D-437

For plat see
Rolled Sketch 40-401

Shine & Associates

REGISTERED SURVEYORS TEXAS AND LOUISIANA
D. D. SHINE, PRESIDENT

File No. Sketch File 46 A
Hutchinson County
F/N 1678.817 ac. Canadian River Bed.
Filed Jan. 28 19 82
GARRY MAURO, Com'r
By Douglas Howard

STATE OF TEXAS }
COUNTY OF HUTCHINSON }

Field notes describing 1678.817 acres of land being a portion of the Canadian River Bed between H. & T. C. Blocks 46 and 47, from Sanford Dam easterly downstream to State Highway 136.

The following described portion of the Canadian River is a result of my survey pursuant to a conference in the General Land Office on May 15, 1980, and Mr. Jack Giberson's letter, to me, of November 23, 1981, regarding a portion of the J. M.Huber Oil, Gas and Mineral Lease No. 9805.

For clarification reference is made to my report to Commissioner Bob Armstrong dated November 6, 1981 and 10 plat pages dated October 19, 1981 and revised December 1, 1981.

All Canadian River meander points were on the gradient boundary of said river at the time of survey (September 1981).

BEGINNING at a 2½ inch U. S. Bureau of Reclamation brass tablet on a 2 inch pipe, stamped "PROP. COR. 319", set for the southwest corner of H. & T. C. Section 39, Block 47, on the north gradient boundary of the Canadian River. Said beginning corner has a coordinate value of X=1,985,804.435 feet and Y=625,834.149 feet.

THENCE S 52° 26' 06" E along and with the U. S. Bureau of Reclamation's property line 1268.71 varas to a 2½ inch U. S. Bureau of Reclamation brass tablet on a 2 inch pipe stambed "PROP. COR. 318".

THENCE S 00° 23' 39" W along and with the said U. S. Bureau of Reclamation's property line 291.26 varas to the northwest corner of H. & T. C. Section 82, Block 46 on the south gradient boundary of the Canadian River.

THENCE along and with the meanders of the gradient boundary of the south or right descending bank of the Canadian River as follows:

BEARING	DISTANCE - VARAS	
S 52° 26' 06" E	1268.71	
S 00° 23' 39" W	291.26	
S 89° 21' 46" E	48.30	Sucker Rod
S 86° 28' 01" E	57.76	
N 88° 58' 32" E	54.05	

P. O. BOX 305, SILSBEE, TEXAS 77656 • TELEPHONE AREA CODE 713 • 385-5266

counter 27325

BEARING	DISTANCE - VARAS	
N 89° 00' 05" E	67.18	Sucker Rod
N 74° 19' 33" E	35.31	
N 62° 09' 40" E	21.13	
N 68° 23' 23" E	57.38	
N 76° 23' 18" E	96.48	
N 86° 19' 55" E	75.15	Sucker Rod
N 76° 25' 19" E	82.42	
N 85° 44' 37" E	32.03	Sucker Rod
S 88° 42' 38" E	141.06	
S 84° 11' 37" E	180.59	
N 78° 40' 23" E	34.23	N. E. Cor. 82
N 78° 40' 23" E	77.02	Sucker Rod
N 73° 19' 53" E	125.88	
N 59° 24' 04" E	27.11	
N 76° 33' 53" E	30.27	Sucker Rod
N 81° 38' 42" E	164.99	Sucker Rod
S 85° 32' 45" E	70.32	
N 67° 57' 18" E	11.12	
N 79° 14' 57" E	54.31	Sucker Rod
N 76° 48' 06" E	66.20	
N 57° 49' 07" E	72.15	
N 62° 29' 32" E	108.01	
N 27° 53' 33" W	16.63	Sucker Rod
N 14° 32' 05" E	22.91	
N 78° 53' 38" E	25.87	
N 20° 39' 05" E	48.52	Sucker Rod
N 61° 59' 15" E	38.24	
N 75° 40' 29" E	105.14	Sucker Rod
N 16° 39' 16" E	36.31	Sucker Rod
N 41° 31' 00" E	4.70	N. E. Cor. 81
N 41° 31' 00" E	81.82	Sucker Rod
N 44° 54' 54" E	60.02	Sucker Rod
N 65° 17' 31" E	31.93	Sucker Rod
N 74° 53' 00" E	70.77	
N 82° 24' 09" E	72.43	
N 73° 22' 38" E	90.10	
N 35° 50' 06" E	32.07	Sucker Rod
N 57° 51' 21" E	55.79	Sucker Rod
N 51° 29' 54" E	98.00	Sucker Rod
N 59° 29' 06" E	71.99	
N 72° 22' 34" E	23.57	Sucker Rod
N 74° 50' 09" E	26.90	
S 83° 29' 42" E	18.22	Sucker Rod
N 88° 24' 34" E	107.44	
N 80° 39' 37" E	34.67	
S 88° 51' 20" E	84.08	Sucker Rod
N 84° 48' 27" E	106.77	N. E. Cor. 80
N 84° 48' 27" E	157.37	Sucker Rod
S 82° 15' 38" E	71.82	
S 72° 53' 25" E	36.78	
S 82° 41' 49" E	67.97	Sucker Rod
S 84° 40' 51" E	28.79	

Hutchinson Co. Sk. File 46A

Counter 27366

BEARING	DISTANCE - VARAS	
N 84° 24' 06" E	69.89	Sucker Rod
N 86° 34' 44" E	60.47	
S 87° 53' 44" E	74.64	
N 84° 30' 39" E	77.25	
N 89° 06' 37" E	89.20	Sucker Rod
N 79° 29' 36" E	114.46	Sucker Rod
N 76° 45' 53" E	74.02	Sucker Rod
N 68° 11' 22" E	44.57	N. E. Cor. 79
N 68° 11' 22" E	94.00	Sucker Rod
N 57° 13' 31" E	112.21	
N 49° 47' 51" E	108.15	
N 53° 27' 09" E	79.21	Sucker Rod
N 81° 27' 56" E	71.37	
N 84° 41' 52" E	94.44	Sucker Rod
N 69° 06' 55" E	134.92	
S 84° 38' 23" E	168.51	
N 87° 25' 57" E	59.30	Sucker Rod
S 87° 30' 48" E	52.78	
N 71° 33' 44" E	61.19	N. E. Cor. 78
N 71° 33' 44" E	56.19	Sucker Rod
N 62° 19' 16" E	76.86	
N 54° 10' 24" E	69.77	
N 60° 28' 53" E	37.80	
N 85° 06' 58" E	97.75	Sucker Rod
N 18° 00' 02" E	22.07	
N 49° 34' 55" E	120.61	
N 67° 28' 40" E	23.74	Sucker Rod
N 69° 05' 55" E	25.96	
N 54° 16' 01" E	37.80	
N 38° 24' 11" E	61.31	Sucker Rod
N 39° 45' 08" E	72.39	
N 49° 59' 34" E	39.78	Sucker Rod
N 50° 49' 28" E	38.84	
N 64° 55' 16" E	65.51	
N 76° 36' 55" E	28.36	Sucker Rod
N 73° 07' 51" E	43.45	
S 89° 54' 41" E	64.61	
N 79° 08' 59" E	92.98	Sucker Rod
N 72° 38' 52" E	45.95	N. E. Cor. 77
N 72° 38' 52" E	75.63	Sucker Rod
N 22° 36' 19" E	53.87	Sucker Rod
N 54° 39' 29" E	110.32	Sucker Rod
N 59° 59' 17" E	44.54	Sucker Rod
N 78° 50' 26" E	24.06	
N 58° 13' 30" E	47.60	
N 38° 47' 03" E	80.78	Sucker Rod
N 64° 54' 35" E	18.18	
N 83° 05' 10" E	102.71	Sucker Rod
N 86° 50' 57" E	61.41	
S 89° 56' 31" E	89.40	
N 58° 54' 04" E	57.98	

Hutchinson Co. Sk. File 46A

Counter 27367

BEARINGS	DISTANCE - VARAS	
S 85° 08' 38" E	35.40	Sucker Rod
S 66° 50' 56" E	70.19	
S 79° 36' 34" E	71.35	Sucker Rod
S 88° 47' 46" E	73.70	
S 66° 38' 28" E	13.74	Sucker Rod
S 68° 58' 52" E	58.50	N. E. Cor. 76
S 64° 27' 30" E	116.10	Sucker Rod
S 77° 54' 04" E	112.23	
S 66° 42' 27" E	63.18	Sucker Rod
S 79° 40' 37" E	70.00	Sucker Rod
S 72° 59' 55" E	109.69	
S 78° 59' 41" E	72.20	
S 74° 07' 58" E	108.00	
S 74° 59' 42" E	106.07	Sucker Rod
N 85° 59' 43" E	76.42	
S 83° 17' 57" E	106.25	
N 82° 46' 24" E	58.19	N. E. Cor. 75
N 82° 46' 24" E	79.73	
S 72° 39' 41" E	66.32	
S 54° 35' 59" E	140.34	
S 36° 12' 22" E	123.45	Sucker Rod
S 29° 56' 35" E	119.95	
S 43° 19' 55" E	33.17	
S 33° 43' 14" E	109.67	Sucker Rod
S 39° 36' 54" E	92.08	
S 37° 06' 56" E	101.24	
S 54° 26' 21" E	362.16	
S 71° 48' 26" E	70.99	N. E. Cor. 74
S 71° 48' 26" E	11.56	Sucker Rod
S 87° 06' 30" E	23.32	
N 72° 22' 20" E	33.18	
N 34° 04' 08" E	71.96	
N 50° 42' 14" E	36.26	
N 39° 23' 41" E	16.24	Sucker Rod
N 60° 58' 02" E	50.72	
N 40° 31' 48" E	40.74	Sucker Rod
N 22° 58' 52" E	32.06	
N 39° 10' 33" E	45.15	Sucker Rod
N 59° 32' 10" E	56.61	
N 76° 36' 12" E	18.77	Sucker Rod
S 86° 09' 05" E	59.78	
S 81° 47' 50" E	57.20	
N 83° 36' 23" E	41.60	Sucker Rod
N 77° 41' 43" E	17.28	
N 46° 28' 19" E	68.68	Sucker Rod
N 53° 48' 17" E	57.55	Sucker Rod
N 39° 51' 00" E	87.71	Sucker Rod
N 49° 17' 36" E	73.95	Sucker Rod
N 28° 36' 31" E	90.01	Sucker Rod
N 16° 42' 44" E	89.31	Sucker Rod
N 44° 31' 30" E	66.24	
N 62° 12' 21" E	24.93	Sucker Rod

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counter 27368

BEARING	DISTANCE - VARAS	
N 58° 00' 49" E	154.58	N. E. Cor. 73
N 58° 00' 49" E	55.35	Sucker Rod
N 43° 40' 25" E	37.02	
N 23° 35' 36" E	43.68	
N 40° 31' 20" E	27.55	Sucker Rod
N 53° 11' 29" E	69.49	
N 60° 16' 55" E	72.17	
N 54° 17' 29" E	113.71	Sucker Rod
N 69° 37' 36" E	143.27	
N 65° 56' 59" E	125.31	Sucker Rod
N 60° 51' 09" E	118.46	Sucker Rod
N 57° 07' 11" E	143.82	
N 52° 47' 55" E	130.17	Sucker Rod
N 59° 00' 14" E	93.16	N. E. Cor. 72
N 59° 00' 14" E	50.27	Sucker Rod
N 61° 04' 12" E	39.31	
S 55° 24' 52" E	310.24	
N 46° 20' 06" E	51.64	
N 59° 54' 32" E	83.54	
N 85° 24' 48" E	44.46	Sucker Rod
S 84° 05' 06" E	37.61	
N 67° 56' 39" E	116.03	
N 74° 32' 22" E	67.10	Sucker Rod
S 89° 17' 06" E	97.44	
S 77° 50' 32" E	177.44	N. E. Cor. 71
S 89° 16' 56" E	46.25	Sucker Rod
N 88° 30' 18" E	95.96	
N 73° 43' 11" E	110.98	
N 79° 50' 17" E	267.18	
S 88° 47' 59" E	48.89	Sucker Rod
S 68° 41' 14" E	60.74	
S 47° 29' 09" E	38.31	
S 33° 05' 46" E	133.81	Sucker Rod
S 47° 31' 15" E	94.21	
N 79° 05' 37" E	180.12	N. E. Cor. 70
N 88° 57' 37" E	47.96	
N 70° 11' 06" E	50.08	
N 67° 32' 43" E	80.48	
N 50° 58' 11" E	34.99	
N 70° 38' 02" E	50.24	
N 79° 40' 58" E	41.44	Sucker Rod
N 79° 52' 05" E	50.83	Sucker Rod in fenceline near the west right-of-way line Highway 136

THENCE N 1° 11' 17" E along and near said fence and right-of-way line 898.74 varas to a sucker rod on the North Gradient Boundary of the Canadian River. Said sucker rod has a coordinate value of X = 2,024,339.274 feet; Y = 631,474.902.

THENCE along and with the meanders of the gradient boundary of the north or right ascending bank of the Canadian River as follows:

BEARING	DISTANCE - VARAS	
N 47° 48' 25" W	25.50	
N 82° 03' 52" W	151.21	
N 57° 08' 11" W	44.65	Sucker Rod
N 54° 32' 35" W	111.11	
N 47° 37' 19" W	173.96	
N 78° 08' 07" W	119.84	Sucker Rod
N 86° 29' 17" W	264.54	S. W. Cor. 26
N 86° 29' 17" W	373.89	
N 80° 16' 36" W	97.19	
S 63° 26' 03" W	119.97	
N 86° 20' 52" W	66.06	Sucker Rod
S 85° 41' 15" W	65.22	
S 75° 58' 22" W	123.36	
S 70° 27' 42" W	88.88	
N 76° 54' 18" W	17.32	Sucker Rod
S 89° 29' 58" W	18.53	
N 23° 09' 35" W	36.34	S. W. Cor. 27
N 63° 44' 48" W	99.20	
S 74° 30' 59" W	67.88	
S 65° 05' 01" W	89.00	
S 42° 20' 42" W	99.67	Sucker Rod
S 60° 38' 19" W	27.22	
N 88° 44' 13" W	28.81	
S 63° 25' 49" W	49.91	Sucker Rod
S 57° 18' 35" W	147.33	Sucker Rod
S 77° 17' 01" W	46.07	Sucker Rod
N 89° 47' 12" W	68.63	Sucker Rod
N 80° 20' 45" W	36.86	
N 55° 33' 21" W	32.19	Sucker Rod
N 53° 23' 09" W	74.31	Sucker Rod
N 52° 57' 10" W	26.54	
S 76° 25' 42" W	54.16	
S 63° 53' 03" W	72.70	
S 45° 37' 53" W	39.65	Sucker Rod
S 40° 46' 11" W	105.94	
S 35° 21' 39" W	180.01	
S 43° 31' 56" W	74.22	Sucker Rod
S 29° 53' 31" W	144.51	
S 11° 40' 34" W	110.50	
S 25° 45' 46" W	144.06	
S 21° 31' 44" W	252.20	Sucker Rod
S 21° 43' 23" W	248.48	Sucker Rod
S 25° 46' 20" W	30.49	
S 37° 23' 43" W	110.42	S. W. Cor. 28
S 40° 40' 20" W	140.02	Sucker Rod
S 63° 15' 33" W	111.43	Sucker Rod
S 68° 53' 57" W	188.22	Sucker Rod
S 65° 00' 57" W	21.82	

Hutchinson Co. Sk. File 46A

counter 27370

BEARING	DISTANCE - VARAS	
N 87° 14' 17" W	97.05	
S 75° 21' 58" W	84.94	
S 46° 11' 27" W	68.22	
S 61° 01' 19" W	33.56	
N 83° 14' 35" W	38.55	Sucker Rod
S 58° 44' 23" W	37.38	
N 89° 19' 56" W	236.00	S. W. Cor. 29
N 79° 48' 23" W	95.49	Sucker Rod
N 85° 46' 16" W	74.06	
N 59° 41' 34" W	109.00	
N 85° 03' 40" W	97.47	Sucker Rod
N 87° 16' 54" W	34.39	
N 65° 50' 41" W	135.42	Sucker Rod
N 58° 39' 25" W	63.56	
N 51° 46' 52" W	106.21	
N 40° 13' 32" W	153.16	Sucker Rod
N 42° 50' 16" W	29.01	
N 24° 13' 21" W	151.91	
N 66° 46' 58" W	124.34	S. W. Cor. 30
N 66° 46' 58" W	37.24	
N 78° 08' 33" W	181.57	
N 45° 50' 43" W	44.74	Sucker Rod
N 44° 46' 46" W	187.34	
N 56° 36' 22" W	97.11	
N 27° 55' 54" W	75.14	
N 47° 04' 45" W	46.03	
N 56° 13' 06" W	107.21	
N 64° 23' 50" W	91.29	
S 85° 19' 52" W	148.65	
S 61° 13' 09" W	119.11	S. W. Cor. 31
S 52° 37' 15" W	64.13	
S 34° 49' 59" W	49.81	
S 58° 17' 04" W	124.37	
S 71° 03' 20" W	96.62	Sucker Rod
S 67° 47' 25" W	64.70	
S 86° 08' 22" W	162.58	Sucker Rod
S 75° 44' 28" W	85.12	
S 57° 09' 00" W	113.55	
S 68° 04' 58" W	86.53	Sucker Rod
S 61° 24' 28" W	50.17	
N 53° 06' 56" W	60.23	
N 77° 28' 55" W	74.42	Sucker Rod
S 79° 09' 33" W	39.62	S. W. Cor. 32
S 67° 24' 08" W	97.80	Sucker Rod
S 65° 52' 53" W	89.10	
N 76° 11' 00" W	20.93	Sucker Rod
S 65° 42' 52" W	65.91	
S 70° 38' 02" W	101.57	Sucker Rod
S 66° 45' 57" W	66.72	Sucker Rod
S 67° 45' 03" W	60.36	
S 54° 32' 13" W	88.94	Sucker Rod
S 54° 12' 20" W	92.58	

Hutchinson Co. Sk. File 46A

counter 27371

BEARING	DISTANCE - VARAS	
S 62° 24' 28" W	73.49	
S 81° 34' 28" W	74.40	Sucker Rod
S 84° 26' 10" W	58.86	
S 78° 47' 07" W	72.00	
S 78° 08' 06" W	65.76	Sucker Rod
S 63° 48' 01" W	18.55	S. W. Cor. 33
S 48° 39' 00" W	124.38	
S 58° 08' 20" W	57.65	Sucker Rod
S 60° 25' 50" W	140.87	Sucker Rod
S 59° 10' 34" W	27.56	
S 73° 55' 41" W	55.59	Sucker Rod
S 71° 18' 19" W	58.04	Sucker Rod
S 89° 36' 36" W	9.84	
S 49° 28' 40" W	93.35	Sucker Rod
S 52° 11' 58" W	131.03	Sucker Rod
S 64° 59' 02" W	104.80	Sucker Rod
N 80° 42' 42" W	14.49	
N 46° 02' 46" W	39.17	
S 78° 22' 49" W	34.77	Sucker Rod
S 64° 08' 18" W	176.28	Sucker Rod
S 69° 41' 13" W	54.84	S. W. Cor. 34
N 86° 44' 30" W	46.67	
S 80° 25' 40" W	51.48	Sucker Rod
S 84° 30' 45" W	48.70	Sucker Rod
S 81° 14' 31" W	184.48	Sucker Rod
N 89° 37' 11" W	98.83	Sucker Rod
N 80° 20' 44" W	45.57	Sucker Rod
N 71° 55' 00" W	60.50	Sucker Rod
N 78° 43' 57" W	43.42	Sucker Rod
N 83° 53' 33" W	38.68	Sucker Rod
S 79° 54' 23" W	58.98	Sucker Rod
N 89° 19' 03" W	71.06	Sucker Rod
S 80° 23' 05" W	52.22	Sucker Rod
N 83° 44' 21" W	69.39	Sucker Rod
N 81° 53' 58" W	96.49	S. W. Cor. 35
S 79° 08' 32" W	31.91	Sucker Rod
S 63° 29' 25" W	113.06	
S 48° 02' 33" W	43.90	Sucker Rod
S 76° 22' 20" W	74.69	
S 65° 35' 04" W	90.42	
S 60° 10' 24" W	80.80	
S 52° 39' 03" W	117.02	
S 65° 30' 49" W	101.37	Sucker Rod
S 57° 18' 12" W	55.98	
S 86° 39' 26" W	60.59	
S 79° 00' 16" W	282.51	S. W. Cor. 36
S 79° 00' 16" W	188.38	
S 72° 27' 01" W	81.31	Sucker Rod
S 62° 30' 12" W	148.54	Sucker Rod
S 71° 28' 44" W	19.88	

Hutchinson Co. Sk. File 46A

counter 27372

BEARING	DISTANCE - VARAS	
N 78° 59' 53" W	15.43	Sucker Rod
N 68° 53' 59" W	21.51	
S 86° 47' 25" W	57.06	Sucker Rod
S 81° 27' 45" W	117.13	
S 69° 45' 40" W	77.38	
S 62° 34' 34" W	87.08	Sucker Rod
S 63° 36' 48" W	71.42	Sucker Rod
S 62° 02' 08" W	75.61	Sucker Rod
N 83° 09' 47" W	25.01	Sucker Rod
N 69° 05' 20" W	20.40	S. W. Cor. 37
N 69° 05' 20" W	45.97	Sucker Rod
N 68° 35' 43" W	26.54	
S 83° 23' 24" W	34.43	
S 61° 11' 19" W	68.08	Sucker Rod
S 76° 12' 41" W	61.53	
N 73° 23' 40" W	29.53	Sucker Rod
N 71° 15' 39" W	26.93	Sucker Rod
S 71° 44' 57" W	46.96	Sucker Rod
S 84° 03' 42" W	48.79	Sucker Rod
N 78° 23' 45" W	63.09	Sucker Rod
S 84° 41' 55" W	47.65	
S 69° 20' 07" W	38.13	
N 72° 16' 50" W	33.59	Sucker Rod
N 59° 22' 23" W	55.84	
N 73° 58' 21" W	97.46	
N 54° 47' 35" W	54.68	
N 76° 10' 54" W	143.03	
N 61° 54' 20" W	102.81	S. W. Cor. 38
N 61° 54' 20" W	24.33	Sucker Rod
N 63° 01' 21" W	170.91	Sucker Rod
N 61° 59' 52" W	35.58	
N 77° 06' 30" W	85.18	Sucker Rod
N 81° 32' 45" W	296.91	Sucker Rod
S 88° 27' 22" W	177.16	
N 79° 00' 57" W	28.26	Sucker Rod
N 85° 48' 04" W	170.85	to the PLACE OF BEGINNING,

containing 1678.817 acres of land.

All horizontal control is referred to the Texas State Plane Coordinate System, Lambert Projection, North Zone. All bearings and distances are grid. The origin of this control is the U. S. Coast and Geodetic (Second Order) Triangulation Station "GEWITT". The theta angle is +0° 01' 39" and the scale factor is 0.999808208.

Surveyed July-September, 1981, by D. D. Shine, Licensed State Land Surveyor.

CHAIN CARRIERS) David Wheeler
) Joe Elizondo

Hutchinson Co. Sk. File 46A

counter 27373

I, D. D. Shine, Licensed State Land Surveyor in the State of Texas, do hereby certify that the foregoing survey was made by me on the ground, according to law, and the limits, corners, and boundaries with the marks of the same, natural and artificial, are truly and correctly described and set forth in the foregoing field notes, just as I found them on the ground.

Given under my hand and seal this 25th day of January, 1982.

D. D. Shine
Licensed State Land Surveyor

DDS/dd

Hutchinson Co. SK. File 46A

Counter 27374

STATE OF TEXAS I

COUNTY OF HUTCHINSON I

I, Janice Knowles, Clerk of the County Court of Hutchinson County, Texas, do hereby certify that the foregoing is a true and correct copy of Field notes in connection with the gradient boundary survey on the Canadian River between H.& T.C. Blocks 46 and 47, from Sanford Dam easterly downstream to State Highway 136 leading from Borger to Stinnett, Hutchinson County, Texas and recorded in the Field Note records in Vol. 9, Page 447.

in my office.

Given under my hand and the seal, at Office in Stinnett, Texas, this the 27th day of January A.D., 1982.

Janice Knowles

Janice Knowles, County Clerk
Hutchinson County, Texas

Hutchinson Co. Sk. File 46A

Counter 27375

(3A)

File No. M-9805

Hutchinson County

River Bed

~~School Land~~

Field Notes

Filed Jan. 28 1982

BOB ARMSTRONG, Com'r

By H Forbes

Correct on Map for _____ acres

counter 27376

RECEIVED AS STATED

$10.00

Date Jan. 28, 1982

Reg. No. 54047

GENERAL LAND OFFICE

JAN 28 1982

General Land Office

D-437

File No. Sketch File 46B
Hutchinson County
Survey Report
Filed Jan. 28 19 82
GARRY MAURO, Com'r
By Douglas Howard

Shine & Associates, Inc.
REGISTERED SURVEYORS TEXAS AND LOUISIANA
D. D. SHINE, PRESIDENT

November 6, 1981

The Honorable Bob Armstrong
Commissioner, General Land Office
1700 N. Congress
Austin, Texas 78701

RE: Survey report in connection with the gradient boundary survey on the Canadian River between H.& T.C. Blocks 46 and 47, from Sanford Dam easterly downstream to State Highway 136 leading from Borger to Stinnett, Hutchinson County, Texas.

Dear Commissioner Armstrong:

"The bed of the Canadian River, we found about six hundred yards wide, with streams a foot deep coursing through it in a network of channels.....The valley of the Canadian possesses alluvial bottoms, covered with loamy soil and occasional patches of grass.....Turkeys congregate under the dark green foliage of scattered copses.....The alluvial bottomlands of the Canadian produce natural vineyards and orchards of plum trees." Not my words, but the words of Lieutenant A. W. Whipple in his Railroad Reconnaissance Survey across the Panhandle of Texas in 1853. (1)

Our survey, 128 years later, found the conditions very much the same as those described by Lieutenant Whipple. Of course, some of the natural features are obscured and are not immediately apparent to the casual glance; however, upon a detailed examination and survey of the river these same conditions can be found today.

The purpose of my employment was to seek out the lowest qualified boundary bank on the Canadian River as specified by the Supreme Court of the United States in the case of Oklahoma vs. Texas upon the boundary of the Red River, (2) and in accord with the principles promulgated in an article in the Texas Law Review. (3) Also to mark and survey the gradient boundary points throughout our area of interest.

The gradient boundary line is a gradient of the flowing water in the river. It is located midway between the lower level of the flowing water that just reaches the cutbank and the higher level of it that just does not overtop the cutbank. The physical top of the cutbank, being very uneven in profile, cannot be a datum for locating

(1) Panhandle-Plains Historical Review, Volume XLIV, 1971. Pages 10-11.
(2) 260 U. S. 606 (1923).
(3) "The Gradient Boundary", Texas Law Review, Volume 30, Number 3, January, 1952.

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the boundary line, but a gradient along the bank must be used for that purpose. The highest point on this gradient must not be higher than the lowest acceptable point on the bank in that vicinity. The boundary line has been determined accordingly.

When the surface of the flowing water in the river and the elevation of the boundary coincide, the boundary is on the ground at the feather edge of the water, and stakes driven there will mark the perfect gradient and the perfect boundary - hence the name, "gradient boundary".

The accretion bank is fundamentally consistent because the material composing it cannot be deposited above the level of the water conveying it. The accretion bank has these features. Between the top of the bank and the rising ground beyond, there is a slight depression somewhat paralleling the river but not a part of the river and in no sense a "bypass" or a "slough". Near the head of this depression is a minute "divide", frequently discoverable only with the engineer's level. This divide is the exact top of the bank. The rising water in the river, upon reaching the top of the bank, barely overflows it. Thence the water flows down the depression and returns to the river in a different place.

The accretion bank is generally the only bank from which the height of the gradient boundary can be determined. The correct height of the boundary cannot be determined from transverse slopes or at waterfalls or rapids in the river.

Finding the one correct bank in the vicinity that locates the gradient boundary upon the ground is no casual undertaking. If this bank is wrong, the whole boundary is wrong on both sides of the river. Once established, the gradient boundary permits no subsequent "corrections" or "adjustments" in the line. The boundary is either right or it is wrong in the first instance, depending upon the correctness of this one lowest bank which is the basis of the gradient boundary.

The surface of the flowing water in the river is the datum plane from which the gradient boundary is located upon the ground. The surface of the water may remain vertically the same for hours, possibly for several days at a time. When the river is thus flowing steadily, locating the boundary is a simple matter. But at other times the surface may be changing vertically from hour to hour.

A gradient of the natural surface of the ground is not equivalent to a gradient of the flowing water in the river. The surface of the flowing water in places may appear to be level, but the water forever runs downhill whereas the surface of the ground in places runs uphill. The two slopes are radically incompatible. For that reason a gradient of the flowing water is essential. (4)

(4) Supra note 3.

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The gates on Sanford Dam were closed on January 28, 1965 which began the impoundment of the waters in Lake Meredith. Since this date the natural flow of the waters has been interrupted. The diminished flow of water has brought about the dense growth of cane, cattails and salt cedar throughout much of the river bed. The flow from incoming streams has deposited alluvial banks within the main river bed. In some instances these banks have built to a height of approximately six feet. Along many of these alluvial banks one can find cottonwoods growing up to twelve inches in diameter.

Since the surface of the flowing water is the datum plane from which the gradient boundary is located, it is necessary to establish this datum plane before any of the work can begin. This task alone proved to be no easy undertaking.

The small discharge of water from the dam often disappears and percolates beneath the surface and sometimes reappears further downstream. Also, incoming streams, when flowing, create surges in the flow at the time of high water. Our survey, through guages and high water marks, proved the surface of the water to be erratic and could not be used as a datum plane.

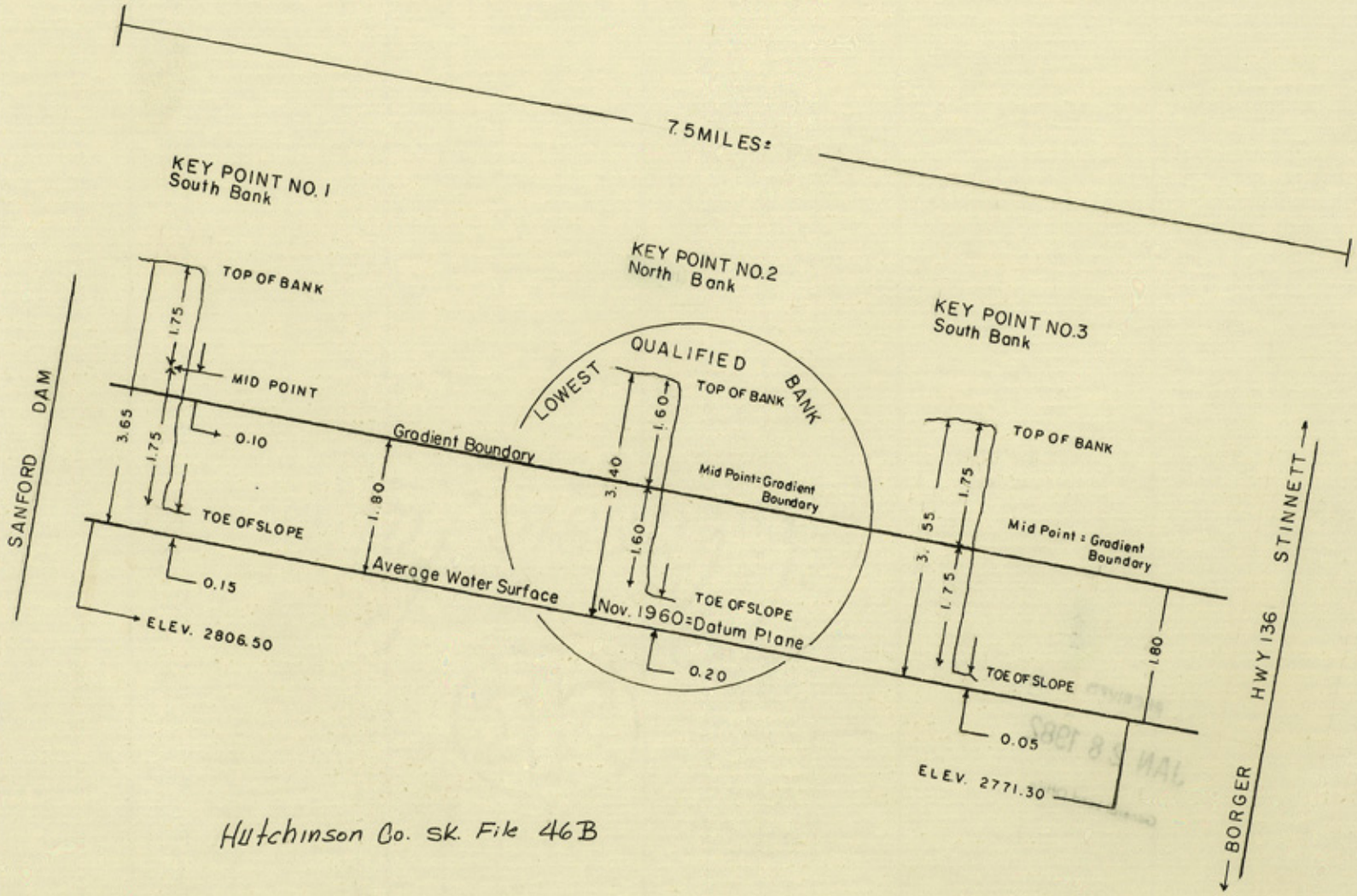
Fortunately, the United States Department of the Interior, Bureau of Reclamation, surveyed degradation range lines at approximately one mile intervals beginning at Sanford Dam and ending approximately eighteen miles downstream. Through investigation, and considerable luck, we found descriptions of permanent bench marks set in connection with this degradation survey in the Canadian River Project Office at the dam site. We further found copies of cross section plats at the Bureau of Reclamation Office in Amarillo. The above data led us to the original field books which were housed in the Bureau of Reclamation Archives in Denver, Colorado. Mr. John Williams, with the Canadian River Authority and Kathy Stein, with the Bureau of Reclamation, were most helpful and provided us copies and the loan of the original field books of this survey. This survey revealed that within our area of interest from November 8, 1960 through November 29, 1960, detailed cross sections were made across the river bed at each of these degradation lines. These cross sections noted the beginning and ending of the apparent river banks as well as the elevations of the water surfaces of the multiple channels found at the particular cross section.

In our survey we were again fortunate to recover each of the bench marks set at the beginning and termination of all of the degradation lines.

With the data thus gathered we proceeded with our survey in the following manner: A random traverse was run in the close proximity of the gradient boundary along the entire north and south banks of the

river within our area of interest. Using the bench marks as set in connection with the degradation survey in 1960, an elevation was established on each of our random traverse points along both banks of the river. This data was platted and the degradation cross section lines reconstructed on the plat. The surface of the water as found in the 1960 survey was platted in profile form from which it was determined that a grade drawn from the first water surface near the dam to the water surface near the bridge, would pass within one or two tenths of a foot of the water surfaces on the intermediate degradation lines. This indisputably established a datum plane from the surface of the flowing water as it was in its natural state.

With the datum plane thus established, we examined thirteen possible key points along approximately sixteen miles of river boundary. We found three of these banks to unquestionably satisfy the conditions set out for key points in the Red River Case and Colonel Stiles' article in the Texas Law Review. The following sketch depicts these three banks and their relation to the water surface datum plane:



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As you will note from the above sketch the mid high point of Banks 2 and 3 have an identical gradient boundary whereas the mid high point on Bank 1 is one-tenth of a foot above the gradient boundary line. Bank 2 is the lowest qualified bank in the area.

Please note the uniformity of these banks in relation to the water surface datum plane. It is also interesting to note that in the ten rejected banks, the greatest variance from our gradient boundary was six-tenths of a foot.

With the gradient boundary line established 1.80 feet above the grade of the average water surface, a gradient boundary elevation was calculated for a point opposite each of the random traverse points previously established by our survey. A five foot sucker rod was driven at the point the gradient boundary intersected the bank of the river opposite each of our traverse points.

To further support this construction, Dr. Robert D. Turpin, noted photogrammetrist and professor of civil engineering at Texas A & M University examined 1959 aerial photography and plotted the location of the banks as they existed in 1959. We overlaid Dr. Turpin's banks on our survey detail and with only minor deviations found that they coincide with the gradient boundary we have placed on the ground.

With the exception of two areas, our gradient boundary survey conformed very nearly to the river banks as noted in the Bureau of Reclamation's 1960 degradation survey. These two areas were in the proximity of the old Rock Island Railroad crossing and the present Highway 136. In both of these areas, a more detailed study was made, along with cross sections, of the river, and Dr. Turpin's review of the aerial photographs was again made to support our placement of the gradient boundary in these areas.

All of the above work was done with the consultation and approval of Mr. Ray C. Wisdom and Mr. Irvin H. Webb. Mr. Wisdom, Mr. Webb and I examined very carefully all of the above key points. Mr. Wisdom and Mr. Webb observed the staking of most of the gradient boundary points in this entire section of the river.

In preparation for this survey I secured from the General Land Office, copies of field notes to the Sections in Blocks 46 and 47 in our area of interest, and adjoining surveys along with field notes and plat of a survey of a portion of the Canadian River Bed in Hutchinson County by Morris Browning dated November 10, 1950.

Surveyor Francis M. Maddox was the original author of the field notes in Blocks 46 and 47. According to his field notes, on July 6, 1874, he surveyed Block 47 and on the following day, July 7, 1874, he surveyed Block 46. Without exception all of the Maddox field notes in both Blocks 46 and 47 within our area of interest were cancelled and a resurvey required by the General Land Office.

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It is obvious in examining the field notes returned by Maddox that very little on the ground surveying was actually performed. It is also obvious that the uncertainty established by Maddox was recognized by the General Land Office, and measures were taken by the Land Commissioner to properly identify and correct the location of the H.& T.C. Sections located by him.

In 1888, George Spiller, a State Surveyor, was commissioned to conduct a resurvey of the Sections in Blocks 46 and 47. From the field notes returned by Spiller it appears that he was a most competent surveyor and performed the survey as commissioned by the General Land Office with the highest professional standards and, in most instances, set and witnessed corners as a true professional.

To the readers of this report who may not be familiar with Texas lands, this comment is made concerning grants made on navigable waters and railroad sections. The statute adopted by the Republic of Texas on December 14, 1837, as re-enacted reads as follows: "All lands surveyed for individuals lying on navigable water courses, shall front one-half of the square on the water course and the line running at right angles with the general course of the stream, if circumstances of the lines previously surveyed under the laws will permit. All streams so far as they retain an average width of 30 feet from the mouth up shall be considered navigable streams within the meaning hereof, and they shall not be crossed by the lines of any survey. All surveys not made upon navigable water courses shall be in a square so far as lines previously surveyed will permit." (Tex. Civ. Stat. Art. 5302 (Vernon 1948), formerly 1 Laws of Texas 1412, 1418 (Gammel 1898)).

Shortly after Texas gained statehood, the State Legislature offered sixteen sections of land for every mile of railroad that should be constructed within the state and put into operation. Every time the railroad surveyed a tract for themselves, they had to survey a like quantity, contiguous, for the state, and number them consecutively. The odd numbers were given to the railroad company and the even numbers were retained by the state. The even numbered sections were later patented to individuals who fulfilled the various requirements in effect at the time.

In our particular area patents were issued on all of the odd numbered sections under State Surveyor George Spiller's notes and some of the even numbered sections. However, many of the even numbered sections were patented under corrected field notes dating from 1920 to 1940.

A section of land is one mile square containing 640 acres or, in terms of varas, 1900.8 x 1900.8 varas. Many of the olden day surveyors considered a section to be 1900 varas square. In this instance sections fronting on the Canadian River were considered by locating surveyors to be 950 varas wide with the exception of Section 28, Block 47.

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Surveyor Howard T. Trigg was the next surveyor in this area, and from May 20, 1920 until March 5, 1927, he returned field notes on which patent was issued on even numbered Sections 72, 74, 76, 78, 80 and 82 in Block 46 and Sections 32, 38 and 40 in Block 47.

From the records in hand it appears that Surveyor Morris Browning was next in the area, and on his corrected field notes of March 27, 1940 patent was issued on Section 28, Block 47. As you will recall, Browning also returned field notes of a survey of the Canadian River Bed dated November 22, 1950.

In examination of the above mentioned field notes there are several things that become apparent. One observation, mentioned earlier, was that Surveyor Maddox did very little on the ground surveying; however, it appears that he did run the west line of Section 28, same being the east line of Section 29, in Block 47. Running north from the river he says, "at 657 varas a rock monument 6 feet high and 5½ foot base on top of a natural rock mound 100 feet high bears S 60 3/4° W 1643 varas". This is the only identifiable natural object called for by Maddox in our immediate area of interest. From this same point, obviously Surveyors Spiller and Browning attempted to correlate their survey with that of Maddox.

Quoting from Surveyor Spiller's field notes of Section 28 beginning at the southwest corner "a stake on the north bank for the southwest corner from which a Hackberry 3" in diameter bears S 82 3/4° W 58 varas and another 3" Hackberry bears S 79 3/4° W 58 varas, a large stone mound on hill bears S 88½° W and another on bluff bears N 23½° E. Thence north at 771 varas pass a point from which a monument 6 feet high 5½ feet base on top of natural rock mound 100 feet high bears S 60 3/4° W 1643 varas, original bearing".

Quoting from Surveyor Morris Browning's notes, dated March 27, 1940, beginning at the southwest corner "thence north at 603 varas pass a point from which a monument on top of natural rock mound 100 feet high bears S 60° 45' W 1643 varas (original Maddox bearing)." It should be noted in the field notes returned by Spiller for Section 29, by subtraction, he places this point 553 varas north of the southeast corner of 29.

This same rock mound Spiller tied in, by bearing, from the southwest corner of Section 29, the southwest corner of Section 31, Block 47 and the northeast and northwest corners of Section 74, Block 46. In Trigg's 1926 survey of Section 32, Block 47 and Section 74, Block 46, he did not call for the rock mound. In Section 28 Browning did call for the rock mound at its southeast corner and says "this point is 251 varas north of Spiller's southeast corner of Survey 28 from which a large stone mound on hill bears S 67½° W. Spiller's bearing to the rock mound from his southeast corner of Section 28 was S 88½° W.

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I believe Surveyor Spiller did what most surveyors would have done, and that was to take the path of least resistance in making his survey. He meandered the river and ran the back "stairstepping lines" of the sections. He picked the lines he thought would be easiest to run from the river for the few dividing lines he ran. Spiller ran the following dividing lines: between Sections 28-29, between Sections 33-34, between Sections 36-37, in Block 47, and between Sections 75-76 and 79-80 in Block 46. Most of these lines begin on the river at or near the mouth of a canyon or creek and run north or south from these points in order to make the ascent to the top of the bordering hills on each side of the river an easier physical task for the surveyors.

In order to locate ourselves within these sections, we attempted to locate as many of the natural objects and corners that had record dignity near our area of interest. In our resurvey we were able to locate U. S. Bureau of Reclamation Property Corner Number 319 (in my opinion this is very near the southwest corner of Section 39 as called for by Spiller in his 1888 survey). We were also able to locate U. S. Bureau of Reclamation Property Corner 318 which appears to be in a projection northerly of the dividing line between Sections 82-83. We also located a 2" iron pipe in this dividing line as called for by Trigg in his 1927 survey. We found a 3/4" pipe in the center of a rock mound at the northeast corner of Section 82. (It appears that Trigg built his survey of Sections 80-82 from this corner.) I believe this to be the corner set by Spiller in 1888. Spiller called for "a stone mound from which a 5" Hackberry in a canyon bears S 49 3/4° E 63 varas". From the rock mound we found Hackberry sprouts growing in a canyon that conforms to the bearing and distance as called for by Spiller.

In Block 46 I believe we found evidence of Surveyor Spiller at the southeast corner of Section 76, also the southwest corner of Section 75. We also found Surveyor Trigg at the southwest corner Section 78 and southwest corner of Section 76. Also found a rock mound by Trigg in the dividing line between Sections 72 and 73 called to be 522 varas southerly from the south bank of the Canadian River.

In Block 47 I believe we found corners set by Spiller at the following locations: northwest corner Section 36, northeast corner Section 36, northwest corner Section 34, northeast corner Section 34, northeast and northwest corners of Section 30 and the northeast corner Section 29. We took the 2" pipe at the northwest corner Section 28 to be the one set by Browning in 1940.

Since our survey of this area dealt mainly with the gradient boundary of the Canadian River, the survey for the relocation of these Sections was not as detailed as it would have been had our primary purpose been for the exact location of their boundaries. However, along with the above corners, we found corners set at most of the Section corners approximately two miles north or south of the river.

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Our survey revealed that most of the Section corners (on our gradient boundary line) are in close proximity to the position as located by Surveyor Spiller nearly one hundred years ago.

I did not agree that all the Section corners found and used on this plat were correct; however, since most of them are being used and accepted by the landowners, we used them in constructing the Sections in order to calculate the acreage contained in each Section adjoining our gradient boundary survey.

In connection with this report, I am also enclosing nine map pages at a scale of 1 inch = 500 feet and a cover sheet at a scale of 1 inch = 1500 feet depicting the gradient boundary as we surveyed it along with a resurvey of the Sections in Blocks 46 and 47 adjoining the river in our area of interest.

I would call your attention to the map cover sheet on which all the Sections are shown. I have shown on this sheet both the called distances (Spiller) and our resurvey measurements (both in varas). Please note the close conformity on most sections.

I have shown the resurvey acreage on each of the 26 Sections. Although some Sections are excessive and some are deficient, it is interesting to note that the patent acreage for these 26 Sections differs only 13 acres from our resurvey values which is about one-half acre per Section.

I have superimposed on the 1 inch = 500 feet maps the Spiller 1888 meanders and the Browning 1950 meanders. Also shown are the degradation range lines.

I refer you to my plat and field notes for further detail concerning this survey.

All of our horizontal measurements refer to the Texas Plane Coordinate System, North Zone, whose origin of control is Second Order Triangulation Stations Sanford and Gewitt. All bearings, distances and acreages are grid.

Respectfully submitted,

D. D. Shine

DDS:nf

Hutchinson Co. Sk. File 46B

Counter 27385

STATE OF TEXAS)

COUNTY OF HUTCHINSON)

I, Janice Knowles, Clerk of the County Court of Hutchinson County, Texas, do hereby certify that the foregoing is a true and correct copy of Survey report in connection with the gradient boundary survey on the Canadian River between H.& T.C. Blocks 46 and 47, from Sanford Dam easterly downstream to State Highway 136 leading from Borger to Stinnett,Hutchinson County, Texas Field Notes Records and Recorded in Vol. 9 Page 448.

in my office.

Given under my hand and the seal, at Office in Stinnett, Texas, this the 27th day of January A.D., 1982.

Janice Knowles

Janice Knowles, County Clerk
Hutchinson County, Texas

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(3B)

File No. M-9805

Hutchinson County

Surveyors Report

Filed Jan. 28 1982

BOB ARMSTRONG, Com'r

By H Forbes

RECEIVED
JAN 28 1982
General Land Office

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Shine & Associates

REGISTERED SURVEYORS TEXAS AND LOUISIANA
D. D. SHINE, PRESIDENT

January 25, 1982

The Honorable Bob Armstrong
Commissioner, General Land Office
1700 N. Congress
Austin, Texas 78701

Dear Commissioner Armstrong:

Pursuant to our meeting in the General Land Office on May 15, 1980, and Mr. Jack Giberson's letter of November 23, 1981 regarding a portion of the J. M. Huber Oil, Gas and Mineral Lease No. 9805, I am enclosing herewith, maps, report and field notes of our Gradient Boundary survey of a portion of the Canadian River in Hutchinson County, Texas.

Yours very truly,

D. D. Shine

DDS/dd

cc: Mr. Lamar Curtis
Mr. Clint Small

File No. Sketch File 46C
Hutchinson County
Correspondance
Filed Jan 28 19 82
GARRY MAURO, Com'r
By Douglas Howard

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(3C)

File No. M-9805

Hutchinson County

letter

Filed Jan. 28 1982

BOB ARMSTRONG, Com'r

By H Forbes

JAN 28 1982

General Land Office

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