BACHAQUERO-01 RESERVOIR, VENEZUELA – INCREASING OIL PRODUCTION BY SWITCHING FROM CYCLIC STEAM INJECTION TO STEAMFLOODING USING HORIZONTAL WELLS

A Thesis

by

MANUEL GREGORIO RODRIGUEZ

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

May 1999

Major Subject: Petroleum Engineering

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May 1999

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ABSTRACT

Bachaquero-01 Reservoir, Venezuela – Increasing Oil Production by Switching from Cyclic Steam Injection to Steamflooding Using Horizontal Wells. (May 1999)

Manuel Gregrorio Rodriguez, B.S., Universidad Central de Venezuela

Chair of Advisory Committee: Dr. Daulat D. Mamora

The Bachaquero-01 reservoir of the Lagunillas field is located in the eastern part of the Maracaibo Lake, Venezuela. The field is operated by the national oil company of Venezuela, PDVSA (Petroleos de Venezuela, S.A.). The Bachaquero-01 heavy oil reservoir lies at about 3,000 ft. ss. and contains 7.037 BSTB of 11.7 degrees API gravity oil with an in-situ viscosity of 635 cp. Cold production began in 1960, but since 1971 the reservoir was produced under a massive cyclic steam injection system. To-date some 370 cyclic-steam injection wells have produced from the reservoir, yielding a cumulative oil recovery of only about 5.6% of initial oil-in-place. The reservoir pressure has dropped from an initial 1,370 psia to its present value of about 700 psia. Maximum oil production peaked at 45.0 MSTB/D in 1991, and has since continued to decline. To arrest production decline, three horizontal cyclic-steam injection wells were drilled and completed in the reservoir in 1995-1997. The horizontal sections were from 1,280 to 1,560 ft long and were drilled in locations with existing vertical cyclic steam injection wells.

Three-dimensional thermal-compositional simulation studies were conducted to evaluate the performance of the three horizontal wells under cyclic steam injection and steamflooding. The Cartesian model dimensions of the three horizontal wells were 11×22×4, 11×27×5, and 12×20×5. In the steamflooding scheme investigated, the existing horizontal wells were used as injectors while existing (and new) vertical wells surrounding the horizontal wells were used as producers. Simulation results indicate oil recovery under cyclic steam injection to be about 15% of initial oil-in-place, compared to about 25% under steamflooding with no new producers, and about 50% under steamflooding with additional producers. The main advantages of steamflooding over cyclic steam injection were in the re-pressurization and improved thermal efficiency for the Bachaquero-01 reservoir. Higher oil recovery with additional wells resulted from improved areal sweep efficiency. Further study is planned to investigate steamflooding for the rest of the reservoir.

DEDICATION

To God, my parents, Aisquel my wife, and my lovely children, Kevin and Ashley, in whom I always found the necessary strength to accomplish every step in my life.

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CHAPTER I

INTRODUCTION

The Bachaquero-01 reservoir in the Lagunillas field is located in the eastern part of Maracaibo Lake, approximately 75 miles southeast of the city of Maracaibo, Venezuela (**Fig. 1.1**). The national oil company of Venezuela, PDVSA (Petroleos de Venezuela, S.A.), operates the Lagunillas field. It represents one of the most important heavy oil accumulations in the Bolivar Coast group of fields. Bachaquero-01 reservoir covers 19,540 acres of unconsolidated sand and contains an OOIP of 7.037 BSTB. The oil has an oil gravity of 11.7 degrees API with a viscosity of 635 cp at initial reservoir conditions of 1,360 psia and 128°F. Currently the reservoir produces 36 MSTB/D oil.

Structurally, the reservoir is a simple monocline, dipping from 2° to 3° to the southwest. It is bounded on the south, west and northwest by a moderate aquifer. It is comprised of nine producing intervals of unconsolidated Miocene sands of the Lagunillas formation. **Fig. 1.2** presents a type log for Bachaquero-01. The sands, of fluvio-deltaic origin, are found at an average subsurface depth of 3,000 ft.[1]

Bachaquero-01 was discovered in 1934. However, during the first 20 years, the reservoir was poorly developed due to low well productivity and high sand production. In the 1960's new sand control techniques were developed resulting in increased development of the reservoir. In 1971 an extensive drilling program was initiated to complete the development at an average well-spacing of 19.3 acres/well. In 1982 infill drilling was conducted, reducing the well-spacing to about 6 acres/well. The resulting primary recovery factor was estimated to be about 14%.

As is common with the miocene reservoirs of the Bolivar Coastal fields, primary production is characterized by an initial period dominated by solution gas drive.

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Production contribution from solution gas drive is estimated at 0% to 5% of OOIP. With the subsequent reservoir pressure drop and the unconsolidated nature of the reservoir sediments and shallow depth, formation compaction becomes the principal reservoir producing mechanism. In Bachaquero-01 reservoir production contribution from compaction drive may be up to 9.2% of OOIP.

Cyclic steam injection began in 1971. As of June 1998, a total of 370 wells have been cyclic-steamed with a total of 1,100 cycles.

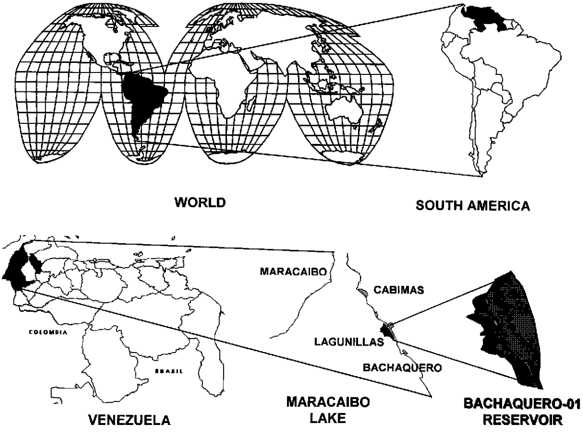

Fig. 1.1 – Location of Bachaquero-01 reservoir.

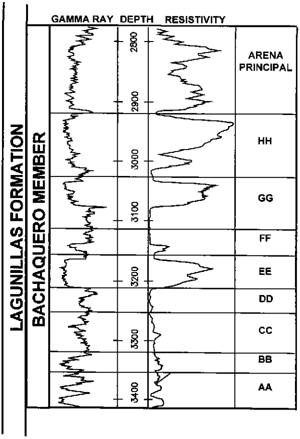

Fig. 1.2 – Type log for Bachaquero-01.

1.1 Problem Description

Bachaquero-01 is a heavy oil reservoir requiring steam injection to reduce the oil viscosity in order to increase well productivity and recovery. Cyclic steam injection as a development strategy began in February 1971. By June 1998, a total of 370 wells were cyclic-steamed with a total of 1,100 cycles. It is the world's largest offshore operation of this type for a single reservoir.

As a result of the production since 1960, the reservoir pressure has dropped from its initial value of 1,370 psia to 700 psia, diminishing the efficiency of steam cyclic injection. There exist some areas where the wells have been cyclic-steamed fives times yielding a recovery factor of only 4% or 5%.

In 1995 two horizontal wells were drilled to investigate the use of cyclic steam injection using horizontal wells to increase oil production.[2,3] In May 1997 the third cyclic-steam horizontal well on the Bachaquero-01 was drilled. Initial production results are encouraging, individual well rates being about 338, 558, and 534 STB/D oil.

Steamflooding projects have been conducted in other parts of Venezuela with satisfactory results but has not been applied in the Maracaibo Lake.[4,5] The use of horizontal wells for cyclic steam injection is a new technology. Further, the depleted reservoir pressure of the Bachaquero-01 may necessitate application of steamflooding after cyclic steaming.

1.2 Objective of the Research

The main objective of this study is to conduct 3D thermal simulation of the Bachaquero-01 reservoir to evaluate a number of strategies aimed at determining an optimum development scheme to maximize production rate and recovery. The study evaluates the use of horizontal and vertical wells as cyclic steam injectors, and steam flooding patterns using horizontal and/or vertical wells.

CHAPTER II

LITERATURE REVIEW

2.1 Cyclic Steam Injection

Green and Willhite[6] reported that cyclic steam injection was discovered in 1959 by accident in the Mene Grande field (Venezuela), when steam broke out behind the casing in a steam injection well. This resulted in high oil production rates and more impressive was the fact that the reservoir was unproductive by primary recovery methods.

This discovery of cyclic steam injection for heavy-oil reservoirs (which could increase production rates by factors of 5 to 10) was a historic point in the development of thermal oil recovery techniques. Cyclic steam stimulation spread rapidly to California and by 1965, projects were under way in most major heavy-oil reservoirs in California.

In 1969 de Haan and van Lookeren[7] described the performance of the first large-scale cyclic steam injection project conducted in Tia Juana field located in the eastern coast of Maracaibo Lake in Venezuela, known as the "Bolivar Coast". The results obtained were more favorable than those in the Mene Grande field. The authors concluded that cyclic steaming resulted in a considerable increase in productivity. The results indicated that the amount of reserves recoverable by primary means in 20 years was recovered in less than three years. The authors also argued that 40% of the oil produced since the start of the cyclic steam project was attributed to compaction. Since compaction was virtually the only active production mechanism during primary production period, this indicates that additional displacement mechanisms such as thermal expansion and inflow from the surrounding areas as a result of the faster pressure drop, have been brought into play by steam injection. But these effects were gradually becoming less important.

In 1965 Payne and Zambrano[8] reported the experience of testing the cyclic steam injection method in Quiriquire field, eastern Venezuela. The method was used in eight wells and in the most successful case a well produced 60% more oil in a 490 day period following start of steam injection than would have been obtained had the well been produced under natural depletion. Steam was injected for 44 days. The second cycle of stimulated production was not as good as the first for this well.

In 1981 a Bachaquero-01 engineering study was conducted by PDVSA and Exxon Production Research Company.[9] The objective of this work was to evaluate conventional and steam-stimulated primary operations and to determine the effect of proposed drilling and steam stimulation programs on field rate and ultimate oil recovery. In addition, the study included calculations of steamdrive performance for later field application.

In 1993 PDVSA conducted a parametric study of the design factors for cyclic steam injection.[10] In this work a simulation sensitivity study was performed for the design parameters of cyclic steam injection in Bachaquero-01 to determine more accurate parametric values than those obtained from field operations only. The parameters under investigation were injection rate, heat or steam input, steam quality, and soak time. Additionally, analyses were made of reservoir behavior during steam drives, gas injection with steam, and heat transfer between layers. The study also investigated the use of horizontal wells for oil recovery by steamflooding and cyclic steaming.

The results of this study show that oil recovery obtained by cycle steamed horizontal wells is three times greater than that of cyclic steamed vertical wells. In steamflooding six configurations were studied; the optimum was two right angle horizontal producers with an equidistant vertical steam injector. This configuration increases the oil recovery up to 33% of OOIP.

In 1995 two horizontal wells were drilled to investigate the use of cyclic steam injection using horizontal wells to increase oil production in Bachaquero-01. Fernandez and Zerpa[2] conducted a numerical simulation study of the performance of these two horizontal wells. The main objective of the study was to history match the horizontal well performance during cold production, and to investigate the feasibility of introducing a cyclic steam injection scheme to enhance productivity. Performance of neighboring vertical wells was also history-matched. Results showed that cyclic steam injection in horizontal wells increased the oil production rate to twice that under cold production. Oil recovery by cyclic steam injection with horizontal wells was 62% higher than that for cyclic-steamed vertical wells.

2.2 Steamflooding

Boberg[11] describes steamflooding as a process similar to waterflooding because both are drive processes. However steamflooding can achieve a higher oil recovery than possible by cyclic steam injection. This occurs because first, steamflooding involves eventually heating the entire reservoir, whereas cyclic steaming concentrates the heating locally at the producing well to reduce oil viscosity and thereby increase productivity. Second, steamflooding is capable of driving oil saturation down to a very low level in parts of the reservoir that are swept by steam. Third, steamflooding results in significantly greater pressure maintenance/repressurization compared to cyclic steaming. On the other hand, the major problems of steamflooding are related to sweep efficiency and heat losses to unproductive formations (including the over- and under-burdens), and suppression of compaction drive.

The applications of successful steamflooding projects have been conducted in several parts of the world. de Haan and Schenk[4] reported in 1969 the results of a steamflooding test in Tia Juana field, western Venezuela which began in 1961. The field test was conducted based on the encouraging results of laboratory experiments and a pilot test. The data obtained from the test showed that a total of 32% of the OOIP was recovered with a further 6% recoverable, bringing the ultimate recovery to 38%. This implies 21% of OOIP over the estimated ultimate primary recovery of 17% of OOIP. The test was performed in 24 wells and seven injectors arranged in an inverted seven-spot pattern of 12 acres/well. Although a significant increase in ultimate recovery was obtained, the process was not considered attractive for large-scale application because it was not profitable under the economic conditions then. Further, steamflooding could suppress the highly effective compaction drive mechanism active in these reservoirs.

In 1976 Coats[12] presented a highly implicit three-dimensional model of steamflooding. It improved stability for all types of steamflooding problems and eliminated the material balance shortcomings of the early model formulations of compositional problems. This model treats oil as a two-component mixture to solve problems involving solution gas, inert gas or distillation. Also, the model simultaneously solves three equations for the dead-oil case and four equations for the compositional case. Transmissibilities, capillary pressures, and production terms are treated implicitly in saturation and composition; they also are treated implicitly in temperature in grid blocks where free gas is not present. The model consists of five equations expressing conservation of energy, conservation of mass, and phase equilibrium. The mass conservation equations apply to water and to two hydrocarbon components. Coats also compared this implicit model with his previous model (sequential model). He concluded that the sequential model performed well for dead-oil problems where the gas phase was 100% steam but performed poorly for compositional problems having high gas-phase flow rates, potentially unstable characteristics, and high gas-phase composition gradients. However, the implicit model requires more arithmetic per grid-block time step than does the sequential model. Several authors reported some success in applying Coats' method in 3D thermal simulation.[13,14]

In 1980 Gomaa[15] developed a simplified easy-to-use method for predicting steamflooding performance. Reservoir simulation was used to determine a set of correlation charts for predicting oil recovery and steam/oil ratio as functions of reservoir characteristics and operating conditions. The correlations emphasize the effects of steam quality, mobile oil saturation, reservoir thickness and net/gross ratio. Generalized correlations or charts are prepared from these results and used for prediction. Special care has to be taken in using this method to predict oil recovery and steam/oil ratio for those reservoirs whose characteristics are outside the range specified in this work.

Rial[14] conducted in 1984 a three-dimension thermal simulation study whose main objective was to study the effect of a horizontal wellbore for steamflooding. A comparison was made between a conventional vertical wellbore and a horizontal wellbore model. The Cartesian model used in the study for the vertical well, was a 7x7x4, simulating one-fourth of a five-spot pattern with an area of 2.5 acres for the five-spot. In the horizontal model the horizontal well replaced the vertical injector, where the horizontal well was located at the bottom layer. The results of the study showed an increased of 13% in oil recovery factor for a horizontal model. Also, the temperature and oil phase saturation distribution revealed improved sweep efficiency using the horizontal well. For a five-year period the horizontal model had production of 214.14 MSTB (64% OOIP) compared to 163.61 MSTB (51% OOIP) for the vertical model. At the end of the 15-years period the horizontal model produced 237.55 MSTB (71% OOIP) and the vertical model produced 194.01 MSTB (58% OOIP).

In 1985 Chu[16] presented a review of state-of-the art of steamflooding field projects. Two correlations for determining the steam-oil ratio (SOR) were developed. These correlations were based on the assumption that SOR depends on the reservoir characteristics only. Moreover, due to the importance of the SOR, Chu recommends that not only these correlations should be used but also the equations developed by Myhill and Stegemeier[17] which are used to calculate SOR knowing reservoir thermal properties, petrophysical properties, and injected steam conditions. Other variables such as sweep and displacement efficiency, oil recovery, special well completions, surface facilities and monitoring devices were discussed for 28-selected steamflooding projects. Operational problems were discussed as well as their remedies.

In 1987 McGee[18] reported the results of the Jobo steamflooding project, located in the eastern part of Venezuela. Several secondary recovery methods were analyzed and steamflooding was selected as the most effective for these reservoirs. Jobo pilot project was designed and implemented on the basis of numerical simulation study. This pilot was conducted in the Jobo field to make use of the existent facilities and because the reservoir and fluid characteristic are identical to those prevailing in the extra-heavy oil accumulation of the Orinoco Belt. The project consisted of 22 production wells and six injector wells arranged in six 15-acre inverted seven-spot patterns. The primary oil recovery factor was estimated at 10% of OOIP, and as of 1987 cumulative oil recovery increased up to 36.2% of OOIP showing the effectiveness of steamflooding in this type of reservoir.

Huang and Hight[19] studied the effect of using horizontal wells to improve steamflooding performance. A three-dimensional numerical steamflooding model was used. The study involves the use of horizontal wells for mature steamflooding to reduce steam override that has already occurred and for the prevention of steam override if used at the start of steamflooding operations. The data used were from a typical California heavy-oil reservoir. The work was based on a single element of symmetry for patterns whose area varies from 18 to 32 acres and with several combinations of number of wells per pattern (nine-spot and 13-spot were studied) as well as horizontal wells combined with the vertical well patterns. A homogenous reservoir was considered. The authors remarked that these results do not apply to dipping reservoirs or those with significant variations in thickness. The results of the study indicate that horizontal wells are effective in recovering oil in blind-spot areas in a mature steamflooding project. Horizontal wells can recover more oil sooner and thus shorten project lives. Another benefit identified was that the use of horizontal wells from the start of steamflooding appears to be a feasible approach for alleviating steam override. In general the authors claimed that the use of horizontal wells could increase the oil recovery factor from 65% to 75% of OOIP.

In 1989 Petit, Renard, and Valentin[20] presented their study of different steam injection strategies depending on the reservoir characteristics, as well as spatial distributions for vertical and horizontal wells. The study was based on two typical reservoirs representing the conditions encountered in Canada and Venezuela. The authors evaluated two patterns: parallel horizontal well line drive which was devoted to study the benefits of alternative injection and productions and a five-spot pattern with vertical wells. The injection strategies applied to the different patterns included the number and duration of the stimulation cycles, starting time of steamflooding, influence of the presence and duration of a waterflooding following steamflooding. The injection strategies applied to the different vertical and horizontal patterns were compared on an economic basis and considered the recoveries and field cost. The results of the 3D simulation showed that the development of a thin viscous-oil reservoir using horizontal wells appear to provide a good potential for an extended range of applications of steamflooding under various economic conditions. For all the development strategies the use of horizontal-well patterns leads to lower produced oil costs than those obtained with standard vertical well patterns.

Harrigal and Clayton[21] investigated two thermally enhanced oil recovery methods, cyclic steaming and steamflooding using a numerical model for a massive, dipping, Midway Sunset field reservoir. In this study comparative economics were conducted for the development alternatives. Since the reservoir description used in the numerical model was generalized, and the emphasis of the model was a comparative study analysis, detailed history matching was not conducted. However, the model performance was consistent with the well-known behavior of the Potter reservoir. The model was successfully calibrated to typical oil rates, water cuts, pressures and temperature profiles. The authors concluded that the ultimate recovery is not sensitive to the method of steam delivery to the reservoir. Cyclic steam methods recovered the same percentage of OOIP as steamflooding. The cyclic steam operations required several times longer time than steamflooding in reaching the same recovery factor. The cyclic steaming process with small steam slugs proved to be the most efficiency based on the steam-oil ratio. As the rate of steam injection increased, the SOR decreased, regardless of the process used to delivery steam to the reservoir. Steamflooding provided superior economics compared to conventional low or moderate slug volumes of cyclic steam, even though steamflooding has the poorest steam utilization. Finally, steamflooding gave a much quicker payout of the development capital and a greater present value return per dollar invested.

Hong[22] developed a comprehensive simulation study to investigate the effects of steam quality and injection rate on steamflooding performance for a variety of steams flooding situations. Two reservoir models were constructed for the study. The first model was a pattern flood used for studying steamflooding in a no-dip reservoir, and the second was a line drive for steamflooding dipping reservoirs. The pattern flood model was a 3D, 7×4×5 grid system representing one-eight of a five spot pattern. Small and large patterns were studied. The reservoir had 75 ft gross thickness, which was divided into five equal communicating layers, each 15 ft thick. Steam was injected into the two bottom layers, and the producer was completed in all layers. The oil was assumed to be composed of methane and 14 degrees API gravity dead oil. A small amount of methane was used to create the initial gas cap in the model. In the line drive model the injector was located at the pattern center so that the injector and the two corner producers represent one-half of a five-spot pattern. In this model nitrogen was used instead of methane to create the initial gas cap. Hong claimed that for a pattern flood the optimum steam quality and injection rate appear to be the highest value that can be obtained for a given steamflooding situation which differs from the previous recommendations. For a steeply dipping reservoir, optimum steam conditions depend on injector location. In general Hong proposed that no single steam quality or injection rate can be optimum for all reservoirs or all modes of operations. Therefore, the optimum steam conditions for a given situation should be determined by economic comparison of the predicted oil recoveries for ranges of steam qualities and injection rates.

He, Zhang, Pu and Ren[23] studied further development of a reservoir when the effectiveness of the cyclic steam process becomes poorer with the increase in number of cycles. In their paper a comprehensive study was conducted to confront the challenge of changing cyclic steam into steamflooding for heavy oil reservoirs of China. The study was made to investigate the effects of oil viscosity, oil formation thickness, vertical permeability difference, reproduction ratio of injected water in steam cycling and channeling path on steamflooding effectiveness. The project was conducted based on three typical types of reservoir (block, multi-layer and single sand body). A thermal numerical simulator was used to determine the reservoirs feasible for steamflooding at the actual field conditions. The reservoir model was an inverted nine-spot pattern with a spacing of 300 ft. (distance between injector and producer) which has been adopted in most of the present heavy oil reservoirs in China.

He *et al* established the criteria to be used to determine reservoirs feasible for steamflooding. These criteria are for oil viscosity and oil formation thickness which are the key factors for steamflooding. Oil viscosity should be less than 10,000 cp and oil formation thickness more than 33 ft. Vertical permeability heterogeneity may greatly influence steamflooding performance. He *et al* pointed out that the channeling path formed during cyclic steaming could be harmful to steamflooding by increasing the SOR.

Escovedo[24] investigated the impact of customizing the geometry of horizontal wells for steamflooding to suit a given reservoir architecture. To optimize the geometry of the well, consideration first has to be given to the expected shape of the steam zone. Given the shape, wells can be arranged to either maximize the sweep efficiency of steam before steam breakthrough and/or minimize the negative consequences of steam interference in producing wells afterwards.

CHAPTER III

CORE ANALYSIS

3.1 Reservoir Description

Geologically, the Bachaquero-01 sandstone reservoir has been divided into nine intervals, namely (from top to bottom), Arena Principal, HH, GG, FF, EE, DD, CC, BB, and AA (**Fig. 1.2**). The upper zone, called Arena Principal, contains 75% of the total reservoir OOIP. The upper four intervals contain 95% of the OOIP. In this section we will briefly discuss these four intervals.

Arena Principal is the thickest and most important zone of the reservoir. Thickness could exceed 200 ft and values of 150 to 200 ft are very common. Lateral and vertical continuity is very good within this interval. Arena Principal consists of mainly well-developed porous and permeable point bar and braided stream sands and also is composed of alluvial sediments.

The HH is the next thickest interval. Net oil sand thickness rarely exceeds 90 ft, and the average is approximately 55 ft. Lateral continuity in the overall extension of the HH interval is good. Vertical continuity is complex and is generally poor. The overall depositional setting is that of an alluvial meander belt.

Net oil sand thickness in the GG interval is quite variable, ranging from less than 20 ft to more than 100 ft, and averaging about 40 ft. The lateral continuity is judged to be only fair, and vertical continuity is generally poor throughout most of the reservoir. A moderate-to-low-energy alluvial complex dominates the GG interval.

Net oil sand thickness of the FF interval is about 20 ft, and is quite variable, ranging from zero to more than 60 ft. Lateral continuity as well as vertical continuity are poor. This interval consists predominantly of low-energy alluvial-plain sediments.

The remaining zones, EE through AA, are generally thinner with increasing lateral variability of sand quality as it moves downward through the section. The water-oil contact cuts across the zone FF through AA leaving the upper Arena Principal with the largest oil-bearing and the zone AA with the least oil-bearing area.

Holbrook and Moretti[1] showed that vertical communication between all zones is not present everywhere but occurs in a sufficiently widely distributed number of places that, for engineering purposes, the individual zones should be considered to be communicating and acting as a reservoir unit. In this study this consideration will be taken in constructing the numerical model.

3.2 Permeability Correlations

In any reservoir simulation work, it is essential to have good estimates of fluid flow parameters such as absolute and relative permeability, and porosity. These parameters are used as input data in simulation. In this study, correlations were developed based on core and log data from the Bachaquero-01 reservoir. A horizontal permeability-porosity correlation was obtained for each interval or sub-interval of the reservoir. Similarly, a vertical permeability correlation was developed. These two correlations are used to estimate horizontal and vertical permeability values in the simulation models.

3.2.1 Core Data Description

Routine and special core analysis had been performed on the core taken from well LL2318.[25] Routine analysis tests included measurement of porosity, permeability, oil saturation, electrical properties, clay mineral analysis, water sensitivity and sieve analysis. The special core analysis tests conducted were waterfloods, gasfloods, water-oil imbibition capillary pressure, oil relative permeability by centrifuge, and air-kerosene drainage capillary pressure. During these special core analysis tests, the samples were handled using test procedures designed to minimize changes in core wettability.

Conventional core analysis data were obtained from 75 horizontal core plugs and additional 17 vertical samples. Water-oil relative permeability measurements from waterflood tests were performed on four composite cores, as well as gas-oil relative permeability from gasflood tests. Water-oil imbibition capillary pressures by centrifuge tests were performed on preserved core plugs. For the same plugs, centrifuge tests were conducted to measure relative permeability to oil and air-kerosene drainage capillary pressure.

3.2.2 Horizontal Permeability

Empirical equations were developed to obtain horizontal permeability as function of porosity, based on regression analysis.

The procedure used is as follows:

Step 1. Using core data the empirical equation for the logarithm of permeability vs. porosity was established.

Step 2. A second correlation was obtained between porosity from core versus porosity from logs. Values of porosity from logs were obtained based on the procedure discussed in **Appendix A**, which is mainly based on the data given by the deep-induction resistivity curve (IR). This procedure was developed due to the limited data from porosity logs in the Bachaquero-01.

Step 3. To determine the value of the horizontal permeability, the porosity obtained from log is first calculated using the method described in **Appendix A**. This value is entered into the correlation obtained in Step 2 above, then the result is introduced into the empirical equation given in Step 1 to finally get the horizontal permeability.

The procedure was repeated for each of the nine intervals in the Bachaquero-01. Due to the scarce log data from well LL2318, it was not possible to obtain a good fit. Hence, it was decided to divide the intervals into sub-intervals to improve the correlations. Since the Arena Principal contains 75% of the OOIP, attention was focused on this interval. Taking as reference the values of permeability as function of depth as well as the data of the deep-induction resistivity curve, Arena Principal was divided into threes sub-intervals called AP-1, AP-2, and AP-3.

Fig. 3.1 shows the variation of permeability with porosity for the Arena Principal and also the best-fit line for the data set. **Fig. 3.2** to **Fig. 3.6** show the relationships between permeability and porosity for the sub-intervals AP-1, AP-2, AP-3, and interval HH, and GG. **Fig. 3.7** shows the SP-IR log for well LL2318, showing the intervals Arena Principal (and its sub-intervals AP-1, AP-2, and AP-3), HH and GG.

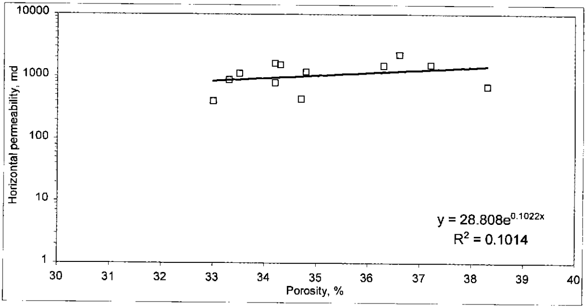

Fig. 3.1 – Interval Arena Principal: horizontal permeability versus porosity (core data).

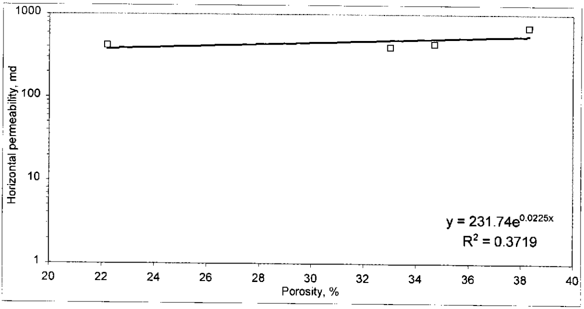

Fig. 3.2 – Sub-interval AP-1: horizontal permeability versus porosity (core data).

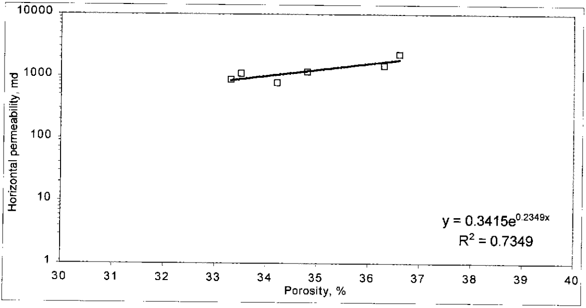

Fig. 3.3 – Sub-interval AP-2: horizontal permeability versus porosity (core data).

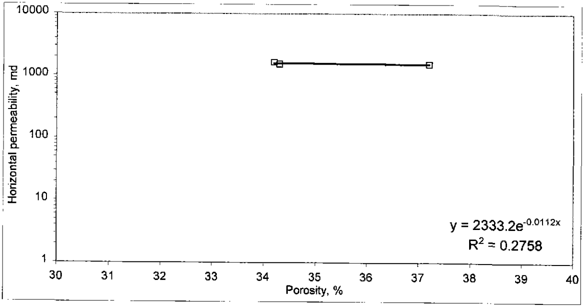

Fig. 3.4 – Sub-interval AP-3: horizontal permeability versus porosity (core data).

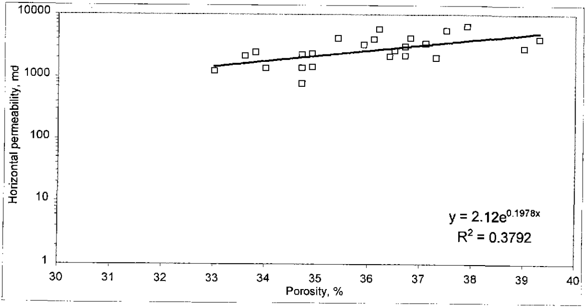

Fig. 3.5 – Interval HH: horizontal permeability versus porosity (core data).

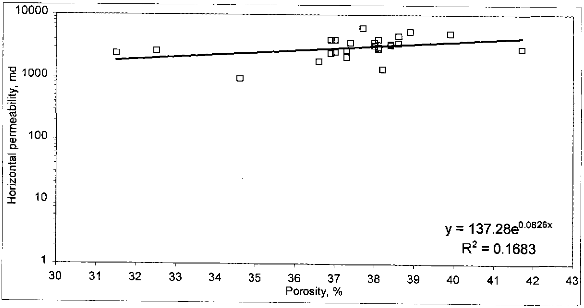

Fig. 3.6 – Interval GG: horizontal permeability versus porosity (core data).

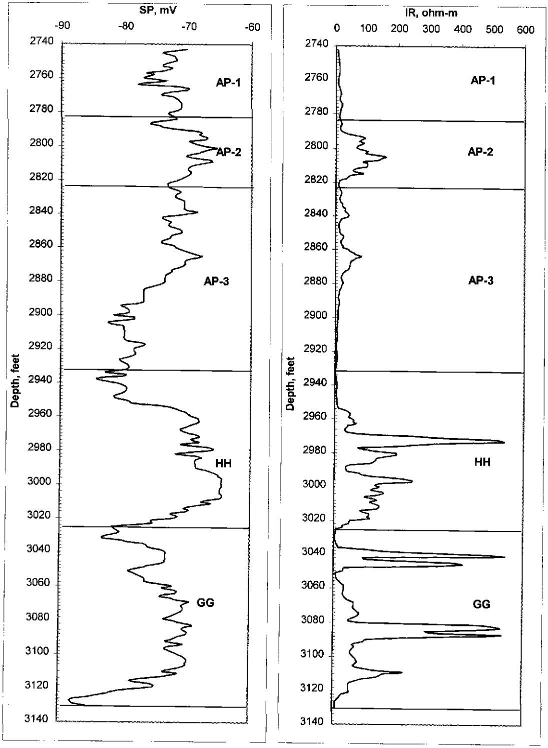

Fig. 3.7 - Well LL2318 SP and IR tracks showing sub-intervals AP-1, AP-2 and AP-3.

It can be seen that sub-dividing Arena Principal further improved the correlation coefficient (R^2 factor) from 0.10 up to values of 0.97 for the sub-interval AP-1. Using the best straight line fits, horizontal permeabilities were calculated for each interval. The results are shown in **Tables 3.1** to **3.5.**

Table 3.1 - Measured and calculated horizontal permeability values, sub-interval AP-1

Depth, ft	Interval	Porosity, %	Measured horizontal permeability, md	Calculated horizontal permeability, md	Difference, %
2768.7	AP-1	38.3	697	549	21.31
2772.4	AP-1	22.2	420	382	9.09
2798.6	AP-1	34.7	439	506	15.22
2799.4	AP-1	33.0	402	487	21.11
Average		32.1	490	477	16.68

Table 3.2 - Measured and calculated horizontal permeability values, sub-interval AP-2

Depth, ft	Interval	Porosity, %	Measured horizontal permeability, md	Calculated horizontal permeability, md	Difference, %
2801.9	AP2	36.3	1500	1724	14.94
2804.9	AP2	36.6	2280	1850	18.86
2805.6	AP2	33.3	885	852	3.71
2814.2	AP2	34.2	790	1053	33.26
2817.0	AP2	34.8	1180	1212	2.72
2827.6	AP2	33.5	1110	893	19.54
Average		34.8	1291	1264	15.51

Table 3.3 - Measured and calculated horizontal permeability values, sub-interval AP-3

Depth, (feet)	Interval	Porosity, (percentage)	Measured Horizontal Permeability, md	Calculated horizontal permeability, md	Difference, (%)
2860.1	AP-3	34.2	1640	1591	3.00
2875.3	AP-3	34.3	1540	1589	3.18
2880.2	AP-3	37.2	1540	1538	0.12
Average		35.2	1573	1573	2.10

Table 3.4 - Measured and calculated horizontal permeability values, interval HH

Depth, ft	Interval	Porosity, %	Measured Horizontal Permeability, md	Calculated horizontal permeability, md	Difference, %
2970.3	HH	37.9	6430	3820	40.59
2971.4	HH	33.6	2130	1632	23.39
2973.6	HH	36.2	5770	2729	52.70
2974.6	HH	36.1	4010	2676	33.27
2976.4	HH	35.4	4120	2330	43.45
2982.1	HH	36.5	2610	2896	10.96
2983.1	HH	34.9	2320	2110	9.03
2986.6	HH	36.4	2110	2839	34.57
2988.3	HH	34.7	2250	2029	9.84
2989.4	HH	34.7	1390	2029	45.94
2998.7	HH	36.7	3040	3013	0.89
2999.6	HH	39.0	2870	4749	65.46
3001.7	HH	34.7	782	2029	159.41
3002.5	HH	34.9	1420	2110	48.62
3005.2	HH	34.0	1360	1766	29.87
3008.3	HH	37.1	3420	3261	4.65
3009.2	HH	35.9	3240	2572	20.62
3010.8	HH	36.7	2160	3013	39.49
3012.7	HH	39.3	4070	5039	23.81
3014.1	HH	37.3	2010	3393	68.79
3015.8	HH	33.8	2452	1698	30.76
3016.9	HH	36.8	4170	3073	26.30
3017.9	HH	33.0	1220	1449	18.79
3018.8	HH	37.5	5490	3530	35.71
Average		36.0	2952	2741	36.54

Table 3.5 - Measured and calculated horizontal permeability values, interval GG

Depth, ft	Interval	Porosity, %	Measured horizontal permeability, md	Calculated horizontal permeability, md	Difference, %
3058.3	GG	38.0	3200	3168	1.00
3059.7	GG	36.6	1810	2822	55.91
3064.7	GG	37.3	2660	2990	12.40
3065.8	GG	37.0	2550	2917	14.38
3066.9	GG	38.1	2870	3194	11.30
3067.9	GG	37.0	4010	2917	27.26
3068.6	GG	38.0	3630	3168	12.73
3069.8	GG	36.9	2410	2893	20.03
3071.1	GG	38.6	3540	3329	5.96
3073.6	GG	31.5	2390	1852	22.52
3081.2	GG	37.4	3600	3015	16.26
3082.6	GG	38.9	5320	3412	35.86
3083.3	GG	38.6	4620	3329	27.95
3084.6	GG	37.7	6070	3090	49.09
3086.8	GG	38.4	3310	3274	1.08
3087.2	GG	41.7	2890	4300	48.80
3088.5	GG	32.5	2610	2011	22.94
3088.5	GG	32.5	2610	2011	22.94
3090.7	GG	38.4	3390	3274	3.41
3091.9	GG	34.6	940	2392	154.49
3098.2	GG	38.2	1370	3221	135.08
3102.1	GG	36.9	3970	2893	27.13
3103.2	GG	38.1	4060	3194	21.33
3112.5	GG	39.9	5060	3706	26.75
3117.9	GG	37.3	2100	2990	42.38
3118.8	GG	38.1	3000	3194	6.47
Average		37.4	3255	3062	32.1

It can be seen that the average difference between the measured and calculated horizontal permeability values vary from 2 to 16% for the sub-intervals AP-1, AP-2 and AP-3. For the intervals HH and GG, this value is around 35%.

3.2.3 Vertical Permeability

A study was carried out to establish the empirical correlation between the log of vertical permeability versus porosity. The same procedure used in determining the horizontal permeability was attempted. But it was found that for the sub-intervals there were not enough data to establish a correlation. Therefore, for the sub-intervals AP-1, AP-2, and AP-3 the vertical permeabilities were estimated as follows:

- Sub-interval AP-1: 550 md (based on average between 1,060 and 37 md).
- Sub-interval AP-2: 400 md (based on one value).
- Sub-interval AP-3: 780 md (based on one value).

For intervals HH and GG correlations were found between log of vertical permeability and porosity. **Fig. 3.8** and **Fig. 3.9** show the empirical equation found based on regression analysis. **Tables 3.6** and **3.7** give the comparison between the vertical permeability measured and calculated as well as the percentage difference.

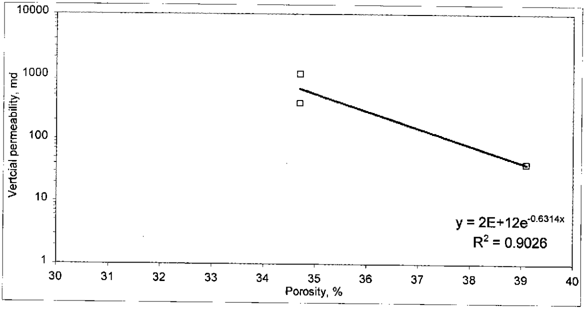

Fig. 3.8 – Interval HH: vertical permeability versus porosity (core data).

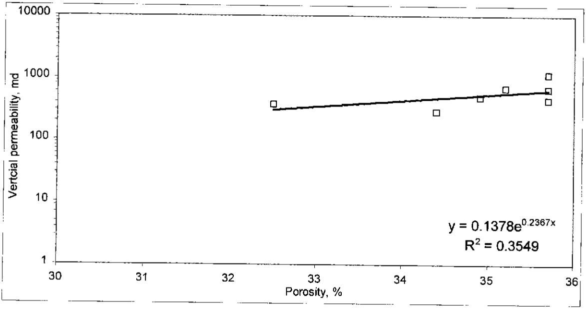

Fig. 3.9 – Interval GG: vertical permeability versus porosity (core data).

Table 3.6 - Measured and calculated vertical permeability values, interval HH

Depth, ft	Interval	Porosity, %	Measured vertical permeability, md	Calculated Vertical permeability, md	Difference, %
2985.5	HH	39.1	40	38	5.11
2999.0	HH	34.7	1090	611	43.97
3014.0	HH	34.7	380	611	60.71
Average		36.2	503	420	36.60

Table 3.7 - Measured and calculated vertical permeability values, interval GG

Depth, ft	Interval	Porosity, %	Measured vertical permeability, md	Calculated Vertical permeability, md	Difference, %
3060.4	GG	34.9	486	533	9.71
3062.9	GG	35.2	682	572	16.07
3091.5	GG	34.4	283	474	67.38
3100.0	GG	35.7	440	644	46.44
3103.0	GG	35.7	1138	644	43.38
3109.0	GG	32.5	370	302	18.35
3063.4	GG	35.7	666	644	3.25
Average		34.9	581	545	29.22

3.2.4 Log Porosity versus Core Porosity

To determine the permeability, given some value of porosity, it was necessary to develop an empirical correlation between porosity from core and porosity from logs. Log-derived porosity was calculated using the procedure given in **Appendix A**. Results of this correlation for each sub-interval or interval are shown in **Figs. 3.10** to **3.14**. Data used including the values of porosity estimated from logs are shown in **Tables 3.8** to **3.12**.

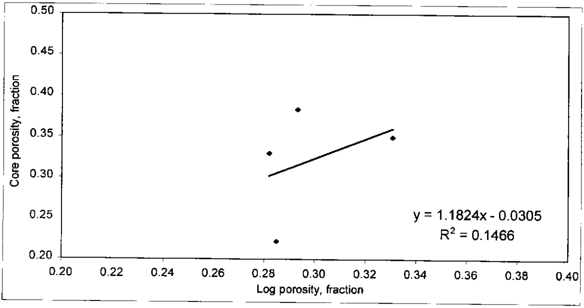

Fig. 3.10 – Sub-interval AP-1: core porosity versus log porosity.

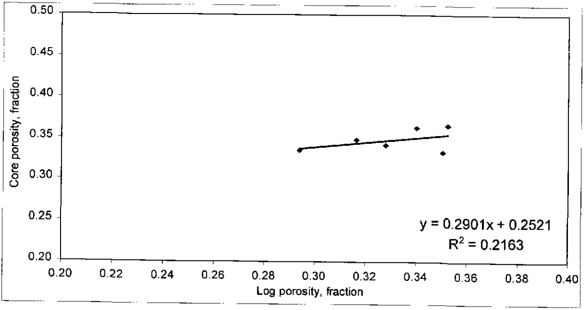

Fig. 3.11 – Sub-interval AP-2: core porosity versus log porosity.

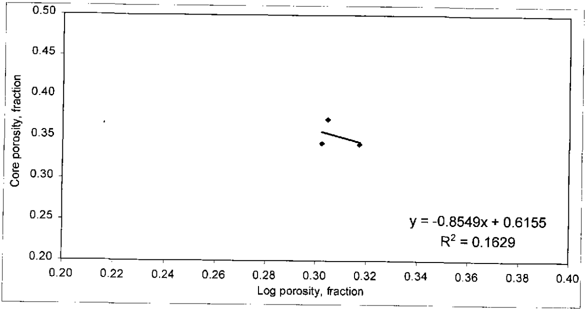

Fig. 3.12 – Sub-interval AP-3: core porosity versus log porosity.

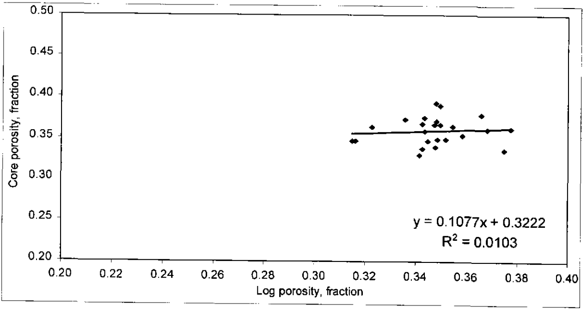

Fig. 3.13 – Interval HH: core porosity versus log porosity.

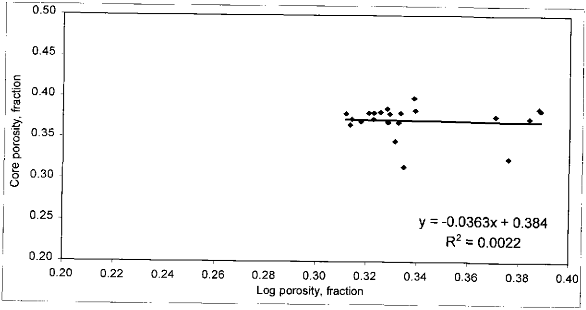

Fig. 3.14 – Interval GG: core porosity versus log porosity.

Table 3.8 - Measured and calculated porosity values, sub-interval AP-1

Measured core porosity, fraction	Measured log porosity, fraction	Calculated porosity, fraction	Difference, %
0.38	0.29	0.32	17.50
0.22	0.28	0.31	37.90
0.33	0.28	0.30	8.30
0.35	0.33	0.36	2.97
Average			16.67

Table 3.9 - Measured and calculated porosity values, sub-interval AP-2

Measured core porosity, fraction	Measured log porosity, fraction	Calculated porosity, fraction	Difference, %
0.36	0.34	0.35	3.38
0.37	0.35	0.35	3.19
0.33	0.35	0.35	6.23
0.34	0.33	0.35	1.53
0.35	0.32	0.34	1.18
0.34	0.29	0.34	0.69
Average			2.70

Table 3.10 - Measured and calculated porosity values, sub-interval AP-3

Measured core porosity, fraction	Measured log porosity, fraction	Calculated porosity, fraction	Difference, %
0.34	0.32	0.34	0.73
0.34	0.30	0.36	4.15
0.37	0.30	0.36	4.47
Average			3.12

Table 3.11 - Measured and calculated porosity values, interval HH

Measured core porosity, fraction	Measured log porosity, fraction	Calculated porosity, fraction	Difference, %
0.38	0.37	0.36	4.60
0.34	0.37	0.36	7.90
0.36	0.38	0.36	0.23
0.36	0.37	0.36	0.23
0.35	0.36	0.36	1.92
0.37	0.35	0.36	1.26
0.35	0.35	0.36	3.07
0.36	0.32	0.36	1.94
0.35	0.32	0.36	2.66
0.35	0.31	0.36	2.62
0.37	0.35	0.36	2.02
0.39	0.35	0.36	7.73
0.35	0.34	0.36	3.55
0.35	0.35	0.36	3.17
0.34	0.35	0.36	5.78
0.37	0.35	0.36	3.05
0.36	0.34	0.36	0.05
0.37	0.35	0.36	1.95
0.39	0.35	0.36	8.48
0.37	0.34	0.36	3.93
0.34	0.34	0.36	6.24
0.37	0.34	0.36	2.42
0.33	0.34	0.36	8.78
0.38	0.34	0.36	4.22
0.38	0.34	0.36	4.22
Average			3.66

Table 3.12 - Measured and calculated porosity values, interval GG

Measured core porosity, fraction	Measured log porosity, fraction	Calculated porosity, fraction	Difference, %
0.38	0.31	0.37	1.92
0.37	0.31	0.37	1.81
0.37	0.31	0.37	0.11
0.37	0.32	0.37	0.67
0.38	0.32	0.37	2.27
0.37	0.33	0.37	0.56
0.38	0.33	0.37	2.09
0.37	0.33	0.37	0.84
0.39	0.33	0.37	3.60
0.32	0.33	0.37	18.05
0.37	0.38	0.37	1.05
0.39	0.39	0.37	4.17
0.38	0.37	0.37	1.71
0.38	0.39	0.37	3.67
0.33	0.38	0.37	13.96
0.38	0.34	0.37	3.20
0.35	0.33	0.37	7.51
0.38	0.33	0.37	2.57
0.37	0.33	0.37	0.80
0.38	0.33	0.37	2.39
0.40	0.34	0.37	6.84
0.37	0.32	0.37	0.19
0.38	0.32	0.37	2.29
Average			3.58

3.2.5 Summary of Correlations

Table 3.13 gives a summary of all permeability and porosity correlations developed.

Table 3.13 - Summary of correlations

Horizontal Permeability

Interval or sub-interval	Equation	Correlation coefficient	Average difference %
AP-1	$k_h = 231.7 \times e^{0.0225\phi}$	0.38	16.68
AP-2	$k_h = 0.3415 \times e^{0.2349\phi}$	0.73	15.51
AP-3	$k_h = 2333.2 \times e^{-0.012\phi}$	0.28	2.10
HH	$k_h = 2.12 \times e^{0.1978\phi}$	0.38	36.54
GG	$k_h = 137.28 \times e^{0.0826\phi}$	0.17	32.10

Vertical Permeability

Interval or sub-interval	Equation	Correlation coefficient	Average difference %
AP-1	$k_v = 550$	N/A	N/A
AP-2	$k_v = 400$	N/A	N/A
AP-3	$k_v = 780$	N/A	N/A
HH	$k_v = 2E12 \times e^{-0.6314\varphi}$	0.93	36.60
GG	$k_v = 0.1378 \times e^{0.2367\varphi}$	0.35	29.22

Core porosity versus log porosity

Interval or sub-interval	Equation	Correlation coefficient	Average difference %
AP-1	$\phi_{core} = 1.1824 \times \phi_{\log} - 0.0305$	0.15	16.67
AP-2	$\phi_{core} = 0.2901 \times \phi_{\log} + 0.2521$	0.22	2.70
AP-3	$\phi_{core} = -0.8549 \times \phi_{\log} + 0.6155$	0.16	3.12
HH	$\phi_{core} = 0.1077 \times \phi_{\log} + 0.3222$	0.01	3.66
GG	$\phi_{core} = -0.0363 \times \phi_{\log} + 0.384$	0.01	3.58

3.3 Relative Permeability Curves

Both oil-water and gas-oil relative permeability data for core samples from Bachaquero-01 were available. However, there were subsequently adjusted through history matching.

3.3.1 Water-Oil System

Figs. 3.15 to **3.18** show the measured relative permeability curves used in this study. These curves were obtained through waterflooding tests on plugs samples taken at four depths in the Bachaquero-01.

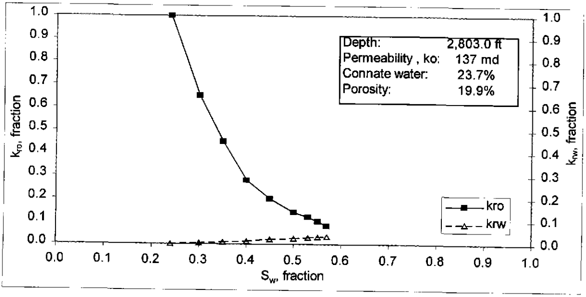

Fig. 3.15 – Water-oil relative permeability data from sample at 2,803.0 ft.

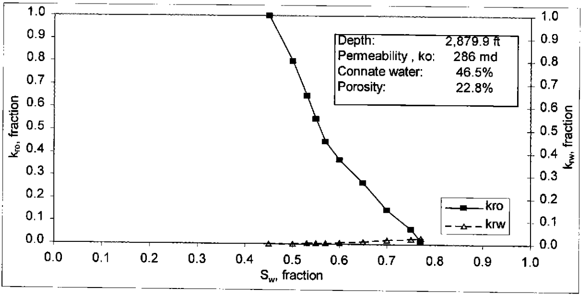

Fig. 3.16 – Water-oil relative permeability data from sample at 2,879.9 ft.

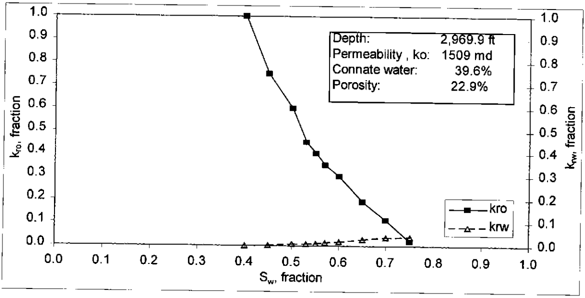

Fig. 3.17 – Water-oil relative permeability data from sample at 2,969.9 ft.

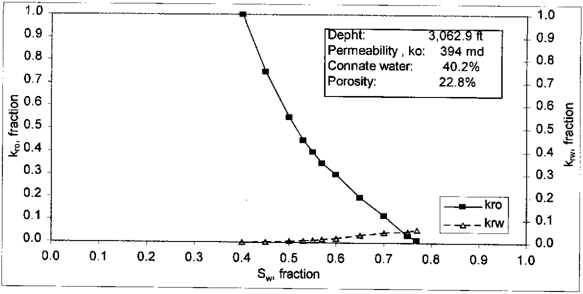

Fig. 3.18 – Water-oil relative permeability data from sample at 3,062.9 ft.

3.3.2 Gas-Oil System

The gas-oil relative permeability curves were obtained from the same four composite cores used for measuring water-oil relative permeability. **Figs. 3.19** to **3.22** show the original gas-oil relative permeability curves.

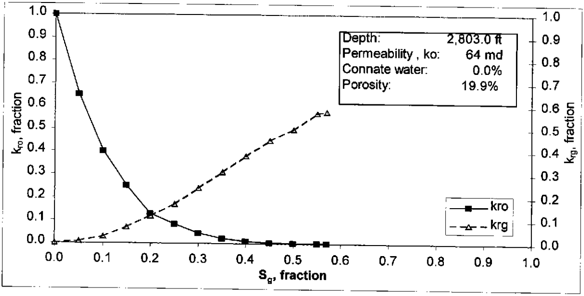

Fig. 3.19 – Gas-oil relative permeability data from sample at 2,803.0 ft.

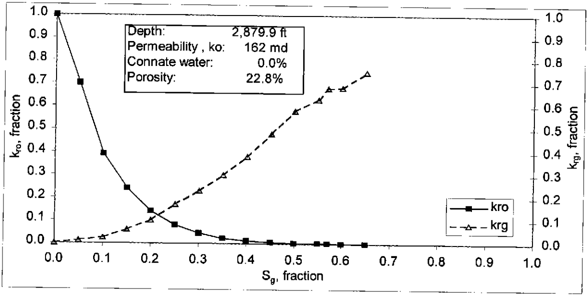

Fig. 3.20 – Gas-oil relative permeability data from sample at 2,879.9 ft.

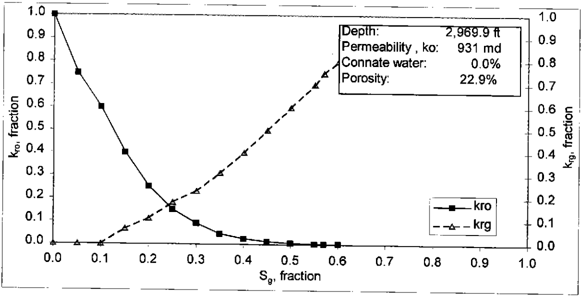

Fig. 3.21 – Gas-oil relative permeability data from sample at 2,969.9 ft.

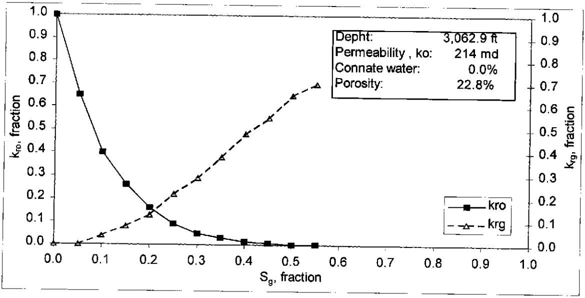

Fig. 3.22 – Gas-oil relative permeability data from sample at 3,062.9 ft.

3.4 Capillary Pressure

Water-oil imbibition capillary pressure data for core samples were available from Bachaquero-01. **Figs. 3.23** to **3.28** show the measured data obtained in the test performed to the core from well LL2318.

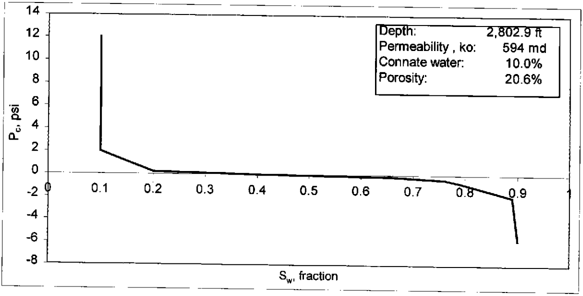

Fig. 3.23 – Water–oil imbibition capillary pressure data from sample at 2,802.9 ft.

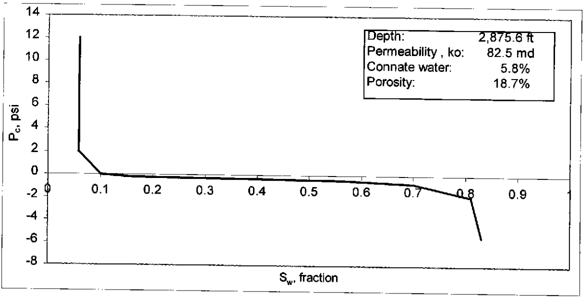

Fig. 3.24 – Water–oil imbibition capillary pressure data from sample at 2,875.6 ft.

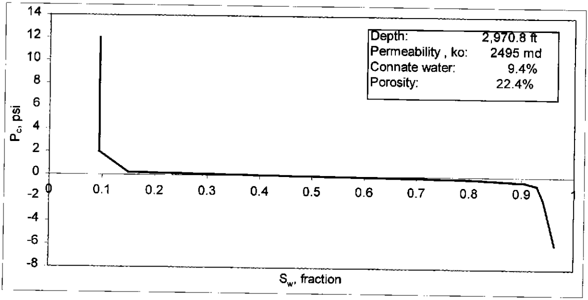

Fig. 3.25 – Water–oil imbibition capillary pressure data from sample at 2,970.8 ft.

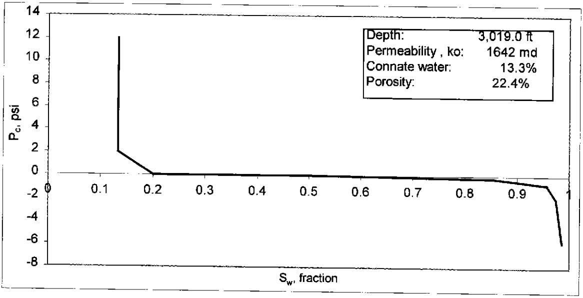

Fig. 3.26 – Water–oil imbibition capillary pressure data from sample at 3,019.0 ft.

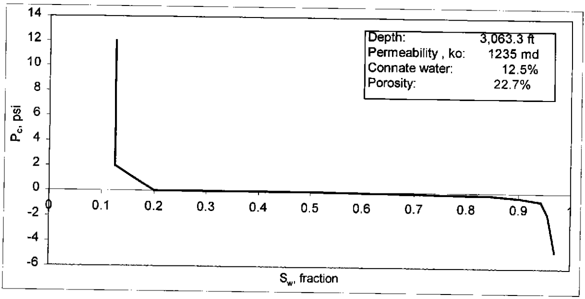

Fig. 3.27 – Water–oil imbibition capillary pressure data from sample at 3,063.3 ft.

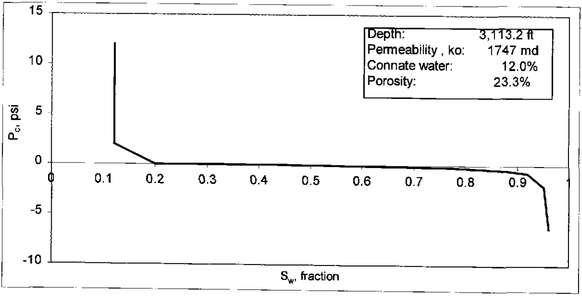

Fig. 3.28 – Water–oil imbibition capillary pressure data from sample at 3,113.2 ft.

CHAPTER IV

NUMERICAL SIMULATION

4.1 Simulator Description

In this study the simulator used was Schlumberger-GeoQuest's ECLIPSE 500 version 98a. It is a fully implicit, 'n'-component thermal simulator with both black oil and compositional options. This simulator also models oils with non-volatile components; three phases are allowed in the simulation: water phase (which only contains water); an oil phase (containing anything but water), and a gas phase which can only contain steam and hydrocarbon components.

ECLIPSE 500 offers a full set of geometry options including corner-point systems and block-center geometry. Moreover, this simulator provides for 2D and 3D grid in both Cartesian and radial system with local grid refinement options. ECLIPSE 500 supports the modeling of thermal conduction through areas where there is no fluid flow, allowing the effects of shales and mudstones to be correctly incorporated.

Recovery processes such as steam drive, steam-assisted-gravity drive (SAGD), hot water injection, single cyclic steam injection, infill drilling, horizontal wells and pattern floods can be simulated.

4.2 Overview of the Models

Three separate models were constructed to simulate the areas where the three horizontal wells are located. These areas were named as Area LL125 where the re-entry well LL125 was drilled and completed on. Area LL3343 corresponds to the location of the horizontal well LL3343, and Area LL3487 to the horizontal well LL3487. In addition to the horizontal wells, vertical wells were included in the areas modeled for proper history matching and reservoir drainage considerations.

Analysis of sample taken from well LL2593[26] indicates that the oil is composed of 61.54% of heptane plus and 29.71% of methane. It was decided to run simulation using the two-component thermal option. The reservoir fluids in the model therefore consist of three phases, namely, vapor, oil, and water, The vapor phase may contain steam and methane, while the oil phase contains heptane plus and methane.

Most of the grid dimensions related to Area LL125 and Area LL3343 were based on a previous model.[2] Also local grid refinement was used around the horizontal wells and vertical wells. The thicknesses of the model layers were based on cross section analysis using logs available. For each model the sub-intervals or intervals AP-1, AP-2, AP-3 and HH and GG were identified and incorporated.

Table 4.1 presents the rock and fluid properties of Bachaquero-01.

Table 4.1 - Bachaquero-01 rock and fluid properties

Oil gravity	degree API	11.7
Average depth	ft	3,000
Original pressure at 3,000 ft	psia	1,370
Bubble point pressure	psia	1,319
Permeability	md	2,000
Porosity	%	33.5
Net oil sand thickness	ft	200
Initial oil viscosity	cp	635
Temperature	°F	128
Gas-oil ratio	scf/STB	87
Oil saturation	%	80
Irreducible water saturation	%	20
Sand heat capacity	Btu/cu.ft-°F	32.7
Sand thermal conductivity	Btu/D-ft-°F	26.4
Rock compressibility	psi^{-1}	60×10^{-6}
OOIP	BSTB	7.037

Rock properties and relative permeability data were based on core analysis. Four sets of relative permeability data were available and they were used in each of the sub-intervals or intervals. The relative permeability curve for each layer was selected as a function of the effective permeability measured for the plugs tested. Fluid properties were based on PVT measurements of sample taken from well LL525.[27]

In compositional simulation, a number of parameters are required to enable proper calculation of compositional and phase partitioning. These are as follows (for each component): heat of vaporization, critical temperature, critical pressure, boiling point temperature, acentric factor, and interaction coefficient. These physical properties were calculated based on the method developed by Whitson.[28] These properties correspond to single component number (SCN) 37, which was selected as function of the molecular weight of oil sample from well LL2593.

As of the time of this study, the module PVTi in ECLIPSE was not available. With the PVTi it would have been possible to directly calculate the physical properties of the heptane plus given the data obtained from lab analysis. Therefore, it was necessary to run several sensibility cases to determine which of the physical properties have the greatest effect on the results. It was found that the molecular weight had a dominant effect on the results

ECLIPSE 500 assumes the steam quality to be at the sand face, while in the field this parameter is measured at the wellhead. It was necessary therefore to calculate wellbore heat losses down to the sand face to estimate the steam quality at the reservoir depth. This was done by using the method developed by Satter.[29] This procedure consists of dividing the length of the wellbore into several intervals, and using thermal properties and the overall thermal resistance being defined for each interval. The heat losses from and temperature drop across each interval then are summed to obtain the heat losses and temperatures to any depth as a function of time.

The completion intervals for each well in the three models were properly taken into consideration by adjusting *kh* product in the well model. The skin factor for each well was determined by history-matching the well flowing bottom hole pressure.

4.3 Area LL125 Model

In this model as for the wells in other parts of Bachaquero-01, the wells are all completed in the interval Arena Principal which is of fluvial-deltaic origin of good lateral continuity. Area LL125 is composed of the wells LL125 and four neighboring vertical wells (LL2296, LL2404, LL2435 and LL3178). The oldest well, LL125, started production in January 1969. A horizontal sidetrack was drilled in 1995. Wells LL2296 has produced since 1980, wells LL2404 and LL2435 since mid-1980's, and LL3178 since September 1991. All the wells have been stimulated by cyclic steam injection. The original pressure of this area was about the original pressure (1,370 psia). However, the reservoir original pressure of this area has since dropped to about 700 psia, which represents an average pressure decline of 20 psi/year. This area is probably the most depleted area in Bachaquero-01.

4.3.1 Grid Size and Properties

The Cartesian model of Area LL125 has grid dimensions of 11×22×4, with areal dimensions the same as used in a previous study.[2] The thickness of each of the four layers was based on the average thickness of the sub-intervals or intervals AP-1, AP-2, AP-3, and HH as seen in the wells in the area. **Fig. 4.1** shows the cross section developed to accomplish this objective using the logs available. **Tables 4.2** and **4.3** give the measured and average properties for each layer, respectively. **Fig. 4.2** presents the areal and layer grid dimensions.

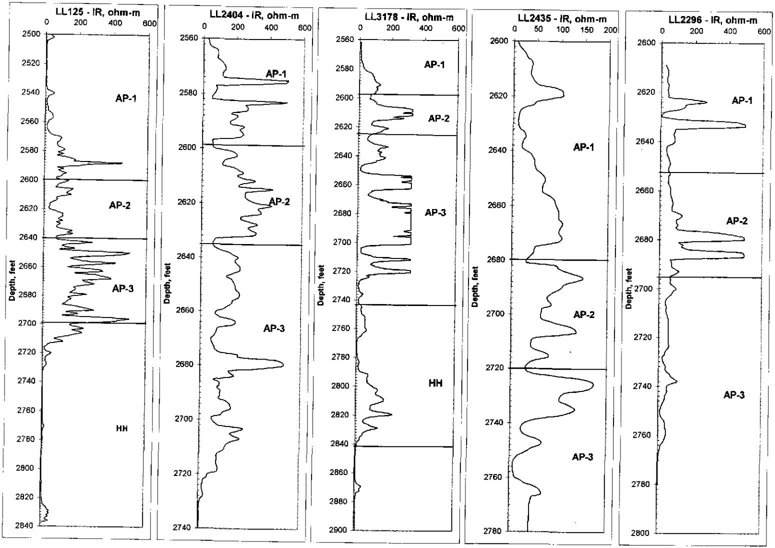

Fig. 4.1 – Log cross section for Area LL125.

Table 4.2 – Area LL125: properties from logs

Well	Layer	Top, ft	Thickness, ft	Log porosity, fraction	S_w, fraction
LL125	AP-1	2499	101	0.22	0.52
	AP-2	2600	40	0.34	0.20
	AP-3	2640	58	0.36	0.12
	HH	2698	75	0.16	0.65
LL2404	AP-1	2560	38	0.35	0.17
	AP-2	2598	37	0.36	0.12
	AP-3	2635	80	0.31	0.25
	HH	2715	0	0.00	0.00
LL3178	AP-1	2562	38	0.27	0.41
	AP-2	2600	25	0.35	0.15
	AP-3	2625	117	0.34	0.21
	HH	2742	98	0.28	0.37
LL2435	AP-1	2600	80	0.32	0.31
	AP-2	2680	40	0.33	0.22
	AP-3	2720	60	0.31	0.32
	HH	2780	0	0.00	0.00
LL2296	AP-1	2609	46	0.32	0.27
	AP-2	2655	40	0.34	0.18
	AP-3	2695	99	0.27	0.41
	HH	2794	0	0.00	0.00

Table 4.3 – Area LL125: average properties

Layer	Top, ft	Thickness, ft	Log porosity, fraction	S_w, fraction	Core porosity, fraction	Horizontal Permeability, md	Vertical Permeability, md
AP-1	2562	61	0.28	0.37	0.30	500	500
AP-2	2623	36	0.34	0.18	0.35	1336	400
AP-3	2659	83	0.32	0.27	0.35	1547	780
HH	2742	87	0.23	0.49	0.35	2030	610

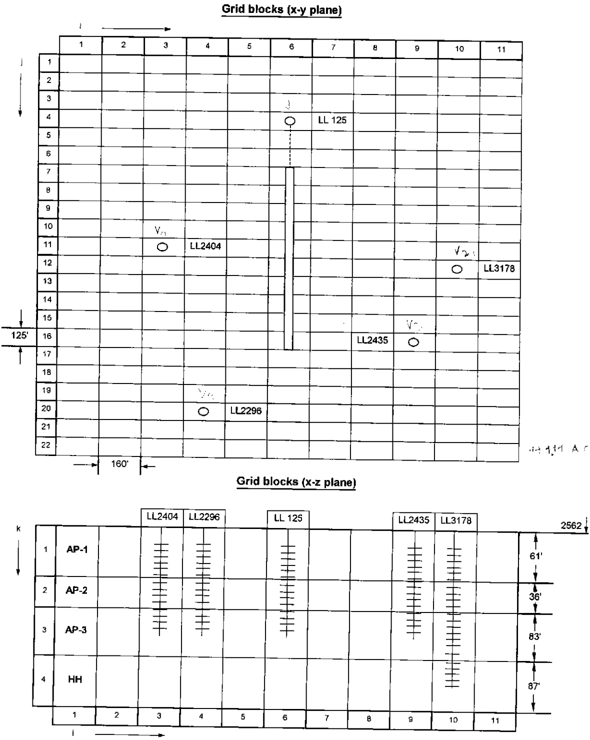

Fig. 4.2 – Area LL125: schematic diagrams showing grid dimensions, well locations and completion intervals.

4.3.2 History Matching

History matching was carried out for the producing period of Area LL125, January 1969 to March 1998, approximately 30 years of history. This period was modeled by specifying the historical oil production and cyclic steam injection rates (equivalent cold water rate injected for each well area shown in **Table 4.4**) and allowing the model to calculate water and gas production rates. The procedure used in this study to obtain the history match was: First, the reservoir pressure was matched. This was achieved by adjusting the value of rock compressibility, which was increased up to 120×10^{-6} psi^{-1}. **Figs. 4.3** and **4.4** show the results of the satisfactory history match of reservoir pressure and oil production rate, respectively. Second, adjusting the water relative permeability curve (k_{rw}) and the irreducible water saturation (S_{wi}) for each layer, the water production was matched (**Fig. 4.5**). To achieve a satisfactory history match k_{rw} was reduced considerably from the measured k_{rw}. Third, the history match for gas production rate was done by adjusting the critical gas saturation (S_{gc}) to 0.05. **Fig. 4.6** shows the satisfactory result for this variable. Finally, the well flowing bottom hole pressures were matched by changing the skin factor. **Figs. 4.7** to **4.11** show the detailed history matching for each well.

Table 4.4 – Area LL125: equivalent cold water rate injected for each well

Well	Injection date	Cyclic number	Injection period, days	Soak period, days	Water injected, BCWE/D	Cumulated water injected, BCWE
$LL125_V$	24-Sep-73	1	30	10	2031	59950
	04-Jun-76	2	36	15	1888	67894
	27-May-80	3	13	6	2306	30144
$LL125_H$	05-Sep-95	4	20	7	2506	50056
	31-Mar-97	5	15	5	2900	43850
$LL2296_V$	04-Apr-81	1	18	6	1931	34638
	03-Nov-89	2	16	32	2394	37556
	12-Aug-93	3	15	10	1931	28181
	10-Feb-95	4	13	4	2438	31331
	23-Jul-97	5	14	5	2594	37575
$LL2404_V$	20-May-86	1	15	15	2438	37544
	11-Oct-89	2	13	45	2813	37456
	13-Jun-92	3	13	17	2488	32556
$LL2435_V$	17-Sep-81	1	12	4	2188	27256
	21-Apr-85	2	14	16	2369	32450
	24-Oct-90	3	10	4	2919	28150
	24-Mar-92	4	12	42	2619	31375
	29-Dec-93	5	9	10	2644	25019
$LL3178_V$	03-Oct-91	1	12	7	2556	31206
	19-Sep-93	2	17	6	1681	28200
	26-Jul-96	3	10	5	2544	24994
					Total	757381

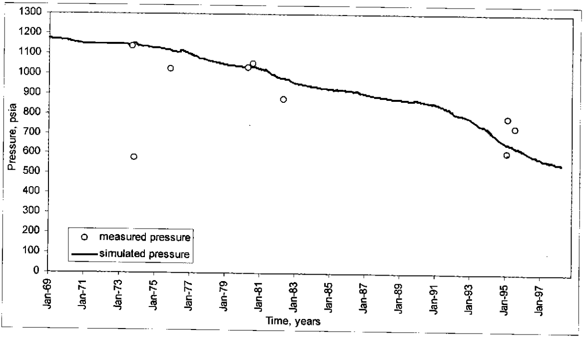

Fig. 4.3 – Area LL125: reservoir pressure history match.

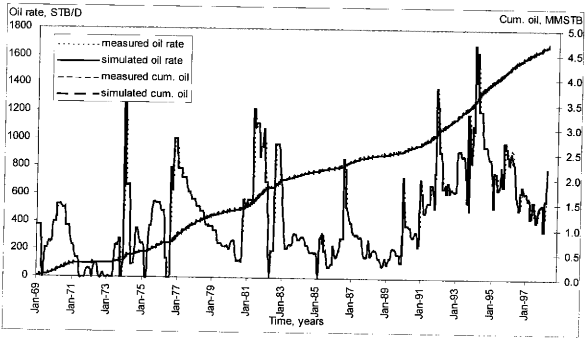

Fig. 4.4 – Area LL125: oil production rate history match.

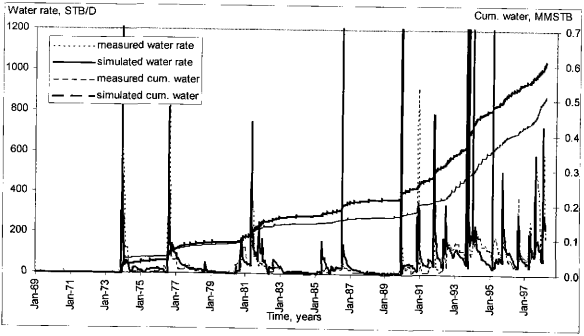

Fig. 4.5 – Area LL125: water production rate history match.

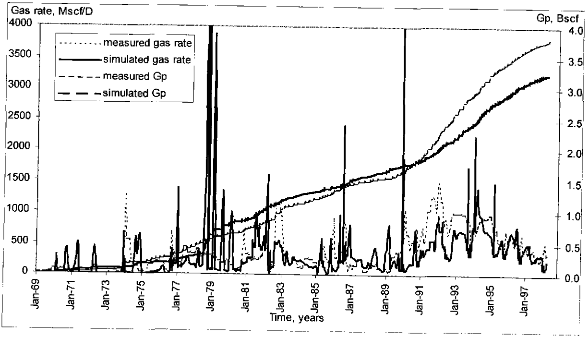

Fig. 4.6 – Area LL125: gas production rate history match.

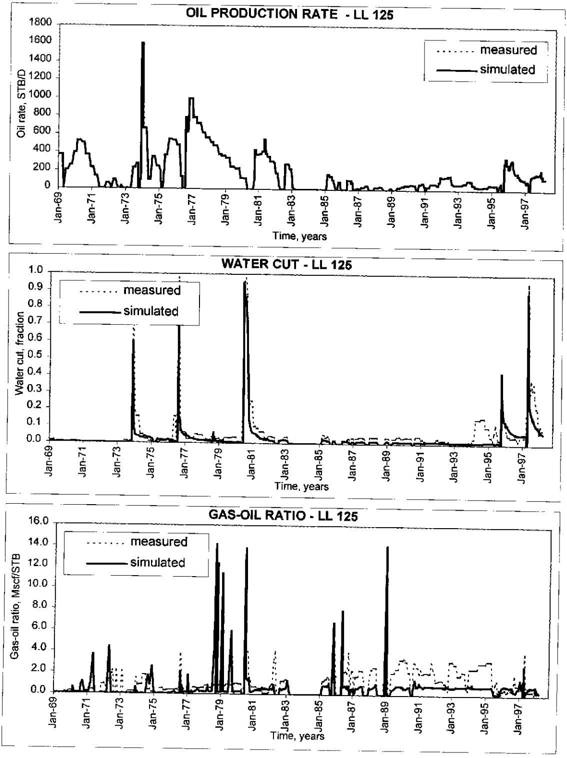

Fig. 4.7 – History matching of well LL125.

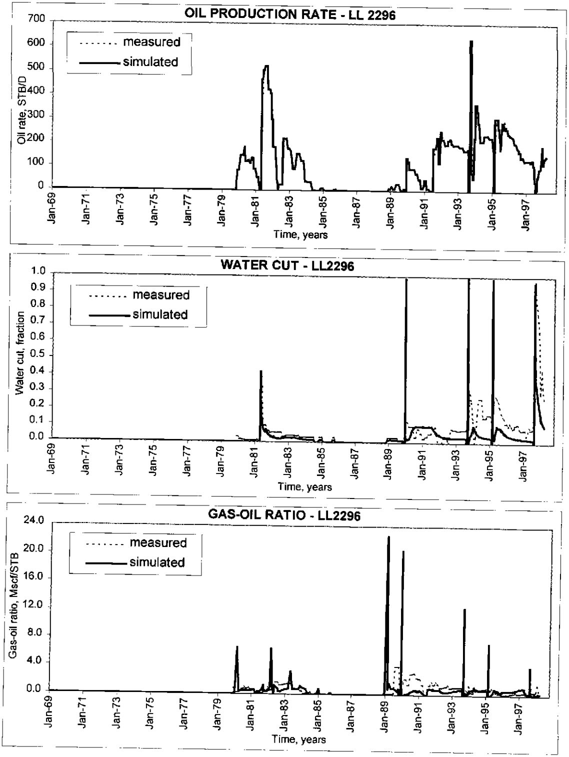

Fig. 4.8 – History matching of well LL2296.

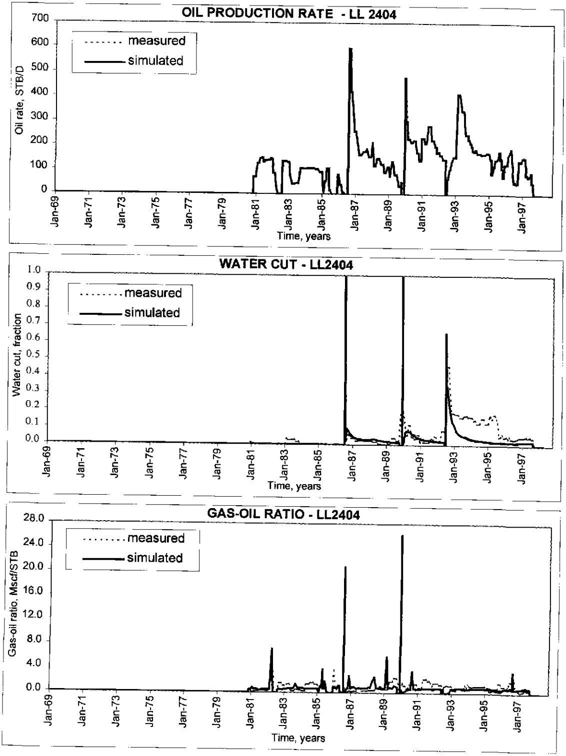

Fig. 4.9 – History matching of well LL2404.

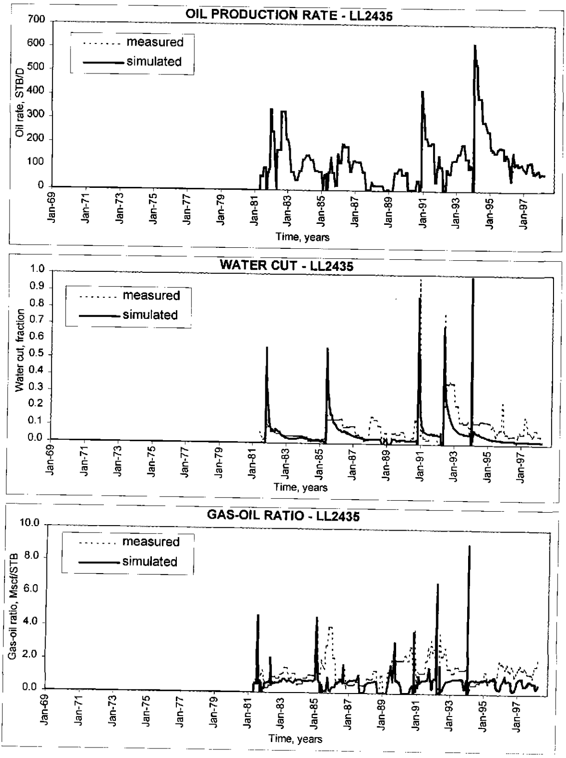

Fig. 4.10 – History matching of well LL2435.

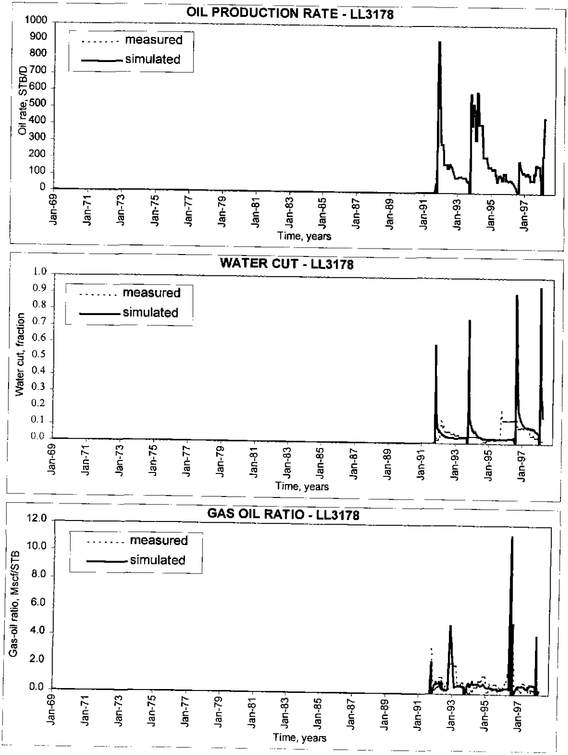

Fig. 4.11 – History matching of well LL3178.

4.4 Area LL3343 Model

Model Area LL3343 contains sand of deltaic-origin. The WOC is at approximately 3,062 ft. (near the base of reservoir in these wells). This is one of the main reasons why this area has been less developed. Moreover, this part of the reservoir shows higher pressure and has declined at 18 psi/year.

Area LL3343 includes the vertical wells LL2366, LL2610, LL2781 and LL2788, and the horizontal LL3343. The vertical wells are completed open-hole across the intervals Arena Principal, HH and GG and have been producing since 1983. All the wells have been stimulated by cyclic steam injection except well LL2781. The horizontal well LL3343 is completed on the Arena Principal and has been producing under cyclic steam injection since August 1995.

4.4.1 Grid Size and Properties

An 11×27×5 Cartesian model was use for Area LL3343. The areal dimensions are based on a previous work.[2] The thicknesses of the layers were determined from the available log as well as the reservoir properties, following the same procedure as used for Area LL125. **Fig. 4.12** shows the log cross sections of wells in Area LL3343. **Tables 4.5** and **4.6** give the measured and average properties for each layer respectively. **Fig. 4.13** presents the grid dimensions.

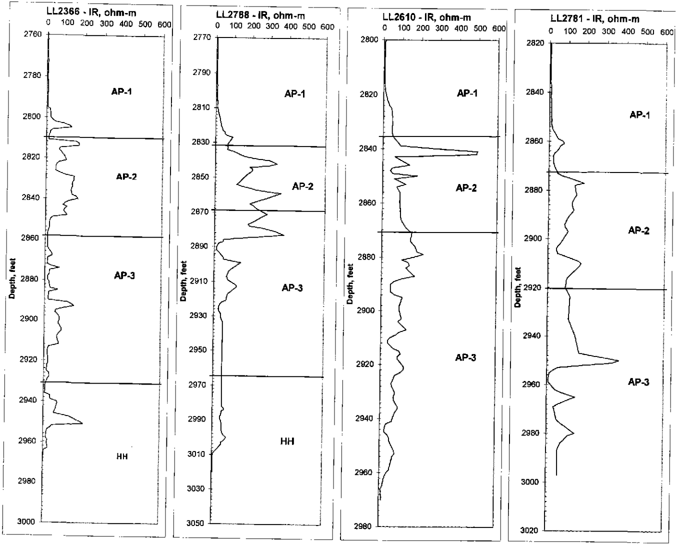

Fig. 4.12 – Log cross section for Area LL3343.

Table 4.5 – Area LL3343: properties from logs

Well	Layer	Top, feet	Thickness, feet	Log porosity, fraction	S_w, fraction
LL2610	AP-1	2805	30	0.18	0.57
	AP-2	2835	35	0.34	0.17
	AP-3	2870	99	0.33	0.26
	HH	2969	0	0.00	0.00
LL2781	AP-1	2822	48	0.18	0.64
	AP-2	2870	50	0.34	0.19
	AP-3	2920	72	0.33	0.23
	HH	2992	0	0.00	0.00
LL2788	AP-1	2773	59	0.14	0.64
	AP-2	2832	35	0.36	0.13
	AP-3	2867	97	0.33	0.24
	HH	2964	87	0.31	0.30
LL2366	AP-1	2762	48	0.10	0.75
	AP-2	2810	48	0.33	0.24
	AP-3	2858	77	0.30	0.39
	HH	2935	89	0.24	0.47

Table 4.6 – Area LL3343: average properties

Layer	Top, ft	Thickness, ft	Log porosity, fraction	S_w, fraction	Core porosity, fraction	Horizontal Permeability, md	Vertical Permeability, md
AP-1	2800	46	0.15	0.66	0.14	333	333
AP-2	2846	42	0.34	0.19	0.35	1311	400
AP-3	2888	86	0.32	0.27	0.34	1560	780
HH	2975	88	0.27	0.39	0.35	2218	459

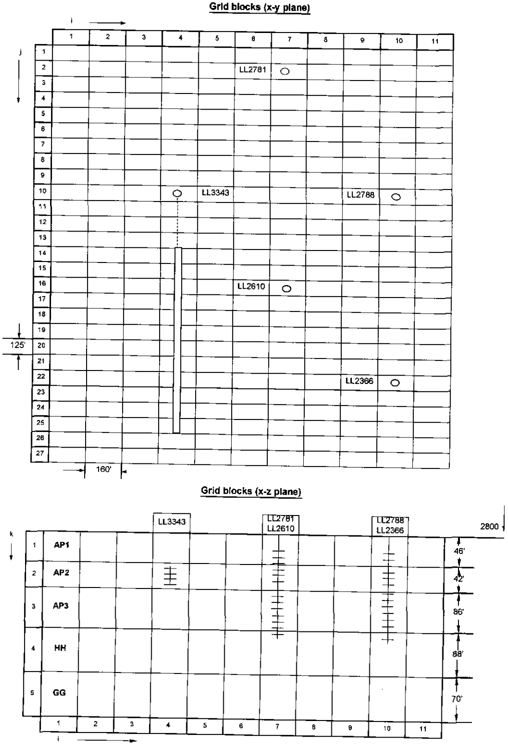

Fig. 4.13 – Area LL3343: schematic diagrams showing grid dimensions, well locations and completion intervals.

4.4.2 History Matching

History match for Area LL3343 was performed from start of production in mid-1980. **Table 4.7** presents the equivalent cold water rate injected to each well. For history matching, the procedure used was the same as that for Area LL125, except for some differences related to the characteristics of Area LL3343. The first one is the existence of the WOC at 3,062 ft. It was modeled by adding a layer (GG) with a thickness of 70 ft. To simulate the water cone present in wells LL2781 and LL2610, the ratio of vertical to horizontal permeability was increased up to 10 times in the lowest block for each well. Based on logs from well LL2610 and LL2781 (**Fig. 4.14**) a transition zone exists for each of these wells. Capillary pressure data were therefore input. The first run used capillary pressure values from core data. But the match was not satisfactory. Therefore, it was decided to change the values of capillary pressure to those based on the Leverett fucntion.[30] Even though these values are higher than those given by core analysis, a good match was not obtained. The values of capillary pressure were then increased by 10 times (**Fig. 4.15**). In all the runs radial local grid refinement around these two wells was used. **Figs. 4.16** to **4.19** show the satisfactory history match for Area LL3343. **Figs. 4.20** to **4.24** show detailed results for each well.

Table 4.7 – Area LL3343: equivalent cold water rate injected for each well

Well	Injection date	Cyclic number	Injection period, days	Soak period, days	Water injected, BCWE/D	Cumulated water injected, BCWE
$LL2366_V$	29-Apr-86	1	17	13	2050	35681
	31-Mar-89	2	14	10	2706	38181
$LL2610_V$	10-Apr-86	1	15	44	2138	31275
	19-Jun-89	2	14	21	2606	37556
	09-Feb-94	3	10	7	2581	25038
$LL2788_V$	02-Feb-85	1	17	13	2031	34519
	29-Jul-88	2	16	26	2444	38206
	20-Jan-91	3	13	3	2781	37556
$LL3343_H$	13-Oct-95	1	25	6	2456	62600
	02-Nov-97	2	18	5	4063	71056
					Total	411669

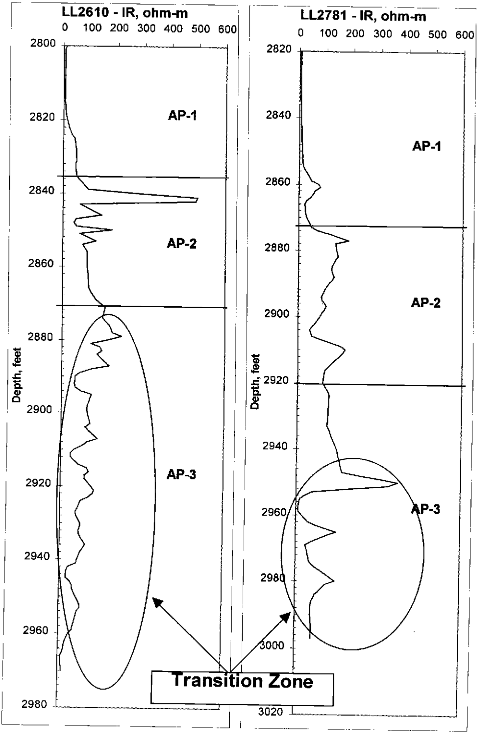

Fig. 4.14 – Transition zone in wells LL2610 and LL2781.

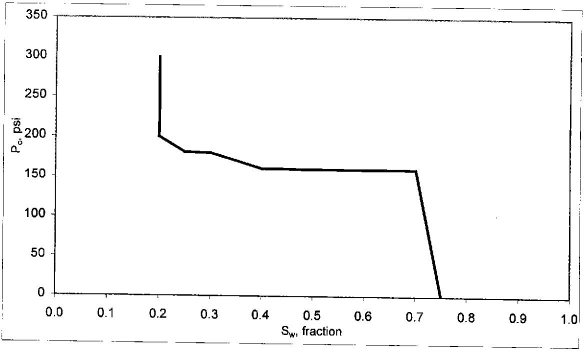

Fig. 4.15 – Final capillary pressure data.

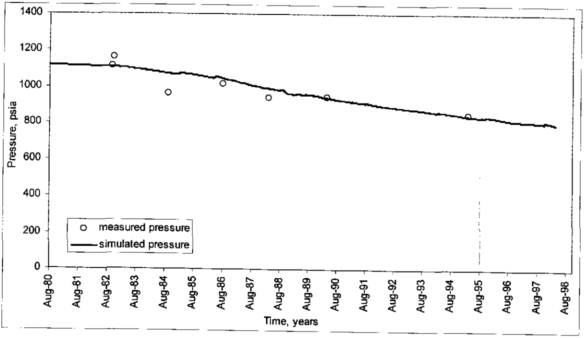

Fig. 4.16 – Area LL3343: reservoir pressure history match.

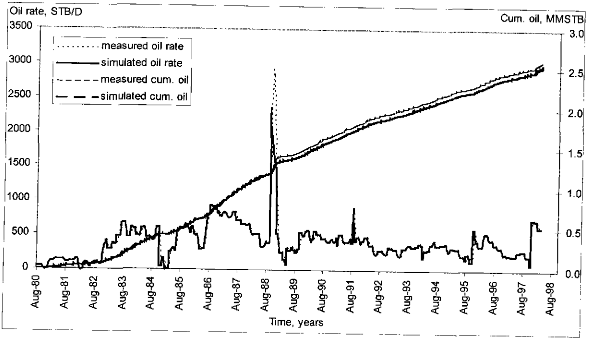

Fig. 4.17 – Area LL3343: oil production rate history match.

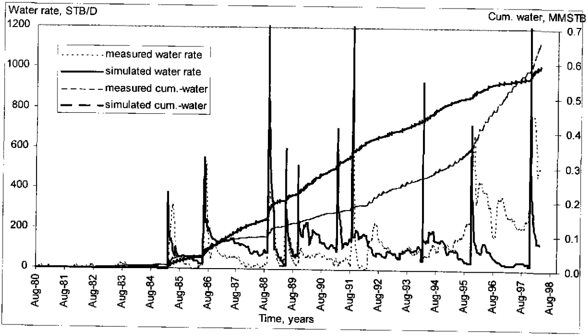

Fig. 4.18 – Area LL3343: water production rate history match.

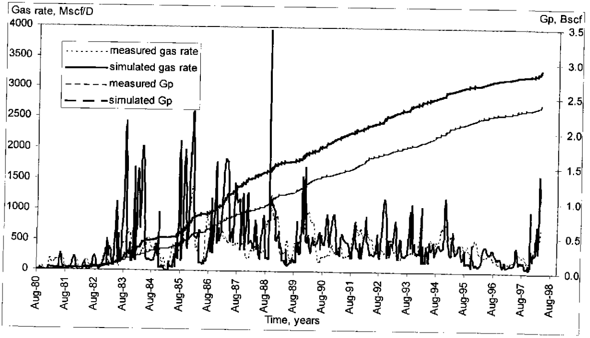

Fig. 4.19 – Area LL3343: gas production rate history match.

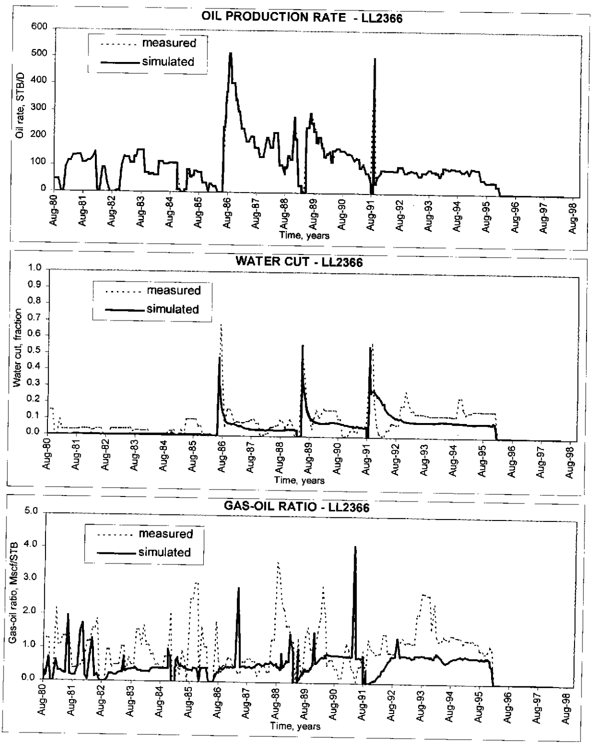

Fig. 4.20 – History matching of well LL2366.

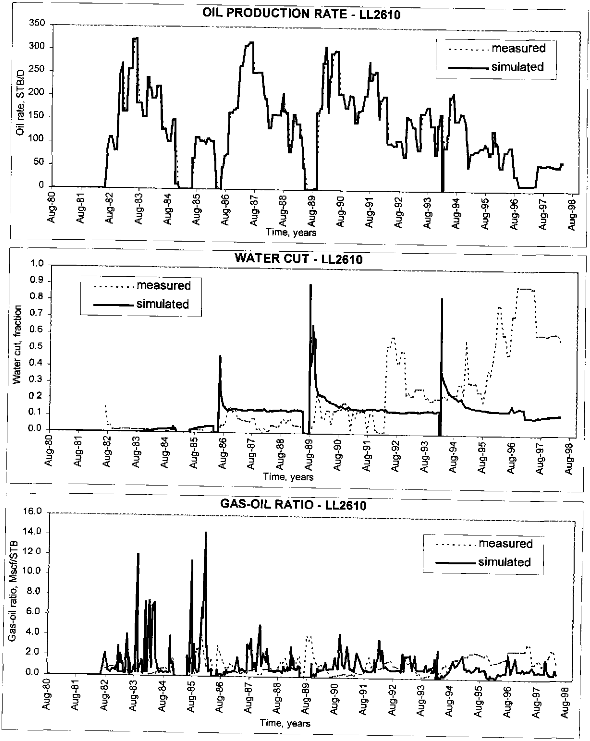

Fig. 4.21 – History matching of well LL2610.

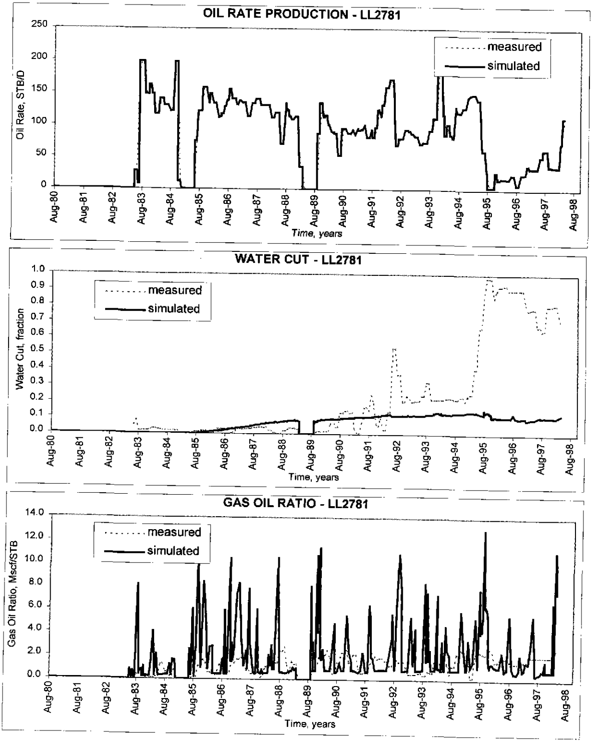

Fig. 4.22 – History matching of well LL2781.

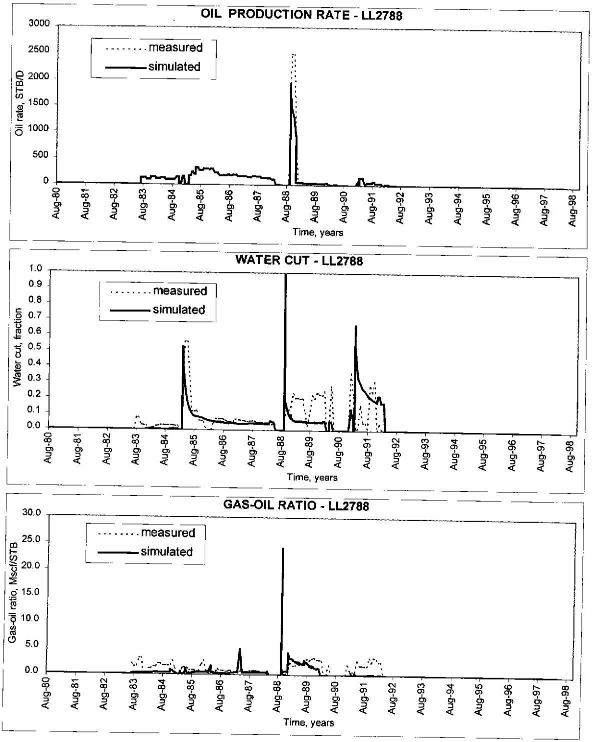

Fig. 4.23 – History matching of well LL2788.

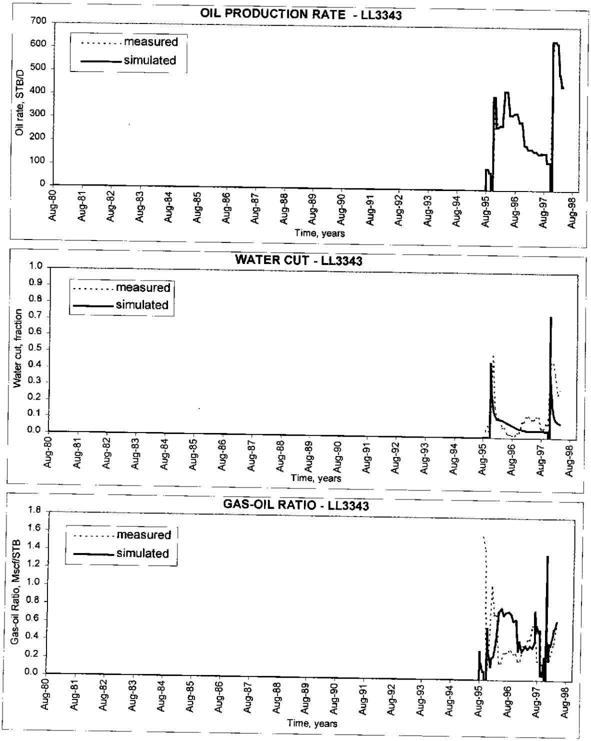

Fig. 4.24 – History matching of well LL3343.

4.5 Area LL3487 Model

Area LL3487 is in one of the less developed parts of Bachaquero-01 and has been producing since the beginning of 1955. The reservoir pressure in this area has declined an average of 10 psi/year. Area LL3487 is of deltaic origin and the WOC is at approximately 3,370 ft.

Area LL3487 includes five vertical wells (LL36, LL112, LL160, LL2527 and LL2849) and horizontal well LL3487. Well LL160 has been producing since 1955. The wells are completed as open-hole in the intervals Arena Principal, HH, and GG. Only wells LL2527 and LL2849 have been cyclic steamed. As of May 1997 a horizontal well LL3487 was drilled in Arena Principal and produced under cyclic steam with good results.

4.5.1 Grid Size and Properties

A 12×20×5 Cartesian model was used for Area LL3487. The areal dimensions are the same as that used in Area LL125 and Area LL3343. The thicknesses of the layers were determined from available logs. **Fig. 4.25** presents the cross section based on logs which are available only for wells LL2849, LL2516, and LL2527. Even though well LL2516 does not belong to the model, it is nearby to it and therefore the log data is relevant. **Tables 4.8** and **4.9** give the average properties for each layer. **Fig. 4.26** presents the schematic diagrams for this area. The estimated drainage area for Area LL3487 is not a rectangle. The model geometry is obtained by defining certain grid blocks (hatched in **Fig. 4.26**) to be inactive blocks.

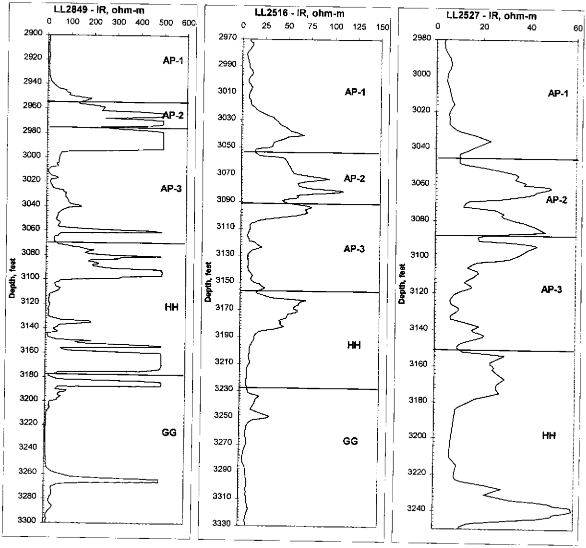

Fig. 4.25 – Log cross section for Area LL3487.

Table 4.8 – Area LL3487: properties from logs

Well	Layer	Top, feet	Thickness, feet	Log porosity, fraction	S_w, fraction
LL36	AP-1	2927	64	0.16	0.65
	AP-2	2991	36	0.33	0.28
	AP-3	3026	76	0.29	0.41
	HH	3102	85	0.29	0.41
	GG	0	0	0.00	0.00
LL112	AP-1	2962	64	0.16	0.65
	AP-2	3026	36	0.33	0.28
	AP-3	3061	72	0.29	0.41
	HH	3133	83	0.29	0.41
	GG	3216	76	0.18	0.63
LL160	AP-1	2935	64	0.16	0.65
	AP-2	2999	36	0.33	0.28
	AP-3	3034	90	0.29	0.41
	HH	3124	69	0.29	0.41
	GG	0	0	0.00	0.00
LL2527	AP-1	2982	63	0.08	0.78
	AP-2	3045	45	0.31	0.38
	AP-3	3090	59	0.26	0.53
	HH	3149	101	0.26	0.53
	GG	0	0	0.00	0.00
LL2849	AP-1	2900	55	0.14	0.63
	AP-2	2955	22	0.37	0.10
	AP-3	2977	93	0.33	0.26
	HH	3070	107	0.34	0.25
	GG	3177	96	0.19	0.57

Table 4.9 – Area LL3487: average properties

Layer	Top, ft	Thickness, ft	Log porosity, fraction	S_w, fraction	Core porosity, fraction	Horizontal Permeability, md	Vertical Permeability, md
AP-1	2940	64	0.16	0.65	0.16	346	333
AP-2	3004	36	0.33	0.28	0.35	1185	400
AP-3	3039	72	0.29	0.41	0.37	1506	780
HH	3111	93	0.29	0.41	0.35	2300	409
GG	3204	95	0.18	0.63	0.38	3100	586

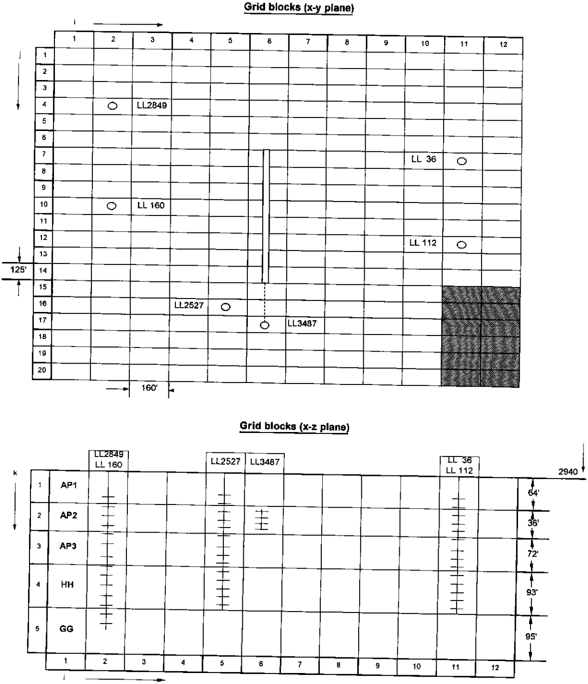

Fig. 4.26 – Area LL3487: schematic diagrams showing grid dimensions, well locations and completion intervals.

4.5.2 History Matching

History matching was carried out for Area LL3487 since beginning of 1955. **Table 4.10** shows the equivalent cold water rate injected for each well. In this area, the history matching procedure used was the same as those for Area LL125 and Area LL3343. By adjusting the water relative permeability curve, a satisfactory history match of water cut was achieved. The gas rate was satisfactorily matched by adjusting the critical gas saturation. Special mention is made of the difficulty in history matching water cut in wells LL160 and LL2527 because the field water cut increased sharply. It was simulated by increasing the water relative permeability curve. Radial local grid refinement was used around these wells. **Figs. 4.27** to **4.30** show the best match results found for this area. **Figs. 4.31** to **4.36** give the detailed history matching for each well.

Table 4.10 – Area LL3487: equivalent cold water rate injected for each well

Well	Injection date	Cyclic number	Injection period, days	Soak period, days	Water injected, BCWE/D	Cumulated water injected, BCWE
$LL2527_V$	3/26/85	1	19	10	1712	31831
	8/14/92	2	12	8	2256	27581
$LL2849_V$	8/10/84	1	18	11	1712	31356
	2/5/91	2	15	6	2237	34450
	3/2/94	3	14	5	1768	25013
$LL3487_H$	6/8/97	1	20	7	2500	50700
					Total	200931

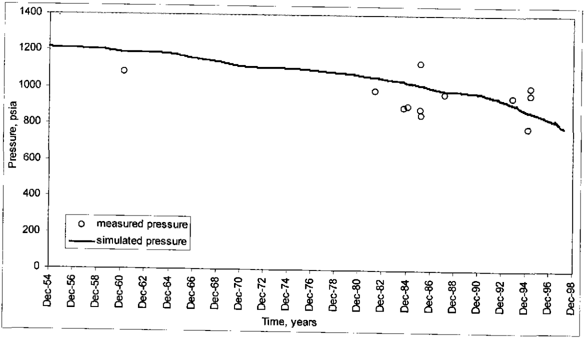

Fig. 4.27 – Area LL3487: reservoir pressure history match.

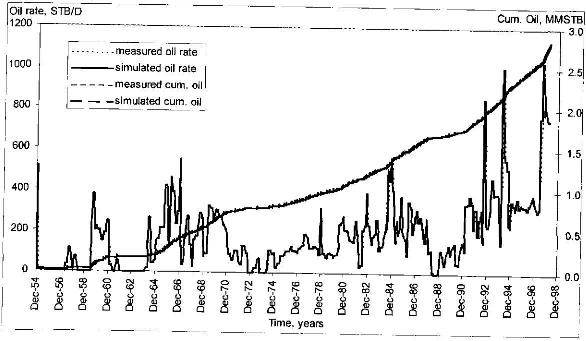

Fig. 4.28 – Area LL3487: oil production rate history match.

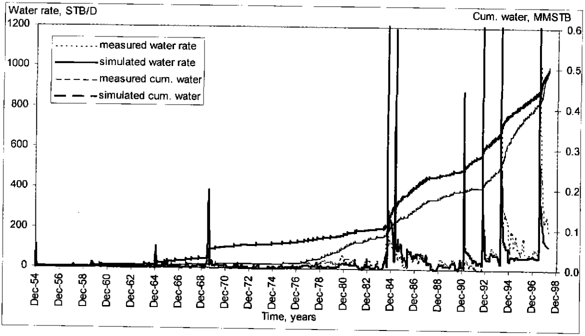

Fig. 4.29 – Area LL3487: water production rate history match.

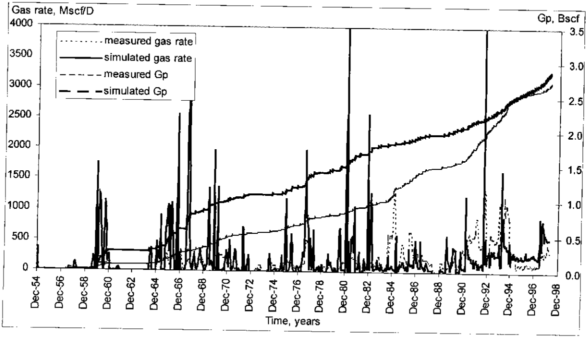

Fig. 4.30 – Area LL3487: gas production rate history match.

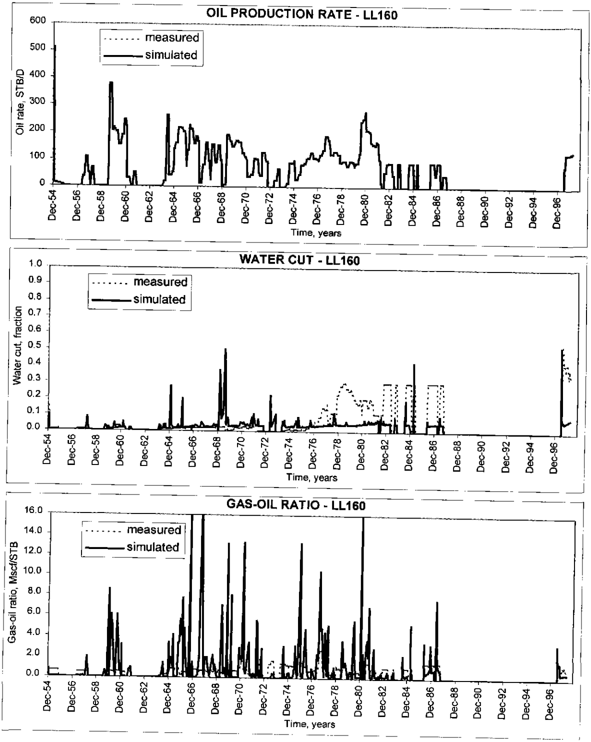

Fig. 4.31 – History matching of well LL160.

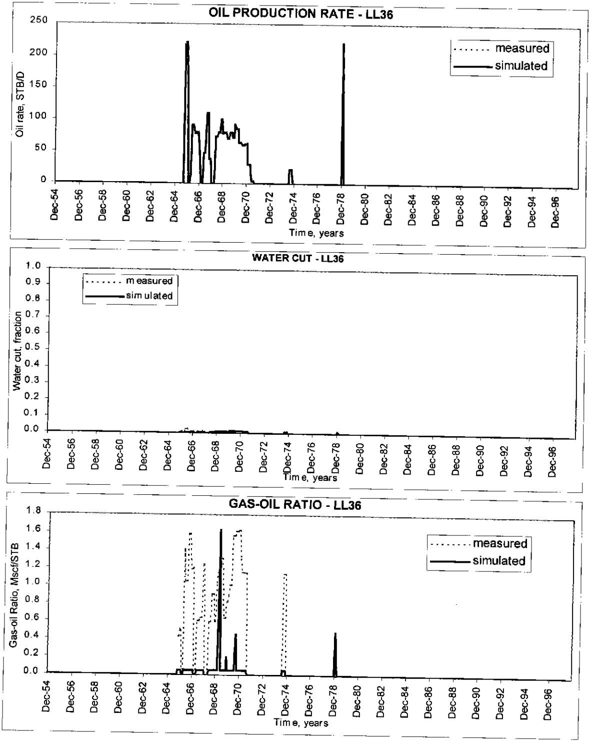

Fig. 4.32 – History matching of well LL36.

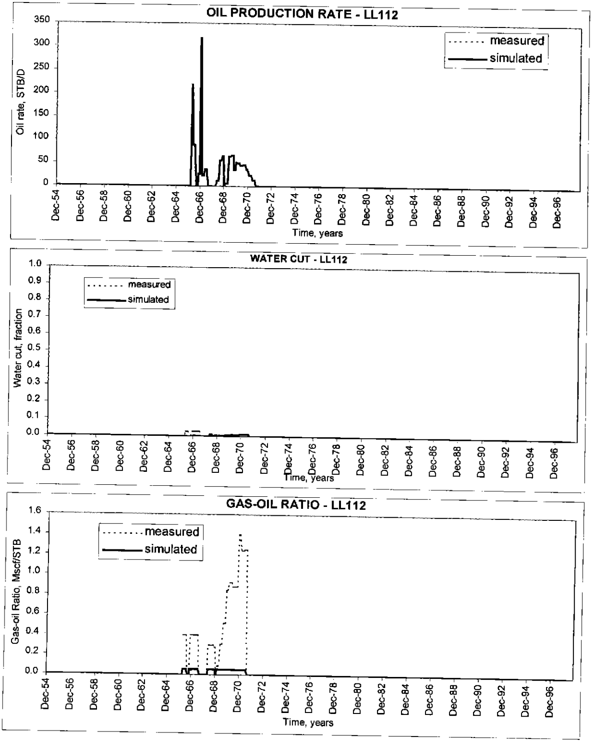

Fig. 4.33 – History matching of well LL112.

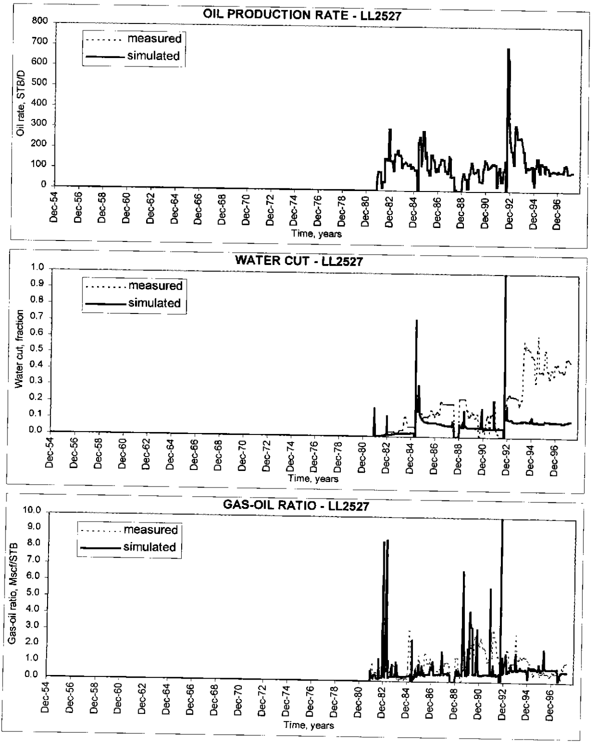

Fig. 4.34 – History matching of well LL2527.

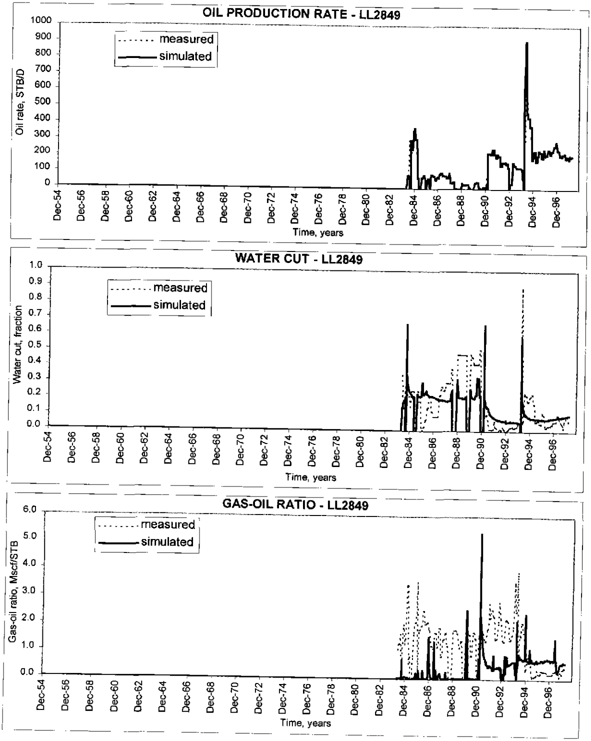

Fig. 4.35 – History matching of well LL2849.

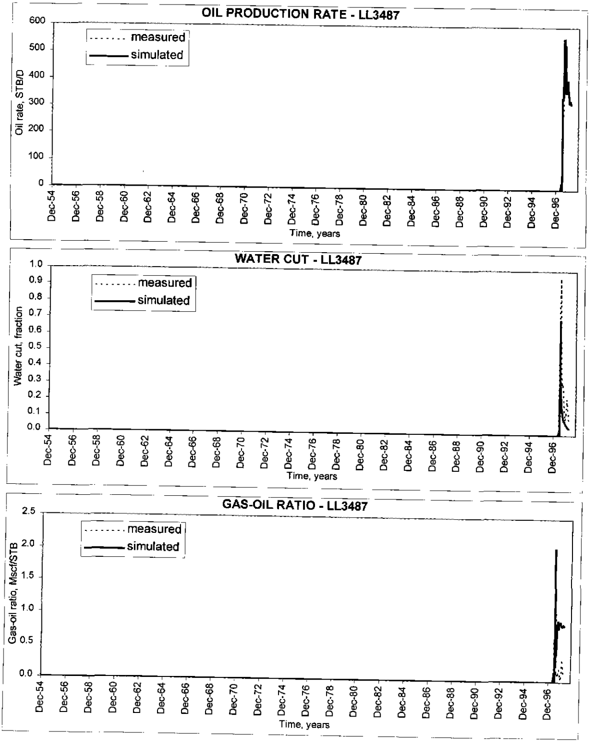

Fig. 4.36 – History matching of well LL3487.

CHAPTER V

RESULTS AND DISCUSSION

5.1 Forecasting

Simulation runs were conducted to predict the performance of the three areas under cyclic steam injection and steamflooding. For each of the cases studied, the well flowing bottom hole pressure (p_{wf}) was kept constant as well as the skin factor. The prediction runs were made for a period of 20 years. The steam injection rate was based on the last rate of injection for each well and was kept constant with a constant steam quality of 75% (at reservoir face). Results for each case were compared on the basis of cumulative oil production.

Horizontal wells provide greater injectivity than vertical wells. Further, inverted patterns are more suitable for the offshore conditions in Maracaibo Lake. Therefore, in the steamflooding cases considered the horizontal wells were used as injectors while existing and new vertical wells were used as producers. In general, the following cases were run for each area except where they are not applicable due to the geometry of the area:

1. Case 1: production of the existing wells with no further cyclic steam injection.
2. Case 2: continuing cyclic steaming in the existing wells until a cumulative of 10 cycles for each well.
3. Case 3: steamflooding with the horizontal well as injector and the existing vertical wells as producers.
4. Case 4: steamflooding with the horizontal well as injector and new horizontal producer wells.
5. Case 5: steamflooding with the horizontal well as injector surrounded by eight new vertical wells.

The results of the prediction runs for each simulation area are discussed in the following sections.

5. 2 Area LL125

The well flowing bottom hole pressure was set at 375 psia for vertical wells and 500 psia for the horizontal well. These values are based on flowing bottom hole pressure surveys taken in the area. These parameters were kept constant during the period under consideration. **Table 5.1** shows the results of the prediction cases considered. The incremental recovery for Case 2 to Case 5 is compared against of that Case 1. Note that cumulative oil production as April 01, 1998 amounts to 12.2% OOIP.

Table 5.1 - Area LL125 prediction results

	Final recovery factor, % OOIP	Incremental recovery, % OOIP	SOR, BCWE/STB
Case 1	14.4	0.0	---
Case 2	16.2	1.9	1.2
Case 3	32.7	18.3	3.1
Case 4	53.0	38.6	1.5
Case 5	53.3	38.9	1.5

It can be seen that the oil recovery factor of Case 3 is almost twice that of Case 1, showing the benefits of steamflooding. Moreover, the SOR of 1.2 for Case 2 is an indicator that cyclic steam stimulation will no longer be efficient when this value is compared to the overall historical value of 0.2 for this area.

The predicted reservoir pressure and oil production rate for Case 1 are shown in **Figs. 5.1** and **5.2**. The oil recovery factor is about 14.4%. **Figs. 5.3** and **5.4** present the results of the runs for Case 2, in which the oil recovery factor is 16.2% of OOIP, an incremental of 1.9%.

The simulation results for Case 3 indicate that there is an increase of oil production eight months after the start of steamflooding. Also the production continues increasing until a peak of 1,400 STB/D in August 2003. Moreover, the reservoir is also repressurized. These effects are shown in **Figs. 5.5 and 5.6.**

Case 4 considers four additional horizontal producers: two of them parallel to the horizontal injector LL125 and two orthogonal to it (**Fig. 5.7**). Several runs were made to find the optimum configuration (in terms of length and position of the horizontal section) to give the highest oil production. **Fig. 5.7** presents the optimum pattern. With this optimum pattern, prediction runs were made. Results of simulated reservoir pressure and production profiles are shown in **Figs. 5.8** and **5.9**. **Fig. 5.8** shows that the reservoir pressure remains almost constant at about 700 psia during the prediction period.

Case 5 involves eight vertical producers and the horizontal injector well. The eight vertical wells replace the four horizontal producer wells of Case 4. Several simulations were made to find the best distribution of the wells to yield the highest oil production. This final configuration is shown in **Fig. 5.10**. Vertical wells WELL02, WELL04, WELL06, and WELL08 were completed in the bottom layer (HH) to delay steam break through, while wells WELL01, WELL03, WELL05, and WELL07 (being further away from the injector) are completed across the whole reservoir.

Figs. 5.11 and **5.12** show the prediction for reservoir pressure and oil production. It is observed that the reservoir pressure in this case increases constantly until the end of the prediction period. Also, the maximum oil rate is reached in the year 2007 and is less than that obtained in Case 4. The recovery factors for Case 4 and Case 5 are the same, 53.0% and 53.3% of OOIP, respectively, indicating that the sweep by the four horizontal producers and the eight vertical producers are similar.

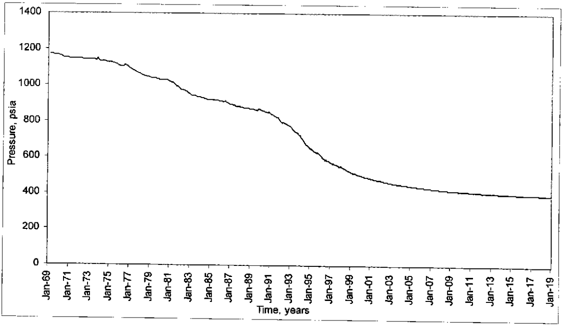

Fig. 5.1 – Area LL125, Case 1 (existing active wells with no further cyclic steam injection): simulated reservoir pressure.

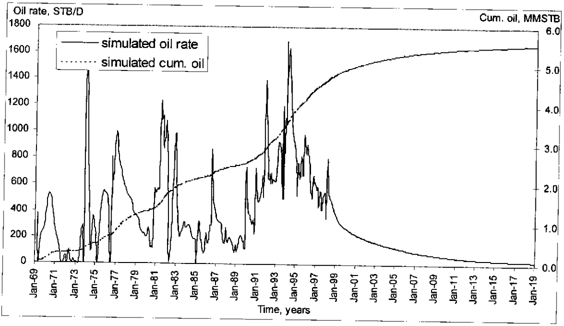

Fig. 5.2 – Area LL125, Case 1 (existing active wells with no further cyclic steam injection): simulated oil production performance.

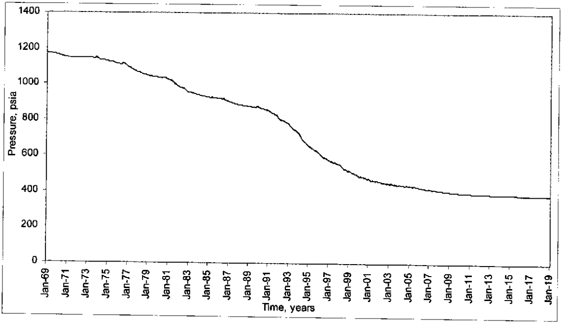

Fig. 5.3 – Area LL125, Case 2 (continuing cyclic steaming in the existing wells): simulated reservoir pressure.

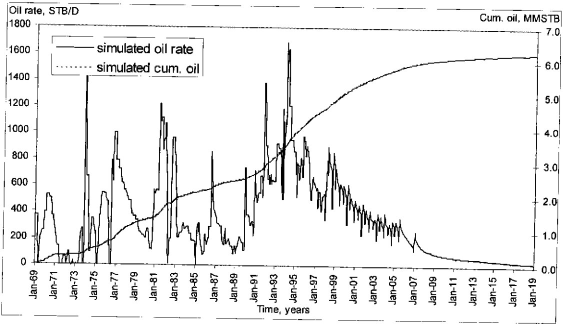

Fig. 5.4 – Area LL125, Case 2 (continuing cyclic steaming in the existing wells): simulated oil production performance.

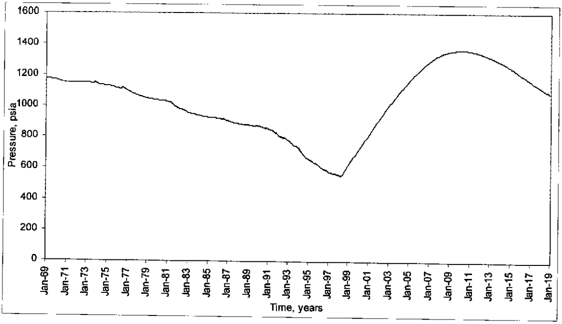

Fig. 5.5 – Area LL125, Case 3 (steamflooding - horizontal well injector, existing vertical producers): simulated reservoir pressure.

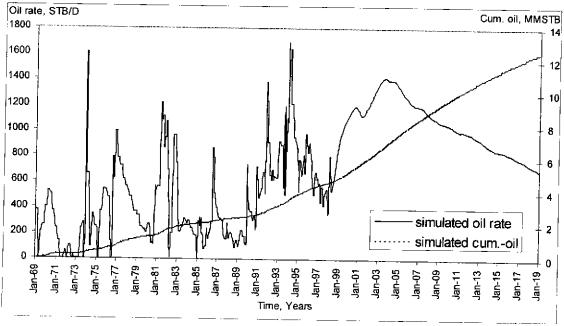

Fig. 5.6 – Area LL125, Case 3 (steamflooding - horizontal well injector, existing vertical producers): simulated oil production performance.

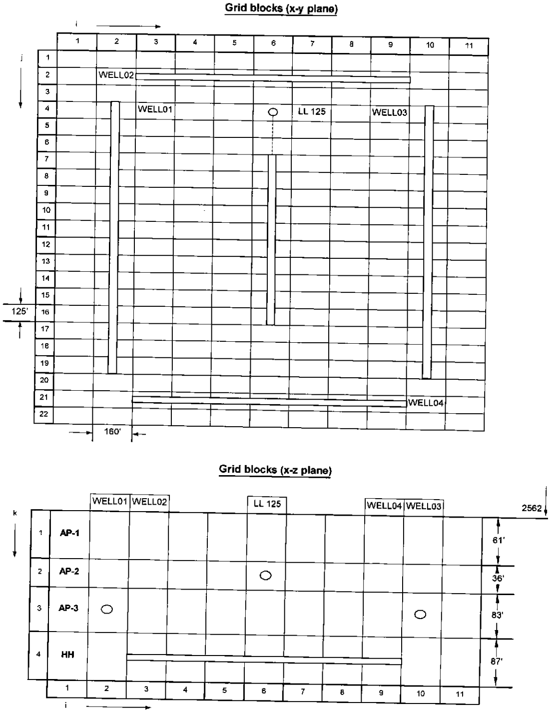

Fig. 5.7 – Area LL125, Case 4 (steamflooding - horizontal well injector, four new horizontal producers): schematic diagrams showing grid dimensions, well locations and completion intervals.

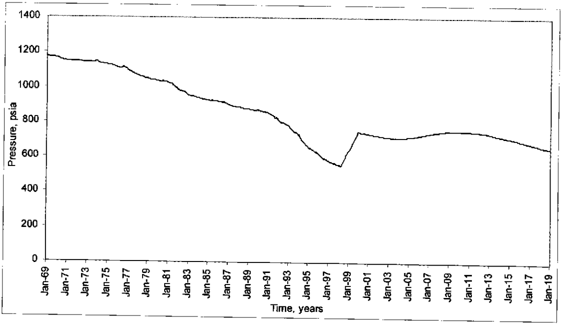

Fig. 5.8 – Area LL125, Case 4 (steamflooding - horizontal well injector, four new horizontal producers): simulated reservoir pressure.

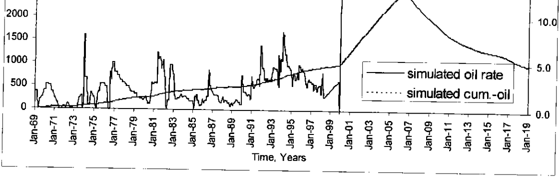

Fig. 5.9 – Area LL125, Case 4 (steamflooding - horizontal well injector, four new horizontal producers): simulated oil production performance.

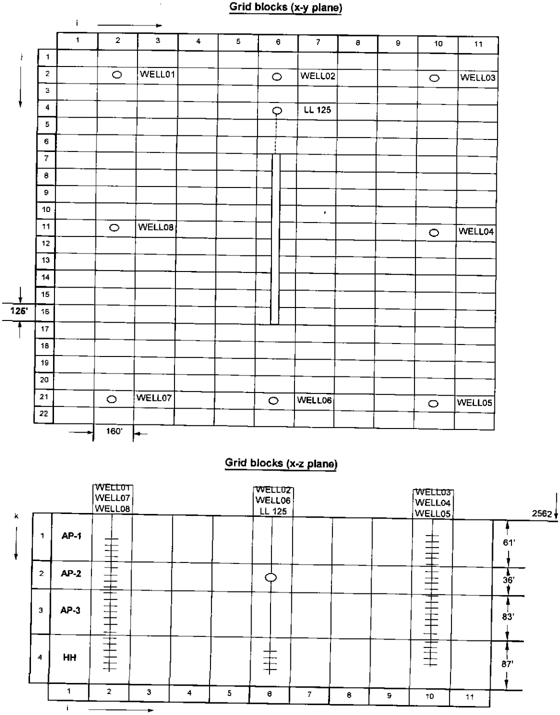

Fig. 5.10 – Area LL125, Case 5 (steamflooding - horizontal well injector, eight new vertical producers): schematic diagrams showing grid dimensions, well locations and completion intervals.

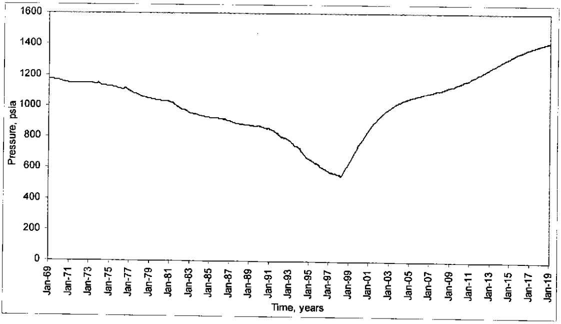

Fig. 5.11 – Area LL125, Case 5 (steamflooding - horizontal well injector, eight new vertical producers): simulated reservoir pressure.

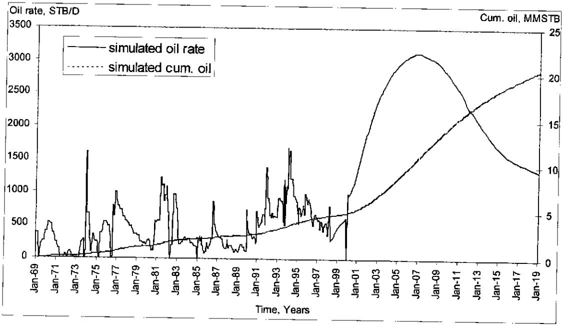

Fig. 5.12 – Area LL125, Case 5 (steamflooding - horizontal well injector, eight new vertical producers): simulated oil production performance.

5.3 Area LL3343

The location of the horizontal well LL3343 and the existing vertical wells do not permit the addition of horizontal producer parallels to well LL3343. The following cases were therefore considered for this area:

1. Case 1: production of existing active well with no further cyclic steam injection.
2. Case 2: continuing cyclic steaming in the existing active wells until a cumulative of 10 cycles for each well.
3. Case 3: steamflooding with the horizontal well as injector and the existing active vertical wells as producers.
4. Case 4: work over the inactive well LL2366, drill new vertical producer wells around the horizontal well, and cyclic steam all wells.
5. Case 5: steamflooding with the horizontal well as injector surrounded by vertical existing, new and workover wells.

Well flowing bottom hole pressure were set to 475 psia for vertical wells, and to 600 psia for horizontal wells. **Table 5.2** shows the results corresponding to the simulations of this area.

Table 5.2 - Area LL3343 prediction results

	Final recovery factor, % OOIP	Incremental recovery, % OOIP	SOR, BCWE/STB
Case 1	10.9	0.0	---
Case 2	12.0	1.1	1.9
Case 3	26.1	15.2	2.2
Case 4	14.9	4.0	1.5
Case 5	38.0	27.1	2.1

The results for Case 1 are shown in **Figs. 5.13** and **5.14.** In this case the oil recovery factor is about 10.9% of OOIP. **Figs. 5.15** and **5.16** give the simulated behavior for the reservoir pressure and production profile, respectively, for Case 2.

It can be seen from the results of Case 2 and Case 4 (cyclic steam scheme) that there is a substantial increase in the SOR (1.9 and 1.5, respectively) considering that the historical average is 0.42. Also, steamflooding process gives better oil cumulative production but also a good value of SOR.

Figs. 5.17 and **5.18** present the results for Case 3. The reservoir pressure increases sharply in the next five years to about 1,360 psia that is thereafter maintained. Furthermore, the production rate increases up to a peak of 1,170 STB/D in 2008. Steam breakthrough is not observed in the prediction period because the reservoir pressure is relatively high and therefore the injection rate is low.

Case 4 involves two new vertical wells (WELL01 and WELL02) and a worked over producer (well LL2366) which has been closed due to sand production. Location and completion of these wells are shown in **Fig. 5.19. Figs. 5.20** and **5.21** present the results of the prediction runs for reservoir pressure and oil production.

Case 5 is similar to Case 4 except that the new wells WELL01, WELL02, and well LL2366 are completed in layer HH to avoid early steam breakthrough and to improve the economics of the project. **Figs. 5.22** and **5.23** show the simulated behavior of the reservoir pressure and oil production rate for this case.

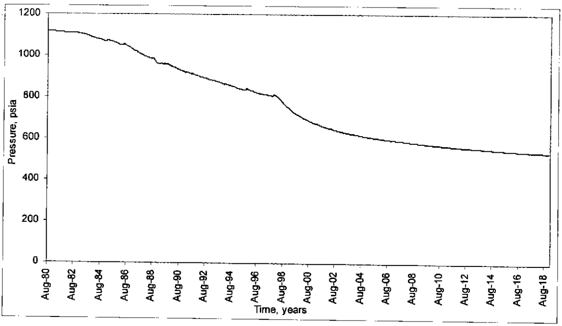

Fig. 5.13 – Area LL3343, Case 1 (existing active wells with no further cyclic steam injection): simulated reservoir pressure.

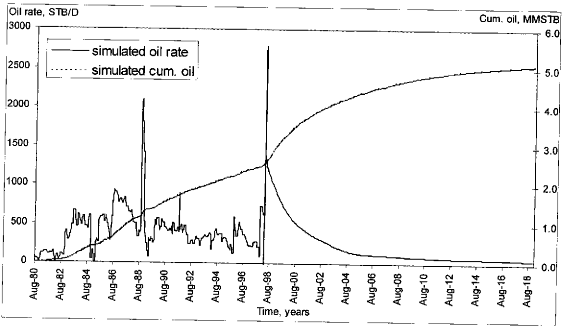

Fig. 5.14 – Area LL3343, Case 1 (existing active wells with no further cyclic steam injection): simulated oil production performance.

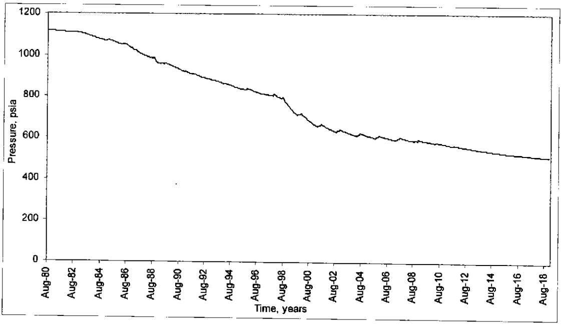

Fig. 5.15 – Area LL3343, Case 2 (continuing cyclic steaming in the existing active wells): simulated reservoir pressure.

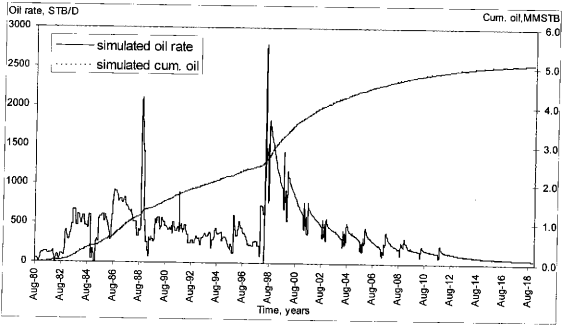

Fig. 5.16 – Area LL3343, Case 2 (continuing cyclic steaming in the existing active wells): simulated oil production performance.

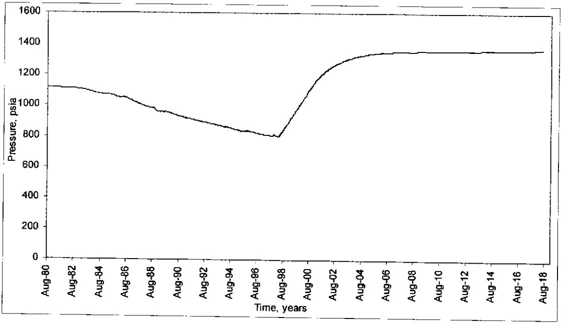

Fig. 5.17 – Area LL3343, Case 3 (steamflooding – horizontal well injector, existing active vertical producers): simulated reservoir pressure.

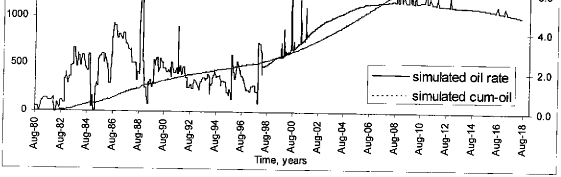

Fig. 5.18 – Area LL3343, Case 3 (steamflooding – horizontal well injector, existing active vertical producers): simulated oil production performance.

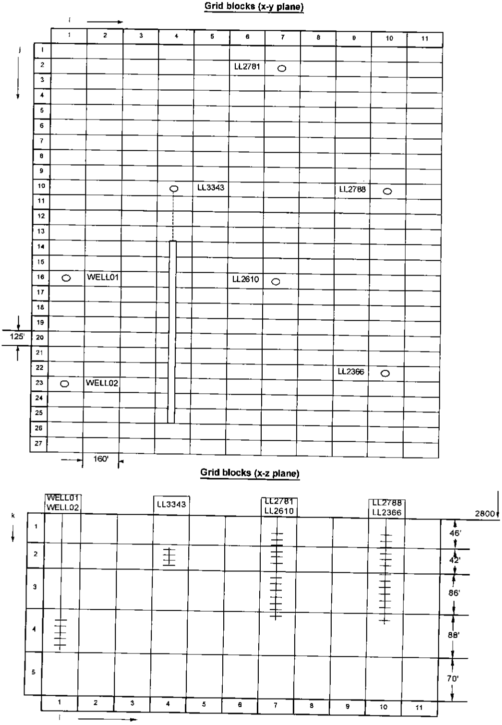

Fig. 5.19 – Area LL3343, Case 4 (cyclic steaming - horizontal well producer, existing and two new vertical producers): schematic diagrams showing grid dimensions, well locations and completion intervals.

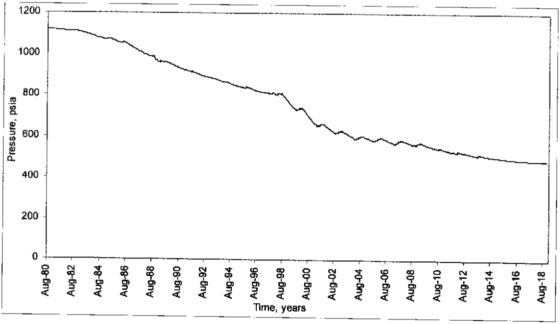

Fig. 5.20 – Area LL3343, Case 4 (cyclic steaming - horizontal well producer, existing and two new vertical producers): simulated reservoir pressure.

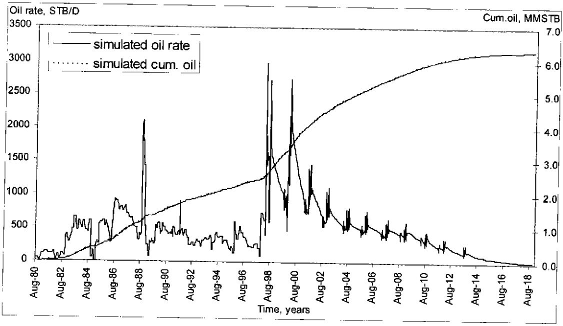

Fig. 5.21 – Area LL3343, Case 4 (cyclic steaming - horizontal well producer, existing and two new vertical producers): simulated oil production performance.

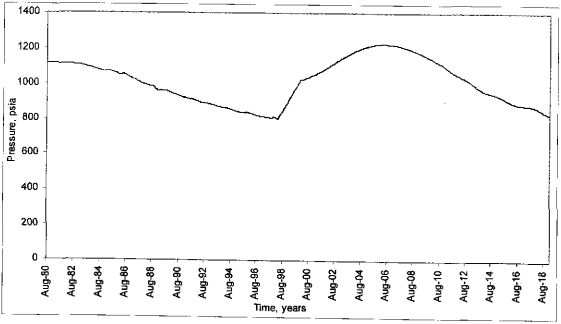

Fig. 5.22 – Area LL3343, Case 5 (steamflooding - horizontal well injector, existing and two new vertical producers): simulated reservoir pressure.

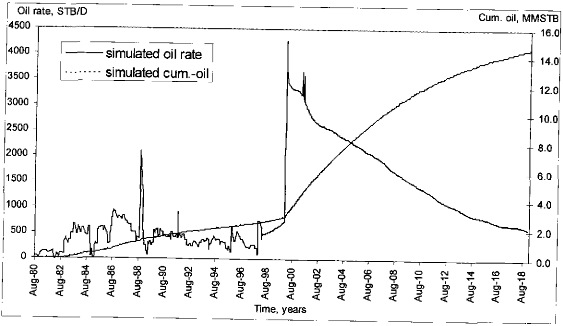

Fig. 5.23 – Area LL3343, Case 5 (steamflooding - horizontal well injector, existing and two new vertical producers): simulated oil production performance.

5.4 Area LL3487

In this area the following cases were studied:

1. Case 1: production of existing active well with no further cyclic steam injection.
2. Case 2: continuing cyclic steaming in the existing active wells until a cumulative of 10 cycles for each well.
3. Case 3: steamflooding with the horizontal well as injector and the existing active vertical wells as producers.
4. Case 4: cyclic steam all wells including worked over wells that have been closed due to sand problems.
5. Case 5: steamflooding with the horizontal well as injector and all vertical producers.
6. Case 6: steamflooding with the horizontal well as injector and four new horizontal producer wells.
7. Case 7: steamflooding with the horizontal well as injector surrounded by eight new vertical producers.

For this area, the well flowing bottom hole pressures were set at 475 psia for vertical wells and 600 psia for horizontal wells. **Table 5.3** shows the results for all the simulation cases studied.

It is observed that steamflooding not only increases the oil recovery factor but also improves the SOR to values that are as good as that for cyclic steam injection. Moreover, in Case 2, with continued cyclic steaming, the overall SOR indicator increases from 0.3 to 1.8.

Figs. 5.24 and **5.25** present the simulation results in terms of simulated reservoir pressure and predicted oil rate production for Case 1, where there is no further cyclic steam injection. **Figs. 5.26** and **5.27** give the results for Case 2 (cyclic steaming the existing wells)

Table 5.3 - Area LL3487 prediction results

	Final recovery factor, percentage	Incremental Recovery, % OOIP	SOR, BCWE/STB
Case 1	11.1	0.0	---
Case 2	12.9	1.8	1.8
Case 3	23.0	11.9	4.8
Case 4	13.9	2.8	2.0
Case 5	32.1	21.0	2.4
Case 6	42.3	31.2	1.9
Case 7	40.7	29.6	1.6

In Case 3 where only the active vertical wells are considered, there is early steam breakthrough in well LL2527, which is closer to the horizontal injector. **Figs. 5.28** and **5.29** show the simulated results of reservoir pressure and oil production for Case 3.

In Case 4 (cyclic steaming) and Case 5 (steamflooding) consider all the vertical wells as producer. These include working over wells LL36 and LL112 which were closed due to sand problems. Also, to delay steam breakthrough into well LL2527, this well was closed in during steamflooding and kept open during cyclic steam injection. The recovery factor (32.1%) for steamflooding is double that for cyclic steam (13.9%). SOR in both cases are about the same, 2.0 - 2.4. **Figs. 5.30** and **5.31** present the results for Case 5.

In Case 6 and Case 7 new producers around the horizontal injector are included. Case 6 involves four new horizontal producers, two of them parallel to the horizontal injector well and two horizontal producers perpendicular to it. Case 7 involves eight new vertical wells around the horizontal injector. **Fig. 5.32** shows the location and completions of the wells in Case 6. **Figs. 5.33** and **5.34** present the results for this case. **Fig. 5.35** presents well locations for Case 7. **Figs. 5.36** and **5.37** present the results for Case 7. In Case 7 the lateral wells were completed in the bottom layer while the corner wells were completed in all layers to improve oil recovery.

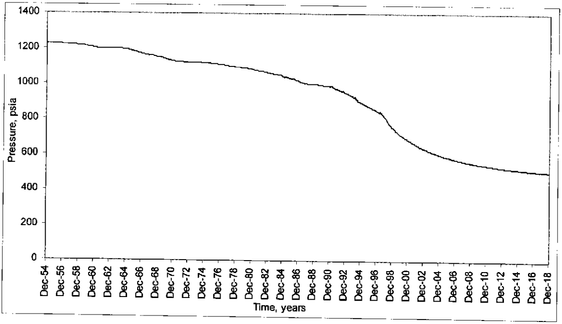

Fig. 5.24 – Area LL3487, Case 1 (existing active wells with no further cyclic steam injection): simulated reservoir pressure.

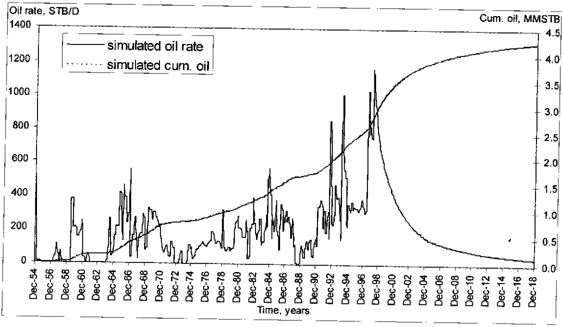

Fig. 5.25 – Area LL3487, Case 1 (existing active wells with no further cyclic steam injection): simulated oil production performance.

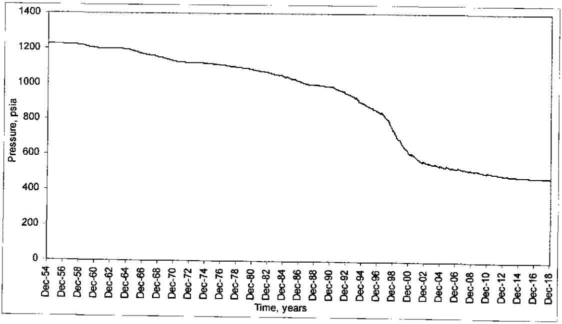

Fig. 5.26 – Area LL3487, Case 2 (continuing cyclic steaming in the existing active wells): simulated reservoir pressure.

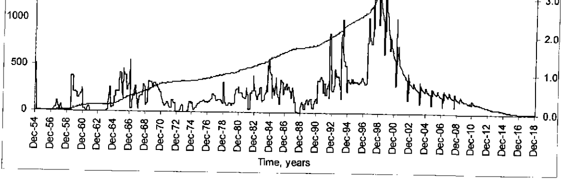

Fig. 5.27 – Area LL3487, Case 2 (continuing cyclic steaming in the existing active wells): simulated oil production performance.

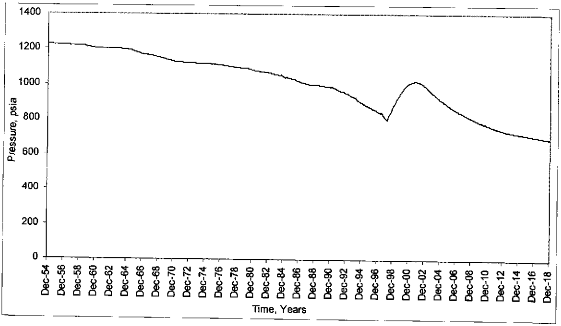

Fig. 5.28 – Area LL3487, Case 3 (steamflooding – horizontal well injector, existing active vertical producers): simulated reservoir pressure.

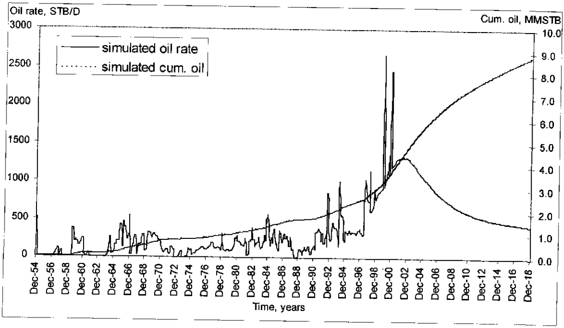

Fig. 5.29 – Area LL3487, Case 3 (steamflooding – horizontal well injector, existing active vertical producers): simulated oil production performance.

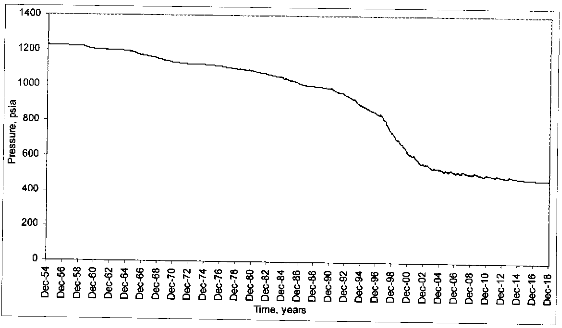

Fig. 5.30 – Area LL3487, Case 4 (cyclic steaming – horizontal well producer, existing active and worked over vertical producers): simulated reservoir pressure.

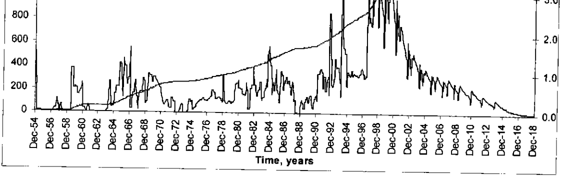

Fig. 5.31 – Area LL3343, Case 4 (cyclic steaming – horizontal well producer, existing active and worked over vertical producers): simulated oil production performance.

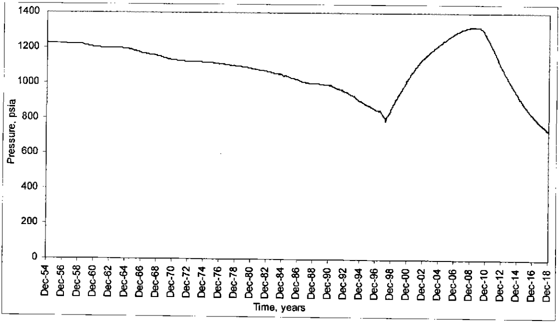

Fig. 5.32 – Area LL3487, Case 5 (steamflooding – horizontal well injector, existing active and worked over vertical producers): simulated reservoir pressure.

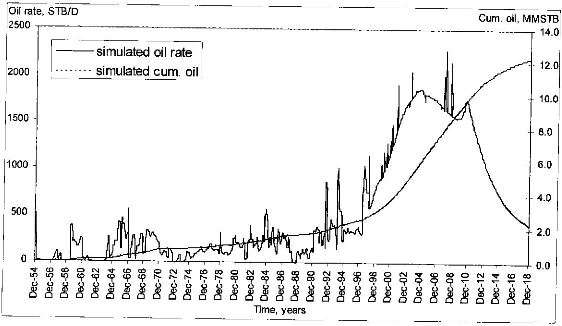

Fig. 5.33 – Area LL3343, Case 5 (steamflooding – horizontal well injector, existing active and worked over vertical producers): simulated oil production performance.

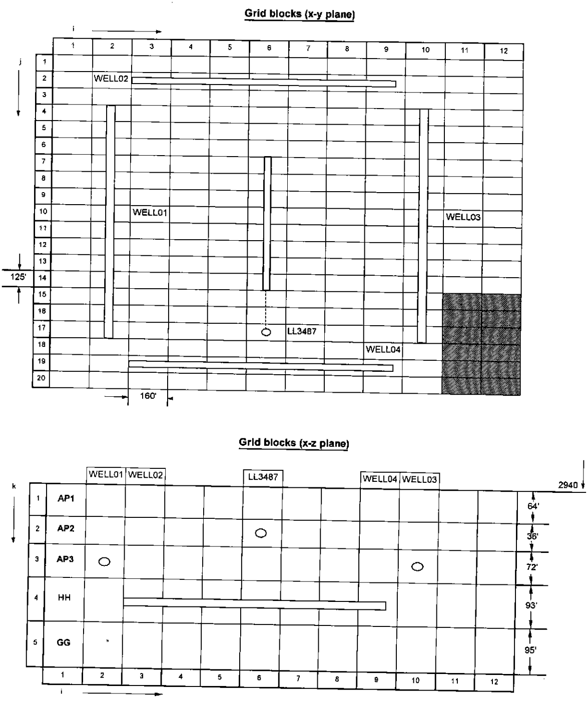

Fig. 5.34 – Area LL3487, Case 6 (steamflooding - horizontal well injector, four new horizontal producers): schematic diagrams showing grid dimensions, well locations and completion intervals.

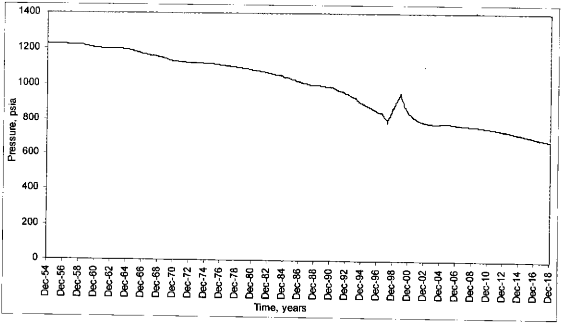

Fig. 5.35 – Area LL3487, Case 6 (steamflooding - horizontal well injector, four new horizontal producers): simulated reservoir pressure.

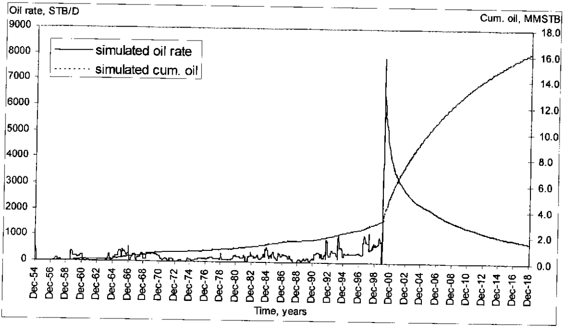

Fig. 5.36 – Area LL3487, Case 6 (steamflooding - horizontal well injector, four new horizontal producers): simulated oil production performance.

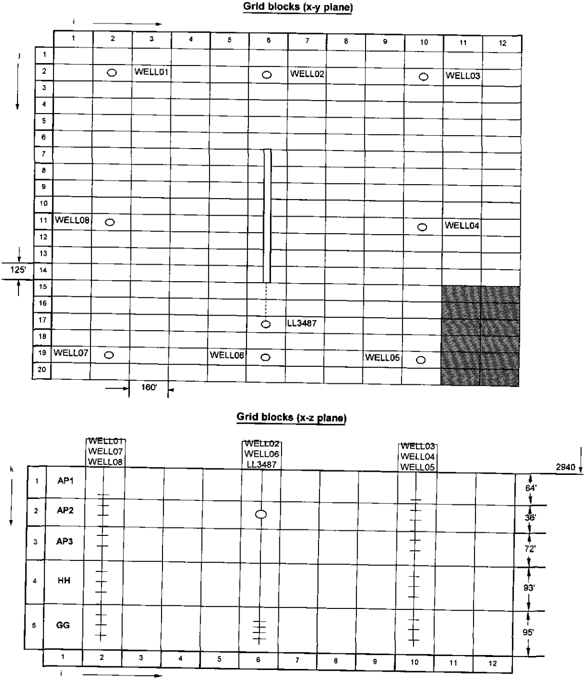

Fig. 5.37 – Area LL3487, Case 7 (steamflooding - horizontal well injector, eight new vertical producers): schematic diagrams showing grid dimensions, well locations and completion intervals.

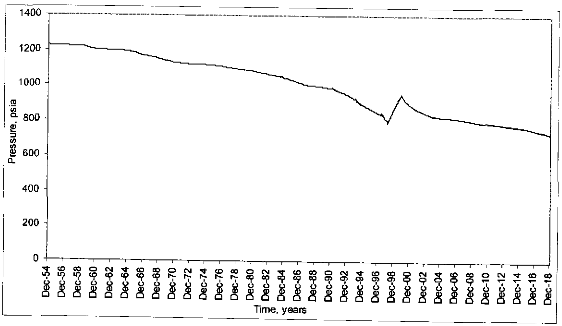

Fig. 5.38 – Area LL3487, Case 7 (steamflooding - horizontal well injector, eight new vertical producers): simulated reservoir pressure.

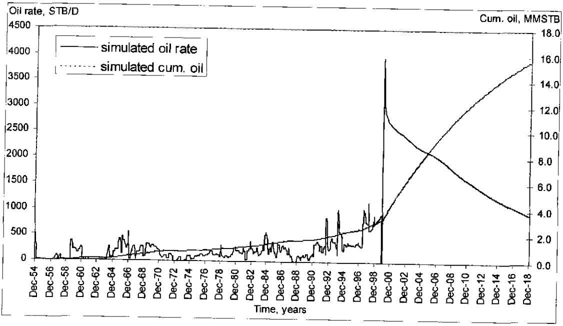

Fig. 5.39 – Area LL3487, Case 7 (steamflooding - horizontal well injector, eight new vertical producers): simulated oil production performance.

CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary

A simulation study has been conducted for three areas of the Bachaquero-01 heavy oil reservoir in Venezuela. Each of these areas contain a recently drilled horizontal well which-like most vertical wells in the field-have been produced under cyclic steam injection.

The main objective of the simulation study is to compare the performance of cyclic steam injection against that of steamflooding. Simulation was conducted using three-phase, two-component oil and thermal compositional option in the numerical simulator, ECLIPSE 500. The three-dimensional Cartesian models used had grid dimensions of 11×22×4, 11×27×5, and 12×20×5

6.2 Conclusions

The following main conclusions can be drawn from the simulation results:

1. For the three areas studied, steamflooding using existing wells increases the oil recovery factor to about twice that under cyclic steam injection at the end of 20 years of production. The oil recovery factor increases from about 12% to 16% of OOIP with cyclic steam injection to about 23% to 33% of OOIP for steamflooding.
2. Continued use of cyclic steam injection not only result in lower oil recovery compared to steamflooding but also result in increasingly less efficient thermal operation with the steam-oil ratio increasing from 0.2 - 0.4 to 1.2 - 1.8.

3. Re-pressurization of Bachaquero-01 reservoir is observed as a result of steamflooding, which contributes to enhancing oil production rates and ultimate recovery.
4. Steamflooding results in an increase of the steam-oil ratio to 2.2 to 4.2 which are economically still excellent values for steamflood projects.
5. When additional vertical wells (new or workovers) or horizontal wells are included as producers, with a horizontal injector in a steamflood scheme, oil recovery factor as high as 53% of OOIP are obtained. This recovery factor is in line with that observed in the largest steamflood project in the world, the Duri field, Indonesia.[31,32] The potential gain with steamflooding (53% OOIP) over cyclic steam injection (about 15% OOIP) for the Bachaquero-01 is large, about 2.7 BSTB.

6.3 Recommendations

Based on the results of this study, the following recommendations are made.

1. Given the very encouraging simulation results for switching from cyclic steam injection to steamflooding for the Bachaquero-01 reservoir, it is recommended to conduct a steamflood pilot test in Area LL125 using existing wells. Area LL125 has been chosen as there is minimum requirement for capital lay out, and because of the rapid increase in oil production expected (less than a year).
2. If the steamflood pilot test in Area LL125 is successful, it is recommended to continue with steamflooding in Area LL125 and to conduct similar pilot tests in the other two areas.
3. Most of the existing 300 vertical well producers on the Bachaquero-01 reservoir has been specifically located in anticipation of future seven-spot steamflood pattern. Based on the results of this study, it is recommended to conduct a study of steamflooding for the whole Bachaquero-01 reservoir particularly in the use of horizontal wells (or sidetracks) as injectors.

NOMENCLATURE

BCWE	Barrel cold water equivalent
F	Formation resistivity factor
h	Formation thickness, ft
IR	Deep-induction resitivity, Ohm-m
k_h	Horizontal permeability, md
k_o	Connate water permeability, md
k_{rg}	Gas relative permeability
k_{ro}	Oil relative permeability
k_{rw}	Water relative permeability
k_v	Vertical permeability, md
l	Length of horizontal section, ft
Np	Cumulative oil production, MSTB
OOIP	Original oil-in-place, BSTB
p_{wf}	Bottom-hole flowing pressure, psia
R_{16}	Shallow resistivity ohm-m,
R^2	Correlation coefficinet
R_t	True resistivity, ohm-m
R_w	Formation water resistivity, ohm-m
R_w	Formation water resistivity, ohm-m
S	Skin factor
SAGD	Steam assisted gravity drive
S_g	Gas Saturation, fraction
S_{gc}	Critical gas saturation, fraction
S_o	Oil saturation, fraction
SOR	Steam-oil ratio, BCWE/STB
SP	Spontaneous potential, mV

S_w	Water saturation, fraction
S_{wi}	Irreducible water saturation
WOC	Water oil contact, ft

Greek Letters

ϕ	Porosity (from core analysis), fraction
ϕ_{core}	Porosity from core analysis, fraction
ϕ_{log}	Log derived porosity, fraction

Subscript

H	Horizontal well
V	Vertical well

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APPENDIX A

THE R_t VERSUS ϕS_o CORRELATION

The scarcity of porosity logs is not a new problem in Bachaquero-01. Consequently in August 1981 a procedure was developed to calculate porosity (ϕ) and oil saturation (S_o) from the information available. The following describes the methodology used by Holbrook and Moretti.[1]

The basic parameter for hydrocarbon pore volume calculations is $\phi S_o h$, where h is the sand thickness. As porosity logs were not available for all the wells, an empirical relationship was developed between resistivity (R_t) and ϕS_o in the wells which had porosity logs. The relationship was then used to calculate the ϕS_o for other wells without porosity logs..

The most common resistivity measurement was with the R_{16}, the shallow investigation tool. The advantage of using this resistivity measurement to estimate ϕS_o was its availability. The disadvantage was the fact that R_{16} values can be adversely affected by invasion of mud filtrate and borehole effects. Therefore, it was considered a trouble to use these values. An alternative was to use R_t data from the deep-induction resistivity curve (*IR*). The advantage of this was its relative freedom from suppression by filtrate invasion. Its disadvantage was that it was available for fewer than 300 of the 750 wells involved.

R_w, formation water resistivity, was one of the key parameters used to develop the correlation. But calculation of R_w from log data requires values for F, the formation resistivity factor.

There was general agreement between the formation resistivity as measured from the core data and the formation resistivity factor estimated using the empirical Humble formula.

A porosity log normalization was needed to improve the correlation coefficient between log R_t and ϕ and between log R_t and log S_w. Five formulas for estimating S_w were tested for accuracy and precision using the available statistical software. The Archie and Poupon methods gave the best result, with essentially equal correlation coefficient. The Archie method was selected due to its simplicity for calculation.

Using log normalization and the Archie equation with core data, the correlation between log R_t and log S_w (Archie method) increased the correlation coefficient to 0.994.

The Archie formula used was:

$$S_w = \left(\frac{1}{2R_t\phi^{1.72}}\right)^{1/2} \quad \text{.......... A-1}$$

A cementation factor of 1.72 was selected which is within the normal range for unconsolidated sands.

Finally, from least-squares-fit, the following relationship was obtained.

$$\log_{10} = -1.8227\log_{10} S_w + 0.64019 \quad \text{.......... A-2}$$

Solving for S_w, Eq. A-2 can be expressed as:

$$Sw = \left(\frac{10^{0.064019}}{R_t}\right)^{1/1.8227} \quad \text{.......... A-3}$$

Using Eq. A-3 to calculated S_w, S_o was then calculate as follows:

$$S_o = 1 - S_w \quad \text{.......... A-4}$$

In the procedure a new plot of R_t vs. ϕS_o was made, yielding the equation:

$$\phi = \frac{[\log_{10}(0.15R_t)]^{1/2} - 0.07196}{3.6278S_o} \quad \text{.......... A-5}$$

APPENDIX B

AREA LL125 – SIMULATOR IMPUT DATA

History Matching

```
-- AREA LL 125 - WELL LL 125
-- 3D CYCLI STEAM INYECTION

RUNSPEC ========================

LIVEOIL
DIMENS
--  NX  NY  NZ
    11  22   4 /
HWELLS
WELLDIMS
20 60 /
TABDIMS
4   6*   4/
WATER
OIL
GAS
FIELD
COMPS
2 /
START
31 'DEC' 1968 /
ROCKDIMS
2 /
THERMAL
FULLIMP

GRID
====================================

INIT
EQUALS
'DX'     160 /
'DY'     125 /
'DZ'      61 1 11 1 22 1 1 /
'DZ'      36 1 11 1 22 2 2 /
'DZ'      83 1 11 1 22 3 3 /
'DZ'      87 1 11 1 22 4 4 /
/
TOPS
242*2562 /
PERMX
 242*500
 242*1336
 242*1547
 242*2030
/
PERMY
 242*500
 242*1336
 242*1547
 242*2030
/
--  kv/kh = as function of each layer
PERMZ
 242*500
 242*400
 242*780
 242*610
/
PORO
 242*0.28
 242*0.34
 242*0.32
 242*0.23
/
THCONR
968*26.4 /
HEATCR
968*32.7 /
CARFIN
--NAME  xi xf yi yf zi zf nx ny nz
RLL125  6   6  4  4  1  3  5   5 3 /
CARFIN
--NAME  xi xf yi yf zi zf nx ny nz
RLL2296  4   4 20 20  1  3  5  5  3 /
CARFIN
--NAME  xi xf yi yf zi zf nx ny nz
RLL240  4  3  3 11  11 1  3 5  5  3 /
CARFIN
--NAME  xi xf yi yf zi zf nx ny nz
RLL2435 9  9  16  16  1  3  5  5  3 /
CARFIN
--NAME  xi xf yi yf zi zf nx ny nz
RLL3178 10  10  12  12  1  4  5  5  4 /
CARFIN
--NAME      xi xf yi yf zi zf nx ny     nz
RLL125H      6  6   6 17   2  2  5  36  3 /
--CARFIN
--NAME      xi   xf yi yf zi zf nx ny    nz
--RHORIZ1     2  2   3 20   3  3    5  54     3 /
--CARFIN
--NAME      xi  xf  yi  yf  zi  zf    nx  ny  nz
--RHORIZ2     2  10   2   2   4     4  45  3   3 /
--CARFIN
--NAME      xi  xf  yi  yf  zi  zf  nx  ny  nz
--RHORIZ3    10  10   3  20   3  3  5  54  3  /
--CARFIN
--NAME      xi  xf  yi  yf  zi  zf  nx  ny  nz
--RHORIZ4     2  10   21  21   4    4  45  3   3 /
--CARFIN
--NAME      xi  xf  yi  yf  zi  zf    nx  ny   nz
--WELL1       2  2   2    2   1  4   5  3  4  /
--CARFIN
--NAME      xi  xf  yi  yf  zi  zf    nx  ny  nz
--WELL2       6  6   2  2   4  4  5    3  3  /
```

```
--CARFIN
--NAME      xi xf yi yf zi zf nx ny nz
--WELL3       10 10  2 2  1 4  5 3 4 /
--CARFIN
--NAME      xi xf yi yf zi zf nx ny    nz
--WELL4       10 10  11 11  4  4 5 3   3 /
--CARFIN
--NAME      xi xf yi yf zi zf nx ny nz
--WELL5       10 10 21  21  1   4 5 3   4 /
--CARFIN
--NAME      xi xf yi yf zi zf nx ny     nz
--WELL6       6 6 21 21  4 4 5 3 3 /
--CARFIN
--NAME      xi xf yi yf zi zf nx ny nz
--WELL7       2 2 21 21  1 4 5 3 4 /
--CARFIN
--NAME      xi xf yi yf zi zf nx ny nz
--WELL8       2 2 11 11  4 4 5 3 3 /
ENDFIN
ROCKPROP
  1  123  24  36  0  /
  2  123  24  36  0  /
/
ROCKCON
  1  1  11  1 22  1  1  'K-'  /  top
  2  1  11  1 22  4  4  'K+'  /  bottom
/

PROPS        ========================

NCOMPS
2 /
KVWI
HEATVAP
219  88.0 /
CNAMES
SGAS HEAVY /
TCRIT
343 1673 /
PCRIT
667. 121. /
ZCRIT
0.286  0.20137 /
ACF
0.013 0.964 /
BIC
0.0502 /
MW
16 460 /
TBOIL
201  1394 /
TREF
201  519.67 /
CREF
1* .00001 /
DREF
26 60 /
THERMEX1
0.0005     0.00204 /
TCRITW
1165.14 /

PCRITW
3208.2356 /
THANALB
SPECHA
.55 .55 /
```

```
TEMPVD
-- Dep  Temp
  2562 123
  2824 123 /
STCOND
60 14.7 /
-- Krw Original / 40
SWOF
-- INTERVAL AP1
--Sw    krw      krow     Pcow
0.40    0.00000 1.00      0
0.45    0.00008 0.75      0
0.50    0.00016 0.55      0
0.55    0.0003  0.40      0
0.60    0.0004  0.30      0
0.65    0.0008  0.20      0
0.70    0.0011  0.12      0
0.75     0.0013  0.03      0
0.80     0.0014  0.00      0 /
-- INTERVAL AP2
--Sw    krw      krow            Pcow
0.20    0.0000      1.00          0
0.25     0.000008  0.95           0
0.30     0.000016  0.90           0
0.35     0.000024  0.85           0
0.40     0.000032  0.80           0
0.45    0.00004   0.7500          0
0.50    0.00019   0.6000          0
0.55    0.00025   0.4000          0
0.60    0.00045   0.3000          0
0.65    0.00070   0.1900          0
0.70    0.00093   0.1100          0
0.75    0.0010    0.0000          0 /
-- INTERVAL AP3
--Sw    krw      krow    Pcow
0.30    0.00000 1.0000  0
0.35    0.00001 0.92    0
0.40     0.00002 0.83     0
0.45    0.00004 0.7500  0
0.50    0.00019 0.6000  0
0.55    0.00025 0.4000  0
0.60    0.00045 0.3000  0
0.65    0.00070 0.1900  0
0.70    0.00093 0.1100  0
0.75    0.0010  0.0000  0 /
-- INTERVAL HH
--Sw    krw      krow    Pcow
0.40    0.0000   1.00    0
0.45    0.00004 0.7500  0
0.50    0.00019 0.6000  0
0.55    0.00025 0.4000  0
0.60    0.00045 0.3000  0
0.65    0.00070 0.1900  0
0.70    0.00093 0.1100  0
0.75    0.0010  0.0000  0   /
SGOF
-- INTERVAL AP1
--Sg    krg      krog      Pcog
0.00    0.000    1.00000   0
0.03    0.000    1.00000   0
0.045   0.009    0.65000   0
0.10    0.028    0.40000   0
0.15    0.070    0.25000   0
0.20    0.120    0.13000   0
0.25    0.170    0.08500   0
0.30    0.240    0.04500   0
0.35    0.310    0.02300   0
```

```
0.40    0.380   0.01000   0
0.45    0.450   0.00430   0
0.50    0.500   0.00230   0
0.55    0.570   0.00120   0
0.57    0.578   0.00116   0
0.60    0.613   0.00080   0
0.65    0.672   0.00043   0
0.70    1.000   0.00000   0 /
-- INTERVAL AP2
--Sg    krg     krog      Pcog
0.00    0.000   1.0000    0
0.03    0.000   0.7500    0
0.05    0.010   0.7500    0
0.10    0.050   0.6000    0
0.15    0.065   0.4000    0
0.20    0.110   0.2500    0
0.25    0.180   0.1500    0
0.30    0.230   0.0900    0
0.35    0.310   0.0450    0
0.40    0.400   0.0250    0
0.45    0.500   0.0130    0
0.50    0.600   0.0065    0
0.55    0.700   0.0030    0
0.57    0.750   0.0023    0
0.60    0.800   0.0018    0
0.80    1.000    0.0000     0 /
-- INTERVAL AP3
--Sg    krg     krog       Pcog
0.00    0.000   1.0000     0
0.03    0.000   1.0000     0
0.05    0.010   0.7500     0
0.10    0.050   0.6000     0
0.15    0.065   0.4000     0
0.20    0.110   0.2500     0
0.25    0.180   0.1500     0
0.30    0.230   0.0900     0
0.35    0.310   0.0450     0
0.40    0.400   0.0250     0
0.45    0.500   0.0130     0
0.50    0.600   0.0065     0
0.55    0.700   0.0030     0
0.57    0.750   0.0023     0
0.60    0.800   0.0018     0
0.75    1.000    0.0000     0 /
-- INTERVAL HH
--Sg    krg     krog       Pcog
0.00    0.000   1.0000     0
0.03    0.000   1.0000     0
0.05    0.010   0.7500     0
0.10    0.050   0.6000     0
0.15    0.065   0.4000     0
0.20    0.110   0.2500     0
0.25    0.180   0.1500     0
0.30    0.230   0.0900     0
0.35    0.310   0.0450     0
0.40    0.400   0.0250     0
0.45    0.500   0.0130     0
0.50    0.600   0.0065     0
0.55    0.700   0.0030     0
0.57    0.750   0.0023     0
0.60    0.800   0.0018     0
0.75    1.000    0.0000     0 /
GASVISCT
128      0.0155  0.0315
160      0.0161  0.0331
190      0.0167  0.0346
220      0.0173  0.0361
250      0.0179  0.0376
280      0.0185  0.0391
310      0.0191  0.0406
340      0.0197  0.0421
370      0.0203  0.0436
400      0.0209  0.0451
430      0.0215  0.0466
460      0.0221  0.0481
490      0.0227  0.0496
520      0.0233  0.0511 /
OILVISCT
--Temp    Visc
128      0.1952  635
160      0.1912  351.74
190      0.1881  86.2
220      0.1855  66.29
250      0.1832  46.36
280      0.1811  26.42
310      0.1793  12.68
340      0.1776  11.42
370      0.1761  10.17
400      0.1747  8.91
430      0.1734  7.66
460      0.1722  6.41
490      0.1711  5.15
520      0.1700  3.9 /
OILCOMPR
-- Compr      Oil Expa.     Oil Expa. Squa
10.14E-06    7.07E-05      5.0E-09 /
PVTW
-- Pref           Bw        Cw        Vw        Cvw
-- PSIA           RB/STB    1/PSI     CPOISE
1/PSI
   1319          1.012     3.1E-06 0.3
7.0E-09 /
ROCK
1370  120.0E-06 /
ZMFVD
2562    0.3      0.7 /

SOLUTION  ===============================

EQUIL
-- Ddat  Pdat     Dwoc      Pcow      Dgoc
Pcog
2592  1133     5020      0.0       2592      0.0
      1        1         0         1 /
DATUM
2700 /
OUTSOL
RESTART PRES      TEMP      SOIL   SWAT   SGAS
XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  =========================

SATNUM
242*1
242*2
242*3
242*4 /

SUMMARY ================================
```

```
FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WOPR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WLPR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WOPRH
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WTEMP
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WGOR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WWCT
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
/
WBHP
'LL125I' 'LL125HI' 'LL2296I' 'LL2404I'
'LL2435I' 'LL3178I' /
DATE
RUNSUM
RPTONLY

SCHEDULE  ==============================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1    90 75 /
/
WELSPECL
LL125I  FIELD     RLL125    3 3   2700 /
LL125P  FIELD     RLL125    3 3   2700 /
LL2296I FIELD     RLL2296 3     3         2700 /
LL2296P FIELD     RLL2296 3     3         2700 /
LL2404I FIELD     RLL2404 3     3         2700 /
LL2404P FIELD     RLL2404 3     3         2700 /
LL2435I FIELD     RLL2435 3     3         2700 /
LL2435P FIELD     RLL2435 3     3         2700 /
LL3178I FIELD     RLL3178 3     3         2700 /
LL3178P FIELD     RLL3178 3     3         2700 /
LL125HI FIELD     RLL125H 3     4         2700 /
```

```
LL125HP FIELD    RLL125H 3       4    2700 /
/
COMPDATL
LL125I  RLL125  3      3       1      1
        3*     0.6    3779 /  -- layer ap1
LL125I  RLL125  3      3       2      2
        3*     0.6 /          -- layer ap2
LL125I  RLL125  3      3       3      3
        3*     0.6  134909 /  -- layer ap1
LL125P  RLL125  3      3       1      1
        3*     0.6    3779 /  -- layer ap1
LL125P  RLL125  3      3       2      2
        3*     0.6 /          -- layer ap2
LL125P  RLL125  3      3       3      3
        3*     0.6  134909 /  -- layer ap1
LL2296I RLL2296        3       3      1
  \     3      3*     0.6 /
LL2296P RLL2296        3       3      1
        3      3*     0.6 /
LL2404I RLL2404        3       3      1 1
        3*     0.6   19083 / -- layer ap1
LL2404I RLL2404        3       3      2
        2      3*     0.6 / -- layer ap2
LL2404I RLL2404        3       3      3 3
        3*     0.6  137276 /  -- layer ap3
LL2404P RLL2404        3       3      1 1
        3*     0.6   19083 /  -- layer ap1
LL2404P RLL2404        3       3      2 2
        3*     0.6 /          -- layer ap2
LL2404P RLL2404        3       3      3 3
        3*     0.6  137276 /  -- layer ap3
LL2435I RLL2435        3       3      1 3
3*     0.6 /          -- layer ap1 - ap3
LL2435P RLL2435        3       3      1 3
3*     0.6 /          -- layer ap1 - ap3
LL3178I RLL3178 3      3       1      1
        3*     0.6    5022 /  -- layer ap1
LL3178I RLL3178 3      3       2      2
3*     0.6   24000 /  -- layer ap2
LL3178I RLL3178 3      3       3      3
3*     0.6   68000 /  -- layer ap3
LL3178I RLL3178 3      3       4      4
3*     0.6   88000 /  -- layer ap4
LL3178P RLL3178 3      3       1      1
        3*     0.6    5022 /  -- layer ap1
LL3178P RLL3178 3      3       2      2
3*     0.6   24000 /  -- layer ap2
LL3178P RLL3178 3      3       3      3
3*     0.6   68000 /  -- layer ap3
LL3178P RLL3178 3      3       4      4
3*     0.6   88000 /  -- layer ap4
LL125HI RLL125H 3  4  2  2 3* 0.5  3*     'Y' /
LL125HI RLL125H 3  5  2  2 3* 0.5  3*     'Y' /
LL125HI RLL125H 3  6  2  2 3* 0.5  3*     'Y' /
LL125HI RLL125H 3  7  2  2 3* 0.5  3*     'Y' /
LL125HI RLL125H 3  8  2  2 3* 0.5  3*     'Y' /
LL125HI RLL125H 3  9  2  2 3* 0.5  3*     'Y' /
LL125HI RLL125H 3  10  2  2 3* 0.5 3*     'Y' /
LL125HI RLL125H 3  11  2  2 3* 0.5 3*     'Y' /
LL125HI RLL125H 3  12  2  2 3* 0.5 3*     'Y' /
LL125HI RLL125H 3  13  2  2 3* 0.5 3*     'Y' /
LL125HI RLL125H 3  14  2  2 3* 0.5 3*     'Y' /
LL125HI RLL125H 3  15  2  2 3* 0.5 3*     'Y' /
LL125HI RLL125H 3  16  2  2 3* 0.5 3*     'Y' /
LL125HI RLL125H 3  17  2  2 3* 0.5 3*     'Y' /
LL125HI RLL125H 3  18  2  2 3* 0.5 3*     'Y' /
LL125HI RLL125H 3  19  2  2 3* 0.5 3*     'Y' /
```

```
LL125HI RLL125H 3  20  2   2  3*  0.5  3*     'Y'  /
LL125HI RLL125H 3  21  2   2  3*  0.5  3*     'Y'  /
LL125HI RLL125H 3  22  2   2  3*  0.5  3*     'Y'  /
LL125HI RLL125H 3  23  2   2  3*  0.5  3*     'Y'  /
LL125HI RLL125H 3  24  2   2  3*  0.5  3*     'Y'  /
LL125HI RLL125H 3  25  2   2  3*  0.5  3*     'Y'  /
LL125HI RLL125H 3  26  2   2  3*  0.5  3*     'Y'  /
LL125HI RLL125H 3  27  2   2  3*  0.5  3*     'Y'  /
LL125HI RLL125H 3  28  2   2  3*  0.5  3*     'Y'  /
LL125HI RLL125H 3  29  2   2  3*  0.5  3*     'Y'  /
LL125HI RLL125H 3  30  2   2  3*  0.5  3*     'Y'  /
LL125HI  RLL125H  3  31  2  2  3*  0.5  3*    'Y'  /
LL125HI RLL125H 3  32  2   2   3*  0.5  3*    'Y'  /
LL125HI RLL125H 3  33  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  4  2  2 3*  0.5   3*       'Y'  /
LL125HP RLL125H 3  5  2  2 3*  0.5   3*       'Y'  /
LL125HP RLL125H 3  6  2  2 3*  0.5   3*       'Y'  /
LL125HP RLL125H 3  7  2  2 3*  0.5   3*       'Y'  /
LL125HP RLL125H 3  8  2  2 3*  0.5   3*       'Y'  /
LL125HP RLL125H 3  9  2  2 3*  0.5   3*       'Y'  /
LL125HP RLL125H 3  10  2  2  3*  0.5  3*      'Y'  /
LL125HP RLL125H 3  11  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  12  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  13  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  14  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  15  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  16  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  17  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  18  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  19  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  20  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  21  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  22  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  23  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  24  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  25  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  26  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  27  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  28  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  29  2   2  3*  0.5  3*     'Y'  /
LL125HP RLL125H 3  30  2   2  3*  0.5  3*     'Y'  /
LL125HP  RLL125H  3  31  2  2  3*  0.5  3*    'Y'  /
LL125HP RLL125H 3  32  2   2   3*  0.5  3*    'Y'  /
LL125HP RLL125H 3  33  2   2  3*  0.5  3*     'Y'  /
/
TSCRIT
2*  92  /
-- ================== YEAR 1969
WCONHIST
'LL125P'        'OPEN'  'ORAT'   373  /
/
TSTEP
90  /
WCONHIST
'LL125P'        'STOP'  'ORAT'     0  /
/
TSTEP
30  /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  207  /
/
TSTEP
92  /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  259    /
/
TSTEP
92  /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  398    /
/
TSTEP
92  /
-- ================== YEAR 1970
WCONHIST
'LL125P'        'OPEN'  'ORAT'  526    /
/
TSTEP
89  /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  500  /
/
TSTEP
92  /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  369     /
/
TSTEP
92  /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  233     /
/
TSTEP
92  /
-- ================== YEAR 1971
WCONHIST
'LL125P'        'OPEN'  'ORAT'  137  /
/
TSTEP
89  /
WCONHIST
'LL125P'        'STOP'  'ORAT'  0  /
/
TSTEP
92  /
WCONHIST
'LL125P'        'STOP'  'ORAT'  0  /
/
TSTEP
61  /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  58   /
/
TSTEP
92  /
-- ================== YEAR 1972
WCONHIST
'LL125P'        'OPEN'  'ORAT'  39  /
/
TSTEP
31  /
WCONHIST
'LL125P'        'STOP'  'ORAT'  0  /
/
TSTEP
29  /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  99  /
/
TSTEP
92  /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  33  /
/
```

```
TSTEP
30 /
WCONHIST
'LL125P'        'STOP'  'ORAT'   0 /
/
TSTEP
62 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  29 /
/
TSTEP
30 /
WCONHIST
'LL125P'        'STOP'  'ORAT'  0/
/
TSTEP
92 /
- ================== YEAR 1973
WCONHIST
'LL125P'        'OPEN'  'ORAT'   5 /
/
TSTEP
31 /
WCONHIST
'LL125P'        'STOP'  'ORAT'  0 /
/
TSTEP
89 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  233 /
/
TSTEP
92 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  276 /
/
TSTEP
61 /
WELLSHUT
LL125P /
/
WELLINJE
LL125I  WA  1*  WA  1*  2031  1*  1*  12*
0.75  580  /
/
TSTEP
30 /  -- INJECTION
WELLSHUT
LL125I /
/
TSTEP
 9 / -- SOAK
WCONHIST
'LL125P'        'OPEN'  'ORAT'  100 /
/
TSTEP
22 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  1609 /
/
TSTEP
31 /
- ================== YEAR 1974
WCONHIST
'LL125P'        'OPEN'  'ORAT'  664/
/
TSTEP
90 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  98 /
/
TSTEP
91 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  351 /
/
TSTEP
92 /

WCONHIST
'LL125P'        'OPEN'  'ORAT'  248 /
/
TSTEP
92 /
-- ================== YEAR 1975
WCONHIST
'LL125P'        'OPEN'  'ORAT'  200/
/
TSTEP
31 /
WCONHIST
'LL125P'        'STOP'  'ORAT'  0 /
/
TSTEP
59 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  370 /
/
TSTEP
91 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  543/
/
TSTEP
92 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  534 /
/
TSTEP
92 /
-- ================== YEAR 1976
WCONHIST
'LL125P'        'OPEN'  'ORAT'  478 /
/
TSTEP
91 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  138 /
/
TSTEP
61 /
WELLSHUT
LL125P /
/
WELLINJE
LL125I  WA  1*  WA  1*  1888  1*  1*  12*
0.75  580 /
/
TSTEP
 36 /  -- INJECTION
WELLSHUT
LL125I /
/
TSTEP
```

```
15 / -- SOAK

WCONHIST
'LL125P'        'OPEN'  'ORAT'  20 /
/
TSTEP
10 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  788 /
/
TSTEP
31 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  627 /
/
TSTEP
30 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  996 /
/
TSTEP
92 /
-- ================== YEAR 1977
WCONHIST
'LL125P'        'OPEN'  'ORAT'  784 /
/
TSTEP
90 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  720 /
/
TSTEP
91 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  619 /
/
TSTEP
92 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  565/
/
TSTEP
92 /
-- ================== YEAR 1978
WCONHIST
'LL125P'        'OPEN'  'ORAT'  513 /
/
TSTEP
90 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  481 /
/
TSTEP
91 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  383 /
/
TSTEP
92 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  367/
/
TSTEP
92 /
-- ================== YEAR 1979
WCONHIST
'LL125P'        'OPEN'  'ORAT'  339 /
/
TSTEP
90 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  249/
/
TSTEP
91 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  226/
/
TSTEP
92 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  230/
/
TSTEP
31 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  122     /
'LL2296P'       'OPEN'  'ORAT'  84 /
/
TSTEP
61 /
-- ================== YEAR 1980
WCONHIST
'LL125P'        'OPEN'  'ORAT'  120/
'LL2296P'       'OPEN'  'ORAT'  147 /
/
TSTEP
91 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  7/
'LL2296P'       'OPEN'  'ORAT'  180/
/
TSTEP
30 /
WCONHIST
'LL125P'        'STOP'  'ORAT'  0 /
'LL2296P'       'OPEN'  'ORAT'  121 /
/
TSTEP
27 /
WELLSHUT
LL125P /
/
WELLINJE
LL125I  WA  1*  WA  1*  2306  1*  1*  12*
0.75  580 /
/
TSTEP
13 /  -- INJECTION
WELLSHUT
LL125I /
/
TSTEP
6 /  --- SOAK
WCONHIST
'LL125P'        'OPEN'  'ORAT'  1       /
/
TSTEP
15 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  1       /
'LL2296P'       'OPEN'  'ORAT'  126     /
/
TSTEP
```

```
31 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  2 /
'LL2296P'       'OPEN'  'ORAT'  112 /
/
TSTEP
31 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  103 /
'LL2296P'       'OPEN'  'ORAT'  134 /
/
TSTEP
30 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  430/
'LL2296P'       'OPEN'  'ORAT'  136 /
/
TSTEP
31 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  379/
'LL2296P'       'OPEN'  'ORAT'  88 /
'LL2404P'       'OPEN'  'ORAT'  70 /
/
TSTEP
61 /
-- ================== YEAR 1981
WCONHIST
'LL125P'        'OPEN'  'ORAT'  386 /
'LL2296P'       'OPEN'  'ORAT'  54 /
'LL2404P'       'OPEN'  'ORAT'  127 /
/
TSTEP
59 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  413 /
'LL2296P'       'STOP'  'ORAT'  0 /
'LL2404P'       'OPEN'  'ORAT'  147 /
/
TSTEP
31 /
WELLSHUT
LL2296P /
/
WELLINJE
LL2296I  WA  1*  WA  1*  1931  1*  1*  12*
0.75  580 /
/
TSTEP
18 /  -- INJECTION
WELLSHUT
LL2296I /
/
TSTEP
12 /  -- SOAK
WCONHIST
'LL125P'        'OPEN'  'ORAT'  543 /
'LL2296P'       'OPEN'  'ORAT'  467 /
'LL2404P'       'OPEN'  'ORAT'  148 /
'LL2435P'       'OPEN'  'ORAT'  61 /
/
TSTEP
31 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  389 /
'LL2296P'       'OPEN'  'ORAT'  506 /
'LL2404P'       'OPEN'  'ORAT'  132 /
'LL2435P'       'OPEN'  'ORAT'  59 /
/
TSTEP
30 /

WCONHIST
'LL125P'        'OPEN'  'ORAT'  359 /
'LL2296P'       'OPEN'  'ORAT'  523 /
'LL2404P'       'OPEN'  'ORAT'  137 /
'LL2435P'       'OPEN'  'ORAT'  96 /
/
TSTEP
62 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  305 /
'LL2296P'       'OPEN'  'ORAT'  425 /
'LL2404P'       'OPEN'  'ORAT'  139 /
'LL2435P'       'OPEN'  'ORAT'  46 /
/
TSTEP
15 /
WELLSHUT
LL2435P /
/
WELLINJE
LL2435I  WA  1*  WA  1*  2188  1*  1*  12*
0.75  580 /
/
TSTEP
12 /  -- INJECTION
WELLSHUT
LL2435I /
/
TSTEP
8 /  -- SOAK
WCONHIST
'LL2435P'       'OPEN'  'ORAT'  75 /
/
TSTEP
26/
WCONHIST
'LL125P'        'OPEN'  'ORAT'  306 /
'LL2296P'       'OPEN'  'ORAT'  408 /
'LL2404P'       'OPEN'  'ORAT'  145 /
'LL2435P'       'OPEN'  'ORAT'  88 /
/
TSTEP
30 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  292 /
'LL2296P'       'OPEN'  'ORAT'  299 /
'LL2404P'       'OPEN'  'ORAT'  142 /
'LL2435P'       'OPEN'  'ORAT'  341 /
/
TSTEP
31 /
-- ================== YEAR 1982
WCONHIST
'LL125P'        'OPEN'  'ORAT'  176/
'LL2296P'       'OPEN'  'ORAT'  182 /
'LL2404P'       'OPEN'  'ORAT'  86 /
'LL2435P'       'OPEN'  'ORAT'  247 /
/
TSTEP
59 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  43 /
```

```
'LL2296P'     'OPEN'  'ORAT'  54 /
'LL2404P'     'OPEN'  'ORAT'  25 /
'LL2435P'     'OPEN'  'ORAT'  112 /
/

TSTEP
31 /
WCONHIST
'LL125P'      'OPEN'  'ORAT'  2 /
'LL2296P'     'OPEN'  'ORAT'  2 /
'LL2404P'     'OPEN'  'ORAT'  1 /
'LL2435P'     'OPEN'  'ORAT'  5 /
/
TSTEP
30 /
WCONHIST
'LL125P'      'STOP'  'ORAT'  0 /
'LL2296P'     'OPEN'  'ORAT'  25 /
'LL2404P'     'STOP'  'ORAT'  0 /
'LL2435P'     'OPEN'  'ORAT'  171 /
/
TSTEP
92 /
WCONHIST
'LL125P'      'OPEN'  'ORAT'  276 /
'LL2296P'     'OPEN'  'ORAT'  219 /
'LL2404P'     'OPEN'  'ORAT'  134 /
'LL2435P'     'OPEN'  'ORAT'  332 /
/
TSTEP
92 /
WCONHIST
'LL125P'      'OPEN'  'ORAT'  224 /
'LL2296P'     'OPEN'  'ORAT'  175 /
'LL2404P'     'OPEN'  'ORAT'  130 /
'LL2435P'     'OPEN'  'ORAT'  216 /
/
TSTEP
61 /
-- ================== YEAR 1983
WCONHIST
'LL125P'      'OPEN'  'ORAT'  26 /
'LL2296P'     'OPEN'  'ORAT'  166 /
'LL2404P'     'OPEN'  'ORAT'  72 /
'LL2435P'     'OPEN'  'ORAT'  187 /
/
TSTEP
31 /
WCONHIST
'LL125P'      'STOP'  'ORAT'  0 /
'LL2296P'     'OPEN'  'ORAT'  91 /
'LL2404P'     'OPEN'  'ORAT'  43 /
'LL2435P'     'OPEN'  'ORAT'  78 /
/
TSTEP
89 /
WCONHIST
'LL125P'      'STOP'  'ORAT'  0 /
'LL2296P'     'OPEN'  'ORAT'  155 /
'LL2404P'     'OPEN'  'ORAT'  45 /
'LL2435P'     'OPEN'  'ORAT'  44 /
/
TSTEP
92 /
WCONHIST
'LL125P'      'STOP'  'ORAT'  0 /
'LL2296P'     'OPEN'  'ORAT'  124 /
'LL2404P'     'OPEN'  'ORAT'  107 /
'LL2435P'     'OPEN'  'ORAT'  84 /
/
TSTEP
92 /
WCONHIST
'LL125P'      'STOP'  'ORAT'  0 /
'LL2296P'     'OPEN'  'ORAT'  38 /
'LL2404P'     'OPEN'  'ORAT'  105 /
'LL2435P'     'OPEN'  'ORAT'  132 /
/
TSTEP
61 /
-- ================== YEAR 1984
WCONHIST
'LL125P'      'STOP'  'ORAT'  0 /
'LL2296P'     'OPEN'  'ORAT'  35 /
'LL2404P'     'OPEN'  'ORAT'  107 /
'LL2435P'     'OPEN'  'ORAT'  150 /
/
TSTEP
91 /
WCONHIST
'LL125P'      'STOP'  'ORAT'  0 /
'LL2296P'     'OPEN'  'ORAT'  2 /
'LL2404P'     'OPEN'  'ORAT'  106 /
'LL2435P'     'OPEN'  'ORAT'  130 /
/
TSTEP
91 /
WCONHIST
'LL125P'      'STOP'  'ORAT'  0 /
'LL2296P'     'STOP'  'ORAT'  0 /
'LL2404P'     'OPEN'  'ORAT'  103 /
'LL2435P'     'OPEN'  'ORAT'  84 /
/
TSTEP
92 /
WCONHIST
'LL125P'      'STOP'  'ORAT'  0 /
'LL2296P'     'OPEN'  'ORAT'  10 /
'LL2404P'     'OPEN'  'ORAT'  91 /
'LL2435P'     'OPEN'  'ORAT'  79 /
/
TSTEP
92 /

-- ================== YEAR 1985
WCONHIST
'LL125P'      'STOP'  'ORAT'  0 /
'LL2296P'     'STOP'  'ORAT'  0 /
'LL2404P'     'STOP'  'ORAT'  0 /
'LL2435P'     'OPEN'  'ORAT'  5 /
/
TSTEP
31 /
WCONHIST
'LL125P'      'OPEN'  'ORAT'  168/
'LL2296P'     'STOP'  'ORAT'  0 /
'LL2404P'     'OPEN'  'ORAT'  53 /
'LL2435P'     'OPEN'  'ORAT'  67 /
/
TSTEP
59 /
WCONHIST
'LL125P'      'OPEN'  'ORAT'  145/
'LL2296P'     'STOP'  'ORAT'  0 /
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 'LL2404P'      'OPEN'  'ORAT'  107 /
 'LL2435P'      'OPEN'  'ORAT'  70 /
 /

 TSTEP
 21 /
 WELLSHUT
 LL2435P /
 /
 WELLINJE
 LL2435I  WA  1*  WA  1*  2368  1*  1*  12*
 0.75  580 /
 /
 TSTEP
 13 /  -- INJECTION
 WELLSHUT
 LL2435I /
 /
 TSTEP
 17 /  -- SOAK
 WCONHIST
 'LL2435P'      'OPEN'  'ORAT'  60 /
 /
 TSTEP
 10 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  103 /
 'LL2296P'      'STOP'  'ORAT'  0 /
 'LL2404P'      'OPEN'  'ORAT'  17 /
 'LL2435P'      'OPEN'  'ORAT'  78 /
 /
 TSTEP
 30 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  41 /
 'LL2296P'      'STOP'  'ORAT'  0 /
 'LL2404P'      'STOP'  'ORAT'  0 /
 'LL2435P'      'OPEN'  'ORAT'  140 /
 /
 TSTEP
 31 /
 WCONHIST
 'LL125P'       'STOP'  'ORAT'  0 /
 'LL2296P'      'OPEN'  'ORAT'  6 /
 'LL2404P'      'STOP'  'ORAT'  0 /
 'LL2435P'      'OPEN'  'ORAT'  75 /
 /
 TSTEP
 61 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  85 /
 'LL2296P'      'STOP'  'ORAT'  0 /
 'LL2404P'      'STOP'  'ORAT'  0 /
 'LL2435P'      'OPEN'  'ORAT'  20 /
 /
 TSTEP
 61 /
 WCONHIST
 'LL125P'       'STOP'  'ORAT'  0 /
 'LL2296P'      'STOP'  'ORAT'  0 /
 'LL2404P'      'OPEN'  'ORAT'  80 /
 'LL2435P'      'OPEN'  'ORAT'  155 /
 /
 TSTEP
 31 /
 -- ================= YEAR 1986
 WCONHIST
 'LL125P'       'STOP'  'ORAT'  0 /
 'LL2296P'      'STOP'  'ORAT'  0 /
 'LL2404P'      'OPEN'  'ORAT'  38 /
 'LL2435P'      'OPEN'  'ORAT'  118 /
 /
 TSTEP
 59 /
 WCONHIST
 'LL125P'       'STOP'  'ORAT'  0  /
 'LL2296P'      'STOP'  'ORAT'  0 /
 'LL2404P'      'OPEN'  'ORAT'  6 /
 'LL2435P'      'OPEN'  'ORAT'  197 /
 /
 TSTEP
 61 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  105 /
 'LL2296P'      'STOP'  'ORAT'  0 /
 'LL2404P'      'STOP'  'ORAT'  0 /
 'LL2435P'      'OPEN'  'ORAT'  185 /
 /
 TSTEP
 31 /
 WCONHIST
 'LL2404P'      'STOP'  'ORAT'  0/
 /
 TSTEP
 22 /
 WELLSHUT
 LL2404P /
 /
 WELLINJE
 LL2404I  WA  1*  WA  1*  2438  1*  1*  12*
 0.75  580 /
 /
 TSTEP
 15 /  -- INJECTION
 WELLSHUT
 LL2404I /
 /
 TSTEP
 15 /  -- SOAK
 WCONHIST
 'LL2404P'      'OPEN'  'ORAT'  568 /
 /
 TSTEP
 9 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  73 /
 'LL2296P'      'STOP'  'ORAT'  0 /
 'LL2404P'      'OPEN'  'ORAT'  595 /
 'LL2435P'      'OPEN'  'ORAT'  123 /
 /
 TSTEP
 31 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  12 /
 'LL2296P'      'STOP'  'ORAT'  0 /
 'LL2404P'      'OPEN'  'ORAT'  420 /
 'LL2435P'      'OPEN'  'ORAT'  81 /
 /
 TSTEP
 30 /
 WCONHIST
 'LL125P'       'STOP'  'ORAT'  0 /
 'LL2296P'      'STOP'  'ORAT'  0 /
 'LL2404P'      'OPEN'  'ORAT'  350 /
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```
'LL2435P'      'OPEN'  'ORAT'  107 /
/
TSTEP
31 /

WCONHIST
'LL125P'       'OPEN'  'ORAT'  15 /
'LL2296P'      'STOP'  'ORAT'  0 /
'LL2404P'      'OPEN'  'ORAT'  259 /
'LL2435P'      'OPEN'  'ORAT'  126 /
/
TSTEP
61 /
-- ================== YEAR 1987
WCONHIST
'LL125P'       'STOP'  'ORAT'  0 /
'LL2296P'      'STOP'  'ORAT'  0 /
'LL2404P'      'OPEN'  'ORAT'  217 /
'LL2435P'      'OPEN'  'ORAT'  123 /
/
TSTEP
31 /
WCONHIST
'LL125P'       'OPEN'  'ORAT'  31 /
'LL2296P'      'STOP'  'ORAT'  0 /
'LL2404P'      'OPEN'  'ORAT'  162 /
'LL2435P'      'OPEN'  'ORAT'  122 /
/
TSTEP
89 /
WCONHIST
'LL125P'       'OPEN'  'ORAT'  43 /
'LL2296P'      'STOP'  'ORAT'  0 /
'LL2404P'      'OPEN'  'ORAT'  174 /
'LL2435P'      'OPEN'  'ORAT'  79 /
/
TSTEP
92 /
WCONHIST
'LL125P'       'OPEN'  'ORAT'  3 /
'LL2296P'      'STOP'  'ORAT'  0 /
'LL2404P'      'OPEN'  'ORAT'  187 /
'LL2435P'      'OPEN'  'ORAT'  2 /
/
TSTEP
31 /
WCONHIST
'LL125P'       'STOP'  'ORAT'  0 /
'LL2296P'      'STOP'  'ORAT'  0 /
'LL2404P'      'OPEN'  'ORAT'  154 /
'LL2435P'      'OPEN'  'ORAT'  3 /
/
TSTEP
91 /
WCONHIST
'LL125P'       'OPEN'  'ORAT'  26 /
'LL2296P'      'STOP'  'ORAT'  0 /
'LL2404P'      'OPEN'  'ORAT'  214 /
'LL2435P'      'OPEN'  'ORAT'  37  /
/
TSTEP
31 /
-- ================== YEAR 1988
WCONHIST
'LL125P'       'OPEN'  'ORAT'  25 /
'LL2296P'      'STOP'  'ORAT'  0 /
'LL2404P'      'OPEN'  'ORAT'  115 /
'LL2435P'      'OPEN'  'ORAT'  22 /
/
TSTEP
60 /
WCONHIST
'LL125P'       'OPEN'  'ORAT'  33 /
'LL2296P'      'STOP'  'ORAT'  0 /
'LL2404P'      'OPEN'  'ORAT'  147 /
'LL2435P'      'OPEN'  'ORAT'  20 /
/
TSTEP
92 /
WCONHIST
'LL125P'       'STOP'  'ORAT'  0 /
'LL2296P'      'STOP'  'ORAT'  0 /
'LL2404P'      'OPEN'  'ORAT'  123 /
'LL2435P'      'OPEN'  'ORAT'  21 /
/
TSTEP
92 /

WCONHIST
'LL125P'       'STOP'  'ORAT'  0 /
'LL2296P'      'STOP'  'ORAT'  0 /
'LL2404P'      'OPEN'  'ORAT'  90 /
'LL2435P'      'OPEN'  'ORAT'  0 /
/
TSTEP
61 /
WCONHIST
'LL125P'       'OPEN'  'ORAT'  17 /
'LL2296P'      'OPEN'  'ORAT'  9 /
'LL2404P'      'OPEN'  'ORAT'  112 /
'LL2435P'      'OPEN'  'ORAT'  6 /
/
TSTEP
61 /
-- ================== YEAR 1989
WCONHIST
'LL125P'       'OPEN'  'ORAT'  2 /
'LL2296P'      'OPEN'  'ORAT'  18 /
'LL2404P'      'OPEN'  'ORAT'  76 /
'LL2435P'      'OPEN'  'ORAT'  0 /
/
TSTEP
31 /
WCONHIST
'LL125P'       'STOP'  'ORAT'  0 /
'LL2296P'      'OPEN'  'ORAT'  9 /
'LL2404P'      'OPEN'  'ORAT'  135 /
'LL2435P'      'OPEN'  'ORAT'  0 /
/
TSTEP
59 /
WCONHIST
'LL125P'       'OPEN'  'ORAT'  27 /
'LL2296P'      'OPEN'  'ORAT'  29 /
'LL2404P'      'OPEN'  'ORAT'  81 /
'LL2435P'      'OPEN'  'ORAT'  78 /
/

TSTEP
91 /

WCONHIST
'LL125P'       'OPEN'  'ORAT'  42 /
'LL2296P'      'OPEN'  'ORAT'  3 /
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'LL2404P'        'OPEN'  'ORAT'  33 /
'LL2435P'        'OPEN'  'ORAT'  94 /
/
TSTEP
92 /
WCONHIST
'LL125P'         'OPEN'  'ORAT'  48 /
'LL2296P'        'OPEN'  'ORAT'  8 /
'LL2404P'        'OPEN'  'ORAT'  49 /
'LL2435P'        'OPEN'  'ORAT'  68 /
/
TSTEP
11 /
WELLSHUT
LL2404P /
/
WELLINJE
LL2404I  WA  1*  WA  1*  2812  1*  1*  12*
0.75  580 /
/
TSTEP
13 /  -- INJECTION
WELLSHUT
LL2404I /
/
TSTEP
7 / --  INITIAL TIME OF SOAK PERIODO FOR
LL2404
WELLSHUT
LL2296P /
/
WELLINJE
LL2296I  WA  1*  WA  1*  1931  1*  1*  12*
0.75  580 /
/
TSTEP
16 /  -- INJECTION LL 2296 / SOAK LL2404
WELLSHUT
LL2296I /
/
TSTEP
25 / -- FINAL SOAK PERIOD FOR LL2404 (48
DAYS)
WCONHIST
'LL2404P'        'OPEN'  'ORAT'  477     120
        200 /
/
TSTEP
7 /
WCONHIST
'LL2296P'        'OPEN'  'ORAT'  140 /
/
TSTEP
13 /
-- ================= YEAR 1990
WCONHIST
'LL125P'         'OPEN'  'ORAT'  54 /
'LL2296P'        'OPEN'  'ORAT'  125 /
'LL2404P'        'OPEN'  'ORAT'  301 /
'LL2435P'        'OPEN'  'ORAT'  80 /
/
TSTEP
31 /
WCONHIST
'LL125P'         'OPEN'  'ORAT'  59 /
'LL2296P'        'OPEN'  'ORAT'  92 /
'LL2404P'        'OPEN'  'ORAT'  227 /
'LL2435P'        'OPEN'  'ORAT'  5 /
/
TSTEP
59 /
WCONHIST
'LL125P'         'OPEN'  'ORAT'  56 /
'LL2296P'        'OPEN'  'ORAT'  92 /
'LL2404P'        'OPEN'  'ORAT'  215 /
'LL2435P'        'OPEN'  'ORAT'  6 /
/
TSTEP
61 /
WCONHIST
'LL125P'         'STOP'  'ORAT'  0 /
'LL2296P'        'OPEN'  'ORAT'  74 /
'LL2404P'        'OPEN'  'ORAT'  223 /
'LL2435P'        'OPEN'  'ORAT'  5 /
/
TSTEP
61 /
WCONHIST
'LL125P'         'OPEN'  'ORAT'  64 /
'LL2296P'        'OPEN'  'ORAT'  49 /
'LL2404P'        'OPEN'  'ORAT'  173 /
'LL2435P'        'OPEN'  'ORAT'  46 /
/
TSTEP
61 /
WCONHIST
'LL125P'         'OPEN'  'ORAT'  76 /
'LL2296P'        'OPEN'  'ORAT'  14 /
'LL2404P'        'OPEN'  'ORAT'  139 /
'LL2435P'        'OPEN'  'ORAT'  240 /
/
TSTEP
24 /
WELLSHUT
LL2435P /
/
WELLINJE
LL2435I  WA  1*  WA  1*  2919  1*  1*  12*
0.75  580 /
/
TSTEP
10 /  -- INJECTION
WELLSHUT
LL2435I /
/
TSTEP
4 / --- SOAK
WCONHIST
'LL2435P'        'OPEN'  'ORAT'  20 /
/
TSTEP
23 /
WCONHIST
'LL125P'         'OPEN'  'ORAT'  39 /
'LL2296P'        'OPEN'  'ORAT'  27 /
'LL2404P'        'OPEN'  'ORAT'  232 /
'LL2435P'        'OPEN'  'ORAT'  420 /
/
TSTEP
31 /
-- ================= YEAR 1991
WCONHIST
'LL125P'         'OPEN'  'ORAT'  14 /
'LL2296P'        'OPEN'  'ORAT'  47 /
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 'LL2404P'      'OPEN'  'ORAT'  231 /
 'LL2435P'      'OPEN'  'ORAT'  327 /
 /

 TSTEP
 31 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  33/
 'LL2296P'      'OPEN'  'ORAT'  10 /
 'LL2404P'      'OPEN'  'ORAT'  209 /
 'LL2435P'      'OPEN'  'ORAT'  224 /
 /
 TSTEP
 59 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  67/
 'LL2296P'      'OPEN'  'ORAT'  1/
 'LL2404P'      'OPEN'  'ORAT'  282/
 'LL2435P'      'OPEN'  'ORAT'  197 /
 /
 TSTEP
 91 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  67 /
 'LL2296P'      'OPEN'  'ORAT'  181 /
 'LL2404P'      'OPEN'  'ORAT'  222 /
 'LL2435P'      'OPEN'  'ORAT'  203 /
 /
 TSTEP
 62 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  53 /
 'LL2296P'      'OPEN'  'ORAT'  215 /
 'LL2404P'      'OPEN'  'ORAT'  202/
 'LL2435P'      'OPEN'  'ORAT'  37 /
 'LL3178P'      'OPEN'  'ORAT'  54 /
 /
 TSTEP
 30 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  53 /
 'LL2296P'      'OPEN'  'ORAT'  225 /
 'LL2404P'      'OPEN'  'ORAT'  196 /
 'LL2435P'      'OPEN'  'ORAT'  37/
 /
 WELLSHUT
 LL3178P /
 /
 WELLINJE
 LL3178I  WA  1*  WA  1*  2556  1*  1*  12*
 0.75  580 /
 /
 TSTEP
 12 /  -- INJECTION
 WELLSHUT
 LL3178I /
 /
 TSTEP
 7 / --- SOAK
 WCONHIST
 'LL3178P'      'OPEN'  'ORAT'  250 /
 /
 TSTEP
 12 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  88 /
 'LL2296P'      'OPEN'  'ORAT'  119 /
```

```
 'LL2404P'      'OPEN'  'ORAT'  171 /
 'LL2435P'      'OPEN'  'ORAT'  96 /
 'LL3178P'      'OPEN'  'ORAT'  90 /
 /
 TSTEP
 30 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  148 /
 'LL2296P'      'OPEN'  'ORAT'  253 /
 'LL2404P'      'OPEN'  'ORAT'  174 /
 'LL2435P'      'OPEN'  'ORAT'  150 /
 'LL3178P'      'OPEN'  'ORAT'  511 /
 /
 TSTEP
 31 /
 -- ================== YEAR 1992
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  138 /
 'LL2296P'      'OPEN'  'ORAT'  218 /
 'LL2404P'      'OPEN'  'ORAT'  162 /
 'LL2435P'      'OPEN'  'ORAT'  103 /
 'LL3178P'      'OPEN'  'ORAT'  290 /
 /
 TSTEP
 60 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  143 /
 'LL2296P'      'OPEN'  'ORAT'  196 /
 'LL2404P'      'OPEN'  'ORAT'  143 /
 'LL2435P'      'OPEN'  'ORAT'  52 /
 'LL3178P'      'OPEN'  'ORAT'  169 /
 /
 TSTEP
 23 /
 WELLSHUT
 LL2435P /
 /
 WELLINJE
 LL2435I  WA  1*  WA  1*  2618  1*  1*  12*
 0.75  580 /
 /
 TSTEP
 13 /  -- INJECTION
 WELLSHUT
 LL2435I /
 /
 TSTEP
 42 / --- SOAK
 WCONHIST
 'LL2435P'      'OPEN'  'ORAT'  30      100
         200 /
 /
 TSTEP
 14 /
 WCONHIST
 'LL125P'       'OPEN'  'ORAT'  159 /
 'LL2296P'      'OPEN'  'ORAT'  215 /
 'LL2435P'      'OPEN'  'ORAT'  91 /
 'LL3178P'      'OPEN'  'ORAT'  150 /
 /
 WELLSHUT
 LL2404P /
 /
 WELLINJE
 LL2404I  WA  1*  WA  1*  2487  1*  1*  12*
 0.75  580 /
 /
```

```
TSTEP
17 /  -- INJECTION
WELLSHUT
LL2404I /
/
TSTEP
13 / -- SOAK

WCONHIST
'LL125P'        'OPEN'  'ORAT'  158 /
'LL2296P'       'OPEN'  'ORAT'  220 /
'LL2404P'       'OPEN'  'ORAT'  64 /
'LL2435P'       'OPEN'  'ORAT'  76 /
'LL3178P'       'OPEN'  'ORAT'  172 /
/
TSTEP
31 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  80 /
'LL2296P'       'OPEN'  'ORAT'  201 /
'LL2404P'       'OPEN'  'ORAT'  103 /
'LL2435P'       'OPEN'  'ORAT'  74 /
'LL3178P'       'OPEN'  'ORAT'  158 /
/
TSTEP
31 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  63/
'LL2296P'       'OPEN'  'ORAT'  193 /
'LL2404P'       'OPEN'  'ORAT'  132 /
'LL2435P'       'OPEN'  'ORAT'  128 /
'LL3178P'       'OPEN'  'ORAT'  128 /
/
TSTEP
30 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  63 /
'LL2296P'       'OPEN'  'ORAT'  194 /
'LL2404P'       'OPEN'  'ORAT'  154 /
'LL2435P'       'OPEN'  'ORAT'  130 /
'LL3178P'       'OPEN'  'ORAT'  92 /
/
TSTEP
92 /
-- ================== YEAR 1993
WCONHIST
'LL125P'        'OPEN'  'ORAT'  63 /
'LL2296P'       'OPEN'  'ORAT'  187 /
'LL2404P'       'OPEN'  'ORAT'  411 /
'LL2435P'       'OPEN'  'ORAT'  159 /
'LL3178P'       'OPEN'  'ORAT'  98 /
/
TSTEP
90 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  80 /
'LL2296P'       'OPEN'  'ORAT'  171 /
'LL2404P'       'OPEN'  'ORAT'  344 /
'LL2435P'       'OPEN'  'ORAT'  197 /
'LL3178P'       'OPEN'  'ORAT'  91 /
/
TSTEP
91 /

WCONHIST
'LL125P'        'OPEN'  'ORAT'  103 /
'LL2296P'       'OPEN'  'ORAT'  177 /
'LL2404P'       'OPEN'  'ORAT'  246 /
'LL2435P'       'OPEN'  'ORAT'  138 /
'LL3178P'       'OPEN'  'ORAT'  73 /
/
TSTEP
31 /
WCONHIST
'LL2296P'       'OPEN'  'ORAT'  145 /
/
TSTEP
12 /
WELLSHUT
LL2296P /
/
WELLINJE
LL2296I  WA   1*  WA  1*  1931  1*  1*  12*
0.75  580 /
/
TSTEP
15 /  -- INJECTION
WELLSHUT
LL2296I /
/
TSTEP
4 / INITIAL SOAK PERIOD LL2296
WCONHIST
'LL3178P'       'OPEN'  'ORAT'  68 /
/
TSTEP
6 / --  FINAL SOAK PERIOD LL2296 (10 DAYS)
WCONHIST
'LL2296P'       'OPEN'  'ORAT'  636 /
/
TSTEP
13 / -- (19 DAY OF PRODUCTION OF LL3178
SEPT-93)
WELLSHUT
LL3178P /
/
WELLINJE
LL3178I  WA   1*  WA  1*  1681  1*  1*  12*
0.75  580 /
/
TSTEP
11 / -- INITIAL INJECTION PERIOD - FINAL
MONTH 24 DAY OF PRODUCTION LL2296
WCONHIST
'LL125P'        'OPEN'  'ORAT'  100 /
'LL2296P'       'OPEN'  'ORAT'  77 /
'LL2404P'       'OPEN'  'ORAT'  226 /
'LL2435P'       'OPEN'  'ORAT'  96 /
/
TSTEP
6 /  -- FINAL INJECTION PERIOD  LL3178
WELLSHUT
LL3178I /
/
TSTEP
6 /  SOAK PERIOD LL3178
WCONHIST
'LL3178P'       'OPEN'  'ORAT'  590 /
/

TSTEP
19 / -  FINAL MONTH - OCT-93
COMPDATL
```

```
LL125P  RLL125 3        3       1        1  3*
0.6    3779  15 / -- layer ap1
LL125P  RLL125 3        3       2        2  3*
0.6       1*  15 / -- layer ap2
LL125P  RLL125 3        3       3        3  3*
0.6  134909  15 / -- layer ap1
/
WCONHIST
'LL125P'        'OPEN'  'ORAT'  61 /
'LL2296P'       'OPEN'  'ORAT'  55 /
'LL2404P'       'OPEN'  'ORAT'  212 /
'LL2435P'       'OPEN'  'ORAT'  110 /
'LL3178P'       'OPEN'  'ORAT'  402 /
/
TSTEP
30 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  53 /
'LL2296P'       'OPEN'  'ORAT'  225 /
'LL2404P'       'OPEN'  'ORAT'  198 /
'LL2435P'       'OPEN'  'ORAT'  101 /
'LL3178P'       'OPEN'  'ORAT'  527 /
/
TSTEP
31 /
-- ================== YEAR 1994
WCONHIST
'LL125P'        'OPEN'  'ORAT'  39 /
'LL2296P'       'OPEN'  'ORAT'  366 /
'LL2404P'       'OPEN'  'ORAT'  180 /
'LL3178P'       'OPEN'  'ORAT'  485 /
/
WELLSHUT
LL2435P /
/
WELLINJE
LL2435I  WA  1*  WA  1*  2647  1*  1*  12*
0.75  580 /
/
TSTEP
9 /  -- INJECTION
WELLSHUT
LL2435I /
/
TSTEP
10 / --  SOAK
WCONHIST
'LL2435P'       'OPEN'  'ORAT'  620 /
/
TSTEP
12 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  39 /
'LL2296P'       'OPEN'  'ORAT'  337 /
'LL2404P'       'OPEN'  'ORAT'  177 /
'LL2435P'       'OPEN'  'ORAT'  556 /
'LL3178P'       'OPEN'  'ORAT'  316 /
/
TSTEP
28 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  34 /
'LL2296P'       'OPEN'  'ORAT'  287/
'LL2404P'       'OPEN'  'ORAT'  185 /
'LL2435P'       'OPEN'  'ORAT'  534 /
'LL3178P'       'OPEN'  'ORAT'  599 /
/
TSTEP
31 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  34/
'LL2296P'       'OPEN'  'ORAT'  211 /
'LL2404P'       'OPEN'  'ORAT'  169 /
'LL2435P'       'OPEN'  'ORAT'  389 /
'LL3178P'       'OPEN'  'ORAT'  409 /
/
TSTEP
91 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  42 /
'LL2296P'       'OPEN'  'ORAT'  236 /
'LL2404P'       'OPEN'  'ORAT'  165 /
'LL2435P'       'OPEN'  'ORAT'  292 /
'LL3178P'       'OPEN'  'ORAT'  216 /
/
TSTEP
92 /
WCONHIST
'LL125P'        'OPEN'  'ORAT'  58 /
'LL2296P'       'OPEN'  'ORAT'  226/
'LL2404P'       'OPEN'  'ORAT'  171 /
'LL2435P'       'OPEN'  'ORAT'  253 /
'LL3178P'       'OPEN'  'ORAT'  157 /
/
TSTEP
92 /
-- ================== YEAR 1995
COMPDATL
LL2404P RLL2404        3       3       1
         1  3*  0.6  19083   7 /  -- layer ap1
LL2404P RLL2404        3       3       2
         2  3*  0.6     1*   7 /  -- layer ap2
LL2404P RLL2404        3       3       3
         3  3*  0.6 137276   7 /  -- layer ap3
LL2435P RLL2435 3       3       1       3  3*
0.6      1*  3 /  -- layer ap1 - ap3
/
WCONHIST
'LL125P'        'OPEN'  'ORAT'  53 /
'LL2296P'       'OPEN'  'ORAT'  174 /
'LL2404P'       'OPEN'  'ORAT'  145 /
'LL2435P'       'OPEN'  'ORAT'  180 /
'LL3178P'       'OPEN'  'ORAT'  143 /
/
TSTEP
31 /
WCONHIST
'LL2296P'       'OPEN'  'ORAT'  174 /
/
TSTEP
11 /
WELLSHUT
LL2296P /
/
WELLINJE
LL2296I  WA  1*  WA  1*  2438  1*  1*  12*
0.75  580 /
/
TSTEP
13 /  -- INJECTION
WELLSHUT
LL2296I /
/
TSTEP
```

```
4 / --  SOAK
WCONHIST
'LL125P'      'OPEN'  'ORAT'  58 /
'LL2296P'     'OPEN'  'ORAT'  306 /
'LL2404P'     'OPEN'  'ORAT'  87 /
'LL2435P'     'OPEN'  'ORAT'  173 /
'LL3178P'     'OPEN'  'ORAT'  144 /
/
TSTEP
31 /
WCONHIST
'LL125P'      'OPEN'  'ORAT'  57 /
'LL2296P'     'OPEN'  'ORAT'  306 /
'LL2404P'     'OPEN'  'ORAT'  117 /
'LL2435P'     'OPEN'  'ORAT'  165 /
'LL3178P'     'OPEN'  'ORAT'  114 /
/
TSTEP
30 /
WCONHIST
'LL125P'      'OPEN'  'ORAT'  8 /
'LL2296P'     'OPEN'  'ORAT'  265 /
'LL2404P'     'OPEN'  'ORAT'  143 /
'LL2435P'     'OPEN'  'ORAT'  164 /
'LL3178P'     'OPEN'  'ORAT'  69 /
/
TSTEP
31 /
-- history matching for horizontal well
WELLSHUT
LL125P /
LL125I /
/
WCONHIST
'LL125HP'     'OPEN'  'ORAT'  54 /
'LL2296P'     'OPEN'  'ORAT'  177 /
'LL2404P'     'OPEN'  'ORAT'  146 /
'LL2435P'     'OPEN'  'ORAT'  179 /
'LL3178P'     'OPEN'  'ORAT'  108 /
/
TSTEP
30 /

WCONHIST
'LL125HP'     'OPEN'  'ORAT'  77 /
'LL2296P'     'OPEN'  'ORAT'  285 /
'LL2404P'     'OPEN'  'ORAT'  156 /
'LL2435P'     'OPEN'  'ORAT'  183 /
'LL3178P'     'OPEN'  'ORAT'  108 /
/
TSTEP
31 /
WCONHIST
'LL125HP'     'OPEN'  'ORAT'  14 /
'LL2296P'     'OPEN'  'ORAT'  289 /
'LL2404P'     'OPEN'  'ORAT'  177 /
'LL2435P'     'OPEN'  'ORAT'  185 /
'LL3178P'     'OPEN'  'ORAT'  100 /
/
TSTEP
31 /
WCONHIST
'LL2296P'     'OPEN'  'ORAT'  265 /
'LL2404P'     'OPEN'  'ORAT'  145 /
'LL2435P'     'OPEN'  'ORAT'  184 /
'LL3178P'     'OPEN'  'ORAT'  77 /
/
```

```
WELLSHUT
LL125HP /
/
WELLINJE
LL125HI  WA  1*  WA  1*  2506  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL125HI /
/
TSTEP
10 / --  SOAK PERIOD
WCONHIST
'LL125HP'     'OPEN'  'ORAT'  299 /
'LL2296P'     'OPEN'  'ORAT'  272 /
'LL2404P'     'OPEN'  'ORAT'  107 /
'LL2435P'     'OPEN'  'ORAT'  182 /
'LL3178P'     'OPEN'  'ORAT'  118 /
/
TSTEP
31 /
WCONHIST
'LL125HP'     'OPEN'  'ORAT'  350 /
'LL2296P'     'OPEN'  'ORAT'  263 /
'LL2404P'     'OPEN'  'ORAT'  74 /
'LL2435P'     'OPEN'  'ORAT'  138 /
'LL3178P'     'OPEN'  'ORAT'  117 /
/
TSTEP
30 /
WCONHIST
'LL125HP'     'OPEN'  'ORAT'  285 /
'LL2296P'     'OPEN'  'ORAT'  242 /
'LL2404P'     'OPEN'  'ORAT'  123 /
'LL2435P'     'OPEN'  'ORAT'  157 /
'LL3178P'     'OPEN'  'ORAT'  78 /
/
TSTEP
31 /
-- ================== YEAR 1996
WCONHIST
'LL125HP'     'OPEN'  'ORAT'  246 /
'LL2296P'     'OPEN'  'ORAT'  238 /
'LL2404P'     'OPEN'  'ORAT'  123 /
'LL2435P'     'OPEN'  'ORAT'  145 /
'LL3178P'     'OPEN'  'ORAT'  76 /
/
TSTEP
31 /
WCONHIST
'LL125HP'     'OPEN'  'ORAT'  320 /
'LL2296P'     'OPEN'  'ORAT'  233 /
'LL2404P'     'OPEN'  'ORAT'  160 /
'LL2435P'     'OPEN'  'ORAT'  113 /
'LL3178P'     'OPEN'  'ORAT'  79 /
/
TSTEP
29 /
WCONHIST
'LL125HP'     'OPEN'  'ORAT'  330 /
'LL2296P'     'OPEN'  'ORAT'  227 /
'LL2404P'     'OPEN'  'ORAT'  171 /
'LL2435P'     'OPEN'  'ORAT'  45 /
'LL3178P'     'OPEN'  'ORAT'  69 /
/
```

```
TSTEP
31 /
WCONHIST
'LL125HP'       'OPEN'  'ORAT'  250 /
'LL2296P'       'OPEN'  'ORAT'  204 /
'LL2404P'       'OPEN'  'ORAT'  188 /
'LL2435P'       'OPEN'  'ORAT'  115 /
'LL3178P'       'OPEN'  'ORAT'  64 /
/
TSTEP
30 /
WCONHIST
'LL125HP'       'OPEN'  'ORAT'  191 /
'LL2296P'       'OPEN'  'ORAT'  203 /
'LL2404P'       'OPEN'  'ORAT'  125 /
'LL2435P'       'OPEN'  'ORAT'  164 /
'LL3178P'       'OPEN'  'ORAT'  49 /
/
TSTEP
31 /
WCONHIST
'LL125HP'       'OPEN'  'ORAT'  190 /
'LL2296P'       'OPEN'  'ORAT'  183 /
'LL2404P'       'OPEN'  'ORAT'  50 /
'LL2435P'       'OPEN'  'ORAT'  112 /
'LL3178P'       'OPEN'  'ORAT'  33 /
/
TSTEP
30 /
WCONHIST
'LL125HP'       'OPEN'  'ORAT'  195 /
'LL2296P'       'OPEN'  'ORAT'  177 /
'LL2404P'       'OPEN'  'ORAT'  51 /
'LL2435P'       'OPEN'  'ORAT'  116 /
'LL3178P'       'STOP'  'ORAT'  0 /
/
TSTEP
31 /
WCONHIST
'LL125HP'       'OPEN'  'ORAT'  165 /
'LL2296P'       'OPEN'  'ORAT'  167 /
'LL2404P'       'OPEN'  'ORAT'  48 /
'LL2435P'       'OPEN'  'ORAT'  122 /
/
WELLSHUT
LL3178P /
/
WELLINJE
LL3178I  WA  1*  WA  1*  2543  1*  1*  12*
0.75  580  /
/
TSTEP
10 / -- INJECTION PERIOD
WELLSHUT
LL3178I /
/
TSTEP
5 / --  SOAK PERIOD
WCONHIST
'LL3178P'       'OPEN'  'ORAT'  10 /
/
TSTEP
16 /
WCONHIST
'LL125HP'       'OPEN'  'ORAT'  136 /
'LL2296P'       'OPEN'  'ORAT'  143 /
'LL2404P'       'OPEN'  'ORAT'  50 /
'LL2435P'       'OPEN'  'ORAT'  109 /
'LL3178P'       'OPEN'  'ORAT'  192 /
/
TSTEP
30 /
WCONHIST
'LL125HP'       'OPEN'  'ORAT'  127 /
'LL2296P'       'OPEN'  'ORAT'  145 /
'LL2404P'       'OPEN'  'ORAT'  140 /
'LL2435P'       'OPEN'  'ORAT'  112 /
'LL3178P'       'OPEN'  'ORAT'  148 /
/
TSTEP
31 /
WCONHIST
'LL125HP'       'OPEN'  'ORAT'  119 /
'LL2296P'       'OPEN'  'ORAT'  128 /
'LL2404P'       'OPEN'  'ORAT'  136 /
'LL2435P'       'OPEN'  'ORAT'  115 /
'LL3178P'       'OPEN'  'ORAT'  121 /
/
TSTEP
30 /
WCONHIST
'LL125HP'       'OPEN'  'ORAT'  117 /
'LL2296P'       'OPEN'  'ORAT'  129 /
'LL2404P'       'OPEN'  'ORAT'  150 /
'LL2435P'       'OPEN'  'ORAT'  101 /
'LL3178P'       'OPEN'  'ORAT'  127 /
/
TSTEP
31 /
-- ================== YEAR 1997
WCONHIST
'LL125HP'       'OPEN'  'ORAT'  83/
'LL2296P'       'OPEN'  'ORAT'  130 /
'LL2404P'       'OPEN'  'ORAT'  155 /
'LL2435P'       'OPEN'  'ORAT'  92 /
'LL3178P'       'OPEN'  'ORAT'  109 /
/
TSTEP
31 /
WCONHIST
'LL125HP'       'OPEN'  'ORAT'  104 /
'LL2296P'       'OPEN'  'ORAT'  130 /
'LL2404P'       'OPEN'  'ORAT'  152 /
'LL2435P'       'OPEN'  'ORAT'  86 /
'LL3178P'       'OPEN'  'ORAT'  117 /
/
TSTEP
28 /
WCONHIST
'LL125HP'       'OPEN'  'ORAT'  84 /
'LL2296P'       'OPEN'  'ORAT'  130 /
'LL2404P'       'OPEN'  'ORAT'  109 /
'LL2435P'       'OPEN'  'ORAT'  112 /
'LL3178P'       'OPEN'  'ORAT'  117 /
/
TSTEP
31 /
WCONHIST
'LL2296P'       'OPEN'  'ORAT'  125 /
'LL2404P'       'OPEN'  'ORAT'  83 /
'LL2435P'       'OPEN'  'ORAT'  121 /
'LL3178P'       'OPEN'  'ORAT'  110 /
/
```

```
WELLSHUT
LL125HP /
/
WELLINJE
LL125HI  WA  1*  WA  1*  2506  1*  1*  12*
0.75  580  /
/
TSTEP
15 / -- INJECTION PERIOD
WELLSHUT
LL125HI /
/
TSTEP
5 / --  SOAK PERIOD
WCONHIST
'LL125HP'      'OPEN'  'ORAT'  10 /
/
TSTEP
10 /
WCONHIST
'LL125HP'      'OPEN'  'ORAT'  151 /
'LL2296P'      'OPEN'  'ORAT'  131 /
'LL2404P'      'OPEN'  'ORAT'  76 /
'LL2435P'      'OPEN'  'ORAT'  123 /
'LL3178P'      'OPEN'  'ORAT'  77 /
/
TSTEP
31 /
WCONHIST
'LL125HP'      'OPEN'  'ORAT'  161 /
'LL2296P'      'OPEN'  'ORAT'  110 /
'LL2404P'      'OPEN'  'ORAT'  79 /
'LL2435P'      'OPEN'  'ORAT'  124 /
'LL3178P'      'OPEN'  'ORAT'  77 /
/
TSTEP
30 /
WCONHIST
'LL125HP'      'OPEN'  'ORAT'  164 /
'LL2296P'      'OPEN'  'ORAT'  41 /
'LL2404P'      'OPEN'  'ORAT'  91 /
'LL2435P'      'OPEN'  'ORAT'  88 /
'LL3178P'      'OPEN'  'ORAT'  77/
/
TSTEP
31 /
WCONHIST
'LL125HP'      'OPEN'  'ORAT'  173 /
'LL2404P'      'OPEN'  'ORAT'  50 /
'LL2435P'      'OPEN'  'ORAT'  75 /
'LL3178P'      'OPEN'  'ORAT'  118 /
/
WELLSHUT
LL2296P /
/
WELLINJE
LL2296I  WA  1*  WA  1*  2593  1*  1*  12*
0.75  580  /
/
TSTEP
15 / -- INJECTION PERIOD
WELLSHUT
LL2296I /
/
TSTEP
5 / --  SOAK PERIOD
1*      0.6  1*  0 /
```

```
WCONHIST
'LL2296P'      'OPEN'  'ORAT'  10 /
/
TSTEP
11 /
WELLSHUT
LL2404P /
LL2404I /
/
WCONHIST
'LL125HP'      'OPEN'  'ORAT'  184 /
'LL2296P'      'OPEN'  'ORAT'  63 /
'LL2435P'      'OPEN'  'ORAT'  79 /
'LL3178P'      'OPEN'  'ORAT'  169 /
/
TSTEP
30 /
WCONHIST
'LL125HP'      'OPEN'  'ORAT'  179 /
'LL2296P'      'OPEN'  'ORAT'  94 /
'LL2435P'      'OPEN'  'ORAT'  87 /
'LL3178P'      'OPEN'  'ORAT'  164 /
/
TSTEP
31 /
WCONHIST
'LL125HP'      'OPEN'  'ORAT'  186 /
'LL2296P'      'OPEN'  'ORAT'  99 /
'LL2435P'      'OPEN'  'ORAT'  90 /
'LL3178P'      'OPEN'  'ORAT'  161 /
/
TSTEP
30 /
WCONHIST
'LL125HP'      'OPEN'  'ORAT'  223 /
'LL2296P'      'OPEN'  'ORAT'  190 /
'LL2435P'      'OPEN'  'ORAT'  70 /
'LL3178P'      'OPEN'  'ORAT'  59 /
/
TSTEP
31 /
-- ================== YEAR 1998
WCONHIST
'LL125HP'      'OPEN'  'ORAT'  164 /
'LL2296P'      'OPEN'  'ORAT'  116 /
'LL2435P'      'OPEN'  'ORAT'  72 /
/
WELLSHUT
LL3178P /
/
WELLINJE
LL3178I  WA  1*  WA  1*  1937  1*  1*  12*
0.75  580  /
/
TSTEP
18 / -- INJECTION PERIOD
WELLSHUT
LL3178I /
/
TSTEP
5 / --  SOAK PERIOD
WCONHIST
'LL3178P'      'OPEN'  'ORAT'  10 /
/
TSTEP
8 /
```

```
WCONHIST
'LL125HP'      'OPEN'  'ORAT'  130 /
'LL2296P'      'OPEN'  'ORAT'  141 /
'LL2435P'      'OPEN'  'ORAT'  74 /
'LL3178P'      'OPEN'  'ORAT'  224/
/
TSTEP
28 /
WCONHIST
'LL125HP'      'OPEN'  'ORAT'  129 /
'LL2296P'      'OPEN'  'ORAT'  148 /
'LL2435P'      'OPEN'  'ORAT'  72 /
'LL3178P'      'OPEN'  'ORAT'  449 /
/
TSTEP
31 /
END
```

Case 1: No Further Cyclic Steam Injection

```
-- AREA LL 125  3D CYCLIC STEAM INJECTION
--CASE 1: EXISTING WELL NO FURTHER CYCLIC
--STEAM INJECTION

RESTART
LL125LGR 244 /
DATUM
2700 /
OUTSOL
PRES    TEMP    SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/
REGIONS      ========================

SATNUM
242*1
242*2
242*3
242*4 /

SUMMARY      ========================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WOPR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WLPR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WOPRH
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WTEMP
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WGOR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WWCT
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
/
WBHP
'LL125I' 'LL125HI' 'LL2296I' 'LL2404I'
'LL2435I' 'LL3178I' /

DATE
RUNSUM
RPTONLY

SCHEDULE   ============================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/
TSCRIT
2* 92 /

-- =====================    PREDICTION
WELLSHUT
LL125HI /
LL2296I /
LL2404I /
LL2435I /
LL3178I /
/

WELLPROD
LL2296P BHP  4*  375 /
LL2435P BHP  4*  375 /
LL3178P BHP  4*  375 /
LL125HP BHP  4*  500 /
/

TSTEP
30  31  30  31  31  30  31  30  31 /
-- ================= YEAR 1999
TSTEP
31 28 31 30 31  30 31  31  30  31  30  31 /
-- ================= YEAR 2000
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================= YEAR 2001
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
```

```
-- ================== YEAR 2002
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2003
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2005
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2006
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31  29  31  30 31 30 31 31 30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
END
```

Case 2: Continuing Cyclic Steaming in the Exiting Wells

```
-- AREA LL 125: 3D CYCLIC STEAM INJECTION
-- CASE 2: CONTINUE CYCLIC STEAMING
EXISTING WELL

RESTART
LL125LGR 244 /
DATUM
2700 /
OUTSOL
PRES    TEMP    SOIL   SWAT   SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  ========================

SATNUM
242*1
242*2
242*3
242*4 /

SUMMARY ===============================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WOPR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WLPR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WOPRH
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WTEMP
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WGOR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WWCT
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
/
WBHP
'LL125I' 'LL125HI' 'LL2296I' 'LL2404I'
'LL2435I' 'LL3178I' /

DATE
RUNSUM
RPTONLY

SCHEDULE      ========================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
```

```
  1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/

-- ======================   PREDICTION
WELLPROD
LL125HP BHP  4*  375 /
LL2296P BHP  4*  375 /
LL2435P BHP  4*  375 /
LL3178P BHP  4*  375 /
/
WELLSHUT
LL2435P /
/
WELLINJE
LL2435I  WA  1*  WA  1*  2625  1*  1*  12*
0.8  580  /
/
TSTEP
10 / -- INJECTION PERIOD
WELLSHUT
LL2435I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2435P BHP  4*  375 /
/
TSTEP
16 31  30  31  31 /
WELLSHUT
LL125HP /
/
WELLINJE
LL125HI  WA  1*  WA  1*  2900  1*  1*  12*
0.8  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL125HI /
/
TSTEP
7 / --  SOAK PERIOD

WELLPROD
LL125HP BHP  4*  375 /
/
TSTEP
3  31  30  31 /
-- ================== YEAR 1999
WELLSHUT
LL2296P /
/
WELLINJE
LL2296I  WA  1*  WA  1*  2500  1*  1*  12*
0.8  580  /
/
TSTEP
13 / -- INJECTION PERIOD
WELLSHUT
LL2296I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2296P BHP  4*  375 /
/
TSTEP
14  28  31  30  31 /
WELLSHUT
LL3178P /
/
WELLINJE
LL3178I  WA  1*  WA  1*  2581  1*  1*  12*
0.8  580  /
/
TSTEP
18 / -- INJECTION PERIOD
WELLSHUT
LL3178I /
/
TSTEP
5 / --  SOAK PERIOD
WELLPROD
LL3178P BHP  4*  375 /
/
TSTEP
7  31  31 30  31 /
WELLSHUT
LL2435P /
/
WELLINJE
LL2435I  WA  1*  WA  1*  2625  1*  1*  12*
0.8  580  /
/
TSTEP
10 / -- INJECTION PERIOD
WELLSHUT
LL2435I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2435P BHP  4*  375 /
/
TSTEP
16  31 /
-- ================== YEAR 2000
TSTEP
31  29 /
WELLSHUT
LL125HP /
/
WELLINJE
LL125HI  WA  1*  WA  1*  2900  1*  1*  12*
0.8  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL125HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL125HP BHP  4*  375 /
/
TSTEP
4  30  31  30 /
WELLSHUT
```

```
LL2296P /
/
WELLINJE
LL2296I  WA  1*  WA  1*  2500  1*  1*  12*
0.8  580  /
/
TSTEP
13 / -- INJECTION PERIOD
WELLSHUT
LL2296I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2296P BHP  4*  375 /
/
TSTEP
14  31  30  31  30 /
WELLSHUT
LL3178P /
/
WELLINJE
LL3178I  WA  1*  WA  1*  2581  1*  1*  12*
0.8  580  /
/
TSTEP
18 / -- INJECTION PERIOD
WELLSHUT
LL3178I /
/
TSTEP
5 / --  SOAK PERIOD
WELLPROD
LL3178P BHP  4*  375 /
/
TSTEP
8 /
-- ================== YEAR 2001
TSTEP
31  28  31  30 /
WELLSHUT
LL2435P /
/
WELLINJE
LL2435I  WA  1*  WA  1*  2625  1*  1*  12*
0.8  580  /
/
TSTEP
10 / -- INJECTION PERIOD
WELLSHUT
LL2435I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2435P BHP  4*  375 /
/
TSTEP
17  30  31  31  /
WELLSHUT
LL125HP /
/
WELLINJE
LL125HI  WA  1*  WA  1*  2900  1*  1*  12*
0.8  580  /
/
TSTEP
```

```
20 / -- INJECTION PERIOD
WELLSHUT
LL125HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL125HP BHP  4*  375 /
/
TSTEP
3  31  30  31 /
-- ================== YEAR 2002
WELLSHUT
LL2296P /
/
WELLINJE
LL2296I  WA  1*  WA  1*  2500  1*  1*  12*
0.8  580  /
/
TSTEP
13 / -- INJECTION PERIOD
WELLSHUT
LL2296I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2296P BHP  4*  375 /
/
TSTEP
14  28  31  30  31 /
WELLSHUT
LL3178P /
/
WELLINJE
LL3178I  WA  1*  WA  1*  2581  1*  1*  12*
0.8  580  /
/
TSTEP
18 / -- INJECTION PERIOD
WELLSHUT
LL3178I /
/
TSTEP
5 / --  SOAK PERIOD
WELLPROD
LL3178P BHP  4*  375 /
/
TSTEP
7  31  31  30  31  /
WELLSHUT
LL2435P /
/
WELLINJE
LL2435I  WA  1*  WA  1*  2625  1*  1*  12*
0.8  580  /
/
TSTEP
10 / -- INJECTION PERIOD
WELLSHUT
LL2435I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2435P BHP  4*  375 /
/
```

```
TSTEP
16  31 /
-- ================== YEAR 2003
TSTEP
31  28 /
WELLSHUT
LL125HP /
/
WELLINJE
LL125HI  WA  1*  WA  1*  2900  1*  1*  12*
0.8  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL125HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL125HP BHP  4*  375 /
/
TSTEP
4  30  31  30 /
WELLSHUT
LL2296P /
/
WELLINJE
LL2296I  WA  1*  WA  1*  2500  1*  1*  12*
0.8  580  /
/
TSTEP
13 / -- INJECTION PERIOD
WELLSHUT
LL2296I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2296P BHP  4*  375 /
/
TSTEP
14  31  30  31  30 /
WELLSHUT
LL3178P /
/
WELLINJE
LL3178I  WA  1*  WA  1*  2581  1*  1*  12*
0.8  580  /
/
TSTEP
18 / -- INJECTION PERIOD
WELLSHUT
LL3178I /
/
TSTEP
5 / --  SOAK PERIOD
WELLPROD
LL3178P BHP  4*  375 /
/
TSTEP
8 /
-- ================== YEAR 2004
TSTEP
31  29  31  30 /
WELLSHUT
LL2435P /
/
WELLINJE
LL2435I  WA  1*  WA  1*  2625  1*  1*  12*
0.8  580  /
/
TSTEP
10 / -- INJECTION PERIOD
WELLSHUT
LL2435I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2435P BHP  4*  375 /
/
TSTEP
17  30  31  31 /
WELLSHUT
LL125HP /
/
WELLINJE
LL125HI  WA  1*  WA  1*  2900  1*  1*  12*
0.8  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL125HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL125HP BHP  4*  375. /
/
TSTEP
3  31 30  31 /
-- ================== YEAR 2005
WELLSHUT
LL2296P /
/
WELLINJE
LL2296I  WA  1*  WA  1*  2500  1*  1*  12*
0.8  580  /
/
TSTEP
13 / -- INJECTION PERIOD
WELLSHUT
LL2296I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2296P BHP  4*  375 /
/
TSTEP
14  28  31  30  31 /
WELLSHUT
LL3178P /
/
WELLINJE
LL3178I  WA  1*  WA  1*  2581  1*  1*  12*
0.8  580  /
/
TSTEP
18 / -- INJECTION PERIOD
WELLSHUT
LL3178I /
```

```
/
TSTEP
5 / --  SOAK PERIOD
WELLPROD
LL3178P BHP  4*  375 /
/
TSTEP
7  31  31  30  31  30  31 /
-- ================== YEAR 2006
TSTEP
31  28  31  30  31  30  31  31  30  31  30
/
WELLSHUT
LL3178P /
/
WELLINJE
LL3178I  WA  1*  WA  1*  2581  1*  1*  12*
0.8  580  /
/
TSTEP
18 / -- INJECTION PERIOD
WELLSHUT
LL3178I /
/
TSTEP
5 / --  SOAK PERIOD
WELLPROD
LL3178P BHP  4*  375 /
/
TSTEP
8 /
-- ================== YEAR 2007
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31  28 31 30 31 30 31 31 30 31 30 31 /
END
```

Case 3: Steamflooding – Horizontal Well as Injector, Existing Vertical Wells as Producers

```
-- AREA LL 125: 3D CYCLIC STEAM INJECTION
-- STEAMFLODING - HORIZONTAL WELL AS
-- INJECTOR
-- VERTICAL WELLS AS PRODUCER

RESTART
LL125LGR 244 /
DATUM
2700 /
OUTSOL
PRES    TEMP    SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  =========================

SATNUM
242*1
242*2
242*3
242*4 /

SUMMARY ================================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WOPR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WLPR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WOPRH
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WTEMP
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WGOR
```

```
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WWCT
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
/
WBHP
'LL125I' 'LL125HI' 'LL2296I' 'LL2404I'
'LL2435I' 'LL3178I' /
DATE
RUNSUM
RPTONLY

SCHEDULE ===============================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/

-- =======================   PREDICTION
WELLSHUT
LL125HP /
LL2296I /
LL2404I /
LL2435I /
LL3178I /
/
WELLPROD
LL2296P BHP  4*  375 /
LL2435P BHP  4*  375 /
LL3178P BHP  4*  375 /
/
WELLINJE
LL125HI  WA  1*  WA  1*  2900  1*  1500
12*  0.75  580  /
/
TSTEP
30 31 30 31 31 30  31  30  31 /
-- ================== YEAR 1999
TSTEP
31 28  31 30 31 30 31 31  30  31  30  31 /
-- ================== YEAR 2000
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2001
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2002
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2003
TSTEP
31 28 3130 31  30  31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2005
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2006
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31  30  31  31  30  31  30  31
/
-- ================== YEAR 2012
TSTEP
31 29 31 30 3130 31  31  30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
END
```

Case 4: Steamflooding – Horizontal Well as Injector, Four New Horizontal Wells as Producers

```
-- AREA LL 125: 3D CYCLIC STEAM INJECTION
-- CASE 4: STEAMFLOODING - HORIZONTAL WELL
-- AS IMJECTOR AND NEW HORIZONTAL PRODUCER
-- WELLS

RESTART
LL125LG2 244 /
DATUM
2700 /
OUTSOL
PRES    TEMP    SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  ========================

SATNUM
242*1
```

```
242*2
242*3
242*4 /

SUMMARY ==============================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
WOPR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
WLPR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
WOPRH
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
WTEMP
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
WGOR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
WWCT
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
/
WBHP
'LL125I' 'LL125HI' 'LL2296I' 'LL2404I'
'LL2435I' 'LL3178I' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /

DATE
RUNSUM
RPTONLY

SCHEDULE
==============================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
```

```
SEPCOND
SEP FIELD 1   90 75 /
/
WELSPECL
HORIZA1 FIELD RHORIZ1 3        3 2700 /
HORIZA2 FIELD RHORIZ2 3        2 2700 /
HORIZA3 FIELD RHORIZ3 3        3 2700 /
HORIZA4 FIELD RHORIZ3 3        2 2700 /
/
WELLPROD
LL125HP BHP  4*  375 /
LL2296P BHP  4*  375 /
LL2435P BHP  4*  375 /
LL3178P BHP  4*  375 /
/
WELLSHUT
LL125HP /
LL2296I /
LL2404I /
LL2435I /
LL3178I /
/

-- ================== YEAR 1998
WELLINJE
LL125HI  WA  1*  WA  1*  2900  1*  1*  12*
0.75  580  /
/
TSTEP
30  31  30  31 31  30  31  30  31 /
-- ================== YEAR 1999
TSTEP
31  28  31  30  31  30  31  31  30  31  30
/
COMPDATL
LL2296P RLL2296       3 3 1 3 SHUT /
LL2404P RLL2404       3 3 1 3 SHUT /
LL2435P RLL2435       3 3 1 3 SHUT /
LL3178P RLL3178       3 3 1 4 SHUT /
/
TSTEP
31 /
-- ================== YEAR 2000
COMPDATL
HORIZA1 RHORIZ1 3  3  2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  4  2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  5  2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  6  2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  7  2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  8  2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  9  2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  10 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  11 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  12 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  13 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  14 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  15 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  16 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  17 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  18 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  19 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  20 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  21 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  22 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  23 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  24 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  25 2 2 3* 0.5 3* 'Y' /
```

```
HORIZA1 RHORIZ1 3  26 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  27 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  28 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  29 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  30 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  31 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  32 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  33 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 3  34 2 2 3* 0.5 3* 'Y' /
HORIZA2 RHORIZ2 3  2  2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 4  2  2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 5  2  2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 6  2  2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 7  2  2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 8  2  2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 9  2  2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 10 2  2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 11 2  2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 12 2  2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 13 2  2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 14 2  2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 15 2  2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 16 2  2 2 3* 0.5 3* 'X' /
HORIZA3 RHORIZ3 3  3  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3  4  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3  5  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3  6  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3  7  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3  8  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3  9  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 10  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 11  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 12  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 13  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 14  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 15  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 16  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 17  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 18  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 19  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 20  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 21  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 22  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 23  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 24  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 25  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 26  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 27  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 28  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 29  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 30  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 31  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 32  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 33  2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 3 34  2 2 3* 0.5 3* 'Y' /
HORIZA4 RHORIZ4 3  2  2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 4  2  2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 5  2  2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 6  2  2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 7  2  2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 8  2  2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 9  2  2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 10 2  2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 11 2  2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 12 2  2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 13 2  2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 14 2  2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 15 2  2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 16 2  2 2 3* 0.5 3* 'X' /
/
WELLPROD
HORIZA1 BHP  4*  500 /
HORIZA2 BHP  4*  500 /
HORIZA3 BHP  4*  500 /
HORIZA4 BHP  4*  500 /
/
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2001
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2002
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2003
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2005
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2006
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
END
```

Case 5: Steamflooding – Horizontal Well as Injector, Eight New Vertical Wells as Producers

```
-- AREA LL 125: 3D CYCLI STEAM INYECTION
-- CASE 5: STEAMFLOODING - HORIZONTAL
-- INJECTOR AND EIGHT NEW VERTICAL
-- PRODUCERS

RESTART
LL125LG3 244 /
DATUM
2700 /
OUTSOL
PRES    TEMP    SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  ========================

SATNUM
242*1
242*2
242*3
242*4 /

SUMMARY ==========================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WBHP
'WELL01' 'WELL02' 'WELL03' 'WELL04'
'WELL05' 'WELL06' 'WELL07' 'WELL08' /
WOPR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WOPR
'WELL01' 'WELL02' 'WELL03' 'WELL04'
'WELL05' 'WELL06' 'WELL07' 'WELL08' /
WLPR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WLPR
'WELL01' 'WELL02' 'WELL03' 'WELL04'
'WELL05' 'WELL06' 'WELL07' 'WELL08' /
WOPRH
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WOPRH
'WELL01' 'WELL02' 'WELL03' 'WELL04'
'WELL05' 'WELL06' 'WELL07' 'WELL08' /
WTEMP
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WTEMP
'WELL01' 'WELL02' 'WELL03' 'WELL04'
'WELL05' 'WELL06' 'WELL07' 'WELL08' /
WGOR
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
WGOR
'WELL01' 'WELL02' 'WELL03' 'WELL04'
'WELL05' 'WELL06' 'WELL07' 'WELL08' /
WWCT
'LL125P' 'LL125HP' 'LL2296P' 'LL2404P'
'LL2435P' 'LL3178P' /
/
WBHP
'LL125I' 'LL125HI' 'LL2296I' 'LL2404I'
'LL2435I' 'LL3178I' /

DATE
RUNSUM
RPTONLY

SCHEDULE  ============================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/
WELSPECL
WELL01 FIELD  WELL1 3  2 2700 /
WELL02 FIELD  WELL2 3  2 2700 /
WELL03 FIELD  WELL3 3  2 2700 /
WELL04 FIELD  WELL4 3  2 2700 /
WELL05 FIELD  WELL5 3  2 2700 /
WELL06 FIELD  WELL6 3  2 2700 /
WELL07 FIELD  WELL7 3  2 2700 /
WELL08 FIELD  WELL8 3  2 2700 /
/
WELLPROD
LL125HP BHP  4*  375 /
LL2296P BHP  4*  375 /
LL2435P BHP  4*  375 /
LL3178P BHP  4*  375 /
/
WELLSHUT
LL125HP /
LL2296I /
LL2404I /
LL2435I /
LL3178I /
/
-- ================== YEAR 1998
WELLINJE
LL125HI  WA  1*  WA  1*  2900  1*  1*  12*
0.75  580  /
/
```

```
TSTEP
30  31  30  31 31  30  31  30  31 /
-- ================== YEAR 1999
TSTEP
31  28  31  30  31  30  31  31  30  31  30
/
COMPDATL
LL2296P  RLL2296 3 3   1       3        SHUT /
LL2404P  RLL2404 3 3   1       3        SHUT /
LL2435P  RLL2435 3 3   1       3        SHUT /
LL3178P  RLL3178 3 3  1        4        SHUT /
/
TSTEP
31 /
-- ================== YEAR 2000
COMPDATL
WELL01  WELL1 3 2 1 4  3* 0.6 /
WELL02  WELL2 3 2 4 4  3* 0.6 /
WELL03  WELL3 3 2 1 4  3* 0.6 /
WELL04  WELL4 3 2 4 4  3* 0.6 /
WELL05  WELL5 3 2 1 4  3* 0.6 /
WELL06  WELL6 3 2 4 4  3* 0.6 /
WELL07  WELL7 3 2 1 4  3* 0.6 /
WELL08  WELL8 3 2 4 4  3* 0.6 /
/
WELLPROD
WELL01 BHP  4*  375 /
WELL02 BHP  4*  375 /
WELL03 BHP  4*  375 /
WELL04 BHP  4*  375 /
WELL05 BHP  4*  375 /
WELL06 BHP  4*  375 /
WELL07 BHP  4*  375 /
WELL08 BHP  4*  375 /
/
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2001
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2002
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2003
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2005
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2006
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
END
```

APPENDIX C

AREA LL3343 – SIMULATOR IMPUT DATA

History Matching

```
-- AREA LL3343H
-- 3D CYCLIC STEAM INJECTION

RUNSPEC ==========================

LIVEOIL
DIMENS
--   NX   NY   NZ
     11   27    5 /
HWELLS
WELLDIMS
20 50 /
TABDIMS
9   6*    9/
WATER
OIL
GAS
FIELD
COMPS
2 /
START
31 'JUL' 1980 /
ROCKDIMS
2 /
THERMAL
FULLIMP

GRID      =======================

INIT
EQUALS
'DX'       160 /
'DY'       125 /
'DZ'        46   1 11 1 27 1 1 /
'DZ'        42   1 11 1 27 2 2 /
'DZ'        86   1 11 1 27 3 3 /
'DZ'        76   1 11 1 27 4 4 /
'DZ'        70   1 11 1 27 5 5 /
'PERMZ'    464 1  6 1 27 1 1 /
'PERMZ'   4640 7  7 1 27 1 1 /
'PERMZ'    464 8 11 1 27 1 1 /
'PERMZ'    393 1  6 1 27 2 2 /
'PERMZ'  13130 7  7 1 27 2 2 /
'PERMZ'    393 8 11 1 27 2 2 /
'PERMZ'    798 1  6 1 27 3 3 /
'PERMZ'  15960 7  7 1 27 3 3 /
'PERMZ'    798 8 11 1 27 3 3 /
'PERMZ'    444 1  6 1 27 4 4 /
'PERMZ'  22180 7  7 1 27 4 4 /
'PERMZ'    444 8 11 1 27 4 4 /
'PERMZ'    444 1  6 1 27 5 5 /
'PERMZ'  22180 7  7 1 27 5 5 /
'PERMZ'    444 8 11 1 27 5 5 /
/

TOPS
297*2800 /
PERMX
 297*464
 297*1313
 297*1597
 297*2218
 297*2218
/
PERMY
 297*464
 297*1313
 297*1597
 297*2218
 297*2218
/
PORO
 297*0.15
 297*0.34
 297*0.32
 297*0.27
 297*0.27
/
THCONR
1485*26.4 /
HEATCR
1485*32.7 /

RADFIN
--NAME  x y zl zu nrr ntr nor Rin Rout
RLL2781  7 2 1 5  5 1 14 0.6 /
NZFIN
3  3  3  3  2 /
RADFIN
--NAME  x y zl zu nrr ntr nor Rin Rout
RLL2610 7 16 1 5  5 1 14 0.6 /
NZFIN
3  3  3  3  2 /
CARFIN
--NAME  xi xf yi yf zi zf nx ny nz
RLL2788 10 10 10 10 1  4 5 5 4 /
CARFIN
--NAME  xi xf yi yf zi zf nx ny nz
RLL2366 10 10 22 22 1  4 5 5 4 /
CARFIN
--NAME  xi xf yi yf zi zf nx ny nz
RLL3343 4  4 14 25 2 2  5 36 3 /
--CARFIN
--NAME  xi xf yi yf zi zf nx ny nz
--RWELL01   1   1 17 17  1 4 3 3 4 /
--CARFIN
--NAME  xi xf yi yf zi zf nx ny nz
--RWELL02  1   1 22 2   1 4 3 3   4 /
```

```
ENDFIN
ROCKPROP
  1  123  24  36  0  /
/
ROCKCON
  1  1  11  1 27  1  1  'K-'  /  top
  1  1  11  1 27  5  5  'K+'  /  bottom
/

PROPS        ==========================

NCOMPS
2 /
KVWI
HEATVAP
219  88.0 /
CNAMES
SGAS HEAVY /
TCRIT
343 1673 /
PCRIT
667. 121. /
ZCRIT
0.286  0.20137 /
ACF
0.013 0.964 /
BIC
0.0502 /
MW
16 460 /
TBOIL
201  1394 /
TREF
201  519.67 /
CREF
.00001 .00001 /
DREF
26 60 /
THERMEX1
0.0005    0.00204 /
TCRITW
1165.14 /
PCRITW
3208.2356 /
THANALB
SPECHA
.55 .55 / -- review values
TEMPVD
-- Dep  Temp
  2800 127
  3120 127 /
STCOND
60 14.7 /
-- krw orignal / 40
SWOF
-- INTERVAL AP1
--Sw    krw      krow       Pcow
0.40    0.000000         1.00    0
0.45    0.000080         0.75    0
0.50    0.000160         0.55    0
0.55    0.000300         0.40    0
0.60    0.000400         0.30    0
0.65    0.000800         0.20    0
0.70    0.001100         0.12    0
0.80    0.001400         0.00    0 /
-- INTERVAL AP2 -
--Sw    krw      krow            Pcow
0.20    0.000000         1.00    0
0.25    0.000008         0.95    0
0.30    0.000016         0.90    0
0.35    0.000024         0.85    0
0.40    0.000032         0.80    0
0.45    0.000040         0.75    0
0.50    0.000190         0.60    0
0.55    0.000250         0.40    0
0.60    0.000450         0.30    0
0.65    0.000700         0.19    0
0.70    0.000935         0.11    0
0.75    0.001000         0.00    0 /
-- INTERVAL AP3
--Sw    krw      krow       Pcow
0.30    0.000000         1.00    0
0.35    0.000010         0.92    0
0.40    0.000020         0.83    0
0.45    0.000040         0.75    0
0.50    0.000190         0.60    0
0.55    0.000250         0.40    0
0.60    0.000450         0.30    0
0.65    0.000700         0.19    0
0.70    0.000935         0.11    0
0.75    0.001000         0.00    0 /
-- INTERVAL HH
--Sw    krw      krow       Pcow
0.40    0.000000         1.00    0
0.45    0.000040         0.75    0
0.50    0.000190         0.60    0
0.55    0.000250         0.40    0
0.60    0.000450         0.30    0
0.65    0.000700         0.19    0
0.70    0.000935         0.11    0
0.75    0.001000         0.00    0 /
1.00    1.00    0.00     0.00 /
-- sixth table ap1 - original * 10
-- linear approach
0.40    0.00    1.00    230.0
0.45    0.07    0.75    110.0
0.50    0.14    0.55    100.0
0.55    0.21    0.40    100.0
0.60    0.28    0.30    100.0
0.65    0.35    0.20    100.0
0.70    0.42    0.12    100.0
0.75    0.49    0.03    100.0
0.80    0.56    0.00     0.0 /
-- seventh table ap2 - original * 10
-- linear approach
0.20    0.00    1.00    300.0
0.25    0.04    0.95    180.7
0.30    0.07    0.90    180.0
0.35    0.11    0.85    170.6
0.40    0.15    0.80    160.9
0.45    0.18    0.75    160.5
0.50    0.22    0.60    160.1
0.55    0.25    0.40    160.1
0.60    0.29    0.30    160.1
0.65    0.33    0.19    160.1
0.70    0.36    0.11    160.1
0.75    0.40    0.00    0.00 /
-- eighth table: ap3 - original * 10
--linear approach
0.30    0.00    1.00    300.
0.35    0.04    0.92    170.1
0.40    0.09    0.83    160.4
0.45    0.13    0.75    160.0
0.50    0.18    0.60    150.6
```

```
0.55    0.22    0.40    150.6
0.60    0.27    0.30    150.6
0.65    0.31    0.19    150.6
0.70    0.36    0.11    150.6
0.75    0.40    0.00    0.00 /
-- nineth table: HH - original * 10
--linear approach
0.40    0.00    1.00    290.0
0.45    0.06    0.75    140.7
0.50    0.11    0.60    140.4
0.55    0.17    0.40    140.4
0.60    0.23    0.30    140.4
0.65    0.29    0.19    140.4
0.70    0.34    0.11    140.4
0.75    0.40    0.00    0.00 /
SGOF
-- INTERVAL AP1
--Sg    krg     krog       Pcog
0.00    0.000   1.00000    0
0.03    0.000   1.00000    0
0.06    0.009   0.65000    0
0.10    0.020   0.40000    0
0.15    0.070   0.25000    0
0.20    0.120   0.13000    0
0.25    0.170   0.08500    0
0.30    0.240   0.04500    0
0.35    0.310   0.02300    0
0.40    0.380   0.01000    0
0.45    0.450   0.00430    0
0.50    0.500   0.00230    0
0.55    0.570   0.00120    0
0.57    0.578   0.00116    0
0.60    0.613   0.00080    0
0.65    0.672   0.00043    0
0.70    1.000   0.00000    0 /
-- INTERVAL AP2
--Sg    krg     krog      Pcog
0.00    0.000   1.0000    0
0.03    0.000   1.0000    0
0.05    0.010   0.7500    0
0.10    0.050   0.6000    0
0.15    0.065   0.4000    0
0.20    0.110   0.2500    0
0.25    0.180   0.1500    0
0.30    0.230   0.0900    0
0.35    0.310   0.0450    0
0.40    0.400   0.0250    0
0.45    0.500   0.0130    0
0.50    0.600   0.0065    0
0.55    0.700   0.0030    0
0.57    0.750   0.0023    0
0.60    0.800   0.0018    0
0.80    1.000   0.0000     0 /
-- INTERVAL AP3
--Sg    krg     krog      Pcog
0.00    0.000   1.0000    0
0.03    0.000   1.0000    0
0.05    0.010   0.7500    0
0.10    0.050   0.6000    0
0.15    0.065   0.4000    0
0.20    0.110   0.2500    0
0.25    0.180   0.1500    0
0.30    0.230   0.0900    0
0.35    0.310   0.0450    0
0.40    0.400   0.0250    0
0.45    0.500   0.0130    0
0.50    0.600   0.0065    0
0.55    0.700   0.0030    0
0.57    0.750   0.0023    0
0.60    0.800   0.0018    0
0.75     1.000   0.0000    0 /
-- INTERVAL HH
--Sg    krg     krog      Pcog
0.00    0.000   1.0000    0
0.03    0.000   1.0000    0
0.05    0.010   0.7500    0
0.10    0.050   0.6000    0
0.15    0.065   0.4000    0
0.20    0.110   0.2500    0
0.25    0.180   0.1500    0
0.30    0.230   0.0900    0
0.35    0.310   0.0450    0
0.40    0.400   0.0250    0
0.45    0.500   0.0130    0
0.50    0.600   0.0065    0
0.55    0.700   0.0030    0
0.57    0.750   0.0023    0
0.60    0.800   0.0018    0
0.75     1.000   0.0000    0 /
0.00    0.000   0.0000    0 /
-- sixth table INTERVAL AP1
---Sg   krg     krog       Pcog
0.00    0.000   1.00000    0
0.03    0.000   1.00000    0
0.06    0.009   0.65000    0
0.10    0.020   0.40000    0
0.15    0.070   0.25000    0
0.20    0.120   0.13000    0
0.25    0.170   0.08500    0
0.30    0.240   0.04500    0
0.35    0.310   0.02300    0
0.40    0.380   0.01000    0
0.45    0.450   0.00430    0
0.50    0.500   0.00230    0
0.55    0.570   0.00120    0
0.57    0.578   0.00116    0
0.60    0.613   0.00080    0
0.65    0.672   0.00043    0
0.70    1.000   0.00000    0 /
-- seventh table - INTERVAL AP2
--Sg    krg     krog      Pcog
0.00    0.000   1.0000    0
0.03    0.000   1.0000    0
0.05    0.010   0.7500    0
0.10    0.050   0.6000    0
0.15    0.065   0.4000    0
0.20    0.110   0.2500    0
0.25    0.180   0.1500    0
0.30    0.230   0.0900    0
0.35    0.310   0.0450    0
0.40    0.400   0.0250    0
0.45    0.500   0.0130    0
0.50    0.600   0.0065    0
0.55    0.700   0.0030    0
0.57    0.750   0.0023    0
0.60    0.800   0.0018    0
0.80    1.000   0.0000     0 /
-- eighth table -- Interval AP3
--Sg    krg     krog      Pcog
0.00    0.000   1.0000    0
0.03    0.000   1.0000    0
0.05    0.010   0.7500    0
0.10    0.050   0.6000    0
0.15    0.065   0.4000    0
```

```
0.20    0.110   0.2500    0
0.25    0.180   0.1500    0
0.30    0.230   0.0900    0
0.35    0.310   0.0450    0
0.40    0.400   0.0250    0
0.45    0.500   0.0130    0
0.50    0.600   0.0065    0
0.55    0.700   0.0030    0
0.57    0.750   0.0023    0
0.60    0.800   0.0018    0
0.75     1.000   0.0000     0 /
-- nineth table -- Interval HH
--Sg     krg     krog      Pcog
0.00    0.000   1.0000    0
0.03    0.000   1.0000    0
0.05    0.010   0.7500    0
0.10    0.050   0.6000    0
0.15    0.065   0.4000    0
0.20    0.110   0.2500    0
0.25    0.180   0.1500    0
0.30    0.230   0.0900    0
0.35    0.310   0.0450    0
0.40    0.400   0.0250    0
0.45    0.500   0.0130    0
0.50    0.600   0.0065    0
0.55    0.700   0.0030    0
0.57    0.750   0.0023    0
0.60    0.800   0.0018    0
0.75    1.000    0.0000     0 /
GASVISCT
128      0.0155  0.0315
160      0.0161  0.0331
190      0.0167  0.0346
220      0.0173  0.0361
250      0.0179  0.0376
280      0.0185  0.0391
310      0.0191  0.0406
340      0.0197  0.0421
370      0.0203  0.0436
400      0.0209  0.0451
430      0.0215  0.0466
460      0.0221  0.0481
490      0.0227  0.0496
520      0.0233  0.0511 /
OILVISCT
--Temp    Visc
128      0.1952  635
160      0.1912  351.74
190      0.1881  86.2
220      0.1855  66.29
250      0.1832  46.36
280      0.1811  26.42
310      0.1793  12.68
340      0.1776  11.42
370      0.1761  10.17
400      0.1747  8.91
430      0.1734  7.66
460      0.1722  6.41
490      0.1711  5.15
520      0.1700  3.9 /
PVTW
-- Pref          Bw       Cw       Vw       Cvw
-- PSIA          RB/STB   1/PSI    CPOISE
1/PSI
   1319         1.012    3.1E-06 0.3
7.0E-09 /
```

```
ROCK
--1370  120.0E-06 /
1370  100.0E-06 /
ZMFVD
2820     0.3      0.7 /

SOLUTION    ==============================

EQUIL
-- Ddat  Pdat     Dwoc     Pcow     Dgoc
Pcog
--2820  1158     3056      0.0      2820  0.0
       1        1        0        1 /
  2820  1050     3050      0.0      2820  0.0
       1        1        0        1 /
DATUM
3000 /
OUTSOL
RESTART PRES     TEMP     SOIL  SWAT  SGAS
XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS   ========================

SATNUM
297*1
297*2
297*3
297*4
297*5 /
BOX
7 7 1 27 1 1 /
SATNUM
27*6 /
ENDBOX
BOX
7 7 1 27 2 2 /
SATNUM
27*7 /
ENDBOX
BOX
7 7 1 27 3 3 /
SATNUM
27*8 /
ENDBOX
BOX
7 7 1 27 4 4 /
SATNUM
27*9 /
ENDBOX

SUMMARY ==============================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
```

```
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WOPR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WLPR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WOPRH
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WTEMP
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WGOR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3178P' /
WWCT
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
/
WBHP
'LL2366I' 'LL2610I' 'LL2781I' 'LL2788I'
'LL3343HI' /
DATE
RUNSUM

SCHEDULE   ===========================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/
WELSPECL
LL2366I  FIELD    RLL2366   3 3 3000 /
LL2366P  FIELD    RLL2366   3 3 3000 /
LL2610I  FIELD    RLL2610   1 1 3000 /
LL2610P  FIELD    RLL2610   1 1 3000 /
LL2781I  FIELD    RLL2781   1 1 3000 /
LL2781P  FIELD    RLL2781   1 1 3000 /
LL2788I  FIELD    RLL2788   3 3 3000 /
LL2788P  FIELD    RLL2788   3 3 3000 /
LL3343HI FIELD    RLL3343   3 3 3000 /
LL3343HP FIELD    RLL3343   3 3 3000 /
/
COMPDATL
LL2366I RLL2366 3 3  1  3 3*  0.6 /-- layer
ap1 - ap3
LL2366I RLL2366 3 3  4  4 3*  0.6  60966 /-
- layer ap4
LL2366P RLL2366 3 3  1  3 3*  0.6 /-- layer
ap1 - ap3
LL2366P RLL2366 3 3  4  4 3*  0.6  60966 /
-- layer ap4
LL2610I RLL2610 1 1  1  9 3*  0.6 /
LL2610I RLL2610 1 1 10 10 3*  0.6 10725 /
-- partial completion in layer hh
LL2610P RLL2610 1 1  1  9 3*  0.6 /
LL2610P RLL2610 1 1 10 10 3*  0.6 10725 /
-- partial completion in layer hh
LL2781I RLL2781 1 1  1  3 3* 0.6 11181 /
LL2781I RLL2781 1 1  4  9 3*  0.6 /
LL2781I RLL2781 1 1  10 10 3* 0.6 12199 / -
- partial completio in layer hh
LL2781P RLL2781 1 1  1  3  3* 0.6 11181 /
LL2781P RLL2781 1 1  4  9 3*  0.6 /
LL2781P RLL2781 1 1 10 10  3* 0.6 12199 / -
- partial completio in layer hh
LL2788I RLL2788 3 3  1 1 3* 0.6 5822 /  --
layer ap1
LL2788I RLL2788 3 3  2 3  3* 0.6 /
LL2788I RLL2788 3 3  4 4  3* 0.6  91985 /
-- layer ap4
LL2788P RLL2788 3 3 1 1  3*  0.6   5822 /
-- layer ap1
LL2788P RLL2788 3 3  2 3  3* 0.6 /
LL2788P RLL2788 3 3  4 4  3* 0.6  91985 /
-- layer ap4
LL3343HI RLL3343 3 1   2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 2   2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 3   2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 4   2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 5   2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 6   2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 7   2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 8   2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 9   2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 10  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 11  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 12  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 13  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 14  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 15  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 16  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 17  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 18  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 19  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 20  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 21  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 22  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 23  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 24  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 25  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 26  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 27  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 28  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 29  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 30  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 31  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 32  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 33  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 34  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 35  2 2 3*  0.5 3*  'Y' /
LL3343HI RLL3343 3 36  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 1   2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 2   2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 3   2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 4   2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 5   2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 6   2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 7   2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 8   2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 9   2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 10  2 2 3*  0.5 3*  'Y' /
```

```
LL3343HP RLL3343 3 11  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 12  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 13  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 14  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 15  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 16  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 17  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 18  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 19  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 20  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 21  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 22  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 23  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 24  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 25  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 26  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 27  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 28  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 29  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 30  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 31  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 32  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 33  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 34  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 35  2 2 3*  0.5 3*  'Y' /
LL3343HP RLL3343 3 36  2 2 3*  0.5 3*  'Y' /
/
-- ================== YEAR 1980
WCONHIST
'LL2366P'      'OPEN'  ORAT'   46/
/
TSTEP
61 /
WCONHIST
'LL2366P'      'STOP'  ORAT'   0/
/
TSTEP
61 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  92/
/
TSTEP
31 /
-- ================== YEAR 1981
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  116/
/
TSTEP
59 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  135/
/
TSTEP
61 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  138/
/
TSTEP
61 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  110/
/
TSTEP
62 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  115/
/
TSTEP
61 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  129/
/
TSTEP
30 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  147/
/
TSTEP
31 /
-- ================== YEAR 1982
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  3/
/
TSTEP
59 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  90/
/

TSTEP
61 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  35/
/
TSTEP
31 /
WCONHIST
'LL2366P'      'STOP'  'ORAT'  0/
'LL2610P'      'OPEN'  'ORAT'  82/
/
TSTEP
30 /
WCONHIST
'LL2366P'      'STOP'  'ORAT'  0/
'LL2610P'      'OPEN'  'ORAT'  110/
/
TSTEP
62 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  4/
'LL2610P'      'OPEN'  'ORAT'  82/
/
TSTEP
61 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  96/
'LL2610P'      'OPEN'  'ORAT'  246/
/
TSTEP
30 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  133/
'LL2610P'      'OPEN'  'ORAT'  270/
/
TSTEP
31 /
-- ================== YEAR 1983
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  128/
'LL2610P'      'OPEN'  'ORAT'  165/
/
TSTEP
59 /
WCONHIST
```

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 'LL2366P'        'OPEN'  'ORAT'  110/
 'LL2610P'        'OPEN'  'ORAT'  258/
 /
 TSTEP
 61 /
 WCONHIST
 'LL2366P'        'OPEN'  'ORAT'  132/
 'LL2610P'        'OPEN'  'ORAT'  321/
 'LL2781P'        'OPEN'  'ORAT'  28/
 /
 TSTEP
 31 /
 WCONHIST
 'LL2366P'        'OPEN'  'ORAT'  153/
 'LL2610P'        'OPEN'  'ORAT'  322/
 'LL2781P'        'OPEN'  'ORAT'  179/
 'LL2781P'        'OPEN'  'ORAT'  8/
 /
 TSTEP
 30 /
 WCONHIST
 'LL2366P'        'OPEN'  'ORAT'  153/
 'LL2610P'        'OPEN'  'ORAT'  183/
 'LL2781P'        'OPEN'  'ORAT'  199/
 'LL2788P'        'OPEN'  'ORAT'  129/
 /
 TSTEP
 62 /
 WCONHIST
 'LL2366P'        'OPEN'  'ORAT'  71/
 'LL2610P'        'OPEN'  'ORAT'  154/
 'LL2781P'        'OPEN'  'ORAT'  148/
 'LL2788P'        'OPEN'  'ORAT'  96/
 /
 TSTEP
 61 /
 WCONHIST
 'LL2366P'        'OPEN'  'ORAT'  65/
 'LL2610P'        'OPEN'  'ORAT'  239/
 'LL2781P'        'OPEN'  'ORAT'  163/
 'LL2788P'        'OPEN'  'ORAT'  143/
 /
 TSTEP
 30 /
 WCONHIST
 'LL2366P'        'OPEN'  'ORAT'  68/
 'LL2610P'        'OPEN'  'ORAT'  216/
 'LL2781P'        'OPEN'  'ORAT'  149/
 'LL2788P'        'OPEN'  'ORAT'  148/
 /
 TSTEP
 31 /
 -- ================== YEAR 1984
 WCONHIST
 'LL2366P'        'OPEN'  'ORAT'  64/
 'LL2610P'        'OPEN'  'ORAT'  195/
 'LL2781P'        'OPEN'  'ORAT'  117/
 'LL2788P'        'OPEN'  'ORAT'  114/
 /
 TSTEP
 60 /
 WCONHIST
 'LL2366P'        'OPEN'  'ORAT'  113/
 'LL2610P'        'OPEN'  'ORAT'  221/
 'LL2781P'        'OPEN'  'ORAT'  141/
 'LL2788P'        'OPEN'  'ORAT'  119/
 /
 TSTEP
 61 /
 WCONHIST
 'LL2366P'        'OPEN'  'ORAT'  104/
 'LL2610P'        'OPEN'  'ORAT'  127/
 'LL2781P'        'OPEN'  'ORAT'  131/
 'LL2788P'        'OPEN'  'ORAT'  99/
 /
 TSTEP
 61 /
 WCONHIST
 'LL2366P'        'OPEN'  'ORAT'  108/
 'LL2610P'        'OPEN'  'ORAT'  102/
 'LL2781P'        'OPEN'  'ORAT'  122/
 'LL2788P'        'OPEN'  'ORAT'  100/
 /
 TSTEP
 62 /
 WCONHIST
 'LL2366P'        'OPEN'  'ORAT'  107/
 'LL2610P'        'OPEN'  'ORAT'  148/
 'LL2781P'        'OPEN'  'ORAT'  198/
 'LL2788P'        'OPEN'  'ORAT'  150/
 /
 TSTEP
 61 /
 WCONHIST
 'LL2366P'        'OPEN'  'ORAT'  9/
 'LL2610P'        'OPEN'  'ORAT'  10/
 'LL2781P'        'OPEN'  'ORAT'  12/
 'LL2788P'        'OPEN'  'ORAT'  21/
 /
 TSTEP
 30 /
 WCONHIST
 'LL2366P'        'STOP'  'ORAT'  0/
 'LL2610P'        'STOP'  'ORAT'  0/
 'LL2781P'        'STOP'  'ORAT'  0/
 'LL2788P'        'OPEN'  'ORAT'  163/
 /
 TSTEP
 31 /
 -- ================== YEAR 1985
 WCONHIST
 'LL2366P'        'STOP'  'ORAT'  0/
 'LL2610P'        'STOP'  'ORAT'  0/
 'LL2781P'        'STOP'  'ORAT'  0/
 'LL2788P'        'STOP'  'ORAT'  0/
 /
 TSTEP
 31 /
 WCONHIST
 'LL2366P'        'OPEN'  'ORAT'  9/
 'LL2610P'        'STOP'  'ORAT'  0/
 'LL2781P'        'STOP'  'ORAT'  0/
 /
 WELLSHUT
 LL2788P /
 /
 WELLINJE
 LL2788I  WA   1*   WA   1*   2056   1*   1*   12*
 0.75   580 /
 /
 TSTEP
 17 /   -- INJECTION
 WELLSHUT
 LL2788I /
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/
TSTEP
11 /  -- SOAK
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  84/
'LL2610P'     'STOP'  'ORAT'  0/
'LL2781P'     'STOP'  'ORAT'  0/
'LL2788P'     'OPEN'  'ORAT'  169/
/
TSTEP
31 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  57/
'LL2610P'     'STOP'  'ORAT'  0/
'LL2781P'     'STOP'  'ORAT'  0/
'LL2788P'     'OPEN'  'ORAT'  241/
/
TSTEP
30 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  62/
'LL2610P'     'STOP'  'ORAT'  0/
'LL2781P'     'STOP'  'ORAT'  0/
'LL2788P'     'OPEN'  'ORAT'  207/
/
TSTEP
31 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  79/
'LL2610P'     'OPEN'  'ORAT'  66/
'LL2781P'     'OPEN'  'ORAT'  75/
'LL2788P'     'OPEN'  'ORAT'  329/
/
TSTEP
30 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  74/
'LL2610P'     'OPEN'  'ORAT'  110/
'LL2781P'     'OPEN'  'ORAT'  122/
'LL2788P'     'OPEN'  'ORAT'  275/
/
TSTEP
62 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  35/
'LL2610P'     'OPEN'  'ORAT'  103/
'LL2781P'     'OPEN'  'ORAT'  159/
'LL2788P'     'OPEN'  'ORAT'  311/
/
TSTEP
61 /
WCONHIST
'LL2366P'     'STOP'  'ORAT'  0/
'LL2610P'     'OPEN'  'ORAT'  97/
'LL2781P'     'OPEN'  'ORAT'  134/
'LL2788P'     'OPEN'  'ORAT'  292/
/
TSTEP
30 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  32/
'LL2610P'     'OPEN'  'ORAT'  108/
'LL2781P'     'OPEN'  'ORAT'  149/
'LL2788P'     'OPEN'  'ORAT'  312/
/
TSTEP
31 /
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-- ================== YEAR 1986
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  22/
'LL2610P'     'OPEN'  'ORAT'  103/
'LL2781P'     'OPEN'  'ORAT'  134/
'LL2788P'     'OPEN'  'ORAT'  237/
/
TSTEP
59 /
WCONHIST
'LL2366P'     'STOP'  'ORAT'  0/
'LL2610P'     'OPEN'  'ORAT'  27/
'LL2781P'     'OPEN'  'ORAT'  112/
'LL2788P'     'OPEN'  'ORAT'  186/
/
TSTEP
31 /
WCONHIST
'LL2366P'     'STOP'  'ORAT'  0/
'LL2781P'     'OPEN'  'ORAT'  113/
'LL2788P'     'OPEN'  'ORAT'  177/
/
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2138  1*  1*  12*
0.75  580 /
/
TSTEP
15 /  -- INJECTION
WELLSHUT
LL2610I /
/
TSTEP
15 / -- INTITAL SOAK LL2610

WCONHIST
'LL2781P'     'OPEN'  'ORAT'  118/
'LL2788P'     'OPEN'  'ORAT'  186/
/
WELLSHUT
LL2366P /
/
WELLINJE
LL2366I  WA  1*  WA  1*  2050  1*  1*  12*
0.75  580 /
/
TSTEP
17 /  -- INJECTION
WELLSHUT
LL2366I /
/
TSTEP
14 / --  FINAL SOAK LL2610 AND LL2366

WCONHIST
'LL2366P'     'OPEN'  'ORAT'  243/
'LL2610P'     'OPEN'  'ORAT'  48/
'LL2781P'     'OPEN'  'ORAT'  129/
'LL2788P'     'OPEN'  'ORAT'  176/
/
TSTEP
30 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  372/
'LL2610P'     'OPEN'  'ORAT'  72/
```

```
 'LL2781P'       'OPEN'  'ORAT'  139/
 'LL2788P'       'OPEN'  'ORAT'  196/
 /
TSTEP
31 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  514/
 'LL2610P'       'OPEN'  'ORAT'  75/
 'LL2781P'       'OPEN'  'ORAT'  156/
 'LL2788P'       'OPEN'  'ORAT'  181/
 /
TSTEP
31 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  403/
 'LL2610P'       'OPEN'  'ORAT'  164/
 'LL2788P'       'OPEN'  'ORAT'  197/
 /
TSTEP
61 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  340/
 'LL2610P'       'OPEN'  'ORAT'  171/
 'LL2781P'       'OPEN'  'ORAT'  132/
 'LL2788P'       'OPEN'  'ORAT'  173/
 /
TSTEP
30 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  299/
 'LL2610P'       'OPEN'  'ORAT'  174/
 'LL2781P'       'OPEN'  'ORAT'  138/
 'LL2788P'       'OPEN'  'ORAT'  163/
 /
TSTEP
31 /
-- ================== YEAR 1987
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  236/
 'LL2610P'       'OPEN'  'ORAT'  266/
 'LL2781P'       'OPEN'  'ORAT'  135/
 'LL2788P'       'OPEN'  'ORAT'  174/
 /
TSTEP
59 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  190/
 'LL2610P'       'OPEN'  'ORAT'  309/
 'LL2781P'       'OPEN'  'ORAT'  114/
 'LL2788P'       'OPEN'  'ORAT'  146/
 /
TSTEP
61 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  208/
 'LL2610P'       'OPEN'  'ORAT'  317/
 'LL2781P'       'OPEN'  'ORAT'  134/
 'LL2788P'       'OPEN'  'ORAT'  171/
 /
TSTEP
61 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  166/
 'LL2610P'       'OPEN'  'ORAT'  251/
 'LL2781P'       'OPEN'  'ORAT'  141/
 'LL2788P'       'OPEN'  'ORAT'  159/
 /
TSTEP
62 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  133/
 'LL2610P'       'OPEN'  'ORAT'  252/
 'LL2781P'       'OPEN'  'ORAT'  131/
 'LL2788P'       'OPEN'  'ORAT'  140/
 /
TSTEP
61 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  178/
 'LL2610P'       'OPEN'  'ORAT'  205/
 'LL2781P'       'OPEN'  'ORAT'  131/
 'LL2788P'       'OPEN'  'ORAT'  129/
 /
TSTEP
30 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  204/
 'LL2610P'       'OPEN'  'ORAT'  195/
 'LL2781P'       'OPEN'  'ORAT'  131/
 'LL2788P'       'OPEN'  'ORAT'  129/
 /
TSTEP
31 /
-- ================== YEAR 1988
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  168/
 'LL2610P'       'OPEN'  'ORAT'  132/
 'LL2781P'       'OPEN'  'ORAT'  112/
 'LL2788P'       'OPEN'  'ORAT'  102/
 /
TSTEP
60 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  221/
 'LL2610P'       'OPEN'  'ORAT'  161/
 'LL2781P'       'OPEN'  'ORAT'  120/
 'LL2788P'       'OPEN'  'ORAT'  6/
 /
TSTEP
61 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  103/
 'LL2610P'       'OPEN'  'ORAT'  160/
 'LL2781P'       'OPEN'  'ORAT'  71/
 'LL2788P'       'STOP'  'ORAT'  0/
 /
TSTEP
61 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  69/
 'LL2610P'       'OPEN'  'ORAT'  207/
 'LL2781P'       'OPEN'  'ORAT'  134/
 'LL2788P'       'STOP'  'ORAT'  0/
 /
TSTEP
31 /
WCONHIST
 'LL2366P'       'OPEN'  'ORAT'  97/
 'LL2610P'       'OPEN'  'ORAT'  168/
 'LL2781P'       'OPEN'  'ORAT'  124/
 /
WELLSHUT
LL2788P /
 /
```

```
WELLINJE
LL2788I  WA  1*  WA  1*  2443  1*  1*  12*
0.75  580 /
/
TSTEP
16 /  -- INJECTION
WELLSHUT
LL2788I /
/
TSTEP
15 /  -- INITIAL SOAK
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  138/
'LL2610P'      'OPEN'  'ORAT'  164/
'LL2781P'      'OPEN'  'ORAT'  114/
/
TSTEP
11 /  -- FINAL SOAK
WCONHIST
'LL2788P'      'OPEN'  'ORAT'  2492/
/
TSTEP
19 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  124/
'LL2610P'      'OPEN'  'ORAT'  81/
'LL2781P'      'OPEN'  'ORAT'  110/
'LL2788P'      'OPEN'  'ORAT'  2492/
/
TSTEP
31 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  279/
'LL2610P'      'OPEN'  'ORAT'  112/
'LL2781P'      'OPEN'  'ORAT'  114/
'LL2788P'      'OPEN'  'ORAT'  915/
/
TSTEP
30 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  199/
'LL2610P'      'OPEN'  'ORAT'  162/
'LL2781P'      'OPEN'  'ORAT'  114/
'LL2788P'      'OPEN'  'ORAT'  52/
/
TSTEP
31 /
-- ================== YEAR 1989
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  27/
'LL2610P'      'OPEN'  'ORAT'  140/
'LL2781P'      'OPEN'  'ORAT'  35/
'LL2788P'      'OPEN'  'ORAT'  50/
/
TSTEP
59 /
WCONHIST
'LL2610P'      'OPEN'  'ORAT'  113/
'LL2781P'      'STOP'  'ORAT'  0/
'LL2788P'      'OPEN'  'ORAT'  38/
/
WELLSHUT
LL2366P /
/
WELLINJE
LL2366I  WA  1*  WA  1*  2706  1*  1*  12*
0.75  580 /
/
TSTEP
14 /  -- INJECTION
WELLSHUT
LL2366I /
/
TSTEP
17 /  INTIAL SOAK LL2366
WCONHIST
'LL2610P'      'OPEN'  'ORAT'  47/
'LL2781P'      'STOP'  'ORAT'  0/
'LL2788P'      'OPEN'  'ORAT'  33/
/
TSTEP
24 / -- FINAL SOAK LL2366
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  230/
/
TSTEP
6 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  242/
'LL2610P'      'STOP'  'ORAT'  0/
'LL2781P'      'STOP'  'ORAT'  0/
'LL2788P'      'OPEN'  'ORAT'  36/
/
TSTEP
31 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  293/
'LL2610P'      'STOP'  'ORAT'  0/
'LL2781P'      'STOP'  'ORAT'  0/
'LL2788P'      'OPEN'  'ORAT'  36/
/
TSTEP
19 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2606  1*  1*  12*
0.75  580 /
/
TSTEP
11 /  -- INITIAL INJECTION
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  258/
'LL2781P'      'STOP'  'ORAT'  0/
'LL2788P'      'OPEN'  'ORAT'  35/
/
TSTEP
3 / -- FINAL INJECTION
WELLSHUT
LL2610I /
/
TSTEP
21 /  -- SOAK
WCONHIST
'LL2610P'      'OPEN'  'ORAT'  1/
/
TSTEP
7 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  228/
'LL2610P'      'OPEN'  'ORAT'  1/
'LL2781P'      'STOP'  'ORAT'  0/
'LL2788P'      'OPEN'  'ORAT'  33/
```

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/
TSTEP
31 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  187/
'LL2610P'     'OPEN'  'ORAT'  4/
'LL2781P'     'OPEN'  'ORAT'  87/
'LL2788P'     'OPEN'  'ORAT'  29/
/
TSTEP
30 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  206/
'LL2610P'     'OPEN'  'ORAT'  165/
'LL2781P'     'OPEN'  'ORAT'  135/
'LL2788P'     'OPEN'  'ORAT'  34/
/
TSTEP
31 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  168/
'LL2610P'     'OPEN'  'ORAT'  175/
'LL2781P'     'OPEN'  'ORAT'  113/
'LL2788P'     'OPEN'  'ORAT'  32/
/
TSTEP
30 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  134/
'LL2610P'     'OPEN'  'ORAT'  273/
'LL2781P'     'OPEN'  'ORAT'  116/
'LL2788P'     'OPEN'  'ORAT'  38/
/
TSTEP
31 /
-- ================== YEAR 1990
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  145/
'LL2610P'     'OPEN'  'ORAT'  308/
'LL2781P'     'OPEN'  'ORAT'  101/
'LL2788P'     'OPEN'  'ORAT'  16/
/
TSTEP
31 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  154/
'LL2610P'     'OPEN'  'ORAT'  166/
'LL2781P'     'OPEN'  'ORAT'  91/
'LL2788P'     'STOP'  'ORAT'  0/
/
TSTEP
28 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  116/
'LL2610P'     'OPEN'  'ORAT'  246/
'LL2781P'     'OPEN'  'ORAT'  90/
'LL2788P'     'STOP'  'OPEN'  0/
/
TSTEP
31 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  159/
'LL2610P'     'OPEN'  'ORAT'  294/
'LL2781P'     'OPEN'  'ORAT'  88/
'LL2788P'     'OPEN'  'ORAT'  18/
/
TSTEP
30 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  164/
'LL2610P'     'OPEN'  'ORAT'  299/
'LL2781P'     'OPEN'  'ORAT'  53/
'LL2788P'     'STOP'  'ORAT'  0/
/
TSTEP
61 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  157/
'LL2610P'     'OPEN'  'ORAT'  206/
'LL2781P'     'OPEN'  'ORAT'  95/
'LL2788P'     'STOP'  'ORAT'  0/
/
TSTEP
62 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  146/
'LL2610P'     'OPEN'  'ORAT'  176/
'LL2781P'     'OPEN'  'ORAT'  88/
'LL2788P'     'STOP'  'ORAT'  0/
/
TSTEP
61 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  142/
'LL2610P'     'OPEN'  'ORAT'  204/
'LL2781P'     'OPEN'  'ORAT'  94/
'LL2788P'     'STOP'  'ORAT'  0/
/
TSTEP
30 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  122/
'LL2610P'     'OPEN'  'ORAT'  202/
'LL2781P'     'OPEN'  'ORAT'  86/
'LL2788P'     'OPEN'  'ORAT'  1/
/
TSTEP
31 /
-- ================== YEAR 1991
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  130/
'LL2610P'     'OPEN'  'ORAT'  165/
'LL2781P'     'OPEN'  'ORAT'  96/
'LL2788P'     'OPEN'  'ORAT'  74/
/
TSTEP
31 /
WCONHIST
'LL2366P'     'OPEN'  'ORAT'  128/
'LL2610P'     'OPEN'  'ORAT'  145/
'LL2781P'     'OPEN'  'ORAT'  93/
/
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2781  1*  1*  12*
0.75  580 /
/
TSTEP
13 /  -- INJECTION
WELLSHUT
LL2788I /
/
```

```
TSTEP
3 /  -- SOAK
WCONHIST
'LL2788P'      'OPEN'  'ORAT'  150/
/
TSTEP
12 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  95/
'LL2610P'      'OPEN'  'ORAT'  170/
'LL2781P'      'OPEN'  'ORAT'  94/
'LL2788P'      'OPEN'  'ORAT'  150/
/
TSTEP
31 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  108/
'LL2610P'      'OPEN'  'ORAT'  172/
'LL2781P'      'OPEN'  'ORAT'  101/
'LL2788P'      'OPEN'  'ORAT'  22/
/
TSTEP
30 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  75/
'LL2610P'      'OPEN'  'ORAT'  203/
'LL2781P'      'OPEN'  'ORAT'  82/
'LL2788P'      'OPEN'  'ORAT'  45/
/
TSTEP
61 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  41/
'LL2610P'      'OPEN'  'ORAT'  276/
'LL2781P'      'OPEN'  'ORAT'  94/
'LL2788P'      'OPEN'  'ORAT'  46/
/
TSTEP
31 /
WCONHIST
'LL2610P'      'OPEN'  'ORAT'  238/
'LL2781P'      'OPEN'  'ORAT'  82/
'LL2788P'      'OPEN'  'ORAT'  76/
/
WELLSHUT
LL2366P /
/
WELLINJE
LL2366I  WA  1*  WA  1*  2781  1*  1*  12*
0.75  580 /
/
TSTEP
14 /  -- INJECTION
WELLSHUT
LL2366I /
/
TSTEP
10 / -- SOAK
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  500/
/
TSTEP
7 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  36/
'LL2610P'      'OPEN'  'ORAT'  251/
'LL2781P'      'OPEN'  'ORAT'  97/
'LL2788P'      'OPEN'  'ORAT'  40/
/
TSTEP
30 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  63/
'LL2610P'      'OPEN'  'ORAT'  256/
'LL2781P'      'OPEN'  'ORAT'  125/
'LL2788P'      'OPEN'  'ORAT'  37/
/
TSTEP
31 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  76/
'LL2610P'      'OPEN'  'ORAT'  154/
'LL2781P'      'OPEN'  'ORAT'  115/
'LL2788P'      'OPEN'  'ORAT'  42/
/
TSTEP
30 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  87/
'LL2610P'      'OPEN'  'ORAT'  194/
'LL2781P'      'OPEN'  'ORAT'  133/
'LL2788P'      'OPEN'  'ORAT'  10/
/
TSTEP
31 /
-- ================= YEAR 1992
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  85/
'LL2610P'      'OPEN'  ORAT'   201/
'LL2781P'      'OPEN'  'ORAT'  160/
'LL2788P'      'OPEN'  'ORAT'  28/
/
TSTEP
60 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  86/
'LL2610P'      'OPEN'  'ORAT'  101/
'LL2781P'      'OPEN'  'ORAT'  172/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
61 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  84/
'LL2610P'      'OPEN'  'ORAT'  96/
'LL2781P'      'OPEN'  'ORAT'  70/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
61 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  100/
'LL2610P'      'OPEN'  'ORAT'  107/
'LL2781P'      'OPEN'  'ORAT'  80/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
62 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  78/
'LL2610P'      'OPEN'  'ORAT'  73/
'LL2781P'      'OPEN'  'ORAT'  94/
'LL2788P'      'STOP'  'ORAT'  0/
/
```

```
TSTEP
61 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  83/
'LL2610P'      'OPEN'  'ORAT'  159/
'LL2781P'      'OPEN'  'ORAT'  92/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
30 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  86/
'LL2610P'      'OPEN'  'ORAT'  154/
'LL2781P'      'OPEN'  'ORAT'  88/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
31 /
-- ================== YEAR 1993
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  82/
'LL2610P'      'OPEN'  'ORAT'  136/
'LL2781P'      'OPEN'  'ORAT'  84/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
59 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  66/
'LL2610P'      'OPEN'  'ORAT'  88/
'LL2781P'      'OPEN'  'ORAT'  72/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
61 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  77/
'LL2610P'      'OPEN'  'ORAT'  165/
'LL2781P'      'OPEN'  'ORAT'  74/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
61 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  89/
'LL2610P'      'OPEN'  'ORAT'  179/
'LL2781P'      'OPEN'  'ORAT'  93/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
62 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  83/
'LL2610P'      'OPEN'  'ORAT'  139/
'LL2781P'      'OPEN'  'ORAT'  112/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
61 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  77/
'LL2610P'      'OPEN'  'ORAT'  78/
'LL2781P'      'OPEN'  'ORAT'  190/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
30 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  65/
'LL2610P'      'OPEN'  'ORAT'  140/
'LL2781P'      'OPEN'  'ORAT'  182/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
31 /
-- ================== YEAR 1994
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  81/
'LL2610P'      'OPEN'  'ORAT'  164/
'LL2781P'      'OPEN'  'ORAT'  117/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
31 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  97/
'LL2781P'      'OPEN'  'ORAT'  86/
'LL2788P'      'STOP'  'ORAT'  0/
/
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2581  1*  1*  12*
0.75  580 /
/
TSTEP
10 /  -- INJECTION
WELLSHUT
LL2610I /
/
TSTEP
7 / -- SOAK
WCONHIST
'LL2610P'      'OPEN'  'ORAT'  92/
/
TSTEP
11 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  94/
'LL2610P'      'OPEN'  'ORAT'  92/
'LL2781P'      'OPEN'  'ORAT'  102/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
31 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  91/
'LL2610P'      'OPEN'  'ORAT'  121/
'LL2781P'      'OPEN'  'ORAT'  86/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
30 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  95/
'LL2610P'      'OPEN'  'ORAT'  202/
'LL2781P'      'OPEN'  'ORAT'  81/
'LL2788P'      'STOP'  'ORAT'  0/
/
TSTEP
31 /
WCONHIST
'LL2366P'      'OPEN'  'ORAT'  93/
```

```
'LL2610P'         'OPEN'  'ORAT'  211/
'LL2781P'         'OPEN'  'ORAT'  129/
'LL2788P'         'STOP'  'ORAT'  0/
/
TSTEP
30 /
WCONHIST
'LL2366P'         'OPEN'  'ORAT'  91/
'LL2610P'         'OPEN'  'ORAT'  150/
'LL2781P'         'OPEN'  'ORAT'  121/
'LL2788P'         'STOP'  'ORAT'  0/
/
TSTEP
62 /
WCONHIST
'LL2366P'         'OPEN'  'ORAT'  82/
'LL2610P'         'OPEN'  'ORAT'  165/
'LL2781P'         'OPEN'  'ORAT'  128/
'LL2788P'         'STOP'  'ORAT'  0/
/
TSTEP
61 /
WCONHIST
'LL2366P'         'OPEN'  'ORAT'  91/
'LL2610P'         'OPEN'  'ORAT'  145/
'LL2781P'         'OPEN'  'ORAT'  145/
'LL2788P'         'STOP'  'ORAT'  0/
/
TSTEP
30 /
WCONHIST
'LL2366P'         'OPEN'  'ORAT'  75
'LL2610P'         'OPEN'  'ORAT'  52
'LL2781P'         'OPEN'  'ORAT'  148
'LL2788P'         'STOP'  'ORAT'  0
/
TSTEP
31 /
-- ================= YEAR 1995
WCONHIST
'LL2366P'         'OPEN'  'ORAT'  94/
'LL2610P'         'OPEN'  'ORAT'  81/
'LL2781P'         'OPEN'  'ORAT'  149/
'LL2788P'         'STOP'  'ORAT'  0/
/
TSTEP
59 /
WCONHIST
'LL2366P'         'OPEN'  'ORAT'  90/
'LL2610P'         'OPEN'  'ORAT'  86/
'LL2781P'         'OPEN'  'ORAT'  140/
'LL2788P'         'STOP'  'ORAT'  0/
/
TSTEP
61 /
WCONHIST
'LL2366P'         'OPEN'  'ORAT'  52/
'LL2610P'         'OPEN'  'ORAT'  92/
'LL2781P'         'OPEN'  'ORAT'  61/
'LL2788P'         'STOP'  'ORAT'  0/
/
TSTEP
61 /
WCONHIST
'LL2366P'         'OPEN'  'ORAT'  42/
'LL2610P'         'OPEN'  'ORAT'  101/
'LL2781P'         'OPEN'  'ORAT'  26/
'LL2788P'         'STOP'  'ORAT'  0/
/
TSTEP
31 /
WCONHIST
'LL2366P'         'OPEN'  'ORAT'  43/
'LL2610P'         'OPEN'  'ORAT'  96/
'LL2781P'         'OPEN'  'ORAT'  4/
'LL2788P'         'STOP'  'ORAT'  0/
'LL3343HP'        'OPEN'  'ORAT'  92/
/
TSTEP
31 /
WCONHIST
'LL2366P'         'OPEN'  'ORAT'  43/
'LL2610P'         'OPEN'  'ORAT'  78/
'LL2781P'         'OPEN'  'ORAT'  4/
'LL2788P'         'STOP'  'ORAT'  0/
'LL3343HP'        'OPEN'  'ORAT'  75/
/
TSTEP
30 /
WCONHIST
'LL2366P'         'OPEN'  'ORAT'  44/
'LL2610P'         'OPEN'  'ORAT'  84/
'LL2781P'         'OPEN'  'ORAT'  4/
'LL2788P'         'STOP'  'ORAT'  0/
/
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  2456  1*  1*  12*
0.75  580 /
/
TSTEP
25 /  -- INJECTION
WELLSHUT
LL3343HI /
/
TSTEP
6 / -- SOAK
WCONHIST
'LL2366P'         'OPEN'  'ORAT'  43/
'LL2610P'         'OPEN'  'ORAT'  128/
'LL2781P'         'OPEN'  'ORAT'  27/
'LL2788P'         'STOP'  'ORAT'  0/
'LL3343HP'        'OPEN'  'ORAT'  400/
/
TSTEP
30 /
WCONHIST
'LL2366P'         'OPEN'  'ORAT'  29/
'LL2610P'         'OPEN'  'ORAT'  100/
'LL2781P'         'OPEN'  'ORAT'  16/
'LL2788P'         'STOP'  'ORAT'  0/
'LL3343HP'        'OPEN'  'ORAT'  271/
/
TSTEP
31 /
-- ================= YEAR 1996
WCONHIST
'LL2366P'         'STOP'  'ORAT'  0/
'LL2610P'         'OPEN'  'ORAT'  51/
'LL2781P'         'OPEN'  'ORAT'  18/
'LL2788P'         'STOP'  'ORAT'  0/
'LL3343HP'        'OPEN'  'ORAT'  276/
```

```
/
TSTEP
60 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  84/
'LL2781P'       'OPEN'  'ORAT'  17/
'LL2788P'       'STOP'  'ORAT'  0/
'LL3343HP'      'OPEN'  'ORAT'  423/
/
TSTEP
61 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  94/
'LL2781P'       'OPEN'  'ORAT'  23/
'LL2788P'       'STOP'  'ORAT'  0/
'LL3343HP'      'OPEN'  ORAT'   323/
/
TSTEP
61 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  33/
'LL2781P'       'OPEN'  'ORAT'  8/
'LL2788P'       'STOP'  'ORAT'  0/
'LL3343HP'      'OPEN'  'ORAT'  330/
/
TSTEP
62 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  13/
'LL2781P'       'OPEN'  'ORAT'  24/
'LL2788P'       'STOP'  'ORAT'  0/
'LL3343HP'      'OPEN'  'ORAT'  293/
/
TSTEP
61 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0
'LL2610P'       'OPEN'  'ORAT'  13
'LL2781P'       'OPEN'  'ORAT'  25
'LL2788P'       'STOP'  'ORAT'  0
'LL3343HP'      'OPEN'  'ORAT'  196
/
TSTEP
30 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  13/
'LL2781P'       'OPEN'  'ORAT'  38/
'LL2788P'       'STOP'  'ORAT'  0/
'LL3343HP'      'OPEN'  'ORAT'  191/
/
TSTEP
31 /
-- ================== YEAR 1997
COMPDATL
LL2366P RLL2366 3 3 1 3 3* 0.6 1* 7 /--
layer ap1 - ap3
LL2366P RLL2366 3 3 4 4 3* 0.6  60966 7 /--
layer ap4
LL2610P RLL2610 1 1 1 9 3* 0.6 1*  25 /
LL2610P RLL2610 1 1 10 10 3* 0.6  10725 25
/-- partial completion in layer hh
LL2781P RLL2781 1 1 1 3 3* 0.6 11181 3 /
LL2781P RLL2781 1 1 4 9 3* 0.6 1*  3 /
LL2781P RLL2781 1 1 10 10 3* 0.6 12199 3
/-- partial completio in layer hh
LL2788P RLL2788 3 3 1 1 3* 0.6 5822 7 /  --
layer ap1
LL2788P RLL2788 3 3 2 3 3* 0.6 1* 7/
LL2788P RLL2788 3 3 4 4 3* 0.6 91985 7 /  -
- layer ap4
/
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  13/
'LL2781P'       'OPEN'  'ORAT'  34/
'LL2788P'       'STOP'  'ORAT'  0/
'LL3343HP'      'OPEN'  'ORAT'  177/
/
TSTEP
59 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  13/
'LL2781P'       'OPEN'  'ORAT'  34/
'LL2788P'       'STOP'  'ORAT'  0/
'LL3343HP'      'OPEN'  'ORAT'  168/
/
TSTEP
61 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  56/
'LL2781P'       'OPEN'  'ORAT'  52/
'LL2788P'       'STOP'  'ORAT'  0/
'LL3343HP'      'OPEN'  'ORAT'  157/
/
TSTEP
61 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  55/
'LL2781P'       'OPEN'  'ORAT'  62/
'LL2788P'       'STOP'  'ORAT'  0/
'LL3343HP'      'OPEN'  'ORAT'  161/
/
TSTEP
62 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  56/
'LL2781P'       'OPEN'  'ORAT'  37/
'LL2788P'       'STOP'  'ORAT'  0/
'LL3343HP'      'OPEN'  'ORAT'  119/
/
TSTEP
61 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  55/
'LL2781P'       'OPEN'  'ORAT'  36/
'LL2788P'       'STOP'  'ORAT'  0/
/
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  4063  1*  1*  12*
0.75  580 /
/
```

```
TSTEP
18 /  -- INJECTION
WELLSHUT
LL3343HI /
/
TSTEP
5 /  -- SOAK
WCONHIST
'LL3343HP'      'OPEN'  'ORAT'  640
/
TSTEP
7 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  54/
'LL2781P'       'OPEN'  'ORAT'  36/
'LL2788P'       'STOP'  'ORAT'  0/
'LL3343HP'      'OPEN'  'ORAT'  640/
/
TSTEP
31 /
-- ================== YEAR 1998
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  53/
'LL2781P'       'OPEN'  'ORAT'  35/
'LL2788P'       'STOP'  'ORAT'  0/
'LL3343HP'      'OPEN'  'ORAT'  630/
/
TSTEP
31 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  53/
'LL2781P'       'OPEN'  'ORAT'  73/
'LL2788P'       'STOP'  'ORAT'  0/
'LL3343HP'      'OPEN'  'ORAT'  498/
/
TSTEP
28 /
WCONHIST
'LL2366P'       'STOP'  'ORAT'  0/
'LL2610P'       'OPEN'  'ORAT'  63/
'LL2781P'       'OPEN'  'ORAT'  113/
'LL2788P'       'OPEN'  'ORAT'  0/
'LL3343HP'      'OPEN'  'ORAT'  445/
/
TSTEP
31 /
END
```

Case 1: No Further Cyclic Steam Injection

```
-- AREA LL3343H: 3D CYCLIC STEAM INJECTION
-- CASE 1: NO FUTHER CICLIC STEAM INJECTION

RESTART
LL3343LJ 169 /
DATUM
3000 /
OUTSOL
PRES    TEMP    SOIL   SWAT   SGAS XMF  YMF  /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  ========================

SATNUM
297*1
297*2
297*3
297*4
297*5 /
BOX
7 7 1 27 1 1 /
SATNUM
27*6 /
ENDBOX
BOX
7 7 1 27 2 2 /
SATNUM
27*7 /
ENDBOX
BOX
7 7 1 27 3 3 /
SATNUM
27*8 /
ENDBOX
BOX
7 7 1 27 4 4 /
SATNUM
27*9 /
ENDBOX

SUMMARY ===============================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL2366P'  'LL2610P'  'LL2781P'  'LL2788P'
'LL3343HP'  /
WOPR
'LL2366P'  'LL2610P'  'LL2781P'  'LL2788P'
'LL3343HP'  /
WLPR
'LL2366P'  'LL2610P'  'LL2781P'  'LL2788P'
'LL3343HP'  /
WOPRH
'LL2366P'  'LL2610P'  'LL2781P'  'LL2788P'
'LL3343HP'  /
WTEMP
'LL2366P'  'LL2610P'  'LL2781P'  'LL2788P'
'LL3343HP'  /
WGOR
```

```
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WWCT
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
/
WBHP
'LL2366I' 'LL2610I' 'LL2781I' 'LL2788I'
'LL3343HI' /

DATE
RUNSUM

SCHEDULE  ============================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /

RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /

SEPCOND
SEP FIELD 1   90 75 /
/

COMPDATL
LL2610P RLL2610 1  1  1   9 3* 0.6   1*    35 /
LL2610P RLL2610 1  1 10  10 3* 0.6  10725 35 /
-- partial completion in layer hh
LL2781P RLL2781 1  1  1   3 3* 0.6  11181   0 /
LL2781P RLL2781 1  1  4   9 3* 0.6    1*    0 /
LL2781P RLL2781 1  1 10  10 3* 0.6  12199   0 /
-- partial completio in layer hh
/

-- ==================    PREDICTION
WELLSHUT
LL2610I /
LL2781I /
LL2788I /
LL3343HI /
/
WELLPROD
LL2610P   BHP  4*  475 /
LL2781P   BHP  4*  475 /
LL2788P   BHP  4*  475 /
LL3343HP  BHP  4*  600 /
/
TSTEP
30  31  30  31  31  30  31  30  31 /
-- ================== YEAR 1999
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2000
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2001
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2002
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2003
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2005
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2006
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
END
```

Case 2: Continuing Cyclic Steaming in the Existing Active Wells

```
-- AREA LL3343H 3D CYCLIC STEAM INJECTION
-- CASE 2: CONTINUE CICLYC STEAMING
-- EXISTING ACTIVE WELLS

RESTART
LL3343L1 169 /
DATUM
3000 /
OUTSOL
PRES    TEMP    SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/
```

```
REGIONS =========================

SATNUM
297*1
297*2
297*3
297*4
297*5 /
BOX
7 7 1 27 1 1 /
SATNUM
27*6 /
ENDBOX
BOX
7 7 1 27 2 2 /
SATNUM
27*7 /
ENDBOX
BOX
7 7 1 27 3 3 /
SATNUM
27*8 /
ENDBOX
BOX
7 7 1 27 4 4 /
SATNUM
27*9 /

ENDBOX

SUMMARY ================================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WOPR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WLPR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WOPRH
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WTEMP
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WGOR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3178P' /
WWCT
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
/
WBHP
'LL2366I' 'LL2610I' 'LL2781I' 'LL2788I'
'LL3343HI' /

DATE
RUNSUM

SCHEDULE ===============================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/
COMPDATL
LL2610P RLL2610 1 1 1   9  3* 0.6    1*   35 /
LL2610P RLL2610 1 1 10  10 3* 0.6  10725  35 /
-- partial completion in layer hh
LL2781P RLL2781 1 1 1   3  3* 0.6  11181   0 /
LL2781P RLL2781 1 1 4   9  3* 0.6    1*    0 /
LL2781P RLL2781 1 1 10  10 3* 0.6  12199   0 /
-- partial completio in layer hh

-- ===================   PREDICTION
WELLPROD
LL2610P   BHP  4*  475 /
LL2781P   BHP  4*  475 /
LL2788P   BHP  4*  475 /
LL3343HP  BHP  4*  600 /
/
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2788I /
/
```

```
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5  31  30  31  30  31 /
-- ================== YEAR 1999
TSTEP
31  28  31  30  31  30  31  31 /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2788I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5 /
-- ================== YEAR 2000
TSTEP
31  29  31  30  31  30  31  31  30  31  30
31 /
-- ================== YEAR 2001
TSTEP
31  28  31 /
WELLSHUT
LL2781P /
/
```

```
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2788I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5  31  30  31  30  31 /
-- ================== YEAR 2002
TSTEP
31  28  31  30  31  30  31  31 /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2788I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
```

```
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5 /
-- ================== YEAR 2003
TSTEP
31  28  31  30  31  30  31  31  30  31  30
31 /
-- ================== YEAR 2004
TSTEP
31  29  31 /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2788I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD

WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5  31  30  31  30  31 /
-- ================== YEAR 2005
TSTEP
31  28  31  30  31  30  31  31 /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
```

```
LL2788I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5 /
-- ================== YEAR 2006
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31  28  31  /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2788I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31  29  31  30  31  30  31  31 /
WELLSHUT
LL2781P /
```

```
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6  31  30 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31  0  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31  28  31 /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6  31  30  31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31  28  31  30  31  30  31  31 /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6  31  30  31 /
-- ================== YEAR 2012
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31  30  31  31  30  31  30  31
/
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30 31 31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
END
```

Case 3: Steamflooding – Horizontal Well as Injector, Existing Active Vertical Wells as Producers

```
-- AREA LL3343H:3D CYCLIC STEAM INJECTION
-- CASE 3: STEAMFLOODING - HORIZONTAL WELL
-- AS INJECTOR EXISITNG VERTICAL WELLS AS
-- PRODUCERS

RESTART
LL3343L1 169 /
DATUM
3000 /
OUTSOL
PRES    TEMP    SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  ========================
```

```
SATNUM
297*1
297*2
297*3
297*4
297*5 /
BOX
7 7 1 27 1 1 /
SATNUM
27*6 /
ENDBOX
BOX
7 7 1 27 2 2 /
SATNUM
27*7 /
ENDBOX
BOX
7 7 1 27 3 3 /
SATNUM
27*8 /
ENDBOX
BOX
7 7 1 27 4 4 /
SATNUM
27*9 /
ENDBOX

SUMMARY ================================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WOPR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WLPR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WOPRH
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WTEMP
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
WGOR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3178P' /
WWCT
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' /
/
WBHP
'LL2366I' 'LL2610I' 'LL2781I' 'LL2788I'
'LL3343HI' /

DATE
RUNSUM

SCHEDULE  ==========================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/

COMPDATL
LL2610P RLL2610 1 1 1   9  3* 0.6    1*   35 /
LL2610P RLL2610 1 1 10  10 3* 0.6  10725  35 /
-- partial completion in layer hh
LL2781P RLL2781 1 1 1   3  3* 0.6  11181   0 /
LL2781P RLL2781 1 1 4   9  3* 0.6     1*   0 /
LL2781P RLL2781 1 1 10  10 3* 0.6  12199   0 /
-- partial completio in layer hh
/

-- ==================   PREDICTION FROM
WELLPROD
LL2610P   BHP  4*  475 /
LL2781P   BHP  4*  475 /
LL2788P   BHP  4*  475 /
/
WELLSHUT
LL2610I /
LL2781I /
LL2788I /
LL2366I /
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1500
12*  0.75  580  /
/
TSTEP
30  31  30  31  31  30  31  30  31 /
-- ================== YEAR 1999
TSTEP
31 28 31 30 31 30 31 31  30  31  30  31 /
-- ================== YEAR 2000
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2001
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2002
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2003
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2005
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
```

```
-- ================== YEAR 2006
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
END
```

Case 4: Cyclic Steaming All Existing Wells and Two New Wells

```
-- AREA LL3343H: 3D CYCLI STEAM INYECTION
-- CASE 4: CICLYC STEAMING ALL EXISITNG
-- WELL AND TWO NEW WELLS

RESTART
LL3343 169 /
DATUM
3000 /
OUTSOL
PRES    TEMP    SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  ========================

SATNUM
297*1
297*2
297*3
297*4
297*5 /
BOX
7 7 1 27 1 1 /
SATNUM
27*6 /
ENDBOX
BOX
7 7 1 27 2 2 /
SATNUM
27*7 /
ENDBOX
BOX
7 7 1 27 3 3 /
SATNUM
27*8 /
ENDBOX
BOX
7 7 1 27 4 4 /
SATNUM
27*9 /
ENDBOX

SUMMARY ================================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' 'WELL01P' 'WELL02P' /
WOPR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' 'WELL01P' 'WELL02P' /
WLPR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' 'WELL01P' 'WELL02P' /
WOPRH
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' 'WELL01P' 'WELL02P' /
WTEMP
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' 'WELL01P' 'WELL02P' /
WGOR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3178P' 'WELL01P' 'WELL02P' /
WWCT
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' 'WELL01P' 'WELL02P' /
/
WBHP
'LL2366I' 'LL2610I' 'LL2781I' 'LL2788I'
'LL3343HI''WELL01I' 'WELL02I' /
```

```
DATE
RUNSUM

SCHEDULE   ==============================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1    90 75 /
/
WELSPECS
WELL01I  FIELD    1  16  3000 /
WELL01P  FIELD    1  16  3000 /
WELL02I  FIELD    1  23  3000 /
WELL02P  FIELD    1  23  3000 /
/
COMPDAT
WELL01I  1 16  1  4  3*   0.6 /
WELL01P  1 16  1  4  3*   0.6 /
WELL02I  1 23  1  4  3*   0.6 /
WELL02P  1 23  1  4  3*   0.6 /
/
COMPDAT
LL2610P  7 16 1 3 3* 0.6    1*    35 /
LL2610P  7 16 4 4 3* 0.6  10725  35 /  --
partial completion in layer 4
LL2781P  7  2 1 1 3* 0.6  11181   0 / --
layer ap1
LL2781P  7  2 2 3 3* 0.6    1*    0 /
-- layer ap2 - ap3
LL2781P  7  2 4 4 3* 0.6   12199  0 / --
partial completion layer 4
/

-- ==================   PREDICTION
WELLPROD
LL2610P   BHP  4*  475 /
LL2781P   BHP  4*  475 /
LL2788P   BHP  4*  475 /
LL3343HP  BHP  4*  600 /
/
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2788I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5  31  30  31  30  31 /
-- ================== YEAR 1999
TSTEP
31  28  31  30  31  30  31  31 /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
```

```
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2788I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5 /
-- ================== YEAR 2000
WELLSHUT
WELL01P /
/
WELLINJE
WELL01I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL01I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL01P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
WELL02P /
/
WELLINJE
WELL02I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL02I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL02P BHP  4*  475 /
/
TSTEP
5 /
WELLSHUT
LL2366P /
/
WELLINJE
LL2366I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2366I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2366P BHP  4*  475 /
/
TSTEP
7  30  31  30  31  31  30  31  30  31 /
-- ================== YEAR 2001
TSTEP
31  28  31 /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
```

```
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2788I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5  /
WELLSHUT
WELL01P /
/
WELLINJE
WELL01I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL01I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL01P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
WELL02P /
/
WELLINJE
WELL02I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL02I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL02P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2366P /
/
WELLINJE
LL2366I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2366I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2366P BHP  4*  475 /
/
TSTEP
7  30  31 /
-- ================== YEAR 2002
TSTEP
31  28  31  30  31  30  31  31 /
WELLSHUT
LL2781P /
/
WELLINJE
```

```
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2788I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5 /
-- ================== YEAR 2003
WELLSHUT
WELL01P /
/
WELLINJE
WELL01I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL01I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL01P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
WELL02P /
/
WELLINJE
WELL02I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL02I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL02P BHP  4*  475 /
/
TSTEP
4 /
WELLSHUT
LL2366P /
/
WELLINJE
LL2366I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2366I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2366P BHP  4*  475 /
/
TSTEP
7 30  31  30  31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31  29  31 /
WELLSHUT
```

```
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2788I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5 /
WELLSHUT
WELL01P /
/
WELLINJE
WELL01I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL01I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL01P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
WELL02P /
/
WELLINJE
WELL02I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL02I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL02P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2366P /
/
WELLINJE
LL2366I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2366I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2366P BHP  4*  475 /
/
TSTEP
7  30  31 /
-- ================= YEAR 2005
TSTEP
```

```
31  28  31  30  31  30  31  31 /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2788I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5 /
-- ================== YEAR 2006
WELLSHUT
WELL01P /
/
WELLINJE
WELL01I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL01I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL01P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
WELL02P /
/
WELLINJE
WELL02I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL02I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL02P BHP  4*  475 /
/
TSTEP
4 /
WELLSHUT
LL2366P /
/
WELLINJE
LL2366I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2366I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2366P BHP  4*  475 /
/
TSTEP
```

```
7  30  31  30  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31  28  31  /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2788P /
/
WELLINJE
LL2788I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2788I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2788P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2610P /
/
WELLINJE
LL2610I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2610I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2610P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5 /
WELLSHUT
WELL01P /
/
WELLINJE
WELL01I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL01I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL01P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
WELL02P /
/
WELLINJE
WELL02I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL02I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL02P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2366P /
/
WELLINJE
LL2366I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2366I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2366P BHP  4*  475 /
```

```
/
TSTEP
7 30  31 /
-- ================== YEAR 2008
TSTEP
31  29  31  30  31  30  31  31 /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6  31  30 /
WELLSHUT
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3343HI /
/
TSTEP
6 / --  SOAK PERIOD
WELLPROD
LL3343HP BHP  4*  600 /
/
TSTEP
5 /
-- ================== YEAR 2009
WELLSHUT
WELL01P /
/
WELLINJE
WELL01I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL01I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL01P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
WELL02P /
/
WELLINJE
WELL02I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL02I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL02P BHP  4*  475 /
/
TSTEP
4 /
WELLSHUT
LL2366P /
/
WELLINJE
LL2366I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2366I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2366P BHP  4*  475 /
/
TSTEP
7 30  31  30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31  28  31 /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6  31  30  31 /
WELLSHUT
WELL01P /
/
WELLINJE
WELL01I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
```

```
WELL01I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL01P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
WELL02P /
/
WELLINJE
WELL02I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL02I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL02P BHP  4*  475 /
/
TSTEP
6  31  30  31 /
-- ================== YEAR 2011
TSTEP
31  28  31  30  31  30  31  31 /
WELLSHUT
LL2781P /
/
WELLINJE
LL2781I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2781I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2781P BHP  4*  475 /
/
TSTEP
6  31 30 31 /
-- ================== YEAR 2012
WELLSHUT
WELL01P /
/
WELLINJE
WELL01I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL01I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL01P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
WELL02P /
/
WELLINJE
WELL02I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL02I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL02P BHP  4*  475 /
/
TSTEP
5  31  30  31  30  31  31  30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31  28  31  30  31  30  31 /
WELLSHUT
WELL01P /
/
WELLINJE
WELL01I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL01I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL01P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
WELL02P /
/
WELLINJE
WELL02I  WA  1*  WA  1*  2625  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
WELL02I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
WELL02P BHP  4*  475 /
/
TSTEP
6  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30 31  30  31  30  31 /
-- ================== YEAR 2015
```

```
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
END
```

Case 5: Steamflooding – Horizontal Well as Injector, Existing Vertical Wells and Two New Wells as Producers

```
-- AREA LL3343H: 3D CYCLIC STEAM INJECTION
-- CASE 5: STEAMFLOODING - HORIZONTAL WELL
-- AS INJECTOR; EXISITNG WELL AS PRODUCER

RESTART
LL3343 169 /
DATUM
3000 /
OUTSOL
PRES    TEMP    SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  ========================

SATNUM
297*1
297*2
297*3
297*4
297*5 /
BOX
7 7 1 27 1 1 /
SATNUM
27*6 /
ENDBOX
BOX
7 7 1 27 2 2 /
SATNUM
27*7 /
ENDBOX
BOX
7 7 1 27 3 3 /
SATNUM
27*8 /
ENDBOX
BOX
7 7 1 27 4 4 /
SATNUM
27*9 /
ENDBOX

SUMMARY ===============================
FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' 'WELL01P' 'WELL02P' /
WOPR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' 'WELL01P' 'WELL02P' /
WLPR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' 'WELL01P' 'WELL02P' /
WOPRH
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' 'WELL01P' 'WELL02P' /
WTEMP
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' 'WELL01P' 'WELL02P' /
WGOR
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3178P' 'WELL01P' 'WELL02P' /
WWCT
'LL2366P' 'LL2610P' 'LL2781P' 'LL2788P'
'LL3343HP' 'WELL01P' 'WELL02P' /
/
WBHP
'LL2366I' 'LL2610I' 'LL2781I' 'LL2788I'
'LL3343HI''WELL01I' 'WELL02I' /

DATE
RUNSUM

SCHEDULE    ==============================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/
WELSPECS
WELL01I  FIELD    1      16  3000 /
WELL01P  FIELD    1      16  3000 /
WELL02I  FIELD    1      23  3000 /
WELL02P  FIELD    1      23  3000 /
/
COMPDAT
LL2610P  7 16 1 3 3* 0.6  1*    35 /
LL2610P  7 16 4 4 3* 0.6 10725  35 /  --
partial completion in layer 4
LL2781P  7  2 1 1 3* 0.6 11181   0 / --
layer ap1
```

```
LL2781P  7  2 2 3 3* 0.6   1*    0 /
-- layer ap2 - ap3
LL2781P  7  2 4 4 3* 0.6  12199  0 / --
partial completion layer 4
/

-- ==================   PREDICTION
WELLPROD
LL2610P   BHP  4*  475 /
LL2781P   BHP  4*  475 /
LL2788P   BHP  4*  475 /
/
WELLSHUT
LL2610I /
LL2781I /
LL2788I /
LL2366I /
LL3343HP /
/
WELLINJE
LL3343HI  WA  1*  WA  1*  3750  1*  1500
12*  0.75  580  /
/
TSTEP
30  31  30  31  31  30  31  30  31 /
-- ================== YEAR 1999
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
COMPDAT
WELL01P  1 16  4 4 3*  0.6 /
WELL02P  1 23  4 4 3*  0.6 /
LL2610P  7 16  1 3 SHUT  /
LL2610P  7 16  4 4 3*  0.6  10725  35 /  --
partial completion in layer 4
/
WELLPROD
WELL01P    BHP  4*  475 /
WELL02P    BHP  4*  475 /
LL2366P    BHP  4*  475 /
/
-- ================== YEAR 2000
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /

-- ================== YEAR 2001
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2002
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2003
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2005
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2006
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
END
```

APPENDIX D

AREA LL3487 – SIMULATOR IMPUT DATA

History Matching

```
-- AREA LL3487H
-- 3D CYCLIC STEAM INJECTION

RUNSPEC   ===============================

LIVEOIL
DIMENS
--  NX  NY  NZ
    12  20   5 /
HWELLS
WELLDIMS
20 50 /
TABDIMS
9   6*   9 /
WATER
OIL
GAS
FIELD
COMPS
2 /
START
30 'NOV' 1954 /
ROCKDIMS
2 /
THERMAL
FULLIMP

GRID   ===============================

INIT
EQUALS
'DX'       160 /
'DY'       125 /
'DZ'         64 1 12 1 20 1 1 /
'DZ'         36 1 12 1 20 2 2 /
'DZ'         72 1 12 1 20 3 3 /
'DZ'         93 1 12 1 20 4 4 /
'DZ'         95 1 12 1 20 5 5 /
/
TOPS
240*2940 /
PERMX
 240*493
 240*1187
 240*1546
 240*2299
 240*2218
/
PERMY
 240*493
 240*1187
 240*1546
 240*2299
 240*2218
/
--  kv/kh = as function of each layer
PERMZ
 240*493   --   kv/kh 1.0
 240*356   --   kv/kh 0.3
 240*773   --   kv/kh 0.5
 240*460   --   kv/kh 0.2
 240*444   --   kv/kh 0.2
/
PORO
 240*0.16
 240*0.33
 240*0.29
 240*0.29
 240*0.18
/
ACTNUM
-- AP1 layer
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
-- AP2 layer
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  0  0
```

```
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
-- AP3 layer
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
-- HH layer
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
-- GG layer
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1 ·1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
1  1  1  1  1  1  1  1  1  1  0  0
```

```
1  1  1  1  1  1  1  1  1  1  0  0 /

THCONR
1200*26.4 /
HEATCR
1200*32.7 /
RADFIN
--NAME  x      y zl zu nrr    ntr nor  Rin
Rout
RLL2849 2      4  1    5 5     1   15 0.6 /
NZFIN
3  3  3  3  3 /
RADFIN
--NAME  x      y zl zu nrr    ntr nor  Rin
Rout
RLL160  2      10 1 4 5 1 12 0.6 /
NZFIN
3  3  3  3 /
RADFIN
--NAME  x      y zl zu nrr    ntr nor  Rin
Rout
RLL2527 5  16 1 4 5  1 12  0.6 /
NZFIN
3  3  3  3 /

CARFIN
--NAME xi xf yi yf zi zf nx ny nz
RLL36   11 11  7 7  1  4  5 5 4 /
CARFIN
--NAME xi xf yi yf zi zf nx ny nz
RLL112 11 11 12 12 2  5       5 5 4 /
CARFIN
--NAME xi xf yi yf zi zf nx ny nz
RLL3487 6 6    6  15  2  2 5  30      3 /
CARFIN
--NAME xi xf yi yf zi zf nx ny nz
RWELL01  2      2  2     2  1    5  5    3  5 /
CARFIN
--NAME xi xf yi yf zi zf nx ny nz
RWELL02  6      6  2     2  1    5  5    3  5 /
CARFIN
--NAME xi xf yi yf zi zf nx ny nz
RWELL03 10  10  2       2  1  5  5   3  5 /
CARFIN
--NAME xi xf yi yf zi zf nx ny nz
RWELL04  10    10  11   11  1  5 5   3  5 /
CARFIN
--NAME xi xf yi yf zi zf nx ny nz
RWELL05  10    10  19   19  1  5 5   3  5 /
CARFIN
--NAME xi xf yi yf zi zf nx ny nz
RWELL06  6      6  19   19  1   5  5    3  5 /
CARFIN
--NAME xi xf yi yf zi zf nx ny nz
RWELL07  2      2  19    19 1  5  5      3  5 /
CARFIN
--NAME xi xf yi yf zi zf nx ny nz
RWELL08  2      2  11    11  1   5  5  3  5 /
ENDFIN

ROCKPROP
  1  123  24  36  0  /--
  2  123  24  36  0  /
/

ROCKCON
  1  1  12  1 20  1  1  'K-'  /  top
```

```
  2  1  12  1 20  5  5  'K+'  /  bottom
/

PROPS        ===========================

NCOMPS
2 /
KVWI
HEATVAP
219  88.0 /
CNAMES
SGAS HEAVY /
TCRIT
343 1673 /
PCRIT
667. 121. /
ZCRIT
0.286  0.20137 /
ACF
0.013 0.964 /
BIC
0.0502 /
MW
16 460 /

TBOIL
201  1394 /
TREF
201  519.67 /
CREF
1* .00001 /
DREF
26 60 /
THERMEX1
0.0005     0.00204 /
TCRITW
1165.14 /
PCRITW
3208.2356 /
THANALB
SPECHA
.55 .55 /
TEMPVD
-- Dep  Temp
  2940 131
  3307 131 /
STCOND
60 14.7 /
-- krw orignal / 10
SWOF
-- INTERVAL AP1
--Sw    krw     krow      Pcow
0.40    0.000000          1.00    0
0.45    0.000320          0.75    0
0.50    0.000640          0.55    0
0.55    0.001200          0.40    0
0.60    0.001600          0.30    0
0.65    0.003200          0.20    0
0.70    0.004400          0.12    0
0.80    0.005600          0.00    0 /
-- INTERVAL AP2
--Sw    krw     krow              Pcow
0.20    0.000000          1.00    0
0.25    0.000016          0.95    0
0.30    0.000064          0.90    0
0.35    0.000096          0.85    0
0.40    0.000128          0.80    0
0.45    0.000160          0.75    0
0.50    0.000760          0.60    0
0.55    0.001000          0.40    0
0.60    0.001800          0.30    0
0.65    0.002800          0.19    0
0.70    0.003700          0.11    0
0.75    0.004000          0.00    0 /
-- INTERVAL AP3
--Sw    krw     krow      Pcow
0.30    0.000000          1.00    0
0.35    0.000040          0.92    0
0.40    0.000080          0.83    0
0.45    0.000160          0.75    0
0.50    0.000760          0.60    0
0.55    0.001000          0.40    0
0.60    0.002000          0.30    0
0.65    0.002800          0.19    0
0.70    0.003740          0.11    0
0.75    0.004000          0.00    0  /
-- INTERVAL HH
--Sw    krw     krow      Pcow
0.40    0.000000          1.00    0
0.45    0.000160          0.75    0
0.50    0.000760          0.60    0
0.55    0.001000          0.40    0
0.60    0.002000          0.30    0
0.65    0.002800          0.19    0
0.70    0.003740          0.11    0
0.75    0.004000          0.00    0  /
-- INTERVAL GG
--Sw    krw     krow      Pcow
0.60    0.000000          0.30    0
0.65    0.002800          0.19    0
0.70    0.003740          0.11    0
0.75    0.004000          0.00    0  /
-- sixth table ap1 - original * 10
-- linear approach
0.40    0.00    1.00    230.0
0.45    0.07    0.75    110.0
0.50    0.14    0.55    100.0
0.55    0.21    0.40    100.0
0.60    0.28    0.30    100.0
0.65    0.35    0.20    100.0
0.70    0.42    0.12    100.0
0.75    0.49    0.03    100.0
0.80    0.56    0.00     0.0 /
-- seventh table ap2 - original * 10
-- linear approach
0.20    0.00    1.00    300.0
0.25    0.04    0.95    180.7
0.30    0.07    0.90    180.0
0.35    0.11    0.85    170.6
0.40    0.15    0.80    160.9
0.45    0.18    0.75    160.5
0.50    0.22    0.60    160.1
0.55    0.25    0.40    160.1
0.60    0.29    0.30    160.1
0.65    0.33    0.19    160.1
0.70    0.36    0.11    160.1
0.75    0.40    0.00    0.00 /
-- eighth table: ap3 - original * 10
--Sw    krw     krow    Pcow
--linear approach
0.30    0.00    1.00    300.
0.35    0.04    0.92    170.1
0.40    0.09    0.83    160.4
```

```
0.45    0.13    0.75    160.0
0.50    0.18    0.60    150.6
0.55    0.22    0.40    150.6
0.60    0.27    0.30    150.6
0.65    0.31    0.19    150.6
0.70    0.36    0.11    150.6
0.75    0.40    0.00    0.00 /
-- nineth table: HH - original * 10
--Sw    krw             krow    Pcow
--0.40    0.000000      1.00     0
--0.45  0.016000        0.75    0
--0.50  0.076000        0.60    0
--0.55  0.100000        0.40    0
--0.60  0.180000        0.30    0
--0.65  0.280000        0.19    0
--0.70  0.374000        0.11    0
--0.75  0.400000        0.00    0 /
--linear approach
0.40    0.00    1.00    290.0
0.45    0.06    0.75    140.7
0.50    0.11    0.60    140.4
0.55    0.17    0.40    140.4
0.60    0.23    0.30    140.4
0.65    0.29    0.19    140.4
0.70    0.34    0.11    140.4
0.75    0.40    0.00    0.00 /
SGOF
-- INTERVAL AP1
--Sg    krg     krog       Pcog
0.00    0.000   1.00000   0
0.03    0.000   1.00000   0
0.05    0.005   0.65000   0
0.10    0.028   0.40000   0
0.15    0.070   0.25000   0
0.20    0.120   0.13000   0
0.25    0.170   0.08500   0
0.30    0.240   0.04500   0
0.35    0.310   0.02300   0
0.40    0.380   0.01000   0
0.45    0.450   0.00430   0
0.50    0.500   0.00230   0
0.55    0.570   0.00120   0
0.57    0.578   0.00116   0
0.60    0.613   0.00080   0
0.65    0.672   0.00043   0
0.70    1.000   0.00000   0 /
-- INTERVAL AP2
--Sg    krg     krog     Pcog
0.00    0.000   1.0000    0
0.03    0.000   1.0000    0
0.05    0.010   0.7500    0
0.10    0.050   0.6000    0
0.15    0.065   0.4000    0
0.20    0.110   0.2500    0
0.25    0.180   0.1500    0
0.30    0.230   0.0900    0
0.35    0.310   0.0450    0
0.40    0.400   0.0250    0
0.45    0.500   0.0130    0
0.50    0.600   0.0065    0
0.55    0.700   0.0030    0
0.57    0.750   0.0023    0
0.60    0.800   0.0018    0
0.80     1.000    0.0000    0 /
-- INTERVAL AP3
--Sg    krg     krog       Pcog
0.00    0.000   1.0000     0
0.03    0.000   1.0000     0
0.05    0.010   0.7500     0
0.10    0.050   0.6000     0
0.15    0.065   0.4000     0
0.20    0.110   0.2500     0
0.25    0.180   0.1500     0
0.30    0.230   0.0900     0
0.35    0.310   0.0450     0
0.40    0.400   0.0250     0
0.45    0.500   0.0130     0
0.50    0.600   0.0065     0
0.55    0.700   0.0030     0
0.57    0.750   0.0023     0
0.60    0.800   0.0018     0
0.75     1.000    0.0000     0 /
-- INTERVAL HH
--Sg    krg     krog       Pcog
0.00    0.000   1.0000     0
0.03    0.000   1.0000     0
0.05    0.010   0.7500     0
0.10    0.050   0.6000     0
0.15    0.065   0.4000     0
0.20    0.110   0.2500     0
0.25    0.180   0.1500     0
0.30    0.230   0.0900     0
0.35    0.310   0.0450     0
0.40    0.400   0.0250     0
0.45    0.500   0.0130     0
0.50    0.600   0.0065     0
0.55    0.700   0.0030     0
0.57    0.750   0.0023     0
0.60    0.800   0.0018     0
0.75     1.000    0.0000     0 /
-- INTERVAL GG
--Sg    krg     krog       Pcog
0.00    0.000   1.0000     0
0.03    0.000   1.0000     0
0.05    0.010   0.7500     0
0.10    0.050   0.6000     0
0.15    0.065   0.4000     0
0.20    0.110   0.2500     0
0.25    0.180   0.1500     0
0.30    0.230   0.0900     0
0.35    0.310   0.0450     0
0.40    0.400   0.0250     0
0.45    0.500   0.0130     0
0.50    0.600   0.0065     0
0.55    0.700   0.0030     0
0.57    0.750   0.0023     0
0.60    0.800   0.0018     0
0.75     1.000    0.0000     0 /
-- sixth table
-- INTERVAL AP1
--Sg    krg     krog       Pcog
0.00    0.000   1.00000    0
0.03    0.000   1.00000    0
0.05    0.008   0.65000    0
0.10    0.028   0.40000    0
0.15    0.070   0.25000    0
0.20    0.120   0.13000    0
0.25    0.170   0.08500    0
0.30    0.240   0.04500    0
0.35    0.310   0.02300    0
0.40    0.380   0.01000    0
0.45    0.450   0.00430    0
0.50    0.500   0.00230    0
0.55    0.570   0.00120    0
```

```
0.57    0.578   0.00116   0
0.60    0.613   0.00080   0
0.65    0.672   0.00043   0
0.70    1.000   0.00000   0 /
-- seventh table
-- INTERVAL AP2
--Sg    krg     krog      Pcog
0.00    0.000   1.0000    0
0.03    0.000   1.0000    0
0.05    0.010   0.7500    0
0.10    0.050   0.6000    0
0.15    0.065   0.4000    0
0.20    0.110   0.2500    0
0.25    0.180   0.1500    0
0.30    0.230   0.0900    0
0.35    0.310   0.0450    0
0.40    0.400   0.0250    0
0.45    0.500   0.0130    0
0.50    0.600   0.0065    0
0.55    0.700   0.0030    0
0.57    0.750   0.0023    0
0.60    0.800   0.0018    0
0.80    1.000   0.0000     0 /
--eighth table
-- INTERVAL AP3
--Sg    krg     krog       Pcog
0.00    0.000   1.0000     0
0.03    0.000   1.0000     0
0.05    0.010   0.7500     0
0.10    0.050   0.6000     0
0.15    0.065   0.4000     0
0.20    0.110   0.2500     0
0.25    0.180   0.1500     0
0.30    0.230   0.0900     0
0.35    0.310   0.0450     0
0.40    0.400   0.0250     0
0.45    0.500   0.0130     0
0.50    0.600   0.0065     0
0.55    0.700   0.0030     0
0.57    0.750   0.0023     0
0.60    0.800   0.0018     0
0.75    1.000   0.0000     0 /
-- nine table
-- INTERVAL HH
--Sg    krg     krog       Pcog
0.00    0.000   1.0000     0
0.03    0.000   1.0000     0
0.05    0.010   0.7500     0
0.10    0.050   0.6000     0
0.15    0.065   0.4000     0
0.20    0.110   0.2500     0
0.25    0.180   0.1500     0
0.30    0.230   0.0900     0
0.35    0.310   0.0450     0
0.40    0.400   0.0250     0
0.45    0.500   0.0130     0
0.50    0.600   0.0065     0
0.55    0.700   0.0030     0
0.57    0.750   0.0023     0
0.60    0.800   0.0018     0
0.75    1.000   0.0000     0 /

GASVISCT
128     0.0155  0.0315
160     0.0161  0.0331
190     0.0167  0.0346
220     0.0173  0.0361
250     0.0179  0.0376
280     0.0185  0.0391
310     0.0191  0.0406
340     0.0197  0.0421
370     0.0203  0.0436
400     0.0209  0.0451
430     0.0215  0.0466
460     0.0221  0.0481
490     0.0227  0.0496
520     0.0233  0.0511 /

OILVISCT
--Temp   Visc
128     0.1952  635
160     0.1912  351.74
190     0.1881  86.2
220     0.1855  66.29
250     0.1832  46.36
280     0.1811  26.42
310     0.1793  12.68
340     0.1776  11.42
370     0.1761  10.17
400     0.1747  8.91
430     0.1734  7.66
460     0.1722  6.41
490     0.1711  5.15
520     0.1700  3.9 /
OILCOMPR
-- Compr     Oil Expa.    Oil Expa. Squa
10.14E-06   7.07E-05     5.0E-09 /
PVTW
-- Pref          Bw       Cw       Vw       Cvw
-- PSIA          RB/STB   1/PSI    CPOISE
1/PSI
   1319         1.012    3.1E-06 0.3
7.0E-09 /
ROCK
--1370  120.0E-06 /
1370  100.0E-06 /
ZMFVD
2960    0.3      0.7 /

SOLUTION   ==========================

EQUIL
-- Ddat  Pdat    Dwoc     Pcow     Dgoc
Pcog
  2960  1200    3370     0.0      2960  0.0
     1       1       0        1 /

DATUM
3000 /
OUTSOL
RESTART PRES    TEMP    SOIL  SWAT  SGAS
XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  ========================

SATNUM
240*1
240*2
240*3
```

```
240*4
240*5 /

SUMMARY ==============================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WLPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPRH
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WTEMP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WGOR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WWCT
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
/
WBHP
'LL160I' 'LL36I' 'LL112I' 'LL2527I'
'LL2849I' 'LL3487HI' /

DATE
RUNSUM

SCHEDULE ==========================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/
WELSPECL
LL36I    FIELD  RLL36    3 3    3000 /
LL36P    FIELD  RLL36    3 3    3000 /
LL112I   FIELD  RLL112   3 3    3000 /
LL112P   FIELD  RLL112   3 3    3000 /
LL2849I  FIELD  RLL2849  1 1    3000 /
LL2849P  FIELD  RLL2849  1 1    3000 /
LL160I   FIELD  RLL160   1 1    3000 /
```

```
LL160P   FIELD   RLL160  1 1  3000 /
LL2527I  FIELD   RLL2527 1 1  3000 /
LL2527P  FIELD   RLL2527 1 1  3000 /
LL3487HI FIELD   RLL3487 3 27 3000 /
LL3487HP FIELD   RLL3487 3 27 3000 /
/
COMPDATL
LL36I   RLL36   3 3 1 1 3*  0.6  2464 /
LL36I   RLL36   3 3 2 2 3*  0.6 21362 /
LL36I   RLL36   3 3 3 3 3*  0.6 44130 /
LL36I   RLL36   3 3 4 4 3*  0.6   181183 /
LL36P   RLL36   3 3 1 1 3*  0.6  2464   7 /
LL36P   RLL36   3 3 2 2 3*  0.6 21362   7 /
LL36P   RLL36   3 3 3 3 3*  0.6 44130   7 /
LL36P   RLL36   3 3 4 4 3*  0.6   181183  7 /
LL112I  RLL112  3 3 1 1 3*  0.6   /
LL112I  RLL112  3 3 2 2 3*  0.6    15459 /
LL112I  RLL112  3 3 3 3 3*  0.6  168139 /
LL112I  RLL112  3 3 4 4 3*  0.6    27726 /
LL112P  RLL112  3 3 1 1 3*  0.6  1*      7 /
LL112P  RLL112  3 3 2 2 3*  0.6    15459  7 /
LL112P  RLL112  3 3 3 3 3*  0.6  168139   7 /
LL112P  RLL112  3 3 4 4 3*  0.6    27726  7 /
LL2849I RLL2849  1 1  10 12 3*  0.6 13323
/-- layer hh
LL2849I RLL2849  1 1  13 15 3* 0.6 14633 /-
- layer gg
LL2849P RLL2849   1 1  10 12 3* 0.6 13323 /-
- layer hh
LL2849P RLL2849  1 1  13 15 3* 0.6 14633 /-
- layer gg
LL160I   RLL160  1 1 1 3   1* 6 1* 0.6 /--
layer ap1
LL160I   RLL160  1 1 4  6 1* 7 1* 0.6 /--
layer ap2
LL160I   RLL160  1 1 7 9   1* 8 1* 0.6 /--
layer ap3
LL160I   RLL160  1 1 9 12 1* 9 1* 0.6 /--
layer hh
LL160P   RLL160  1 1 1 3   1* 6 1* 0.6 /  --
layer ap1
LL160P   RLL160  1 1 4 6   1* 7 1* 0.6 / --
layer ap2
LL160P   RLL160  1 1 7 9   1* 8 1* 0.6 / --
layer ap3
LL160P   RLL160  1 1 9 12 1* 9 1* 0.6 / --
layer hh
LL2527I  RLL2527 1 1  1  3  1* 6 1* 0.6
        2490 / -- layer ap1
LL2527I  RLL2527 1 1  4  6  1* 7 1* 0.6 /--
layer ap2
LL2527I  RLL2527 1 1  7  9  1* 8 1* 0.6 /--
layer ap3
LL2527I  RLL2527 1 1  10 12 1* 9 1* 0.6 /--
layer hh
LL2527P  RLL2527 1 1  1  3  1* 6 1* 0.6
2490 /-- layer ap1
LL2527P  RLL2527 1 1  4  6  1* 7 1* 0.6 /--
layer ap2
LL2527P  RLL2527 1 1  7  9  1* 8 1* 0.6 /--
layer ap3
LL2527P  RLL2527 1 1  10 12 1* 9 1* 0.6 /--
layer hh
LL3487HI RLL3487 3 4   2 2 3*  0.5 3* 'Y' /
LL3487HI RLL3487 3 5   2 2 3*  0.5 3* 'Y' /
LL3487HI RLL3487 3 6   2 2 3*  0.5 3* 'Y' /
LL3487HI RLL3487 3 7   2 2 3*  0.5 3* 'Y' /
```

```
LL3487HI RLL3487 3 8   2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 9   2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 10  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 11  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 12  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 13  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 14  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 15  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 16  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 17  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 18  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 19  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 20  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 21  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 22  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 23  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 24  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 25  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 26  2 2 3*  0.5 3*  'Y'  /
LL3487HI RLL3487 3 27  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 4   2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 5   2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 6   2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 7   2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 8   2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 9   2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 10  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 11  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 12  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 13  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 14  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 15  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 16  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 17  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 18  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 19  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 20  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 21  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 22  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 23  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 24  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 25  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 26  2 2 3*  0.5 3*  'Y'  /
LL3487HP RLL3487 3 27  2 2 3*  0.5 3*  'Y'  /
/
WCONHIST
'LL160P'      'OPEN'  'ORAT'  512     /
/
TSTEP
31 /
-- ================== YEAR 1955
WCONHIST
'LL160P'      'OPEN'  'ORAT'  11      /
/
TSTEP
90 /
WCONHIST
'LL160P'      'OPEN'  'ORAT'  10      /
/
TSTEP
91 /
WCONHIST
'LL160P'      'OPEN'  'ORAT'  4       /
/
TSTEP
92 /
WCONHIST
'LL160P'      'STOP'  'ORAT'  0       /
/
TSTEP
61 /
WCONHIST
'LL160P'      'STOP'  'ORAT'  0       /
/
TSTEP
31 /
-- ================== YEAR 1956
WCONHIST
'LL160P'      'STOP'  'ORAT'  0       /
/
TSTEP
91 /
WCONHIST
'LL160P'      'STOP'  'ORAT'  0       /
/
TSTEP
91 /
WCONHIST
'LL160P'      'STOP'  'ORAT'  0       /
/
TSTEP
92 /
WCONHIST
'LL160P'      'STOP'  'ORAT'  0       /
/
TSTEP
61 /
WCONHIST
'LL160P'      'STOP'  'ORAT'  0       /
/
TSTEP
31 /
-- ================== YEAR 1957
WCONHIST
'LL160P'      'STOP'  'ORAT'  0       /
/
TSTEP
90 /
WCONHIST
'LL160P'      'OPEN'  'ORAT'  36      /
/
TSTEP
91 /
WCONHIST
'LL160P'      'OPEN'  'ORAT'  109     /
/
TSTEP
92 /
WCONHIST
'LL160P'      'OPEN'  'ORAT'  50      /
/
TSTEP
61 /
WCONHIST
'LL160P'      'STOP'  'ORAT'  14      /
/
TSTEP
31 /
-- ================== YEAR 1958
WCONHIST
'LL160P'      'OPEN'  'ORAT'  69      /
/
TSTEP
90 /
```

```
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
91 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
92 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
31 /
-- ================== YEAR 1959
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
90 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
91 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  378     /
/
TSTEP
92 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  205     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  218     /
/
TSTEP
31 /
-- ================== YEAR 1960
WCONHIST
'LL160P'        'OPEN'  'ORAT'  202     /
/
TSTEP
91 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  154     /
/
TSTEP
91 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  189     /
/
TSTEP
92 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  247     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  206     /
/
TSTEP
31 /
-- ================== YEAR 1961
WCONHIST
'LL160P'        'OPEN'  'ORAT'  32      /
/
TSTEP
90 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
91 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  52      /
/
TSTEP
92 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
31 /
-- ================== YEAR 1962
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
90 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
91 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
92 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
31 /
-- ================== YEAR 1963
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
90 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
```

```
91 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
92 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
/
TSTEP
31 /
-- ================== YEAR 1964
WCONHIST
'LL160P'        'OPEN'  'ORAT'  20      /
/
TSTEP
90 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  262     /
/
TSTEP
91 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  43      /
/
TSTEP
92 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  54      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  140     /
/
TSTEP
31 /
-- ================== YEAR 1965
WCONHIST
'LL160P'        'OPEN'  'ORAT'  161     /
/
TSTEP
90 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  216     /
/
TSTEP
91 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  215     /
/
TSTEP
62 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  202     /
'LL36P' 'OPEN'  'ORAT'  218     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  189     /
'LL36P' 'OPEN'  'ORAT'  221     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  74      /
'LL36P' 'OPEN'  'ORAT'  136     /
/
TSTEP
31 /
-- ================== YEAR 1966
WCONHIST
'LL160P'        'OPEN'  'ORAT'  134     /
'LL36P' 'STOP'  'ORAT'  0       /
/
TSTEP
59 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  226     /
'LL36P' 'OPEN'  'ORAT'  14      /
'LL112P'        'OPEN'  'ORAT'  220     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  211     /
'LL36P' 'OPEN'  'ORAT'  92      /
'LL112P'        'OPEN'  'ORAT'  89      /
/
TSTEP
91 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  158     /
'LL36P' 'OPEN'  'ORAT'  79      /
'LL112P'        'STOP'  'ORAT'  0       /
/
TSTEP
92 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  185     /
'LL36P' 'OPEN'  'ORAT'  81      /
'LL112P'        'OPEN'  'ORAT'  27      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  167     /
'LL36P' 'OPEN'  'ORAT'  65      /
'LL112P'        'OPEN'  'ORAT'  318     /
/
TSTEP
31 /
-- ================== YEAR 1967
WCONHIST
'LL160P'        'OPEN'  'ORAT'  12      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'OPEN'  'ORAT'  23      /
/
TSTEP
90 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  80      /
'LL36P' 'OPEN'  'ORAT'  48      /
'LL112P'        'OPEN'  'ORAT'  37      /
/
TSTEP
91 /
WCONHIST
```

```
'LL160P'        'OPEN'  'ORAT'  161     /
'LL36P' 'OPEN'  'ORAT'  111     /
'LL112P'        'STOP'  'ORAT'  0       /
/
TSTEP
92 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  95      /
'LL36P' 'OPEN'  'ORAT'  39      /
'LL112P'        'STOP'  'ORAT'  0       /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  27      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
/
TSTEP
31 /
-- ================== YEAR 1968
WCONHIST
'LL160P'        'OPEN'  'ORAT'  157     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
/
TSTEP
91 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  90      /
'LL36P' 'OPEN'  'ORAT'  74      /
'LL112P'        'OPEN'  'ORAT'  12      /
/
TSTEP
91 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  153     /
'LL36P' 'OPEN'  'ORAT'  80      /
'LL112P'        'OPEN'  'ORAT'  56      /
/
TSTEP
92 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  98      /
'LL36P' 'OPEN'  'ORAT'  101     /
'LL112P'        'OPEN'  'ORAT'  65      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'OPEN'  'ORAT'  79      /
'LL112P'        'STOP'  'ORAT'  0       /
/
TSTEP
31 /
-- ================== YEAR 1969
WCONHIST
'LL160P'        'OPEN'  'ORAT'  8       /
'LL36P' 'OPEN'  'ORAT'  80      /
'LL112P'        'OPEN'  'ORAT'  6       /
/
TSTEP
90 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  191     /
'LL36P' 'OPEN'  'ORAT'  71      /
'LL112P'        'OPEN'  'ORAT'  64      /
/
TSTEP
91 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  168     /
'LL36P' 'OPEN'  'ORAT'  80      /
'LL112P'        'OPEN'  'ORAT'  66      /
/
TSTEP
92 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  149     /
'LL36P' 'OPEN'  'ORAT'  72      /
'LL112P'        'OPEN'  'ORAT'  36      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  157     /
'LL36P' 'OPEN'  'ORAT'  93      /
'LL112P'        'OPEN'  'ORAT'  51      /
/
TSTEP
31 /
-- ================== YEAR 1970
WCONHIST
'LL160P'        'OPEN'  'ORAT'  169     /
'LL36P' 'OPEN'  'ORAT'  86      /
'LL112P'        'OPEN'  'ORAT'  50      /
/
TSTEP
90 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  164     /
'LL36P' 'OPEN'  'ORAT'  64      /
'LL112P'        'OPEN'  'ORAT'  45      /
/
TSTEP
91 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  124     /
'LL36P' 'OPEN'  'ORAT'  60      /
'LL112P'        'OPEN'  'ORAT'  46      /
/
TSTEP
92 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  111     /
'LL36P' 'OPEN'  'ORAT'  62      /
'LL112P'        'OPEN'  'ORAT'  37      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  97      /
'LL36P' 'OPEN'  'ORAT'  63      /
'LL112P'        'OPEN'  'ORAT'  29      /
/
TSTEP
31 /
-- ================== YEAR 1971
WCONHIST
'LL160P'        'OPEN'  'ORAT'  38      /
'LL36P' 'OPEN'  'ORAT'  30      /
'LL112P'        'OPEN'  'ORAT'  24      /
/
```

```
TSTEP
90 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  46        /
'LL36P' 'OPEN'    'ORAT'  4        /
'LL112P'          'OPEN'  'ORAT'  13        /
/
TSTEP
91 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  104       /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
92 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  102       /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
61 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  56        /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
31 /
-- ================== YEAR 1972
WCONHIST
'LL160P'          'OPEN'  'ORAT'  41        /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
91 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  128       /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
91 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  94        /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
92 /
WCONHIST
'LL160P'          'STOP'  'ORAT'  0         /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
61 /
WCONHIST
'LL160P'          'STOP'  'ORAT'  0         /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
31 /
-- ================== YEAR 1973
WCONHIST
'LL160P'          'STOP'  'ORAT'  0         /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
90 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  25        /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
91 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  68        /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
92 /
WCONHIST
'LL160P'          'STOP'  'ORAT'  0         /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
61 /
WCONHIST
'LL160P'          'STOP'  'ORAT'  0         /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
31 /
-- ================== YEAR 1974
WCONHIST
'LL160P'          'STOP'  'ORAT'  0         /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
90 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  14        /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
91 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  88        /
'LL36P' 'OPEN'    'ORAT'  23       /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
92 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  89        /
'LL36P' 'STOP'    'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0         /
/
TSTEP
61 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  98        /
'LL36P' 'STOP'    'ORAT'  0        /
```

```
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
31 /
-- ================== YEAR 1975
WCONHIST
'LL160P'         'OPEN'  'ORAT'  29       /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
90 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  48       /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
91 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  82       /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
92 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  89       /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
61 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  105      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
31 /
-- ================== YEAR 1976
WCONHIST
'LL160P'         'OPEN'  'ORAT'  107      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
91 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  128      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
91 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  108      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
92 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  106      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
61 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  100      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
31 /
-- ================== YEAR 1977
WCONHIST
'LL160P'         'OPEN'  'ORAT'  120      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
90 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  138      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
91 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  188      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
92 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  174      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
61 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  122      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
31 /
-- ================== YEAR 1978
WCONHIST
'LL160P'         'OPEN'  'ORAT'  121      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
90 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  131      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
91 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  121      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'         'STOP'  'ORAT'  0        /
/
TSTEP
92 /
```

```
WCONHIST
'LL160P'         'OPEN'  'ORAT'  92        /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
61 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  95        /
'LL36P' 'OPEN'   'ORAT'  221       /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
31 /
-- ================== YEAR 1979
WCONHIST
'LL160P'         'OPEN'  'ORAT'  97        /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
90 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  79        /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
91 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  97        /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
92 /
WCONHIST
'LL160P'         'OPEN'  ORAT'   95        /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
61 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  78        /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
31 /
-- ================== YEAR 1980
WCONHIST
'LL160P'         'OPEN'  'ORAT'  88        /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
60 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  90        /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
61 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  127       /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
61 /
WCONHIST
'LL160P'         'OPEN'  ORAT'   241       /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
62 /
WCONHIST
'LL160P'         'OPEN'  ORAT'   251       /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
61 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  278       /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
30 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  210       /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
31 /
-- ================== YEAR 1981
WCONHIST
'LL160P'         'OPEN'  'ORAT'  210       /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
59 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  205       /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
61 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  165       /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
61 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  158       /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
TSTEP
62 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  154       /
'LL36P' 'STOP'   'ORAT'  0         /
'LL112P'         'STOP'  'ORAT'  0         /
/
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TSTEP
61 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  167      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  67       /
/
TSTEP
30 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  163      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  94       /
/
TSTEP
31 /
-- ================== YEAR 1982
WCONHIST
'LL160P'          'OPEN'  'ORAT'  103      /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  91       /
/
TSTEP
59 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  17       /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  15       /
/
TSTEP
61 /
WCONHIST
'LL160P'          'STOP'  'ORAT'  0        /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  44       /
/
TSTEP
61 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  56       /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  156      /
/
TSTEP
62 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  88       /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  148      /
/
TSTEP
61 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  90       /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  301      /
/
TSTEP
30 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  90       /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  148      /
/
TSTEP
31 /
-- ================== YEAR 1983
WCONHIST
'LL160P'          'OPEN'  'ORAT'  90       /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  147      /
/
TSTEP
59 /
WCONHIST
'LL160P'          'OPEN'  'ORAT'  46       /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  99       /
/
TSTEP
61 /
WCONHIST
'LL160P'          'STOP'  'ORAT'  0        /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  179      /
/
TSTEP
61 /
WCONHIST
'LL160P'          'STOP'  'ORAT'  0        /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  198      /
/
TSTEP
62 /
WCONHIST
'LL160P'          'OPEN'  ORAT'   90       /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  174      /
/
TSTEP
61 /
WCONHIST
'LL160P'          'STOP'  'ORAT'  0        /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  161      /
/
TSTEP
30 /
WCONHIST
'LL160P'          'STOP'  'ORAT'  0        /
'LL36P' 'STOP'   'ORAT'  0        /
'LL112P'          'STOP'  'ORAT'  0        /
'LL2527P'         'OPEN'  'ORAT'  113      /
/
TSTEP
31 /
-- ================== YEAR 1984
WCONHIST
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```
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  133     /
/
TSTEP
60 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  140     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  135     /
'LL2849P'       'OPEN'  'ORAT'  23      /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  126     /
'LL2849P'       'OPEN'  'ORAT'  82      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  90      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  125     /
'LL2849P'       'OPEN'  'ORAT'  77      /
/
TSTEP
31 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  90      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  132     /
'LL2849P'       'OPEN'  'ORAT'  67      /
/
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  1723  1*  1*  12*
0.75  580 /
/
TSTEP
19 /  -- INJECTION
WELLSHUT
LL2849I /
/
TSTEP
12 /  -- SOAK
WCONHIST
'LL160P'        'OPEN'  ORAT'   90      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
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```
'LL2527P'       'OPEN'  'ORAT'  111     /
'LL2849P'       'OPEN'  'ORAT'  300     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  90      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  119     /
'LL2849P'       'OPEN'  'ORAT'  245     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  90      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  117     /
'LL2849P'       'OPEN'  'ORAT'  356     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  90      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  103     /
'LL2849P'       'OPEN'  'ORAT'  373     /
/
TSTEP
31 /
-- ================== YEAR 1985
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  103     /
'LL2849P'       'OPEN'  'ORAT'  305     /
/
TSTEP
59 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  52      /
'LL2849P'       'OPEN'  'ORAT'  103     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  90      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2849P'       'OPEN'  'ORAT'  65      /
/
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  1721  1*  1*  12*
0.75  580 /
/
TSTEP
19 /  -- INJECTION
WELLSHUT
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LL2527I /
/
TSTEP
11 /  -- SOAK
WCONHIST
'LL160P'        'STOP'  'ORAT'  0      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  236    /
'LL2849P'       'STOP'  'ORAT'  0      /
/
TSTEP
31 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  263    /
'LL2849P'       'STOP'  'ORAT'  0      /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  123    /
'LL2849P'       'OPEN'  'ORAT'  69     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  179    /
'LL2849P'       'OPEN'  'ORAT'  68     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  293    /
'LL2849P'       'OPEN'  'ORAT'  82     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  161    /
'LL2849P'       'OPEN'  'ORAT'  48     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  191    /
'LL2849P'       'OPEN'  'ORAT'  2      /
/
TSTEP
31 /
-- ================== YEAR 1986
WCONHIST
'LL160P'        'STOP'  'ORAT'  0      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  104    /
'LL2849P'       'OPEN'  'ORAT'  63     /
/
TSTEP
59 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  79     /
'LL2849P'       'OPEN'  'ORAT'  10     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  90     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  177    /
'LL2849P'       'OPEN'  'ORAT'  87     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  90     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  153    /
'LL2849P'       'OPEN'  'ORAT'  80     /
/
TSTEP
62 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  46     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  96     /
'LL2849P'       'OPEN'  'ORAT'  56     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  90     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  113    /
'LL2849P'       'OPEN'  'ORAT'  75     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  90     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0      /
'LL2527P'       'OPEN'  'ORAT'  98     /
'LL2849P'       'OPEN'  'ORAT'  66     /
/
TSTEP
31 /
-- ================== YEAR 1987
WCONHIST
'LL160P'        'OPEN'  'ORAT'  90     /
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'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  131     /
'LL2849P'       'OPEN'  'ORAT'  89      /
/
TSTEP
59 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  156     /
'LL2849P'       'OPEN'  'ORAT'  98      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  44      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  153     /
'LL2849P'       'OPEN'  'ORAT'  81      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  45      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  99      /
'LL2849P'       'OPEN'  'ORAT'  79      /
/
TSTEP
62 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  87      /
'LL2849P'       'OPEN'  'ORAT'  68      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  172     /
'LL2849P'       'OPEN'  'ORAT'  97      /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  158     /
'LL2849P'       'OPEN'  'ORAT'  69      /
/
TSTEP
31 /
-- ================= YEAR 1988
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  69      /
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'LL2849P'       'OPEN'  'ORAT'  36      /
/
TSTEP
60 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  70      /
'LL2849P'       'OPEN'  'ORAT'  44      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  7       /
'LL2849P'       'OPEN'  'ORAT'  2       /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'STOP'  'ORAT'  0       /
'LL2849P'       'STOP'  'ORAT'  0       /
/
TSTEP
62 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'STOP'  'ORAT'  0       /
'LL2849P'       'STOP'  'ORAT'  0       /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'STOP'  'ORAT'  0       /
'LL2849P'       'OPEN'  'ORAT'  9       /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  63      /
'LL2849P'       'OPEN'  'ORAT'  37      /
/
TSTEP
31 /
-- ================= YEAR 1989
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  88      /
'LL2849P'       'OPEN'  'ORAT'  26      /
/
TSTEP
```

```
59 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  61      /
'LL2849P'       'OPEN'  'ORAT'  27      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  13      /
'LL2849P'       'OPEN'  'ORAT'  29      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  88      /
'LL2849P'       'OPEN'  'ORAT'  9       /
/
TSTEP
62 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  139     /
'LL2849P'       'STOP'  'ORAT'  0       /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  93      /
'LL2849P'       'STOP'  'ORAT'  0       /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  89      /
'LL2849P'       'OPEN'  'ORAT'  12      /
/
TSTEP
31 /
-- ================== YEAR 1990
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  94      /
'LL2849P'       'OPEN'  'ORAT'  37      /
/
TSTEP
59 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  108     /
'LL2849P'       'OPEN'  'ORAT'  41      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  47      /
'LL2849P'       'OPEN'  'ORAT'  4       /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  45      /
'LL2849P'       'OPEN'  'ORAT'  1       /
/
TSTEP
62 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  112     /
'LL2849P'       'OPEN'  'ORAT'  11      /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  152     /
'LL2849P'       STOP'   'ORAT'  0       /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  142     /
'LL2849P'       STOP'   'ORAT'  0       /
/
TSTEP
31 /
-- ================== YEAR 1991
COMPDATL
LL2849I RLL2849 1 1 10 15 SHUT /
LL2849P RLL2849 1 1 10 15 SHUT /
LL2849I RLL2849 1 1  4  6  3* 0.6  6413  /
-- layer ap2
LL2849I RLL2849 1 1  7  9  3* 0.6 15957  /
-- layer ap3
LL2849I RLL2849 1 1 10  12 3* 0.6  9992  /
-- layer hh
LL2849P RLL2849 1 1  4  6  3* 0.6  6413  /
-- layer ap2
LL2849P RLL2849 1 1  7  9  3* 0.6 15957  /
-- layer ap3
```

```
LL2849P RLL2849 1 1 10  12 3* 0.6  9992  /
-- layer hh
/
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  128     /
'LL2849P'       'OPEN'  'ORAT'  31      /

/
TSTEP
31 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  112     /
/
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2238  1*  1*  12*
0.75  580 /
/
TSTEP
15 /  -- INJECTION
WELLSHUT
LL2849I /
/
TSTEP
6 /  -- SOAK
WCONHIST
'LL2849P'       'OPEN'  'ORAT'  220     /
/
TSTEP
7 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  118     /
'LL2849P'       'OPEN'  'ORAT'  220     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  119     /
'LL2849P'       'OPEN'  'ORAT'  219     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  124     /
'LL2849P'       'OPEN'  'ORAT'  218     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  129     /
'LL2849P'       'OPEN'  'ORAT'  217     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  135     /
'LL2849P'       'OPEN'  'ORAT'  245     /
/
TSTEP
62 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  129     /
'LL2849P'       'OPEN'  'ORAT'  217     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  24      /
'LL2849P'       'OPEN'  'ORAT'  194     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  97      /
'LL2849P'       'OPEN'  'ORAT'  217     /
/
TSTEP
31 /
-- ================== YEAR 1992
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  116     /
'LL2849P'       'OPEN'  'ORAT'  203     /
/
TSTEP
60 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  46      /
'LL2849P'       'OPEN'  'ORAT'  144     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  101     /
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```
'LL2849P'       'OPEN'  'ORAT'  166     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  148     /
'LL2849P'       'OPEN'  'ORAT'  160     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  148     /
'LL2849P'       'OPEN'  'ORAT'  166     /
/
TSTEP
15 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2256  1*  1*  12*
0.75  580 /
/
TSTEP
12 /  -- INJECTION

WELLSHUT
LL2527I /
/
TSTEP
4 /  --  INITIAL SOAK PERIOD
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2849P'       'OPEN'  'ORAT'  156     /
/
TSTEP
6 / -- FINAL SOAK PERIOD
WCONHIST
'LL2527P'       'OPEN'  'ORAT'  700     /
/
TSTEP
24 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  639     /
'LL2849P'       'OPEN'  'ORAT'  161     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  330     /
'LL2849P'       'OPEN'  'ORAT'  134     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  245     /
'LL2849P'       'OPEN'  'ORAT'  7       /
/
TSTEP
31 /
-- ================== YEAR 1993
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  199     /
'LL2849P'       'OPEN'  'ORAT'  34      /
/
TSTEP
59 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  131     /
'LL2849P'       'OPEN'  'ORAT'  164     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  322     /
'LL2849P'       'OPEN'  'ORAT'  144     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  258     /
'LL2849P'       'OPEN'  'ORAT'  132     /
/
TSTEP
62 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  261     /
'LL2849P'       'OPEN'  'ORAT'  132     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  263     /
'LL2849P'       'OPEN'  'ORAT'  131     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
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```
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  224     /
'LL2849P'       'OPEN'  'ORAT'  126     /
/
TSTEP
31 /
-- ================== YEAR 1994
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  196     /
'LL2849P'       'OPEN'  'ORAT'  65      /
/
TSTEP
59 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  148     /
/
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2343  1*  1*  12*
0.75  580 /
/
TSTEP
14 /  -- INJECTION
WELLSHUT
LL2849I /
/
TSTEP
5 /  -- SOAK PERIOD
WCONHIST
'LL2849P'       'OPEN'  'ORAT'  700     /
/
TSTEP
12 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  101     /
'LL2849P'       'OPEN'  'ORAT'  908     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  120     /
'LL2849P'       'OPEN'  'ORAT'  630     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  113     /
'LL2849P'       'OPEN'  'ORAT'  465     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  116     /
'LL2849P'       'OPEN'  'ORAT'  439     /
/
TSTEP
62 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  124     /
'LL2849P'       'OPEN'  'ORAT'  388     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  59      /
'LL2849P'       'OPEN'  'ORAT'  184     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  28      /
'LL2849P'       'OPEN'  'ORAT'  199     /
/
TSTEP
31 /
-- ================== YEAR 1995
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  120     /
'LL2849P'       'OPEN'  'ORAT'  235     /
/
TSTEP
59 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  162     /
'LL2849P'       'OPEN'  'ORAT'  175     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  105     /
'LL2849P'       'OPEN'  'ORAT'  208     /
/
TSTEP
31 /
WCONHIST
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'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  92      /
'LL2849P'       'OPEN'  'ORAT'  238     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  138     /
'LL2849P'       'OPEN'  'ORAT'  230     /
/
TSTEP
62 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  130     /
'LL2849P'       'OPEN'  'ORAT'  194     /
/
TSTEP
61 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  95      /
'LL2849P'       'OPEN'  'ORAT'  245     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  128     /
'LL2849P'       'OPEN'  'ORAT'  207     /
/
TSTEP
31 /
-- ================== YEAR 1996
COMPDATL
LL2849P RLL2849 1 1 4  6 3* 0.6  6413 /  --
layer ap2
LL2849P RLL2849 1 1 7  9 3* 0.6 15957  /  --
layer ap3
LL2849P RLL2849 1 1 10 12 3* 0.6  9992/  --
layer hh
LL160P  RLL160  1 1 1 3  1* 6  1*  0.6  1*
15 / -- layer ap1
LL160P  RLL160  1 1 4 6  1* 7  1*  0.6  1*
15 / -- layer ap2
LL160P  RLL160  1 1 7 9  1* 8  1*  0.6  1*
15 /-- layer ap3
LL160P  RLL160  1 1 9 12 1* 9  1*  0.6  1*
15 /-- layer hh
LL2527P  RLL2527 1 1 1 3 1* 6 1* 0.6 2490
25 /
LL2527P  RLL2527 1 1 4 6 1* 7 1* 0.6  1*  25
/ -- layer ap2
LL2527P  RLL2527 1 1 7 9 1* 8 1* 0.6  1*  25
/ -- layer ap3
LL2527P  RLL2527 1 1 10 12 1* 9 1* 0.6   1*
25 /
LL3487HP RLL3487 3  4 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3  5 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3  6 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3  7 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3  8 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3  9 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 10 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 11 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 12 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 13 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 14 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 15 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 16 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 17 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 18 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 19 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 20 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 21 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 22 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 23 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 24 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 25 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 26 2 2 3* 0.5 1* 10  1*
'Y' /
LL3487HP RLL3487 3 27 2 2 3* 0.5 1* 10  1*
'Y' /
/
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  117     /
'LL2849P'       'OPEN'  'ORAT'  213     /
/
TSTEP
60 /
WCONHIST
'LL160P'        'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  86      /
'LL2849P'       'OPEN'  'ORAT'  243     /
/
```

```
TSTEP
61 /
WCONHIST
'LL160P'         'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'         'STOP'  'ORAT'  0       /
'LL2527P'        'OPEN'  'ORAT'  99      /
'LL2849P'        'OPEN'  'ORAT'  218     /
/
TSTEP
61 /
WCONHIST
'LL160P'         'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'         'STOP'  'ORAT'  0       /
'LL2527P'        'OPEN'  'ORAT'  100     /
'LL2849P'        'OPEN'  'ORAT'  236     /
/
TSTEP
62 /
WCONHIST
'LL160P'         'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'         'STOP'  'ORAT'  0       /
'LL2527P'        'OPEN'  'ORAT'  98      /
'LL2849P'        'OPEN'  'ORAT'  265     /
/
TSTEP
61 /
WCONHIST
'LL160P'         'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'         'STOP'  'ORAT'  0       /
'LL2527P'        'OPEN'  'ORAT'  92      /
'LL2849P'        'OPEN'  'ORAT'  293     /
/
TSTEP
30 /
WCONHIST
'LL160P'         'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'         'STOP'  'ORAT'  0       /
'LL2527P'        'OPEN'  'ORAT'  102     /
'LL2849P'        'OPEN'  'ORAT'  265     /
/
TSTEP
31 /
-- ================= YEAR 1997
WCONHIST
'LL160P'         'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'         'STOP'  'ORAT'  0       /
'LL2527P'        'OPEN'  'ORAT'  96      /
'LL2849P'        'OPEN'  'ORAT'  239     /
/
TSTEP
59 /
WCONHIST
'LL160P'         'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'         'STOP'  'ORAT'  0       /
'LL2527P'        'OPEN'  'ORAT'  96      /
'LL2849P'        'OPEN'  'ORAT'  209     /
/
TSTEP
61 /
WCONHIST
'LL160P'         'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'         'STOP'  'ORAT'  0       /
'LL2527P'        'OPEN'  'ORAT'  95      /
'LL2849P'        'OPEN'  'ORAT'  206     /
'LL3487HP'       'OPEN'  'ORAT'  22      /
/
TSTEP
31 /
WCONHIST
'LL160P'         'STOP'  'ORAT'  0       /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'         'STOP'  'ORAT'  0       /
'LL2527P'        'OPEN'  'ORAT'  107     /
'LL2849P'        'OPEN'  'ORAT'  215     /
/
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580 /
/
TSTEP
20 /  -- INJECTION

WELLSHUT
LL3487HI /
/
TSTEP
7 /  -- SOAK PERIOD
WCONHIST
'LL3487HP'       'OPEN'  'ORAT'  50      /
/
TSTEP
3 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  80      /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'         'STOP'  'ORAT'  0       /
'LL2527P'        'OPEN'  'ORAT'  127     /
'LL2849P'        'OPEN'  'ORAT'  217     /
'LL3487HP'       'OPEN'  'ORAT'  338     /
/
TSTEP
31 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  127     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'         'STOP'  'ORAT'  0       /
'LL2527P'        'OPEN'  'ORAT'  129     /
'LL2849P'        'OPEN'  'ORAT'  221     /
'LL3487HP'       'OPEN'  'ORAT'  558     /
/
TSTEP
31 /
WCONHIST
'LL160P'         'OPEN'  'ORAT'  127     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'         'STOP'  'ORAT'  0       /
'LL2527P'        'OPEN'  'ORAT'  121     /
'LL2849P'        'OPEN'  'ORAT'  191     /
'LL3487HP'       'OPEN'  'ORAT'  534     /
/
TSTEP
30 /
WCONHIST
```

```
'LL160P'        'OPEN'  'ORAT'  128     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  90      /
'LL2849P'       'OPEN'  'ORAT'  203     /
'LL3487HP'      'OPEN'  'ORAT'  361     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  127     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  89      /
'LL2849P'       'OPEN'  'ORAT'  199     /
'LL3487HP'      'OPEN'  'ORAT'  405     /
/
TSTEP
30 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  126     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  89      /
'LL2849P'       'OPEN'  'ORAT'  188     /
'LL3487HP'      'OPEN'  'ORAT'  359     /
/
TSTEP
31 /
-- ================== YEAR 1998
WCONHIST
'LL160P'        'OPEN'  'ORAT'  130     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  92      /
'LL2849P'       'OPEN'  'ORAT'  207     /
'LL3487HP'      'OPEN'  'ORAT'  322     /
/
TSTEP
31 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  129     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  94      /
'LL2849P'       'OPEN'  'ORAT'  199     /
'LL3487HP'      'OPEN'  'ORAT'  328     /
/
TSTEP
28 /
WCONHIST
'LL160P'        'OPEN'  'ORAT'  132     /
'LL36P' 'STOP'  'ORAT'  0       /
'LL112P'        'STOP'  'ORAT'  0       /
'LL2527P'       'OPEN'  'ORAT'  94      /
'LL2849P'       'OPEN'  'ORAT'  205     /
'LL3487HP'      'OPEN'  'ORAT'  318     /
/
TSTEP
31 /
END
```

Case 1: No Further Cyclic Steam Injection

```
-- AREA LL3487H: 3D CYCLI STEAM INYECTION
-- CASE 1: NO FUTHER CICLYC STEAM INJECTION

DATUM
3000 /
RESTART
LL3487LG1 285 /
OUTSOL
PRES    TEMP    SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  ========================

SATNUM
240*1
240*2
240*3
240*4
240*5 /

SUMMARY ================================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WLPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPRH
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WTEMP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WGOR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WWCT
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
/
```

```
WBHP
'LL160I' 'LL36I' 'LL112I' 'LL2527I'
'LL2849I' 'LL3487HI' /

DATE
RUNSUM

SCHEDULE   ===========================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/
-- ==================   PREDICTION
TSTEP
30  31  30  31  31  30  31  30  31 /
-- ================== YEAR 1999
TSTEP
31 28 31 30 31  30 31  31  30  31  30  31 /
-- ================== YEAR 2000
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2001
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2002
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2003
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2005
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2006
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31  29  31  30 31 30 31 31 30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
END
```

Case 2: Continuing Cyclic Steaming in the Existing Active Wells

```
-- AREA LL3487H: 3D CYCLI STEAM INYECTION
-- CASE 2: CONTINUE CYCLIC STEAMING ALL
-- ACTIVE WELL

DATUM
3000 /
RESTART
LL3487LGR 285 /
OUTSOL
PRES    TEMP    SOIL   SWAT   SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS   ==========================

SATNUM
240*1
240*2
240*3
240*4
240*5 /

SUMMARY =================================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPR
```

```
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WLPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPRH
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WTEMP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WGOR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WWCT
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
/
WBHP
'LL160I' 'LL36I' 'LL112I' 'LL2527I'
'LL2849I' 'LL3487HI' /

DATE
RUNSUM

SCHEDULE   ============================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /

RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /

SEPCOND
SEP FIELD 1   90 75 /
/

-- ===================   PREDICTION
WELLPROD
LL160P   BHP  4*  475 /
LL2527P  BHP  4*  475 /
LL2849P  BHP  4*  475 /
LL3487HP BHP  4*  600 /
/
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  375 /
/
TSTEP
6 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  375 /
/
TSTEP
7  30  31  31  30  31 30 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
4 /
-- ================== YEAR 1999
TSTEP
31  28  31  30  31 30  31  31 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  375 /
/
TSTEP
6 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
```

```
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  375 /
/
TSTEP
7  30  31 /
-- ================== YEAR 2000
TSTEP
31 29 31 30  31 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
3  31 31  30  31  30  31 /
-- ================== YEAR 2001
TSTEP
31  28 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  375 /
/
TSTEP
7 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  475 /
/
TSTEP
6  31 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
3  31  31  30  31  30  31 /
-- ================== YEAR 2002
TSTEP
31  28  31  30  31  30  31  31 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  475 /
/
TSTEP
7 30  31 /
-- ================== YEAR 2003
TSTEP
```

```
31  28  31  30  31 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
3  31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31  29 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  475 /
/
TSTEP
6 31 30  31  31  30  31  30 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
4 /
-- ================== YEAR 2005
TSTEP
31  28  31  30  31  30  31  31 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  475 /
/
TSTEP
7  30  31 /
-- ================== YEAR 2006
TSTEP
31  28  31  30  31 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
```

```
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
3  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31  28 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  475 /
/
TSTEP
6 31 30  31  31  30  31  30 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
4 /
-- ================== YEAR 2008
TSTEP
31  29  31  30  31  30  31  31 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  475 /
/
TSTEP
6  31  30  31 /
-- ================== YEAR 2009
TSTEP
31  28  31  30  31 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
3  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30 31  31  30  31  30 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
```

```
4 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
END
```

Case 3: Steamflooding – Horizontal Well as Injector, Existing Active Vertical Wells as Producers

```
-- AREA LL3487H: 3D CYCLIC STEAM INJECTION
-- CASE 3: STEAMFLOODING - HORIZONTAL WELL
-- AS INJECTOR ACTIVE VERTICAL WELL AS
-- PRODUCER

DATUM
3000 /
RESTART
LL3487LGR 285 /
OUTSOL
PRES    TEMP    SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  ==========================

SATNUM
240*1
240*2
240*3
240*4
240*5 /

SUMMARY ================================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WLPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPRH
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WTEMP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WGOR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WWCT
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
/
WBHP
'LL160I' 'LL36I' 'LL112I' 'LL2527I'
'LL2849I' 'LL3487HI' /

DATE
RUNSUM
RPTONLY

SCHEDULE   ==========================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /

RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /

SEPCOND
SEP FIELD 1   90 75 /
/

-- ==================   PREDICTION
WELLPROD
LL160P   BHP  4*  475 /
LL2527P  BHP  4*  475 /
LL2849P  BHP  4*  475 /
/
WELLSHUT
LL3487HP /
LL2527I /
LL2849I /
/
WELLINJE
```

```
LL3487HI   WA   1*   WA   1*   2500   1*   1*   12*
0.75   580   /
/
TSTEP
30  31  30  31  31  30  31  30  31 /
-- ================== YEAR 1999
TSTEP
31 28 31 30 31  30 31  31  30  31  30  31 /
-- ================== YEAR 2000
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2001
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2002
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2003
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2005
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2006
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31  29  31  30 31 30 31 31 30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
END
```

Case 4: Cyclic Steaming All Existing Wells

```
-- AREA LL3487H: 3D CYCLIC STEAM INJECTION
-- CASE 4: CICLYC STEAMING  ALL WELLS

RUNSPEC    =============================

DATUM
3000 /
RESTART
LL3487LG1 285 /
OUTSOL
PRES    TEMP    SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  ========================

SATNUM
240*1
240*2
240*3
240*4
240*5 /

SUMMARY ===============================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WLPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPRH
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WTEMP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WGOR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WWCT
```

```
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
/
WBHP
'LL160I' 'LL36I' 'LL112I' 'LL2527I'
'LL2849I' 'LL3487HI' /

DATE
RUNSUM

SCHEDULE ================================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/
-- ===================   PREDICTION
WELLPROD
LL160P   BHP  4*  475 /
LL2527P  BHP  4*  475 /
LL2849P  BHP  4*  475 /
LL3487HP BHP  4*  600 /
/
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  475 /
/
TSTEP
7  30  31  31  30  31 30 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
4 /
-- ================== YEAR 1999
TSTEP
31  28 31  30  31 30  31  31 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  475 /
/
TSTEP
7  30  31 /
-- ================== YEAR 2000
TSTEP
31 29 /
WELLSHUT
LL36P /
/
WELLINJE
LL36I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
```

```
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL36I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL36P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL112P /
/
WELLINJE
LL112I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL112I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL112P BHP  4*  475 /
/
TSTEP
6  31 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
3  31 31  30  31  30  31 /
-- ================== YEAR 2001
TSTEP
31  28 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  475 /
/
TSTEP
6  31 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
3  31 /
WELLSHUT
LL36P /
/
WELLINJE
LL36I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL36I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL36P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL112P /
/
WELLINJE
```

```
LL112I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL112I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL112P BHP  4*  475 /
/
TSTEP
6  31  30  31 /
-- ================== YEAR 2002
TSTEP
31  28  31  30  31  30  31  31 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  475 /
/
TSTEP
7 30  31 /
-- ================== YEAR 2003
TSTEP
31 /
WELLSHUT
LL36P /
/
WELLINJE
LL36I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL36I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL36P BHP  4*  475 /
/
TSTEP
4 /
WELLSHUT
LL112P /
/
WELLINJE
LL112I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL112I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL112P BHP  4*  475 /
/
TSTEP
7 30  31 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
3  31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31  29 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
```

```
LL2527P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  475 /
/
TSTEP
6 31 30  31 /
WELLSHUT
LL36P /
/
WELLINJE
LL36I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL36I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL36P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL112P /
/
WELLINJE
LL112I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL112I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL112P BHP  4*  475 /
/
TSTEP
6 31  30 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
4 /
-- =================== YEAR 2005
TSTEP
31  28  31  30  31  30  31  31 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  475 /
/
TSTEP
7  30  31 /
-- =================== YEAR 2006
TSTEP
31  28 /
WELLSHUT
LL36P /
/
WELLINJE
LL36I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
```

```
LL36I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL36P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL112P /
/
WELLINJE
LL112I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL112I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL112P BHP  4*  475 /
/
TSTEP
6  31 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
3  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31  28 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL2849P /
/
WELLINJE
LL2849I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2849I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2849P BHP  4*  475 /
/
TSTEP
6  31 30  31  31  30 /
WELLSHUT
LL36P /
/
WELLINJE
LL36I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL36I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL36P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL112P /
/
WELLINJE
LL112I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL112I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL112P BHP  4*  475 /
/
TSTEP
6 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
```

```
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
4 /
-- ================== YEAR 2008
TSTEP
31  29  31  30  31  30  31  31 /
WELLSHUT
LL2527P /
/
WELLINJE
LL2527I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL2527I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL2527P BHP  4*  475 /
/
TSTEP
6  31  30  31 /
-- ================== YEAR 2009
TSTEP
31  28 /
WELLSHUT
LL36P /
/
WELLINJE
LL36I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL36I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL36P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL112P /
/
WELLINJE
LL112I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL112I /
/
```

```
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL112P BHP  4*  475 /
/
TSTEP
6  31 /
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
3  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31  28  31  30  31  30  31  31  30  /
WELLSHUT
LL36P /
/
WELLINJE
LL36I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL36I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL36P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL112P /
/
WELLINJE
LL112I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL112I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL112P BHP  4*  475 /
/
TSTEP
6 /
```

```
WELLSHUT
LL3487HP /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL3487HI /
/
TSTEP
7 / --  SOAK PERIOD
WELLPROD
LL3487HP BHP  4*  600 /
/
TSTEP
4 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31  29 /
WELLSHUT
LL36P /
/
WELLINJE
LL36I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL36I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL36P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL112P /
/
WELLINJE
LL112I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL112I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL112P BHP  4*  475 /
/
TSTEP
6 31  30  31  31  30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31  28  31  30  31  30  31  31  30  /
WELLSHUT
LL36P /
/
WELLINJE
LL36I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL36I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL36P BHP  4*  475 /
/
TSTEP
7 /
WELLSHUT
LL112P /
/
WELLINJE
LL112I  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
20 / -- INJECTION PERIOD
WELLSHUT
LL112I /
/
TSTEP
4 / --  SOAK PERIOD
WELLPROD
LL112P BHP  4*  475 /
/
TSTEP
6  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
END
```

Case 5: Steamflooding – Horizontal Well as Injector, Existing Vertical Wells and as Producers

```
-- AREA LL3487H: 3D CYCLIC STEAM INJECTION
-- CASE 5: STEAMFLODING - HORIZONTAL WELL
-- AS INJECTOR EXISITNG VERICAL WELLS AS
-- PRODUCERS
```

```
DATUM
3000 /
RESTART
LL3487LG1 285 /
OUTSOL
PRES     TEMP     SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS =======================

SATNUM
240*1
240*2
240*3
240*4
240*5 /

SUMMARY ==============================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WLPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPRH
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WTEMP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WGOR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WWCT
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
/
WBHP
'LL160I' 'LL36I' 'LL112I' 'LL2527I'
'LL2849I' 'LL3487HI' /

DATE
RUNSUM
```

```
SCHEDULE   ============================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/

-- =================   PREDICTION
WELLSHUT
LL36I /
LL112I /
LL3487HP /
LL2527I /
LL2849I /
/
WELLPROD
LL160P   BHP  4*  475 /
LL2527P  BHP  4*  475 /
LL2849P  BHP  4*  475 /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  2500  1*  1*  12*
0.75  580  /
/
TSTEP
30  31  30  31  31  30  31  30  31 /
--================== YEAR 1999
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
--================== YEAR 2000
COMPDATL
LL36P   RLL36   3 3 1 1 3* 0.6   2464  15 /
LL36P   RLL36   3 3 2 2 3* 0.6  21362  15 /
LL36P   RLL36   3 3 3 3 3* 0.6  44130  15 /
LL36P   RLL36   3 3 4 4 3* 0.6 181183  15 /
LL112P  RLL112  3 3 1 1 3* 0.6  1*     15 /
LL112P  RLL112  3 3 2 2 3* 0.6  15459  15 /
LL112P  RLL112  3 3 3 3 3* 0.6 168139  15 /
LL112P  RLL112  3 3 4 4 3* 0.6  27726  15 /
/
WELLSHUT
LL2527P /
LL2527I /
/
WELLPROD
LL112P   BHP  4*  475 /
LL36P    BHP  4*  475 /
/
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================= YEAR 2001
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================= YEAR 2002
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================= YEAR 2003
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================= YEAR 2004
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================= YEAR 2005
```

```
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2006
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31  29  31  30 31 30 31 31 30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
END
```

Case 6: Steamflooding – Horizontal Well as Injector, New Four Horizontal Wells as Producers

```
-- AREA LL3487H: 3D CYCLIC STEAM INJECTION
-- CASE 6: STEAMFLOODING - HORIZONTAL WELL
-- AS INJECTOR, NEW FOUR HORIZONTAL WELLS
-- AS PRODUCER

RESTART
LL3487LG2 285 /
DATUM
3000 /
OUTSOL
PRES    TEMP    SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS  ==========================

SATNUM
240*1
240*2
240*3
240*4
240*5 /

SUMMARY ===============================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
WOPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
WLPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
WOPRH
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
WTEMP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
WGOR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
WWCT
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /
/
WBHP
'LL160I' 'LL36I' 'LL112I' 'LL2527I'
'LL2849I' 'LL3487HI' 'HORIZA1' 'HORIZA2'
'HORIZA3' 'HORIZA4' /

DATE
RUNSUM

SCHEDULE  ==============================

RPTPRINT
```

```
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/
WELSPECL
HORIZA1 FIELD RHORIZ1  2 3       3000 /
HORIZA2 FIELD RHORIZ2  3 2       3000 /
HORIZA3 FIELD RHORIZ3  2 3       3000 /
HORIZA4 FIELD RHORIZ3  3 2       3000 /
/
-- ==================   PREDICTION
WELLSHUT
LL36I /
LL112I /
LL3487HP /
LL2527I /
LL2849I /
/
WELLPROD
LL160P   BHP  4*  475 /
LL2527P  BHP  4*  475 /
LL2849P  BHP  4*  475 /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  3500  1*  1*  12*
0.75  580  /
/
TSTEP
30  31  30  31 31  30  31  30  31 /
-- ================== YEAR 1999
TSTEP
31 28 31 30 31 30 31  31  30  31  30 /
COMPDATL
LL160P   RLL160        1 1 1  12   SHUT /
LL2527P  RLL2527 1 1 1        12   SHUT /
LL2849P  RLL2849 1 1 4        12   SHUT /
/
TSTEP
31 /
-- ================== YEAR 2000
COMPDATL
HORIZA1 RHORIZ1 2 3   2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 4   2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 5   2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 6   2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 7   2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 8   2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 9   2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 10 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 11 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 12 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 13 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 14 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 15 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 16 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 17 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 18 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 19 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 20 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 21 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 22 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 23 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 24 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 25 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 26 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 27 2 2 3* 0.5 3* 'Y' /
HORIZA1 RHORIZ1 2 28 2 2 3* 0.5 3* 'Y' /
HORIZA2 RHORIZ2 3   2 2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 4   2 2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 5   2 2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 6   2 2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 7   2 2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 8   2 2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 9   2 2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 10 2 2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 11 2 2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 12 2 2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 13 2 2 2 3* 0.5 3* 'X' /
HORIZA2 RHORIZ2 14 2 2 2 3* 0.5 3* 'X' /
HORIZA3 RHORIZ3 2 3   2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 4   2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 5   2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 6   2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 7   2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 8   2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 9   2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 10 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 11 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 12 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 13 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 14 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 15 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 16 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 17 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 18 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 19 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 20 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 21 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 22 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 23 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 24 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 25 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 26 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 27 2 2 3* 0.5 3* 'Y' /
HORIZA3 RHORIZ3 2 28 2 2 3* 0.5 3* 'Y' /
HORIZA4 RHORIZ4 3   2 2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 4   2 2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 5   2 2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 6   2 2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 7   2 2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 8   2 2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 9   2 2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 10 2 2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 11 2 2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 12 2 2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 13 2 2 2 3* 0.5 3* 'X' /
HORIZA4 RHORIZ4 14 2 2 2 3* 0.5 3* 'X' /
/
WELLPROD
HORIZA1 BHP  4*  600 /
HORIZA2 BHP  4*  600 /
HORIZA3 BHP  4*  600 /
HORIZA4 BHP  4*  600 /
/
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2001
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2002
TSTEP
```

```
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2003
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2005
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2006
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31  29  31  30 31 30 31 31 30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
END
```

Case 7: Steamflooding – Horizontal Well as Injector, New Eight Vertical Wells as Producers

```
-- AREA LL3487H: 3D CYCLI STEAM INYECTION
-- CASE 7:STEAMFLODING - HORIZONTAL WELL AS
-- INJECTOR EIGHT NEW VERTICAL PRODUCERS

DATUM
3000 /
RESTART
LL3487LG3 285 /
```

```
OUTSOL
PRES    TEMP    SOIL  SWAT  SGAS XMF YMF /
RPTSOL
PRES TEMP SOIL SWAT SGAS XMF YMF /
FIELDSEP
1 90 75 /
/

REGIONS ========================

SATNUM
240*1
240*2
240*3
240*4
240*5 /

SUMMARY ===============================

FOPR
FOPT
FWPR
FWPT
FWCT
FGPR
FGPT
FPPO
FGOR
FPRP
FWIR
FWIT
FOSAT
FWSAT
FGSAT
WBHP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WBHP
'WELL01' 'WELL02' 'WELL03' 'WELL04'
'WELL05' 'WELL06' 'WELL07' 'WELL08' /
WOPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPR
'WELL01' 'WELL02' 'WELL03' 'WELL04'
'WELL05' 'WELL06' 'WELL07' 'WELL08' /
WLPR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WLPR
'WELL01' 'WELL02' 'WELL03' 'WELL04'
'WELL05' 'WELL06' 'WELL07' 'WELL08' /
WOPRH
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WOPRH
'WELL01' 'WELL02' 'WELL03' 'WELL04'
'WELL05' 'WELL06' 'WELL07' 'WELL08' /
WTEMP
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
WTEMP
'WELL01' 'WELL02' 'WELL03' 'WELL04'
'WELL05' 'WELL06' 'WELL07' 'WELL08' /
WGOR
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
```

```
WGOR
'WELL01' 'WELL02' 'WELL03' 'WELL04'
'WELL05' 'WELL06' 'WELL07' 'WELL08' /
WWCT
'LL160P' 'LL36P' 'LL112P' 'LL2527P'
'LL2849P' 'LL3487HP' /
/
WBHP
'LL160I' 'LL36I' 'LL112I' 'LL2527I'
'LL2849I' 'LL3487HI' /

DATE
RUNSUM

SCHEDULE   ===============================

RPTPRINT
-- s  F  R  G  S  W  C  s  nl
   1  1  0  0  0  1  1  1  0 /
RPTSCHED
PRES TEMP SOIL SWAT SGAS XMF YMF /
SEPCOND
SEP FIELD 1   90 75 /
/
WELSPECL
WELL01  FIELD RWELL01 3      2 3000 /
WELL02  FIELD RWELL02 3      2 3000 /
WELL03  FIELD RWELL03 3      2 3000 /
WELL04  FIELD RWELL04 3      2 3000 /
WELL05  FIELD RWELL05 3      2 3000 /
WELL06  FIELD RWELL06 3      2 3000 /
WELL07  FIELD RWELL07 3      2 3000 /
WELL08  FIELD RWELL08 3      2 3000 /
/
-- ==================   PREDICTION
WELLSHUT
LL36I /
LL112I /
LL3487HP /
LL2527I /
LL2849I /
/
WELLPROD
LL160P   BHP  4*  475 /
LL2527P  BHP  4*  475 /
LL2849P  BHP  4*  475 /
/
WELLINJE
LL3487HI  WA  1*  WA  1*  3500  1*  1*  12*
0.75  580  /
/
TSTEP
30 31 30 31 31 30  31  30  31 /
-- ================== YEAR 1999
TSTEP
31  28  31  30  31  30  31  31  30  31  30
/
COMPDATL
LL160P  RLL160  1 1 1  12      SHUT /
LL2527P RLL2527 1 1 1  12      SHUT /
LL2849P RLL2849 1 1 4  12      SHUT /
/
TSTEP
31 /
--=================== YEAR 2000
COMPDATL
WELL01  RWELL01 3 2 1 5 3* 0.6 /
WELL02  RWELL02 3 2 5 5 3* 0.6 /
WELL03  RWELL03 3 2 1 5 3* 0.6 /
WELL04  RWELL04 3 2 5 5 3* 0.6 /
WELL05  RWELL05 3 2 1 5 3* 0.6 /
WELL06  RWELL06 3 2 5 5 3* 0.6 /
WELL07  RWELL07 3 2 1 5 3* 0.6 /
WELL08  RWELL08 3 2 5 5 3* 0.6 /
/
WELLPROD
WELL01   BHP  4*  475 /
WELL02   BHP  4*  475 /
WELL03   BHP  4*  475 /
WELL04   BHP  4*  475 /
WELL05   BHP  4*  475 /
WELL06   BHP  4*  475 /
WELL07   BHP  4*  475 /
WELL08   BHP  4*  475 /
/
TSTEP
31 29 31 30 31 30 31  31  30  31  30  31 /
-- ================== YEAR 2001
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2002
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2003
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2004
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2005
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2006
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2007
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2008
TSTEP
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2009
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2010
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2011
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2012
TSTEP
31  29  31  30 31 30 31 31 30  31  30  31 /
-- ================== YEAR 2013
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2014
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2015
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2016
TSTEP
```

```
31 29 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2017
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
-- ================== YEAR 2018
TSTEP
31 28 31 30 31 30  31  31  30  31  30  31 /
END
```

VITA

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Professional Experience:	Petroleos de Venezuela S. A. Exploration and Production (March 1986 - present)