Evaluation of Reformer Tubes Degradation after Long Term Operation

By

Nurul Aimi Binti Saari
13656

Dissertation submitted in partial fulfilment of
the requirements for the
Bachelor of Engineering (Hons)
(Mechanical)
FYP II MAY 2014

Universiti Teknologi PETRONAS
Bandar Seri Iskandar
31750 Tronoh
Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

Evaluation of Reformer Tubes Degradation after Long Term Operation

by

Nurul Aimi Binti Saari

13656

A project dissertation submitted to the

Mechanical Engineering Programme

Universiti Teknologi PETRONAS

in partial fulfilment of the requirement for the

BACHELOR OF ENGINEERING (Hons)

(MECHANICAL)

Approved by,

____

(DR. MASDI BIN MUHAMMAD)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

May 2014

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

____

(NURUL AIMI BINTI SAARI)

ABSTRACT

Since the estimation of remnant life by deterministic methods is expensive and time consuming, in this study the remnant life is evaluated using structural reliability analysis and distribution analysis. The remnant life of the reformer tubes was studied by using the creep lifetime model and Monte Carlo Simulation, based on available data provided through non-destructive in site tests which is Laser-Optic Tube Inspection System (LOTIS) and the MANTIS technology consists of combined Eddy Current (ET) and Creep Stain measurement methodologies. The criterion which was used to evaluate the remnant life of the tubes is the service life, wall thickness measurements and minimum wall thickness. Then, the probabilistic variables related to parametric mentioned is gathered and modelled using the probabilistic distribution functions and their adoptable distribution functions were distinguished through simulation develop in Microsoft Excel spreadsheet.

ACKNOWLEDGEMENT

Author are deeply indebted to the people who provided advice and help throughout the study. Their generous support and efforts enables this study to complete. In particular Dr Masdi and Dr Ainul, who continuously supervise and provided assistance and insights. Through their couching and constructive suggestions, the author was able to complete the study without problems and on time.

The author would also like to extend gratitude to Universiti Teknologi Petronas that provide financial support for this study and to the people who have contributed to the present study or helped to review the report.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS AND NOMENCLATURES

Abbreviations and Nomenclature	Full Meaning
ET	Eddy current
LOTIS	Laser-Optic Tube Inspection System
GLOSS	Generalized Local Stress Strain
LDA	Life Data Analysis
API	American Petroleum Institute
TTF	Time to failure
K-S	Kolmogrov-Smirnov test
Grade HK (25 Cr, 20 Ni, and 0.4 C)	Chromium-Nickel-Iron Alloy
Grade HP (26 Cr, 35 Ni, and 0.4 C)	Nickel-Chromium-Iron Alloy

CHAPTER 1

INTRODUCTION

1.1. Background

In petrochemical industry, reformer furnaces are widely used and are subjected to extreme operation conditions. The tubes carries a mixture of hydrocarbon and steam at 980 kPa to 3500 kPa and is heated at the temperature of 500°C or above with the presence of a catalyst. The reaction is to produce a hydrogen gas at a temperature ranging from 850-900°C. According to American Petroleum Institute (API) Recommended Practice 5301, reformer tubes are designed to achieve a nominal life of 100,000 h (11.4 years) [1]. Nevertheless, depending on the operation conditions and the tubes material, the service life could be in the range from 30,000 to 150,000h. In order to meet the severe operating conditions of the tubes, generally the reformer tube is fabricated using centrifugally cast creep-resistant high carbon austenitic steel of ASTM A297 Grade HK (25 Cr, 20 Ni, and 0.4 C) or Grade HP (26 Cr, 35 Ni, and 0.4 C). Besides that, heat resistant alloys with a composition derived from HP grade can also be used in some cases for other high temperature.

It was found that primarily, the damage mechanism that leads to the tube failures under long term service is creep. In the early stage of service, the material may subject to carbon precipitations that cause embrittlement and reduction in strength or others. However, further degradation of the material under high temperature may lead to creep activities [2] [3] [4]. Similarly, I. Le May, T. L. da Silveirab and C.H. Viannac the authors for journal on Criteria for the Evaluation of Damage and Remaining Life in Reformer Furnace Tubes also points creep as the primarily damage mechanism for reformer furnace tube [4].

1.2.Problem Statement

Catalytic tubes are important parts of reformer units at ammonia, methanol, hydrogen and gas process plants. They are the most expensive parts of reformer equipment. A steam reforming process converts hydrocarbons into mixture of hydrogen, carbon monoxide and dioxide. Chemical reactions proceed at a temperature range of 800-900°C and under pressure of 3-4 MPa. These severe working conditions cause a structural damage of tubes. Therefore, effective analysis on degradation indicator and remnant life of the tubes should be determine for future maintenance strategies before unexpected failure of the reformer tubes can cost unplanned downtime of the plant process and asset management.

1.3.Objectives

The objective of this study is to evaluate reformer tubes degradation after long term operation in twofold: (a) to evaluate the degradation of the tubes with respect to time of service and (b) to estimate the remnant life of the reformer tubes system for a given operating condition.

1.4.Scope Of Study

This study will utilize quantitative data collection tools from non-destructive in site tests which is Laser-Optic Tube Inspection System (LOTIS) and the MANTIS technology consists of combined Eddy Current (ET) that will evaluate the degradation mechanism through degradation analysis and Monte Carlo Simulation using macro in Microsoft Excel for the reformer tubes system remaining life. The limitations of this study would be that this study is the simulation of the life prediction through algorithms which can only partially indicates the asset health states.

CHAPTER 2

LITERATURE REVIEW

Degradation

In Reliability and risk: a Bayesian perspective, Singpurwalla stated that degradation is the accumulation of plastic damage throughout the service life which eventually led to failure wherein damage is regarded as aging of material. Through literature review, aging which relates to a unit is view in a state space whereas the probabilities of failure are greater than in a prior position [2]. With regards to the statement, degradation cannot be observed and assess directly therefore degradation model is established to relates the observable degradation indicators with the mathematical model on the degradation phenomenon. There are 3 types of degradation model that are commonly used, which are threshold crossing models, hazard rate process and state space models. Threshold crossing models is representing by degradation process in an indicator versus the time when it crosses a failure threshold. Secondly, degradation model modelled by failure time which built upon a hazard rate process. The third type, relates the relationship between the degradation process with degradation indicators by using a state and an observation equation.

Degradation mechanism

In degradation mechanism field of study, there are many mechanism that happens due to exposure to high temperature condition. Referring to API571 the relevant degradation mechanism that could relates to the severe operating condition imposed on the reformer catalytic tubes are Thermal shock, Creep and Stress rupture, Oxidation, Carburization and Hydrogen Embrittlement [1]. Creep affects all metals and alloys that operate at high temperatures and experiencing slow and continuous deformation under load which is below the yield stress. This time dependent deformation is a function of temperature, load and material. Generally creep deformation can be found in process with high temperature operating conditions above the creep range such as hydrogen reforming furnace tubes, hot-wall catalytic reforming reactors and furnace tube. In the presence of oxygen in the surrounding air at high temperature, oxidation can took place when the oxygen reacts with the alloys and carbon steel to form metal oxide. Depending on composition and temperature, all iron based materials and nickel base alloys can be suspected of oxidation to varying degree. However, depending on the chromium content of the material, high chromium levels create a more protective oxide scale. Piping, equipment and combustion equipment that operate at high temperature exceeding 1000°F (538°C) will expose to oxidation. Carburization happens when a material is in contact with a carburizing environment or carbonaceous material at temperature that is high enough for diffusion of carbon into metal which around 1000°F (538°C). Materials that can be affected by this degradation mechanism are carbon steel, cast stainless steel, low alloy steels, nickel base alloys and HK/HP alloys. This degradation mechanism can results in loss of ambient temperature mechanical properties and loss of high temperature creep ductility. Penetration of hydrogen into carbon steel, low alloy steels and high strength nickel base alloys can results in a loss of ductility of high strength steels.

Remaining life assessment for reformer tubes

There are several Nondestructive Examination that have been introduced to detect degradation mechanism in reformer tube especially due to creep damage such as Eddy Current, profilometry, and thermography. Seeing that the creep initiates at the grain scale, it cannot be evaluate straight forwardly. In Verification of Inspection Method Used to Predict Premature Failure of Primary Reformer Tubes, by Mahlangu, there were more than 300 tubes were inspected using Eddy current (ET) to estimate creep damage which provides results on the outer and inner diameter of the tube wall [3]. Mahlangu then further examined the tubes through metallographic approaches to further verify the findings before coming up with the nature and extent of the damage.

Other than that, analytical approaches have also been developed in assessing the reformer tubes life which as the procedure described in API Std 530 Calculation of Heater Tube Thickness in Petroleum Refineries [1], models and algorithm [5], robust method using Generalized Local Stress Strain (GLOSS) [6]or computational method [7].

Nowadays, probabilistic estimation of the remnant life of reformer tubes is one of the approaches that have been extensively used in this area by the engineers and researchers. Monte Carlo simulation is one of the applications which have been used excessively in engineering applications for its ability to model a complex system using less complicated approach where it involves non complex mathematical analysis and the input algorithms that are easy to understand. Monte Carlo simulation works by analysing and evaluating the logical model of the system repeatedly using different values of the distributed parameter for each run. This approach can be used in modelling a system reliability and availability using suitable computer program. Before running Monte Carlo simulation random variables that follow an arbitrary statistical distribution need to be generated, which for each input a distribution is assigned to represents the current state of the system. Reliability statistical distribution can be divided into point processes, discrete functions (Poisson distribution and Binomial Distribution) and continuous functions (Lognormal, Exponential, Gamma, Weibull, Extreme value and Normal or Gaussian distribution) as well as two additional important statistical distribution which is uniform distribution and triangular distribution which typically are not used to model failures but frequently used in engineering approximations and basic random number generations in Monte Carlo approach. Discrete function may describe situation concerned two-state discrete system such as either an equipment is in operational or a failed state whereas continuous functions is used to expressed continuous variables situation such as time or distance travelled. On the contrary, statistics of point functions is used for repairable systems, when there is more than one failure to occur in a continuous period. Generally, the choice of method will depend upon the available type of data and problem type. [8]

CHAPTER 3

METHODOLOGY

This study will utilize quantitative data collection tools that will evaluate the degradation mechanism for the reformer tubes after long term operation. This research methodology requires compilation of relevant data from journals, articles and specified documents in order to analyse and arrive at a more depth understanding of the degradation mechanism involved in reformer tube before a degradation model can be develop for different types of reformer tubes material and operating condition as the study basis. From this randomness degradation mechanism, further evaluation on the degradation of the tubes with respect to time of service and to estimation of the remnant life of the tubes for a given operating condition can be analyse according to the degradation model.

In developing the degradation model the studies from literature on the random variables of service life are listed and characteristic curve will be plot for each reformer tube. The characteristic curve will illustrate the relation of the wall thickness of the tube against time and the minimum thickness that have been specified. From the findings, each of the tube condition will be recorded and illustrate in order to observe the extent of degradation condition for different positions along the tube. Finally, this study will attempt probabilistic approached to modelling on estimating remnant life of the reformer tubes. Using the available data and random variables of service life, the remnant life of the reformer tube will be determined. The summarization on this study methodology is as presented in *figure1*.

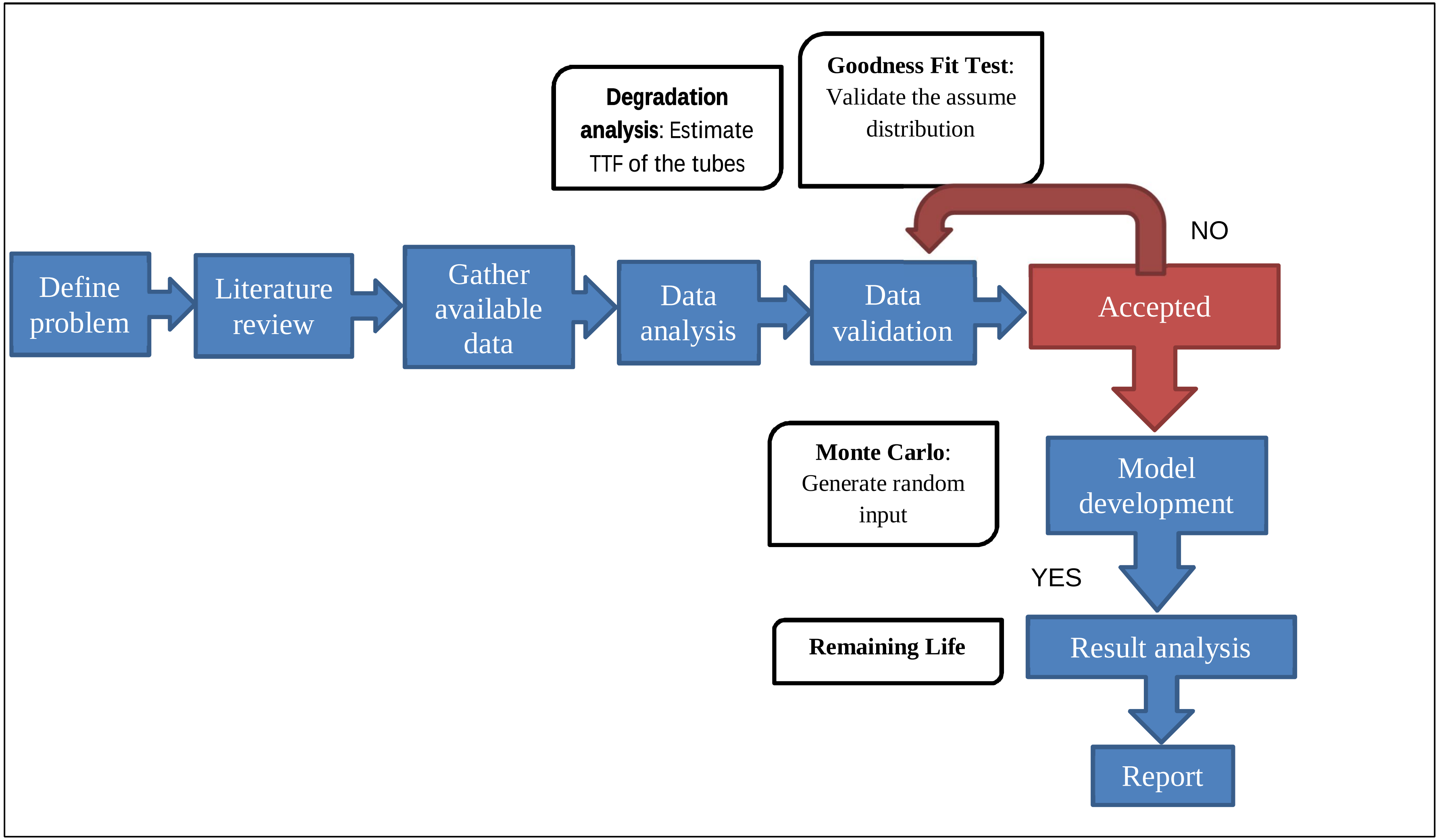


Figure 1 Methodology flow chart

1. **Gather available data**

Generally premature creep failures in reformer tubes are associated with significant tube wall thinning, e.g. 30% or more. This thinning phenomenon primarily results from excess oxidation due to high temperature exposure, however for certain cases, foreign species in the fluid may cause increased rates of fire-side corrosion at design temperatures. For this study the available data given are the tubes failure threshold at 4.03 inch minimum inner diameter of the reformer tubes as well as general information on the reformer and tubing. From the given data, the remnant life of the tubes system is to be calculated. This study used the relation between minimum wall thickness permitted, rate of wall thinning, life fraction range and the service life of a tube to calculate the remaining life of reformer tubes system.

2. **Data Analysis**

Components testing approach requires long term procedure and under normal operating condition failure may occur after long time, therefore degradation analysis is used to allows the data to be extrapolate at the point of failure based on degradations measured over time. At the point of failure the failure times is identified, and life data analysis can be conducted to analyse the demonstrate failures. *Figure 2* below demonstrates the form of degradation analysis.

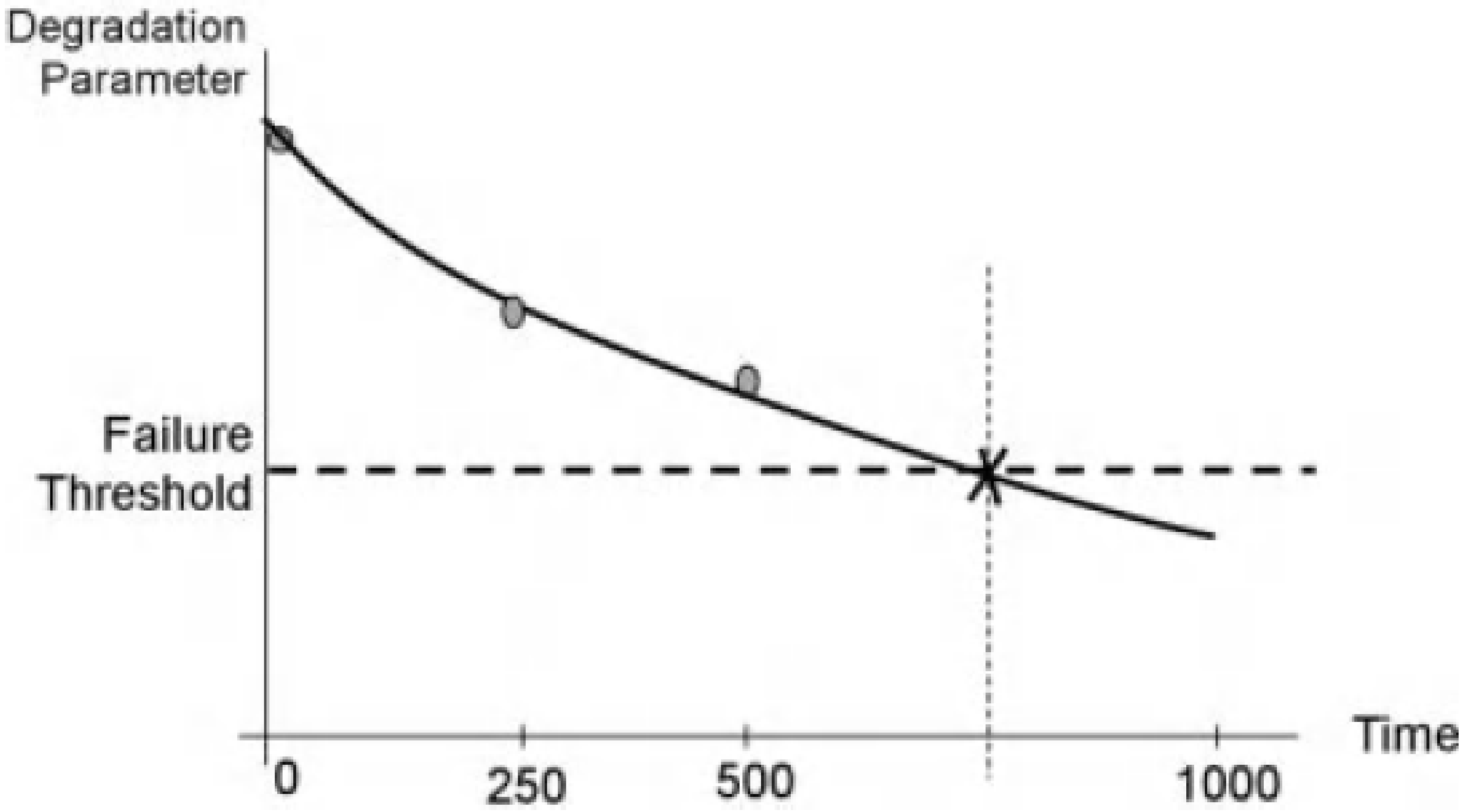


Figure 2 Degradation analysis diagram

3. Data Validation

It is vital to recognize the type of distribution functions of the variables which are concerned within the system, hence goodness-of-fit test which is Kolmogrov-Smirnov test is use to analyse the results statistics. First, the ranked failure data will be tabulate and the values of $|x_i - E_i|$ will be calculated where x_i is the i_{th} cumulative rank value and E_i the expected cumulative rank value for the assumed distribution. Next, the highest single value is determined and lastly this value will be compare with the appropriate K–S value (Appendix 1).

4. Model development: Monte Carlo Simulations

Figure 3 show the Monte Carlo simulation procedure which after identifying the best system data distribution, random inputs is entered into simple mathematical equation in order to generate random outputs in the forms of probability distribution which the sample is simulated into actual population using the best describe distribution of the sample state vice versa it can simulate sample numbers randomly for any probability distribution for given cumulative distribution function which is called inverse statistical function shown in *figure 4.*

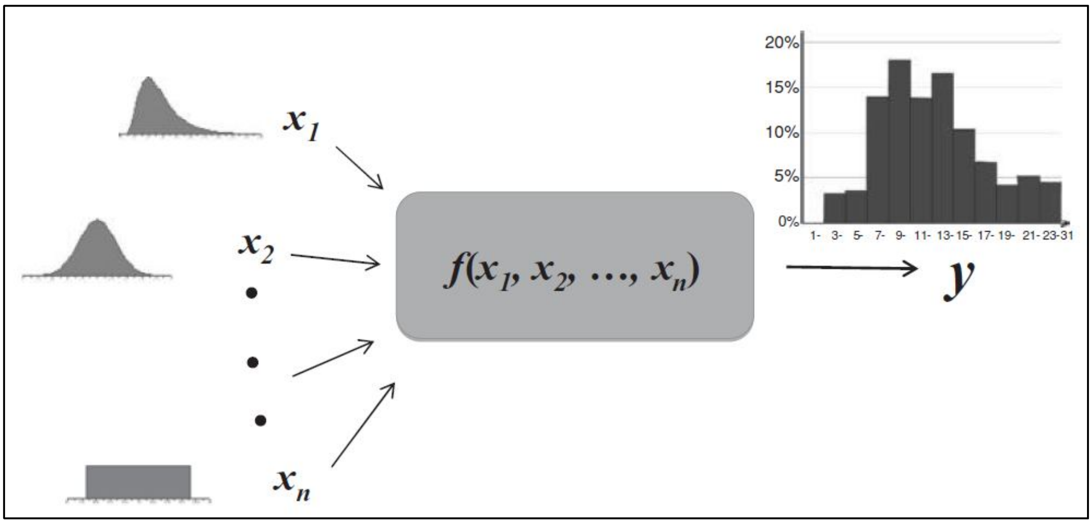


Figure 3 Monte Carlo simulation procedure

Distribution	cdf	Excel Function
Uniform	$F(x) = \begin{cases} \frac{x-a}{(b-a)} & a \le x \le b \\ 0 & \text{otherwise} \end{cases}$	=(b−a)*RAND()
Triangular (Symmetrical)	$F(x) = \begin{cases} 2\left(\frac{x-a}{b-a}\right)^2 & \text{for } a \le x \le \frac{a+b}{2} \\ 1-2\left(\frac{b-x}{b-a}\right)^2 & \text{for } \frac{a+b}{2} \le x \le b \end{cases}$	=a+(b−a)*(RAND()+RAND())/2
Normal	$F(x) = \Phi\left(\frac{x-\mu}{\sigma}\right)$	=NORMINV(RAND(), μ, σ)
Lognormal	$F(x) = \Phi\left(\frac{\ln x-\mu}{\sigma}\right)$	=LOGINV(RAND(), μ, σ)
Weibull (2 Parameter)	$F(x) = 1-e^{-\left(\frac{x}{\eta}\right)^{\beta}}$	=(η(-LN(RAND()))^(1/β))
Weibull (3 Parameter)	$F(x) = 1-e^{-\left(\frac{x-\gamma}{\eta}\right)^{\beta}}$	=(η(-LN(RAND()))^(1/β))+γ
Extreme Value (Minimum)	$F(x) = 1-\exp\left\{-\exp\left[\frac{1}{\sigma}(x-\mu)\right]\right\}$	=μ+σ*LN(LN(1/RAND()))
Extreme Value (Maximum)	$F(x) = \exp\left\{-\exp\left[-\frac{1}{\sigma}(x-\mu)\right]\right\}$	=μ−σ*LN(LN(1/RAND()))

Figure 4 Statistical distributions sampling using Microsoft Excel

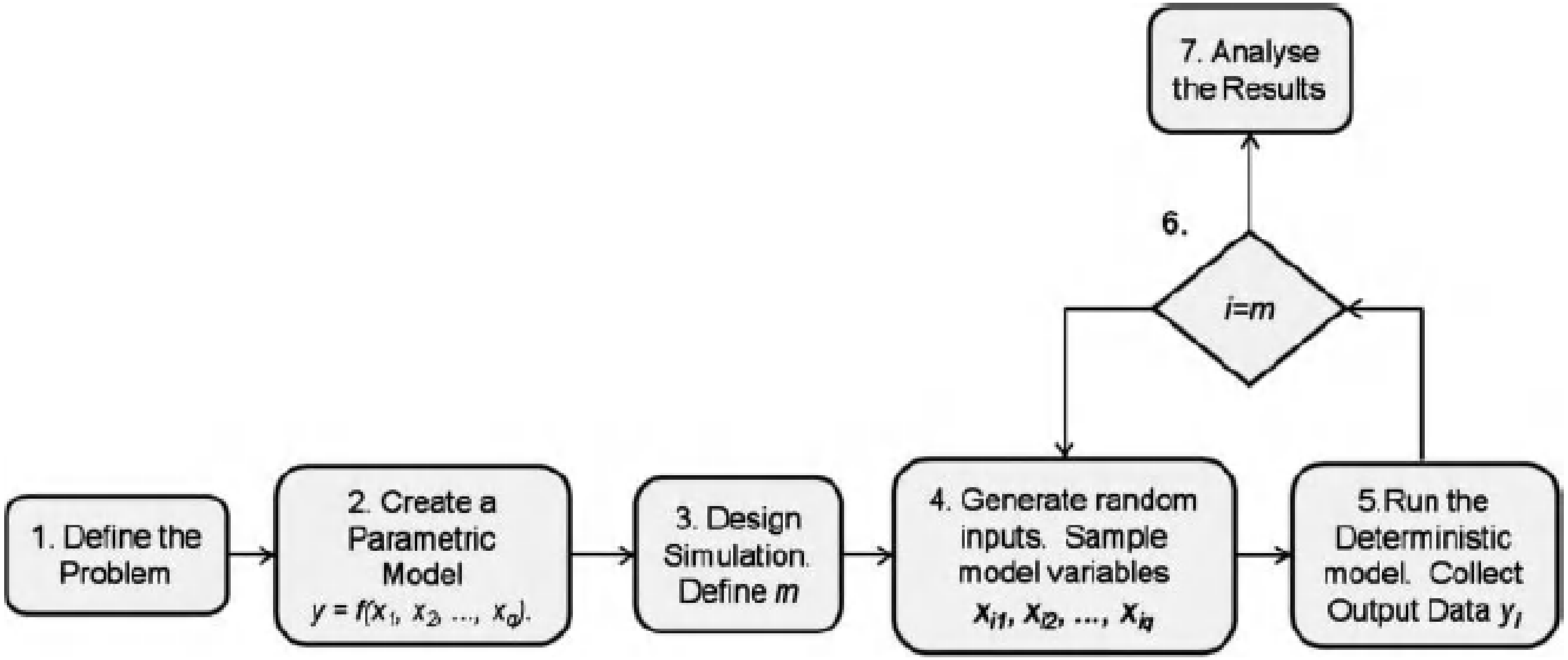


Figure 5 Monte Carlo simulation process

5. Define the system and create a parametric model [9]

Assuming the tubes are homogenous, life data analysis can be perform using results from degradation analysis as the relations of service life, wall thickness measurements and minimum wall thickness permits estimations of time to failure for the tubes. The parametric model of the evaluation would be time to failure of the tubes which the limit state function is represented by a set of random variables described by the distribution type and other parameters such as mean and standard deviation.

Ellis et al. stated that the life fraction range is established to correlate with damage classification model by Cane et al. which proposed relation between numbers of fraction of cavitated boundaries with life fraction consumed using heat specific constant for a constrained-cavity-growth model. [10] Through metallographic observations, Wedel-Neuber damage rating class is prove to be possible in relating the expended life fraction of material to the creep cavitation evolution and quantitatively examined through stochastic approach. The results of mean value and standard error of damage rating obtained from the stochastic analysis is summarized as in *table 1* [11]

Table 1 Dispersion in Wdel-Neubauer Classification of Damage Ratings

DAMAGE RATING	EXPENDED LIFE FRACTION (t/t_r) mean value ± standard error
1 - UNDAMAGED	0.074 ± 0.035
A - ISOLATED CAVITIES	0.237 ± 0.032
B - ORIENTED CAVITIES	0.408 ± 0.029
C - MICROCRACKS	0.630 ± 0.046
D - MACROCRACKS	0.861 ± 0.037

By having the corresponding damage rating, the remaining life can be calculated using the equation shown below:

$$T_{rem} = T_t\left(\frac{T_r}{T_t} - 1\right)$$

$$T_{rem} = T_r - T_t \text{ (Eq1)}$$

Creep level at Oriented Cavities level life fraction of $T_t$time of service over T_r rupture life is defined as Eq2:

$$0.408 = \frac{T_t}{T_r} \text{ (Eq2)}$$

By substituting Eq2 into Eq1:

$T_{rem} = T_r - 0.408T_r$ (Eq3)

Eq3 is the system model for Monte Carlo which T_{rem} is the remaining life

$0.408 = \frac{T_r - T_{ttf}}{T_r}$ (Eq4)

Eq4 is defined as the parametric model which the time to failure of the tubes, T_{ttf} will generated random output of normally distributed T_{ttf} $with$ T_r rupture life

Tubes that experience life fraction that is equal or more than 0.408 is consider failed, whereas for the whole tubes system to be considered fail it is assumed to be at 10% of tubes fail.

Table 2 System threshold

Condition for tube to fail	$0.408 = \frac{T_r - T_{ttf}}{T_r}$
Threshold of the system to fail	10% of the tubes fail

6. **Design the simulation**

Define how many simulation runs, m should be used which m is affected by the complexity of the model and the sought accuracy of results.

$$m = \frac{Z_{\propto/2} \times \sigma/\mu}{Er(\mu)/\mu}$$

where,

$Er(\mu)$=standard error of the mean

$\propto$=1-C, where C is the confidence level

$Z_{\propto/2}$=the standard normal statistic

σ =standard deviation of the output

7. **Generate a set of random inputs**

In generating a set of random inputs through basic formula as many time as the quantity of simulations required for the model, Monte Carlo simulation can be run using basic spread sheet program. In this study, macro excel functions was used to generate the random inputs. *Figure 4* shows the statistical distributions sampling functions using Microsoft Excel®. Input parameters will be tested will different type of probability distribution in order to identify the parameters distribution. In this case, the time to failure of the tubes will be statistically distributed using normal distribution trend.

8. **Run the deterministic system model with the set of random input**
9. **Evaluate the model and the results is recorded**
10. **Analyse the results**

CHAPTER 4

RESULTS AND DISCUSSION

Using degradation analysis, the relations of service life, wall thickness measurements and minimum wall thickness permitted was plotted to calculate the estimations of time to failure for the tubes.

The data of the wall thickness and service life is presented in *table 3*. Degradation analysis of the tubes is presented in *figure 6 b*y plotting thickness of the tubes versus the time of service. In order to determine the time to failure of each data set, trend line was used to get the best line fit of the data set with highest R-square valued. After the type of trend line has been decided, the equation of the line was identified and the time to failure for each data set was obtained by extrapolate the line when thickness, y-axis is at zero. The obtained trend line for linear equation, R-square value and time to failure of the data set were tabulated in *table 4*.

Table 3 Wall thickness data over time of use

Time (days)	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
638	1.4	1.41	1.41	1.39	1.4	1.45	1.39	1.39	1.39	1.4	1.39	1.42	1.41	1.4	1.41
820	1.39	1.39	1.39	1.38	1.4	1.42	1.38	1.39	1.38	1.39	1.39	1.4	1.4	1.39	1.39
1004	1.37	1.34	1.38	1.37	1.39	1.4	1.36	1.38	1.37	1.38	1.37	1.38	1.39	1.37	1.38
1826	0	0.01	0.02	0.04	0.09	0.03	0.03	0.06	0.03	0.01	0.02	0.04	0.03	0.02	0.03

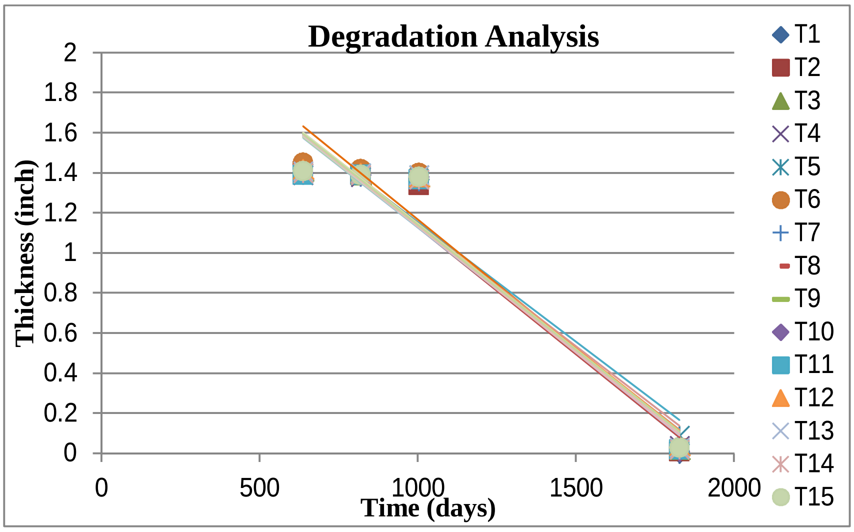


Figure 6 Degradation Analysis: Linear regression model between the wall thickness and time

Table 4 The data set trend line equation, R-square value and time to failure

i	Equation of linear model	R Square
1	y = -0.0013x + 2.383	0.9252
2	y = -0.0013x + 2.3911	0.9283
3	y = -0.0013x + 2.3953	0.9283
4	y = -0.0013x + 2.3964	0.94
5	y = -0.0013x + 2.4018	0.9252
6	y = -0.0013x + 2.402	0.9314
7	y = -0.0013x + 2.4026	0.9283
8	y = -0.0013x + 2.4045	0.9252
9	y = -0.0013x + 2.4057	0.9282
10	y = -0.0013x + 2.452	0.9341
11	y = -0.0012x + 2.3526	0.9222
12	y = -0.0012x + 2.3572	0.9221
13	y = -0.0012x + 2.3626	0.9253
14	y = -0.0012x + 2.3665	0.9285
15	y = -0.0012x + 2.3699	0.9253

From the obtain time to failure value, goodness fit test, Kolmogrov-Smirnov test was conducted in order to obtain the type of distribution for the time to failure of the system. Assuming that the data was normally distributed the critical value of the data was calculated with mean of 1888.578 days and standard deviation of 59.40842 days. The highest critical value obtained is 0.303947 which is smaller compared with K-S table value for 15 number of sample at 10% significance level which is 0.40962. Hence, the early assumption, that the data is normally distributed is accepted. The goodness fit test calculation was summarized in as in *table 5* below.

Table 5 Goodness fit test

i	Equation of linear model	R Square	TTF (days)	X	E	Abs(X-E)
1	y = -0.0013x + 2.383	0.9252	1833.077	0.045455	0.175094	0.129639
2	y = -0.0013x + 2.3911	0.9283	1839.308	0.11039	0.203455	0.093065
3	y = -0.0013x + 2.3953	0.9283	1842.538	0.175325	0.219181	0.043856
4	y = -0.0013x + 2.3964	0.94	1843.385	0.24026	0.223412	0.016848
5	y = -0.0013x + 2.4018	0.9252	1847.538	0.305195	0.244846	0.060349
6	y = -0.0013x + 2.402	0.9314	1847.692	0.37013	0.24566	0.12447
7	y = -0.0013x + 2.4026	0.9283	1848.154	0.435065	0.248113	0.186952
8	y = -0.0013x + 2.4045	0.9252	1849.615	0.5	0.255964	0.244036
9	y = -0.0013x + 2.4057	0.9282	1850.538	0.564935	0.260988	0.303947
10	y = -0.0013x + 2.452	0.9341	1886.154	0.62987	0.483727	0.146143
11	y = -0.0012x + 2.3526	0.9222	1960.5	0.694805	0.886983	0.192178
12	y = -0.0012x + 2.3572	0.9221	1964.333	0.75974	0.898875	0.139134
13	y = -0.0012x + 2.3626	0.9253	1968.833	0.824675	0.911638	0.086963
14	y = -0.0012x + 2.3665	0.9285	1972.083	0.88961	0.920081	0.030471
15	y = -0.0012x + 2.3699	0.9253	1974.917	0.954545	0.926931	0.027614

Referring to the obtained distribution, random inputs of the time to failure was generated using NORMINV(RAND(),μ,σ) function in excel for the 288 tubes. Using the parametric model constructed the relations of the time to failure and rupture life was simulated in order to calculate the remaining life of the system. For the simulation, the parametric model was run for 1000 iterations. The rupture life of the tubes is presented in the forms of cumulative failure probability, therefore by deciding the threshold failure of the tubes for the system to fail the remaining life can be obtained. To determine the threshold of failure, operational circumstances must be considered from various points of view. The remaining system life prediction for this study is assumed to be 10% of failure probability. The results of the simulation are presented in *figure 7*.

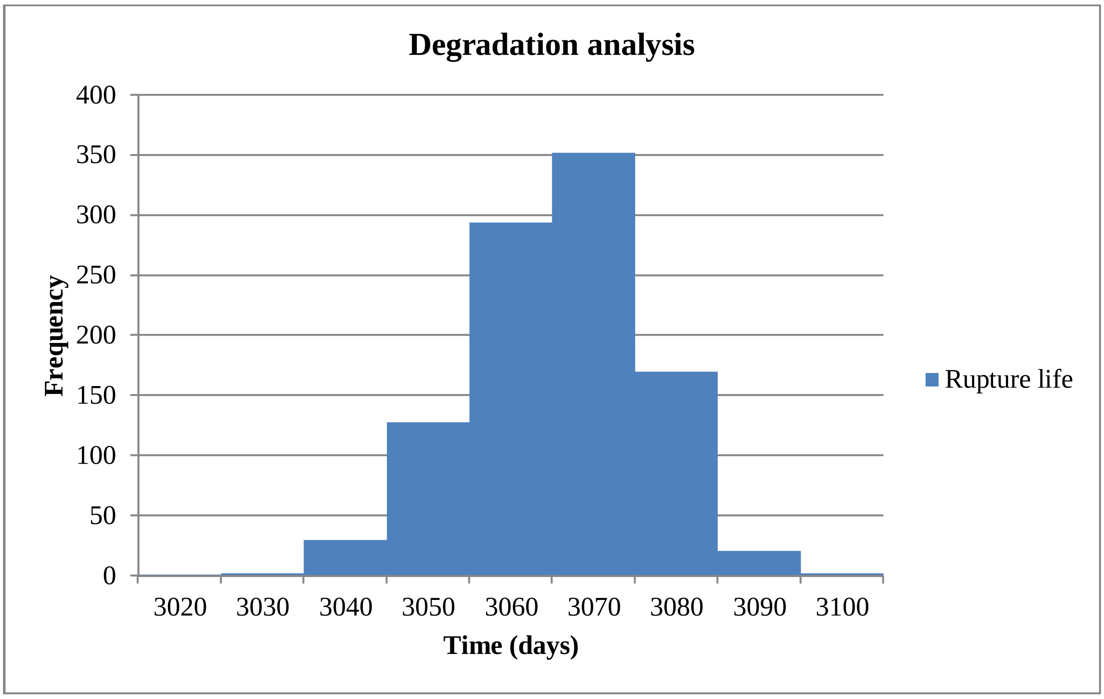


Figure 7 Rupture life of the system for 1000 simulations

The average rupture system life prediction for 10% failure of tubes and the remaining life of the system is estimated as shown in *table 6* below.

Table 6 Average remaining life prediction with 10% tubes failure for 1000 times

Time to rupture, T_r, days	**Time to rupture, T_{rem}, days (years)**
3066	1814.865 (5)

To ensure the accuracy of the calculated value, the simulation was run for 20 times, the resulted remaining life for each run is tabulated in *table 7* below.

Table 7 Calculated remaining life prediction with 20 runs for 1000 iteration

Run	Time to rupture, T_r, days	Remaining life, T_{rem}, days (years)
1	3066.52	1815.37984
2	3066.53	1815.38576
3	3066.56	1815.40352
4	3066.55	1815.3976
5	3066.56	1815.40352
6	3066.55	1815.3976
7	3066.56	1815.40352
8	3066.55	1815.3976
9	3066.55	1815.3976
10	3066.57	1815.40944
11	3066.54	1815.39168
12	3066.55	1815.3976
13	3066.55	1815.3976
14	3066.54	1815.39168
15	3066.55	1815.3976
16	3066.55	1815.3976
17	3066.54	1815.39168
18	3066.52	1815.37984
19	3066.55	1815.3976
20	3066.53	1815.38576

From the resulted 20 runs of the simulation, the value shows insignificant different in the values of the calculated remaining life. Therefore, the average life taken is applicable. It is to be noted that, the preciseness of the estimation depends on the precision of distinguishing the probabilistic functions. Besides that, rate of wall thinning also contributes on the remaining life estimation. Monte Carlo simulation approach enables life assessment with considering typical variations in reformer tubes pressure and skin temperatures, in addition with time. Moreover, using this approach individual circumstance associated within plant can be adopted.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

In preceding development, it has been proved that a practicable approach to perform residual life predictions can be achieved in absence of complete knowledge on the operational history of a component subjected to creep conditions. The non-destructive test and degradation analysis using simple wall thickness displacement measurements provide information to be elaborated for more realistic prediction of residual life.

From the literature review there have been many models, algorithms and techniques discussed, hence in the future it would be recommended to conduct a study on how to effectively use all the available data to estimates the remnant life of the reformer tubes and to design a multi failure modes in a model.

REFERENCES

[1] American Petroleum Institute, "Calculation of Heater-Tube Thickness in Petroleum Refineries," *API Recommended Practice,* vol. 5, p. 4, 2003.

[2] N. D. Singpurwalla, Reability and Risk: A Bayesian Perspective, John Wiley & Sons, Ltd, 2006.

[3] F.Mahlangu, "Verification of Inspection Method Used to Predict Premature Failure of Primary Reformer Tubes," in *Sixth International Colloquium,* Cape Town, 2001.

[4] I. L. May, T. L. d. Silveirab and C. Viannac, "Criteria for the Evaluation of Damage and Remaining Life in Reformer Furnace Tubes," *International Journal of Pressure Vessel and Piping,* vol. 66, pp. 233-241, 1996.

[5] Y. Zhou, "Modelling Correlated Degradation Processes of Direct and Indirect Indicator," Queensland University of Technology, Queensland, 2010.

[6] R. Seshadri, I. L. May, S. D. Bhole and L. C. F. C. Gomes, "Remaining Life Evaluation of Catalytic Furnace Tubes," in *ANNUAL CONFERENCE OF METALLURGISTS-METALLURGICAL SOCIETY OF THE CANADIAN INSTITUTE OF MINING AND METALLURGY,* Montreal, 1994.

[7] C. Zhou and S. Tu, "A stochastic computational model for the creep damage of furnace tube," *International Journal of Pressure Vessels and Piping,* vol. 78, pp. 617-625, 2001.

[8] P. O'Connor and A. Kleyner, Practical Reliability Engineering, West Sussex: John Wiley & Sons, Ltd, 2012.

[9] E. Poursaeidi, A. Moharrami and M. Amini, "Failure Probability and Remaining Life Assessment of Reheater Tubes," *International Journal of Engineering,* vol. 26, no. 5, pp. 543-552, 2013.

[10] M. S. B.J. Cane, "A Method for Remaining Life Estimation of Quantitative Assessment of Creep Cavitation," Central Electricity Generating Board, England, 1984.

[11] F. e. a. Ellies, "Remaining Life Estimation of Boiler Pressure Parts," *Mettallographic Methods,* vol. 4, no. CS-5588, 1989.

[12] S. Konosu, T. Koshimizu and K. Maeda, "Evaluation of creep-fatigue damage interaction in HK39 alloy," *Journal of Mechanical Design,* vol. 115, pp. 41-46, 1993.

[13] B. Poulson, "Wear," in *Degradation of Materials ain Nuclear Power Contorl,* 2007, pp. 233-235, 497-401.

[14] D. Shipley, "Creep damage in reformer tube," *International Journal of Pressure Vessels and Piping,* vol. 14, no. 1, pp. 21-34, 1983.

[15] Y.-L. Wang, F.-Z. Sheng and S.-T. Tu, "A study of creep crack propagation of HK 40 furnace tubes with C-shaped specimens," *Engineering Fracture Mechanics,* vol. 47, no. 1, pp. 39-47, 1994.

[16] M. C. M. M. C. S. A. Garzillo, "A Practical Route from IN-Service Damage Measurements to Analysis Estimation of High-Temperature Component Life," *Materials Ageing and Component Life Extension,* vol. 1, no. 8b, 1995.

APPENDICES

APPENDIX 1

Kolmogorov–Smirnov Tables

Critical values, $d_{alpha};(n)^a$, of the maximum absolute difference between sample $F_n(x)$ and population $F(x)$ cumulative distribution.

Number of trials, n	Level of significance, α			
	0.10	0.05	0.02	0.01
1	0.95000	0.97500	0.99000	0.99500
2	0.77639	0.84189	0.90000	0.92929
3	0.63604	0.70760	0.78456	0.82900
4	0.56522	0.62394	0.68887	0.73424
5	0.50945	0.56328	0.62718	0.66853
6	0.46799	0.51926	0.57741	0.61661
7	0.43607	0.48342	0.53844	0.57581
8	0.40962	0.45427	0.50654	0.54179
9	0.38746	0.43001	0.47960	0.51332
10	0.36866	0.40925	0.45662	0.48893
11	0.35242	0.39122	0.43670	0.46770
12	0.33815	0.37543	0.41918	0.44905
13	0.32549	0.36143	0.40362	0.43247
14	0.31417	0.34890	0.38970	0.41762
15	0.30397	0.33760	0.37713	0.40420
16	0.29472	0.32733	0.36571	0.39201
17	0.28627	0.31796	0.35528	0.38086
18	0.27851	0.30936	0.34569	0.37062
19	0.27136	0.30143	0.33685	0.36117
20	0.26473	0.29408	0.32866	0.35241
21	0.25858	0.28724	0.32104	0.34427
22	0.25283	0.28087	0.31394	0.33666
23	0.24746	0.27490	0.30728	0.32954
24	0.24242	0.26931	0.30104	0.32286
25	0.23768	0.26404	0.29516	0.31657
26	0.23320	0.25907	0.28962	0.31064
27	0.22898	0.25438	0.28438	0.30502
28	0.22497	0.24993	0.27942	0.29971
29	0.22117	0.24571	0.27471	0.29466
30	0.21756	0.24170	0.27023	0.28987
31	0.21412	0.23788	0.26596	0.28530
32	0.21085	0.23424	0.26189	0.28094
33	0.20771	0.23076	0.25801	0.27677
34	0.20472	0.22743	0.25429	0.27279
35	0.20185	0.22425	0.26073	0.26897
36	0.19910	0.22119	0.24732	0.26532
37	0.19646	0.21826	0.24404	0.26180
38	0.19392	0.21544	0.24089	0.25843
39	0.19148	0.21273	0.23786	0.25518
40[b]	0.18913	0.21012	0.23494	0.25205

[a] Values of $d_\alpha(n)$ such that $p(\max)|F^n(x) - F(x)|d^n(n) = \alpha$.

[b] $N > 40 \approx \frac{1.22}{N^{1/2}}, \frac{1.36}{N^{1/2}}, \frac{1.51}{N^{1/2}}$ and $\frac{1.63}{N^{1/2}}$ for the four levels of significance.

APPENDIX 2

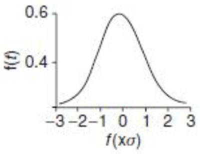
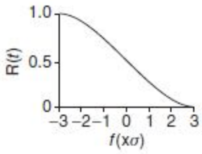
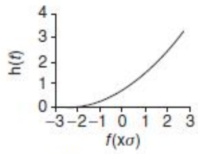
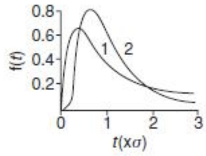
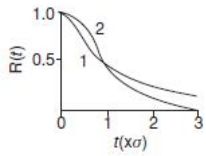
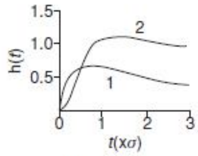
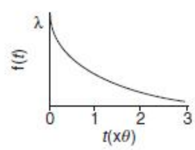
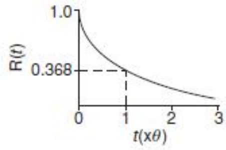
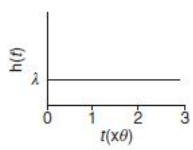
$\chi^2(\alpha, \nu)$ Distribution Values

Degrees of freedom ν	α(risk factor) = 1 − Confidence 0.995	0.990	0.975	0.95	0.90	0.80	0.70	0.60
1	0.0^4393	0.0^3157	0.03982	0.0^2393	0.0158	0.0642	0.148	0.275
2	0.0100	0.0201	0.0506	0.103	0.211	0.446	0.713	1.02
3	0.0717	0.115	0.216	0.352	0.584	1.00	1.42	1.87
4	0.207	0.297	0.484	0.711	1.06	1.65	2.19	2.75
5	0.412	0.554	0.831	1.15	1.61	2.34	3.00	3.66
6	0.676	0.872	1.24	1.64	2.20	3.07	3.83	4.57
7	0.989	1.24	1.69	2.17	2.83	3.82	4.67	5.49
8	1.34	1.65	2.18	2.73	3.49	4.59	5.53	6.42
9	1.73	2.09	2.70	3.33	4.17	5.38	6.39	7.36
10	2.16	2.56	3.25	3.94	4.87	6.18	7.27	8.30
11	2.60	3.05	3.82	4.57	5.58	6.99	8.15	9.24
12	3.07	3.57	4.40	5.23	6.30	7.81	9.03	10.2
13	3.57	4.11	5.01	5.89	7.04	8.63	9.93	11.1
14	4.07	4.66	5.63	6.57	7.79	9.47	10.8	12.1
15	4.60	5.23	6.26	7.26	8.55	10.3	11.7	13.0
16	5.14	5.81	6.91	7.96	9.31	11.2	12.6	14.0
17	5.70	6.41	7.56	8.67	10.1	12.0	13.5	14.9
18	6.26	7.01	8.23	9.39	10.9	12.9	14.4	15.9
19	6.84	7.63	8.91	10.1	11.7	13.7	15.4	16.9
20	7.43	8.26	9.59	10.9	12.4	14.6	16.3	17.8
21	8.03	8.90	10.3	11.6	13.2	15.4	17.2	18.8
22	8.64	9.54	11.0	12.3	14.0	16.3	18.1	19.7
23	9.26	10.2	11.7	13.1	14.8	17.2	19.0	20.7
24	9.89	10.9	12.4	13.8	15.7	18.1	19.9	21.7
25	10.5	11.5	13.1	14.6	16.5	18.9	20.9	22.6
26	11.2	12.2	13.8	15.4	17.3	19.8	21.8	23.6
27	11.8	12.9	14.6	16.2	18.1	20.7	22.7	24.5
28	12.5	13.6	15.3	16.9	18.9	21.6	23.6	25.5
29	13.1	14.3	16.0	17.7	19.8	22.5	24.6	26.5
30	13.8	15.0	16.8	18.5	20.6	23.4	25.5	27.4
35	17.2	18.5	20.6	22.5	24.8	27.8	30.2	32.3
40	20.7	22.2	24.4	26.5	29.1	32.3	34.9	37.1
45	24.3	25.9	28.4	30.6	33.4	36.9	39.6	42.0
50	28.0	29.7	32.4	34.8	37.7	41.4	44.3	46.9
75	47.2	49.5	52.9	56.1	59.8	64.5	68.1	71.3
100	67.3	70.1	74.2	77.9	82.4	87.9	92.1	95.8

0.50	0.40	0.30	0.20	0.10	0.05	0.025	0.010	α 0.005	ν
0.455	0.708	1.07	1.64	2.71	3.84	5.02	6.63	7.88	1
1.39	1.83	2.41	3.22	4.61	5.99	7.38	9.21	10.6	2
2.37	2.95	3.67	4.64	6.25	7.81	9.35	11.3	12.8	3
3.36	4.04	4.88	5.99	7.78	9.49	11.1	13.3	14.9	4
4.35	5.13	6.06	7.29	9.24	11.1	12.8	15.1	16.7	5
5.35	6.21	7.23	8.56	10.6	12.6	14.4	16.8	18.5	6
6.35	7.28	8.38	9.80	12.0	14.1	16.0	18.5	20.3	7
7.34	8.35	9.52	11.0	13.4	15.5	17.5	20.1	22.0	8
8.34	9.41	10.7	12.2	14.7	16.9	19.0	21.7	23.6	9
9.34	10.5	11.8	13.4	16.0	18.3	20.5	23.2	25.2	10
10.3	11.5	12.9	14.6	17.3	19.7	21.9	24.7	26.8	11
11.3	12.6	14.0	15.8	18.5	21.0	23.3	26.2	28.3	12
12.3	13.6	15.1	17.0	19.8	22.4	24.7	27.7	29.8	13
13.3	14.7	16.2	18.2	21.1	23.7	26.1	29.1	31.3	14
14.3	15.7	17.3	19.3	22.3	25.0	27.5	30.6	32.8	15
15.3	16.8	18.4	20.5	23.5	26.3	28.8	32.0	34.3	16
16.3	17.8	19.5	21.6	24.8	27.6	30.2	33.4	35.7	17
17.3	18.9	20.6	22.8	26.0	28.9	31.5	34.8	37.2	18
18.3	19.9	21.7	23.9	27.2	30.1	32.9	36.2	38.6	19
19.3	21.0	22.8	25.0	28.4	31.4	34.2	37.6	40.0	20
20.3	22.0	23.9	26.2	29.6	32.7	35.5	38.9	41.4	21
21.3	23.0	24.9	27.3	30.8	33.9	36.8	40.3	42.8	22
22.3	24.1	26.0	28.4	32.0	35.2	38.1	41.6	44.2	23
23.3	25.1	27.1	29.6	33.2	36.4	39.4	43.0	45.6	24
24.3	26.1	28.2	30.7	34.4	37.7	40.6	44.3	46.9	25
25.3	27.2	29.2	31.8	35.6	38.9	41.9	45.6	48.3	26
26.3	28.2	30.3	32.9	36.7	40.1	43.2	47.0	49.6	27
27.3	29.2	31.4	34.0	37.9	41.3	44.5	48.3	51.0	28
28.3	30.3	32.5	35.1	39.1	42.6	45.7	49.6	52.3	29
29.3	31.3	33.5	36.3	40.3	43.8	47.0	50.9	53.7	30
34.3	36.5	38.9	41.8	46.1	49.8	53.2	57.3	60.3	35
39.3	41.6	44.2	47.3	51.8	55.8	59.3	63.7	66.8	40
44.3	46.8	49.5	52.7	57.5	61.7	65.4	70.0	73.2	45
49.3	51.9	54.7	58.2	63.2	67.5	71.4	76.2	79.5	50
74.3	77.5	80.9	85.1	91.1	96.2	100.8	106.4	110.3	75
99.3	102.9	106.9	111.7	118.5	124.3	129.6	135.6	140.2	100

APPENDIX 3

Summary of Continuous Statistical Distributions

Type of distribution	Parameters	Probability density function, f(t)	Reliability function, R(t) = I − F(t)	Hazard function (instantaneous failure rate). $h(t) = \frac{f(t)}{R(t)}$
Normal	Mean, μ Standard deviation, σ	 $f(t) = \frac{1}{\sigma(2\pi)^{1/2}} \exp\left[-\frac{(t-\mu)^2}{2\sigma^2}\right]$	 $R(t) = \int_t^\infty f(t)\,dt$	 $h(t) = \frac{f(t)}{R(t)}$ (general expression)
Lognormal	Mean, μ Standard deviation, σ	 $f(t) = \frac{1}{\sigma t(2\pi)^{1/2}} \exp\left[-\frac{(\ln t-\mu)^2}{2\sigma^2}\right]$	 $R(t) = \int_t^\infty f(t)\,dt$	 $h(t) = \frac{f(t)}{R(t)}$ (general expression)
Exponential	Failure rate, λ MTBF (=SD), θ $\theta = \lambda^{-1}$	 $f(t) = \lambda \exp(-\lambda t)$	 $R(t) = \exp(-\lambda t)$	 $h(t) = \lambda = \theta^{-1}$

APPENDIX 4

Simulation

Tube	Days	3000	3010	3020	3030	3040	3050	3060	3070	3080	3090	3100
	Percentage fail	0	0	0	0	0	0	0	0	0	0	0
	At 10% threshold	0	0	0	0	0	0	0	0	0	0	0
	# of tubes fail	11	12	13	16	19	24	25	26	32	35	40
Tube	RL / TTF	3000	3010	3020	3030	3040	3050	3060	3070	3080	3090	3100
1	1937.337337	0	0	0	0	0	0	0	0	0	0	0
2	1827.630234	0	0	0	0	0	0	0	0	0	1	1
3	1896.492805	0	0	0	0	0	0	0	0	0	0	0
4	1902.235478	0	0	0	0	0	0	0	0	0	0	0
5	2007.741802	0	0	0	0	0	0	0	0	0	0	0
6	1940.723476	0	0	0	0	0	0	0	0	0	0	0
7	1908.319752	0	0	0	0	0	0	0	0	0	0	0
8	1897.900861	0	0	0	0	0	0	0	0	0	0	0
9	1921.158199	0	0	0	0	0	0	0	0	0	0	0
10	1863.53298	0	0	0	0	0	0	0	0	0	0	0
11	1867.466106	0	0	0	0	0	0	0	0	0	0	0
12	1972.420731	0	0	0	0	0	0	0	0	0	0	0
13	1887.577175	0	0	0	0	0	0	0	0	0	0	0
14	1925.108204	0	0	0	0	0	0	0	0	0	0	0
15	1805.314859	0	0	0	0	0	1	1	1	1	1	1
16	1887.805862	0	0	0	0	0	0	0	0	0	0	0
17	1936.164459	0	0	0	0	0	0	0	0	0	0	0
18	2032.503408	0	0	0	0	0	0	0	0	0	0	0
19	1823.228672	0	0	0	0	0	0	0	0	1	1	1
20	1863.908251	0	0	0	0	0	0	0	0	0	0	0
21	1794.229061	0	0	0	0	1	1	1	1	1	1	1
22	1876.166713	0	0	0	0	0	0	0	0	0	0	0
23	1843.273302	0	0	0	0	0	0	0	0	0	0	0
24	1947.139175	0	0	0	0	0	0	0	0	0	0	0
25	1975.821477	0	0	0	0	0	0	0	0	0	0	0
26	1949.881663	0	0	0	0	0	0	0	0	0	0	0
27	1868.028614	0	0	0	0	0	0	0	0	0	0	0
28	1830.706224	0	0	0	0	0	0	0	0	0	0	1
29	1898.199602	0	0	0	0	0	0	0	0	0	0	0
30	1858.309257	0	0	0	0	0	0	0	0	0	0	0
31	1856.673565	0	0	0	0	0	0	0	0	0	0	0
32	1894.648788	0	0	0	0	0	0	0	0	0	0	0
33	1776.065278	0	1	1	1	1	1	1	1	1	1	1
34	1952.988368	0	0	0	0	0	0	0	0	0	0	0
35	1764.717022	1	1	1	1	1	1	1	1	1	1	1
36	1941.485437	0	0	0	0	0	0	0	0	0	0	0
37	1959.738653	0	0	0	0	0	0	0	0	0	0	0
38	1926.476452	0	0	0	0	0	0	0	0	0	0	0
39	1872.255825	0	0	0	0	0	0	0	0	0	0	0
40	1865.648707	0	0	0	0	0	0	0	0	0	0	0
41	1915.601286	0	0	0	0	0	0	0	0	0	0	0
42	1929.965773	0	0	0	0	0	0	0	0	0	0	0
43	1931.924859	0	0	0	0	0	0	0	0	0	0	0
44	1899.060659	0	0	0	0	0	0	0	0	0	0	0
45	1900.834771	0	0	0	0	0	0	0	0	0	0	0
46	1964.131925	0	0	0	0	0	0	0	0	0	0	0
47	1902.166218	0	0	0	0	0	0	0	0	0	0	0
48	1821.981325	0	0	0	0	0	0	0	0	1	1	1
49	1896.887205	0	0	0	0	0	0	0	0	0	0	0
50	1880.81786	0	0	0	0	0	0	0	0	0	0	0
51	1904.435587	0	0	0	0	0	0	0	0	0	0	0
52	1863.69416	0	0	0	0	0	0	0	0	0	0	0
53	1830.326588	0	0	0	0	0	0	0	0	0	0	1
54	1920.440945	0	0	0	0	0	0	0	0	0	0	0
55	1891.523478	0	0	0	0	0	0	0	0	0	0	0
56	1974.980547	0	0	0	0	0	0	0	0	0	0	0
57	1765.345584	1	1	1	1	1	1	1	1	1	1	1
58	1852.72938	0	0	0	0	0	0	0	0	0	0	0
59	1823.87812	0	0	0	0	0	0	0	0	0	1	1
60	1924.773798	0	0	0	0	0	0	0	0	0	0	0
61	2000.439605	0	0	0	0	0	0	0	0	0	0	0
62	1840.441512	0	0	0	0	0	0	0	0	0	0	0
63	1842.357806	0	0	0	0	0	0	0	0	0	0	0
64	1879.264461	0	0	0	0	0	0	0	0	0	0	0
65	1792.96986	0	0	0	1	1	1	1	1	1	1	1
66	1994.033918	0	0	0	0	0	0	0	0	0	0	0
67	1941.52152	0	0	0	0	0	0	0	0	0	0	0
68	1770.677411	1	1	1	1	1	1	1	1	1	1	1
69	1867.723943	0	0	0	0	0	0	0	0	0	0	0
70	1942.249462	0	0	0	0	0	0	0	0	0	0	0

71	1868.521112	0	0	0	0	0	0	0	0	0	0	0
72	1890.612182	0	0	0	0	0	0	0	0	0	0	0
73	1739.52966	1	1	1	1	1	1	1	1	1	1	1
74	1869.868183	0	0	0	0	0	0	0	0	0	0	0
75	1906.860812	0	0	0	0	0	0	0	0	0	0	0
76	1899.527489	0	0	0	0	0	0	0	0	0	0	0
77	1878.132235	0	0	0	0	0	0	0	0	0	0	0
78	1944.782471	0	0	0	0	0	0	0	0	0	0	0
79	1932.086989	0	0	0	0	0	0	0	0	0	0	0
80	1847.328602	0	0	0	0	0	0	0	0	0	0	0
81	1895.252522	0	0	0	0	0	0	0	0	0	0	0
82	2001.54553	0	0	0	0	0	0	0	0	0	0	0
83	2047.716424	0	0	0	0	0	0	0	0	0	0	0
84	1924.195919	0	0	0	0	0	0	0	0	0	0	0
85	1925.003971	0	0	0	0	0	0	0	0	0	0	0
86	1889.748057	0	0	0	0	0	0	0	0	0	0	0
87	1789.613611	0	0	0	1	1	1	1	1	1	1	1
88	1943.276977	0	0	0	0	0	0	0	0	0	0	0
89	1895.711945	0	0	0	0	0	0	0	0	0	0	0
90	1882.497428	0	0	0	0	0	0	0	0	0	0	0
91	1933.282584	0	0	0	0	0	0	0	0	0	0	0
92	1858.408203	0	0	0	0	0	0	0	0	0	0	0
93	1946.163581	0	0	0	0	0	0	0	0	0	0	0
94	1879.564952	0	0	0	0	0	0	0	0	0	0	0
95	1924.740133	0	0	0	0	0	0	0	0	0	0	0
96	1906.520695	0	0	0	0	0	0	0	0	0	0	0
97	1855.521273	0	0	0	0	0	0	0	0	0	0	0
98	1846.204726	0	0	0	0	0	0	0	0	0	0	0
99	1979.102428	0	0	0	0	0	0	0	0	0	0	0
100	1934.358308	0	0	0	0	0	0	0	0	0	0	0
101	1885.936966	0	0	0	0	0	0	0	0	0	0	0
102	1879.495106	0	0	0	0	0	0	0	0	0	0	0
103	1975.223886	0	0	0	0	0	0	0	0	0	0	0
104	1801.89144	0	0	0	0	0	1	1	1	1	1	1
105	1924.366665	0	0	0	0	0	0	0	0	0	0	0
106	1865.573506	0	0	0	0	0	0	0	0	0	0	0
107	1762.231487	1	1	1	1	1	1	1	1	1	1	1
108	1886.448003	0	0	0	0	0	0	0	0	0	0	0
109	1883.612799	0	0	0	0	0	0	0	0	0	0	0
110	1894.445656	0	0	0	0	0	0	0	0	0	0	0
111	1845.393756	0	0	0	0	0	0	0	0	0	0	0
112	1831.158228	0	0	0	0	0	0	0	0	0	0	1
113	2039.967225	0	0	0	0	0	0	0	0	0	0	0
114	1985.691764	0	0	0	0	0	0	0	0	0	0	0
115	1906.931768	0	0	0	0	0	0	0	0	0	0	0
116	1886.065268	0	0	0	0	0	0	0	0	0	0	0
117	1889.879453	0	0	0	0	0	0	0	0	0	0	0
118	1723.457465	1	1	1	1	1	1	1	1	1	1	1
119	1889.408397	0	0	0	0	0	0	0	0	0	0	0
120	1870.958473	0	0	0	0	0	0	0	0	0	0	0
121	1864.777503	0	0	0	0	0	0	0	0	0	0	0
122	2012.350414	0	0	0	0	0	0	0	0	0	0	0
123	1928.297802	0	0	0	0	0	0	0	0	0	0	0
124	1875.728754	0	0	0	0	0	0	0	0	0	0	0
125	1783.967483	0	0	1	1	1	1	1	1	1	1	1
126	1976.90058	0	0	0	0	0	0	0	0	0	0	0
127	2042.761131	0	0	0	0	0	0	0	0	0	0	0
128	1857.069031	0	0	0	0	0	0	0	0	0	0	0
129	1840.943024	0	0	0	0	0	0	0	0	0	0	0
130	1938.889237	0	0	0	0	0	0	0	0	0	0	0
131	2003.6905	0	0	0	0	0	0	0	0	0	0	0
132	1971.083283	0	0	0	0	0	0	0	0	0	0	0
133	1962.405462	0	0	0	0	0	0	0	0	0	0	0
134	1843.800757	0	0	0	0	0	0	0	0	0	0	0
135	1848.509692	0	0	0	0	0	0	0	0	0	0	0
136	1948.2523	0	0	0	0	0	0	0	0	0	0	0
137	1864.499479	0	0	0	0	0	0	0	0	0	0	0
138	1860.338138	0	0	0	0	0	0	0	0	0	0	0
139	1871.552938	0	0	0	0	0	0	0	0	0	0	0
140	1869.023172	0	0	0	0	0	0	0	0	0	0	0
141	1989.515119	0	0	0	0	0	0	0	0	0	0	0
142	1896.653554	0	0	0	0	0	0	0	0	0	0	0
143	1805.435068	0	0	0	0	0	1	1	1	1	1	1
144	1901.386743	0	0	0	0	0	0	0	0	0	0	0
145	1976.126638	0	0	0	0	0	0	0	0	0	0	0
146	1882.145466	0	0	0	0	0	0	0	0	0	0	0
147	1868.311132	0	0	0	0	0	0	0	0	0	0	0
148	1912.345448	0	0	0	0	0	0	0	0	0	0	0
149	1868.57978	0	0	0	0	0	0	0	0	0	0	0
150	1893.802209	0	0	0	0	0	0	0	0	0	0	0
151	1964.769427	0	0	0	0	0	0	0	0	0	0	0
152	1803.997699	0	0	0	0	0	1	1	1	1	1	1
153	1975.192004	0	0	0	0	0	0	0	0	0	0	0
154	1923.594811	0	0	0	0	0	0	0	0	0	0	0
155	1961.654042	0	0	0	0	0	0	0	0	0	0	0
156	1738.669259	1	1	1	1	1	1	1	1	1	1	1
157	1908.944716	0	0	0	0	0	0	0	0	0	0	0
158	1902.579899	0	0	0	0	0	0	0	0	0	0	0
159	1908.647118	0	0	0	0	0	0	0	0	0	0	0
160	1880.430438	0	0	0	0	0	0	0	0	0	0	0
161	1907.854563	0	0	0	0	0	0	0	0	0	0	0
162	1901.69316	0	0	0	0	0	0	0	0	0	0	0
163	1914.55561	0	0	0	0	0	0	0	0	0	0	0
164	1854.029566	0	0	0	0	0	0	0	0	0	0	0
165	1886.75531	0	0	0	0	0	0	0	0	0	0	0
166	1854.772117	0	0	0	0	0	0	0	0	0	0	0
167	1959.313785	0	0	0	0	0	0	0	0	0	0	0
168	1872.199292	0	0	0	0	0	0	0	0	0	0	0
169	1935.094746	0	0	0	0	0	0	0	0	0	0	0
170	1936.799048	0	0	0	0	0	0	0	0	0	0	0
171	1888.407454	0	0	0	0	0	0	0	0	0	0	0
172	1919.262232	0	0	0	0	0	0	0	0	0	0	0
173	1937.391571	0	0	0	0	0	0	0	0	0	0	0
174	1847.891508	0	0	0	0	0	0	0	0	0	0	0
175	1923.855334	0	0	0	0	0	0	0	0	0	0	0
176	1829.895249	0	0	0	0	0	0	0	0	0	0	1
177	1892.533915	0	0	0	0	0	0	0	0	0	0	0
178	1858.344174	0	0	0	0	0	0	0	0	0	0	0
179	1771.329433	1	1	1	1	1	1	1	1	1	1	1
180	1977.45829	0	0	0	0	0	0	0	0	0	0	0

181	1992.459368	0	0	0	0	0	0	0	0	0	0	0
182	1860.419597	0	0	0	0	0	0	0	0	0	0	0
183	1896.997424	0	0	0	0	0	0	0	0	0	0	0
184	1861.957903	0	0	0	0	0	0	0	0	0	0	0
185	1892.63837	0	0	0	0	0	0	0	0	0	0	0
186	1870.464143	0	0	0	0	0	0	0	0	0	0	0
187	1844.981621	0	0	0	0	0	0	0	0	0	0	0
188	1887.308955	0	0	0	0	0	0	0	0	0	0	0
189	1914.138212	0	0	0	0	0	0	0	0	0	0	0
190	1863.092118	0	0	0	0	0	0	0	0	0	0	0
191	1857.233741	0	0	0	0	0	0	0	0	0	0	0
192	1878.097109	0	0	0	0	0	0	0	0	0	0	0
193	1800.902983	0	0	0	0	0	1	1	1	1	1	1
194	1799.387678	0	0	0	0	1	1	1	1	1	1	1
195	1857.269446	0	0	0	0	0	0	0	0	0	0	0
196	1979.445368	0	0	0	0	0	0	0	0	0	0	0
197	1861.537744	0	0	0	0	0	0	0	0	0	0	0
198	1934.998137	0	0	0	0	0	0	0	0	0	0	0
199	1710.079398	1	1	1	1	1	1	1	1	1	1	1
200	1887.210472	0	0	0	0	0	0	0	0	0	0	0
201	1937.051677	0	0	0	0	0	0	0	0	0	0	0
202	1927.257978	0	0	0	0	0	0	0	0	0	0	0
203	1857.587671	0	0	0	0	0	0	0	0	0	0	0
204	1838.956312	0	0	0	0	0	0	0	0	0	0	0
205	1839.259347	0	0	0	0	0	0	0	0	0	0	0
206	1855.020023	0	0	0	0	0	0	0	0	0	0	0
207	1969.072386	0	0	0	0	0	0	0	0	0	0	0
208	1881.389033	0	0	0	0	0	0	0	0	0	0	0
209	1841.56013	0	0	0	0	0	0	0	0	0	0	0
210	1898.295726	0	0	0	0	0	0	0	0	0	0	0
211	1726.693632	1	1	1	1	1	1	1	1	1	1	1
212	2005.870768	0	0	0	0	0	0	0	0	0	0	0
213	1895.079436	0	0	0	0	0	0	0	0	0	0	0
214	2011.780214	0	0	0	0	0	0	0	0	0	0	0
215	1976.397082	0	0	0	0	0	0	0	0	0	0	0
216	1872.853986	0	0	0	0	0	0	0	0	0	0	0
217	1899.919735	0	0	0	0	0	0	0	0	0	0	0
218	1924.720689	0	0	0	0	0	0	0	0	0	0	0
219	1861.804418	0	0	0	0	0	0	0	0	0	0	0
220	1821.251564	0	0	0	0	0	0	0	0	1	1	1
221	1954.930745	0	0	0	0	0	0	0	0	0	0	0
222	1863.63574	0	0	0	0	0	0	0	0	0	0	0
223	1900.70563	0	0	0	0	0	0	0	0	0	0	0
224	2000.978141	0	0	0	0	0	0	0	0	0	0	0
225	1890.8856	0	0	0	0	0	0	0	0	0	0	0
226	1941.101087	0	0	0	0	0	0	0	0	0	0	0
227	1908.631432	0	0	0	0	0	0	0	0	0	0	0
228	1911.055758	0	0	0	0	0	0	0	0	0	0	0
229	1864.11891	0	0	0	0	0	0	0	0	0	0	0
230	1870.584463	0	0	0	0	0	0	0	0	0	0	0
231	1908.045676	0	0	0	0	0	0	0	0	0	0	0
232	1914.975581	0	0	0	0	0	0	0	0	0	0	0
233	1941.8126	0	0	0	0	0	0	0	0	0	0	0
234	1856.93067	0	0	0	0	0	0	0	0	0	0	0
235	1890.706136	0	0	0	0	0	0	0	0	0	0	0
236	1817.084111	0	0	0	0	0	0	0	1	1	1	1
237	1916.187151	0	0	0	0	0	0	0	0	0	0	0
238	1878.985144	0	0	0	0	0	0	0	0	0	0	0
239	2015.587872	0	0	0	0	0	0	0	0	0	0	0
240	1907.230419	0	0	0	0	0	0	0	0	0	0	0
241	1822.787379	0	0	0	0	0	0	0	0	1	1	1
242	1933.160479	0	0	0	0	0	0	0	0	0	0	0
243	1874.691897	0	0	0	0	0	0	0	0	0	0	0
244	1866.376192	0	0	0	0	0	0	0	0	0	0	0
245	1953.563179	0	0	0	0	0	0	0	0	0	0	0
246	1933.654327	0	0	0	0	0	0	0	0	0	0	0
247	1955.153634	0	0	0	0	0	0	0	0	0	0	0
248	1982.427377	0	0	0	0	0	0	0	0	0	0	0
249	1928.7553	0	0	0	0	0	0	0	0	0	0	0
250	1825.633863	0	0	0	0	0	0	0	0	0	1	1
251	1731.012843	1	1	1	1	1	1	1	1	1	1	1
252	1831.204105	0	0	0	0	0	0	0	0	0	0	1
253	1790.849938	0	0	0	1	1	1	1	1	1	1	1
254	1903.348068	0	0	0	0	0	0	0	0	0	0	0
255	1909.825742	0	0	0	0	0	0	0	0	0	0	0
256	1935.441948	0	0	0	0	0	0	0	0	0	0	0
257	1847.096769	0	0	0	0	0	0	0	0	0	0	0
258	1956.105883	0	0	0	0	0	0	0	0	0	0	0
259	1866.558811	0	0	0	0	0	0	0	0	0	0	0
260	1928.727245	0	0	0	0	0	0	0	0	0	0	0
261	1923.300582	0	0	0	0	0	0	0	0	0	0	0
262	1875.688873	0	0	0	0	0	0	0	0	0	0	0
263	1850.514102	0	0	0	0	0	0	0	0	0	0	0
264	1839.809507	0	0	0	0	0	0	0	0	0	0	0
265	1952.866219	0	0	0	0	0	0	0	0	0	0	0
266	1971.662174	0	0	0	0	0	0	0	0	0	0	0
267	1890.776073	0	0	0	0	0	0	0	0	0	0	0
268	1799.431124	0	0	0	0	1	1	1	1	1	1	1
269	1903.0993	0	0	0	0	0	0	0	0	0	0	0
270	1850.80664	0	0	0	0	0	0	0	0	0	0	0
271	1818.243276	0	0	0	0	0	0	0	0	1	1	1
272	1875.968466	0	0	0	0	0	0	0	0	0	0	0
273	1882.986507	0	0	0	0	0	0	0	0	0	0	0
274	1939.315456	0	0	0	0	0	0	0	0	0	0	0
275	1934.012716	0	0	0	0	0	0	0	0	0	0	0
276	1807.459317	0	0	0	0	0	0	1	1	1	1	1
277	1886.916443	0	0	0	0	0	0	0	0	0	0	0
278	1914.277898	0	0	0	0	0	0	0	0	0	0	0
279	1950.289958	0	0	0	0	0	0	0	0	0	0	0
280	1856.75146	0	0	0	0	0	0	0	0	0	0	0
281	1974.327914	0	0	0	0	0	0	0	0	0	0	0
282	1819.774589	0	0	0	0	0	0	0	0	1	1	1
283	1890.968976	0	0	0	0	0	0	0	0	0	0	0
284	1918.511054	0	0	0	0	0	0	0	0	0	0	0
285	1916.85956	0	0	0	0	0	0	0	0	0	0	0
286	1940.493404	0	0	0	0	0	0	0	0	0	0	0
287	1878.312119	0	0	0	0	0	0	0	0	0	0	0
288	1918.7069	0	0	0	0	0	0	0	0	0	0	0

Days Iteration	3000	3010	3020	3030	3040	3050	3060	3070	3080	3090	3100	At 10% threshold
1	0	0	0	0	0	1	1	1	1	1	1	3050
2	0	0	0	0	0	0	0	1	1	1	1	3070
3	0	0	0	0	0	0	0	1	1	1	1	3070
4	0	0	0	0	0	0	1	1	1	1	1	3060
5	0	0	0	0	0	0	0	1	1	1	1	3070
6	0	0	0	0	0	1	1	1	1	1	1	3050
7	0	0	0	0	1	1	1	1	1	1	1	3040
8	0	0	0	0	0	0	1	1	1	1	1	3060
9	0	0	0	0	1	1	1	1	1	1	1	3040
10	0	0	0	0	0	0	0	0	0	1	1	3090
11	0	0	0	0	0	0	1	1	1	1	1	3060
12	0	0	0	0	0	1	1	1	1	1	1	3050
13	0	0	0	0	0	1	1	1	1	1	1	3050
14	0	0	0	0	0	0	1	1	1	1	1	3060
15	0	0	0	0	0	0	0	0	1	1	1	3080
16	0	0	0	0	0	0	1	1	1	1	1	3060
17	0	0	0	0	0	0	1	1	1	1	1	3060
18	0	0	0	0	0	0	0	1	1	1	1	3070
19	0	0	0	0	0	0	0	1	1	1	1	3070
20	0	0	0	0	0	0	1	1	1	1	1	3060
21	0	0	0	0	0	0	0	1	1	1	1	3070
22	0	0	0	0	0	0	0	0	1	1	1	3080
23	0	0	0	0	0	0	0	1	1	1	1	3070
24	0	0	0	0	0	0	1	1	1	1	1	3060
25	0	0	0	0	1	1	1	1	1	1	1	3040
26	0	0	0	0	0	0	0	0	0	1	1	3090
27	0	0	0	0	0	0	1	1	1	1	1	3060
28	0	0	0	0	0	0	0	1	1	1	1	3070
29	0	0	0	0	0	0	1	1	1	1	1	3060
30	0	0	0	0	0	0	0	1	1	1	1	3070
31	0	0	0	0	0	0	0	1	1	1	1	3070
32	0	0	0	0	0	0	0	0	0	1	1	3090
33	0	0	0	0	0	0	1	1	1	1	1	3060
34	0	0	0	0	0	0	1	1	1	1	1	3060
35	0	0	0	0	0	0	1	1	1	1	1	3060
36	0	0	0	0	0	0	1	1	1	1	1	3060
37	0	0	0	0	0	0	0	0	1	1	1	3080
38	0	0	0	0	0	0	1	1	1	1	1	3060
39	0	0	0	0	0	0	0	1	1	1	1	3070
40	0	0	0	0	0	0	1	1	1	1	1	3060
41	0	0	0	0	0	0	0	1	1	1	1	3070
42	0	0	0	0	1	1	1	1	1	1	1	3040
43	0	0	0	0	0	0	1	1	1	1	1	3060
44	0	0	0	0	0	0	0	0	1	1	1	3080
45	0	0	0	0	0	0	1	1	1	1	1	3060
46	0	0	0	0	0	0	1	1	1	1	1	3060
47	0	0	0	0	0	0	0	1	1	1	1	3070
48	0	0	0	0	0	1	1	1	1	1	1	3050
49	0	0	0	0	0	0	0	0	1	1	1	3080
50	0	0	0	0	0	0	1	1	1	1	1	3060
51	0	0	0	0	0	1	1	1	1	1	1	3050
52	0	0	0	0	0	0	1	1	1	1	1	3060
53	0	0	0	0	0	0	0	1	1	1	1	3070
54	0	0	0	0	0	0	0	0	1	1	1	3080
55	0	0	0	0	0	0	1	1	1	1	1	3060
56	0	0	0	0	0	0	0	1	1	1	1	3070
57	0	0	0	0	0	1	1	1	1	1	1	3050
58	0	0	0	0	0	1	1	1	1	1	1	3050
59	0	0	0	0	0	1	1	1	1	1	1	3050
60	0	0	0	0	0	0	1	1	1	1	1	3060
61	0	0	0	0	0	0	0	0	1	1	1	3080
62	0	0	0	0	0	0	1	1	1	1	1	3060
63	0	0	0	0	0	0	0	1	1	1	1	3070
64	0	0	0	0	0	0	0	0	1	1	1	3080
65	0	0	0	0	0	0	1	1	1	1	1	3060
66	0	0	0	0	0	0	0	1	1	1	1	3070
67	0	0	0	0	0	0	0	1	1	1	1	3070
68	0	0	0	0	0	0	1	1	1	1	1	3060
69	0	0	0	0	0	0	0	1	1	1	1	3070
70	0	0	0	0	0	0	1	1	1	1	1	3060
71	0	0	0	0	0	0	1	1	1	1	1	3060
72	0	0	0	0	0	0	0	1	1	1	1	3070
73	0	0	0	0	0	0	1	1	1	1	1	3060
74	0	0	0	0	0	0	1	1	1	1	1	3060
75	0	0	0	0	0	0	1	1	1	1	1	3060
76	0	0	0	0	0	0	0	0	0	1	1	3090
77	0	0	0	0	0	0	1	1	1	1	1	3060
78	0	0	0	0	0	0	1	1	1	1	1	3060
79	0	0	0	0	0	0	1	1	1	1	1	3060
80	0	0	0	0	0	0	0	1	1	1	1	3070
81	0	0	0	0	0	0	1	1	1	1	1	3060
82	0	0	0	0	0	1	1	1	1	1	1	3050
83	0	0	0	0	0	0	1	1	1	1	1	3060
84	0	0	0	0	0	0	0	0	1	1	1	3080
85	0	0	0	0	0	0	0	0	1	1	1	3080
86	0	0	0	0	0	0	1	1	1	1	1	3060
87	0	0	0	0	0	0	0	0	1	1	1	3080
88	0	0	0	0	0	0	0	1	1	1	1	3070
89	0	0	0	0	0	0	0	1	1	1	1	3070
90	0	0	0	0	0	1	1	1	1	1	1	3050
91	0	0	0	0	0	0	0	1	1	1	1	3070
92	0	0	0	0	1	1	1	1	1	1	1	3040

93	0	0	0	0	0	0	0	1	1	1	1	3070
94	0	0	0	0	0	0	1	1	1	1	1	3060
95	0	0	0	0	0	0	1	1	1	1	1	3060
96	0	0	0	0	0	0	1	1	1	1	1	3060
97	0	0	0	0	0	0	0	1	1	1	1	3070
98	0	0	0	0	0	0	0	1	1	1	1	3070
99	0	0	0	0	0	0	1	1	1	1	1	3060
100	0	0	0	0	0	0	1	1	1	1	1	3060
101	0	0	0	0	0	1	1	1	1	1	1	3050
102	0	0	0	0	0	0	0	1	1	1	1	3070
103	0	0	0	0	0	0	1	1	1	1	1	3060
104	0	0	0	0	0	0	0	0	1	1	1	3080
105	0	0	0	0	0	0	0	1	1	1	1	3070
106	0	0	0	0	0	0	0	1	1	1	1	3070
107	0	0	0	0	0	1	1	1	1	1	1	3050
108	0	0	0	0	0	0	0	1	1	1	1	3070
109	0	0	0	0	0	0	1	1	1	1	1	3060
110	0	0	0	0	0	1	1	1	1	1	1	3050
111	0	0	0	0	0	0	0	1	1	1	1	3070
112	0	0	0	0	0	0	0	1	1	1	1	3070
113	0	0	0	0	0	0	0	1	1	1	1	3070
114	0	0	0	0	0	0	0	0	1	1	1	3080
115	0	0	0	0	0	0	1	1	1	1	1	3060
116	0	0	0	0	0	0	0	1	1	1	1	3070
117	0	0	0	0	0	0	1	1	1	1	1	3060
118	0	0	0	0	0	0	0	1	1	1	1	3070
119	0	0	0	0	0	0	1	1	1	1	1	3060
120	0	0	0	0	0	0	1	1	1	1	1	3060
121	0	0	0	0	0	0	1	1	1	1	1	3060
122	0	0	0	0	0	0	0	1	1	1	1	3070
123	0	0	0	0	0	0	1	1	1	1	1	3060
124	0	0	0	0	0	0	0	1	1	1	1	3070
125	0	0	0	0	0	0	0	1	1	1	1	3070
126	0	0	0	0	0	0	0	1	1	1	1	3070
127	0	0	0	0	0	0	1	1	1	1	1	3060
128	0	0	0	0	0	0	0	1	1	1	1	3070
129	0	0	0	0	0	0	0	0	1	1	1	3080
130	0	0	0	0	0	0	0	1	1	1	1	3070
131	0	0	0	0	0	0	1	1	1	1	1	3060
132	0	0	0	0	0	0	1	1	1	1	1	3060
133	0	0	0	0	0	1	1	1	1	1	1	3050
134	0	0	0	0	0	0	0	1	1	1	1	3070
135	0	0	0	0	0	0	1	1	1	1	1	3060
136	0	0	0	0	0	0	0	1	1	1	1	3070
137	0	0	0	0	0	0	1	1	1	1	1	3060
138	0	0	0	0	0	0	1	1	1	1	1	3060
139	0	0	0	0	0	0	0	1	1	1	1	3070
140	0	0	0	0	0	0	1	1	1	1	1	3060
141	0	0	0	0	0	0	0	0	1	1	1	3080
142	0	0	0	0	0	0	1	1	1	1	1	3060
143	0	0	0	0	0	0	0	1	1	1	1	3070
144	0	0	0	0	0	0	1	1	1	1	1	3060
145	0	0	0	0	1	1	1	1	1	1	1	3040
146	0	0	0	0	0	0	1	1	1	1	1	3060
147	0	0	0	0	0	0	0	0	1	1	1	3080
148	0	0	0	0	0	0	0	0	1	1	1	3080
149	0	0	0	0	0	0	0	1	1	1	1	3070
150	0	0	0	0	0	0	0	0	1	1	1	3080
151	0	0	0	0	0	0	0	1	1	1	1	3070
152	0	0	0	0	0	0	0	0	1	1	1	3080
153	0	0	0	0	0	0	0	1	1	1	1	3070
154	0	0	0	0	0	0	0	1	1	1	1	3070
155	0	0	0	0	0	1	1	1	1	1	1	3050
156	0	0	0	0	0	0	1	1	1	1	1	3060
157	0	0	0	0	0	0	0	1	1	1	1	3070
158	0	0	0	0	0	0	1	1	1	1	1	3060
159	0	0	0	0	0	0	0	1	1	1	1	3070
160	0	0	0	0	0	0	0	1	1	1	1	3070
161	0	0	0	0	0	0	1	1	1	1	1	3060
162	0	0	0	0	0	0	1	1	1	1	1	3060
163	0	0	0	0	0	0	0	1	1	1	1	3070
164	0	0	0	0	0	0	0	0	1	1	1	3080
165	0	0	0	0	0	0	0	1	1	1	1	3070
166	0	0	0	0	0	0	0	0	1	1	1	3080
167	0	0	0	0	0	0	1	1	1	1	1	3060
168	0	0	0	0	0	0	1	1	1	1	1	3060
169	0	0	0	0	0	1	1	1	1	1	1	3050
170	0	0	0	0	0	0	1	1	1	1	1	3060
171	0	0	0	0	0	0	1	1	1	1	1	3060
172	0	0	0	0	0	0	0	1	1	1	1	3070
173	0	0	0	0	0	0	1	1	1	1	1	3060
174	0	0	0	0	0	0	0	1	1	1	1	3070
175	0	0	0	0	0	0	0	0	1	1	1	3080
176	0	0	0	0	0	0	0	0	1	1	1	3080
177	0	0	0	0	0	0	1	1	1	1	1	3060
178	0	0	0	0	0	0	0	1	1	1	1	3070
179	0	0	0	0	0	0	0	0	1	1	1	3080
180	0	0	0	0	0	0	0	1	1	1	1	3070
181	0	0	0	0	0	0	0	1	1	1	1	3070
182	0	0	0	0	0	1	1	1	1	1	1	3050
183	0	0	0	0	0	0	0	1	1	1	1	3070
184	0	0	0	0	0	0	0	0	1	1	1	3080
185	0	0	0	0	0	0	1	1	1	1	1	3060
186	0	0	0	0	0	0	1	1	1	1	1	3060
187	0	0	0	0	0	0	0	1	1	1	1	3070
188	0	0	0	0	0	0	0	1	1	1	1	3070
189	0	0	0	0	0	0	0	0	1	1	1	3080
190	0	0	0	0	0	0	1	1	1	1	1	3060
191	0	0	0	0	0	1	1	1	1	1	1	3050
192	0	0	0	0	0	0	0	1	1	1	1	3070
193	0	0	0	0	0	0	0	0	1	1	1	3080
194	0	0	0	0	0	0	0	1	1	1	1	3070
195	0	0	0	0	0	1	1	1	1	1	1	3050
196	0	0	0	0	0	0	1	1	1	1	1	3060
197	0	0	0	0	0	0	1	1	1	1	1	3060
198	0	0	0	0	0	0	0	1	1	1	1	3070
199	0	0	0	0	0	0	0	0	1	1	1	3080
200	0	0	0	0	0	0	1	1	1	1	1	3060
201	0	0	0	0	0	0	1	1	1	1	1	3060
202	0	0	0	0	0	0	0	1	1	1	1	3070
203	0	0	0	0	0	0	0	1	1	1	1	3070
204	0	0	0	0	0	1	1	1	1	1	1	3050
205	0	0	0	0	0	0	0	1	1	1	1	3070
206	0	0	0	0	0	0	0	1	1	1	1	3070
207	0	0	0	0	0	0	0	1	1	1	1	3070
208	0	0	0	0	0	0	0	1	1	1	1	3070
209	0	0	0	0	0	0	0	0	1	1	1	3080
210	0	0	0	0	0	1	1	1	1	1	1	3050

211	0	0	0	0	0	0	1	1	1	1	1	3060
212	0	0	0	0	0	0	0	0	1	1	1	3080
213	0	0	0	0	0	0	1	1	1	1	1	3060
214	0	0	0	0	0	0	0	1	1	1	1	3070
215	0	0	0	0	0	1	1	1	1	1	1	3050
216	0	0	0	0	0	0	0	1	1	1	1	3070
217	0	0	0	0	0	0	0	1	1	1	1	3070
218	0	0	0	0	0	0	1	1	1	1	1	3060
219	0	0	0	0	0	0	0	1	1	1	1	3070
220	0	0	0	0	0	0	0	1	1	1	1	3070
221	0	0	0	0	0	0	0	1	1	1	1	3070
222	0	0	0	0	0	0	0	1	1	1	1	3070
223	0	0	0	0	0	0	0	1	1	1	1	3070
224	0	0	0	0	0	0	1	1	1	1	1	3060
225	0	0	0	0	0	0	1	1	1	1	1	3060
226	0	0	0	0	0	0	0	0	1	1	1	3080
227	0	0	0	0	0	0	1	1	1	1	1	3060
228	0	0	0	0	0	0	0	0	1	1	1	3080
229	0	0	0	0	0	0	0	0	1	1	1	3080
230	0	0	0	0	0	0	1	1	1	1	1	3060
231	0	0	0	0	0	0	0	1	1	1	1	3070
232	0	0	0	0	0	0	0	0	1	1	1	3080
233	0	0	0	0	0	0	0	1	1	1	1	3070
234	0	0	0	0	0	0	1	1	1	1	1	3060
235	0	0	0	0	0	0	1	1	1	1	1	3060
236	0	0	0	0	0	0	0	0	0	1	1	3090
237	0	0	0	0	0	1	1	1	1	1	1	3050
238	0	0	0	0	0	0	0	1	1	1	1	3070
239	0	0	0	0	0	0	1	1	1	1	1	3060
240	0	0	0	0	0	0	1	1	1	1	1	3060
241	0	0	0	0	0	0	0	0	0	0	1	3100
242	0	0	0	0	0	0	0	0	1	1	1	3080
243	0	0	0	0	0	0	0	1	1	1	1	3070
244	0	0	0	0	0	0	0	0	0	1	1	3090
245	0	0	0	0	1	1	1	1	1	1	1	3040
246	0	0	0	0	0	0	0	1	1	1	1	3070
247	0	0	0	0	0	0	0	0	1	1	1	3080
248	0	0	0	0	0	0	0	1	1	1	1	3070
249	0	0	0	0	0	0	0	1	1	1	1	3070
250	0	0	0	0	0	0	1	1	1	1	1	3060
251	0	0	0	0	0	0	0	1	1	1	1	3070
252	0	0	0	0	0	0	1	1	1	1	1	3060
253	0	0	0	0	0	0	0	1	1	1	1	3070
254	0	0	0	0	0	0	0	1	1	1	1	3070
255	0	0	0	0	0	0	1	1	1	1	1	3060
256	0	0	0	0	0	0	0	1	1	1	1	3070
257	0	0	0	0	0	1	1	1	1	1	1	3050
258	0	0	0	0	0	1	1	1	1	1	1	3050
259	0	0	0	0	0	1	1	1	1	1	1	3050
260	0	0	0	0	0	0	1	1	1	1	1	3060
261	0	0	0	0	0	0	0	1	1	1	1	3070
262	0	0	0	0	0	0	0	1	1	1	1	3070
263	0	0	0	0	0	0	1	1	1	1	1	3060
264	0	0	0	0	0	0	0	1	1	1	1	3070
265	0	0	0	0	0	0	1	1	1	1	1	3060
266	0	0	0	0	0	0	0	0	1	1	1	3080
267	0	0	0	0	0	0	1	1	1	1	1	3060
268	0	0	0	0	0	0	0	1	1	1	1	3070
269	0	0	0	0	0	0	0	1	1	1	1	3070
270	0	0	0	0	0	0	1	1	1	1	1	3060
271	0	0	0	0	0	0	0	0	1	1	1	3080
272	0	0	0	0	0	0	0	1	1	1	1	3070
273	0	0	0	0	0	0	0	0	0	1	1	3090
274	0	0	0	0	0	1	1	1	1	1	1	3050
275	0	0	0	0	0	0	0	1	1	1	1	3070
276	0	0	0	0	0	0	0	0	1	1	1	3080
277	0	0	0	0	0	0	0	1	1	1	1	3070
278	0	0	0	0	0	0	0	1	1	1	1	3070
279	0	0	0	0	0	1	1	1	1	1	1	3050
280	0	0	0	0	0	0	1	1	1	1	1	3060
281	0	0	0	0	0	0	0	1	1	1	1	3070
282	0	0	0	0	0	0	0	1	1	1	1	3070
283	0	0	0	0	0	0	0	1	1	1	1	3070
284	0	0	0	0	0	0	0	0	1	1	1	3080
285	0	0	0	0	0	0	1	1	1	1	1	3060
286	0	0	0	0	0	0	0	1	1	1	1	3070
287	0	0	0	0	0	0	0	0	1	1	1	3080
288	0	0	0	0	0	0	0	1	1	1	1	3070
289	0	0	0	0	0	0	0	1	1	1	1	3070
290	0	0	0	0	0	0	0	1	1	1	1	3070
291	0	0	0	0	0	0	0	1	1	1	1	3070
292	0	0	0	0	0	0	1	1	1	1	1	3060
293	0	0	0	0	0	0	0	1	1	1	1	3070
294	0	0	0	0	0	0	0	0	1	1	1	3080
295	0	0	0	0	0	1	1	1	1	1	1	3050
296	0	0	0	0	0	0	1	1	1	1	1	3060
297	0	0	0	0	0	1	1	1	1	1	1	3050
298	0	0	0	0	0	0	0	0	1	1	1	3080
299	0	0	0	0	0	0	0	1	1	1	1	3070
300	0	0	0	0	0	0	0	1	1	1	1	3070
301	0	0	0	0	0	0	0	1	1	1	1	3070
302	0	0	0	0	1	1	1	1	1	1	1	3040
303	0	0	0	0	0	0	1	1	1	1	1	3060
304	0	0	0	0	0	0	0	1	1	1	1	3070
305	0	0	0	0	0	0	0	0	1	1	1	3080
306	0	0	0	0	0	0	1	1	1	1	1	3060
307	0	0	0	0	0	0	0	1	1	1	1	3070
308	0	0	0	0	0	0	1	1	1	1	1	3060
309	0	0	0	0	0	1	1	1	1	1	1	3050
310	0	0	0	0	0	0	0	0	1	1	1	3080
311	0	0	0	0	0	0	1	1	1	1	1	3060
312	0	0	0	0	0	0	0	0	0	1	1	3090
313	0	0	0	0	0	0	1	1	1	1	1	3060
314	0	0	0	0	0	0	1	1	1	1	1	3060
315	0	0	0	0	0	0	0	0	1	1	1	3080
316	0	0	0	0	0	0	1	1	1	1	1	3060
317	0	0	0	0	0	0	0	1	1	1	1	3070
318	0	0	0	0	0	0	1	1	1	1	1	3060
319	0	0	0	0	0	0	1	1	1	1	1	3060
320	0	0	0	0	0	0	1	1	1	1	1	3060

321	0	0	0	0	0	0	0	1	1	1	1	3070
322	0	0	0	0	0	0	0	1	1	1	1	3070
323	0	0	0	0	0	0	0	1	1	1	1	3070
324	0	0	0	0	0	0	0	0	1	1	1	3080
325	0	0	0	0	0	0	0	1	1	1	1	3070
326	0	0	0	0	0	0	1	1	1	1	1	3060
327	0	0	0	0	0	0	1	1	1	1	1	3060
328	0	0	0	0	0	0	0	1	1	1	1	3070
329	0	0	0	0	0	0	0	1	1	1	1	3070
330	0	0	0	0	0	0	1	1	1	1	1	3060
331	0	0	0	0	0	0	1	1	1	1	1	3060
332	0	0	0	0	0	0	0	1	1	1	1	3070
333	0	0	0	0	0	1	1	1	1	1	1	3050
334	0	0	0	0	0	1	1	1	1	1	1	3050
335	0	0	0	0	0	0	0	1	1	1	1	3070
336	0	0	0	0	0	0	0	1	1	1	1	3070
337	0	0	0	0	0	0	0	0	1	1	1	3080
338	0	0	0	0	0	1	1	1	1	1	1	3050
339	0	0	0	0	0	0	1	1	1	1	1	3060
340	0	0	0	0	0	0	0	0	1	1	1	3080
341	0	0	0	0	0	0	0	1	1	1	1	3070
342	0	0	0	0	0	0	0	1	1	1	1	3070
343	0	0	0	0	0	0	0	1	1	1	1	3070
344	0	0	0	0	0	0	0	1	1	1	1	3070
345	0	0	0	0	0	0	1	1	1	1	1	3060
346	0	0	0	0	0	0	1	1	1	1	1	3060
347	0	0	0	0	0	0	1	1	1	1	1	3060
348	0	0	0	0	0	0	0	0	0	0	1	3100
349	0	0	0	0	0	0	0	1	1	1	1	3070
350	0	0	0	0	0	0	0	1	1	1	1	3070
351	0	0	0	0	0	0	1	1	1	1	1	3060
352	0	0	0	0	0	0	1	1	1	1	1	3060
353	0	0	0	0	0	0	0	1	1	1	1	3070
354	0	0	0	0	0	0	0	1	1	1	1	3070
355	0	0	0	0	0	0	1	1	1	1	1	3060
356	0	0	0	0	0	0	0	1	1	1	1	3070
357	0	0	0	0	0	0	0	0	1	1	1	3080
358	0	0	0	0	0	0	1	1	1	1	1	3060
359	0	0	0	0	0	0	0	1	1	1	1	3070
360	0	0	0	0	1	1	1	1	1	1	1	3040
361	0	0	0	0	0	0	0	1	1	1	1	3070
362	0	0	0	0	0	0	0	1	1	1	1	3070
363	0	0	0	0	0	0	0	1	1	1	1	3070
364	0	0	0	0	0	1	1	1	1	1	1	3050
365	0	0	0	0	0	0	0	1	1	1	1	3070
366	0	0	0	0	0	0	0	1	1	1	1	3070
367	0	0	0	0	0	0	0	0	0	1	1	3090
368	0	0	0	0	0	0	0	0	1	1	1	3080
369	0	0	0	0	0	0	1	1	1	1	1	3060
370	0	0	0	0	0	0	1	1	1	1	1	3060
371	0	0	0	0	0	1	1	1	1	1	1	3050
372	0	0	0	0	0	0	1	1	1	1	1	3060
373	0	0	0	0	0	0	0	1	1	1	1	3070
374	0	0	0	0	0	0	1	1	1	1	1	3060
375	0	0	0	0	0	0	1	1	1	1	1	3060
376	0	0	0	0	0	1	1	1	1	1	1	3050
377	0	0	0	0	0	0	1	1	1	1	1	3060
378	0	0	0	0	0	0	0	1	1	1	1	3070
379	0	0	0	0	0	0	0	0	1	1	1	3080
380	0	0	0	0	0	0	1	1	1	1	1	3060
381	0	0	0	0	0	0	0	1	1	1	1	3070
382	0	0	0	0	0	0	0	1	1	1	1	3070
383	0	0	0	0	1	1	1	1	1	1	1	3040
384	0	0	0	0	0	0	0	0	1	1	1	3080
385	0	0	0	0	0	0	0	1	1	1	1	3070
386	0	0	0	0	0	0	0	1	1	1	1	3070
387	0	0	0	0	0	1	1	1	1	1	1	3050
388	0	0	0	0	0	0	0	1	1	1	1	3070
389	0	0	0	0	0	1	1	1	1	1	1	3050
390	0	0	0	0	0	0	1	1	1	1	1	3060
391	0	0	0	0	0	1	1	1	1	1	1	3050
392	0	0	0	0	0	1	1	1	1	1	1	3050
393	0	0	0	0	1	1	1	1	1	1	1	3040
394	0	0	0	0	0	0	1	1	1	1	1	3060
395	0	0	0	0	0	1	1	1	1	1	1	3050
396	0	0	0	0	0	0	1	1	1	1	1	3060
397	0	0	0	0	0	0	1	1	1	1	1	3060
398	0	0	0	0	0	0	1	1	1	1	1	3060
399	0	0	0	0	0	0	1	1	1	1	1	3060
400	0	0	0	0	0	0	1	1	1	1	1	3060
401	0	0	0	0	0	0	0	0	1	1	1	3080
402	0	0	0	0	0	0	1	1	1	1	1	3060
403	0	0	0	0	0	0	0	1	1	1	1	3070
404	0	0	0	0	0	0	1	1	1	1	1	3060
405	0	0	0	0	0	0	0	1	1	1	1	3070
406	0	0	0	0	0	0	0	0	1	1	1	3080
407	0	0	0	0	0	0	1	1	1	1	1	3060
408	0	0	0	0	0	1	1	1	1	1	1	3050
409	0	0	0	0	0	0	0	1	1	1	1	3070
410	0	0	0	0	0	0	1	1	1	1	1	3060
411	0	0	0	0	0	0	1	1	1	1	1	3060
412	0	0	0	0	0	0	0	0	1	1	1	3080
413	0	0	0	0	0	0	0	0	1	1	1	3080
414	0	0	0	0	0	0	1	1	1	1	1	3060
415	0	0	0	0	0	0	1	1	1	1	1	3060
416	0	0	0	0	0	0	0	1	1	1	1	3070
417	0	0	0	0	0	0	0	1	1	1	1	3070
418	0	0	0	0	0	0	0	0	1	1	1	3080
419	0	0	0	0	0	0	1	1	1	1	1	3060
420	0	0	0	0	0	0	0	0	0	1	1	3090
421	0	0	0	0	0	0	1	1	1	1	1	3060
422	0	0	0	0	0	1	1	1	1	1	1	3050
423	0	0	0	0	0	0	1	1	1	1	1	3060
424	0	0	0	0	0	0	1	1	1	1	1	3060
425	0	0	0	0	0	0	1	1	1	1	1	3060
426	0	0	0	0	0	0	1	1	1	1	1	3060
427	0	0	0	0	0	0	0	1	1	1	1	3070
428	0	0	0	0	0	0	1	1	1	1	1	3060
429	0	0	0	0	0	1	1	1	1	1	1	3050
430	0	0	0	0	0	0	0	0	0	1	1	3090

431	0	0	0	0	0	0	0	1	1	1	1	3070
432	0	0	0	0	0	0	0	1	1	1	1	3070
433	0	0	0	0	0	0	0	1	1	1	1	3070
434	0	0	0	0	0	0	0	0	1	1	1	3080
435	0	0	0	0	0	0	0	1	1	1	1	3070
436	0	0	0	0	0	0	0	0	1	1	1	3080
437	0	0	0	0	1	1	1	1	1	1	1	3040
438	0	0	0	0	0	1	1	1	1	1	1	3050
439	0	0	0	0	0	0	0	1	1	1	1	3070
440	0	0	0	0	0	1	1	1	1	1	1	3050
441	0	0	0	0	0	0	1	1	1	1	1	3060
442	0	0	0	0	0	0	0	1	1	1	1	3070
443	0	0	0	0	0	0	0	0	1	1	1	3080
444	0	0	0	0	1	1	1	1	1	1	1	3040
445	0	0	0	0	0	0	0	1	1	1	1	3070
446	0	0	0	0	0	0	1	1	1	1	1	3060
447	0	0	0	0	0	1	1	1	1	1	1	3050
448	0	0	0	0	0	0	0	1	1	1	1	3070
449	0	0	0	0	0	0	1	1	1	1	1	3060
450	0	0	0	0	0	0	1	1	1	1	1	3060
451	0	0	0	0	0	0	0	1	1	1	1	3070
452	0	0	0	0	0	1	1	1	1	1	1	3050
453	0	0	0	0	0	1	1	1	1	1	1	3050
454	0	0	0	0	0	0	1	1	1	1	1	3060
455	0	0	0	0	0	0	1	1	1	1	1	3060
456	0	0	0	0	0	0	0	1	1	1	1	3070
457	0	0	0	0	0	0	0	0	1	1	1	3080
458	0	0	0	0	0	0	0	1	1	1	1	3070
459	0	0	0	0	0	0	0	1	1	1	1	3070
460	0	0	0	0	0	0	0	0	1	1	1	3080
461	0	0	0	0	0	0	0	1	1	1	1	3070
462	0	0	0	0	0	0	0	0	1	1	1	3080
463	0	0	0	0	0	0	0	1	1	1	1	3070
464	0	0	0	0	0	0	0	0	1	1	1	3080
465	0	0	0	0	0	0	0	0	0	1	1	3090
466	0	0	0	0	0	0	0	0	1	1	1	3080
467	0	0	0	0	0	1	1	1	1	1	1	3050
468	0	0	0	0	0	0	0	1	1	1	1	3070
469	0	0	0	0	0	0	0	0	1	1	1	3080
470	0	0	0	0	0	0	1	1	1	1	1	3060
471	0	0	0	0	0	0	0	1	1	1	1	3070
472	0	0	0	0	0	0	1	1	1	1	1	3060
473	0	0	0	0	0	0	0	1	1	1	1	3070
474	0	0	0	0	0	1	1	1	1	1	1	3050
475	0	0	0	0	0	0	0	1	1	1	1	3070
476	0	0	0	0	0	0	1	1	1	1	1	3060
477	0	0	0	0	0	0	1	1	1	1	1	3060
478	0	0	0	0	0	0	0	1	1	1	1	3070
479	0	0	0	0	0	0	1	1	1	1	1	3060
480	0	0	0	0	0	0	1	1	1	1	1	3060
481	0	0	0	0	0	1	1	1	1	1	1	3050
482	0	0	0	0	0	0	0	1	1	1	1	3070
483	0	0	0	0	0	0	1	1	1	1	1	3060
484	0	0	0	0	0	1	1	1	1	1	1	3050
485	0	0	0	0	0	0	0	0	1	1	1	3080
486	0	0	0	0	0	0	0	1	1	1	1	3070
487	0	0	0	0	0	0	0	1	1	1	1	3070
488	0	0	0	0	0	0	0	0	1	1	1	3080
489	0	0	0	0	0	0	0	1	1	1	1	3070
490	0	0	0	0	0	0	1	1	1	1	1	3060
491	0	0	0	0	0	0	1	1	1	1	1	3060
492	0	0	0	0	0	0	1	1	1	1	1	3060
493	0	0	0	0	0	0	0	1	1	1	1	3070
494	0	0	0	0	0	0	1	1	1	1	1	3060
495	0	0	0	0	0	0	0	1	1	1	1	3070
496	0	0	0	0	0	0	0	1	1	1	1	3070
497	0	0	0	0	0	0	1	1	1	1	1	3060
498	0	0	0	0	0	1	1	1	1	1	1	3050
499	0	0	0	0	0	0	0	1	1	1	1	3070
500	0	0	0	0	0	0	0	1	1	1	1	3070
501	0	0	0	0	0	0	0	1	1	1	1	3070
502	0	0	0	0	0	0	0	1	1	1	1	3070
503	0	0	0	0	0	0	0	0	1	1	1	3080
504	0	0	0	0	0	0	0	0	1	1	1	3080
505	0	0	0	0	0	0	0	1	1	1	1	3070
506	0	0	0	0	0	0	1	1	1	1	1	3060
507	0	0	0	0	0	0	0	1	1	1	1	3070
508	0	0	0	0	0	0	0	1	1	1	1	3070
509	0	0	0	0	0	0	1	1	1	1	1	3060
510	0	0	0	0	0	1	1	1	1	1	1	3050
511	0	0	0	0	0	0	0	1	1	1	1	3070
512	0	0	0	0	0	0	0	1	1	1	1	3070
513	0	0	0	0	0	0	0	1	1	1	1	3070
514	0	0	0	0	0	1	1	1	1	1	1	3050
515	0	0	0	0	0	0	0	1	1	1	1	3070
516	0	0	0	0	0	0	0	1	1	1	1	3070
517	0	0	0	0	0	0	1	1	1	1	1	3060
518	0	0	0	0	0	0	0	1	1	1	1	3070
519	0	0	0	0	0	0	1	1	1	1	1	3060
520	0	0	0	0	0	0	0	1	1	1	1	3070
521	0	0	0	0	0	0	0	1	1	1	1	3070
522	0	0	0	0	0	0	0	0	1	1	1	3080
523	0	0	0	0	0	0	1	1	1	1	1	3060
524	0	0	0	0	0	0	0	0	1	1	1	3080
525	0	0	0	0	0	0	0	1	1	1	1	3070
526	0	0	0	0	0	0	0	1	1	1	1	3070
527	0	0	0	0	0	0	1	1	1	1	1	3060
528	0	0	0	0	0	0	0	1	1	1	1	3070
529	0	0	0	0	0	0	1	1	1	1	1	3060
530	0	0	0	0	0	0	1	1	1	1	1	3060
531	0	0	0	0	0	0	1	1	1	1	1	3060
532	0	0	0	0	0	0	1	1	1	1	1	3060
533	0	0	0	0	0	0	1	1	1	1	1	3060
534	0	0	0	0	0	1	1	1	1	1	1	3050
535	0	0	0	0	0	0	1	1	1	1	1	3060
536	0	0	0	0	0	1	1	1	1	1	1	3050
537	0	0	0	0	0	0	0	1	1	1	1	3070
538	0	0	0	0	0	0	0	1	1	1	1	3070
539	0	0	0	0	0	0	1	1	1	1	1	3060
540	0	0	0	0	0	0	0	1	1	1	1	3070

541	0	0	0	0	0	0	1	1	1	1	1	3060
542	0	0	0	0	0	0	1	1	1	1	1	3060
543	0	0	0	0	0	1	1	1	1	1	1	3050
544	0	0	0	0	0	0	0	1	1	1	1	3070
545	0	0	0	0	0	0	0	1	1	1	1	3070
546	0	0	0	0	0	1	1	1	1	1	1	3050
547	0	0	0	0	0	0	0	0	1	1	1	3080
548	0	0	0	0	0	0	0	1	1	1	1	3070
549	0	0	0	0	0	0	1	1	1	1	1	3060
550	0	0	0	0	0	0	0	1	1	1	1	3070
551	0	0	0	0	0	0	0	1	1	1	1	3070
552	0	0	0	0	0	0	1	1	1	1	1	3060
553	0	0	0	0	0	0	1	1	1	1	1	3060
554	0	0	0	0	0	1	1	1	1	1	1	3050
555	0	0	0	0	0	0	0	0	1	1	1	3080
556	0	0	0	0	0	0	1	1	1	1	1	3060
557	0	0	0	0	0	0	1	1	1	1	1	3060
558	0	0	0	0	0	0	0	0	1	1	1	3080
559	0	0	0	0	0	0	0	1	1	1	1	3070
560	0	0	0	0	0	0	1	1	1	1	1	3060
561	0	0	0	0	0	0	0	1	1	1	1	3070
562	0	0	0	0	0	0	0	0	1	1	1	3080
563	0	0	0	0	0	0	1	1	1	1	1	3060
564	0	0	0	0	0	0	0	0	1	1	1	3080
565	0	0	0	0	0	0	0	0	1	1	1	3080
566	0	0	0	0	0	0	1	1	1	1	1	3060
567	0	0	0	0	0	1	1	1	1	1	1	3050
568	0	0	0	0	0	0	0	0	1	1	1	3080
569	0	0	0	0	0	0	0	1	1	1	1	3070
570	0	0	0	0	0	0	1	1	1	1	1	3060
571	0	0	0	0	0	0	1	1	1	1	1	3060
572	0	0	0	0	0	0	0	1	1	1	1	3070
573	0	0	0	0	0	0	1	1	1	1	1	3060
574	0	0	0	0	0	1	1	1	1	1	1	3050
575	0	0	0	0	0	0	0	1	1	1	1	3070
576	0	0	0	0	0	0	0	1	1	1	1	3070
577	0	0	0	0	0	0	0	0	0	1	1	3090
578	0	0	0	0	0	0	0	1	1	1	1	3070
579	0	0	0	0	0	0	1	1	1	1	1	3060
580	0	0	0	0	0	0	1	1	1	1	1	3060
581	0	0	0	0	0	0	0	0	1	1	1	3080
582	0	0	0	0	0	1	1	1	1	1	1	3050
583	0	0	0	0	0	0	1	1	1	1	1	3060
584	0	0	0	0	0	0	1	1	1	1	1	3060
585	0	0	0	0	0	1	1	1	1	1	1	3050
586	0	0	0	0	0	0	1	1	1	1	1	3060
587	0	0	0	0	0	0	0	1	1	1	1	3070
588	0	0	0	0	0	0	1	1	1	1	1	3060
589	0	0	0	0	0	0	0	0	1	1	1	3080
590	0	0	0	0	0	0	1	1	1	1	1	3060
591	0	0	0	0	0	0	0	1	1	1	1	3070
592	0	0	0	0	0	0	0	0	1	1	1	3080
593	0	0	0	0	0	0	0	1	1	1	1	3070
594	0	0	0	0	0	0	0	0	1	1	1	3080
595	0	0	0	0	0	0	1	1	1	1	1	3060
596	0	0	0	0	0	0	0	0	1	1	1	3080
597	0	0	0	0	0	0	0	0	0	1	1	3090
598	0	0	0	0	0	1	1	1	1	1	1	3050
599	0	0	0	0	0	0	0	0	0	1	1	3090
600	0	0	0	0	0	0	1	1	1	1	1	3060
601	0	0	0	0	0	1	1	1	1	1	1	3050
602	0	0	0	0	0	0	1	1	1	1	1	3060
603	0	0	0	0	0	0	1	1	1	1	1	3060
604	0	0	0	0	0	0	0	1	1	1	1	3070
605	0	0	0	0	0	0	1	1	1	1	1	3060
606	0	0	0	0	0	0	0	1	1	1	1	3070
607	0	0	0	0	0	0	0	1	1	1	1	3070
608	0	0	0	0	0	0	0	0	1	1	1	3080
609	0	0	0	0	0	1	1	1	1	1	1	3050
610	0	0	0	0	0	0	1	1	1	1	1	3060
611	0	0	0	0	0	0	0	1	1	1	1	3070
612	0	0	0	0	0	0	0	0	1	1	1	3080
613	0	0	0	0	0	0	0	1	1	1	1	3070
614	0	0	0	0	0	0	1	1	1	1	1	3060
615	0	0	0	0	0	0	1	1	1	1	1	3060
616	0	0	0	0	0	0	1	1	1	1	1	3060
617	0	0	0	0	0	1	1	1	1	1	1	3050
618	0	0	0	0	0	1	1	1	1	1	1	3050
619	0	0	0	0	0	0	0	1	1	1	1	3070
620	0	0	0	0	0	0	0	0	1	1	1	3080
621	0	0	0	0	0	0	0	1	1	1	1	3070
622	0	0	0	0	0	0	0	1	1	1	1	3070
623	0	0	0	0	0	0	0	1	1	1	1	3070
624	0	0	0	0	0	1	1	1	1	1	1	3050
625	0	0	0	0	0	0	0	1	1	1	1	3070
626	0	0	0	0	0	0	0	0	1	1	1	3080
627	0	0	0	0	0	0	0	1	1	1	1	3070
628	0	0	0	0	0	0	0	0	1	1	1	3080
629	0	0	0	0	0	1	1	1	1	1	1	3050
630	0	0	0	0	0	0	1	1	1	1	1	3060
631	0	0	0	0	0	0	0	1	1	1	1	3070
632	0	0	0	0	0	1	1	1	1	1	1	3050
633	0	0	0	0	0	0	0	0	1	1	1	3080
634	0	0	0	0	0	0	1	1	1	1	1	3060
635	0	0	0	0	0	0	0	1	1	1	1	3070
636	0	0	0	0	0	0	1	1	1	1	1	3060
637	0	0	0	0	0	0	1	1	1	1	1	3060
638	0	0	0	0	0	0	1	1	1	1	1	3060
639	0	0	0	0	0	0	0	0	0	1	1	3090
640	0	0	0	0	0	0	1	1	1	1	1	3060
641	0	0	0	0	0	0	1	1	1	1	1	3060
642	0	0	0	0	0	1	1	1	1	1	1	3050
643	0	0	0	0	0	0	0	1	1	1	1	3070
644	0	0	0	0	0	0	0	1	1	1	1	3070
645	0	0	0	0	0	0	0	0	1	1	1	3080
646	0	0	0	0	0	0	0	0	1	1	1	3080
647	0	0	0	0	0	0	0	1	1	1	1	3070
648	0	0	0	0	0	0	1	1	1	1	1	3060
649	0	0	0	0	0	1	1	1	1	1	1	3050
650	0	0	0	0	0	0	1	1	1	1	1	3060

651	0	0	0	0	0	0	0	1	1	1	1	3070
652	0	0	0	0	0	0	0	1	1	1	1	3070
653	0	0	0	0	0	0	1	1	1	1	1	3060
654	0	0	0	0	0	0	1	1	1	1	1	3060
655	0	0	0	0	0	0	0	0	1	1	1	3080
656	0	0	0	0	0	0	1	1	1	1	1	3060
657	0	0	0	0	0	0	1	1	1	1	1	3060
658	0	0	0	0	0	0	0	1	1	1	1	3070
659	0	0	0	0	0	0	1	1	1	1	1	3060
660	0	0	0	0	0	0	1	1	1	1	1	3060
661	0	0	0	0	0	0	1	1	1	1	1	3060
662	0	0	0	0	0	1	1	1	1	1	1	3050
663	0	0	0	0	0	0	0	1	1	1	1	3070
664	0	0	0	0	0	0	0	0	1	1	1	3080
665	0	0	0	0	0	0	0	1	1	1	1	3070
666	0	0	0	0	0	0	1	1	1	1	1	3060
667	0	0	0	0	0	0	0	0	1	1	1	3080
668	0	0	0	0	0	0	1	1	1	1	1	3060
669	0	0	0	0	0	0	0	0	1	1	1	3080
670	0	0	0	0	0	1	1	1	1	1	1	3050
671	0	0	0	0	1	1	1	1	1	1	1	3040
672	0	0	0	0	0	0	0	1	1	1	1	3070
673	0	0	0	0	0	1	1	1	1	1	1	3050
674	0	0	0	0	0	0	0	0	1	1	1	3080
675	0	0	0	0	0	0	0	1	1	1	1	3070
676	0	0	0	0	0	0	1	1	1	1	1	3060
677	0	0	0	0	0	0	1	1	1	1	1	3060
678	0	0	0	0	0	0	0	1	1	1	1	3070
679	0	0	0	0	0	0	1	1	1	1	1	3060
680	0	0	0	0	0	0	1	1	1	1	1	3060
681	0	0	0	0	0	0	1	1	1	1	1	3060
682	0	0	0	0	0	0	0	0	1	1	1	3080
683	0	0	0	0	0	0	0	1	1	1	1	3070
684	0	0	0	0	0	0	0	1	1	1	1	3070
685	0	0	0	0	0	0	1	1	1	1	1	3060
686	0	0	0	0	0	0	0	1	1	1	1	3070
687	0	0	0	0	0	0	1	1	1	1	1	3060
688	0	0	0	0	0	0	0	0	0	1	1	3090
689	0	0	0	0	0	0	1	1	1	1	1	3060
690	0	0	0	0	0	0	0	0	1	1	1	3080
691	0	0	0	0	0	0	1	1	1	1	1	3060
692	0	0	0	0	0	0	0	1	1	1	1	3070
693	0	0	0	0	0	0	1	1	1	1	1	3060
694	0	0	0	0	0	0	0	0	1	1	1	3080
695	0	0	0	0	0	0	0	1	1	1	1	3070
696	0	0	0	0	0	0	1	1	1	1	1	3060
697	0	0	0	0	0	0	0	0	1	1	1	3080
698	0	0	0	0	0	0	1	1	1	1	1	3060
699	0	0	0	0	0	0	1	1	1	1	1	3060
700	0	0	0	0	0	0	1	1	1	1	1	3060
701	0	0	0	0	0	0	0	1	1	1	1	3070
702	0	0	0	0	1	1	1	1	1	1	1	3040
703	0	0	0	0	0	0	1	1	1	1	1	3060
704	0	0	0	0	0	0	1	1	1	1	1	3060
705	0	0	0	0	0	0	0	1	1	1	1	3070
706	0	0	0	0	0	0	1	1	1	1	1	3060
707	0	0	0	0	0	0	0	1	1	1	1	3070
708	0	0	0	0	0	0	0	1	1	1	1	3070
709	0	0	0	0	0	0	0	1	1	1	1	3070
710	0	0	0	0	0	0	0	1	1	1	1	3070
711	0	0	0	0	0	0	1	1	1	1	1	3060
712	0	0	0	0	0	0	1	1	1	1	1	3060
713	0	0	0	0	0	0	1	1	1	1	1	3060
714	0	0	0	0	0	1	1	1	1	1	1	3050
715	0	0	0	0	0	0	0	0	0	1	1	3090
716	0	0	0	0	0	0	0	1	1	1	1	3070
717	0	0	0	0	0	0	1	1	1	1	1	3060
718	0	0	0	0	0	0	1	1	1	1	1	3060
719	0	0	0	0	0	0	1	1	1	1	1	3060
720	0	0	0	0	0	1	1	1	1	1	1	3050
721	0	0	0	0	0	0	0	1	1	1	1	3070
722	0	0	0	0	0	0	1	1	1	1	1	3060
723	0	0	0	0	0	0	1	1	1	1	1	3060
724	0	0	0	0	0	0	0	0	1	1	1	3080
725	0	0	0	0	0	0	0	1	1	1	1	3070
726	0	0	0	0	0	0	0	1	1	1	1	3070
727	0	0	0	0	0	0	1	1	1	1	1	3060
728	0	0	0	0	0	0	1	1	1	1	1	3060
729	0	0	0	0	0	0	0	0	0	1	1	3090
730	0	0	0	0	0	0	1	1	1	1	1	3060
731	0	0	0	0	0	0	1	1	1	1	1	3060
732	0	0	0	0	0	0	0	0	1	1	1	3080
733	0	0	0	0	0	0	1	1	1	1	1	3060
734	0	0	0	0	0	0	0	0	1	1	1	3080
735	0	0	0	0	0	0	0	1	1	1	1	3070
736	0	0	0	0	0	0	1	1	1	1	1	3060
737	0	0	0	0	0	0	0	1	1	1	1	3070
738	0	0	0	0	0	0	1	1	1	1	1	3060
739	0	0	0	0	0	0	0	1	1	1	1	3070
740	0	0	0	0	0	0	1	1	1	1	1	3060
741	0	0	0	0	0	0	0	1	1	1	1	3070
742	0	0	0	0	0	0	0	1	1	1	1	3070
743	0	0	0	0	0	0	0	1	1	1	1	3070
744	0	0	0	0	0	0	0	0	0	1	1	3090
745	0	0	0	0	0	1	1	1	1	1	1	3050
746	0	0	0	0	0	0	1	1	1	1	1	3060
747	0	0	0	0	0	0	1	1	1	1	1	3060
748	0	0	0	0	0	0	0	1	1	1	1	3070
749	0	0	0	0	0	0	1	1	1	1	1	3060
750	0	0	0	0	0	0	0	1	1	1	1	3070
751	0	0	0	0	0	0	1	1	1	1	1	3060
752	0	0	0	0	0	0	0	1	1	1	1	3070
753	0	0	0	1	1	1	1	1	1	1	1	3030
754	0	0	0	0	0	1	1	1	1	1	1	3050
755	0	0	0	0	0	0	0	1	1	1	1	3070
756	0	0	0	0	0	0	0	1	1	1	1	3070
757	0	0	0	0	0	0	1	1	1	1	1	3060
758	0	0	0	0	0	1	1	1	1	1	1	3050
759	0	0	0	0	0	0	1	1	1	1	1	3060
760	0	0	0	0	0	0	0	0	1	1	1	3080

761	0	0	0	0	0	0	0	0	1	1	1	3080
762	0	0	0	0	0	0	0	1	1	1	1	3070
763	0	0	0	0	0	0	0	1	1	1	1	3070
764	0	0	0	0	0	0	1	1	1	1	1	3060
765	0	0	0	0	0	0	0	1	1	1	1	3070
766	0	0	0	0	0	1	1	1	1	1	1	3050
767	0	0	0	0	0	0	1	1	1	1	1	3060
768	0	0	0	0	0	0	0	1	1	1	1	3070
769	0	0	0	0	0	0	0	1	1	1	1	3070
770	0	0	0	0	0	0	0	1	1	1	1	3070
771	0	0	0	0	0	0	1	1	1	1	1	3060
772	0	0	0	0	0	0	0	1	1	1	1	3070
773	0	0	0	0	0	0	0	1	1	1	1	3070
774	0	0	0	0	0	0	0	1	1	1	1	3070
775	0	0	0	0	1	1	1	1	1	1	1	3040
776	0	0	0	0	0	0	0	1	1	1	1	3070
777	0	0	0	0	0	0	0	1	1	1	1	3070
778	0	0	0	0	0	1	1	1	1	1	1	3050
779	0	0	0	0	0	0	1	1	1	1	1	3060
780	0	0	0	0	0	0	1	1	1	1	1	3060
781	0	0	0	0	0	0	0	1	1	1	1	3070
782	0	0	0	0	0	0	0	0	1	1	1	3080
783	0	0	0	0	0	0	1	1	1	1	1	3060
784	0	0	0	0	0	0	0	1	1	1	1	3070
785	0	0	0	0	0	0	1	1	1	1	1	3060
786	0	0	0	0	0	0	0	0	0	1	1	3090
787	0	0	0	0	0	0	0	1	1	1	1	3070
788	0	0	0	0	0	0	0	1	1	1	1	3070
789	0	0	0	0	0	0	0	1	1	1	1	3070
790	0	0	0	0	0	0	0	1	1	1	1	3070
791	0	0	0	0	0	0	0	1	1	1	1	3070
792	0	0	0	0	0	1	1	1	1	1	1	3050
793	0	0	0	0	0	0	0	1	1	1	1	3070
794	0	0	0	0	0	0	0	1	1	1	1	3070
795	0	0	0	0	0	0	0	1	1	1	1	3070
796	0	0	0	0	0	0	0	0	1	1	1	3080
797	0	0	0	0	0	0	0	0	1	1	1	3080
798	0	0	0	0	0	0	0	1	1	1	1	3070
799	0	0	0	0	0	0	0	1	1	1	1	3070
800	0	0	0	0	0	1	1	1	1	1	1	3050
801	0	0	0	0	0	0	0	1	1	1	1	3070
802	0	0	0	0	0	0	1	1	1	1	1	3060
803	0	0	0	0	0	1	1	1	1	1	1	3050
804	0	0	0	0	0	0	1	1	1	1	1	3060
805	0	0	0	0	0	1	1	1	1	1	1	3050
806	0	0	0	0	0	0	0	1	1	1	1	3070
807	0	0	0	0	0	0	1	1	1	1	1	3060
808	0	0	0	0	0	1	1	1	1	1	1	3050
809	0	0	0	0	0	0	1	1	1	1	1	3060
810	0	0	0	0	0	0	0	1	1	1	1	3070
811	0	0	0	0	0	0	0	0	1	1	1	3080
812	0	0	0	0	0	0	0	1	1	1	1	3070
813	0	0	0	0	0	0	1	1	1	1	1	3060
814	0	0	0	0	0	0	0	1	1	1	1	3070
815	0	0	0	0	0	0	0	1	1	1	1	3070
816	0	0	0	0	0	0	0	0	1	1	1	3080
817	0	0	0	0	0	0	0	0	1	1	1	3080
818	0	0	0	0	0	0	1	1	1	1	1	3060
819	0	0	0	0	0	0	0	1	1	1	1	3070
820	0	0	0	0	0	0	0	1	1	1	1	3070
821	0	0	0	0	0	0	0	1	1	1	1	3070
822	0	0	0	0	0	0	0	1	1	1	1	3070
823	0	0	0	0	0	0	1	1	1	1	1	3060
824	0	0	0	0	0	0	1	1	1	1	1	3060
825	0	0	0	0	0	0	0	0	1	1	1	3080
826	0	0	0	0	0	0	1	1	1	1	1	3060
827	0	0	0	0	0	0	0	0	1	1	1	3080
828	0	0	0	0	0	0	1	1	1	1	1	3060
829	0	0	0	0	0	0	1	1	1	1	1	3060
830	0	0	0	0	0	0	1	1	1	1	1	3060
831	0	0	0	0	0	0	0	1	1	1	1	3070
832	0	0	0	0	0	0	1	1	1	1	1	3060
833	0	0	0	0	0	0	0	0	1	1	1	3080
834	0	0	0	0	0	0	0	0	1	1	1	3080
835	0	0	0	0	0	0	1	1	1	1	1	3060
836	0	0	0	0	0	0	0	1	1	1	1	3070
837	0	0	0	0	0	0	0	1	1	1	1	3070
838	0	0	0	0	0	0	1	1	1	1	1	3060
839	0	0	0	0	0	0	0	1	1	1	1	3070
840	0	0	0	0	0	0	1	1	1	1	1	3060
841	0	0	0	0	0	0	1	1	1	1	1	3060
842	0	0	0	0	0	0	1	1	1	1	1	3060
843	0	0	0	0	0	0	0	1	1	1	1	3070
844	0	0	0	0	0	1	1	1	1	1	1	3050
845	0	0	0	0	0	0	0	1	1	1	1	3070
846	0	0	0	0	0	0	1	1	1	1	1	3060
847	0	0	0	0	0	0	1	1	1	1	1	3060
848	0	0	0	0	0	0	0	1	1	1	1	3070
849	0	0	0	0	0	0	0	1	1	1	1	3070
850	0	0	0	0	0	0	1	1	1	1	1	3060
851	0	0	0	0	0	0	1	1	1	1	1	3060
852	0	0	0	0	0	0	0	1	1	1	1	3070
853	0	0	0	0	0	0	0	0	1	1	1	3080
854	0	0	0	0	0	0	1	1	1	1	1	3060
855	0	0	0	0	0	0	1	1	1	1	1	3060
856	0	0	0	0	0	0	1	1	1	1	1	3060
857	0	0	0	0	0	0	0	0	1	1	1	3080
858	0	0	0	0	0	0	0	1	1	1	1	3070
859	0	0	0	0	0	0	1	1	1	1	1	3060
860	0	0	0	0	0	0	0	1	1	1	1	3070
861	0	0	0	0	0	0	1	1	1	1	1	3060
862	0	0	0	0	0	0	0	1	1	1	1	3070
863	0	0	0	0	0	0	1	1	1	1	1	3060
864	0	0	0	0	0	0	1	1	1	1	1	3060
865	0	0	0	0	0	0	0	1	1	1	1	3070
866	0	0	0	0	0	0	0	1	1	1	1	3070
867	0	0	0	0	1	1	1	1	1	1	1	3040
868	0	0	0	0	0	0	0	1	1	1	1	3070
869	0	0	0	0	0	0	0	1	1	1	1	3070
870	0	0	0	0	0	0	1	1	1	1	1	3060

871	0	0	0	0	0	0	1	1	1	1	1	3060
872	0	0	0	0	0	0	0	0	1	1	1	3080
873	0	0	0	0	0	0	1	1	1	1	1	3060
874	0	0	0	0	0	0	0	1	1	1	1	3070
875	0	0	0	0	0	1	1	1	1	1	1	3050
876	0	0	0	0	0	0	0	1	1	1	1	3070
877	0	0	0	0	0	0	0	1	1	1	1	3070
878	0	0	0	0	0	1	1	1	1	1	1	3050
879	0	0	0	0	0	1	1	1	1	1	1	3050
880	0	0	0	0	0	0	0	1	1	1	1	3070
881	0	0	0	0	0	0	0	1	1	1	1	3070
882	0	0	0	0	0	1	1	1	1	1	1	3050
883	0	0	0	0	0	0	0	0	1	1	1	3080
884	0	0	0	0	0	0	1	1	1	1	1	3060
885	0	0	0	0	0	0	1	1	1	1	1	3060
886	0	0	0	0	0	0	0	1	1	1	1	3070
887	0	0	0	0	0	0	1	1	1	1	1	3060
888	0	0	0	0	0	0	0	0	1	1	1	3080
889	0	0	0	0	0	0	0	1	1	1	1	3070
890	0	0	0	0	0	0	0	0	1	1	1	3080
891	0	0	0	0	0	0	0	1	1	1	1	3070
892	0	0	0	0	0	1	1	1	1	1	1	3050
893	0	0	0	0	0	0	0	0	1	1	1	3080
894	0	0	0	0	0	0	0	1	1	1	1	3070
895	0	0	0	0	0	1	1	1	1	1	1	3050
896	0	0	0	0	0	0	0	1	1	1	1	3070
897	0	0	0	0	0	0	1	1	1	1	1	3060
898	0	0	0	0	0	0	1	1	1	1	1	3060
899	0	0	0	0	0	0	0	0	0	1	1	3090
900	0	0	0	0	0	0	0	1	1	1	1	3070
901	0	0	0	0	0	0	0	1	1	1	1	3070
902	0	0	0	0	0	0	0	1	1	1	1	3070
903	0	0	0	0	0	0	0	1	1	1	1	3070
904	0	0	0	0	0	0	0	1	1	1	1	3070
905	0	0	0	0	0	0	0	1	1	1	1	3070
906	0	0	0	0	0	0	0	1	1	1	1	3070
907	0	0	0	0	0	0	1	1	1	1	1	3060
908	0	0	0	0	0	0	1	1	1	1	1	3060
909	0	0	0	0	0	0	0	1	1	1	1	3070
910	0	0	0	0	0	0	1	1	1	1	1	3060
911	0	0	0	0	0	0	0	1	1	1	1	3070
912	0	0	0	0	1	1	1	1	1	1	1	3040
913	0	0	0	0	0	0	0	1	1	1	1	3070
914	0	0	0	0	0	0	0	1	1	1	1	3070
915	0	0	0	0	0	0	1	1	1	1	1	3060
916	0	0	0	0	0	0	0	1	1	1	1	3070
917	0	0	0	0	0	1	1	1	1	1	1	3050
918	0	0	0	0	0	0	1	1	1	1	1	3060
919	0	0	0	0	0	0	0	1	1	1	1	3070
920	0	0	0	0	0	0	0	1	1	1	1	3070
921	0	0	0	0	0	0	0	0	1	1	1	3080
922	0	0	0	0	0	0	0	1	1	1	1	3070
923	0	0	0	0	0	1	1	1	1	1	1	3050
924	0	0	0	0	0	0	1	1	1	1	1	3060
925	0	0	0	0	0	0	0	1	1	1	1	3070
926	0	0	0	0	0	0	0	0	1	1	1	3080
927	0	0	0	0	0	1	1	1	1	1	1	3050
928	0	0	0	0	0	0	0	1	1	1	1	3070
929	0	0	0	0	0	0	0	0	0	1	1	3090
930	0	0	0	0	0	0	0	1	1	1	1	3070
931	0	0	0	0	0	0	1	1	1	1	1	3060
932	0	0	0	0	0	0	0	1	1	1	1	3070
933	0	0	0	0	0	0	1	1	1	1	1	3060
934	0	0	0	0	0	0	1	1	1	1	1	3060
935	0	0	0	0	0	0	1	1	1	1	1	3060
936	0	0	0	0	0	0	0	0	1	1	1	3080
937	0	0	0	0	0	0	0	0	1	1	1	3080
938	0	0	0	0	0	0	0	1	1	1	1	3070
939	0	0	0	0	0	1	1	1	1	1	1	3050
940	0	0	0	0	0	0	1	1	1	1	1	3060
941	0	0	0	0	0	0	0	1	1	1	1	3070
942	0	0	0	0	0	0	0	0	1	1	1	3080
943	0	0	0	0	0	0	0	0	1	1	1	3080
944	0	0	0	0	0	0	1	1	1	1	1	3060
945	0	0	0	0	0	0	1	1	1	1	1	3060
946	0	0	0	0	0	0	0	1	1	1	1	3070
947	0	0	0	0	0	0	0	0	1	1	1	3080
948	0	0	0	0	0	0	0	0	1	1	1	3080
949	0	0	0	0	0	0	1	1	1	1	1	3060
950	0	0	0	0	0	0	0	1	1	1	1	3070
951	0	0	0	0	0	0	1	1	1	1	1	3060
952	0	0	0	0	0	0	0	0	1	1	1	3080
953	0	0	0	0	0	0	0	0	1	1	1	3080
954	0	0	0	0	0	0	1	1	1	1	1	3060
955	0	0	0	0	0	1	1	1	1	1	1	3050
956	0	0	0	0	0	0	0	1	1	1	1	3070
957	0	0	0	0	0	0	0	0	1	1	1	3080
958	0	0	0	0	0	0	0	1	1	1	1	3070
959	0	0	0	0	0	0	0	1	1	1	1	3070
960	0	0	0	0	0	0	1	1	1	1	1	3060
961	0	0	0	0	0	1	1	1	1	1	1	3050
962	0	0	0	0	0	0	1	1	1	1	1	3060
963	0	0	0	0	0	0	0	1	1	1	1	3070
964	0	0	0	0	0	0	1	1	1	1	1	3060
965	0	0	0	0	0	0	0	1	1	1	1	3070
966	0	0	0	0	0	0	0	0	1	1	1	3080
967	0	0	0	0	0	0	1	1	1	1	1	3060
968	0	0	0	0	0	0	0	0	1	1	1	3080
969	0	0	0	0	0	0	1	1	1	1	1	3060
970	0	0	0	0	0	0	1	1	1	1	1	3060
971	0	0	0	0	0	0	1	1	1	1	1	3060
972	0	0	0	0	0	0	0	0	1	1	1	3080
973	0	0	0	0	0	1	1	1	1	1	1	3050
974	0	0	0	0	0	0	1	1	1	1	1	3060
975	0	0	0	0	0	0	0	0	1	1	1	3080
976	0	0	0	0	0	0	1	1	1	1	1	3060
977	0	0	0	0	0	0	0	0	1	1	1	3080
978	0	0	0	0	0	0	1	1	1	1	1	3060
979	0	0	0	0	0	0	1	1	1	1	1	3060
980	0	0	0	0	0	0	0	0	1	1	1	3080
981	0	0	0	0	0	1	1	1	1	1	1	3050
982	0	0	0	0	0	0	0	1	1	1	1	3070
983	0	0	0	0	0	0	0	1	1	1	1	3070
984	0	0	0	0	0	0	1	1	1	1	1	3060
985	0	0	0	0	0	0	0	1	1	1	1	3070
986	0	0	0	0	0	0	1	1	1	1	1	3060
987	0	0	0	0	0	0	1	1	1	1	1	3060
988	0	0	0	0	0	0	0	1	1	1	1	3070
989	0	0	0	0	0	0	0	1	1	1	1	3070
990	0	0	0	0	0	0	0	1	1	1	1	3070

991	0	0	0	0	0	0	0	0	1	1	1	3080
992	0	0	0	0	0	0	0	1	1	1	1	3070
993	0	0	0	0	0	0	0	1	1	1	1	3070
994	0	0	0	0	0	0	0	1	1	1	1	3070
995	0	0	0	0	0	0	0	0	1	1	1	3080
996	0	0	0	0	0	0	0	1	1	1	1	3070
997	0	0	0	0	0	0	0	0	1	1	1	3080
998	0	0	0	0	0	1	1	1	1	1	1	3050
999	0	0	0	0	0	0	0	1	1	1	1	3070
1000	0	0	0	0	0	0	0	0	1	1	1	3080