estate. Request the concurrent approval of this estate with the approval of the Real Estate Plan in the Feasibility Study.

FEE SIMPLE

The fee simple title to Tract No. _____, subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

CHANNEL IMPROVEMENT EASEMENT

A perpetual and assignable right and easement to construct, operate and maintain channel improvement works on, over and across the land, together with all right, title and interest in and to the timber, growing crops, buildings, improvements and/or other obstructions situated thereon; to excavate, dredge, cut away, and remove any and all of said land, to place thereon dredged or excavated material, and for such other purposes as may be required in connection with said work of improvement; reserving, however, to the owners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however,

to existing easements for public roads and highways, public utilities, railroads and pipelines.

SEASONAL FLOWAGE EASEMENT FOR LAKE ISOM

The perpetual right, power, privilege and easement to overflow, flood and submerge the land described in Schedule A, (Tracts Nos. , , and), from and between October 1st, to and through March 31st, of any given year, and to maintain mosquito control in connection with the operation and maintenance of the project as authorized and approved, together with all right, title and interest in and to the structures and improvements now situate on the land, except fencing and also excepting those structures, not designed for human habitation, which the representative of the United States in charge of the project determines in writing to allow to remain on the land; provided that no structures for human habitation shall be constructed or maintained on the land, that no other structures shall be constructed or maintained on the land except as may be approved in writing by the representative of the United States in charge of the project, and that no excavation shall be conducted and no landfill placed on the land without such approval as to the location and method of excavation and/or placement of landfill; the above estate is taken subject to existing easements for public roads and highways, public utilities, railroads and pipelines; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used and enjoyed without interfering with the use of the project for the purposes authorized or abridging the rights and easement hereby acquired; provided further that any use of the land shall be subject to Federal and State laws with respect to pollution.

WATER PIPELINE EASEMENT

A perpetual and assignable easement and right-of-way in, on, over and across the land, for the location, construction, operation, maintenance, alteration, repair and patrol of a water pipeline; together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

The fee estate is used in the Sedimentation Basin, Shelby Lake, and New Spillway for several reasons. The design of each feature will cause a change in use and nature of the lands. Shelby Lake and the Sedimentation Basin will have Waterfowl Management Areas constructed, and hardwood forests planted. The New Spillway will have the disposal material spread out rather than left as berms. The sponsor desires to not have large berms, but have areas more accessible to wildlife. A Channel Improvement Easement could have been used for this feature but it would be tantamount to a fee taking and would have also necessitated a separate disposal area be acquired. Therefore, the fee estate was estimated for most of this feature because it is most economical.

C-05. EXISTING FEDERAL PROJECTS

The Lake Isom Feature lies within a larger existing federal project. This is the Lake Isom National Wildlife Refuge. The U. S. Fish and Wildlife Service of the Department of Interior established this Refuge in 1938. It contains 1,846 acres of open water, forested wetlands, and croplands and resembles the larger Reelfoot National Wildlife Refuge. Due to its proximity to the Mississippi River and its floodplain, it is a stopover point and wintering area for waterfowl of the Mississippi Flyway. The land is owned in the fee estate by the U. S. Government.

Reelfoot Lake is managed by the U. S. Fish and Wildlife Service as part of the Reelfoot Lake National Wildlife Refuge. The Refuge is located on the northern portion of Reelfoot Lake in the northwester corner of Tennessee and southwest corner of Kentucky. It was established in 1941 under the terms of a lease and a cooperative agreement with the State of Tennessee. Additional land purchases by the Federal Government have extended the refuge into Kentucky to its present 10,428 acres.

C-06. EXISTING FEDERAL LANDS

The Lake Isom feature will be constructed on federally owned lands in the Lake Isom National Wildlife Refuge, but seasonal flowage easements will be necessary on abutting privately owned lands. The U. S. Fish and Wildlife Service operates the Lake Isom National Wildlife Refuge. The existing levee will be raised, a new spillway outlet constructed, a borrow pit developed, and gravel road placed on the raised levee; all on the federal property. The amount of federally owned land needed for the Lake Isom feature has not been estimated. The manager of both of the National Wildlife Refuges is aware of the plans for the Lake Isom Feature and is part of the Planning Team for the project.

The Sedimentation Basin Feature will abut the Grassy Island Unit of the Reelfoot National Wildlife Refuge, but no construction will occur within Grassy Island Unit. The outlet flow from the Sedimentation Basin Spillway is expected to follow the same creek channels as it does now through the marshland of the Grassy Island Unit. The Fish and Wildlife Service operates the Grassy Island Unit under a lease and cooperative agreement with the State of Tennessee.

C-07. NAVIGATIONAL SERVITUDE

Some of the real estate rights needed for the New Spillway, Shelby Lake Restoration, and Reelfoot Lake Circulation Channels are below the ordinary low water mark. The Non-federal Sponsor, the State of Tennessee, controls all the land below the ordinary low water level in navigable streams so is considered to have the necessary real estate rights. Channel Improvement Easements will be needed over approximately 30 acres that are below the ordinary low water mark. The navigation servitude is not available because no project feature serves a purpose which is in aid of commerce. It is

neither a navigation, flood control, or hydroelectric power project. The project also has no connection with any prior navigation project that might create a nexus of applicability.

C-08. MAPS

A map of the overall project and maps of the individual features are included as an attachment. The tracts to be acquired will not be finalized until plans and specs are complete. The identification of the tracts to be acquired will be the responsibility of the project sponsor. Engineering Division reports that no additional right of way is required for utility and facility relocations. Known or potential hazardous waste lands are not located in any of the project areas.

C-09. INDUCED FLOODING

Since this is an environmental restoration project, water is being retained as part of Lake Isom Restoration, Shelby Lake Restoration, and the Sediment Retention Basin. Most areas that may experience water retention are being purchased in fee. An area outside the feature boundary at Lake Isom may experience intermittent induced flooding and a Seasonal Flowage Easement is proposed for this feature. Flooding is not expected to be induced outside any other feature boundaries by the construction, operation, or maintenance of the project.

C-10. BASELINE COST ESTIMATE FOR REAL ESTATE: A Baseline Cost Estimate for Real Estate is attached.

C-11. P. L. 91-646 RELOCATION BENEFITS

Four residences will be acquired. It is estimated that three tenants and one owner will be relocated. No farms or businesses are expected to be relocated. Relocation benefits are estimated at $39,000 ®. Replacement housing is available. Last resort housing payments are not anticipated.

C-12. TIMBER AND MINERALS

Surface and subsurface mineral activity in the vicinity is not present or anticipated. Timber activity is present in the area. Since this is an environmental restoration project, the intention is to include all timber in the fee acquisitions. The timber may remain on many parcels. The project will avoid the removal of timber whenever possible but will acquire the rights to the timber present in the easement areas.

C-13. NON-FEDERAL SPONSOR'S ACQUISITION CAPABILITY

The Non-federal Sponsor is the State of Tennessee. As such, it has the experience and capability to acquire land for the construction, operation, and maintenance of the project. The real estate contact for the sponsor has been notified of their responsibilities in regards to P.L. 91-646 actions. He stated his staff was aware of the requirements and abided by them for other public acquisitions, such as for state highways. The relocation booklets developed by the Federal Highway Administration will be provided to the sponsor. The Non-federal Sponsor has been told of the importance of keeping accurate records of their time and costs for the project and of reasonable items of administration.

Property rights in Tennessee may be acquired through condemnation and the sponsor may ask the Corps to proceed with condemnation in Tennessee. The Non-federal Sponsor intends to use funds designated as "Wetland Funds" for acquisition. According to the Non-federal Sponsor, by state law, these funds cannot be used for condemnation or for negotiated settlements above the appraised value. The Project manager advised the non-Federal sponsor that if the Corps were to condemn land for the project, the Corps would need funding up front for the land to be condemned and the associated costs of condemning the land. The Acquisition Capability Checklist is included as an attachment

C-14. ZONING ORDINANCES: No changes in zoning are anticipated.

C-15. SCHEDULE OF LAND ACQUISITION:

It is anticipated that this project will be authorized through WRDA 1999. Acquisitions will not be initiated until after the Project Cooperation Agreement is signed. It is unrealistic to provide a detailed schedule at this time. The local sponsor expects an individual uncontested acquisition to take 9 months. All the individual tract acquisitions will not begin at the same time but will be staggered to coordinate with the order of feature construction. Once acquisition of the real estate for the project begins it is expected to take two years to complete all the acquisitions needed

C-16. FACILITY AND UTILITY RELOCATIONS:

Engineering reports there are about 20 facilities that may have to be relocated. A Final Attorney's Opinion of Compensability will be provided prior to signing of the PCA for any relocation that has an estimated cost of $250,000 or more. For all other relocations it will be provided in a timely manner prior to the Government's formal notice to the non-Federal sponsor of the relocations that it must perform. The relocations are identified in the MCACES cost estimate and include: 4 gas lines, 3 power lines, 1 sewer force main, 2 water lines, 3 telephone cables, 2 fiber optic cables, 2 cable television cables, sewer grinder pumps, 1 bridge, 1 detour road, and raising of a portion of a highway.

C-17. HAZARDOUS, TOXIC, AND RADIOACTIVE WASTES:

No evidence of existing or potential HTRW sites were noted during ground and air surveys. A search of agency records (State of Tennessee, USEPA, and National Response Center) did not reveal any HTRW concerns near or within the actual project areas. Based upon information gathered during the Corps of Engineers assessment, it is reasonable to assume that no HTRW will be encountered within or near the project. There should be no impact to real estate by HTRW. This is discussed further in Appendix A – Environmental, Section IX: Hazardous, Toxic, and Radioactive Waste.

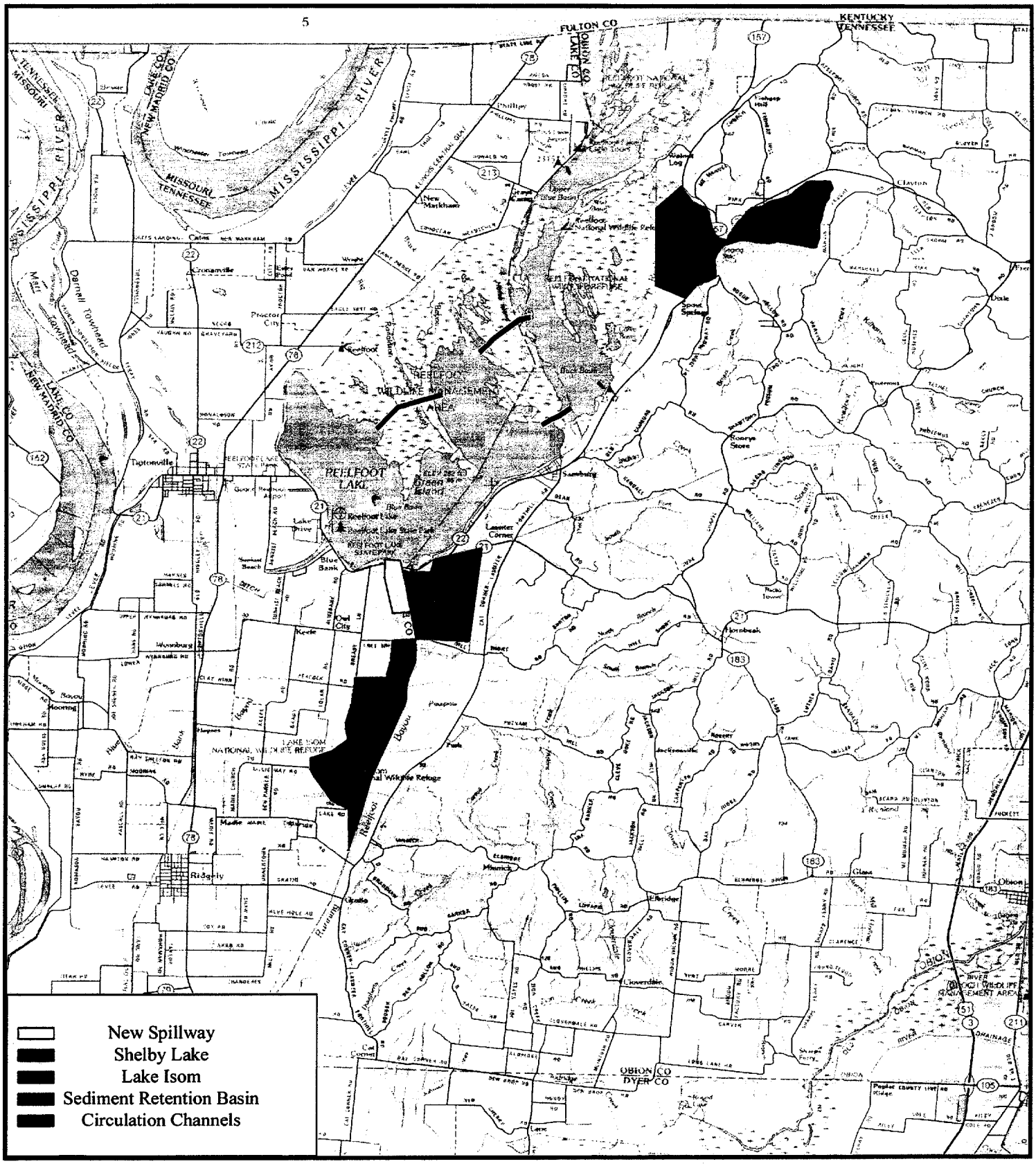
C-18. SUPPORT OR OPPOSITION BY LANDOWNERS

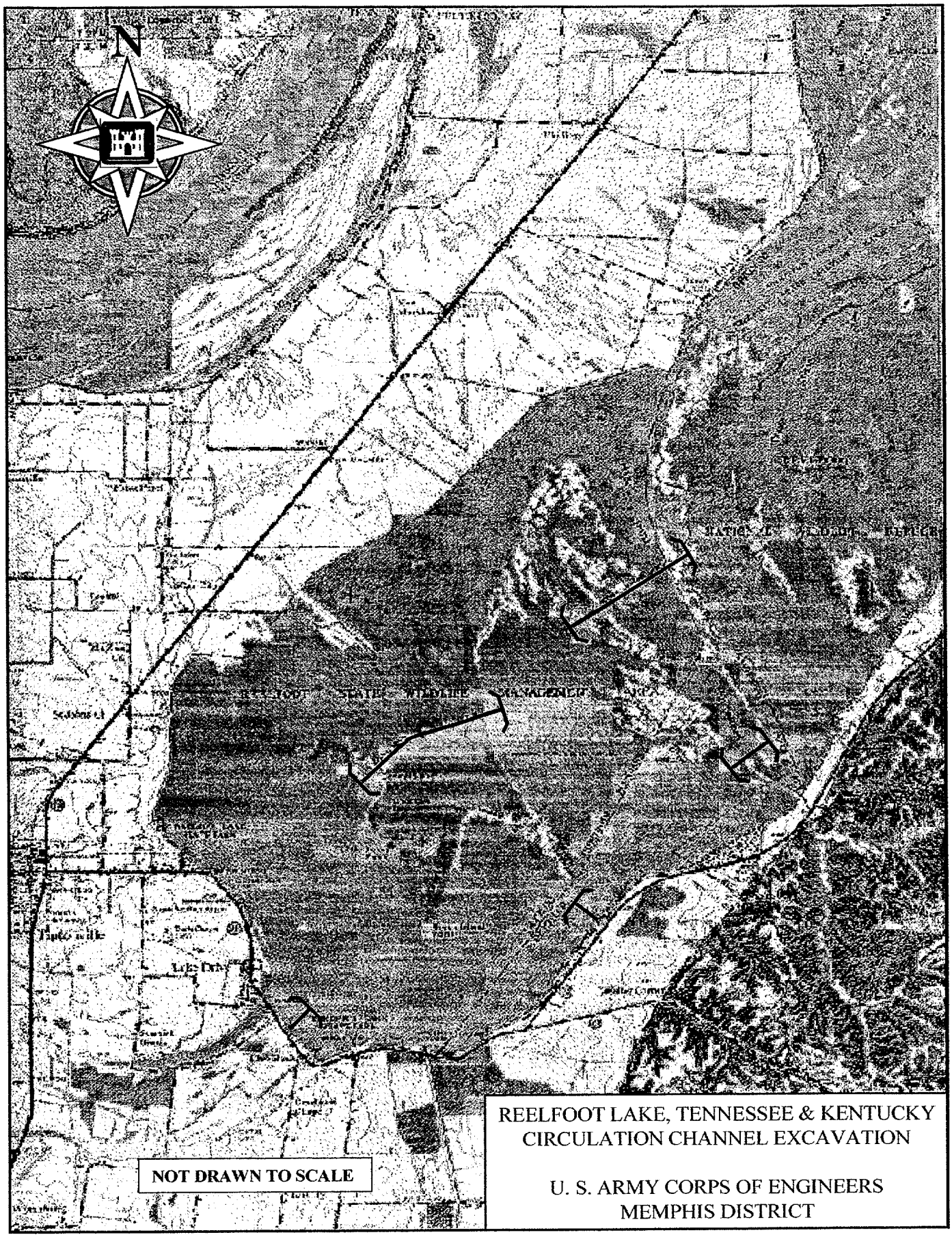
Most landowners in the area support the concept of restoring and maintaining Reelfoot Lake. As is typical, when it comes to the real estate needed to provide the restoration, opposition is expected. One major landowner in the Sedimentation Basin area refused to provide a right of entry for soil borings and is known to oppose this feature. No other specific opposition is known.

C-19. NOTICE TO SPONSOR: The non-federal sponsor has been notified in writing about the risks associated with acquiring land before the execution of the PCA.

C-20. OTHER ISSUES: There are no other issues to be discussed.

Project Location Map

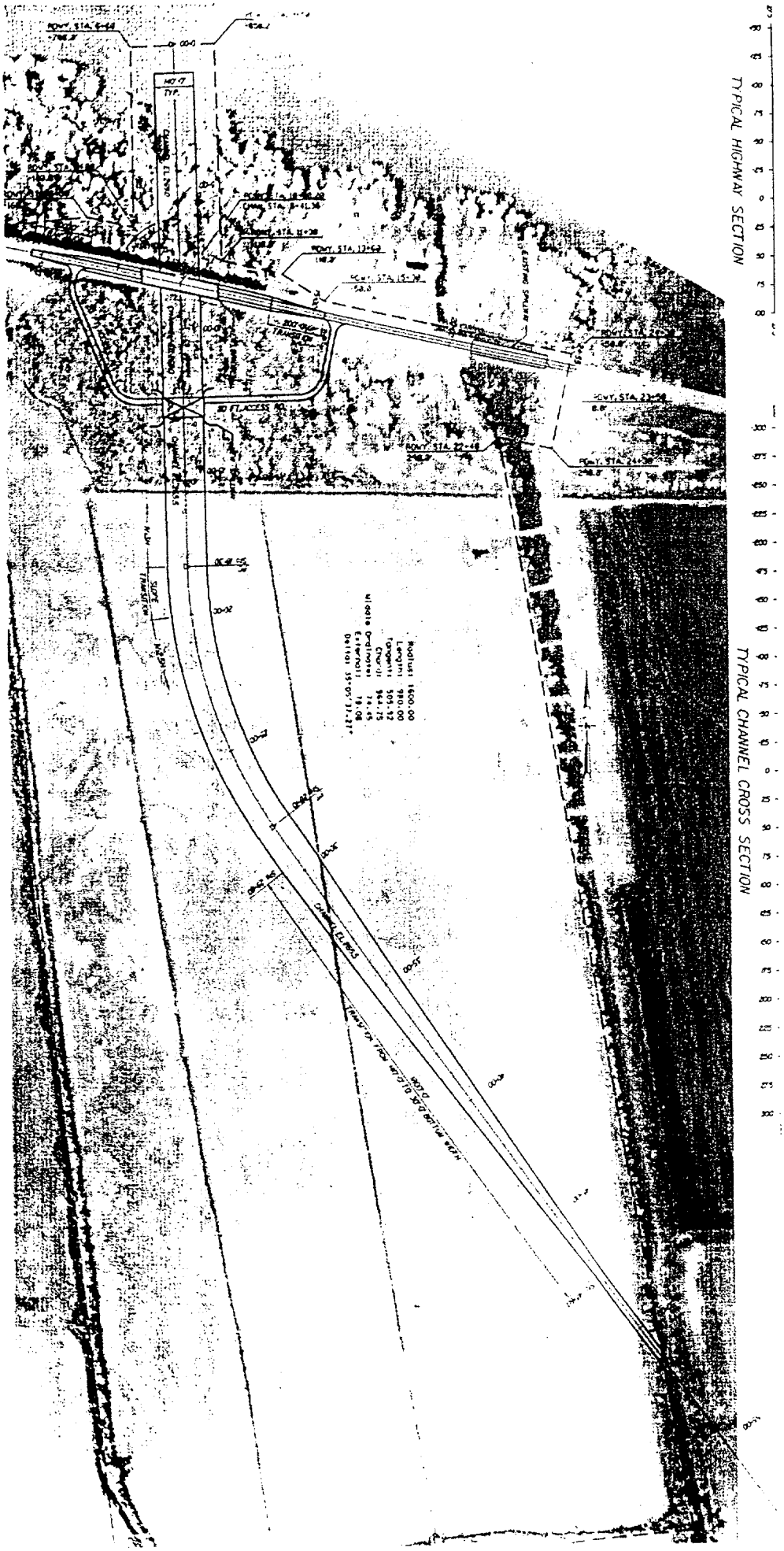


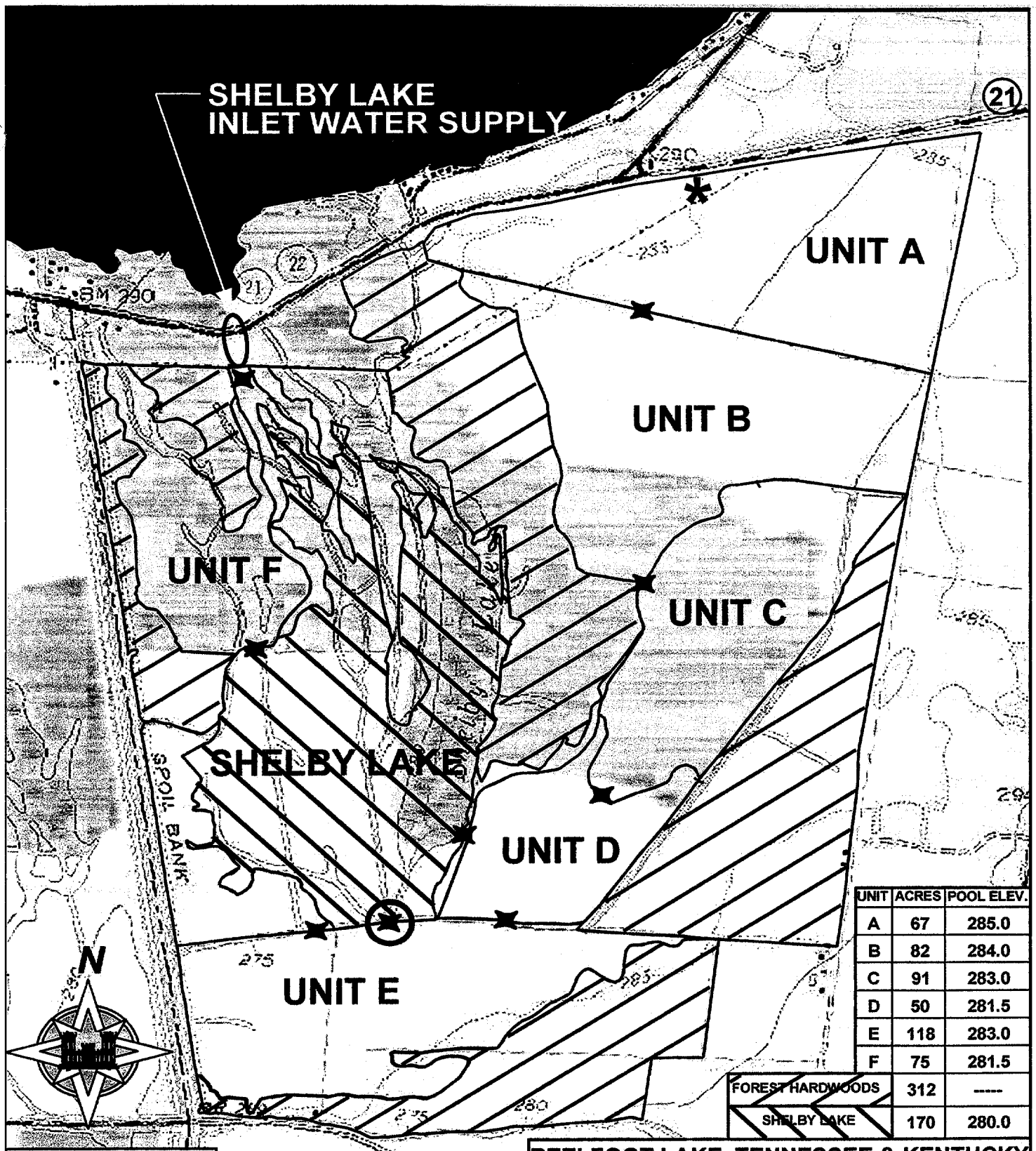


REELFOOT LAKE, TENNESSEE & KENTUCKY
CIRCULATION CHANNEL EXCAVATION

U. S. ARMY CORPS OF ENGINEERS
MEMPHIS DISTRICT

REELFOOT LAKE ALTERNATIVE SPILLWAY





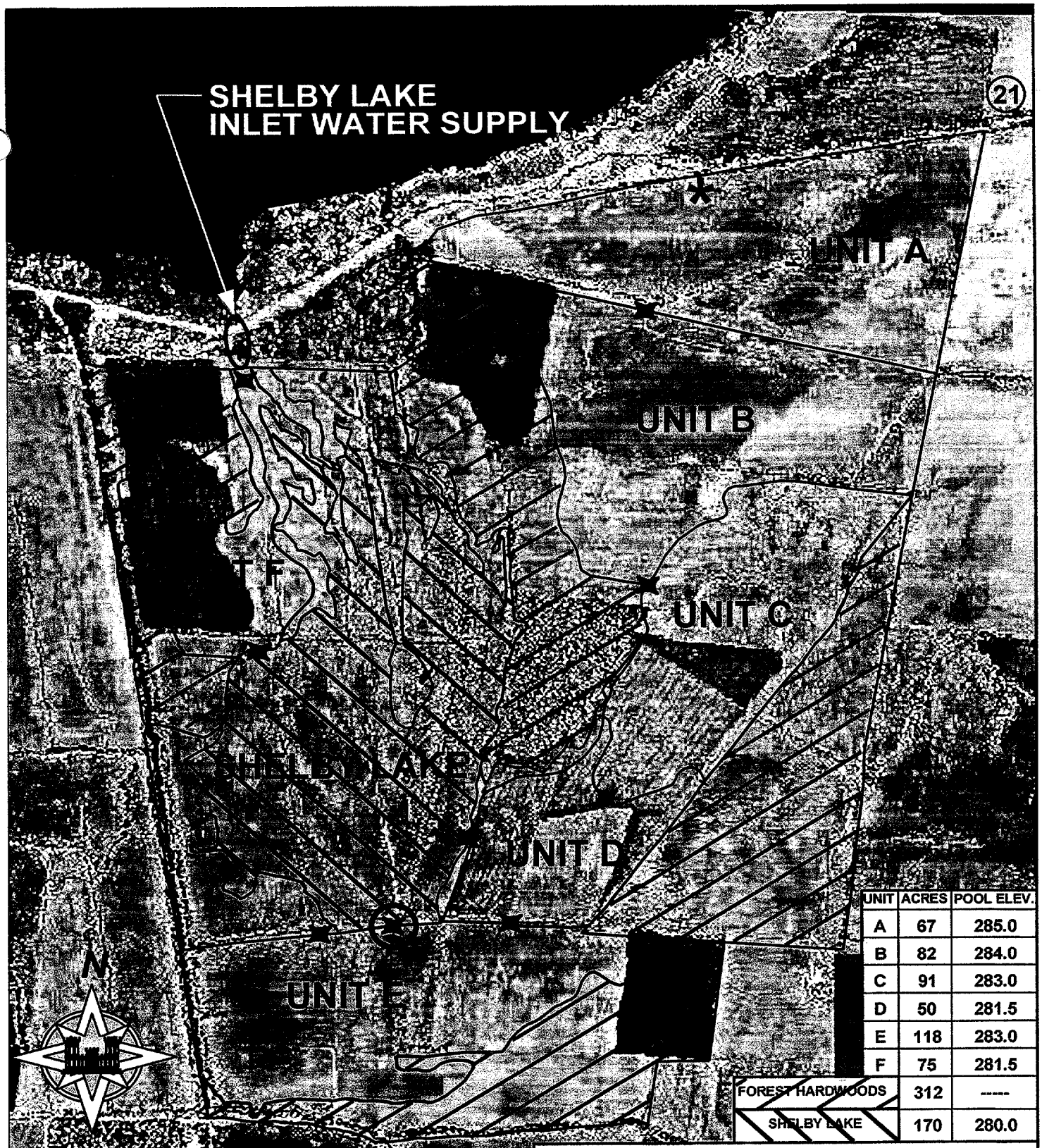
UNIT	ACRES	POOL ELEV.
A	67	285.0
B	82	284.0
C	91	283.0
D	50	281.5
E	118	283.0
F	75	281.5
FOREST HARDWOODS	312	-----
SHELBY LAKE	170	280.0

NOT DRAWN TO SCALE

- PUMP
- CONCRETE WATER CONTROL STRUCTURE
- METAL WATER CONTROL STRUCTURE

REELFOOT LAKE, TENNESSEE & KENTUCKY
SHELBY LAKE RESTORATION

MEMPHIS DISTRICT
U. S. ARMY CORPS OF ENGINEERS



UNIT	ACRES	POOL ELEV.
A	67	285.0
B	82	284.0
C	91	283.0
D	50	281.5
E	118	283.0
F	75	281.5
FOREST HARDWOODS	312	-----
SHELBY LAKE	170	280.0

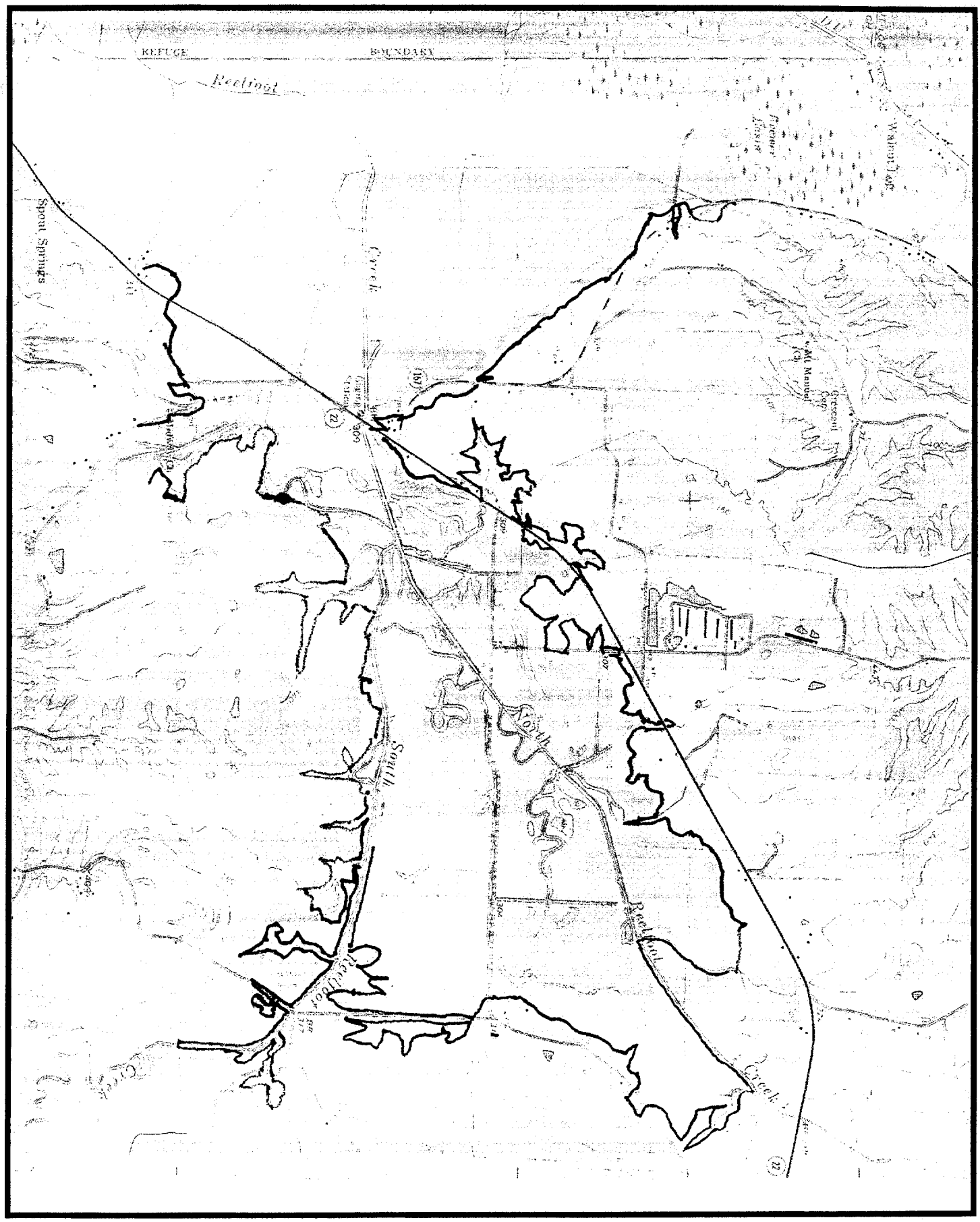
NOT DRAWN TO SCALE

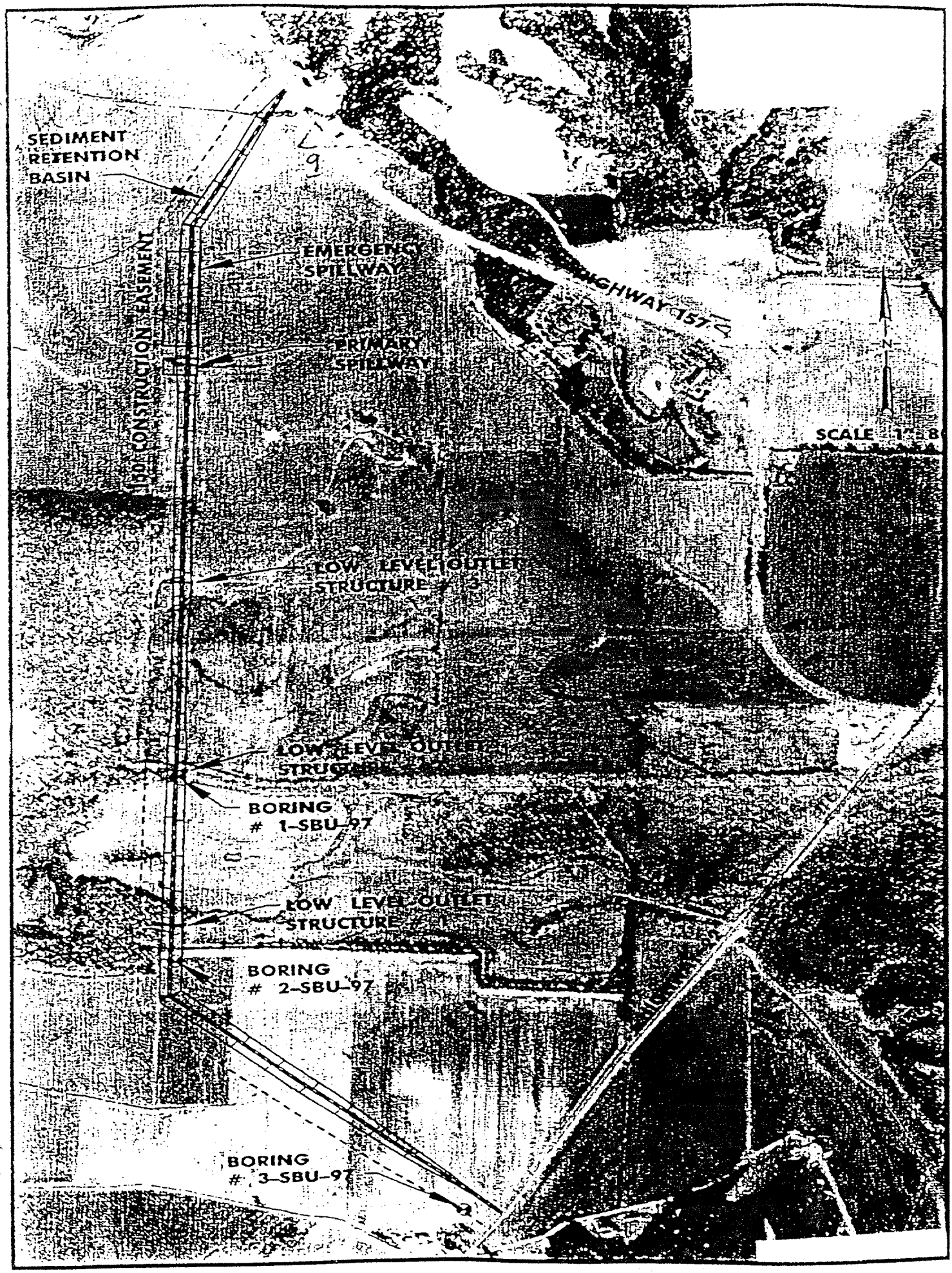
- PUMP
- CONCRETE WATER CONTROL STRUCTURE
- METAL WATER CONTROL STRUCTURE

REELFOOT LAKE, TENNESSEE & KENTUCKY
SHELBY LAKE RESTORATION

MEMPHIS DISTRICT
U. S. ARMY CORPS OF ENGINEERS

305' ELEVATION LINE FOR EAST SEDIMENT BASIN




SEDIMENT
RETENTION
BASIN
EMERGENCY
SPILLWAY
PRIMARY
SPILLWAY
150' CONSTRUCTION EASEMENT
HIGHWAY 157
N
SCALE 1" = 8
LOW LEVEL OUTLET
STRUCTURE # 3
LOW LEVEL OUTLET
STRUCTURE # 2
BORING
1-SBU-97
LOW LEVEL OUTLET
STRUCTURE # 1
BORING
2-SBU-97
BORING
3-SBU-97

C-10 **Project Name: Reelfoot Lake Environmental Restoration Study**

Project Activity: New (or Alternate) Spillway

Work Category Codes				
	Estimated Number of Owners:	5		
	Contingency Percentage		25%	
01	**LANDS AND DAMAGES**	PROJECT COST	CONTINGENCY	TOTAL
01A	**PROJECT PLANNING**			
01A10	REAL ESTATE SUPPLEMENT/PLAN	$ -	$ -	$ -
01A20	PRELIMINARY RE ACQUISITION MAPS	$ 500	$ 130	$ 630
01A30	PHYSICAL TAKINGS ANALYSIS	$ -	$ -	$ -
01A40	PRELIMINARY ATTORNEY'S OPINION OF COMPENSABILITY	$ -	$ -	$ -
01A50	ALL OTHER REAL ESTATE ANALYSES/DOCUMENTS	$ -	$ -	$ -
01B	**ACQUISITIONS**			
01B10	BY GOVERNMENT	$ -	$ -	$ -
01B20	BY LOCAL SPONSOR (LS)	$ 20,000	$ 5,000	$ 25,000
01B30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01B40	REVIEW OF LOCAL SPONSOR	$ 250	$ 60	$ 310
01C	**CONDEMNATIONS**			
01C10	BY GOVERNMENT	$ -	$ -	$ -
01C20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01C30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ 8,000	$ 2,000	$ 10,000
01C40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01D	**INLEASING**			
01D10	BY GOVERNMENT	$ -	$ -	$ -
01D20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01D30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01D40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01E	**APPRAISAL**			
01E10	BY GOVERNMENT (IN HOUSE)	$ -	$ -	$ -
01E20	BY GOVERNMENT (CONTRACT)	$ -	$ -	$ -
01E30	BY LOCAL SPONSOR (LS)	$ 28,000	$ 7,000	$ 35,000
01E40	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01E50	REVIEW OF LOCAL SPONSOR	$ 1,750	$ 440	$ 2,190
01F	**PL 91-646 ASSISTANCE**			
01F10	BY GOVERNMENT	$ -	$ -	$ -
01F20	BY LOCAL SPONSOR (LS)	$ 1,500	$ 380	$ 1,880
01F30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01F40	REVIEW OF LOCAL SPONSOR	$ 300	$ 80	$ 380
01G	**TEMPORARY PERMITS/LICENSES/RIGHTS-OF-ENTRY**			
01G10	BY GOVERNMENT	$ 1,000	$ 250	$ 1,250
01G20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01G30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01G40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01G50	OTHER	$ -	$ -	$ -
01G60	DAMAGE CLAIMS	$ 500	$ 130	$ 630
01H	**AUDITS**			
01H10	BY GOVERNMENT	$ -	$ -	$ -
01H20	BY LOCAL SPONSOR (LS)	$ 2,500	$ 630	$ 3,130
01H30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01H40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -

C-10	Project Activity: New (or Alternate) Spillway	PROJECT COST	CONTINGENCY	TOTAL
01J	**ENCROACHMENTS AND TRESPASS**			
01J10	BY GOVERNMENT	$ -	$ -	$ -
01J20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01J30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01J40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01K	**DISPOSALS**			
01K10	BY GOVERNMENT	$ -	$ -	$ -
01K20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01K30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01K40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01L00	**REAL PROPERTY ACCOUNTABILITY**	$ -	$ -	$ -
01M00	**PROJECT RELATED ADMINISTRATION**	$ 2,500	$ 630	$ 3,130
01N00	**FACILITY/UTILITY RELOCATIONS**	$ -	$ -	$ -
01P00	**WITHDRAWALS (PUBLIC DOMAIN LAND)**	$ -	$ -	$ -
01Q00	**RESERVED FOR FUTURE HQUSACE USE**	$ -	$ -	$ -
01R	**REAL ESTATE PAYMENTS**			
01R1	**LAND PAYMENTS**			
01R1A	BY GOVERNMENT	$ -	$ -	$ -
01R1B	BY LOCAL SPONSOR (LS)	$ 353,000	$ 88,000	$ 441,000
01R1C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R1D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R2	**PL 91-646 ASSISTANCE PAYMENTS**			
01R2A	BY GOVERNMENT	$ -	$ -	$ -
01R2B	BY LOCAL SPONSOR (LS)	$ 16,000	N/A	$ 16,000
01R2C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R2D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R3	**DAMAGE PAYMENTS**			
01R3A	BY GOVERNMENT	$ -	$ -	$ -
01R3B	BY LOCAL SPONSOR (LS)		$ -	$ -
01R3C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R3D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R9	**OTHER**	$ -	$ -	$ -
01S	**DISPOSAL RECEIPTS**			
01S10	DISPOSAL RECEIPTS - REIMBURSEMENTS (CR) - LANDS	$ -	$ -	$ -
01S20	DISPOSAL RECEIPTS - GENERAL FUND (CR) - LANDS	$ -	$ -	$ -
01T	**LERRD CREDITING**			
01T10	LAND PAYMENTS	$ -	$ -	$ -
01T20	ADMINISTRATIVE COSTS	$ 2,500	$ 630	$ 3,130
01T30	PL 91-646 ASSISTANCE	$ -	$ -	$ -
01T40	ALL OTHER	$ 250	$ 60	$ 310
	Total Project Cost:	$ 439,000	$ 106,000	$ 545,000
	Total Federal:	$ 5,000	$ 2,000	$ 7,000
	Total Non-Federal:	$ 434,000	$ 104,000	$ 538,000
	Total Non-Federal minus Lands:	$ 81,000	$ 16,000	$ 97,000

C-10 **Project Name: Reelfoot Lake Environmental Restoration Study**

Project Activity: Lake Isom

Work Category Codes				
	Estimated Number of Owners:	4		
	Contingency Percentage		25%	
01	**LANDS AND DAMAGES**	PROJECT COST	CONTINGENCY	TOTAL
01A	**PROJECT PLANNING**			
01A10	REAL ESTATE SUPPLEMENT/PLAN	$ -	$ -	$ -
01A20	PRELIMINARY RE ACQUISITION MAPS	$ 400	$ 100	$ 500
01A30	PHYSICAL TAKINGS ANALYSIS	$ -	$ -	$ -
01A40	PRELIMINARY ATTORNEY'S OPINION OF COMPENSABILITY	$ -	$ -	$ -
01A50	ALL OTHER REAL ESTATE ANALYSES/DOCUMENTS	$ -	$ -	$ -
01B	**ACQUISITIONS**			
01B10	BY GOVERNMENT	$ 16,000	$ 4,000	$ 20,000
01B20	BY LOCAL SPONSOR (LS)		$ -	$ -
01B30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01B40	REVIEW OF LOCAL SPONSOR		$ -	$ -
01C	**CONDEMNATIONS**			
01C10	BY GOVERNMENT	$ -	$ -	$ -
01C20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01C30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01C40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01D	**INLEASING**			
01D10	BY GOVERNMENT	$ -	$ -	$ -
01D20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01D30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01D40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01E	**APPRAISAL**			
01E10	BY GOVERNMENT (IN HOUSE)	$ 16,000	$ 4,000	$ 20,000
01E20	BY GOVERNMENT (CONTRACT)	$ -	$ -	$ -
01E30	BY LOCAL SPONSOR (LS)		$ -	$ -
01E40	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01E50	REVIEW OF LOCAL SPONSOR		$ -	$ -
01F	**PL 91-646 ASSISTANCE**			
01F10	BY GOVERNMENT	$ -	$ -	$ -
01F20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01F30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01F40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01G	**TEMPORARY PERMITS/LICENSES/RIGHTS-OF-ENTRY**			
01G10	BY GOVERNMENT	$ 800	$ 200	$ 1,000
01G20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01G30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01G40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01G50	OTHER	$ -	$ -	$ -
01G60	DAMAGE CLAIMS		$ -	$ -
01H	**AUDITS**			
01H10	BY GOVERNMENT	$ 2,000	$ 500	$ 2,500
01H20	BY LOCAL SPONSOR (LS)		$ -	$ -
01H30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01H40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -

C-10	Project Activity: Lake Isom	PROJECT COST	CONTINGENCY	TOTAL
01J	**ENCROACHMENTS AND TRESPASS**			
01J10	BY GOVERNMENT	$ -	$ -	$ -
01J20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01J30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01J40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01K	**DISPOSALS**			
01K10	BY GOVERNMENT	$ -	$ -	$ -
01K20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01K30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01K40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01L00	**REAL PROPERTY ACCOUNTABILITY**	$ -	$ -	$ -
01M00	**PROJECT RELATED ADMINISTRATION**		$ -	$ -
01N00	**FACILITY/UTILITY RELOCATIONS**	$ -	$ -	$ -
01P00	**WITHDRAWALS (PUBLIC DOMAIN LAND)**	$ -	$ -	$ -
01Q00	**RESERVED FOR FUTURE HQUSACE USE**	$ -	$ -	$ -
01R	**REAL ESTATE PAYMENTS**			
01R1	**LAND PAYMENTS**			
01R1A	BY GOVERNMENT	$ 46,000	$ 11,500	$ 57,500
01R1B	BY LOCAL SPONSOR (LS)		$ -	$ -
01R1C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R1D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R2	**PL 91-646 ASSISTANCE PAYMENTS**			
01R2A	BY GOVERNMENT	$ -		$ -
01R2B	BY LOCAL SPONSOR (LS)	$ -		$ -
01R2C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R2D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R3	**DAMAGE PAYMENTS**			
01R3A	BY GOVERNMENT	$ -	$ -	$ -
01R3B	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01R3C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R3D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R9	**OTHER**	$ -	$ -	$ -
01S	**DISPOSAL RECEIPTS**			
01S10	DISPOSAL RECEIPTS - REIMBURSEMENTS (CR) - LANDS	$ -	$ -	$ -
01S20	DISPOSAL RECEIPTS - GENERAL FUND (CR) - LANDS	$ -	$ -	$ -
01T	**LERRD CREDITING**			
01T10	LAND PAYMENTS	$ -	$ -	$ -
01T20	ADMINISTRATIVE COSTS		$ -	$ -
01T30	PL 91-646 ASSISTANCE	$ -	$ -	$ -
01T40	ALL OTHER		$ -	$ -
	Total Project Cost:	$ 82,000	$ 21,000	$ 103,000
	Total Federal:	$ 82,000	$ 21,000	$ 103,000
	Total Non-Federal:	$ -	$ -	$ -
	Total Non-Federal minus Lands:	$ -	$ -	$ -

C-10 **Project Name: ReelfootLake Environmental Restoration Study**

Project Activity: Shelby Lake

Work Category Codes				
	Estimated Number of Owners:	5		
	Contingency Percentage		25%	
01	**LANDS AND DAMAGES**	PROJECT COST	CONTINGENCY	TOTAL
01A	**PROJECT PLANNING**			
01A10	REAL ESTATE SUPPLEMENT/PLAN	$ -	$ -	$ -
01A20	PRELIMINARY RE ACQUISITION MAPS	$ 500	$ 130	$ 630
01A30	PHYSICAL TAKINGS ANALYSIS	$ -	$ -	$ -
01A40	PRELIMINARY ATTORNEY'S OPINION OF COMPENSABILITY	$ -	$ -	$ -
01A50	ALL OTHER REAL ESTATE ANALYSES/DOCUMENTS	$ -	$ -	$ -
01B	**ACQUISITIONS**			
01B10	BY GOVERNMENT	$ -	$ -	$ -
01B20	BY LOCAL SPONSOR (LS)	$ 20,000	$ 5,000	$ 25,000
01B30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01B40	REVIEW OF LOCAL SPONSOR	$ 250	$ 60	$ 310
01C	**CONDEMNATIONS**			
01C10	BY GOVERNMENT	$ -	$ -	$ -
01C20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01C30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ 16,000	$ 4,000	$ 20,000
01C40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01D	**INLEASING**			
01D10	BY GOVERNMENT	$ -	$ -	$ -
01D20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01D30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01D40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01E	**APPRAISAL**			
01E10	BY GOVERNMENT (IN HOUSE)	$ -	$ -	$ -
01E20	BY GOVERNMENT (CONTRACT)	$ -	$ -	$ -
01E30	BY LOCAL SPONSOR (LS)	$ 20,000	$ 5,000	$ 25,000
01E40	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01E50	REVIEW OF LOCAL SPONSOR	$ 1,250	$ 310	$ 1,560
01F	**PL 91-646 ASSISTANCE**			
01F10	BY GOVERNMENT	$ -	$ -	$ -
01F20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01F30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01F40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01G	**TEMPORARY PERMITS/LICENSES/RIGHTS-OF-ENTRY**			
01G10	BY GOVERNMENT	$ 1,000	$ 250	$ 1,250
01G20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01G30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01G40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01G50	OTHER	$ -	$ -	$ -
01G60	DAMAGE CLAIMS	$ 500	$ 130	$ 630
01H	**AUDITS**			
01H10	BY GOVERNMENT	$ -	$ -	$ -
01H20	BY LOCAL SPONSOR (LS)	$ 2,500	$ 630	$ 3,130
01H30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01H40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -

C-10	Project Activity: Shelby Lake	PROJECT COST	CONTINGENCY	TOTAL
01J	**ENCROACHMENTS AND TRESPASS**			
01J10	BY GOVERNMENT	$ -	$ -	$ -
01J20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01J30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01J40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01K	**DISPOSALS**			
01K10	BY GOVERNMENT	$ -	$ -	$ -
01K20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01K30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01K40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01L00	**REAL PROPERTY ACCOUNTABILITY**	$ -	$ -	$ -
01M00	**PROJECT RELATED ADMINISTRATION**	$ 2,500	$ 630	$ 3,130
01N00	**FACILITY/UTILITY RELOCATIONS**	$ -	$ -	$ -
01P00	**WITHDRAWALS (PUBLIC DOMAIN LAND)**	$ -	$ -	$ -
01Q00	**RESERVED FOR FUTURE HQUSACE USE**	$ -	$ -	$ -
01R	**REAL ESTATE PAYMENTS**			
01R1	**LAND PAYMENTS**			
01R1A	BY GOVERNMENT	$ -	$ -	$ -
01R1B	BY LOCAL SPONSOR (LS)	$ 1,742,000	$ 436,000	$ 2,178,000
01R1C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R1D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R2	**PL 91-646 ASSISTANCE PAYMENTS**			
01R2A	BY GOVERNMENT	$ -	$ -	$ -
01R2B	BY LOCAL SPONSOR (LS)	$ -	N/A	$ -
01R2C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R2D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R3	**DAMAGE PAYMENTS**			
01R3A	BY GOVERNMENT	$ -	$ -	$ -
01R3B	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01R3C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R3D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R9	**OTHER**	$ -	$ -	$ -
01S	**DISPOSAL RECEIPTS**			
01S10	DISPOSAL RECEIPTS - REIMBURSEMENTS (CR) - LANDS	$ -	$ -	$ -
01S20	DISPOSAL RECEIPTS - GENERAL FUND (CR) - LANDS	$ -	$ -	$ -
01T	**LERRD CREDITING**			
01T10	LAND PAYMENTS	$ -	$ -	$ -
01T20	ADMINISTRATIVE COSTS	$ 2,500	$ 630	$ 3,130
01T30	PL 91-646 ASSISTANCE	$ -	$ -	$ -
01T40	ALL OTHER	$ 500	$ 130	$ 630
	Total Project Cost:	**$ 1,810,000**	**$ 453,000**	**$ 2,263,000**
	Total Federal:	**$ 4,000**	**$ 1,000**	**$ 5,000**
	Total Non-Federal:	$ 1,806,000	$ 452,000	$ 2,258,000
	Total Non-Federal minus Lands:	$ 64,000	$ 16,000	$ 80,000

C-10 **Project Name: Reelfoot Lake Environmental Restoration Study**

Project Activity: Sedimentation Basin

Work Category Codes				
	Estimated Number of Owners:	22		
	Contingency Percentage		25%	
01	**LANDS AND DAMAGES**	PROJECT COST	CONTINGENCY	TOTAL
01A	**PROJECT PLANNING**			
01A10	REAL ESTATE SUPPLEMENT/PLAN	$ -	$ -	$ -
01A20	PRELIMINARY RE ACQUISITION MAPS	$ 2,200	$ 550	$ 2,750
01A30	PHYSICAL TAKINGS ANALYSIS	$ -	$ -	$ -
01A40	PRELIMINARY ATTORNEY'S OPINION OF COMPENSABILITY	$ -	$ -	$ -
01A50	ALL OTHER REAL ESTATE ANALYSES/DOCUMENTS	$ -	$ -	$ -
01B	**ACQUISITIONS**			
01B10	BY GOVERNMENT	$ -	$ -	$ -
01B20	BY LOCAL SPONSOR (LS)	$ 88,000	$ 22,000	$ 110,000
01B30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01B40	REVIEW OF LOCAL SPONSOR	$ 1,100	$ 280	$ 1,380
01C	**CONDEMNATIONS**			
01C10	BY GOVERNMENT	$ -	$ -	$ -
01C20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01C30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ 48,000	$ 12,000	$ 60,000
01C40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01D	**INLEASING**			
01D10	BY GOVERNMENT	$ -	$ -	$ -
01D20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01D30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01D40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01E	**APPRAISAL**			
01E10	BY GOVERNMENT (IN HOUSE)	$ -	$ -	$ -
01E20	BY GOVERNMENT (CONTRACT)	$ -	$ -	$ -
01E30	BY LOCAL SPONSOR (LS)	$ 88,000	$ 22,000	$ 110,000
01E40	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01E50	REVIEW OF LOCAL SPONSOR	$ 5,500	$ 1,380	$ 6,880
01F	**PL 91-646 ASSISTANCE**			
01F10	BY GOVERNMENT	$ -	$ -	$ -
01F20	BY LOCAL SPONSOR (LS)	$ 1,000	$ 250	$ 1,250
01F30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01F40	REVIEW OF LOCAL SPONSOR	$ 100	$ 30	$ 130
01G	**TEMPORARY PERMITS/LICENSES/RIGHTS-OF-ENTRY**			
01G10	BY GOVERNMENT	$ 4,400	$ 1,100	$ 5,500
01G20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01G30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01G40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01G50	OTHER	$ -	$ -	$ -
01G60	DAMAGE CLAIMS	$ 2,200	$ 550	$ 2,750
01H	**AUDITS**			
01H10	BY GOVERNMENT	$ -	$ -	$ -
01H20	BY LOCAL SPONSOR (LS)	$ 11,000	$ 2,750	$ 13,750
01H30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01H40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -

C-10	Project Activity: Sedimentation Basin	PROJECT COST	CONTINGENCY	TOTAL
01J	**ENCROACHMENTS AND TRESPASS**			
01J10	BY GOVERNMENT	$ -	$ -	$ -
01J20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01J30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01J40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01K	**DISPOSALS**			
01K10	BY GOVERNMENT	$ -	$ -	$ -
01K20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01K30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01K40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01L00	**REAL PROPERTY ACCOUNTABILITY**	$ -	$ -	$ -
01M00	**PROJECT RELATED ADMINISTRATION**	$ 11,000	$ 2,750	$ 13,750
01N00	**FACILITY/UTILITY RELOCATIONS**	$ -	$ -	$ -
01P00	**WITHDRAWALS (PUBLIC DOMAIN LAND)**	$ -	$ -	$ -
01Q00	**RESERVED FOR FUTURE HQUSACE USE**	$ -	$ -	$ -
01R	**REAL ESTATE PAYMENTS**			
01R1	**LAND PAYMENTS**			
01R1A	BY GOVERNMENT	$ -	$ -	$ -
01R1B	BY LOCAL SPONSOR (LS)	$ 3,975,000	$ 994,000	$ 4,969,000
01R1C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R1D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R2	**PL 91-646 ASSISTANCE PAYMENTS**			
01R2A	BY GOVERNMENT	$ -	$ -	$ -
01R2B	BY LOCAL SPONSOR (LS)	$ 23,000	N/A	$ 23,000
01R2C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R2D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R3	**DAMAGE PAYMENTS**			
01R3A	BY GOVERNMENT	$ -	$ -	$ -
01R3B	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01R3C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R3D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R9	**OTHER**	$ -	$ -	$ -
01S	**DISPOSAL RECEIPTS**			
01S10	DISPOSAL RECEIPTS - REIMBURSEMENTS (CR) - LANDS	$ -	$ -	$ -
01S20	DISPOSAL RECEIPTS - GENERAL FUND (CR) - LANDS	$ -	$ -	$ -
01T	**LERRD CREDITING**			
01T10	LAND PAYMENTS	$ -	$ -	$ -
01T20	ADMINISTRATIVE COSTS	$ 11,000	$ 2,750	$ 13,750
01T30	PL 91-646 ASSISTANCE	$ -	$ -	$ -
01T40	ALL OTHER	$ 2,200	$ 550	$ 2,750
	Total Project Cost:	$ 4,274,000	$ 1,063,000	$ 5,337,000
	Total Federal:	$ 16,000	$ 4,000	$ 20,000
	Total Non-Federal:	$ 4,258,000	$ 1,059,000	$ 5,317,000
	Total Non-Federal minus Lands:	$ 283,000	$ 65,000	$ 348,000

C-10 **Project Name: Reelfoot Lake Environmental Restoration Study**

Project Activity: Reelfoot Lake Circulation Channels

Work Category Codes				
	Estimated Number of Owners:	1		
	Contingency Percentage		25%	
01	**LANDS AND DAMAGES**	PROJECT COST	CONTINGENCY	TOTAL
01A	**PROJECT PLANNING**			
01A10	REAL ESTATE SUPPLEMENT/PLAN	$ -	$ -	$ -
01A20	PRELIMINARY RE ACQUISITION MAPS	$ 100	$ 30	$ 130
01A30	PHYSICAL TAKINGS ANALYSIS	$ -	$ -	$ -
01A40	PRELIMINARY ATTORNEY'S OPINION OF COMPENSABILITY	$ -	$ -	$ -
01A50	ALL OTHER REAL ESTATE ANALYSES/DOCUMENTS	$ -	$ -	$ -
01B	**ACQUISITIONS**			
01B10	BY GOVERNMENT	$ -	$ -	$ -
01B20	BY LOCAL SPONSOR (LS)	$ 4,000	$ 1,000	$ 5,000
01B30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01B40	REVIEW OF LOCAL SPONSOR	$ 50	$ 10	$ 60
01C	**CONDEMNATIONS**			
01C10	BY GOVERNMENT	$ -	$ -	$ -
01C20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01C30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01C40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01D	**INLEASING**			
01D10	BY GOVERNMENT	$ -	$ -	$ -
01D20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01D30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01D40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01E	**APPRAISAL**			
01E10	BY GOVERNMENT (IN HOUSE)	$ -	$ -	$ -
01E20	BY GOVERNMENT (CONTRACT)	$ -	$ -	$ -
01E30	BY LOCAL SPONSOR (LS)	$ 4,000	$ 1,000	$ 5,000
01E40	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01E50	REVIEW OF LOCAL SPONSOR	$ 250	$ 60	$ 310
01F	**PL 91-646 ASSISTANCE**			
01F10	BY GOVERNMENT	$ -	$ -	$ -
01F20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01F30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01F40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01G	**TEMPORARY PERMITS/LICENSES/RIGHTS-OF-ENTRY**			
01G10	BY GOVERNMENT	$ 200	$ 50	$ 250
01G20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01G30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01G40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01G50	OTHER	$ -	$ -	$ -
01G60	DAMAGE CLAIMS	$ 100	$ 30	$ 130
01H	**AUDITS**			
01H10	BY GOVERNMENT	$ -	$ -	$ -
01H20	BY LOCAL SPONSOR (LS)	$ 500	$ 130	$ 630
01H30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01H40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -

C-10	Project Activity: Reelfoot Lake Circulation Channels	PROJECT COST	CONTINGENCY	TOTAL
01J	**ENCROACHMENTS AND TRESPASS**			
01J10	BY GOVERNMENT	$ -	$ -	$ -
01J20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01J30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01J40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01K	**DISPOSALS**			
01K10	BY GOVERNMENT	$ -	$ -	$ -
01K20	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01K30	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01K40	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01L00	**REAL PROPERTY ACCOUNTABILITY**	$ -	$ -	$ -
01M00	**PROJECT RELATED ADMINISTRATION**	$ 500	$ 130	$ 630
01N00	**FACILITY/UTILITY RELOCATIONS**	$ -	$ -	$ -
01P00	**WITHDRAWALS (PUBLIC DOMAIN LAND)**	$ -	$ -	$ -
01Q00	**RESERVED FOR FUTURE HQUSACE USE**	$ -	$ -	$ -
01R	**REAL ESTATE PAYMENTS**			
01R1	**LAND PAYMENTS**			
01R1A	BY GOVERNMENT	$ -	$ -	$ -
01R1B	BY LOCAL SPONSOR (LS)	$ 1,000	$ 1,000	$ 2,000
01R1C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R1D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R2	**PL 91-646 ASSISTANCE PAYMENTS**			
01R2A	BY GOVERNMENT	$ -	$ -	$ -
01R2B	BY LOCAL SPONSOR (LS)	$ -	N/A	$ -
01R2C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R2D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R3	**DAMAGE PAYMENTS**			
01R3A	BY GOVERNMENT	$ -	$ -	$ -
01R3B	BY LOCAL SPONSOR (LS)	$ -	$ -	$ -
01R3C	BY GOVERNMENT ON BEHALF OF LOCAL SPONSOR	$ -	$ -	$ -
01R3D	REVIEW OF LOCAL SPONSOR	$ -	$ -	$ -
01R9	**OTHER**	$ -	$ -	$ -
01S	**DISPOSAL RECEIPTS**			
01S10	DISPOSAL RECEIPTS - REIMBURSEMENTS (CR) - LANDS	$ -	$ -	$ -
01S20	DISPOSAL RECEIPTS - GENERAL FUND (CR) - LANDS	$ -	$ -	$ -
01T	**LERRD CREDITING**			
01T10	LAND PAYMENTS	$ -	$ -	$ -
01T20	ADMINISTRATIVE COSTS	$ 500	$ 130	$ 630
01T30	PL 91-646 ASSISTANCE	$ -	$ -	$ -
01T40	ALL OTHER	$ 100	$ 30	$ 130
	Total Project Cost:	$ 12,000	$ 4,000	$ 16,000
	Total Federal:	$ 1,000	$ 1,000	$ 2,000
	Total Non-Federal:	$ 11,000	$ 3,000	$ 14,000
	Total Non-Federal minus Lands:	$ 10,000	$ 2,000	$ 12,000

ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE ACQUISITION CAPABILITY

PROJECT NAME: Reelfoot Lake Environmental Restoration LEVEL STUDY: Feasibility

I. Legal Authority

a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes?.....(Yes/No)
b. Does the sponsor have the power of eminent domain for this project?.....(Yes/No)
c Does the sponsor have "quick take" authority for this project?.....(Yes/No)
d. Are any of the lands/interests in the land required for the project located outside of the sponsor's political boundary?.....(Yes/No)
e. Are any of the lands/interest in land required for the project owned by an entity whose property the sponsor can not condemn?.....(Yes/No)

II. Human Resource Requirements:

a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of Federal projects including P. L. 91-646, as amended?.....(Yes/No)
b If the answer to II.a. is "yes", has a reasonable plan been developed to provide such training?.....(Yes/No)
c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project?.....(Yes/No)
d. Is the sponsor's projected in-house staffing level sufficient considering its other work load, if any, and the project schedule?.....(Yes/No)
e. Can the sponsor obtain contractor support, if required, in a timely fashion?.....(Yes/No)
f. Will the sponsor likely request USACE assistance in acquiring real estate?.....(Yes/No)
(If "yes", provide description). Please note Section C-13 of the Real Estate Report

III. Other Project Variables:

a. Will the sponsor's staff be located within reasonable proximity to the project site?.....(Yes/No)
b. Has the sponsor approved the project/real estate schedule/milestones?.....(Yes/No)

IV: Overall Assessment:

a. Has the sponsor performed satisfactorily on other USACE projects?.....(Yes/No/Not applicable)
b. With regard to this project, the sponsor is anticipated to be: highly capable/ fully capable/moderately capable/marginally capable/insufficiently capable.
(If sponsor is believed to be "insufficiently capable", provide explanation).

V. Coordination:

a. Has this assessment been coordinated with the sponsor?.....(Yes/No)
b. Does the sponsor concur with this assessment?.....(Yes/No)
(If "No", provide explanation).

Prepared by:

Martha Cole

Martha Cole
Appraiser

Reviewed and Approved by:

Billy D. Johnson

for Harris T. Vandergriff
Chief, Real Estate Division

APPENDIX D

ECONOMIC AND SOCIAL ANALYSIS

APPENDIX D

ECONOMICS AND SOCIAL ANALYSIS

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SECTION 1 - SOCIO-ECONOMIC STATUS OF THE STUDY AREA

APPENDIX D - SECTION 1

SECTION 1 -- SOCIO-ECONOMIC STATUS OF THE STUDY AREA

D-01 INTRODUCTION

1. A general insight about the study area -- Reelfoot Lake including Lake and Obion Counties, Tennessee and Fulton County, Kentucky -- is necessary to assess impacts without and with proposed improvement alternatives. In that regard, socioeconomic statistics for Lake, Obion, and Fulton counties germane to project analysis were assessed by the study team. Findings are presented below. In that Reelfoot Lake is encompassed, primarily, by Lake and Obion Counties, Tennessee and these two counties incur the primary affects of the alternative improvements analyzed, their economies were addressed in greater detail.

2. Information was gathered on historical and projected population, historical employment, and historical per capital income for the study area. Also, some socio-economic statistics for Tennessee, Kentucky and the United States were developed for comparative purposes. Attraction of Reelfoot Lake as a unique influence on the region's economic and social environment was also qualitatively and/or quantitatively evaluated.

D-02 HUMAN RESOURCES

3. All economic growth stems from activities undertaken to satisfy human needs. Human labor is a major production input factor to a region's present and future economic development. The supply of and the demand for labor constitutes a human resources market. However, the "process" of human resources development is the path by which labor evolves into a highly trained and motivated labor force. Indicators of the "process" relate to socio-economic trends in the context of population, employment, income, and education. Some measurements are cited below for the 1990 census populations for Obion, Lake, and Fulton Counties. These measurements are helpful to the assessment of relative well-being of study area residents. Table D-1-1 provides a tabular presentation of Bureau of the Census measurements for the study area. For comparison, estimates also are shown for Tennessee, Kentucky, and the United States.

(1) Lake County's population of 7129 is classified as rural, with compositions such as --- farm and non-farm residents, 2.8% and 97.2%, respectively; civilian labor force and labor force unemployed, 42.2% and 8%, respectively; high school and college graduates, 49.6% and 5%, respectively; and, poverty status in 1989, 23%. Per capita income is $8,264.

(2) Obion County's population is 31,717, with 41.6%urban and 58.4% rural. Other compositions of the total include --- rural farm and non-farm residents, 19.5% and 54%,

respectively; civilian labor force and labor force unemployed, 47.4% and 5.3%, respectively; high school and college graduates, 61.3% and 8.5%, respectively; and, poverty status in 1989, 15%. Per capita income is $11,095.

(3) Fulton County's population of 8271 is 70.9% urban and 29.1% rural. Other components include --- rural farm and non-farm residents, 4.7% and 24.4%, respectively; civilian labor force and labor force unemployed, 42.7% and 5.5%, respectively; high school and college graduates, 54.4% and 10.3%, respectively; and, poverty status in 1989, 29.8%. Per capita income is $9,820.

a. Employment/Population Relation

4. The level of civilian employment depends upon the number of civilians in the labor force who are successful in finding work. The basic assumption the Office of Business Economics uses in analyzing the national and regional employment picture, is that fiscal, monetary, and labor market policies will be adequate to sustain reasonably full employment nationally at all points for which projections are made. Unemployment will be disproportionately distributed regionally, but the extent of disproportion will diminish as workers migrate to areas of economic opportunities and away from slow-growth or declining areas.

b. Personal and Per Capita Income

5. Although gross national product (GNP) is the most comprehensive measure of national economic activity, it is not available for sub-national areas. Historically, personal income has been closely correlated with changes in GNP and is, therefore, recognized as the most comprehensive measure of economic activity available for sub-national areas.

6. The per capita personal income, obtained by dividing total personal income by total population, is the generally accepted measure for individual welfare. The per capita income for each study area county, as expressed above, is less than that of its respective state and far less than that of the nation (see per capita income cited in Table D-1-1).

c. Household and Family Income Relationship

7. A measure of a region's wealth and an indicator of the caliber of area economic activity is household and/or family income. The median household and family income for each study area county, as cited above, is less than that of its respective state and far less than that of the nation. In keeping with that income disbursement, the percentage of study area residents having incomes below the poverty level was greater than that of the respective state and of the nation (see median household income, median family and poverty status cited in Table D-1-1).

d. Education Levels

8. Educational accomplishment has a tangible effect upon a community's socio-economic fabric for the development of a viable economy. The percentages of high school and college graduates in each county's population are less than those computed for the respective states. The difference is even greater when compared to the nation (see education levels cited in Table D-1).

e. Actual and Projected Population

9. The population increases or declines for the study area depend upon the respective employment opportunities generated within the area and its vicinity. Table D-1-2 shows --- (1) the actual and projected populations for Obion, Lake, and Fulton Counties for the period 1960 to 1996, and (2) population growth indexes (based against 1990 census population), as prepared by the U.S. Bureau of the Census for Tennessee, Kentucky, and the United States for the period 1960 to 2050. For study purposes, population growth for Obion and Lake Counties during the period 1996 to 2050 is assumed to be at the same rate projected for the State of Tennessee. For Fulton County, Kentucky, the 1996 population (7794) is assumed constant through year 2050.

10. For the three counties comprising the study area, only Obion County had a diversified and expanding economy. Measurements made by the U.S. Bureau of Census during the 1990 census year and its subsequent reporting (to present) show strong indications that Obion county is currently the only study area county experiencing an expanding economy. This trend is not projected to change significantly for the study area through the analysis period.

TABLE D-1-1

SOCIO-ECONOMIC CHARACTERISTICS OF THE POPULATION

(Measurement for Specified Counties and States, and the United States)

ITEM	State Counties: Lake, TN		Obion, TN		Fulton, KY		Tennessee		Kentucky		United States	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
PERSONS 1/	7,129	100	31,717	100.0	8,271	100		100.0		100.0		100.0
Urban	-		13,200	41.6	5,861	70.9		60.87		51.8		75.2
Rural	7,129	100	18,517	58.4	2,410	29.1		39.13		48.2		24.8
Farm	201	2.8	1,390	19.5	389	4.7		2.29		3.6		1.5
Non-Farm	6,928	97.2	17,127	54.0	2,021	24.4		36.84		32.8		23.2
LABOR FORCE 2/												
Civilian Labor Force	3,005		15,027		3,531							
% of Total Persons		42.2		47.4		42.7		50.7		0.5		66.5
% of Force Unemployed		8.0		5.3		5.5		4.8		5.4		4.3
EDUCATION (Persons 25 years and Older) 1/												
% High School Graduates		49.6		61.3		54.4		67.10		64.6		75.5
% College Graduates		5.0		8.5		10.3		16.00		13.6		20.4
INCOME IN 1989 ($) 1/												
Per Capita 3/	8,264	57.3	11,095	76.9	9,820	68.1	12,255	85.0	11153	77.3	14420	100.0
Median Household 3/	16,804	55.9	22,344	74.3	16,087	53.5	24,807	82.5	22534	75.0	30056	100.0
Median Family 3/	20,730	58.9	27,448	77.9	22,592	64.1	29,546	83.9	27028	76.7	35225	100.0
Median Non-family Household 3/	8,285	48.1	8,794	51.0	8,375	48.6	12,819	74.4	11471	66.5	17240	100.0
POVERTY STATUS IN 1989 1/												
PERSONS LIVING BELOW	1,658		4,758		2,467							
% OF TOTAL PERSONS		23.3		15.0		29.8		15.3		18.5		12.7

1/ U.S. Bureau of the Census, Census of Population 1990.
2/ Bureau of Labor Statistics, Civilian labor force, 1994.
3/ The percentages shown in columns are measured against associated values for the United States.

NOTE: For states and the United States, data entry appear only where considered relevant for analyzing with and without project conditions in the study area.

TABLE D-1-2

POPULATION: HISTORIC, PRESENT, AND PROJECTED

Year	1960	1970	1980	1990	1996	2000	2015	2025	2050
COUNTIES AND GROWTH BETWEEN DECADES									
Lake County, TN	9,672	8,074	7,455	7,129	8,331				
Obion County, TN	26,957	30,247	32,781	31,717	32,053				
Fulton County, KY	11,256	10,183	8,717	8,271	7,794				
GROWTH RATES WITH 1990-YEAR BASE									
Lake County, TN	1.3567	1.1326	1.0457	1.0000	1.1686				
Obion County, TN	0.8499	0.9537	1.0335	1.0000	1.0106				
Fulton County, KY	1.3609	1.2312	1.0539	1.0000	0.9423				
GROWTH RATES WITH 1990-YEAR BASE									
TENNESSEE	0.7314	0.8048	0.9414	1.0000	1.0777	1.1599	1.2233	1.3051	1.3666
KENTUCKY	0.8240	0.8736	0.9929	1.0000	1.0469	1.0835	1.1115	1.1475	1.1701
UNITED STATES	0.7266	0.8247	0.9160	1.0000	1.0667	1.0949	1.2469	1.3474	1.5838

SOURCE: U.S. Bureau of the Census, Census of Population.

SECTION 2 - EVALUATION OF THE WITHOUT AND WITH PROJECT CONDITIONS

TABLE D-2-1

REELFOOT LAKE, TENNESSEE-KENTUCKY FEASIBILITY STUDY
SUMMARY OF TANGIBLE BENEFITS AND COSTS FOR SPECIFIED PROJECT FEATURES ANALYZED
(OCTOBER 1998 PRICES)

	AAE Values $	B/C Ratio
I. COSTS 1/		
A. Water Management Practice--Alternative 2	236,400	
First Costs	192,100	
Induced Flood Damages to Samburg Property	44,300	
B. Alternative Spillway	834,100	
First Costs	815,800	
O&M Charges	18,300	
C. Sediment Basin	1,000,600	
First Costs	898,400	
O&M Charges	102,200	
D. Circulation Channels Cleanout	48,800	
First Costs	47,100	
O&M Charges	1,700	
E. Shelby Lake	443,300	
First Costs	402,600	
O&M Charges	40,700	
F. Lake Isom	139,300	
First Costs	113,000	
O&M Charges	26,300	
II. BENEFITS		
A. Water Management Practice--Alternative 2	542,300	2.29
Commercial Fishing 2/	25,500	
Recreation 2/	516,800	
B. Alternative Spillway	923,000	1.11
Cost Saving to Sustaining WOP Base Study Conditions 3/	623,000	
Land Value Enhancements 4/	300,000	
Recreation-Related	150,000	
Environment-Related	150,000	
C. Sediment Basin	217,900	0.22
Row Crop Production 3/	82,400	
Recreation & Commercial Fishing 5/	135,500	
D. Circulation Channels (Recreation & Commercial Fishing) 5/	38,400	0.79
E. Shelby Lake	138,400	0.31
Row Crop Production 3/	38,400	
Recreation & Commercial Fishing 5/	100,000	
F. Lake Isom (Recreation & Commercial Fishing) 5/	22,300	0.99

1/ The first and O&M costs were transcribed from Table D-2 and Table D-3, respectively, and induced flood damages from Table D-6.

2/ Values transcribed from Table D-8.

3/ Values transcribed from Table D-4

4/ See discussion topic, "Land Value of Shoreline Properties," in this appendix.

5/ See the Environmental Appendix (Appendix A) for discussion and value derivations

APPENDIX D - SECTION 2

ANALYSIS OF ALTERNATIVE PROJECT CONDITIONS

D-01. INTRODUCTION

1. Presented in this report section are discussions and tabular computations that summarize the rationale, methodology, and technical backup materials used to assess economic feasibility of implementing a plan (project) for rectifying the without project conditions negative impacts to economic activities of Reelfoot Lake and vicinity. See the main report topic, "General Description of the Study Area," for additional descriptive background.

2. This appendix presents tangible (monetarily quantifiable) economic values associated with each project alternative studied, excluding recreation and fishery benefits. Study assessments for the recreation and fishery accounts are presented in the Biological and Environmental Appendix (Appendix A).

3. Project benefit (positive and/or negative) accounts are reflective of the project's impacts on the analysis areas' without project economic, environmental, and social activities for the analysis period (ending 2004-2054). The accounts specified herein are: (1) land value enhancement; (2) inundation damage reduction--structures, contents, and grounds; (3) commercial fishing; (4) recreational enhancements; and, (5) the enhancement of intangible environmental amenities.

D-02. SUMMARY OF EVALUATION CONSTRAINTS AND RESULTS

4. National Economic Development (NED) benefits and costs for each project were computed based on the existing economy (industrial development, market exchanges, policy/regulations, etc.) of the analysis areas during study year 1998. See Table D-2-1 for a summary of costs and tangible benefits for each project feature of the alternatives cited in Main Report Table 26. The benefits and costs (tangibles and intangibles) shown in Table 26 are all appropriate for the National Economic Development (NED), Environmental Quality (EQ), and Other Social Effects (OSE) accounts. Other criteria basic to the assessment of project impacts (costs and/or benefits) are cited below.

i. All values are priced at October 1998 levels.

ii. The reference point in time for purposes of discounting and determining present values is the ending of year 2004.

iii. For the purpose of discrete discounting to obtain present values, first costs (initial financial investment) for each project alternative are assumed to take place at the end of the year during which they are expended. Benefits are assumed to occur one year after construction is completed. The reference point in time for obtaining all present values is ending 2004. Project benefit and/or cost streams accruing prior to the reference point in time for discounting are compounded forward, and those after are discounted backward at the project interest rate of 7-1/8%. The present values are then amortized over 50 years (ending year 2004-2054) at the same interest rate to derive the average annual equivalent benefits and costs, which are the tangible factors used in the evaluation of project justification.

5. To facilitate a manageable analysis, several simplifying assumptions and data-gathering and manipulating conveniences were employed to derive the project impacts cited in Table D-2-1. There are risks and uncertainties associated with each simplification process, of course, and this analysis attempts to address the most critical elements for each benefit and/or cost category used in the project justification estimates. Those critical assumptions that are deemed professionally sensitive (ones having a high degree of uncertainty about their applicability and/or accuracy for estimating benefits and/or costs) are addressed later under the topic heading "Sensitivity Analysis". Conclusions in the sensitivity section, however, will be included in the discussion of individual categories when the results appear to be especially critical or germane.

D-03. PROJECT COSTS

6. The costs associated with project alternatives analyzed in this study are discussed in terms of --- (1) initial investment (first) costs; (2) operation and maintenance costs; and (3) economic costs.

7. **First Costs**. Section IV of Appendix B (Engineering Costs) presents detailed estimations of first costs (pre-construction estimates, and construction and planning estimates) for each project alternative studied. In costing out each project, an average contingency of 20% cost was included. Also, the engineering and design, and supervision and administration costs were estimated lump sum items based on costs of similar projects throughout the Memphis District. Table D-2-2 provides a summary of these costs for project alternatives herein analyzed.

8. **Operation and Maintenance Charges**. Each project feature is assumed to operate at peak project design efficiency levels throughout the project's economic life. To retain the peak design efficiency level, operation and maintenance (O&M) charges are incurred. Table D-2-3 presents the estimated O&M expenditure schedule and the average annual equivalent O&M charges computed for project conditions for the 50-year project life.

TABLE D-2-2

REELFOOT LAKE FEASIBILITY STUDY

FIRST COST EXPENDITURES, PRESENT VALUES AND AVERAGE ANNUAL EQUIVALENT VALUES

(OCTOBER 1998 PRICES, $000)

ITEM	2000	2001	2002	2003	2004	2005	2006	TOTAL FIRST COST 2001-6	PRESENT VALUE COST 1/	AAE COST 2/
Ending Year	2000	2001	2002	2003	2004	2005	2006	2001-6		
	$000	$000	$000	$000	$000	$000	$000	$000	$000	$000
A. IMPLEMENT WATER LEVEL MANAGEMENT PRACTICE 3/										
1. Alternative 1									0.0	0.0
2. Alternative 2								2270.0	2609.5	192.1
01 Land & Damages		760.0	755.0	755.0				2270.0	2609.5	
3. Alternative 3 4/									0.0	0.0
B. CONSTRUCT ALTERNATIVE SPILLWAY								9709.0	11083.4	815.8
01 Land & Damages		400.0	145					545.0	658.1	
02 Relocations		1825.3						1825.3	2243.9	
06 Spillway and Outlet			1743.8	2647	1322.3			5713.3	6159.3	
30 Planning, E.. & D. Costs	1140.6							1140.6	1502.1	
31 S. & A. Costs			121.2	242.4	121.2			484.8	520.0	
C. CONSTRUCT SEDIMENT BASIN ON REELFOOT CREEK								11248.1	12204.7	898.4
01 Land & Damages		1761.5	1761.5	1810.9				5334.0	6127.0	
02 Relocations		104.0	107.6					211.6	251.3	
06 Sed Retention Basin					1514.3	2973.2		4487.5	4289.7	
18 Cultural Res Preservation		150.0						150.0	184.4	
30 Planning, E.. & D. Costs	925.8							925.8	1219.2	
31 S. & A. Costs					45.9	93.3		139.2	133.0	
D. CONSTRUCT DREDGED CIRCULATION CHANNELS								539.1	639.4	47.1
01 Land & Damages		16.0						16.0	19.7	
06 Circulation Channels			249.5					249.5	286.3	
30 Planning, E.. & D. Costs		237.6						237.6	292.1	
31 S. & A. Costs			36.0					36	41.3	
E. RESTORE SHELBY LAKE / MANAGE WATERFOWL UNITS								4963.2	5469.5	402.6
01 Land & Damages		746.5	746.5	770.1				2263.0	2599.2	
02 Relocations		8.4						8.4	10.3	
06 Waterfowl Mgt./Tree Planting					1905.8			1905.8	1905.8	
18 Cultural Res Preservation					150			150.0	150.0	
30 Planning, E.. & D. Costs	530.4							530.4	698.5	
31 S & A. Costs					105.6			105.6	105.6	
F. RESTORE LAKE ISOM								1342.5	1534.6	113.0
01 Land & Damages			55	55				110.0	122.0	
06 Lake Isom Improvements				812.5				812.5	870.4	
30 Planning, E.. & D. Costs	375.6							375.6	494.6	
31 S. & A. Costs				44.4				44.4	47.6	

1/ Sum of cost streams discounted/compounded at project interest rate (7-1/8%) to ending year 2004.

2/ Present worth values amortized over a 50-year period at 7-1/8% interest rate and 0.07361 amortization factor .

3/ Alternatives: 1. No Action; 2. Dynamic Water Level Fluctuation with Major Periodic Drawdown; 3. Interim Plan with Major Periodic Drawdown.

4/ The cost to implement this alternative is estimated to be same as that to implement alternative 2.

NOTE: The derivation of these first cost estimates are presented in report Section 4 of Appendix B.

TABLE D-2-3

REELFOOT LAKE FEASIBILITY STUDY
ALTERNATIVE PROJECT FEATURES OPERATION AND MAINTENANCE EXPENDITURES
(OCTOBER 1998 PRICES)

ITEM	INTERVAL YRS	COSTS 1/ $	PV COST 2/ $	AAE 3/ $
A. WATER LEVEL MANAGEMENT PRACTICE			0.0	0.0
B. ALTERNATIVE SPILLWAY			249,351	18,355
Grading of Road	1	200	2,717	200
Mowing	1	3,600	48,906	3,600
Relief Wells		99,000	53,069	3,906
Inspections	5	2,500	5,891	434
Rehab Well	25	84,000	17,721	1,304
Pump Test	5	12,500	29,457	2,168
Rehab of Concrete Structure	25	140,000	29,536	2,174
Rehab of Mechanical/Electrical Component	25	217,500	45,886	3,378
Channel Maintenance	25	120,000	25,316	1,864
Operation	1	3,000	40,755	3,000
Rehab of Structure & Stoplogs	25	15,000	3,165	233
C. SEDIMENT BASIN			1,388,287	102,192
1. Levee System and Operations			770,835	56,741
Grading of Road	1	4,700	63,850	4,700
Mowing	10	90	88	6
Relief Wells	1	34,400	467,328	34,400
Grading of Road	1	15,000	203,777	15,000
Mowing	25	104,000	21,941	1,615
Relief Wells	25	65,655	13,851	1,020
2. CR Mgt. Area			617,453	45,451
Operation, Mowing, Levee Repair, Pl	1	35,000	475,479	35,000
Grading of Road	1	720	9,781	720
Stoplog Structure Replacement	15	50	26	2
Rehab Pump/Motors	15	11,250	5,942	437
Relief Wells	25	37,500	7,911	582
Relief Wells Operating Cost	1	8,709	118,313	8,709
D. CIRCULATION CHANNEL CLEANOUT	25	109,471	23,095	1,700
E. SHELBY LAKE			552,740	40,687
Operation, Mowing, Levee Repair, Planting	1	35,000	475,479	35,000
Grading of Road	1	392	5,325	392
Stoplog Structure Replacement	15	20	11	1
Rehab Pump/Motors	15	3,750	1,981	146
Relief Wells	25	12,500	2,637	194
Relief Wells Operating Cost	1	4,838	65,725	4,838
Concrete Inlet Structure & Gates	25	7,500	1,582	116
F. LAKE ISOM			357,875	26,343
Grading of Road	1	68	924	68
Concrete Outlet Structure & Stoplogs	25	15,000	3,165	233
Mowing	1	3,975	54,001	3,975
Rehab Pump/Motors	15	22,500	11,884	875
Relief Wells	25	75,000	15,823	1,165
Relief Wells Operating Cost	1	12,442	169,026	12,442
Operation	1	7,500	101,888	7,500
Riprap/Filter Replacement	25	5,520	1,165	86

1/ The derivation of these operation and maintenance costs are presented in report Section 4 of Appendix B.
2/ Sum of cost streams discounted at project interest rate (7-1/8%) to ending year 2004.
3/ Present worth values amortized over a 50-year period at a 7-1/8% interest rate and 0.07361 amortization factor.

9. **Economic Costs**. The applicable costs for use in measuring project justification status (benefit-cost ratios) are project economic costs (national economic development costs). And from the national perspective, economic costs are the values foregone in alternative uses of the goods and services required for construction and operation and maintenance plus the value of resources destroyed or otherwise adversely affected by the project. It is assumed that market prices generally provide a measure of the value of goods and services in alternative uses.

10. Though first costs and operation and maintenance costs specified for a project are usually the same as economic costs, differences do occur and may be quite significant. In this study, first costs and operation and maintenance costs for project alternatives (inclusive of the new spillway) significantly exceed project economic costs. For these conditions, first costs exceed economic costs by the measure of: (1) expenses necessary to maintain the current (without project base conditions from which project justification measurements were computed) functional level of the spillway/bridge throughout the analysis period; and, (2) fee simple costs for crop acres that would not change from their use under without project conditions.

11. The Memphis District determined that analyzing the functional ability of the existing spillway
proved to be highly problematic. These problems included the following.

(1) The structure is currently more than ten years beyond its design life.
(2) It is in need of repair from problems of seepage below the structure.
(3) Operability of the outlet structure's radial gate for discharging waters from the lake has significantly deteriorated.
(4) Actions are needed to prevent structural failure and to assure the structure's functional ability, replacement, and/or significant repairs during the analysis period.
(5) Operation and maintenance repairs to the spillway/bridge replacement over the analysis period include overlap in reference to the preceding item.

12. Regarding a no-Corps action future, therefore, the local sponsor will make the necessary expenditures to maintain the existing functional ability of the spillway/bridge during the analysis period. These costs were conservatively estimated to be 75% of the construction and maintenance and operations costs for the project spillway feature. Additionally, it was determined that with project conditions these expenses would be eliminated. Thus, the inclusion of these non-economic costs within first costs is offset by the inclusion of a project benefit that is equal to the precluded costs (amounts by which the project precludes the local sponsor's expense on the existing spillway/bridge). Notably, limiting the benefits from this expenditure to just equal the precluded costs is a highly conservative estimate of the benefits obtained from the current spillway's functional ability. Notwithstanding, the implication made here and the resulting conservative benefit estimation sufficiently serve this study. See Table D-2-4 for computation of the benefit adjustment value to the project spillway's first costs.

TABLE D-2-4

REELFOOT LAKE, TENNESSEE-KENTUCKY FEASIBILITY STUDY
PROJECT BENEFIT ADJUSTMENTS FOR JUSTIFICATION STATUS MEASURED AGAINST FIRST COST ESTIMATIONS
(OCTOBER 1998 PRICES, $000)

Item	NO USE-CHANGE CROPLAND 1/ Acres	Value/Acre $	Total Value $	SPILLWAY COSTS Repair/ Replace $	Q&M $	AAE TOTAL $
1. Spillway Construction						
Without Project 2/				609,500	13,500	623,000
With Project 3/				812,600	18,000	830,600
2. Sediment Basin						
Without Project	1036	1800	1,864,800			137,300
With Project	1036	1080	1,118,900			82,400
3. Shelby Lake						
Without Project	483	1800	869,400			64,000
With Project	483	1080	521,600			38,400

1/ The full market price (fee simple) for these acres are charged against this project feature and expressed in the project first cost estimate (District Real Estate Division appraised at $1,800/acre). Notably, however, these acreages will continue in same use with project, but will be management adjusted, via lease for farming by State of Tennessee, to have 25% of harvest left for wildlife consumption. Without project production potential would be reduced by 25%. Additionally, to account for possible planting delays because of wet conditions associated with management of these sites, the without project average year crop yield was reduced by 15%. The with project production on these acres was estimated conservatively at 60% of the without project crop production value. Assuming the appraised land price is an expression of the capitalized expected production capability of these lands, 60% of the capitalized value that remains with the project is added to the project benefits to offset the capitalized value's inclusion with project first costs.

2/ The value expressed here is 75% of the costs estimated for the with plan spillway construction expressed in Table D-2-2 and Table D-2-3. The base study without project conditions from which to measure justification benefits for project improvement is Interim plan (FWS, 1991) for conditions throughout the analysis period. The state of the current spillway as inspected by the Corps was determined to: be ten years in advance of its design life; be in current need of repair for problems of seepage below the structure; have significantly deteriorated operability of the outlet structure's radial gate for discharging waters from the lake. Thus, assurance of the structure's functional ability during the analysis necessitates replacement of or significant repairs to the existing spillway/bridge structure. With project conditions for the spillway feature exclude the expenditure associated with retaining the base conditions from which the marginal project benefit over without project conditions was measured. Therefore, a benefit accrues from the projected without project cost saving and is minimally as great as the cost saved.

3/ The with project average annual total was transcribed from Tables D-2-2 and Table D-2-3.

13. In addition, Table D-2-4 presents the economic cost estimates for farm lands (row crop acreage purchased fee simple) that is projected without and with project conditions to be in the same use over the analysis period, but farmed with project under specified lease/management conditions. The with project management specifications for these lands include following: 1) 25% of the crop harvest be left for waterfowl; only specified crops be grown; 3) cropped acreage around Shelby Lake will be to be flooded for waterfowl in the fall of the year. See Table D-2-4 for computation of the benefit adjustment to project first costs for this acreage.

D-04. LANDS AND DEVELOPMENT, EXISTING (1998) AND FUTURE, WITH AND WITHOUT PROJECT CONDITIONS

14. Development (residential, commercial, industrial, etc.) and agricultural and forestry properties comprising the analysis area were inventoried in 1986 and verified and updated in the study year (1998) via field observations. Only nominal change in 1998 to land use in the analysis areas for both with and without project conditions is projected over the analysis period, exclusive of land use change associated with project design. For this study, therefore, no change was assumed in these properties' usage. Plan conditions are projected to produce some property use efficiencies during the analysis period. Table D-2-5 shows existing condition stage-area relations for specified acreage within the Tennessee and Kentucky project analysis areas.

D-05. PROPERTY (STRUCTURES, CONTENTS, AND GROUNDS)

15. Property (structures, contents, and grounds) for the analysis areas was inventoried initially by Memphis District personnel in 1986--houses, motels, restaurants, shops, etc., located in and around Samburg, Tennessee. We utilized a windshield-survey approach to validate the 1986 inventory as current (existing, 1998 year) property. No observable changes were shown to have occurred to the physical construction of area property. Thus, the number and configuration of structures in the 1986 inventory were verified as current.

16. Expected annual flood damages to the 1986 Samburg property inventory for both with and without project conditions were computed via the District computerized flood damage model, to be discussed below. These damages were then updated to October 1998 dollars via the ENR construction price index for converting from October 1986 dollars to October 1998 dollars.

17. Inputs for the Memphis District computerized model, used in estimating expected annual damages to Samburg property, consist of --- flood elevations for various frequency flood events, structure files including first floor elevations, structure value and type, content value, and Memphis District depth-percent damage curves for all structure types.

TABLE D-2-5

REELFOOT LAKE, TENNESSEE-KENTUCKY FEASIBILITY STUDY
STAGE AREA FOR SPECIFIED ACREAGE

1	2	3	4	5	6	7	8
	Total Stage-Surface Relations			Disaggregation of Tennessee Acreage			
Elevation	Area In TN & KY 2/ 1/	Surface Area In KY 1/	Surface Area In TN (Col. 2-3)	Cleared Acres In TN	Wood&Scrubs Acres In TN (Col	Houses Rd & Ditches Acres (Col. 5x.05)	Lake at Elevation 282.2 2/
290.0	47,804	12,314	35,490	12,438	6,481	622	15,949
289.0	46,166	11,892	34,274	10,952	6,825	548	15,949
288.0	43,093	9,667	33,426	9,466	7,538	473	15,949
287.0	40,145	7,337	32,808	7,980	8,480	399	15,949
286.0	37,503	5,589	43,092	6,494	20,324	325	15,949
285.0	36,188	3,953	40,141	5,006	18,936	250	15,949
284.0	28,735	2,459	26,276	3,216	6,950	161	15,949
283.9	27,983	2,303	25,680	3,037	6,542	152	15,949
283.8	27,232	2,147	25,084	2,858	6,134	143	15,949
283.7	26,480	1,992	24,488	2,679	5,726	134	15,949
283.6	25,728	1,836	23,892	2,500	5,318	125	15,949
283.5	24,977	1,680	23,296	2,321	4,910	116	15,949
283.4	24,225	1,524	22,700	2,142	4,502	107	15,949
283.3	23,473	1,368	22,104	1,963	4,094	98	15,949
283.2	22,721	1,213	21,508	1,784	3,686	89	15,949
283.1	21,970	1,057	20,912	1,609	3,274	80	15,949
283.0	21,154	837	20,317	1,426	2,871	71	15,949
282.9	20,559	788	20,642	1,247	3,384	62	15,949
282.8	19,964	739	20,047	1,068	2,977	53	15,949
282.7	19,369	690	19,452	889	2,570	44	15,949
282.6	18,774	641	18,857	710	2,163	36	15,949
282.5	18,179	592	18,262	531	1,755	27	15,949
282.4	17,584	543	17,667	352	1,348	18	15,949
282.3	16,989	494	17,072	173	941	9	15,949
282.2	16,394	445	16,839	0	890	0	15,949

1/ Acreage estimation provided by study hydrologist--acreage estimation between elevation 282-283, and 283-284 derived via interpolation. Acreage specifications (excluding state total) were estimated by the District's Economics Branch.

2/ Includes water surface area and marshlands and other lands which are inundated frequently.

TABLE D-2-6

REELFOOT LAKE, TENNESSEE-KENTUCKY FEASIBILITY STUDY

EXPECTED ANNUAL PROPERTY DAMAGES FOR ALTERNATIVE LAKE POOL ELEVATIONS

(OCTOBER 1998 PRICE LEVEL)

	Structure Damages $			Contents Damages $			Clean-Up Damages $			TOTAL DAMAGES $		
	Pool	Wave Wash	Total	Pool	Wave Wash	Total	Pool	Wave Wash	Total	Pool	Wave Wash	Total
A. ELEVATION DAMAGE ESTIMATION												
282.2	1,900	13,200	15,100	400	6,200	6,600	300	3,500	3,800	2,600	22,900	25,500
282.7	3,400	20,100	23,500	900	9,300	10,200	800	5,700	6,500	5,100	35,100	40,200
283.2	4,500	26,400	30,900	1,500	11,900	13,400	1,300	7,500	8,800	7,300	45,800	53,100
284.0	9,000	47,700	56,700	3,400	22,700	26,100	2,500	12,100	14,600	14,900	82,500	97,400
284.5	16,500	85,100	101,600	7,700	39,600	47,300	5,700	20,100	25,800	29,900	144,800	174,700
B. MARGINAL DAMAGE INCREASE WITH INCREASED LAKE POOL ELEVATION												
282.2-282.7	1,500	6,900	8,400	500	3,100	3,600	500	2,200	2,700	2,500	12,200	14,700
282.7-283.2	1,100	6,300	7,400	600	2,600	3,200	500	1,800	2,300	2,200	10,700	12,900
283.2-284.0	4,500	21,300	25,800	1,900	10,800	12,700	1,200	4,600	5,800	7,600	36,700	44,300
284.0-284.5	7,500	37,400	44,900	4,300	16,900	21,200	3,200	8,000	11,200	15,000	62,300	77,300

NOTE: Wave wash effects were computed by adding one foot to the pool water elevations.

TABLE D-2-7

REELFOOT LAKE, TENNESSEE-KENTUCKY FEASIBILITY STUDY

PROPERTY AND FLOOD HAZARD RELATIONS FOR ALTERNATIVE LAKE POOL ELEVATIONS

		PROPERTY LOCATED WITHIN SPECIFIED HAZARD ZONE							TOTALS		Wave Wash Less Pool	
Hazard Zone		1-2 Yr	2-5 Yr	5 - 10 Yr	10-25 Yr	25-50 Yr	50-100 Yr	100-500Yr	1-100Yr	1-500 Yr	0-100Yr	0-500Yr
A. POOL ELEVATIONS WITHOUT AND WITH WAVE WASH												
282.2	Pool	0	3	9	4	8	19	84	43	127		
	Wave Wash	12	23	13	29	46	64	95	187	282	144	155
282.7	Pool	0	12	10	2	3	32	113	59	172		
	Wave Wash	22	26	68	7	28	46	130	197	327	138	155
283.2	Pool	0	16	8	3	13	75	64	115	179		
	Wave Wash	24	53	45	28	29	86	82	265	347	150	168
284.0	Pool	12	12	11	8	16	68	69	127	196		
	Wave Wash	48	74	50	18	6	94	108	290	398	163	202
284.5	Pool	6	18	8	11	56	57	93	156	249		
	Wave Wash	122	64	4	6	69	61	102	326	428	170	179
B. MARGINAL INCREASE IN STRUCTURES WITHIN HAZARD ZONE PER ELEVATION INCREASE												
282.2-282.7									26	90		
282.7-283.2									10	45		
283.2-284.0									56	7		
284.0-284.5									124	27		

NOTE: Wave wash effects were computed by adding one foot to the pool water elevations.

18. Using the study year property inventory, Tables D-2-6 and D-2-7 show property damages and property hazard changes, respectively, for alternative lake pool elevations analyzed in the study. In consideration of the minor change for shoreline property use estimated for both without and with project conditions over the analysis period, the existing property inventory was used to evaluate future with and without project property impacts from altering the lake base pool level.

D-06. LAND VALUE FOR SHORELINE PROPERTIES

19. General. The market price that shoreline property demands is assumed to capture value of the socioeconomic utilities (productive potential, esthetics appeal--direct and/or associative, hazard, etc. embodying its demand function), negative and positive. The demand function for Reelfoot Lake shoreline properties is greatly influenced by the Metropolitan statistical are of Memphis, Tennessee. Thus, its market is defined regionally, as opposed to locally. The average dollar value that shoreline properties demand in the region is roughly $500/feet (the value used in this document). It is also the average value for recent shoreline property sales for Horseshoe Lake, Arkansas shoreline properties—a large lake of region with qualities similar to those at Reelfoot Lake.

20. Without Project Conditions. The Reelfoot Lake analysis area has both privately and publicly owned shoreline properties. The project benefits in this section were computed for privately owned properties in and about the vicinity of Samburg, Tennessee-- a small incorporated community of less than 500 residents located on the southeast lake shore and primarily centered at the intersection of Bluff Road and state highway 22. the environmental section discusses project impacts for publicly owned properties serving the local and national recreational and environmental objectives.

21. District personnel made a land value assessment of the shoreline property of the Blue Basin area of Reelfoot Lake only, excluding the Blue Basin land occupied by the Samburg, Tennessee residents for which flood damages were analyzed above. Linear feet of shoreline lands deemed by study analysts suited for residential/non-residential property development were estimated via 1:24000 quadrangle map and visual survey, and was priced for both without and with project conditions. The value per shoreline foot assigned these properties for study year conditions was $325, the average of the price range ($200 to $400) of property sales at Reelfoot during recent years. The land values assigned to shoreline property are contingent on the serviceability of Reelfoot Lake in supplying the recreational, environmental, and esthetics demands owners and prospective owners have for this type property.

22. Blue Basin sale prices were substantially lowers than the market prices for Lake Shoreline land of similar characteristics (excluding the negative effects of Blue Basin's high sediment levels) in the Memphis metropolitan area.

23. In reviewing the characteristics of Reelfoot Lake and comparable lakes in the Memphis metropolitan statistical area, the study analysts made this discovery. Notwithstanding the fact that the Reelfoot area possesses relatively greater environmental amenities, the average shoreline land sale price for lakes for which sales were retrieved was, as also noted above, $500 per foot.

24. Study analysts judged that the probable without project negative effects of Lake Sedimentation on Reelfoot Lake relative to other lakes in the region during the analysis period would cause the value of its shoreline properties to become progressively lower. This position was taken because, unattended over the analysis period, Reelfoot Lake will loose and/or have greatly reduced several of its amenities of attraction--a matter to be discussed in detail in the Biological and Environmental Appendix A—and, thereby, lessen its marketability.

25. Project Conditions. Those project alternatives that have the sediment retention feature will, in the judgement of the study analysts, sufficiently reduce the sediment load to Reelfoot Lake to enable only a minimal reduction in existing lake capacity and functional quality during the analysis period. Combined with other project features designed to enhance lake esthetics and/or environmental quality and recreational opportunities, project effects will, thereby, induce an increase in the environmental amenities to the Reelfoot Lake area compared to other lakes in the region. As a result, that shoreline property value will increase relative to other lakes in the region.

26. Furthermore, study findings indicate that project conditions will not only preserve current Reelfoot shoreline property land value from further decline relative to other lakes in the region, but this value will also be at least as great as comparable lakes in the region.

27. The potential justification benefit for Blue Basin shoreline property was computed assuming this property will demand, with project, prices comparable to those currently demanded by similar lakes in the region at $500 per shoreline foot. Thus, the potential project benefit for Blue Basin shoreline property per foot was computed as $175. The total project benefits, unadjusted for construction lag, were computed as $300,000.

28. As noted above, the project will positively impact, with respect to risk to lake esthetics and environmental concerns, the factors associated with the value of lake property. These positive effects will induce an increase in the without project estimated market value of the analysis area, privately owned Blue Basin shoreline properties of $300,000. Due to time and money constraints and the relatively minor weight that this $300,000 has on project justification and/or selection, there was no data assimilation, neither processing nor evaluation done to proportion the $300,000 land value increase between --- (1) environmental enhancements, and (2) recreational opportunity enhancements. For the purpose of this study, however, the increase was equally proportioned between environmental ($150,000) and recreation ($150,000), in order to properly classify project-induced priority benefits.

Table D-2-8

Reelfoot Lake, Tennessee & Kentucky Feasibility Report
Recreation and Commercial Fishing Benefit Streams
Future With & Without Water Level Management
(FY 1998 Dollar Values)

	End of Year	Big Game Hunting $	Small Game Hunting $	Waterfowl Hunting $	Trapping $	Sport Fishing $	Eagle Tours $	Wildlife Observation $	Other 1/ Outdoor Recreation $	Commercial Fishing $	Total AAE $
A. Future Without Project	1	93,967	18,728	490,958	3,072	2,554,041	211,607	233,519	789,481	150,750	
	50	103,363	20,601	490,958	2,800	1,813,369	264,509	291,899	881,079	112,783	
	AAE 2/	96,341	19,202	490,958	2,995	2,366,896	224,975	248,270	821,220	139,704	4,410,600
B. Future With Project Level Management	1	93,967	18,728	373,128	2,535	2,388,028	211,607	233,519	800,981	140,951	
	2	"	"	576,876	3,686	3,064,849				180,900	
	3	"	"	540,054	3,686						
	10	"	"	540,054	3,686					165,825	
	11	"	"	373,128	2,535	2,388,028	222,187	245,195		140,951	
	12	"	"	576,876	3,686	3,064,849	222,187	245,195		180,900	
	13	"	"	540,054	3,686						
	20	"	"	540,054	3,686	2,809,445	232,768	256,871		165,825	
	21	"	"	373,128	2,535	2,388,028	222,187	245,195		140,951	
	22	"	"	576,876	3,686	3,064,849				180,900	
	23	"	"	540,054	3,686						
	30	"	"	540,054	3,686	2,809,445	243,348	268,547		165,825	
	31	"	"	373,128	2,535	2,388,028	222,187	245,195		140,951	
	32	"	"	576,876	3,686	3,064,849					
	33	"	"	540,054	3,686					165,825	
	40	"	"	540,054	3,686	2,809,445	253,928	280,223		140,951	
	41	"	"	373,128	2,535	2,388,028	222,187	245,195		180,900	
	42	"	"	576,876	3,686	3,064,849					
	43	"	"	540,054	3,686						
	50	93,967	18,728	540,054	3,686	2,809,445	264,509	291,899	881,079	165,825	
	AAE 2/	94,000	18,700	522,300	3,500	2,864,700	223,700	246,209	821,220	169,085	4,963,400
C. Net AAE Benefit (A-B)											552,800

1/ This category includes sightseeing, photography, picnicking, hiking, boating, and camping. See report Appendix A for derivation of values.
2/ AAE denotes average annual equivalent.

D-07. HABITAT AND RECREATION ACCOUNT

29. The analytical procedure used to assess habitat (intangible) and recreation (tangible) values for each project alternative is presented in the **Biological and Environmental Appendix (Appendix A)** of this report. Also, only the tangible impacts, comparing project and without project conditions, are accounted for in this appendix (see accounts presented in Table D-2-8).

D-08. SYSTEM OF ACCOUNTS

a. General Overview

30. Study parameters, computations and national economic development (NED) determinations for each alternative project feature are presented in this appendix, excluding the recreation and commercial fishing accounts which are discussed in Appendix A. Table D-2-1 presents a summary of NED benefits and costs for each project feature, formatted to allow for comparisons between features. Also, Table 26 of report volume 1 presents a summary of NED and EQ benefits and costs, both tangible and intangible values, formatted to allow for comparisons between features. To more fully address the local sponsor's socio-economic concerns, however, with regard to probable negative impacts on the local economy during the years of implementing lake drawdown -- effects not expressed in study NED and/or EQ project justification accounts, a socio-economic evaluation was done on a lake drawdown year. The analytical process and results of that evaluation are presented below.

b. Lake Drawdown Feature Effects on Local Economic Development

31. Introduction. This discussion addresses the economic effects of implementing the project's drawdown of Reelfoot Lake on the local (Lake, Obion, and Fulton Counties) economy, specifically during drawdown years. To determine these effects, the without project economic effects that the lake has on the local economy during the average year were measured. Using this data configuration as a base, the economic effects for an average project drawdown year were determined. It should be noted that a detailed impact assessment for Reelfoot Lake, without and/or with project conditions, exceeds the scope of this study. Such an assessment would include economic impacts such as income and employment generating effects between local businesses, households, and governments, as well as transactions between public and private entities located elsewhere. Therefore, to address the most basic economic effects to a significantly informative degree, a lake visitation and spending profile of average yearly without project conditions and lake drawdown year conditions was estimated and is presented below.

TABLE D-2-9

REELFOOT LAKE TENNESSEE & KENTUCKY FEASIBILITY STUDY
VISITATION AND SPENDING PROFILES (OCTOBER 1998 PRICES)

Visitor Type 1/	YEARLY VISITATION WITHOUT PROJECT			VISITATION DURING Drawdown Year			WOP LESS DRAWDOWN YEAR		
	Resident	Non-Res	Total	Resident	Non-Res	Total	Resident	Non-Res	Total
ITEM 2/									
I. TYPE VISITATION									
A. Recreation Directly Associated with Lake Accessibility (Fishing, Boating, Swimming, etc.)									
a. January- June	13,931	55,725	69,656	13,931	55,725	69,656	-	-	-
b. July-December	3,233	7,545	10,778	-	-	-	3,233	7,545	10,778
c. Total	17,165	63,270	80,435	13,931	55,725	69,656	3,233	7,545	10,778
B. Recreation Indirectly Associated with Lake (Interpretation/Observation, Environmental, Educational, etc.)									
a. January- June	5,724	51,518	57,242	5,724	51,518	57,242	-	-	-
b. July-December	10,906	98,150	109,056	10,906	98,150	109,056	-	-	-
c. Total	16,630	149,668	166,297	16,630	149,668	166,297	-	-	-
C. Totals									
a. January- June	19,655	107,243	126,898	19,655	107,243	126,898	-	-	-
b. July-December	14,139	105,695	119,834	10,906	98,150	109,056	3,233	7,545	10,778
c. Total	33,794	212,938	246,732	30,561	205,393	235,954	3,233	7,545	10,778
II. Mean Spending/Visitor	$ 61.84	$ 155.71		$ 61.84	$ 155.71				
III. TOTAL TRIP COSTS (I.C. x II)									
A. January-June	$ 1,215,516	$ 16,698,837	$ 17,914,354	$ 1,215,516	$ 16,698,837	$ 17,914,354	$ -	$ -	$ -
B. July-December	$ 874,374	$ 16,457,798	$ 17,332,172	$ 674,412	$ 15,282,997	$ 15,957,409	$ 199,962	$ 1,174,801	$ 1,374,762
C. Totals	$ 2,089,890	$ 33,156,635	$ 35,246,525	$ 1,889,928	$ 31,981,835	$ 33,871,763	$ 199,962	$ 1,174,801	$ 1,374,762
IV. AAE COSTS 3/	$ 2,089,890	$ 33,156,635	$ 35,246,525	$ 2,040,484	$ 32,866,372	$ 34,906,857	$ 49,405	$ 290,263	$ 339,668

1/ Residents are persons residing within either Lake, Obion, or Fulton Counties. Persons residing outside of these counties are non-residents.

2/ Estimates made in consideration of visitation data retrieved from the Tennessee Wildlife Resources Agency, Reelfoot Lake State Park Agency, and U.S. Fish and Wildlife Service. Very helpful resource used also was "A Summary of Spending Profiles for Recreation Visitors to Corps of Engineers Projects," produced by the Department of the Army Corps of Engineers at Vicksburg, Mississippi under its natural resources research program.

3/ Sum of cost streams for 50-year project life as discounted at project interest rate (7-1/8%) to reference year for discounting/compounding values (ending 2004), amortized over a 50-year period at the same interest rate--the amortization factor 0.07361. Lake drawdown effects are computed against a drawdown management plan that starts first lake drawdown at beginning of project life and repeats the same in 5-year rotations throughout the 50-year project life.

NOTE: The without project values here are same as estimated for existing conditions. Thus, the most probable without project futures measured in this study are --- a less viable lake and, thereto, a less visited lake, and less spending associated with the lake. But, to the contrary, are future lake visitation and spending for plan conditions, including the lake drawdown feature. Though the lake drawdown year visitation and spending may fall short of the totals for the without project condition total year visitation and spending, the difference computed here likely overstates substantially the drawdown year reduction in visitation and spending.

32. Measuring Visitor Use. The first step in assessing recreation economic effects was a measurement of recreation use associated with the lake.[1] Recreation use was described in terms of user groups (i.e., day users, campers, and hotel guests) that exhibit homogeneous spending patterns. Defining use in this way facilitates accurate estimates of total visitor spending. Also, important to the analysis of economic impacts is the origin of visitors in relation to the analysis area. This is necessary to distinguish visitors bringing "new" dollars into the area (non-resident visitor) from visitors who live within the area, retaining money that already exists in the area (resident visitors). The majority of visitors to Reelfoot Lake are non-resident. Table D-2-9 presents a summary of visitation at the lake.

33. Measuring Visitor Spending. A key step in assessing economic impacts is the development of visitor expenditure profiles. An expenditure profile is a series of mean expenditure rates, derived from visitor surveys, for individual goods and services purchased either during a recreation trip or for use on a recreation trip. In that respect, visitor spending can be divided into two broad categories. The first category includes goods and services purchased and consumed during a single trip. These expenses are known as trip expenses. The second category includes durable goods, such as boats and camping equipment that are purchased and used on many trips. Visitor trip spending for Reelfoot Lake is judged by study analysts as the only spending base of significance to the local economy induced by Reelfoot Lake.[2] See Table D-2-9 for mean spending estimate per Reelfoot Lake visitor.

34. Assessing Economic Effects. The translation of visitor spending into economic effects in terms of local income and employment opportunities can be accomplished through use of an input-output (I-O) model constructed for the local economy. That I-O model then serves to aid in measuring/specifying economic transactions between local businesses, households, and governments, as well as transactions between public and private entities located elsewhere.

35. Impact analysis is the most common use of I-O models. But, to provide such an inclusive local I-O model exceeds the scope of this type study. Thus, the local model used for the study estimation of without and/or with project impacts that Reelfoot Lake has on the local economy includes only estimated spending within Lake, Obion, and Fulton Counties (See Table D-2-9).

36. Table D-2-9 shows that average yearly resident and non-resident visitation and spending are 246,732 and $35,246,525, respectively, without project, and are reduced to 235,954 and $33,871,763, respectively, during an average lake drawdown year. For each lake drawdown year, therefore, visitation and spending at Reelfoot Lake decline from the average without

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[1] Data sources for making this determination were: U.S. Fish and Wildlife Service at Reelfoot; Tennessee Wildlife Resource Agency; Reelfoot Lake State Park Service.

[2] Sources used in estimating mean spending/visitor: 1) Department of U.S. Army Corps of Engineers, "A Summary of Spending Profiles for Recreation Visitors to Corps of Engineers Project," August 1992 Final Report, and 2) all sources cited in note 1 above.

project year by 10,778 (4.4%) and $1,374,762 (3.9%), respectively. These drawdown year declines are also estimated to occur during the period July-December. July-December lake visitation and spending decline from 119,834 and $17,332,172, respectively, without project, to 109,056 and $15,957,409, respectively, for an average lake drawdown year. Therefore, during each drawdown year at Reelfoot Lake, July-December visitation and spending decline by 0.09% and 7.9%, respectively.

37. Average yearly non-resident visitation and spending shown in Table D-2-9 are 212,938 and $33,156,635, respectively, without project, and are reduced to 205,393 and $31,981,835, respectively, during an average lake drawdown year. Therefore, for each lake drawdown year, Reelfoot Lake non-resident visitation and spending decline by 7,545 (3.5%) and $1,174,801 (3.5%), respectively. These drawdown year induced declines are due to the non-resident visitation potential for the July-December lake season. During this season, non-resident visitation and spending are reduced from 105,695 and $16,457,798, respectively, without project to 98,150 and $15,282,997, respectively, for an average lake drawdown year. Therefore, during each drawdown year at Reelfoot Lake, July-December non-resident visitation and spending decline by 7.1% and 7.1%, respectively.

38. The contrast in average annual equivalent spending between without project and lake drawdown year conditions for resident and non-resident visitation is rather insignificant. Over the fifty-year analysis period at the project interest rate (7-1/8%), the average annual equivalent spending for without project and for lake drawdown year management is $35,246,525 and $34,906,837, respectively. Therefore, lake drawdown year average annual equivalent spending shows a decline of only 0.096%.

39. Conclusion. Table D-2-9 shows the possible negative impact of drawdown. But, for project alternatives that include the lake drawdown management feature, the probable extent of decline in lake visitation and spending is likely much less for the reasons that follow.

(1) Without project visitation and spending are computed against stable/constant (study year 1998) lake environmental qualities for the analysis period. The more accurate future being analyzed for project justification, however, shows visitation and spending declines for without project conditions while also showing an average yearly increase in visitation and spending for project conditions (see Table D-2-8).

(2) No consideration was given to a margin of increase in lake visitation that would likely occur from persons interested in observing the lake during and after implementation of the drawdown.

40. Therefore, a more balanced estimation of visitation and spending for both without and with project (including the drawdown feature) suggests that if the drawdown year visitation and spending are less than those for the average without project condition year, the differences will be negligible. There also seems to be an equally plausible probability of lake drawdown visitation and spending being greater than the average yearly rates for without project conditions.

D-9. SENSITIVITY ANALYSIS

41. **Benefit Distribution and Relativity.** Table D-2-1 and Table 26 of report volume 1 display the varied project NED and EQ benefit and cost accounts for each project alternative. For tangible benefits and costs, the proportional value that a said account has to the total is commonly accepted as the primary indicator of that account's relative significance. In that respect, sensitivities for the accounts' greater relative significance are herein addressed. The primary project outputs for project alternatives in this study are intangibles (habitat unit values, HUV). Although each project alternative provides some measure of environmental restoration, i.e., the ecosystems are improved sufficiently to induce some increase in analysis area habitat unit values, this output has no standard measurement scale for determining relative value between the varied habitat types produced. Therefore, only subjective evaluation of these intangibles can be made with respect to the project justification and optimization status. Therein lies a significant sensitivity question with respect to project selection, i.e., "Is the selected project the most proficient/optimal project alternative?".

42. **Dynamic Water Level Fluctuation with Major Periodic Drawdown**. There exists no test case to calibrate the impacts estimated in this study from implementation of this feature. Further, if the hydraulics and hydrology of Reelfoot Lake, which are significant variables used in loss and benefit estimation for this feature, are varied in relatively minor degrees, significant variations in output estimations could result.

43. **Non-Quantified Project Effects.** The objective of this appendix has been to quantify, in dollar terms, the direct and indirect influence of alternative project conditions on economic activities within the study area. There are without project activities in the study area that would be affected by project conditions positively or negatively which were not addressed or quantified in this analysis. Those activities were omitted because --- (1) it is perceived that they would have nominal effects on plan results, and (2) the data necessary to quantify their effects were either not available or were too costly and time consuming to justify acquiring. In the opinion of the study analysts, however, all tangible and intangible items that could significantly alter project justification and environmental effects have either been quantified in the benefit/cost computations of this appendix or are included in the intangible accounts. Some of the positive and negative categories not included in the plan justification results in Table D-2-1 and Table 26 of report volume 1 are listed below.

Possible Positive Categories (Reduction in Losses)

1. Loss of income
2. Vehicular damage
3. Traffic diversion costs
4. Emergency services costs
5. Operation and Maintenance displacement, excluding the existing spillway

Possible Negative Categories

1. Insignificant intangible environmental effects
2. Increases in hazards/accidents associated with lake use
3. Community cohesiveness