STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

IN THE MATTER OF:)
)
APPLICATION OF YATES PETROLEUM)
PORATION FOR SPECIAL POOL) CASE NO. 10145
ES, EDDY COUNTY, NEW MEXICO.)
)

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: JIM MORROW, Hearing Examiner

November 28, 1990
10:45 a.m.
Santa Fe, New Mexico

This matter came on for hearing before the Oil servation Division on November 28, 1990, at 10:45 a.m. at Oil Conservation Division Conference Room, State Land Office Building, 310 Old Santa Fe Trail, Santa Fe, New Mexico, before Deborah LaVine, RPR, Certified Shorthand Reporter No. 252 and Notary Public, in and for the County of Santa Fe, State of New Mexico.

FOR: OIL CONSERVATION DIVISION

BY: DEBORAH LAVINE, RPR
Certified Shorthand Reporter

HUNNICUTT REPORTING
DEBORAH LAVINE, CSR, RPR

BEFORE THE
OIL CONSERVATION DIVISION
Santa Fe, New Mexico

Case Nos. 11297 and 11298 Exhibit No. 5

Submitted by: Yates Petroleum Corporation

Hearing Date: June 29, 1995

I N D E X

November 28, 1990
Examiner Hearing
Case No. 10145

** ** ** **

A. Sometime next year in 1991, our intention is to go into this well and to perforate the middle section of the Delaware. And there's an evidence in the part of the exhibit here, it has a log of the one where we're perforated.

(Intervenor's Exhibit No. 2 was marked for identification.)

Q. That's your Exhibit Number 2?

A. Yes, that's Exhibit Number 2. And Exhibit Number 3 of a cross section starting at about 3,490 feet that we plan on perforating which we feel like that we might be successful in completing this. And, of course, if we're successful, our intention is to go ahead and to continue drilling or to plug back that number one.

Q. Again, Mr. Jones, what's marked as Exhibit Number 2 is three pages; correct?

A. Right.

Q. And this is the log on the current Delaware producer?

A. Right, yeah, that identifies the log on it. That's the neutron density log.

Q. The first page of that shows the current perforated interval in that well?

A. Yes, sir.

Q. And then the second portion or the last page of this exhibit indicates the interval which correlates to the

exactly what, you know, exactly initially the perforations and number of prorations which you'd have to have in order to complete an AFE.

Q. And so am I correct in assuming that you really have no timetable at this time with respect to doing that operation?

A. No, I intend to do that next year.

Q. Next year. Well, can you --

A. In 1991.

Q. Well, do you have any specific evidence which tells you or which would show to the commission that the granting of this application today will adversely affect through drainage of your location or your tract of land any time during the year of 1991?

A. Do I have any specific -- other than my testimony here and what we brought up, I don't have any other evidence.

MR. CARROLL: That's all I have.

EXAMINATION

BY EXAMINER MORROW:

Q. Mr. Jones, you indicated that you would continue drilling. I think I understood you to mean that if you were successful in this first recompletion, you would drill other wells; is that correct?

A. That's correct.

Q. Did you answer a question that was asked of you as

BEFORE THE
OIL CONSERVATION DIVISION
Santa Fe, New Mexico

Case Nos. 11297 and 11298 Exhibit No. 6

Submitted by: Yates Petroleum Corporation

Hearing Date: June 29, 1995

YATES PETROLEUM CORPORATION

105 SOUTH FOURTH STREET
ARTESIA, NEW MEXICO 88210
TELEPHONE (505) 748-1471

November 25, 1992

Exxon
P. O. Box 3116
Midland, Texas 79702-3116

ATTN: Larry Long

RE: Avalon Delaware Unit

Dear Larry,

Yates has reviewed in detail the comprehensive Engineering Report prepared by Exxon for the proposed Avalon Delaware Unit. Your people have done an excellent job, and we hope to proceed with formation of the unit. There are several items that merit discussion for possible clarification or modification. Yates has discussed these items with the Coquina people, and their concerns are similar to ours.

MARTIN YATES, III
1912 - 1985
FRANK W. YATES
1936 - 1986

YATES PETROLEUM CORPORATION

105 SOUTH FOURTH STREET
ARTESIA, NEW MEXICO 88210
TELEPHONE (505) 748-1471

S. P. YATES
CHAIRMAN OF THE BOARD
JOHN A. YATES
PRESIDENT
PEYTON YATES
EXECUTIVE VICE PRESIDENT
RANDY G. PATTERSON
SECRETARY
DENNIS G. KINSEY
TREASURER

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Area Outside Primary Production

We are not convinced that the areas outside the wells where primary production has been established in the Upper Cherry/Upper Brushy can be developed economically with CO_2. My preferred plan would be to unitize the whole area and to develop the CO_2 flood only in the area of primary production. When response is acceptable, conduct a small CO_2 pilot in a promising portion of the outside area. Then expand to the entire outside area only when this pilot succeeds.

We have attempted to divide the economics in your report into two pieces. Our estimates are that the costs to flood the primary area are $45 million and the costs to flood the outside area are $39 million. The result is that the CO_2 project in the primary area has an attractive rate of return equal to 25^+ percent, while the project in the outside area returns an unrisked 13 percent. We may have mishandled some of your numbers, but our concern over development of the outside area seems justified.

I admit that your report could be understood to be compatible with the plan I suggest. The tone of the report allows no uncertainty of success in the outside area, but we should talk about your actual plan of development.

Primary Reserves

Yates calculated primary reserves for all wells in the Avalon Delaware pool. Our numbers agree with the Exxon numbers for all wells except four. Naturally, we get higher reserves than Exxon gets for two Yates wells (Stonewal "EP" #5 and "EP" #8) and lower reserves for two Exxon wells (Yates C #3 and #4). I think we feel that the Exxon GOR limit artificially shuts down the two Yates wells at a time when economic reserves could still be produced. The problem with the two Exxon wells apparently is an adjustment we do not understand. In any case, I believe we should talk about the primary reserves of these four wells.

Geology and Modeling

You've heard us say before that the geological study is very complete while the Engineering work cut a few corners in comparison. I am a little concerned that the modeling work required that permeability be increased by a factor of two or more. This is not unusual in itself, but it might cast doubt on the shaly-sand analysis of the logs which reduced log porosity and indirectly log permeability. Maybe a different log analysis would have given permeabilities that fit the computer model without modification. Probably you all believe there is no chance that the basic geological picture can be wrong.

Workover Reserves

The workover reserves greatly benefit Yates, but they may be overestimated in the Report.

Summary

I hope we can discuss with you the few major concerns we have about the Engineering Report. Yates wants this CO_2 project to happen and we'd like to resolve our concerns with the Report and move on to the details of unitization.

Sincerely,

Dave Boneau

David F. Boneau
Reservoir Engineering Manager

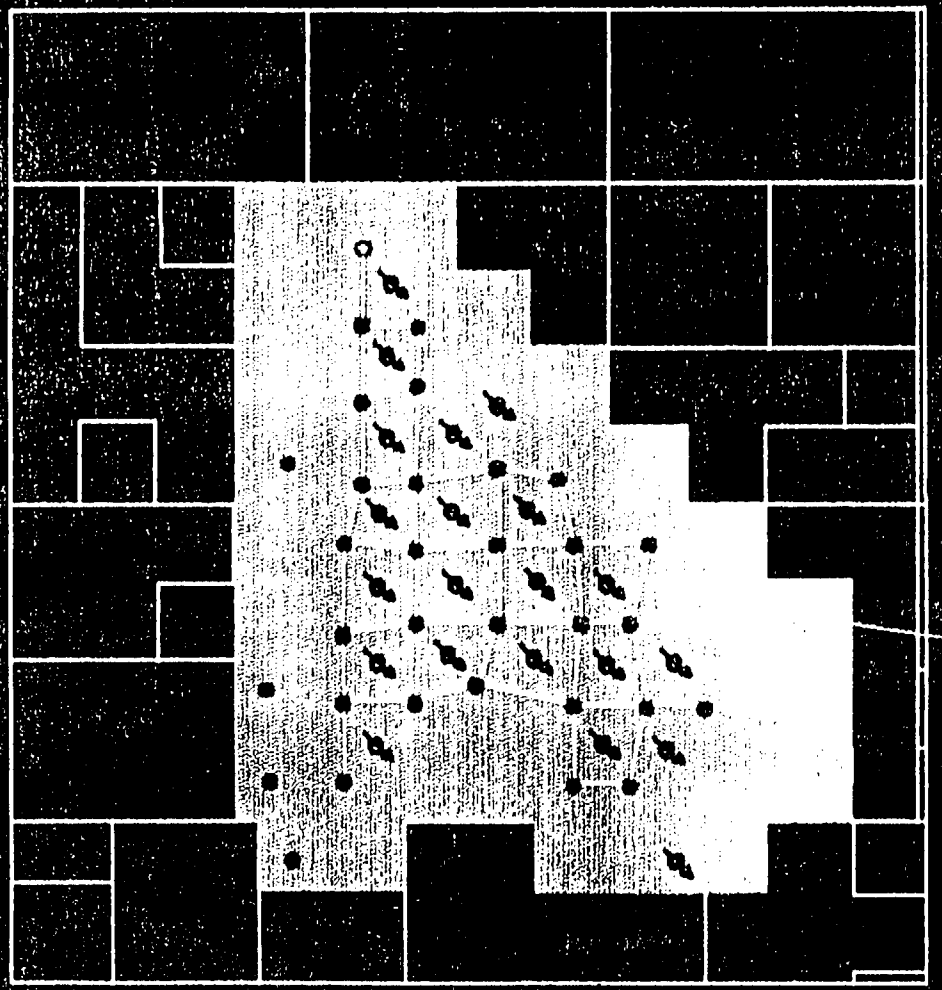
AVALON TECHNICAL REPORT MEETING
WITH YATES PETROLEUM
December 9, 1992

AGENDA ITEM	DISCUSSION LEADER	ESTIMATED TIME
Introduction/Objectives	Larry Long	15 min.
Discussion/Clarification of Concerns	Yates	15 min.
Development Plan	Gil Beuhler	45 min.
Geology and Modeling	Dave Cantrell Mike Goodwin	90 min.
Primary Reserves - 4 Wells	Mike Goodwin	45 min.
Workover Reserves	Dave Cantrell Mike Goodwin	60 min.
Summary: Remaining Concerns and Proposals	Yates	15 min.
Summary: Proposed Action	Larry Long	15 min.

OTHER ATTENDEES: DAVE BONEAU - YATES
BOB FANT - YATES
MARK JONES - EXXON

BUHLER
12-9-92

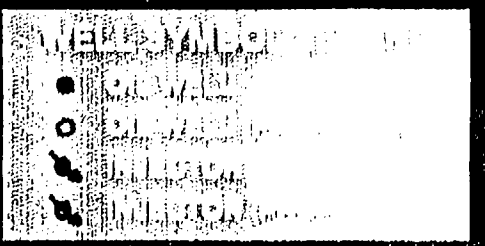
AVALON (DELAWARE) FIELD
WATER INJECTION PHASE DEVELOPMENT



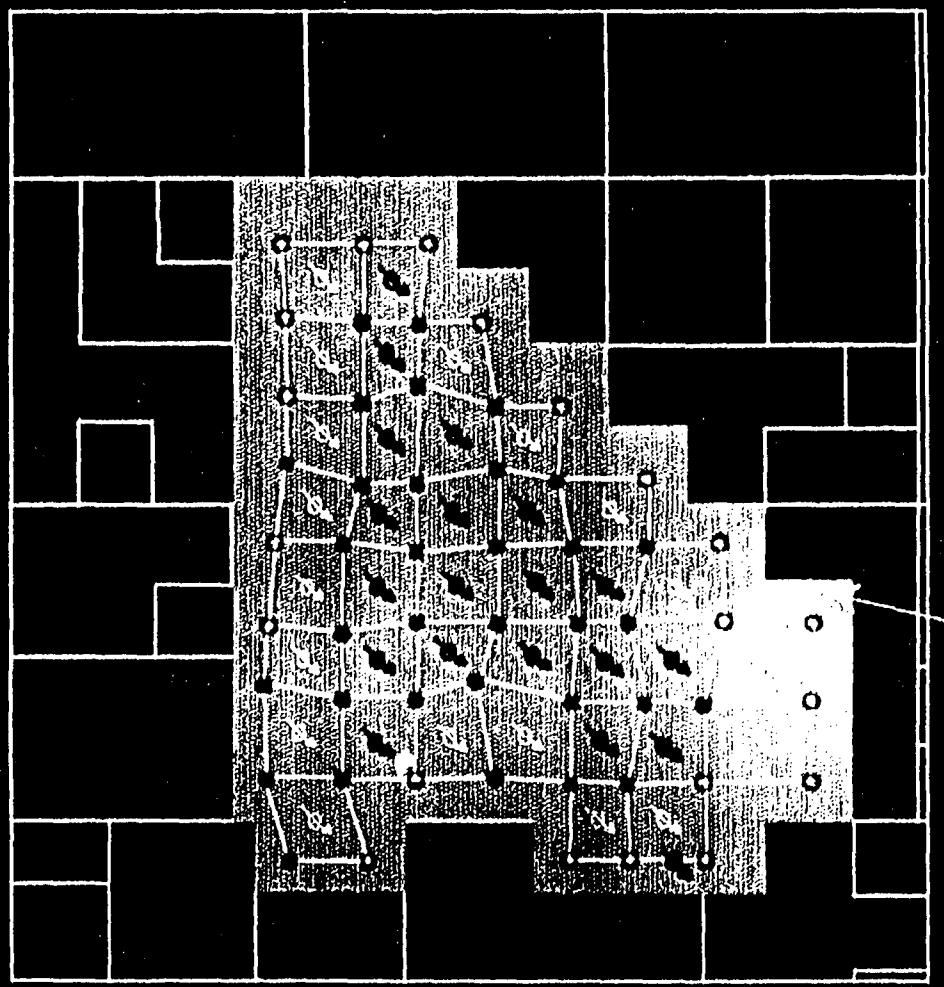
DEVELOPMENT SUMMARY

- START 1Q 93
- 18 INJECTOR DRILLWELLS
- 1 PRODUCER DRILLWELL
- $23M GROSS INVESTMENT

PROPOSED UNIT AREA



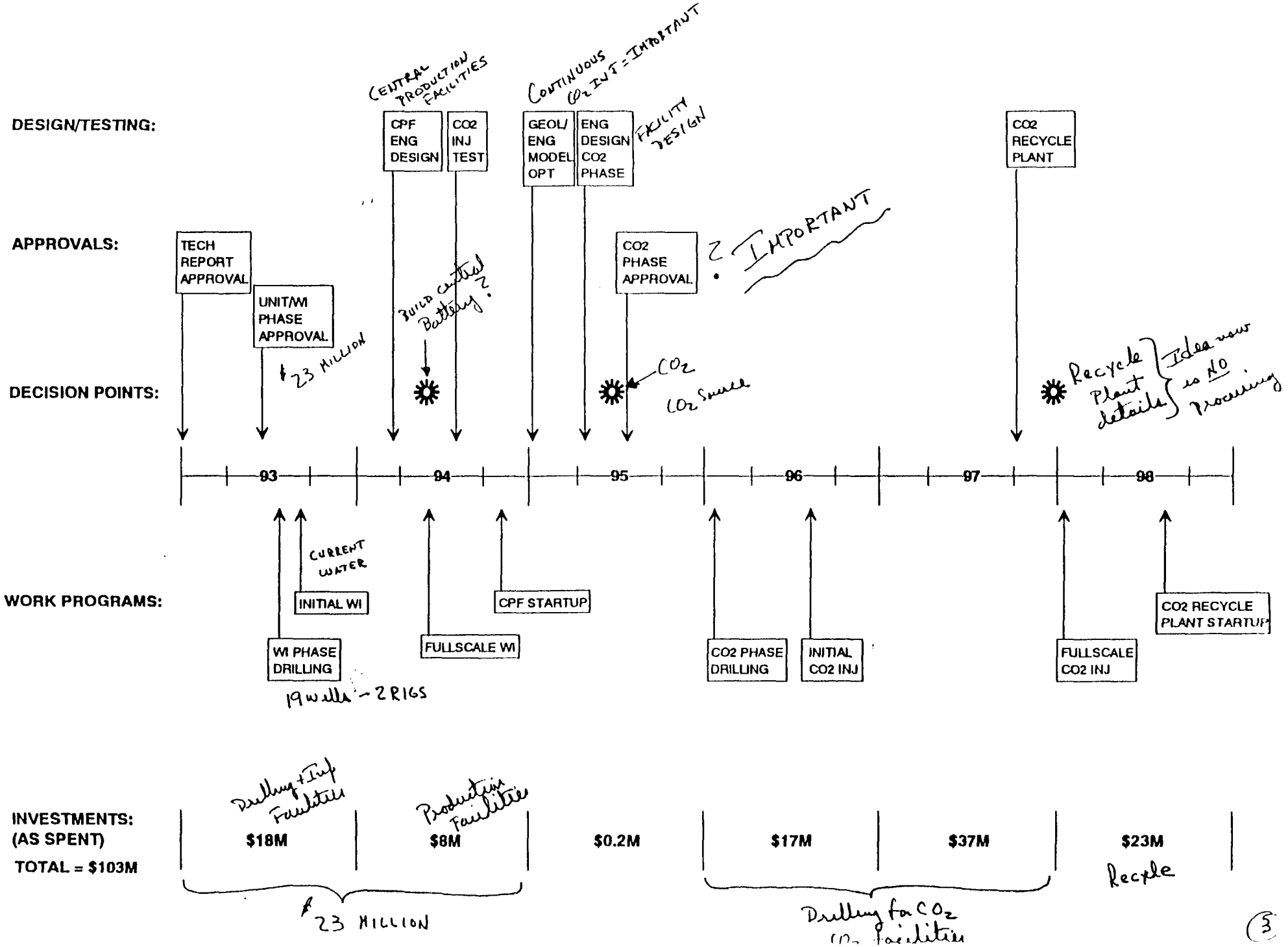
AVALON (DELAWARE) FIELD
CO2 INJECTION PHASE DEVELOPMENT



DEVELOPMENT SUMMARY

- START 1Q 96
- 55 INJECTOR DRILLWELLS
- 20 PRODUCER DRILLWELLS
- $61M GROSS INVESTMENT

AVALON EOR PROJECT TIMING



AVALON (DELAWARE) UNIT - INVESTMENT SUMMARY

NOTE: INVESTMENTS ARE 1992$

CASE	INVESTMENT YEAR	(1) DRILLING (M$)	(2) PRODUCTION FACILITIES (M$)	(3) INJECTION FACILITIES (M$)	(4) CAPITAL WORKOVERS (M$)	ART. LIFT ADDITIONS (M$)	OTHER (M$)	TOTAL (M$)	COMMENTS
CONTINUED OPERATIONS	1993	-	-	0.2	-	-	-	0.2	
WATER INJECTION PHASE	1992	-	-	0.6	-	-	-	0.6	
	1993	9.0	0.9	5.1	0.7	0.3	0.2	16.2	DRILLING: 1 PROD, 18 INJ, 1 WSW; OTHER: FORM EVAL
	1994	-	6.5	-	0.1	-	-	6.6	
	TOTAL	9.0	7.4	5.8	0.9	0.3	0.2	23.5	
CO2 INJECTION PHASE	1994	-	-	-	-	-	0.4	0.4	OTHER: CO2 INJECTIVITY TEST
	1995	-	-	0.2	-	-	-	0.2	
	1996	6.6	1.7	6.0	-	-	-	14.4	DRILLING: 5 PROD, 10 INJ
	1997	26.7	0.5	0.5	0.7	0.3	-	28.6	DRILLING: 15 PROD, 45 INJ
	1998	-	0.6	15.8 RECYCLE PLANT	1.0	-	-	17.3	
	TOTAL	33.4	2.8	22.5	1.6	0.3	0.4	61.0	
TOTAL EOR PROJECT	TOTAL	42.3	10.2	28.3	2.5	0.5	0.6	84.4	TOTAL INVESTMENT DOES NOT INCLUDE INVESTMENT FOR CONTINUED OPERATIONS (NOT NEEDED WITH PROJECT)

COMMENTS:

(1) - DRILLED PRODUCERS, INJECTORS, AND WATER SUPPLY WELL; THE YEARLY DRILLWELLS TOTALS DO NOT EXACTLY MATCH EXHIBIT H-3, BUT SHOULD MORE CLOSELY MATCH ACTUAL YEARLY EXPENDITURES

(2) - PRODUCTION FACILITIES INCLUDES FLOWLINES AND CENTRALIZED PRODUCTION FACILITY

(3) - INJECTION FACLITIES INCLUDES INJECTION LINES, WATER INJECTION FACILITIES, CO2 INJECTION LINES, AND CO2 RECYCLE COMPRESSOR FACILITY

(4) - CAPITAL WORKOVERS INCLUDE RECOMPLETING TA'D WELLS AND ADD ZONE WORKOVERS

AVALON EOR PROJECT - "RING" EVALUATION
12/8/92

	BASE CASE EOR PROJECT	DEVEL AREA ONLY	RING AREA ONLY
ECONOMIC SUMMARY:			
PATTERNS	37	19	18
INVESTMENT	$84.2M	$52.3M	$31.9M
RESERVES	42.2 MBO	26.8 MBO	15.4 MBO
PVP @ 10%	$134M	$100M	$34M
ROR	25%	27%	19%
CO2 INJECTION PHASE INVESTMENT SUMMARY:			
PRODUCER DRILLWELLS	20	4	16
INJECTOR DRILLWELLS	55	19	36
MAX. PROCESSING RATE	18.2 MCFPD	12.0 MCFPD	6.2 MCFPD
INVESTMENT DETAIL			
DRILLING	$33.4M	$10.4M	$23.0M
FACILITIES	$25.3M	$16.7M	$ 8.6M
WORKOVERS	$ 1.6M	$ 1.3M	$ 0.3M
MISC	$ 0.7M	$ 0.7M	$ 0.0M
TOTAL	61.0M	$29.1M	$31.9M

NOTE: WATER INJECTION PHASE INVESTMENTS ARE THE SAME IN EACH CASE

DATE 12-9-92

FORMATION EVALUATION AND PETROPHYSICS

METHODOLOGY AND CALCULATION PARAMETERS

(Continued)

Porosity Calculation

- Calculate total porosity from neutron-density crossplot (PHI_{nd}) or from Wyllie time-average sonic porosity (PHI_{son})

  $PHI_{son} = (DT - DT_{ma})/(DT_{fl} - DT_{ma})$

  Where DT = sonic transit time measured
  DT_{ma} = matrix transit time (55.5 msec/ft used)
  DT_{fl} = fluid transit time (189 msec/ft used))

- Apply GR cutoff (75 API units) to net out shales
- Calculate clay-corrected effective porosity

  $PHI_e = PHI_{nd} - (V_{clay} * PHI_{clay})$

  Where $PHI_{clay} = 0.26$

  $V_{clay} = 0.33 [2^{(2 * I_{gr})} - 1.0]$

  Gamma Ray Index (I_{gr}) = $(GR_{log} - GR_{min})/(GR_{max} - GR_{min})$

  Where GR_{log} = gamma ray measured
  GR_{min} = gamma ray from "clean" sand (50 was used)
  GR_{max} = gamma ray from shale (120 was used) (Asquith)

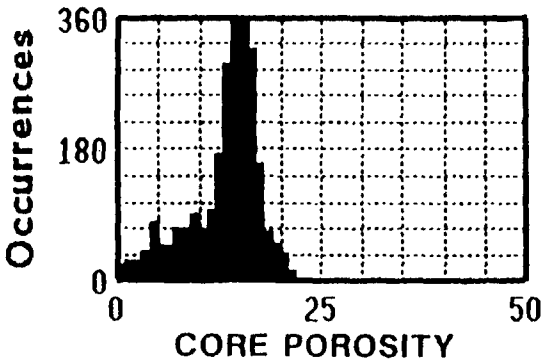
- Calibrate clay-corrected PHI_e to core

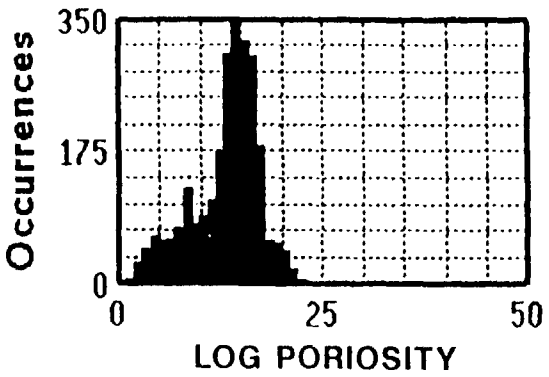
  $PHI_{ec} = (PHI_e + 1.747918)/1.17736$

  PHI_{son} needs no correction or calibration

- Product is foot-by-foot clay-corrected porosity data

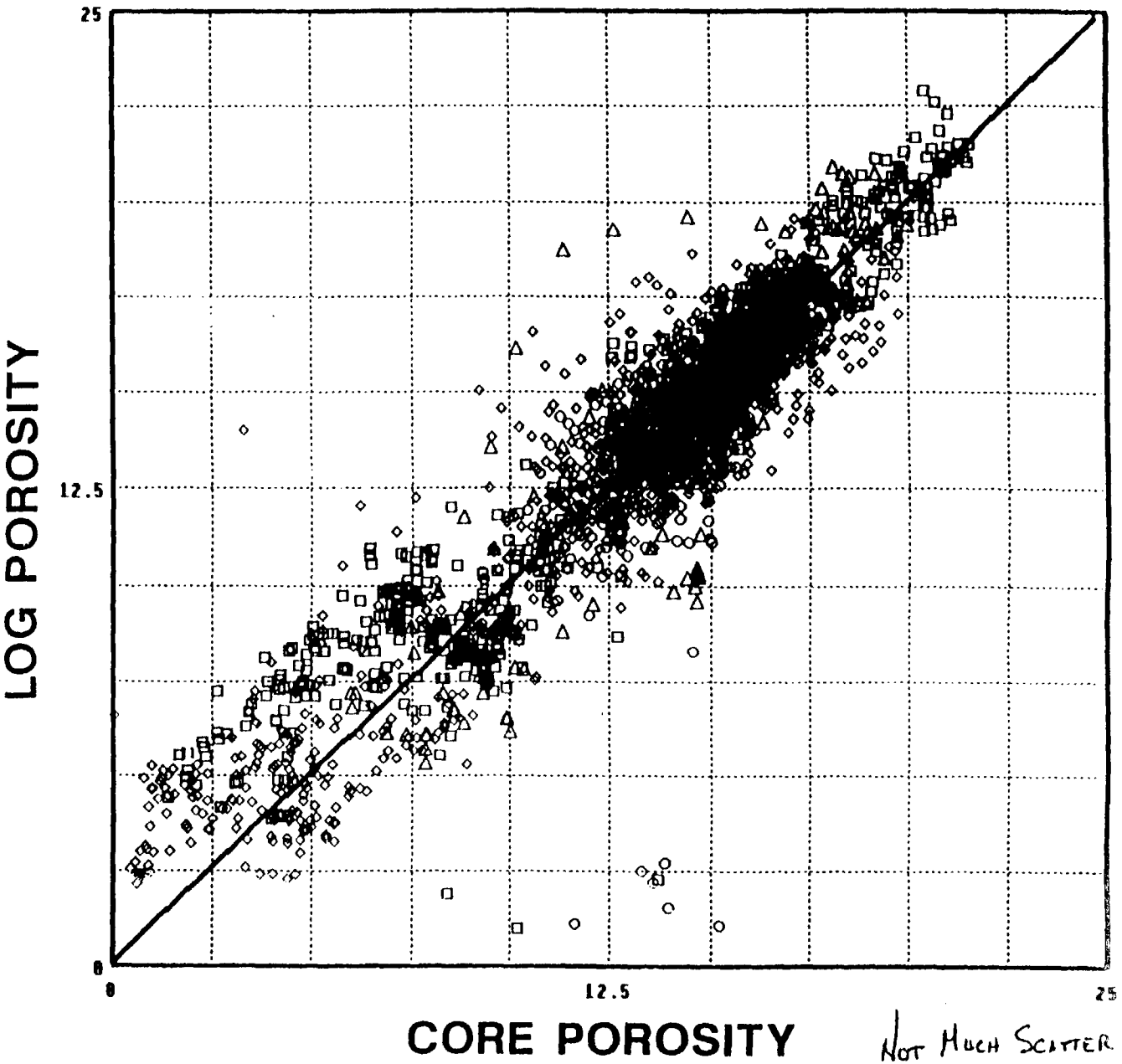
CORE POROSITY VS. LOG POROSITY



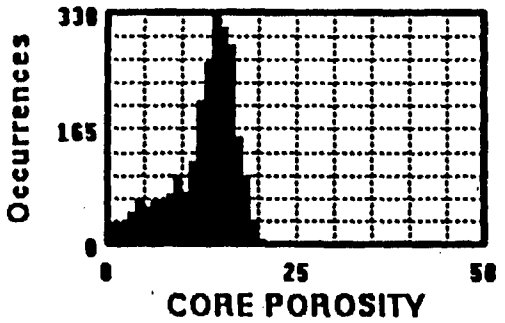


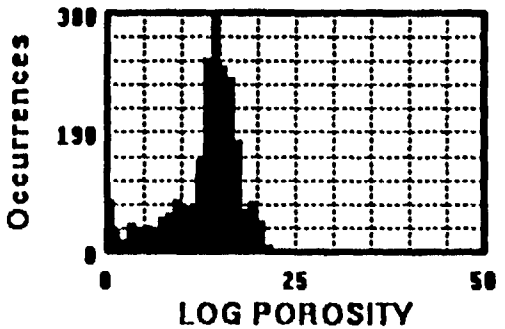
Well/Zone Legend

- ○ yates 'c' federal # 17
  - MIDDLE/LOWER CHERRY
  - UPPER BRUSHY
  - UPPER CHERRY
- □ yates 'c' federal # 18
  - MIDDLE/LOWER CHERRY
  - UPPER BRUSHY
  - UPPER CHERRY
- △ yates 'c' federal #6
  - MIDDLE/LOWER CHERRY
  - UPPER BRUSHY
  - UPPER CHERRY
- ◇ Exxon Yates Federal 'C' 36
  - MIDDLE/LOWER CHERRY
  - UPPER BRUSHY
  - UPPER CHERRY



LOG POROSITY-CORE POROSITY CROSSPLOT

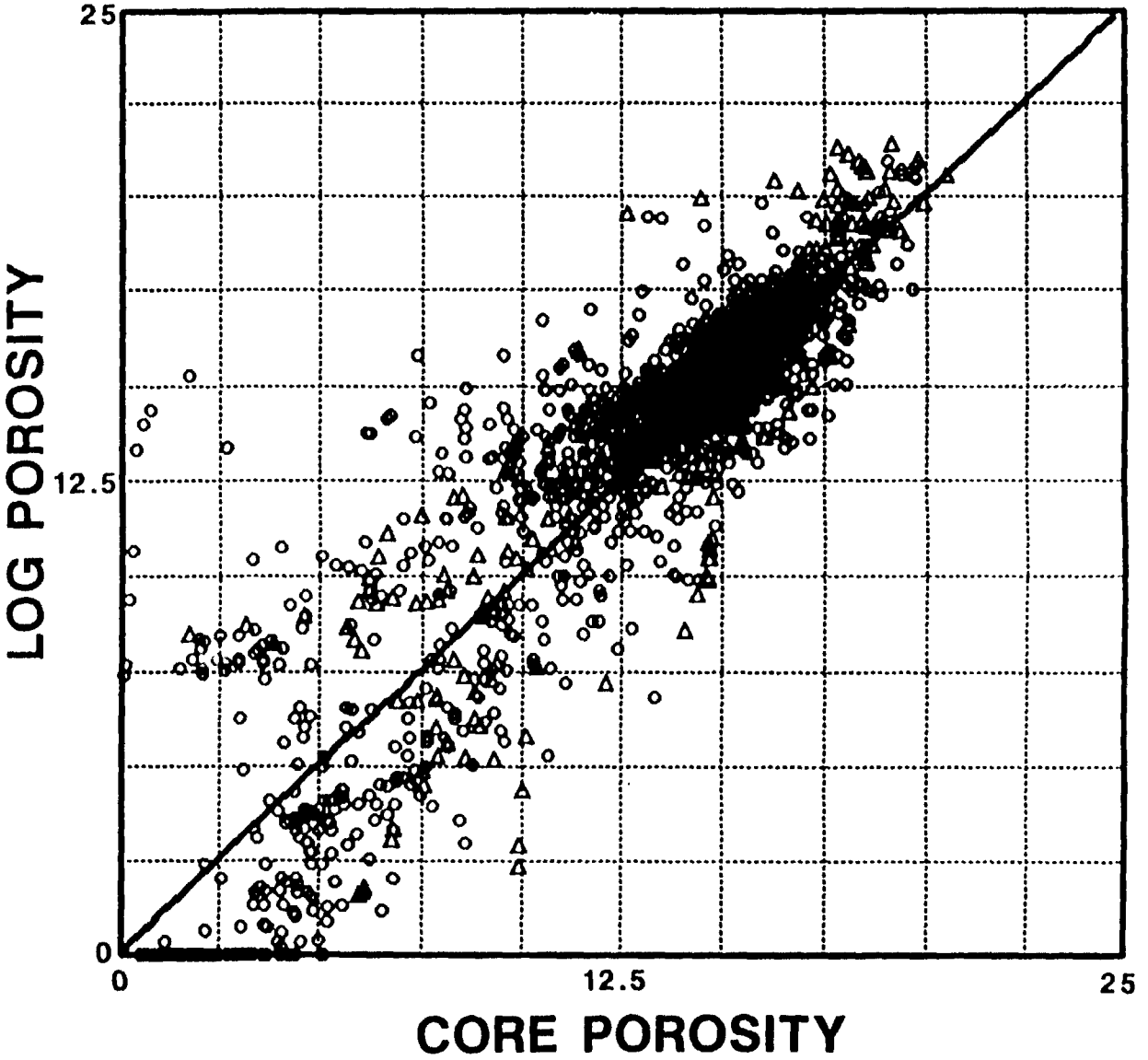




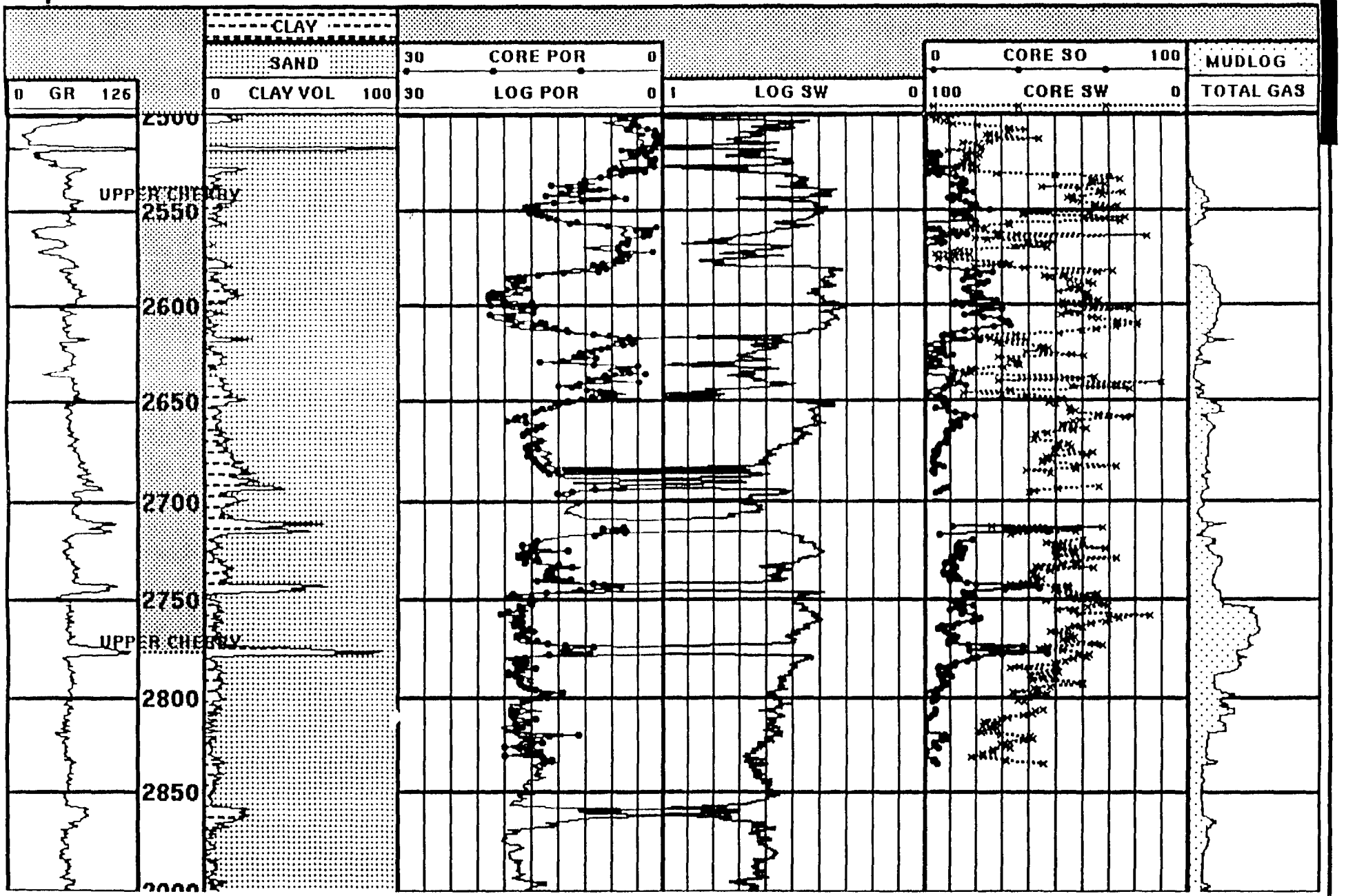
Well/Zone Legend

O Exxon Yates Federal 'C' 36
1
2
3

Δ yates 'c' federal #8
1
2
3



Exxon Yates Federal 'C' 36 Wednesday, 11 November 1992 2:31:49 p.m.
Depth: 2522.759



COMPARISON OF LOG-DERIVED AND CORE-CALCULATED PARAMETERS

WELL	CORE			LOG			
	Net	AP	PT	Net	AP	PT	
Upper Cherry Canyon							
Yates "C" Federal #18	56	0.123	6.9	52	0.125	6.5	(+5.8%)
Yates "C" Federal #36	139	0.147	20.5	150	0.145	21.8	(-6.3%)
Upper Brushy Canyon							
Yates "C" Federal #17	171	0.142	24.3	176	0.142	24.9	(-2.5%)
Yates "C" Federal #36	181	0.145	26.2	185	0.145	26.8	(-2.3%)

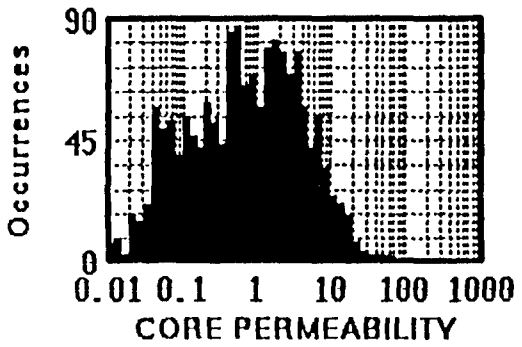
Total Average Difference (Core vs. Log) 4.2%

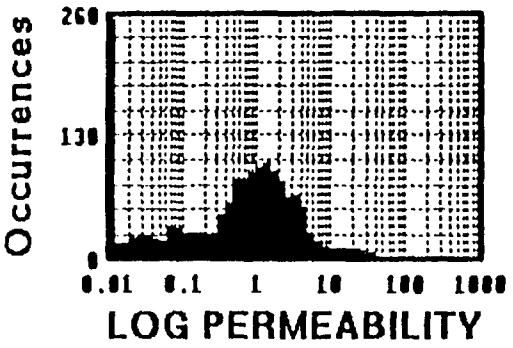
Net = Net feet of porous reservoir which meets cutoff criteria

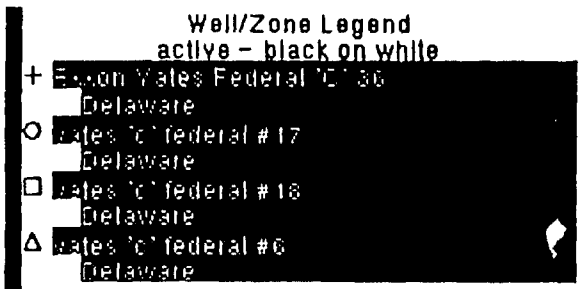
AP = Average porosity of reservoir interval meeting cutoff criteria

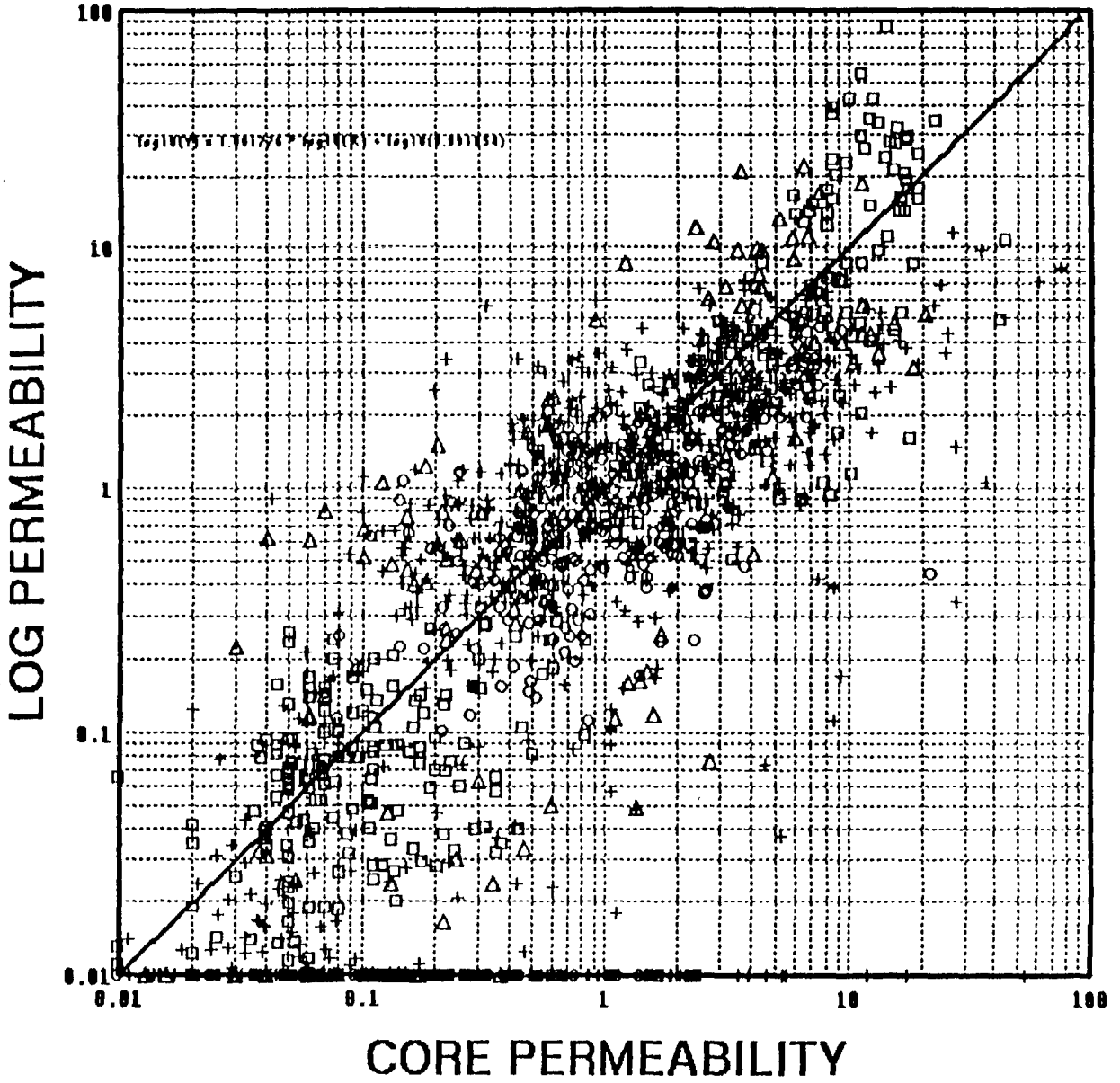
PT = Porosity thickness, product of net thickness and average porosity

Log-Derived vs Core Permeability









MIKE GOODWIN
12-9-92

SIMULATION PROTOTYPE SCALE-UP JUSTIFICATION

- PRACTICAL ALTERNATIVE TO 3D FULL-FIELD SIMULATION

  - AVALON FULL-FIELD MODEL WOULD REQUIRE ±135,000 GRID BLOCKS FOR ADEQUATE AREAL AND VERTICAL DEFINITION (CONTRAST TO FORD GERALDINE MODEL WITH 19,380 GRID BLOCKS)

    MAYBE 75,000 MINIMUM
    26 LAYERS for 300ft of reservoir.

  - ENABLES MULTIPLE SENSITIVITY RUNS (OVER 50 DIFFERENT SENSITIVITIES RUN ON CO_2 DEVELOPMENT SCENARIOS)

  - BENEFITS OF FULL-FIELD MODELING WILL BE MORE FULLY REALIZED ONCE PROJECT IMPLEMENTED

    + PRIMARY PRODUCTION PERFORMANCE GIVES LITTLE INSIGHT INTO INTERWELL HETEROGENEITIES/DESCRIPTION
    + INFILL DRILLING AND WATER INJECTION PERFORMANCE WILL ENABLE MUCH BETTER CALIBRATION OF MODEL

- METHODOLOGY HAS BEEN VALIDATED IN OTHER EXXON MULTI-WELL/MULTI-PATTERN FLOODS

  - WATERFLOODS
  - CO_2

  PROTOTYPE SIMULATION + SCALE UP

- TECHNIQUE SIMILAR TO THAT UTILIZED BY OTHER MAJORS WITHIN INDUSTRY

  - CHEVRON
  - MOBIL
  - ARCO

SIMULATION PROTOTYPE SCALE-UP METHODOLOGY

- DEVELOP SIMULATION PROTOTYPE CURVES
  - IDENTIFY PROTOTYPES
  - DEVELOP PROTOTYPE SIMULATOR MODEL
  - HISTORY MATCH ACTUAL PERFORMANCE
  - GENERATE DIMENSIONLESS MODEL CURVES FOR EXISTING PROCESS
  - GENERATE DIMENSIONLESS MODEL CURVES FOR PROPOSED PROCESS(ES)
- DEVELOP RESERVOIR VOLUMETRICS
  - DEVELOP GEOLOGIC MODEL
  - DEFINE PATTERN ELEMENTS
  - GENERATE PATTERN ELEMENT VOLUMETRICS UTILIZING GEOLOGIC MODEL
- HISTORY MATCH FULL-FIELD PERFORMANCE
  - UTILIZE PROTOTYPE CURVES, PATTERN ELEMENT VOLUMETRICS AND RATES
  - ADJUST MODEL TO OBTAIN MATCH
  - REVIEW NEED FOR ADDITIONAL PROTOTYPES
- DEVELOP FULL-FIELD FLOWSTREAM PREDICTION
  - DEFINE PROJECT DEVELOPMENT PLAN TO ESTABLISH SCHEDULE/TIMING
  - UTILIZE NEW PROCESS CURVES, VOLUMETRICS AND PREDICTED RATES FROM HISTORY MATCH

SIMULATION PROTOTYPE SCALE-UP
AVALON PROCESS DESCRIPTION

- DEVELOP SIMULATION PROTOTYPE CURVES
  - IDENTIFY PROTOTYPES
    - + COMPLETION STATUS
      - o SINGLE ZONE
      - o FRAC JOB
    - + REPRESENTATIVE STRATIFICATION
    - + SELECTED YCF #6 FOR UBC, HONDO "A" STATE #4 FOR UCC
  - DEVELOP PROTOTYPE SIMULATOR MODEL
    - + IDENTIFIED 13 FLOW UNITS IN UCC IN YCF #16 CORE AND CORRELATED TO HONDO "A" #4
    - + IDENTIFIED 13 FLOW UNITS IN UBC IN YCF #17 CORE AND CORRELATED TO YCF #6
    - + AVERAGE FLOW UNIT PERMEABILITIES FROM CORE DATA ASSIGNED TO SIMULATOR LAYERS
    - + SIMULATOR LAYER THICKNESS, DEPTH, AND POROSITY DETERMINED FROM LOGS
    - + MODEL CONFIGURATION IS 24x1x13 (2D VARIABLE WIDTH) FOR BOTH UBC AND UCC
  - HISTORY MATCH ACTUAL PERFORMANCE
    - + ADJUST S_{WI} TO MATCH INITIAL WOR
    - + INITIALIZE GAS SATURATIONS IN UBC MODELS
      - o 7% IN LAYER 8 OF YCF #6 MODEL
      - o 20% IN LAYER 8 OF WM #6 MODEL
    - + MULTIPLY AIR PERMS
      - o 2.4x FOR UCC
      - o 1.7x FOR UBC

- GENERATE DIMENSIONLESS MODEL CURVES FOR EXISTING PROCESS
  + PRIMARY DEPLETION
- GENERATE DIMENSIONLESS MODEL CURVES FOR PROPOSED PROCESS(ES)
  + WATERFLOOD
  + CO_2 FLOOD
    - o SLUG
    - o SLUG/WAG COMBINATION
    - o WAG RATIO
    - o SLUG SIZES
    - o FINAL FLOOD PROCESS

- DEVELOP RESERVOIR VOLUMETRICS
  - DEVELOP GEOLOGIC MODEL
  - DEFINE PATTERN ELEMENTS
    + NO-FLOW BOUNDARIES ≈ SUBPATTERNS
  - GENERATE PATTERN ELEMENT VOLUMETRICS UTILIZING GEOLOGIC MODEL
    + 216 SUB-PATTERNS EX 6Z
    + 5 LAYERS PER SUBPATTERN
      - o POROSITY, NET PAY, S_{WI}, PERMEABILITY PER GEOLOGIC MODEL

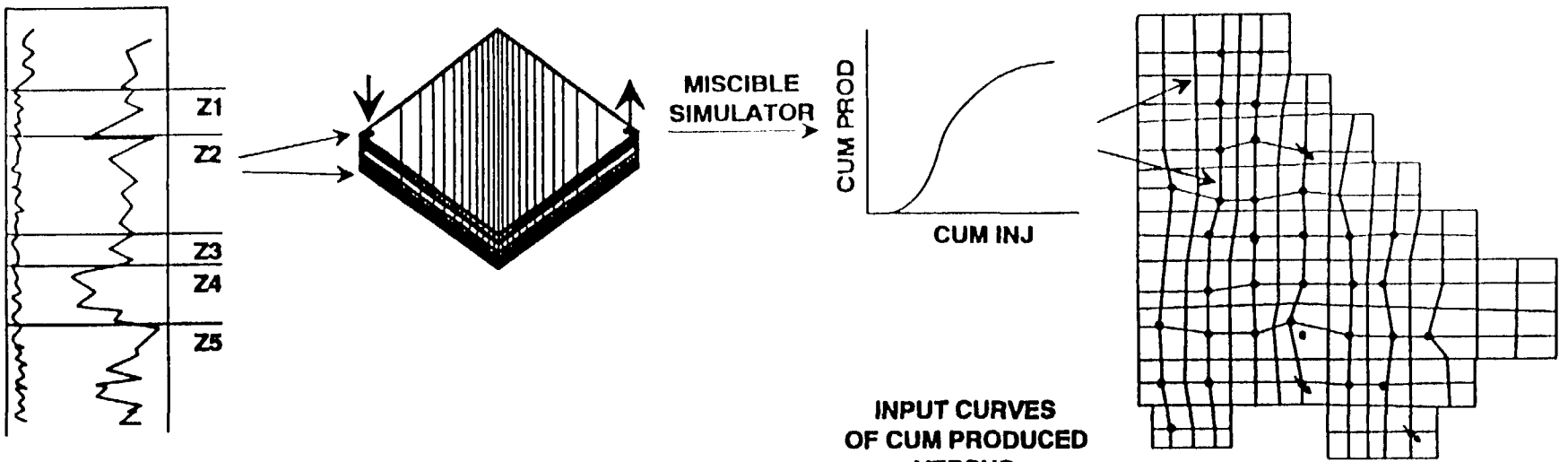
- HISTORY MATCH FULL-FIELD PERFORMANCE
  - UTILIZE PROTOTYPE CURVES, PATTERN ELEMENT VOLUMETRICS AND RATES
    + PRIMARY CURVES
    + ACTUAL RATES
  - ADJUST MODEL TO OBTAIN MATCH
    + WOR & GOR VS. CUM OIL FIRST ORDER CRITERION
    + EUR (MODEL) VS. EUR (DECLINE CURVE ANALYSIS) SECOND ORDER CRITERION
    + RECOGNIZED COMPLETION EFFICIENCIES

    + Parameter adjustments (in priority order)
        o Zone perms
        o Zone S_{WI}
        o Zone continuity
    + Review need for additional prototypes
        o Identified need for high GOR prototype (WM #6)

- Develop full-field flowstream prediction
    - Define project development plan to establish schedule/timing
        + Waterflood
            o Work program
            o Injection schedule
        + CO_2
            o Work program
            o Injection schedule
    - Utilize new process curves, volumetrics and predicted rates from history match
        + Water injection calibration
        + CO_2 process alternatives, sensitivities
            o Process type
            o Final flood process
            o Slug size
            o Other sensitivities

GOODWIN
12-9-92

AVALON (DELAWARE) PROJECT
FLOWSTREAM DEVELOPMENT METHODOLOGY



RESERVOIR DESCRIPTION

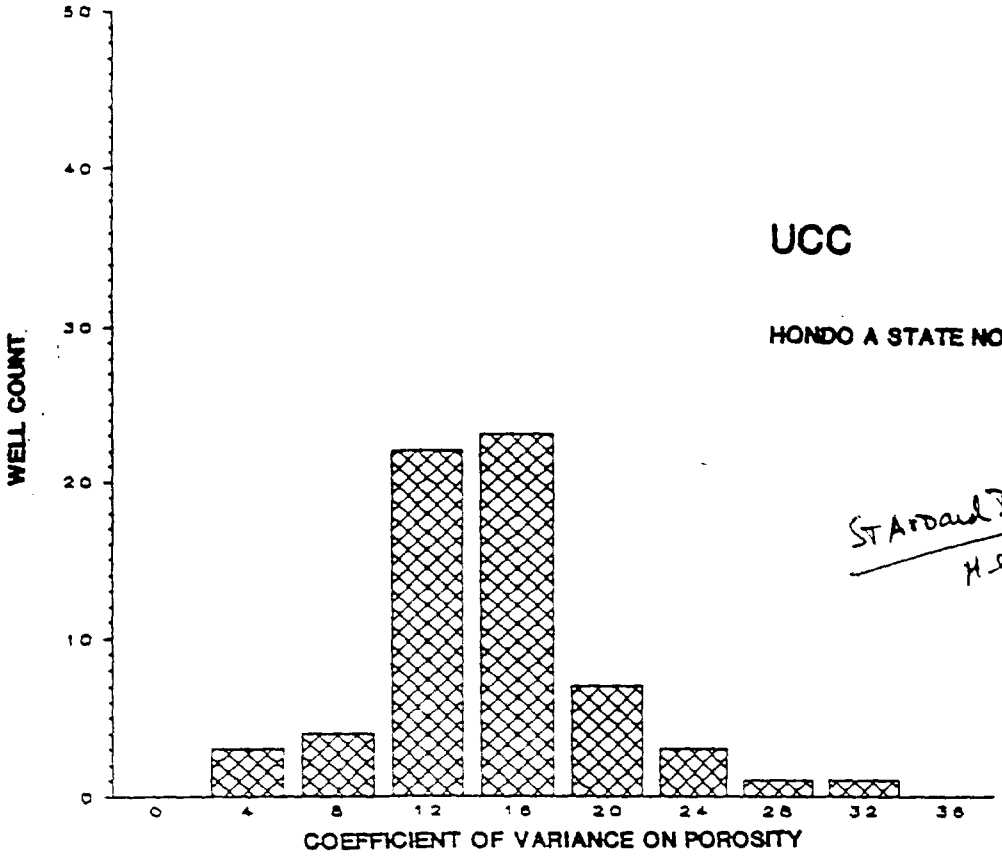
SIMULATOR MODEL OF MAJOR FLOW UNIT

INPUT CURVES OF CUM PRODUCED VERSUS CUM INJECTED FOR PRIMARY, WATER INJECTION, AND CO2 INJECTION

PROJECT AREA PATTERN DESCRIPTION AND DEVELOPMENT PLAN

Exhibit G-1

FREQUENCY CHART OF THE COEFFICIENT OF VARIANCE ON POROSITY



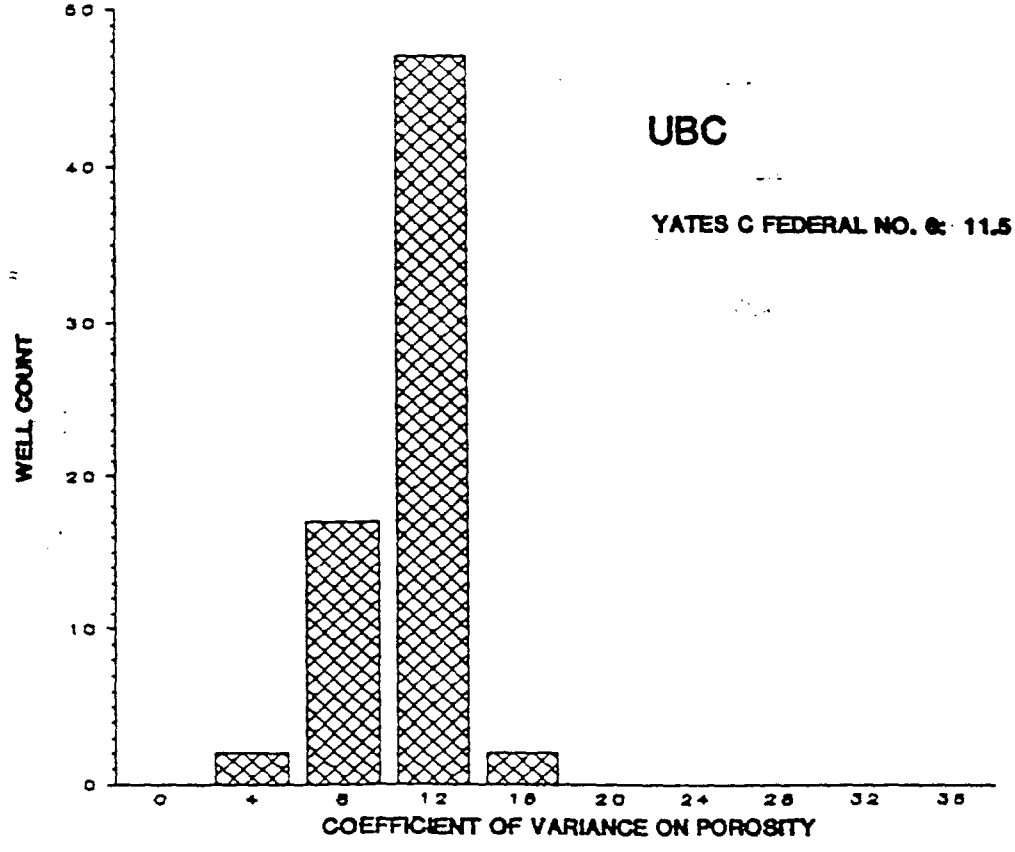


Exhibit F-3

UPPER CHERRY CANYON MODEL DESCRIPTION

LAYER	THICKNESS (FT)	Ø (%)	Kx (MD)	Kz (MD)	LAYER
1	5	11.7	1.20	0	1
2	8	12.5	1.20	0	2
3	16	15.0	1.37	1.62	3
4	16	15.4	4.67	1.28	4
5	12	14.5	2.98	0	5
6	3	14.7	4.56	1.57	6
7	13	16.6	11.24	0.72	7
8	4	15.5	1.57	0	8
9	5	15.9	7.40	0.71	9
10	16	18.3	4.60	0.37	10
11	29	15.8	1.20	0	11
12	24	15.4	1.20	0	12
13	27	16.3	0.75		13

UPPER BRUSHY CANYON MODEL DESCRIPTION

LAYER	THICKNESS (FT)	Ø (%)	Kx (MD)	Kz (MD)	LAYER
1	12	15.4	1.49	0	1
2	13	15.6	1.00	0	2
3	12	14.7	1.49	0.36	3
4	8	14.1	0.70	0	4
5	19	14.0	0.87	0.01	5
6	5	15.8	2.02	0.05	6
7	30	14.0	0.95	0	7
8	12	13.6	2.94	0.31	8
9	13	14.7	1.96	0	9
10	8	17.7	6.44	0.37	10
11	13	16.4	2.85	0	11
12	8	13.5	3.32	0.14	12
13	10	16.9	2.47		13

PATTERN ELEMENT MODEL

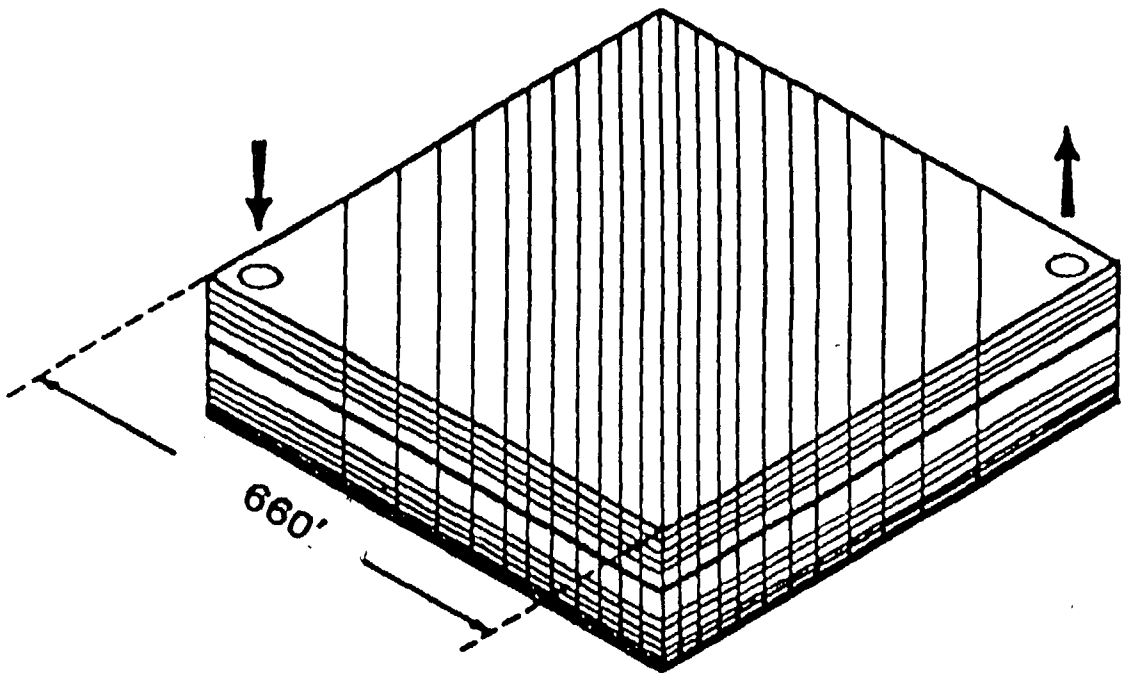
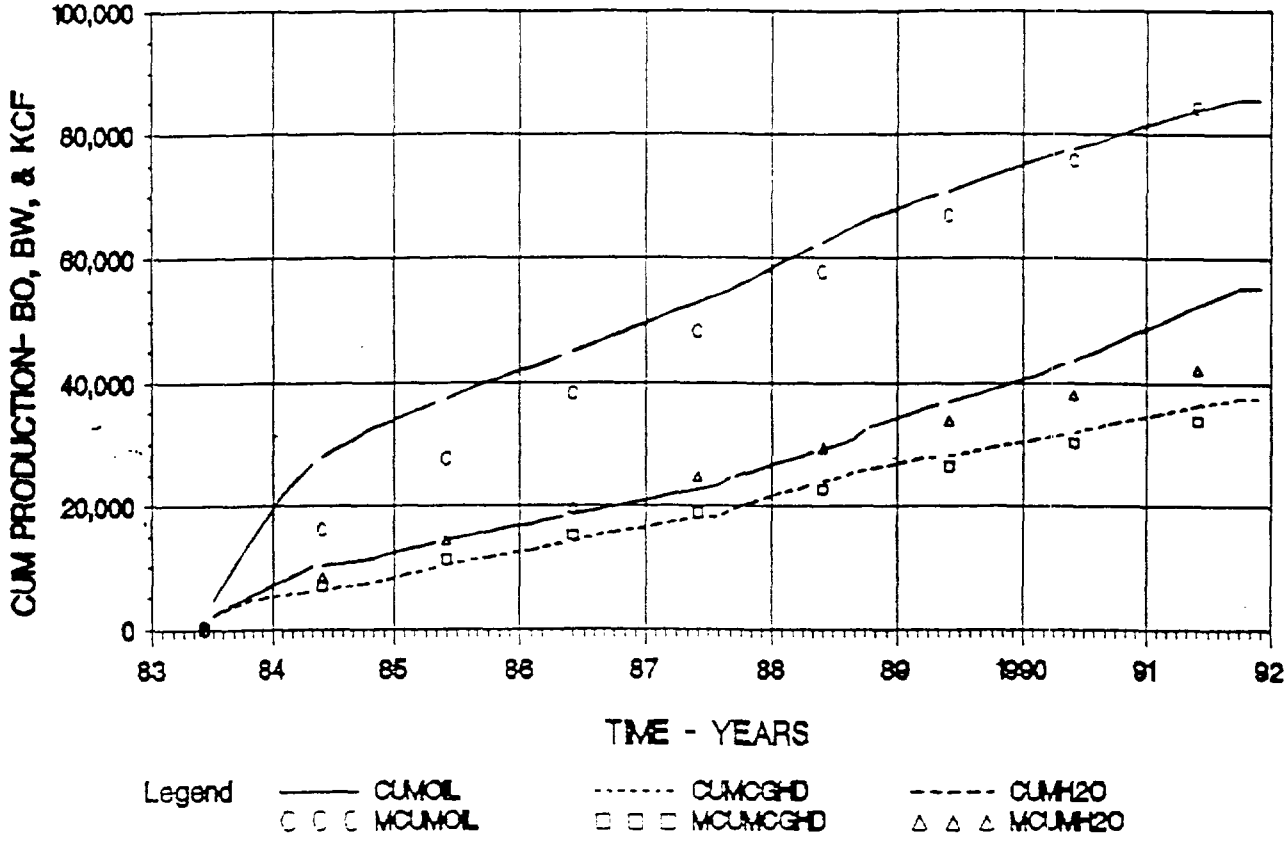


Exhibit F-2

AVALON UCC
HONDO A STATE NO. 4 HISTORY MATCH



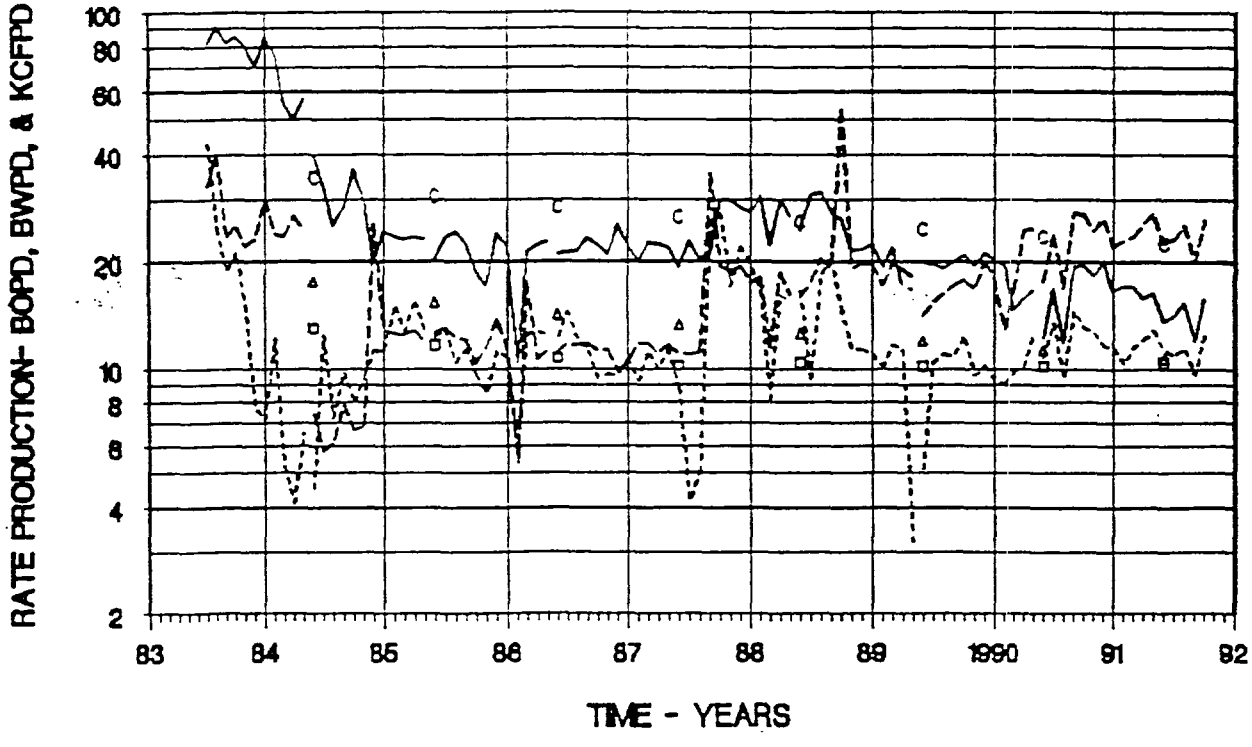
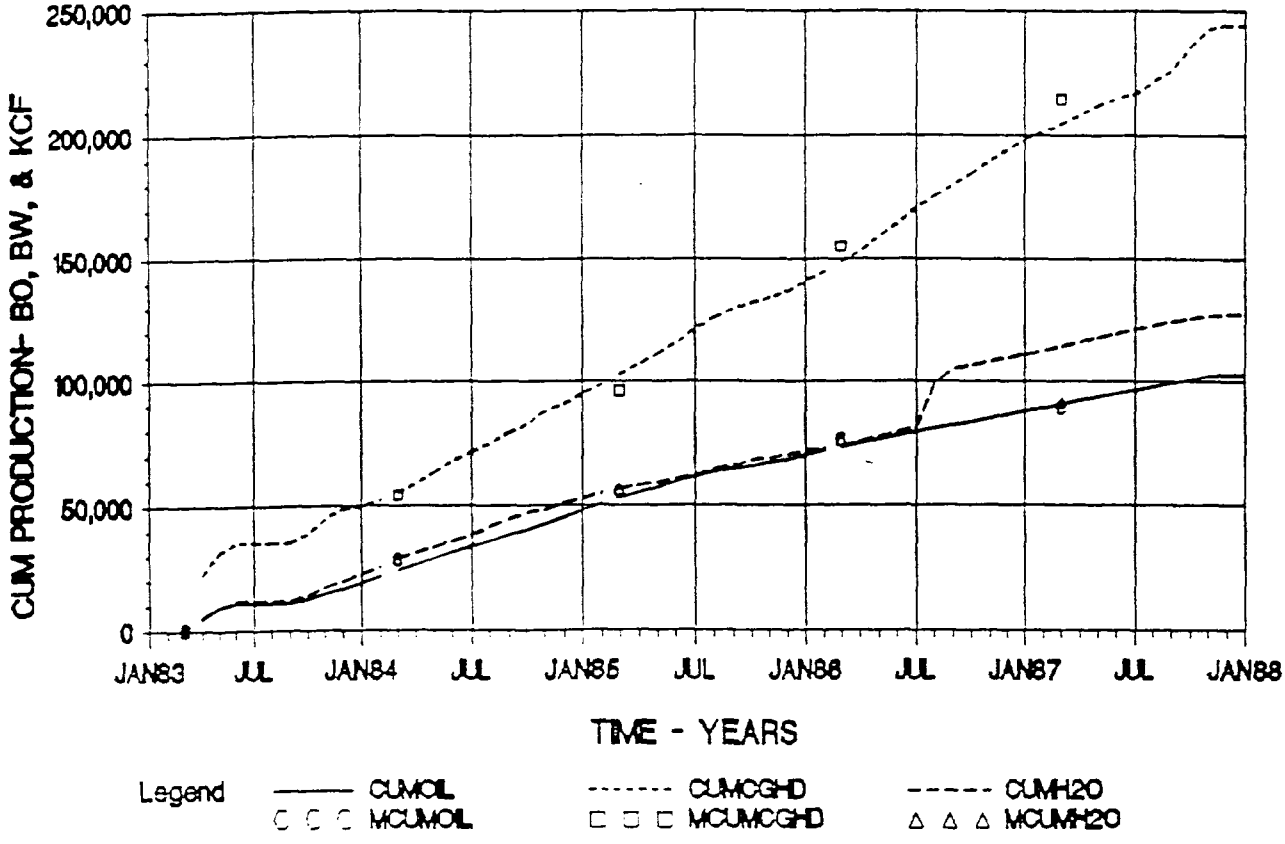


Exhibit F-12

AVALON UBC
YATES C FEDERAL NO. 6 HISTORY MATCH



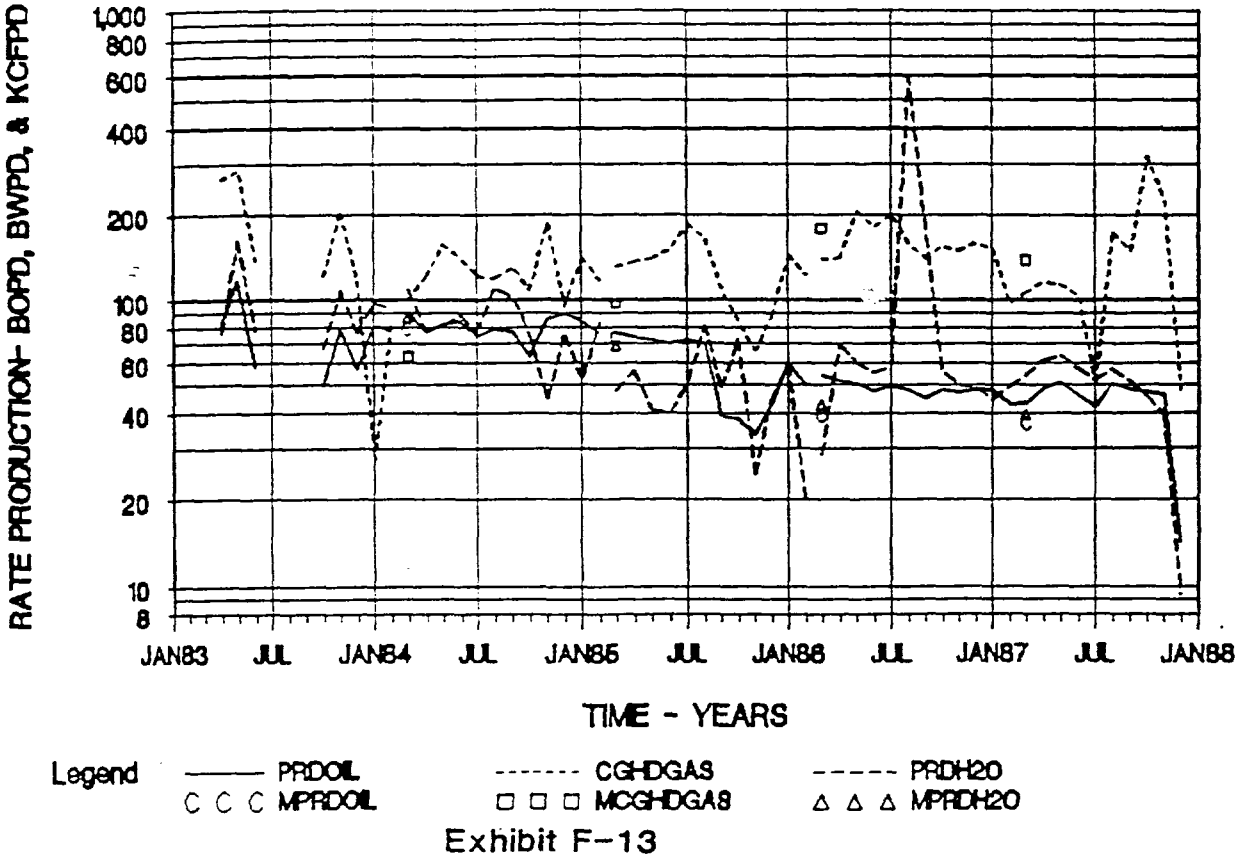
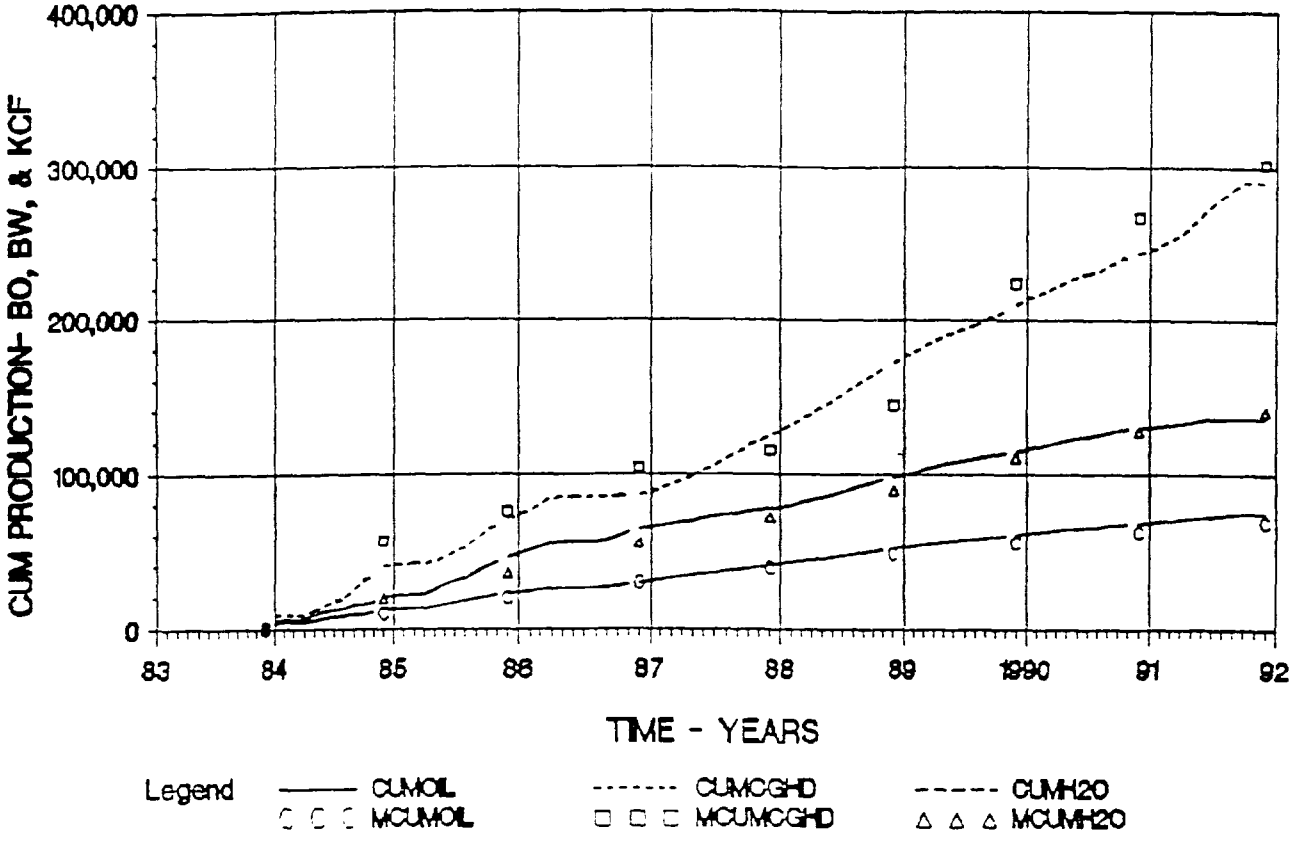


Exhibit F-13

AVALON UBC
STONEWALL WM STATE NO. 6 HISTORY MATCH



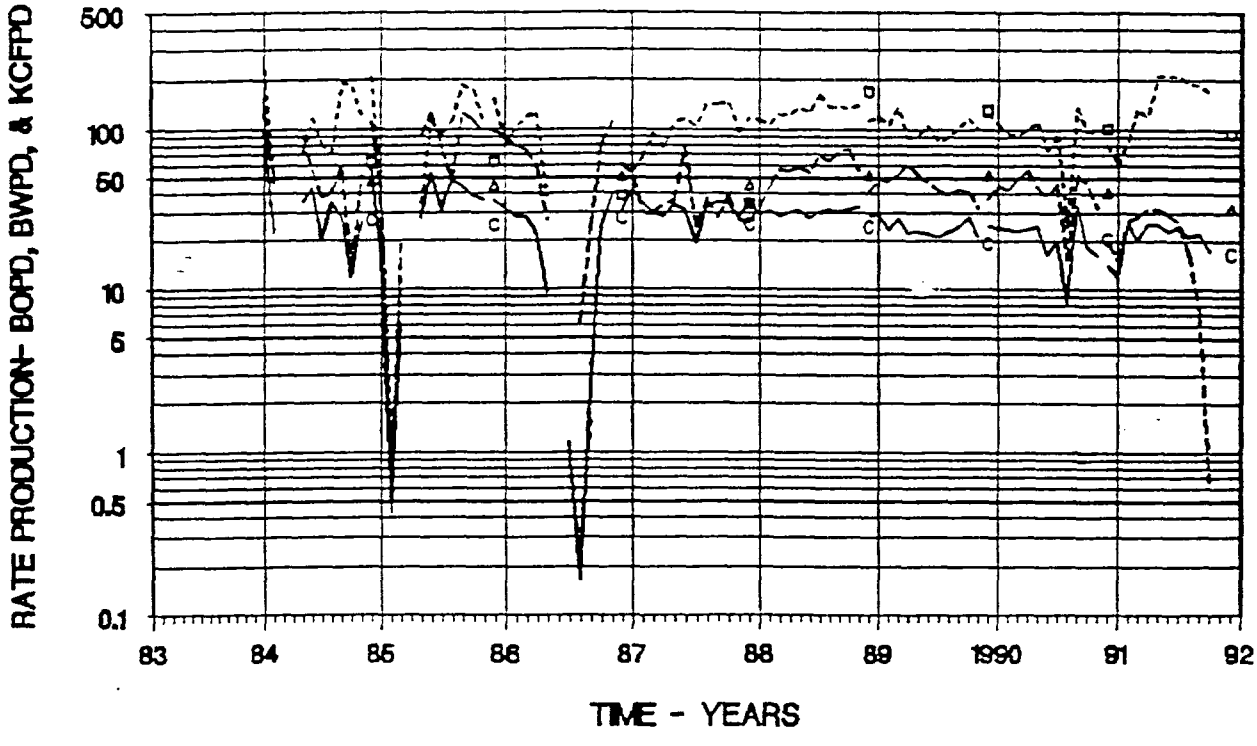
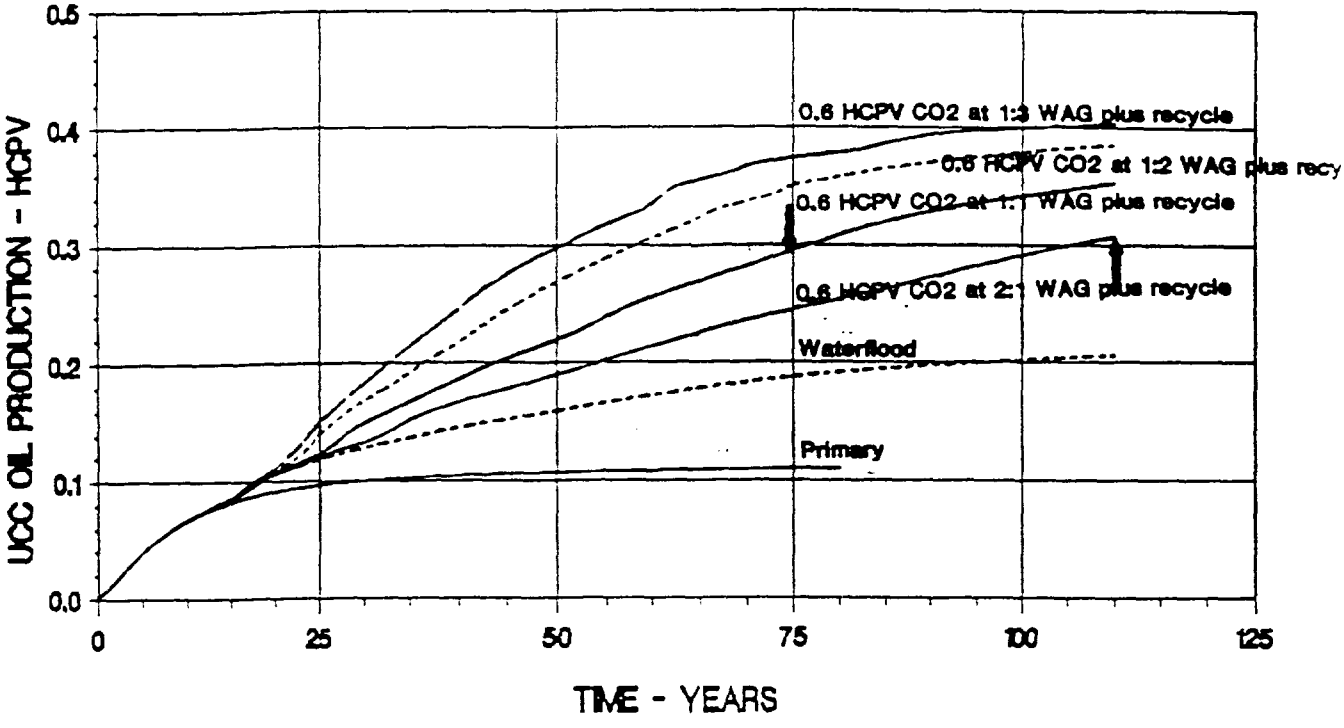
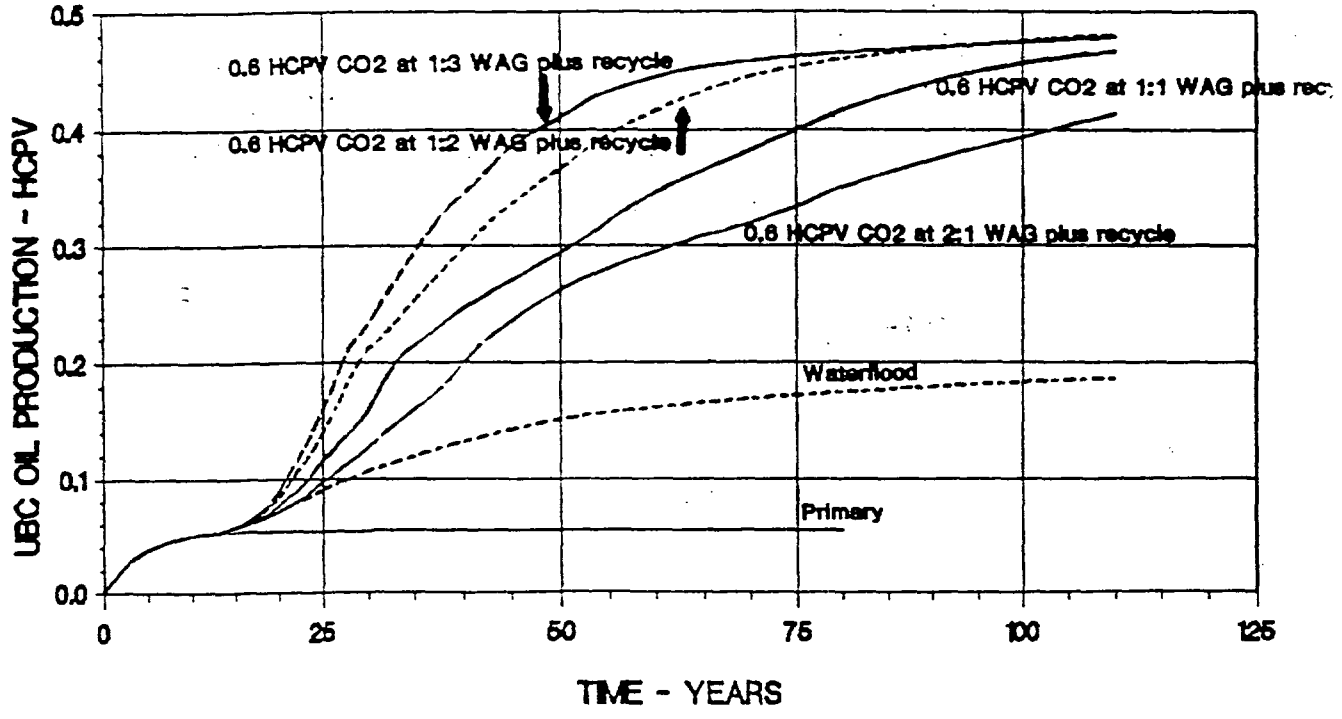


Exhibit F-14

PATTERN ELEMENT MODEL PREDICTIONS
COMPARING WAG RATIOS





Yates C6

Exhibit F-19

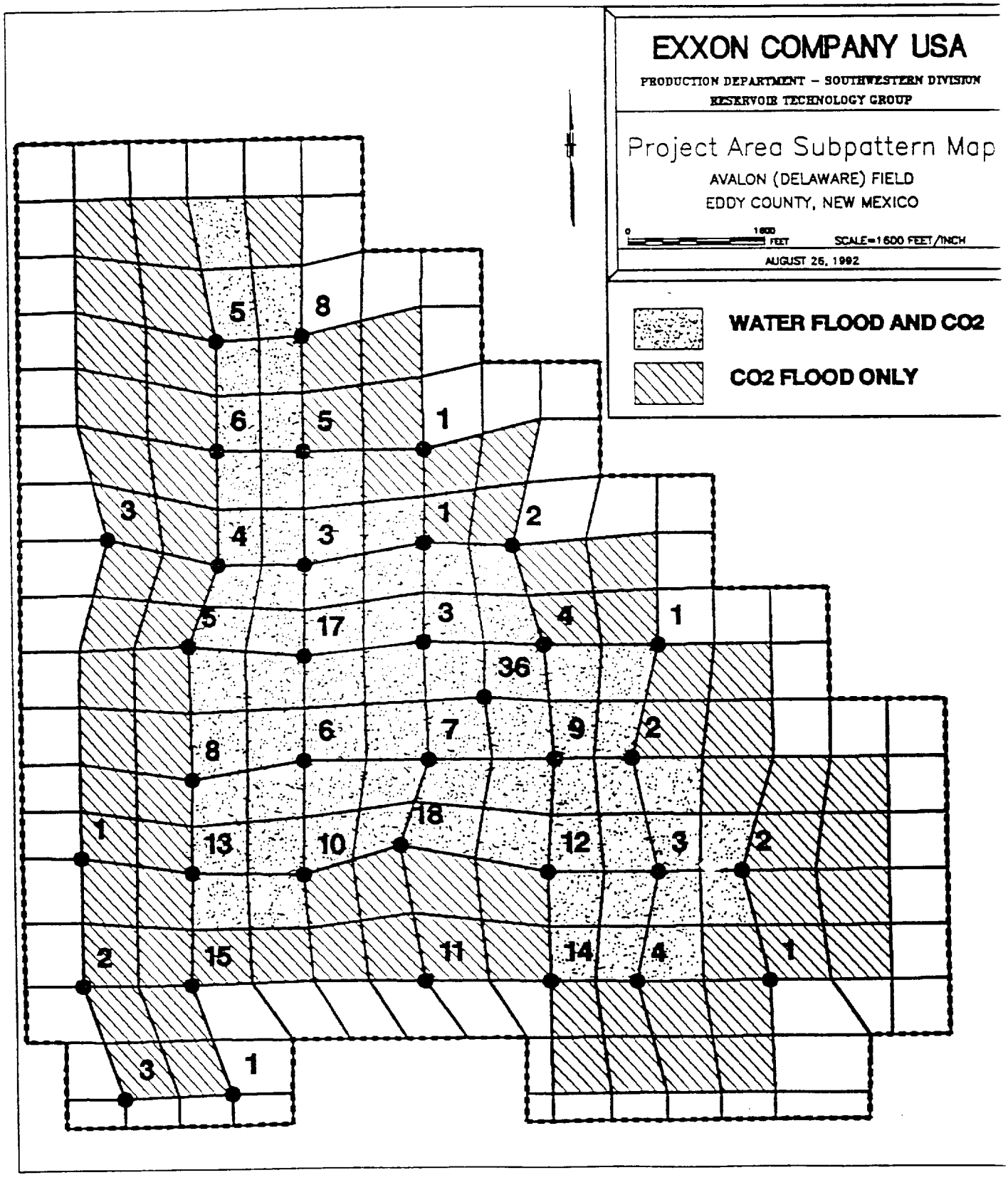
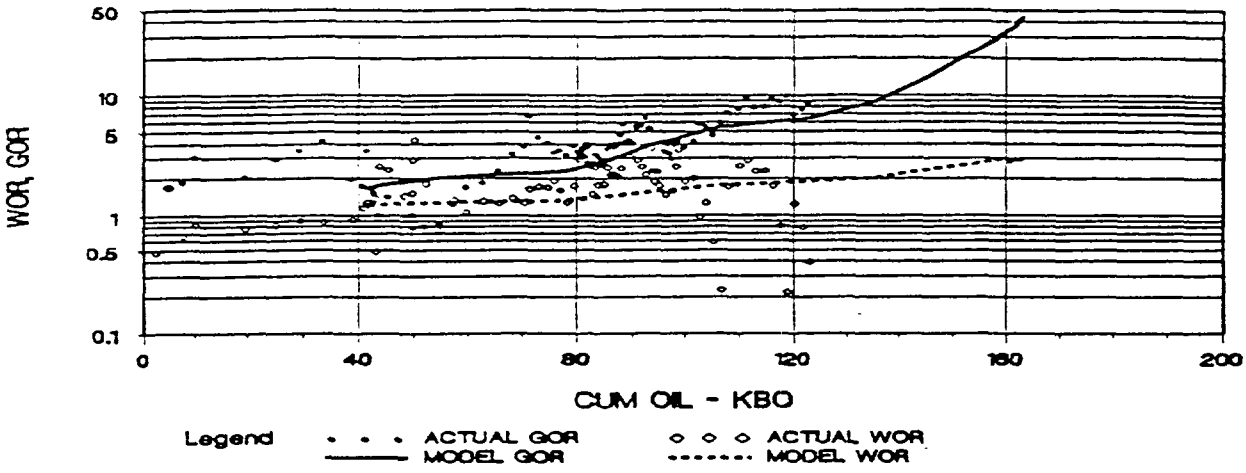

EXXON COMPANY USA
PRODUCTION DEPARTMENT – SOUTHWESTERN DIVISION
RESERVOIR TECHNOLOGY GROUP
Project Area Subpattern Map
AVALON (DELAWARE) FIELD
EDDY COUNTY, NEW MEXICO
0
1600
FEET
SCALE=1600 FEET/INCH
AUGUST 26, 1992
WATER FLOOD AND CO2
CO2 FLOOD ONLY
5
8
6
5
1
3
4
3
1
2
5
17
3
4
1
36
6
7
9
2
8
1
18
13
10
12
3
2
2
15
11
14
4
1
3
1

Exhibit G-2

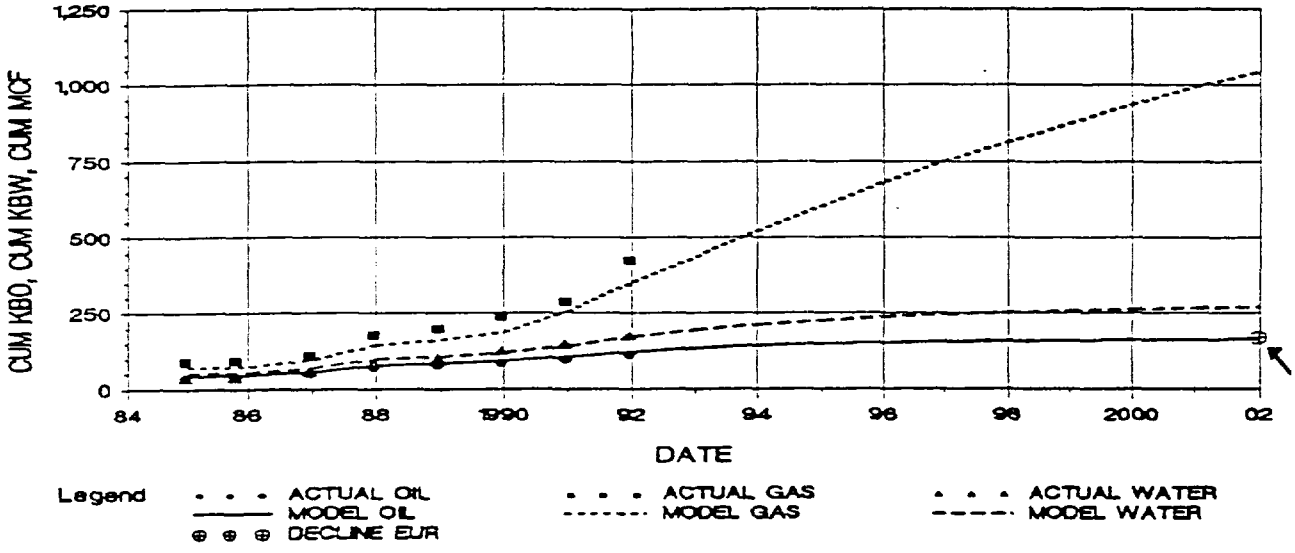
AVALON FIELD
PRIMARY HISTORY MATCH
WELL = STONEWALL EP STATE #05 (1311)

Hard Match Criteria

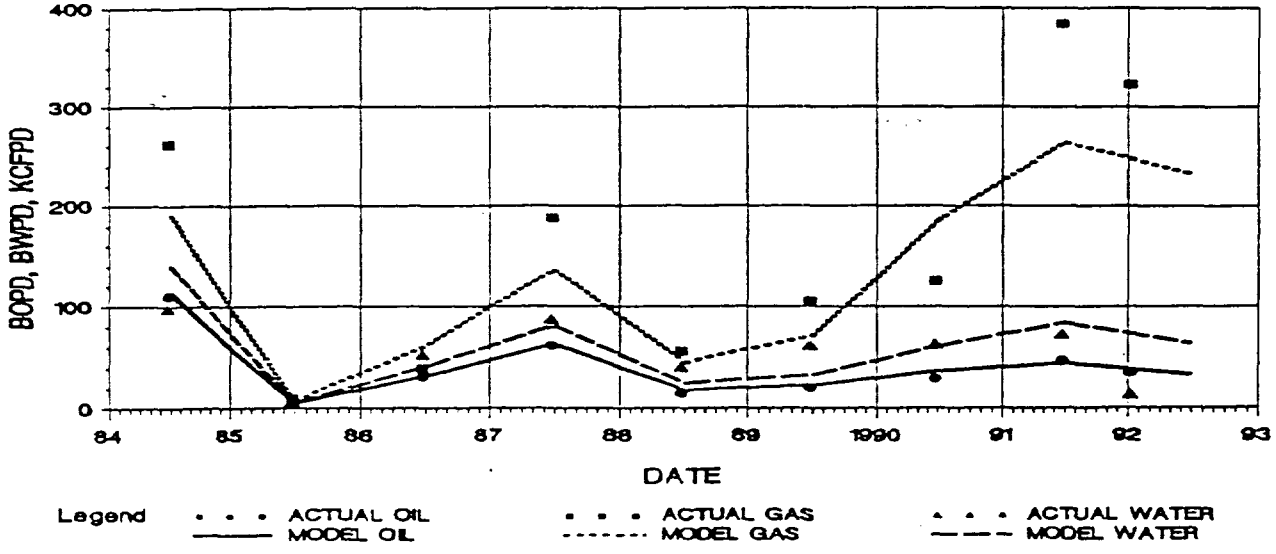


WELL = STONEWALL EP STATE #05 (1311)

Hard to hit 2 curves

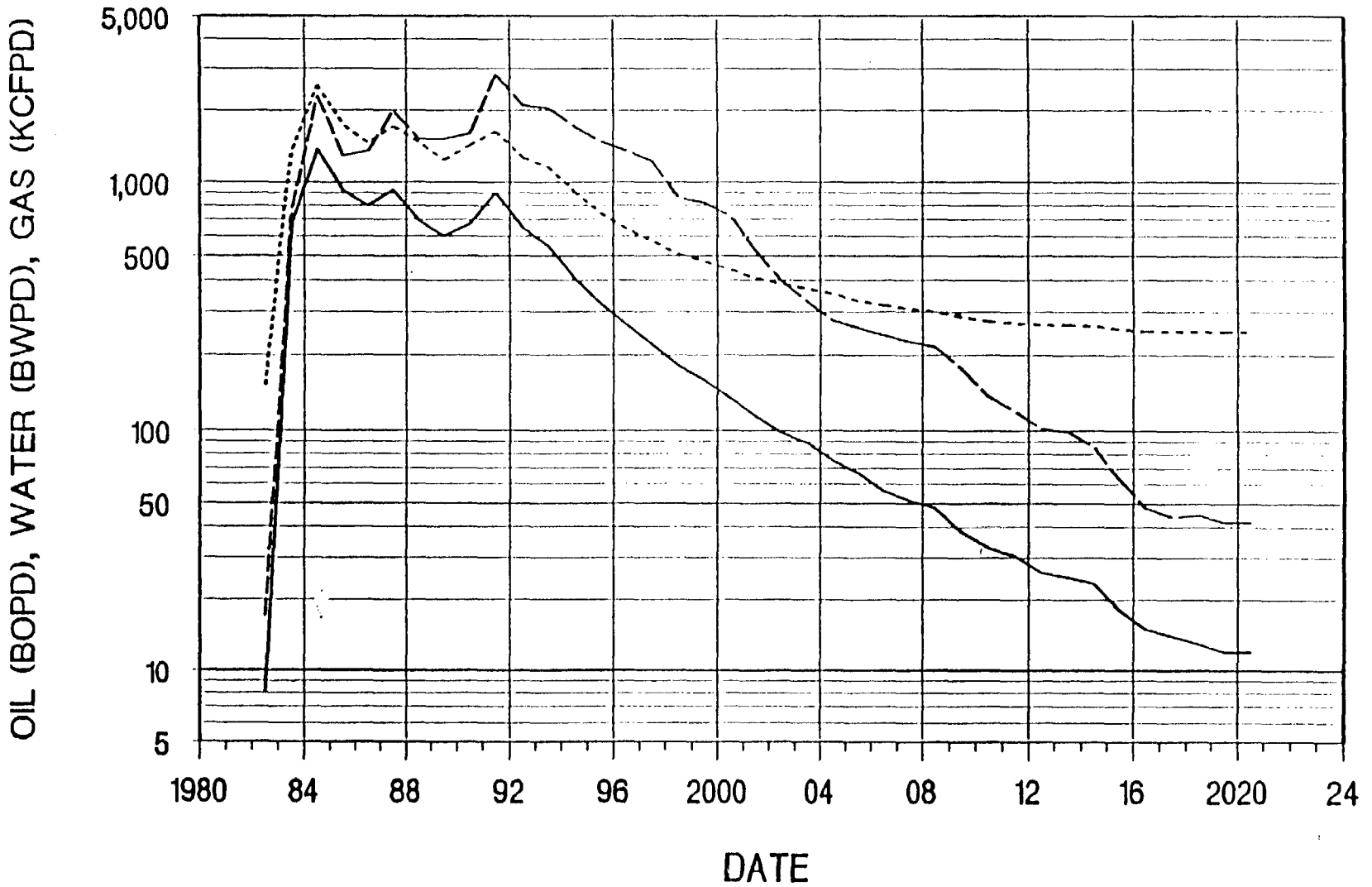


WELL = STONEWALL EP STATE #05 (1311)

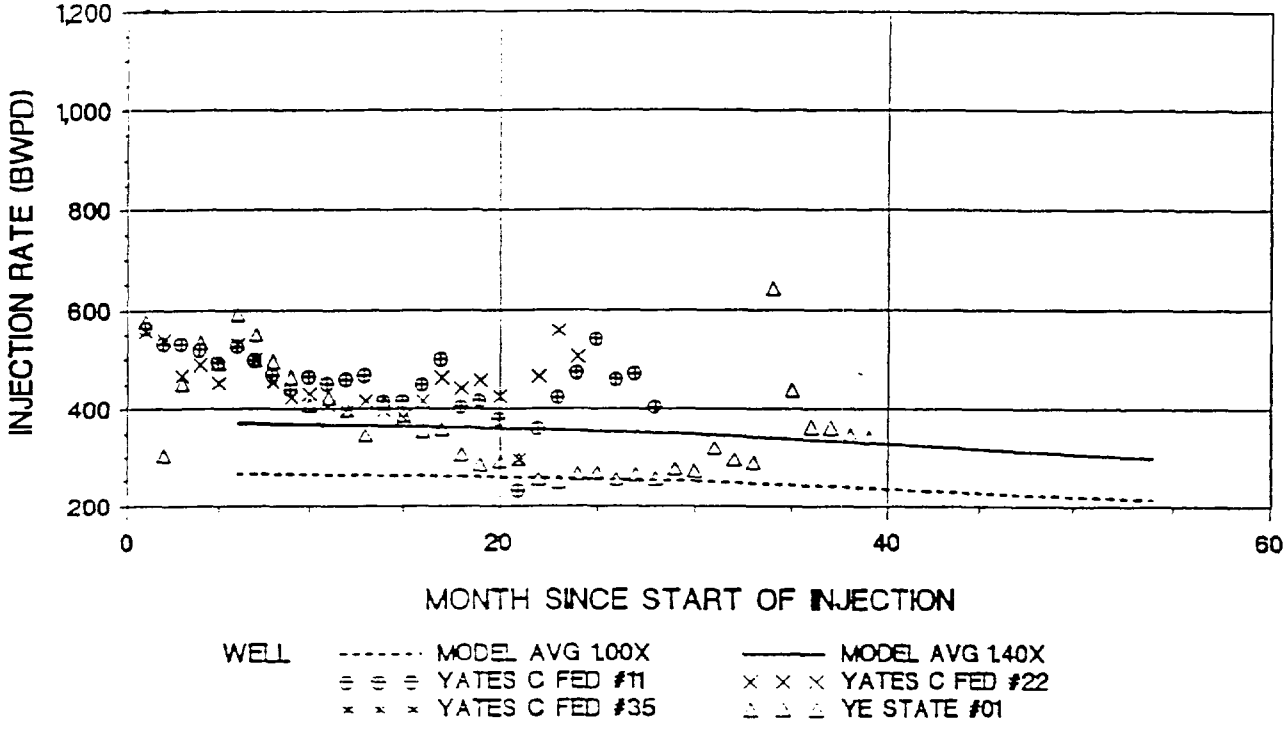


AVALON PROJECT FLOWSTREAMS

CONTINUED PRIMARY



AVALON WATER INJECTIVITY
COMPARISON OF ACTUAL VERSUS MODEL



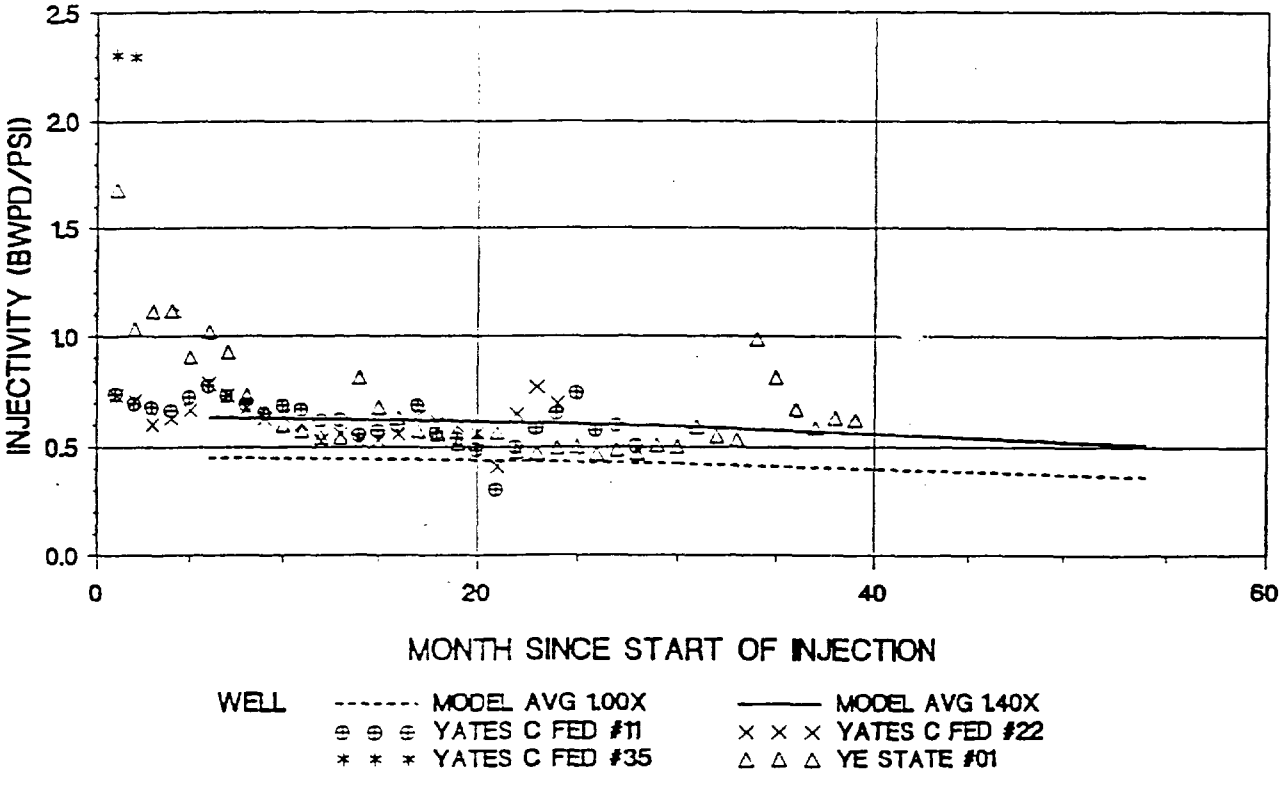
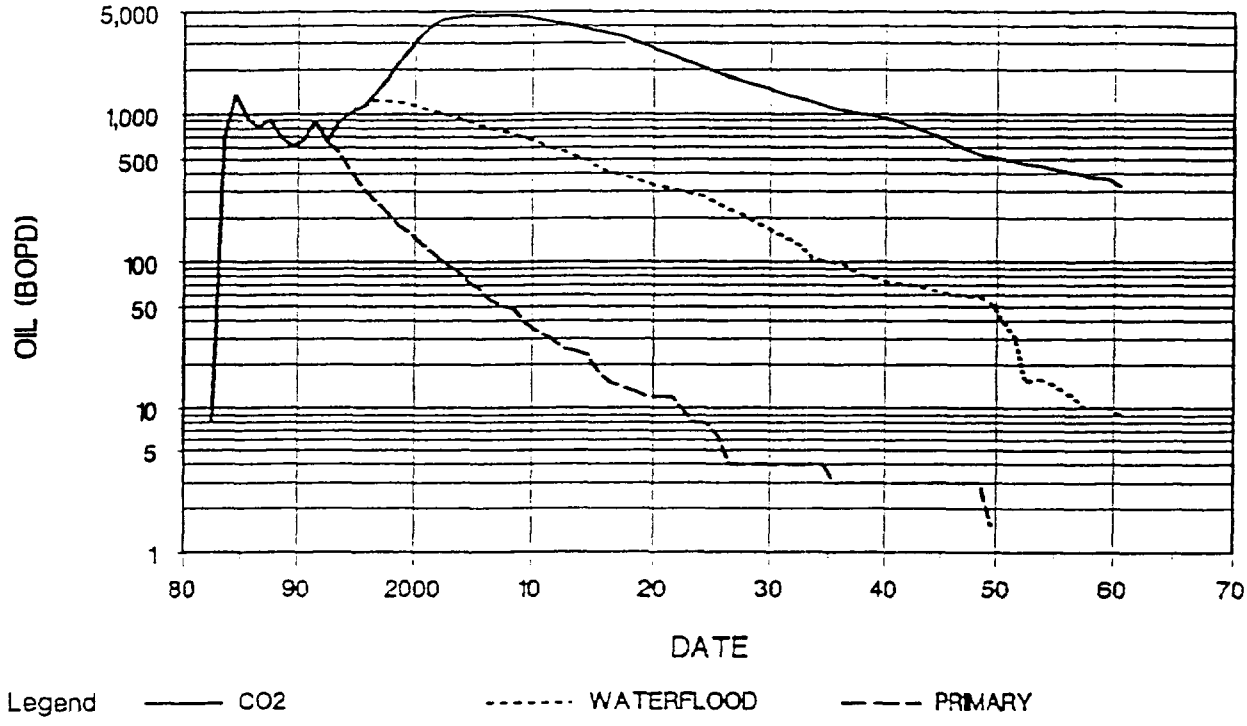


Exhibit G-12

AVALON PROJECT FLOWSTREAMS
PROJECT COMPARISON



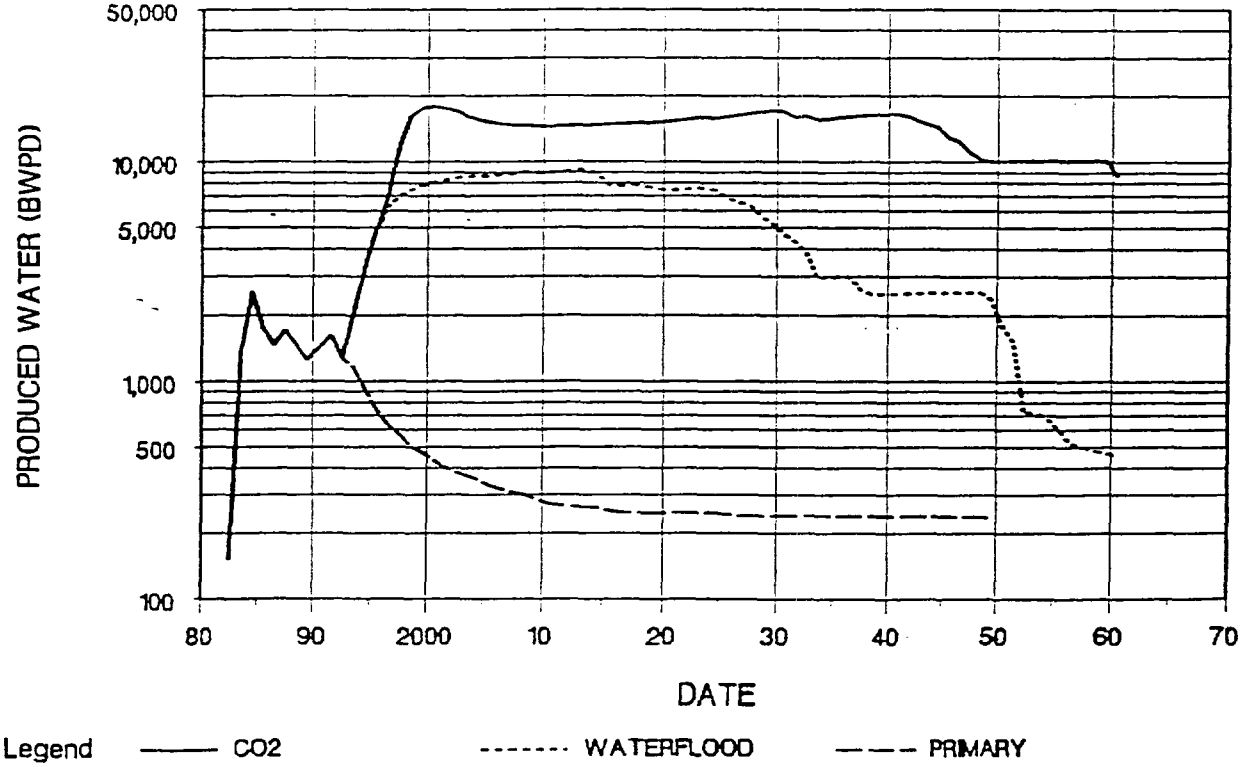


Exhibit G-15

Goodwin
12-9-92

DECLINE CURVE ANALYSIS METHODOLOGY

- FOR CAPACITY WELLS:
  - DEFINE TIME INTERVAL FOR DECLINE ANALYSIS
  - DEVELOP LEAST-SQUARES FIT FOR LOG OIL RATE VS. TIME, OIL RATE VS. CUM OIL FOR TIME INTERVAL
  - GENERATE WEIGHTED EUR ESTIMATE, WEIGHTING BASED ON CORRELATION COEFFICIENT
- FOR GOR ALLOWABLE RESTRICTED WELLS:
  - DEFINE TIME INTERVALS OF CAPACITY PRODUCTION
  - DEVELOP LEAST SQUARE FIT OF CAPACITY OIL RATE VS. CUM OIL FOR TIME INTERVALS
  - DEFINE TIME INTERVAL FOR GOR TREND ANALYSIS
  - DEVELOP LEAST SQUARE FIT OF LOG GOR VS. CUM OIL
  - GENERATE WEIGHTED EUR ESTIMATE, WEIGHTING BASED ON CORRELATION COEFFICIENT

DECLINE CURVE ANALYSIS
EP #5, EP #8, YCF #3, YCF #4

EP #5 & #8

DATA SUPPORTING INCREASING EUR:

- UPDATED ANALYSIS THROUGH 7/92 W/TECH. RPT. METHODOLOGY
- GOR LIMIT MAY HAVE BEEN RESTRICTIVE
- CAPACITY DECLINE ANALYSIS FOR 10/90-7/92

DATA SUPPORTING DECREASING/NO CHANGE:

- GOR HAS INCREASED TO 8,000-10,000 RANGE
- GOR VERSUS CUM OIL MODELING
- CAPACITY DECLINE ANALYSIS FOR 4/91-7/92

YCF #3

Data Supporting decreasing EUR:

- Updated analysis through 7/92 w/Tech. Rpt. methodology
- Capacity decline analysis for 3/91-7/92

Data supporting increasing/no change:

- GOR still in 4,000-5,000 range
- Performance of YCF #36

YCF #4

Data supporting decreasing EUR:

- Alternate capacity analysis for 12/88-12/90 (well"shut-in" 1991 due to YCF #36 D&C)

Data supporting increasing/no change:

- Technical Report analysis
- Performance of YCF #36
- GOR versus cum oil modeling

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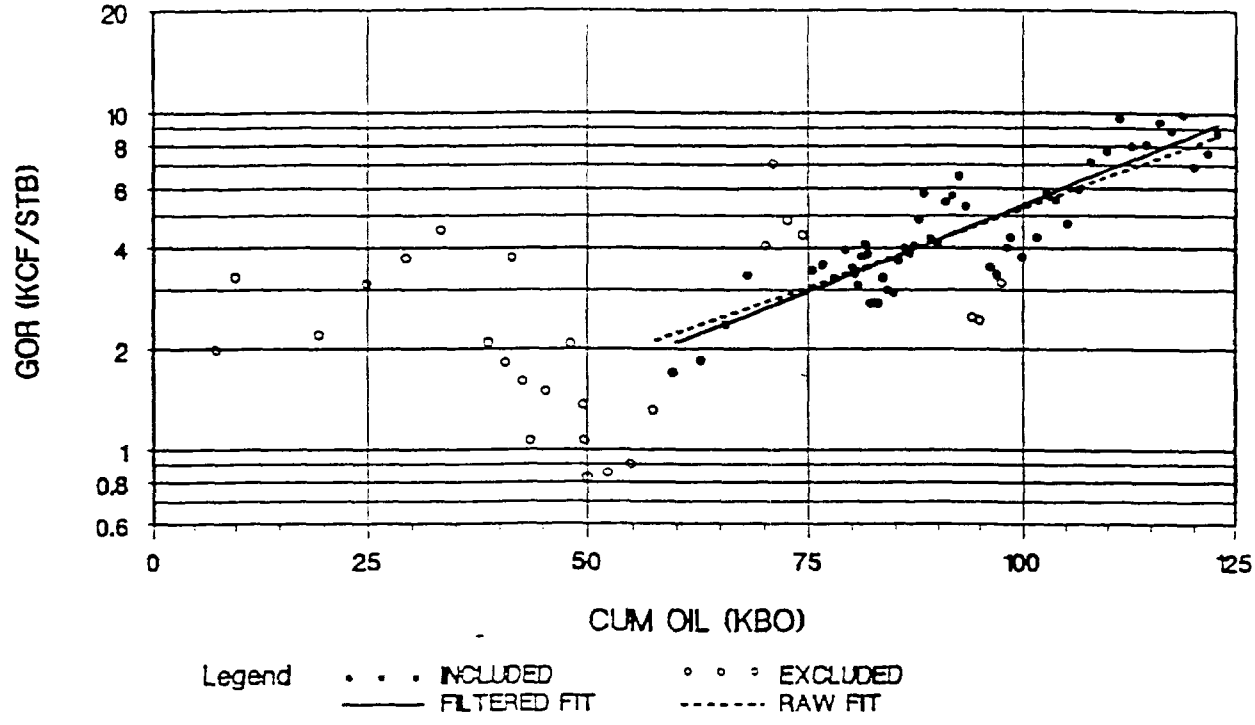
12-9-92

AVALON DECLINE CURVE ANALYSIS

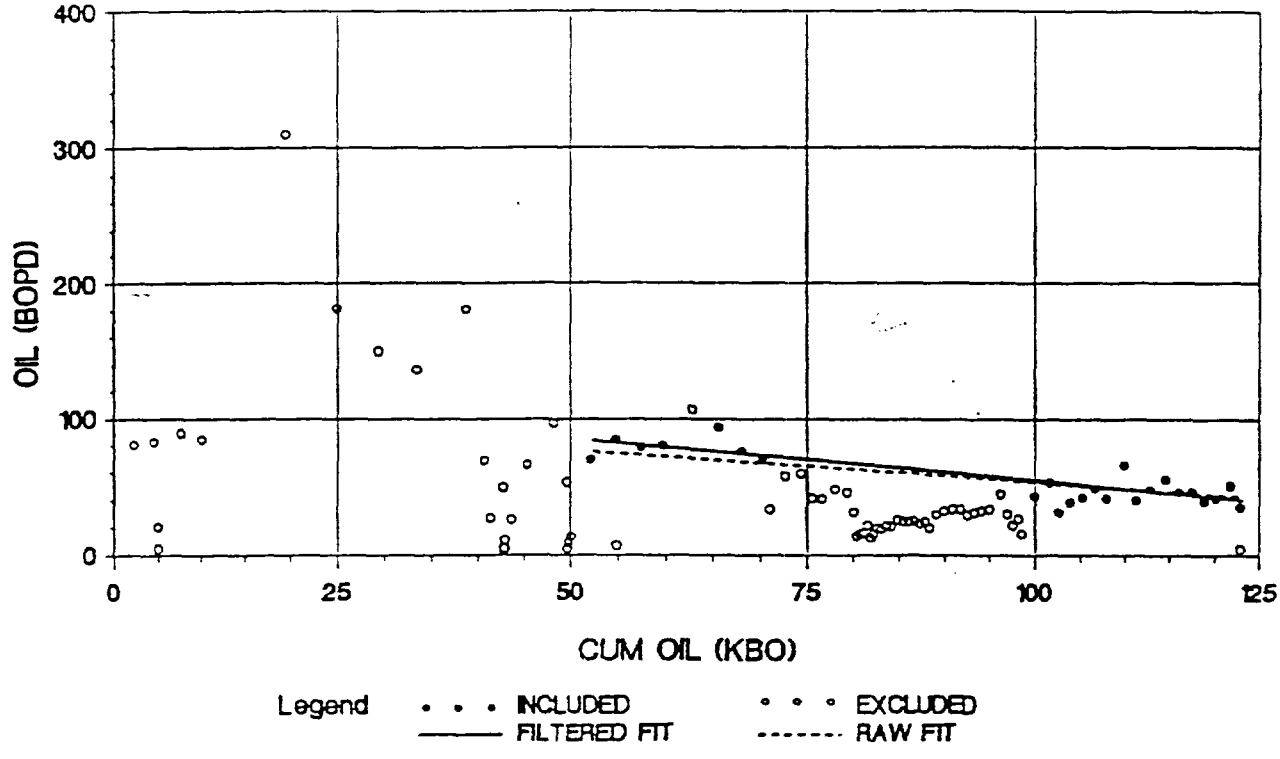
	Technical Report Methodology								Capacity Decline Analysis			
Well	Capacity Production Date Ranges			GOR Date Range	Tech Rpt EUR	7/92 Update EUR	GOR lim = 30,000 EUR	300 ↓	Date Range	Weighted EUR	Date Range	Weighted EUR
	Range 1	Range 2	Range 3					185				
EP #5	10/86-3/87	4/87-6/87	9/90-1/92	1/87-1/92	171.6	176.9	186.3		10/90-7/92	252.4	4/91-7/92	153.1
EP #8	5/84-10/84	1/87-6/87	9/90-1/92	11/85-1/92	141.2	144.2	153.2	~165 157	10/90-7/92	187.3	4/91-7/92	135.9
→ YCF #3	2/88-9/88	5/89-9/89	2/91-1/92	1/85-1/92	385.7	362.6	425.1	305	3/91-7/92	296.7		
YCF #4			8/89-6/91		239.7	NC	NC	209	12/88-12/90	191.2		
YCF #36					44.0				3/91-7/92	200.2		

AVALON FIELD DECLINE CURVES

WELL = STONEWALL EP STATE #05 (1311)

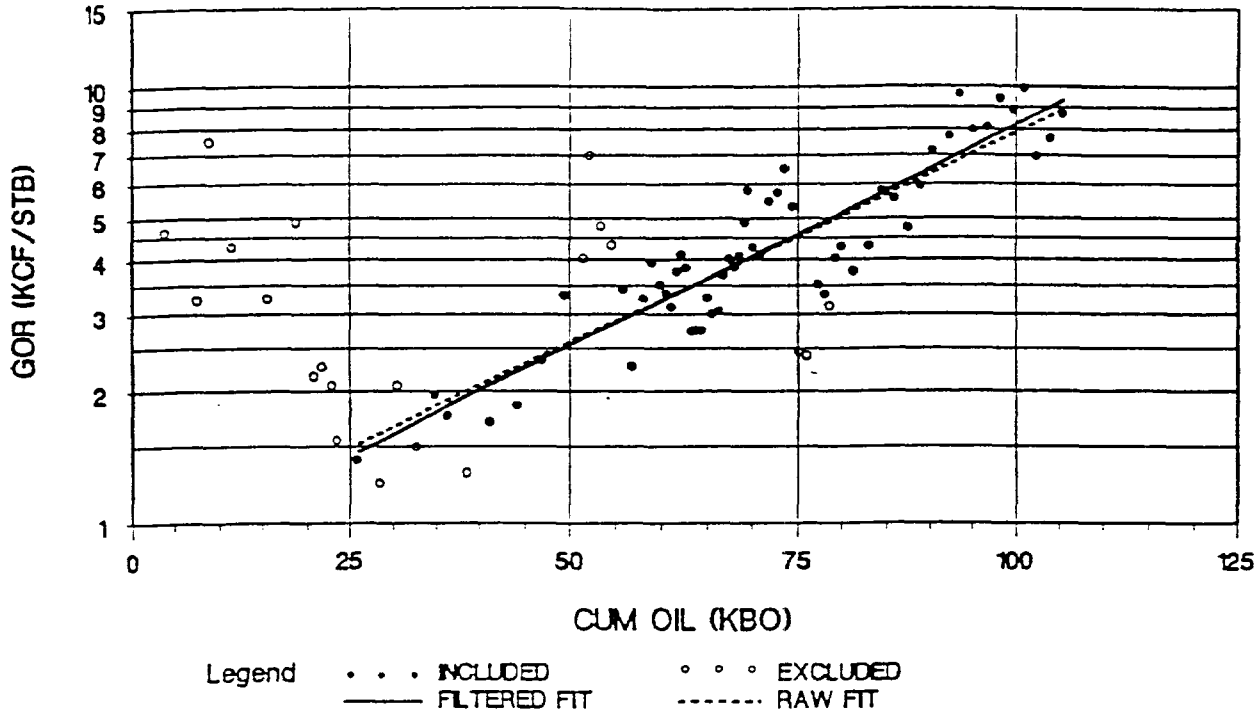


WELL = STONEWALL EP STATE #05 (1311)

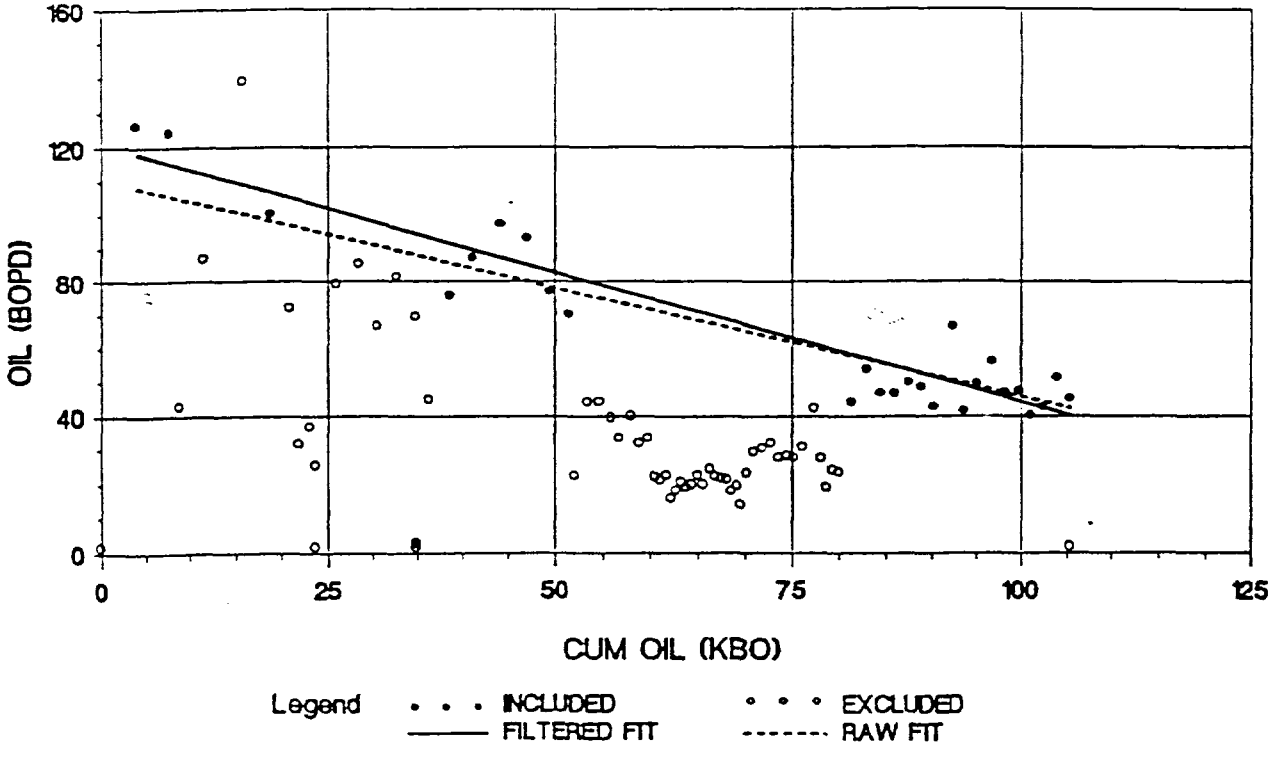


AVALON FIELD DECLINE CURVES

WELL = STONEWALL EP STATE #08 (1313)

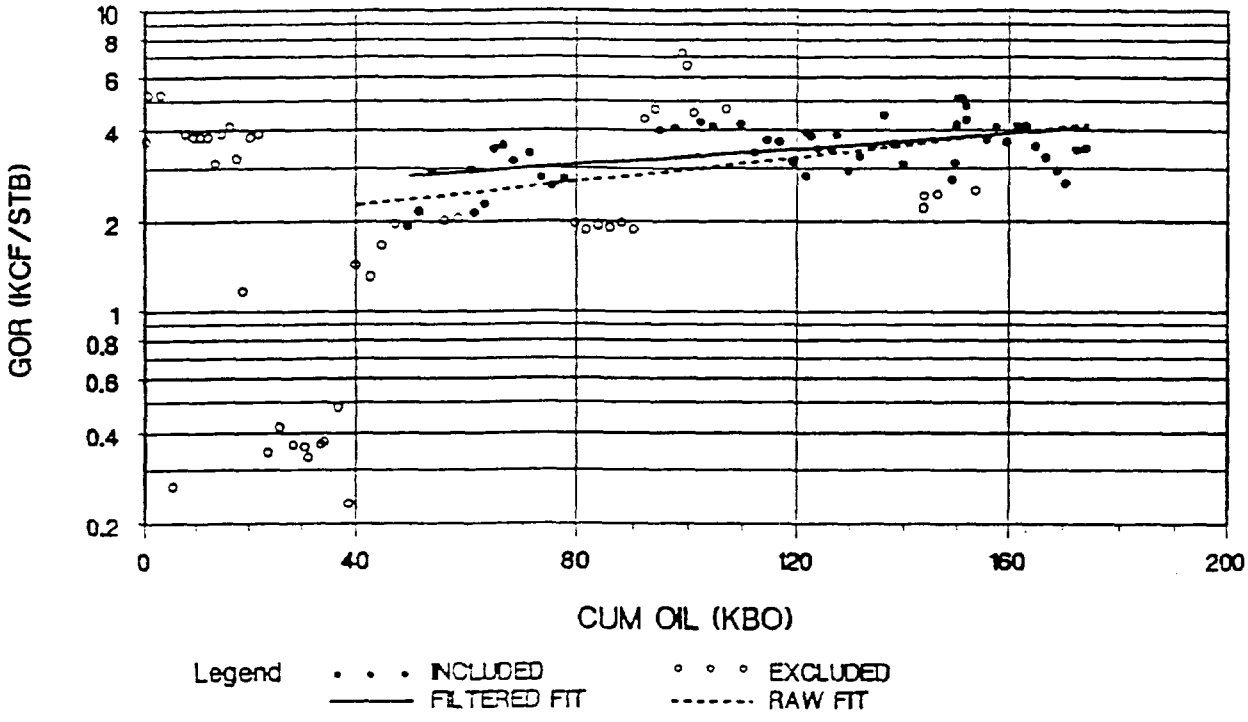


WELL = STONEWALL EP STATE #08 (1313)

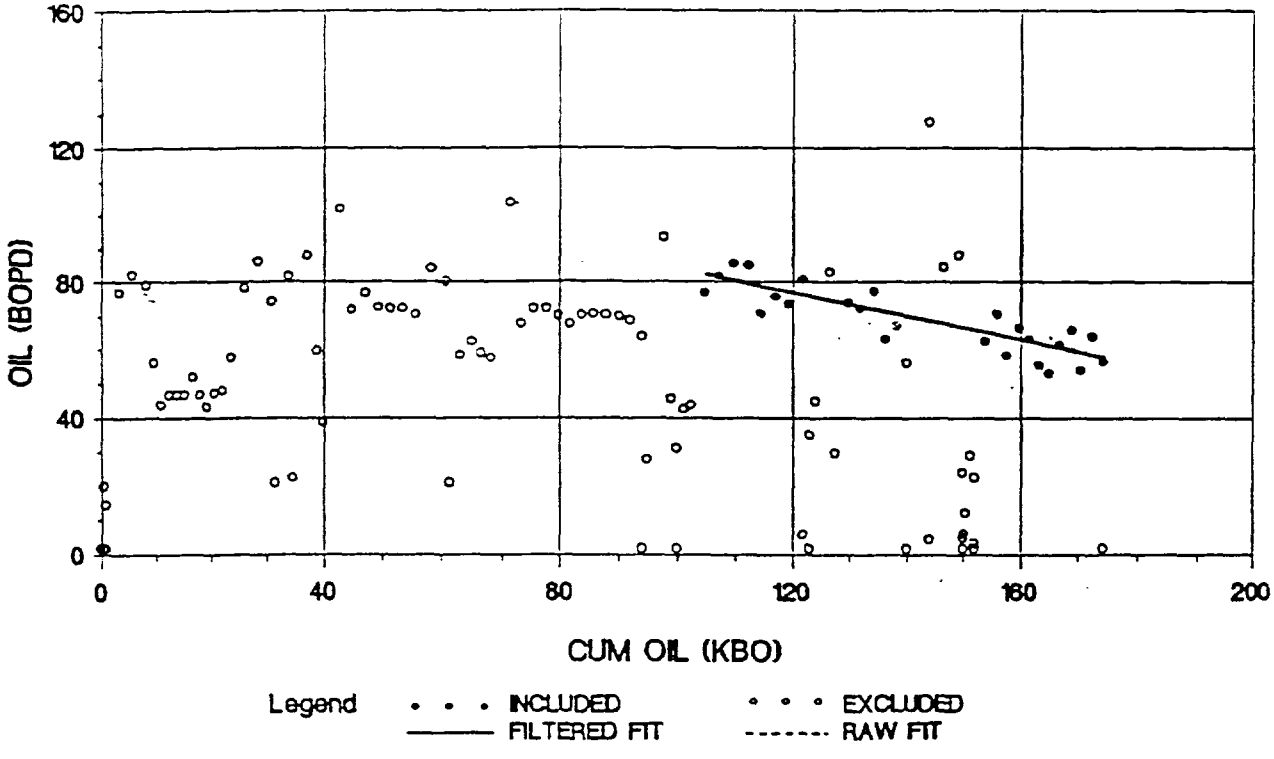


AVALON FIELD DECLINE CURVES

WELL = YATES C FEDERAL #03 (1915)

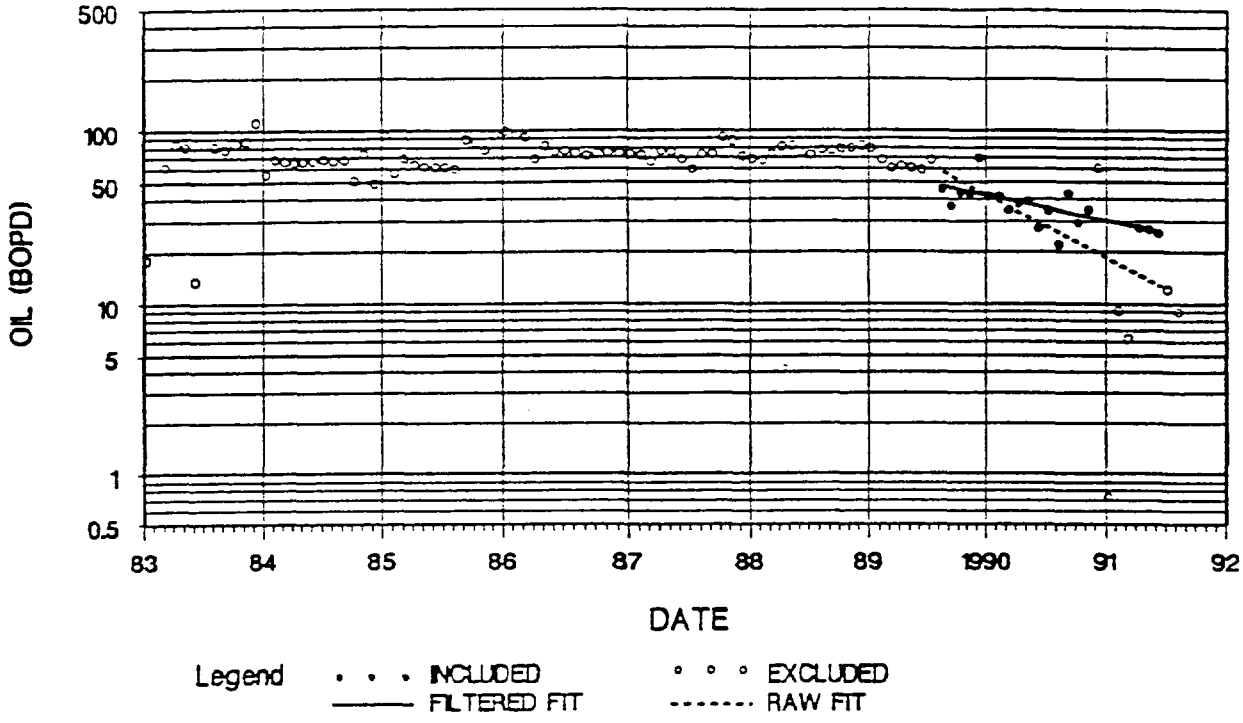


WELL = YATES C FEDERAL #03 (1915)

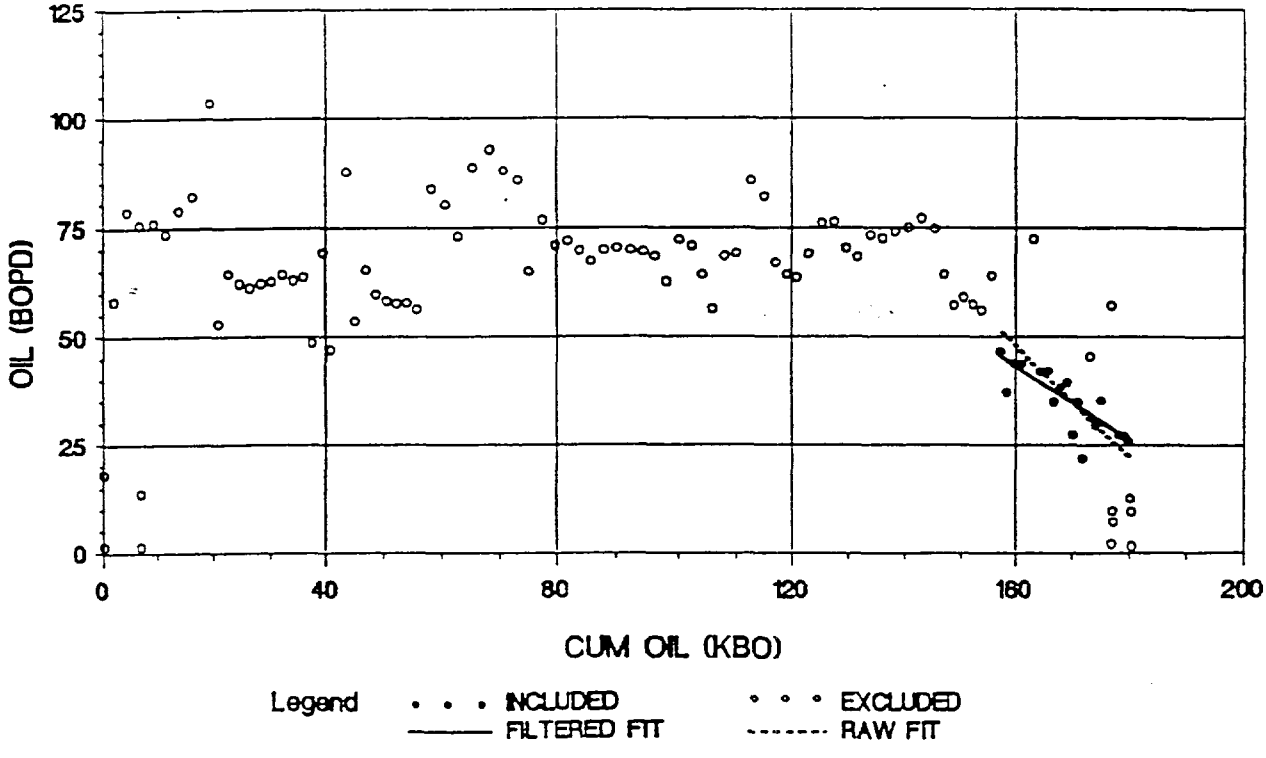


AVALON FIELD DECLINE CURVES

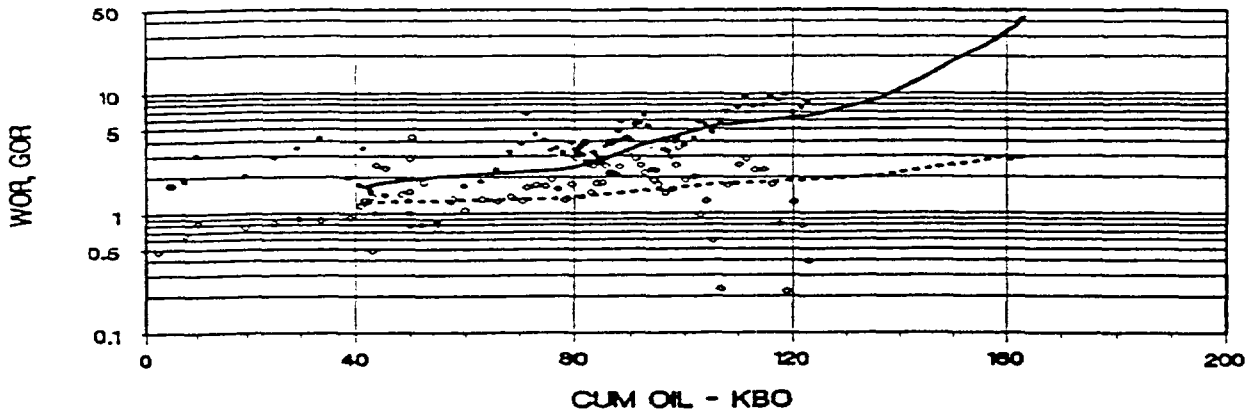
WELL = YATES C FEDERAL #04 (1917)



WELL = YATES C FEDERAL #04 (1917)

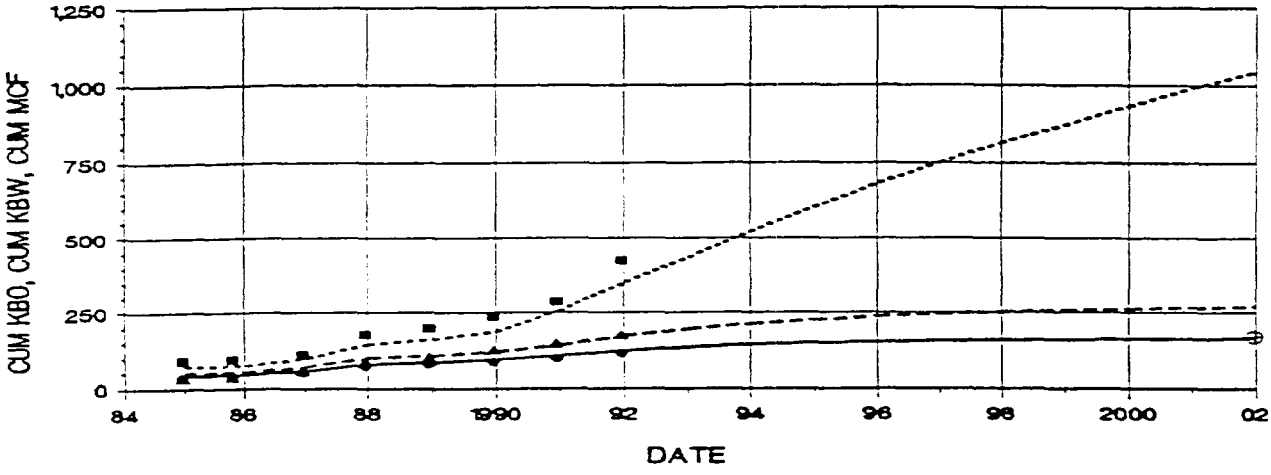


AVALON FIELD
PRIMARY HISTORY MATCH
WELL = STONEWALL EP STATE #05 (1311)



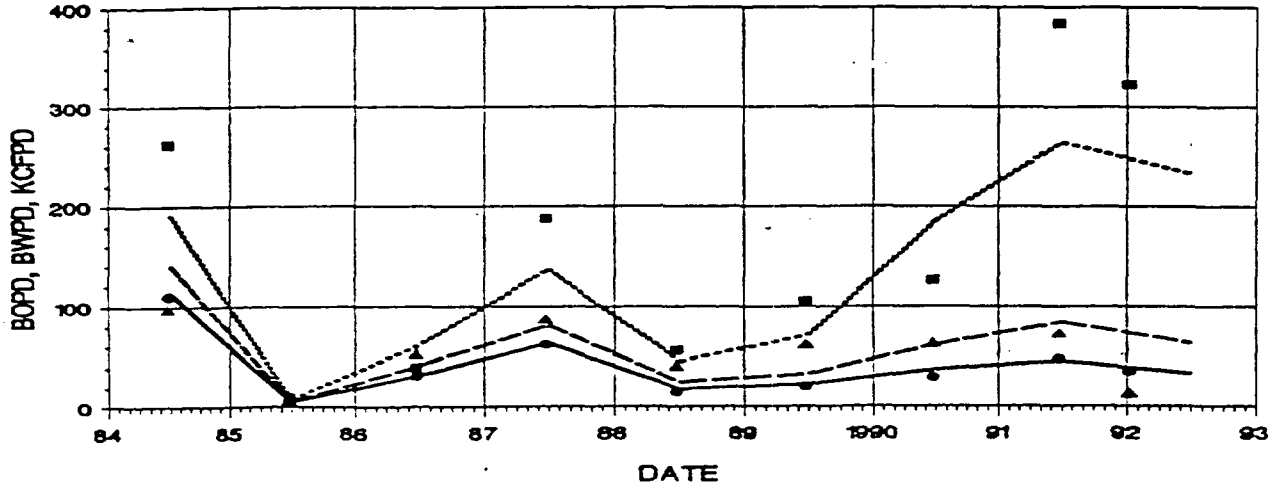
Legend ACTUAL GOR ACTUAL WOR MODEL GOR MODEL WOR

WELL = STONEWALL EP STATE #05 (1311)



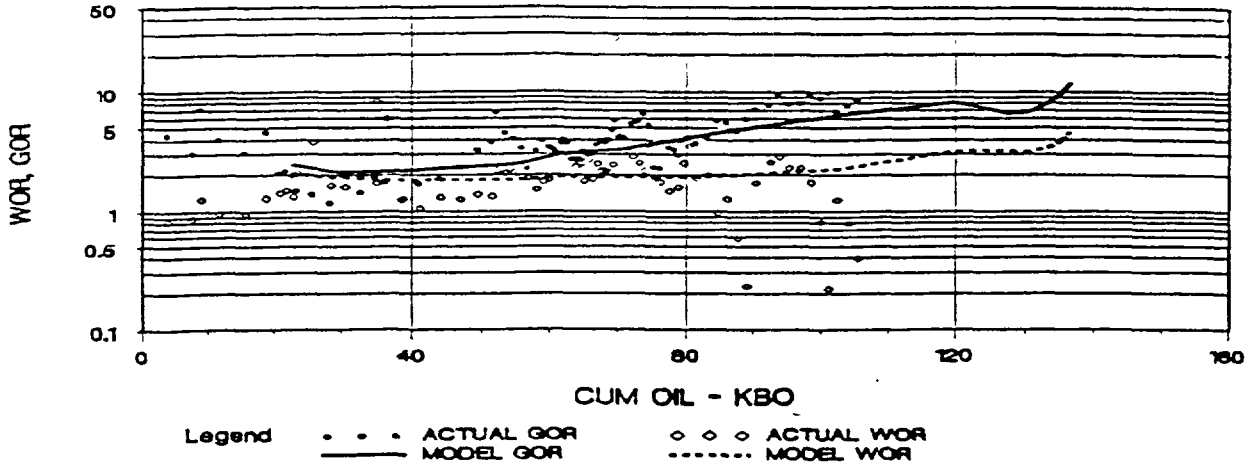
Legend ACTUAL OIL ACTUAL GAS ACTUAL WATER MODEL OIL MODEL GAS MODEL WATER DECLINE EUR

WELL = STONEWALL EP STATE #05 (1311)

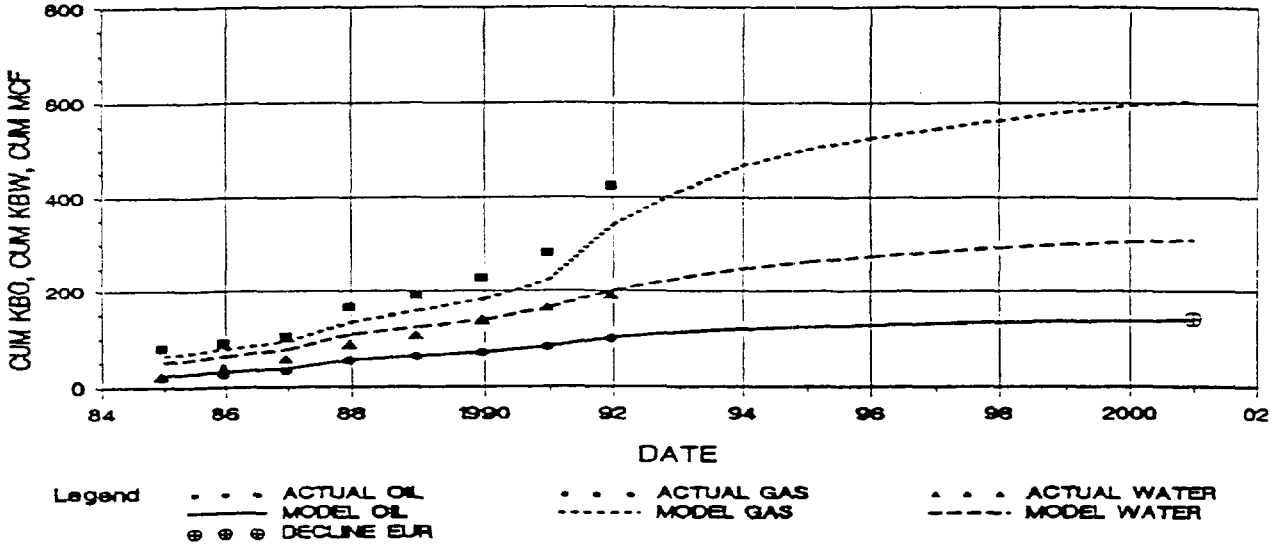


Legend ACTUAL OIL ACTUAL GAS ACTUAL WATER MODEL OIL MODEL GAS MODEL WATER

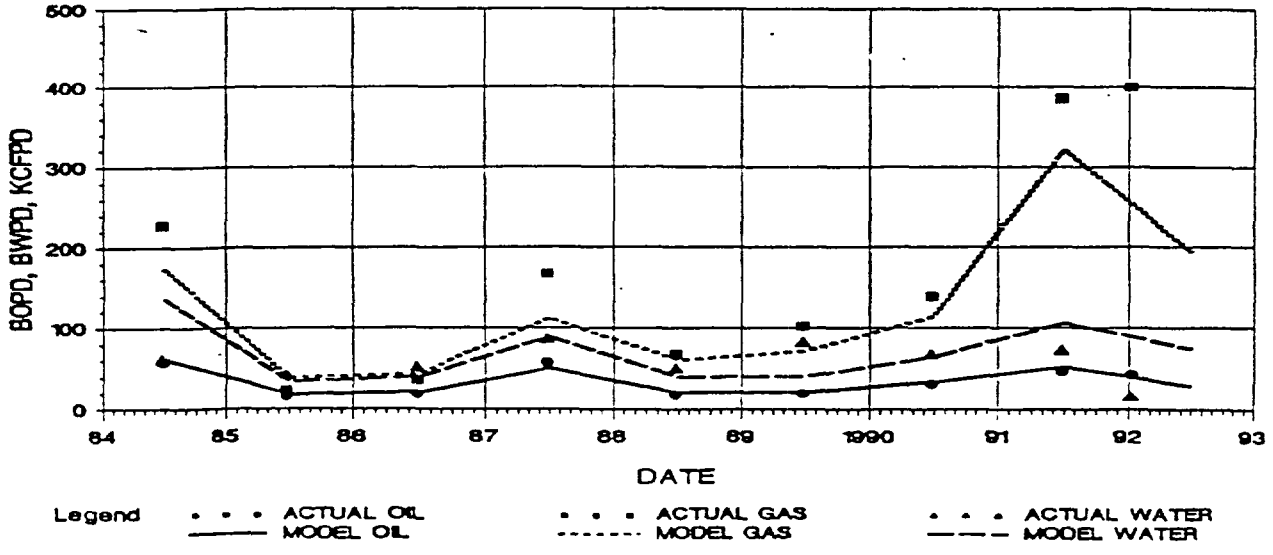
AVALON FIELD
PRIMARY HISTORY MATCH
WELL = STONEWALL EP STATE #08 (1313)



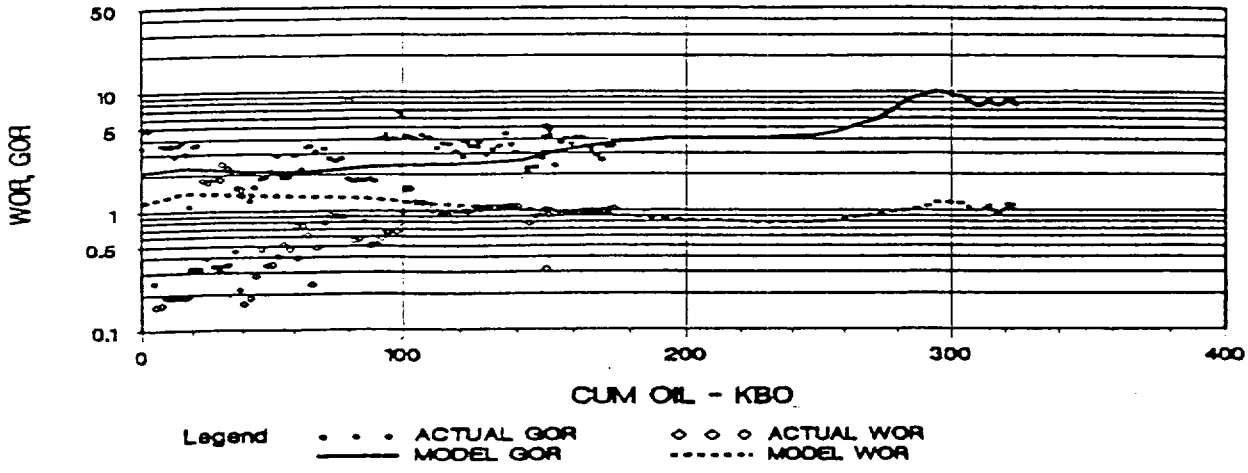
WELL = STONEWALL EP STATE #08 (1313)



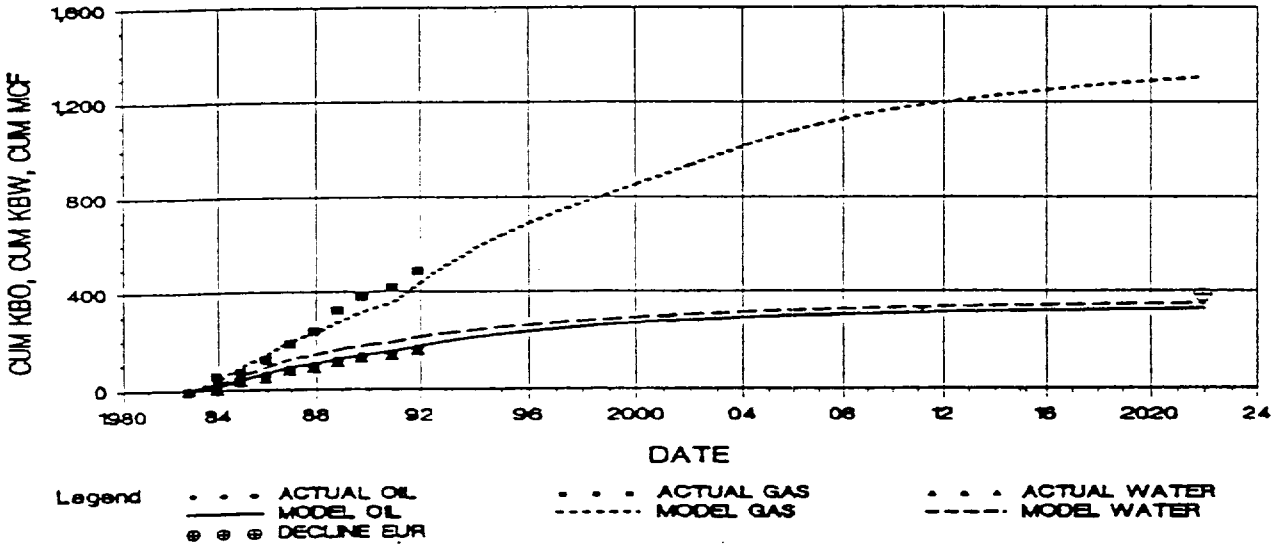
WELL = STONEWALL EP STATE #08 (1313)



AVALON FIELD
PRIMARY HISTORY MATCH
WELL = YATES C FEDERAL #03 (1915)



WELL = YATES C FEDERAL #03 (1915)



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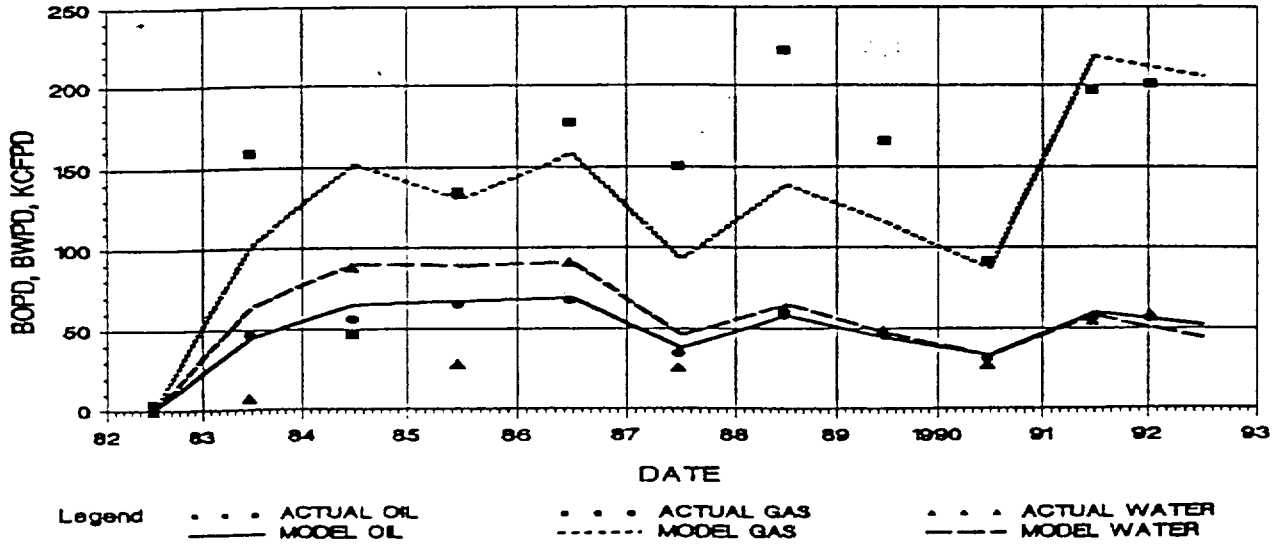
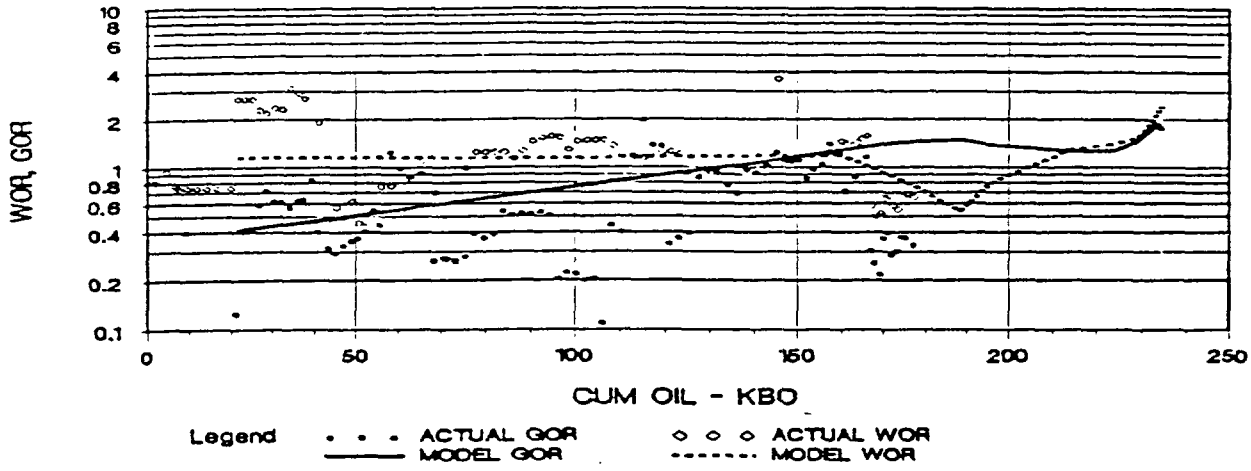
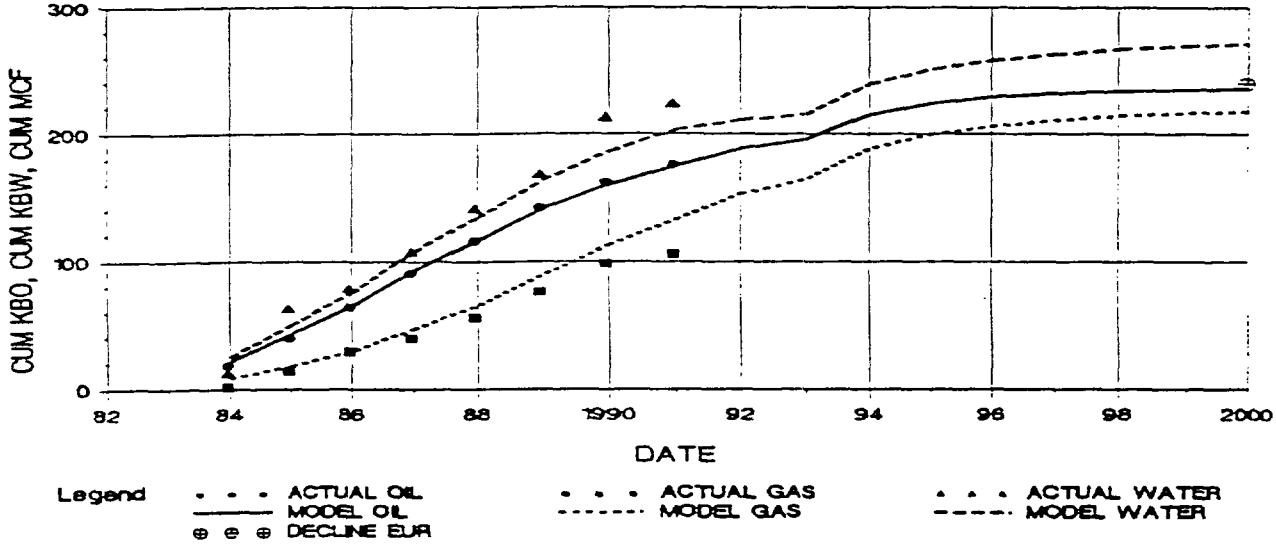


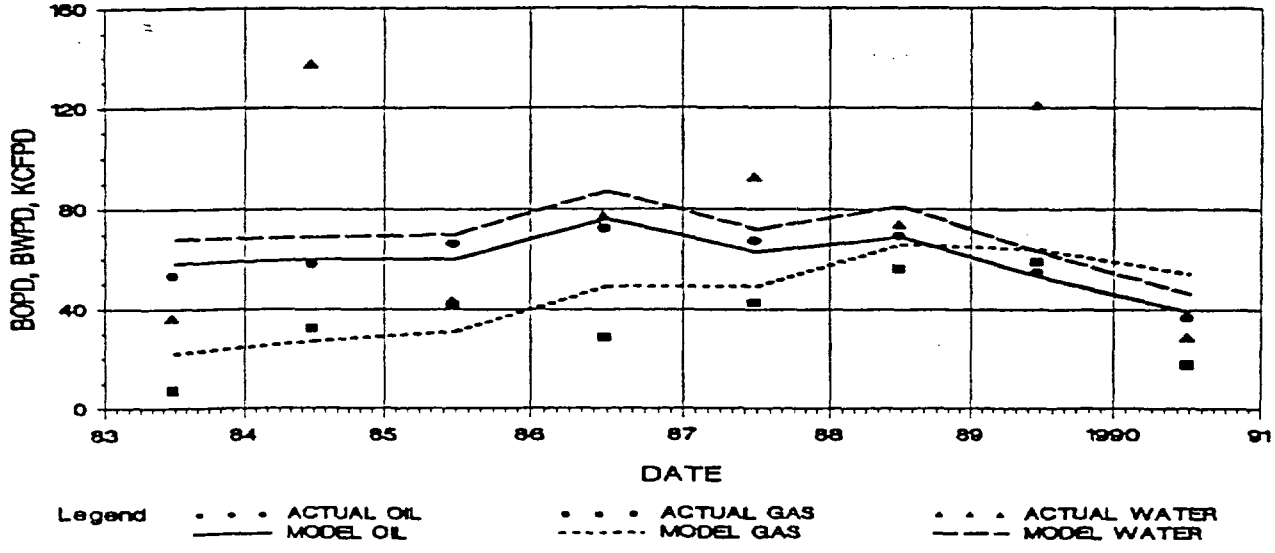
AVALON FIELD
PRIMARY HISTORY MATCH
WELL = YATES C FEDERAL #04 (1917)



WELL = YATES C FEDERAL #04 (1917)



WELL = YATES C FEDERAL #04 (1917)



AVALON FIELD PRODUCTION

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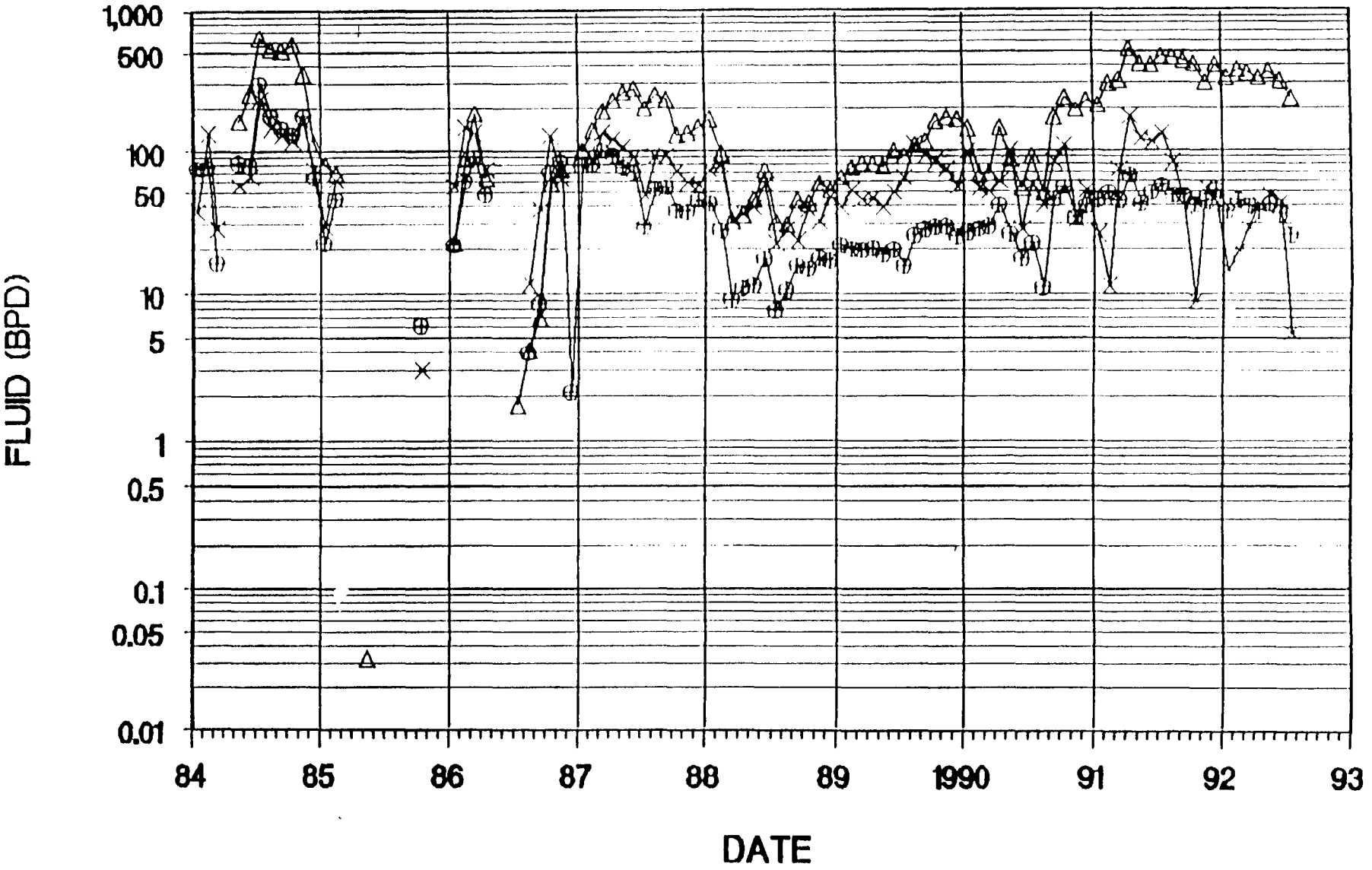

AVALON FIELD PRODUCTION

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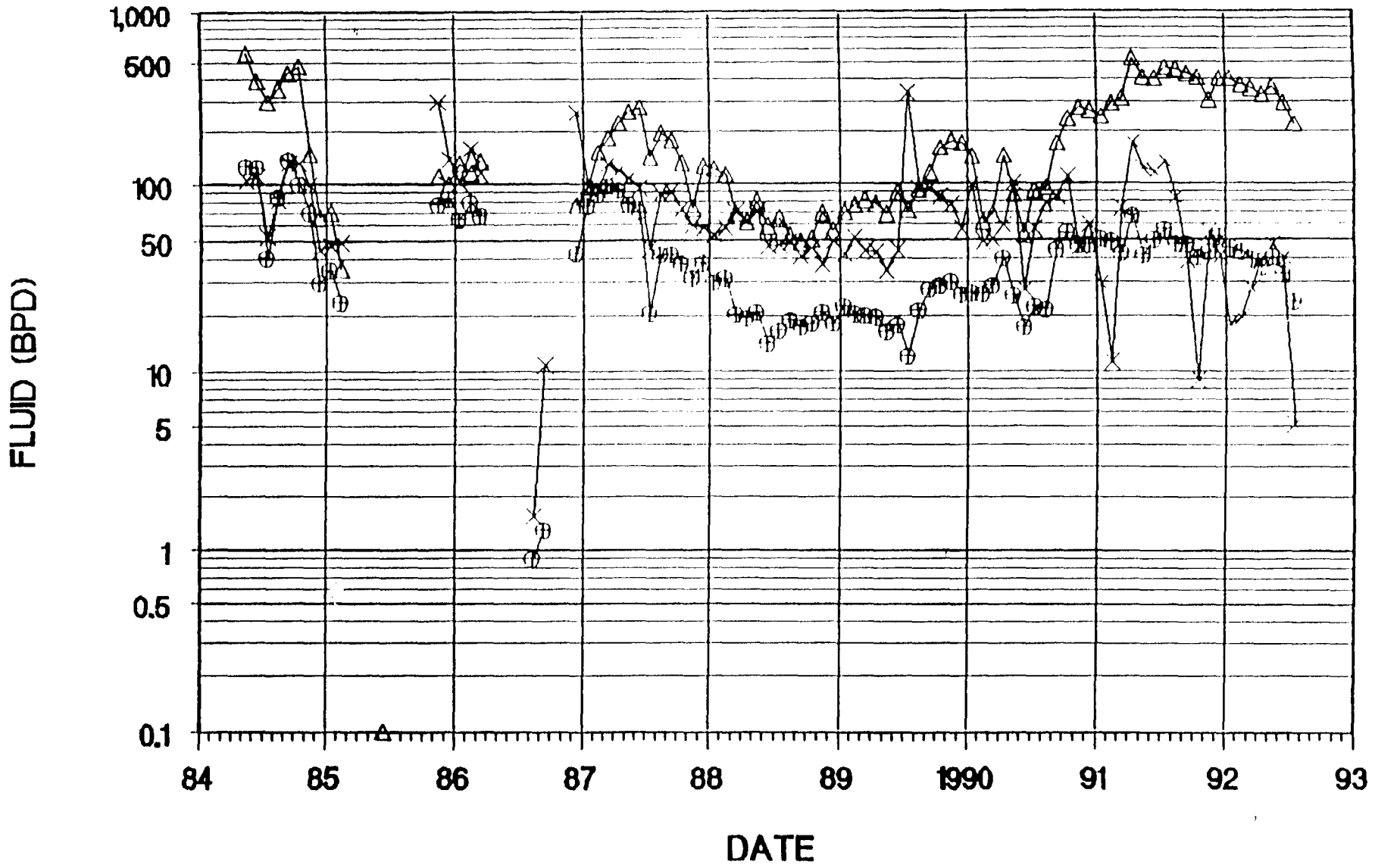

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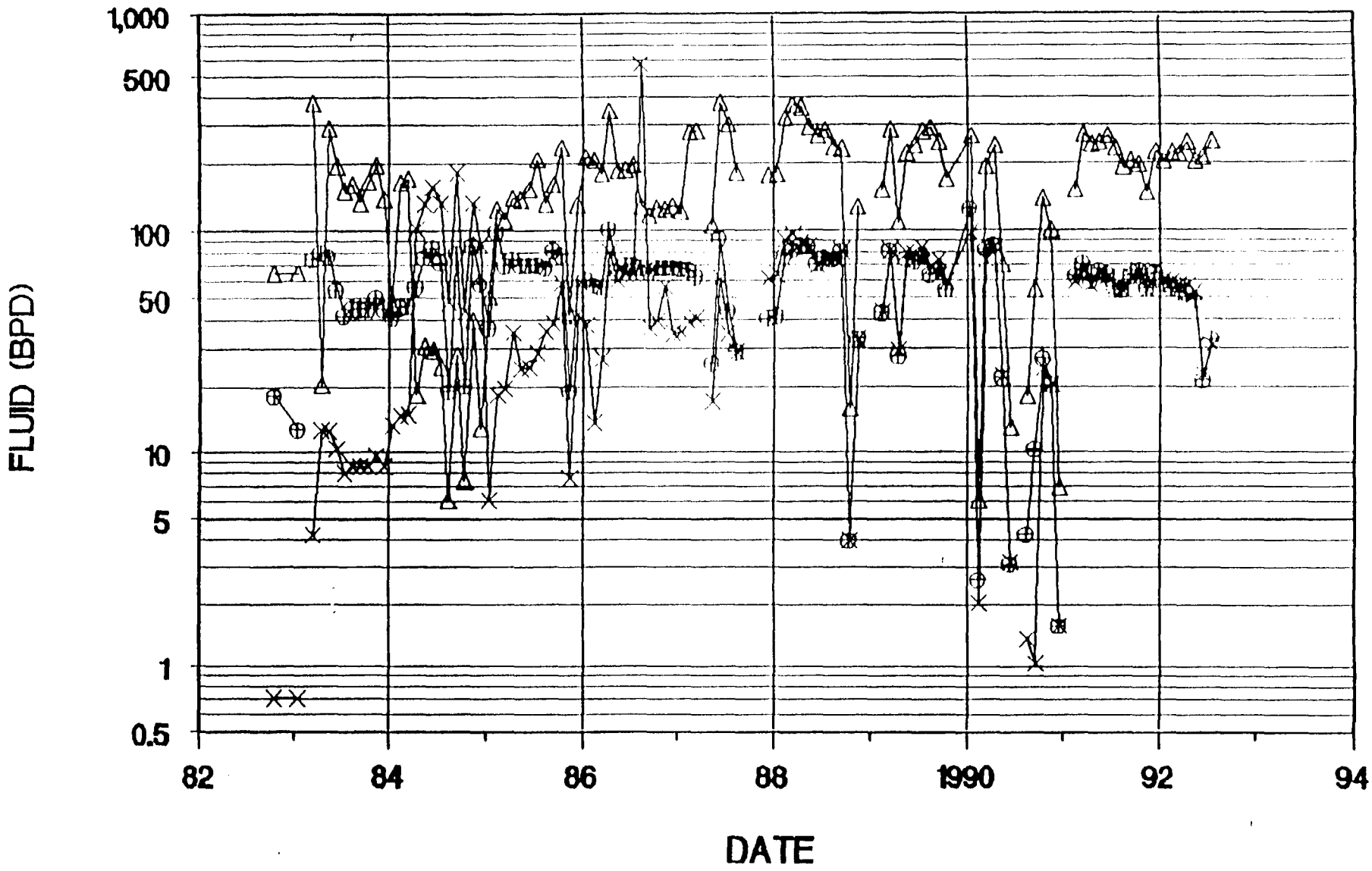

AVALON FIELD PRODUCTION

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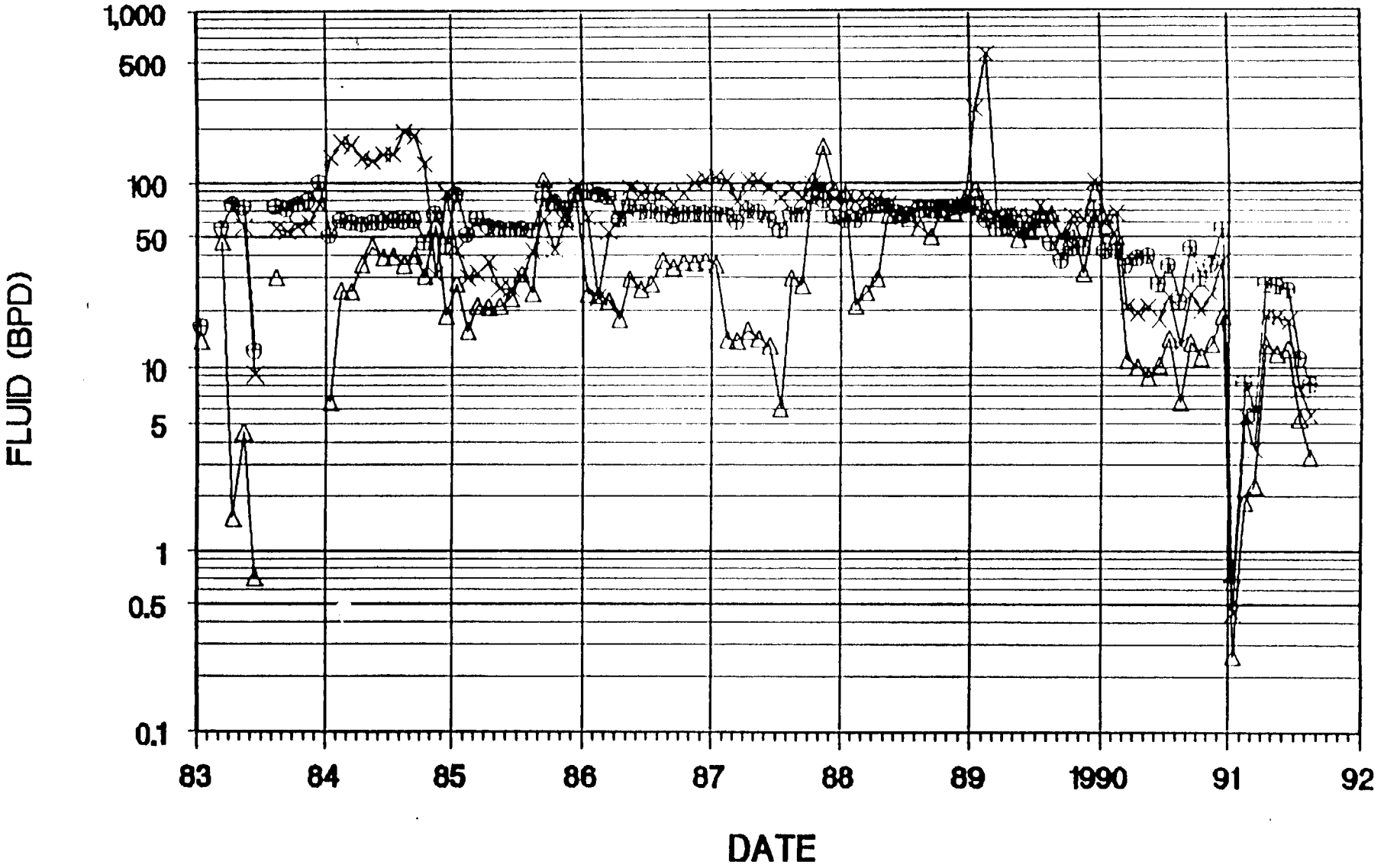
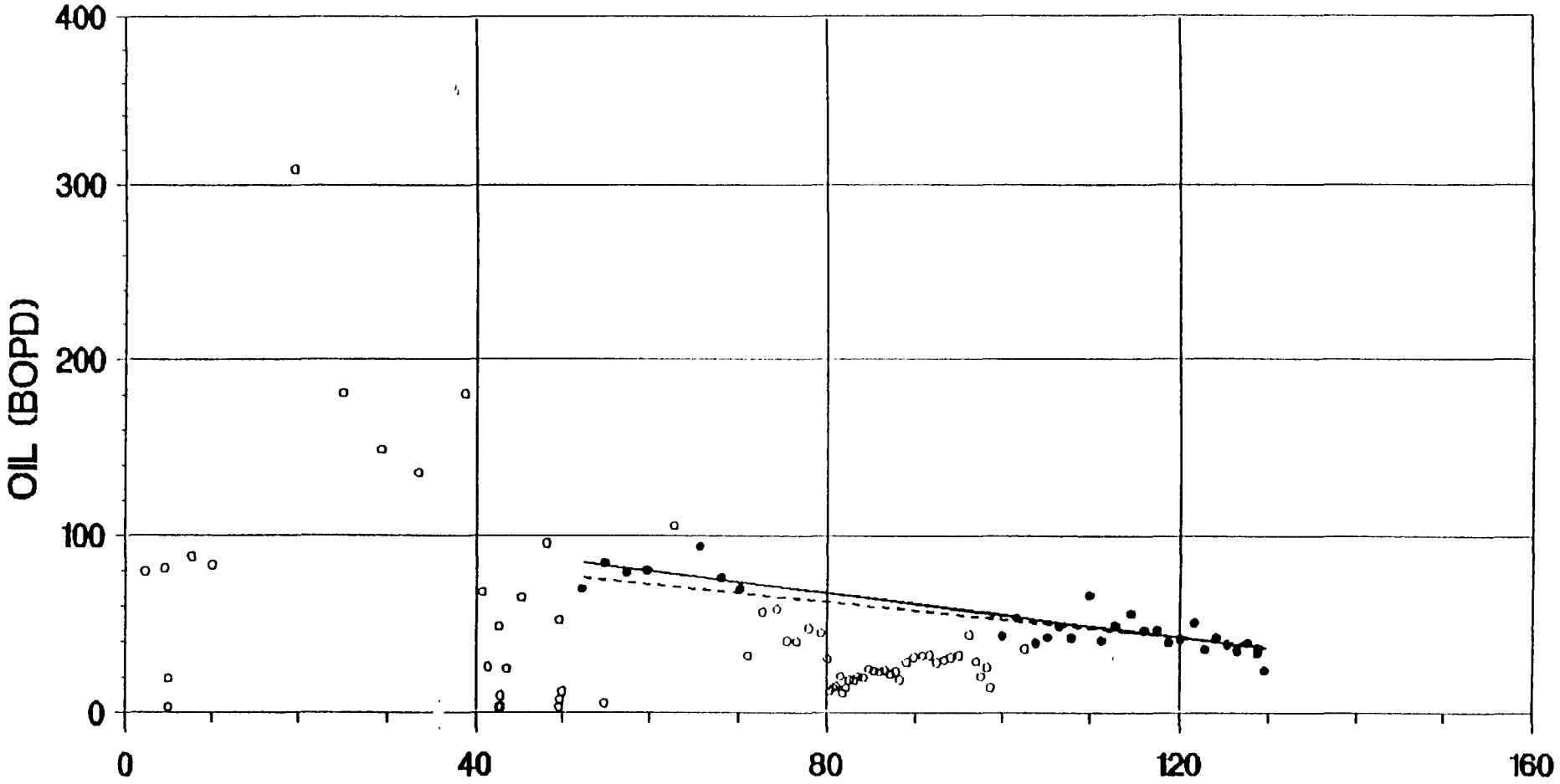


7/92 update

AVALON FIELD DECLINE CURVES

WELL = STONEWALL EP STATE #05 (1311)



* INDICATES PRODUCTION BELOW ASSUMED ECONOMIC LIMIT

7/92 updated

AVALON FIELD DECLINE CURVES

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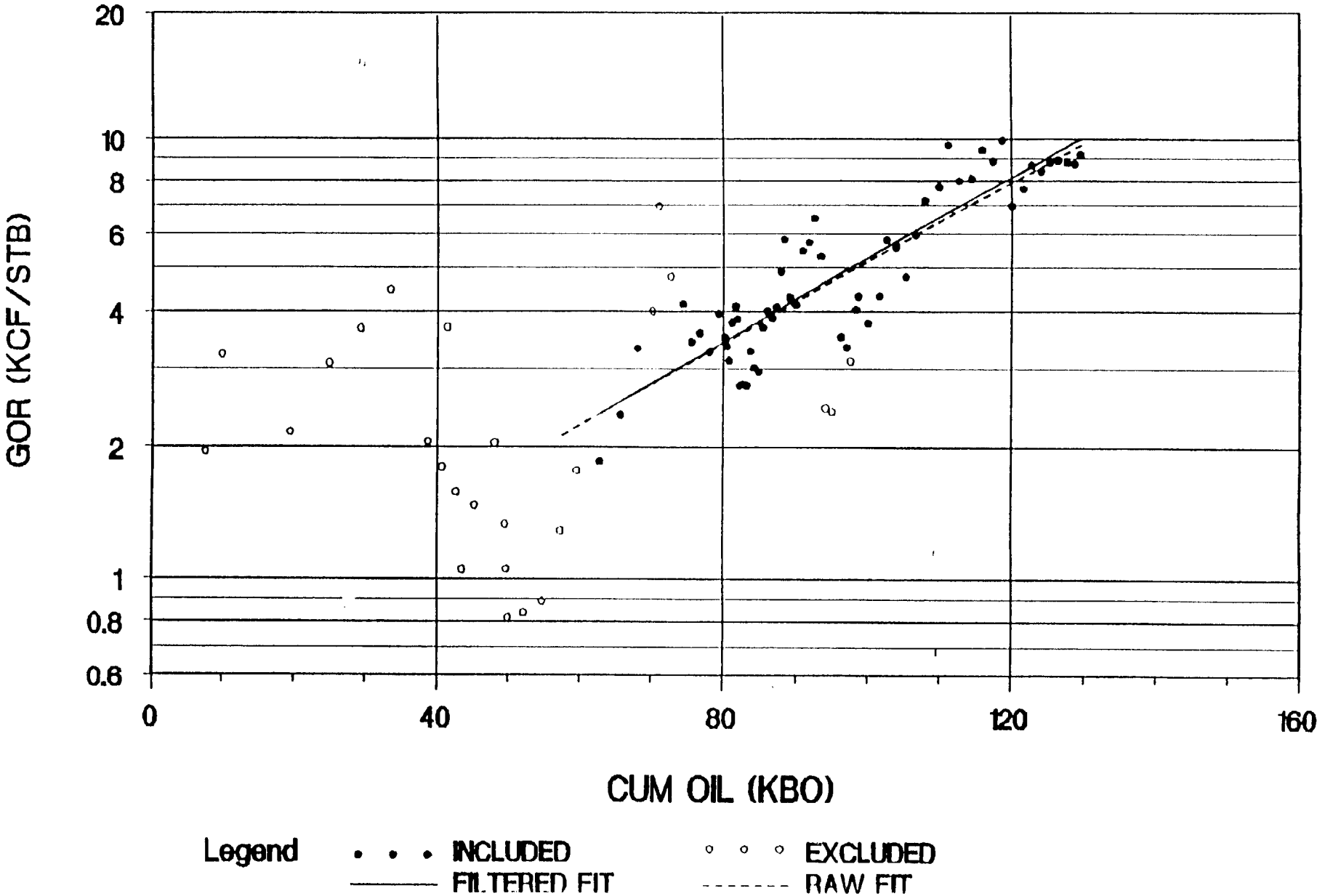

1/92 update

AVALON FIELD DECLINE CURVES

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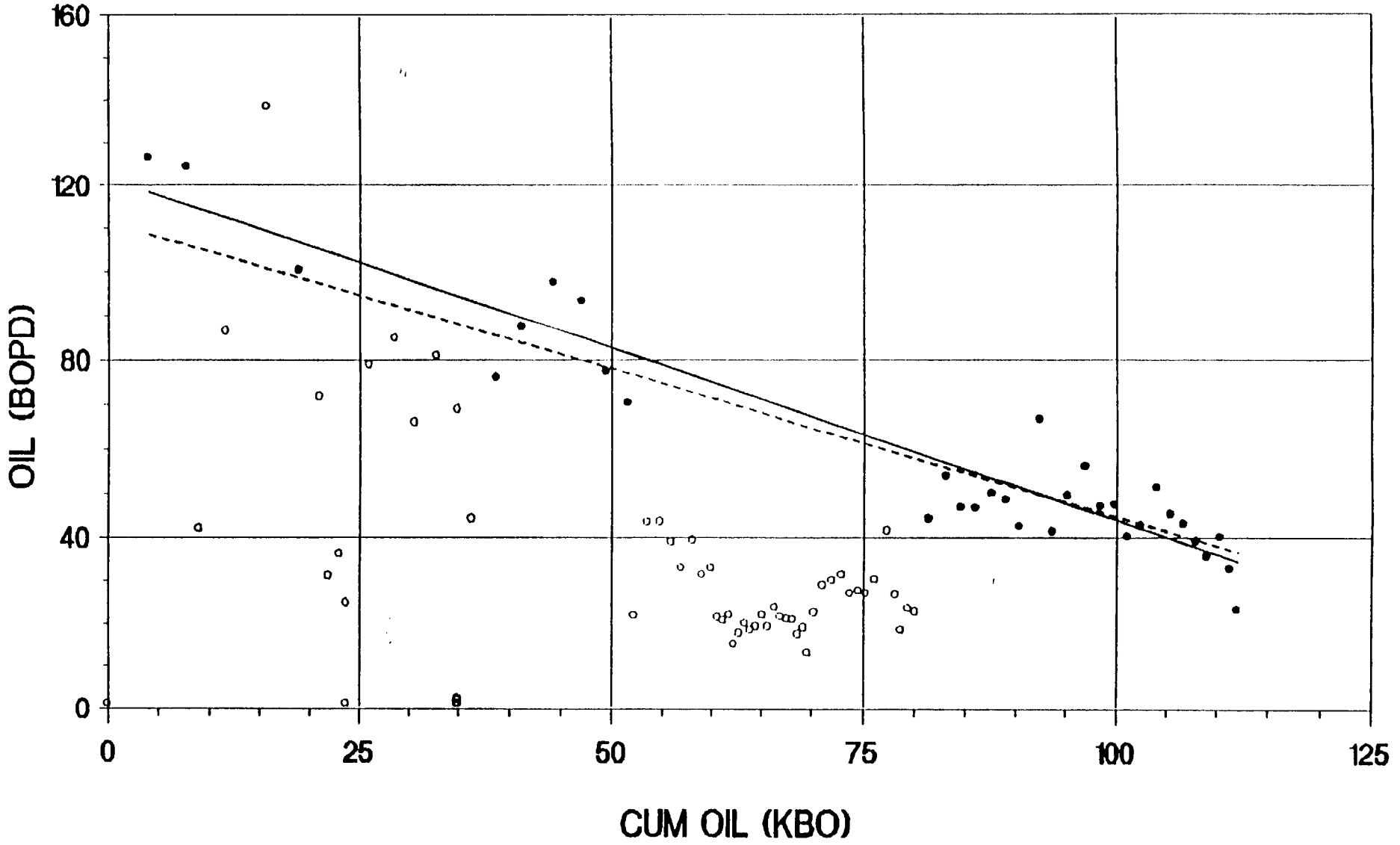

1/92 updt

AVALON FIELD DECLINE CURVES

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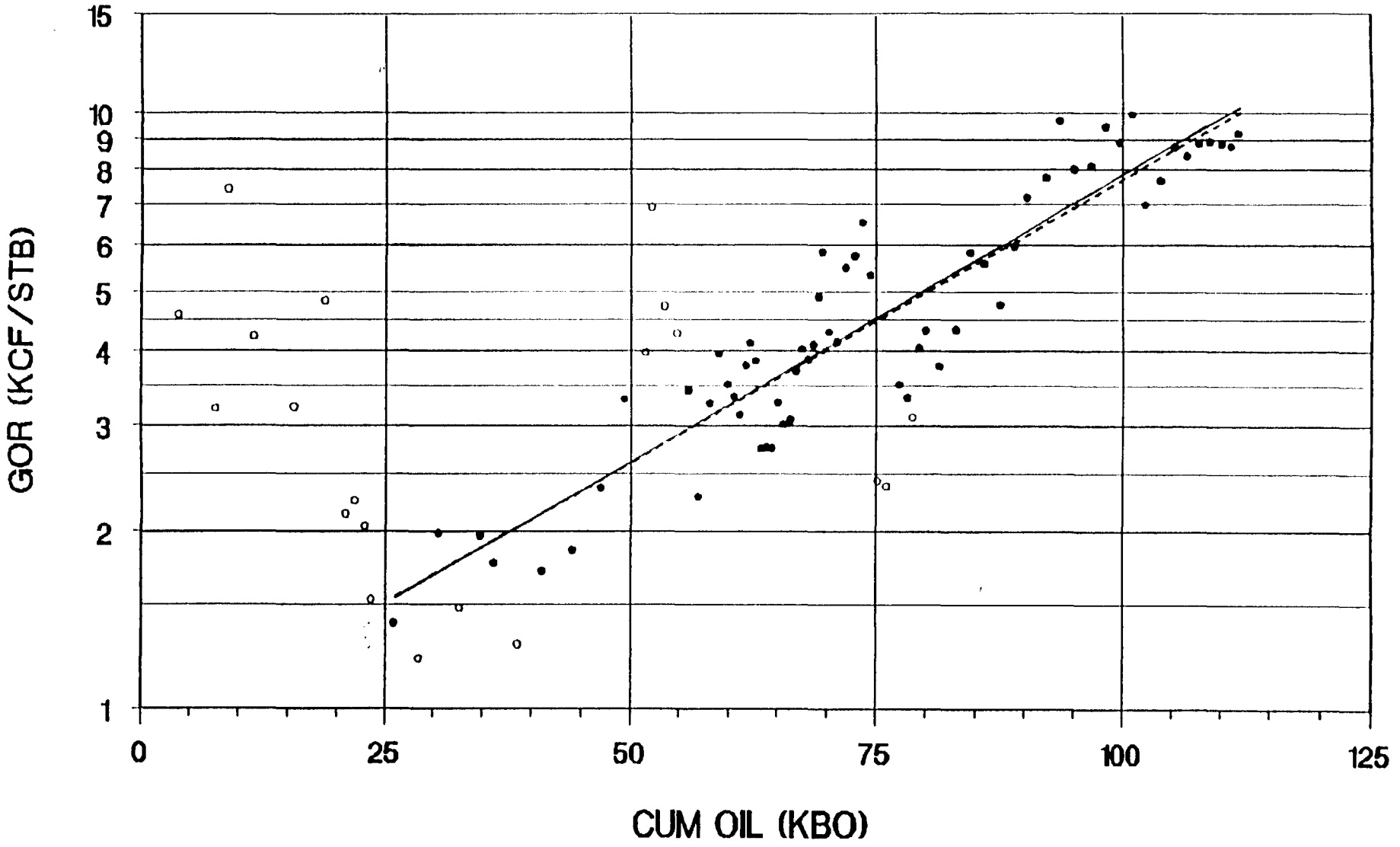
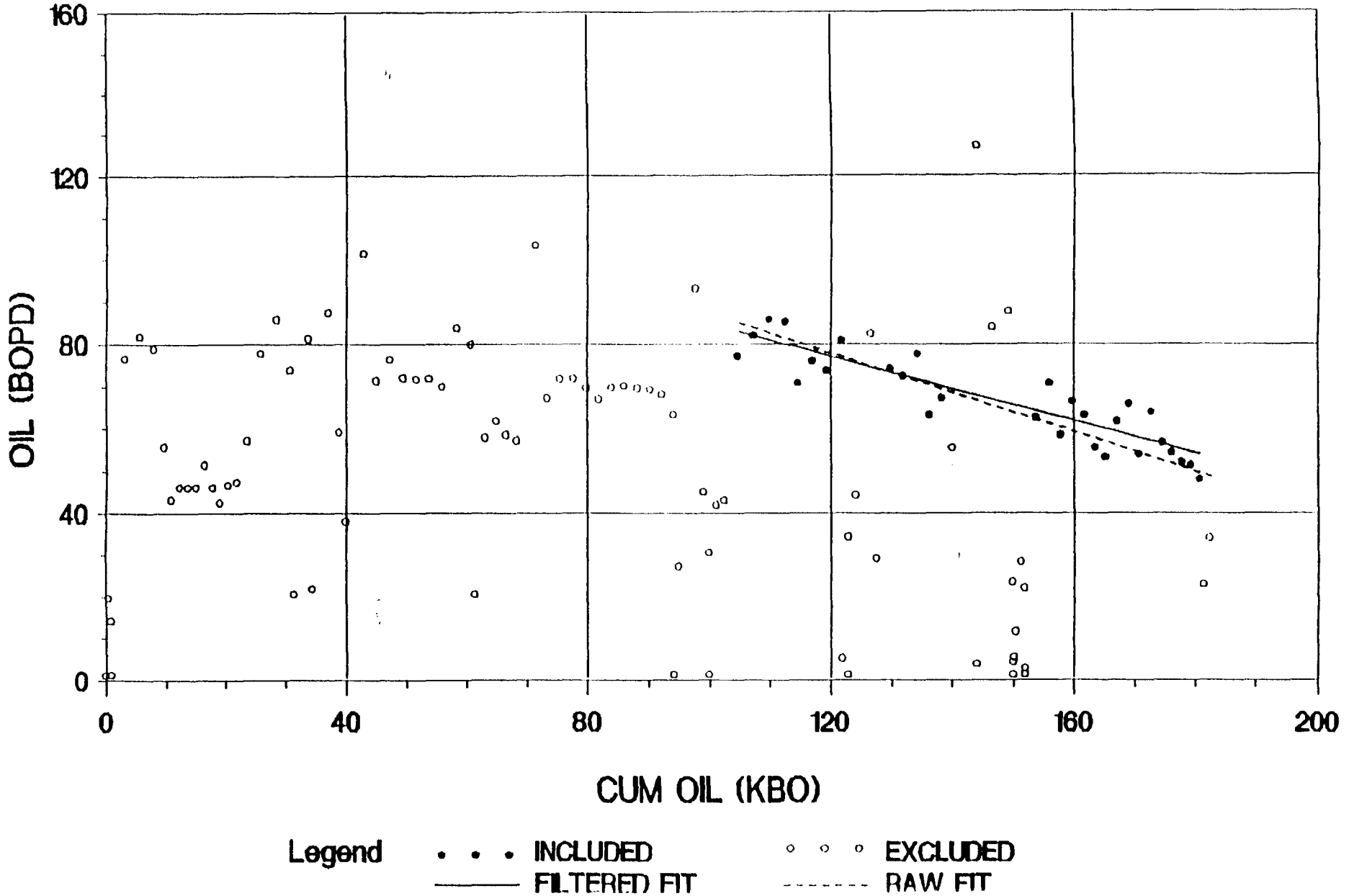


7/92 update

AVALON FIELD DECLINE CURVES

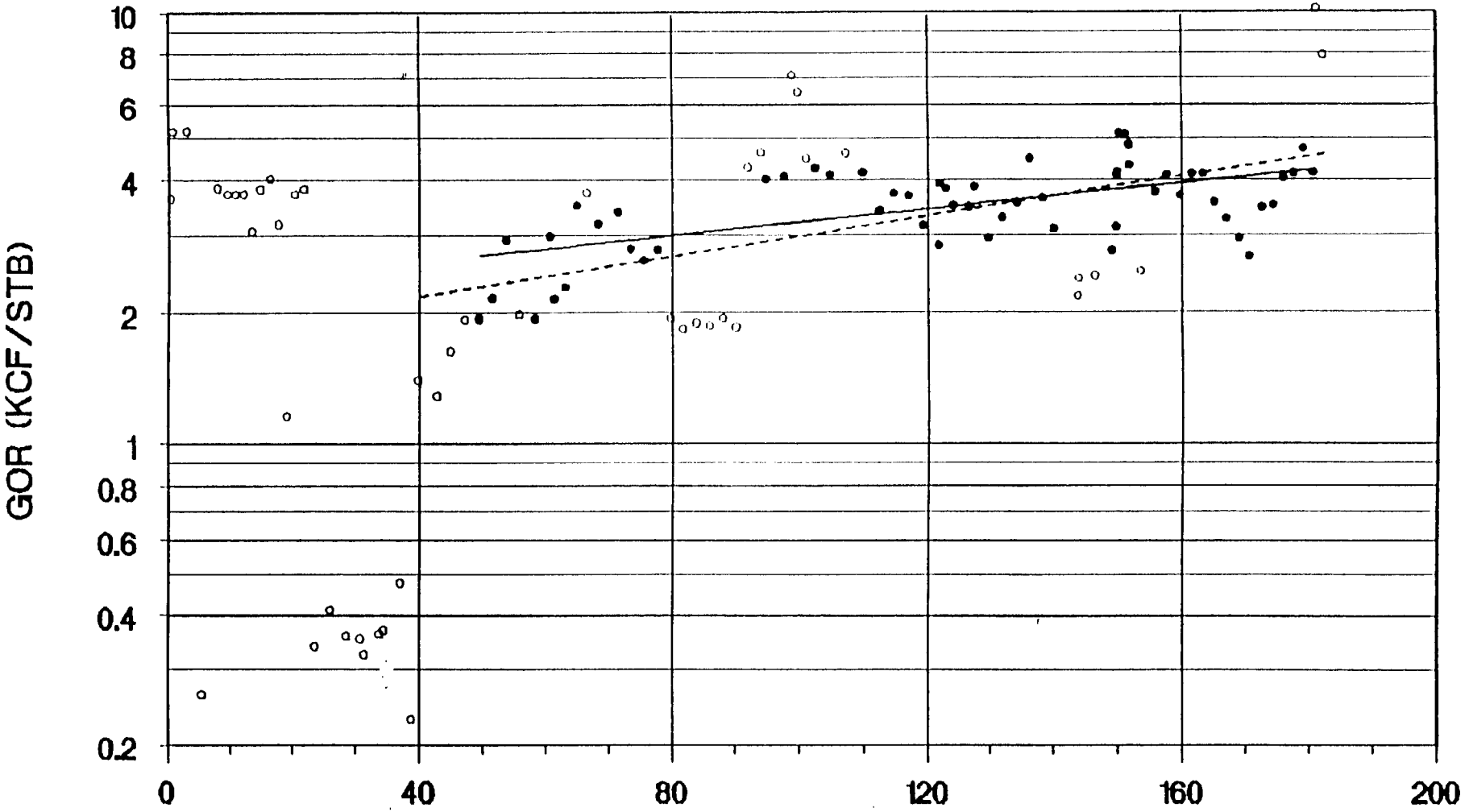
WELL = YATES C FEDERAL #03 (1915)



AVALON FIELD DECLINE CURVES

WELL = YATES C FEDERAL #03 (1915)

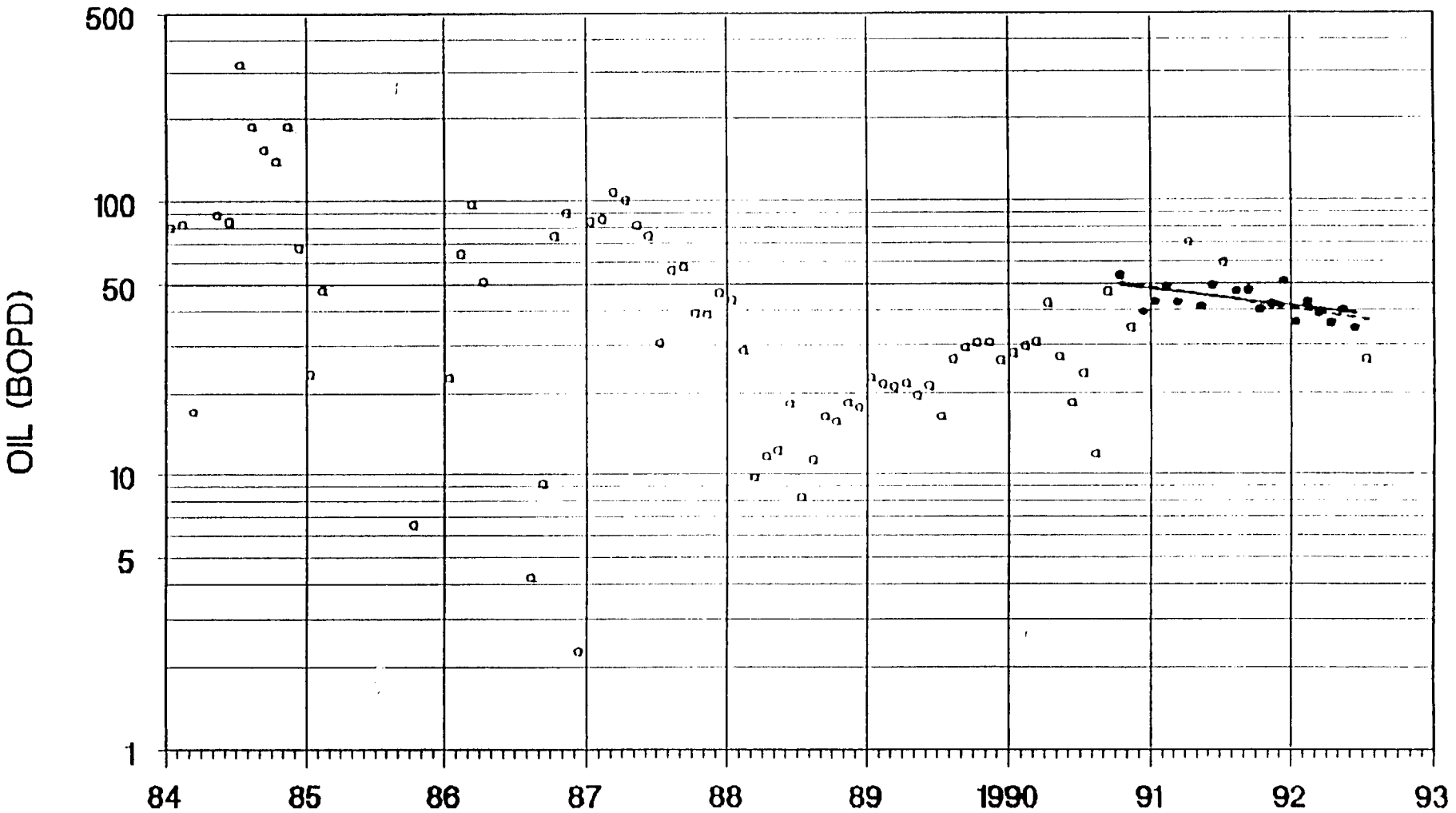
1/92 Updated



AVALON FIELD DECLINE CURVES

WELL = STONEWALL EP STATE #05 (1311)

10/90 - 7/92



10/90 - 7/92

AVALON FIELD DECLINE CURVES

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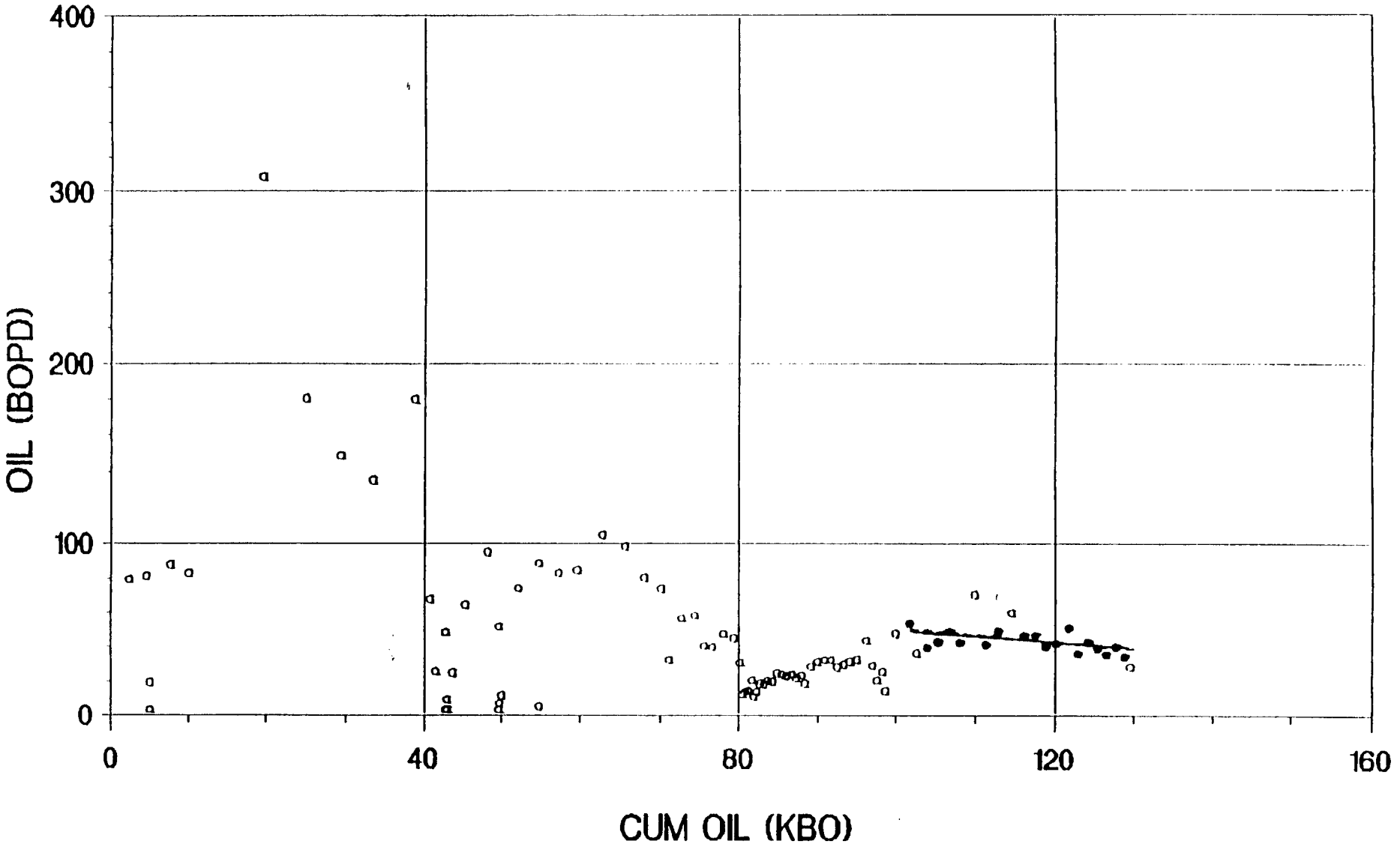

10/90 - 7/92

AVALON FIELD DECLINE CURVES

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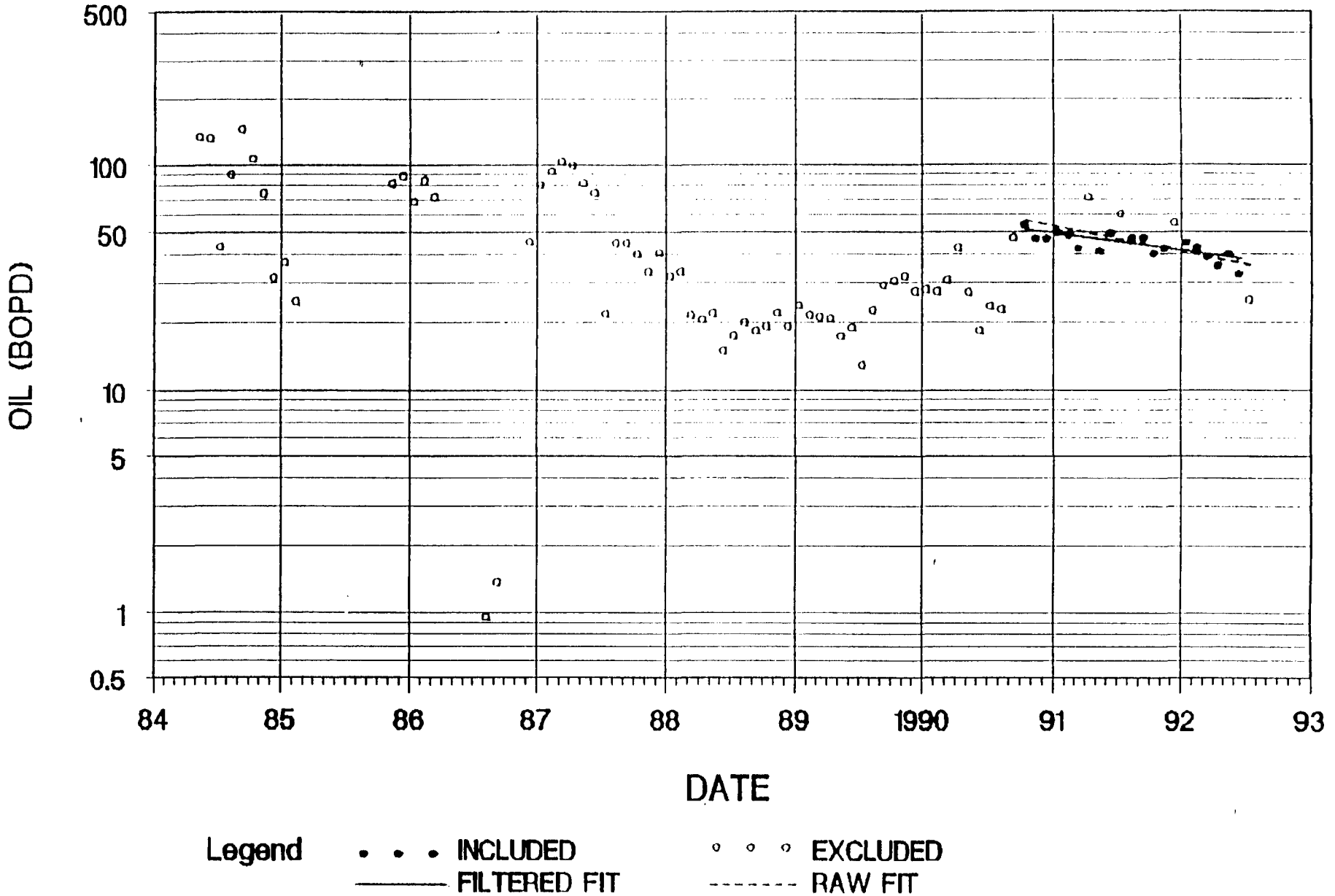

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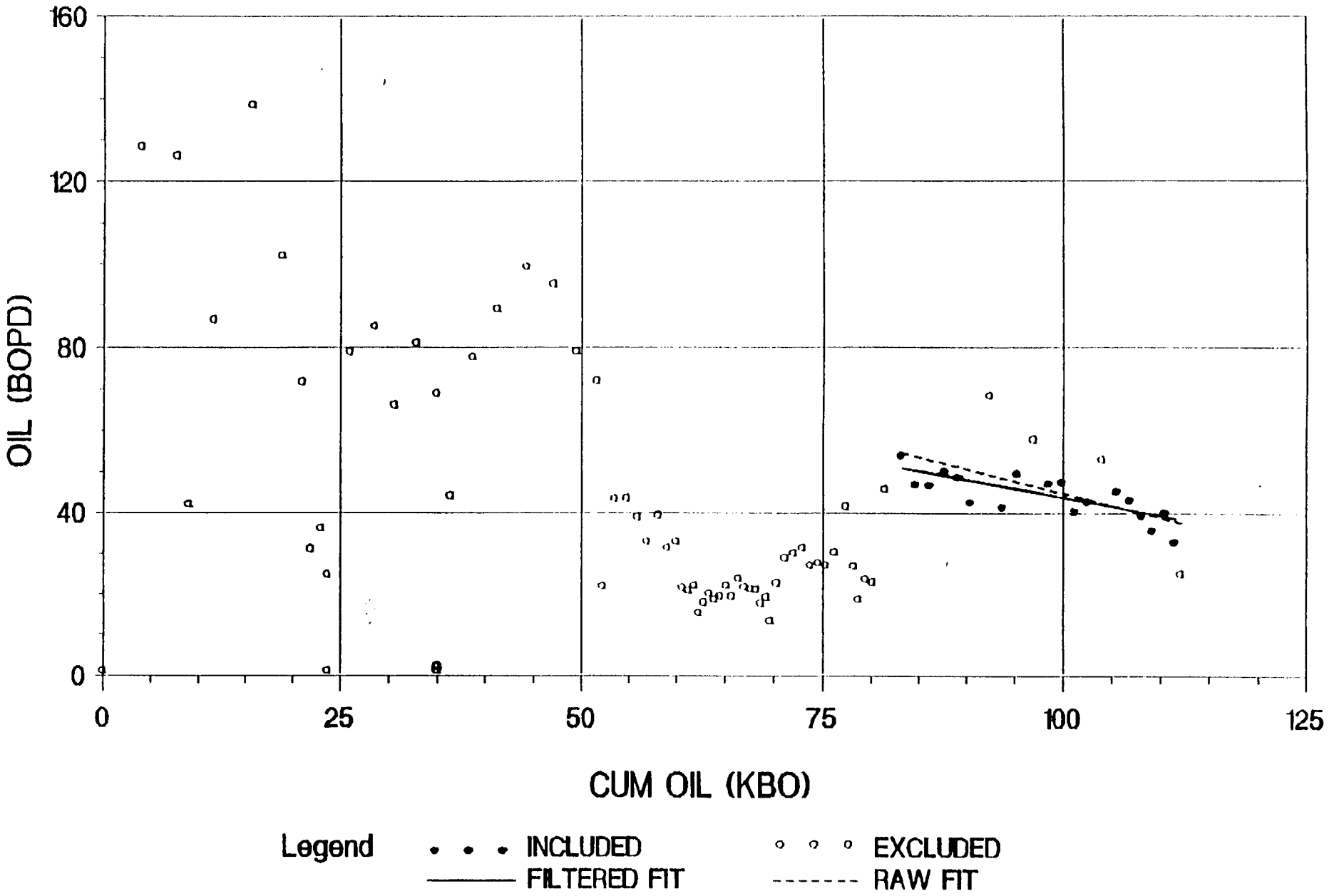
WELL = STONEWALL EP STATE #08 (1313)

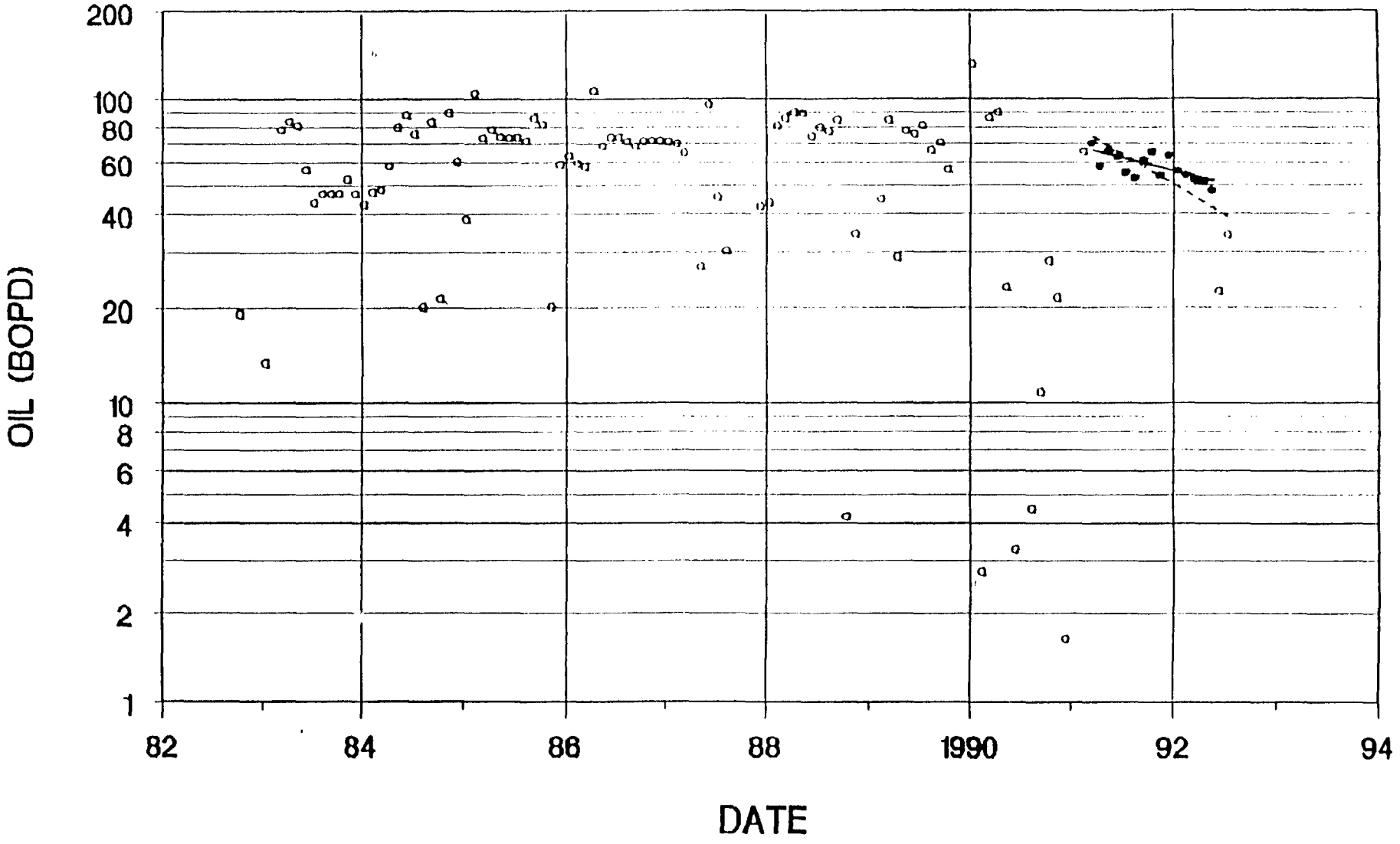
10/90 - 7/92



AVALON FIELD DECLINE CURVES

WELL = YATES C FEDERAL #03 (1915)

3/91 - 7/92



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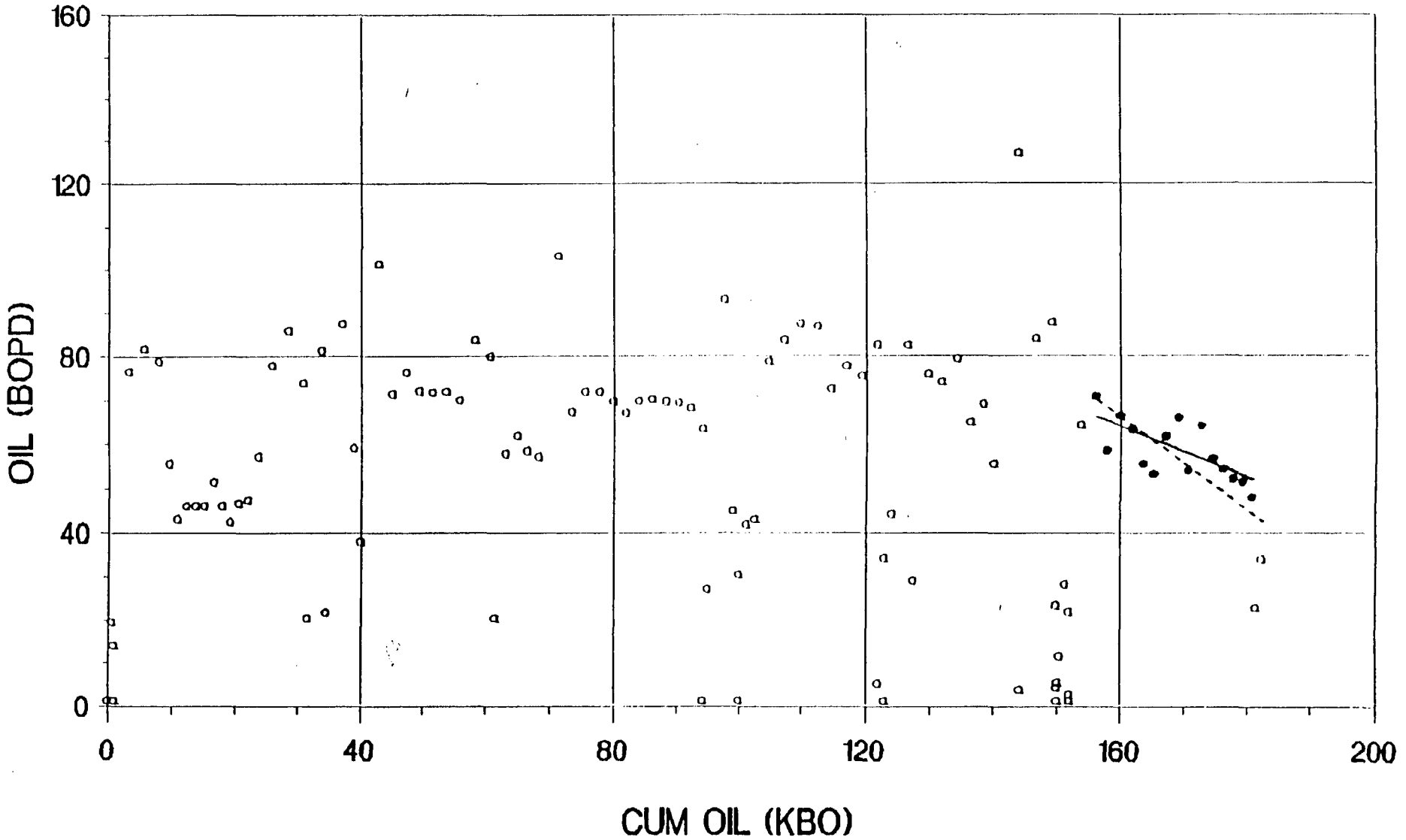
WELL = YATES C FEDERAL #03 (1915)

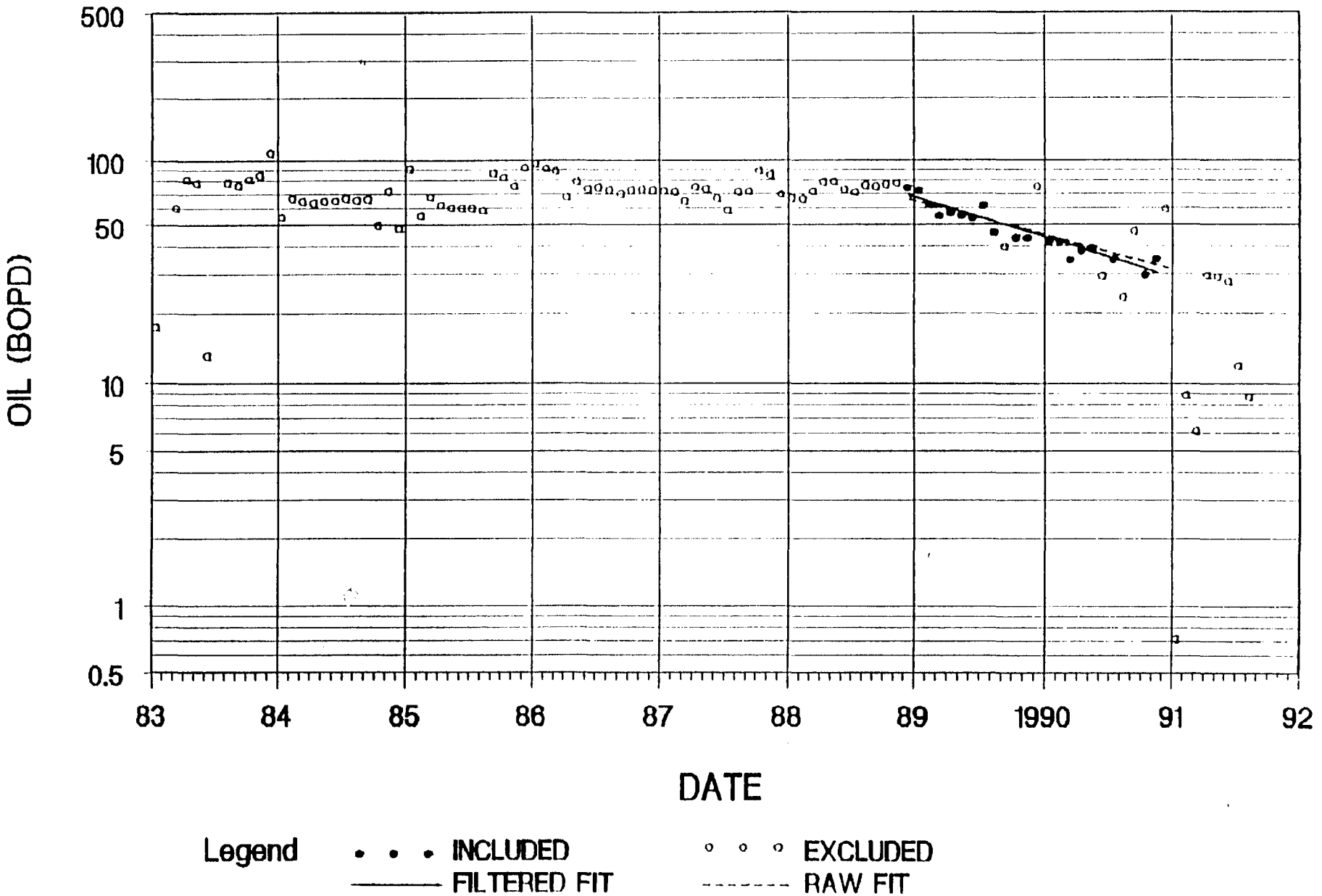
3/91 - 7/92



AVALON FIELD DECLINE CURVES

WELL = YATES C FEDERAL #04 (1917)

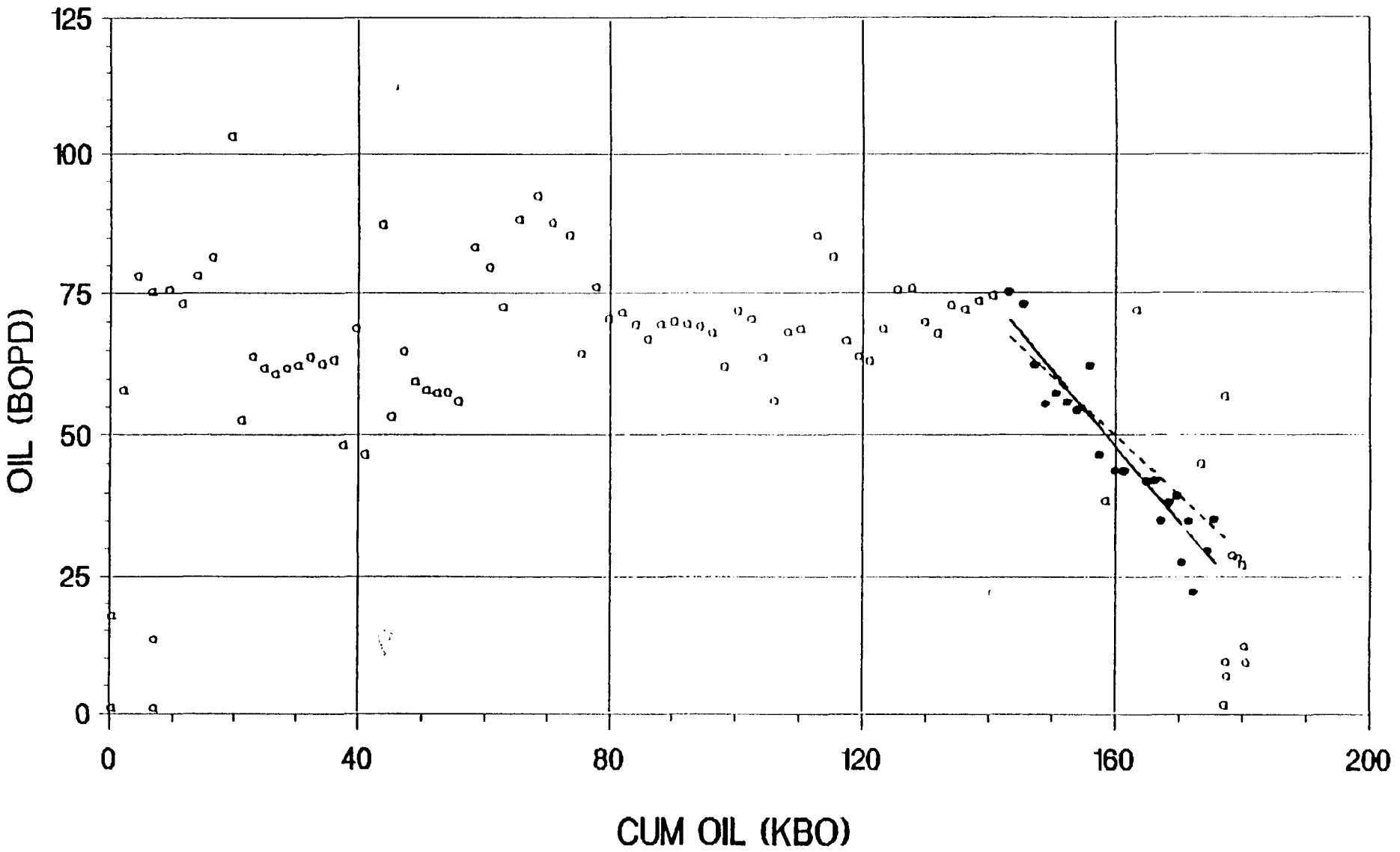
12/88 - 12/90



AVALON FIELD DECLINE CURVES

WELL = YATES C FEDERAL #04 (1917)

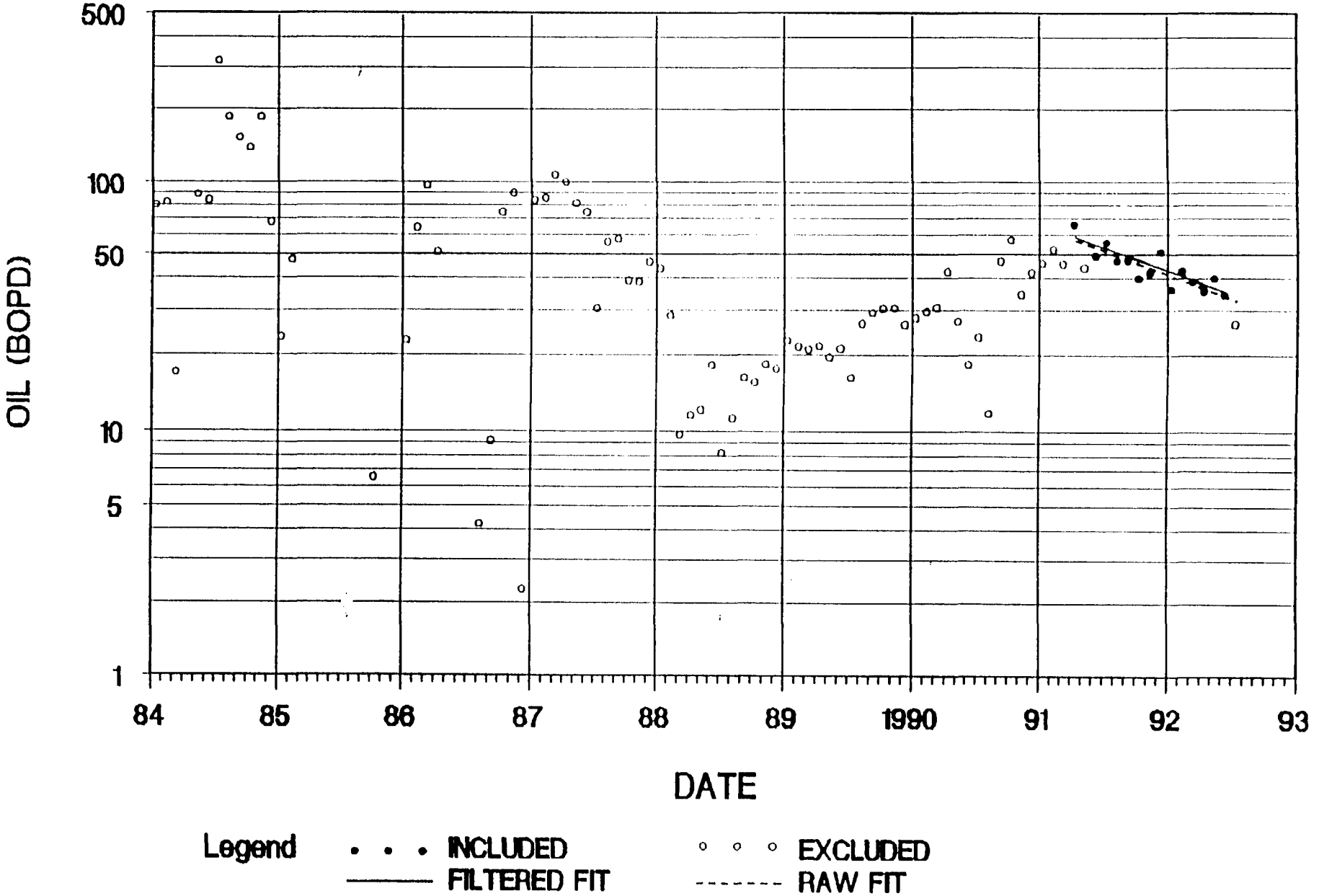
12/88 - 12/90



AVALON FIELD DECLINE CURVES

WELL = STONEWALL EP STATE #05 (1311)

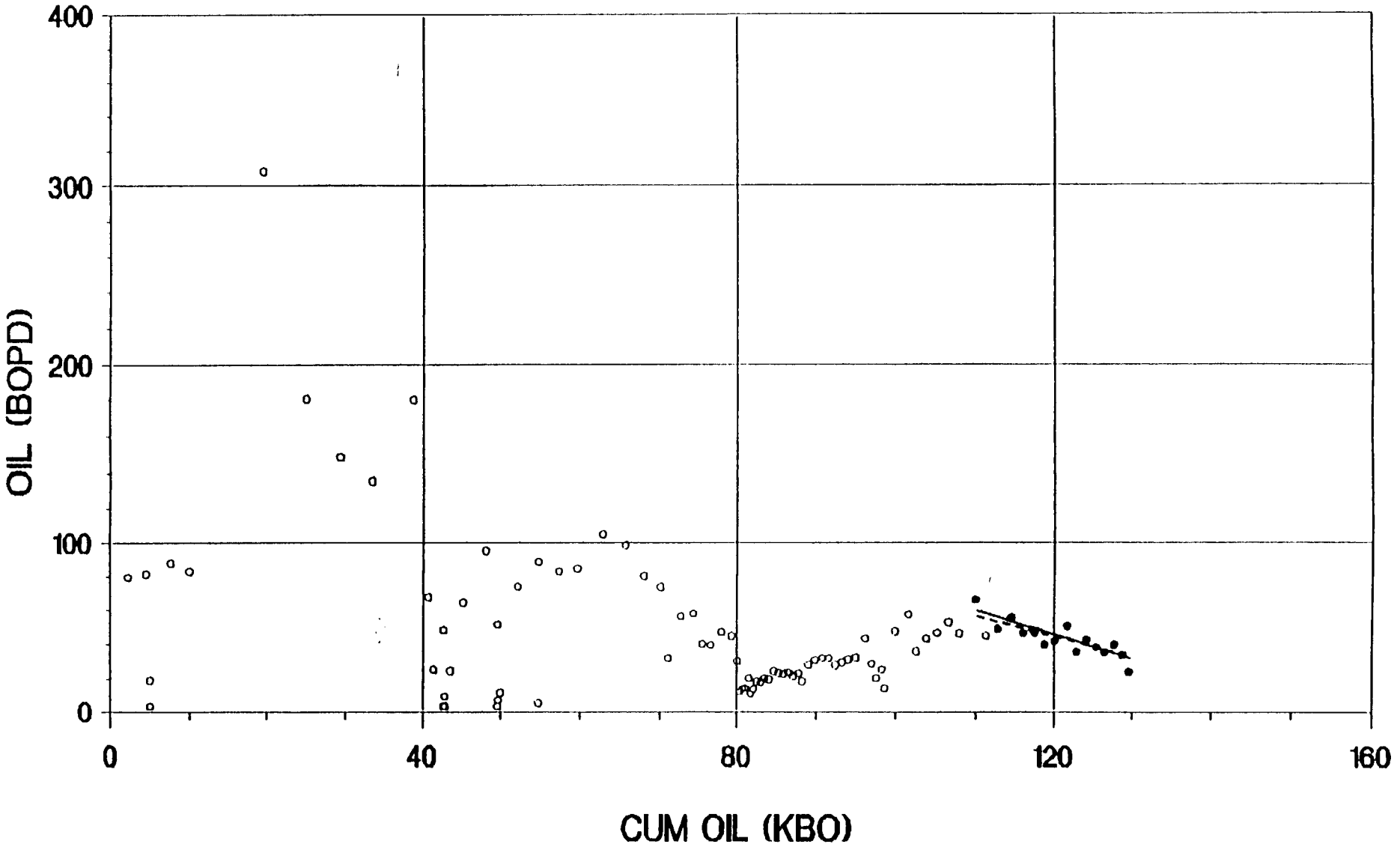
4/91 - 7/92



AVALON FIELD DECLINE CURVES

WELL = STONEWALL EP STATE #05 (1311)

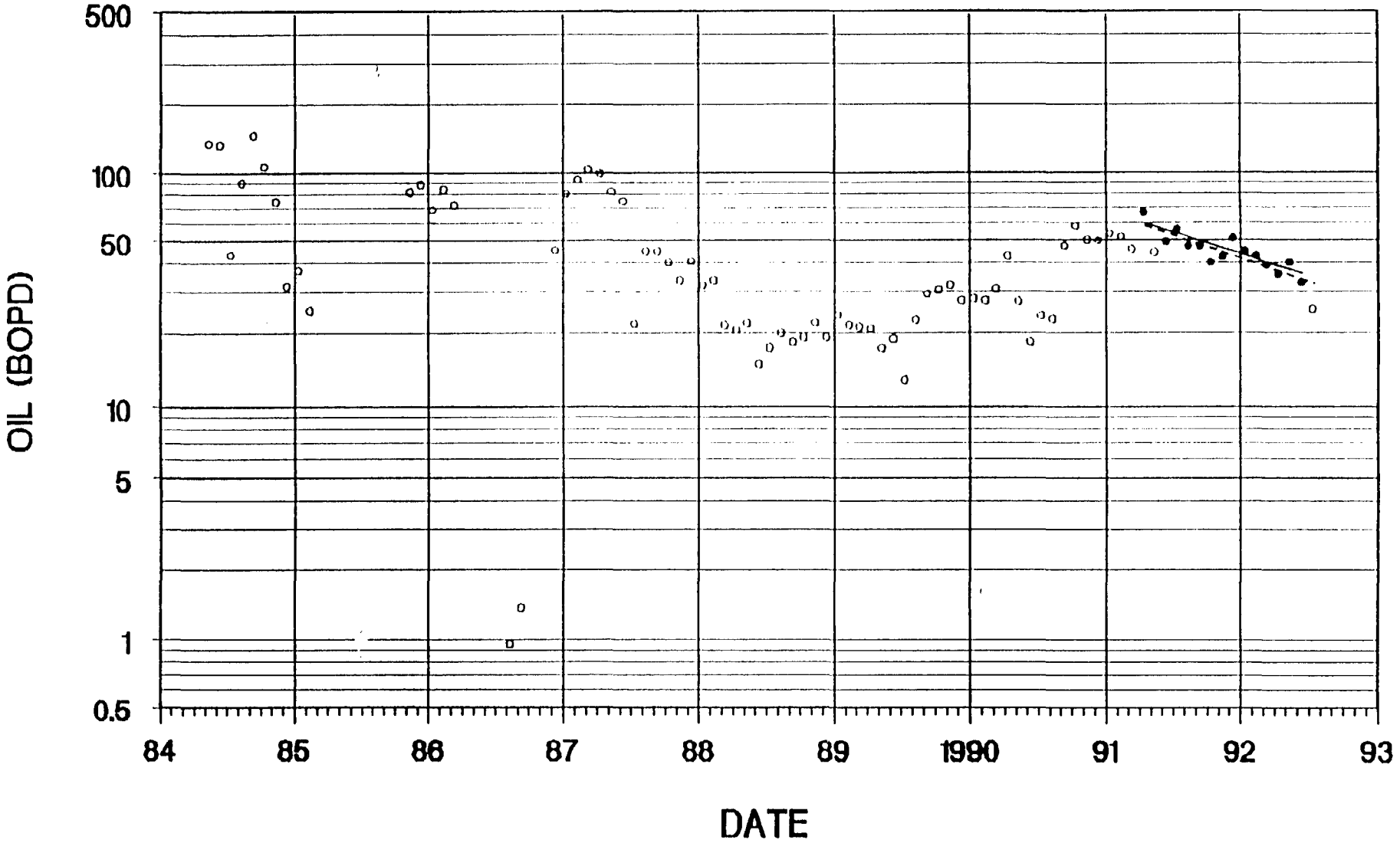
4/91 - 7/92



AVALON FIELD DECLINE CURVES

WELL = STONEWALL EP STATE #08 (1313)

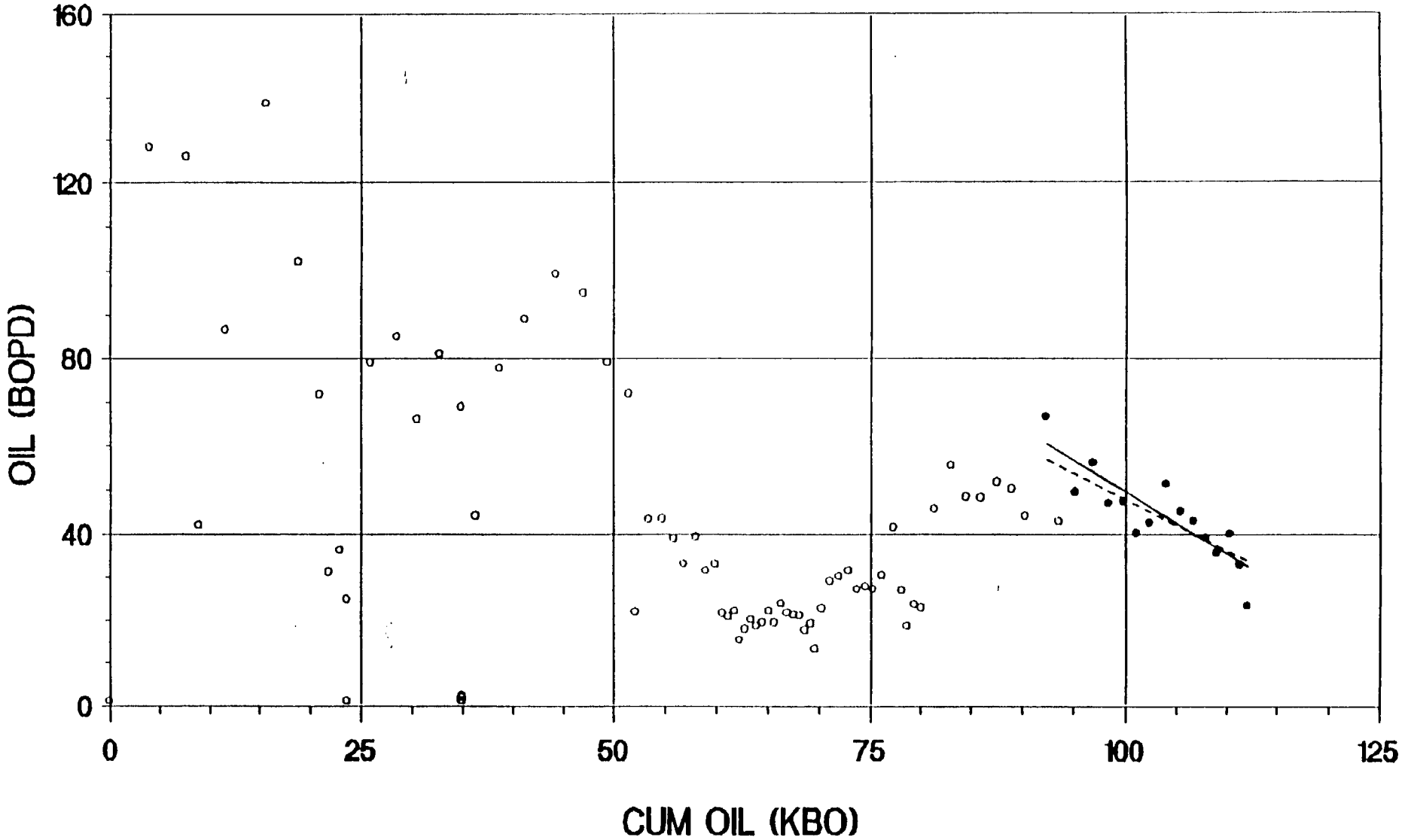
4/91 - 7/92



AVALON FIELD DECLINE CURVES

WELL = STONEWALL EP STATE #08 (1313)

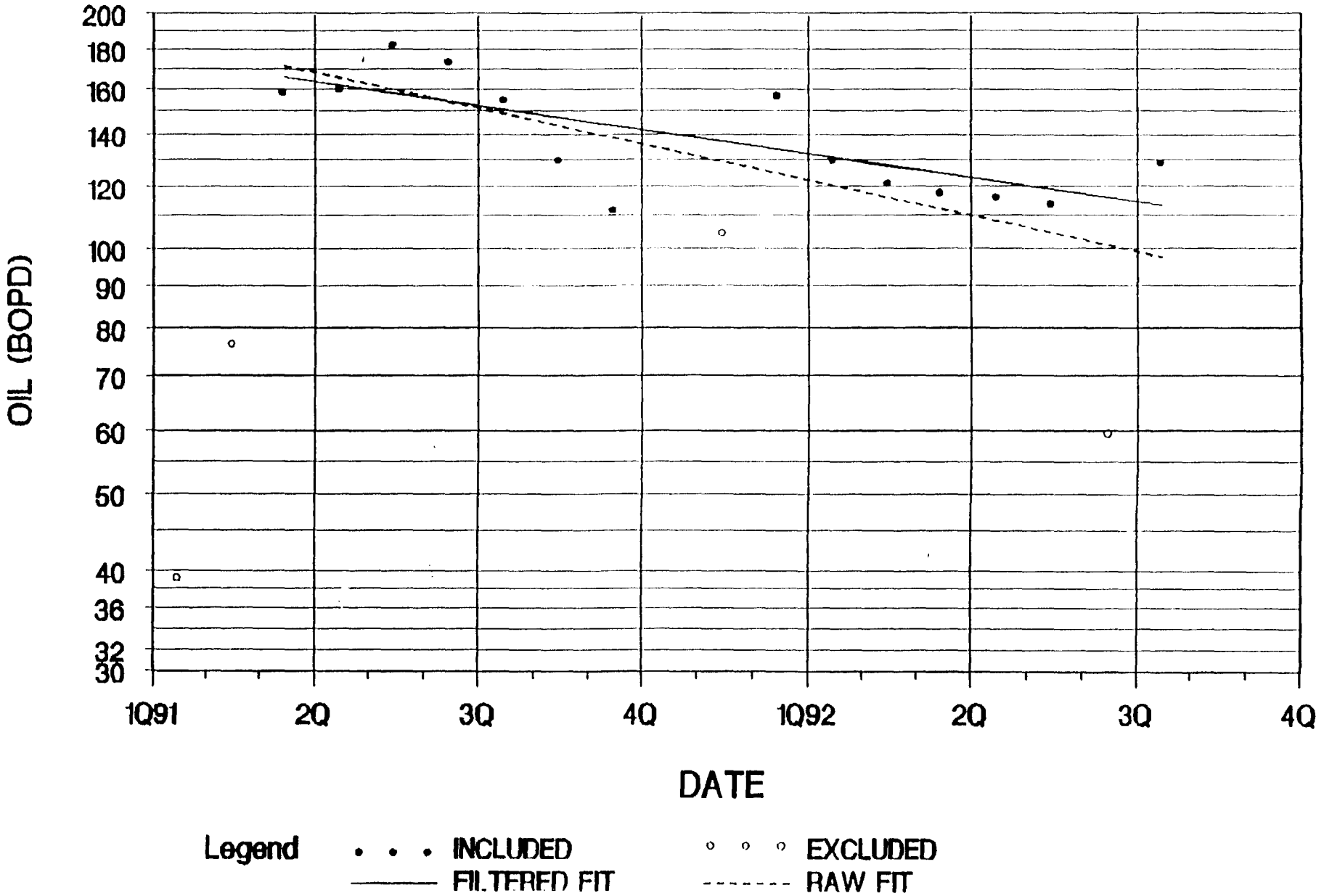
4/91 - 7/92



AVALON FIELD DECLINE CURVES

WELL = YATES C FEDERAL #36 (2016)

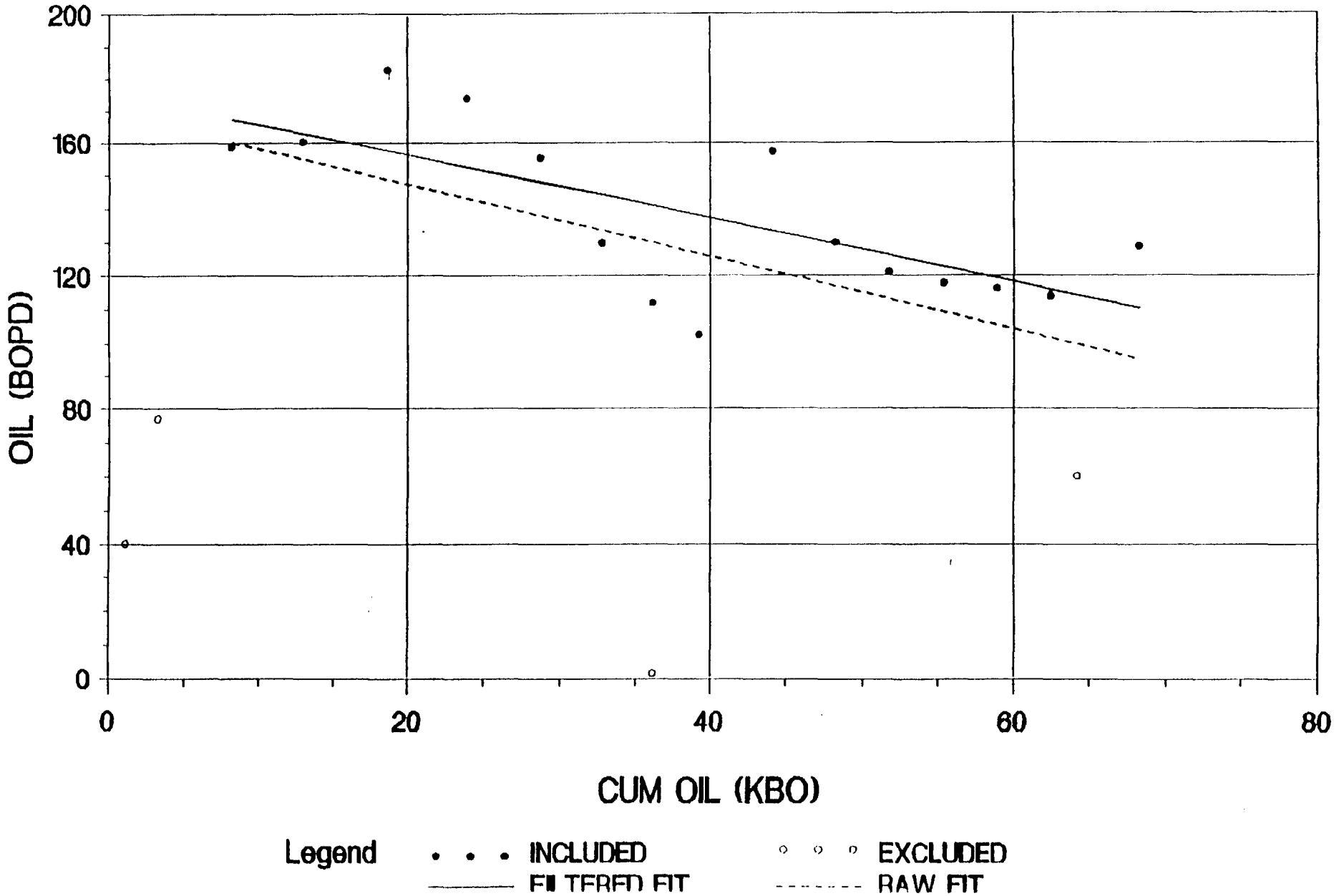
3/91 - 7/12



AVALON FIELD DECLINE CURVES

WELL = YATES C FEDERAL #36 (2016)

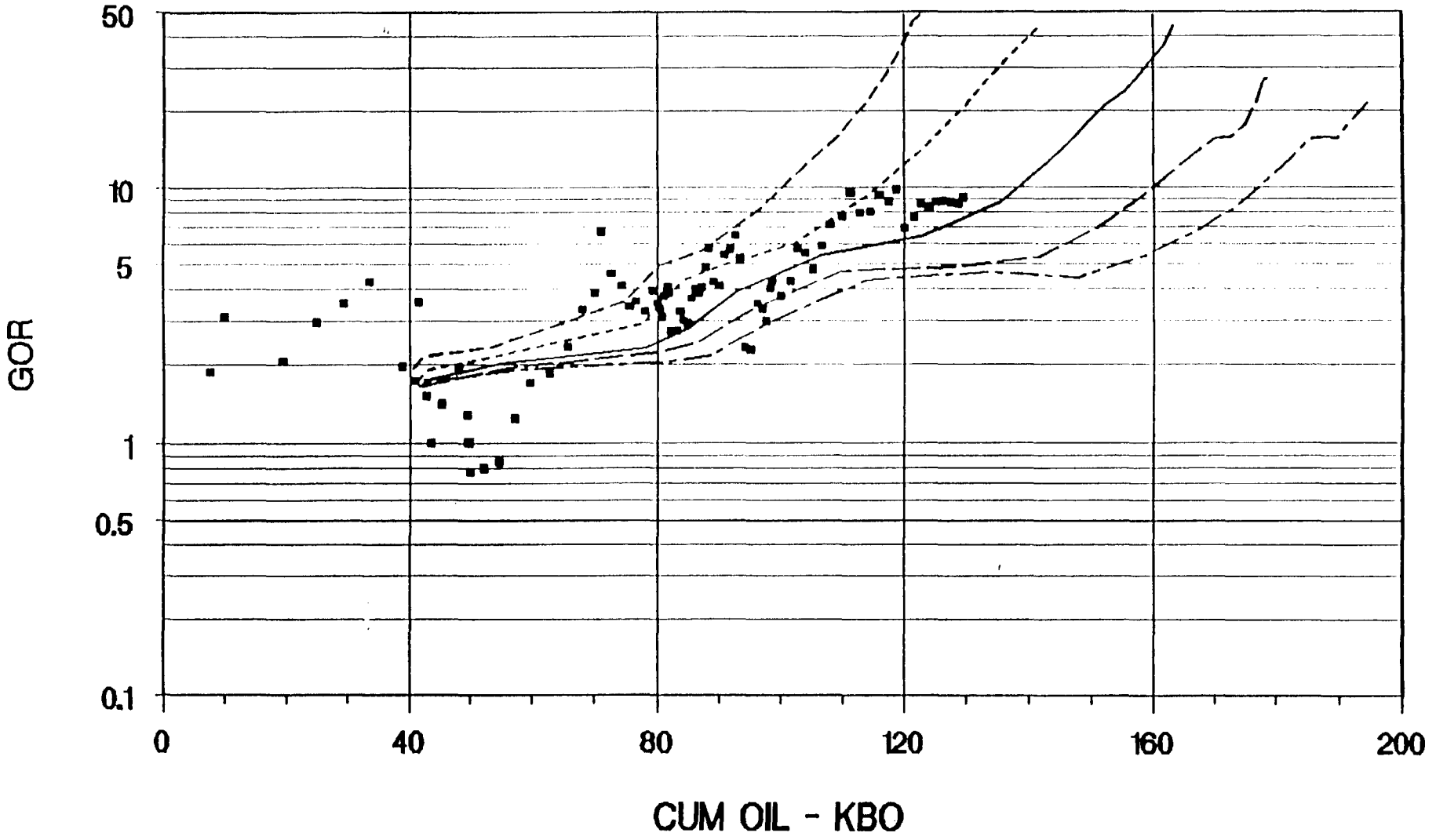
3/91 - 7/92



AVALON FIELD

PRIMARY HISTORY MATCH

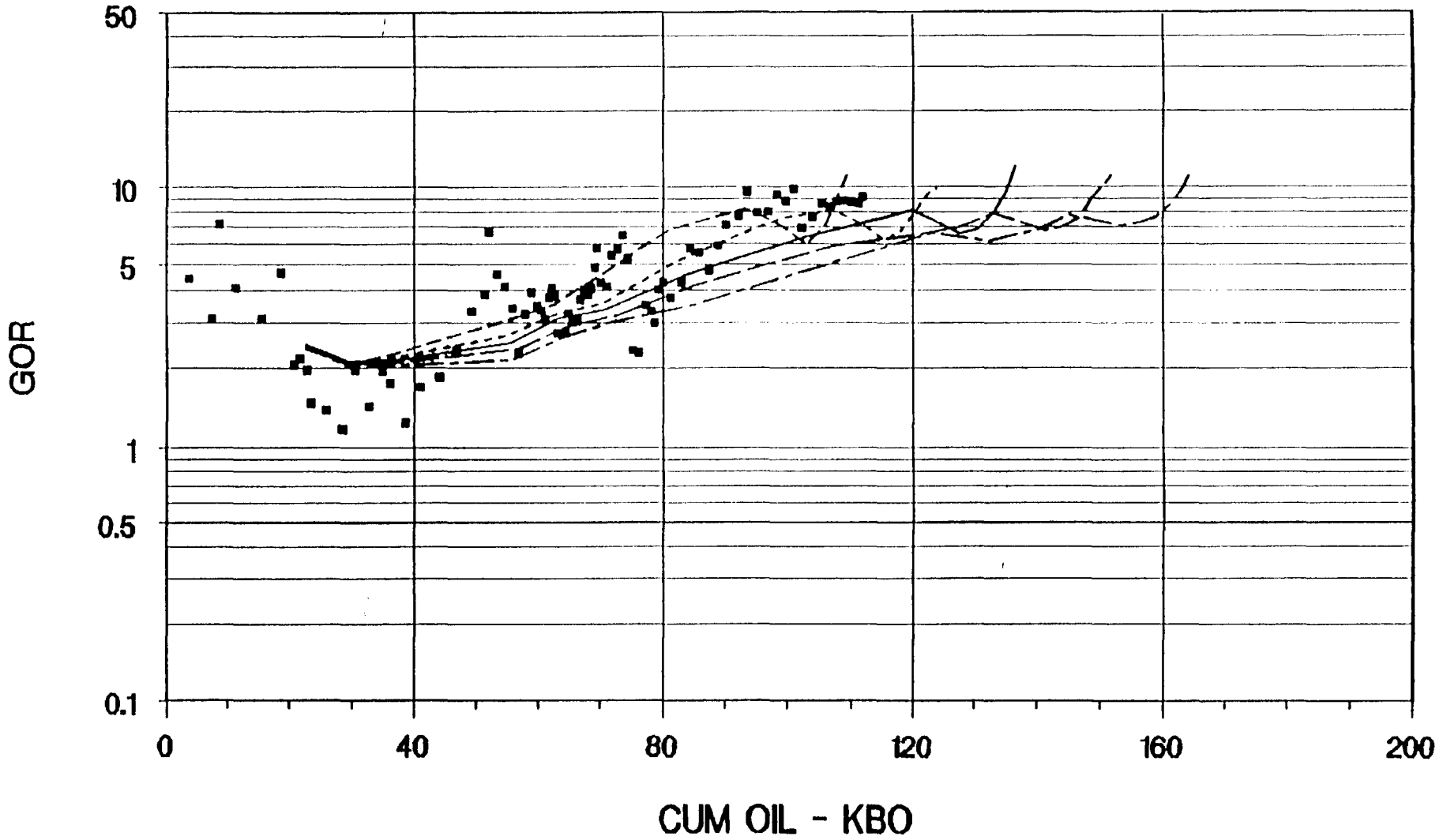
WELL - STONEWALL EP STATE #05 (1311)



AVALON FIELD

PRIMARY HISTORY MATCH

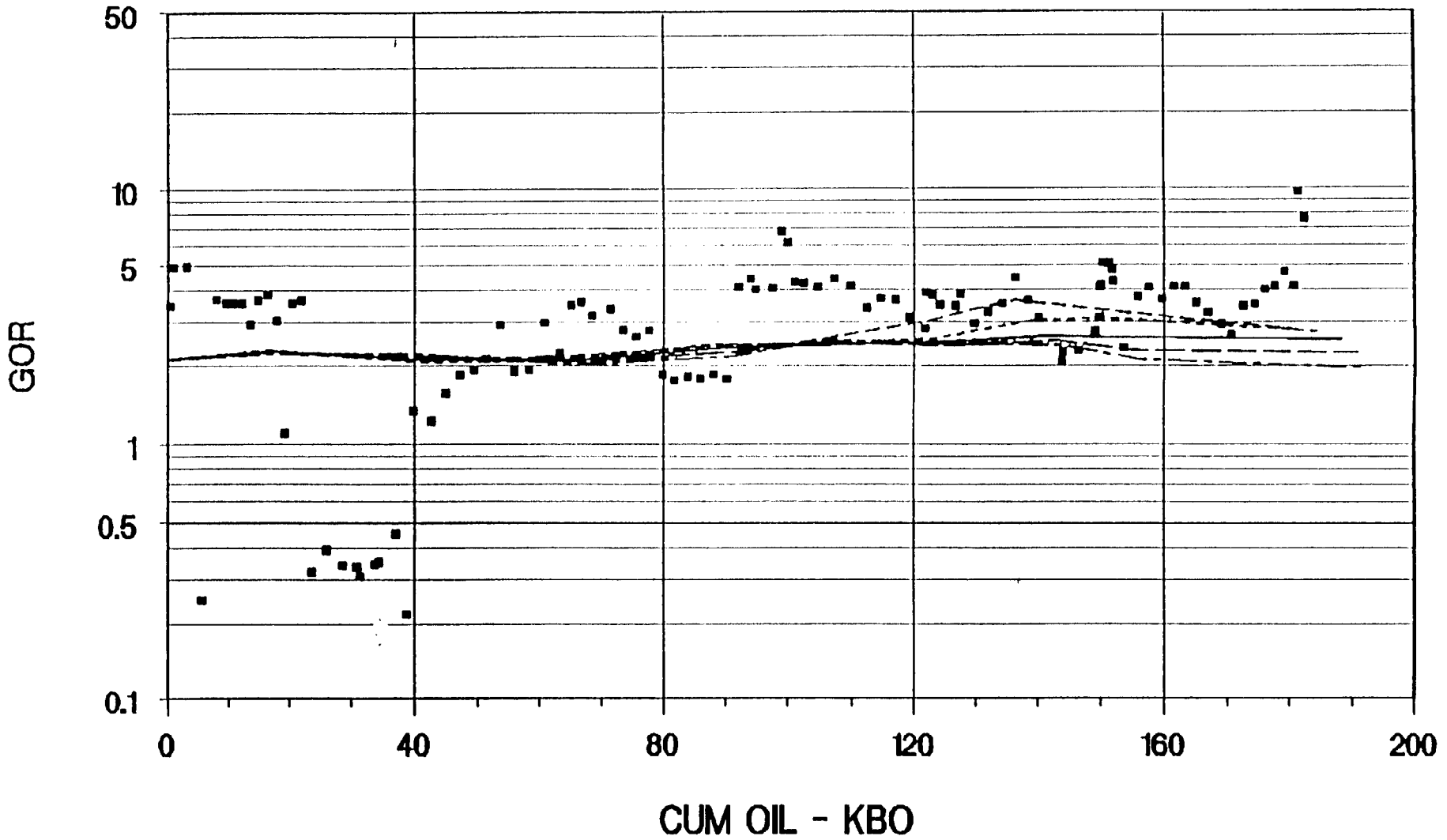
WELL - STONEWALL EP STATE #08 (1313)



AVALON FIELD

PRIMARY HISTORY MATCH

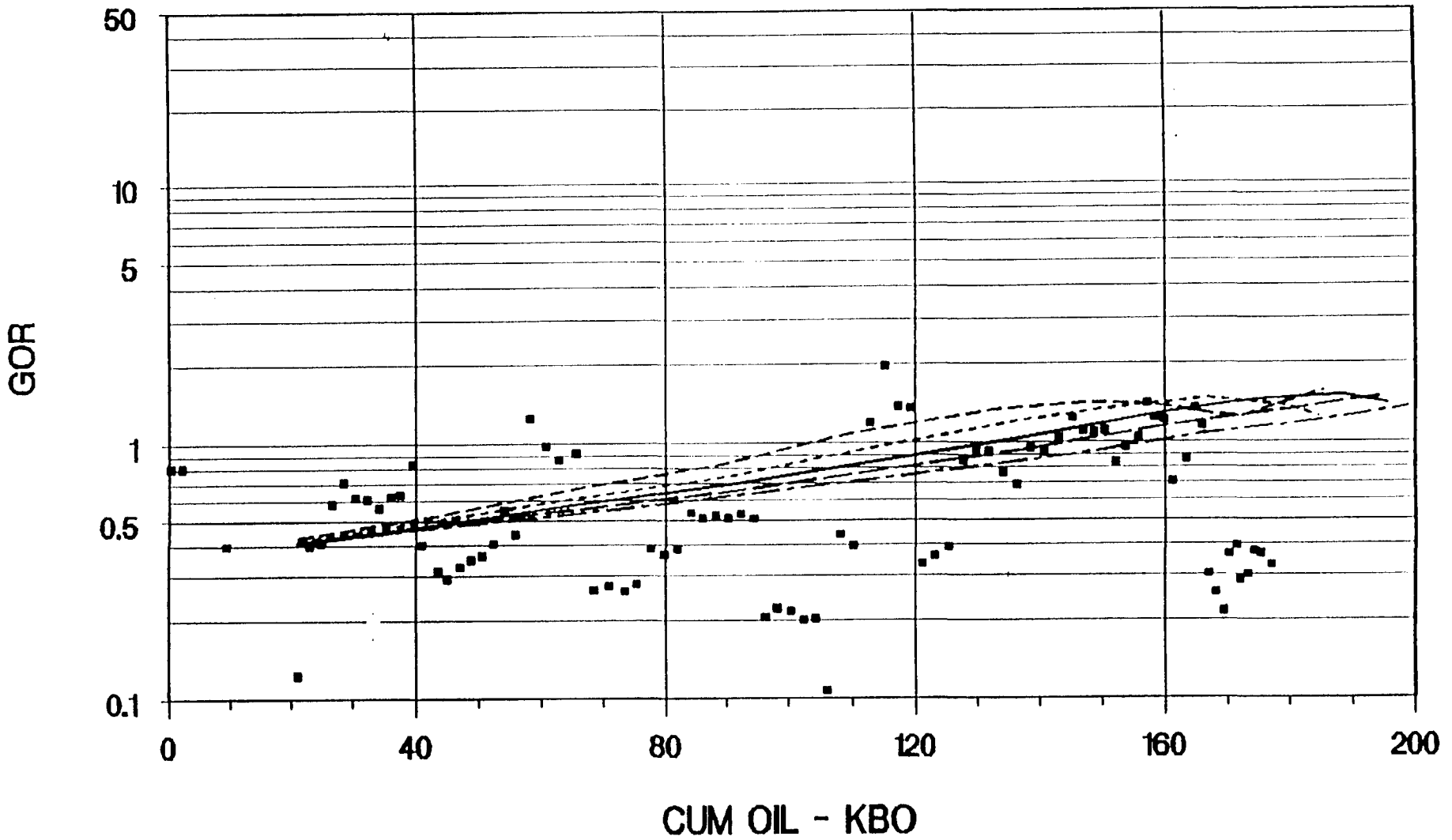
WELL - YATES C FEDERAL #03 (1915)



AVALON FIELD

PRIMARY HISTORY MATCH

WELL - YATES C FEDERAL #04 (1917)



CAUTRELL (WORKOVERS)
12-9-92

FORMATION EVALUATION AND PETROPHYSICS

METHODOLOGY AND CALCULATION PARAMETERS

(Continued)

Water Saturation Calculation

- Utilized all resistivity curves available to calculate Rt

  DLL : corrected for invasion — 62 wells
  DIL : no invasion correction needed — 8 wells (deeper tool)

- Input parameters included:

Rt	:	from resistivity logs
Rw @ BHT	:	averaged from 15 produced water analyses (Rw average for Upper Cherry Canyon = 0.0471 ohm-meters @ 105°F Rw average for Upper Brushy Canyon = 0.0459 ohm-meters @ 105°F)
a	:	determined from special core analysis (SCAL) work on Yates "C" Federal #6, used 1.0
m	:	determined from SCAL work, used 1.9
n	:	determined from SCAL work, used 1.84
Rwb	:	calculated resistivity of bound water in clays, used 1.93 ← bound water as fresh

5-15% clay from x-ray

- Used "Dual Water" model to calculate foot-by-foot clay corrected water saturations

Cutoffs

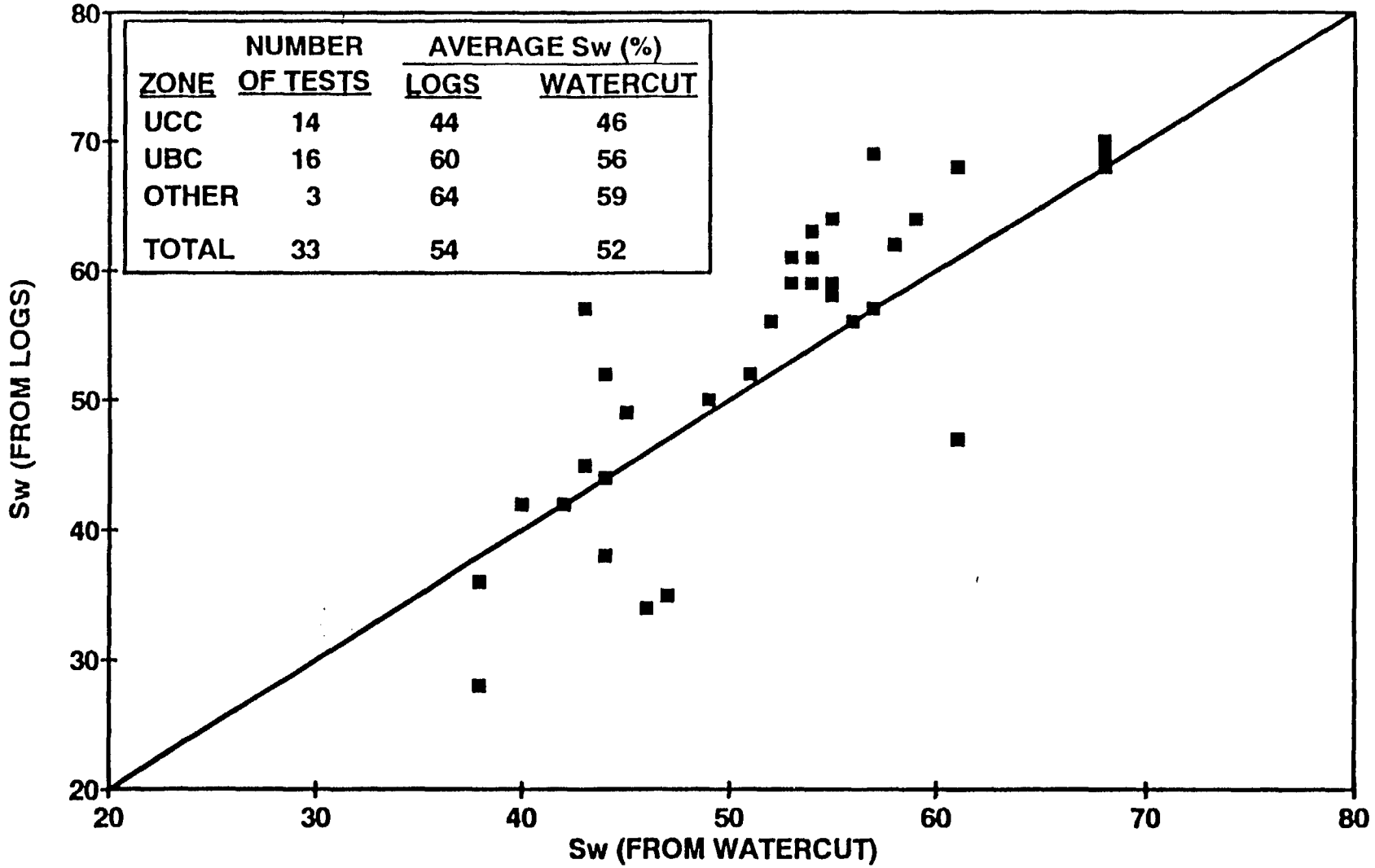
- Applied porosity cutoffs to foot-by-foot porosity data to net out non-pay section
- Different cutoffs used in each zone:

  Upper Cherry Canyon cutoff = 10% PHI_{ec}
  Upper Brushy Canyon cutoff = 11% PHI_{ec}

- Allows calculation of net thickness, average porosity and average water saturation by zone

AVALON (DELAWARE) FIELD
Sw CHECK

ZONE	NUMBER OF TESTS	AVERAGE Sw (%) LOGS	AVERAGE Sw (%) WATERCUT
UCC	14	44	46
UBC	16	60	56
OTHER	3	64	59
TOTAL	33	54	52



Fractional flow from relative perm curves

AVALON (DELAWARE) FIELD
RECENT WORKOVER RESULTS

Well	Year	Depth	S_w	HC Pore-Thickness	Test Results
YFC#7	1989	3105-3113	0.587	0.656 ft	Swabbed tr oil
YFC#7	1989	2574-2755	0.710	4.70 ft	P/42/420
YFC#9	1989	2538-2788	0.629	9.71 ft	F/71/277 (Commingled UCC + UBC)
YFC#36	1990	4708-4736	0.702	1.22 ft	P/0/268
YFC#36	1990	3406-3624	0.571	10.7 ft	P/142/261
YFC#36	1991	3038-3189	0.586	6.02 ft	P/104/500
YFC#36	1991	2546-2810	0.440	10.9 ft	P/200/200
EP#7	1992	2558-2572	0.260	1.92 ft	P/10/100

good relation

EP#7 Summary:

2796-2836 S_w = 0.422, HC Pore-Thickness = 3.86
Acidized with 15% NEFE.
No frac.
Swab tested for less than 2 days, swabbed dry, small show of gas - no oil.

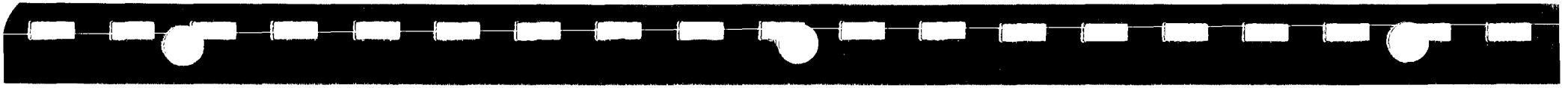
2662-2686 S_w = 0.350, HC Pore-Thickness = 2.50
Acidized with 15% NEFE.
No frac.
Swab tested for less than 2 days, did not recover load. Swabbed dry, no show of gas or oil.

2558-2572 S_w = 0.260, HC Pore-Thickness = 1.92
Acidized with 15% NEFE (with clay stabilizer)
Pre-frac swab tests (84 bbls load to recover):

(1) Recovered 14 bbls, swabbed dry.
(2) 1½ hours later, made swab run in barrel, recovered 8 gal. oil/20 gal. water, swabbed dry.
(3) 1½ hours later, recovered 13 gal. oil/23 gal. water, swabbed dry. Small gas show.
(4) Next day, recovered 1 bbl oil/5½ bbls water.

Fraced (357 bbl load).
Recovered (swabbed?) 9 bbl oil/301 bbl water.
Recovered 13 BO/117 BW.
PWOP.

Model prediction for zone CDCM = 11 BOPD.



EXXON COMPANY, U.S.A.
POST OFFICE BOX 1600 • MIDLAND, TEXAS 79702-1600

PRODUCTION DEPARTMENT
SOUTHWESTERN DIVISION

December 22, 1992

Proposed Avalon Delaware Unit
Technical Report Review

Yates Petroleum Corporation
105 South Fourth Street
Artesia, New Mexico 88210

Attention: David F. Boneau

Dear Dave,

Exxon has reassessed the primary reserves for the 5 wells which we discussed in our meeting of December 9. The results of that decline curve analyses are summarized on the attached table. The total adjustment for the 5 wells is 93.2 kBO ultimate primary (or 2.2% of the Unit total) and 4.9 kBO remaining primary as of 1/1/93 (or 0.4% of the Unit total). The adjustments for the "EP" #5, "EP #8 and "C" #3 are straight-forward. The adjustments for "C" #4 and "C" #36 are slightly more involved since they share an allowable and the former has been shut-in since the latter was put on production. The original estimates for "C" #36 were based on continuity calculations rather than decline curve analysis since the well had been on production only a few months. Reviewing more recent production from the "C" #36 and its two offsets indicates no apparent interference, supporting the greater hydrocarbon-bearing section found in this well. The net increase in remaining primary for the "C" #4/"C" #36 combination is 20.8 kBO over the Report values.

Exxon would prefer not to revise the Technical Report since we feel the revisions are relatively minor, yet would result in a 4-8 week delay in approval. The delay would result from our preference to advise the other owners of prospective changes and to solicit additional input with opportunity for review; then to ballot an addendum to the Report. An addendum would also include a paragraph regarding development philosophy as we discussed. However, if Yates Petroleum prefers that the changes be made, we are willing to take that approach.

We would be glad to discuss the issue further at your convenience.

Sincerely,

Larry D. Long

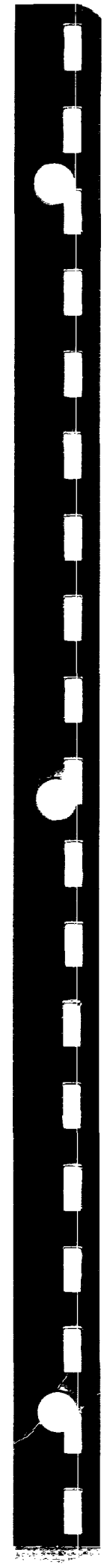
LDL:hho
Attachment

PRIMARY RESERVE SUMMARY

WELL	EXHIBIT G19 PRIMARY RESERVES	REVISED DECLINE CURVE RESERVES	DELTA	EXHIBIT G19 1/1/93 RUR	REVISED 1/93 RUR	DELTA
Stonewall "EP" #5 (1311)	163.6	179.8	+16.2	27.2	43.4	+16.2
#8 (1313)	137.1	152.4	+15.3	18.1	33.4	+15.3
	300.7	332.2	+31.5	45.3	76.8	+31.5
Yates "C" Federal #3 (1915)	356.4	309.0	-47.4	160.9	113.5	-47.4
#4 (1917)	233.8	210.1	-23.7	53.0	29.3	-23.7
#36 (2016)	45.6	178.4	+132.8	45.6(a)	90.1(b)	+44.5
	635.8	697.5	+ 61.7	259.5	232.9	-26.6
	936.5	1029.7	+ 93.2	304.8	309.7	+ 4.9
Total Unit	4182.4		+2.2%	1187.4		+0.4%

(a) The Yates "C" 36 remaining reserves as of 1/93 were based on continuity calculations rather than decline curve as indicated by the "Comments" on Exhibit G-4. At the time the Report was prepared the well had been on production only several months.

(b) The revised estimates are based on the revised EUR of 178.4 kBO and a revised estimated 1/93 cumulative of 88.3 kBO.



MARTIN YATES, III
1912 - 1985
FRANK W. YATES
1936 - 1986

YATES PETROLEUM CORPORATION

105 SOUTH FOURTH STREET
ARTESIA, NEW MEXICO 88210
TELEPHONE (505) 748-1471

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CHAIRMAN OF THE BOARD
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RANDY G. PATTERSON
SECRETARY
DENNIS G. KINSEY
TREASURER

January 7, 1993

Coquina Oil Company
1717 St James Place
Suite 200
Houston, Texas 77056

Attn: Sherri Clark

Subject - Avalon Delaware Unit

Dear Sherri,

This letter is intended to be a record of the meeting between Yates and Exxon on December 9, 1992, concerning the proposed Avalon Delaware Unit. Exxon replied to our concern about primary reserves on December 22, 1992; and that reply is included here also.

You recall that Yates and Coquina had questions about four areas in the Engineering Report prepared by Exxon. As expressed in my letter of November 25 (Attachment 1) to Larry Long, our questions covered: EX 2A

1) Area Outside Primary Production
2) Primary Reserves
3) Geology and Modeling
4) Workover Reserves

EX 2B

Exxon prepared rather elaborate responses (Attachment 2) to each of the four questions.

Area Outside Primary Production - Gil Beuhler

My main concern is that Exxon may commit about $100 million for CO2 both inside and outside the area of primary production without decision points to provide an escape mechanism in the remote case that the projects fails early in its life. Exxon attempted to address this concern with the time line on page 3 of Attachment 3. EX 2B Exxon sees the project having two phases. Phase I covers the initiation of waterflooding during 1993 and 1994. An $18 million AFE in late 1992 would cover the drilling of 19 wells (18 injectors and one producer all in the area of primary production) plus installation of water-injection facilities. A separate AFE for $8 million might be issued in 1994 if consolidation of production facilities is necessary after the central waterflood gets underway. Phase II covers the installation of the CO2 project during the period 1996 to 1998. Exxon plans to send out one AFE in the middle of 1995 to cover the drilling of 56 wells, installation of CO2 facilities plus a plant to compress CO2 for recycle. The

amount of the AFE is about $77 million for CO2 development both inside and outside the area of primary production. This amount includes about $23 million for a plant to recycle produced CO2. The actual recycle needs are difficult to estimate before the project begins. Initially, Exxon plans to inject all purchased CO2 into the area of primary production. Some water injectors will be needed outside the primary production area at that time to handle water produced inside the primary production area. However, the number of outside injectors required to support CO2 injection inside the primary production area is only 10 to 20 percent of the outside injectors Exxon plans to drill in the 1996 drilling program. Exxon believes that the entire CO2 project must be installed at once to maximize rate of return. Exxon is comfortable enough with the geology and with its CO2 experience to offset any risk of subpar performance.

Yates pointed out that we disagree with the philosophy behind a single AFE in 1995 for $77 million. I believe it is prudent to have one AFE in 1995 for a CO2 project inside the area of primary production and a second AFE two to three years later for expansion of CO2 outside the area of primary production. The Exxon people sounded sympathetic to our proposal, but the Exxon system must require management approval of the whole CO2 project in 1995. I asked whether Exxon's management in Dallas could approve the whole thing at one time while Exxon in Midland sent out a series of AFE's over several years. The Exxon reply was that this might be possible, but Exxon prefers its own approach. I feel the Exxon people at the meeting believe that our suggestion is logical, but someone higher in the company required that they follow the company line. Exxon agreed to consider our suggestion. If Exxon doesn't modify its position, Yates and Coquina can only seek a voting procedure that permits us to vote down an AFE for $77 million in 1995.

Exxon said its economic runs show a 27 percent rate of return for the area of primary production and a 20 percent rate of return outside the area of Primary production. The corresponding Yates values are 25 and 13 respectively.

Geology and Modeling - Dave Cantrell and Mike Goodwin

My letter of November 25 commented about the fact that the computer modeling required reservoir permeability to be increased by a factor of two or more. I hinted that this might cast suspicion on the accuracy of the log analysis. Exxon's answer was that the reservoir permeability had to be increased because the wells are hydraulically fractured. The Exxon geology work gives results that match core data. The modeling via prototype simulation and scale up is a proven technique that Exxon has used in large reservoirs. A three-dimensional reservoir simulation is unreasonable for a reservoir as big as Avalon Delaware.

I feel the Exxon geology and the Exxon modeling is totally adequate. We learned several items I did not know:

1) Exxon is performing shear-wave VSP at Avalon to determine directional permeability.

2) The sonic logs were not corrected for presence of clay since no correction is needed.

3) Separate correlations of permeability as a function of porosity were developed for each Delaware zone.

4) Water-oil ratios were ignored on wells with large fracture treatments because water is surely produced from out-of-zone.

5) Permeabilities in the simulator were derived by correlating core data from nearby wells to the three prototype wells.

6) All vertical - permeability data came from core taken at Yates C #36.

7) All wells outside the area of primary production were assumed to have low GOR's because they are located down - structure.

Decline Curves (Primary Reserves) - Mike Goodwin

Yates made independent estimates of the remaining oil reserves for all wells in the Avalon Delaware pool and compared estimates with the Exxon numbers in the Engineering Report. The Yates and Exxon estimates matched except for four wells (Stonewall EP #5 and EP #8 and Yates C #3 and #4). At the meeting on December 9, Exxon explained how the Engineering Report calculated reserves, but was not able to explain the differences with the Yates values on the spur of the moment. The Exxon letter of December 22 (Attachment 4) says that the reserves of Yates Stonewall EP #5 and #8 should be increased by 31.5 MBO while the reserves for Exxon Yates C Federal #3 and #4 should decrease by 71.1 MBO. At the same time, the reserves of the Yates C #36 should increase by 44.5 MBO. The Yates C #36 is the newest well in the field and occupies the same spacing unit as Yates C #4. EX. 2C

The Engineering Report divided the wells into two groups for reserve purposes: 1) those with no restrictions on rate or GOR and 2) those where GOR and/or oil allowable restricted production. For the first group, Exxon plotted both log of rate versus time and rate versus oil cumulative. Exxon removed extraneous points and fit lines to the remaining data. An average of the two estimates (weighted according to the statistical error bars) was used as ultimate reserves. Yates C Federal #4 fit into this first group, and some confusion related to the spacing unit shared with Yates C #36 caused the apparent error in its reserves. The second group of wells with restricted production could not be analyzed in so straight-forward a manner. Stonewall EP #5 and #8 plus Yates C #3 and #36 all fall into the second group. The Engineering Report used at least two approaches to the restricted wells. In some cases, rate versus cumulative could be plotted over some intervals where the well did produce at capacity. In other cases, GOR was plotted against oil cumulative on semilog paper up to a limiting GOR of 20,000. Exxon agreed that 20,000 is probably low as a limiting GOR for EP #5 and EP #8; and the reserves have been raised accordingly. Yates C #36 is a special case where the well has produced for a short time at rates above allowable. Initially, Exxon made a conservative

estimate of reserves for Yates C #36. The letter of December 22 includes a less conservative estimate for Yates C #36.

One thing that is clear to me is that Exxon's goal has always been to provide an unbiased estimate of reserves. Yates questioned wells where reserves are difficult to estimate.

Workover Reserves - Dave Cantrell, Mike Goodwin

Exxon explained that the Yates work at re-completing Stonewall EP #7 actually fits Exxon's expectation for workover so that the workover reserves should be retained in the Engineering Report.

Yates tested three Delaware zones in the EP #7 and ended up producing 13 BO and 117 BW from the zone at 2558-2572. Exxon contends that its experience shows that oil-on-swab translates into a successful completion after frac while "no show" on swab still means a successful completion after frac in 50 percent of the cases. Also Exxon developed a correlation (Attachment 3, page 73) between feet of hydrocarbon pore volume and production after frac. About 2 feet of hydrocarbon pore volume is required for a minimal completion while 6 to 11 feet is required for production above 100 BOPD. Now apply the Exxon experience to Stonewall EP #7. The zone at 2796-2836 has 3.86 feet of hydrocarbon pore volume. Yates swabbed a small show of gas after acid and abandoned the zone. Exxon believes this is the best zone in the well and it might produce 40 BOPD. The zone at 2662-2686 has 2.50 feet of hydrocarbon pore volume. Yates swabbed the well dry after acid and abandoned the zone. Exxon thinks this zone could produce 25 BOPD. The zone at 2558-2572 has 1.92 feet of hydrocarbon pore volume. Yates swabbed about 1.5 BO in two days and fraced the zone. After swabbing back most of the frac load, Yates produced 13 BO and 117 BW on initial potential. The Exxon correlation says the initial rate should be 11 BOPD.

The Exxon conclusion is that Exxon understands Delaware workovers and Stonewall EP #7 behaved according to the Exxon model. After unitization, Exxon will frac the two lower zones and increase production by 65 BOPD. Since the assumed workover reserves benefit Yates, we are willing to believe the Exxon explanation and leave the workover reserves in the Engineering Report.

SUMMARY

I feel the Exxon responses concerning Workover Reserves and Geology/Modeling are completely acceptable. Exxon essentially agrees with the Yates modifications to Primary Reserves. The Exxon approach to the Area Outside Primary Production still seems crazy to me. The Exxon letter of December 22 repeats Exxon's offer to add a paragraph to the report which says that the economics in the report assume the entire CO2 flood will be implemented as one continuous project, but the risk associated with the area outside primary production may cause some delay in expanding CO2 to the outer ring. Such a delay will have some minor negative effect on the overall economics. So, the questions come down to whether we should accept the Exxon Engineering Report with such an addendum and whether the addendum

should include anything about the revised primary reserves. I suggest an addendum with a bit of CO2 philosophy plus a list of revised primary reserves for five wells. What think you?

We owe Exxon a reply on the Engineering Report. Let's talk a few days after you receive this.

Sincerely,

Dave Boneau

David F. Boneau
Reservoir Engineering Supervisor

DFB/mjw

Attachments

cc Larry Long (Exxon)
Mike Slater
Brian Collins
Bob Fant
Randy Patterson
Brent May

EXXON COMPANY, U.S.A.
POST OFFICE BOX 1600 • MIDLAND, TEXAS 79702-1600

PRODUCTION DEPARTMENT
SOUTHWESTERN DIVISION

February 15, 1993

Proposed Avalon (Delaware) Unit
Technical Report

Yates Petroleum Corporation
105 South Fourth Street
Artesia, New Mexico 88210

Attention: Mr. Bob Fant

Dear Bob,

The enclosed material includes a draft of a proposed addendum and associated exhibit dealing with waterflood and tertiary reserves. I've also enclosed two-work maps and a summary sheet reflecting the overall results for your information. I told Dave last week that I would draft a paragraph addressing Yates' concern over the development plan described in the Report. That draft is also enclosed for your comments. I'd be glad to discuss the procedure, maps and proposals at your convenience.

Sincerely,

Larry D. Long

LDL:hho
Enclosures

DRAFT

Proposed Addendum to Technical Report

Section G: Flowstreams

The reserves discussed and summarized in Section G of the Technical Report are through-wellbore reserves determined by the procedures detailed in that Section. Those reserves were based on a series of flood pattern configurations largely dictated by existing wellbores as indicated qualitatively in Exhibit G-2. The few producers to-be-drilled were generally centered within their nominal 40-acre tracts. Injectors to-be-drilled were generally placed mid-way between offset producers so as to enhance pattern areal conformance and ultimate recovery. The resulting flood pattern boundaries generally do not conform to lease-lines nor internal nominal 40-acre tract lines. This non-conformance results in some in-place reserves being pushed off their respective tracts to adjacent producing wells during flooding operations.

Exhibit G-24 better represents in-place ownership of the produced reserves. For that Exhibit, primary reserves were not revised from those shown in Exhibit G-19 except for those wells affected by an accompanying addendum as a separate issue. Tract Waterflood Reserves were determined by (1) first determining the reserves associated with the waterflood's nominal quarter-patterns (the polygons shown in Exhibit G-2) for each production well; (2) determining the original-oil-in-place for each of the smaller polygons ("tract-patterns") created by the intersections of the quarter-pattern and 40-acre well-tract boundaries; (3) allocating the quarter-pattern reserves to the tract-patterns by the ratio of the associated OOIP's; and (4) recombining the resulting tract-pattern reserves for each well-tract. Both sets of boundaries are defined by co-ordinates used for other calculations reflected in the Report, most notably the volumes contained in Sections E and G. The Tract Waterflood Reserves shown in Exhibit G-24 include both the workover volumes and the waterflood volumes shown separately in Exhibit G-19. The Tract CO_2 Reserves were determined in an analogous procedure.

AVALON (DELAWARE) UNIT
BY WELL-TRACT RESERVES
---RUR AS OF 1/1/93---
---VOLUMES ARE KBO---

DRAFT

WELL TRACT	1/1/93 REMAINING PRIMARY	ULTIMATE PRIMARY RESERVES	TRACT WATERFLOOD RESERVES	TRACT CO2 RESERVES
1109	0.0	0.0	0.0	265.4
1111	0.0	0.0	345.1	530.6
1113	0.0	0.0	0.8	446.7
1309	0.0	0.0	0.0	607.3
1311	43.4	179.8	403.6	1693.0
1313	33.4	152.4	373.3	1045.9
1315	0.0	0.0	0.0	362.5
1509	0.0	0.0	0.0	579.0
1511	53.4	137.1	368.1	1425.9
1513	33.8	154.6	741.5	2177.2
1515	0.0	1.7	0.0	852.5
1517	0.0	0.0	0.0	247.4
1709	0.0	5.1	0.0	174.3
1711	19.3	127.6	174.5	1189.7
1713	40.3	164.8	698.4	2009.3
1715	20.2	66.3	157.5	966.2
1717	0.0	0.0	69.3	481.0
1719	0.0	0.0	0.0	203.9
1909	0.0	0.0	0.0	336.2
1911	66.4	190.7	252.6	1687.4
1913	80.9	268.8	648.3	1861.6
1915	113.5	309.0	1101.1	2271.4
1917	119.4	388.5	156.3	739.5
1919	24.1	68.4	11.3	448.6
1921	0.0	0.0	0.0	143.8
2109	0.0	0.0	0.0	91.4
2111	50.7	138.9	102.5	1195.1
2113	120.3	360.8	553.9	1496.8
2115	38.0	257.6	397.1	1933.6
2117	76.6	275.8	587.5	2241.8
2119	126.9	258.2	232.2	925.2
2121	0.0	0.0	0.0	308.9
2123	0.0	0.0	0.0	51.5
2309	0.4	10.9	0.0	46.7
2311	19.3	150.6	157.9	1207.9
2313	56.7	199.5	264.9	1064.2
2315	0.0	22.7	73.4	523.1
2317	0.0	29.5	28.6	881.0
2319	29.3	173.6	167.5	823.6
2321	3.1	23.2	69.7	741.6
2323	0.0	0.0	0.0	120.1
2509	0.3	6.0	0.0	119.1
2511	0.0	11.9	0.0	522.4
2513	0.0	0.0	0.0	219.4
2515	0.0	0.0	0.4	353.9
2517	0.0	24.6	43.7	525.1
2519	22.5	114.1	88.3	710.5
2521	0.0	0.0	0.1	299.2
2523	0.0	0.0	0.0	19.5
2709	0.0	3.1	0.0	239.4
2711	0.0	0.0	0.0	204.9
2717	0.0	0.0	0.0	148.9
2719	0.0	0.0	0.0	111.9
2721	0.0	0.0	0.0	10.0
TOTAL	1192.2	4275.8	8269.1	39882.9

NOTE: PRIMARY RESERVES ADJUSTED ONLY TO REFLECT ACCOMPANYING ADDENDUM
THAT APPLIES TO WELLS 1311, 1313, 1915 AND 1917 (INCLUDES 2016)
NOTE: WELL 2016 RESERVES ARE INCLUDED WITH THOSE OF WELL 1917 SINCE
THE WELLS SHARE THE SAME PRIMARY PRORATION TRACT
NOTE: WATERFLOOD RESERVES INCLUDE BOTH WORKOVER AND FLOOD RESERVES

EXHIBIT G-24

DRAFT

Addendum to Technical Report

The Technical Report, Section H, describes a development plan with a pressure-building water injection step to be implemented in 1993. After approximately three years of water injection, it is anticipated that the area reservoir pressure will be increased to the level desired for CO_2 miscible operations. The analysis performed at the time the Report was compiled indicates that the entire proposed area would achieve acceptable economic performance and that a near-simultaneous implementation across the area achieves the maximum present-worth for the investments required. However, it is also expected that additional reservoir description data resulting from the 1993-94 drill wells; the planned CO_2 injectivity test referenced in the Report; the water injectivity data across the area; the over-all performance data of the water injection phase; and non-technical data such as crude prices will all provide valuable information for optimizing the overall project and its implementation plan. Thus, while the CO_2-injection phase implementation across the entire area in the 1996-97 time-frame appears to be the optimum plan under currently-known conditions, it is likely that additional information gained prior to that time could lead to modifications to the plan. Approval of the implementation plan will require the necessary owner ballot approval.

SUMMARY OF AREA RESERVES WITH AND WITHOUT ADJUSTMENTS
TOTAL RESERVES QUOTED ARE POST-1/1/93

TRACT GROUP	1/1/93 REMAIN PRIMARY	REPORT SECONDARY RESERVES	ADJUSTED SECONDARY RESERVES	REPORT TERTIARY RESERVES	ADJUSTED TERTIARY RESERVES	REPORT TOTAL RESERVE	ADJUSTED TOTAL RESERVE	TOTAL RESERVE ADJUSTMENT
YATES-OPERATED	243.8	3436.2	3332.0	13828.1	13855.2	17508.1	17431.0	-77.1
HUDSON-OPERATED	0.0	0.0	0.0	242.8	203.9	242.8	203.9	-38.9
PREMIER-OPERATED	0.0	0.0	0.0	2055.4	1626.0	2055.4	1626.0	-429.4
MWJ-OPERATED	0.7	0.0	0.0	173.7	165.7	174.4	166.4	-8.0
MERIT-OPERATED	0.0	0.0	0.0	448.5	444.3	448.5	444.3	-4.2
KERR MCGEE-OPERATED	0.0	0.0	0.0	226.9	191.2	226.9	191.2	-35.7
EXXON-OPERATED	947.7	4832.9	4937.1	22907.5	23396.6	28688.1	29281.4	593.3
TOTAL	1192.2	8269.1	8269.1	39882.9	39882.9	49344.2	49344.2	-0.0

Bob,
For your information,
Larry

YATES PETROLEUM CORPORATION

105 SOUTH FOURTH STREET
ARTESIA, NEW MEXICO 88210
TELEPHONE (505) 748-1471

March 3, 1993

Exxon Company,. U. S. A.
P. O. Box 1600
Midland, Texas 79702-1600

ATTN: Mr. Larry D. Long

RE: Proposed Addendum to the Avalon (Delaware) Unit Technical Report

Dear Sir:

After speaking with you on March 2, 1993, I discussed the report with Dave Boneau. Attached is a draft copy of a paragraph that Yates Petroleum Corporation requests be included as an addendum to the technical report.

Assuming this paragraph is included, we are recommending to our management that they approve the technical report and that we proceed with unitization talks.

If you have any further questions regarding this matter, please let me know.

Sincerely,

Robert S. Fant
Engineer

RSF/cvg

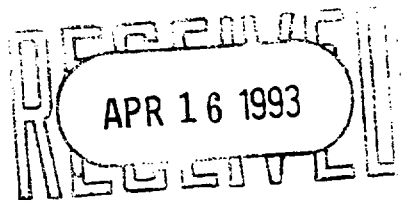
DRAFT

Addendum to Technical Report

The Technical Report, Section H, describes a development plan with a pressure-building water injection step to be implemented in 1993. After approximately three years of water injection, it is anticipated that the area reservoir will be increased to the level desired for CO_2 miscible operations. The analysis performed by the Technical Committee at the time the Report was compiled indicates that the entire proposed area would achieve acceptable economic performance and that a near-simultaneous implementation across the area achieves the maximum present-worth for the investments required. However, some prospective unit owners have expressed the view that this "near-simultaneous implementation" may not be the optimal plan of development. It is expected that additional reservoir description data resulting from the 1993-94 drill wells; the planned CO_2 injectivity test referenced in the Report; the water injectivity data across the area; the over-all performance data of the water injection phase; and non-technical data such as crude prices will all provide valuable information for optimizing the project and its implementation plan. Thus, while different viewpoints regarding project implementation in the 1996-97 time frame exist at this time, it is likely that the additional information gained prior to this time will lead to the development of an agreed upon optimal plan of development. Whatever implementation plan submitted in the 1996-97 time frame will require ballot and approval by the working interest owners in accordance with the ballot and voting procedures outlined in the Unitization Agreement.

EXXON COMPANY, U.S.A.
POST OFFICE BOX 1600 • MIDLAND, TEXAS 79702-1600

APRIL 15, 1993



PRODUCTION DEPARTMENT
SOUTHWESTERN DIVISION

J. WAYNE ACHEE
PRODUCTION MANAGER

Proposed Avalon (Delaware) Unit
Technical Report Addenda
Ballot #93-04-135

Working Interest Owners
Proposed Avalon (Delaware) Unit
Eddy County, New Mexico

Please find enclosed a ballot for your approval to accept certain addenda to the "Report of the Technical Committee for the Working Interest Owners", with the Report and addenda to serve as the basis for future unitization negotiations.

Attached to the ballot are revised Exhibits "E" and "F" of the Pre-Unitization Voting Agreement. Those revisions reflect lease ownership information made available subsequent to the August 1992 update. Per the Agreement, other exhibits to the Agreement are unchanged.

When executed, the Ballot should be returned to the address shown below. Any general questions should be directed to Larry D. Long, telephone (915) 688-7932. Any additional title information or questions should be directed to Joe B. Thomas, telephone (915) 688-7162 or to his attention at the address shown below.

Your continued support in the unitization effort is appreciated.

Sincerely,

J. Wayne Achee

JWA:hho
Attachment

Return Ballot to: Exxon Company, U.S.A.
Operations Accounting
Attn: J. J. Degraffenreid
P. O. Box 51040
Midland, Texas 79710-1040

Title Information to:
Exxon Company, U.S.A.
Attn: J. B. Thomas
P.O. Box 1600
Midland, Texas 79702-1600

Proposed Avalon (Delaware) Unit Ballot # 93-04-135

Exxon seeks your approval of the "Report of the Technical Committee for the Working Interest Owners" and the attached Addenda as the basis of all future negotiations regarding the proposed Unit. The Report, dated August 1992, includes two volumes: "VOLUME I - TEXT AND EXHIBITS" and "VOLUME II - MAPS AND CROSS SECTIONS." The Addenda include Items #1 through #5 described in the attachments.

Approval of the Report and Addenda will not constitute a selection of the specific parameters to be used in the participation formula(s) nor of the formula(s) themselves, but does establish that only the data contained in the Report and Addenda will be used for the values of the parameters eventually selected in the negotiating process.

As a result of updated lease ownership information, Exhibits "E" and "F" (dated March 1993) of the approved Pre-Unitization Voting Agreement (the "Agreement") have been revised and are attached. The revisions are made in accordance with the Agreement and do not require approval as part of this ballot, but are included for your information to reflect new voting ownership.

Approved: _____

Title: _____

Representing: _____

Date: _____

Attachment to Ballot 93-04-135

Addenda to the "Report of the Technical Committee for the Working Interest Owners"

ITEM #1 SECTION E: MAPPING AND VOLUMETRICS

Exhibit E-7, Well-Tract 2109, Tertiary Factor should be 0.50

ITEM #2 SECTION E: MAPPING AND VOLUMETRICS

Should include the following addition:

The "limits of primary production" shown on Maps 13, 14, 20 and 21 simply indicate the limits of known current production in the Lower Cherry/Upper Brushy Canyon and Upper Cherry Canyon intervals. These productive limits are shown solely for the purpose of comparing mapping results to production data in the Avalon area and are not intended to represent the absolute limits of all potential primary production from these zones.

ITEM #3 SECTION G: FLOWSTREAMS

EXHIBIT G-19 should include the following revisions:

UNIT WELL NUMBER	PRIMARY 1/1/93 RUR	PRIMARY EUR
1311	43.4	179.8
1313	33.4	152.4
1915	113.5	309.0
1917	29.3	210.1
2016	90.1	178.4

ITEM #4 SECTION G: FLOWSTREAMS

The following discussion and EXHIBIT G-24 should be included:

The reserves discussed and summarized in Section G of the Technical Report are through-wellbore reserves determined by the procedures detailed in that Section. Those reserves were based on a series of flood pattern configurations largely dictated by existing wellbores as indicated qualitatively in Exhibit G-2. The few producers to-be-drilled were generally centered within their nominal 40-acre tracts. Injectors to-be-drilled were generally placed mid-way between offset producers so as to enhance pattern areal conformance and ultimate recovery. The resulting flood pattern boundaries generally do not conform to lease-lines nor internal nominal 40-acre tract lines. This non-conformance results in some in-place reserves being pushed off their respective tracts to adjacent producing wells during flooding operations.

Exhibit G-24 better represents in-place ownership of the produced reserves. For that Exhibit, primary reserves were not revised from those shown in Exhibit G-19 except for those wells affected by addendum Item #3. Tract Waterflood Reserves were determined by (1) first determining the reserves associated with the waterflood's nominal quarter-patterns (the polygons shown in Exhibit G-2) for each production well; (2) determining the original-oil-in-place for each of the polygons ("tract-patterns") created by the intersections of the quarter-pattern and 40-acre well-tract boundaries; (3) allocating the quarter-pattern reserves to the tract-patterns by the ratio of the associated OOIP's; and (4) recombining the resulting tract-pattern reserves for each well-tract. Both sets of boundaries are defined by co-ordinates used for other calculations reflected in the Report, most notably the volumes contained in Sections E and G. The Tract Waterflood Reserves shown in Exhibit G-24 include both the workover volumes and the waterflood volumes shown separately in Exhibit G-19. The Tract CO_2 Reserves were determined in an analogous procedure.

AVALON (CLEARFORK) UNIT
BY WELL-TRACT RESERVES
---RUR AS OF 1/1/93---
---VOLUMES ARE KBO---

WELL TRACT	1/1/93 REMAINING PRIMARY	ULTIMATE PRIMARY RESERVES	TRACT WATERFLOOD RESERVES	TRACT CO2 RESERVES
1109	0.0	0.0	0.0	265.4
1111	0.0	0.0	345.1	530.6
1113	0.0	0.0	0.8	446.7
1309	0.0	0.0	0.0	607.3
1311	43.4	179.8	403.6	1693.0
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2123	0.0	0.0	0.0	51.5
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2321	3.1	23.2	69.7	741.6
2323	0.0	0.0	0.0	120.1
2509	0.3	6.0	0.0	119.1
2511	0.0	11.9	0.0	522.4
2513	0.0	0.0	0.0	219.4
2515	0.0	0.0	0.4	353.9
2517	0.0	24.6	43.7	525.1
2519	22.5	114.1	88.3	710.5
2521	0.0	0.0	0.1	299.2
2523	0.0	0.0	0.0	19.5
2709	0.0	3.1	0.0	239.4
2711	0.0	0.0	0.0	204.9
2717	0.0	0.0	0.0	148.9
2719	0.0	0.0	0.0	111.9
2721	0.0	0.0	0.0	10.0
TOTAL	1192.2	4275.8	8269.4	39883.0

NOTE: PRIMARY RESERVES ADJUSTED ONLY TO REFLECT ACCOMPANYING ADDENDUM THAT APPLIES TO WELLS 1311, 1313, 1915 AND 1917 (INCLUDES 2016)
NOTE: WELL 2016 RESERVES ARE INCLUDED WITH THOSE OF WELL 1917 SINCE THE WELLS SHARE THE SAME PRIMARY PRORATION TRACT
NOTE: WATERFLOOD RESERVES INCLUDE BOTH WORKOVER AND FLOOD RESERVES
NOTE: TOTALS MAY NOT EQUAL EXHIBIT G-19 BECAUSE OF ROUND-OFF

EXHIBIT G-24

ITEM #5: SECTION H: ECONOMICS

Should include the following addition:

The Technical Report, Section H, describes a development plan with a pressure-building water injection step to be implemented in 1993. After approximately three years of water injection, it is anticipated that the area reservoir pressure will be increased to the level desired for CO_2 miscible operations. The analysis performed by the Technical Committee at the time the Report was compiled indicates that the entire proposed area would achieve acceptable economic performance and that a near-simultaneous implementation across the area achieves the maximum present-worth for the investments required. However, some prospective unit owners have expressed the view that this "near-simultaneous implementation" may not be the optimal plan of development. It is expected that additional reservoir description data resulting from the 1993-94 drill wells; the planned CO_2 injectivity test referenced in the Report; the water injectivity data across the area; the over-all performance data of the water injection phase; and non-technical data such as crude prices will all provide valuable information for optimizing the project and its implementation plan. Thus, while different viewpoints regarding project implementation in the 1996-97 time frame exist at this time, it is likely that additional information gained prior to this time will lead to the development of an agreed upon optimal plan of development. That plan will require approval by the working interest owners in accordance with the ballot and voting procedures outlined in the Unitization Agreement.

ATTACHMENT "E"
PROPOSED AVALON (DELAWARE) UNIT

MARCH, 1993

OPERATOR	LEASE	OWNER	WELL-TRACT OWNER FRACTION	WELL-TRACTS INCLUDED
EXXON	YATES C FEDERAL	EXXON	1.00000000	1911-1917, 2111-2117, 2311-2317, 2511-2517
EXXON	HONDO A STATE	EXXON	1.00000000	1919, 1921, 2119, 2319, 2519, 2521
EXXON	HONDO FEE	EXXON	1.00000000	2121, 2321
EXXON	YATES C FEDERAL B	EXXON	1.00000000	2717, 2719, 2721
HUDSON	STONEWALL FEDERAL	W.A.HUDSON, II	0.33333333	1719
HUDSON	STONEWALL FEDERAL	E.R.HUDSON, JR	0.33333333	1719
HUDSON	STONEWALL FEDERAL	MARY HUDSON ARD	0.33333333	1719
MARALO	KEYSTONE	MARALO	0.37500000	2123, 2323, 2523
MARALO	KEYSTONE	NAPECO	0.25000000	2123, 2323, 2523
MARALO	KEYSTONE	HAMON OPERATING	0.21875000	2123, 2323, 2523
MARALO	KEYSTONE	YATES DRILLING CO	0.04166670	2123, 2323, 2523
MARALO	KEYSTONE	MYCO INDUSTRIES, INC	0.04166660	2123, 2323, 2523
MARALO	KEYSTONE	JOHN A. YATES	0.02083340	2123, 2323, 2523
MARALO	KEYSTONE	LOS CHICOS	0.02083330	2123, 2323, 2523
MARALO	KEYSTONE	DONALD CLAYTON CHAPELL	0.01562500	2123, 2323, 2523
MARALO	KEYSTONE	CAROL CHAPEL HENRY TR	0.00390625	2123, 2323, 2523
MARALO	KEYSTONE	LISA KENNEDY HICKS	0.00390625	2123, 2323, 2523
MARALO	KEYSTONE	CLAYTON CHAPELL KENNEDY	0.00390625	2123, 2323, 2523
MARALO	KEYSTONE	JOSEPH O KENNEDY III	0.00390625	2123, 2323, 2523
MERIT	BURTON FLAT ST	MERIT	1.00000000	2709, 2711
MWJ	GWA STATE	MARTIN,WILLIAMS,JUDSON	0.67968750	2309, 2509
MWJ	GWA STATE	MYCO	0.08333340	2309, 2509
MWJ	GWA STATE	JOHN A. YATES	0.08333330	2309, 2509
MWJ	GWA STATE	S.P.YATES	0.08333330	2309, 2509
MWJ	GWA STATE	SIGMAR, INC	0.02669270	2309, 2509
MWJ	GWA STATE	LAJ CORPORATION	0.01757810	2309, 2509
MWJ	GWA STATE	F.A. AND D.M.FOX	0.00911460	2309, 2509
MWJ	GWA STATE	JAMES L.MARTIN,TRUSTEE	0.00911460	2309, 2509
MWJ	GWA STATE	JOHN L. SCHLAGAL	0.00781250	2309, 2509
PREMIER	EDDY STATE	PREMIER	1.00000000	1109, 1309, 1509, 1709
YATES	STONEWALL EP STATE	EXXON	0.27973850	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	COQUINA	0.17651980	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	YATES PETROLEUM CORP	0.10083120	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	YATES DRILLING CO	0.10083120	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	MYCO	0.10083120	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	W.A.HUDSON, II	0.04124310	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	E.R.HUDSON, JR	0.04124310	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	MARY HUDSON ARD	0.04124310	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	ABO	0.03361040	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	NORTH AMERICAN-YATES	0.02300800	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	DEVON	0.02300800	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	MWJ	0.01546620	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	CLAREMONT	0.00773310	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	KERR-MCGEE	0.00745550	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	ROSALIND REDFERN	0.00361880	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL EP STATE	JOHN J. REDFERN	0.00361880	1111, 1113, 1311, 1313, 1315
YATES	STONEWALL WM ST	EXXON	0.27973850	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	COQUINA	0.17651980	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	YATES PETROLEUM CORP	0.10083120	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	YATES DRILLING CO	0.10083120	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	MYCO	0.10083120	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	W.A.HUDSON, II	0.04124310	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	E.R.HUDSON, JR	0.04124310	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	MARY HUDSON ARD	0.04124310	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	ABO	0.03361040	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	NORTH AMERICAN-YATES	0.02300800	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	DEVON	0.02300800	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	MWJ	0.01546620	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	CLAREMONT	0.00773310	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	KERR-MCGEE	0.00745550	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	ROSALIND REDFERN	0.00361880	1511, 1513, 1711, 1713
YATES	STONEWALL WM ST	JOHN J. REDFERN	0.00361880	1511, 1513, 1711, 1713
YATES	STONEWALL YE STATE	CHEVRON PBC	0.25000000	1515, 1517
YATES	STONEWALL YE STATE	EXXON	0.20980388	1515, 1517
YATES	STONEWALL YE STATE	COQUINA	0.13238985	1515, 1517
YATES	STONEWALL YE STATE	YATES PETROLEUM CORP	0.07562340	1515, 1517
YATES	STONEWALL YE STATE	YATES DRILLING CO	0.07562340	1515, 1517
YATES	STONEWALL YE STATE	MYCO	0.07562340	1515, 1517
YATES	STONEWALL YE STATE	W.A.HUDSON, II	0.03093232	1515, 1517
YATES	STONEWALL YE STATE	E.R.HUDSON, JR	0.03093232	1515, 1517
YATES	STONEWALL YE STATE	MARY HUDSON ARD	0.03093232	1515, 1517
YATES	STONEWALL YE STATE	ABO	0.02520780	1515, 1517
YATES	STONEWALL YE STATE	NORTH AMERICAN-YATES	0.01725600	1515, 1517
YATES	STONEWALL YE STATE	DEVON	0.01725600	1515, 1517
YATES	STONEWALL YE STATE	MWJ	0.01159965	1515, 1517
YATES	STONEWALL YE STATE	CLAREMONT	0.00579982	1515, 1517
YATES	STONEWALL YE STATE	KERR-MCGEE	0.00559163	1515, 1517
YATES	STONEWALL YE STATE	ROSALIND REDFERN	0.00271410	1515, 1517
YATES	STONEWALL YE STATE	JOHN J. REDFERN	0.00271410	1515, 1517
YATES	STONEWALL WM ST B	CHEVRON PBC	0.25000000	1715, 1717
YATES	STONEWALL WM ST B	EXXON	0.20980388	1715, 1717
YATES	STONEWALL WM ST B	COQUINA	0.13238985	1715, 1717
YATES	STONEWALL WM ST B	YATES PETROLEUM CORP	0.07562340	1715, 1717
YATES	STONEWALL WM ST B	YATES DRILLING CO	0.07562340	1715, 1717
YATES	STONEWALL WM ST B	MYCO	0.07562340	1715, 1717
YATES	STONEWALL WM ST B	W.A.HUDSON, II	0.03093232	1715, 1717
YATES	STONEWALL WM ST B	E.R.HUDSON, JR	0.03093232	1715, 1717
YATES	STONEWALL WM ST B	MARY HUDSON ARD	0.03093232	1715, 1717
YATES	STONEWALL WM ST B	ABO	0.02520780	1715, 1717
YATES	STONEWALL WM ST B	NORTH AMERICAN-YATES	0.01725600	1715, 1717
YATES	STONEWALL WM ST B	DEVON	0.01725600	1715, 1717
YATES	STONEWALL WM ST B	MWJ	0.01159965	1715, 1717
YATES	STONEWALL WM ST B	CLAREMONT	0.00579982	1715, 1717
YATES	STONEWALL WM ST B	KERR-MCGEE	0.00559163	1715, 1717
YATES	STONEWALL WM ST B	ROSALIND REDFERN	0.00271410	1715, 1717
YATES	STONEWALL WM ST B	JOHN J. REDFERN	0.00271410	1715, 1717
YATES	CITIDEL	YATES	1.00000000	1909, 2109

PROPOSED AVALON (DELAWARE) UNIT
PRE-UNITIZATION OWNER VOTING PERCENTAGES
MARCH, 1993

VOTING PERCENTAGE BY OWNER
WEIGHTED BY 40% CURRENT PRODUCTION
40% CUMULATIVE PRODUCTION
20% ACRES

OWNER	VOTING PERCENTAGE	= (WEIGHT FACTOR	X OWNER BOPD	/ TOTAL AREA BOPD)	+ (WEIGHT FACTOR	X OWNER CUMUL PROD 1000 BO	/ TOTAL AREA CUMUL PROD 1000 BO)	+ (WEIGHT FACTOR	X OWNER ACRES	/ TOTAL AREA ACRES)
CHEVRON PBC	0.646316	= (0.4000	* 2.2	/ 823.6)	+ (0.4000	* 10.698	/ 2642.273)	+ (0.2000	* 40.4	/ 2134.1)
CLAREMONT	0.209893	= (0.4000	* 2.1	/ 823.6)	+ (0.4000	* 4.729	/ 2642.273)	+ (0.2000	* 3.8	/ 2134.1)
COQUINA	4.791118	= (0.4000	* 48.3	/ 823.6)	+ (0.4000	* 107.940	/ 2642.273)	+ (0.2000	* 86.5	/ 2134.1)
DEVON	0.624485	= (0.4000	* 6.3	/ 823.6)	+ (0.4000	* 14.069	/ 2642.273)	+ (0.2000	* 11.3	/ 2134.1)
EXXON	74.207433	= (0.4000	* 621.2	/ 823.6)	+ (0.4000	* 2167.030	/ 2642.273)	+ (0.2000	* 1198.8	/ 2134.1)
HAMON OPERATING	0.247172	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.000	/ 2642.273)	+ (0.2000	* 26.4	/ 2134.1)
E.R.HUDSON JR	1.245315	= (0.4000	* 11.3	/ 823.6)	+ (0.4000	* 25.220	/ 2642.273)	+ (0.2000	* 33.6	/ 2134.1)
W.A.HUDSON II	1.245315	= (0.4000	* 11.3	/ 823.6)	+ (0.4000	* 25.220	/ 2642.273)	+ (0.2000	* 33.6	/ 2134.1)
MARY HUDSON ARD	1.245315	= (0.4000	* 11.3	/ 823.6)	+ (0.4000	* 25.220	/ 2642.273)	+ (0.2000	* 33.6	/ 2134.1)
MARALO	0.423723	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.000	/ 2642.273)	+ (0.2000	* 45.2	/ 2134.1)
MERIT	0.653657	= (0.4000	* 1.3	/ 823.6)	+ (0.4000	* 3.080	/ 2642.273)	+ (0.2000	* 58.2	/ 2134.1)
MWJ	0.419785	= (0.4000	* 4.2	/ 823.6)	+ (0.4000	* 9.457	/ 2642.273)	+ (0.2000	* 7.6	/ 2134.1)
MARTIN, WILLIAMS AND JUDSON	0.735902	= (0.4000	* 1.3	/ 823.6)	+ (0.4000	* 10.848	/ 2642.273)	+ (0.2000	* 54.5	/ 2134.1)
SIGMAR, INC	0.028900	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.426	/ 2642.273)	+ (0.2000	* 2.1	/ 2134.1)
LAJ CORP	0.019032	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.281	/ 2642.273)	+ (0.2000	* 1.4	/ 2134.1)
F.A.FOX AND D.M.FOX	0.009868	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.145	/ 2642.273)	+ (0.2000	* 0.7	/ 2134.1)
JAMES L.MARTIN JR, TRUSTEE	0.009868	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.145	/ 2642.273)	+ (0.2000	* 0.7	/ 2134.1)
JOHN L.SCHLAGAL	0.008459	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.125	/ 2642.273)	+ (0.2000	* 0.6	/ 2134.1)
NAPECO	0.282482	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.000	/ 2642.273)	+ (0.2000	* 30.1	/ 2134.1)
PREMIER	1.597814	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 5.074	/ 2642.273)	+ (0.2000	* 162.3	/ 2134.1)
KERR MCGEE	0.202358	= (0.4000	* 2.0	/ 823.6)	+ (0.4000	* 4.559	/ 2642.273)	+ (0.2000	* 3.7	/ 2134.1)
ROSALIND REDFERN	0.098222	= (0.4000	* 1.0	/ 823.6)	+ (0.4000	* 2.213	/ 2642.273)	+ (0.2000	* 1.8	/ 2134.1)
JOHN J. REDFERN	0.098222	= (0.4000	* 1.0	/ 823.6)	+ (0.4000	* 2.213	/ 2642.273)	+ (0.2000	* 1.8	/ 2134.1)
YATES	0.755065	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.000	/ 2642.273)	+ (0.2000	* 80.6	/ 2134.1)
YATES DRILLING	2.783851	= (0.4000	* 27.6	/ 823.6)	+ (0.4000	* 61.657	/ 2642.273)	+ (0.2000	* 54.4	/ 2134.1)
YATES PETROLEUM	2.736770	= (0.4000	* 27.6	/ 823.6)	+ (0.4000	* 61.657	/ 2642.273)	+ (0.2000	* 49.4	/ 2134.1)
MYCO	2.874076	= (0.4000	* 27.8	/ 823.6)	+ (0.4000	* 62.987	/ 2642.273)	+ (0.2000	* 61.1	/ 2134.1)
ABO	0.912257	= (0.4000	* 9.2	/ 823.6)	+ (0.4000	* 20.552	/ 2642.273)	+ (0.2000	* 16.5	/ 2134.1)
JOHN A.YATES	0.113766	= (0.4000	* 0.2	/ 823.6)	+ (0.4000	* 1.330	/ 2642.273)	+ (0.2000	* 9.2	/ 2134.1)
S.P.YATES	0.090225	= (0.4000	* 0.2	/ 823.6)	+ (0.4000	* 1.330	/ 2642.273)	+ (0.2000	* 6.7	/ 2134.1)
NORTH AMERICAN YATES	0.624485	= (0.4000	* 6.3	/ 823.6)	+ (0.4000	* 14.069	/ 2642.273)	+ (0.2000	* 11.3	/ 2134.1)
LOS CHICOS	0.023540	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.000	/ 2642.273)	+ (0.2000	* 2.5	/ 2134.1)
DONALD CLAYTON CHAPELL	0.017655	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.000	/ 2642.273)	+ (0.2000	* 1.9	/ 2134.1)
CAROL CHAPELL HENRY TRUST	0.004414	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.000	/ 2642.273)	+ (0.2000	* 0.5	/ 2134.1)
LISA KENNEDY HICKS	0.004414	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.000	/ 2642.273)	+ (0.2000	* 0.5	/ 2134.1)
CLAYTON CHAPELL KENNEDY	0.004414	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.000	/ 2642.273)	+ (0.2000	* 0.5	/ 2134.1)
JOSEPH O KENNEDY III	0.004414	= (0.4000	* 0.0	/ 823.6)	+ (0.4000	* 0.000	/ 2642.273)	+ (0.2000	* 0.5	/ 2134.1)
TOTAL	100.000000	= (0.4000	* 823.6	/ 823.6)	+ (0.4000	* 2642.273	/ 2642.273)	+ (0.2000	* 2134.1	/ 2134.1)