PERFORMANCE PREDICTION OF A WATER DRIVE RESERVOIR USING ECLIPSE SIMULATOR

Project Report

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CERTIFICATE

This is to certify that the project report on "PERFORMANCE PREDICTION OF A WATER DRIVE RESERVIOR USING ECLIPSE AS A SIMULATOR" submitted to University of petroleum and Energy Studies, Dehradun, by Mr. Bhartendu Bhatt and Mr. Manish Dutt Kothiyal, in partial fulfillment of the requirement for the " B.Tech. in Applied Petroleum Engneering", is a bonafide work carried out by them under my supervision and guidance. This work has not been submitted anywhere else for any other degree or diploma.

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CONTENTS

CHAPTER **Page No.**

CHAPTER **Page No.**

LIST OF FIGURES

LIST OF TABLES

Abstract

The constrain of ability to produce a reservoir only once in a lifetime and having no scope to undo a step taken once on the reservoir and every step on the reservoir adding to the total cost on the production and with no control with the producer on the price of the produced hydrocarbons in combination with regulatory authorities having an upper hand on the production rates, it has become increasingly important to simulate the reservoir before actually producing it, so as to have an insight into the total revenue generated and compliance with the regulatory authority.

Scope of Project :-

Today's market with depleting existing reservoirs and no major discoveries since long has lead to the necessity of the most optimal production scheme for every existing reservoir and any new discovery .

Simulation study with highly accurate and professional soft wares like ECLIPSE have given the petroleum industry a tool to virtually produce a reservoir many times so that the most optimal production scheme can be selected

Reliable, efficient and effective production schemes are key to optimal production of a reservoir

Such a production scheme is given to us by the use of a simulator

Importance of the project:-

Asset evaluation – Economic production - Maximize ultimate recovery

With rising energy cost, depleting reservoirs and environmental pressures through the climate change levy, there is growing need to produce a reservoir to get maximum recovery with the minimum cash input for maximizing the industry's profit.

This project report gives an insight of the modeling concepts of a reservoir in ECLIPSE and prediction of its behavior under different conditions.

Chapter 1

Introduction to Simulation

1. Introduction to Simulation

The Dictionary defines simulate as simply "to give appearance of.". To the engineer or analyst, simulation involves the utilization of a model to obtain some insight into the behaviour of a physical process. It is a process or mechanism by which a problem can be studied in varying depths of detail to obtain answers or to confirm hypothesis.

Simulation has long been recognized in many applied science disciplines as the final resort e.g. transportation model networks, telephone system design etc.

Simulation, however, involves a lot more than just the design and use of a good model to analyze a process.

1.1 The Classical Approach to Simulation

The classical approach to solving a problem has been to formulate a problem and then try to make as many simplifying assumptions as possible to obtain a manageable problem.

The models are basically of two types; in a very general way they are the one that can be physically felt and one that cant be felt. The former are *physical* models, the latter *mathematical* models.

Various Classical Modeling Schemes for Reservoir Simulation

a) Tank Models

The tank model, described in such reservoir engineering textbooks as Craft and Hawkins[1], is most useful when rapid answers are needed and average reservoir pressure is deemed as the only important factor in making operating or investment decisions. Use of a tank model simply involves a classical, hand calculation method

b) Analog Resistance Capacitance Networks[2]

Usually called electrical analyzers, employ the similarity between electric flow and fluid flow in a reservoir to develop an electrical analog of the petroleum reservoir.

c) The Electrolytic Model[2]

These models are developed with the basic aim of analyzing the movement of fluid fronts with the reservoir. These models are based on the analog between Ohm's law for flow in a conductor and Darcy's law for flow in the porous medium.

d) The Potentiometeric Model[2]

This is basically a steady state model with basic aim to determine the Steady state potential distribution in the model

All the models referred so far suffered from several restrictions. The biggest problem was the fact that each reservoir had its own unique model which had to be build from the scratch. Such modifications were complex and time consuming these also incorporated the inherent problem of the components to be used during simulation and associated leaks and breaks. Finally these models however scaled down, were too bulky to use.

To overcome the associate problems and time constrain involved thus evolved the *Numerical Models*

1.2 Numerical Models[2]

Numerical models utilize digital machines to solve mathematical equations[3] which govern the behavior of the fluids in the porous media. They provide a generalized approach using a girded format[4,5] which can accommodate any reservoir description just by recording indices of the grid.

The procedure of simulation consists of descretizing[2] the reservoir into blocks and performing mass and energy balance[6] on all these blocks simultaneously. The girding of cells provides more realistic representation of rock and fluid properties which can vary in any manner.

1.3 Performance Prediction.

The basic aim, keeping in mind for which a simulation study originated its wings was predicting the performance of a reservoir, well, or any surface facility in connection with the reservoir, so that the engineer has an insight into the way a system is going to behave under certain conditions.

By knowing the system behavior before producing it, the engineer has an advantage to point out the best production scheme and thus validate his findings to the management people so that a suggested project may be operated in reality.

The basic steps in performance prediction of any reservoir are as follows

a) make the most appropriate model resembling the system
b) validate the model through tools such as History match[4(spe)]
c) suggest various production schemes
d) predict/simulate each production scheme and compare the results
e) Select the most optimum production scheme

Constant monitoring of the reservoir, regular up gradation of the model and history match form an important and regular role in any simulation study for performance prediction because:

A. Accuracy of the simulated result lies in the accuracy of the input data which can not be assumed to be dependable all the time in real life situations due to inevitable errors such as human and mechanical errors occurring at many stages of the data collection,
B. The actual reservoir is very large i.e. tens of square kms. in area, but we have the basic rock and fluid data from some selected points of the reservoir i.e wells. And this limited data from the wells is presumed to occur in the whole reservoir.
C. Finally, if we talk about aquifer model, most of its data is assumed by experience because we don't measure the aquifer properties by any of the methods such as logging. The objective is clear that we are interested in Hydrocarbon part not in the water bearing part of the reservoir.

1.4 The Commercial Soft wares.

The numerical model to any system i.e. The governing fluid flow equations of a system[1] are non linear and complex in nature and thus their solution using analytical techniques[7] is not possible and thus one has to go for the Numerical or Iterative methods[2,3,7] of solution are adopted.

As discussed earlier the reservoir is divided into grids and the governing equations of flow are solved for each and every grid block. This is a tedious and time consuming assignment and for a realistic reservoir where the complexity can range with several thousand grid blocks and multicomponent system[2,3] and high heterogeneity, also an added pressure of calculating the results to the most accurate, and again and again for varying well locations and surface facilities.

Such a job is not possible within time by human hands, however with advent of high speed computational machines and their increased use as compared to the desk board calculators have given the engineer a scope to reproduce the reservoir many times in his own liking scheme and then produce it in the most economical and revenue generating pattern.

Various soft wares have been developed with the advancing age of simulation, each providing a greater degree of reliability and ease of using to the user, so that the field is optimally produced.

There are a bunch of reservoir simulation soft wares present in the market and each is being updated for shortcomings regularly. Basically all reservoir simulation soft wares adopt the same principal of solving the reservoir fluid flow equations for the input reservoir, with any of the best available solution method or any of the user specified solution technique.

To name some, table 1.1 lists the commercially used simulators in the petroleum industry.

1.5 Benefits of Simulation

The engineer knows he has a single opportunity to produce the reservoir; any mistakes made in this process will be around forever. However, the simulation study can be made several times and the alternatives examined when the simulation study is used as a management tool the efficient utilization of the available energy within the reservoir can lead to greater ultimate production and certainly a more economic operation.

One benefit of simulation which in reality was not designed into the process at the start but has evolved as a fruitful by-product is the presence now of a common ground between companies and regulating bodies and other agencies which deal with petroleum resources this commonality is the knowledge that all these groups are now using simulators to determine reservoir performance, and the differences between two opposing groups can be narrowed down to the data used rather than to the calculation procedure itself. The calculation procedures do not differ by very much, and if need be a standardized approach can be used in which the data can be run by a third party system for comparison purposes.

Finally, it can be said in a rather laconic way that even if the results of the simulator study were in conclusive, the mechanics of simulation have compiled all the data pertinent to that reservoir into one compact database which is probably now in better shape than it ever was before.

Chapter 2
The literature Review

The reservoir simulation as a classical subject is in itself an in depth course, It includes works from the renowned names in reservoir engineering right from the basic Darcy law for the fluid flow, to the material balance calculations in the reservoir.

There are these classical books for reservoir simulation basics study

1) Petroleum Reservoir Simulation by Khalid Aziz and Antonin Settari.
2) Modern Reservoir Engineering-A Simulation Approach by Henry B. Crichlow.

However, several compilation works have thereafter been made for the better understanding of the implication of these reservoir modeling and simulation concepts to the computer based modeling and solution techniques. One of the best in line being the SPE manual on the reservoir simulation.

It must be noted by the reader as a guideline from the compiler of this dissertation that before understanding the reservoir simulation as a whole it is necessary to clear the basic reservoir engineering concepts. For that objective in mind some classical books might be referred by the reader

1) Petroleum Reservoir Engineering-Physical Properties by James W. Amyx, Daniel M. Bass, JR. and Robert L. Whiting
2) Applied petroleum reservoir engineering by B.C.Craft and Hawkins, M.F.
3) The Practice of Reservoir Engineering by Dake, L.P.
4) Reservoir Engineering Hand book by Tarek Ahmed

However, this dissertation work in no way familiarizes the reader with the above reservoir engineering concepts and/or the reservoir modeling and simulation concepts. **This work is mainly focused on the need of Performance Prediction of a reservoir, using the commercial Simulator i.e. ECLIPSE.**

There is only one direct source available to any person to learn the basics of using ECLIPSE, and that is through the available Training and Exercise Guide on that very version of Eclipse. Based on the diversity in the reservoir configuration there are several versions of ECLIPSE available to a petroleum engineer and the engineer must know beforehand, which version suits his reservoir the best, an insight to this can be had through the Schlumberger website i.e. http://www.slb.com. It must also be noted that the Training and Exercise Guide gives an insight to the basic functioning of that version of ECLIPSE while the online Manual available within the software helps in determining the right keyword and its Syntax to be used in the real programming(i.e. the input data file).

The Training and Exercise Guide plus the Online Manual served by Schlumberger are in itself promised complete learning tool by Schlumberger. However with the advancing need of using commercial soft wares with fluency and its addition into the scholar stage, there are emerging help websites that provide a lot of information and structured input data files for the user to get acquainted with the ECLIPSE data file interface. Following is a list of such websites;

1) http://www.kgb.edu
2) http://www.iies.org/OLD_Site/english/services/iies-res-exa1
3) http://www.spe.org

Chapter 3
Introduction To ECLIPSE

3.1 ECLIPSE Origin

ECLIPSE originated from ECL in the late 1970's. At the time ECL specialized in seismic data acquisition and quality control, and it became apparent that diversification into dynamic flow modeling would be advantageous, Although a number of reservoir simulators were available at the time, the most popular commercial simulators were not fully Implicit and did not use fully implicit well models. The team of reservoir engineers and software developers chosen by ECL was particularly well placed to create a new product having these features, since most of them were very well versed with the PORES simulator. The first commercial release of the new simulator, ECLIPSE, was announced in 1983 SPE. ECLIPSE rapidly became the simulator of choice in Europe and still is today, although the ownership of the technology has changed a number of times since the first release.

3.2 Why ECLIPSE ?

ECLIPSE reservoir simulation software offers multiple choices of robust numerical simulation techniques for accurate and fast solutions for all kinds of reservoirs and all degrees of complexity—structure, geology, fluids and development scheme.

ECLIPSE provides solutions for the entire spectrum of reservoir simulation. The finite difference[2,3] simulators are ECLIPSE Blackoil, ECLIPSE Compositional® and ECLIPSE Thermal reservoir simulation software. Streamline capabilities are provided by ECLIPSE FrontSim streamline reservoir simulation software. By choosing from a wide range of add-on options—coal bed methane, gas field operations, calorific value-based controls, reservoir coupling and surface networks—ECLIPSE simulators are tailored to engineer's needs to greatly enhance the scope of simulation studies.

Complex geological features may be modeled by defining the reservoir using block-centered, corner-point or unstructured grids[5]. ECLIPSE gives fully implicit and IMPES,AIM and IMPSAT[2,3] solvers for the right balance of precision and speed. With ECLIPSE, one has the freedom of platforms, including UNIX‡ (SUN‡,SGI‡ and IBM‡) and PC (WIN‡, NT‡ and Linux‡).

With ECLIPSE, one can implement parallel processing[5] on multiple processor machines.

3.5 ECLIPSE Black Oil Features

ECLIPSE Blackoil is a fully implicit, three-phase,three-dimensional, general-purpose blackoil[5,7] simulator. Blackoil includes several advanced and unique features such as directional relative permeability, vertical equilibrium, dual porosity and permeability. The Blackoil model assumes the reservoir fluids consist of reservoir oil, solvent gas and water. The reservoir oil and solvent gas components are assumed to be miscible in all proportions.

3.5 Reservoir Simulation With ECLIPSE

The following steps are taken in a simulation study:

1. Decide a clear objective
2. Collect and review data
3. Build the model
4. Connect wells
5. Specify historical production rates
6. History match
    a) Pressure match
    b) Production match
7. Sensitivity studies are appropriate at any stage
8. Predict future production under varying operating strategies

For building the reservoir model the following steps are taken

- The reservoir is divided into a number of cells
- Basic data is provided for each cell
- Wells are positioned Within the cells
- The required well production rates are specified as a function of time

- The equations are solved (by ECLIPSE) to give the pressure and saturations for each block as well as the production of each phase from each well

We are Interested in Simulating Flow

- Flow from one grid block to the next
- Flow from a grid block to the well completion
- Flow within the wells (and surface networks)

The fluid flow equation that ECLIPSE uses to calculate the above stated flow is given by

Flow	=	Transmissibility	*	Mobility	*	Potential Difference
		|		|		|
		Geometry & Properties		Fluid Properties		Well Production

3.5 Various ECLIPSE Sections

3.4.1 The RUNSPEC section:- generate model characterstics

Runspec section has two main purposes. One is memory allocation for various components of the simulation sequentially within the memory area. These components include wells, tabular data, the simulation grid and the solver stack. The other is to specify the basic character of the model its start date and to invoke simulation options.

3.4.2 The GRID Section:- Grid geometry and basic rock properties

the main purpose of the GRID section is to provide ECLIPSE with the information necessary for the calculation of cell pore volume and transmissibility in all directions this information will be used to calculate flow of each phase from cell to cell and from timestep to timestep

3.4.3 The EDIT* Section:- Modification of the processed grid data

The main purpose of this section is to modify any pore volume, cell center depths, transmissibilities, direct and non neighbor connections previously calculated in the GRID section

3.4.4 The PROPS Section:- This section is restricted to fluid PVT properties and rock compressibilities. The data is needed to evaluate phase densities at reservoir and stock tank conditions using the black oil equation of state

3.4.5 The REGIONS* Section:- Subdivision of the reservoir

This section is used to assign variable properties to the reservoir and/or to create useful reports.

3.4.6 The SOLUTION Section:- Initialization

This section is used to define the initial state of every cell in the model i.e. Initial pressure and phase saturation, Initial solution ratio, depth dependence of reservoir fluid properties, oil and gas re solution rates, initial analytical aquifer conditions

3.4.7 The SUMMARY* Section:- Request output for line plots

This section is where output to generate line plots is specified. The data may be quantities relating to the blocks, wells, completions, groups, regions, or the entire field.

3.4.8 The SCHEDULE Section:- wells, completions, rate data, flow co-relations, surface facilities, simulator advance, control and termination.

The schedule section is used to specify the means of production and injection for the entire model, advance the simulation and specify any other data that depends on time.

Chapter 4
Model Description

As we don't have any real life data of the reservoir, we assumed the required data and the rest are generated with the help of the simulator.

4.1 Grid Description

A hypothetical 20x20x1 rectangular block centered grid block was selected to make the study, further depths were provided to each grid block in a uniform manner so as to give it an appearance of a uniform anticline. Fig:-4.1

The used grid contains uniform cells of 1000 (ft) x 1000 (ft) x 40 (ft) dimension. And the timestep is taken as one month. Its also assumed that the reservoir is pure sand and contains no shales in it.

4.2 Reservoir Geometry and Properties

A simple reservoir having an anticlinal shape was assumed to occur which consists of two phases i.e. Oil and Water. The initial reservoir pressure is 4500 psia. The thickness of the reservoir is 40 ft (12.2 m). The reservoir length and breadth are taken as 20,000 ft (6097.56 m).The average porosity of the reservoir is 12 %.The average permeability in the x-direction is 202.6 mD, whereas the average permeability in the y-direction is 157.3 mili Darcies and in the z-direction, it is uniform i.e. 50 mili darcies.

The Oil-Water contact is at 7200 ft. The top most part of the anticline is 7060 ft from the datum top. And the bottom most part is 7300 ft from the datum top.

The water drive is provided by the Edge water drive (Fig. 4.1) which is represented by the Fetkovitch Aquifer Model[dake].

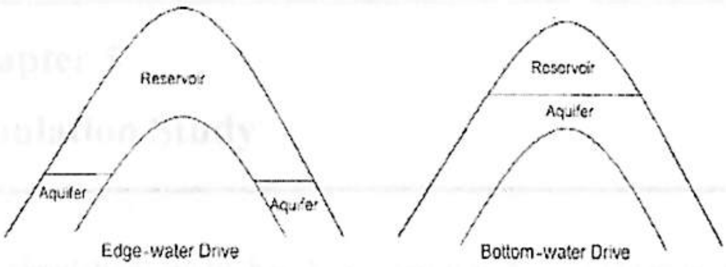

Fig 4.1 :- drive mechanism

Rock compressibility is 5.0 x 10^(-6) /psi at 525 psia.

The Formation Volume Factor for oil at 400 psia, is 1.16 rb/STB and at 5600 psia, it is 1.19 rb/STB. Density of Oil is assumed to be 47 lb/cubic feet, whereas the density of water is taken as 63 lb/cubic feet. The specific gravity of water is unity and the specific gravity of oil is 0.746. Water compressibility at 3600 psia, is 3.0 x 10^(-6) / psia and at 3900 psia, it is 2.67 x 10^(-6) / psia. Initial Oil saturation was 97.5 %, and the connate water saturation was 2.5%. Residual oil saturation is 50%, The initial oil in place was 2 x 10^(8) bbls.

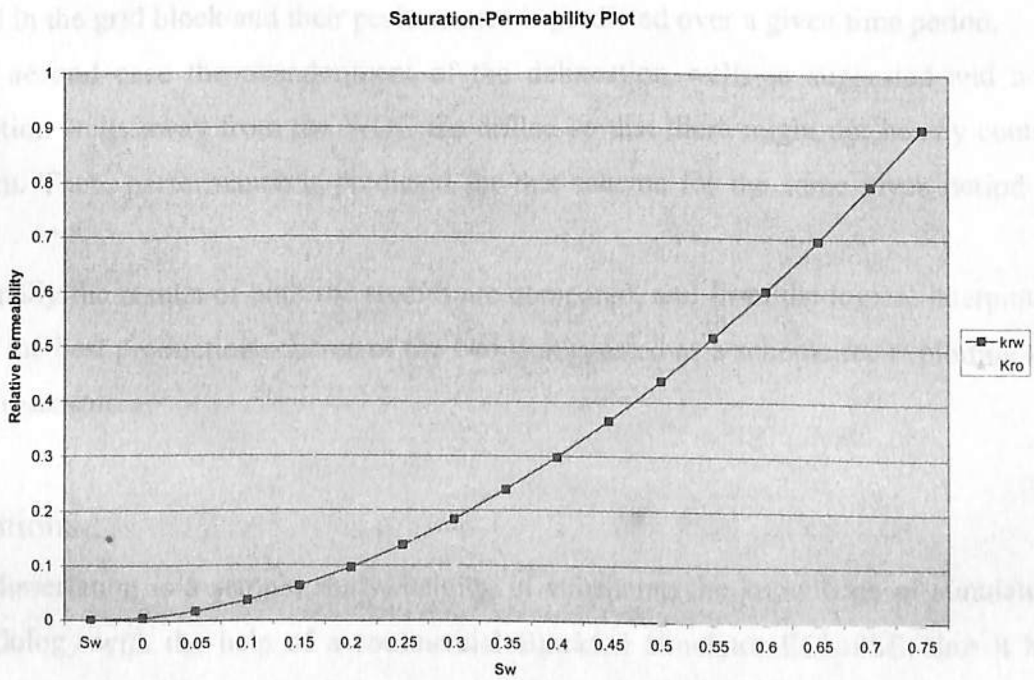

fig. 4.2

Chapter 5
Simulation Study

The simulation study has been performed on academic version of ECLIPSE BlackOil Simulator, thus the study suffers some of the basic simulation features such as the History Matching and Dynamic Modeling. However, this study gives a complete insight into the way data is given to the simulator, how the simulator deals with the provided data, what are the various generated files and their use, and finally how the provided output by the simulator is analyzed

5.1 Objective

The main objective of the simulation study (keeping in mind all the restrictions of the available soft ware) of the reservoir is to give the *optimum development plan* for the exploitation of the reservoir.

With this purpose in mind two cases are taken as the scheme of production, the first being at the delineation stage where some delineation wells and some production wells are located in the grid block and their performance is predicted over a given time period.

In the second case the abandonment of the delineation wells is suggested and new production wells away from the WOC are drilled so that there might not be any coning problem. Then, performance is predicted for this scheme for the same given period of time.

And finally the results of both the studies are compared, and from the logical interpreted results the best production scheme of the two is suggested as a scheme for exploiting the model reservoir.

5.2 Limitations

This dissertation is a sample study, helping in enhancing the knowledge of simulation methodology with the help of a commercial BlackOil simulator ECLIPSE, thus it has several limitations of its own, following is a list of assumptions and limitations of this study

a) The study uses an academic version of ECLIPSE BlackOil and thus does not provide all the built features.

b) The reservoir is highly simplified for study and uses all imaginary data, not representing. any field in reality however proper precautions have been taken to assume as realistic data as possible for all the inputted data.

c) The comparison is restricted to only two scheme patterns of the author's choice, just to give an insight of the power and utility of using a simulator and necessity of Performance prediction. However, this does not suggest that the given scheme is the best for producing the sample reservoir. A further study might suggest a more economical and revenue generating .pattern.

5.3 Simulator input data, the *.DATA File

-- this file provides the necessary data to the simulator, see chapter 3 (3.4)

5.3.1 Input data file for production scheme 1 Ref. fig(4)

```
--generate model characteristics
RUNSPEC
--gives title to the project
TITLE
WATER DRIVE
-- Specifies the dimensions of the grid: 20x20x1
DIMENS
20 20 1 /
-- Specifies phases present: oil, water
OIL
WATER

-- Field units to be used
FIELD
```

EQLDIMS

1* 100 /

--Specifies Aquifer type and Dimensions

AQUDIMS

0 0 0 0 1 400 /

-- Specifies maximum number of well and groups of wells
WELLDIMS

7 1 7 /

-- Specifies start of simulation
START

1 'JAN' 2007 /

-- Specifies Grid geometry and basic rock properties

GRID

BOX

1 20 1 20 1 1 /

-- Specifies the length of the cell in the X direction
DXV

20*1000 /

-- Specifies the length of the cell in the Y direction
DYV

20*1000 /

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        -- Specifies the length of the cell in the Z direction
DZ
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-- Specify porosity
    PORO
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    0.16 0.14 0.12 0.1 0.08 0.09 0.1 0.11 0.12 0.13 0.16 0.14 0.12 0.1 0.08 0.09 0.1 0.11 0.12 0.13
    0.16 0.14 0.12 0.1 0.09 0.09 0.1 0.11 0.12 0.13 0.16 0.14 0.12 0.1 0.09 0.09 0.1 0.11 0.12 0.13
    0.15 0.14 0.12 0.1 0.10 0.09 0.1 0.11 0.12 0.13 0.15 0.14 0.12 0.1 0.10 0.09 0.1 0.11 0.12 0.13
    0.15 0.14 0.12 0.1 0.10 0.09 0.1 0.11 0.12 0.13 0.15 0.14 0.12 0.1 0.10 0.09 0.1 0.11 0.12 0.13
     /
     --Specify Permeability in X-direction
     PERMX
     150 250 8*260 3*140 4*160 2*180 146
     140 250 8*260 3*150 4*134 2*168 147
     130 250 8*265 3*140 4*142 2*175 149
     120 250 8*270 3*155 4*160 2*177 157
     110 250 8*275 3*140 4*132 2*164 152
     100 250 8*275 3*134 4*135 2*158 156
```

```
90 250 8*260 3*147 4*144 2*174 133
80 250 8*260 3*154 4*154 2*186 133
60 250 8*275 3*170 4*160 2*169 162
50 250 8*275 3*130 4*150 2*180 146
150 250 8*260 3*140 4*160 2*180 146
140 250 8*260 3*150 4*134 2*168 147
130 250 8*265 3*140 4*142 2*175 149
120 250 8*270 3*155 4*160 2*177 157
110 250 8*275 3*140 4*132 2*164 152
100 250 8*275 3*134 4*135 2*158 156
90 250 8*260 3*147 4*144 2*174 133
80 250 8*260 3*154 4*154 2*186 133
60 250 8*275 3*170 4*160 2*169 162
50 250 8*275 3*130 4*150 2*180 146
/
--Specify Permeability in Y-direction
PERMY
150 150 8*160 3*140 4*160 2*180 146
140 150 8*160 3*150 4*134 2*168 147
130 150 8*165 3*140 4*142 2*175 149
120 150 8*170 3*155 4*160 2*177 157
110 150 8*175 3*140 4*132 2*164 152
100 150 8*175 3*134 4*135 2*158 156
190 150 8*160 3*147 4*144 2*174 133
180 150 8*160 3*154 4*154 2*186 133
160 150 8*175 3*170 4*160 2*169 162
150 150 8*175 3*130 4*150 2*180 146
150 150 8*160 3*140 4*160 2*180 146
140 150 8*160 3*150 4*134 2*168 147
130 150 8*165 3*140 4*142 2*175 149
120 150 8*170 3*155 4*160 2*177 157
```

110 150 8*175 3*140 4*132 2*164 152

100 150 8*175 3*134 4*135 2*158 156

90 150 8*160 3*147 4*144 2*174 133

80 150 8*160 3*154 4*154 2*186 133

60 150 8*175 3*170 4*160 2*169 162

50 150 8*175 3*130 4*150 2*180 146 /

--Specify Permeability in Y-direction

PERMZ

400*50 /

ENDBOX

/

--Specifies the top of the gridblock from a reference datum

TOPS

7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300

7300 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7300

7300 7260 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7260 7300

7300 7260 7220 7180 7180 7180 7180 7180 7180 7180 7180 7180 7180 7180 7180 7180 7180 7220 7260 7300

7300 7260 7220 7180 7140 7140 7140 7140 7140 7140 7140 7140 7140 7140 7140 7140 7180 7220 7260 7300

7300 7260 7220 7180 7140 7140 7140 7140 7140 7140 7140 7140 7140 7140 7140 7140 7180 7220 7260 7300

7300 7260 7220 7180 7140 7140 7100 7100 7100 7100 7100 7100 7100 7100 7140 7140 7180 7220 7260 7300

7300 7260 7220 7180 7140 7140 7100 7100 7100 7100 7100 7100 7100 7100 7140 7140 7180 7220 7260 7300

7300 7260 7220 7180 7140 7140 7100 7100 7060 7060 7060 7060 7100 7100 7140 7140 7180 7220 7260 7300

7300 7260 7220 7180 7140 7140 7100 7100 7060 7060 7060 7060 7100 7100 7140 7140 7180 7220 7260 7300

7300 7260 7220 7180 7140 7140 7100 7100 7060 7060 7060 7060 7100 7100 7140 7140 7180 7220 7260 7300

7300 7260 7220 7180 7140 7140 7100 7100 7060 7060 7060 7060 7100 7100 7140 7140 7180 7220 7260 7300

7300 7260 7220 7180 7140 7140 7100 7100 7100 7100 7100 7100 7100 7100 7140 7140 7180 7220 7260 7300

7300 7260 7220 7180 7140 7140 7100 7100 7100 7100 7100 7100 7100 7100 7140 7140 7180 7220 7260 7300

7300 7260 7220 7180 7140 7140 7140 7140 7140 7140 7140 7140 7140 7140 7140 7140 7180 7220 7260 7300

7300 7260 7220 7180 7140 7140 7140 7140 7140 7140 7140 7140 7140 7140 7140 7140 7180 7220 7260 7300

7300 7260 7220 7180 7180 7180 7180 7180 7180 7180 7180 7180 7180 7180 7180 7180 7180 7220 7260 7300

7300 7260 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7220 7260 7300

7300 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7260 7300

7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300 7300

/

```
--=========================================================================
-- Specifies rock and fluid properties
PROPS
--Specifies saturation and relative permeability
SWOF
-- Sw     krw        kro        Pcwo
0.00   0.000000   0.900000   0
0.05   0.004389   0.724054   0
0.10   0.016608   0.570544   0
0.15   0.036175   0.438425   0
0.20   0.062847   0.326599   0
0.25   0.096462   0.233902   0
0.30   0.136893   0.159099   0
0.35   0.184043   0.100859   0
0.40   0.237829   0.057735   0
0.45   0.298179   0.028125   0
0.50   0.365033   0.010206   0
0.55   0.438335   0.001804   0
0.60   0.518036   0.000000   0
0.65   0.604092   0.000000   0
0.70   0.696463   0.000000   0
0.75   0.795110   0.000000   0
0.80   0.900000   0.000000   0
/
```

```
-- Specifies PVT properties of OIL
PVDO
--Pressure   Viscocity    Bo
      400    1.012        1.16
     1200    1.0040       1.164
     2000    0.9960       1.167
     2800    0.9880       1.172
     3600    0.9802       1.177
     4400    0.9724       1.181
     5200    0.9646       1.185
     5600    0.9607       1.19
/
-- Specifies PVT properties of Water
PVTW
3600.0       1.00341      3.00E-06     0.52341      0.00E-01 /
3900         1            2.67E-06     0.56341      1.20E-07 /
-- Specifies density of oil and water in lb/ft3
DENSITY
-- oil       water
  47         63.0200  /
--specify rock compressibility at given pressure
ROCK
525.0        5.0E-06 /
--==================================================================
--Specify initial stage of every cell
SOLUTION

-- Specify initial equilibration conditions
-- Datum depth = 7000 ft
-- Reference pressure at datum = 4500 psia
```

-- Water Oil Contact= 7220 ft.

EQUIL

7000 4500 7220 0 4* 0 /

--Specify initial conditions for the Fetcowitch Aquifer

-- Datum depth=7000 ft

-- Reference pressure at datum=4500 psia

--Aquifer volume=2 x 10^9 bbls

--Water compressibility at ref. pressure=1 x 10^5 /psia

--Aquifer productivity Index= 50 bbl/psi

AQUFETP

1 7000 4500 2.0E9 1.0E-5 50.0 1 /

--Specify dimensions and direction of aquifer

--Aquifer name=1

--In x-direction, from 1^{st} block to 20^{th} block

--In y-direction, from 1^{st} block to 20^{th} block

--In z-direction only in the 1^{st} block

--From bottom to top

AQUANCON

1 1 20 1 20 1 1 'J+' /

1 1 20 1 20 1 1 'I+' /

/

--===

--Request output for line plots

SUMMARY

--For Average pressure for field.

FPR

-- For Field Oil production total

FOPT

```
--For Field Water cut total
FWCT
--For Water Reservoir Volume in Place
FWIPR
--For Fraction of total oil produced by water influx
FORFW
--For Well Bottom Hole Pressure
WBHP
P1 P2 P3 P4 P5 P6 P7 /
--For Well Water Production Rate
WWPR
P1 P2 P3 P4 P5 P6 P7 /

--For Well Water Cut
WWCT
P1 P2 P3 P4 P5 P6 P7  /

--For Field Oil in Place
FOIP
--For Field Water Saturation
FWSAT
--For Field Oil Pore Volume
FOPV
--For Field Water Pore Volume
FWPV
--For Field Oil Efficiency
FOE
--For Field water Influx total
FAQT
--For Field Water production total
FWPT
```

EXCEL

--==

SCHEDULE

-- Define well specifications, i.e. well name, group name, x-y coordinates,
--ref. depth (perforation), producing phase
WELSPECS

P1	G1	5	14	7160	OIL	0	1*	STOP /
P2	G2	11	4	7200	OIL	0	1*	STOP /
P3	G3	8	11	7120	OIL	0	1*	STOP /
P4	G4	13	8	7120	OIL	0	1*	STOP /
P5	G5	17	11	7200	OIL	0	1*	STOP /
P6	G6	12	17	7200	OIL	0	1*	STOP /
P7	G7	12	12	7180	OIL	0	1*	STOP /

/

-- Specifies completion data
-- Well name: I for injector and P for producer
-- I location of the well completion
-- J location of the well completion
-- K location for the top limit of the completion interval: 1
-- K location for the bottom limit of the completion interval: 1
-- This means that the wells are completed in the same layer
-- Well Radius = 0.4 ft
COMPDAT

P1	5	14	1	1	OPEN 0	0.0	0.40	0 /	
P2	11	4	1	1	OPEN 0	0.0	0.40	0 /	
P3	8	11	1	1	OPEN 0	0.0	0.40	0 /	
P4	13	8	1	1	OPEN 0	0.0	0.40	0 /	
P5	17	11	1	1	OPEN 0	0.0	0.40	0 /	
P6	12	17	1	1	OPEN 0	0.0	0.40	0 /	
P7	12	12	1	1	OPEN 0	0.0	0.40	0 /	

/

-- Specifies well controls for the producer

```
-- Name of the well: P
-- Status of the well: open to production
-- Well control mode: Oil production rate
WCONPROD
P1   OPEN   ORAT   850   /
P2   OPEN   ORAT   950   /
P3   OPEN   ORAT   1500  /
P4   OPEN   ORAT   1700  /
P5   OPEN   ORAT   650   /
P6   OPEN   ORAT   800   /
P7   OPEN   ORAT   1900  /
/

--Specify timestep: one month (total simulation for 14 years)
TSTEP
31 28 31 30 31 30 31 31 30 31 30 31
31 28 31 30 31 30 31 31 30 31 30 31
31 28 31 30 31 30 31 31 30 31 30 31
31 28 31 30 31 30 31 31 30 31 30 31
31 28 31 30 31 30 31 31 30 31 30 31
31 28 31 30 31 30 31 31 30 31 30 31
31 28 31 30 31 30 31 31 30 31 30 31
31 28 31 30 31 30 31 31 30 31 30 31
31 28 31 30 31 30 31 31 30 31 30 31
31 28 31 30 31 30 31 31 30 31 30 31
31 28 31 30 31 30 31 31 30 31 30 31
31 28 31 30 31 30 31 31 30 31 30 31
31 28 31 30 31 30 31 31 30 31 30 31
31 28 31 30 31 30 31 31 30 31 30 31
/
END
```

5.3.2 Case 2:- Input Data file for Production scheme 2 ref. Fig (Appendix B fig B)

The production schemes for both the cases can be visualized from the figures provided as appendix,

The cases differ from each other only in terms of well locations thus the input data file remains nearly same for both, only changes occur in

a) RUNSPEC section, where the no. of wells have decreased
b) SUMMARY Section ,where plots for the given wells are asked
c) SCHEDULE section, where control data for each well is provided

RUNSPEC

TITLE

WATER DRIVE BB N MDK

DIMENS

20 20 1 /

OIL

WATER

FIELD

EQLDIMS

1* 100 /

AQUDIMS

0 0 0 0 1 400 /

WELLDIMS

4 1 4 /

START

1 'JAN' 2007 /

********** Grid, Solution, Props encounter no change for the given model

**********SUMMARY Section encounters the following changes

WBHP

P1 P2 P3 P4 /

--Well Pressure

```
WWPR
P1 P2 P3 P4 /
--Well Water Cut
WWCT
P1 P2 P3 P4 /
**********Schedule Section encounters the following changes
COMPDAT
P1   5    14   1 1 OPEN   0    0.0    0.40   0 /
P2   8    11   1 1 OPEN   0    0.0    0.40   0 /
P3   13   8    1 1 OPEN   0    0.0    0.40   0 /
P4   12   12   1 1 OPEN   0    0.0    0.40   0 /
/
WCONPROD
P1   OPEN ORAT 850    /
P2   OPEN ORAT 1500   /
P3   OPEN ORAT 1700   /
P4   OPEN ORAT 1900   / .
/
```

The complete set of files for case1 and case2 can be referred from the enclosed CD Appendix D

5.4 Simulator Output File: *.PRT File

The output file from the simulator, is a file with .PRT extension this file contains the summary of the programme run, i.e. it starts reading the data file from the beginning, then checks the input data file for any errors, the errors, warnings or comments if any are displayed at the end of the .PRT file. If error free, the .PRT file contains calculations at each time step for the requested parameters. The output for Case 1 is as shown below

```
*****************************************************************
SIMULATE AT 0.00 DAYS *WATER DRIVE BB N MDK
* ECLIPSE VERSION 2005a
REPORT 0 1 JAN 2007 *WIN32 RUN
* RUN AT 14:50 ON 26 APR 2007
*****************************************************************
STEP 1 TIME= 1.00 DAYS ( +1.0 DAYS INIT 1 ITS) (2-JAN-2007)
PAV= 4558.6 PSIA WCT= 0.00 GOR= 0.00000 MSCF/STB WGR= 0.00000
STB/MSCF

STEP 2 TIME= 4.00 DAYS ( +3.0 DAYS MAXF 1 ITS) (5-JAN-2007)
PAV= 4553.1 PSIA WCT= 0.00 GOR= 0.00000 MSCF/STB WGR= 0.00000
STB/MSCF

STEP 3 TIME= 13.00 DAYS ( +9.0 DAYS MAXF 3 ITS) (14-JAN-2007)
PAV= 4538.9 PSIA WCT=0.000 GOR= 0.00000 MSCF/STB WGR= 0.00000
STB/MSCF

STEP 4 TIME= 31.00 DAYS ( +18.0 DAYS REPT 1 ITS) (1-FEB-2007)
PAV= 4515.0 PSIA WCT=0.000 GOR= 0.00000 MSCF/STB WGR= 0.00000
STB/MSCF
*****************************************************************
SIMULATE AT 31.00 DAYS *WATER DRIVE BB N MDK
* ECLIPSE VERSION 2005a
```

REPORT 1 1 FEB 2007 *WIN32 RUN
* RUN AT 14:50 ON 26 APR 2007
****

STEP 5 TIME= 59.00 DAYS (+28.0 DAYS REPT 2 ITS) (1-MAR-2007)
PAV= 4484.6 PSIA WCT=0.000 GOR= 0.00000 MSCF/STB WGR= 0.00000 STB/MSCF
****

SIMULATE AT 59.00 DAYS *WATER DRIVE BB N MDK
* ECLIPSE VERSION 2005a
REPORT 2 1 MAR 2007 *WIN32 RUN
* RUN AT 14:50 ON 26 APR 2007
****

The above table shows the simulated calculation up to 59 days. For complete .PRT files of both the cases, refer enclosed CD. Appendix D

5.5 Results and Comparison

The results of a simulation study can be compiled in several ways. ECLIPSE provides an engineer varied platforms to get the output results.

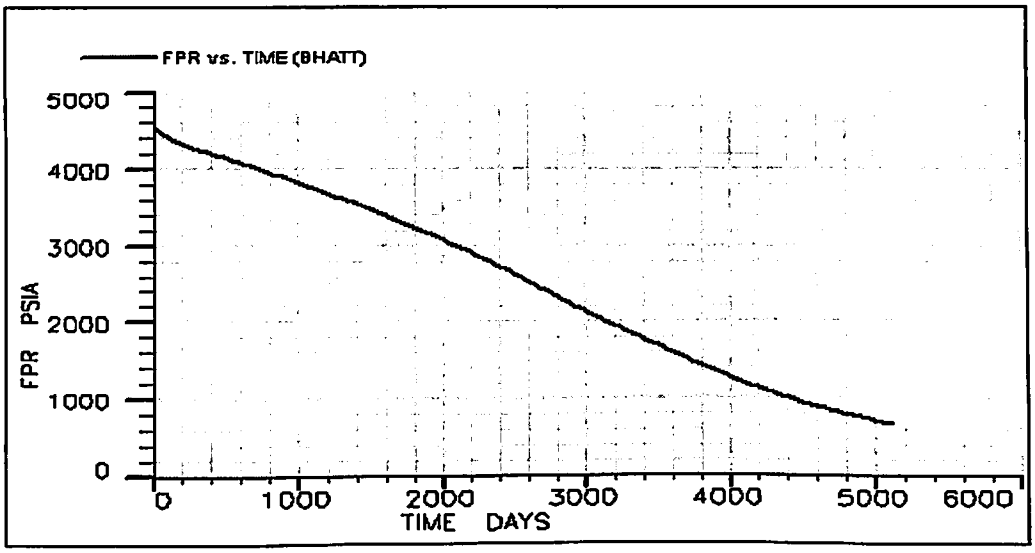
The results can be compiled as a complete set of calculated parameters in tabular form, or as a graphical representation.

These results are obtained by compiling the *.SMPEC file in ECLIPSE OFFICE MODULE, this SMPEC file is generated automatically by ECLIPSE after a successful run.

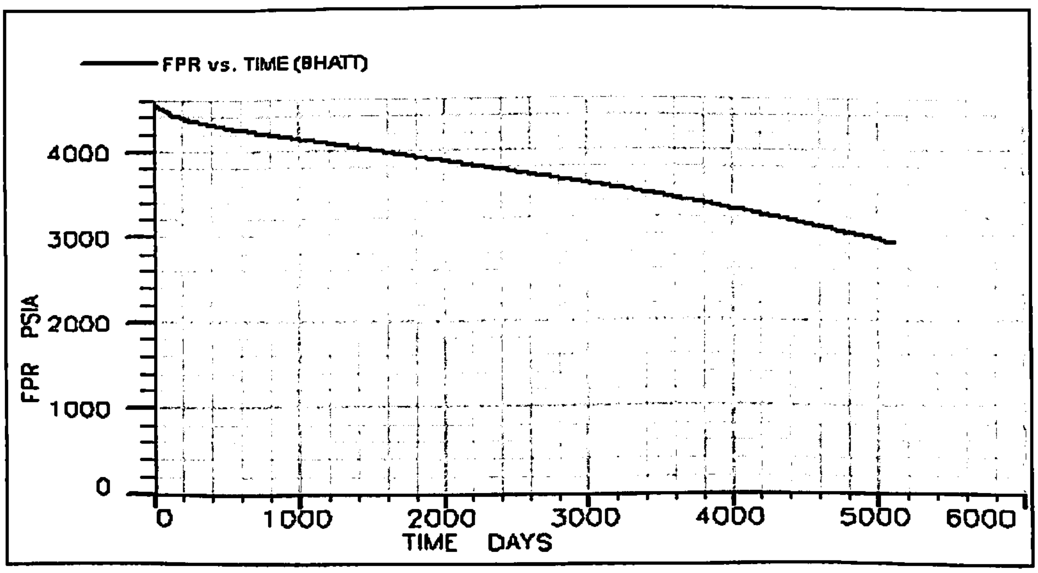
In this study both the results have been derived for a comparison purpose. The tabular form is given in Appendix Section (Chart A1; Chart A2), some of the graphical data is used for comparison purpose between Case1 and Case2

1. **Field Pressure:**

Case 1: **fig 5.1.1**



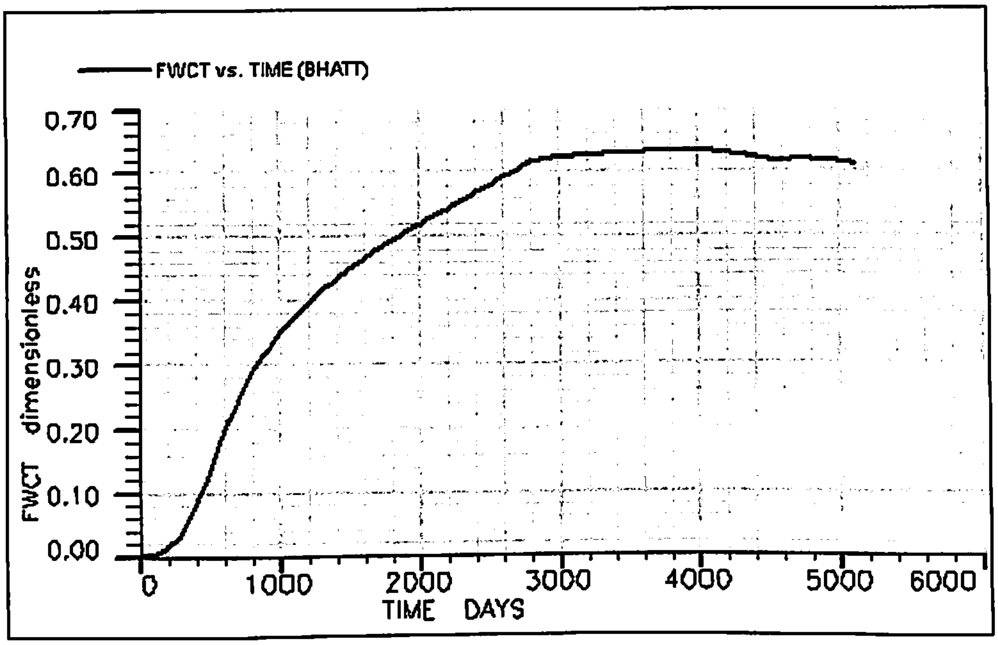
Case 2: **fig 5.1.2**



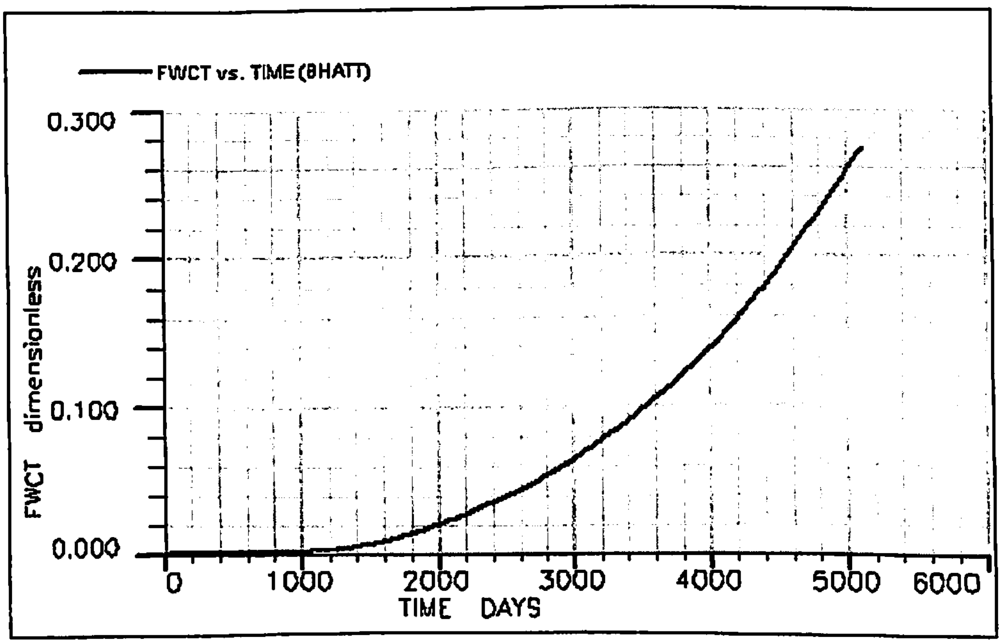
From the above comparison, between the two cases with respect to field pressure, its clear that rate of depletion of reservoir energy in case 1 is much higher than the case 2.

2. Field Water Cut:

Case 1: **fig 5.2.1**



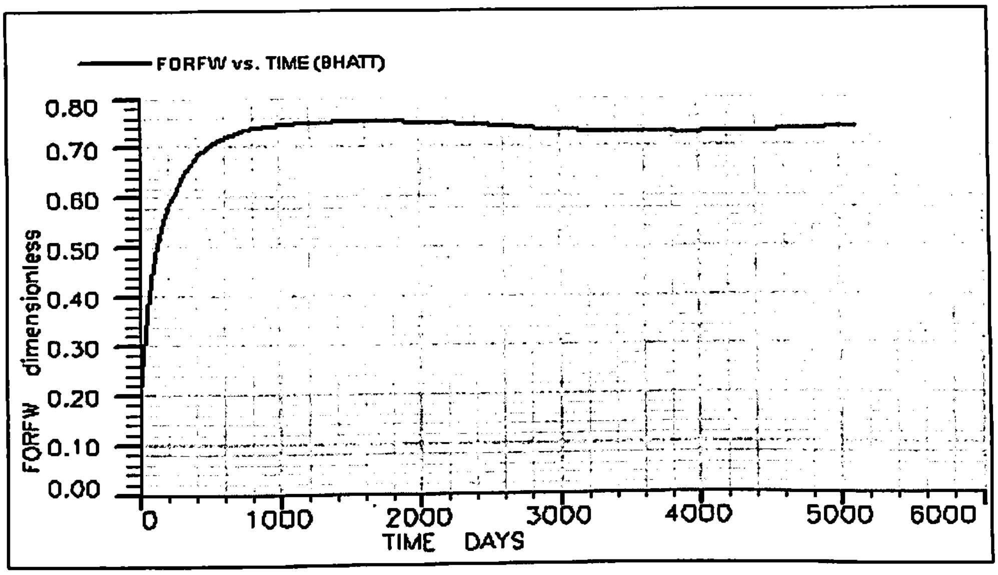
Case 2: **fig 5.2.2**



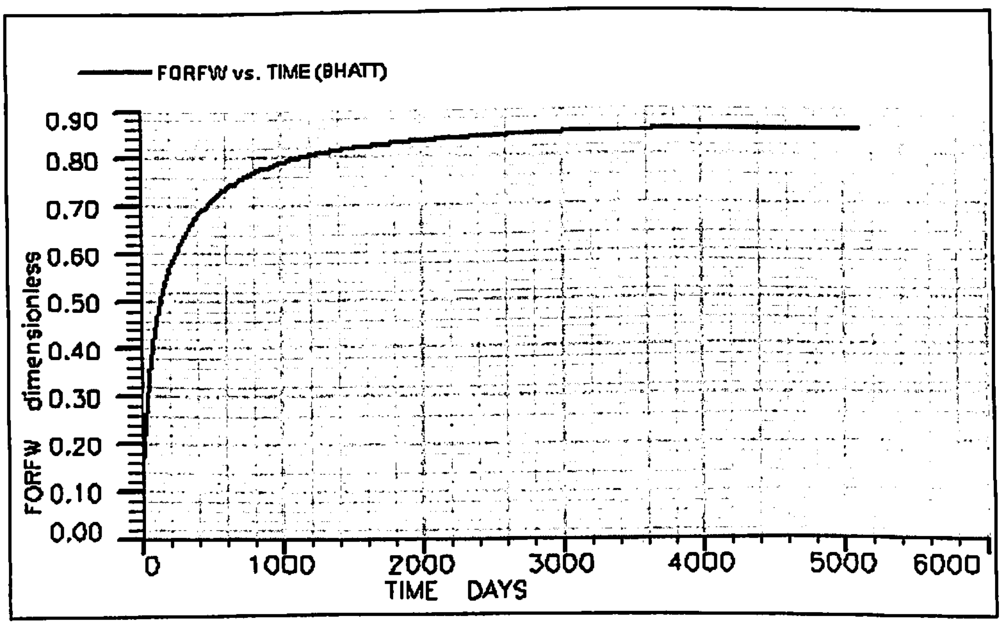
From the above graphs, its clear that, for case 1 water breakthrough has occurred on the 100th day and thereafter water cut is increasing exponentially. Whereas, for case 2, the breakthrough takes place after the 1000th day. Also it can be seen that to reach water cut of 30% case2 takes 5000 days while case1 encounters the same at 1000 days

3 Fraction of total oil produced by water influx

Case 1: **fig 5.3.1**



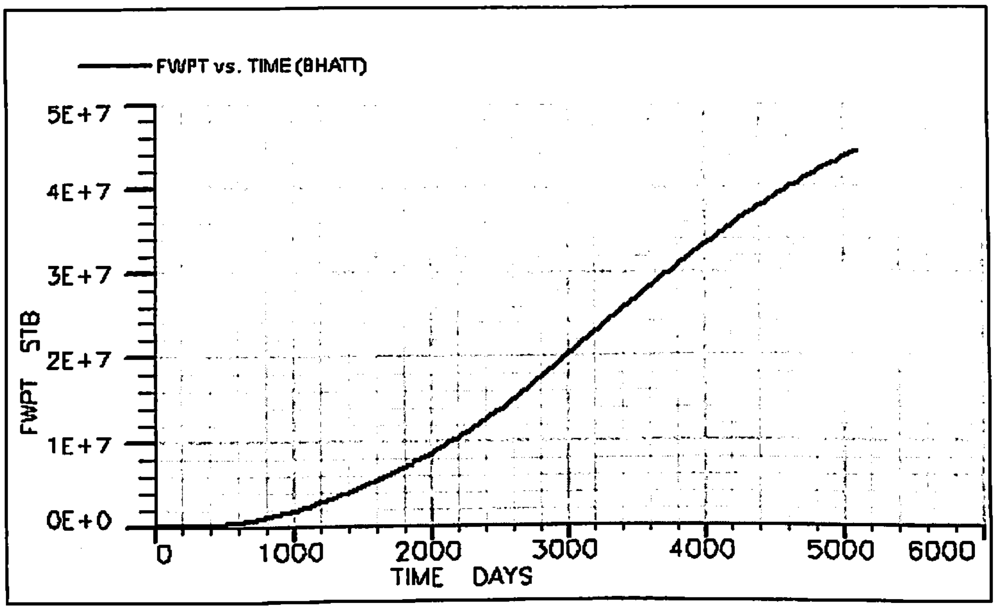
Case2: **fig 5.3.2**



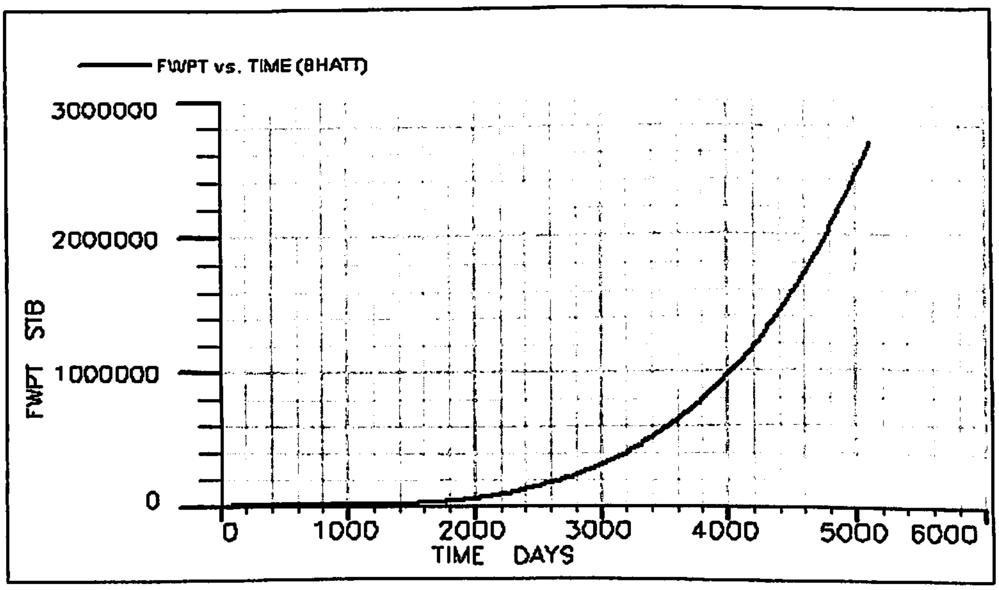
On analyzing these plots it is seen that the case1 produces on average less oil (maximum 0.75) through water encroachment in comparison to case2 (maximum 0.86).

4 Field water production total

Case1: **fig 5.4.1**



Case2: **fig 5.4.2**



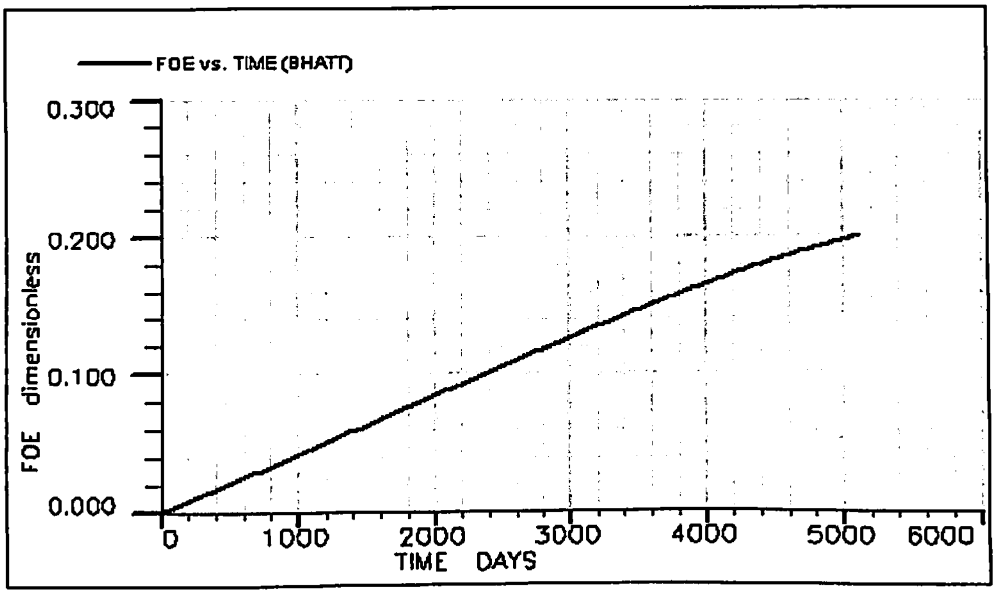
On comparing these plots it is clear that water production in case1 is much more than in case2; for E.g. see both plots at time 4000 days, cumulative water production

case1 = 20 million stb

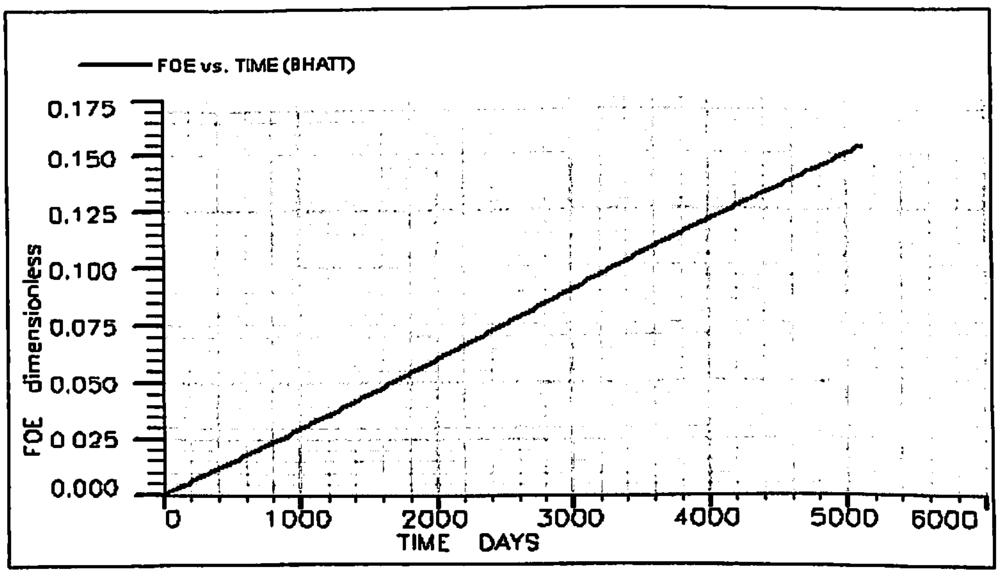
case2 = 1 million stb

5 Oil Recovery

Case1: **fig 5.5.1**



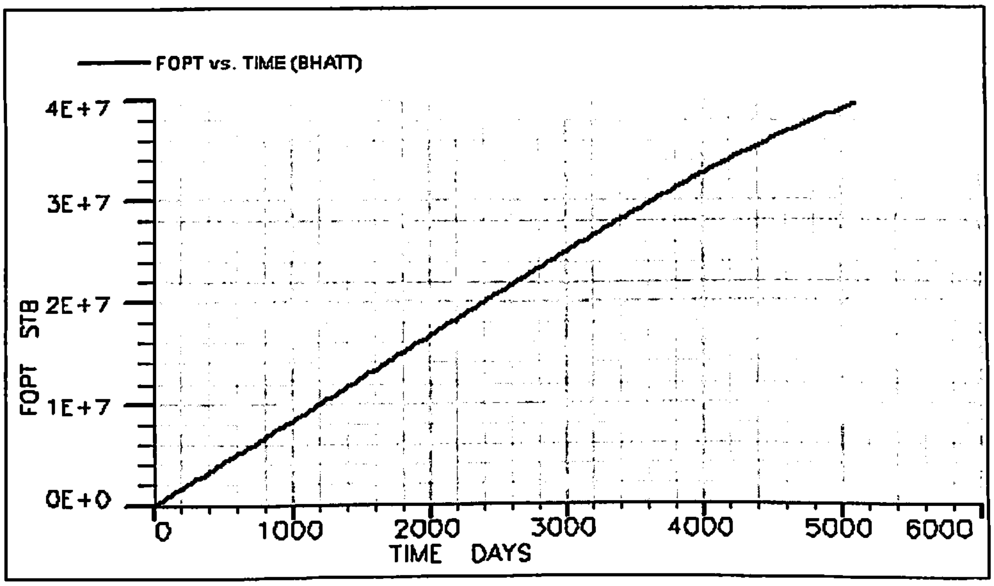
Case2: **fig 5.5.2**



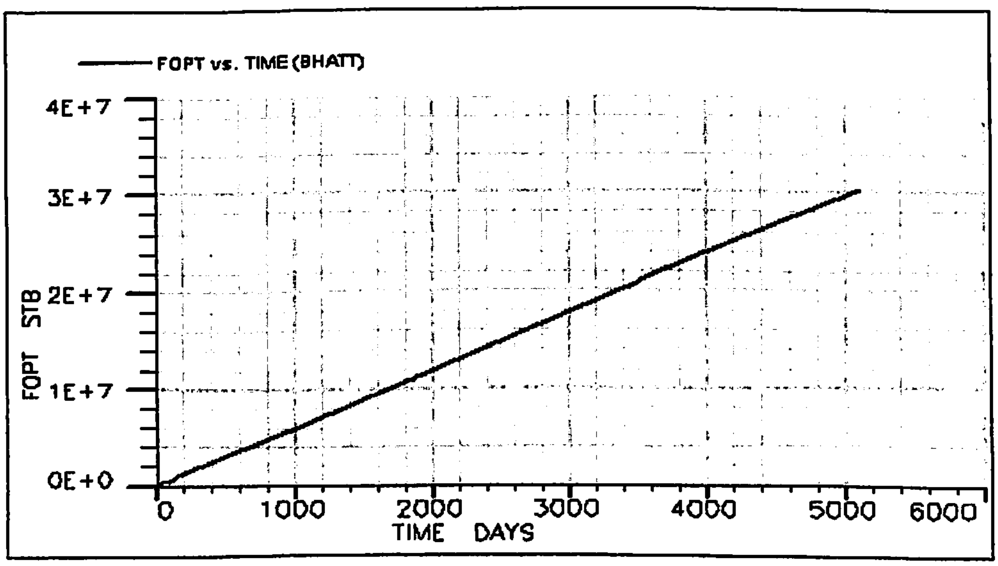
On examining these plots one might feel that recovery in case1 is more than case2; but on a broader aspect i.e. on analyzing graph 1,2 it can be made clear that for a recovery of 20% in case1 the pressure has declined up to 600psia. While that in case2 the pressure declines to only 3000psia for 15% recovery. Thus on introducing more wells as per case2 scheme, much more oil can be produced.

6. Field Total Oil Production

Case1: **fig 5.6.1**



Case2: **fig 5.6.2**



On analyzing these two plots we see that in case1 the production has been 40 mm STB at 5000 days, while that in case2 is only 30 mm STB for the same time. Thus it is worth considering the drilling of some more wells or increasing the current production rates, whichever is economically feasible.

Chapter 6

Summary, Conclusion, Recommendation

6.1 Summary

The reservoir simulation study emerges as a basic need the current scenario, for that purpose in mind, using a commercial simulator is must to achieve higher accuracy, reliability and performing the study in a smaller time.

The major advantage of performing a simulation study is Predicting the performance of a system under varied operating conditions, which gives an additional idea about the level to which the field can be exploited that too working under the regulatory constrains.

Due to these very advantages, some companies start simulating their field from day one.

In the current scenario it has thus become important for a petroleum engineer to learn how to use a commercial simulator for such studies, this study has given the basics of using ECLIPSE Blackoil for performance prediction.

This simulation study was for the performance prediction of a hypothetical reservoir, taking two different production schemes in consideration. Arbitrary data for porosity, permeability, depths of the formation, water and oil viscosity, density, saturation and relative permeability characteristics were taken. However data was assumed to reflect as realistic data as possible. All the simulation work was done on ECLIPSE Blackoil Academic version and thus the dynamic modeling was not possible.

6.2 Conclusion

We conclude our work by disclosing the facts of the study as follows

4) The initial objective of our work was to prove the necessity of a simulation work for performance prediction, and the second objective was to give an introduction to the use of ECLIPSE Blackoil. The results provided from this study gives a clear picture of the power of a commercial simulator like ECLIPSE and the comparison of the results of the two assumed cases gives an insight into options available for various development strategies.

5) The hypothetical reservoir contains $2x10^8$ Barrels oil initially in place

6) The reservoir was formulated into two production patterns; scheme1 assumed some wells were drilled in the delineation stage to know the water oil contact. Further a simulation run was made to find out weather producing these wells P1, P2, P6, P5 (Ref. Appendix B fig A) would be more beneficial or closing them. Scheme2 assumed the above wells as shut in (Ref. Appendix B fig. B).

7) The two production schemes (Ref. Appendix B fig A,B) were simulated for 14 years and finally it was proved that production scheme2 prove to be more beneficial (for detailed support reasons see sec. 5.5)

8) It was also justified that to meet with the production requirements, by drilling some more wells away from the WOC would prove to be more beneficial, (for detailed support reasons see sec. 5.5 fig. 5.6.1, 5.6.2)

Signature of candidate
Date:

6.3 Recommendations

For future and advanced study we recommend the following.

1) While using ECLIPSE there is a lot of data is to be entered, for study and familiarization process take as simplified data as possible.
2) For realistic study there can be a multiple source of a single data thus an engineer should select the most reliable source.
3) The simulated result should be validated by analyzing the pattern of the obtained plots, which should run according to a known pattern and should not show unrealistic variations.
4) A continuous simulation should be done rather than making it discrete(as in our case) for e.g. we should close our wells P1, P2, P6, P5 (ref. Appendix B fig A) at the stage they start encountering water cuts above permissible values. Say if the permissible water cut is below 65% then well P1 can be produced up to 600 days while P2 can continue production till 2000 days (compare fig.)
5) For suggesting the location of new wells to be drilled at a later stage, the saturation front movement must be given the primary consideration and wells to be drilled in locations where the saturation of oil is still large and in profitable amounts.
6) With any simulation study a techno economic appraisal must be supplemented.

References

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3. Aziz, Khalid and Antonin, Settari.: Petroleum Reservoir Simulation; Applied Science Publishers LTD, London (1979)
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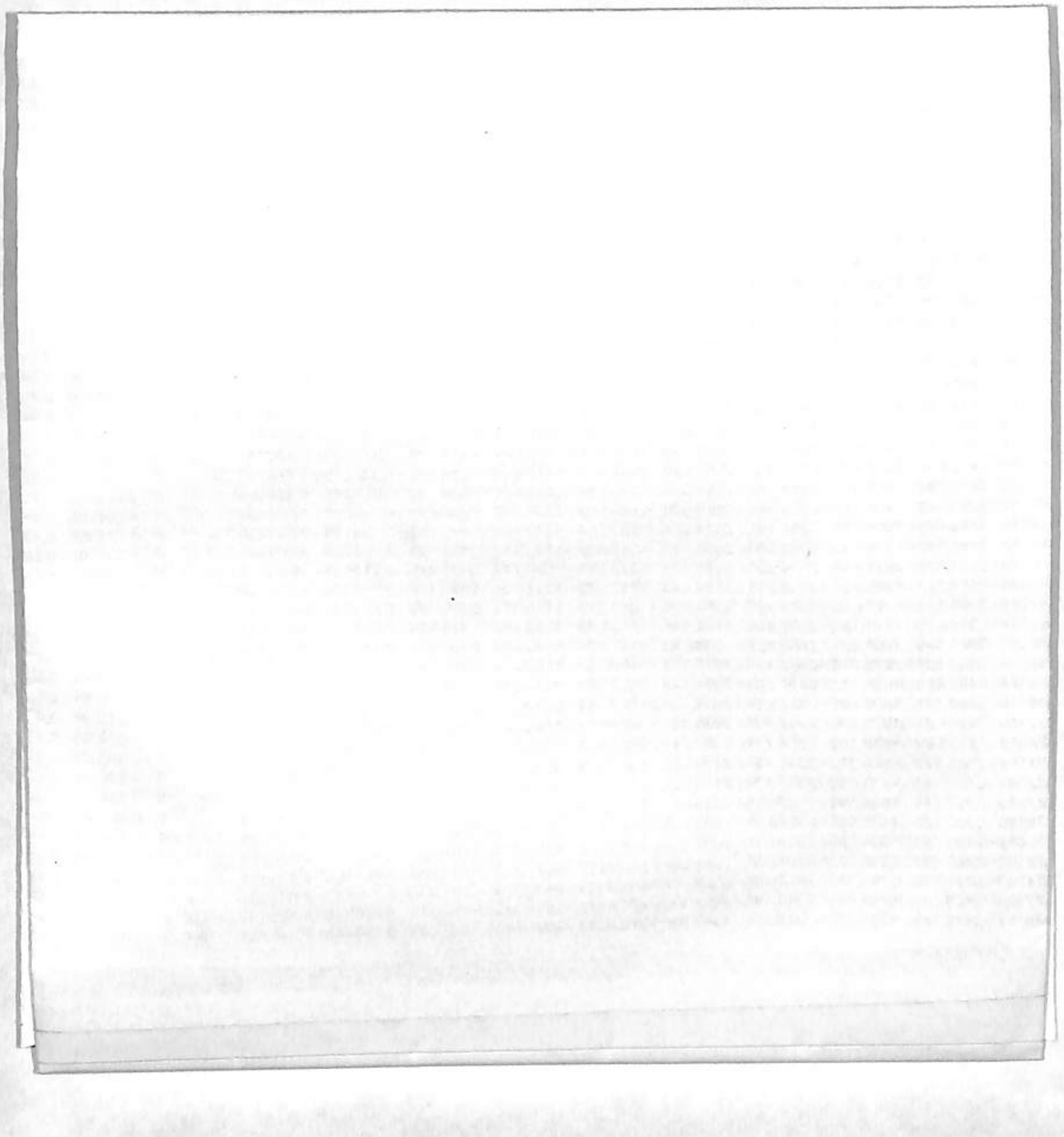
APPENDIX A

Chart A1



TIME	FAQT	FOE	FOIP	FOPT	FOPV	FORFW	FPR	FWCT	FWPT	FWPV	FWSAT	WBHP:P1	WBHP:P2	WBHP:P3	WBHP:P4	WBHP:P5	WBHP:P6	WBHP:P7	WWCT:P1	WWCT:P2	WWCT:P3	WWCT:P4	WWCT:P5	WWCT:P6	WWCT:P7	WWPR:P1	WWPR:P2	WWPR:P3	WWPR:P4	WWPR:P5	WWPR:P6	WWPR:P7
(DAYS)	(STB)		(STB)	(STB)	(RB)		(PSIA)		(STB)	(RB)		(PSIA)	(PSIA)	(PSIA)	(PSIA)	(PSIA)	(PSIA)	(PSIA)								(STB/DAY)	(STB/DAY)	(STB/DAY)	(STB/DAY)	(STB/DAY)	(STB/DAY)	(STB/DAY)
0	0	0	1.97E+08	0	1.92E+08	0	4560.516	0	0	1.44E+08	0.428274	4553.739	4567.178	4540.301	4540.301	4567.178	4567.178	4526.866	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1015.686	4.23E-05	1.97E+08	8350	1.92E+08	0.040185	4557.826	0	0	1.44E+08	0.428275	4405.126	4346.463	4268.968	4143.016	4413.718	4369.935	4109.363	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	3827.318	0.000169	1.97E+08	33400	1.92E+08	0.127071	4550.729	5.84E-05	1.462213	1.44E+08	0.428286	4388.167	4330.67	4236.328	4095.627	4406.462	4357.444	4053.935	0	0.000187	0	0	0.000242	0.00019	0	0	0.17793	0	0	0.15711	0.152365	0
13	13852.34	0.00055	1.97E+08	108550	1.92E+08	0.216242	4531.951	0.000254	20.59028	1.44E+08	0.428342	4368.409	4308.773	4199.624	4049.33	4389.975	4340.919	3998.891	3.14E-08	0.000806	1.42E-09	4.83E-09	0.001065	0.000832	0	2.67E-05	0.766111	2.12E-06	8.21E-06	0.692677	0.666516	0
31	44748.88	0.001311	1.97E+08	258850	1.92E+08	0.303345	4499.949	0.000702	126.136	1.44E+08	0.428502	4337.73	4272.803	4153.311	3999.443	4361.131	4314.231	3943.179	2.65E-06	0.002157	0	0	0.003022	0.002292	0	0.002255	2.053142	0	0	1.970041	1.838212	0
59	118028.1	0.002495	1.97E+08	492650	1.91E+08	0.387167	4459.018	0.00151	479.6558	1.44E+08	0.428827	4296.563	4220.494	4100.662	3947.641	4322.101	4277.043	3889.24	1.00E-05	0.004477	0	0	0.0067	0.004926	0	0.008497	4.272552	0	0	4.38405	3.960609	0
90	224008.7	0.003806	1.97E+08	751500	1.91E+08	0.448273	4420.955	0.002557	1143.277	1.44E+08	0.429251	4257.311	4165.94	4054.144	3903.536	4283.169	4239.408	3845.643	2.22E-05	0.00732	0	0	0.011659	0.008324	0	0.018887	7.005621	0	0	7.667606	6.715029	0
120	345032.9	0.005075	1.96E+08	1002000	1.91E+08	0.492334	4389.07	0.004223	2205.673	1.44E+08	0.429704	4224.162	4116.799	4016.208	3868.143	4247.837	4204.729	3811.533	3.81E-05	0.010371	0	3.56E-08	0.023432	0.012138	0	0.032413	9.955236	0	6.06E-05	15.59601	9.829476	0
151	486008.1	0.006386	1.96E+08	1260850	1.91E+08	0.528947	4360.071	0.007045	4042.228	1.44E+08	0.430208	4194.121	4068.613	3982.303	3836.247	4211.921	4170.627	3781.456	6.05E-05	0.01487	0	2.75E-08	0.040098	0.021647	0	0.051388	14.33937	0	4.67E-05	27.15233	17.70057	0
181	634542.7	0.007655	1.96E+08	1511350	1.91E+08	0.558282	4334.948	0.010835	6786.185	1.44E+08	0.430722	4168.1	4026.081	3953.364	3809.055	4175.636	4137.874	3755.827	8.64E-05	0.023661	0	8.72E-08	0.058886	0.033464	0	0.073464	23.02267	0	0.000148	40.67114	27.6978	0
212	798910.3	0.008966	1.96E+08	1770200	1.90E+08	0.583988	4311.42	0.016068	11013.36	1.44E+08	0.431273	4143.889	3983.844	3926.639	3783.65	4138.095	4103.08	3731.973	0.000124	0.03343	0	1.32E-07	0.089365	0.047177	0	0.105048	32.85656	0	0.000224	63.78793	39.6107	0
243	972298.1	0.010277	1.95E+08	2029050	1.90E+08	0.605927	4289.786	0.022248	16903.41	1.45E+08	0.431842	4121.726	3942.783	3902.413	3760.329	4097.78	4066.858	3710.056	0.000174	0.043954	0	1.64E-07	0.123737	0.06366	0	0.148154	43.67641	0	0.000279	91.78621	54.39061	0
273	1147316	0.011545	1.95E+08	2279550	1.90E+08	0.624191	4270.203	0.029817	24602.12	1.45E+08	0.432404	4101.742	3903.565	3880.819	3739.327	4055.338	4031.743	3690.227	0.000237	0.054925	0	1.83E-07	0.16171	0.086573	0	0.201337	55.2109	0	0.000311	125.3884	75.82273	0
304	1335252	0.012856	1.95E+08	2538400	1.90E+08	0.640597	4251.085	0.039602	35275.86	1.45E+08	0.432994	4082.308	3864.315	3860.04	3718.89	4010.345	3993.076	3670.838	0.000316	0.06981	0	1.91E-07	0.208946	0.112156	0	0.268415	71.29726	0	0.000324	171.6887	101.0595	0
334	1522888	0.014125	1.95E+08	2788900	1.90E+08	0.654361	4233.309	0.050464	48588.94	1.45E+08	0.433572	4064.33	3827.224	3841.022	3699.954	3962.038	3952.535	3652.806	0.000406	0.086931	0	1.93E-07	0.25626	0.138873	0	0.345163	90.4475	0	0.000328	223.9613	129.015	0
365	1722806	0.015436	1.94E+08	3047750	1.89E+08	0.66678	4215.513	0.063392	66108.55	1.45E+08	0.434175	4046.394	3788.415	3822.224	3681.044	3907.497	3908.981	3634.719	0.000514	0.105275	0	1.87E-07	0.306925	0.171056	0	0.43709	111.7782	0	0.000318	287.8493	165.0837	0
396	1928364	0.016747	1.94E+08	3306600	1.89E+08	0.677548	4198.027	0.078232	88077.5	1.46E+08	0.43478	4028.835	3748.768	3804.01	3662.52	3852.483	3863.902	3616.924	0.000638	0.124257	0	1.77E-07	0.359359	0.206924	0	0.542288	134.7935	0	0.000301	364.6095	208.7303	0
424	2118195	0.017931	1.94E+08	3540400	1.89E+08	0.685974	4182.277	0.092672	111957.1	1.46E+08	0.435328	4013.115	3711.903	3787.825	3645.908	3798.003	3819.933	3600.878	0.000766	0.141952	0	1.69E-07	0.404995	0.239976	0	0.651446	157.1642	0	0.000288	442.4283	252.5985	0
455	2334419	0.019242	1.94E+08	3799250	1.89E+08	0.694187	4164.938	0.109905	143918.7	1.46E+08	0.435935	3995.854	3671.223	3770.111	3627.604	3732.516	3767.562	3583.133	0.000931	0.163408	0	1.53E-07	0.45297	0.276954	0	0.792353	185.5591	0	0.00026	538.2356	306.4305	0
485	2548764	0.020511	1.93E+08	4049750	1.89E+08	0.701038	4148.002	0.127822	180630.7	1.46E+08	0.436522	3979.062	3632.646	3752.988	3609.822	3667.845	3715.372	3565.824	0.001115	0.186021	0	1.48E-07	0.496074	0.313779	0	0.948593	217.1062	0	0.000252	639.8728	365.8056	0
516	2776071	0.021822	1.93E+08	4308600	1.88E+08	0.707151	4130.287	0.146543	225076.4	1.46E+08	0.437127	3961.522	3591.755	3735.193	3591.169	3604.773	3661.808	3547.621	0.00133	0.208997	0	1.32E-07	0.534905	0.351719	0	1.131738	251.0067	0	0.000224	747.5626	434.0335	0
546	3001252	0.023091	1.93E+08	4559100	1.88E+08	0.712243	4112.864	0.164478	274389	1.47E+08	0.43771	3944.253	3551.206	3717.768	3572.867	3542.58	3607.131	3529.692	0.001562	0.230786	0	1.17E-07	0.56756	0.386642	0	1.329998	285.0272	0	0.000199	853.099	504.2963	0
577	3239914	0.024402	1.93E+08	4817950	1.88E+08	0.716812	4094.611	0.182571	332202.4	1.47E+08	0.438312	3926.091	3508.393	3699.519	3553.709	3478.291	3548.127	3510.87	0.00183	0.252675	0	1.04E-07	0.596625	0.420619	0	1.558122	321.201	0	0.000177	961.4053	580.7838	0
608	3484376	0.025713	1.92E+08	5076800	1.88E+08	0.720762	4076.064	0.200061	396939.4	1.47E+08	0.438911	3907.567	3464.734	3680.978	3534.279	3414.703	3486.815	3491.752	0.002125	0.273842	0	8.97E-08	0.621545	0.452323	0	1.810455	358.2544	0	0.000153	1067.511	660.7138	0
638	3726264	0.026981	1.92E+08	5327300	1.87E+08	0.724066	4057.811	0.216299	466076.5	1.47E+08	0.439488	3889.253	3421.765	3662.787	3515.224	3354.115	3427.13	3472.953	0.002439	0.293566	0	7.84E-08	0.642292	0.480715	0	2.078127	394.7827	0	0.000133	1167.127	740.5806	0
669	3982191	0.028292	1.92E+08	5586150	1.87E+08	0.727058	4038.71	0.232118	544322.4	1.47E+08	0.440083	3870.004	3380.042	3643.684	3495.296	3296.125	3370.877	3453.264	0.002795	0.313838	0	6.35E-08	0.660372	0.50718	0	2.382747	434.5134	0	0.000108	1263.859	823.3094	0
699	4234999	0.029561	1.92E+08	5836650	1.87E+08	0.729587	4019.972	0.246298	626182.1	1.47E+08	0.440657	3851.031	3340.327	3624.932	3475.813	3245.992	3316.29	3433.999	0.003176	0.332359	0	5.41E-08	0.674995	0.530256	0	2.708327	472.9209	0	9.19E-05	1349.969	903.0549	0
730	4502013	0.030872	1.91E+08	6095500	1.87E+08	0.731909	4000.43	0.260065	717160.3	1.48E+08	0.441249	3831.117	3299.44	3605.324	3455.501	3195.384	3260.103	3413.896	0.003609	0.350062	0	4.35E-08	0.688325	0.551699	0	3.079019	511.6785	0	7.39E-05	1435.508	984.5147	0
761	4774469	0.032183	1.91E+08	6354350	1.87E+08	0.733959	3980.679	0.273009	814367.1	1.48E+08	0.44184	3810.855	3258.87	3585.492	3435.01	3145.697	3204.217	3393.606	0.004083	0.366402	0	3.69E-08	0.700204	0.570978	0	3.485136	549.3726	0	6.28E-05	1518.142	1064.705	0
789	5024469	0.033367	1.91E+08	6588150	1.86E+08	0.735568	3962.583	0.284057	907129.4	1.48E+08	0.442371	3792.197	3222.476	3567.361	3416.299	3101.414	3153.853	3375.067	0.004547	0.380111	0	3.38E-08	0.709889	0.586777	0	3.882552	582.5319	0	5.74E-05	1590.526	1136.001	0
820	5307232	0.034678	1.91E+08	6847000	1.86E+08	0.737218	3942.511	0.295589	1015750	1.48E+08	0.44296	3771.33	3182.805	3547.133	3395.49	3053.281	3099.098	3354.436	0.005104	0.394094	0	3.26E-08	0.719652	0.602597	0	4.36099	617.901	0	5.54E-05	1668.544	1213.072	0
850	5585490	0.035947	1.90E+08	7097500	1.86E+08	0.738633	3922.899	0.30614	1126274	1.48E+08	0.443529	3750.83	3144.943	3527.398	3375.212	3007.041	3046.581	3334.336	0.005687	0.406573	0	3.17E-08	0.728307	0.61649	0	4.861997	650.8707	0	5.38E-05	1742.404	1285.995	0
881	5878328	0.037258	1.90E+08	7356350	1.86E+08	0.739966	3902.533	0.316432	1246098	1.49E+08	0.444116	3729.388	3106.478	3506.868	3354.174	2959.989	2993	3313.454	0.006339	0.418401	0	3.39E-08	0.736508	0.62956	0	5.422169	683.4265	0	5.76E-05	1816.867	1359.593	0
911	6166176	0.038527	1.90E+08	7606850	1.86E+08	0.741114	3882.655	0.325869	1367188	1.49E+08	0.444683	3708.363	3069.812	3486.864	3333.665	2914.728	2941.777	3293.106	0.007017	0.428966	0	3.48E-08	0.743842	0.641121	0	6.006187	713.6496	0	5.91E-05	1887.5	1429.162	0
942	6468731	0.039838	1.90E+08	7865700	1.85E+08	0.742201	3862.026	0.335141	1497668	1.49E+08	0.445268	3686.375	3032.545	3466.063	3312.374	2868.286	2889.474	3271.961	0.00777	0.439027	0	3.95E-08	0.750902	0.652097	0	6.656407	743.485	0	6.71E-05	1959.417	1499.494	0
973	6775998	0.041149	1.89E+08	8124550	1.85E+08	0.743187	3841.283	0.3438	1633286	1.49E+08	0.445853	3664.141	2995.858	3445.148	3290.972	2822.105	2842.617	3250.711	0.008582	0.448322	0	4.70E-08	0.757488	0.66175	0	7.358115	772.0202	0	7.99E-05	2030.28	1565.112	0
1003	7077492	0.042418	1.89E+08	8375050	1.85E+08	0.744042	3821.06	0.351784	1769231	1.49E+08	0.446419	3642.365	2960.831	3424.786	3270.129	2777.745	2798.214	3230.004	0.00943	0.456681	0	5.46E-08	0.763431	0.670414	0	8.091696	798.5124	0	9.28E-05	2097.608	1627.289	0
1034	7393832	0.043729	1.89E+08	8633900	1.85E+08	0.744861	3800.101	0.359701	1914646	1.49E+08	0.447003	3619.59	2925.149	3403.638	3248.514	2732.269	2752.634	3208.533	0.010375	0.46471	0	6.80E-08	0.769185	0.678846	0	8.911148	824.7382	0	0.000116	2166.112	1691.019	0
1064	7703936	0.044997	1.89E+08	8884400	1.84E+08	0.745571	3779.674	0.367072	2059925	1.50E+08	0.447567	3597.252	2891.023	3383.071	3227.505	2688.393	2708.437	3187.641	0.011359	0.471982	0	8.79E-08	0.774416	0.686558	0	9.766101	849.1801	0	0.000149	2231.404	1752.305	0
1095	8029032	0.046308	1.88E+08	9143250	1.84E+08	0.746252	3758.505	0.374414	2214847	1.50E+08	0.44815	3573.868	2857.311	3361.721	3205.725	2643.334	2662.84	3165.972	0.012453	0.478998	0	1.08E-07	0.779514	0.694111	0	10.71874	873.4092	0	0.000183	2298.028	1815.327	0
1126	8358432	0.047619	1.88E+08	9402100	1.84E+08	0.746871	3737.22	0.381483	2374498	1.50E+08	0.448733	3550.258	2824.905	3340.266	3183.864	2598.786	2617.293	3144.205	0.014306	0.48556	0	1.34E-07	0.784275	0.701262	0	12.33657	896.6682	0	0.000227	2363.097	1877.936	0
1154	8658865	0.048804	1.88E+08	9635900	1.84E+08	0.747345	3717.77	0.387661	2522513	1.50E+08	0.449258	3528.733	2795.773	3320.727	3163.946	2558.699	2576.037	3124.361	0.016973	0.491184	0	1.58E-07	0.788309	0.707384	0	14.67623	917.0813	0	0.000268	2420.516	1933.962	0
1185	8996526	0.050115	1.88E+08	9894750	1.84E+08	0.747863	3696.26	0.394308	2691026	1.50E+08	0.449839	3504.679	2763.768	3298.981	3141.847	2514.682	2530.622	3102.317	0.020069	0.497099	0	1.90E-07	0.792571	0.71386	0	17.40821	939.04	0	0.000324	2483.61	1995.833	0
1215	9326874	0.051383	1.87E+08	10145250	1.83E+08	0.7483	3675.257	0.400543	2858404	1.50E+08	0.450401	3481.08	2732.938	3277.812	3120.322	2472.118	2486.466	3080.852	0.023209	0.502555	0	2.28E-07	0.796484	0.719836	0	20.1965	959.7596	0	0.000387	2543.849	2055.475	0
1246	9672581	0.052694	1.87E+08	10404100	1.83E+08	0.748716	3653.458	0.406811	3035925	1.51E+08	0.450982	3456.4	2701.267	3255.811	3097.985	2428.282	2440.754	3058.547	0.026609	0.507939	0	2.78E-07	0.800338	0.725752	0	23.2357	980.6562	0	0.000473	2605.506	2117.066	0
1276	10010618	0.053963	1.87E+08	10654600	1.83E+08	0.749068	3632.197	0.412462	3211780	1.51E+08	0.451543	3432.149	2670.677	3234.369	3076.237	2390.569	2396.29	3036.815	0.030053	0.512942	0	3.37E-07	0.803535	0.731233	0	26.33661	1000.487	0	0.000572	2658.469	2176.557	0
1307	10364127	0.055274	1.87E+08	10913450	1.83E+08	0.749407	3610.147	0.418203	3397845	1.51E+08	0.452123	3406.789	2639.133	3212.102	3053.674	2351.209	2350.564	3014.266	0.033778	0.51791	0	4.01E-07	0.806783	0.736642	0	29.71539	1020.587	0	0.000681	2714.095	2237.686	0
1338	10721496	0.056585	1.86E+08	11172300	1.83E+08	0.749706	3587.957	0.423829	3588254	1.51E+08	0.452702	3381.089	2607.62	3189.702	3030.99	2311.584	2304.77	2991.59	0.037678	0.522704	0	4.77E-07	0.809946	0.74181	0	33.2805	1040.378	0	0.000811	2770.074	2298.493	0
1368	11070740	0.057854	1.86E+08	11422800	1.82E+08	0.749948	3566.302	0.42915	3776573	1.51E+08	0.453261	3355.855	2577.102	3167.88	3008.898	2273.021	2260.331	2969.491	0.041627	0.527201	0	5.65E-07	0.812901	0.746593	0	36.91963	1059.309	0	0.000961	2824.099	2356.983	0
1399	11435777	0.059165	1.86E+08	11681650	1.82E+08	0.750177	3543.845	0.43454	3975492	1.51E+08	0.453839	3329.468	2545.552	3145.204	2985.96	2233.09	2214.47	2946.546	0.045905	0.531708	0	6.69E-07	0.815864	0.751336	0	40.89668	1078.651	0	0.001138	2880.007	2417.191	0
1429	11792369	0.060433	1.86E+08	11932150	1.82E+08	0.750355	3521.931	0.439631	4172019	1.52E+08	0.454397	3303.542	2514.945	3123.125	2963.603	2194.259	2170.103	2924.19	0.05024	0.535955	0	7.82E-07	0.818631	0.755716	0	44.96321	1097.214	0	0.00133	2933.85	2474.872	0
1460	12164938	0.061744	1.85E+08	12191000	1.82E+08	0.75052	3499.205	0.444761	4379365	1.52E+08	0.454974	3276.367	2483.273	3100.179	2940.393	2154.251	2124.567	2900.986	0.05493	0.540227	0	9.22E-07	0.821386	0.760033	0	49.40439	1116.238	0	0.001567	2989.134	2533.797	0
1491	12541219	0.063055	1.85E+08	12449850	1.82E+08	0.750655	3476.334	0.449751	4590939	1.52E+08	0.45555	3248.765	2451.524	3077.103	2917.059	2114.29	2079.171	2877.658	0.059841	0.544393	0	1.09E-06	0.824027	0.764148	0	54.10223	1135.13	0	0.001846	3043.755	2591.961	0
1519	12883457	0.06424	1.85E+08	12683650	1.81E+08	0.750719	3455.41	0.454187	4785490	1.52E+08	0.456068	3223.829	2422.697	3056.067	2895.762	2078.06	2038.069	2856.373	0.066103	0.548075	0	1.24E-06	0.826309	0.767691	0	60.16494	1152.119	0	0.002113	3092.286	2643.694	0
1550	13266998	0.065551	1.85E+08	12942500	1.81E+08	0.750798	3432.262	0.459039	5005140	1.52E+08	0.456643	3196.056	2390.739	3032.637	2872.105	2038.011	1992.814	2832.708	0.073283	0.55206	0	1.45E-06	0.828789	0.771491	0	67.21667	1170.822	0	0.002466	3146.492	2700.958	0
1580	13641255	0.066819	1.84E+08	13193000	1.81E+08	0.750833	3409.638	0.463643	5221679	1.53E+08	0.457198	3168.808	2359.667	3009.798	2849.024	1998.949	1948.858	2809.637	0.080354	0.555836	0	1.68E-06	0.83112	0.775027	0	74.26865	1188.848	0	0.002851	3198.883	2755.975	0
1611	14031920	0.06813	1.84E+08	13451850	1.81E+08	0.75085	3386.143	0.468323	5449685	1.53E+08	0.45777	3140.361	2327.452	2986.044	2825.045	1958.466	1903.402	2785.654	0.087777	0.559655	0	1.95E-06	0.833466	0.77856	0	81.78974	1207.399	0	0.003316	3253.112	2812.713	0
1641	14413107	0.069399	1.84E+08	13702350	1.81E+08	0.75083	3363.194	0.472739	5674282	1.53E+08	0.458323	3112.448	2296.127	2962.884	2801.67	1919.085	1859.615	2762.271	0.095073	0.563276	0	2.25E-06	0.835662	0.78182	0	89.30209	1225.289	0	0.003825	3305.264	2866.693	0
1672	14810932	0.07071	1.83E+08	13961200	1.80E+08	0.750794	3339.371	0.477215	5910568	1.53E+08	0.458894	3083.293	2263.648	2938.793	2777.373	1878.364	1814.489	2737.961	0.102732	0.566945	0	2.60E-06	0.837869	0.785061	0	97.3204	1243.718	0	0.004424	3359.1	2921.993	0
1703	15212320	0.072021	1.83E+08	14220050	1.80E+08	0.750735	3315.379	0.481582	6151025	1.53E+08	0.459465	3053.819	2231.172	2914.538	2752.927	1837.761	1769.377	2713.505	0.110541	0.570546	0	3.01E-06	0.839986	0.78818	0	105.6372	1262.11	0	0.005115	3412.155	2976.793	0
1733	15603686	0.07329	1.83E+08	14470550	1.80E+08	0.750646	3291.954	0.485708	6387603	1.53E+08	0.460015	3024.878	2199.629	2890.889	2729.066	1798.338	1725.658	2689.657	0.11824	0.573914	0	3.45E-06	0.841967	0.791083	0	113.9815	1279.595	0	0.005863	3463.059	3029.274	0
1764	16012379	0.074601	1.83E+08	14729400	1.80E+08	0.750544	3267.649	0.489913	6636215	1.54E+08	0.460584	2994.607	2167.012	2866.293	2704.292	1757.456	1680.497	2664.879	0.126338	0.577308	0	3.97E-06	0.843973	0.793994	0	122.9165	1297.497	0	0.006757	3515.932	3083.392	0
1794	16410773	0.07587	1.82E+08	14979900	1.79E+08	0.750416	3243.915	0.493915	6880691	1.54E+08	0.461133	2964.88	2135.335	2842.318	2680.112	1717.532	1636.673	2640.72	0.134311	0.580516	0	4.54E-06	0.845872	0.796714	0	131.8773	1314.685	0	0.00771	3567.269	3135.35	0
1825	16826352	0.077181	1.82E+08	15238750	1.79E+08	0.750275	3219.282	0.498011	7137489	1.54E+08	0.4617	2933.79	2102.528	2817.384	2654.987	1675.931	1591.397	2615.614	0.142684	0.583754	0	5.19E-06	0.847815	0.799444	0	141.4661	1332.304	0	0.008825	3621.13	3188.917	0
1856	17245436	0.078492	1.82E+08	15497600	1.79E+08	0.750115	3194.484	0.50197	7398387	1.54E+08	0.462266	2902.288	2069.614	2792.292	2629.685	1633.843	1548.713	2590.362	0.151189	0.586917	0	5.93E-06	0.849737	0.801938	0	151.4004	1349.781	0	0.010077	3675.739	3239.13	0
1884	17626104	0.079676	1.82E+08	15731400	1.79E+08	0.74993	3171.799	0.505463	7637353	1.54E+08	0.462775	2873.94	2039.732	2769.427	2606.592	1595.339	1511.43	2567.326	0.159846	0.589714	0	6.66E-06	0.851432	0.804027	0	161.7194	1365.457	0	0.011319	3725.103	3282.19	0
1915	18052152	0.080987	1.81E+08	15990250	1.79E+08	0.74974	3146.709	0.509375	7906094	1.54E+08	0.463339	2842.676	2006.613	2743.962	2580.959	1552.377	1470.042	2541.73	0.169812	0.592739	0	7.58E-06	0.853322	0.806347	0	173.8643	1382.654	0	0.012881	3781.464	3331.099	0
1945	18467408	0.082255	1.81E+08	16240750	1.78E+08	0.749528	3122.186	0.513135	8170111	1.55E+08	0.463884	2812.094	1974.439	2719.155	2555.947	1510.114	1429.561	2516.782	0.179386	0.595599	0	8.55E-06	0.855134	0.808551	0	185.8102	1399.153	0	0.014538	3836.905	3378.662	0
1976	18900404	0.083566	1.81E+08	16499600	1.78E+08	0.749298	3096.715	0.517005	8447188	1.55E+08	0.464447	2780.246	1941.11	2693.354	2529.948	1465.966	1387.492	2490.843	0.189238	0.598489	0	9.68E-06	0.856994	0.810796	0	198.3966	1416.061	0	0.016452	3895.26	3428.233	0
2006	19322494	0.084835	1.81E+08	16750100	1.78E+08	0.749048	3071.822	0.52071	8719335	1.55E+08	0.464989	2749.095	1908.717	2668.194	2504.575	1422.792	1346.423	2465.532	0.198798	0.601223	0	1.09E-05	0.858762	0.812919	0	210.9055	1432.287	0	0.018515	3952.148	3476.229	0
2037	19762628	0.086146	1.80E+08	17008950	1.78E+08	0.748781	3045.964	0.524522	9004885	1.55E+08	0.46555	2716.552	1875.145	2642.004	2478.183	1377.801	1303.752	2439.195	0.208703	0.603988	0	1.23E-05	0.860571	0.815083	0	224.1859	1448.916	0	0.020928	4011.877	3526.273	0
2068	20206376	0.087457	1.80E+08	17267800	1.78E+08	0.748495	3019.901	0.528302	9294797	1.55E+08	0.466109	2683.621	1841.447	2615.627	2451.601	1332.397	1260.743	2412.675	0.218633	0.60669	0	1.39E-05	0.862352	0.817208	0	237.8366	1465.399	0	0.02368	4072.189	3576.553	0
2098	20638988	0.088726	1.80E+08	17518300	1.77E+08	0.748193	2994.432	0.531928	9579471	1.55E+08	0.466648	2651.318	1808.701	2589.894	2425.652	1287.872	1218.781	2388.777	0.228264	0.609248	0	1.57E-05	0.864053	0.819218	0	251.4123	1481.208	0	0.02669	4131.275	3625.215	0
2129	21090118	0.090037	1.80E+08	17777150	1.77E+08	0.747874	2967.98	0.535664	9878084	1.56E+08	0.467205	2617.552	1774.76	2563.102	2398.668	1241.217	1175.479	2359.842	0.238237	0.611833	0	1.78E-05	0.865813	0.821246	0	265.8331	1497.401	0	0.030263	4193.985	3675.436	0

2159	21529900	0.091306	1.79E+08	18027650	1.77E+08	0.74754	2942.126	0.539254	10171267	1.56E+08	0.467743	2584.41	1741.756	2536.969	2372.314	1195.23	1133.404	2333.554	0.247917	0.614282	0	2.01E-05	0.867511	0.823148	0	280.194	1512.938	0	0.03418	4256.063	3723.547	0
2190	21988462	0.092616	1.79E+08	18286500	1.77E+08	0.74719	2915.301	0.542923	10478734	1.56E+08	0.468297	2549.849	1707.427	2509.828	2344.82	1147.357	1090.066	2306.271	0.257927	0.616754	0	2.27E-05	0.869248	0.82505	0	295.4392	1528.828	0	0.038622	4321.233	3772.733	0
2221	22450776	0.093927	1.79E+08	18545350	1.77E+08	0.746817	2888.238	0.546624	10790823	1.56E+08	0.46885	2514.809	1673.074	2482.457	2317.171	1097.97	1046.471	2278.749	0.267967	0.61915	0	2.57E-05	0.871026	0.826915	0	311.1503	1544.419	0	0.043668	4389.771	3822.001	0
2249	22870704	0.095111	1.79E+08	18779150	1.76E+08	0.746442	2863.453	0.54995	11076520	1.56E+08	0.469347	2482.699	1641.981	2457.503	2291.923	1052.351	1006.633	2253.575	0.277124	0.621267	0	2.87E-05	0.872623	0.828556	0	325.8583	1558.364	0	0.048824	4452.95	3866.256	0
2280	23340714	0.096422	1.78E+08	19038000	1.76E+08	0.746038	2835.998	0.553696	11397656	1.56E+08	0.469898	2446.781	1607.402	2429.69	2263.768	1000.863	962.4549	2225.563	0.287328	0.623573	0	3.25E-05	0.874434	0.830372	0	342.6952	1573.726	0	0.055208	4526.557	3916.2	0
2310	23798956	0.097691	1.78E+08	19288500	1.76E+08	0.745618	2809.125	0.557352	11713069	1.56E+08	0.470429	2411.41	1573.996	2402.509	2236.383	949.6514	919.0066	2198.17	0.297269	0.625779	0	3.67E-05	0.876194	0.832122	0	359.5661	1588.606	0	0.062372	4600.155	3965.357	0
2341	24276928	0.099002	1.78E+08	19547350	1.76E+08	0.745169	2781.144	0.561183	12044099	1.57E+08	0.470976	2375.66	1539.182	2374.174	2207.795	895.6802	873.72	2169.646	0.30813	0.628004	0	4.16E-05	0.878032	0.833912	0	378.5537	1603.794	0	0.07071	4679.258	4016.736	0
2371	24743048	0.10027	1.78E+08	19797850	1.76E+08	0.744705	2753.739	0.56487	12369289	1.57E+08	0.471504	2340.679	1505.242	2346.487	2179.803	842.4849	829.4387	2141.733	0.318511	0.630105	0	4.69E-05	0.879796	0.835612	0	397.2696	1618.299	0	0.079726	4757.472	4066.534	0
2402	25229348	0.101581	1.77E+08	20056700	1.75E+08	0.744215	2725.225	0.568668	12710557	1.57E+08	0.472048	2304.147	1470.003	2317.624	2150.622	786.9116	783.3484	2112.653	0.329098	0.632228	0	5.31E-05	0.8816	0.837352	0	416.9502	1633.124	0	0.090232	4839.857	4118.607	0
2433	25719924	0.102892	1.77E+08	20315550	1.75E+08	0.743706	2696.435	0.572445	13057126	1.57E+08	0.47259	2267.176	1434.568	2288.5	2121.15	730.5228	736.7979	2083.313	0.33955	0.634306	0	6.00E-05	0.88338	0.839069	0	437.0007	1647.798	0	0.102012	4923.679	4171.082	0
2463	26198486	0.104161	1.77E+08	20566050	1.75E+08	0.743187	2668.255	0.576082	13397542	1.57E+08	0.473113	2230.931	1400.061	2260.04	2092.32	675.0167	691.2459	2054.618	0.349541	0.636275	5.42E-09	6.75E-05	0.885085	0.840704	0	456.77	1661.861	8.12E-06	0.114724	5006.354	4222.099	0
2494	26697890	0.105472	1.77E+08	20824900	1.75E+08	0.742642	2638.933	0.579858	13754794	1.57E+08	0.473652	2193.081	1364.223	2230.357	2062.283	616.6306	643.7119	2024.707	0.359753	0.638272	2.12E-07	7.61E-05	0.886847	0.842389	0	477.6125	1676.281	0.000318	0.129407	5094.421	4275.8	0
2524	27185110	0.106741	1.76E+08	21075400	1.75E+08	0.742089	2610.221	0.583511	14105750	1.58E+08	0.474171	2156.037	1329.308	2201.354	2032.889	558.9263	597.1442	1995.464	0.369564	0.640168	4.44E-07	8.54E-05	0.888543	0.843998	0	498.2734	1690.124	0.000666	0.145163	5181.863	4328.138	0
2555	27693632	0.108052	1.76E+08	21334250	1.74E+08	0.741508	2580.333	0.587311	14474128	1.58E+08	0.474707	2117.298	1293.029	2171.105	2002.234	498.0725	548.5424	1964.974	0.379617	0.642094	7.00E-07	9.60E-05	0.890302	0.845655	0	520.1218	1704.33	0.00105	0.163264	5275.368	4383.18	0
2586	28206834	0.109363	1.76E+08	21593100	1.74E+08	0.740907	2550.134	0.591117	14848343	1.58E+08	0.47524	2078.082	1256.451	2140.594	1971.183	435.9622	499.3254	1934.176	0.389569	0.643973	1.03E-06	0.000108	0.892054	0.847297	0	542.4589	1718.335	0.001549	0.183223	5371.551	4438.94	0
2614	28673424	0.110547	1.76E+08	21826900	1.74E+08	0.740328	2522.428	0.594527	15191153	1.58E+08	0.475719	2042.139	1223.277	2112.71	1942.835	378.6343	454.4003	1906.001	0.398445	0.645663	1.36E-06	0.000119	0.893618	0.84874	0	563.0043	1731.063	0.002036	0.202981	5460.031	4488.905	0
2645	29196216	0.111858	1.75E+08	22085750	1.74E+08	0.739695	2491.677	0.598347	15576765	1.58E+08	0.47625	2002.029	1186.307	2081.569	1911.2	314.1907	404.3326	1874.568	0.408149	0.647496	1.72E-06	0.000134	0.89536	0.850352	0	586.172	1745.002	0.002579	0.227112	5561.786	4545.888	0
2675	29706348	0.113127	1.75E+08	22336250	1.74E+08	0.739056	2461.537	0.602006	15955671	1.58E+08	0.47676	1962.712	1150.25	2051.133	1880.25	251.1539	355.1228	1843.828	0.417427	0.649234	2.10E-06	0.000149	0.897003	0.851897	0	609.0441	1758.362	0.003148	0.252696	5660.893	4601.665	0
2706	30238938	0.114438	1.75E+08	22595100	1.73E+08	0.738385	2430.143	0.605782	16353437	1.58E+08	0.477286	1921.602	1112.759	2019.378	1847.962	185.317	303.5422	1811.757	0.426896	0.651	2.51E-06	0.000166	0.898673	0.853501	0	633.1527	1772.064	0.00377	0.28176	5764.871	4660.78	0
2736	30758770	0.115706	1.75E+08	22845600	1.73E+08	0.737709	2399.378	0.609407	16744269	1.59E+08	0.477793	1881.242	1076.198	1988.319	1816.345	120.83	252.8361	1780.364	0.435948	0.652677	2.96E-06	0.000184	0.900251	0.855044	0	656.954	1785.21	0.004443	0.312468	5866.352	4718.917	0
2767	31301448	0.117017	1.74E+08	23104450	1.73E+08	0.737009	2367.388	0.612956	17154208	1.59E+08	0.478316	1839.064	1038.139	1955.943	1783.349	59.3776	199.7518	1747.661	0.445176	0.654366	3.52E-06	0.000204	0.901698	0.856645	0	682.0179	1798.57	0.005286	0.347138	5962.31	4780.542	0
2798	31848746	0.118328	1.74E+08	23363162	1.73E+08	0.736316	2335.308	0.61596	17569152	1.59E+08	0.478838	1796.368	1000.946	1923.325	1750.371	14.7	145.9628	1714.92	0.454278	0.655943	4.17E-06	0.000227	0.903197	0.858241	0	707.5703	1811.17	0.006257	0.385142	6022.854	4843.366	0
2828	32381148	0.119593	1.74E+08	23613022	1.73E+08	0.735697	2304.604	0.61753	17972574	1.59E+08	0.479345	1754.645	965.1693	1891.754	1719.005	14.7	93.69457	1683.721	0.462954	0.657454	4.79E-06	0.00025	0.90496	0.859758	0	732.7333	1823.348	0.00719	0.425103	5986.439	4904.415	0
2859	32934416	0.120898	1.74E+08	23870664	1.72E+08	0.735106	2273.214	0.619278	18391654	1.59E+08	0.47987	1711.473	928.326	1859.255	1687.077	14.7	39.61396	1651.931	0.471778	0.658996	5.47E-06	0.000277	0.906933	0.861315	0	759.1724	1835.893	0.008209	0.470295	5954.692	4968.459	0
2889	33471072	0.122157	1.73E+08	24119184	1.72E+08	0.734584	2243.238	0.620375	18797778	1.59E+08	0.48038	1670.708	892.872	1828.105	1656.519	14.7	14.7	1621.697	0.480082	0.660492	6.27E-06	0.000305	0.9089	0.863043	0	784.8732	1848.167	0.009402	0.518109	5925.143	4978.801	0
2920	34026632	0.123452	1.73E+08	24374842	1.72E+08	0.734126	2212.979	0.620993	19216666	1.59E+08	0.480909	1629.986	856.4547	1796.444	1625.282	14.7	14.7	1591.275	0.488427	0.662018	7.06E-06	0.000336	0.910965	0.865118	0	811.5422	1860.797	0.010591	0.572008	5896.193	4943.406	0
2951	34582136	0.124741	1.73E+08	24629358	1.72E+08	0.733718	2183.185	0.621665	19634878	1.60E+08	0.481439	1589.755	820.404	1765.324	1594.423	14.7	14.7	1561.513	0.49658	0.663505	7.92E-06	0.000371	0.913024	0.867323	0	838.45	1873.22	0.011878	0.630817	5867.242	4911.132	0
2979	35082660	0.1259	1.73E+08	24858316	1.72E+08	0.733363	2156.388	0.622242	20012020	1.60E+08	0.481917	1553.523	788.1166	1737.495	1566.716	14.7	14.7	1534.895	0.503791	0.66482	8.76E-06	0.000405	0.914855	0.869353	0	862.9891	1884.3	0.013137	0.688202	5839.556	4881.804	0
3010	35637640	0.127179	1.72E+08	25110692	1.71E+08	0.733029	2127.264	0.622928	20428946	1.60E+08	0.482447	1513.746	752.756	1707.077	1536.381	14.7	14.7	1505.875	0.511645	0.666247	9.72E-06	0.000445	0.916866	0.871658	0	890.5362	1896.418	0.014584	0.757346	5810.104	4851.412	0
3040	36173576	0.12841	1.72E+08	25353896	1.71E+08	0.732723	2099.222	0.62355	20831790	1.60E+08	0.482959	1475.313	718.8331	1677.915	1507.244	14.7	14.7	1478.041	0.519133	0.667601	1.07E-05	0.000489	0.918765	0.873896	0	917.6417	1908.007	0.016093	0.831501	5780.14	4821.48	0
3071	36726948	0.129678	1.72E+08	25604132	1.71E+08	0.732438	2070.531	0.624174	21247382	1.60E+08	0.483488	1435.592	684.1271	1648.082	1477.396	14.7	14.7	1449.546	0.52679	0.668969	1.19E-05	0.000544	0.920668	0.876219	0	946.2434	1919.817	0.017808	0.925212	5748.4	4790.819	0
3101	37261204	0.130899	1.72E+08	25845308	1.71E+08	0.732173	2042.864	0.624726	21648872	1.60E+08	0.483998	1397.011	650.8198	1619.39	1448.629	14.7	14.7	1422.133	0.534122	0.670261	1.30E-05	0.000607	0.922452	0.878457	0	974.5123	1931.063	0.019572	1.032789	5715.953	4760.409	0
3132	37812692	0.132156	1.71E+08	26093488	1.71E+08	0.731925	2014.526	0.625281	22063004	1.61E+08	0.484525	1357.052	616.7177	1589.962	1419.054	14.7	14.7	1394.016	0.541637	0.671564	1.44E-05	0.000684	0.924249	0.880773	0	1004.425	1942.493	0.021543	1.162951	5681.819	4729.163	0
3163	38363044	0.133408	1.71E+08	26340658	1.70E+08	0.731691	1986.337	0.6258	22476364	1.61E+08	0.485051	1316.935	582.9438	1560.732	1389.574	14.7	14.7	1366.07	0.549093	0.672833	1.58E-05	0.000772	0.926	0.883073	0	1035.089	1953.712	0.023672	1.313077	5646.496	4697.554	0
3193	38894228	0.134615	1.71E+08	26578928	1.70E+08	0.73147	1959.12	0.626254	22875612	1.61E+08	0.485558	1277.828	550.5199	1532.555	1361.077	14.7	14.7	1339.116	0.556268	0.674013	1.73E-05	0.000869	0.927652	0.885266	0	1065.569	1964.23	0.025887	1.47804	5610.894	4666.079	0
3224	39442368	0.135857	1.71E+08	26824174	1.70E+08	0.731261	1931.204	0.626712	23287356	1.61E+08	0.486081	1237.317	517.2908	1503.573	1331.695	14.7	14.7	1311.411	0.563682	0.675204	1.89E-05	0.000982	0.929319	0.887518	0	1098.12	1974.913	0.028346	1.670624	5573.733	4633.575	0
3254	39971288	0.137054	1.70E+08	27060622	1.70E+08	0.73106	1904.229	0.627115	23685012	1.61E+08	0.486585	1197.775	485.3294	1475.628	1303.27	14.7	14.7	1284.678	0.570839	0.676329	2.06E-05	0.001104	0.930893	0.889672	0	1130.608	1985.083	0.030948	1.878873	5536.384	4601.203	0
3285	40516992	0.138287	1.70E+08	27304026	1.70E+08	0.730868	1876.539	0.627527	24095088	1.61E+08	0.487106	1156.599	452.5114	1446.862	1273.922	14.7	14.7	1257.191	0.578241	0.677467	2.26E-05	0.001245	0.932491	0.891885	0	1165.369	1995.432	0.033852	2.118683	5497.533	4567.766	0
3316	41061336	0.139515	1.70E+08	27546520	1.69E+08	0.730682	1848.936	0.627918	24504318	1.61E+08	0.487625	1114.994	419.8784	1418.197	1244.58	14.7	14.7	1229.816	0.585654	0.678582	2.47E-05	0.001401	0.93406	0.894074	0	1201.424	2005.649	0.037026	2.384558	5457.79	4533.689	0
3344	41550980	0.140621	1.70E+08	27764820	1.69E+08	0.730503	1823.885	0.628217	24873188	1.62E+08	0.488091	1076.903	390.4718	1392.296	1217.961	14.7	14.7	1205.048	0.592346	0.67957	2.68E-05	0.001555	0.935447	0.896016	0	1235.102	2014.762	0.040128	2.647093	5420.047	4501.334	0
3375	42093092	0.141841	1.69E+08	28005638	1.69E+08	0.730332	1796.479	0.628595	25280766	1.62E+08	0.488607	1034.501	358.0874	1363.726	1188.522	14.7	14.7	1177.797	0.599764	0.680645	2.92E-05	0.001742	0.936973	0.898167	0	1273.747	2024.748	0.04383	2.966685	5379.496	4466.669	0
3405	42615984	0.143017	1.69E+08	28237884	1.69E+08	0.730164	1769.945	0.628931	25674402	1.62E+08	0.489104	992.9699	326.8797	1336.148	1160.026	14.7	14.7	1151.495	0.60694	0.681672	3.18E-05	0.001942	0.938427	0.900224	0	1312.52	2034.347	0.047727	3.307923	5338.958	4432.042	0
3436	43155384	0.144228	1.69E+08	28477084	1.69E+08	0.729999	1742.637	0.629264	26080406	1.62E+08	0.489618	949.5126	294.7602	1307.707	1130.572	14.7	14.7	1124.38	0.614364	0.682714	3.47E-05	0.002177	0.939914	0.902053	0	1354.153	2044.141	0.052053	3.708771	5296.896	4397.947	0
3466	43675812	0.145397	1.69E+08	28707862	1.69E+08	0.729835	1716.162	0.629567	26472622	1.62E+08	0.490112	906.8481	263.763	1280.172	1101.908	14.7	14.7	1098.142	0.621558	0.683703	3.77E-05	0.002432	0.941333	0.903716	0	1396.05	2053.509	0.056589	4.144152	5255.003	4365.123	0
3497	44212752	0.146601	1.68E+08	28945588	1.68E+08	0.729672	1688.902	0.629901	26877230	1.62E+08	0.490622	862.3085	231.8319	1251.732	1072.116	14.7	14.7	1071.047	0.628986	0.684711	4.11E-05	0.002726	0.942777	0.905453	0	1441.019	2063.106	0.06165	4.647101	5211.603	4331.405	0
3528	44748400	0.147802	1.68E+08	29182588	1.68E+08	0.72951	1661.651	0.630223	27281156	1.62E+08	0.491131	817.1364	199.9914	1223.292	1042.155	14.7	14.7	1043.964	0.636391	0.685705	4.47E-05	0.003053	0.944167	0.907194	0	1487.676	2072.638	0.067117	5.206108	5167.063	4297.248	0
3558	45265288	0.14896	1.68E+08	29411276	1.68E+08	0.729348	1635.227	0.630505	27671390	1.63E+08	0.491621	772.8286	169.2045	1195.733	1012.916	14.7	14.7	1017.716	0.643509	0.686652	4.85E-05	0.003402	0.945464	0.908867	0	1534.351	2081.774	0.072776	5.80231	5122.414	4263.393	0
3589	45798628	0.150153	1.68E+08	29646896	1.68E+08	0.729188	1608.022	0.630796	28073954	1.63E+08	0.492127	726.6285	137.4571	1167.264	982.5032	14.7	14.7	990.6448	0.650783	0.68762	5.27E-05	0.003798	0.946761	0.910583	0	1584.015	2091.166	0.079059	6.480475	5075.786	4228.373	0
3619	46313272	0.151305	1.68E+08	29874282	1.68E+08	0.729029	1581.648	0.631026	28462832	1.63E+08	0.492614	682.5086	106.7631	1139.698	952.8413	14.7	14.7	964.4441	0.657599	0.688545	5.70E-05	0.004217	0.947974	0.912225	0	1632.467	2100.205	0.085556	7.198467	5029.186	4193.462	0
3650	46844280	0.152492	1.67E+08	30108588	1.67E+08	0.728874	1554.511	0.631237	28863908	1.63E+08	0.493117	638.3839	75.09739	1111.253	921.9559	14.7	14.7	937.431	0.66435	0.689493	6.18E-05	0.00469	0.94919	0.913908	0	1682.398	2109.51	0.09271	8.009925	4980.657	4157.31	0
3681	47374028	0.153675	1.67E+08	30342250	1.67E+08	0.72872	1527.392	0.631439	29264232	1.63E+08	0.493619	593.6467	43.47665	1082.828	890.807	14.7	14.7	910.4531	0.671091	0.690432	6.69E-05	0.005205	0.950367	0.915572	0	1734.3	2118.795	0.100345	8.89558	4931.097	4120.446	0
3709	47850608	0.154741	1.67E+08	30552784	1.67E+08	0.728567	1502.733	0.631574	29625140	1.63E+08	0.49407	552.6039	14.89127	1057.093	862.3705	14.7	14.7	885.9887	0.677141	0.691272	7.18E-05	0.00571	0.951394	0.91705	7.75E-08	1782.731	2127.138	0.107687	9.761888	4884.359	4085.491	0.000147
3740	48378216	0.155916	1.67E+08	30784612	1.67E+08	0.728454	1476.204	0.631631	30022648	1.63E+08	0.494571	506.9031	14.7	1028.906	831.2815	14.7	14.7	859.168	0.683798	0.692487	7.76E-05	0.006325	0.952506	0.918677	2.51E-07	1838.158	2091.954	0.116468	10.82101	4833.971	4047.834	0.000476
3770	48886940	0.157046	1.66E+08	31007802	1.67E+08	0.728367	1450.878	0.631698	30405458	1.64E+08	0.495056	462.3335	14.7	1001.963	801.3633	14.7	14.7	833.5064	0.690176	0.693844	8.36E-05	0.006977	0.953548	0.920227	4.34E-07	1893.494	2059.995	0.125344	11.94501	4784.321	4010.429	0.000825
3801	49411344	0.158208	1.66E+08	31237222	1.66E+08	0.728307	1425.164	0.631799	30799118	1.64E+08	0.495557	416.2808	14.7	974.5408	770.536	14.7	14.7	807.3382	0.696645	0.695394	9.01E-05	0.007715	0.954593	0.921807	6.43E-07	1952	2028.492	0.135144	13.21697	4733.172	3971.687	0.001222
3831	49916780	0.159327	1.66E+08	31458122	1.66E+08	0.728261	1400.52	0.631882	31178298	1.64E+08	0.496041	371.5854	14.7	948.3183	740.6287	14.7	14.7	782.2797	0.702769	0.697002	9.68E-05	0.008491	0.955572	0.923307	8.70E-07	2009.728	1998.898	0.145193	14.55809	4682.803	3933.248	0.001652
3862	50437572	0.160477	1.66E+08	31685218	1.66E+08	0.728236	1375.417	0.631985	31568286	1.64E+08	0.496541	325.3795	14.7	921.5546	709.5959	14.7	14.7	756.6877	0.708955	0.698764	0.000104	0.009363	0.956554	0.924833	1.13E-06	2070.388	1969.11	0.156213	16.06735	4630.956	3893.584	0.002151
3893	50956320	0.161621	1.66E+08	31911166	1.66E+08	0.728223	1350.537	0.632076	31956454	1.64E+08	0.49704	279.1879	14.7	895.0341	678.2953	14.7	14.7	731.3195	0.714936	0.700615	0.000112	0.010309	0.957501	0.926328	1.42E-06	2131.788	1939.904	0.167869	17.70837	4578.585	3853.361	0.002707
3923	51456088	0.162723	1.65E+08	32128768	1.66E+08	0.728216	1326.588	0.63213	32330368	1.64E+08	0.497521	234.503	14.7	869.573	647.6668	14.7	14.7	706.9244	0.720543	0.702477	0.00012	0.011299	0.958385	0.927746	1.74E-06	2191.608	1911.976	0.179812	19.42835	4527.034	3813.584	0.003299
3954	51970836	0.163857	1.65E+08	32352524	1.66E+08	0.728224	1302.108	0.632181	32714944	1.65E+08	0.498017	188.4851	14.7	843.4853	615.7196	14.7	14.7	681.9401	0.72613	0.704472	0.000129	0.012406	0.959208	0.929186	2.10E-06	2253.658	1883.531	0.192854	21.35448	4474.365	3772.567	0.00399
3984	52466644	0.164948	1.65E+08	32568074	1.65E+08	0.728233	1278.495	0.6322	33085448	1.65E+08	0.498495	144.0464	14.7	818.4013	584.5591	14.7	14.7	657.8666	0.731334	0.706459	0.000137	0.014016	0.959809	0.930549	2.48E-06	2313.78	1856.171	0.206177	24.1667	4423.823	3731.965	0.004721
4015	52977256	0.166071	1.65E+08	32789772	1.65E+08	0.728252	1254.306	0.632262	33466618	1.65E+08	0.498988	98.34892	14.7	792.651	552.6937	14.7	14.7	633.1525	0.736503	0.708577	0.000147	0.016992	0.960437	0.931929	2.93E-06	2375.841	1828.155	0.220696	29.38489	4372.142	3690.066	0.005568
4046	53485652	0.167189	1.64E+08	33010444	1.65E+08	0.728276	1230.24	0.6323	33846088	1.65E+08	0.49948	52.87272	14.7	767.0574	520.6149	14.7	14.7	608.5628	0.74146	0.710752	0.000157	0.020099	0.961067	0.933274	3.43E-06	2437.696	1800.285	0.235986	34.86929	4320.291	3647.55	0.006513
4074	53942224	0.168194	1.64E+08	33208878	1.65E+08	0.72829	1208.481	0.632227	34187212	1.65E+08	0.499921	14.7	14.7	744.07	491.3223	14.7	14.7	586.3612	0.745761	0.712756	0.000167	0.023029	0.961632	0.934457	3.92E-06	2487.821	1775.071	0.250577	40.07147	4272.125	3607.692	0.007457
4105	54446216	0.169297	1.64E+08	33426632	1.65E+08	0.728381	1185.6	0.631566	34560480	1.65E+08	0.500414	14.7	14.7	720.1083	458.9534	14.7	14.7	562.6137	0.750607	0.715033	0.000178	0.026412	0.962258	0.935746	4.52E-06	2459.821	1747.815	0.267565	46.11848	4220.881	3566.062	0.008591
4135	54930528	0.170355	1.64E+08	33635620	1.65E+08	0.728505	1164.126	0.630888	34917688	1.65E+08	0.50089	14.7	14.7	698.0221	427.745	14.7	14.7	540.3882	0.755217	0.717263	0.00019	0.02982	0.962857	0.936961	5.15E-06	2435.522	1722.021	0.284915	52.25127	4170.841	3525.957	0.009792
4166	55427836	0.17144	1.64E+08	33849796	1.64E+08	0.728673	1142.67	0.630171	35282636	1.65E+08	0.501383	14.7	14.7	676.1244	395.6747	14.7	14.7	518.1829	0.759884	0.719592	0.000203	0.033476	0.963467	0.938184	5.88E-06	2411.685	1696.177	0.303905	58.87977	4119.944	3485.438	0.011173
4196	55905240	0.172482	1.63E+08	34055452	1.64E+08	0.728855	1122.372	0.629413	35631924	1.66E+08	0.501859	14.7	14.7	655.5875	364.7259	14.7	14.7	497.2499	0.764323	0.721859	0.000215	0.037139	0.96404	0.939329	6.66E-06	2388.948	1671.793	0.323314	65.57169	4070.355	3446.011	0.012652
4227	56395020	0.17355	1.63E+08	34266308	1.64E+08	0.729069	1101.95	0.628602	35988804	1.66E+08	0.50235	14.7	14.7	634.9445	332.8173	14.7	14.7	476.1431	0.768799	0.724233	0.00023	0.04105	0.964619	0.940478	7.54E-06	2365.906	1647.369	0.344513	72.77234	4019.898	3405.874	0.014326
4258	56880608	0.174609	1.63E+08	34475564	1.64E+08	0.729299	1081.94	0.627725	36341648	1.66E+08	0.502839	14.7	14.7	614.8128	300.9105	14.7	14.7	455.4776	0.773148	0.726628	0.000245	0.045083	0.965181	0.94159	8.51E-06	2342.792	1623.508	0.366986	80.25947	3969.474	3365.654	0.016177
4288	57346500	0.175628	1.63E+08	34676612	1.64E+08	0.72953	1062.863	0.626797	36679316	1.66E+08	0.503311	14.7	14.7	595.693	269.9464	14.7	14.7	435.796	0.777245	0.728957	0.00026	0.049096	0.965708	0.94263	9.55E-06	2320.035	1600.803	0.389952	87.77291	3920.367	3326.325	0.018146
4319	57824004	0.176672	1.63E+08	34882872	1.63E+08	0.729784	1043.563	0.625799	37024252	1.66E+08	0.503798	14.7	14.7	576.313	237.9409	14.7	14.7	415.8412	0.781367	0.731379	0.000277	0.05335	0.966241	0.943673	1.07E-05	2296.371	1577.808	0.41508	95.80613	3870.303	3286.19	0.020391
4349	58281728	0.177676	1.62E+08	35081112	1.63E+08	0.730033	1025.104	0.62473	37354268	1.66E+08	0.504266	14.7	14.7	557.8388	206.8732	14.7	14.7	396.8147	0.785259	0.733654	0.000294	0.057566	0.966742	0.944645	1.20E-05	2272.949	1555.306	0.440688	103.8402	3821.3	3246.674	0.02284
4380	58750820	0.178706	1.62E+08	35284548	1.63E+08	0.730302	1006.379	0.623639	37691368	1.66E+08	0.504749	14.7	14.7	539.0691	175.1319	14.7	14.7	377.4011	0.789179	0.736088	0.000312	0.062559	0.967248	0.945622	1.34E-05	2248.793	1533.097	0.468754	113.4466	3771.687	3206.743	0.025545
4411	59215548	0.17973	1.62E+08	35486616	1.63E+08	0.730576	987.8812	0.62251	38024596	1.67E+08	0.505229	14.7	14.7	520.5434	144.5514	14.7	14.7	358.2467	0.793002	0.738521	0.000332	0.068648	0.967741	0.946567	1.50E-05	2224.164	1510.862	0.498483	125.3042	3721.825	3166.508	0.02859
4439	59630932	0.180648	1.62E+08	35668036	1.63E+08	0.730814	971.1935	0.621359	38322308	1.67E+08	0.50566	14.7	14.7	503.925	117.0599	14.7	14.7	341.0605	0.796378	0.740658	0.000351	0.074084	0.968174	0.947389	1.67E-05	2201.197	1490.328	0.526673	136.0194	3675.557	3128.927	0.031711

4470	60087668	0.181659	1.62E+08	35867596	1.63E+08	0.731097	953.1637	0.620124	38648080	1.67E+08	0.506137	14.7	14.7	485.8043	86.84881	14.7	14.7	322.2695	0.800029	0.743089	0.000373	0.080039	0.968646	0.948284	1.87E-05	2176.025	1468.415	0.559748	147.9049	3626.604	3089.204	0.035498
4500	60525244	0.182631	1.61E+08	36059564	1.62E+08	0.731368	935.8309	0.618814	38959716	1.67E+08	0.506596	14.7	14.7	468.4373	57.8194	14.7	14.7	304.2974	0.803254	0.745445	0.000396	0.085773	0.969091	0.949123	2.08E-05	2152.038	1447.2	0.5935	159.4938	3578.504	3050.089	0.0396
4531	60973388	0.18363	1.61E+08	36256748	1.62E+08	0.731653	918.1586	0.617389	39277896	1.67E+08	0.507069	14.7	14.7	450.6574	28.03015	14.7	14.7	285.9621	0.806393	0.747825	0.00042	0.09166	0.969542	0.949965	2.34E-05	2127.716	1424.95	0.630342	171.5457	3529.178	3009.784	0.044484
4561	61402708	0.184586	1.61E+08	36445536	1.62E+08	0.731942	901.4916	0.617096	39582152	1.67E+08	0.507524	14.7	14.7	433.8783	14.7	14.7	14.7	268.7012	0.809411	0.750142	0.000445	0.097313	0.969966	0.950759	2.62E-05	2104.268	1404.394	0.668172	179.8184	3481.904	2970.751	0.049709
4592	61842176	0.185559	1.61E+08	36637700	1.62E+08	0.732269	885.0471	0.617698	39892636	1.67E+08	0.507991	14.7	14.7	417.2296	14.7	14.7	14.7	251.7696	0.812489	0.752457	0.000473	0.103092	0.970391	0.951559	2.93E-05	2080.268	1383.976	0.709098	184.9871	3434.53	2931.108	0.055738
4623	62276916	0.186519	1.61E+08	36827112	1.62E+08	0.732608	869.1477	0.618139	40199248	1.67E+08	0.508454	14.7	14.7	401.2347	14.7	14.7	14.7	235.5341	0.815512	0.754653	0.000501	0.10882	0.970801	0.952333	3.29E-05	2056.507	1364.073	0.752191	189.845	3387.814	2891.669	0.062478
4653	62692800	0.187434	1.60E+08	37007944	1.62E+08	0.73294	854.1177	0.618418	40492316	1.68E+08	0.508897	14.7	14.7	386.2241	14.7	14.7	14.7	220.236	0.818377	0.756605	0.00053	0.114311	0.971184	0.953053	3.66E-05	2033.519	1344.53	0.79579	194.1337	3342.681	2853.218	0.069614
4684	63118008	0.188368	1.60E+08	37192288	1.61E+08	0.733292	839.0515	0.618634	40791348	1.68E+08	0.50935	14.7	14.7	371.1486	14.7	14.7	14.7	204.8609	0.821269	0.758538	0.000562	0.11994	0.971566	0.953776	4.10E-05	2010.126	1325.223	0.843179	198.2031	3297.209	2814.49	0.077846
4714	63524592	0.189259	1.60E+08	37368412	1.61E+08	0.733631	824.7339	0.618726	41077164	1.68E+08	0.509785	14.7	14.7	356.8857	14.7	14.7	14.7	190.2733	0.823998	0.760333	0.000594	0.12535	0.971921	0.954449	4.56E-05	1987.456	1306.792	0.891263	201.7745	3253.148	2776.978	0.086657
4745	63940100	0.190169	1.60E+08	37548076	1.61E+08	0.733986	810.3019	0.618741	41368740	1.68E+08	0.510229	14.7	14.7	342.4729	14.7	14.7	14.7	175.536	0.826726	0.762115	0.000629	0.130903	0.972276	0.955122	5.09E-05	1964.181	1287.983	0.943411	205.1084	3208.469	2738.908	0.096773
4776	64350592	0.191067	1.60E+08	37725492	1.61E+08	0.734339	796.132	0.618652	41656560	1.68E+08	0.510669	14.7	14.7	328.347	14.7	14.7	14.7	161.0548	0.829368	0.763835	0.000665	0.136423	0.972619	0.955772	5.68E-05	1940.846	1269.4	0.998107	208.0961	3164.033	2701.022	0.108004
4804	64716612	0.19187	1.60E+08	37883960	1.61E+08	0.734648	783.4009	0.618439	41913404	1.68E+08	0.511062	14.7	14.7	315.7502	14.7	14.7	14.7	148.1099	0.831686	0.765347	0.000699	0.141383	0.972917	0.956337	6.27E-05	1919.398	1252.728	1.04967	210.4986	3123.128	2666.13	0.119135
4835	65117900	0.192747	1.59E+08	38057300	1.61E+08	0.734999	769.7293	0.618186	42194056	1.68E+08	0.511493	14.7	14.7	302.087	14.7	14.7	14.7	134.0466	0.834176	0.766968	0.000739	0.146843	0.973238	0.956949	6.99E-05	1895.876	1234.425	1.109524	212.8623	3079.759	2629.103	0.13278
4865	65501276	0.193587	1.59E+08	38223144	1.61E+08	0.735332	756.6373	0.617825	42462152	1.69E+08	0.511906	14.7	14.7	289.073	14.7	14.7	14.7	120.6156	0.836514	0.768499	0.000783	0.152103	0.973539	0.95752	7.75E-05	1872.956	1216.904	1.17518	214.8725	3037.518	2593.041	0.14731
4896	65892880	0.194445	1.59E+08	38392580	1.60E+08	0.735677	743.3535	0.617375	42735544	1.69E+08	0.512328	14.7	14.7	275.7927	14.7	14.7	14.7	106.9197	0.838827	0.770095	0.000834	0.15804	0.97384	0.958097	8.62E-05	1849.382	1199.286	1.251329	217.7504	2994.654	2556.557	0.163881
4926	66266976	0.195267	1.59E+08	38554812	1.60E+08	0.736	730.5755	0.616781	42996652	1.69E+08	0.512733	14.7	14.7	263.0628	14.7	14.7	14.7	93.74836	0.840983	0.771559	0.000888	0.164081	0.974124	0.958635	9.55E-05	1826.058	1181.658	1.332825	220.8955	2952.722	2520.743	0.181413
4957	66649040	0.196107	1.59E+08	38720656	1.60E+08	0.736334	717.599	0.616113	43262820	1.69E+08	0.513147	14.7	14.7	250.0446	14.7	14.7	14.7	80.30466	0.843134	0.773058	0.00095	0.170229	0.97441	0.959151	0.000106	1801.968	1163.914	1.425732	223.7429	2910.219	2484.614	0.201305
4988	67026336	0.196938	1.59E+08	38884768	1.60E+08	0.736664	704.7747	0.615343	43525356	1.69E+08	0.513557	14.7	14.7	237.1577	14.7	14.7	14.7	67.03272	0.845213	0.774544	0.001017	0.176298	0.974688	0.959519	0.000117	1777.731	1146.278	1.527511	226.2198	2867.907	2448.959	0.223066
5018	67386848	0.197734	1.58E+08	39042008	1.60E+08	0.736977	692.4673	0.614501	43776000	1.69E+08	0.51395	14.7	14.7	224.7844	14.7	14.7	14.7	54.28935	0.847159	0.775971	0.001089	0.182104	0.974951	0.959871	0.000129	1754.057	1129.304	1.634531	228.2692	2826.9	2414.462	0.245982
5049	67755048	0.198548	1.58E+08	39202848	1.60E+08	0.7373	679.9659	0.613579	44031392	1.69E+08	0.514353	14.7	14.7	212.1287	14.7	14.7	14.7	41.26933	0.849106	0.777435	0.001168	0.18804	0.975217	0.960232	0.000143	1729.593	1111.898	1.754456	230.0649	2785.346	2379.522	0.271778
5079	68106840	0.199329	1.58E+08	39357004	1.60E+08	0.737607	667.9672	0.61259	44275152	1.69E+08	0.514739	14.7	14.7	199.9903	14.7	14.7	14.7	28.81509	0.850933	0.778846	0.001251	0.19373	0.975468	0.960578	0.000157	1705.767	1095.165	1.879458	231.5048	2745.06	2345.66	0.298872
5110	68466120	0.200128	1.58E+08	39514748	1.59E+08	0.737924	655.7832	0.611514	44523456	1.69E+08	0.515135	14.7	14.7	187.603	14.7	14.7	14.7	16.16439	0.852763	0.780296	0.001344	0.19956	0.975723	0.960932	0.000173	1681.185	1078.02	2.018398	232.7178	2704.18	2311.321	0.329388

Chart A2

TIME	FAQT	FOE	FOIP	FOPT	FOPV	FPR	FWCT	FWIT	FWPT	FWPV	FWSAT	WBHP:P1	WBHP:P2	WBHP:P3	WBHP:P4	WWCT:P1	WWCT:P2	WWCT:P3	WWCT:P4	WWPR:P1	WWPR:P2	WWPR:P3	WWPR:P4
(DAYS)	(STB)		(STB)	(STB)	(RB)	(PSIA)		(STB)	(STB)	(RB)		(PSIA)	(PSIA)	(PSIA)	(PSIA)					(STB/DAY)	(STB/DAY)	(STB/DAY)	(STB/DAY)
0	0	0	2.87E+08	0	2.79E+08	4568.479	0	0	0	56367016	0.168083	4553.739	4567.178	4540.301	4540.301	0	0	0	0	0	0	0	0
1	24346.56	1.05E-05	2.87E+08	3000	2.79E+08	4571.278	1.56E-13	0	4.68E-10	56387752	0.168127	4406.064	4350.438	4450.035	4376.955	4.49E-18	9.80E-15	1.17E-16	6.56E-13	3.82E-15	9.31E-12	5.86E-14	4.59E-10
4	87795.34	4.15E-05	2.87E+08	12000	2.79E+08	4580.793	4.56E-10	0	4.10E-06	56445648	0.168272	4390.329	4325.864	4439.15	4358.237	1.61E-09	8.19E-13	0	2.14E-12	1.36E-06	7.78E-10	0	1.50E-09
13	238007.9	0.000135	2.87E+08	39000	2.79E+08	4605.222	4.04E-09	0	0.000113	56587952	0.168657	4390.599	4308.33	4430.827	4350.215	1.40E-08	0	3.94E-10	0	1.19E-05	0	1.97E-07	0
31	462992	0.000323	2.87E+08	93000	2.79E+08	4641.361	7.89E-09	0	0.000539	56805260	0.169267	4415.252	4305.466	4436.403	4365.539	2.78E-08	0	0	0	2.37E-05	0	0	0
59	725625.6	0.000615	2.87E+08	177000	2.78E+08	4680.534	1.43E-08	0	0.001738	57061640	0.17	4454.725	4319.841	4462.492	4400.643	4.89E-08	1.89E-10	2.15E-09	0	4.16E-05	1.80E-07	1.08E-06	0
90	957523.5	0.000939	2.87E+08	270000	2.78E+08	4711.609	2.60E-08	0	0.004158	57289308	0.170658	4490.295	4341.879	4494.241	4435.487	8.93E-08	8.62E-10	2.58E-09	0	7.59E-05	8.19E-07	1.29E-06	0
120	1147473	0.001252	2.87E+08	360000	2.78E+08	4734.231	2.25E-10	0	0.004178	57476336	0.1712	4517.363	4363.764	4521.877	4462.775	0	7.10E-10	0	0	0	6.75E-07	0	0
151	1319523	0.001576	2.87E+08	453000	2.78E+08	4752.297	2.11E-09	0	0.004375	57646060	0.171694	4539.068	4385.068	4545.865	4485.138	0	5.60E-09	0	1.45E-09	0	5.32E-06	0	1.01E-06
181	1469271	0.001889	2.87E+08	543000	2.78E+08	4766.089	5.74E-09	0	0.004891	57794008	0.172126	4555.623	4403.544	4565.022	4502.253	0	1.20E-08	0	8.29E-09	0	1.14E-05	0	5.80E-06
212	1610572	0.002213	2.87E+08	636000	2.78E+08	4777.374	9.71E-09	0	0.005794	57933804	0.172536	4569.061	4420.121	4581.107	4516.239	0	1.98E-08	0	1.47E-08	0	1.88E-05	0	1.03E-05
243	1741115	0.002537	2.87E+08	729000	2.78E+08	4786.294	1.38E-08	0	0.007077	58063156	0.172915	4579.615	4434.246	4594.113	4527.339	0	2.86E-08	7.47E-10	1.97E-08	0	2.72E-05	3.73E-07	1.38E-05
273	1859148	0.00285	2.87E+08	819000	2.78E+08	4793.105	1.81E-08	0	0.008702	58180280	0.17326	4587.655	4445.778	4604.297	4535.913	0	3.81E-08	3.36E-09	2.33E-08	0	3.62E-05	1.68E-06	1.63E-05
304	1973931	0.003174	2.86E+08	912000	2.77E+08	4798.564	2.27E-08	0	0.010815	58294340	0.173596	4594.069	4455.648	4612.691	4542.901	0	4.96E-08	5.01E-09	2.65E-08	0	4.71E-05	2.51E-06	1.85E-05
334	2079187	0.003487	2.86E+08	1002000	2.77E+08	4802.574	2.76E-08	0	0.013296	58399076	0.173905	4598.838	4463.476	4619.137	4548.18	0	6.24E-08	6.44E-09	2.89E-08	0	5.93E-05	3.22E-06	2.02E-05
365	2182843	0.003811	2.86E+08	1095000	2.77E+08	4805.596	3.32E-08	0	0.01638	58502352	0.174211	4602.473	4469.954	4624.287	4552.317	0	7.77E-08	7.62E-09	3.12E-08	0	7.38E-05	3.81E-06	2.18E-05
396	2282068	0.004134	2.86E+08	1188000	2.77E+08	4807.65	3.93E-08	0	0.020035	58601340	0.174505	4605.025	4475.02	4628.157	4555.329	0	9.53E-08	8.37E-09	3.31E-08	0	9.06E-05	4.19E-06	2.31E-05
424	2368374	0.004427	2.86E+08	1272000	2.77E+08	4808.78	4.59E-08	0	0.023894	58687540	0.174762	4606.585	4478.507	4630.749	4557.163	0	1.13E-07	1.38E-08	3.36E-08	0	0.000107	6.91E-06	2.35E-05
455	2460901	0.00475	2.86E+08	1365000	2.77E+08	4809.363	5.35E-08	0	0.028871	58780036	0.175037	4607.524	4481.329	4632.672	4558.415	0	1.35E-07	1.79E-08	3.31E-08	0	0.000128	8.95E-06	2.32E-05
485	2547736	0.005064	2.86E+08	1455000	2.77E+08	4809.338	6.06E-08	0	0.034327	58866940	0.175296	4607.793	4483.212	4633.773	4558.982	0	1.59E-07	1.79E-08	3.15E-08	0	0.000151	8.96E-06	2.21E-05
516	2635121	0.005387	2.86E+08	1548000	2.77E+08	4808.797	6.78E-08	0	0.04063	58954464	0.175558	4607.494	4484.361	4634.218	4558.967	0	1.86E-07	1.34E-08	2.89E-08	0	0.000176	6.71E-06	2.02E-05
546	2717678	0.0057	2.86E+08	1638000	2.77E+08	4807.834	7.50E-08	0	0.047382	59037228	0.175806	4606.735	4484.827	4634.085	4558.458	0	2.14E-07	6.52E-09	2.59E-08	0	0.000204	3.26E-06	1.82E-05
577	2801263	0.006024	2.86E+08	1731000	2.77E+08	4806.459	8.35E-08	0	0.055147	59121080	0.176057	4605.529	4484.706	4633.436	4557.476	0	2.47E-07	0	2.24E-08	0	0.000235	0	1.57E-05
608	2883302	0.006348	2.86E+08	1824000	2.76E+08	4804.745	9.41E-08	0	0.063902	59203436	0.176304	4603.959	4484.071	4632.346	4556.104	0	2.83E-07	0	1.89E-08	0	0.000269	0	1.32E-05
638	2961402	0.006661	2.85E+08	1914000	2.76E+08	4802.803	1.06E-07	0	0.073417	59281888	0.176539	4602.139	4483.041	4630.934	4554.456	0	3.22E-07	0	1.59E-08	0	0.000306	0	1.11E-05
669	3041032	0.006985	2.85E+08	2007000	2.76E+08	4800.559	1.19E-07	0	0.08448	59361912	0.17678	4599.991	4481.591	4629.147	4552.462	0	3.66E-07	0	1.30E-08	0	0.000348	0	9.08E-06
699	3117124	0.007298	2.85E+08	2097000	2.76E+08	4798.175	1.33E-07	0	0.096464	59438424	0.17701	4597.692	4479.884	4627.154	4550.299	0	4.13E-07	0	1.05E-08	0	0.000392	0	7.38E-06
730	3194976	0.007621	2.85E+08	2190000	2.76E+08	4795.539	1.49E-07	0	0.110348	59516732	0.177246	4595.121	4477.835	4624.855	4547.852	0	4.65E-07	0	8.32E-09	0	0.000442	0	5.82E-06
761	3272094	0.007945	2.85E+08	2283000	2.76E+08	4792.742	1.67E-07	0	0.125871	59594336	0.177479	4592.378	4475.543	4622.349	4545.22	0	5.22E-07	0	6.37E-09	0	0.000496	0	4.46E-06
789	3341105	0.008237	2.85E+08	2367000	2.76E+08	4790.076	1.84E-07	0	0.141344	59663808	0.177689	4589.765	4473.297	4619.931	4542.702	0	5.78E-07	0	5.02E-09	0	0.000549	0	3.51E-06
820	3417158	0.008561	2.85E+08	2460000	2.76E+08	4787.041	2.05E-07	0	0.160402	59740380	0.177919	4586.755	4470.624	4617.101	4539.782	0	6.44E-07	0	3.80E-09	0	0.000612	0	2.66E-06
850	3490250	0.008874	2.85E+08	2550000	2.76E+08	4783.994	2.26E-07	0	0.180785	59813992	0.178141	4583.74	4467.889	4614.237	4536.841	0	7.13E-07	0	2.74E-09	0	0.000678	0	1.92E-06
881	3565430	0.009198	2.85E+08	2643000	2.76E+08	4780.766	2.50E-07	0	0.204077	59889724	0.17837	4580.533	4464.927	4611.166	4533.701	0	7.90E-07	0	1.88E-09	0	0.00075	0	1.32E-06
911	3637803	0.009511	2.85E+08	2733000	2.76E+08	4777.56	2.75E-07	0	0.22885	59962644	0.17859	4577.351	4461.951	4608.098	4530.575	0	8.68E-07	0	1.20E-09	0	0.000825	0	8.42E-07
942	3712346	0.009835	2.85E+08	2826000	2.76E+08	4774.191	3.03E-07	0	0.257001	60037764	0.178816	4573.993	4458.773	4604.844	4527.27	0	9.55E-07	0	7.43E-10	0	0.000908	0	5.20E-07
973	3786622	0.010158	2.84E+08	2919000	2.76E+08	4770.763	3.32E-07	0	0.28787	60112624	0.179042	4570.576	4455.508	4601.516	4523.898	0	1.05E-06	0	3.93E-10	0	0.000996	0	2.75E-07
1003	3858245	0.010472	2.84E+08	3009000	2.75E+08	4767.389	3.62E-07	0	0.320445	60184824	0.17926	4567.213	4452.276	4598.232	4520.577	0	1.14E-06	0	1.33E-10	0	0.001086	0	9.34E-08
1034	3932122	0.010795	2.84E+08	3102000	2.75E+08	4763.87	3.95E-07	0	0.35717	60259304	0.179485	4563.695	4448.869	4594.784	4517.097	0	1.25E-06	0	7.50E-11	0	0.001185	0	5.25E-08
1064	4003410	0.011109	2.84E+08	3192000	2.75E+08	4760.42	4.29E-07	0	0.395743	60331180	0.179703	4560.251	4445.518	4591.4	4513.684	0	1.35E-06	0	2.01E-11	0	0.001286	0	1.41E-08
1095	4076989	0.011432	2.84E+08	3285000	2.75E+08	4756.834	4.65E-07	0	0.439026	60405376	0.179927	4556.661	4442.006	4587.864	4510.123	0	1.47E-06	0	1.43E-10	0	0.001396	0	9.98E-08
1126	4150435	0.011756	2.84E+08	3378000	2.75E+08	4753.218	5.04E-07	0	0.485924	60479440	0.180151	4553.043	4438.453	4584.293	4506.53	0	1.59E-06	0	2.92E-10	0	0.001513	0	2.04E-07
1154	4216557	0.012048	2.84E+08	3462000	2.75E+08	4749.906	5.41E-07	0	0.53137	60546136	0.180352	4549.74	4435.208	4581.034	4503.249	0	1.71E-06	0	3.02E-10	0	0.001623	0	2.12E-07
1185	4289856	0.012372	2.84E+08	3555000	2.75E+08	4746.254	5.84E-07	0	0.58569	60620060	0.180576	4546.072	4431.588	4577.402	4499.604	0	1.84E-06	0	7.00E-10	0	0.001752	0	4.90E-07
1215	4360648	0.012685	2.84E+08	3645000	2.75E+08	4742.69	6.28E-07	0	0.642207	60691468	0.180791	4542.503	4428.058	4573.867	4496.053	0	1.98E-06	0	9.41E-10	0	0.001883	0	6.59E-07
1246	4433782	0.013009	2.84E+08	3738000	2.75E+08	4739.002	6.76E-07	0	0.705068	60765240	0.181014	4538.802	4424.388	4570.195	4492.37	0	2.13E-06	0	1.32E-09	0	0.002027	0	9.21E-07
1276	4504448	0.013322	2.84E+08	3828000	2.75E+08	4735.408	7.25E-07	0	0.770304	60836528	0.18123	4535.202	4420.817	4566.625	4488.788	0	2.29E-06	0	1.59E-09	0	0.002173	0	1.11E-06
1307	4577478	0.013646	2.83E+08	3921000	2.75E+08	4731.694	7.78E-07	0	0.842684	60910200	0.181453	4531.475	4417.111	4562.921	4485.078	0	2.46E-06	0	2.01E-09	0	0.002333	0	1.40E-06
1338	4650461	0.013969	2.83E+08	4014000	2.75E+08	4727.97	8.35E-07	0	0.920316	60983832	0.181675	4527.74	4413.394	4559.209	4481.359	0	2.63E-06	0	2.40E-09	0	0.002503	0	1.68E-06
1368	4721014	0.014282	2.83E+08	4104000	2.75E+08	4724.35	8.92E-07	0	1.000626	61055020	0.181891	4524.113	4409.784	4555.603	4477.748	0	2.82E-06	0	2.73E-09	0	0.002675	0	1.91E-06
1399	4793952	0.014606	2.83E+08	4197000	2.74E+08	4720.613	9.55E-07	0	1.089458	61128608	0.182113	4520.362	4406.044	4551.87	4474.013	0	3.01E-06	0	3.21E-09	0	0.002863	0	2.25E-06
1429	4864464	0.014919	2.83E+08	4287000	2.74E+08	4716.981	1.02E-06	0	1.181189	61199756	0.182328	4516.723	4402.415	4548.249	4470.387	0	3.22E-06	0	3.58E-09	0	0.003055	0	2.51E-06
1460	4937367	0.015243	2.83E+08	4380000	2.74E+08	4713.235	1.09E-06	0	1.282474	61273316	0.182551	4512.963	4398.659	4544.503	4466.64	0	3.44E-06	0	4.13E-09	0	0.003264	0	2.89E-06
1491	5010245	0.015567	2.83E+08	4473000	2.74E+08	4709.482	1.16E-06	0	1.390602	61346856	0.182773	4509.201	4394.896	4540.753	4462.889	0	3.67E-06	0	4.66E-09	0	0.003485	0	3.26E-06
1519	5075931	0.015859	2.83E+08	4557000	2.74E+08	4706.065	1.23E-06	0	1.494112	61413148	0.182974	4505.786	4391.488	4537.356	4459.483	0	3.89E-06	0	4.93E-09	0	0.003693	0	3.45E-06

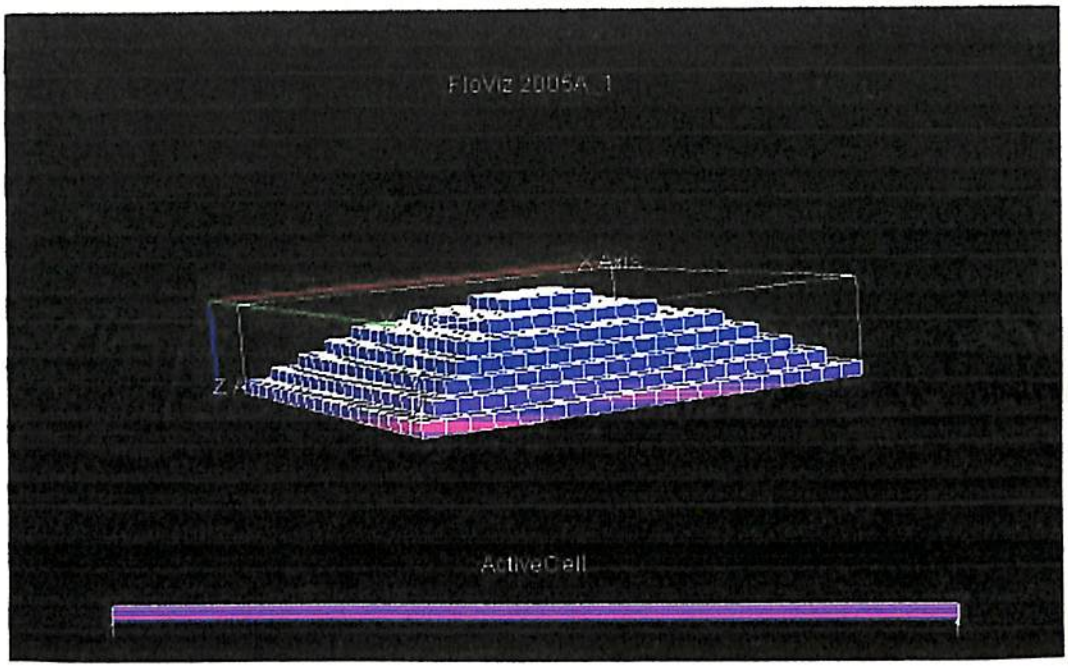
1550	5148829	0.016183	2.83E+08	4650000	2.74E+08	4702.313	1.31E-06	0	1.616264	61486704	0.183196	4502.014	4387.712	4533.593	4455.722	0	4.14E-06	0	5.62E-09	0	0.003936	0	3.93E-06
1580	5219300	0.016496	2.83E+08	4740000	2.74E+08	4698.667	1.40E-06	0	1.741897	61557824	0.183412	4498.36	4384.054	4529.95	4452.077	0	4.40E-06	0	6.10E-09	0	0.004183	0	4.27E-06
1611	5292164	0.016819	2.83E+08	4833000	2.74E+08	4694.907	1.49E-06	0	1.880049	61631356	0.183634	4494.589	4380.272	4526.186	4448.312	0	4.69E-06	0	6.74E-09	0	0.004452	0	4.72E-06
1641	5362617	0.017133	2.82E+08	4923000	2.74E+08	4691.256	1.58E-06	0	2.021922	61702460	0.183849	4490.933	4376.607	4522.539	4444.662	0	4.97E-06	0	7.25E-09	0	0.004724	0	5.08E-06
1672	5435470	0.017456	2.82E+08	5016000	2.74E+08	4687.492	1.67E-06	0	2.177691	61775984	0.184072	4487.157	4372.819	4518.771	4440.892	0	5.28E-06	0	7.95E-09	0	0.005019	0	5.56E-06
1703	5508309	0.01778	2.82E+08	5109000	2.74E+08	4683.724	1.78E-06	0	2.34307	61849496	0.184294	4483.381	4369.029	4515.002	4437.12	0	5.61E-06	0	8.63E-09	0	0.005329	0	6.04E-06
1733	5578747	0.018093	2.82E+08	5199000	2.74E+08	4680.066	1.88E-06	0	2.512527	61920592	0.184509	4479.719	4365.357	4511.35	4433.463	0	5.94E-06	0	9.22E-09	0	0.005642	0	6.46E-06
1764	5651590	0.018417	2.82E+08	5292000	2.73E+08	4676.297	2.00E-06	0	2.69816	61994108	0.184732	4475.938	4361.562	4507.575	4429.687	0	6.30E-06	0	1.00E-08	0	0.005981	0	7.00E-06
1794	5722030	0.01873	2.82E+08	5382000	2.73E+08	4672.638	2.11E-06	0	2.888099	62065208	0.184947	4472.273	4357.886	4503.919	4426.026	0	6.66E-06	0	1.06E-08	0	0.006324	0	7.45E-06
1825	5794874	0.019054	2.82E+08	5475000	2.73E+08	4668.867	2.23E-06	0	3.095865	62138736	0.185169	4468.49	4354.087	4500.142	4422.248	0	7.05E-06	0	1.15E-08	0	0.006694	0	8.02E-06
1856	5867708	0.019377	2.82E+08	5568000	2.73E+08	4665.093	2.36E-06	0	3.315637	62212252	0.185392	4464.706	4350.287	4496.365	4418.468	0	7.45E-06	0	1.23E-08	0	0.007081	0	8.58E-06
1884	5933366	0.01967	2.82E+08	5652000	2.73E+08	4661.658	2.48E-06	0	3.524316	62278536	0.185592	4461.273	4346.849	4492.945	4415.04	0	7.84E-06	0	1.27E-08	0	0.007444	0	8.91E-06
1915	6006240	0.019993	2.82E+08	5745000	2.73E+08	4657.89	2.62E-06	0	3.768374	62352092	0.185815	4457.483	4343.044	4489.161	4411.257	0	8.28E-06	0	1.37E-08	0	0.007863	0	9.58E-06
1945	6076697	0.020306	2.81E+08	5835000	2.73E+08	4654.23	2.77E-06	0	4.017249	62423216	0.18603	4453.814	4339.361	4485.5	4407.592	0	8.72E-06	0	1.44E-08	0	0.008286	0	1.01E-05
1976	6149557	0.02063	2.81E+08	5928000	2.73E+08	4650.457	2.92E-06	0	4.288537	62496764	0.186253	4450.027	4335.556	4481.718	4403.81	0	9.20E-06	0	1.53E-08	0	0.00874	0	1.07E-05
2006	6220015	0.020943	2.81E+08	6018000	2.73E+08	4646.795	3.08E-06	0	4.565359	62567896	0.186468	4446.358	4331.873	4478.058	4400.146	2.14E-08	9.68E-06	0	1.61E-08	1.82E-05	0.009198	0	1.12E-05
2037	6292882	0.021267	2.81E+08	6111000	2.73E+08	4643.023	3.26E-06	0	4.868804	62641452	0.186691	4442.572	4328.069	4474.277	4396.366	1.02E-07	1.02E-05	0	1.70E-08	8.68E-05	0.00969	0	1.19E-05
2068	6365744	0.021591	2.81E+08	6204000	2.73E+08	4639.249	3.46E-06	0	5.190289	62715008	0.186914	4438.786	4324.268	4470.498	4392.587	1.85E-07	1.07E-05	0	1.79E-08	0.000157	0.010201	0	1.25E-05
2098	6436219	0.021904	2.81E+08	6294000	2.73E+08	4635.588	3.65E-06	0	5.518742	62786160	0.187129	4435.12	4320.587	4466.839	4388.928	2.60E-07	1.13E-05	0	1.86E-08	0.000221	0.010715	0	1.30E-05
2129	6509112	0.022227	2.81E+08	6387000	2.73E+08	4631.819	3.86E-06	0	5.877435	62859752	0.187352	4431.339	4316.787	4463.063	4385.152	3.43E-07	1.19E-05	0	1.96E-08	0.000292	0.011265	0	1.37E-05
2159	6579610	0.022541	2.81E+08	6477000	2.72E+08	4628.163	4.06E-06	0	6.243062	62930932	0.187567	4427.676	4313.109	4459.406	4381.494	4.18E-07	1.24E-05	0	2.04E-08	0.000355	0.011818	0	1.43E-05
2190	6652524	0.022864	2.81E+08	6570000	2.72E+08	4624.396	4.28E-06	0	6.641462	63004544	0.18779	4423.898	4309.31	4455.631	4377.72	5.01E-07	1.31E-05	3.98E-10	2.13E-08	0.000426	0.01241	1.99E-07	1.49E-05
2221	6725434	0.023188	2.81E+08	6663000	2.72E+08	4620.627	4.51E-06	0	7.061192	63078156	0.188013	4420.121	4305.512	4451.859	4373.947	5.86E-07	1.37E-05	3.45E-09	2.23E-08	0.000498	0.013024	1.72E-06	1.56E-05
2249	6791167	0.02348	2.81E+08	6747000	2.72E+08	4617.199	4.72E-06	0	7.457871	63144532	0.188214	4416.694	4302.077	4448.444	4370.527	6.49E-07	1.43E-05	5.46E-09	2.29E-08	0.000552	0.013596	2.73E-06	1.60E-05
2280	6864131	0.023804	2.80E+08	6840000	2.72E+08	4613.44	4.97E-06	0	7.919679	63218200	0.188437	4412.916	4298.278	4444.669	4366.755	7.33E-07	1.50E-05	8.62E-09	2.40E-08	0.000623	0.014252	4.31E-06	1.68E-05
2310	6934680	0.024117	2.80E+08	6930000	2.72E+08	4609.789	5.21E-06	0	8.388272	63289432	0.188653	4409.258	4294.601	4441.016	4363.102	8.09E-07	1.57E-05	1.13E-08	2.48E-08	0.000688	0.014909	5.63E-06	1.74E-05
2341	7007635	0.024441	2.80E+08	7023000	2.72E+08	4606.026	5.46E-06	0	8.89652	63363096	0.188876	4405.483	4290.804	4437.245	4359.331	8.94E-07	1.64E-05	1.43E-08	2.58E-08	0.00076	0.01561	7.15E-06	1.81E-05
2371	7078187	0.024754	2.80E+08	7113000	2.72E+08	4602.375	5.72E-06	0	9.411437	63434336	0.189092	4401.826	4287.127	4433.595	4355.678	9.71E-07	1.72E-05	1.70E-08	2.67E-08	0.000825	0.016311	8.48E-06	1.87E-05
2402	7151149	0.025078	2.80E+08	7206000	2.72E+08	4598.611	6.00E-06	0	9.969073	63508012	0.189315	4398.05	4283.331	4429.825	4351.908	1.06E-06	1.80E-05	2.00E-08	2.77E-08	0.000899	0.01706	1.00E-05	1.94E-05
2433	7224105	0.025401	2.80E+08	7299000	2.72E+08	4594.847	6.28E-06	0	10.55308	63581680	0.189538	4394.275	4279.534	4426.056	4348.139	1.15E-06	1.88E-05	2.31E-08	2.87E-08	0.000974	0.017833	1.16E-05	2.01E-05
2463	7294665	0.025715	2.80E+08	7389000	2.72E+08	4591.194	6.56E-06	0	11.14356	63652936	0.189754	4390.617	4275.862	4422.406	4344.486	1.23E-06	1.96E-05	2.59E-08	2.96E-08	0.001044	0.018605	1.29E-05	2.07E-05
2494	7367639	0.026038	2.80E+08	7482000	2.72E+08	4587.431	6.86E-06	0	11.78175	63726624	0.189977	4386.841	4272.067	4418.636	4340.715	1.32E-06	2.05E-05	2.91E-08	3.07E-08	0.001122	0.019429	1.46E-05	2.15E-05
2524	7438210	0.026351	2.80E+08	7572000	2.72E+08	4583.779	7.16E-06	0	12.42598	63797892	0.190193	4383.179	4268.393	4414.984	4337.062	1.39E-06	2.13E-05	3.17E-08	3.16E-08	0.001185	0.020251	1.58E-05	2.21E-05
2555	7511193	0.026675	2.80E+08	7665000	2.71E+08	4580.016	7.47E-06	0	13.12089	63871596	0.190416	4379.399	4264.596	4411.213	4333.29	1.47E-06	2.22E-05	3.44E-08	3.26E-08	0.001247	0.021129	1.72E-05	2.28E-05
2586	7584169	0.026999	2.80E+08	7758000	2.71E+08	4576.25	7.79E-06	0	13.84498	63945292	0.190639	4375.614	4260.8	4407.44	4329.519	1.51E-06	2.32E-05	3.62E-08	3.34E-08	0.001281	0.022035	1.81E-05	2.34E-05
2614	7649958	0.027291	2.79E+08	7842000	2.71E+08	4572.824	8.07E-06	0	14.5231	64011744	0.19084	4372.187	4257.366	4404.026	4326.099	1.53E-06	2.41E-05	3.70E-08	3.39E-08	0.001299	0.022877	1.85E-05	2.37E-05
2645	7722980	0.027615	2.79E+08	7935000	2.71E+08	4569.065	8.40E-06	0	15.3045	64085484	0.191064	4368.406	4253.567	4400.25	4322.325	1.56E-06	2.51E-05	3.85E-08	3.48E-08	0.001324	0.023839	1.93E-05	2.43E-05
2675	7793581	0.027928	2.79E+08	8025000	2.71E+08	4565.414	8.73E-06	0	16.09009	64156792	0.19128	4364.746	4249.887	4396.597	4318.669	1.58E-06	2.61E-05	3.95E-08	3.54E-08	0.001344	0.024798	1.98E-05	2.48E-05
2706	7866588	0.028252	2.79E+08	8118000	2.71E+08	4561.651	9.08E-06	0	16.93426	64230524	0.191503	4360.968	4246.086	4392.824	4314.897	1.61E-06	2.72E-05	4.07E-08	3.63E-08	0.001365	0.02582	2.04E-05	2.54E-05
2736	7937187	0.028565	2.79E+08	8208000	2.71E+08	4557.999	9.42E-06	0	17.78234	64301832	0.191719	4357.307	4242.406	4389.172	4311.241	1.63E-06	2.83E-05	4.15E-08	3.69E-08	0.001384	0.026839	2.08E-05	2.58E-05
2767	8010198	0.028888	2.79E+08	8301000	2.71E+08	4554.234	9.79E-06	0	18.69298	64375572	0.191943	4353.529	4238.605	4385.399	4307.467	1.65E-06	2.94E-05	4.25E-08	3.76E-08	0.001403	0.027924	2.13E-05	2.64E-05
2798	8083201	0.029212	2.79E+08	8394000	2.71E+08	4550.469	1.02E-05	0	19.63891	64449308	0.192166	4349.75	4234.804	4381.628	4303.694	1.67E-06	3.06E-05	4.35E-08	3.84E-08	0.001423	0.029042	2.17E-05	2.69E-05
2828	8153805	0.029525	2.79E+08	8484000	2.71E+08	4546.815	1.05E-05	0	20.58827	64520628	0.192382	4346.089	4231.124	4377.976	4300.038	1.69E-06	3.17E-05	4.42E-08	3.90E-08	0.00144	0.030156	2.21E-05	2.73E-05
2859	8226823	0.029849	2.79E+08	8577000	2.71E+08	4543.049	1.10E-05	0	21.60666	64594380	0.192606	4342.309	4227.322	4374.202	4296.264	1.72E-06	3.30E-05	4.52E-08	3.97E-08	0.00146	0.031341	2.26E-05	2.78E-05
2889	8297438	0.030162	2.79E+08	8667000	2.71E+08	4539.396	1.13E-05	0	22.62811	64665712	0.192822	4338.647	4223.644	4370.548	4292.608	1.74E-06	3.42E-05	4.60E-08	4.04E-08	0.001477	0.032521	2.30E-05	2.83E-05
2920	8370468	0.030486	2.79E+08	8760000	2.71E+08	4535.631	1.18E-05	0	23.72316	64739484	0.193045	4334.866	4219.843	4366.775	4288.835	1.76E-06	3.56E-05	4.70E-08	4.11E-08	0.001497	0.033775	2.35E-05	2.88E-05
2951	8443495	0.030809	2.78E+08	8853000	2.70E+08	4531.866	1.22E-05	0	24.85888	64813252	0.193269	4331.088	4216.044	4363.003	4285.064	1.78E-06	3.69E-05	4.79E-08	4.19E-08	0.001516	0.035066	2.40E-05	2.93E-05
2979	8509335	0.031102	2.78E+08	8937000	2.70E+08	4528.44	1.26E-05	0	25.91857	64879772	0.19347	4327.663	4212.61	4359.59	4281.646	1.80E-06	3.82E-05	4.85E-08	4.23E-08	0.001529	0.036263	2.42E-05	2.96E-05
3010	8582415	0.031425	2.78E+08	9030000	2.70E+08	4524.683	1.31E-05	0	27.13473	64953592	0.193694	4323.881	4208.81	4355.815	4277.876	1.82E-06	3.96E-05	4.97E-08	4.32E-08	0.001551	0.037625	2.48E-05	3.02E-05
3040	8653076	0.031739	2.78E+08	9120000	2.70E+08	4521.035	1.35E-05	0	28.35287	65024976	0.19391	4320.222	4205.132	4352.163	4274.226	1.85E-06	4.10E-05	5.06E-08	4.39E-08	0.00157	0.038979	2.53E-05	3.07E-05
3071	8726151	0.032062	2.78E+08	9213000	2.70E+08	4517.275	1.40E-05	0	29.6569	65098796	0.194134	4316.446	4201.334	4348.393	4270.459	1.87E-06	4.25E-05	5.17E-08	4.47E-08	0.001591	0.040417	2.59E-05	3.13E-05
3101	8796821	0.032376	2.78E+08	9303000	2.70E+08	4513.627	1.45E-05	0	30.96234	65170196	0.194351	4312.789	4197.659	4344.744	4266.81	1.89E-06	4.40E-05	5.26E-08	4.54E-08	0.001611	0.041846	2.63E-05	3.18E-05
3132	8869908	0.032699	2.78E+08	9396000	2.70E+08	4509.869	1.50E-05	0	32.35903	65244032	0.194574	4309.015	4193.862	4340.976	4263.044	1.92E-06	4.56E-05	5.38E-08	4.62E-08	0.001632	0.043363	2.69E-05	3.23E-05
3163	8942989	0.033023	2.78E+08	9489000	2.70E+08	4506.109	1.55E-05	0	33.80472	65317864	0.194798	4305.241	4190.067	4337.21	4259.28	1.95E-06	4.73E-05	5.49E-08	4.70E-08	0.001655	0.04492	2.74E-05	3.29E-05
3193	9013673	0.033336	2.78E+08	9579000	2.70E+08	4502.461	1.61E-05	0	35.25079	65389280	0.195015	4301.586	4186.393	4333.563	4255.632	1.97E-06	4.89E-05	5.58E-08	4.77E-08	0.001674	0.046467	2.79E-05	3.34E-05
3224	9086775	0.03366	2.78E+08	9672000	2.70E+08	4498.703	1.66E-05	0	36.79665	65463136	0.195238	4297.812	4182.597	4329.796	4251.866	2.00E-06	5.06E-05	5.69E-08	4.85E-08	0.001697	0.048107	2.84E-05	3.40E-05

3254	9157473	0.033973	2.78E+08	9762000	2.70E+08	4495.056	1.72E-05	0	38.34211	65534572	0.195455	4294.155	4178.922	4326.149	4248.218	2.02E-06	5.23E-05	5.78E-08	4.92E-08	0.001718	0.049734	2.89E-05	3.45E-05
3285	9230587	0.034297	2.77E+08	9855000	2.70E+08	4491.298	1.78E-05	0	39.99336	65608440	0.195679	4290.38	4175.126	4322.382	4244.453	2.05E-06	5.42E-05	5.90E-08	5.01E-08	0.001742	0.051459	2.95E-05	3.51E-05
3316	9303695	0.03462	2.77E+08	9948000	2.69E+08	4487.539	1.84E-05	0	41.70026	65682308	0.195903	4286.606	4171.329	4318.614	4240.688	2.08E-06	5.60E-05	6.02E-08	5.10E-08	0.001767	0.053229	3.01E-05	3.57E-05
3344	9369607	0.034913	2.77E+08	10032000	2.69E+08	4484.118	1.89E-05	0	43.28827	65748920	0.196105	4283.184	4167.893	4315.204	4237.273	2.10E-06	5.77E-05	6.08E-08	5.15E-08	0.001784	0.054864	3.04E-05	3.60E-05
3375	9442764	0.035236	2.77E+08	10125000	2.69E+08	4480.363	1.95E-05	0	45.10479	65822836	0.196329	4279.403	4164.09	4311.431	4233.502	2.13E-06	5.97E-05	6.22E-08	5.25E-08	0.001811	0.056719	3.11E-05	3.68E-05
3405	9513497	0.035549	2.77E+08	10215000	2.69E+08	4476.715	2.02E-05	0	46.91862	65894308	0.196546	4275.744	4160.407	4307.778	4229.848	2.16E-06	6.16E-05	6.32E-08	5.33E-08	0.001835	0.058557	3.16E-05	3.73E-05
3436	9586641	0.035873	2.77E+08	10308000	2.69E+08	4472.955	2.08E-05	0	48.85416	65968220	0.19677	4271.962	4156.6	4304.003	4226.077	2.19E-06	6.37E-05	6.46E-08	5.43E-08	0.001862	0.060504	3.23E-05	3.80E-05
3466	9657376	0.036186	2.77E+08	10398000	2.69E+08	4469.304	2.15E-05	0	50.78585	66039700	0.196986	4268.301	4152.915	4300.35	4222.422	2.22E-06	6.57E-05	6.56E-08	5.51E-08	0.001886	0.062432	3.28E-05	3.86E-05
3497	9730528	0.03651	2.77E+08	10491000	2.69E+08	4465.542	2.22E-05	0	52.84608	66113620	0.197211	4264.52	4149.107	4296.576	4218.65	2.25E-06	6.79E-05	6.68E-08	5.60E-08	0.001914	0.064472	3.34E-05	3.92E-05
3528	9803674	0.036833	2.77E+08	10584000	2.69E+08	4461.777	2.29E-05	0	54.97196	66187540	0.197435	4260.74	4145.299	4292.802	4214.877	2.28E-06	7.01E-05	6.80E-08	5.70E-08	0.001941	0.066561	3.40E-05	3.99E-05
3558	9874420	0.037147	2.77E+08	10674000	2.69E+08	4458.125	2.36E-05	0	57.09205	66259036	0.197652	4257.079	4141.611	4289.148	4211.221	2.31E-06	7.22E-05	6.91E-08	5.78E-08	0.001965	0.068629	3.45E-05	4.05E-05
3589	9947588	0.03747	2.77E+08	10767000	2.69E+08	4454.36	2.43E-05	0	59.35136	66332980	0.197876	4253.297	4137.8	4285.373	4207.445	2.34E-06	7.45E-05	7.02E-08	5.88E-08	0.001989	0.070816	3.51E-05	4.11E-05
3619	10018349	0.037784	2.76E+08	10857000	2.69E+08	4450.707	2.50E-05	0	61.60332	66404496	0.198093	4249.634	4134.109	4281.717	4203.787	2.36E-06	7.68E-05	7.10E-08	5.96E-08	0.002009	0.072979	3.55E-05	4.17E-05
3650	10091529	0.038107	2.76E+08	10950000	2.69E+08	4446.941	2.58E-05	0	64.00196	66478452	0.198317	4245.851	4130.295	4277.94	4200.01	2.39E-06	7.92E-05	7.21E-08	6.06E-08	0.002031	0.075266	3.60E-05	4.24E-05
3681	10164706	0.038431	2.76E+08	11043000	2.69E+08	4443.175	2.66E-05	0	66.47375	66552408	0.198541	4242.07	4126.481	4274.166	4196.233	2.41E-06	8.17E-05	7.29E-08	6.15E-08	0.002051	0.077604	3.64E-05	4.31E-05
3709	10230680	0.038723	2.76E+08	11127000	2.68E+08	4439.747	2.73E-05	0	68.76707	66619100	0.198744	4238.644	4123.032	4270.749	4192.808	2.43E-06	8.40E-05	7.33E-08	6.21E-08	0.002065	0.079759	3.66E-05	4.35E-05
3740	10303907	0.039047	2.76E+08	11220000	2.68E+08	4435.985	2.81E-05	0	71.38238	66693104	0.198968	4234.858	4119.213	4266.967	4189.028	2.45E-06	8.65E-05	7.41E-08	6.32E-08	0.002085	0.082198	3.71E-05	4.43E-05
3770	10374708	0.03936	2.76E+08	11310000	2.68E+08	4432.332	2.89E-05	0	73.98619	66764668	0.199185	4231.193	4115.517	4263.309	4185.366	2.47E-06	8.91E-05	7.47E-08	6.41E-08	0.002103	0.084608	3.74E-05	4.49E-05
3801	10447925	0.039684	2.76E+08	11403000	2.68E+08	4428.566	2.98E-05	0	76.75635	66838668	0.19941	4227.41	4111.698	4259.531	4181.587	2.50E-06	9.17E-05	7.54E-08	6.51E-08	0.002124	0.087153	3.77E-05	4.55E-05
3831	10518729	0.039997	2.76E+08	11493000	2.68E+08	4424.91	3.06E-05	0	79.51315	66910240	0.199627	4223.744	4108	4255.872	4177.924	2.52E-06	9.44E-05	7.60E-08	6.59E-08	0.002142	0.089667	3.80E-05	4.61E-05
3862	10591953	0.04032	2.76E+08	11586000	2.68E+08	4421.142	3.15E-05	0	82.44476	66984252	0.199851	4219.958	4104.179	4252.091	4174.143	2.54E-06	9.72E-05	7.66E-08	6.68E-08	0.002162	0.092321	3.83E-05	4.68E-05
3893	10665171	0.040644	2.76E+08	11679000	2.68E+08	4417.371	3.24E-05	0	85.46108	67058264	0.200076	4216.171	4100.36	4248.312	4170.361	2.57E-06	0.0001	7.72E-08	6.78E-08	0.002183	0.095032	3.86E-05	4.75E-05
3923	10735985	0.040957	2.76E+08	11769000	2.68E+08	4413.712	3.33E-05	0	88.46103	67129848	0.200293	4212.501	4096.664	4244.651	4166.696	2.59E-06	0.000103	7.76E-08	6.86E-08	0.002203	0.097709	3.88E-05	4.80E-05
3954	10809223	0.041281	2.75E+08	11862000	2.68E+08	4409.941	3.43E-05	0	91.64928	67203880	0.200518	4208.71	4092.843	4240.869	4162.913	2.62E-06	0.000106	7.83E-08	6.96E-08	0.002225	0.100534	3.91E-05	4.87E-05
3984	10880051	0.041594	2.75E+08	11952000	2.68E+08	4406.282	3.52E-05	0	94.81905	67275480	0.200735	4205.038	4089.145	4237.206	4159.248	2.64E-06	0.000109	7.88E-08	7.04E-08	0.002246	0.103324	3.94E-05	4.93E-05
4015	10953302	0.041918	2.75E+08	12045000	2.68E+08	4402.511	3.62E-05	0	98.18646	67349528	0.200959	4201.246	4085.323	4233.423	4155.463	2.67E-06	0.000112	7.94E-08	7.15E-08	0.00227	0.106267	3.97E-05	5.00E-05
4046	11026549	0.042241	2.75E+08	12138000	2.68E+08	4398.738	3.72E-05	0	101.6478	67423576	0.201184	4197.455	4081.503	4229.64	4151.68	2.70E-06	0.000115	8.00E-08	7.25E-08	0.002294	0.109271	4.00E-05	5.07E-05
4074	11092586	0.042534	2.75E+08	12222000	2.68E+08	4395.305	3.81E-05	0	104.8521	67490352	0.201387	4194.018	4078.048	4226.217	4148.249	2.72E-06	0.000118	8.03E-08	7.31E-08	0.002312	0.112035	4.02E-05	5.12E-05
4105	11165884	0.042857	2.75E+08	12315000	2.67E+08	4391.538	3.92E-05	0	108.4973	67564440	0.201612	4190.221	4074.224	4222.428	4144.464	2.75E-06	0.000121	8.11E-08	7.42E-08	0.002339	0.115158	4.06E-05	5.20E-05
4135	11236754	0.043171	2.75E+08	12405000	2.67E+08	4387.88	4.02E-05	0	112.1182	67636096	0.201829	4186.546	4070.523	4218.764	4140.798	2.78E-06	0.000124	8.17E-08	7.52E-08	0.002363	0.11824	4.09E-05	5.26E-05
4166	11310044	0.043494	2.75E+08	12498000	2.67E+08	4384.11	4.13E-05	0	115.9615	67710192	0.202054	4182.752	4066.7	4214.979	4137.015	2.81E-06	0.000128	8.25E-08	7.63E-08	0.002391	0.12149	4.13E-05	5.34E-05
4196	11380919	0.043808	2.75E+08	12588000	2.67E+08	4380.451	4.24E-05	0	119.7778	67781848	0.202271	4179.078	4063	4211.315	4133.349	2.84E-06	0.000131	8.31E-08	7.72E-08	0.002418	0.124696	4.16E-05	5.40E-05
4227	11454219	0.044131	2.75E+08	12681000	2.67E+08	4376.681	4.35E-05	0	123.8269	67855960	0.202496	4175.285	4059.177	4207.531	4129.566	2.88E-06	0.000135	8.39E-08	7.83E-08	0.002447	0.128075	4.19E-05	5.48E-05
4258	11527515	0.044455	2.75E+08	12774000	2.67E+08	4372.908	4.47E-05	0	127.9839	67930064	0.202721	4171.493	4055.354	4203.749	4125.784	2.91E-06	0.000138	8.46E-08	7.94E-08	0.002476	0.131521	4.23E-05	5.55E-05
4288	11598406	0.044768	2.74E+08	12864000	2.67E+08	4369.249	4.58E-05	0	132.1095	68001744	0.202939	4167.818	4051.653	4200.086	4122.119	2.95E-06	0.000142	8.52E-08	8.03E-08	0.002504	0.13492	4.26E-05	5.62E-05
4319	11671725	0.045092	2.74E+08	12957000	2.67E+08	4365.478	4.70E-05	0	136.4847	68075880	0.203164	4164.026	4047.83	4196.302	4118.336	2.98E-06	0.000146	8.60E-08	8.14E-08	0.002535	0.1385	4.30E-05	5.70E-05
4349	11742634	0.045405	2.74E+08	13047000	2.67E+08	4361.819	4.82E-05	0	140.8256	68147576	0.203381	4160.353	4044.128	4192.64	4114.671	3.02E-06	0.000149	8.66E-08	8.24E-08	0.002563	0.142031	4.33E-05	5.77E-05
4380	11815968	0.045729	2.74E+08	13140000	2.67E+08	4358.049	4.95E-05	0	145.4274	68221728	0.203606	4156.56	4040.303	4188.856	4110.888	3.05E-06	0.000153	8.74E-08	8.36E-08	0.002595	0.145749	4.37E-05	5.85E-05
4411	11889299	0.046052	2.74E+08	13233000	2.67E+08	4354.277	5.08E-05	0	150.1478	68295880	0.203832	4152.769	4036.479	4185.074	4107.106	3.09E-06	0.000157	8.82E-08	8.48E-08	0.002628	0.149539	4.41E-05	5.93E-05
4439	11955413	0.046344	2.74E+08	13317000	2.67E+08	4350.846	5.19E-05	0	154.5096	68362744	0.204035	4149.334	4033.02	4181.652	4103.676	3.12E-06	0.000161	8.85E-08	8.56E-08	0.002654	0.153021	4.43E-05	5.99E-05
4470	12028797	0.046668	2.74E+08	13410000	2.67E+08	4347.081	5.32E-05	0	159.4617	68436944	0.20426	4145.542	4029.192	4177.866	4099.892	3.16E-06	0.000165	8.94E-08	8.69E-08	0.002689	0.156949	4.47E-05	6.08E-05
4500	12099752	0.046981	2.74E+08	13500000	2.66E+08	4343.425	5.45E-05	0	164.3711	68508696	0.204478	4141.873	4025.487	4174.204	4096.227	3.20E-06	0.000169	9.01E-08	8.80E-08	0.002722	0.16082	4.51E-05	6.16E-05
4531	12173128	0.047305	2.74E+08	13593000	2.66E+08	4339.658	5.59E-05	0	169.5717	68582896	0.204703	4138.085	4021.659	4170.423	4092.444	3.24E-06	0.000174	9.10E-08	8.93E-08	0.002758	0.164894	4.55E-05	6.25E-05
4561	12244087	0.047618	2.74E+08	13683000	2.66E+08	4336.001	5.73E-05	0	174.726	68654656	0.204921	4134.415	4017.954	4166.762	4088.778	3.29E-06	0.000178	9.16E-08	9.04E-08	0.002793	0.168907	4.58E-05	6.33E-05
4592	12317472	0.047942	2.74E+08	13776000	2.66E+08	4332.232	5.87E-05	0	180.1842	68728872	0.205146	4130.627	4014.126	4162.981	4084.995	3.33E-06	0.000182	9.24E-08	9.17E-08	0.002831	0.173131	4.62E-05	6.42E-05
4623	12390852	0.048265	2.73E+08	13869000	2.66E+08	4328.463	6.01E-05	0	185.777	68803080	0.205371	4126.84	4010.298	4159.202	4081.212	3.38E-06	0.000187	9.32E-08	9.30E-08	0.002869	0.177431	4.66E-05	6.51E-05
4653	12461824	0.048579	2.73E+08	13959000	2.66E+08	4324.805	6.16E-05	0	191.3175	68874856	0.205589	4123.171	4006.593	4155.542	4077.546	3.42E-06	0.000191	9.38E-08	9.41E-08	0.002906	0.181666	4.69E-05	6.59E-05
4684	12535226	0.048902	2.73E+08	14052000	2.66E+08	4321.036	6.31E-05	0	197.1821	68949096	0.205815	4119.383	4002.764	4151.761	4073.762	3.47E-06	0.000196	9.45E-08	9.55E-08	0.002946	0.186121	4.73E-05	6.68E-05
4714	12606214	0.049216	2.73E+08	14142000	2.66E+08	4317.379	6.45E-05	0	202.9903	69020888	0.206033	4115.715	3999.057	4148.102	4070.097	3.51E-06	0.0002	9.51E-08	9.67E-08	0.002984	0.190507	4.76E-05	6.77E-05
4745	12679630	0.049539	2.73E+08	14235000	2.66E+08	4313.611	6.61E-05	0	209.1365	69095144	0.206258	4111.927	3995.228	4144.321	4066.314	3.56E-06	0.000205	9.59E-08	9.80E-08	0.003026	0.19512	4.79E-05	6.86E-05
4776	12753041	0.049863	2.73E+08	14328000	2.66E+08	4309.841	6.77E-05	0	215.4295	69169392	0.206484	4108.14	3991.399	4140.542	4062.532	3.61E-06	0.00021	9.66E-08	9.94E-08	0.003071	0.199813	4.83E-05	6.96E-05
4804	12819227	0.050155	2.73E+08	14412000	2.66E+08	4306.411	6.91E-05	0	221.2352	69236344	0.206687	4104.707	3987.936	4137.122	4059.101	3.66E-06	0.000215	9.70E-08	1.00E-07	0.003108	0.20412	4.85E-05	7.02E-05
4835	12892687	0.050479	2.73E+08	14505000	2.66E+08	4302.648	7.07E-05	0	227.8149	69310640	0.206913	4100.915	3984.103	4133.337	4055.317	3.71E-06	0.00022	9.79E-08	1.02E-07	0.003156	0.208971	4.90E-05	7.14E-05
4865	12963714	0.050792	2.73E+08	14595000	2.65E+08	4298.993	7.24E-05	0	234.3269	69382480	0.207131	4097.244	3980.393	4129.675	4051.652	3.77E-06	0.000225	9.86E-08	1.03E-07	0.003202	0.213744	4.93E-05	7.23E-05
4896	13037163	0.051116	2.73E+08	14688000	2.65E+08	4295.226	7.40E-05	0	241.2132	69456768	0.207357	4093.456	3976.56	4125.894	4047.869	3.83E-06	0.00023	9.94E-08	1.05E-07	0.003252	0.218761	4.97E-05	7.33E-05
4926	13108192	0.051429	2.73E+08	14778000	2.65E+08	4291.569	7.57E-05	0	248.0268	69528624	0.207575	4089.786	3972.849	4122.234	4044.203	3.88E-06	0.000235	1.00E-07	1.06E-07	0.003301	0.223696	5.00E-05	7.42E-05

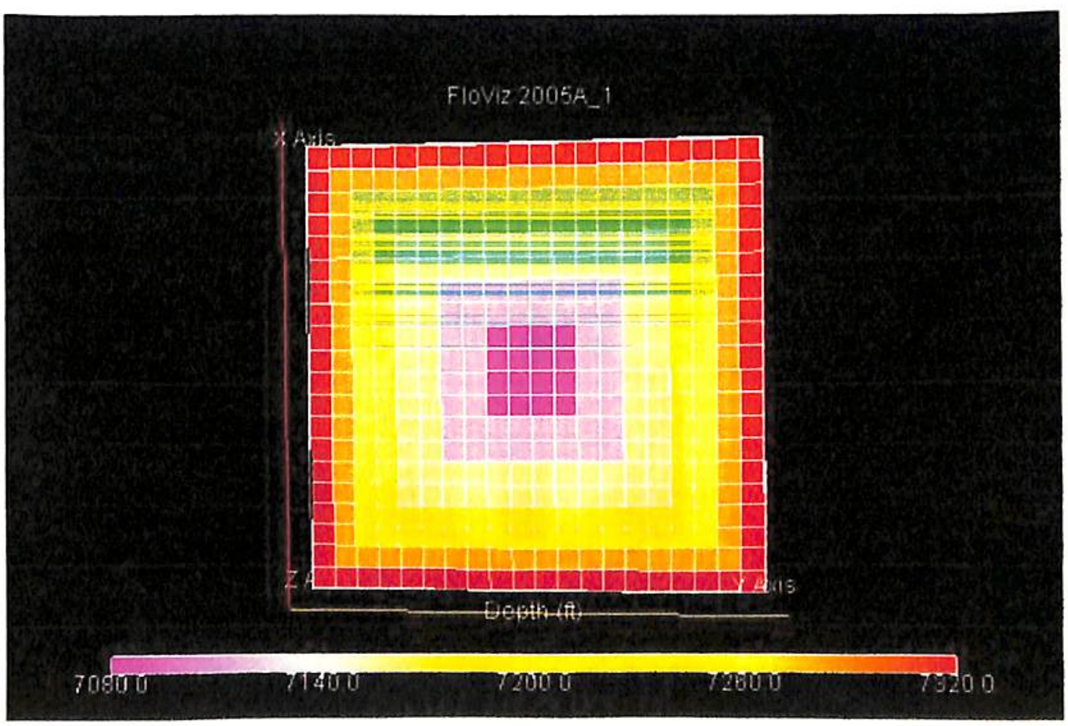
4957	13181648	0.051753	2.72E+08	14871000	2.65E+08	4287.801	7.74E-05	0	255.23	69602920	0.2078	4085.995	3969.015	4118.452	4040.419	3.95E-06	0.000241	1.01E-07	1.08E-07	0.003354	0.228881	5.04E-05	7.53E-05
4988	13255097	0.052076	2.72E+08	14964000	2.65E+08	4284.03	7.92E-05	0	262.5983	69677216	0.208026	4082.205	3965.181	4114.672	4036.635	4.01E-06	0.000246	1.01E-07	1.09E-07	0.00341	0.234153	5.07E-05	7.63E-05
5018	13326134	0.052389	2.72E+08	15054000	2.65E+08	4280.371	8.10E-05	0	269.8862	69749080	0.208244	4078.533	3961.468	4111.01	4032.968	4.07E-06	0.000252	1.02E-07	1.10E-07	0.003463	0.239338	5.10E-05	7.72E-05
5049	13399601	0.052713	2.72E+08	15147000	2.65E+08	4276.601	8.28E-05	0	277.5877	69823400	0.20847	4074.74	3957.632	4107.228	4029.183	4.14E-06	0.000258	1.03E-07	1.12E-07	0.003521	0.244784	5.14E-05	7.83E-05
5079	13470651	0.053026	2.72E+08	15237000	2.65E+08	4272.943	8.46E-05	0	285.2031	69895280	0.208689	4071.065	3953.919	4103.565	4025.516	4.21E-06	0.000263	1.03E-07	1.13E-07	0.003578	0.250139	5.17E-05	7.93E-05
5110	13544130	0.05335	2.72E+08	15330000	2.65E+08	4269.173	8.65E-05	0	293.2488	69969608	0.208914	4067.271	3950.082	4099.781	4021.731	4.28E-06	0.000269	1.04E-07	1.15E-07	0.003641	0.255762	5.21E-05	8.04E-05

Appendix B

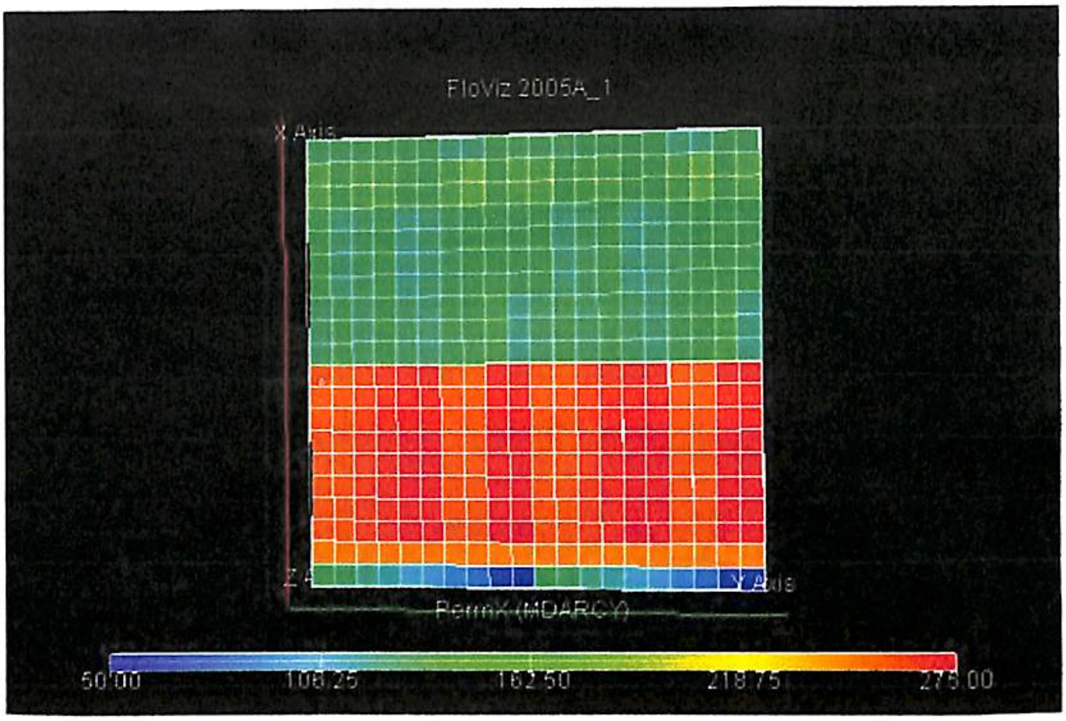
B1



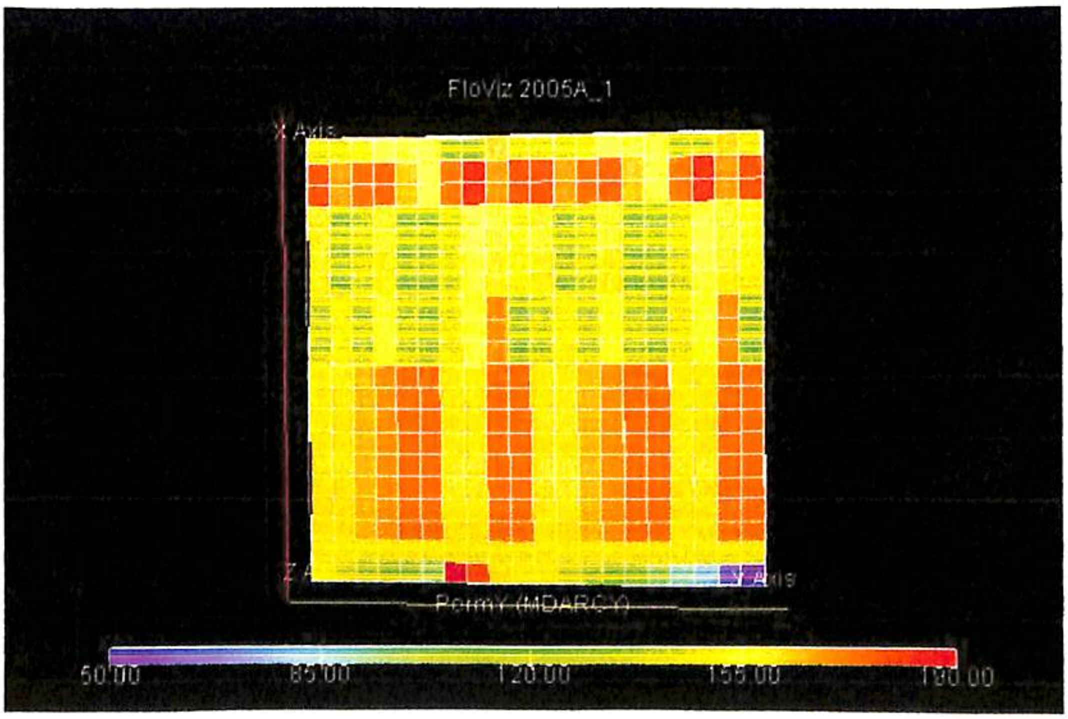
B2



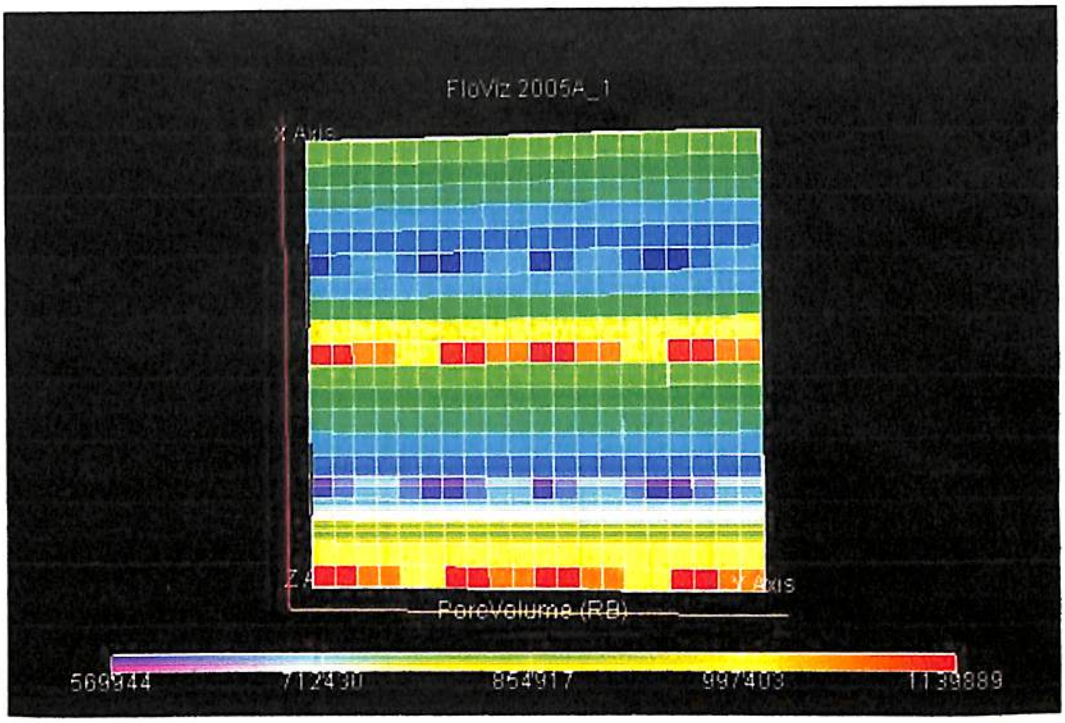
B3


FloViz 2005A_1
X Axis
Y Axis
PermX (MDARCY)
50.00
106.25
162.50
218.75
275.00

B4


FloViz 2005A_1
X Axis
PermY (MDARCY)
50.00
85.00
120.00
155.00
190.00

B5


FloViz 2005A_1
X Axis
Z A
Y Axis
PoreVolume (RB)
569944
712430
854917
997403
1139889

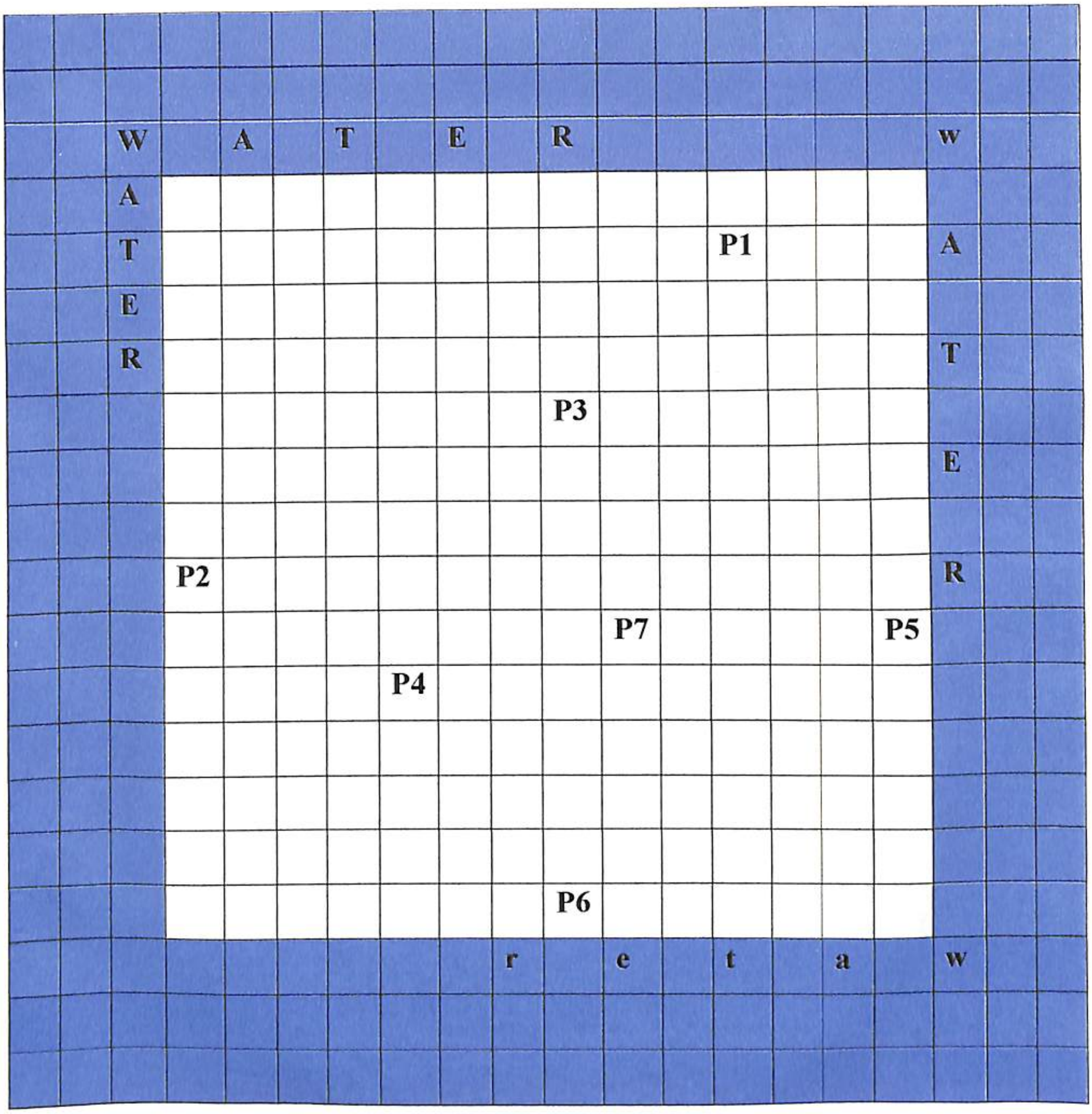


Fig: A Production scheme 1

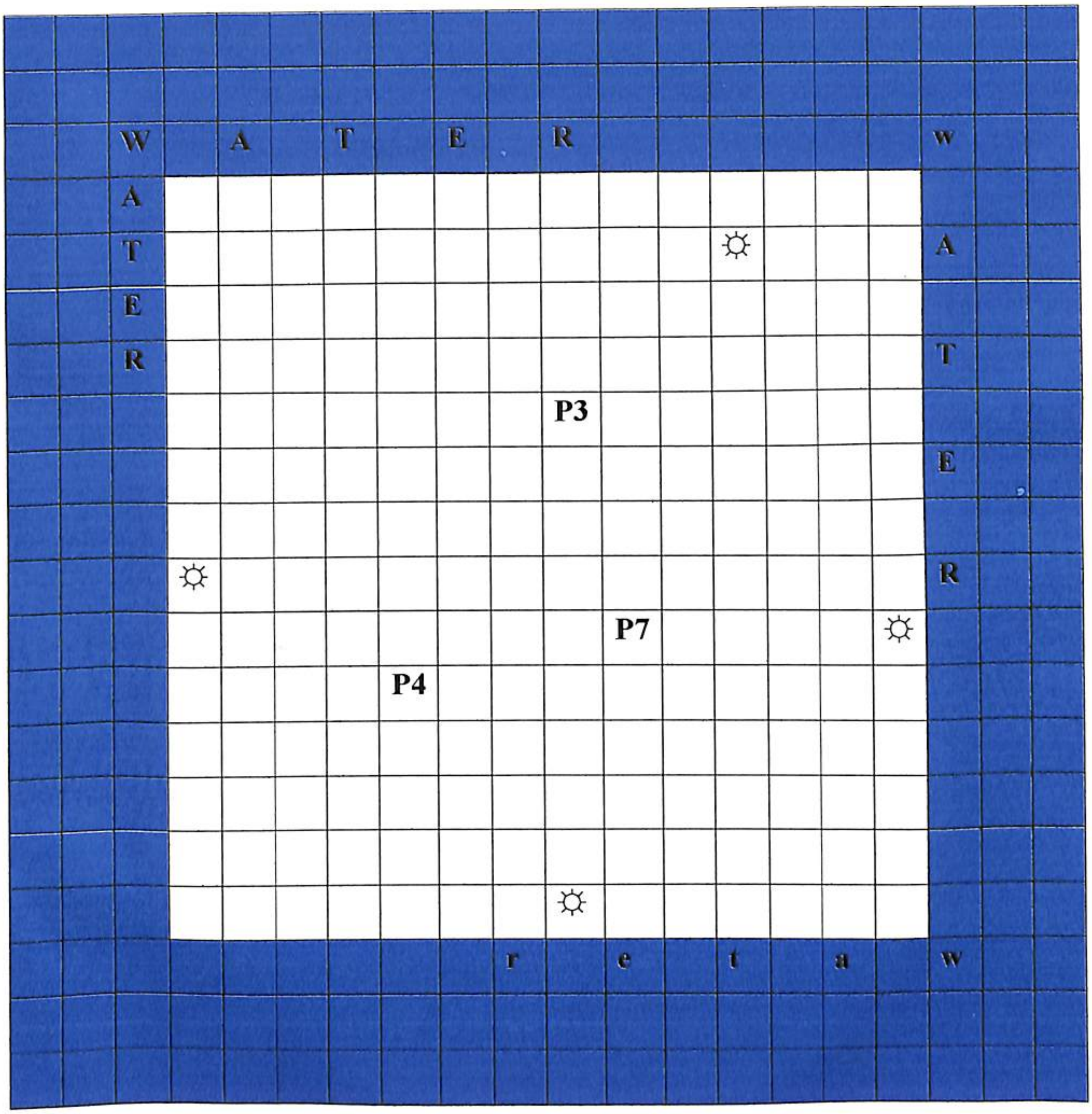


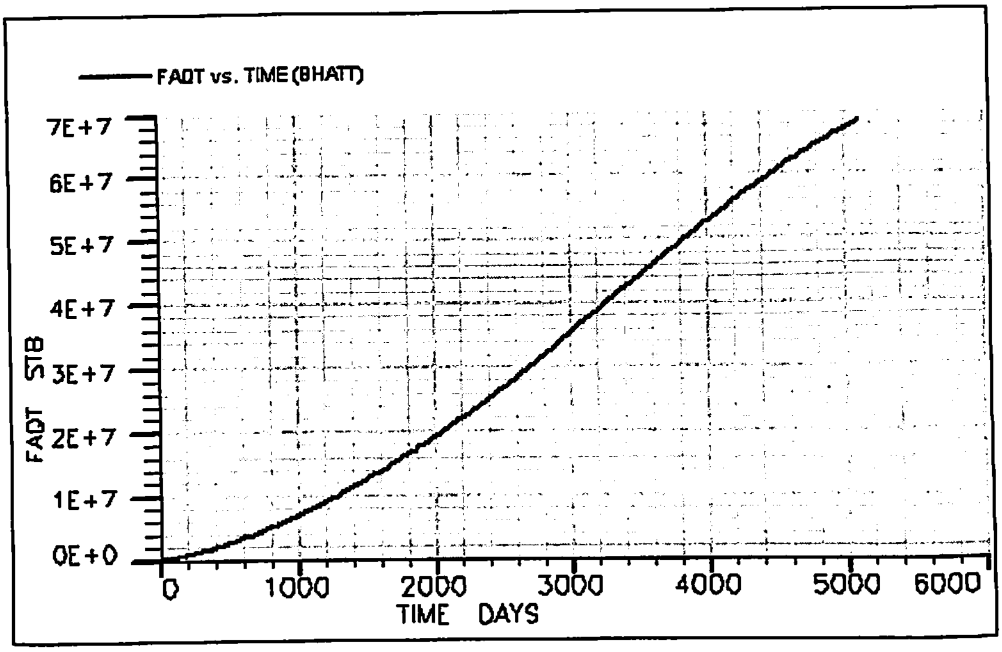
Fig. B Production Scheme2

☼ denotes a shut in well

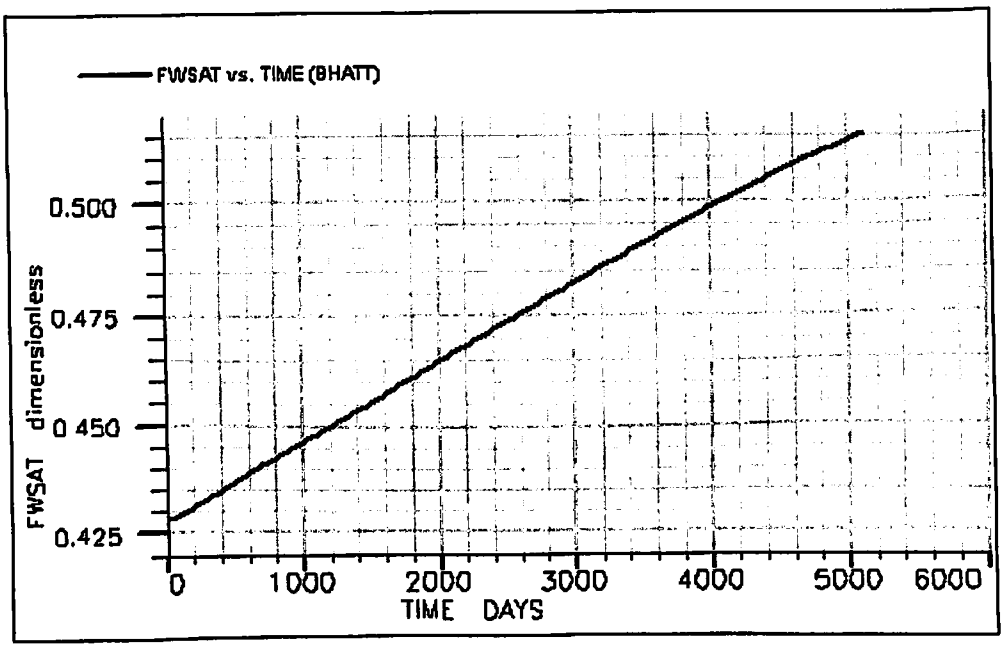
APPENDIX C

Graphs for case1

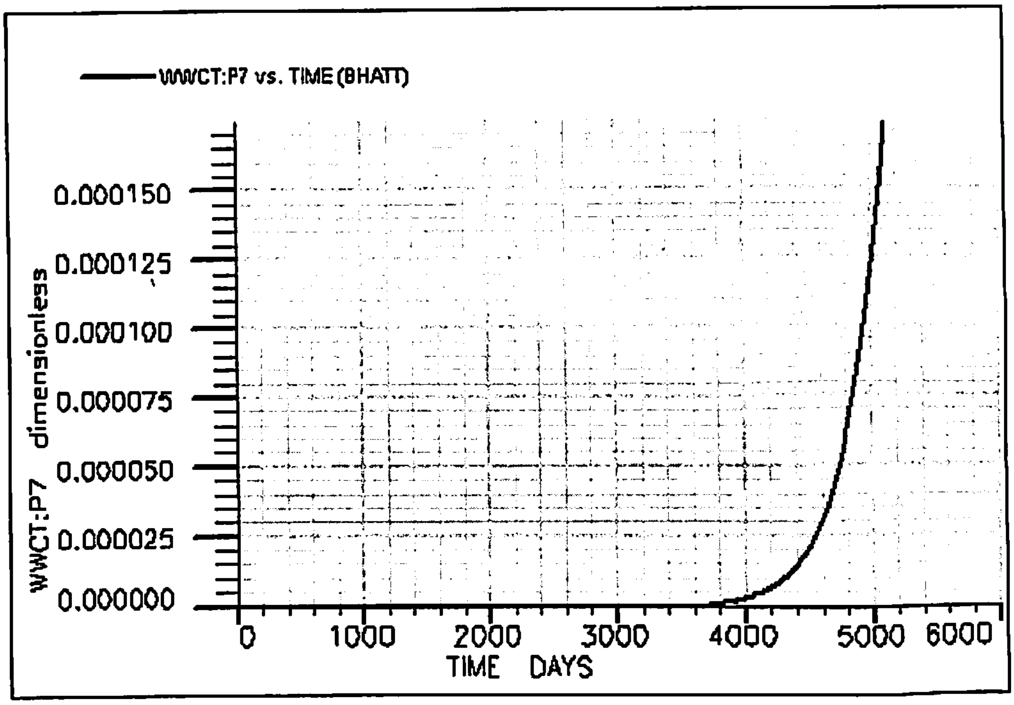
1. Cumulative Aquifer influx: c1.1



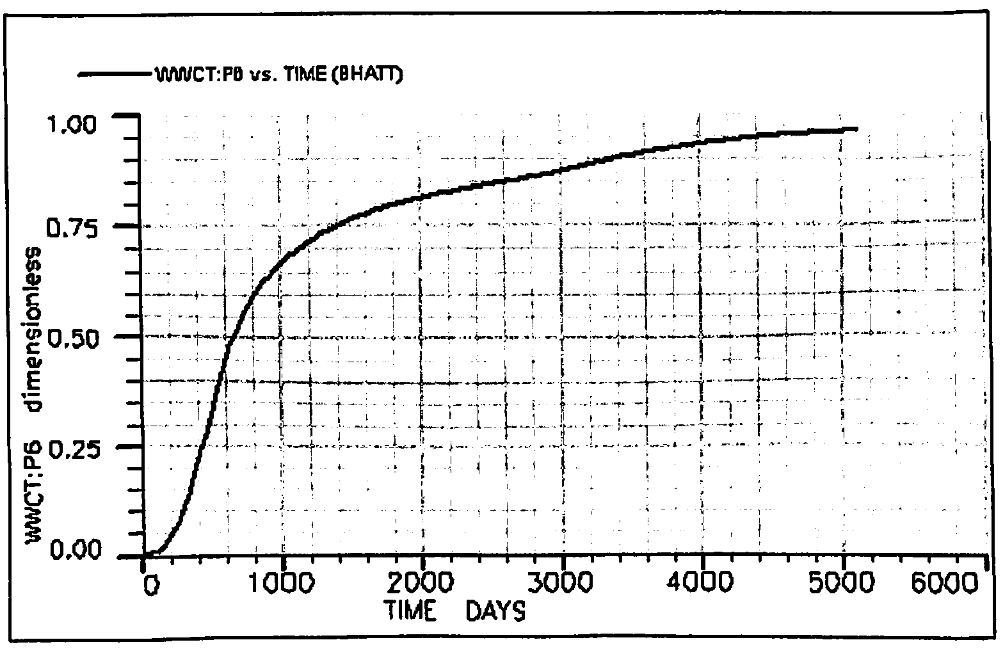
2. Field water saturation: **c1.2**



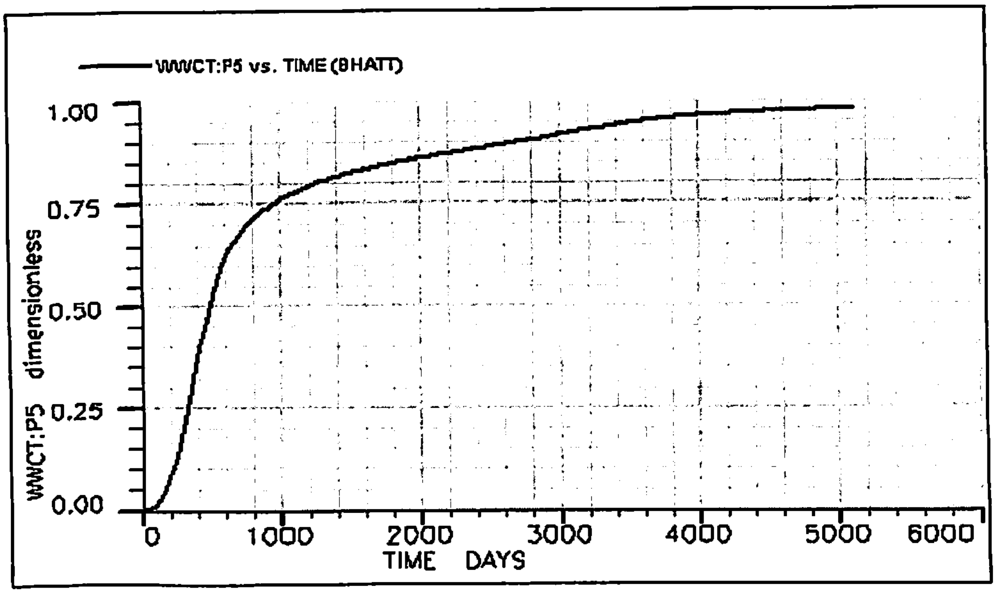
3. Water cut for well P7: c1.3



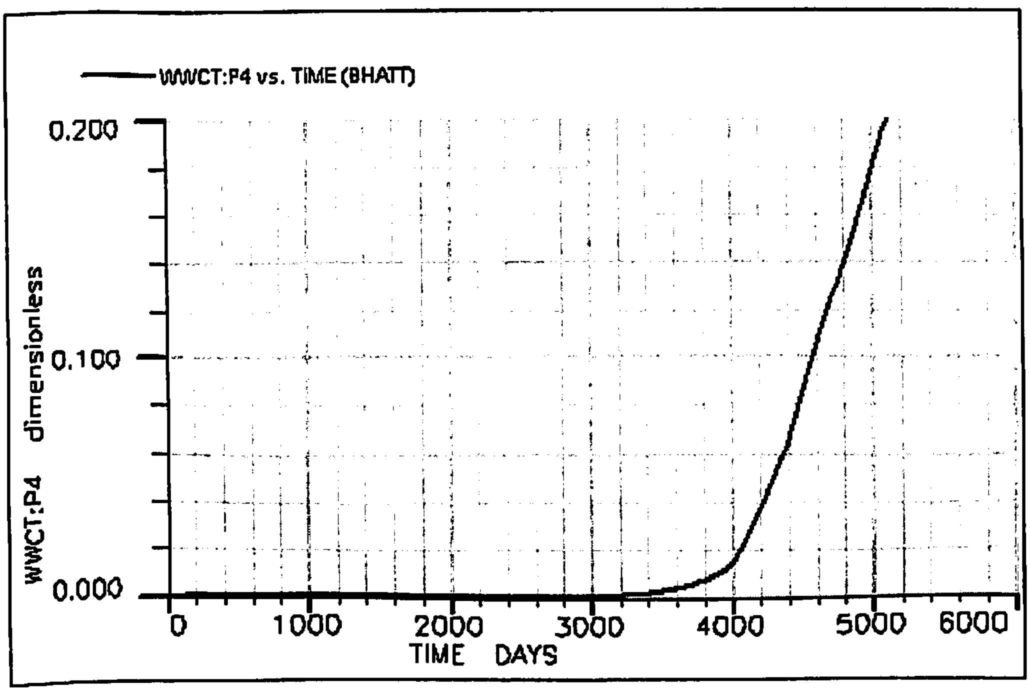
4. Water cut for well P6: c1.4



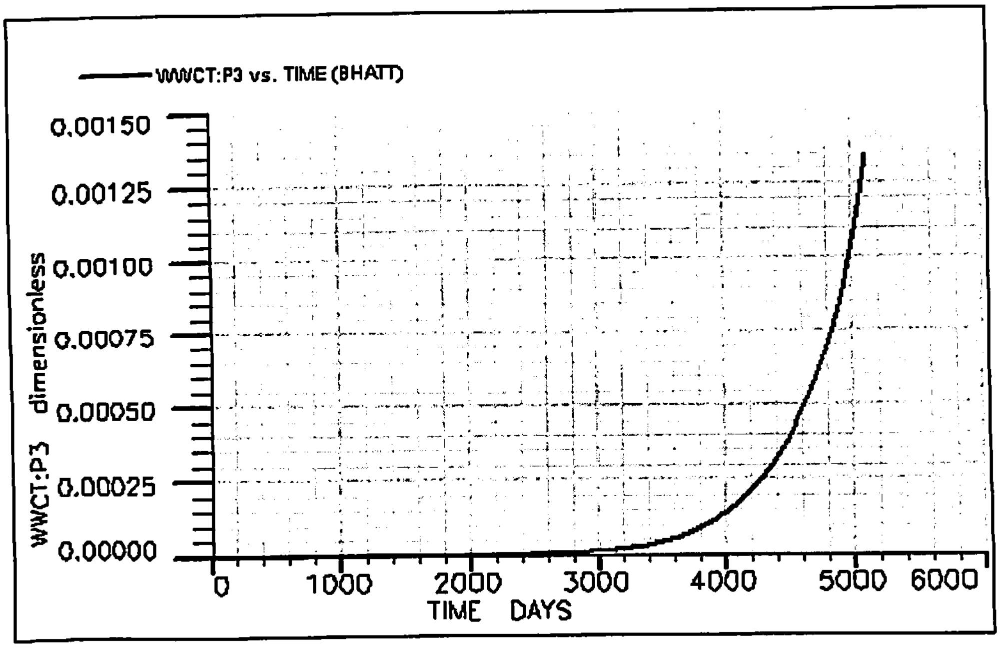
5. Water cut for well P5: c1.5



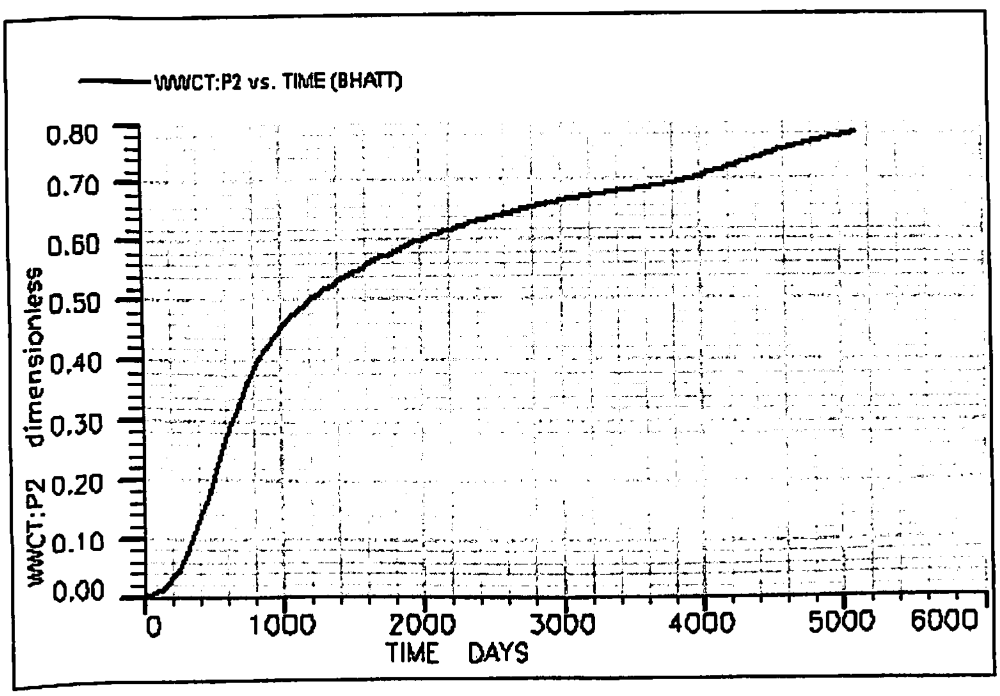
6. Water cut for well P4: c1.6



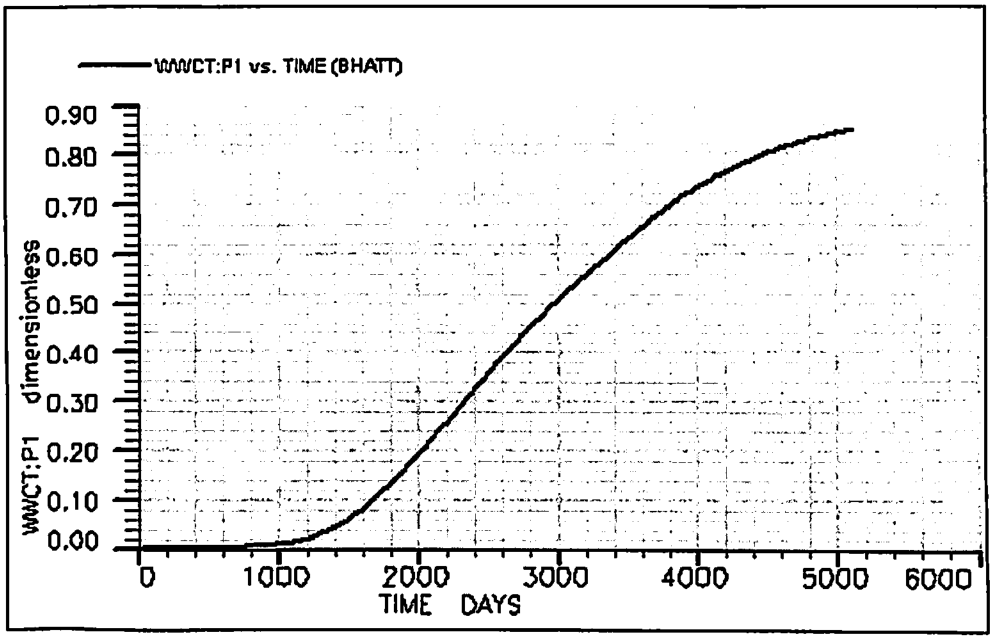
7. Water cut for well P3: c1.7



8 water cut for well P2: c1.8

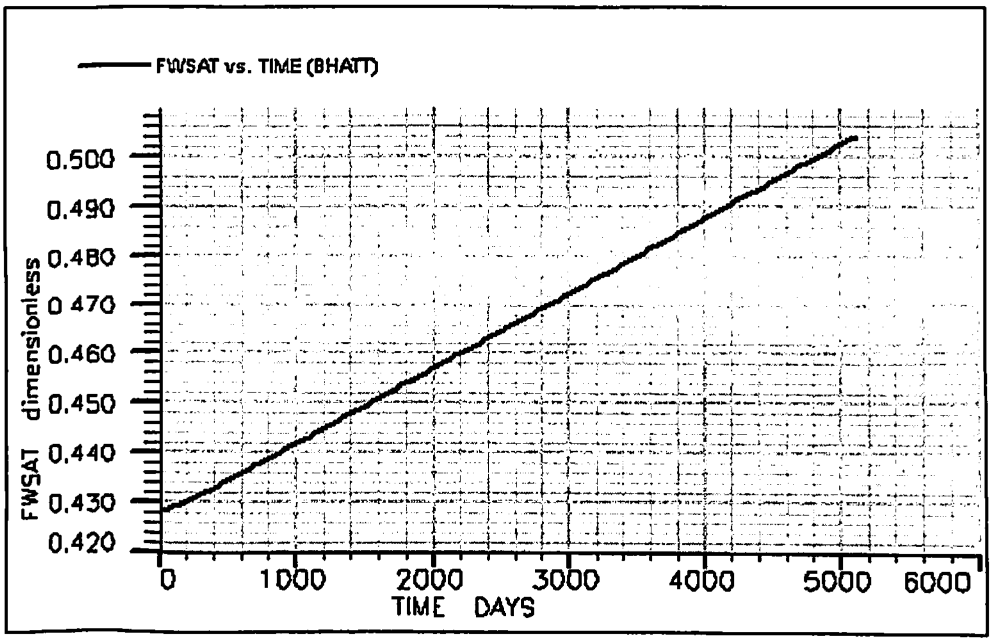


9 Water cut for well P1: c1.9

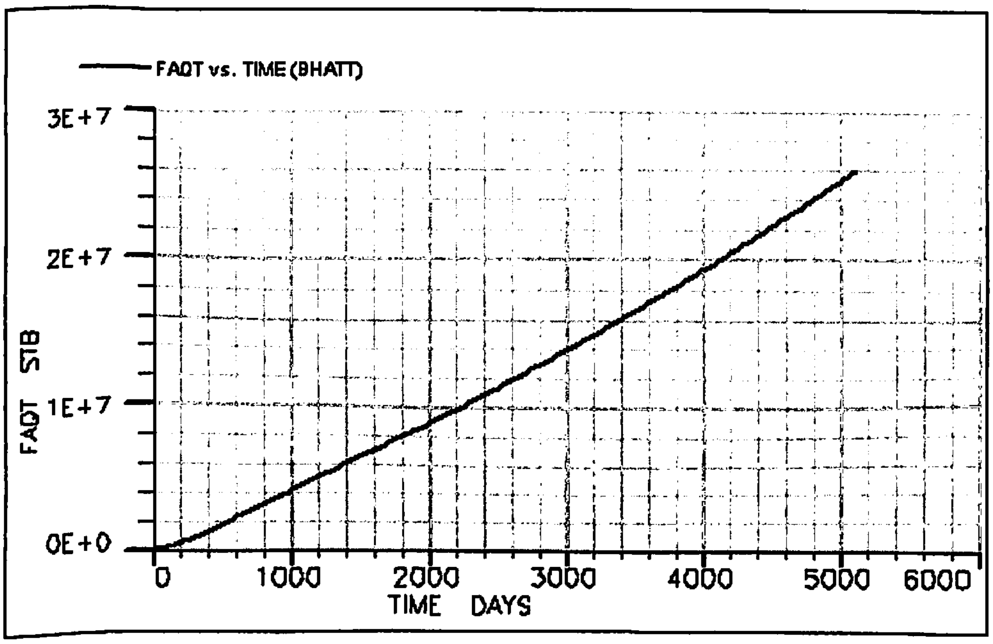


Graphs For Case2

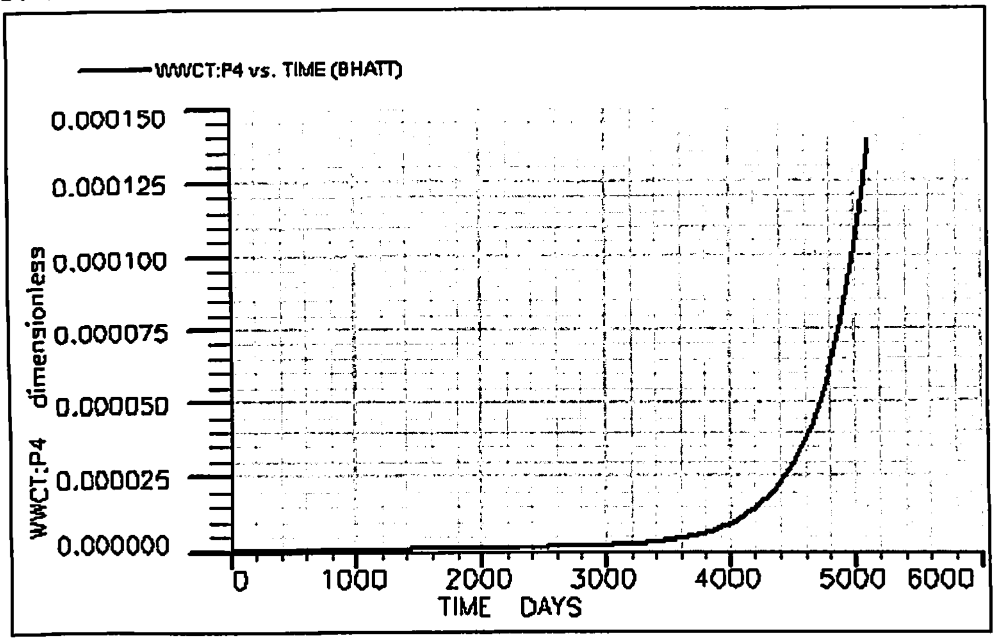
1. Field Water Saturation: c2.1



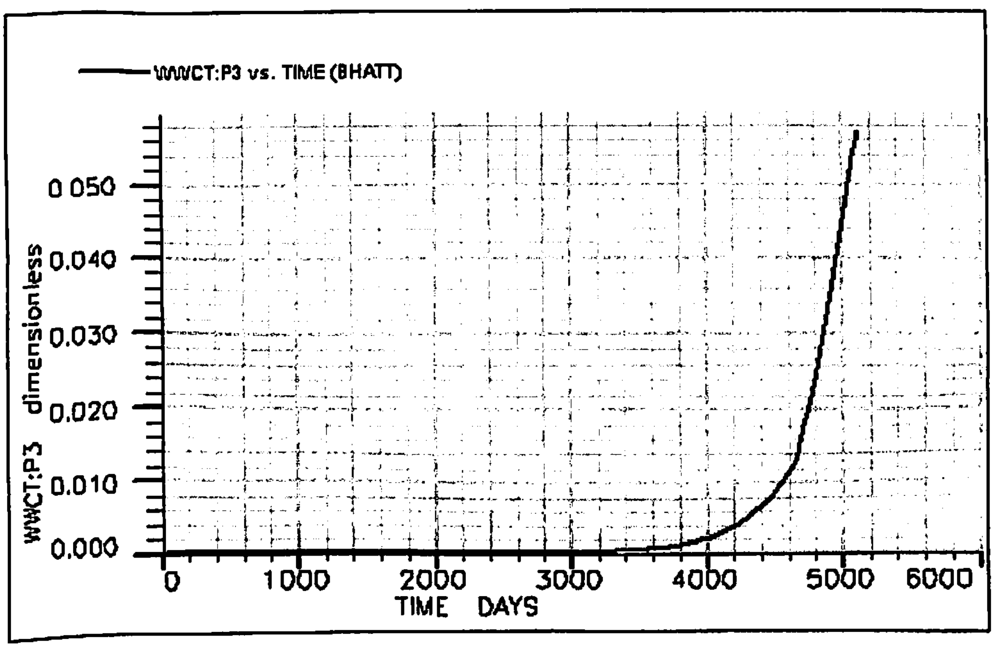
2. Cumulative Water Influx: c2.2



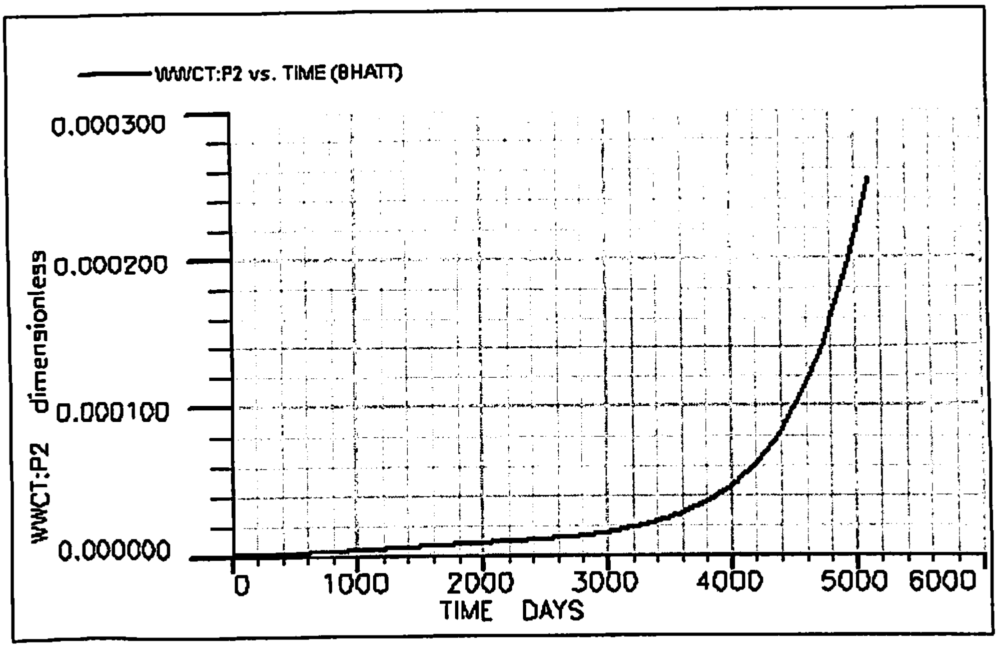
3. Water cut for well P4: c2.3



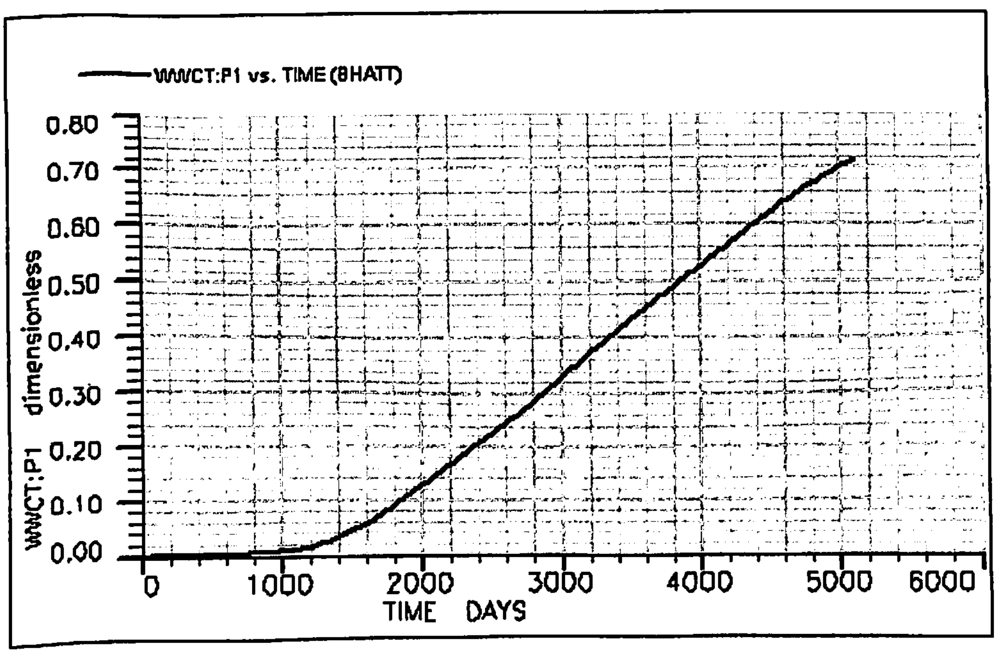
4. Water cut for well P3: c2.4



5. Water cut for well P2: c2.5



6. Water cut for well P1: c2.6



Appendix D

This data CD contains all the files required to do the simulation study, as was performed by us it also contains all the output results of both the cases and the self generated files.