

NABLA CORPORATION

ROD PUMPING ANALYSIS

WELL IDENTIFICATION: UNION OIL, TRACY NO. 1
ANALYSIS NUMBER: 5R0-7-10-1
DATE OF ANALYSIS: 7-10-90

CONCLUSIONS AND RECOMMENDATIONS:

1) Well is pumping virtually at capacity. A low pump intake pressure of 100 psi is computed, and a slight fluid pound is occurring (94.2% pump fillage). Pump displacement is near ideal.

2) Surface equipment (gearbox, structure and motor) loads are well within ratings. Unit is in good balance.

3) Rod loads are low.

4) Unocal is doing a good job of producing this well. No operational changes are suggested.

BEFORE EXAMINER CATANACH	
OIL CONSERVATION DIVISION	
UNOCAL	EXHIBIT NO. 5
CASE NO.	10051

PRODUCTION POTENTIAL:

A low calculated pump intake pressure of 100 psi and incomplete pump fillage indicate that this well is producing at capacity.

EQUIPMENT LOADING:

1) Peak torque is 84.6% of the gearbox rating. Unit is in good balance.

2) Structure and prime mover are lightly loaded at 53.7% and 40.7% of rating, respectively.

3) Based on the API Goodman Diagram and a service factor of 0.9 (mild corrosion), the rods are operating at 45.1% (3/4 inch) and 47.2% (5/8 inch) of rating. Since the load percentages are near equal, the rod taper design is good.

4) Downhole friction is normal.

PUMP CONDITION:

1) Pump is mechanically in good condition.

2) Unanchored tubing is moving 3 inches which is resulting in a loss of 9 BPD in pump displacement. Since the well is overdisplaced, tubing movement is not resulting in a loss in production.

3) Pump liquid fillage is 94.2%. Slight fluid pound is occurring.

4) Net pump displacement (116 BPD) is lower than the test (119 BFPD). Test seems slightly high. Considering normal pump leakage, the pump is displacing about 106 BFPD.

K. B. Nolen/ft

NABLA CORPORATION

2064 MARKET STREET

MIDLAND, TEXAS 79703

915 697-2228

ROD PUMPING DIAGNOSTIC ANALYSIS

WELL: UNION OIL, TRACY NO. 1

ANALYSIS NUMBER: SRO-7-10-1

DATE OF ANALYSIS: 07-10-1990

PUMPING SPEED (spm): 13.06

POL ROD POWER (hp): 3.3

MAX STR LOAD (lbs): 7573

MIN STR LOAD (lbs): 2985

ROD WEIGHT IN AIR (lbs): 4583

ROD WEIGHT IN FLUID (lbs): 4206

STFG BOX FRICTION (lbs): 100

STFG BOX POWER LOSS (hp): 0.3

APPROX TBG GRADIENT (psi/ft): 0.300

TBG HEAD PRESSURE (psi): 40

BUOYANT FORCE AT BOTTOM OF ROD STRING (lbs): -321

PUMP SLIPPAGE COEFFICIENT: 0.56

*** CONDITIONS IN ROD STRING AT SPECIAL DEPTHS ***

DEPTH (ft)	MAX LOAD (lbs)	MIN LOAD (lbs)	LOAD RANGE (lbs)	POWER (hp)	STROKE (in)
0	7473	2985	4488	3.0	49.0
1250	4918	1529	3389	2.9	47.2
3350	1857	-644	2500	2.7	42.7

EQUIPMENT LOADING ANALYSIS

<<<<< PRIME MOVER >>>>>

DESCRIPTION: TOSHIBA 15 HP ELECTRIC

POWER REQ'D (HP): 6.1

CYCLIC LOAD FACTOR: 1.648

<<<<< PUMPING UNIT >>>>>

DESCRIPTION: LUFKIN C80-141-48 (4846R0 CRANKS)

REDUCER RATING (M in-lbs):	80.0	MEASURED STROKE (in):	49.0
STRUCTURE RATING (lbs):	14100	COMPUTED STROKE (in):	49.1
PUMPING SPEED (spm):	13.06	POLISHED ROD POWER (hp):	3.3
STFG BOX FRICTION (lbs):	100	STFG BOX POWER LOSS (hp):	0.3

ACTUAL STRUCTURE LOAD *****

MAXIMUM (lbs): 7573

MINIMUM (lbs): 2885

MAX AS % OF RATING: 53.7

SUMMARY OF REDUCER PERFORMANCE *****

	EXISTING	IN-BALANCE
PEAK TORQUE (M in-lbs):	67.7	64.1
COUNTERBALANCE (M in-lbs):	116.6	121.0
PERCENT OF REDUCER RATING:	84.6	80.2

<<<<< ROD STRING >>>>>

PROPERTIES AND ACTUAL LOADING *****

DIAM- ETER (in)	INTERVAL LENGTH (ft)	MAX STRESS (psi)	MIN STRESS (psi)	MOD- ULUS (MM psi)	MIN TENSILE (ksi)	% OF API-GOODMAN RANGE FOR SERVICE FACTOR OF		
						1.0	0.9	0.8
0.750	1250	16915	6756	30.5	115	39.4	45.1	52.7
0.625	2100	16029	4984	30.5	115	41.6	47.2	54.5

NABLA CORPORATION

2064 MARKET STREET
INDUSTRIAL PARK

MIDLAND, TX 79703
(915) 697-2228

<<<< SUBSURFACE PUMP ANALYSIS >>>>

WELL: TRACY NO. 1
DATE OF ANALYSIS: 07-10-1990
PUMP BORE SIZE (IN): 1.5000

ANALYST: DJE
ANALYSIS NUMBER: YT2
SETTING DEPTH (FT): 3410

ACTUAL PUMP CONDITIONS *****

PUMP INTAKE PRESSURE (PSI):	100	PUMPING SPEED (SPM):	13.06
GROSS STROKE (IN):	42.7	NET STROKE (IN):	37.4
GAS INTERFERENCE:	NONE	FLUID POUND:	SLIGHT
FLUID LOAD (LBS):	1750	PUMP LEAKAGE:	NIL
CRUDE SHRINKAGE FACTOR FROM PUMP TO STOCK TANK (BBL PER BBL):	1.122		

- PUMP VOLUMETRIC DISPLACEMENTS -

BASED ON NET STROKE

BASED ON GROSS STROKE

128 BPD
(116 BPD @ STOCK TANK CONDITIONS)

146 BPD

- PUMP EFFICIENCIES -

BASED ON TEST
AND GROSS STROKE
(PERCENT)

BASED ON TEST
AND NET STROKE
(PERCENT)

CRUDE SHRINKAGE NOT CONSIDERED	81.3	92.8
CRUDE SHRINKAGE CONSIDERED	89.7	102.3 **

** TEST SEEMS HIGH FOR EXISTING CONDITIONS.

<<<< OTHER DIAGNOSTIC INDICATORS >>>>

DOWNHOLE FRICTION:	NORMAL	
TUBING OR ANNULUS CHECK VALVE LEAK:	NONE LIKELY	
TUBING MOVEMENT (IN):	3	LOST DISPLACEMENT (BPD): 9
FLOWLINE PRESSURE (PSI):	40	AVG TBG GRAD (PSI PER FT): 0.308

<<<< WELL TEST AND FLUID PROPERTY DATA >>>>

TEST DATE: 7-10-90	
BFPD: 119	BOPD: 101
BWPD: 18	OIL CUT (%): 84.9
GOR: UNKNOWN	
PUMPING UNIT STROKE: 49	TEST SPM: 13.06
OIL GRAVITY (API): 36	WATER GRAVITY (SG): 1.100
BUBBLE POINT (PSI): 1250 EST.	SOLUTION GOR: 500 EST.
FORMATION VOLUME FACTOR (BBL PER BBL): 1.300 EST.	

UNION OIL

TRACY NO. 1

07-10-1990

13:28:24

SURFACE CARD

PUMP CARD

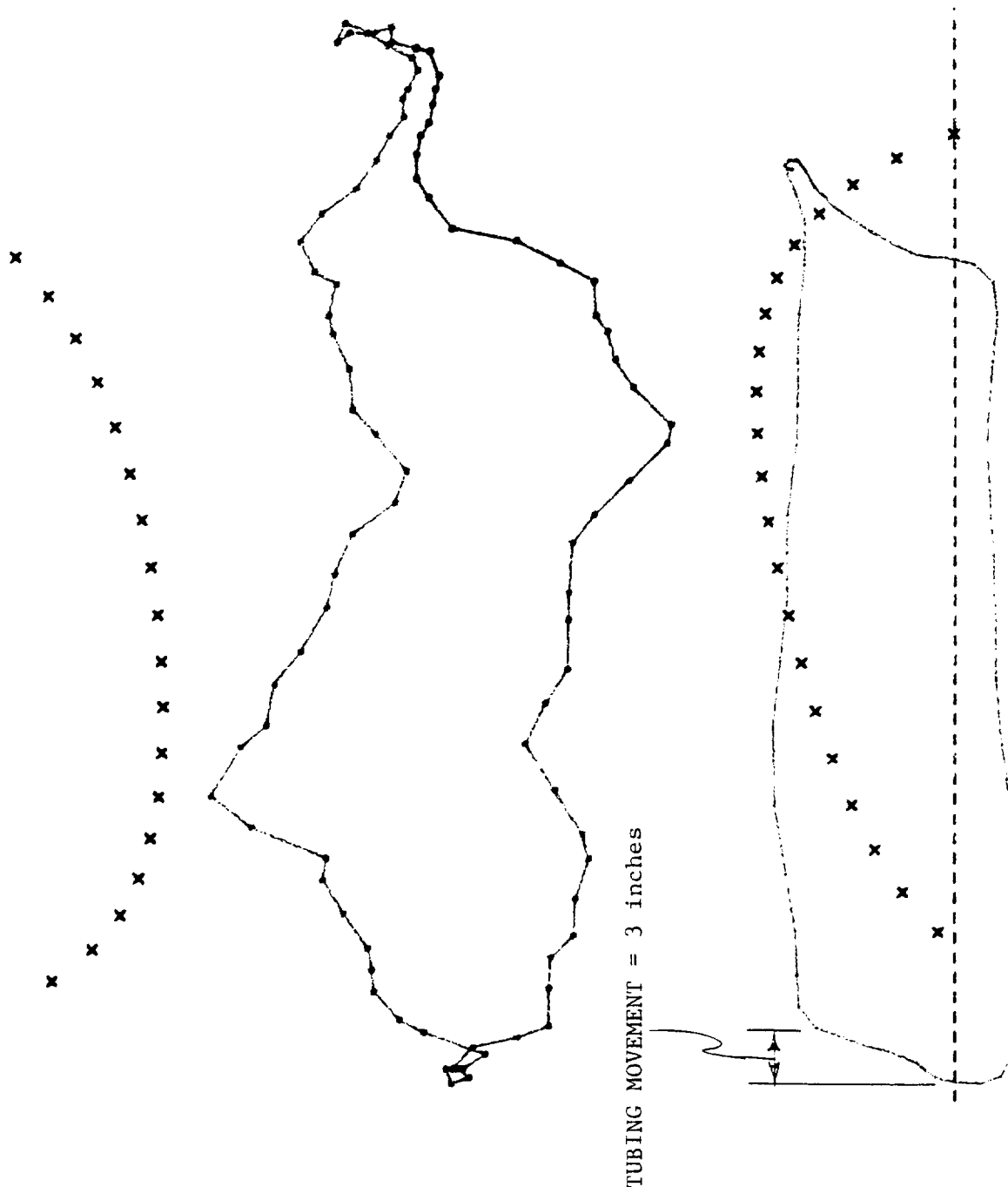
ZERO LOAD

PERMISSIBLE LOADS
FOR REDUCER

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UNION OIL

REDUCER TORQUE VERSUS STROKE

TRACY NO. 1

07-10-1990

13:28:24

UPSTROKE
DOWNSTROKE
ZERO TORQUE
RATING

MAX (in-lbs): 67.7
MIN (in-lbs): -14.5



UNION OIL

TRACY NO. 1

07-10-1990

13:28:24

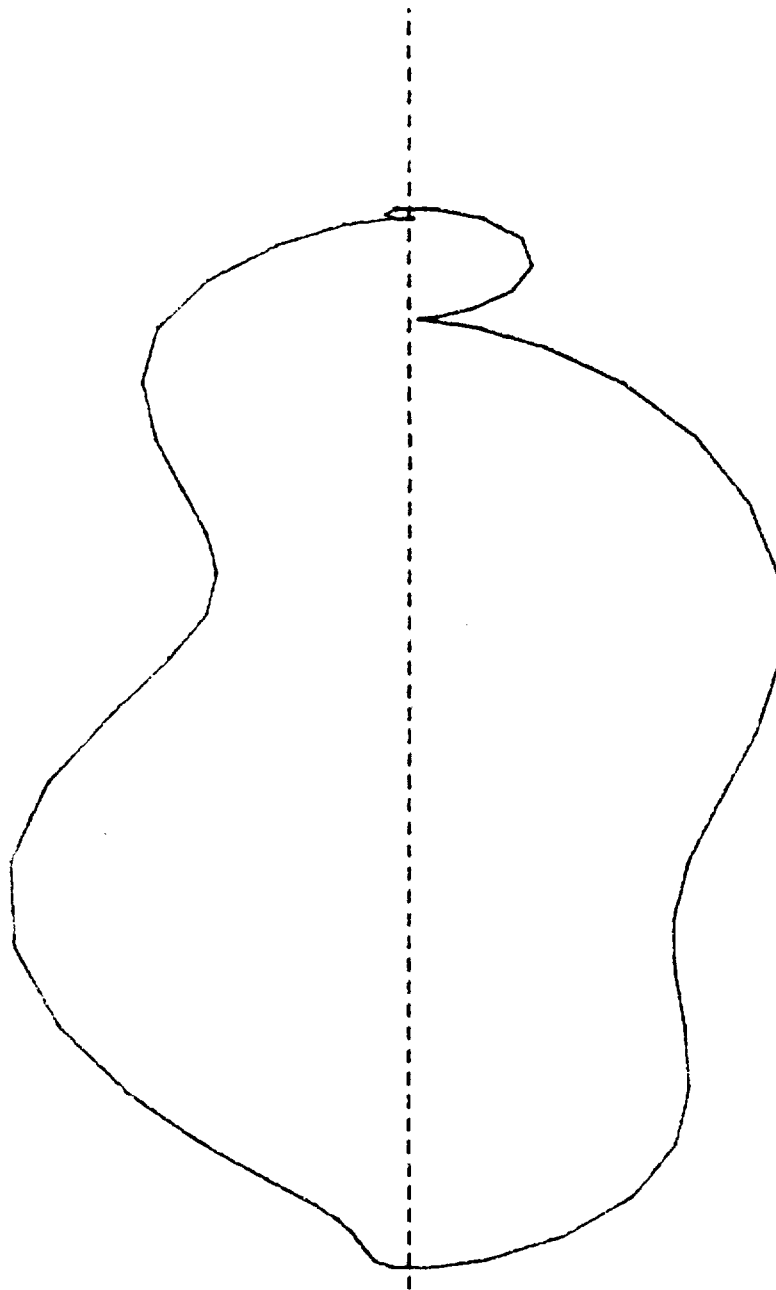
PUMP VELOCITY (referred to casing) VERSUS PUMP POSITION

----- ZERO VEL

MAX VEL (in/sec): 43.5

MIN VEL (in/sec): -40.7

VEL FCTR (in/sec-in): 21.4



NABLA CORPORATION

PRELIMINARY DATA FOR ROD PUMPING ANALYSIS

COMPANY, LEASE & WELL NO. Union Oil, Tracy No. 1

FIELD Esperanza COUNTY _____ STATE N.M.

SEND ANALYSIS TO: Willie Rodriguez (523-9312 Andrews)
PO Box 1749, Andrews 79714

PURPOSE OF ANALYSIS: _____

SUBSURFACE EQUIPMENT AND COMPLETION DETAILS:

CASING OR LINER 4 1/2 IN PBDT 3550 FT TUBING 2 3/8 IN SET AT _____ FT

COMPLETION TYPE Perfs FROM 3417 FT TO 3424 FT

TUBING ANCHOR AND/OR PACKER DESCRIPTION: None? AT _____ FT

DOWNHOLE GAS SEPARATOR DESCRIPTION: _____

PUMP DESCRIPTION: 1 1/2 SEATING NIPPLE AT 3410 FT

ROD DESIGN DETAILS:

	SIZE (IN)	LENGTH (FT)	MGFR. TYPE AND GRADE
(TOP)	(50) <u>3/4</u>	<u>1250</u>	<u>National No. 40</u>
	(84) <u>5/8</u>	<u>2100</u>	<u>"</u>
	_____	_____	_____
	_____	_____	_____

7-10-90 101 18 119
PRODUCTION AND FLUID PROPERTY DATA:

LAST TEST--DATE 6-90 BOPD 111 BWPD 23 BFPD _____ SPM _____ STROKE _____ IN

OIL GRAVITY 36.3 API@ 60 F GOR _____ WATER S.G. _____ OR PPM CL _____

RESERVOIR DATA:

BUBBLE POINT 1250 * PSI SOL'N GOR AT BUBBLE PT. 500 * B.H. TEMP. 110 * F

FORMATION VOLUME FACTOR AT BUBBLE PT. 1.3 * STATIC PRESSURE _____ PSI

COMMENTS: 2400 BOPD allowable.

(SEE REVERSE SIDE FOR HYDRAULIC PUMPING DATA FORM)

NABLA CORPORATION
(DATA GATHERED WHILE ON SITE)

data\dataform/08-89

COMPANY, LEASE & WELL NUMBER Union Oil, Tracy No. 1

ANALYSIS NUMBER: 5RO-7-10-1

PUMPING UNIT DATA:

Unit Description: Lufkin C80-141-48

Measured Unit Stroke: 49 inches in the long crank hole.

Crank Description: 4846RO Crank holes: 4

Structural Unbalance: +410 lbs. Rotation cv ccw ✓-1

Counterbalance Weight Description and Positions:

	<u>Master Weights</u>	<u>Position</u>	<u>Auxiliary Weights</u>
Right Leading	<u>5ARA</u>	<u>14"</u>	<u>None</u>
Right Lagging	<u>↓</u>	<u>↓</u>	<u>↓</u>
Left Leading	<u>↓</u>	<u>↓</u>	<u>↓</u>
Left Lagging	<u>✓</u>	<u>✓</u>	<u>✓</u>

Counterbalance Effect in-lbs Reducer Ratio:

Unit Sounds: Balanced ✓ Overbalanced Underbalanced

PRIME MOVER DATA:

Prime Mover Description: Toshiba electric, 284T Frame.

Torque Mode: Power Rating: 15 HP Current Rating: amps

Thermal Current: amps RPM: Opr. Voltage: volts.

Unit Sheave: (PD/OD) Motor Sheave: 10.5", 39. (PD/OD)

Circle Hand Auto Pin Timer % Timer POC Run Time %.

OTHER DATA:

Tubing Pressure: 40 psi Casing Pressure: 40 psi.

Bleeder sample: Water Cut (%) 0 Water S.G. 1.10 at tank battery Comments:

Misalignment: Leaks: Brake:

FOR AIR BALANCED UNITS:

Max Receiver Pressure: psi Min Receiver Pressure psi.

Pressure corresponding with counterbalance measurement: psi.

Pressure required to offset structural unbalance: psi.

COMMENTS: