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The oxidation of sulfur dioxide in a regenerative reactor

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THE OXIDATION OF SULFUR DIOXIDE IN A REGENERATIVE REACTOR

BY

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ABSTRACT

A novel dual-unit sulfuric acid converter is depicted that performs in cyclic operation in unsteady state. A mathematical model and IBM 1130 Computer program were developed to show the temperature and conversion profiles in commercial-sized vanadium oxide catalyst beds. In the catalytic oxidation of sulfur dioxide conversions of 95-97% were attained without benefit of conventional heat exchangers. A single exchanger operating in conjunction with the dual-unit system might attain conversions as high as 99%.

ACKNOWLEDGMENTS

The author wishes to express his gratitude to the Allied Chemical Corporation for the use of the IBM 1130 Digital Computer; to Dr. Deran Hanesian for his guidance, assistance and encouragements; and to the author's wife, Grace, for her patience and understanding throughout the prolonged period of this endeavour.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

THE PROBLEM

The pebble heater was developed for the purpose of heating steam to temperatures higher than could be obtained in metallic units. It has been used to heat air, hydrogen, methane, steam, etc., for use in industrial operations, as well as, to recover the heat from hot effluent process gases. Thermal regenerators, such as the pebble stove, have been used to obtain air preheat temperatures of 2800°F in blast furnace operation. These pebble-stove regenerators, in addition to the attainment of elevated temperatures, can perform a second function:

> Extremely high thermal efficiences are observed to be an inherent characteristic of this type of heat exchanger and indicate its importance in processes where gases are subjected to a specified and restricted time-temperature history.[1]

Gilbert and Daniels[2] used magnesia refractory pebble stoves to preheat air to 3600°F in a process for the fixation of nitrogen; i.e., heating air to temperatures

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[1] J. H. Perry, R. H. Perry, C. H. Chilton and S. D. Kirkpatrick, Chemical Engineer's Handbook. New York: McGraw-Hill Book Company, 1963, chap., 9, p. 58.

[2] N. Gilbert and F. Daniels, Ind. & Eng. Chem., 40, 1719 (1948).

such that nitric acid was formed, then chilling it rapidly before the reverse reaction could take place appreciably.

In the manufacture of sulfuric acid by the contact process, the sulfur dioxide is oxidized to sulfur trioxide in a catalytic converter equipped with internal or external heat exchangers to obtain maximum conversion. This is dictated by the fact that conversion decreases, while rate of reaction increases, with increasing temperatures. It is customary to use three or four layers of catalyst with interstage cooling to obtain conversions of 97 to 99 percent. As stated by Duecker and West[3]:

> In the reaction a rapid rate of reaction is incompatible with a high thermodynamic conversion; therefore, control of the temperature at an optimum value is necessary to obtain sulfuric acid on the most economical basis.

References cited by Duecker and West[4] show that vanadium catalysts operated continuously at high temperatures (1,112 to 1,148°F) show perceptible decreases in

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[3]W. W. Duecker and J. R. West, The Manufacture of Sulfuric Acid. New York: Reinhold Publishing Corporation, 1959, p. 204.

[4]W. W. Duecker and J. R. West, op. cit., p. 184.

catalyst activity.

It should be possible to use a regenerator (pebble stove) reactor (packed with vanadium catalyst) to obtain high conversions. This could decrease heat exchanger cost, increase catalyst life (by avoiding exposure of the catalyst to high temperatures for extended periods) and simplify temperature control, while obtaining maximum conversion. The feasibility of this visualized process can readily be studied by simulation with the use of a digital computer.

Statement of the Problem

It was the purpose of this study to determine the temperature and conversion profiles in a dual catalyst bed system employing cyclic operation (rapid reversal of flows) for the oxidation of sulfur dioxide to sulfur trioxide. Simulation was achieved by the development of a mathematical model. Calculations were performed on an IBM 1130 Digital Computer.

Importance of the Study

The danger of air pollution from sulfur dioxide is causing considerable concern to our nation today. Although the contact process for sulfuric acid manufacture has been studied and employed for many years, Duecker and

West[5] state:

> Design of catalytic converters from published data must at present be largely empirical.

Emphasis has been placed on optimizing costs and maximizing conversions, studying reaction kinetics for vanadium and platinum catalysts and postulating mechanisms for the reaction rate equation. Eklund[5] was one of the few researchers who measured conversions at various catalyst bed depths for a single flow rate, catalyst size and initial gas composition. This study could provide an insight on optimizing reactor design. If a less expensive reactor system could be devised as a result of this study, more funds could be spent on reducing the amount of effluent sulfur dioxide without markedly increasing the production cost of sulfuric acid.

Review of the Literature

Heat transfer in packed beds. Several processes embodying chemical reaction have taken advantage of the excellent heat transfer performance of the pebble bed regenerator: nitric oxide production by the heating and chilling of air[2]; the fixation of acetylene by the

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[5]W. W. Duecker and J. R. West, op. cit., p. 168.

Wisconsin process[6]; the reaction of methane and steam to produce hydrogen and carbon dioxide[7] and the cracking of hydrocarbons (ethane, butane, etc.) to make ethylene and acetylene[8]. The literature data covers the general overall performances of these units.

Since the use of these regenerators, as heat exchangers, poses many interesting problems, a considerable number of articles describing the various methods of predicting, solving and investigating this means of heat transfer have been published. Norton[9] pioneered the use of the pebble stove. One of the first attempts at the mathematical solution of this type of heat transfer was made by Schumann[10]. He developed a complete and comprehensive theory for heat transfer from a non-compressible fluid to a bed of small particles. The calculated coefficients of heat transfer varied as functions of absolute temperature, gas velocity and diameter of the particles. The temperature distribution

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[6]P. K. Leung and D. Quon, Can. J. Chem. Eng., 26 (Feb., 1966).

[7]C. K. Buell and A. Clark, U. S. Patent 2,699,986 (1955).

[8]M. O. Kilpatrick, L. E. Dean, D. S. Hall and K. W. Seed, Pet. Refiner, 33, 171 (1954).

[9]C. L. Norton, Jr., Chem. & Met. Eng., 116 (July, 1946)

[10]T. E. W. Schumann, Franklin Inst. J., 208, 405 (1929)

curves were calculated by the solutions of Bessel Functions for the transfer of heat for a fluid passing through a porous solid. Temperatures of the solid and gas were depicted as functions of time and distance. Unfortunately the range of values which he covered is far below the values encountered in practical industrial application.

Furnas[11] determined experimentally temperatures of hot gases passing through various types and sizes of solid particles. The temperature-time curves, thus obtained, were compared with Schumann's theoretical curves for different assumed heat transfer coefficients. By finding the theoretical curve which most nearly resembled in shape the experimental one, a value of the heat transfer coefficient was deduced. It is doubtful whether Furnas' results are applicable, except in the particular circumstances of his experiments, since the heat capacity of the container was several times that of the particles inside, the flow of gas was not uniformly distributed and the wall effects could not be disregarded; i.e., the ratio of bed diameter to particle diameter was low.

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[11] C. C. Furnas, Ind. & Eng. Chem., 22, 26-31 (1930).

Saunders and Ford[12] studied the effects of passing hot air through beds of steele, lead or glass spheres with varying diameters and bed depths. Curves are given for the heat transfer and for calculating the variation of gas temperature through a given bed at any given moment. It is shown, for example, that the time taken to attain a given temperature at a given depth of bed is directly proportional to the specific heat and density of the particles; inversely, proportional to the gas velocity and only slightly affected by changes of particle size. These data gave good fit with Schumann's curves. Two important conclusions were noted: the heat is transfereed largely by convection; the velocity distribution across the bed is uniform.

Ledoux[13] developed a graphical method for the determination of the cooling curves for a bed of broken solids. The curves are plotted in dimensionless coordinates so that they may be used with any consistent system of units for the solution of cooling problems. The heat transfer equations were derived by graphical solution of partial differential equations.

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[12] O. A. Saunders and D. Ford, Iron and Steel Inst. J., 141, 291 (1940).

[13] E. Ledoux, Ind. & Eng. Chem., 40, 1970 (1948)

Lancashire, Lezberg and Morris[14, 15] used a regenerative pebble-bed heat exchanger in order to produce large quantities of high-temperature air for use on the experimental evaluation of hypersonic flight problems. Heat transfer coefficients were computed via a modified method of matching Schumann's curves. The screening of the experimental data eliminated those values of the heat-transfer coefficients which gave somewhat arbitrary matches with the theoretical curves. From a statistical viewpoint, the data, which gave the most reliable matches, have a standard deviation of 25.2% with a near normal distribution.

Since Furnas and Saunders and Ford compared results with Schumann and all showed or assumed neglibible resistance to heat transfer within the particles, Lovell and Karnofsky[16] developed a mathematical method to take into account the resistance to heat transfer by conduction. A differential equation for heat conduction within the

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[14] R. B. Lancashire, E. A. Lezberg and J. F. Morris, NASA Technical Note D-265 (March, 1960)

[15] R. B. Lancashire, E. A. Lezberg and J. F. Morris, Ind. & Eng. Chem., 52, 433-434 (1960).

[16] C. L. Lovell and G. Karnofsky, Ind. & Eng. Chem., 35, 391 (1943).

particle is set up. The method of solving the partial differential equation for the heat conditions under a given set of boundary conditions involves a graphical solution by the Schmidt method.

Klinkerberg[17] simplified the differential equations of heat and mass transfer. His results were similar to those of Schumann and Furnas. He was able to approximate these curves by error function equations. Accordingly, he devised a nomograph to obtain values of the error functions.

Grossman[18] extended the method of graphical solutions to the calculation of temperatures in catalytic converters. The results were obtained by trial and error computations involving finite difference and graphical procedures.

Schalwijk[19] noted that regenerative heaters do not have 100 percent efficiency, since the gases have different mean temperatures during the heating and cooling period. He solved the differential equations of heat transfer using Eigen functions.

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[17] A. Klinkerberg, Ind. & Eng. Chem., 40, 1992-1994 (1948).

[18] L. M. Grossman, Trans. A. I. Ch. E., 42, 535 (1946).

[19] W. F. Schalkwijk, Brit. Chem. Eng., 5, 33 (1960).

New methods of treating heat transfer in fixed beds were advanced with the development of modern mass transport computations. Bird[20] and his co-workers developed a solution of the problem of a chemical reaction being carried out in a fixed-bed flow reactor; noting that:

> In a chemical reaction thermal energy is produced or consumed when the atoms of the reactant molecules rearrange to form the products. The volume rate of thermal energy production by chemical reactions, S_c, is in general a complicated function of pressure, temperature, composition and catalyst activity. For simplicity, we represent S_c here as a function of temperature only and assume a linear temperature dependence:
>
> $$S_c = S_{c1} \frac{T - T^o}{T_1 - T^o} \qquad (1)$$
>
> Here T is the local temperature in the catalyst bed (assumed equal for catalyst and fluid*), and S_{c1} and T^o are empirical constants for the given reactor inlet conditions. More realistic expressions for S_c can be handled by numerical methods.
>
> *The temperature difference between catalyst and fluid is not always neglibible.

In the development, the mechanism of heat transfer was

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[20] R. B. Bird, W. E. Stewart and E. N. Lightfoot, "Transport Phenomena", New York: John Wiley & Sons, Inc., 1960, pp. 279-283.

"heat conduction with chemical heat source". Upon completion of the development it was noted that the previous equation (upon which the development was based) is reasonable only when the composition change is small; i. e., for short reactors, for high flow rates, or for slow reactions; and that the reacting system does attain a steady state. This treatment is not valid for this problem in SO_2 oxidation since the composition change is great, a long reactor is used, flow rates are moderately low, the reaction is extremely fast and the reaction proceeds under conditions of unstedy state. The authors point out[21] that in problems involving energy balances in nonisothermal systems it is necessary or convenient to use a less detailed analysis than that for isothermal systems. The usual procedure is to correlate dimensional analysis of the equations of change for nonisothermal flow with experimental data on heat-transfer rates to arrive at dimensionless presentations of the rates of forced- and free-convection heat transfer. By analyzing a large amount of experimental information on heat and mass transfer in packed beds the following empirical correlations were

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[21] R. B. Bird, et al., op. cit., p. 390

evolved defining the heat-transfer coefficients for forced convection through packed beds:[22]

$$j_H = 0.91\ Re^{-0.51}\ \psi \quad (Re < 50) \qquad (2)$$

$$j_H = 0.61\ Re^{-0.41}\ \psi \quad (Re > 50) \qquad (3)$$

Here the Colburn j_H factor and the Reynolds number are defined by

$$j_H = \frac{h_{loc}}{c_{pb}G_o}\left(\frac{c_p\,\mu}{k}\right)_f^{2/3} \qquad (4)$$

$$Re = \frac{G_o}{a\,\mu_f\,\psi} \qquad (5)$$

In these equations the subscript f denotes properties at the "film temperature", $T_f = \frac{1}{2}(T_o + T_b)$, and $G_o = w/S$ is the superficial mass velocity. The quantity ψ is an empirical coefficient that depends on the particle shape ($\psi = 0.91$ for cylinders).

a = interfacial area per unit volume of bed
W = mass flow rate
S = cross sectional area
G_o = mass velocity
k = thermal conductivity
C_p = heat capacity at constant pressure, per unit mass
μ = viscosity
T_o = temp. at surface
T_b = bulk temp.

The modern approach is the concept of the finite

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[22] R. B. Bird, et al., op. cit., pp. 411-412

state or cell model, in contrast to the axial dispersion model. The general method of solution is made by using the techniques of frequency response of a series of perfect mixers and moments analysis. These two models agree reasonably well over a wide range of parameters[23]. It is suggested that the finite stage model be used for simulation studies since results can be computed by application of inverse Fourier transformation together with convolution.

Turner[24] developed a mathematical model for using the harmonic frequency response of the system to determine three unknown parameters: the thermal diffusivity of the solid packing; the heat transfer coefficient between the fluid and the solid packing and the longtitudinal dispersion coefficient in the bed.

Leung and Quon[25] set up a computational model by proceeding in a stepwise fashion and trying at every stage to compare the results either with a known analytical solution, or if that were not possible, with

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[23] C. P. Jefferson, Chem. Eng. Science, 23, 509-523 (1968).

[24] G. A. Turner, A. I. Ch. E. J., 13, 678 (1967).

[25] P. K. Leung and D. Quon, Can. J. of Chem. Eng., 44, 26-31 (Feb., 1966).

a numerical solution involving techniques that had been tested and shown to be valid and accurate. Their work is summarized, thus:

> 1. For packed bed heat exchangers with no reaction, the Crank-Nicholson method which involves dividing the solid particles into a number of incremental shells and using a time average for the solid temperature, is a general and stable method that should be satisfactory.
>
> 2. For packed bed regenerative chemical reactors, with reaction in the fluid phase only, the very large problem involving a system of non-linear partial differential equations can be reduced, by a decoupling technique, into two much smaller problems involving first, a linear partial differential equation and second, a set of first-order non-linear ordinary differential equations. An efficient computational technique for solving the former is presented; conventional explicit methods are employed in the latter.

This article pointed out the danger of attempting to solve non-linear differential equations:

> If the implicit method outlined in the previous section is to be applied, then a set of algebraic non-linear equations would have to be solved at each step. This usually requires an iterative procedure, with convergence being a very serious computational difficulty. Indeed, a different convergence scheme might have to be used for each type of non-linear term encountered, and since the type depends upon the functional form of the reaction rate correlation, each case would have to be analyzed separately.

Some kind of explicit method may be used, but if the maximum time step is unacceptably small the numerical

solution would be made impractical, even for a large computer.

Schertz and Bischoff[26] obtained correlations of the point values of eddy thermal conductivity and mass dispersion coefficients by solving multiple gradient mass and heat belances via vector analysis with the aid of a numerical computation scheme. Comments in their introduction appear to summarize the present status of heat transfer in nonisothermal packed beds; namely, mathematical models of heat transfer in packed beds fail to give good agreement with actual data:

> Considerable data has been reported in the literature concerning the prediction of temperatures and concentrations in packed bed reactors. Much of the effort has utilized the procedure of writing differential mass and energy balances on the reactor, assuming that the packed bed could be treated as a continuum, although alternate methods have also been used. The resulting differential equations were then simplified by various assumptions to yield equations that could be solved analytically. Results from computations of this type have been useful tools, but have not been completely successful in predicting the performance of actual reactors. The next level of sophistication was to solve the partial differential equations by numerical methods using high speed computers. This allowed Richardson and Fahien, for example to use varying values for the bed properties in

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[26] W. W. Schertz and K. B. Bischoff, A. I. Ch. E. J., 15, 597 (1969).

calculations of reactor behavior. However, they found that various assumptions utilizing mean value correlations for varying local values gave poor comparison with measured reactor data.

Oxidation of sulfur dioxide. The oxidation of sulfur dioxide is comprehensively presented in the American Chemical Society's Monograph No. 144, "Manufacture of Sulfuric Acid"[27]. This complete and reliable treatise has been used as the principal reference for this work.

Since, for all practical purposes, vanadium catalyst is the only commercial catalyst used today for the oxidation of sulfur dioxide[28], references describing platinum and iron oxide catalysts were not reviewed.

The forward reaction $SO_2 + \frac{1}{2}O_2 \longrightarrow SO_3$ evolves a considerable quantity of heat. As expected with an exothermic reaction, the equilibrium constant becomes more unfavorable with respect to sulfur trioxide formation as temperature increases. The effects of sulfur dioxide concentration, as well as pressures, may readily be calculated from the equilibrium constants given in Table 1. As expected, increases in oxygen

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[27] W. W. Duecker and J. R. West, op. cit., pp. 135-287.

[28] Ibid., p. 159

TABLE 1

Heat Evolved and Equilibrium Constant for Reaction[29]

$$SO_2 + \tfrac{1}{2}\, O_2 \longrightarrow SO_3$$

Temperature °K	Heat Evolved (Cal/g.mole)	Heat Evolved (Btu/lb.mole)	Equilibrium Constant
600	23,420	42,160	4,170.0
700	23,270	41,890	257.0
800	23,080	41,540	32.0
900	22,870	41,170	6.47

[29] W. W. Duecker and J. R. West, op. cit., p. 160.

concentration or pressure gives a more favorable equilibrium but the relative gain is rather small.

Davidson[30] presents a logical mechanism for the catalytic reaction:

> The partial pressures of the reactants and products (including nitrogen) in the turbulent region above the catalyst pellet are those corresponding to the steady-state values. In order for the chemical reaction to proceed at a significant rate, the reactants (SO_2 and O_2) must interact on the surface of the catalyst. These components are believed to reach the surface by diffusing through a thin laminar boundary layer which lies adjacent to the monemolecular layer of chemisorbed gases on the catalyst surface. Therefore, when sulfur dioxide and oxygen are passed over a vanadium pentoxide catalyst, the following steps are believed to take place:
>
> (1) Diffusion of reactants (including nitrogen) from the main gas stream through the laminar boundary layer to the catalyst surface.
>
> (2) Chemisorption of reactants (including nitrogen) on the surface of the catalyst forming a monemolecular layer.

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[30] B. Davidson, Dissertation No. 64-2472, "Kinetics of the Catalytic Oxidation of Sulfur Dioxide", Northwestern University, PhD (1963), University Microfilms, Inc., Ann Arbor, Michigan, pp. 13-14.

(3) Chemical reaction on the surface of the catalyst.

(4) Desorption of sulfur trioxide from the surface of the catalyst.

(5) Diffusion of sulfur trioxide through the laminar boundary layer from the surface of the catalyst to the main gas stream.

The considerable disagreement in the literature as to the form of the rate expression and even as to the magnitude of the reaction rates probably stems from variations of the postulated reaction mechanism, differences in catalyst compositions, physical structure of the catalyst pellets and size and/or types of reactors used. Davidson[31], for example, concluded that the rate equation could be depicted as:

$$r = \frac{\exp.\ (44{,}900/RT - 5/R)\ P_{SO_2}\ P_{O_2}^{\frac{1}{2}}}{\left[1 + \exp.\ (50{,}400/RT - 39.4/R)P_{SO_2} + \exp.\ (57{,}800/RT - 46.7/R)P_{O_2}^{\frac{1}{2}} + \exp.\ (-44{,}400/RT + 44.1/R)P_{SO_3} + \exp.\ (-36{,}400/RT + 29.8/R)P_{N_2}\right]^2} \qquad (6)$$

This related the measured rate of reaction to the partial pressures of the reactants (including nitrogen) at the catalyst surface and which expressed the constants in

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[31] Ibid, p. 108

that equation as a function of temperature. The rate-controlling step was associated with the surface reaction between chemisorbed sulfur dioxide and chemisorbed atomic oxygen to produce chemisorbed sulfur trioxide and a vacant site.

Many other reaction rate expressions have been used to express the results of the individual investigators. In 1937 Boreskov and Sokolova[32] concluded that the rate of reaction could be represented by the following relationship:

$$r = K \frac{(P_{SO_2})^{0.8}(P_{O_2})}{(P_{SO_3})^{0.8}} \qquad (7)$$

Buryak[33] developed a technique for the calculation of the rate constants to be used in the Boreskov equation.

In 1947 Krichevskaya[34] used a commercial grade catalyst and correlated the results by:

$$r = k (P_{SO_2} P_{O2})^{\frac{1}{2}} \qquad (8)$$

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[32] G. K. Boreskov and T. I. Sokolova, J. Chem. Ind. (U.S.S.R.), 14, 1241 (1937).

[33] K. A. Buryak, J. Appl. Chem. (U.S.S.R.), 36, 1835-1838 (1963).

[34] E. L. Krichevskaya, J. Phys. Chem. (U.S.S.R.), 21, 287 (1947).

Calderbank[35] performed independent studies on the kinetics of this reaction and on the adsorption equilibrium of the components of this reaction to establish the temperature dependence of the rate of reaction. It was shown that the kinetics of the reaction could be represented by a power-law expression of the form:

$$r = k\,(P_{SO_2})^m (P_{O_2})^n \qquad (9)$$

where m varies from 0.35 to 0.56 and n from 0.72 to 0.50 in the temperature range of 370°C to 420°C.

From these studies[36], it was concluded that the rate-controlling step involves chemisorbed sulfur dioxide and oxygen in the gas phase to produce chemisorbed sulfur trioxide. The adsorption equilibrium studies revealed that sulfur dioxide was strongly chemisorbed, while oxygen was weakly adsorbed. The adsorption of nitrogen was shown to be negligible.

Baron, Johnstone, and Manning[37] studied the effects of inert gases in a tubular reactor with posassium

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[35] P. H. Calderbank, J. Appl. Chem. (London), 2,482 (1952).

[36] B. Davidson, op. cit., p. 9.

[37] T. Baron, W. R. Manning and H. F. Johnstone, Chem. Eng. Prog., 48, 1251 (1952).

metavanadate catalyst using a simplified mathematical analysis of first order reactions. It was observed that the activation energy decreased as the weight of the inert gas increased. The rate expression was given as:

$$r = k\,(P_{SO_2}) \qquad (10)$$

The rate controlling step was concluded to be associated with the rate of desorption of sulfur trioxide.

Using the approach suggested by Hougen and Watson[38], Goldman, Canjar and Beckman[39] formulated a slightly less complex expression for the same mechanism suggested by Davidson[31]:

$$r = \frac{C\left[P_{SO_2}P_{O_2}^{\frac{1}{2}} - P_{SO_3}/K_{p.}\right]}{\left[1 + K_{SO_2}P_{SO_2} + K_{O_2}^{\frac{1}{2}}P_{O_2}^{\frac{1}{2}} + K_{SO_3}P_{SO_3}\right]^2} \qquad (11)$$

Their results correlated linearly with temperature in accordance with the Arrhenius Theory.

A separate investigation by Hara, Adachi and Kurata[40]

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[38] O. A. Hougen and K. M. Watson, Chemical Process Principles, New York: John Wiley and Sons, (1947), pp. 902-926, 982-990 and 1020-1028.

[39] M. Goldman, L. N. Canjar and R. B. Beckmann, J. Appl. Chem. (London), 7, 274 (1957).

[40] H. Hara, A. Adachi and N. Kurata, Kogyo Kagsku Zasshi, 63, 56-59 (1960).

showed good agreement with the results of Goldman, et al.

Mathur and Thodos[41] utilized the initial rate approach which revealed that the controlling mechanism undergoes a change as the temperature is increased from 650°F to 750°F. For 649°F and 701°F, the rate controlling step was found to be the surface reaction between chemisorbed sulfur dioxide and molecular oxygen in the gas phase:

$$r = \frac{C\left[P_{SO_2}P_{O_2}^{\frac{1}{2}} - P_{SO_3}/K\right]}{\left[1 + K_{SO_2}P_{SO_2} + K_{SO_3}P_{SO_3}\right]^2} \qquad (12)$$

On the other hand, at 752°F, the controlling step was found to shift to the desorption of sulfur trioxide:

$$r = \frac{C'\left[P_{SO_2}P_{O_2}^{\frac{1}{2}} - P_{SO_3}/K\right]}{1 + K_{SO_2}P_{SO_2} + K_{SO_3}P_{SO_2}P_{O_2}^{\frac{1}{2}}} \qquad (13)$$

Only Eklund's work[42] appears applicable to normal commercial catalyst, although it should be noted that Boreskov et al. and Calderbank are in approximate agreement with Eklund in regard to the relative effects of gas

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[41] G. P. Mathur and G. Thodos, Chem. Eng. Science, 21, 1199 (1966).

[42] W. E. Duecker and J. R. Wesr, op. cit., p. 166

concentration (partial pressure) changes. The equation proposed by Eklund is:

$$r = k\sqrt{\frac{P_{SO_2}}{P_{SO_3}}\left[P_{O_2} - \left(\frac{P_{SO_3}}{P_{SO_2} K_p}\right)^2\right]} \qquad (14)$$

where r = the rate of reaction (g.mole SO_2/g. catalyst, sec)
k = rate constant (g.mole SO_2/g.catalyst, sec, atm)
P = partial pressure (atm)
K_p= equilibrium constant

Note: This equation will be used to express the rate of reaction for the computer program.

The experimental conditions for which this equation has been directly proved are limited to temperatures between 437°C (818°F) and 554°C(1029°F), and generally to relatively low sulfur dioxide and sulfur trioxide partial pressures. Note also that oxygen partial pressure is found to affect reaction rate more than is shown by the equation at temperatures below 460°C(860°F) and simultaneous oxygen partial pressures above 0.13 atmospheres.

Hulett and Wilson[43] minimized the effect of pore and bulk diffusion (heat and mass transfer resistances) by using a thin film of catalyst in a back-mix flow reactor. Their empirical rate equation describing the rate of reaction for the three surface steps of adsorption,

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[43]J. R. Hulett and W. Wilson, J. Chem. Soc. (A), 2569-2571 (1968).

reaction and desorption was:

$$r = k \frac{(P_{SO_2})^{0.4}(P_{O_2})^{0.7}}{(P_{SO_3})^{0.7}} \qquad (15)$$

Kubota et al.[44] describe a graphical method for optimization of the process conditions for a multistage fluidized bed.

Boreskov and his co-workers[45] demonstrated that there is a minimum permissible temperature (the ignition temperature) for the oxidation of SO_2 to SO_3. At lower temperatures SO_2 practically does not oxidize. At this ignition temperature, rapid combustion starts up in the contact mass layer and the reaction rate approximates the value characteristic of high temperatures. The sharp decrease in activity below the ignition temperature is apparently caused by the conversion of the active component (vanadium pentoxide or alkali vanadates) to vanadyl sulfate, according to the equation:

$$V_2O_5 + SO_2 + SO_3 = 2\ VOSO_4 \qquad (16)$$

The ignition temperature is dependent on both the partial pressures of SO_2 and SO_3 and the equilibrium constant for

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[44] H. Kubota, S. Nam Koong, T. Akehata and M. Shindo, Can. J. Chem. Eng., 39, 64 (1961).

[45] G. K. Boreskov, L. G. Ritter and M. T. Serebrennikowa, Khim. Prom., 1, 8 (1947).

the above reaction. Good agreement was found between calculated and observed values for the ignition temperatures at varied conditions (TABLE 2).

Various aspects of the design of conventional converters are described by Slin'ko and Beskov[46], Boreskov and Slin'ko[47], Thomas and Thomas[48], Homme and Othmer[49], Chartrand and Crowe[50], Minhas and Carberry[51], Fariss[52], Shannon et al.[53], and Burkhardt[54]. The last four references indicate that the maximum attainable practical conversion is approximately 98 percent.

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[46]M. G. Slin'ko and V. S. Beskov, Int. Chem. Eng., 2, 388-393 (July, 1962).

[47]G. K. Boreskov and M. G. Slin'ko, British Chem. Eng., 10, 173 (March, 1965).

[48]J. M. Thomas and W. J. Thomas, Introduction to the Principles of Heterogeneous Catalysis, New York: Academic

[49]A. C. Homme and D. F. Othmer, Ind. & Eng. Chem., 53, 979-984 (1961).

[50]G. Chartrand and C. M. Crowe, Can. J. Chem. Eng., 47, 296-301 (1969).

[51]S. Minhas and J. Carberry, British Chem. Eng., 14, 799-802 (1969).

[52]Farris, "Proceedings of the Symposium on Catalysis in Practice", (London), Instn. Chem. Engrs., 51-54 (1963).

[53]P. Shannon, A. Johnson, C. Crowe, T. Hoffman, A. Hamielec and D. Woods, Chem. Eng. Prog., 62, 54 (1966).

[54]D. Burkhardt, Chem. Eng. Prog., 64, 66-70 (1968).

TABLE 2

IGNITION TEMPERATURES FOR SO_2 OXIDATION

Percent SO_2 in Excess of Stoichiometric:

	10	20	30	40	50
Observed Ignition Temperature (°C)	408	407	406	405	405
Calculated " " "	408	409	410	410	410

Percent O_2 in Excess of Stoichiometric:

	5	10	20	30	40	50
Observed Ignition Temperature (°C)	433	408	403	399	395	392
Calculated " " "	433	418	404	395	389	383

CHAPTER II

DEVELOPMENT OF THE MODEL

Ohki et al.[1] developed a computational model based on the combined concepts of mass and heat transfer for fluid mixing by the finite balance model and the other heat transfer mechanisms in terms of a cell-to-cell heat transfer coefficient. Their model produced calculated results which agreed with the experimental results of Hall and Smith[2] in the oxidation of sulfur dioxide with a platinum catalyst. Since the object of this work was to explore the feasibility of a dual-bed reactor without regard for the actual physical mechanisms of heat and mass transfer (empirical equations could be utilized for computations), it was decided to use a simpler approach by depicting a commercial sized reactor to consist of many small segments with chemical reaction and heat and mass transfer shown by partial differential equations.

As a basis for the model several assumptions were made:

(1) The chemical reaction occurs in the fluid phase

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[1] Y. Ohki, E. O'Shima, H. Inoue and S. Yagi, Chem. Eng., (Japan), 4, 316 (1966)

[2] R. E. Hall and J. M. Smith, Chem. Eng. Prog., 45, 464 (1949).

with the reaction rate controlled by the temperature of the solid catalyst;

(2) The fixed bed is packed with uniform cylindrical particles;

(3) Flow is unidimensional and the condition of the inlet fluid is a known function of time;

(4) Heat is transferred between the fluid and the solid particles but particle-to-particle heat transfer is neglected;

(5) There is no heat transfer to the walls of the reactor;

(6) Radiant and axial heat transfer are negligible;

(7) The particles are small enough so that internal temperature gradients are insignificant and each solid particle is assumed to be isothermal throughout; i. e., high thermal diffusivity;

(8) The fluid environment is considered uniform; i. e., assume radial symmetry for both solid and fluid;

(9) Rate of heat transfer at any point is proportional to the average temperature between fluid and solid at that point;

(10) Change in volume of fluid and solid due to temperature change may be neglected.

Process Data

Although the rate equation of Kubota et al.[3] more fully covers the ranges of temperatures and conversions found in a conventional reactor, Eklund's rate equation[4] was selected because of the supplemental data provided in this reference. Computations (See APPENDIX A) were made on the basis of this data to show the conditions which might prevail in a commercial reactor. This data is summarized forthwith:

Reactor system. Two units, each having a cross sectional area of 250 sq. ft. and a 4 ft. depth of catalyst. Flow patterns are shown in Figures I-IV (pp. 30-33). In the normal flow cycle with counter-current operation (Fig. I), the cold feed gas flows upwards through the inlet valve through the hot catalyst in Unit No. 1. In the bottom section, the gas is preheated with the resultant cooling of this catalyst layer, which is maintained below the ignition temperature. When the feed gas reaches catalyst which is at or above the ignition temperature the reaction takes place and gas and catalyst are rapidly heated. The reaction rate accelerates,

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[3] H. Kubota, M. Ishizawa and M. Shindo, Sulphuric Acid (Japan), 12, 243 (1959).

[4] W. W. Duecker and J. R. West, op. cit., pp. 168-169.

accordingly. The major proportion of the conversion takes place in Unit No. 1. Gas leaving the top of Unit No. 1 enters the top of Unit No. 2 where the remainder of the conversion takes place. The catalyst in the bottom section of Unit No. 2 is heated gradually. The reaction gas discharges from the bottom of Unit No. 2 through the outlet valve to the adsorption system.

In order to prevent excessive temperature rises in Unit No. 1 with attendant lower conversions or temperatures in the bottom section of Unit No. 2 in excess of the ignition temperature, the positions of the inlet and outlet valves are reversed (Fig. II). Gas now enters through the bottom of Unit No. 2; passes downward through Unit No. 1 and exits from the bottom of Unit No. 1.

The valving and piping is slightly more complicated for parallel operation. In the normal flow cycle (Fig. III) the feed gas flows upward through Unit No. 1; then upward through Unit No. 2 and discharges from the top of Unit No. 2.

The valve positions are reversed for the alternate flow cycle (Fig. IV). Upward flow is maintained; however, the feed gas enters Unit No. 2 and discharges

from Unit No. 1.

The catalyst is vanadium impregnated into a silica base. The pellets are cylindrical in shape, 8 mm. in diameter by 25 mm. in length. The feed gas composition is 7% SO_2, 10.9% O_2 and 82.1% N_2. The total gas flow is 2430 lb. moles/hr (75,200 lbs./hr). The initial entering gas temperature is 380°F and the initial solid temperature is 842°F. The catalyst surface area is 101 sq. ft./cu. ft.

Data for heat and mass transfer on a differential volume. Segment = 1 sq. ft. in cross section by 1 inch in depth.

Catalyst weight = 2.817 lbs.

Gas Flows (lbs/min) = 3.717 N_2
0.727 SO_2
0.567 O_2

Heat transfer coefficient = 4.81

Specific Heats of Gases and Catalyst

Many investigators assume constant specific heats for the reactants and catalyst to simplify calculations. In this model specific heat equations from the literature have been modified to show good agreement with JANAF[5] data, especially in the desired temperature range. The derived equations are shown below. Results obtained from these

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[5]JANAF Thermochemical Data, The Dow Chemical Co., Midland, Michigan (1961, 1965).

FIGURE I

Normal Flow Cycle-Countercurrent Paths

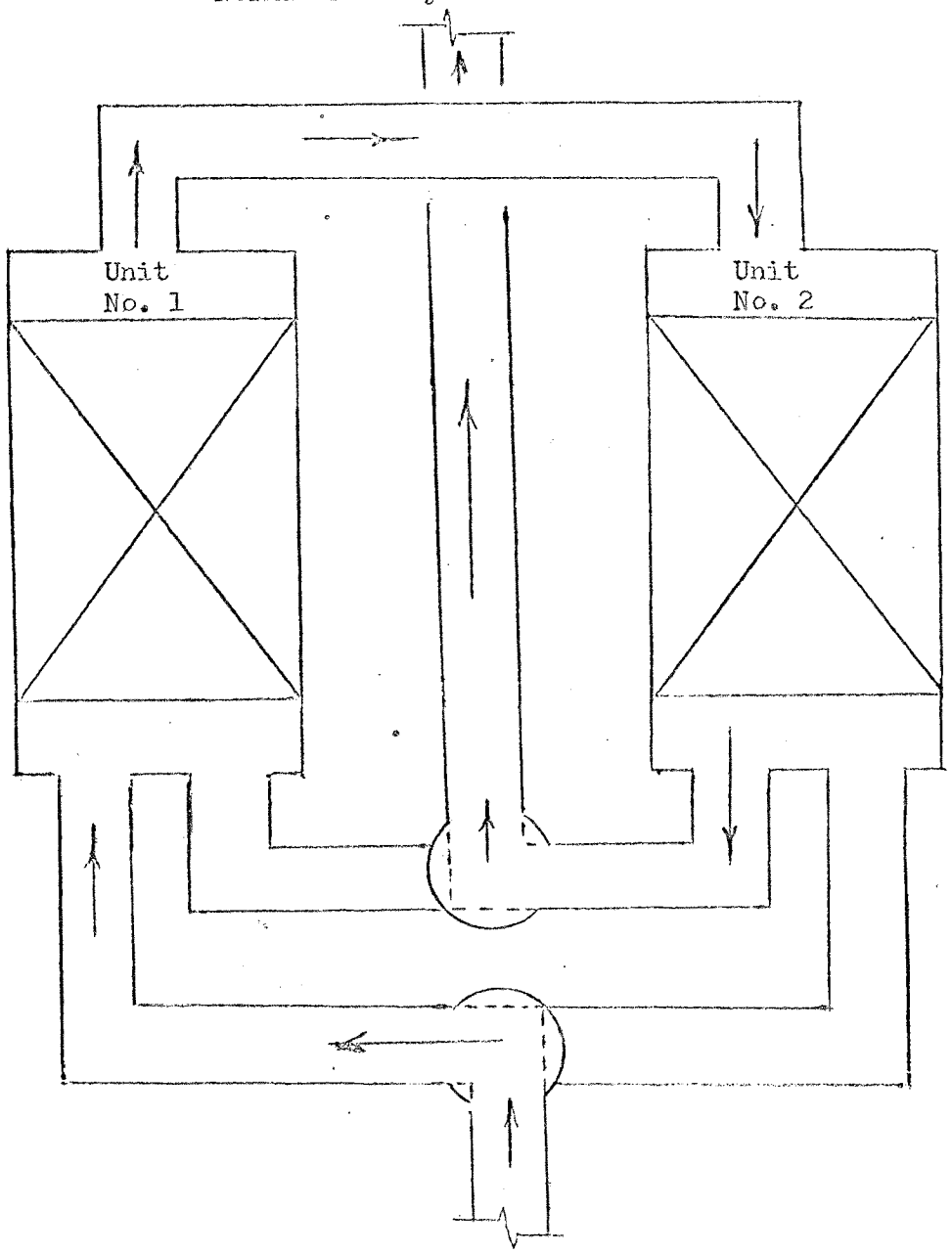


FIGURE II

Alternate Flow Cycle-Countercurrent Paths

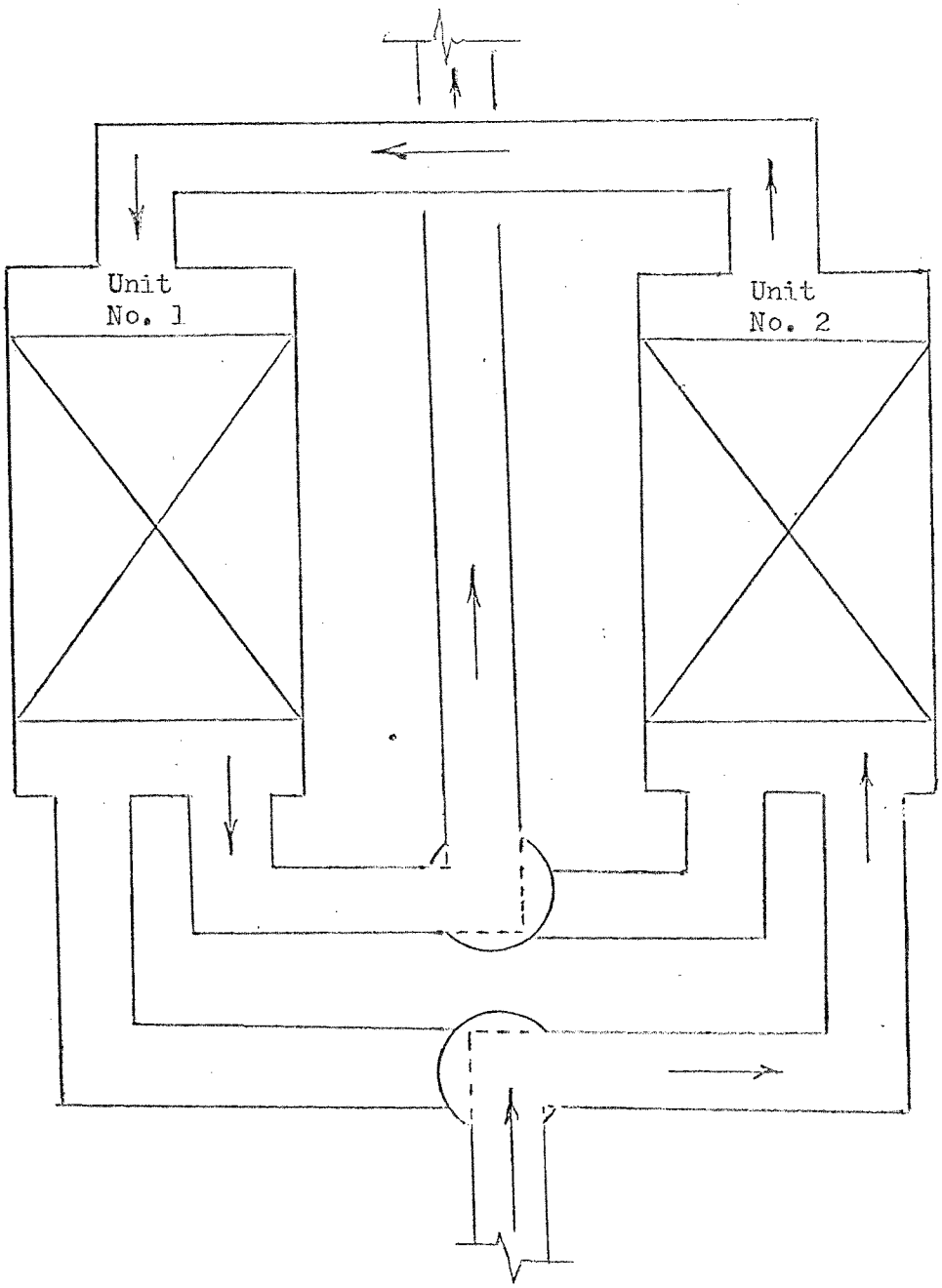


FIGURE III

Normal Flow Cycle-Parallel Paths

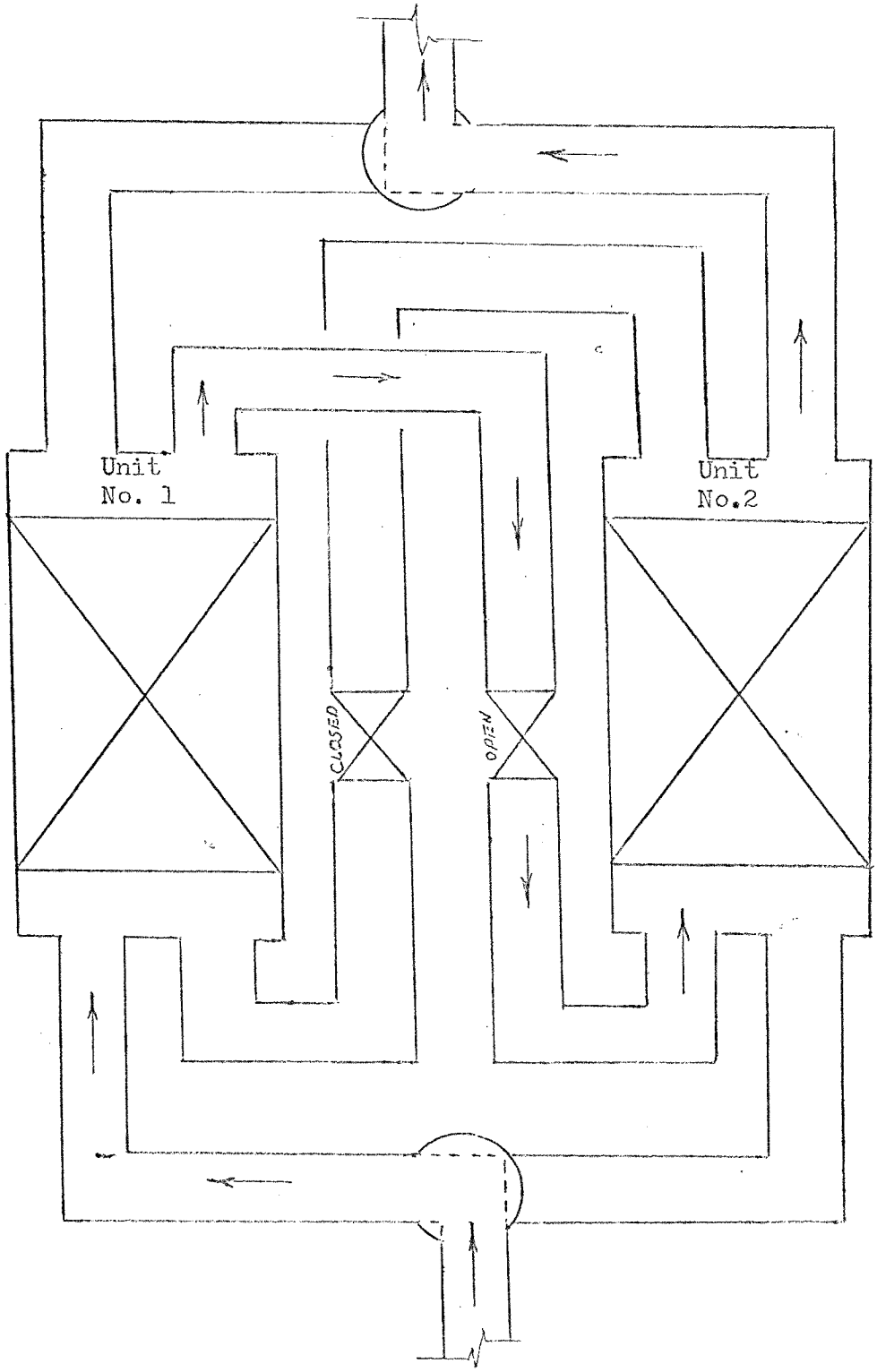
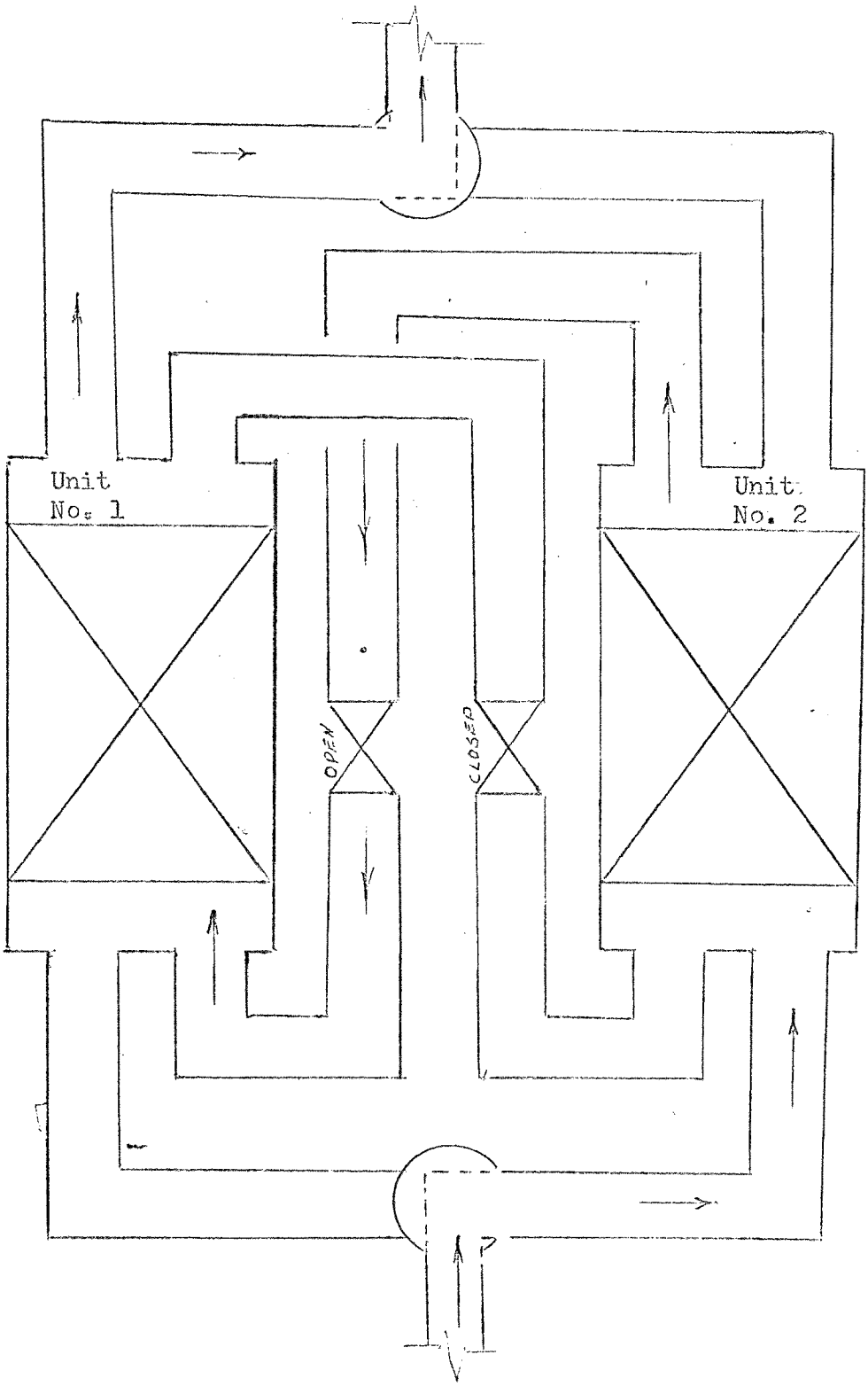


FIGURE IV

Alternate Flow Cycle-Parallel Paths



equations are compared with JANAF data in APPENDIX B.

Nitrogen:

$$C_p = 7.543 - 0.34 \times 10^{-2}(T) + 0.636 \times 10^{-5}(T)^2 - 0.2702 \times 10^{-8}(T)^3 - 0.3913 \times 10^4/(T)^2 \quad (17)$$

Sulfur Dioxide:

$$C_p = 4.474 + 0.02041(T) - 0.1743 \times 10^{-4}(T)^2 + 0.5463 \times 10^{-8}(T)^3 + 0.3838 \times 10^5/(T)^2 \quad (18)$$

Oxygen:

$$C_p = 4.399 + 0.7895 \times 10^{-2}(T) - 0.5454 \times 10^{-5}(T)^2 + 0.1399 \times 10^{-8}(T)^3 + 0.7069 \times 10^5/(T)^2 \quad (19)$$

Sulfur Trioxide:

$$C_p = 4.638 + 0.03266(T) - 0.2792 \times 10^5/(T)^2 + 0.8782 \times 10^{-8}(T)^3 - 0.1936 \times 10^{-4}/(T)^2 \quad (20)$$

Alpha Quartz (298°K - 848°K) Note: There is a transformation of alpha quartz to beta quartz at 848°K.

$$C_p = 11.22 + 8.20 \times 10^{-3}(T) - 2.70 \times 10^5/(T)^2 \quad (21)$$

Beta Quartz (848°K - 2000°K)

$$C_p = 14.41 + 2.04 \times 10^{-3}(T) \quad (22)$$

Equilibrium Constant

For the reaction, $SO_2 + \frac{1}{2} O_2 \longrightarrow SO_3$, at equilibrium, $\Delta F = 0$, and

$$-\frac{\Delta F^o}{T} = R \ln \frac{(a_{SO_3})}{(a_{SO_2})(a_{O_2})^{\frac{1}{2}}} = R \ln K_p \qquad (23)$$

where the activities of the separate components are represented by the symbols, a_{SO_3}, a_{SO_2}, and a_{O_2}. It may be assumed that the activity and fugacity coefficients are equal to unity, so that

$$-\frac{\Delta F^o}{T} = R \ln \left(\frac{(P_{SO_3})}{(P_{SO_2})(P_{O_2})^{\frac{1}{2}}} \right) = R \ln K_p \qquad (24)$$

$$= 2.302585 \, R \log_{10} K_p$$

$$= 4.5757 \log_{10} K_p \text{ , since } R = 1.98719 \text{ cal./deg.mole}$$

Moreover, the change of the equilibrium constant with temperature is given by the Van't Hoff Equation:

$$\frac{d \ln K}{dt} = \frac{\Delta H^o}{RT^2} \qquad (25)$$

Upon integration,

$$\ln K = -\Delta H^o/RT + C \qquad (26)$$

A plot of ln K against the reciprocal of the absolute

temperature (1/T) gives a straight line of slope $-\Delta H^{\circ}/R$. A plot of $\log_{10} K$ versus 1/T will be a straight line with slop $-\Delta H^{\circ}/2.302585R$ which equals $-\Delta H^{\circ}/4.5757$.

The values of the equilibrium constants, as shown by various writers, have been dependent on the values of the thermodynamic properties used in these computations. Ross'[6] tabulations should be very accurate in view of the precision of measurement of the sulfur trioxide data reported by Lovejoy and colleagues[7]. Equations encompassing some of the literature data are shown below:

$$\log K_p = 5186.5/T + 0.611 \log T - 6.7497 \quad 8 \qquad (27)$$

$$\log K_p = 4.905/T - 4.6455 \quad 9 \qquad (28)$$

$$\log K_p = 5143/T - 4.884 \quad 10 \qquad (29)$$

$$\log K_p = 4956/T - 4.678 \quad 11 \qquad (30)$$

$$\ln K_p = 22{,}600/RT - 10.68 \quad 12 \qquad (31)$$

---

[6] L. W. Ross, The Journal of World Sulfur, 65, 37 (Aug/Sept 1966).

[7] R. W. Lovejoy, H. H. Folwell, D. F. Eggers, Jr. and G. K. Halsey, Jr., J. Chem. Phys., 30, 612 (1962).

[8] Bodenstein and Pohl, Z. Elektrochem. (1904).

[9] V. S. Chesalova and G. K. Boreskov, Zhur. Fiz. Khim., 30, 2560 (1956).

[10] L. W. Ross, loc. cit.

[11] W. E. Duecker and J. R. West, op. cit., p. 135.

[12] P. H. Calderbank, Chem. Eng. Prog., 49, 586 (1953).

No data for the equilibrium constant, K_p, was included with Eklund's kinetic equation. Since Eklund indicated that his data were in agreement with both Boreskov and Calderbank, Calderbank's (equation 30) will be used in the mathematical model. Equilibrium data from these and other sources are listed in APPENDIX

Rate Constant

Eklund's data for commercial catalyst[13] was plotted (Fig. V) and two equations were derived for the two straight lines representing the data:

For T from 680°K to 730°K

$$k = 1.56 \times 10^{-7}(T) - 1.06 \times 10^{-4} \qquad (32)$$

For T greater than 730°K

$$k = 4.874 \times 10^{-7} (T) - 3.48 \times 10^{-4} \qquad (33)$$

Heat of Reaction

The following equation represents the heat of reaction reported by Duecker[14]:

$$H_R = - 3.3 (T) + 44,140 \text{ Btu/lb.mole} \qquad (34)$$

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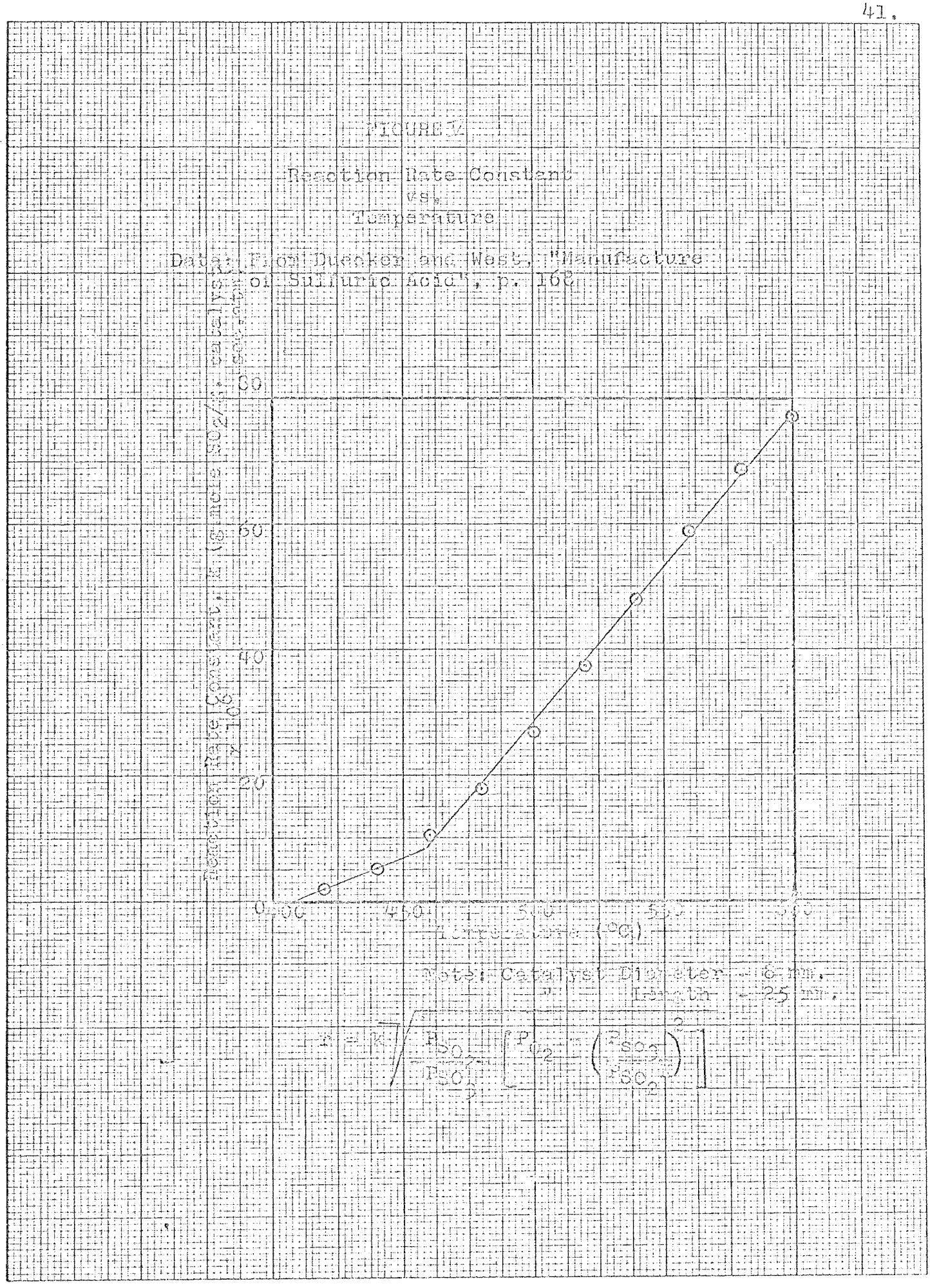
[13] W. W. Duecker and J. R. West, op. cit., p. 168.

[14] W. W. Duecker and J. R. West, op. cit., p. 160.

FIGURE 2

Reaction Rate Constant
vs.
Temperature

Data from Duecker and West, "Manufacture of Sulfuric Acid", p. 162



Note: Catalyst Diameter = 6 mm.
Temperature = 25 °C.

$$K = \sqrt{\frac{P_{SO_2}}{P_{SO_3}}\left[P_{O_2} - \left(\frac{P_{SO_3}}{K_{SO_2}}\right)^2\right]}$$

Heat Transfer Equations

The derivations of the heat transfer equations employed are shown below.

For cylindrical coordinates:

Gas $$\rho_g c_{p_g}\left(\frac{\partial T}{\partial t} + v_r\frac{\partial T}{\partial r} + \frac{v_\theta}{r}\frac{\partial T}{\partial \theta} + v_z\frac{\partial T}{\partial z}\right) = \kappa\left[\frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial T}{\partial r}\right) + \frac{1}{r^2}\frac{\partial^2 T}{\partial \theta^2} + \frac{\partial^2 T}{\partial z^2}\right] + \Pi\Delta H - Q_s \quad (35)$$

but $v_r = v_\theta = 0$

and for all practical purposes $\frac{\partial T}{\partial t} = 0$

Since thermal conduction is negligible compared to bulk flow

$$k\left[\frac{1}{r}\cdot\frac{\partial}{\partial r}\left(r\frac{\partial T}{\partial r}\right) + \frac{1}{r^2}\frac{\partial^2 T}{\partial \theta^2} + \frac{\partial^2 T}{\partial z^2}\right] = 0 \quad (36)$$

then $$\rho_g c_{p_g} v_z \frac{\partial T}{\partial z} = \Pi\Delta H - Q_s \quad (37)$$

or using the names used in the computer program

$$QG = CPGAS\ [TG(M,I) - TG(M,I-1)] = QEVOL \quad (38)$$
$$-QS$$

Solid $$\rho_s c_{p_s}\left(\frac{\partial T}{\partial t} + v_r\frac{\partial T}{\partial r} + \frac{v_\theta}{r}\frac{\partial T}{\partial \theta} + v_z\frac{\partial T}{\partial z}\right) \quad (39)$$

$$= k\left[\frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial T}{\partial r}\right) + \frac{1}{r^2}\frac{\partial^2 T}{\partial \theta^2} + \frac{\partial^2 T}{\partial z^2}\right] + \pi\Delta H - Q_g \qquad (39)$$

but $v_r = v_\theta = v_z = 0$

and thermal conduction is small compared to heat transfer so

$$k\left[\frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial T}{\partial r}\right) + \frac{1}{r^2}\frac{\partial^2 T}{\partial \theta^2} + \frac{\partial^2 T}{\partial z^2}\right] = 0 \qquad (40)$$

Since thermal conduction is small compared to heat transfer

$$\rho_s c_{ps}\frac{\partial T}{\partial t} = \pi\Delta H - Q_g \qquad (41)$$

or using the names used in the computer program

$$QS = FS \times SHS \times \left[TS(M,I) - TS(M-1,I)\right] \qquad (42)$$

The Computer Program

The development of the mathematical model for the IBM 1130 Computer was an arduous, time-consuming and frustrating task; not only, because of the inexperience of the writer in computer programming, but because of the difficulty in formulating average gas and solid temperature expressions which would permit convergence. Use of a modified Newton-Raphson technique was attempted on several

occasions but had to be abandonned in favor of a simpler vut longer trial-and-error iteration scheme.

One of the disadvantages of the IBM 1130 Computer is its limited capacity. It was difficult to program this problem satisfactorily since the limited storage of data posed many difficulties which would not have been encountered if a computer with greater disk storage had been used.

This computer proved to be highly desirable; however, because of its stepwise print-out of process calculations which simplified the debugging of the computer programs.

One of the major problems was to develop a method of computing the solid and gas temperatures at zero and one inch, respectively, after the first one minute interval. The programming proceeded considerably easier and faster after this obstacle was surmounted.

Eight programs were written to perform the desired computations. The first four programs (See APPENDIX C) compute temperatures and conversions in the first unit at four levels of initial solid and gas temperatures. The fifth program extends the time range of Program No. 4. The sixth and seventh programs calculate temperature and conversion profiles in the second unit assuming counter-

current flow. The last program assumes parallel flow in the second unit. For the last three programs, the initial conditions are entered as data input, being obtained as data output from Program No. 4.

The first four programs contain two parts; the first, calculates solid (TS) and gas temperatures (TG) and conversions (XS02) at 0 and 1 inches, respectively, for 11 minutes of time in 1 minute intervals (Note: the subscripts, M and I, designate times at "minutes minus one" and depth at "inches minus one", respectively; i. e., at M = 1, time = 0 minutes, at I = 1, depth = 0 inches, etc.); the second part calculates the remaining solid and gas temperatures and conversions for the time and depth range desired. The last four programs are very similar to the second part of Programs Nos. 1-4.

In view of the similarity of the programs, the flow charts for the first program only are shown. Detailed flow charts for segments of the program are described as Flow Chart Boxes 1 through 4. These detailed flow charts are then included in the composite flow charts by indicating the Flow Chart Box description, only. The flow charts (Figures VI - XII) follow.

FIGURE VI

Flow Chart Box No. 1.

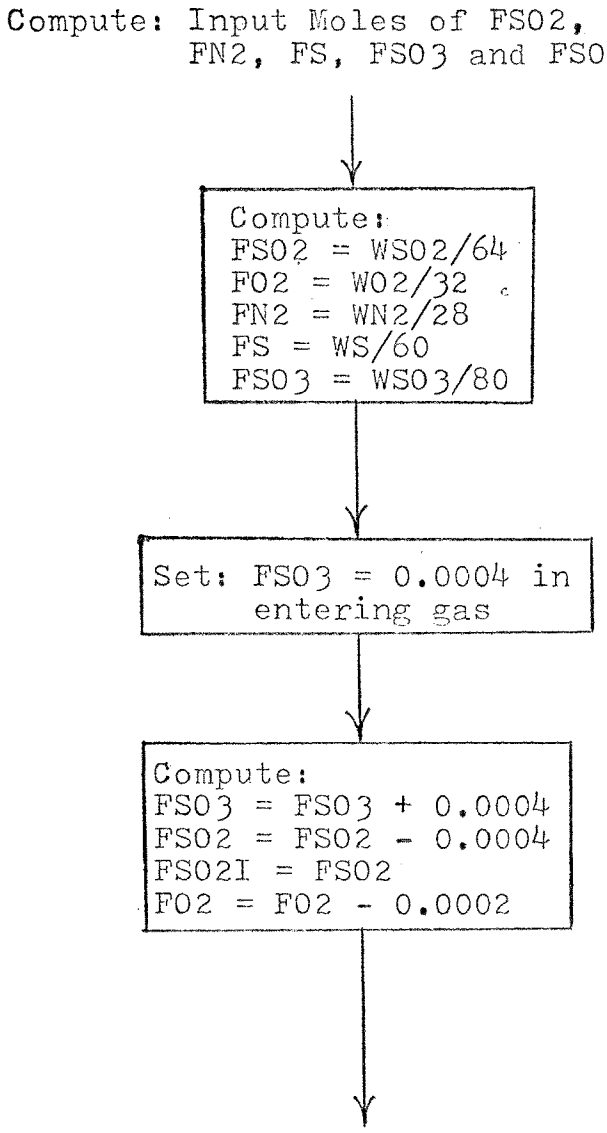


FIGURE VII

Flow Chart Box No. 2.

Initial Data Input and Computation
Compute: TSEST

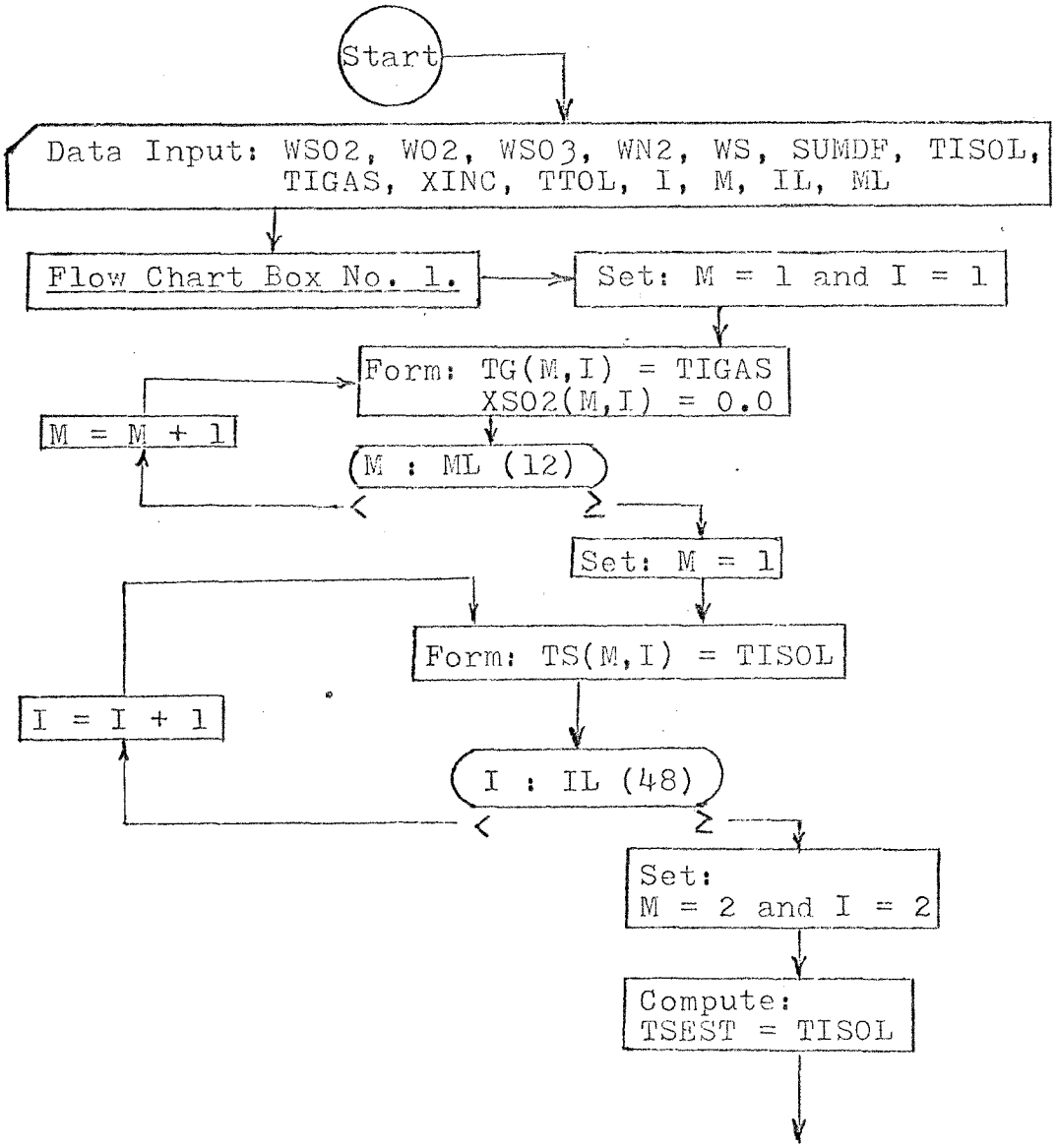


FIGURE VIII

Flow Chart Box No. 3.

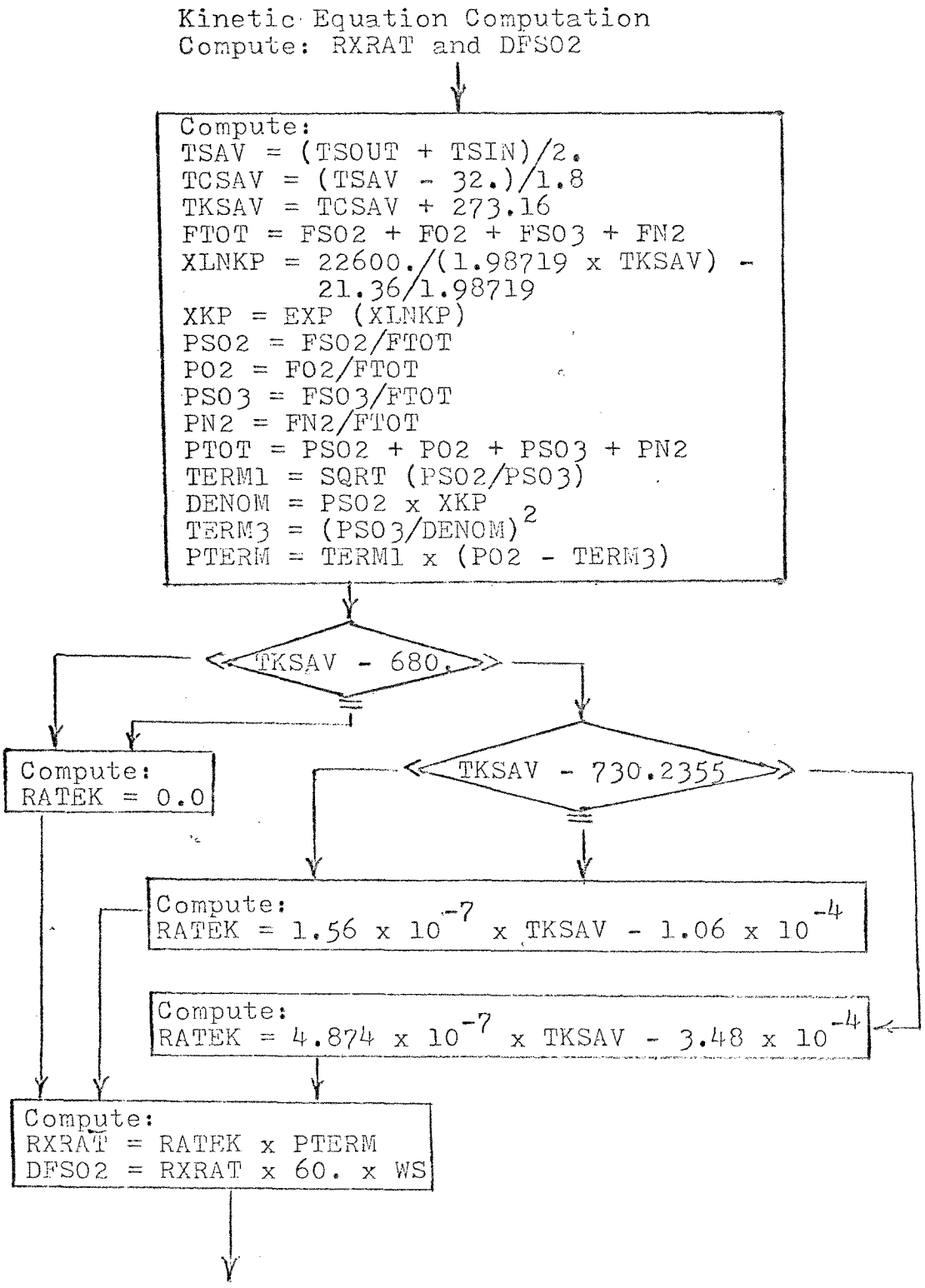


FIGURE IX

Flow Chart Box No. 4.

Heat Balance Calculations
Compute: DELTA

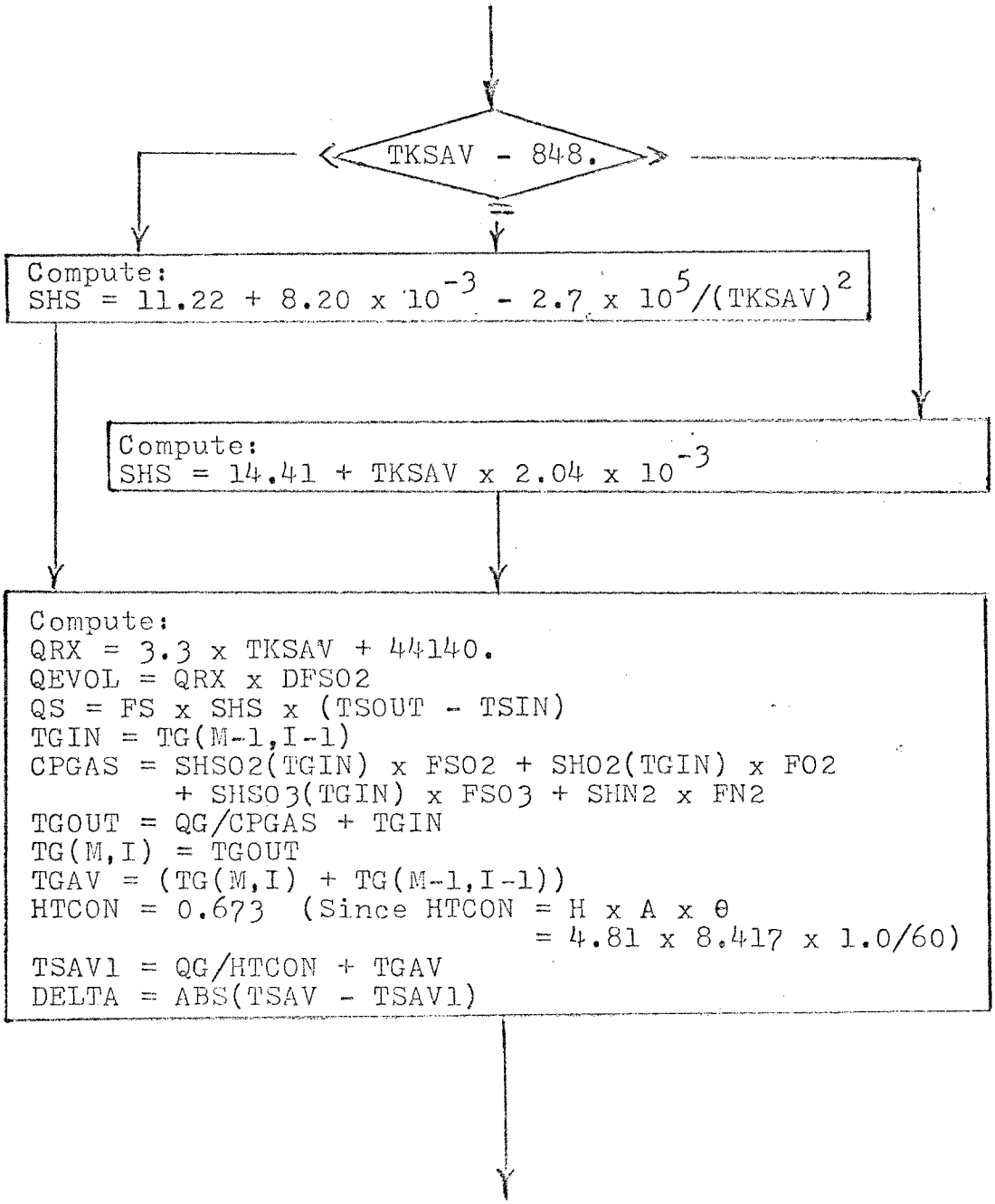


FIGURE X

Flow Chart Box No. 5.

Conversion Calculation and Final Tabulation
Compute: XSO2(M,I)
Tabulate: Results

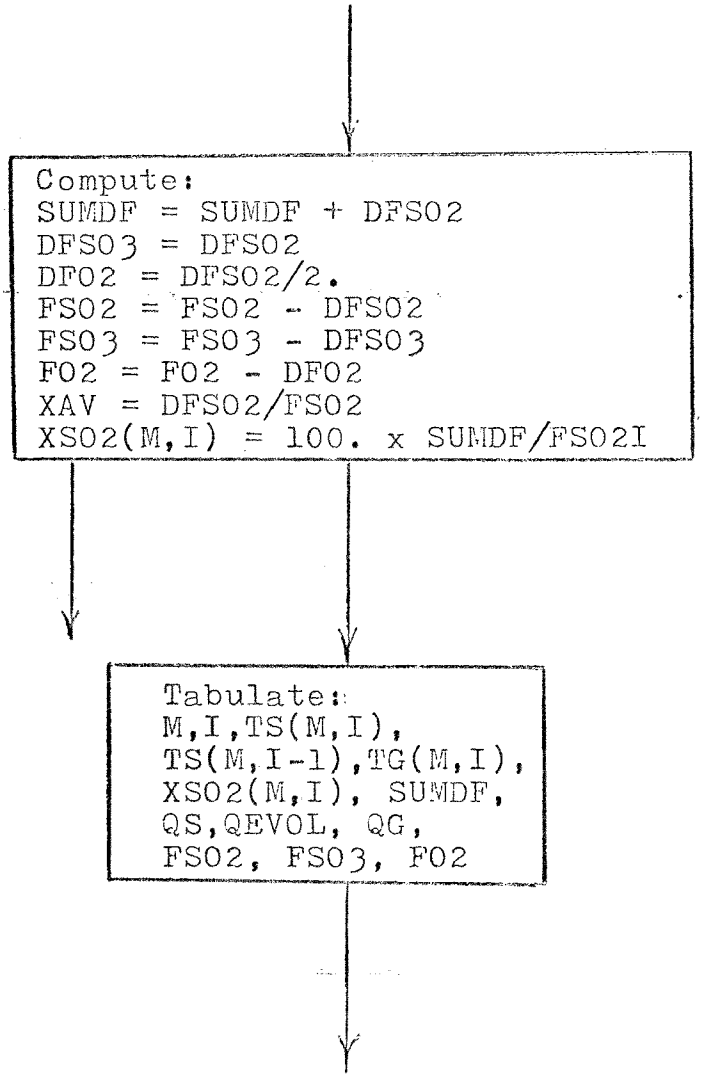


FIGURE XI

Composite Flow Chart - Program No. 1.

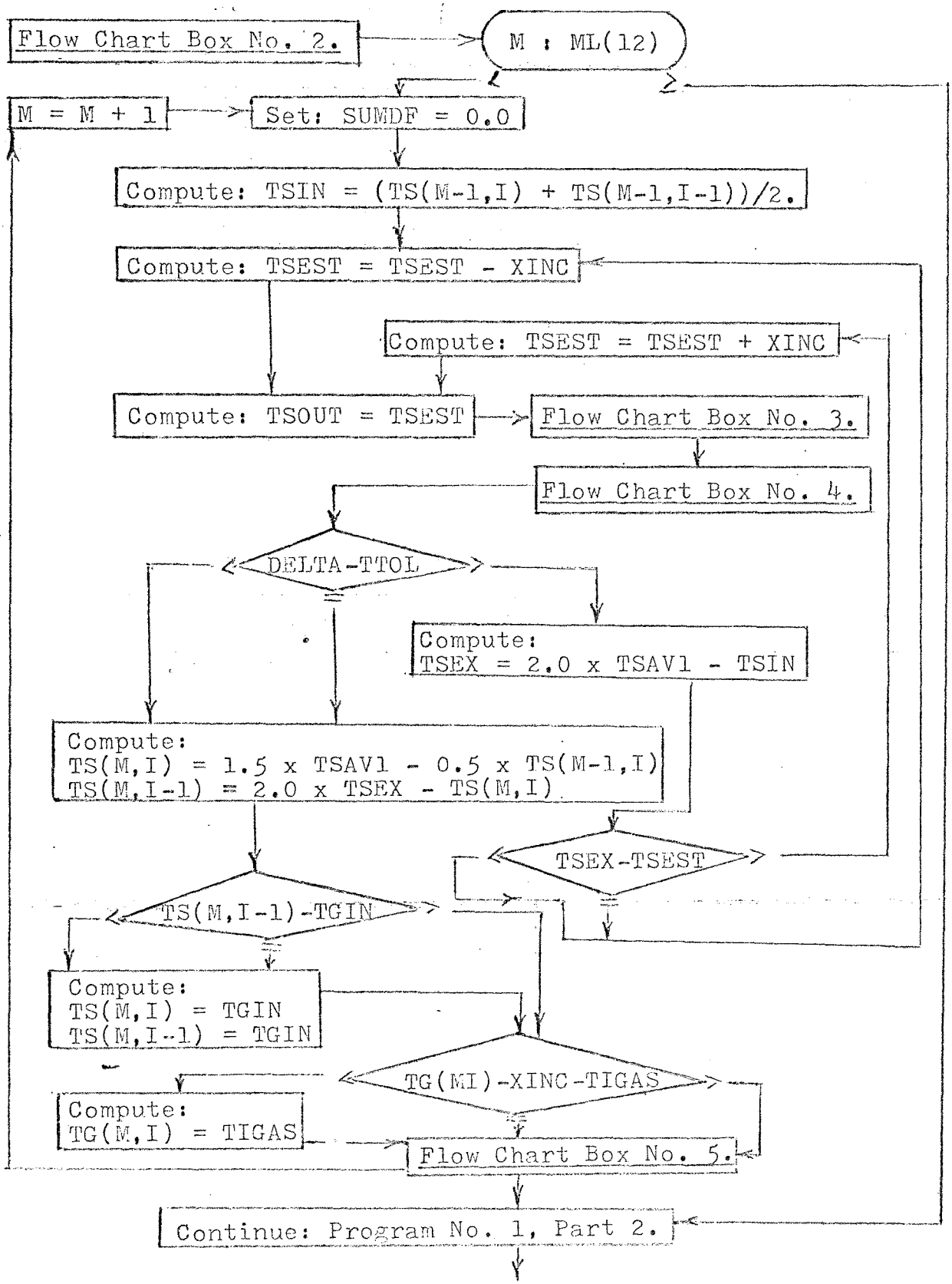
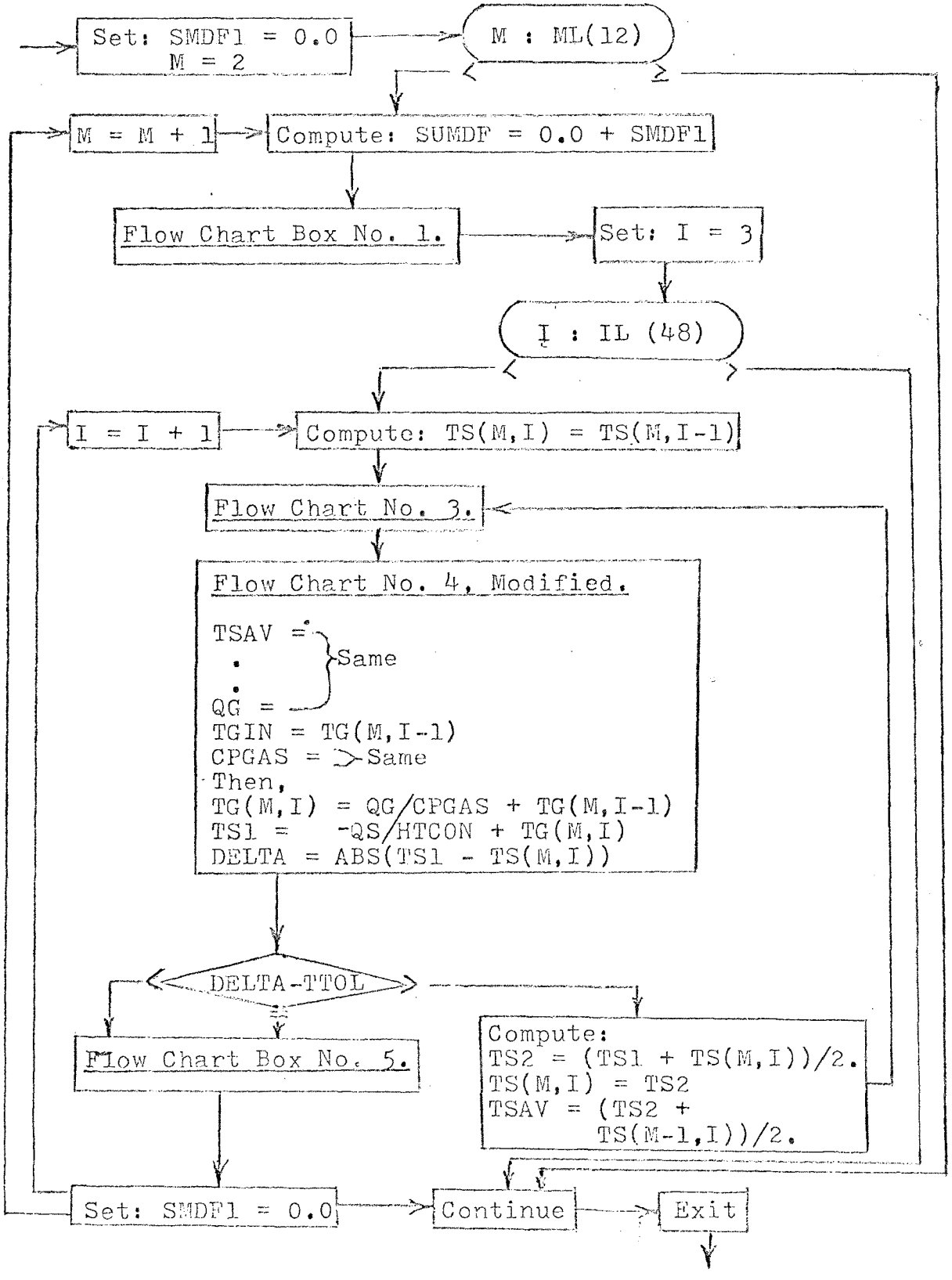


FIGURE XII

Composite Flow Chart - Program No. 1, Part 2.



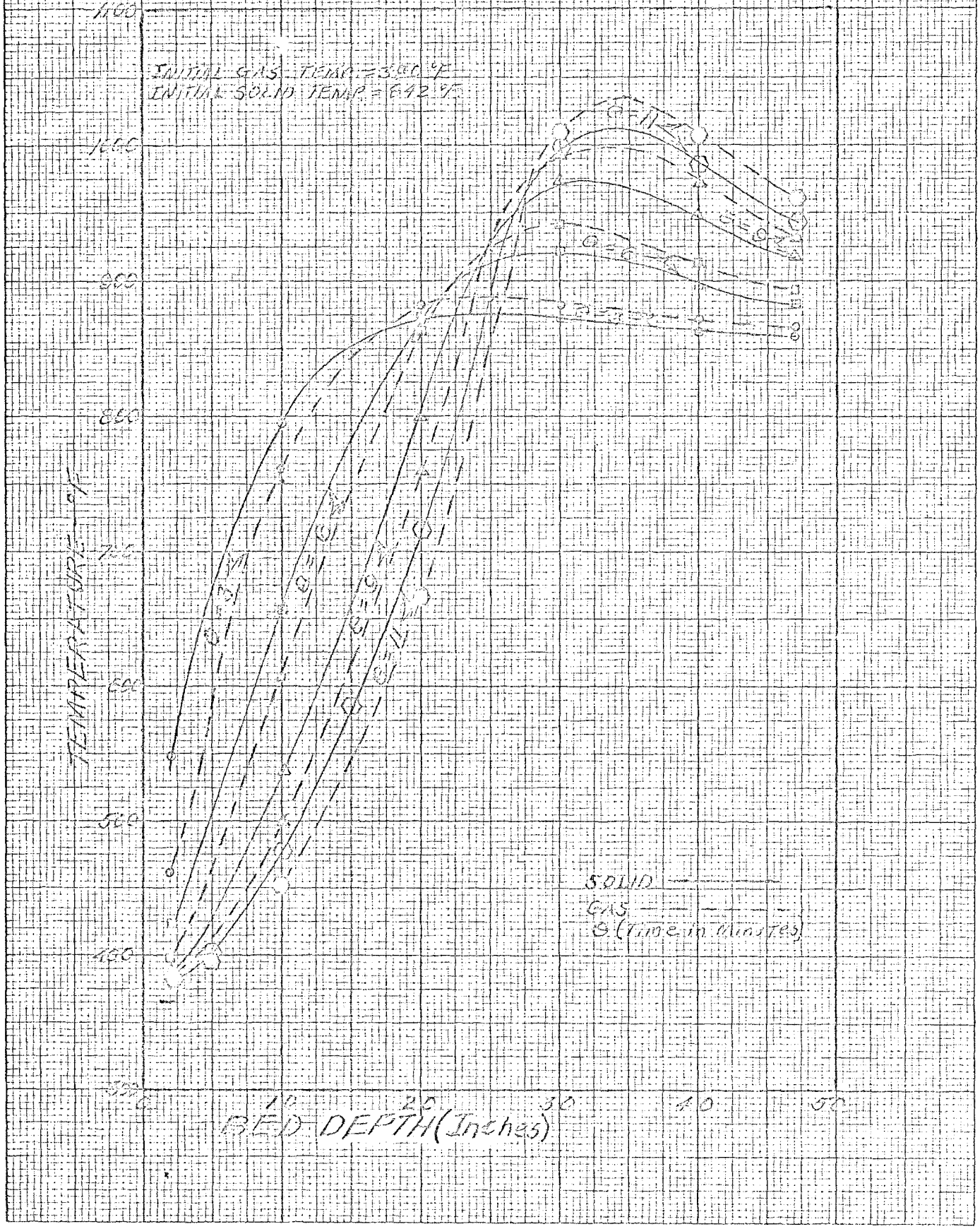
CHAPTER III

RESULTS AND DISCUSSION OF RESULTS

As noted previously, eight programs were written for the IBM 1130 Computer, to compute the temperature (both gas and solid) and conversion profiles through the dual-bed reactor system. The tabulated print-out is presented in the APPENDIX. In order to analyze the data, graphs (Figs. XIII - XXVIII) were prepared to show the effects of the various parameters. Four processing sequences are depicted in these graphs: flow through Unit No. 1 at varying initial gas and solid temperatures (Figs. XIII - XX); countercurrent flow through Unit No. 2 assuming an entering gas temperature and temperature profile through the catalyst, as discussed previously (Figs. XXI - XXII); countercurrent flow through Unit No. 2 with uniform cooling of the solids (Figs. XXIII - XXVI) and parallel flow through Unit No. 2 (Figs. XXVII - XXVIII). As expected, an ever increasing hot zone progresses through the bed as time elapses. The gas temperature exceeds the solid temperature by 20°F to 25°F. The maximum values for several time intervals are listed in TABLE 5).

Several trends were observed during the upward flow

TEMPERATURE PROFILES
UNIT NO. 1



PERCENTAGE CONVERSIONS OF SULFUR DIOXIDE

PROFILES IN UNIT NO. 1

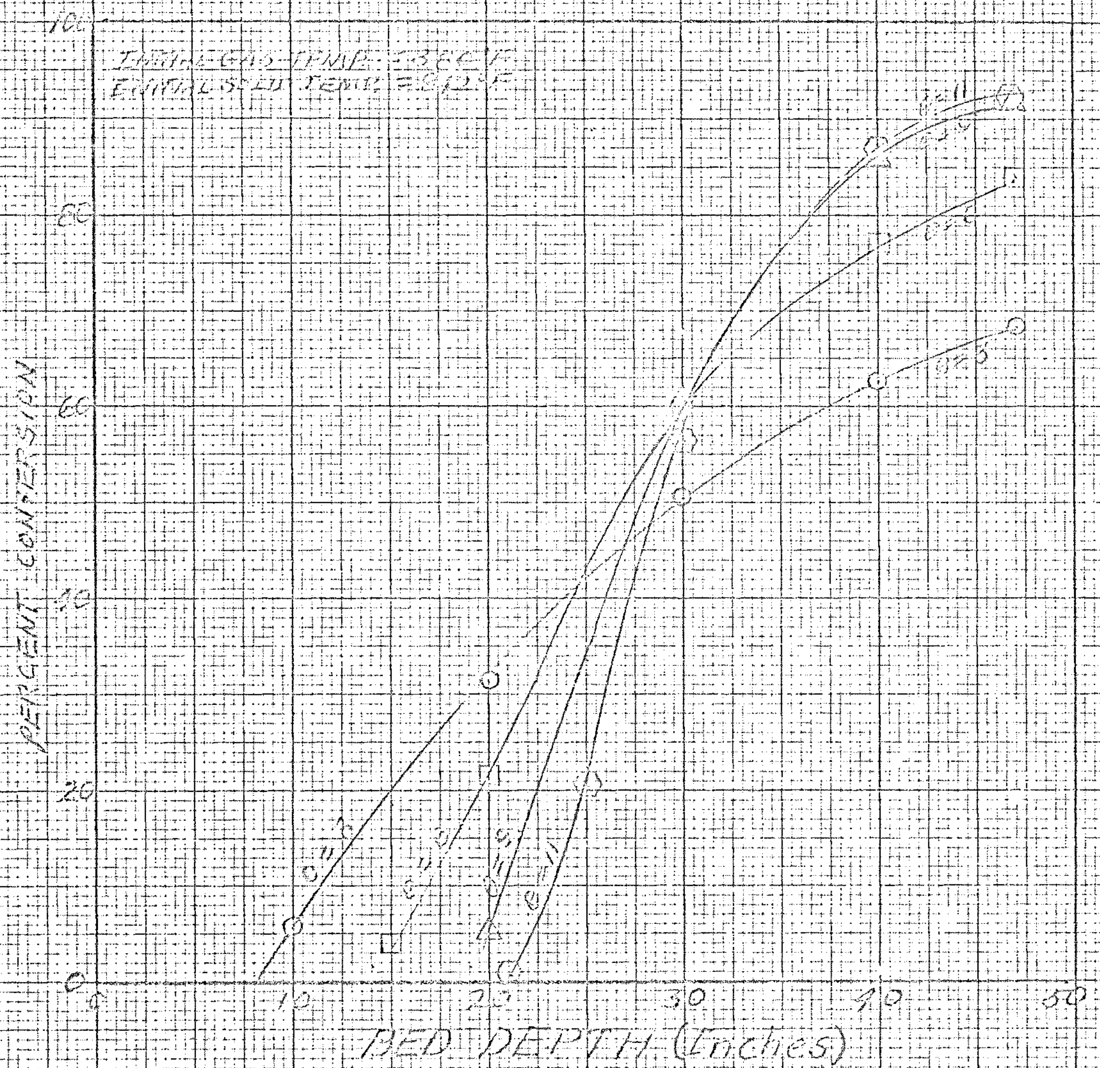


Figure XV

TEMPERATURE PROFILES
UNIT NO. II

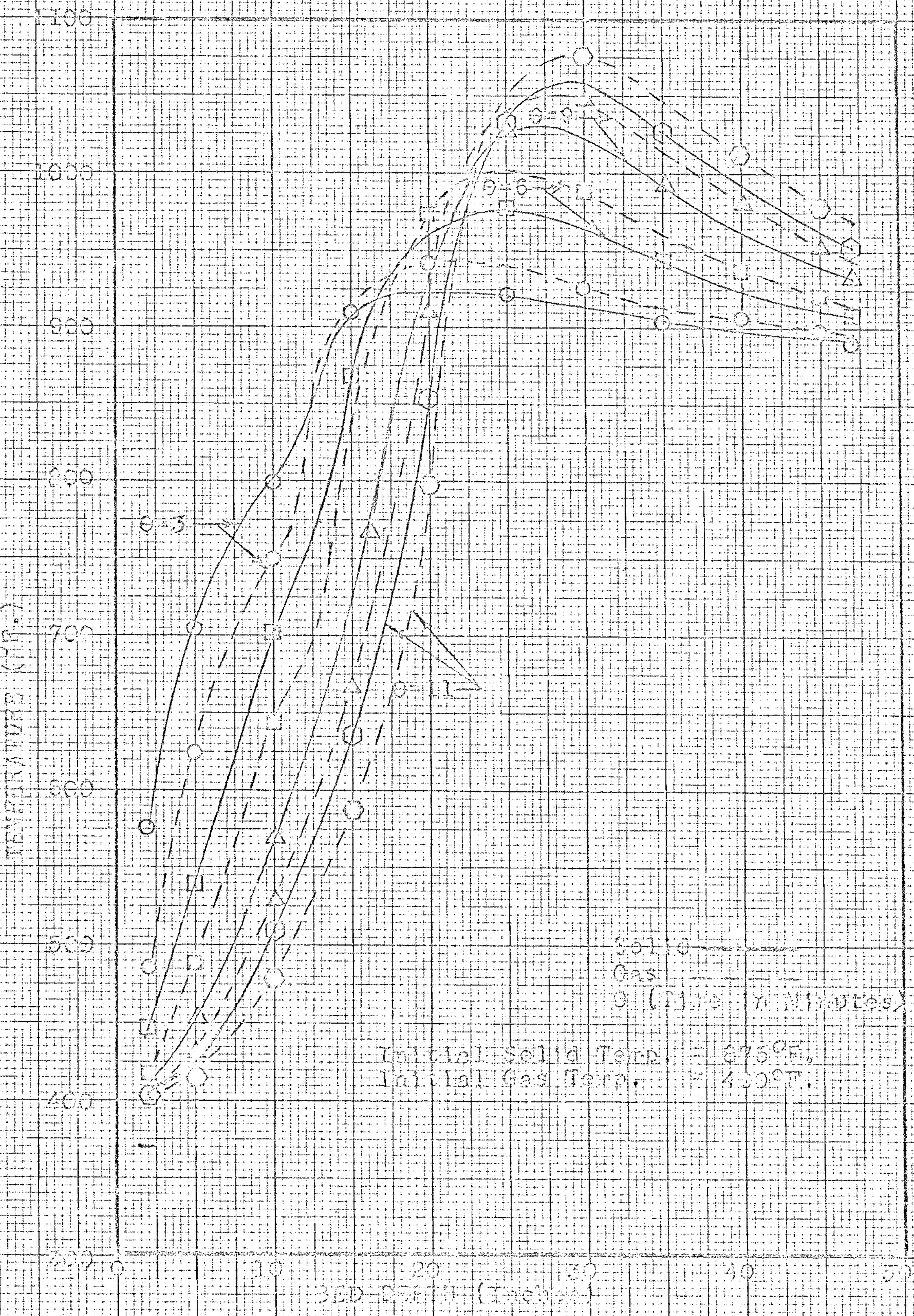
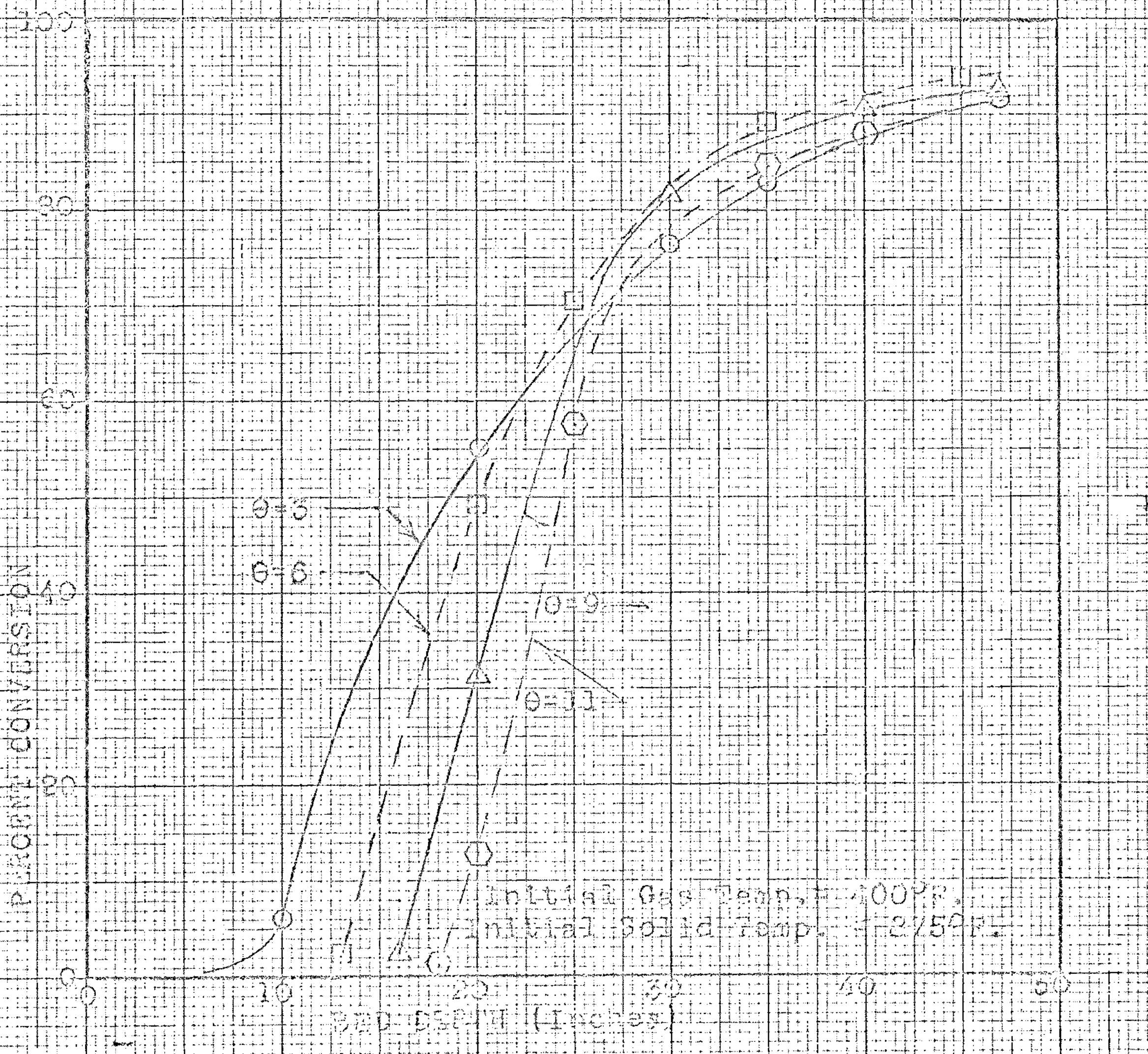


Figure XVI

PERCENTAGE CONVERSIONS
OF
SULFUR DIOXIDE

PROFILES IN UNIT NO. 1



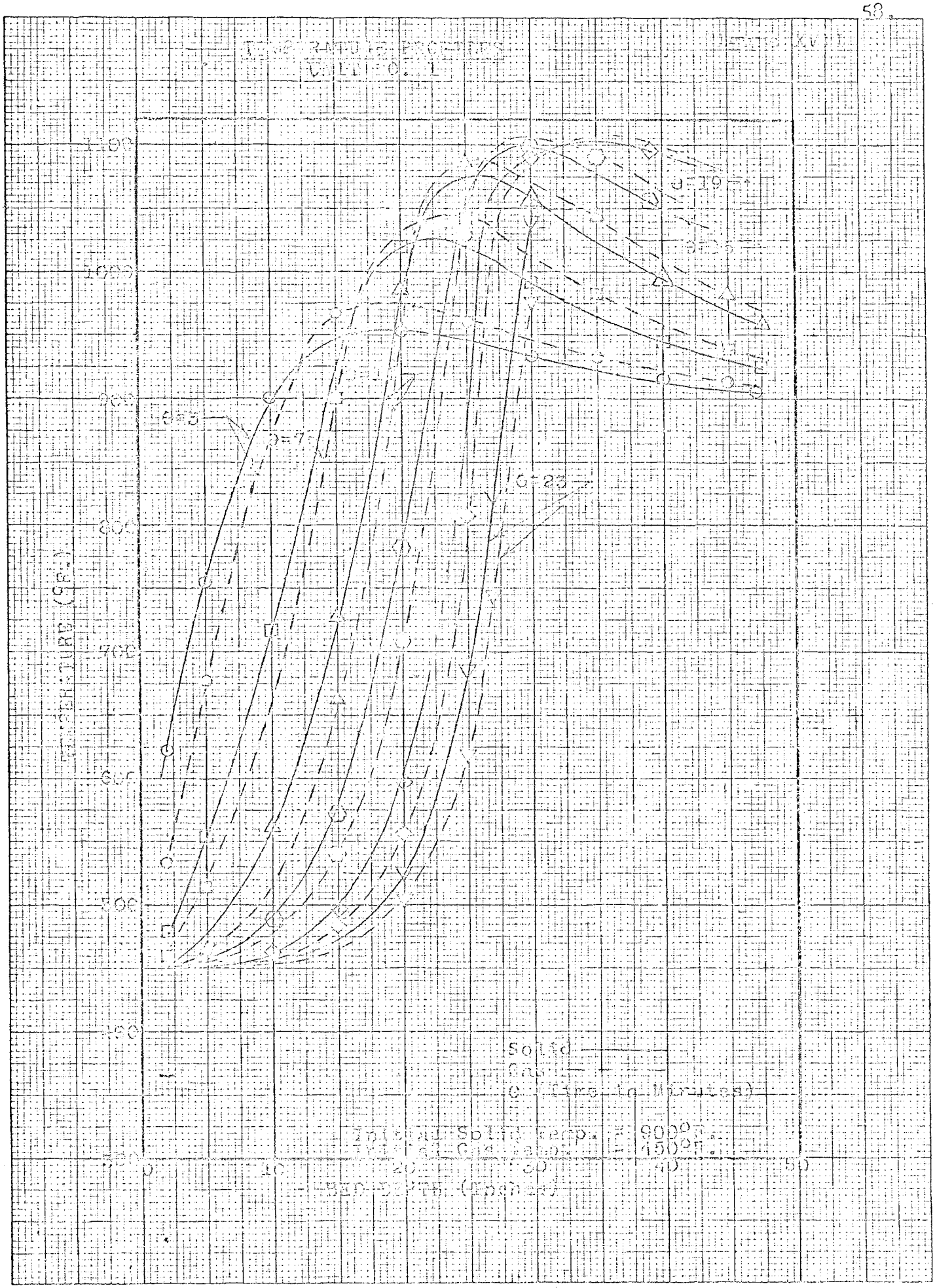
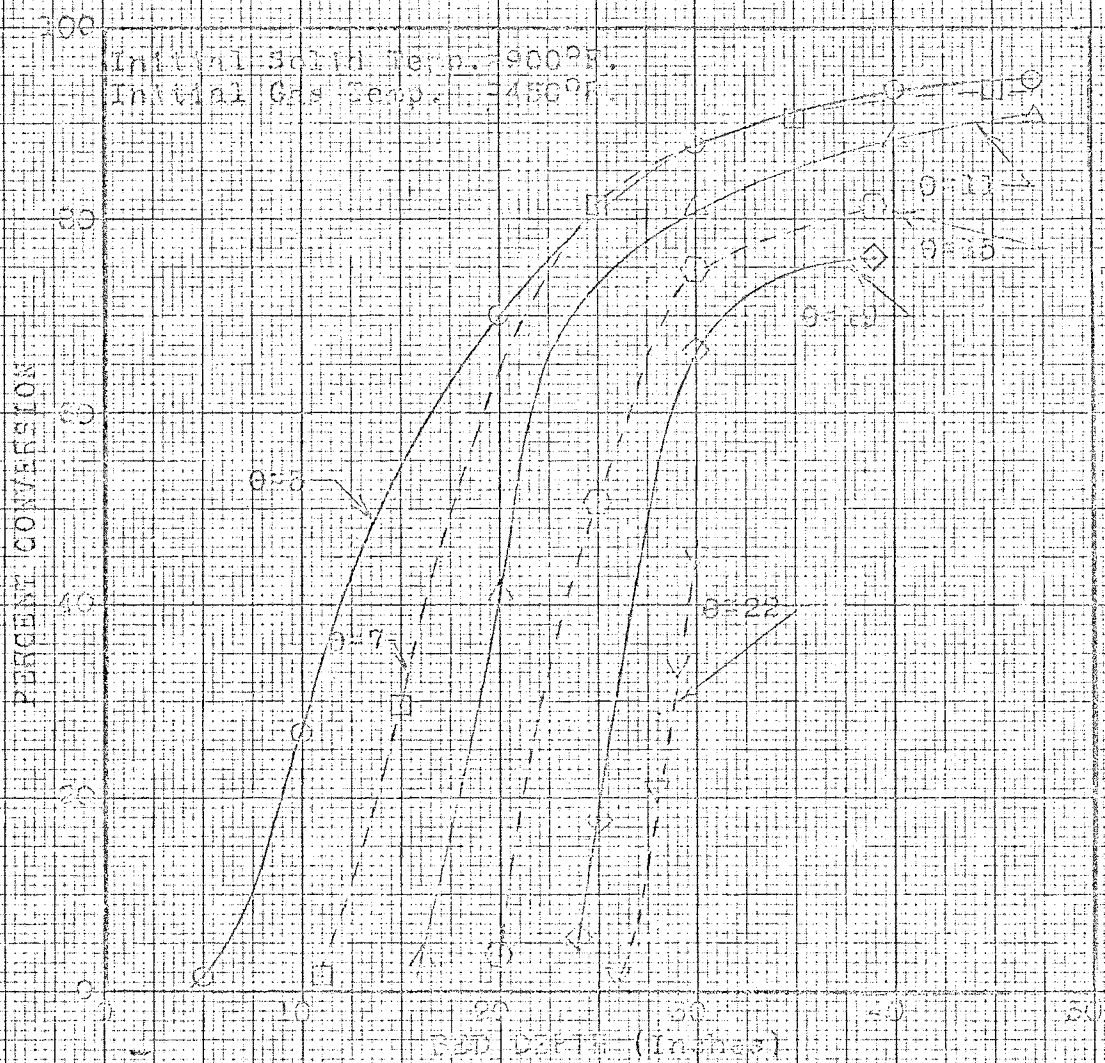
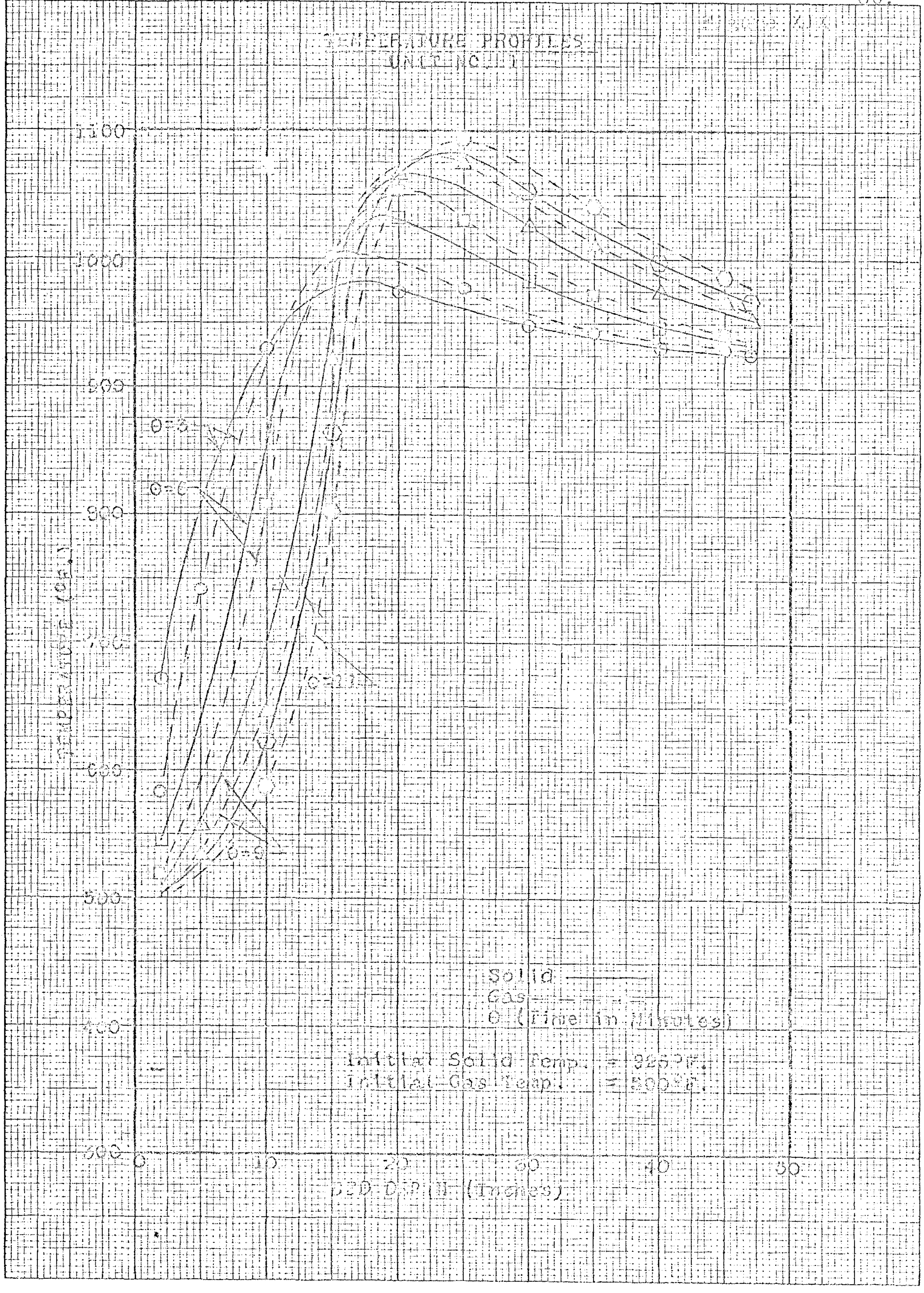


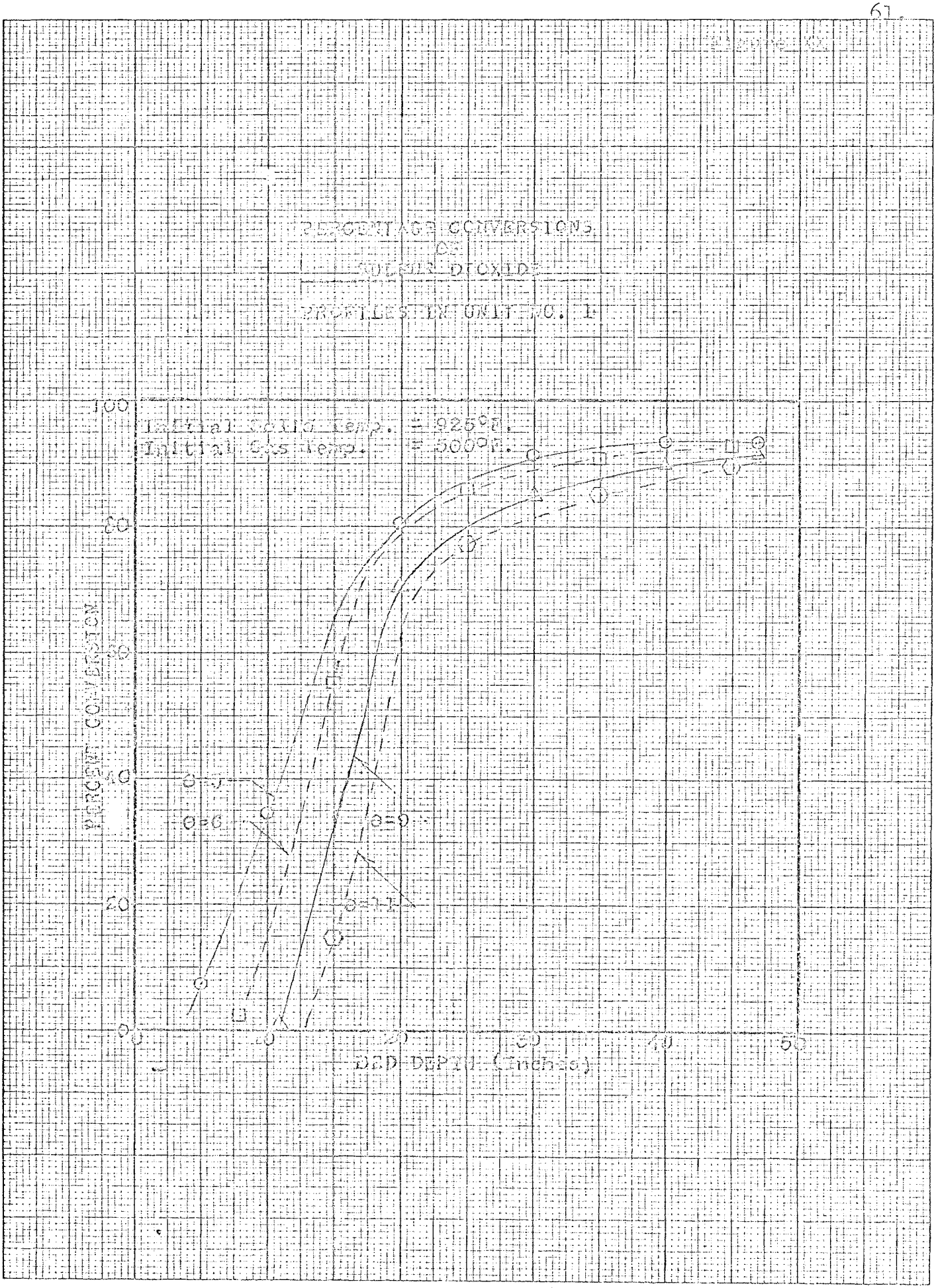
FIGURE XVIII

PERCENTAGE CONVERSIONS
OF
SULFUR DIOXIDE

PROFILES IN UNIT NO. 1




TEMPERATURE PROFILES
UNIT NO. 1
TEMPERATURE (°F.)
1100
1000
900
800
700
600
500
400
300
θ=3
θ=6
θ=12
θ=9
0
10
20
30
40
50
BED DEPTH (Inches)
Solid
Gas
θ (Time in Minutes)
Initial Solid Temp. = 925°F.
Initial Gas Temp. = 500°F.


PERCENTAGE CONVERSIONS
OF
SULPHUR DIOXIDE
PROFILES IN UNIT NO. 1
Initial Liquid Temp. = 925°F.
Initial Gas Temp. = 500°F.
PERCENT CONVERSION
100
80
60
40
20
0
0
10
20
30
40
50
DEP DEPTH (Inches)
θ=0
θ=9
θ=11

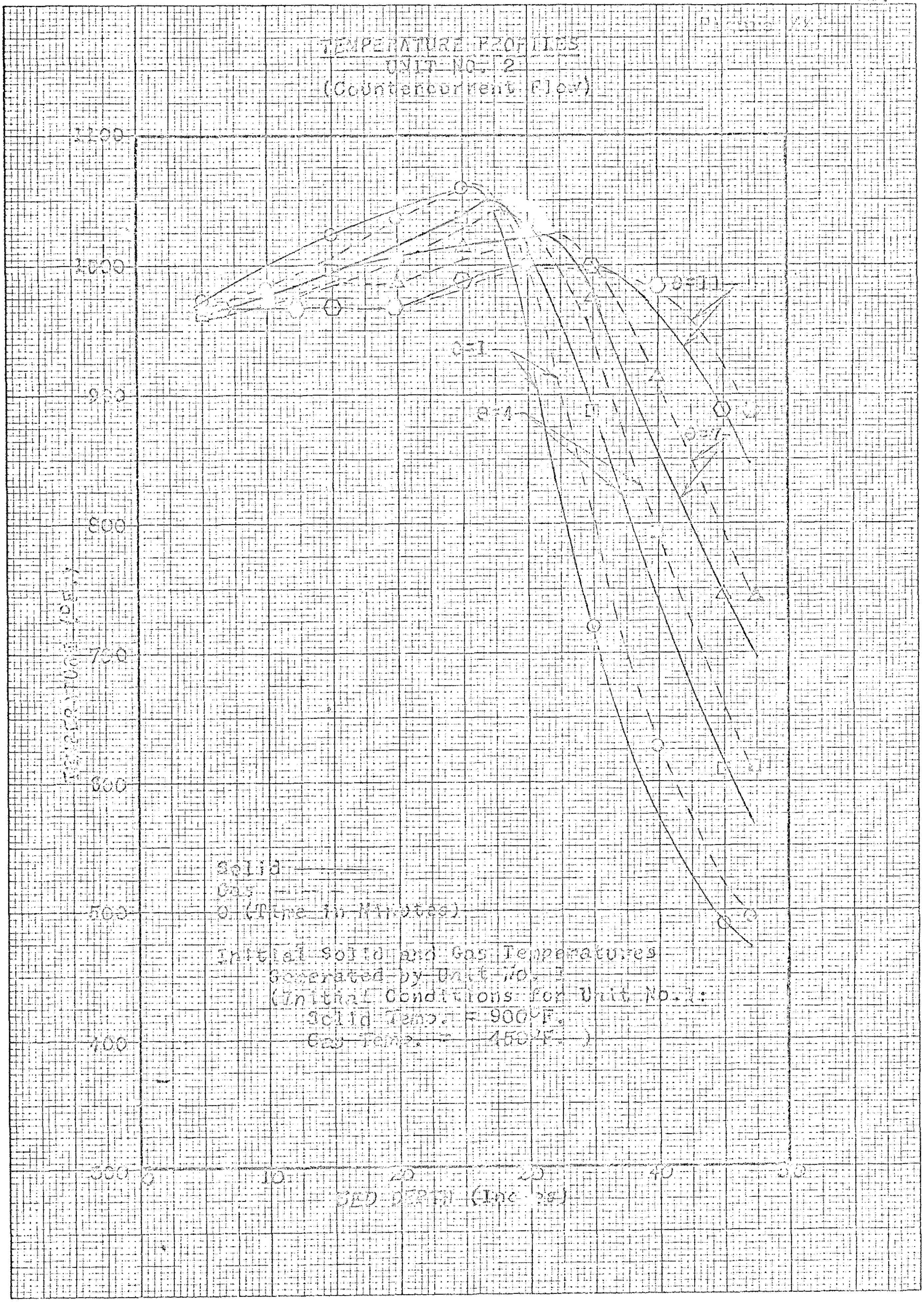
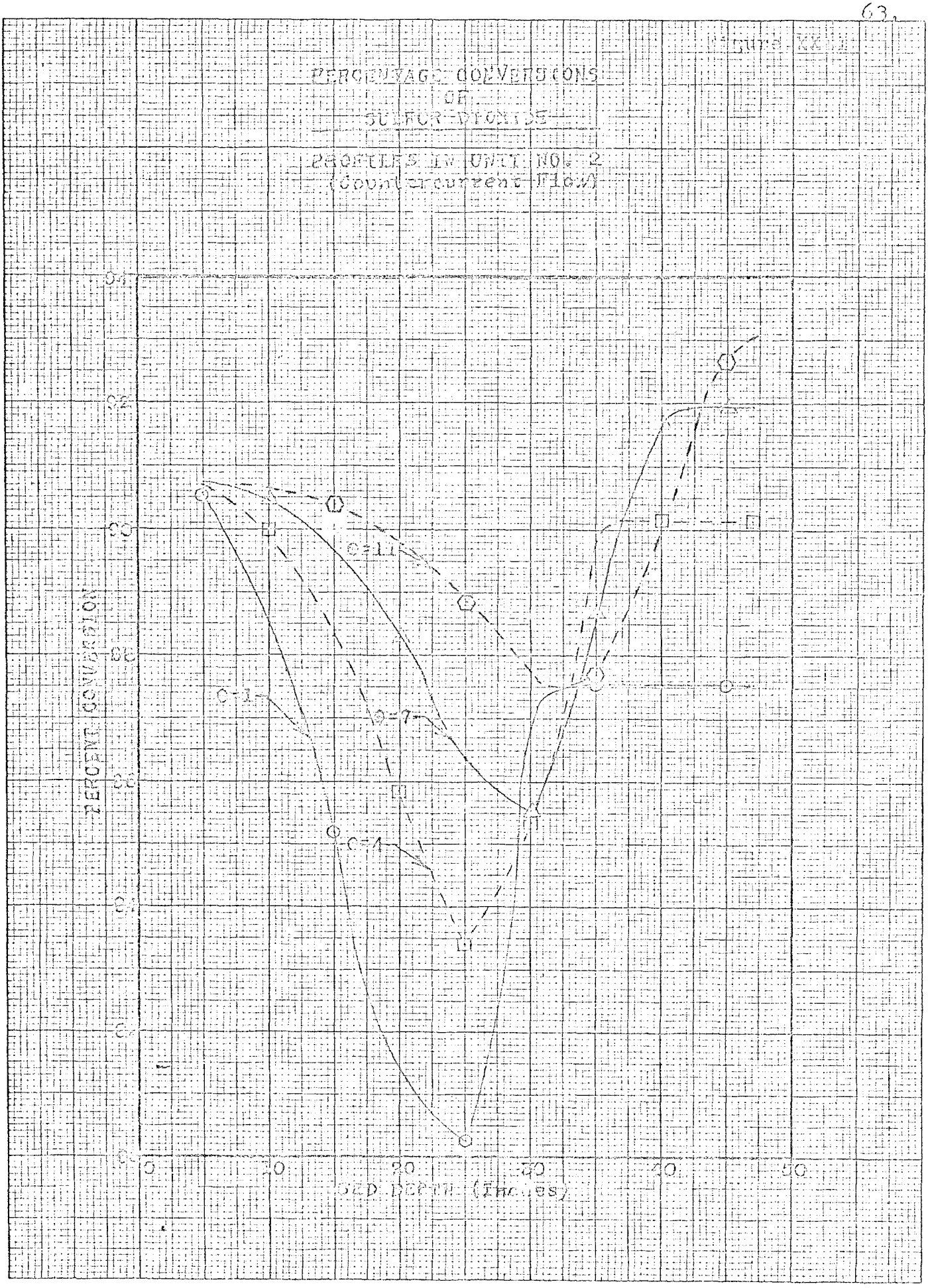
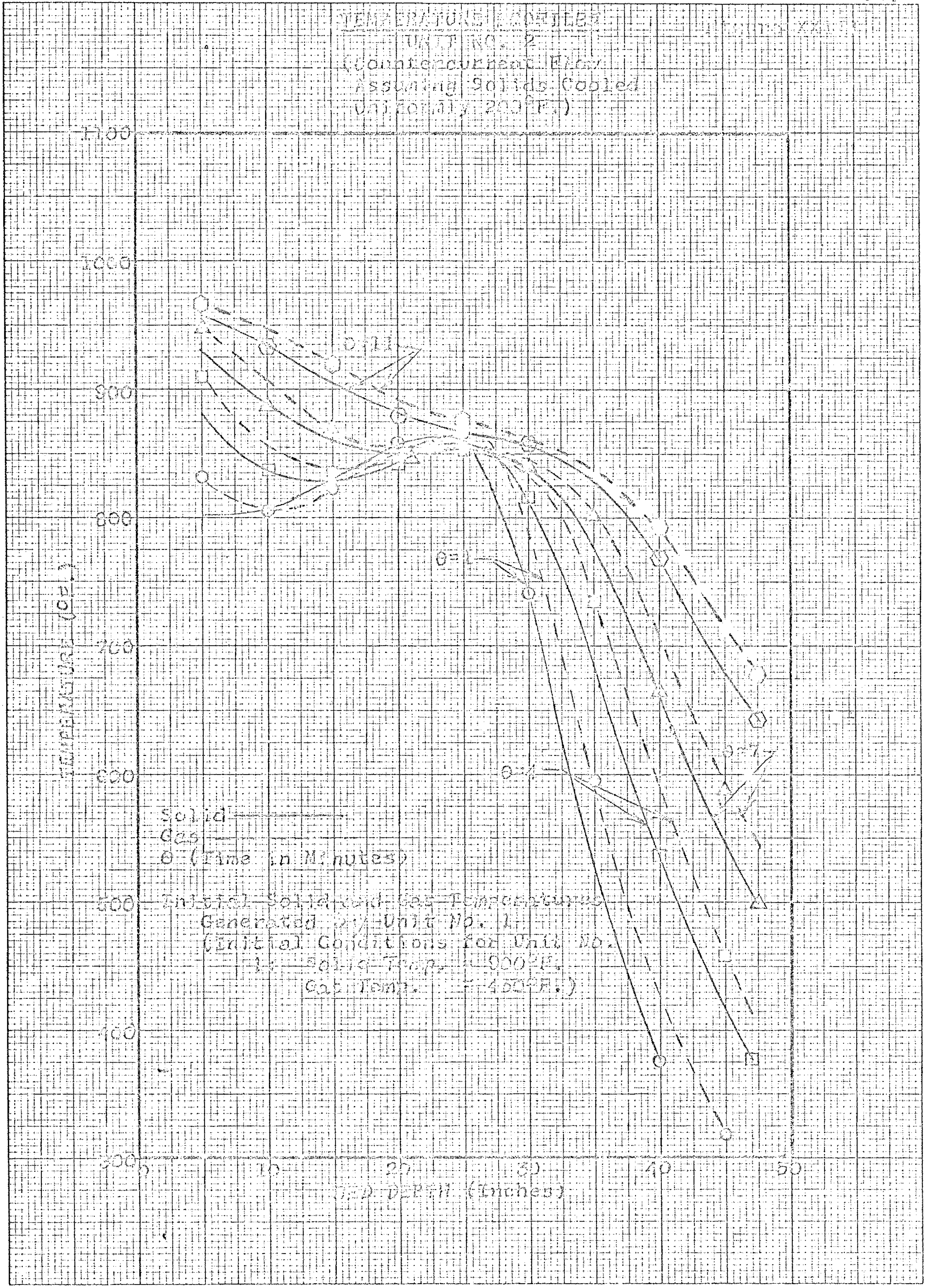
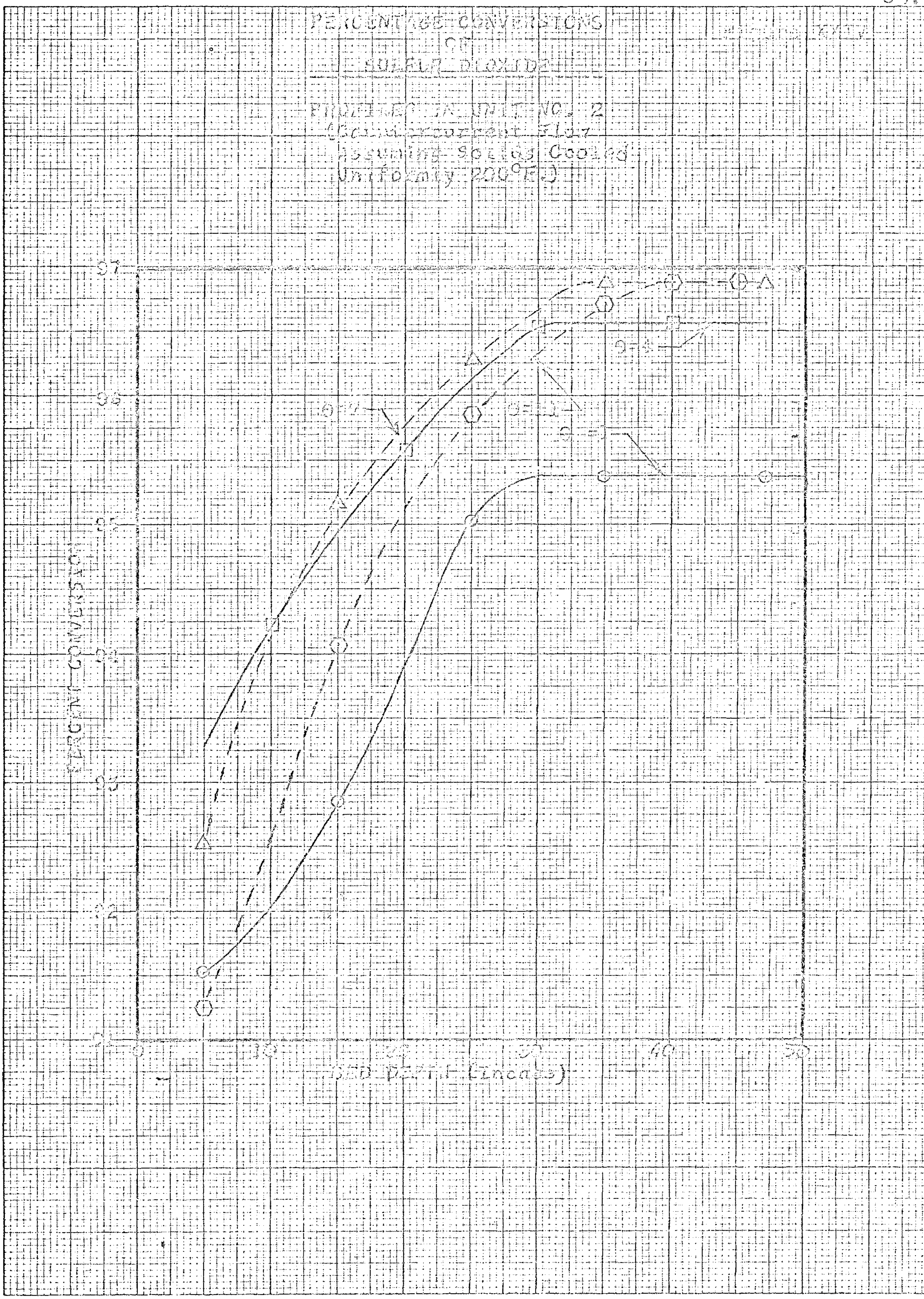

TEMPERATURE PROFILES
UNIT NO. 2
(Countercurrent Flow)
1100
1000
900
800
700
600
500
400
300
0
10
20
30
40
50
BED DEPTH (Inches)
θ=11
θ=1
θ=4
θ=7
Solid
Gas
θ (Time in Minutes)
Initial Solid and Gas Temperatures
Generated by Unit No. 1
(Initial Conditions for Unit No. 1:
Solid Temp. = 900°F.
Gas Temp. = 450°F.)

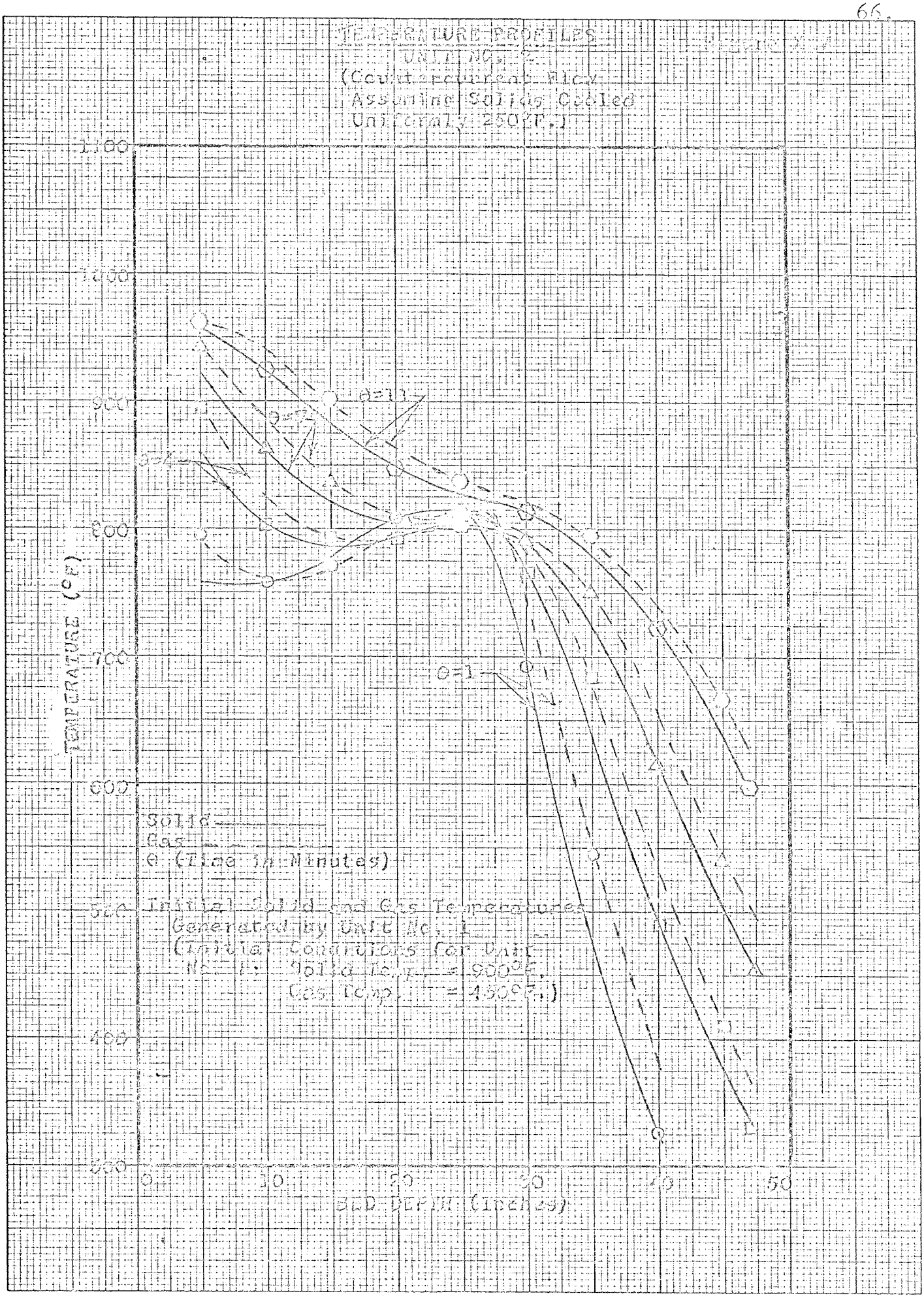
Figure 22

PERCENTAGE CONVERSIONS OF SUCROSE PROFILES IN UNIT NO. 2 (Countercurrent Flow)




TEMPERATURE PROFILES
UNIT NO. 2
(Countercurrent Flow
Assuming Solids Cooled
Uniformly 200°F.)
θ=11
θ=1
θ=4
θ=7
Solid
Gas
θ (Time in Minutes)
Initial Solid and Gas Temperature
Generated by Unit No. 1
(Initial Conditions for Unit No.
1: Solid Temp. = 900°F.
Gas Temp. = 400°F.)
TEMPERATURE (°F.)
BED DEPTH (Inches)


PERCENTAGE CONVERSIONS
OF
SULFUR DIOXIDE
(Cocurrent Flow
Assuming Solids Cooled
Uniformly 200°F)
PERCENT CONVERSION
97
96
95
94
93
92
91
0
10
20
30
40
50
BED DEPTH (inches)


TEMPERATURE PROFILES
UNIT NO. 1
(Countercurrent Flow
Assuming Solids Cooled
Uniformly 250°F.)
1,100
1,000
900
800
700
600
500
θ=1.0
θ=0.9
θ=0.8
θ=0.7
θ=0.6
θ=0.5
θ=0.4
θ=0.3
θ=0.2
θ=0.1
TEMPERATURE (°F)
Solid
Gas
θ (Time in Minutes)
0
10
20
30
40
50
BED DEPTH (Inches)
Gas Initial Solid and Gas Temperatures
Generated by UNIT No. 1
(Initial Conditions for UNIT
No. 1: Solids Temp. = 900°F.
Gas Temp. = 450°F.)

PERCENTAGE CONVERSIONS OF SULFUR DIOXIDE PARTICLES IN UNIT NO. 2 (Countercurrent Flow Assuming Solids Cooled Uniformly 230°F.)

FIGURE XXI

θ = 11

θ = 7

θ = 4

θ = 1

PERCENT CONVERSION

97

96

95

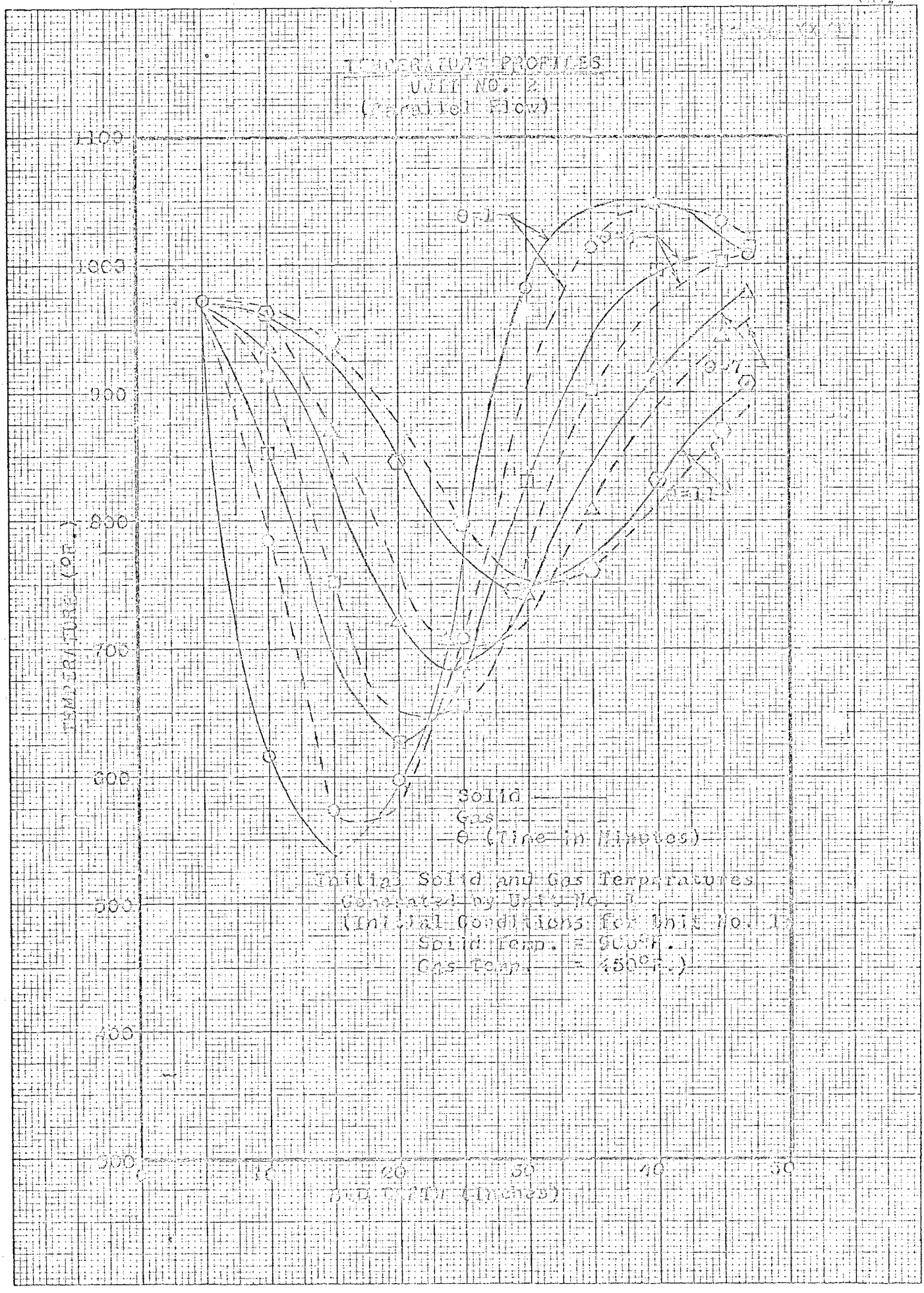
94

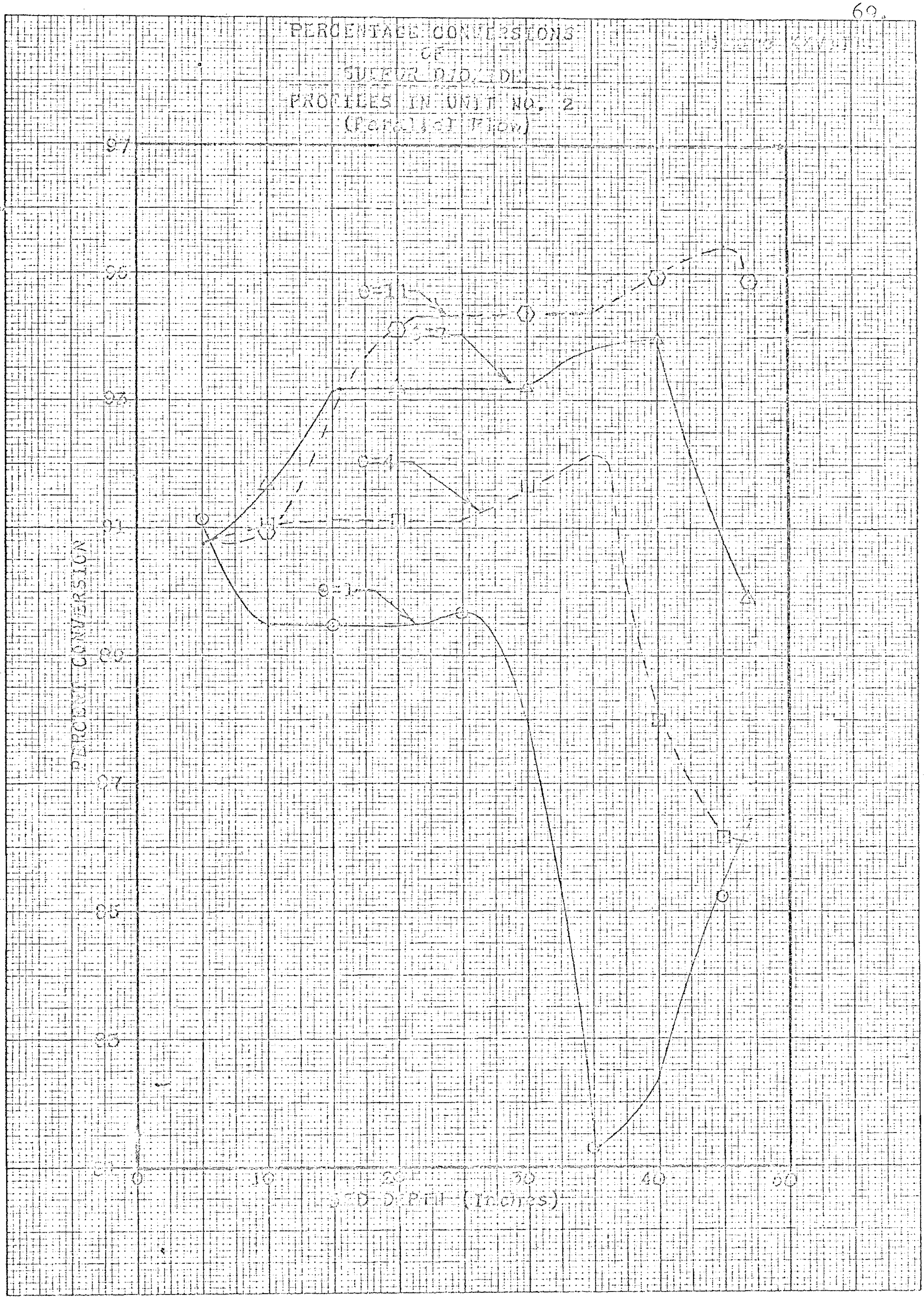
93

92

0 10 20 30 40 50

BED DEPTH (Inches)


TEMPERATURE PROFILES
UNIT NO. 2
(Parallel Flow)
1100
1000
900
800
700
600
500
400
300
TEMPERATURE (°F.)
10
20
30
40
50
θ = 1
Solid
Gas
θ (Time in Minutes)
Initial Solid and Gas Temperatures
Generated by Unit No. 1
(Initial Conditions for Unit No. 1
Solid Temp. = 900°F.
Gas Temp. = 450°F.)


PERCENTAGE CONVERSIONS
OF
SULFUR DIOXIDE
PROFILES IN UNIT NO. 2
(Parallel Flow)
θ=11
θ=7
θ=4
θ=1
97
95
93
91
89
87
85
83
81
0
10
20
30
40
50
60
PERCENT CONVERSION
BED DEPTH (Inches)

through Unit No. 1: at initial gas and solid temperatures of 380°F and 842°F, respectively, an exit conversion of 90 percent was attained after 8 minutes; this conversion level was reached in 3 minutes with the gas and solid at 400°F and 875°F, respectively, and less than one minute was required for the other two cases. An extrapolation of the data for Case 3 (initial gas temperature = 450°F, initial solid temperature - 900°F) indicates that the conversions and temperatures would level off at the conditions normally present in the outlet from the first bed of a commercial catalytic reactor; i. e., 74 percent at 1115°F (TABLE 6) in 22 to 25 minutes. The moderately slow approach to equilibrium (TABLE 7) shows how the rate of reaction controls this condition. This is in agreement with Duecker and West[1]:

> In contrast to the unfavorable effect of high temperature on equilibrium, it is found that the velocity of the reaction (or activity of the catalyst) increases rapidly with rising temperature. Consequently, optimum performance requires a balance between the opposing effects of reaction rate and equilibrium. For all practical purposes, reaction rate with vanadium catalyst is negligible below 400°C(752°F) and rather slow below 450°C (842°F). Gases entering the catalyst beds normally are maintained at temperatures somewhere between these values.

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[1]W. W. Duecker and J. R. West, op. cit., p. 163

It appears relatively easy to maintain conversions of 90 percent or better exiting Unit No. 1 (TABLE 8). In most cases a maximum conversion of approximately 93-94 percent is obtained, but the conversion decreases as the exit temperature decreases. The data from Case 3 indicated that with short cycles (up to 7 minutes), maximum bed temperatures of 960°F to 1000°F and exit catalyst temperatures of 900°F to 925°F, conversions of 94 percent or more would be easily maintained. The maximum time cycle that can be used without excessive overheating of the discharge section of the catalyst bed seems to be in the range of 10 to 12 minutes.

The temperature and conversion profiles in Unit No. 2 with countercurrent flow illustrate two effects that must be avoided if one is to realize high conversions from the dual-unit system:

(1) When the central portion of the bed is permitted to reach temperatures significantly higher than 1000°F, the gas in countercurrent flow can approach equilibrium rapidly because of the high reaction rates. Consequently, even though the conversions might have been 90 - 94 percent leaving Unit No. 1, the conversions can drop to 80 - 85 percent, or even less, in passing

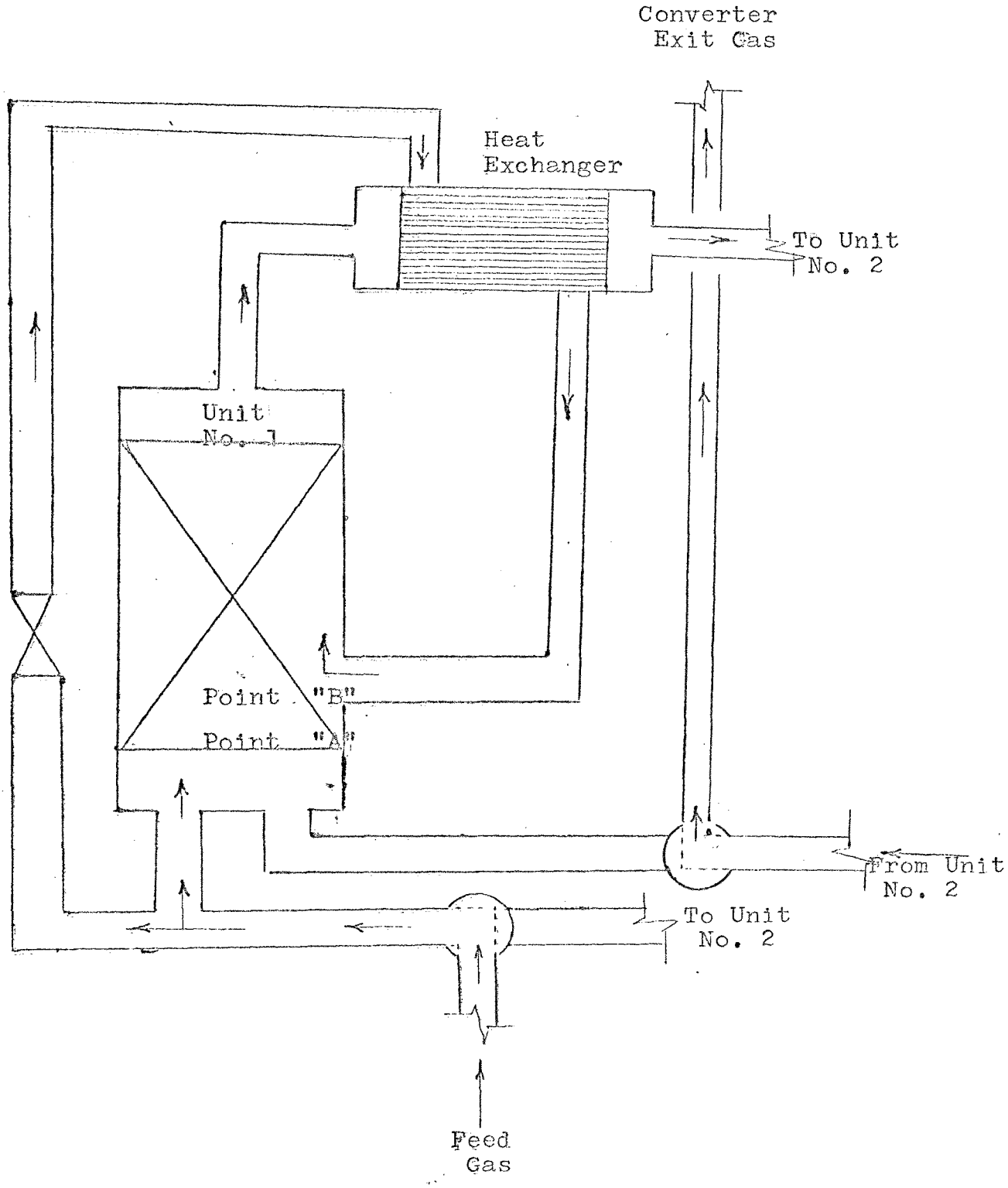
through the maximum temperature zone. With passing time, the temperature of the hot zone will gradually decrease but the conversions of the exiting gas may be consistently less than the conversions in the gas entering Unit No. 2.

(2) Little reaction occurs below $800^{0}F$. Consequently, as soon as the gases pass through catalyst maintained at $800^{0}F$ or less the reaction virtually ceases thereby "quenching" the reaction and "fixing" the conversion. The temperature of the discharge section of Unit No. 2 should preferably be close to $800^{0}F$ and the zone should be relatively long to permit a close approach to equilibrium at this temperature.

In keeping with the idea of improving the conversion by reducing the bed temperature, the initial solid temperatures in Unit No. 2 were uniformly decreased by $200^{0}F$ (Case 6) and $250^{0}F$ (Case 7) to demonstrate the effects of lower catalyst temperatures. It was apparent that conversions of 95 - 97 percent were readily obtainable under these conditions. Obviously, it is not practical to uniformly cool the bed in the manner indicated, but the concept is valid and viable.

FIGURE XXVIX

Normal Flow Cycle-Countercurrent Paths
with Cooling of Exit Gas from Unit No. 1



A proposed scheme to utilize this idea is depicted in Fig. XXIX. An intermediate heat exchanger is installed between Units 1 and 2 to provide a controlled temperature zone in the Fail Unit. This will increase the maximum attainable conversion in comparison with the normal dual-cycle unit (Figs. I and II). A description of the visualized operation of Unit No. 1 follows. Feed gas at 350°F to 450°F enters Unit No. 1 via the two-way valve. A portion of the feed gas enters the bottom of Unit No. 1 and contacts the solid catalyst at point "A". The remainder of the feed gas passes through a regulating valve into the shell side of a shell-and-tube heat exchanger. This fraction of the feed gas is heated to about 800°F to 850°F and enters Unit No. 1 at point "B". The pressure drop between point "A" and point "B" should be greater than the pressure drop for the gas flowing through the shell side of the heat exchanger. This simplifies valving and precludes the use of a booster blower. The combined gases move upward through Unit No. 1, the maximum solids temperature (950°F - 975°F) and the exit solids temperature (900°F to 925°F) being controlled by the cycling of the two units (10 to 12 minutes per cycle). The gases leaving Unit No. 1 are cooled in the heat exchanger to 825°F - 875°F prior to entering the top of Unit No. 2 (Countercurrent flow). Since these gases are below the solids temperature,

the solids temperature will be reduced by 25°F - 50°F fairly rapidly. A maximum conversion of 99 percent (corresponding to an equilibrium temperature of 784°F) may be obtainable by this processing scheme. It must be pointed out that since the catalyst bed is depicted as a constant enthalpy heat sink (fluctuating temperatures within but no increase or decrease of the average solid temperature of the bed) the net effect of the heat of reaction must be to heat up the feed gas and to compensate for heat losses; i. e., there must be no accumulation of heat within the bed. The temperature of the feed gas will therefore be dictated by its temperature rise and the heat losses of the system.

One possible problem with the two-unit system is the increased pressure drop. The pressure drop for the system could be reduced if the catalyst were formed in rings (Raschig rings) rather than solid cylindrical shapes. Moreover, ring-shaped packing has less surface area per unit of reactor volume in comparison with the cylindrical packing. The ring packing should decrease the reaction rate throughout the catalyst bed. The temperature increases throughout the bed should be less abrupt and better temperature control should be possible. The selection of an optimum size for Raschig ring shaped catalyst indicates the need for further study.

In order to complete the picture, parallel flow was assumed in Unit No. 2 (Case 8) to see whether or not contacting the hot gases with the cooler solid might not produce a satisfactory effluent gas. The rapid changes in temperature throughout the bed and the poor exit conversions indicate that parallel flow is considerably inferior to countercurrent flow.

CHAPTER IV

CONCLUSIONS

The catalytic oxidation of sulfur dioxide can be carried out under unsteady state conditions in a dual unit system by cyclic operation. This system, operating without heat exchangers, can realize conversions equivalent to those of conventional commercial units employing three passes; i. e., two intermediate cooling stages. By utilizing a single heat exchanger, this dual unit system should be competitive and possibly superior to typical U. S. contact plants employing four passes to obtain maximum conversions of 98 percent, normally.

It should prove very advantageous to use this process in conjunction with the Bayer Double Contact Process[1] whereby overall yields exceeding 99.5 percent should be attainable.

The programs and data presented provide means of predicting temperature profiles in commercial sulfuric acid converters. Temperature profiles,

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[1] W. Moeller and K. Winkler, J. of the Air Pollution Control Assoc., 18, 324-325 (May, 1968).

reaction rates and conversion profiles can be determined within the range of the listed operating parameters when vanadium oxide is used as the catalyst.

CHAPTER V

RECOMMENDATIONS

Optimization and economic studies should be conducted to determine the ultimate value of this work. The concept of the single heat exchanger with the dual-unit system; the idea of using this process in combination with the Bayer Double Contact Process and the possibility of using Raschig ring shaped packing, either alone or in combination with cylindrical packing should be investigated.

Experimental work should be conducted in a laboratory or pilot plant to verify the temperature and conversion profiles projected by the mathematical model.

Development work on Raschig ring shaped catalyst should be considered for use in present commercial contact acid plants. Power costs could be substantially reduced in present plants because of the lower pressure drop, if such a catalyst shape could be employed.

NOMENCLATURE

a_{SO_2} , a_{O_2} , a_{SO_3} = activities of reactants, dimensionless

C, C' = constants

c_p = heat capacity at constant pressure, cal./deg. mole

c_{p_g} = specific heat of gas, Btu/lb./°F

c_{p_s} = specific heat of solid, Btu/lb./°F

D_p = diameter of particle, ft.

e = base of natural logarithm, 2.7182818

ΔF^o = standard free energy of formation

G^o = superficial mass velocity, lb./hr.ft.^{2}

h = heat transfer coefficient, Btu./hr./sq.ft./°F.

ΔH = change in enthalpy (heat content), cal./mole
Btu./lb.

k = thermal conductivity , Btu./hr./ft./°F.

k = rate constant, g.mole SO_2/ g.catalyst

K_p = thermodynamic equilibrium constant

K_{SO_2} , K_{O_2} , K_{SO_3} , K_{N_2} = adsorption equilibrium constants

m = exponent

n = exponent

N_{Re} = Reynolds number, dimensionless

P_{SO_2} , P_{O_2} , P_{SO_3} , P_{N_2} = partial pressures of gaseous components, atmospheres

Q_g , Q_s = heat transferred, Btu/hr.

r = rate of reaction, lb.moles of SO_2converted,hr.
lb. of catalyst

R = gas law constant, 1.98719 cal/deg.mole

r = radial direction

t = time, sec. or hours.

T = temperature, ^oK

v_r, v_θ, v_z = velocities, ft./hr.

w_c = weight of catalyst, lb.

z = vertical compontent

ρ_g = density of gas, lb./cu.ft.

ρ_s = density of solid, lb./cu.ft.

μ = viscosity, lb./hr.ft.

θ = time, sec or hours

θ = angular direction

REFERENCES

Barker, J. J., Ind. & Eng. Chem., 57, 44, (1965)

Baron, T., Manning, W. R., and Johnstone, H. F., Chem. Eng. Prog., 48, 1251 (1952).

Bird, R. B., Stewart, W. E., and Lightfoot, E. N., "Transport Phenomena", John Wiley & Sons, Inc., New York, 1960, pp. 279-283

Boreskov, G. K., Bitter, L. G. and Serebrennikowa, M. T., Khim. Prom., 1, 8 (1947)

Boreskov, G. K., and Slin'ko, M. G., British Chem. Eng., 10, 173 (March, 1965)

Boreskov, G. K. and Sokolova, J. Chem. Ind. (U.S.S.R.), 14, 1241 (1937)

Bodenstein and Pohl, Z. Elektrochem. (1904)

Buell, C. K. and Clark, A., U. S. Patent 2,699,986, (1955)

Bureau of Mines, Bulletin 605, (1963), p. 103

Burkhardt, D., Chem. Eng. Prog., 64, 66-70 (1968)

Buryak, K. A., J. Appl. Chem. (U.S.S.R.), 36, 1835-1838 (1963).

Calderbank, P. H., J. Appl. Chem. (London), 2, 482 (1952)

Calderbank, P. H., Chem. Eng. Prog., 49, 586 (1953).

Chartrand, G. and Crowe, C. M., Can. J. Chem. Eng., 47, 296-301 (1969).

Chesalova, V. S. and Boreskok, G. K., Zhur. Fig. Khim., 30, 2560 (1956)

Duecker, W. W. and West, J. R., "The Manufacture of Sulfuric Acid", Reinhold Publishing Corporation, New York, 1959, pp. 135-287.

Davidson, B., Dissertation No. 64-2472, "Kinetics of the Catalytic Oxidation of Sulfur Dioxide", Northwestern University, PhD (1963), University Microfilms, Inc., Ann Arbor, Michigan, pp. 13-14.

Farris, "Proceedings of the Symposium on Catalysis in Practice", (London), Instn. Chem. Engrs., 51-54 (1963)

Faust, Wenzel, Clump, Maus, and Anderson, "Principles of Unit Operations", John Wiley & Sons, New York, 1960, p. 473.

Furnas, C. C., Ind. & Eng. Chem., 22, 26-31 (1930)

Gilbert, N. and Daniels, F., Ind. & Eng. Chem., 40, 1719 (1948)

Goldman, M., Canjar, L. N. and Beckmann, R. B., J. Appl. Chem. (London), 7, 274 (1957)

Grossman, L. M., Trans. A.I.Ch.E., 42, 535 (1946)

Hall, R. E. and Smith, J. M., Chem. Eng. Prog., 45, 464 (1949).

Hara, H., Adachi, A. and Kurata, N., Kogyo Kagaku Zasshi, 63, 56-59 (1960)

Homme, A. C. and Othmer, D. F., Ind. & Eng. Chem., 53, 979-984 (1961)

Hougen, O. A. and Watson, K. M., "Chemical Process Principles", John Wiley and Sons, New York, (1947), pp. 902-926, 982-990 and 1020-1028.

Hulett, J. R. and Wilson, J. Chem. Soc. (A), 2569-2571 (1968)

JANAF Thermochemical Data, The Dow Chemical Co., Midland, Michigan (1961, 1965)

Jefferson, C. P., Chem. Eng. Science, 23, 509-523 (1968)

Kilpatrick, M. O., Dean, L. E., Hall, D. S. and Seed, K. W., Pet. Refiner, 33, 171 (1954)

Klinkenberg, A., Ind. & Eng. Chem., 40, 1992-1994 (1948).

Krichevskaya, E. L., J. Phys. Chem. (U.S.S.R.) 21, 287 (1947)

Kubota H., Ishizawa, M. and Shindo, M., Sulphuric Acid (Japan), 12, 243 (1959)

Kubota, H. Nam Koong, S. Akehata, T. and Shindo, M., Can. J. Chem. Eng., 39, 64 (1961)

Lancashire, K. B., Lezberg, E. A. and Morris, J. F., Ind. & Eng. Chem., 52, 433-434 (1960)

Lancashire, R. B., Lezberg, E. A., and Morris, J. F., NASA Technical Note D-265 (March, 1960)

Leung, P. K. and Quon, D., Can. J. Chem. Eng., 44, 26-31 (1966)

Ledoux, E., Ind. & Eng. Chem., 40, 1970 (1948)

Lovell, C. L. and Karnofsky, Ind. & Eng. Chem., 35, 391 (1943).

Mathur, G. P. and Thodos, G., Chem. Eng. Science, 21, 1199 (1966)

McAdams, W. H., "Heat Transmission", McGraw-Hill Book Company, Inc., New York, 1954, p. 457

Minhas, S. and Carberry, British Chem. Eng., 14 799-802 (1969)

Moeller, W. and Winkler, K., J. of the Air Pollution Control Assoc., 18, 324-325 (May, 1968).

Norton, C. L. Jr., Chem. & Met. Eng. 116 (July, 1946)

Ohki, Y. O'Shima, E., Inoue, H. and Yagi, S., Chem. Eng., (Japan), 4, 316 (1966)

Perry, J. H. Perry, R. H., Chilton, C. H. and Kirkpatrick, S. D., "Chemical Engineer's Handbook", McGraw-Hill Book Company, New York, 1963, chap., 9, p. 58.

Ross, L. W., The Journal of World Sulfur, 65, 37 (Aug/Sept 1966)

Saunders, O. A. and Ford, D., Iron and Steel Inst. J., 141, 291 (1940)

Schumann, T. W. W., Franklin Inst. J. 208, 405 (1929)

Schalkwijk, W. F., Brit. Chem. Eng., 5, 33 (1960)

Schertz, W. W. and Bischoff, K. S. A.I.Ch.E.J., 15, 597 (1969)

Shannon, P., Johnson, A., Crowe, C., Hoffman, T., Hamielec, A., and Woods, D., Chem. Eng. Prog., 62, 54 (19660)

Slin'ko, M. G., and Beskov, V. S., Int. Chem. Eng., 2, 388-393 (July, 1962)

Thomas, J. M. and Thomas, W. J., "Introduction to the Principles of Heterogeneous Catalysis", Academic Press, New York, (1967), 487-491

Turner, G. A., A.I.Ch.E.J., 13, 678 (1967)

APPENDIX A

DATA FOR INITIALIZATION

Basic Data

Basis: Eklund's data[1]

Total gas mass velocity = 300 lb./hr./sq.ft.

Initial gas composition = 7% SO_2, 10.9% O_2 and 82.1% N_2 by volume.

Assume: H_2SO_4 plant capacity = 200 tons/day

200/24 x 2000 x 32/98 = 5440 lbs. sulfur/hr.

Assume: Catalyst loading = 5.0 cu. ft./daily ton[2]
i.e. For 7% SO_2--4.33 cu. ft. at 96% conversion
--5.61 " " " 97% "
"

200 x 5 = 1000 cu. ft. of catalyst required

Moles SO_2/hr. = Moles S/hr. = 5440/32 = 170

Total moles of gas/hr. = 170/0.07 = 2430

				Moles/hr.			Lbs./hr.
SO_2	2430	x 0.07	=	170	x 64	=	10,900
O_2	2430	x 0.109	=	265	x 32	=	8,500
N_2	2430	x 0.821	=	1995	x 28	=	55,800
		Total		2430			75,200

Sq. ft. of catalyst area = 75,200 Lbs./hr./300 Lbs./hr./sq.ft.

Depth of catalyst = 1000 cu. ft./250 sq.ft. = 4.0 ft. = 48 inches

	Lbs./hr./sq.ft. of cross section		Lbs./min.
SO_2	10,900/250 = 43.6	/60 =	0.727
O_2	8,500/250 = 34.0	/60 =	0.567
N_2	55,800/250 =223	/60 =	3.717
Total	75,200/250 =300.6	/60 =	5.01

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[1] W. W. Duecker and J. R. West, op. cit., p. 169

[2] W. W. Duecker and J. R. West, op. cit., p. 170

Approximate heat balance

Temperature range of converters[3] = 410°C (770°F) to 600°C (1110°F)

hence average temperature = 500°C = 773°K = 932°F

Total heat liberated = 170 Lb. moles of SO_2/hr.
x 42,000 Btu/lb.mole
= 7,150,000 Btu/hr.

Assume molar specific heat[4] = 8.33 Btu/ Lb. mile of mixture/ 1°F

2430 Lb. moles of mixture x 8.33 = 20,200 Btu/°F/hr.

Total temperature rise = 7,150,00 / 20,200 = 353°F.

$$\begin{array}{r} 1110^{\circ}F \\ - \ 770 \\ \hline 340^{\circ}F \end{array}$$

This apparently satisfactory temperature rise check indicates that from a heat balance viewpoint, the reaction can take place in the type of unit under consideration.

Properties of catalyst

Spherical Diameter[5]

Catalyst size = 8 mm. dia. x 25 mm. long

For an irregular particle of known A_p to V_p ratio there is only one size of sphere having this same ratio. The diameter of this sphere is taken as characteristic of the particle.

$D_p = 6/A_p/V_p$ = Dsp.

Area of cylinder = 3.14 x 8 x 25 + 2 x 3.14 x 4 x 4
= 728.8 sq.mm.

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[3]W. W. Duecker and J. R. West, on. cit., p. 252

[4]W. W. Duecker and J. R. West, on. cit., p. 162

[5]Faust, Wenzel, Clump, Maus, and Anderson, "Principles of Unit Operations", John Wiley & Sons, New York, 1960, p. 473

Volume of cylinder = 3.14 x 4 x 4 x 25 = 1260 cu. mm.

Hence D_{sp} = 6/728/1260 = 6/0.58 = 10.35 mm
= 1.035 cm
= 1.035 x 0.3937 = 0.407 inches
= 0.407/12 = 0.034 feet

Porosity[6]

Sphericity = ψ_v = A_o/A_p = D_o^2/A_p

V_p = $D_o^3/6$ = 1260

D_o = 13.4 mm.

ψ_v = A_o/A_p = $(13.4)^2/728.8$ = 563/728.8 = 0.772

From Fig. B-12[7]

At sphericity = 0.771,

Porosity, ϵ, = 0.45 for normal packing

" " = 0.42 " dense "

Use porosity, ϵ, = 0.42 for dense packing

Calculation of Average Physical Properties of Reaction Gas

Component	Temp.(°F)	k[8]	c_p[9]	μ 10 cp.	μ 10 #/hr.°F	Prandtl No. $N_{pr}(c_p\mu/k)$
SO_2	32	0.0050	0.154	0.0115	0.0278	0.855
"	212	0.0069	0.161	0.0150	0.0363	0.85
N_2	32	0.0139	0.250	0.0167	0.0405	0.73
"	212	0.0181	0.252	0.021	0.0508	0.705
"	392	0.0220	0.258	0.025	0.0606	0.71
"	572	0.0255	0.261	0.0287	0.0695	0.71
"	752	0.0287	0.263	0.0325	0.0786	0.72
O_2	32	0.0142	0.220	0.0192	0.0465	0.72
"	122	0.0166	0.225	0.022	0.0533	0.72
"	212	0.0188	0.227	0.024	0.0581	0.70
SO_3	No data available					

[6] Ibid, p. 535

[7] Ibid, p. 537

[8] W. H. McAdams, "Heat Transmission", McGraw-Hill Book Company, Inc., New York, 1954, p. 457

Average Prandtl Number at 930°F

Avg. μ at 930°F N_2 0.821 x 0.036 = 0.0296 cp.
O_2 0.109 x 0.040 = 0.0044 "
SO_2 0.070 x 0.028 = 0.0020 "
Avg. = 0.0360 cp.

0.036 x 2.42 = 0.087 Lb./(hr)(ft)

Avg. c_p at 930°F N_2 0.821 x 0.27 = 0.221
O_2 0.109 x 0.26 = 0.028
SO_2 0.070 x 0.21 = 0.015
Avg. = 0.264

Avg. k at 930°F N_2 0.821 x 0.032 = 0.0263
O_2 0.109 x 0.033 = 0.0035
SO_2 0.070 x 0.015 = 0.0011
Avg. = 0.0309

Avg. $c_p\mu/k$ = 0.264 x 0.087 / 0.0309 = 0.74

Assume Prandtl No. is constant at 0.74

Gas Density

Volumetric flow = 2430 moles/hr.
= 2430/250 = 9.72 lb.moles/hr/sq.ft.
= 300 lbs/hr/sq.ft.

Cu.ft./hr/sq.ft. at 930°F = 9.72 x 359 x (460 + 932)/(460 + 32) = 9880

Gas Density at 930°F = 300/9880 = 0.0303 lbs./ cu.ft.

Heat Transfer Coefficient

D_p = 0.034 ft.

$N_{Re} = \frac{D_p G}{\mu}$ = 0.034 x 300 / 0.087 = 117

$j = 0.400\ Re^{-0.437} = h/c_p G_o (c_p/k)_f^{2/3}$ [11]
$= 0.400(117)^{-0.437} = h/(0.264 \times 300) \times (0.74)^{2/3}$

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[9] Ibid, p. 464

[10] Ibid, p. 469

[11] R. B. Lancashire, E. A. Lezberg and J. F. Morris, op. cit., p. 9.

$= 0.400/8.03 = h \times 0.82 / 79.3 = 0.0103\ h$
$= 0.0496 = 0.0103\ h$
$h = 0.0496/0.0103 = 4.81$

For this work h will be considered constant at 4.81, since j-factors (and the resultant values of h) show large variations in this type of application. Barker's[12] review of j-factors shows that the factor could vary from 0.04 to 0.3 at the Reynolds number computed from this data.

Catalyst Surfact Area

Basis: 1 cu. ft. of catalyst (assume void volume = porosity)

$\epsilon = 0.42$

$1 - \epsilon = 1 - 0.42 = 0.58$ cu. ft. occupied by catalyst

$0.58 \times 1728 = 1000$ cu. in. of catalyst/ cu. ft. of volume.

Volume of each catalyst pellet = 1260 cu. mm. = 1.26 cc.
= 1.26/16.39 = 0.077 cu. in.

Catalyst pellets/cu. ft. = 1000/0.077 = 13,000

Surface area of each pellet = 728.8 sq. mm. = 7.288 sq. mm.
= 7.288/6.45 = 1.12 sq.in. = 1.12/144 = 0.00777 sq. ft.

Surface area/cu. ft. = 13,000 x 0.00777 = 101 sq.ft./cu.ft.

Surface area/sq. ft. of cross section (Bed depth = 4 ft.)

= 4 x 101 = 404 sq. ft. of surface/sq.ft. of cross section.

---

[12] J. J. Barker, Ind. & Eng. Chem., 57, 44, (1965)

Estimate of Entering Gas Temperature

Total heat liberated by reaction = 7,150,000 Btu/hr.

" " " " " /sq.ft. of cross section

= 7,150,000 / 250 = 28,600 Btu/(hr)(sq.ft.)

Lb.moles/(hr)(sq.ft.) = 9.72

Final temperature to which gases must be preheated during preheat cycle = normal lower temperature of converters

= 770°F

Molar specific heat for 7% SO_2[13]

Temperature			Molar Sp.Heat
°K	°C	°F	
650	377	710	7.66
600	327	620	7.58
550	277	530	7.50
500	227	440	7.42
450	177	350	7.34
400	127	260	7.26

Trial No. 1

Assume initial temp. = 110°F

Avg. temp = (770 + 110)/2 = 440°F

Molar sp. heat = 7.42

Heat transferred = 9.72 x (770 - 110) x 7.42 = 47,600 Btu/hr.

Heat transferred is too high hence assumed temperature is too low.

Trial No. 2

Assume initial temp. = 390°F

Avg. temp. = (770 + 390)/2 = 580°F

---

[13] W. W. Duecker and J. R. West, op. cit., p. 161

Molar sp. heat = 7.54

Heat transferred = 9.72 x (770 - 390) x 7.54

= 27,900 Btu/hr.

Heat transferred is too low hence assumed temperature is too high.

Trial No. 3

Assume initial temp. = 380°F

Avg. temp. = (770 + 380)/ 2 = 575°F

Molar sp. heat = 7.54

Heat transferred = 9.72 x (770 - 380) x 7.54

= 28,600 Btu/hr which is the heat liberated/sq.ft. of cross section

Initial estimate of entering gas temperature is therefore = 380°F

Estimate of Initial Solid Temperature and Probable Cycle Time

Density of silica catalyst = 33.8 lbs./ cu. ft.[14]

Wt. of catalyst/sq.ft. of cross section (4 cu. ft.)

= 4 x 33.8 = 135 lbs.

For alpha quartz $c_p = 11.22 + 8.20 \times 10^{-3}T - 2.70 \times 10^{5}/T^{2}$ [15]

where T = °K

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[14] Ibid, p. 181

[15] Bureau of Mines, Bulletin 605, (1963), p. 103

For the avg. temp. of 930°F (499°C = 772°K)

$$c_p = 11.22 + (772) \times 8.20 \times 10^{-3} - 2.70 \times 10^5/(772)^2$$

$$= 17.1 \text{ cal/g.mole} = 17.1/60.06 = 0.285 \text{ Btu/lb.}$$

Heat transferred/hr. $= Q = w_c c_p (T_{max} - T_{init.})t$

$$= 28,600 = 135 \times 0.285 \times (1112-770) \times t = 13,200\ t$$

Hence $t = 28,600/13,200 = 2.16$ hours

Since this time is the time in which all the catalyst would be raised to 1110°F, a probable time cycle would be about 25% of this value or about 0.5 hours.

The initial solid temperature must be above the ignition temperature (about 400°C, 752°F) for the oxidation of SO_2. The temperature should be sufficiently greater than this value to permit the reaction rate to exceed the cooling rate of the incoming air. An arbitrary temperature differential of 50°C (90°F) was selected to fulfill this requirement. The estimated initial solid temperature is therefore 842°F (450°C).

Gas Retention Time

Free volume/sq. ft. of cross section = 4.0 = 4 x 0.42

= 1.68 cu.ft.

Volumetric gas flow at 930°F = 9880 cu.ft./hr/sq.ft.
= 165 cu.ft./min/sq.ft.

Therefore the retention time/sq. ft. of cross section

(4 cu.ft.)

= 1.68/165 = 0.0102 min. = 0.61 sec.

The time for gas to pass through 1" of catalyst =

0.61/48 = 0.0127 seconds.

Selection of Segment for Heat and Mass Balance Studies

In view of the dimensions of the visualized commercial reactor; i.e. 250 sq. ft. x 48" high, and the approximate time cycle of 30 minutes, it was decided to conduct the heat and mass balance studies on a 1 sq.ft. by 1" high segment of catalyst for 1 minute time increments.

APPENDIX B

Summary of Basic Data Used and Other Tabulated Data

TABLE 3

SPECIFIC HEAT DATA

Temperature		Nitrogen		Sulfur Dioxide		Oxygen	
°K	°F	JANAF	Calc.	JANAF	Calc.	JANAF	Calc.
700	801	7.350	7.345	12.180	12.172	7.883	7.877
800	981	7.512	7.504	12.532	12.504	8.063	8.051
900	1161	7.670	7.660	12.806	12.755	8.212	8.194

Temperature	Sulfur Trioxide		Quartz		
°K	JANAF	Calc.	JANAF	Calc.	
700	16.824	16.827	16.436	16.41	(Alpha)
800	17.391	17.391	17.615	17.36	"
900	17.823	17.816	16.246	16.246	(Beta)

TABLE 4

VALUES OF EQUILIBRIUM CONSTANTS

Temperature °K	Ross[13]	Lovejoy[14]	JANAF[15]	Duecker[16]
700	2.459		2.436	2.410
800	1.541	1.52	1.533	1.505
900	0.830	0.816	0.837	0.811

Temperature °K	Bodenstein[17]	Chesalavo[18]	Duecker[19]
700	2.398	2.362	2.402
800	1.507	1.486	1.517
900	0.818	0.805	0.829

Temperature °K	Slinko[20]	Calderbank[21]
700	2 .362	2.4176
800	1.483	1.5367
900		0.
		0.8301

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[13] L. W. Ross, loc. cit.

[14] R. W. Lovejoy, J. H. Colwell, D. F. Eggers, Jr., and G. K. Halsey, Jr., loc. cit.

[15] JANAF Thermochemical Tables, loc. cit.

[16] W. W. Duecker and J. R. West, op. cit., p. 136

[17] Bodenstein and Pohl, loc. cit.

[18] V. S. Chesalova and G. K. Boreskov, loc. cit.

[19] W. W. Duecker and J. R. West, op. cit., p. 135

[20] M. G. Slin'ko and V. S. Beskov, loc. cit.

[21] P. H. Calderbank, loc. cit.

TABLE 5

MAXIMUM GAS AND SOLID TEMPERATURES IN UNIT NO. 1

Initial Gas Temp. = 350°F., Initial Solid Temp. = 842°F.

	Total Elapsed Time, Minutes			
	3	6	9	11
Bed Depth at which Gas Temp. = Solid Temp.	16½	22	26½	29
Temp. of Above	853	886	935	969
Bed Depth Needed to Attain Max. Solid Temp.	26	29	32	35
Max. Solid Temperature	873	921	976	1013
Max. Temp. Difference Between Gas and Solid[1]	14.6	20.4	25.6	26.3

Initial Gas Temp. = 400°F., Initial Solid Temp. = 875°F.

	Total Elapsed Time, Minutes			
	3	6	9	11
Bed Depth at which Gas Temp. = Solid Temp.	14½	19	22½	26
Temp. of Above	895	937	975	1029
Bed Depth Needed to Attain Max. Solid Temp.	22	25	28	30
Max. Solid Temperature	923	980	1032	1059
Max. Temp Difference Between Gas and Solid[1]	21.4	25.8	23.8	20.8

Initial Gas Temp = 450°F., Initial Solid Temp. = 900°F.

	Total Elapsed Time, Minutes				
	3	7	11	15	19
Bed Depth at which Gas Temp. = Solid Temp.	13	18	24	29	33
Temp. of Above	929	980	1060	1098	1106
Bed Depth Needed to Attain Max. Solid Temp.	19	23	26	30	34
Max. Temp Difference Between Gas and Solid[1]	23.8	23.3	18.9	15.8	7.5

Initial Gas Temp. = 500°F., Initial Solid Temp. = 925°F.

	Total Elapsed Time, Minutes			
	3	6	9	11
Bed Depth at which Gas Temp. = Solid Temp.	11	15	19	22
Temp. of Above	946	987	1042	1079
Bed Depth Needed to Attain Max. Solid Temp.	17	20	22	24
Max. Solid Temperature	981	1033	1071	1087
Max. Temp. Difference Between Gas and Solid	24.3	22.9	18.6	15.7

1. After Gas Temp. = Solid Temp.

TABLE 6

TEMPERATURES AND CONVERSIONS IN EACH STAGE OF A MONSANTO CONVERTER

Location	Temperature		Temperature Rise		Equivalent Conversion (percent)
	(°C)	(°F)	(°C)	(°F)	
Gas entering first pass	410.0	770			
Gass leaving first pass	601.8	1115	191.8	345	74.0
Gas entering second pass	438.0	820			
Gas leaving second pass	485.3	906	47.3	86	18.4
Gas entering third pass	432	810			
Gas leaving third pass	443	830	11	20	4.3
Gas entering fourth pass	427.0	800			
Gas leaving fourth pass	430.3	806	3.3	6	1.3
Totals			253.4	457	98.0

Duecker and West, op. cit., 252

TABLE 7

EQUILIBRIUM CONVERSION OF SULFUR DIOXIDE

Initial Feed Composition

Mol Percent Sulfur Dioxide = 7.0

Mol Percent Oxygen = 10.9

Mol Percent Nitrogen = 82.1

Total =100.0

Pressure in Atmospheres

Pressure = 1.0

TEMPERATURE °K	°C	°F	EQUILIBRIUM CONSTANT K_p	EQUILIBRIUM CONVERSION %
997	724	1335	1.93	40
961	688	1270	2.94	50
928	655	1211	4.50	60
895	622	1152	7.12	70
856	583	1081	12.4	80
805	532	990	28.6	90
800	527	981	32.2	91
793	520	968	36.7	92
785	512	954	42.4	93
776	503	937	50.0	94
766	493	919	60.7	95
755	482	900	76.8	96
739	466	871	104	97
719	446	835	158	98
691	418	784	303	99
684	411	772	356	99.1
679	406	763	402	99.2
675	402	756	458	99.3
669	396	745	535	99.4
661	388	730	642	99.5
648	375	707	806	99.6
641	368	694	1075	99.7
628	355	671	1610	99.8
606	333	631	3070	99.9
540	267	513	30700	99.99

TABLE 8

CONDITIONS IN UNIT NO. L FOR EXIT CONVERSIONS GREATER THAN NINETY PERCENT

Initial Gas Temperature °F	Initial Solid Temperature °F	Total Elapsed Time (Minutes)	Maximum Bed(Solid) Temperature (°F)	Exit Bed Temp. (°F)	Exit Conversion (%)
380	842	8	957	906	90.45
		9	976	917	91.87
		10	995	930	92.11
		11	1013	943	91.63
400	875	3	923	891	91.82
		4	942	897	93.49
		5	960	901	94.24
		6	980	908	94.31
		7	998	915	94.02
		8	1016	923	93.55
		9	1032	932	92.95
		10	1047	942	92.24
		11	1059	953	91.41
450	900	1	917	902	96.57
		2	934	904	94.64
		3	954	906	94.66
		4	973	910	94.53
		5	992	913	94.31
		6	1009	917	94.00
		7	1026	925	93.59
		8	1041	932	93.10
		9	1055	941	92.52
		10	1067	949	91.84
		11	1076	959	91.06
500	925	1	942	926	98.90
		2	961	926	93.78
		3	981	927	93.69
		4	999	929	93.56
		5	1017	931	93.38
		6	1033	934	93.11
		7	1047	939	92.78
		8	1061	946	92.33
		9	1071	953	91.79
		10	1079	960	91.15
		11	1087	969	90.43

APPENDIX C

COMPUTER LISTING AND OUTPUT

Description of the Computer Program

A summary of the basic functions of the individual programs follows.

Program No. 1, pp.

Unit No. 1. Initial Solid Temperature (TISOL) = 842°F

Initial Gas Temperature (TIGAS) = 380°F

For Catalyst Depth = 0 - 1 Inch and Time = 0 - 11 Minutes

Statements 5 - 30 Initialization of Data

" 30 - 550 Calculation of Reaction Rate

" 550 - 94 Heat Balance

" 95 - 99 Mass Balance

For Catalyst Depth = 1 - 47 Inches and Time = 0 - 11 Minutes

Statements 100 - 141 Initialization of Data

" 141 - 650 Calculation of Reaction Rate

" 650 - 190 Heat Balance

" 190 - 200 Mass Balance

Program No. 2, pp.

Unit No. 1. Initial Solid Temperature = 875°F

Initial Gas Temperature = 400°F

For Catalyst Depth = 0 - 47 Inches and Time = 0 - 11 Minutes

Same as Program No. 1

Program No. 3, pp.

Unit No. 1. Initial Solid Temperature = 900°F

Initial Gas Temperature = 450°F

For Catalyst Depth = 0 - 47 Inches and Time = 0 - 11 and 11 - 22 Minutes

Same as Program No. 1

Program No. 4, pp.

Unit No. 1. Initial Solid Temperature = 925°F

Initial Gas Temperature = 500°F

For Catalyst Depth = 0 - 47 Inches and Time = 0 - 11 Minutes

Same as Program No. 1

Program No. 5, pp.

Unit No. 2. Countercurrent Flow. Initial Solid Temperature Profile = Reverse of Solid Temperature Profile Obtained from Program No. 3 at Time = 11 Minutes

Initial Gas Temperature = Gas Temperature from Program No. 3 at Depth = 47 Inches and Time = 11 Minutes

Initial Moles of Reactants and Products = Moles of Reactants and Products from Program No. 3 at Depth = 47 Inches and Time = 11 Minutes

Statements 5 - 141 Initialization of Data

" 141 - 650 Calculation of Rate of Reaction

Statements 650 - 190 Heat Balance

190 - 200 Mass Balance

Program No. 6, pp.

Unit No. 2. Countercurrent Flow. 200°F Intercooling.

Same as Program No. 5, except

Statement 35 Each Initial Solid Temperature

TS = TS - 200

Program No. 7, pp.

Unit No. 2. Countercurrent Flow. 250°F Intercooling.

Same as Program No. 5, except

Statement 35 Each Initial Solid Temperature

TS = TS - 250

Program No. 8, pp.

Unit No. 2. Parallel Flow.

Same as Program No. 5, except that the Initial Solid Temperature Profile is Identical with the Solid Temperature Profile Obtained from Program No. 3 at Time = 11 Minutes

```
// JOB
// FOR
*IOCS(CARD,TYPEWRITER,1132PRINTER,DISK)
*ONE WORD INTEGERS
*ARITHMETIC TRACE
*TRANSFER TRACE
*LIST ALL
      DIMENSION TS(12, 48), TG(12, 48), XSO2(12,48)
      SHSO2 (TEMP) = 0.4474E01 + 0.2041E-01*TEMP - 0.1743E-04* TEMP**2
     1   + 0.5463E-08 *  TEMP**3 + 0.3838E05 /  TEMP **2
      SHO2(TEMP) = 0.4399E01 + 0.7895E-02 * TEMP - 0.5454E-05 * TEMP**2
     1  + 0.1399E-08 *  TEMP**3 + 0.7069E05 /  TEMP**2
      SHSO3(TEMP) = 0.4638E01 + 0.3266E-01 * TEMP - 0.2792E-04 * TEMP**2
     1      + 0.8782E-08 *  TEMP**3 - 0.1936E04 /  TEMP**2
      SHN2(TEMP) = 0.7543E01 - 0.34E-02 * TEMP + 0.636E-05 * TEMP**2
     1  -0.2702E-08 *  TEMP**3 - 0.3913E04 /  TEMP**2
      READ (2, 5) WSO2, WO2, WSO3, WN2, WS, SUMDF,TISOL, TIGAS, XINC,
     1 TTOL, I, M, IL, ML
      WRITE(3, 5) WSO2, WO2, WSO3, WN2, WS, SUMDF,TISOL, TIGAS, XINC,
     1 TTOL, I, M, IL, ML
    5 FORMAT (6F 10.6, 2F 6.0 / 2F 5.2, 4 I 4, F8.3)
      FSO2       = WSO2 / 64.0628
      FO2        = WO2 / 31.9988
      FN2 = WN2 / 28.0134
      FS = WS/60.0848
      FSO3 = WSO3 / 80.0622
      FSO3       = FSO3       + 0.0004
      FSO2       = FSO2       - 0.0004
      FSO2I = FSO2
      FO2 = FO2 - 0.0002
      DO 10 M = M, ML
      TG(M,I) = TIGAS
   10 XSO2(M,I) = 0.0
      M = 1
      DO 20 I = 1, IL
   20 TS(M,I) = TISOL
C     MATERIAL BALANCE
      WRITE ( 3, 25)
   25 FORMAT  ('     M     I TS(M,I) TS(M,I-1) TG(M,I) XSO2(M,I)  SUMDF
     1  QS          QEVOL       QG        FSO2     FSO3         FO2')
      I = 2
      M = 2
      TSEST = TISOL
      DO 100 M = 2, ML
      SUMDF = 0.0
      TSIN =(TS(M-1, I) + TS(M-1, I-1))/ 2.
   30 TSEST = TSEST - XINC
      GO TO 40
   35 TSEST = TSEST + XINC
   40 TSOUT = TSEST
      TSAV = (TSOUT  + TSIN) / 2.
```

```
      TCSAV = (TSAV - 32.) / 1.8
      TKSAV = TCSAV + 273.16
      FTOT = FSO2 + FO2 + FSO3 + FN2
      XLNKP = 22600. / (1.98719 * TKSAV) - 21.36 / 1.98719
      XKP = EXP (XLNKP)
      PSO2 = FSO2       / FTOT
      PO2 = FO2         / FTOT
      PSO3 = FSO3       / FTOT
      PN2 = FN2 / FTOT
      PTOT = PSO2 + PO2 + PSO3 + PN2
      TERM1 = SQRT (PSO2 / PSO3)
      DENOM = PSO2 * XKP



      TERM3 = (PSO3 / DENOM)**2
      PTERM = TERM1 * (PO2 - TERM3)
      IF (TKSAV - 680.) 510, 510, 520
  510 RATEK = 0.
      GO TO 550
  520 IF (TKSAV - 730.2355) 530, 530, 540
  530 RATEK = 1.56E-07 * TKSAV - 1.06E-04
      GO TO 550
  540 RATEK = 4.874E-07 * TKSAV - 3.48E-04
  550 RXRAT = RATEK * PTERM
      DFSO2 = RXRAT * 60. * WS
C     HEAT BALANCE
      IF (TKSAV - 848.) 50, 50, 55
   50 SHS = 11.22 + 8.20E-03*TKSAV - 2.70E+05 / TKSAV**2
      GO TO 60
   55 SHS = 14.41 + 2.04E-03 * TKSAV
   60 QRX = (3.3 * TKSAV + 44140.)
      QEVOL = QRX * DFSO2
      QS = FS * SHS * (TSOUT - TSIN)
      QG = QEVOL - QS
      TGIN = TG(M-1, I-1)
      CPGAS = SHSO2(TGIN)  * FSO2 + SHO2(TGIN)  * FO2 + SHSO3(TGIN) *
     1 FSO3 + SHN2(TGIN)  * FN2
      TGOUT = QG / CPGAS + TGIN
      TG(M,I) = TGOUT
      TGAV = (TG(M,I) + TG(M-1, I-1))/2.0
C     HTCON = H * A * THETA = 4.81 *  8.417 * 1.0/60.
      HTCON = 0.673
      TSAV1 = QG / HTCON + TGAV
      DELTA = ABS(TSAV - TSAV1)
      IF (DELTA -TTOL) 90, 90, 70
```

```
   70 TSEX = 2.0 * TSAV1 - TSIN
      IF (TSEX - TSEST) 80, 80, 85
   80 GO TO 30
   85 GO TO 35
   90 TS(M,I) = 1.5 * TSAV1 - 0.5 * TS(M-1,I)
      TS(M,I-1) = 2.0 * TSEX - TS(M,I)
      IF (TS(M,I-1) - TGIN) 92, 92, 93
   92 TS(M,I) = TGIN
      TS(M,I-1) = TGIN
   93 CONTINUE
      IF (TG(M,I) -XINC - TIGAS) 94, 94, 95
   94 TG(M,I) = TIGAS
   95 CONTINUE
      SUMDF = SUMDF + DFSO2
      DFSO3 = DFSO2
      DFO2 = DFSO2 / 2.
      FSO2       = FSO2       - DFSO2
      FSO3       = FSO3       + DFSO3
      FO2        = FO2        - DFO2
      XAV = DFSO2 / FSO2
      XSO2(M,I) = 100. * SUMDF / FSO2I
      WRITE(3,99) M, I, TS(M,I), TS(M,I-1), TG(M,I), XSO2(M,I), SUMDF,
     1 QS, QEVOL, QG, FSO2, FSO3, FO2
   99 FORMAT (2I5, 4F8.2, F12.6, 3F10.4, 3F11.6)
  100 CONTINUE
      SMDF1 = 0.000000
      DO 200 M = 2, ML
      SUMDF = 0.0 +SMDF1
      FSO2       = WSO2 / 64.0628
      FO2        = WO2 / 31.9988



      FN2 = WN2 / 28.0134
      FS = WS/60.0848
      FSO3 = WSO3 / 80.0622
      FSO3       = FSO3       + 0.0004
      FSO2       = FSO2       - 0.0004
      FSO2I = FSO2
      FO2 = FO2 - 0.0002
      DO 200 I = 3, IL
      TS(M,I)=TS(M,I-1)
      TSAV =  (TS(M,I) + TS(M-1, I))/2.
  141 TCSAV = (TSAV - 32.) / 1.8
      TKSAV = TCSAV + 273.16
      FTOT = FSO2 + FO2 + FSO3 + FN2
```

```
      XLNKP = 22600. / (1.98719 * TKSAV) - 21.36 / 1.98719
      XKP = EXP (XLNKP)
      PSO2 = FSO2       / FTOT
      PO2 = FO2       / FTOT
      PSO3 = FSO3       / FTOT
      PN2 = FN2 / FTOT
      PTOT = PSO2 + PO2 + PSO3 + PN2
      TERM1 = SQRT (PSO2 / PSO3)
      DENOM = PSO2 * XKP
      TERM3 = (PSO3 / DENOM)**2
      PTERM = TERM1 * (PO2 - TERM3)
      IF (TKSAV - 680.) 610, 610, 620
  610 RATEK = 0.
      GO TO 650
  620 IF (TKSAV - 730.2355) 630, 630, 640
  630 RATEK = 1.56E-07 * TKSAV - 1.06E-04
      GO TO 650
  640 RATEK = 4.874E-07 * TKSAV - 3.48E-04
  650 RXRAT = RATEK * PTERM
      DFSO2 = RXRAT * 60. * WS
C     HEAT BALANCE
      IF (TKSAV - 848.) 150, 150, 155
  150 SHS = 11.22 + 8.20E-03*TKSAV - 2.70E+05 / TKSAV**2
      GO TO 160
  155 SHS = 14.41 + 2.04E-03 * TKSAV
  160 QRX = (3.3 * TKSAV + 44140.)
      QEVOL = QRX * DFSO2
      QS = FS * SHS * (TS(M,I) - TS(M-1,I))
      QG = QEVOL - QS
      TGIN = TG(M,I-1)
      CPGAS = SHSO2(TGIN)  * FSO2 + SHO2(TGIN)  * FO2 + SHSO3(TGIN) *
     1 FSO3 + SHN2(TGIN)  * FN2
      TG(M,I) = QG / CPGAS + TG(M,I-1)
      TS1  =-QS / HTCON +TG(M,I)
      DELTA = ABS (TS1       - TS(M,I))
      IF (DELTA -TTOL) 190, 190, 170
  170 TS2= (TS1       + TS(M,I)) / 2.
      TS(M,I) = TS2
      TSAV = (TS2+ TS(M-1, I)) / 2.
      GO TO 141
  190 TS(M,I) = TS1
      SUMDF = SUMDF + DFSO2
      DFSO3 = DFSO2
      DFO2 = DFSO2 / 2.
      FSO2       = FSO2       - DFSO2
      FSO3       = FSO3       + DFSO3
      FO2       = FO2       - DFO2
      XAV = DFSO2 / FSO2
```

```
      XSO2(M,I) = 100. * SUMDF / FSO2I
      WRITE(3,196)M, I, TS(M,I), TS(M,I-1), TG(M,I), XSO2(M,I), SUMDF,
     1 QS, QEVOL, QG, FSO2, FSO3, FO2
  196 FORMAT (2I5, 4F8.2, F12.6, 3F10.4, 3F11.6)
      SMDF1 = 0.0
  200 CONTINUE
      CALL EXIT
      END
```

```
// XEQ

 0.726667  0.566667  0.000000  3.716667  2.816667  0.000000  842.
 0.25 0.75    1    1   48   12
    M     I  TS(M,I)  TS(M,I-1)  TG(M,I)  XSO2(M,I)   SUMDF       QS
    2     2  662.13   540.85     532.67     0.00      0.000000  -178.8538
    3     2  480.02   478.59     451.73     0.00      0.000000   -84.0344
    4     2  436.50   407.65     411.69     0.00      0.000000   -37.1277
    5     2  396.23   396.98     393.23     0.00      0.000000   -15.5061
    6     2  388.90   382.02     385.06     0.00      0.000000    -5.9345
    7     2  380.60   380.70     381.50     0.00      0.000000    -1.7635
    8     2  380.00   380.00     380.00     0.00      0.000000    -0.1017
    9     2  380.00   380.00     380.00     0.00      0.000000     0.1617
   10     2  380.00   380.00     380.00     0.00      0.000000     0.0000
   11     2  380.00   380.00     380.00     0.00      0.000000    -0.1617
   12     2  380.46   382.01     380.00     0.00      0.000000    -0.1617
    2     3  733.01   662.13     609.41     1.84      0.000201   -83.1783
    2     4  761.98   733.01     669.70     4.17      0.000457   -62.1052
    2     5  783.80   761.98     716.30     6.64      0.000727   -45.4268
    2     6  800.52   783.80     752.17     9.11      0.000997   -32.5396
    2     7  813.30   800.52     779.70    11.53      0.001261   -22.6149
    2     8  823.07   813.30     800.78    13.86      0.001517   -14.9978
    2     9  830.50   823.07     816.87    16.11      0.001763    -9.1745
    2    10  835.58   830.50     828.91    18.27      0.002000    -4.4913
    2    11  839.86   835.58     838.02    20.34      0.002226    -1.2325
    2    12  843.10   839.86     844.89    22.32      0.002442     1.2013
    2    13  845.53   843.10     850.01    24.21      0.002650     3.0141
    2    14  847.91   845.53     853.97    26.02      0.002848     4.0809
    2    15  849.01   847.91     856.77    27.76      0.003038     5.2258
    2    16  849.28   849.01     858.54    29.44      0.003221     6.2344
    2    17  850.49   849.28     859.94    31.04      0.003397     6.3582
    2    18  851.03   850.49     860.89    32.59      0.003566     6.6362
    2    19  850.83   851.03     861.31    34.08      0.003730     7.0577
    2    20  851.40   850.83     861.64    35.52      0.003887     6.8970
    2    21  851.28   851.40     861.70    36.91      0.004039     7.0116
    2    22  850.63   851.28     861.41    38.26      0.004187     7.2528
    2    23  851.30   850.63     861.32    39.56      0.004330     6.7417
    2    24  851.12   851.30     861.10    40.83      0.004468     6.7191
    2    25  850.95   851.12     860.80    42.05      0.004602     6.6308
    2    26  850.79   850.95     860.46    43.24      0.004732     6.5102
    2    27  850.62   850.79     860.09    44.40      0.004859     6.3742
    2    28  850.45   850.62     859.71    45.53      0.004982     6.2320
    2    29  850.28   850.45     859.32    46.62      0.005102     6.0883
    2    30  850.10   850.28     858.94    47.69      0.005219     5.9456
    2    31  849.93   850.10     858.55    48.74      0.005333     5.8055
    2    32  849.75   849.93     858.17    49.75      0.005444     5.6688
    2    33  849.58   849.75     857.80    50.74      0.005553     5.5360
```

380.

QEVOL	QG	FSO2	FSO3	FO2	
0.0000	178.8538	0.010943	0.000400	0.017509	2-2
0.0000	84.0344	0.010943	0.000400	0.017509	
0.0000	37.1277	0.010943	0.000400	0.017509	
0.0000	15.5061	0.010943	0.000400	0.017509	
0.0000	5.9345	0.010943	0.000400	0.017509	
0.0000	1.7635	0.010943	0.000400	0.017509	
0.0000	0.1017	0.010943	0.000400	0.017509	
0.0000	-0.1617	0.010943	0.000400	0.017509	
0.0000	0.0000	0.010943	0.000400	0.017509	
0.0000	0.1617	0.010943	0.000400	0.017509	
0.0000	0.1617	0.010943	0.000400	0.017509	
9.3752	92.5535	0.010741	0.000601	0.017408	
11.8581	73.9633	0.010485	0.000857	0.017280	
12.5487	57.9756	0.010215	0.001127	0.017145	
12.5612	45.1008	0.009945	0.001397	0.017010	
12.2914	34.9063	0.009681	0.001661	0.016878	
11.8945	26.8924	0.009425	0.001917	0.016750	
11.4437	20.6183	0.009179	0.002163	0.016627	
11.0006	15.4919	0.008943	0.002400	0.016508	
10.5272	11.7597	0.008716	0.002626	0.016395	
10.0727	8.8714	0.008500	0.002842	0.016287	
9.6433	6.6291	0.008293	0.003050	0.016183	
9.2208	5.1398	0.008094	0.003248	0.016084	
8.8584	3.6325	0.007904	0.003438	0.015989	
8.5292	2.2948	0.007721	0.003621	0.015898	
8.1790	1.8207	0.007545	0.003797	0.015810	
7.8735	1.2372	0.007376	0.003966	0.015725	
7.6047	0.5470	0.007212	0.004130	0.015643	
7.3259	0.4289	0.007055	0.004287	0.015565	
7.0851	0.0735	0.006903	0.004439	0.015489	
6.8692	-0.3835	0.006755	0.004587	0.015415	
6.6300	-0.1117	0.006613	0.004730	0.015343	
6.4318	-0.2872	0.006474	0.004868	0.015274	
6.2433	-0.3875	0.006340	0.005002	0.015207	
6.0647	-0.4454	0.006210	0.005132	0.015142	
5.8960	-0.4781	0.006083	0.005259	0.015079	
5.7364	-0.4955	0.005960	0.005382	0.015017	
5.5854	-0.5028	0.005840	0.005502	0.014957	
5.4422	-0.5034	0.005723	0.005619	0.014899	
5.3061	-0.4993	0.005609	0.005733	0.014842	
5.1767	-0.4920	0.005498	0.005844	0.014786	
5.0534	-0.4826	0.005389	0.005953	0.014732	2-33

2	34	849.41	849.58	857.44	51.71	0.005659	5.4071
2	35	849.24	849.41	857.09	52.66	0.005763	5.2824
2	36	849.07	849.24	856.74	53.59	0.005864	5.1617
2	37	848.91	849.07	856.41	54.49	0.005963	5.0452
2	38	848.76	848.91	856.09	55.38	0.006060	4.9327
2	39	848.61	848.76	855.78	56.25	0.006155	4.8239
2	40	848.46	848.61	855.47	57.10	0.006248	4.7190
2	41	848.32	848.46	855.18	57.93	0.006339	4.6178
2	42	848.18	848.32	854.90	58.74	0.006428	4.5199
2	43	848.05	848.18	854.62	59.54	0.006516	4.4254
2	44	847.92	848.05	854.36	60.33	0.006602	4.3341
2	45	847.80	847.92	854.10	61.10	0.006686	4.2458
2	46	847.67	847.80	853.86	61.85	0.006768	4.1604
2	47	847.56	847.67	853.62	62.59	0.006849	4.0778
2	48	847.45	847.56	853.39	63.31	0.006929	3.9978
3	3	629.95	480.02	516.24	0.00	0.000000	-76.5249
3	4	671.68	629.95	572.04	0.00	0.000000	-67.0574
3	5	706.23	671.68	619.84	0.00	0.000000	-58.1439
3	6	735.69	706.23	661.71	0.33	0.000036	-49.7857
3	7	761.13	735.69	701.19	2.04	0.000223	-40.3360
3	8	782.67	761.13	735.86	4.38	0.000480	-31.5043
3	9	800.27	782.67	764.97	6.94	0.000760	-23.7610
3	10	814.04	800.27	788.71	9.52	0.001042	-17.0523
3	11	825.28	814.04	807.98	12.07	0.001321	-11.6439
3	12	834.18	825.28	823.47	14.56	0.001593	-7.2128
3	13	841.17	834.18	835.79	16.97	0.001857	-3.6218
3	14	846.41	841.17	845.47	19.30	0.002112	-0.6330
3	15	850.55	846.41	852.98	21.53	0.002356	1.6371
3	16	853.38	850.55	858.60	23.65	0.002588	3.5125
3	17	856.08	853.38	863.01	25.69	0.002811	4.6647
3	18	858.56	856.08	866.53	27.64	0.003025	5.3607
3	19	858.84	858.56	868.76	29.52	0.003230	6.6772
3	20	860.53	858.84	870.68	31.35	0.003431	6.8360
3	21	861.25	860.53	872.01	33.11	0.003624	7.2394
3	22	861.01	861.25	872.56	34.78	0.003806	7.7726
3	23	861.15	861.01	872.91	36.42	0.003986	7.9168
3	24	861.34	861.15	873.01	37.99	0.004158	7.8568
3	25	860.59	861.34	872.68	39.50	0.004323	8.1383
3	26	861.01	860.59	872.41	40.94	0.004481	7.6778
3	27	860.77	861.01	872.01	42.32	0.004632	7.5633
3	28	860.50	860.77	871.51	43.65	0.004777	7.4101
3	29	860.19	860.50	870.94	44.93	0.004916	7.2353
3	30	859.21	860.19	870.12	46.16	0.005051	7.3441
3	31	859.11	859.21	869.44	47.35	0.005182	6.9570
3	32	858.90	859.11	868.83	48.51	0.005308	6.6866
3	33	857.95	858.90	868.03	49.63	0.005431	6.7798
3	34	857.23	857.95	867.17	50.73	0.005551	6.6885

4.9356	-0.4714	0.005283	0.006059	0.014679
4.8231	-0.4592	0.005179	0.006163	0.014627
4.7153	-0.4463	0.005078	0.006264	0.014576
4.6120	-0.4332	0.004979	0.006363	0.014527
4.5128	-0.4198	0.004882	0.006460	0.014478
4.4174	-0.4065	0.004787	0.006555	0.014431
4.3256	-0.3933	0.004694	0.006648	0.014384
4.2372	-0.3805	0.004603	0.006739	0.014339
4.1520	-0.3679	0.004514	0.006828	0.014294
4.0697	-0.3557	0.004426	0.006916	0.014250
3.9901	-0.3439	0.004340	0.007002	0.014207
3.9132	-0.3326	0.004256	0.007086	0.014165
3.8386	-0.3217	0.004174	0.007168	0.014124
3.7665	-0.3112	0.004093	0.007249	0.014084
3.6965	-0.3013	0.004013	0.007329	0.014044
0.0000	76.5249	0.010943	0.000400	0.017509

2-34

10107

1-6

0.0000	67.0574	0.010943	0.000400	0.017509
0.0000	58.1439	0.010943	0.000400	0.017509
1.7029	51.4886	0.010906	0.000436	0.017490
8.6795	49.0155	0.010719	0.000623	0.017397
11.9235	43.4278	0.010462	0.000880	0.017268
13.0016	36.7627	0.010182	0.001160	0.017128
13.1249	30.1773	0.009900	0.001442	0.016987
12.9895	24.6335	0.009621	0.001721	0.016848
12.6670	19.8798	0.009349	0.001993	0.016712
12.2472	15.8691	0.009085	0.002257	0.016580
11.8760	12.5091	0.008830	0.002512	0.016452
11.3560	9.7189	0.008586	0.002756	0.016330
10.8000	7.2874	0.008354	0.002988	0.016214
10.3915	5.7268	0.008131	0.003211	0.016103
9.9352	4.5744	0.007917	0.003425	0.015996
9.5820	2.9047	0.007712	0.003630	0.015893
9.3379	2.5018	0.007511	0.003831	0.015793
8.9623	1.7228	0.007318	0.004024	0.015696
8.4964	0.7237	0.007136	0.004206	0.015605
8.3699	0.4531	0.006956	0.004386	0.015515
7.9915	0.1347	0.006784	0.004558	0.015429
7.7065	-0.4317	0.006619	0.004723	0.015347
7.3298	-0.3479	0.006461	0.004881	0.015268
7.0350	-0.5283	0.006310	0.005032	0.015192
6.7553	-0.6548	0.006165	0.005177	0.015120
6.4913	-0.7439	0.006026	0.005316	0.015050
6.2833	-1.0607	0.005891	0.005451	0.014983
6.0731	-0.8839	0.005760	0.005582	0.014917
5.8885	-0.7981	0.005634	0.005708	0.014854
5.7289	-1.0509	0.005511	0.005831	0.014793
5.5702	-1.1182	0.005391	0.005951	0.014733

3-34

3	35	857.23	857.23	866.52	51.79	0.005667	6.2535
3	36	857.09	857.23	865.97	52.82	0.005780	5.9732
3	37	856.89	857.09	865.47	53.82	0.005890	5.7731
3	38	856.64	856.89	864.98	54.80	0.005997	5.6137
3	39	855.71	856.64	864.29	55.76	0.006102	5.7772
3	40	855.17	855.71	863.59	56.69	0.006204	5.6674
3	41	855.07	855.17	863.03	57.60	0.006303	5.3573
3	42	854.36	855.07	862.37	58.49	0.006401	5.3907
3	43	854.63	854.36	861.97	59.36	0.006496	4.9387
3	44	854.48	854.63	861.60	60.21	0.006588	4.7919
3	45	854.30	854.48	861.25	61.03	0.006679	4.6762
3	46	854.11	854.30	860.91	61.84	0.006768	4.5762
3	47	853.90	854.11	860.56	62.64	0.006854	4.4840
3	48	853.69	853.90	860.22	63.41	0.006939	4.3962
4	3	548.20	436.50	461.33	0.00	0.000000	-58.4620
4	4	593.10	548.20	508.98	0.00	0.000000	-56.6175
4	5	633.00	593.10	553.54	0.00	0.000000	-53.4733
4	6	668.38	633.00	594.55	0.00	0.000000	-49.6879
4	7	699.82	668.38	631.93	0.00	0.000000	-45.6918
4	8	727.36	699.82	665.62	0.00	0.000000	-41.5499
4	9	753.03	727.36	698.96	0.98	0.000108	-36.3936
4	10	775.64	753.03	731.27	3.07	0.000336	-29.8614
4	11	795.25	775.64	760.22	5.61	0.000614	-23.5786
4	12	811.65	795.25	785.11	8.31	0.000910	-17.8630
4	13	825.12	811.65	806.03	11.04	0.001208	-12.8462
4	14	835.92	825.12	823.30	13.72	0.001502	-8.4959
4	15	844.66	835.92	837.41	16.34	0.001788	-4.8759
4	16	851.37	844.66	848.71	18.85	0.002063	-1.7901
4	17	856.74	851.37	858.03	21.39	0.002341	0.8648
4	18	861.83	856.74	866.14	24.02	0.002629	2.8969
4	19	864.92	861.83	872.33	26.58	0.002909	4.9844
4	20	868.19	864.92	877.49	29.13	0.003188	6.2604
4	21	871.03	868.19	881.65	31.60	0.003458	7.1470
4	22	871.37	871.03	884.23	33.95	0.003716	8.6552
4	23	872.88	871.37	886.15	36.20	0.003961	8.9273
4	24	873.08	872.88	887.26	38.36	0.004197	9.5437
4	25	873.05	873.08	887.64	40.38	0.004419	9.8166
4	26	873.18	873.05	887.74	42.33	0.004632	9.7975
4	27	873.00	873.18	887.50	44.18	0.004835	9.7568
4	28	872.26	873.00	886.87	45.95	0.005028	9.8300
4	29	872.04	872.26	886.14	47.62	0.005211	9.4896
4	30	870.97	872.04	885.03	49.20	0.005384	9.4647
4	31	870.82	870.97	884.07	50.70	0.005548	8.9169
4	32	869.85	870.82	882.94	52.14	0.005706	8.8098
4	33	868.69	869.85	881.59	53.50	0.005854	8.6814

5.4065	-0.8469	0.005275	0.006067	0.014675 3-35
5.2571	-0.7161	0.005162	0.006180	0.014618
5.1178	-0.6552	0.005052	0.006290	0.014563
4.9866	-0.6270	0.004945	0.006397	0.014510
4.8727	-0.9045	0.004840	0.006502	0.014457
4.7541	-0.9132	0.004738	0.006604	0.014406
4.6339	-0.7233	0.004639	0.006703	0.014356
4.5301	-0.8606	0.004541	0.006801	0.014308
4.4147	-0.5239	0.004446	0.006896	0.014260
4.3137	-0.4782	0.004354	0.006988	0.014214
4.2175	-0.4586	0.004263	0.007079	0.014169
4.1253	-0.4508	0.004174	0.007168	0.014124
4.0367	-0.4473	0.004088	0.007254	0.014081
3.9513	-0.4448	0.004003	0.007339	0.014039
0.0000	58.4620	0.010943	0.000400	0.017509
0.0000	56.6175	0.010943	0.000400	0.017509
0.0000	53.4733	0.010943	0.000400	0.017509
0.0000	49.6879	0.010943	0.000400	0.017509
0.0000	45.6918	0.010943	0.000400	0.017509
0.0000	41.5499	0.010943	0.000400	0.017509
5.0268	41.4205	0.010834	0.000508	0.017454
10.5953	40.4567	0.010606	0.000736	0.017340
12.9401	36.5188	0.010328	0.001014	0.017201
13.7372	31.6003	0.010032	0.001310	0.017053
13.8739	26.7201	0.009734	0.001608	0.016904
13.6598	22.1558	0.009440	0.001902	0.016757
13.3003	18.1763	0.009154	0.002188	0.016614
12.8147	14.6048	0.008879	0.002463	0.016477
12.9279	12.0630	0.008601	0.002741	0.016338
13.4262	10.5293	0.008313	0.003029	0.016194
13.0291	8.0446	0.008033	0.003309	0.016054
12.9910	6.7306	0.007754	0.003588	0.015914
12.5623	5.4153	0.007484	0.003858	0.015779
12.0230	3.3678	0.007226	0.004116	0.015650
11.4372	2.5098	0.006981	0.004361	0.015528
10.9954	1.4516	0.006745	0.004597	0.015410
10.3101	0.4934	0.006523	0.004819	0.015299
9.9352	0.1376	0.006310	0.005032	0.015192
9.4416	-0.3152	0.006107	0.005235	0.015091
9.0015	-0.8284	0.005914	0.005428	0.014994
8.5370	-0.9525	0.005731	0.005611	0.014902
8.0188	-1.4459	0.005558	0.005784	0.014816
7.6496	-1.2672	0.005394	0.005948	0.014734
7.3403	-1.4695	0.005236	0.006106	0.014655
6.9160	-1.7654	0.005088	0.006254	0.014581 4-33

4	34	867.66	868.69	880.16	54.78	0.005995	8.4122
4	35	867.50	867.66	879.03	56.01	0.006130	7.7610
4	36	866.53	867.50	877.85	57.20	0.006260	7.6174
4	37	866.35	866.53	876.88	58.35	0.006385	7.0841
4	38	865.33	866.35	875.79	59.45	0.006505	7.0387
4	39	864.24	865.33	874.55	60.49	0.006620	6.9352
4	40	863.98	864.24	873.51	61.48	0.006728	6.4115
4	41	862.91	863.98	872.39	62.45	0.006834	6.3811
4	42	862.62	862.91	871.42	63.36	0.006934	5.9223
4	43	862.37	862.62	870.65	64.26	0.007032	5.5720
4	44	861.38	862.37	869.75	65.13	0.007127	5.6280
4	45	861.27	861.38	869.03	65.97	0.007220	5.2250
4	46	861.03	861.27	868.41	66.79	0.007309	4.9637
4	47	860.74	861.03	867.83	67.58	0.007395	4.7740
4	48	859.70	860.74	867.05	68.35	0.007480	4.9455
5	3	488.67	396.23	428.01	0.00	0.000000	-40.8248
5	4	530.47	488.67	465.20	0.00	0.000000	-43.9250
5	5	569.84	530.47	503.02	0.00	0.000000	-44.9727
5	6	606.55	569.84	540.25	0.00	0.000000	-44.6205
5	7	640.48	606.55	576.11	0.00	0.000000	-43.3192
5	8	671.37	640.48	610.02	0.00	0.000000	-41.2874
5	9	700.30	671.37	642.00	0.00	0.000000	-39.2348
5	10	726.52	700.30	671.80	0.00	0.000000	-36.8304
5	11	751.69	726.52	701.82	0.74	0.000081	-33.5622
5	12	775.07	751.69	732.81	2.79	0.000305	-28.4419
5	13	795.83	775.07	761.61	5.40	0.000591	-23.0288
5	14	813.46	795.83	786.94	8.22	0.000900	-17.8454
5	15	828.25	813.46	808.68	11.09	0.001214	-13.1717
5	16	840.31	828.25	826.95	13.93	0.001524	-8.9958
5	17	850.19	840.31	842.12	16.70	0.001827	-5.4332
5	18	858.68	850.19	855.73	19.76	0.002163	-1.9877
5	19	865.74	858.68	867.37	22.94	0.002511	1.0961
5	20	872.12	865.74	877.37	26.19	0.002866	3.5324
5	21	877.55	872.12	885.78	29.43	0.003220	5.5423
5	22	880.69	877.55	891.98	32.50	0.003557	7.5973
5	23	883.74	880.69	896.85	35.48	0.003883	8.8205
5	24	885.96	883.74	900.39	38.29	0.004191	9.7113
5	25	886.24	885.96	902.45	40.96	0.004483	10.9047
5	26	887.47	886.24	903.84	43.48	0.004758	11.0175
5	27	887.43	887.47	904.39	45.86	0.005019	11.4170
5	28	887.24	887.43	904.29	48.09	0.005262	11.4779
5	29	886.99	887.24	903.83	50.19	0.005493	11.3349
5	30	885.28	886.99	902.61	52.17	0.005709	11.6634
5	31	885.13	885.28	901.48	54.03	0.005913	11.0029
5	32	883.41	885.13	899.87	55.79	0.006105	11.0739
5	33	881.98	883.41	898.02	57.43	0.006285	10.7944
5	34	880.52	881.98	896.05	58.97	0.006454	10.4526
5	35	880.26	880.52	894.45	60.44	0.006614	9.5510
5	36	878.17	880.26	892.49	61.83	0.006766	9.6383
5	37	877.97	878.17	890.96	63.14	0.006910	8.7401

6.5464	-1.8658	0.004947	0.006395	0.014511
6.2835	-1.4774	0.004812	0.006530	0.014443
6.0687	-1.5487	0.004682	0.006660	0.014378
5.8137	-1.2703	0.004557	0.006785	0.014316
5.6163	-1.4224	0.004437	0.006905	0.014256
5.3171	-1.6181	0.004322	0.007020	0.014198
5.0551	-1.3563	0.004214	0.007128	0.014144
4.9183	-1.4628	0.004108	0.007234	0.014091
4.6604	-1.2618	0.004008	0.007334	0.014041
4.5625	-1.0095	0.003910	0.007432	0.013992
4.4459	-1.1820	0.003815	0.007527	0.013944
4.2905	-0.9345	0.003722	0.007620	0.013898
4.1515	-0.8121	0.003633	0.007709	0.013854
4.0229	-0.7510	0.003547	0.007795	0.013811
3.9277	-1.0177	0.003462	0.007880	0.013768
0.0000	40.8248	0.010943	0.000400	0.017509
0.0000	43.9250	0.010943	0.000400	0.017509
0.0000	44.9727	0.010943	0.000400	0.017509
0.0000	44.6205	0.010943	0.000400	0.017509
0.0000	43.3192	0.010943	0.000400	0.017509
0.0000	41.2874	0.010943	0.000400	0.017509
0.0000	39.2348	0.010943	0.000400	0.017509
0.0000	36.8304	0.010943	0.000400	0.017509
3.7978	37.3601	0.010861	0.000481	0.017468
10.3852	38.8272	0.010637	0.000705	0.017356
13.3063	36.3352	0.010351	0.000991	0.017213
14.3337	32.1791	0.010042	0.001300	0.017058
14.6007	27.7725	0.009729	0.001614	0.016901
14.4517	23.4476	0.009418	0.001924	0.016746
14.1212	19.5544	0.009115	0.002227	0.016595
15.6168	17.6045	0.008779	0.002563	0.016427
16.2005	15.1044	0.008431	0.002911	0.016253
16.5309	12.9984	0.008076	0.003266	0.016075
16.5093	10.9670	0.007722	0.003620	0.015898
15.6883	8.0909	0.007385	0.003957	0.015730
15.1914	6.3708	0.007059	0.004283	0.015567
14.3436	4.6323	0.006751	0.004591	0.015413
13.6082	2.7034	0.006459	0.004883	0.015267
12.8423	1.8248	0.006184	0.005158	0.015129
12.1394	0.7224	0.005923	0.005419	0.014999
11.3518	-0.1261	0.005680	0.005662	0.014877
10.7296	-0.6053	0.005449	0.005893	0.014762
10.0644	-1.5990	0.005233	0.006109	0.014654
9.5161	-1.4867	0.005029	0.006313	0.014552
8.9560	-2.1179	0.004837	0.006505	0.014456
8.3750	-2.4194	0.004657	0.006685	0.014366
7.8586	-2.5939	0.004488	0.006854	0.014281
7.4626	-2.0884	0.004328	0.007014	0.014201
7.0677	-2.5705	0.004176	0.007166	0.014125
6.7246	-2.0155	0.004032	0.007310	0.014053

5	38	875.97	877.97	889.09	64.39	0.007047	8.8271
5	39	874.62	875.97	887.20	65.57	0.007176	8.4680
5	40	874.37	874.62	885.73	66.69	0.007298	7.6477
5	41	872.26	874.37	883.90	67.76	0.007415	7.8320
5	42	872.07	872.26	882.50	68.78	0.007526	7.0194
5	43	870.78	872.07	881.04	69.76	0.007634	6.9048
5	44	869.57	870.78	879.54	70.69	0.007736	6.7099
5	45	869.41	869.57	878.40	71.58	0.007834	6.0522
5	46	868.32	869.41	877.20	72.45	0.007928	5.9761
5	47	868.15	868.32	876.27	73.28	0.008019	5.4615
5	48	866.50	868.15	874.99	74.07	0.008106	5.7149
6	3	448.38	388.90	408.15	0.00	0.000000	-27.0742
6	4	483.99	448.38	435.75	0.00	0.000000	-32.4709
6	5	518.73	483.99	465.84	0.00	0.000000	-35.5932
6	6	553.31	518.73	497.45	0.00	0.000000	-37.5962
6	7	586.71	553.31	529.57	0.00	0.000000	-38.4544
6	8	618.36	586.71	561.39	0.00	0.000000	-38.3439
6	9	648.63	618.36	592.51	0.00	0.000000	-37.7665
6	10	676.89	648.63	622.47	0.00	0.000000	-36.6193
6	11	704.01	676.89	651.30	0.00	0.000000	-35.4729
6	12	729.56	704.01	678.86	0.00	0.000000	-34.1249
6	13	754.83	729.56	707.85	0.88	0.000097	-31.6176
6	14	778.65	754.83	738.35	3.08	0.000337	-27.1268
6	15	800.07	778.65	767.03	5.83	0.000638	-22.2320
6	16	818.46	800.07	792.56	8.78	0.000961	-17.4318
6	17	834.06	818.46	814.71	11.79	0.001290	-13.0232
6	18	847.43	834.06	833.75	14.79	0.001618	-9.2078
6	19	859.26	847.43	851.43	18.23	0.001995	-5.2693
6	20	870.19	859.26	867.64	22.02	0.002409	-1.7157
6	21	879.68	870.19	881.89	25.94	0.002839	1.4869
6	22	886.16	879.68	893.32	29.81	0.003263	4.8198
6	23	892.08	886.16	902.61	33.58	0.003675	7.0858
6	24	896.68	892.08	909.90	37.20	0.004071	8.8998
6	25	899.29	896.68	915.01	40.59	0.004442	10.5802
6	26	901.67	899.29	918.75	43.81	0.004794	11.4924
6	27	903.13	901.67	921.17	46.81	0.005123	12.1378
6	28	903.75	903.13	922.48	49.62	0.005430	12.6043
6	29	903.62	903.75	922.85	52.25	0.005718	12.9418
6	30	901.87	903.62	921.99	54.68	0.005984	13.5431
6	31	901.76	901.87	921.00	56.97	0.006234	12.9496
6	32	899.46	901.76	919.14	59.08	0.006465	13.2399
6	33	897.78	899.46	916.94	61.04	0.006680	12.8946
6	34	895.81	897.78	914.46	62.86	0.006879	12.5565
6	35	894.79	895.81	912.22	64.58	0.007067	11.7294
6	36	892.84	894.79	909.73	66.17	0.007241	11.3693
6	37	891.22	892.84	907.34	67.68	0.007406	10.8482
6	38	888.77	891.22	904.64	69.08	0.007559	10.6822

6.3739	-2.4532	0.003895	0.007447	0.013985
5.9991	-2.4688	0.003766	0.007576	0.013920
5.7191	-1.9286	0.003644	0.007698	0.013859
5.4329	-2.3990	0.003527	0.007815	0.013801
5.1830	-1.8364	0.003416	0.007926	0.013745
5.0043	-1.9005	0.003308	0.008034	0.013691
4.7412	-1.9687	0.003206	0.008136	0.013640
4.5588	-1.4934	0.003109	0.008233	0.013591
4.4133	-1.5628	0.003014	0.008328	0.013544
4.2367	-1.2247	0.002923	0.008419	0.013499
4.0417	-1.6732	0.002836	0.008506	0.013455
0.0000	27.0742	0.010943	0.000400	0.017509
0.0000	32.4709	0.010943	0.000400	0.017509
0.0000	35.5932	0.010943	0.000400	0.017509
0.0000	37.5962	0.010943	0.000400	0.017509
0.0000	38.4544	0.010943	0.000400	0.017509
0.0000	38.3439	0.010943	0.000400	0.017509
0.0000	37.7665	0.010943	0.000400	0.017509
0.0000	36.6193	0.010943	0.000400	0.017509
0.0000	35.4729	0.010943	0.000400	0.017509
0.0000	34.1249	0.010943	0.000400	0.017509
4.5153	36.1329	0.010845	0.000497	0.017460
11.1343	38.2612	0.010605	0.000737	0.017340
14.0089	36.2410	0.010304	0.001038	0.017189
15.0321	32.4639	0.009981	0.001361	0.017028
15.3046	28.3279	0.009652	0.001690	0.016863
15.2672	24.4750	0.009324	0.002018	0.016699
17.5552	22.8245	0.008947	0.002395	0.016511
19.2914	21.0072	0.008533	0.002809	0.016304
20.0225	18.5355	0.008103	0.003239	0.016089
19.7373	14.9174	0.007679	0.003663	0.015877
19.2303	12.1445	0.007267	0.004075	0.015671
18.4636	9.5637	0.006871	0.004471	0.015473
17.2873	6.7071	0.006500	0.004842	0.015287
16.4053	4.9129	0.006148	0.005194	0.015111
15.3205	3.1826	0.005819	0.005523	0.014947
14.3302	1.7258	0.005512	0.005830	0.014793
13.4352	0.4933	0.005224	0.006118	0.014649
12.4087	-1.1343	0.004958	0.006384	0.014516
11.6403	-1.3092	0.004708	0.006634	0.014391
10.7857	-2.4541	0.004477	0.006865	0.014276
10.0032	-2.8914	0.004262	0.007080	0.014168
9.2923	-3.2642	0.004063	0.007279	0.014069
8.7747	-2.9546	0.003875	0.007467	0.013974
8.0911	-3.2782	0.003701	0.007641	0.013888
7.6980	-3.1502	0.003536	0.007806	0.013805
7.1367	-3.5454	0.003383	0.007959	0.013729

5-38

6-38

6	39	886.92	888.77	902.00	70.39	0.007703	10.1455
6	40	885.87	886.92	899.73	71.63	0.007839	9.3269
6	41	883.96	885.87	897.34	72.78	0.007965	9.0052
6	42	882.44	883.96	895.12	73.88	0.008085	8.5367
6	43	880.68	882.44	892.89	74.92	0.008199	8.2149
6	44	879.04	880.68	890.70	75.90	0.008305	7.8472
6	45	878.81	879.04	889.06	76.83	0.008407	6.8983
6	46	876.63	878.81	887.12	77.71	0.008504	7.0566
6	47	876.47	876.63	885.68	78.56	0.008597	6.1972
6	48	874.08	876.47	883.79	79.36	0.008684	6.5358
7	3	422.59	380.60	396.49	0.00	0.000000	-17.5640
7	4	450.36	422.59	416.11	0.00	0.000000	-23.0470
7	5	479.62	450.36	439.20	0.00	0.000000	-27.2061
7	6	510.20	479.62	464.94	0.00	0.000000	-30.4608
7	7	540.46	510.20	492.23	0.00	0.000000	-32.4583
7	8	570.75	540.46	520.51	0.00	0.000000	-33.8129
7	9	600.53	570.75	549.22	0.00	0.000000	-34.5343
7	10	629.20	600.53	577.80	0.00	0.000000	-34.5929
7	11	657.08	629.20	606.02	0.00	0.000000	-34.3682
7	12	683.81	657.08	633.59	0.00	0.000000	-33.7998
7	13	710.10	683.81	660.60	0.00	0.000000	-33.3160
7	14	735.25	710.10	686.85	0.00	0.000000	-32.5781
7	15	761.06	735.25	716.24	1.28	0.000140	-30.1638
7	16	785.34	761.06	746.84	3.75	0.000411	-25.9120
7	17	807.17	785.34	775.51	6.70	0.000733	-21.3077
7	18	826.37	807.17	801.26	9.82	0.001075	-16.8977
7	19	843.33	826.37	824.07	13.02	0.001425	-12.9594
7	20	859.32	843.33	846.31	16.92	0.001852	-8.7559
7	21	874.18	859.32	867.37	21.37	0.002338	-4.5874
7	22	886.04	874.18	885.53	25.93	0.002838	-0.3407
7	23	896.32	886.04	900.95	30.49	0.003337	3.1165
7	24	904.59	896.32	913.59	34.92	0.003821	6.0594
7	25	909.90	904.59	923.16	39.13	0.004282	8.9262
7	26	914.55	909.90	930.46	43.11	0.004718	10.7103
7	27	917.85	914.55	935.77	46.85	0.005127	12.0637
7	28	919.89	917.85	939.32	50.33	0.005507	13.0790
7	29	921.12	919.89	941.43	53.55	0.005860	13.6645
7	30	919.93	921.12	941.73	56.50	0.006183	14.6713
7	31	919.87	919.93	941.39	59.25	0.006484	14.4822
7	32	917.56	919.87	939.78	61.76	0.006759	14.9576
7	33	915.72	917.56	937.58	64.08	0.007012	14.7144
7	34	913.30	915.72	934.83	66.20	0.007245	14.4914
7	35	911.59	913.30	932.04	68.18	0.007461	13.7646

6.6703	-3.4751	0.003239	0.008103	0.013657 6-39
6.3439	-2.9830	0.003103	0.008239	0.013589
5.8675	-3.1376	0.002977	0.008365	0.013526
5.6206	-2.9160	0.002857	0.008485	0.013466
5.2838	-2.9310	0.002743	0.008599	0.013409
4.9724	-2.8748	0.002637	0.008705	0.013356
4.7464	-2.1519	0.002535	0.008807	0.013305
4.5118	-2.5448	0.002438	0.008904	0.013256
4.3139	-1.8833	0.002345	0.008997	0.013210
4.0616	-2.4741	0.002258	0.009084	0.013166
0.0000	17.5640	0.010943	0.000400	0.017509
0.0000	23.0470	0.010943	0.000400	0.017509
0.0000	27.2061	0.010943	0.000400	0.017509
0.0000	30.4608	0.010943	0.000400	0.017509
0.0000	32.4583	0.010943	0.000400	0.017509
0.0000	33.8129	0.010943	0.000400	0.017509
0.0000	34.5343	0.010943	0.000400	0.017509
0.0000	34.5929	0.010943	0.000400	0.017509
0.0000	34.3682	0.010943	0.000400	0.017509
0.0000	33.7998	0.010943	0.000400	0.017509
0.0000	33.3160	0.010943	0.000400	0.017509
0.0000	32.5781	0.010943	0.000400	0.017509
6.5304	36.6943	0.010802	0.000540	0.017438
12.5605	38.4725	0.010531	0.000811	0.017303
14.9773	36.2850	0.010209	0.001133	0.017142
15.9197	32.8175	0.009867	0.001475	0.016971
16.2767	29.2361	0.009517	0.001825	0.016796
19.8811	28.6371	0.009090	0.002252	0.016582
22.6771	27.2645	0.008604	0.002738	0.016339
23.2815	23.6222	0.008104	0.003238	0.016089
23.2447	20.1281	0.007606	0.003737	0.015840
22.6160	16.5566	0.007121	0.004221	0.015598
21.4949	12.5686	0.006660	0.004682	0.015367
20.3272	9.6168	0.006224	0.005118	0.015149
19.0624	6.9987	0.005815	0.005527	0.014945
17.7621	4.6830	0.005435	0.005907	0.014755
16.4499	2.7853	0.005082	0.006260	0.014578
15.0750	0.4036	0.004759	0.006583	0.014417
14.0297	-0.4524	0.004458	0.006884	0.014266
12.8329	-2.1246	0.004183	0.007159	0.014129
11.8033	-2.9110	0.003930	0.007412	0.014002
10.8497	-3.6417	0.003697	0.007645	0.013886
10.0790	-3.6856	0.003481	0.007861	0.013778 7-35

7	36	909.64	911.59	929.13	69.99	0.007660	13.1166
7	37	907.41	909.64	926.11	71.68	0.007844	12.5852
7	38	904.63	907.41	922.82	73.23	0.008013	12.2421
7	39	902.09	904.63	919.49	74.66	0.008170	11.7098
7	40	900.04	902.09	916.35	76.00	0.008317	10.9773
7	41	897.60	900.04	913.20	77.24	0.008453	10.4988
7	42	895.36	897.60	910.14	78.40	0.008580	9.9474
7	43	893.03	895.36	907.11	79.48	0.008698	9.4784
7	44	890.78	893.03	904.16	80.48	0.008807	9.0054
7	45	888.91	890.78	901.46	81.44	0.008912	8.4425
7	46	887.01	888.91	898.83	82.32	0.009009	7.9579
7	47	885.40	887.01	896.45	83.17	0.009101	7.4395
7	48	883.44	885.40	894.04	83.95	0.009186	7.1355
8	3	406.03	380.00	389.49	0.00	0.000000	-11.1279
8	4	426.76	406.03	403.08	0.00	0.000000	-15.9369
8	5	450.16	426.76	420.22	0.00	0.000000	-20.1533
8	6	475.84	450.16	440.43	0.00	0.000000	-23.8323
8	7	502.55	475.84	462.94	0.00	0.000000	-26.6527
8	8	530.19	502.55	487.25	0.00	0.000000	-28.8991
8	9	558.22	530.19	512.83	0.00	0.000000	-30.5496
8	10	585.36	558.22	538.88	0.00	0.000000	-31.2835
8	11	612.77	585.36	565.32	0.00	0.000000	-31.9347
8	12	639.60	612.77	591.80	0.00	0.000000	-32.1667
8	13	666.15	639.60	618.21	0.00	0.000000	-32.2642
8	14	691.94	666.15	644.29	0.00	0.000000	-32.0652
8	15	718.01	691.94	670.28	0.00	0.000000	-32.1252
8	16	743.54	718.01	696.00	0.00	0.000000	-31.9962
8	17	769.85	743.54	726.82	1.88	0.000206	-28.9639
8	18	794.85	769.85	758.00	4.73	0.000518	-24.8040
8	19	817.60	794.85	787.08	7.95	0.000870	-20.5366
8	20	838.00	817.60	813.56	11.36	0.001243	-16.4503
8	21	858.79	838.00	840.43	15.71	0.001720	-12.3547
8	22	877.06	858.79	866.07	20.76	0.002272	-7.3957
8	23	893.21	877.06	889.06	26.07	0.002853	-2.7986
8	24	906.70	893.21	908.70	31.36	0.003432	1.3479
8	25	916.76	906.70	924.47	36.43	0.003987	5.1893
8	26	924.99	916.76	937.00	41.25	0.004514	8.0853
8	27	930.51	924.99	946.42	45.77	0.005009	10.7075
8	28	934.81	930.51	953.28	49.98	0.005470	12.4280
8	29	937.73	934.81	958.00	53.88	0.005896	13.6436
8	30	937.99	937.73	960.33	57.43	0.006284	15.0380
8	31	939.05	937.99	961.50	60.69	0.006641	15.1094
8	32	936.96	939.05	960.81	63.65	0.006965	16.0507
8	33	935.25	936.96	959.11	66.35	0.007261	16.0557
8	34	933.29	935.25	956.68	68.80	0.007529	15.7414

9.2732	-3.8433	0.003282	0.008060	0.013678 7-36
8.5924	-3.9927	0.003098	0.008244	0.013586
7.8950	-4.3470	0.002929	0.008413	0.013502
7.3112	-4.3985	0.002772	0.008570	0.013423
6.8421	-4.1351	0.002625	0.008717	0.013350
6.3416	-4.1571	0.002489	0.008853	0.013282
5.9113	-4.0360	0.002362	0.008980	0.013218
5.4968	-3.9815	0.002244	0.009098	0.013159
5.1216	-3.8838	0.002135	0.009207	0.013105
4.8813	-3.5611	0.002030	0.009312	0.013052
4.5065	-3.4513	0.001933	0.009409	0.013004
4.3066	-3.1329	0.001841	0.009501	0.012958
3.9659	-3.1695	0.001756	0.009586	0.012915
0.0000	11.1279	0.010943	0.000400	0.017509
0.0000	15.9369	0.010943	0.000400	0.017509
0.0000	20.1533	0.010943	0.000400	0.017509
0.0000	23.8323	0.010943	0.000400	0.017509
0.0000	26.6527	0.010943	0.000400	0.017509
0.0000	28.8991	0.010943	0.000400	0.017509
0.0000	30.5496	0.010943	0.000400	0.017509
0.0000	31.2835	0.010943	0.000400	0.017509
0.0000	31.9347	0.010943	0.000400	0.017509
0.0000	32.1667	0.010943	0.000400	0.017509
0.0000	32.2642	0.010943	0.000400	0.017509
0.0000	32.0652	0.010943	0.000400	0.017509
0.0000	32.1252	0.010943	0.000400	0.017509
0.0000	31.9962	0.010943	0.000400	0.017509
9.5926	38.5566	0.010736	0.000606	0.017405
14.4849	39.2889	0.010424	0.000918	0.017249
16.3796	36.9163	0.010072	0.001270	0.017073
17.3728	33.8231	0.009699	0.001643	0.016887
22.1821	34.5368	0.009222	0.002120	0.016648
25.7437	33.1395	0.008670	0.002672	0.016372
27.0866	29.8853	0.008089	0.003253	0.016082
27.0167	25.6687	0.007510	0.003832	0.015792
25.8720	20.6826	0.006955	0.004387	0.015515

10111

24.5851	16.4998	0.006428	0.004914	0.015251
23.1287	12.4212	0.005933	0.005409	0.015004
21.5009	9.0729	0.005472	0.005870	0.014773
19.9026	6.2590	0.005046	0.006296	0.014560
18.1273	3.0893	0.004658	0.006684	0.014366
16.6620	1.5526	0.004301	0.007041	0.014188
15.1350	-0.9156	0.003977	0.007365	0.014026
13.7942	-2.2614	0.003681	0.007661	0.013878
12.5193	-3.2220	0.003413	0.007929	0.013744 8-34

8	35	931.08	933.29	953.80	71.05	0.007775	15.2927
8	36	928.58	931.08	950.56	73.10	0.008000	14.7978
8	37	925.78	928.58	947.03	74.99	0.008206	14.2978
8	38	922.55	925.78	943.16	76.70	0.008393	13.8709
8	39	919.34	922.55	939.14	78.27	0.008565	13.3257
8	40	916.39	919.34	935.16	79.71	0.008722	12.6282
8	41	913.26	916.39	931.14	81.02	0.008867	12.0393
8	42	910.22	913.26	927.19	82.23	0.008999	11.4157
8	43	907.18	910.22	923.28	83.35	0.009121	10.8348
8	44	904.21	907.18	919.46	84.37	0.009232	10.2616
8	45	901.51	904.21	915.81	85.31	0.009336	9.6268
8	46	898.87	901.51	912.32	86.18	0.009431	9.0491
8	47	896.47	898.87	909.03	86.99	0.009519	8.4502
8	48	893.96	896.47	905.84	87.73	0.009600	7.9940
9	3	395.31	380.00	385.58	0.00	0.000000	-6.5451
9	4	410.12	395.31	394.53	0.00	0.000000	-10.4928
9	5	428.59	410.12	406.94	0.00	0.000000	-14.5708
9	6	449.29	428.59	422.35	0.00	0.000000	-18.1327
9	7	471.86	449.29	440.34	0.00	0.000000	-21.2165
9	8	496.05	471.86	460.53	0.00	0.000000	-23.9051
9	9	521.36	496.05	482.53	0.00	0.000000	-26.1349
9	10	546.81	521.36	505.71	0.00	0.000000	-27.6622
9	11	572.90	546.81	529.86	0.00	0.000000	-28.9643
9	12	598.33	572.90	554.40	0.00	0.000000	-29.5712
9	13	624.32	598.33	579.36	0.00	0.000000	-30.2552
9	14	649.99	624.32	604.49	0.00	0.000000	-30.6175
9	15	675.88	649.99	629.80	0.00	0.000000	-31.0117
9	16	701.50	675.88	655.12	0.00	0.000000	-31.2088
9	17	727.60	701.50	680.63	0.00	0.000000	-31.6145
9	18	754.82	727.60	708.88	0.84	0.000093	-30.9138
9	19	782.13	754.82	740.93	3.30	0.000361	-27.7290
9	20	807.97	782.13	772.56	6.48	0.000709	-23.8357
9	21	832.65	807.97	802.68	10.04	0.001099	-20.1746
9	22	857.23	832.65	833.66	14.73	0.001611	-15.8635
9	23	880.24	857.23	864.45	20.43	0.002236	-10.6305
9	24	900.41	880.24	892.34	26.47	0.002897	-5.4295
9	25	916.69	900.41	915.98	32.43	0.003549	-0.4763
9	26	930.05	916.69	935.48	38.16	0.004176	3.6534
9	27	939.98	930.05	950.79	43.54	0.004765	7.2767
9	28	947.63	939.98	962.55	48.55	0.005312	10.0375
9	29	952.49	947.63	971.00	53.18	0.005819	12.4617
9	30	955.26	952.49	976.45	57.38	0.006279	14.2605
9	31	957.45	955.26	979.89	61.23	0.006701	15.1080
9	32	957.30	957.45	981.13	64.69	0.007079	16.0346
9	33	955.56	957.30	980.52	67.82	0.007422	16.8004
9	34	953.63	955.56	978.70	70.65	0.007731	16.8693
9	35	951.79	953.63	976.16	73.19	0.008010	16.4025
9	36	949.05	951.79	972.92	75.49	0.008261	16.0663

11.4697	-3.8229	0.003167	0.008175	0.013621 8-35
10.5027	-4.2951	0.002942	0.008400	0.013508
9.6056	-4.6921	0.002736	0.008606	0.013405
8.7511	-5.1198	0.002549	0.008793	0.013312
7.9969	-5.3288	0.002377	0.008965	0.013226
7.3476	-5.2805	0.002220	0.009122	0.013147
6.7298	-5.3095	0.002075	0.009267	0.013075
6.1796	-5.2360	0.001943	0.009399	0.013009
5.6721	-5.1627	0.001821	0.009521	0.012948
5.2122	-5.0493	0.001710	0.009632	0.012892
4.8106	-4.8162	0.001606	0.009736	0.012840
4.4393	-4.6098	0.001511	0.009831	0.012793
4.1111	-4.3390	0.001423	0.009919	0.012749
3.7923	-4.2016	0.001342	0.010000	0.012708
0.0000	6.5451	0.010943	0.000400	0.017509
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0.0000	14.5708	0.010943	0.000400	0.017509
0.0000	18.1327	0.010943	0.000400	0.017509
0.0000	21.2165	0.010943	0.000400	0.017509
0.0000	23.9051	0.010943	0.000400	0.017509
0.0000	26.1349	0.010943	0.000400	0.017509
0.0000	27.6622	0.010943	0.000400	0.017509
0.0000	28.9643	0.010943	0.000400	0.017509
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0.0000	30.6175	0.010943	0.000400	0.017509
0.0000	31.0117	0.010943	0.000400	0.017509
0.0000	31.2088	0.010943	0.000400	0.017509
0.0000	31.6145	0.010943	0.000400	0.017509
4.3155	35.2293	0.010850	0.000493	0.017462
12.4891	40.2181	0.010581	0.000761	0.017328
16.1444	39.9802	0.010233	0.001109	0.017154
18.1761	38.3507	0.009843	0.001499	0.016959
23.8546	39.7181	0.009331	0.002011	0.016703
29.1166	39.7471	0.008706	0.002636	0.016390
30.8223	36.2518	0.008045	0.003297	0.016060
30.4270	30.9034	0.007393	0.003949	0.015734
29.2709	25.6174	0.006766	0.004576	0.015420
27.4787	20.2019	0.006177	0.005165	0.015126
25.5922	15.5547	0.005630	0.005712	0.014852
23.6765	11.2147	0.005123	0.006219	0.014599
21.4984	7.2378	0.004663	0.006679	0.014368
19.6910	4.5830	0.004241	0.007101	0.014158
17.6783	1.6437	0.003863	0.007479	0.013969
15.9923	-0.8081	0.003520	0.007822	0.013797
14.4417	-2.4276	0.003211	0.008131	0.013643
13.0194	-3.3831	0.002932	0.008410	0.013503
11.7459	-4.3203	0.002681	0.008661	0.013378 9-36

9	37	945.85	949.05	969.11	77.56	0.008488	15.6578
9	38	942.19	945.85	964.82	79.43	0.008692	15.2311
9	39	938.37	942.19	960.21	81.10	0.008875	14.7006
9	40	934.60	938.37	955.47	82.62	0.009041	14.0398
9	41	930.71	934.60	950.62	83.98	0.009190	13.3998
9	42	926.85	930.71	945.76	85.21	0.009324	12.7283
9	43	923.00	926.85	940.93	86.32	0.009446	12.0698
9	44	919.21	923.00	936.17	87.32	0.009555	11.4158
9	45	915.62	919.21	931.56	88.22	0.009654	10.7272
9	46	912.15	915.62	927.11	89.04	0.009744	10.0674
9	47	908.88	912.15	922.85	89.78	0.009825	9.4020
9	48	905.65	908.88	918.76	90.45	0.009898	8.8239
10	3	388.99	380.00	383.28	0.00	0.000000	-3.8459
10	4	399.23	388.99	389.10	0.00	0.000000	-6.8200
10	5	412.66	399.23	397.69	0.00	0.000000	-10.0781
10	6	429.28	412.66	409.19	0.00	0.000000	-13.5163
10	7	447.69	429.28	423.20	0.00	0.000000	-16.4838
10	8	468.13	447.69	439.52	0.00	0.000000	-19.2560
10	9	490.19	468.13	457.89	0.00	0.000000	-21.7421
10	10	513.16	490.19	477.88	0.00	0.000000	-23.7434
10	11	537.18	513.16	499.27	0.00	0.000000	-25.5072
10	12	561.31	537.18	521.60	0.00	0.000000	-26.7303
10	13	586.17	561.31	544.76	0.00	0.000000	-27.8689
10	14	610.49	586.17	568.26	0.00	0.000000	-28.4190
10	15	635.66	610.49	592.28	0.00	0.000000	-29.1945
10	16	660.85	635.66	616.63	0.00	0.000000	-29.7591
10	17	686.48	660.85	641.35	0.00	0.000000	-30.3695
10	18	712.93	686.48	666.59	0.00	0.000000	-31.1891
10	19	739.69	712.93	692.27	0.00	0.000000	-31.9128
10	20	769.05	739.69	724.12	1.88	0.000206	-30.2379
10	21	798.43	769.05	758.28	5.03	0.000550	-27.0225
10	22	826.73	798.43	791.77	8.75	0.000958	-23.5330
10	23	855.98	826.73	827.19	13.84	0.001514	-19.3783
10	24	883.61	855.98	863.20	20.24	0.002215	-13.7411
10	25	907.44	883.61	895.73	26.98	0.002952	-7.8857
10	26	927.51	907.44	923.68	33.63	0.003680	-2.5783
10	27	943.34	927.51	946.61	39.96	0.004373	2.1990
10	28	955.78	943.34	964.89	45.89	0.005021	6.1272
10	29	964.64	955.78	978.73	51.33	0.005617	9.4814
10	30	970.58	964.64	988.65	56.29	0.006159	12.1555
10	31	974.30	970.58	995.32	60.79	0.006652	14.1507
10	32	976.13	974.30	999.19	64.83	0.007095	15.5158
10	33	975.73	976.13	1000.50	68.43	0.007489	16.6692
10	34	974.41	975.73	999.92	71.64	0.007840	17.1740
10	35	972.40	974.41	997.99	74.50	0.008153	17.2222

10.5870	-5.0708	0.002454	0.008888	0.013264
9.5210	-5.7101	0.002250	0.009092	0.013162
8.5683	-6.1322	0.002067	0.009275	0.013071
7.7282	-6.3116	0.001901	0.009441	0.012988
6.9627	-6.4371	0.001752	0.009590	0.012913
6.2787	-6.4496	0.001618	0.009724	0.012846
5.6615	-6.4083	0.001496	0.009846	0.012785
5.1074	-6.3084	0.001387	0.009955	0.012731
4.6158	-6.1114	0.001288	0.010054	0.012681
4.1726	-5.8948	0.001198	0.010144	0.012636
3.7772	-5.6247	0.001117	0.010225	0.012596
3.4153	-5.4085	0.001044	0.010298	0.012559
0.0000	3.8459	0.010943	0.000400	0.017509
0.0000	6.8200	0.010943	0.000400	0.017509
0.0000	10.0781	0.010943	0.000400	0.017509
0.0000	13.5163	0.010943	0.000400	0.017509
0.0000	16.4838	0.010943	0.000400	0.017509
0.0000	19.2560	0.010943	0.000400	0.017509
0.0000	21.7421	0.010943	0.000400	0.017509
0.0000	23.7434	0.010943	0.000400	0.017509
0.0000	25.5072	0.010943	0.000400	0.017509
0.0000	26.7303	0.010943	0.000400	0.017509
0.0000	27.8689	0.010943	0.000400	0.017509
0.0000	28.4190	0.010943	0.000400	0.017509
0.0000	29.1945	0.010943	0.000400	0.017509
0.0000	29.7591	0.010943	0.000400	0.017509
0.0000	30.3695	0.010943	0.000400	0.017509
0.0000	31.1891	0.010943	0.000400	0.017509
0.0000	31.9128	0.010943	0.000400	0.017509
9.5832	39.8211	0.010736	0.000606	0.017405
15.9955	43.0180	0.010392	0.000950	0.017233
18.9651	42.4982	0.009984	0.001358	0.017029
25.9246	45.3030	0.009428	0.001914	0.016751
32.6712	46.4124	0.008727	0.002615	0.016401
34.3812	42.2669	0.007990	0.003352	0.016032
33.9922	36.5706	0.007262	0.004080	0.015668
32.3687	30.1697	0.006569	0.004773	0.015322
30.2867	24.1595	0.005921	0.005421	0.014998
27.8526	18.3711	0.005325	0.006017	0.014700
25.3438	13.1882	0.004783	0.006559	0.014429
23.0505	8.8997	0.004290	0.007052	0.014182
20.6752	5.1593	0.003847	0.007495	0.013961
18.4186	1.7493	0.003453	0.007889	0.013764
16.4095	-0.7644	0.003102	0.008240	0.013588
14.6354	-2.5868	0.002789	0.008553	0.013432

10	36	970.21	972.40	995.14	77.04	0.008430	16.7806
10	37	966.89	970.21	991.40	79.28	0.008676	16.4923
10	38	962.26	966.89	986.69	81.27	0.008893	16.4395
10	39	958.48	962.26	981.69	83.02	0.009085	15.6220
10	40	953.33	958.48	976.12	84.56	0.009254	15.3407
10	41	948.61	953.33	970.36	85.93	0.009403	14.6387
10	42	943.86	948.61	964.53	87.13	0.009534	13.9076
10	43	939.12	943.86	958.69	88.18	0.009650	13.1729
10	44	934.44	939.12	952.92	89.11	0.009752	12.4373
10	45	930.60	934.44	947.51	89.94	0.009842	11.3814
10	46	925.62	930.60	942.00	90.66	0.009921	11.0215
10	47	922.09	925.62	936.93	91.30	0.009991	9.9897
10	48	917.47	922.09	931.82	91.87	0.010053	9.6596
11	3	385.28	380.00	381.92	0.00	0.000000	-2.2585
11	4	392.19	385.28	385.67	0.00	0.000000	-4.3877
11	5	401.74	392.19	391.53	0.00	0.000000	-6.8703
11	6	414.07	401.74	399.74	0.00	0.000000	-9.6414
11	7	429.08	414.07	410.43	0.00	0.000000	-12.5550
11	8	445.85	429.08	423.31	0.00	0.000000	-15.1693
11	9	464.52	445.85	438.28	0.00	0.000000	-17.6612
11	10	484.58	464.52	455.07	0.00	0.000000	-19.8652
11	11	506.03	484.58	473.51	0.00	0.000000	-21.8889
11	12	528.21	506.03	493.25	0.00	0.000000	-23.5229
11	13	551.35	528.21	514.17	0.00	0.000000	-25.0196
11	14	574.60	551.35	535.87	0.00	0.000000	-26.0640
11	15	598.70	574.60	558.36	0.00	0.000000	-27.1465
11	16	622.45	598.70	581.24	0.00	0.000000	-27.7391
11	17	647.21	622.45	604.70	0.00	0.000000	-28.6071
11	18	672.73	647.21	628.82	0.00	0.000000	-29.5493
11	19	698.67	672.73	653.49	0.00	0.000000	-30.4031
11	20	726.48	698.67	679.18	0.00	0.000000	-31.8301
11	21	756.95	726.48	709.27	1.06	0.000116	-32.0904
11	22	788.92	756.95	744.77	3.98	0.000435	-29.7146
11	23	821.23	788.92	781.39	7.81	0.000855	-26.8121
11	24	855.04	821.23	821.16	13.30	0.001455	-22.8018
11	25	886.97	855.04	862.09	20.34	0.002226	-16.7436
11	26	914.45	886.97	899.24	27.78	0.003040	-10.2387
11	27	937.58	914.45	931.03	35.07	0.003837	-4.4038
11	28	956.31	937.58	957.30	41.96	0.004592	0.6634
11	29	971.23	956.31	978.31	48.34	0.005289	4.7647
11	30	981.60	971.23	994.25	54.14	0.005925	8.5136
11	31	988.75	981.60	1005.76	59.37	0.006497	11.4421
11	32	992.55	988.75	1013.25	64.05	0.007009	13.9300
11	33	994.41	992.55	1017.45	68.18	0.007461	15.5074
11	34	994.92	994.41	1019.13	71.80	0.007858	16.2993

12.9722	-3.8083	0.002512	0.008830	0.013293 10-36
11.4849	-5.0074	0.002266	0.009076	0.013170
10.1542	-6.2852	0.002049	0.009293	0.013062
8.9477	-6.6743	0.001857	0.009485	0.012966
7.9012	-7.4394	0.001688	0.009654	0.012881
6.9611	-7.6775	0.001539	0.009803	0.012807
6.1323	-7.7752	0.001408	0.009934	0.012741
5.4017	-7.7711	0.001292	0.010050	0.012683
4.7594	-7.6778	0.001190	0.010152	0.012632
4.1948	-7.1866	0.001100	0.010242	0.012587
3.7034	-7.3180	0.001021	0.010321	0.012548
3.2701	-6.7196	0.000951	0.010391	0.012513
2.8913	-6.7682	0.000889	0.010453	0.012482
0.0000	2.2585	0.010943	0.000400	0.017509
0.0000	4.3877	0.010943	0.000400	0.017509
0.0000	6.8703	0.010943	0.000400	0.017509
0.0000	9.6414	0.010943	0.000400	0.017509
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0.0000	15.1693	0.010943	0.000400	0.017509
0.0000	17.6612	0.010943	0.000400	0.017509
0.0000	19.8652	0.010943	0.000400	0.017509
0.0000	21.8889	0.010943	0.000400	0.017509
0.0000	23.5229	0.010943	0.000400	0.017509
0.0000	25.0196	0.010943	0.000400	0.017509

10113

0.0000	26.0640	0.010943	0.000400	0.017509
0.0000	27.1465	0.010943	0.000400	0.017509
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0.0000	29.5493	0.010943	0.000400	0.017509
0.0000	30.4031	0.010943	0.000400	0.017509
0.0000	31.8301	0.010943	0.000400	0.017509
5.4074	37.4978	0.010826	0.000516	0.017450
14.8428	44.5575	0.010507	0.000835	0.017291
19.5208	46.3330	0.010087	0.001255	0.017081
27.9427	50.7446	0.009487	0.001855	0.016781
35.9488	52.6924	0.008716	0.002626	0.016395
38.0130	48.2517	0.007902	0.003440	0.015988
37.2251	41.6289	0.007105	0.004237	0.015589
35.2748	34.6113	0.006350	0.004992	0.015212
32.5972	27.8325	0.005653	0.005689	0.014864
29.7144	21.2008	0.005017	0.006325	0.014546
26.7891	15.3470	0.004445	0.006897	0.014260
23.9514	10.0213	0.003933	0.007409	0.014004
21.1356	5.6281	0.003481	0.007861	0.013778
18.5520	2.2526	0.003085	0.008258	0.013579 11-34

11	35	992.82	994.92	1018.41	74.98	0.008205	17.2183
11	36	991.27	992.82	1016.36	77.74	0.008507	16.8841
11	37	988.13	991.27	1013.00	80.13	0.008768	16.7370
11	38	982.86	988.13	1008.15	82.18	0.008994	17.0247
11	39	978.35	982.86	1002.69	83.95	0.009187	16.3787
11	40	972.71	978.35	996.53	85.47	0.009353	16.0273
11	41	967.21	972.71	990.04	86.78	0.009496	15.3604
11	42	961.60	967.21	983.37	87.90	0.009619	14.6498
11	43	955.98	961.60	976.66	88.87	0.009725	13.9176
11	44	950.41	955.98	969.99	89.71	0.009817	13.1777
11	45	945.45	950.41	963.61	90.43	0.009896	12.2203
11	46	939.83	945.45	957.24	91.07	0.009966	11.7199
11	47	935.23	939.83	951.26	91.62	0.010026	10.7898
11	48	930.02	935.23	945.37	92.11	0.010080	10.3315
12	3	383.45	380.46	381.26	0.00	0.000000	-1.4789
12	4	388.30	383.45	383.83	0.00	0.000000	-3.0125
12	5	394.48	388.30	387.71	0.00	0.000000	-4.5530
12	6	403.41	394.48	393.44	0.00	0.000000	-6.7140
12	7	414.73	403.41	401.20	0.00	0.000000	-9.1085
12	8	427.95	414.73	410.94	0.00	0.000000	-11.4501
12	9	443.82	427.95	422.89	0.00	0.000000	-14.0797
12	10	460.87	443.82	436.69	0.00	0.000000	-16.2736
12	11	479.52	460.87	452.22	0.00	0.000000	-18.3736
12	12	499.32	479.52	469.27	0.00	0.000000	-20.2245
12	13	520.33	499.32	487.71	0.00	0.000000	-21.9511
12	14	541.95	520.33	507.25	0.00	0.000000	-23.3470
12	15	564.54	541.95	527.84	0.00	0.000000	-24.6953
12	16	587.30	564.54	549.15	0.00	0.000000	-25.6736
12	17	610.99	587.30	571.25	0.00	0.000000	-26.7468
12	18	634.78	610.99	593.88	0.00	0.000000	-27.5245
12	19	659.65	634.78	617.23	0.00	0.000000	-28.5455
12	20	685.97	659.65	641.56	0.00	0.000000	-29.8913
12	21	714.35	685.97	667.22	0.00	0.000000	-31.7188
12	22	745.33	714.35	695.35	0.25	0.000028	-33.6407
12	23	780.00	745.33	732.09	2.95	0.000323	-32.2453
12	24	816.29	780.00	771.89	6.95	0.000760	-29.8833
12	25	854.47	816.29	815.96	12.87	0.001409	-25.9143
12	26	890.62	854.47	861.65	20.56	0.002250	-19.4964
12	27	921.64	890.62	903.01	28.63	0.003133	-12.5348
12	28	948.04	921.64	938.54	36.48	0.003992	-6.3943
12	29	969.58	948.04	968.02	43.87	0.004801	-1.0500
12	30	985.84	969.58	991.37	50.65	0.005543	3.7171

16.2414	-0.9768	0.002737	0.008605	0.013406 11-35
14.1369	-2.7471	0.002435	0.008907	0.013255
12.2312	-4.5057	0.002174	0.009168	0.013124
10.5296	-6.4951	0.001949	0.009394	0.013011
9.0580	-7.3207	0.001755	0.009587	0.012915
7.7719	-8.2554	0.001589	0.009753	0.012831
6.6749	-8.6855	0.001446	0.009896	0.012760
5.7411	-8.9087	0.001323	0.010019	0.012699
4.9506	-8.9669	0.001217	0.010125	0.012646
4.2840	-8.8937	0.001125	0.010217	0.012600
3.7087	-8.5116	0.001046	0.010296	0.012560
3.2472	-8.4727	0.000976	0.010366	0.012525
2.8322	-7.9575	0.000916	0.010426	0.012495
2.5073	-7.8241	0.000862	0.010480	0.012468
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0.0000	4.5530	0.010943	0.000400	0.017509
0.0000	6.7140	0.010943	0.000400	0.017509
0.0000	9.1085	0.010943	0.000400	0.017509
0.0000	11.4501	0.010943	0.000400	0.017509
0.0000	14.0797	0.010943	0.000400	0.017509
0.0000	16.2736	0.010943	0.000400	0.017509
0.0000	18.3736	0.010943	0.000400	0.017509
0.0000	20.2245	0.010943	0.000400	0.017509
0.0000	21.9511	0.010943	0.000400	0.017509
0.0000	23.3470	0.010943	0.000400	0.017509
0.0000	24.6953	0.010943	0.000400	0.017509
0.0000	25.6736	0.010943	0.000400	0.017509
0.0000	26.7468	0.010943	0.000400	0.017509
0.0000	27.5245	0.010943	0.000400	0.017509
0.0000	28.5455	0.010943	0.000400	0.017509
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0.0000	31.7188	0.010943	0.000400	0.017509
1.3190	34.9597	0.010914	0.000428	0.017494
13.7186	45.9639	0.010619	0.000723	0.017347
20.3264	50.2097	0.010182	0.001160	0.017128
30.2002	56.1146	0.009533	0.001809	0.016804
39.2559	58.7523	0.008692	0.002650	0.016383
41.1866	53.7214	0.007809	0.003533	0.015942
40.1509	46.5452	0.006950	0.004392	0.015512
37.8543	38.9043	0.006141	0.005201	0.015108
34.7075	30.9904	0.005399	0.005943	0.014737 12-30

12	31	998.43	985.84	1009.32	56.76	0.006211	7.3298
12	32	1006.12	998.43	1022.05	62.17	0.006804	10.7204
12	33	1010.80	1006.12	1030.38	66.92	0.007323	13.1740
12	34	1012.76	1010.80	1034.98	71.05	0.007775	14.9505
12	35	1012.69	1012.76	1036.49	74.57	0.008160	16.0165
12	36	1010.89	1012.69	1035.55	77.56	0.008488	16.5979
12	37	1008.65	1010.89	1032.96	80.08	0.008763	16.3631
12	38	1003.17	1008.65	1028.35	82.18	0.008993	16.9489
12	39	998.20	1003.17	1022.73	83.93	0.009184	16.5137
12	40	992.14	998.20	1016.24	85.39	0.009344	16.2201
12	41	985.98	992.14	1009.26	86.62	0.009479	15.6666
12	42	979.64	985.98	1002.02	87.67	0.009593	15.0574
12	43	973.26	979.64	994.68	88.56	0.009691	14.4152
12	44	966.92	973.26	987.36	89.34	0.009776	13.7586
12	45	961.02	966.92	980.26	90.02	0.009850	12.9495
12	46	954.77	961.02	973.25	90.62	0.009916	12.4358
12	47	949.27	954.77	966.56	91.15	0.009975	11.6388
12	48	943.46	949.27	960.03	91.63	0.010027	11.1514

31.2680	23.9381	0.004731	0.006611	0.014403 12-31
27.7415	17.0211	0.004138	0.007204	0.014106
24.3337	11.1596	0.003619	0.007723	0.013846
21.1280	6.1775	0.003167	0.008175	0.013621
18.0477	2.0312	0.002782	0.008560	0.013428
15.3398	-1.2581	0.002454	0.008888	0.013264
12.8785	-3.4846	0.002179	0.009163	0.013127
10.7534	-6.1955	0.001949	0.009393	0.013012
8.9583	-7.5553	0.001758	0.009584	0.012916
7.4944	-8.7257	0.001598	0.009744	0.012836
6.3018	-9.3648	0.001463	0.009879	0.012769
5.3464	-9.7109	0.001349	0.009993	0.012712
4.5843	-9.8308	0.001251	0.010091	0.012663
3.9741	-9.7844	0.001166	0.010176	0.012620
3.4598	-9.4896	0.001092	0.010250	0.012583
3.0740	-9.3617	0.001026	0.010316	0.012550
2.7189	-8.9198	0.000968	0.010374	0.012521
2.4527	-8.6986	0.000915	0.010427	0.012495 12-98

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// JOB
// FOR
*IOCS(CARD,TYPEWRITER,1132PRINTER,DISK)
*ONE WORD INTEGERS
*ARITHMETIC TRACE
*TRANSFER TRACE
*LIST ALL
      DIMENSION TS(12, 48), TG(12, 48), XSO2(12,48)
      SHSO2 (TEMP) = 0.4474E01 + 0.2041E-01*TEMP - 0.1743E-04* TEMP**2
     1   + 0.5463E-08 *  TEMP**3 + 0.3838E05 /  TEMP **2
      SHO2(TEMP) = 0.4399E01 + 0.7895E-02 * TEMP - 0.5454E-05 * TEMP**2
     1   + 0.1399E-08 *  TEMP**3 + 0.7069E05 /  TEMP**2
      SHSO3(TEMP) = 0.4638E01 + 0.3266E-01 * TEMP - 0.2792E-04 * TEMP**2
     1   + 0.8782E-08 *  TEMP**3 - 0.1936E04 /  TEMP**2
      SHN2(TEMP) = 0.7543E01 - 0.34E-02 * TEMP + 0.636E-05 * TEMP**2
     1   -0.2702E-08 *  TEMP**3 - 0.3913E04 /  TEMP**2
      READ (2, 5) WSO2, WO2, WSO3, WN2, WS, SUMDF,TISOL, TIGAS, XINC,
     1  TTOL, I, M, IL, ML
      WRITE(3, 5) WSO2, WO2, WSO3, WN2, WS, SUMDF,TISOL, TIGAS, XINC,
     1  TTOL, I, M, IL, ML
    5 FORMAT (6F 10.6, 2F 6.0 / 2F 5.2, 4 I 4, F8.3)
      FSO2       = WSO2 / 64.0628
      FO2        = WO2 / 31.9988
      FN2 = WN2 / 28.0134
      FS = WS/60.0848
      FSO3 = WSO3 / 80.0622
      FSO3       = FSO3       + 0.0004
      FSO2       = FSO2       - 0.0004
      FSO2I = FSO2
      FO2 = FO2 - 0.0002
      DO 10 M = M, ML
      TG(M,I) = TIGAS
   10 XSO2(M,I) = 0.0
      M = 1
      DO 20 I = 1, IL
   20 TS(M,I) = TISOL
C     MATERIAL BALANCE
      WRITE ( 3, 25)
   25 FORMAT  ('     M     I TS(M,I) TS(M,I-1) TG(M,I) XSO2(M,I)   SUMDF
     1   QS          QEVOL       QG         FSO2    FSO3        FO2')
      I = 2
      M = 2
      TSEST = TISOL
      DO 100 M = 2, ML
      SUMDF = 0.0
      TSIN =(TS(M-1, I) + TS(M-1, I-1))/ 2.
   30 TSEST = TSEST - XINC
      GO TO 40
   35 TSEST = TSEST + XINC
   40 TSOUT = TSEST
      TSAV = (TSOUT  + TSIN) / 2.
      TCSAV = (TSAV - 32.) / 1.8
      TKSAV = TCSAV + 273.16
      FTOT = FSO2 + FO2 + FSO3 + FN2
      XLNKP = 22600. / (1.98719 * TKSAV) - 21.36 / 1.98719
      XKP = EXP (XLNKP)
      PSO2 = FSO2       / FTOT
      PO2 = FO2        / FTOT
      PSO3 = FSO3       / FTOT
      PN2 = FN2 / FTOT
      PTOT = PSO2 + PO2 + PSO3 + PN2
      TERM1 = SQRT (PSO2 / PSO3)
      DENOM = PSO2 * XKP
```

```
      TERM3 = (PSO3 / DENOM)**2
      PTERM = TERM1 * (PO2 - TERM3)
      IF (TKSAV - 680.) 510, 510, 520
  510 RATEK = 0.
      GO TO 550
  520 IF (TKSAV - 730.2355) 530, 530, 540
  530 RATEK = 1.56E-07 * TKSAV - 1.06E-04
      GO TO 550
  540 RATEK = 4.874E-07 * TKSAV - 3.48E-04
  550 RXRAT = RATEK * PTERM
      DFSO2 = RXRAT * 60. * WS
C     HEAT BALANCE
      IF (TKSAV - 848.) 50, 50, 55
   50 SHS = 11.22 + 8.20E-03*TKSAV - 2.70E+05 / TKSAV**2
      GO TO 60
   55 SHS = 14.41 + 2.04E-03 * TKSAV
   60 QRX = (3.3 * TKSAV + 44140.)
      QEVOL = QRX * DFSO2
      QS = FS * SHS * (TSOUT - TSIN)
      QG = QEVOL - QS
      TGIN = TG(M-1, I-1)
      CPGAS = SHSO2(TGIN)  * FSO2 + SHO2(TGIN)  * FO2 + SHSO3(TGIN) *
     1 FSO3 + SHN2(TGIN)  * FN2
      TGOUT = QG / CPGAS + TGIN
      TG(M,I) = TGOUT
      TGAV = (TG(M,I) + TG(M-1, I-1))/2.0
C     HTCON = H * A * THETA = 4.81 *  8.417 * 1.0/60.
      HTCON = 0.673
      TSAV1 = QG / HTCON + TGAV
      DELTA = ABS(TSAV - TSAV1)
      IF (DELTA -TTOL) 90, 90, 70
   70 TSEX = 2.0 * TSAV1 - TSIN
      IF (TSEX - TSEST) 80, 80, 85
   80 GO TO 30
   85 GO TO 35
   90 TS(M,I) = 1.5 * TSAV1 - 0.5 * TS(M-1,I)
      TS(M,I-1) = 2.0 * TSEX - TS(M,I)
      IF (TS(M,I-1) - TGIN) 92, 92, 93
   92 TS(M,I) = TGIN
      TS(M,I-1) = TGIN
   93 CONTINUE
      IF (TG(M,I) -XINC - TIGAS) 94, 94, 95
   94 TG(M,I) = TIGAS
   95 CONTINUE
      SUMDF = SUMDF + DFSO2
      DFSO3 = DFSO2
      DFO2 = DFSO2 / 2.
      FSO2       = FSO2       - DFSO2
      FSO3       = FSO3       + DFSO3
      FO2        = FO2        - DFO2
      XAV = DFSO2 / FSO2
      XSO2(M,I) = 100. * SUMDF / FSO2I
      WRITE(3,99) M, I, TS(M,I), TS(M,I-1), TG(M,I), XSO2(M,I), SUMDF,
     1 QS, QEVOL, QG, FSO2, FSO3, FO2
   99 FORMAT (2I5, 4F8.2, F12.6, 3F10.4, 3F11.6)
  100 CONTINUE
      SMDF1 = 0.000000
      DO 200 M = 2, ML
      SUMDF = 0.0 +SMDF1
      FSO2       = WSO2 / 64.0628
      FO2        = WO2 / 31.9988
```

```
      FN2 = WN2 / 28.0134
      FS = WS/60.0848
      FSO3 = WSO3 / 80.0622
      FSO3        = FSO3        + 0.0004
      FSO2        = FSO2        - 0.0004
      FSO2I = FSO2
      FO2 = FO2 - 0.0002
      DO 200 I = 3, IL
      TS(M,I)=TS(M,I-1)
      TSAV =  (TS(M,I) + TS(M-1, I))/2.
  141 TCSAV = (TSAV - 32.) / 1.8
      TKSAV = TCSAV + 273.16
      FTOT = FSO2 + FO2 + FSO3 + FN2
      XLNKP = 22600. / (1.98719 * TKSAV) - 21.36 / 1.98719
      XKP = EXP (XLNKP)
      PSO2 = FSO2       / FTOT
      PO2 = FO2         / FTOT
      PSO3 = FSO3       / FTOT
      PN2 = FN2 / FTOT
      PTOT = PSO2 + PO2 + PSO3 + PN2
      TERM1 = SQRT (PSO2 / PSO3)
      DENOM = PSO2 * XKP
      TERM3 = (PSO3 / DENOM)**2
      PTERM = TERM1 * (PO2 - TERM3)
      IF (TKSAV - 680.) 610, 610, 620
  610 RATEK = 0.
      GO TO 650
  620 IF (TKSAV - 730.2355) 630, 630, 640
  630 RATEK = 1.56E-07 * TKSAV - 1.06E-04
      GO TO 650
  640 RATEK = 4.874E-07 * TKSAV - 3.48E-04
  650 RXRAT = RATEK * PTERM
      DFSO2 = RXRAT * 60. * WS
C     HEAT BALANCE
      IF (TKSAV - 848.) 150, 150, 155
  150 SHS = 11.22 + 8.20E-03*TKSAV - 2.70E+05 / TKSAV**2
      GO TO 160
  155 SHS = 14.41 + 2.04E-03 * TKSAV
  160 QRX = (3.3 * TKSAV + 44140.)
      QEVOL = QRX * DFSO2
      QS = FS * SHS * (TS(M,I) - TS(M-1,I))
      QG = QEVOL - QS
      TGIN = TG(M,I-1)
      CPGAS = SHSO2(TGIN)  * FSO2 + SHO2(TGIN)  * FO2 + SHSO3(TGIN) *
     1 FSO3 + SHN2(TGIN)  * FN2
      TG(M,I) = QG / CPGAS + TG(M,I-1)
      TS1  =-QS / HTCON +TG(M,I)
      DELTA = ABS (TS1       - TS(M,I))
      IF (DELTA -TTOL) 190, 190, 170
  170 TS2= (TS1        + TS(M,I)) / 2.
      TS(M,I) = TS2
      TSAV = (TS2+ TS(M-1, I)) / 2.
      GO TO 141
  190 TS(M,I) = TS1
      SUMDF = SUMDF + DFSO2
      DFSO3 = DFSO2
      DFO2 = DFSO2 / 2.
      FSO2        = FSO2        - DFSO2
      FSO3        = FSO3        + DFSO3
      FO2       = FO2       - DFO2
      XAV = DFSO2 / FSO2
```

```
      XSO2(M,I) = 100. * SUMDF / FSO2I
      WRITE(3,196)M, I, TS(M,I), TS(M,I-1), TG(M,I), XSO2(M,I), SUMDF,
     1 QS, QEVOL, QG, FSO2, FSO3, FO2
  196 FORMAT (2I5, 4F8.2, F12.6, 3F10.4, 3F11.6)
      SMDF1 = 0.0
  200 CONTINUE
      CALL EXIT
      END
```

// XEQ

0.726667 0.566667 0.000000 3.716667 2.816667 0.000000 875.
0.25 0.75 1 1 48 12

M	I	TS(M,I)	TS(M,I-1)	TG(M,I)	XSO2(M,I)	SUMDF	QS
2	2	691.58	567.91	557.02	0.00	0.000000	-184.5423
3	2	505.38	503.60	474.54	0.00	0.000000	-87.6107
4	2	459.69	429.73	433.35	0.00	0.000000	-39.2018
5	2	417.74	418.47	414.12	0.00	0.000000	-16.6003
6	2	410.21	403.20	405.66	0.00	0.000000	-6.6569
7	2	401.39	401.27	401.93	0.00	0.000000	-2.2691
8	2	400.00	400.00	400.00	0.00	0.000000	-0.2209
9	2	400.00	400.00	400.00	0.00	0.000000	0.1635
10	2	400.00	400.00	400.00	0.00	0.000000	0.0000
11	2	400.00	400.00	400.00	0.00	0.000000	-0.1635
12	2	400.46	402.03	400.00	0.00	0.000000	-0.1635
2	3	767.34	691.58	643.97	4.40	0.000481	-83.0274
2	4	797.18	767.34	707.55	7.99	0.000875	-60.3206
2	5	819.53	797.18	755.48	11.34	0.001241	-43.1038
2	6	836.89	819.53	792.17	14.57	0.001595	-30.0961
2	7	850.35	836.89	821.32	18.06	0.001976	-19.5373
2	8	860.87	850.35	844.09	21.60	0.002363	-11.2911
2	9	868.40	860.87	861.45	25.09	0.002745	-4.6808
2	10	874.51	868.40	874.62	28.46	0.003114	0.0685
2	11	879.11	874.51	884.46	31.68	0.003467	3.6020
2	12	882.49	879.11	891.69	34.74	0.003802	6.1914
2	13	884.92	882.49	896.88	37.65	0.004120	8.0451
2	14	887.10	884.92	900.63	40.40	0.004421	9.1053
2	15	887.43	887.10	902.88	43.02	0.004708	10.3963
2	16	888.72	887.43	904.42	45.49	0.004978	10.5653
2	17	889.15	888.72	905.26	47.83	0.005234	10.8411
2	18	888.79	889.15	905.40	50.06	0.005478	11.1804
2	19	889.12	888.79	905.31	52.17	0.005709	10.8932
2	20	888.97	889.12	904.93	54.18	0.005929	10.7411
2	21	888.77	888.97	904.37	56.09	0.006138	10.4941
2	22	888.53	888.77	903.68	57.92	0.006338	10.1980
2	23	888.24	888.53	902.92	59.66	0.006528	9.8780
2	24	887.21	888.24	901.88	61.33	0.006711	9.8754
2	25	887.10	887.21	900.96	62.92	0.006885	9.3308
2	26	886.87	887.10	900.10	64.44	0.007052	8.9042
2	27	885.92	886.87	899.06	65.91	0.007213	8.8429
2	28	885.81	885.92	898.17	67.31	0.007366	8.3183
2	29	885.60	885.81	897.37	68.66	0.007514	7.9207
2	30	885.34	885.60	896.62	69.95	0.007655	7.5908
2	31	884.35	885.34	895.67	71.20	0.007792	7.6147
2	32	883.74	884.35	894.71	72.41	0.007923	7.3833
2	33	883.69	883.74	893.94	73.56	0.008050	6.9013
2	34	883.58	883.69	893.28	74.67	0.008171	6.5304
2	35	883.40	883.58	892.68	75.74	0.008288	6.2440
2	36	883.19	883.40	892.11	76.77	0.008401	6.0025
2	37	882.97	883.19	891.57	77.77	0.008510	5.7864
2	38	882.74	882.97	891.04	78.73	0.008615	5.5856
2	39	882.50	882.74	890.52	79.65	0.008716	5.3949
2	40	882.27	882.50	890.02	80.54	0.008814	5.2119
2	41	882.04	882.27	889.53	81.41	0.008908	5.0350
2	42	881.82	882.04	889.05	82.24	0.008999	4.8636
2	43	881.60	881.82	888.58	83.04	0.009087	4.6970
2	44	881.38	881.60	888.12	83.81	0.009171	4.5351
2	45	881.17	881.38	887.68	84.55	0.009253	4.3776
2	46	880.97	881.17	887.24	85.27	0.009331	4.2242
2	47	880.77	880.97	886.82	85.96	0.009407	4.0746
2	48	880.57	880.77	886.41	86.62	0.009479	3.9285
3	3	660.18	505.38	541.55	0.00	0.000000	-79.8369

400.

QEVOL	QG	FSO2	FSO3	FO2	
0.0000	184.5423	0.010943	0.000400	0.017509	2-2
0.0000	87.6107	0.010943	0.000400	0.017509	
0.0000	39.2018	0.010943	0.000400	0.017509	
0.0000	16.6003	0.010943	0.000400	0.017509	
0.0000	6.6569	0.010943	0.000400	0.017509	
0.0000	2.2691	0.010943	0.000400	0.017509	
0.0000	0.2209	0.010943	0.000400	0.017509	
0.0000	-0.1635	0.010943	0.000400	0.017509	
0.0000	0.0000	0.010943	0.000400	0.017509	
0.0000	0.1635	0.010943	0.000400	0.017509	
0.0000	0.1635	0.010943	0.000400	0.017509	
22.3966	105.4240	0.010461	0.000881	0.017268	
18.3059	78.6265	0.010067	0.001275	0.017071	
17.0517	60.1555	0.009701	0.001641	0.016888	
16.4613	46.5575	0.009347	0.001995	0.016711	
17.7682	37.3056	0.008966	0.002376	0.016520	
18.0261	29.3172	0.008579	0.002763	0.016327	
17.7906	22.4714	0.008197	0.003145	0.016136	
17.1756	17.1070	0.007828	0.003514	0.015951	
16.4279	12.8258	0.007475	0.003867	0.015775	
15.6314	9.4399	0.007140	0.004202	0.015607	
14.8313	6.7861	0.006822	0.004520	0.015448	
14.0173	4.9120	0.006521	0.004821	0.015298	
13.3462	2.9499	0.006234	0.005108	0.015154	
12.5933	2.0279	0.005964	0.005378	0.015019	
11.9417	1.1005	0.005708	0.005634	0.014891	
11.3660	0.1855	0.005464	0.005878	0.014769	
10.7691	-0.1240	0.005233	0.006109	0.014654	
10.2440	-0.4970	0.005013	0.006329	0.014544	
9.7535	-0.7405	0.004804	0.006538	0.014439	
9.2979	-0.9001	0.004604	0.006738	0.014339	
8.8749	-1.0030	0.004414	0.006928	0.014244	
8.5134	-1.3620	0.004231	0.007111	0.014153	
8.1251	-1.2057	0.004057	0.007285	0.014066	
7.7738	-1.1304	0.003890	0.007452	0.013982	
7.4760	-1.3668	0.003729	0.007613	0.013902	
7.1567	-1.1616	0.003576	0.007766	0.013825	
6.8664	-1.0542	0.003428	0.007914	0.013751	
6.5974	-0.9933	0.003287	0.008055	0.013681	
6.3684	-1.2463	0.003150	0.008192	0.013612	
6.1312	-1.2521	0.003019	0.008323	0.013546	
5.8879	-1.0133	0.002892	0.008450	0.013483	
5.6639	-0.8664	0.002771	0.008571	0.013423	
5.4553	-0.7886	0.002654	0.008688	0.013364	
5.2582	-0.7442	0.002541	0.008801	0.013308	
5.0705	-0.7159	0.002432	0.008910	0.013253	
4.8906	-0.6950	0.002327	0.009015	0.013201	
4.7177	-0.6772	0.002226	0.009116	0.013150	
4.5511	-0.6608	0.002128	0.009214	0.013101	
4.3901	-0.6449	0.002034	0.009308	0.013054	
4.2343	-0.6292	0.001943	0.009399	0.013009	
4.0833	-0.6137	0.001855	0.009487	0.012965	
3.9366	-0.5985	0.001771	0.009571	0.012923	
3.7939	-0.5836	0.001689	0.009653	0.012882	
3.6549	-0.5693	0.001611	0.009731	0.012843	
3.5191	-0.5554	0.001535	0.009807	0.012805	
3.3863	-0.5422	0.001463	0.009879	0.012769	
0.0000	79.8369	0.010943	0.000400	0.017509	3-3

3	4	703.77	660.18	599.58	0.00	0.000000	-70.1188
3	5	742.23	703.77	653.67	1.30	0.000142	-59.6011
3	6	774.58	742.23	703.51	4.04	0.000442	-47.8339
3	7	801.86	774.58	746.27	7.22	0.000790	-37.4105
3	8	824.16	801.86	781.95	10.51	0.001150	-28.4113
3	9	842.21	824.16	811.32	13.79	0.001509	-20.7932
3	10	857.54	842.21	837.39	17.70	0.001937	-13.5586
3	11	870.16	857.54	859.36	21.84	0.002390	-7.2690
3	12	880.20	870.16	877.21	25.99	0.002844	-2.0130
3	13	887.40	880.20	891.13	30.04	0.003287	2.5110
3	14	893.59	887.40	902.00	33.94	0.003714	5.6580
3	15	897.49	893.59	909.85	37.58	0.004113	8.3190
3	16	900.90	897.49	915.71	41.05	0.004492	9.9710
3	17	903.07	900.90	919.78	44.30	0.004848	11.2477
3	18	904.38	903.07	922.33	47.33	0.005179	12.0803
3	19	904.64	904.38	923.67	50.18	0.005491	12.8079
3	20	904.84	904.64	924.16	52.86	0.005784	13.0001
3	21	905.23	904.84	924.18	55.36	0.006058	12.7501
3	22	905.00	905.23	923.72	57.71	0.006315	12.5965
3	23	903.87	905.00	922.69	59.92	0.006558	12.6626
3	24	902.61	903.87	921.20	61.99	0.006784	12.5108
3	25	902.42	902.61	919.85	63.94	0.006997	11.7304
3	26	901.05	902.42	918.23	65.79	0.007199	11.5618
3	27	899.70	901.05	916.41	67.52	0.007389	11.2402
3	28	899.49	899.70	914.89	69.16	0.007568	10.3622
3	29	898.04	899.49	913.19	70.72	0.007739	10.1964
3	30	897.82	898.04	911.77	72.20	0.007901	9.3926
3	31	895.77	897.82	909.94	73.59	0.008053	9.5336
3	32	894.83	895.77	908.21	74.91	0.008198	9.0040
3	33	894.63	894.83	906.83	76.17	0.008335	8.2113
3	34	893.38	894.63	905.36	77.37	0.008466	8.0623
3	35	893.22	893.38	904.18	78.51	0.008591	7.3800
3	36	892.05	893.22	902.88	79.60	0.008711	7.2891
3	37	891.89	892.05	901.83	80.64	0.008825	6.6869
3	38	890.78	891.89	900.64	81.64	0.008933	6.6334
3	39	890.64	890.78	899.68	82.58	0.009037	6.0864
3	40	889.60	890.64	898.59	83.49	0.009136	6.0493
3	41	889.47	889.60	897.71	84.35	0.009230	5.5477
3	42	888.50	889.47	896.70	85.17	0.009320	5.5207
3	43	888.38	888.50	895.89	85.95	0.009406	5.0581
3	44	887.47	888.38	894.96	86.70	0.009488	5.0380
3	45	887.36	887.47	894.21	87.41	0.009566	4.6089
3	46	887.13	887.36	893.54	88.09	0.009639	4.3143
3	47	886.05	887.13	892.66	88.73	0.009710	4.4461
3	48	885.96	886.05	891.95	89.34	0.009776	4.0328
4	3	575.78	459.69	485.02	0.00	0.000000	-61.0821
4	4	622.51	575.78	534.58	0.00	0.000000	-59.1760
4	5	665.58	622.51	581.49	0.00	0.000000	-56.5945
4	6	703.67	665.58	624.95	0.00	0.000000	-52.9777
4	7	738.72	703.67	666.49	0.49	0.000054	-48.6119
4	8	771.02	738.72	709.58	2.90	0.000317	-41.3468
4	9	798.77	771.02	749.07	6.06	0.000664	-33.4461
4	10	823.20	798.77	783.77	9.48	0.001038	-26.5396
4	11	844.55	823.20	814.34	13.15	0.001439	-20.3362
4	12	863.25	844.55	843.04	17.72	0.001940	-13.6029
4	13	878.54	863.25	867.74	22.56	0.002469	-7.2687
4	14	891.40	878.54	888.41	27.44	0.003003	-2.0136
4	15	901.02	891.40	904.82	32.14	0.003517	2.5575
4	16	908.75	901.02	917.71	36.63	0.004009	6.0284
4	17	913.83	908.75	927.28	40.87	0.004473	9.0544
4	18	917.77	913.83	934.22	44.83	0.004906	11.0706
4	19	920.13	917.77	938.86	48.50	0.005307	12.6029
4	20	922.12	920.13	941.91	51.90	0.005679	13.3207

0.0000	70.1188	0.010943	0.000400	0.017509	3-4
6.6082	66.2094	0.010800	0.000542	0.017437	
13.9282	61.7622	0.010500	0.000842	0.017287	
16.2009	53.6114	0.010152	0.001190	0.017113	
16.7535	45.1648	0.009792	0.001550	0.016933	
16.6892	37.4824	0.009433	0.001909	0.016754	
19.9400	33.4987	0.009005	0.002337	0.016540	
21.1215	28.3906	0.008552	0.002790	0.016313	
21.1608	23.1738	0.008098	0.003244	0.016086	
20.6518	18.1408	0.007655	0.003687	0.015865	
19.8694	14.2114	0.007228	0.004114	0.015651	
18.6143	10.2952	0.006829	0.004513	0.015452	
17.6657	7.6946	0.006450	0.004892	0.015262	
16.5927	5.3449	0.006094	0.005248	0.015084	
15.4383	3.3579	0.005763	0.005579	0.014919	
14.5711	1.7631	0.005451	0.005891	0.014763	
13.6466	0.6465	0.005158	0.006184	0.014616	
12.7708	0.0207	0.004884	0.006458	0.014479	
11.9925	-0.6039	0.004627	0.006715	0.014351	
11.3073	-1.3552	0.004384	0.006958	0.014229	
10.5518	-1.9589	0.004158	0.007184	0.014116	
9.9447	-1.7857	0.003945	0.007397	0.014010	
9.4250	-2.1367	0.003743	0.007599	0.013909	
8.8383	-2.4018	0.003553	0.007789	0.013814	
8.3611	-2.0011	0.003374	0.007968	0.013724	
7.9587	-2.2377	0.003203	0.008139	0.013639	
7.5299	-1.8626	0.003041	0.008301	0.013558	
7.1170	-2.4165	0.002889	0.008453	0.013482	
6.7268	-2.2771	0.002744	0.008598	0.013409	
6.4004	-1.8108	0.002607	0.008735	0.013341	
6.1256	-1.9366	0.002476	0.008866	0.013275	
5.8268	-1.5531	0.002351	0.008991	0.013213	
5.5733	-1.7158	0.002231	0.009111	0.013153	
5.3024	-1.3844	0.002117	0.009225	0.013096	
5.0719	-1.5615	0.002009	0.009333	0.013041	
4.8265	-1.2598	0.001905	0.009437	0.012990	
4.6157	-1.4335	0.001806	0.009536	0.012940	
4.3920	-1.1556	0.001712	0.009630	0.012893	
4.1976	-1.3231	0.001622	0.009720	0.012848	
3.9921	-1.0659	0.001536	0.009806	0.012805	
3.8111	-1.2268	0.001454	0.009888	0.012764	
3.6207	-0.9882	0.001376	0.009966	0.012725	
3.4414	-0.8729	0.001303	0.010039	0.012689	
3.2807	-1.1653	0.001232	0.010110	0.012653	
3.1069	-0.9258	0.001166	0.010176	0.012620	
0.0000	61.0821	0.010943	0.000400	0.017509	
0.0000	59.1760	0.010943	0.000400	0.017509	
0.0000	56.5945	0.010943	0.000400	0.017509	
0.0000	52.9777	0.010943	0.000400	0.017509	
2.5257	51.1377	0.010888	0.000454	0.017481	
12.2106	53.5574	0.010625	0.000717	0.017350	
16.1255	49.5717	0.010278	0.001064	0.017176	
17.4044	43.9441	0.009904	0.001438	0.016989	
18.6950	39.0312	0.009503	0.001839	0.016789	
23.2982	36.9012	0.009002	0.002340	0.016538	
24.6876	31.9563	0.008473	0.002869	0.016274	
24.8657	26.8793	0.007939	0.003403	0.016007	
23.9911	21.4335	0.007425	0.003917	0.015750	
22.9271	16.8986	0.006933	0.004409	0.015504	
21.6420	12.5875	0.006469	0.004873	0.015272	
20.2158	9.1451	0.006036	0.005306	0.015055	
18.7243	6.1214	0.005635	0.005707	0.014855	
17.3503	4.0296	0.005263	0.006079	0.014669	4-20

4	21	922.37	922.12	943.45	55.07	0.006027	14.1874
4	22	922.55	922.37	943.94	58.02	0.006349	14.3948
4	23	922.35	922.55	943.60	60.73	0.006646	14.2981
4	24	920.42	922.35	942.20	63.24	0.006921	14.6573
4	25	920.25	920.42	940.78	65.58	0.007176	13.8166
4	26	917.85	920.25	938.59	67.75	0.007414	13.9629
4	27	916.11	917.85	936.15	69.76	0.007633	13.4843
4	28	915.05	916.11	933.84	71.64	0.007839	12.6468
4	29	912.90	915.05	931.25	73.38	0.008030	12.3508
4	30	911.91	912.90	928.92	75.02	0.008210	11.4507
4	31	909.98	911.91	926.41	76.54	0.008376	11.0518
4	32	907.69	909.98	923.72	77.96	0.008531	10.7881
4	33	906.76	907.69	921.42	79.30	0.008677	9.8662
4	34	904.81	906.76	919.01	80.54	0.008814	9.5576
4	35	904.58	904.81	917.15	81.72	0.008943	8.4583
4	36	902.79	904.58	915.12	82.82	0.009063	8.2942
4	37	901.42	902.79	913.16	83.86	0.009177	7.9030
4	38	899.88	901.42	911.17	84.84	0.009284	7.5987
4	39	899.69	899.88	909.64	85.76	0.009384	6.6986
4	40	897.58	899.69	907.77	86.62	0.009479	6.8570
4	41	897.45	897.58	906.36	87.43	0.009567	5.9953
4	42	895.61	897.45	904.67	88.19	0.009651	6.0985
4	43	895.49	895.61	903.39	88.90	0.009729	5.3205
4	44	893.78	895.49	901.85	89.57	0.009802	5.4300
4	45	893.67	893.78	900.69	90.19	0.009870	4.7181
4	46	892.61	893.67	899.45	90.78	0.009934	4.6059
4	47	891.37	892.61	898.10	91.32	0.009993	4.5286
4	48	891.27	891.37	897.08	91.82	0.010048	3.9115
5	3	514.01	417.74	450.44	0.00	0.000000	-42.7838
5	4	557.60	514.01	489.24	0.00	0.000000	-46.0108
5	5	599.60	557.60	529.00	0.00	0.000000	-47.5151
5	6	638.75	599.60	568.32	0.00	0.000000	-47.3935
5	7	675.75	638.75	606.61	0.00	0.000000	-46.5312
5	8	710.56	675.75	643.45	0.00	0.000000	-45.1643
5	9	743.50	710.56	680.21	0.56	0.000061	-42.5929
5	10	775.51	743.50	720.26	3.06	0.000335	-37.1833
5	11	804.36	775.51	758.37	6.41	0.000701	-30.9537
5	12	830.52	804.36	792.90	10.04	0.001099	-25.3193
5	13	854.59	830.52	826.22	14.66	0.001604	-19.0959
5	14	876.01	854.59	857.44	20.10	0.002200	-12.4986
5	15	893.60	876.01	884.33	25.71	0.002814	-6.2431
5	16	908.03	893.60	906.65	31.24	0.003419	-0.9279
5	17	918.83	908.03	924.31	36.50	0.003994	3.6866
5	18	927.18	918.83	937.97	41.44	0.004535	7.2632
5	19	932.44	927.18	947.90	46.04	0.005039	10.4075
5	20	936.84	932.44	955.10	50.31	0.005506	12.2903
5	21	939.25	936.84	959.77	54.23	0.005934	13.8144
5	22	941.19	939.25	962.71	57.82	0.006328	14.4794
5	23	941.60	941.19	964.05	61.13	0.006689	15.1072
5	24	939.83	941.60	963.59	64.14	0.007019	15.9901
5	25	939.14	939.83	962.45	66.92	0.007323	15.6904
5	26	936.83	939.14	960.28	69.44	0.007599	15.7811
5	27	934.67	936.83	957.55	71.74	0.007851	15.3992
5	28	932.83	934.67	954.66	73.87	0.008083	14.6882
5	29	930.75	932.83	951.56	75.80	0.008295	14.0009
5	30	928.80	930.75	948.47	77.59	0.008491	13.2361
5	31	926.32	928.80	945.20	79.23	0.008670	12.7078
5	32	923.53	926.32	941.74	80.73	0.008835	12.2543
5	33	921.46	923.53	938.45	82.12	0.008987	11.4388
5	34	918.93	921.46	935.13	83.40	0.009126	10.9061
5	35	916.74	918.93	931.97	84.58	0.009256	10.2523
5	36	914.98	916.74	929.03	85.67	0.009375	9.4566
5	37	912.95	914.98	926.17	86.68	0.009485	8.8981

16.2183	2.0308	0.004915	0.006427	0.014495
15.0470	0.6522	0.004593	0.006749	0.014334
13.8456	-0.4525	0.004296	0.007046	0.014185
12.8114	-1.8459	0.004021	0.007321	0.014048
11.9333	-1.8832	0.003766	0.007576	0.013920
11.0694	-2.8935	0.003528	0.007814	0.013801
10.2455	-3.2388	0.003309	0.008033	0.013692
9.6041	-3.0426	0.003103	0.008239	0.013589
8.9167	-3.4341	0.002912	0.008430	0.013493
8.3758	-3.0748	0.002732	0.008610	0.013403
7.7281	-3.3237	0.002566	0.008776	0.013320
7.2451	-3.5430	0.002411	0.008931	0.013243
6.8239	-3.0422	0.002265	0.009077	0.013170
6.3738	-3.1837	0.002128	0.009214	0.013101
6.0001	-2.4582	0.001999	0.009343	0.013037
5.6175	-2.6767	0.001879	0.009463	0.012977
5.3181	-2.5848	0.001765	0.009577	0.012920
4.9734	-2.6253	0.001658	0.009684	0.012866
4.6847	-2.0139	0.001558	0.009784	0.012816
4.3963	-2.4606	0.001463	0.009879	0.012769
4.1355	-1.8598	0.001375	0.009967	0.012724
3.8742	-2.2242	0.001291	0.010051	0.012683
3.6375	-1.6829	0.001213	0.010129	0.012644
3.4000	-2.0299	0.001140	0.010202	0.012607
3.1823	-1.5357	0.001072	0.010270	0.012573
2.9800	-1.6259	0.001008	0.010334	0.012541
2.7569	-1.7717	0.000949	0.010393	0.012512
2.5620	-1.3495	0.000894	0.010448	0.012484
0.0000	42.7838	0.010943	0.000400	0.017509
0.0000	46.0108	0.010943	0.000400	0.017509
0.0000	47.5151	0.010943	0.000400	0.017509
0.0000	47.3935	0.010943	0.000400	0.017509
0.0000	46.5312	0.010943	0.000400	0.017509
0.0000	45.1643	0.010943	0.000400	0.017509
2.8612	45.4541	0.010881	0.000461	0.017478
12.7380	49.9213	0.010607	0.000735	0.017341
17.0067	47.9604	0.010241	0.001101	0.017158
18.5081	43.8275	0.009843	0.001499	0.016959
23.5285	42.6245	0.009338	0.002004	0.016706
27.7476	40.2462	0.008742	0.002600	0.016408
28.6455	34.8887	0.008128	0.003214	0.016101
28.2114	29.1393	0.007523	0.003819	0.015799
26.8382	23.1515	0.006948	0.004394	0.015511
25.2541	17.9908	0.006407	0.004935	0.015241
23.5123	13.1047	0.005903	0.005439	0.014989
21.8155	9.5252	0.005436	0.005906	0.014755
20.0053	6.1909	0.005008	0.006334	0.014541
18.3671	3.8877	0.004614	0.006728	0.014344
16.8907	1.7835	0.004253	0.007089	0.014163
15.3745	-0.6155	0.003923	0.007419	0.013999
14.1883	-1.5021	0.003619	0.007723	0.013847
12.8862	-2.8949	0.003343	0.007999	0.013709
11.7808	-3.6184	0.003091	0.008251	0.013583
10.8432	-3.8450	0.002859	0.008483	0.013467
9.8897	-4.1112	0.002647	0.008695	0.013361
9.1336	-4.1025	0.002451	0.008891	0.013263
8.3752	-4.3326	0.002272	0.009070	0.013173
7.6602	-4.5941	0.002107	0.009235	0.013091
7.0904	-4.3484	0.001955	0.009387	0.013015
6.5055	-4.4006	0.001816	0.009526	0.012945
6.0680	-4.1843	0.001686	0.009656	0.012880
5.5602	-3.8963	0.001567	0.009775	0.012821
5.1205	-3.7775	0.001457	0.009885	0.012766

4-21

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5-37

5	38	910.84	912.95	923.36	87.60	0.009586	8.4252
5	39	908.99	910.84	920.70	88.45	0.009680	7.8805
5	40	907.18	908.99	918.14	89.23	0.009765	7.3724
5	41	905.55	907.18	915.73	89.96	0.009844	6.8568
5	42	903.28	905.55	913.21	90.61	0.009916	6.6830
5	43	903.10	903.28	911.34	91.22	0.009982	5.5463
5	44	901.09	903.10	909.28	91.77	0.010042	5.5116
5	45	899.69	901.09	907.32	92.27	0.010097	5.1382
5	46	898.22	899.69	905.40	92.72	0.010146	4.8353
5	47	896.65	898.22	903.49	93.12	0.010191	4.5970
5	48	896.51	896.65	902.06	93.49	0.010231	3.7379
6	3	472.11	410.21	429.84	0.00	0.000000	-28.4470
6	4	508.77	472.11	458.49	0.00	0.000000	-33.8399
6	5	546.12	508.77	490.18	0.00	0.000000	-37.6481
6	6	582.87	546.12	523.57	0.00	0.000000	-39.9092
6	7	618.90	582.87	557.76	0.00	0.000000	-41.1465
6	8	653.81	618.90	592.04	0.00	0.000000	-41.5706
6	9	687.54	653.81	625.96	0.00	0.000000	-41.4475
6	10	720.52	687.54	659.38	0.00	0.000000	-41.1494
6	11	753.77	720.52	695.67	1.16	0.000127	-39.1012
6	12	785.88	753.77	735.00	4.10	0.000449	-34.2478
6	13	816.56	785.88	772.94	7.75	0.000848	-29.3510
6	14	845.58	816.56	809.64	12.18	0.001333	-24.1841
6	15	872.19	845.58	846.51	18.07	0.001978	-17.2839
6	16	895.32	872.19	879.65	24.41	0.002671	-10.5480
6	17	913.98	895.32	907.55	30.69	0.003358	-4.3292
6	18	928.88	913.98	930.25	36.70	0.004016	0.9258
6	19	939.70	928.88	947.84	42.30	0.004629	5.4777
6	20	948.19	939.70	961.30	47.51	0.005199	8.8236
6	21	953.22	948.19	970.82	52.30	0.005723	11.8467
6	22	957.36	953.22	977.50	56.69	0.006203	13.5545
6	23	959.64	957.36	981.69	60.68	0.006640	14.8394
6	24	959.72	959.64	983.46	64.26	0.007032	15.9739
6	25	959.62	959.72	983.75	67.52	0.007388	16.2403
6	26	957.78	959.62	982.49	70.44	0.007709	16.6303
6	27	955.60	957.78	980.19	73.08	0.007997	16.5492
6	28	953.28	955.60	977.24	75.46	0.008258	16.1259
6	29	950.63	953.28	973.80	77.62	0.008494	15.5974
6	30	947.88	950.63	970.07	79.57	0.008707	14.9333
6	31	944.74	947.88	966.04	81.32	0.008899	14.3351
6	32	941.31	944.74	961.77	82.90	0.009072	13.7645
6	33	938.21	941.31	957.49	84.33	0.009228	12.9740
6	34	934.90	938.21	953.17	85.61	0.009369	12.2992
6	35	931.76	934.90	948.92	86.77	0.009495	11.5522
6	36	928.92	931.76	944.86	87.81	0.009609	10.7251
6	37	926.03	928.92	940.91	88.75	0.009712	10.0162
6	38	923.13	926.03	937.07	89.59	0.009804	9.3796
6	39	920.43	923.13	933.39	90.34	0.009886	8.7180
6	40	917.83	920.43	929.86	91.01	0.009960	8.0958
6	41	915.40	917.83	926.51	91.61	0.010025	7.4805
6	42	912.69	915.40	923.21	92.14	0.010083	7.0789
6	43	910.50	912.69	920.12	92.61	0.010134	6.4786
6	44	908.72	910.50	917.34	93.03	0.010180	5.7979
6	45	906.78	908.72	914.71	93.39	0.010220	5.3386
6	46	904.83	906.78	912.20	93.71	0.010255	4.9573
6	47	902.88	904.83	909.77	94.00	0.010286	4.6408
6	48	901.26	902.88	907.52	94.24	0.010313	4.2128
7	3	445.26	401.39	417.70	0.00	0.000000	-18.5444
7	4	474.01	445.26	438.16	0.00	0.000000	-24.1229
7	5	505.29	474.01	462.50	0.00	0.000000	-28.7973
7	6	537.11	505.29	489.47	0.00	0.000000	-32.0598
7	7	570.04	537.11	518.50	0.00	0.000000	-34.6857
7	8	603.05	570.04	548.84	0.00	0.000000	-36.4846

4.7056	-3.7196	0.001356	0.009986	0.012715
4.3724	-3.5080	0.001262	0.010080	0.012668
3.9818	-3.3906	0.001177	0.010165	0.012626
3.6855	-3.1713	0.001098	0.010244	0.012586
3.3569	-3.3260	0.001026	0.010316	0.012550
3.0778	-2.4684	0.000960	0.010382	0.012517
2.7942	-2.7174	0.000900	0.010442	0.012487
2.5501	-2.5880	0.000845	0.010497	0.012460
2.3044	-2.5308	0.000796	0.010546	0.012435
2.0743	-2.5226	0.000751	0.010591	0.012413
1.8623	-1.8755	0.000711	0.010631	0.012393
0.0000	28.4470	0.010943	0.000400	0.017509
0.0000	33.8399	0.010943	0.000400	0.017509
0.0000	37.6481	0.010943	0.000400	0.017509
0.0000	39.9092	0.010943	0.000400	0.017509
0.0000	41.1465	0.010943	0.000400	0.017509
0.0000	41.5706	0.010943	0.000400	0.017509
0.0000	41.4475	0.010943	0.000400	0.017509
0.0000	41.1494	0.010943	0.000400	0.017509
5.9279	45.0291	0.010815	0.000527	0.017445
14.9570	49.2049	0.010493	0.000849	0.017284
18.5613	47.9124	0.010094	0.001248	0.017084
22.5526	46.7368	0.009609	0.001733	0.016842
30.0575	47.3415	0.008964	0.002378	0.016519
32.3588	42.9068	0.008271	0.003071	0.016173
32.0463	36.3755	0.007584	0.003758	0.015829
30.7075	29.7817	0.006926	0.004416	0.015500
28.6509	23.1731	0.006313	0.005029	0.015193
26.6191	17.7954	0.005743	0.005599	0.014909
24.4748	12.6281	0.005219	0.006123	0.014647
22.4375	8.8830	0.004739	0.006603	0.014407
20.4038	5.5644	0.004302	0.007040	0.014188
18.3310	2.3570	0.003910	0.007432	0.013992
16.6292	0.3889	0.003554	0.007788	0.013814
14.9572	-1.6731	0.003233	0.008109	0.013654
13.4829	-3.0662	0.002945	0.008397	0.013510
12.1913	-3.9346	0.002684	0.008658	0.013379
11.0127	-4.5847	0.002448	0.008894	0.013261
9.9590	-4.9742	0.002235	0.009107	0.013155
8.9754	-5.3597	0.002043	0.009299	0.013059
8.0722	-5.6922	0.001870	0.009472	0.012972
7.2895	-5.6844	0.001714	0.009628	0.012894
6.5583	-5.7408	0.001573	0.009769	0.012824
5.9067	-5.6455	0.001447	0.009895	0.012761
5.3241	-5.4009	0.001333	0.010009	0.012703
4.7828	-5.2334	0.001230	0.010112	0.012652
4.2863	-5.0933	0.001138	0.010204	0.012606
3.8370	-4.8810	0.001056	0.010286	0.012565
3.4263	-4.6695	0.000983	0.010360	0.012528
3.0523	-4.4282	0.000917	0.010425	0.012496
2.7105	-4.3684	0.000859	0.010483	0.012467
2.3974	-4.0811	0.000808	0.010534	0.012441
2.1196	-3.6783	0.000762	0.010580	0.012418
1.8662	-3.4724	0.000722	0.010620	0.012398
1.6407	-3.3165	0.000687	0.010655	0.012381
1.4430	-3.1978	0.000656	0.010686	0.012365
1.2404	-2.9724	0.000629	0.010713	0.012352
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7	9	635.82	603.05	579.93	0.00	0.000000	-37.6190
7	10	668.38	635.82	611.39	0.00	0.000000	-38.3483
7	11	701.23	668.38	643.21	0.00	0.000000	-39.0482
7	12	733.52	701.23	675.04	0.00	0.000000	-39.3530
7	13	768.89	733.52	713.80	2.20	0.000240	-37.0759
7	14	803.07	768.89	754.43	5.80	0.000634	-32.7319
7	15	835.54	803.07	793.27	9.88	0.001081	-28.4533
7	16	868.16	835.54	835.71	16.25	0.001778	-21.8344
7	17	896.37	868.16	874.79	23.29	0.002548	-14.5259
7	18	919.89	896.37	908.35	30.33	0.003319	-7.7662
7	19	938.29	919.89	935.78	37.04	0.004053	-1.6855
7	20	952.84	938.29	957.67	43.32	0.004740	3.2510
7	21	963.02	952.84	974.21	49.08	0.005371	7.5333
7	22	970.81	963.02	986.52	54.34	0.005947	10.5696
7	23	975.25	970.81	994.92	59.12	0.006469	13.2410
7	24	977.79	975.25	1000.08	63.39	0.006937	15.0019
7	25	979.60	977.79	1002.97	67.22	0.007356	15.7296
7	26	978.20	979.60	1003.36	70.63	0.007730	16.9315
7	27	976.32	978.20	1002.01	73.66	0.008061	17.2948
7	28	974.51	976.32	999.64	76.35	0.008355	16.9113
7	29	971.67	974.51	996.32	78.72	0.008615	16.5873
7	30	968.41	971.67	992.32	80.82	0.008844	16.0876
7	31	964.70	968.41	987.78	82.67	0.009047	15.5299
7	32	959.91	964.70	982.59	84.30	0.009225	15.2601
7	33	956.46	959.91	977.47	85.73	0.009381	14.1412
7	34	951.61	956.46	971.99	86.98	0.009519	13.7148
7	35	948.10	951.61	966.77	88.08	0.009639	12.5655
7	36	943.57	948.10	961.43	89.04	0.009744	12.0159
7	37	940.27	943.57	956.46	89.87	0.009835	10.8906
7	38	935.87	940.27	951.40	90.60	0.009915	10.4507
7	39	932.80	935.87	946.77	91.24	0.009984	9.3999
7	40	929.40	932.80	942.34	91.79	0.010045	8.7040
7	41	926.15	929.40	938.12	92.27	0.010098	8.0569
7	42	922.83	926.15	934.04	92.70	0.010144	7.5497
7	43	919.84	922.83	930.20	93.06	0.010184	6.9692
7	44	917.21	919.84	926.64	93.38	0.010219	6.3411
7	45	914.63	917.21	923.30	93.66	0.010249	5.8363
7	46	912.13	914.63	920.16	93.91	0.010276	5.4054
7	47	909.70	912.13	917.19	94.12	0.010300	5.0380
7	48	907.53	909.70	914.42	94.31	0.010321	4.6364
8	3	427.79	400.00	410.12	0.00	0.000000	-11.8966
8	4	449.41	427.79	424.41	0.00	0.000000	-16.8242
8	5	474.39	449.41	442.56	0.00	0.000000	-21.4223
8	6	501.27	474.39	463.84	0.00	0.000000	-25.1920
8	7	530.10	501.27	487.79	0.00	0.000000	-28.4775
8	8	559.41	530.10	513.59	0.00	0.000000	-30.8321
8	9	589.82	559.41	540.97	0.00	0.000000	-32.8791
8	10	620.70	589.82	569.49	0.00	0.000000	-34.4638
8	11	652.21	620.70	598.97	0.00	0.000000	-35.8326
8	12	683.71	652.21	629.03	0.00	0.000000	-36.7965
8	13	717.38	683.71	660.24	0.00	0.000000	-38.4560
8	14	753.17	717.38	695.82	1.09	0.000119	-38.5999
8	15	789.63	753.17	737.23	4.34	0.000475	-35.2600
8	16	826.85	789.63	779.37	8.52	0.000933	-31.9518
8	17	864.25	826.85	826.00	15.14	0.001657	-25.7392
8	18	897.66	864.25	870.48	22.78	0.002493	-18.2941
8	19	924.71	897.66	908.87	30.48	0.003335	-10.6599
8	20	947.21	924.71	940.84	37.84	0.004141	-4.2871
8	21	964.36	947.21	966.31	44.67	0.004889	1.3176
8	22	978.22	964.36	986.33	50.93	0.005573	5.4559
8	23	987.18	978.22	1001.02	56.57	0.006190	9.3150
8	24	993.10	987.18	1011.22	61.61	0.006742	12.1975
8	25	996.50	993.10	1017.74	66.11	0.007234	14.2955

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0.0000	38.3483	0.010943	0.000400	0.017509
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32.4738	54.3082	0.009164	0.002178	0.016619
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34.2928	35.9783	0.006889	0.004453	0.015482
32.1184	28.8674	0.006202	0.005140	0.015138
29.4482	21.9148	0.005571	0.005771	0.014823
26.9310	16.3613	0.004995	0.006347	0.014535
24.4347	11.1937	0.004473	0.006869	0.014274
21.8859	6.8839	0.004005	0.007337	0.014040
19.5995	3.8699	0.003586	0.007756	0.013830
17.4505	0.5189	0.003212	0.008130	0.013643
15.4936	-1.8011	0.002881	0.008461	0.013478
13.7278	-3.1834	0.002587	0.008755	0.013331
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10.7393	-5.3483	0.002098	0.009244	0.013086
9.4631	-6.0668	0.001895	0.009447	0.012985
8.3244	-6.9356	0.001717	0.009625	0.012896
7.3065	-6.8347	0.001561	0.009781	0.012818
6.4073	-7.3075	0.001423	0.009919	0.012749
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4.9007	-7.1152	0.001199	0.010144	0.012636
4.2761	-6.6144	0.001107	0.010235	0.012591
3.7256	-6.7251	0.001027	0.010315	0.012551
3.2462	-6.1537	0.000958	0.010384	0.012516
2.8257	-5.8783	0.000897	0.010445	0.012486
2.4586	-5.5982	0.000844	0.010498	0.012459
2.1488	-5.4008	0.000798	0.010544	0.012436
1.8735	-5.0957	0.000758	0.010584	0.012416
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1.2531	-4.1523	0.000666	0.010676	0.012370
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21.2741	53.2260	0.010009	0.001333	0.017042
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25.8275	13.6299	0.004200	0.007142	0.014137
23.0244	8.7289	0.003708	0.007634	0.013891 8-25

8	26	997.85	996.50	1021.10	70.04	0.007665	15.6496
8	27	996.58	997.85	1021.65	73.48	0.008041	16.8735
8	28	994.92	996.58	1020.33	76.48	0.008369	17.1032
8	29	992.75	994.92	1017.69	79.07	0.008652	16.7888
8	30	989.40	992.75	1013.90	81.29	0.008896	16.4878
8	31	984.55	989.40	1008.94	83.20	0.009105	16.4140
8	32	979.32	984.55	1003.18	84.83	0.009283	16.0581
8	33	974.76	979.32	997.21	86.22	0.009435	15.1077
8	34	969.20	974.76	990.85	87.41	0.009565	14.5706
8	35	964.49	969.20	984.60	88.42	0.009675	13.5330
8	36	959.13	964.49	978.27	89.28	0.009770	12.8813
8	37	954.63	959.13	972.23	90.02	0.009851	11.8457
8	38	949.49	954.63	966.24	90.67	0.009922	11.2729
8	39	945.31	949.49	960.63	91.22	0.009982	10.3077
8	40	941.03	945.31	955.27	91.70	0.010035	9.5860
8	41	937.62	941.03	950.42	92.12	0.010081	8.6100
8	42	933.00	937.62	945.51	92.49	0.010122	8.4208
8	43	929.92	933.00	941.11	92.83	0.010158	7.5327
8	44	926.63	929.92	936.99	93.12	0.010190	6.9682
8	45	923.44	926.63	933.09	93.38	0.010219	6.4966
8	46	920.39	923.44	929.42	93.62	0.010245	6.0758
8	47	917.46	920.39	925.93	93.83	0.010268	5.6993
8	48	914.76	917.46	922.66	94.02	0.010289	5.3139
9	3	417.01	400.00	406.19	0.00	0.000000	-7.2835
9	4	432.67	417.01	415.83	0.00	0.000000	-11.3332
9	5	451.84	432.67	428.92	0.00	0.000000	-15.4278
9	6	473.59	451.84	445.13	0.00	0.000000	-19.1540
9	7	497.84	473.59	464.23	0.00	0.000000	-22.6193
9	8	523.52	497.84	485.66	0.00	0.000000	-25.4820
9	9	550.84	523.52	509.15	0.00	0.000000	-28.0556
9	10	578.60	550.84	534.11	0.00	0.000000	-29.9463
9	11	607.89	578.60	560.53	0.00	0.000000	-31.8738
9	12	637.73	607.89	588.07	0.00	0.000000	-33.4215
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9	14	702.88	669.38	647.37	0.00	0.000000	-37.3611
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9	16	777.57	737.56	721.48	2.95	0.000323	-37.7487
9	17	818.89	777.57	766.81	7.27	0.000796	-35.0497
9	18	861.08	818.89	817.62	14.21	0.001555	-29.2479
9	19	897.96	861.08	866.57	22.41	0.002452	-21.1253
9	20	929.91	897.96	909.65	30.70	0.003360	-13.6315
9	21	955.65	929.91	945.62	38.61	0.004225	-6.7455
9	22	976.54	955.65	974.97	45.98	0.005031	-1.0620
9	23	991.76	976.54	997.70	52.66	0.005762	3.9981
9	24	1003.25	991.76	1014.78	58.62	0.006415	7.7592
9	25	1010.37	1003.25	1026.71	63.88	0.006991	10.9957
9	26	1013.80	1010.37	1034.07	68.47	0.007493	13.6390
9	27	1015.53	1013.80	1037.87	72.40	0.007923	15.0350
9	28	1014.34	1015.53	1038.52	75.75	0.008289	16.2692
9	29	1012.94	1014.34	1037.14	78.56	0.008597	16.2828
9	30	1009.93	1012.94	1034.02	80.91	0.008854	16.2166
9	31	1004.42	1009.93	1029.09	82.86	0.009067	16.6051
9	32	998.86	1004.42	1023.11	84.48	0.009244	16.3202
9	33	993.44	998.86	1016.62	85.82	0.009391	15.5942
9	34	987.24	993.44	1009.67	86.95	0.009514	15.0946
9	35	981.54	987.24	1002.69	87.90	0.009618	14.2323
9	36	975.42	981.54	995.64	88.71	0.009708	13.6124
9	37	969.90	975.42	988.82	89.41	0.009785	12.7280
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9	40	953.80	958.91	969.59	91.06	0.009964	10.6233
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7.1073	-8.0003	0.001507	0.009835	0.012791
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5.1680	-8.3650	0.001267	0.010075	0.012670
4.4322	-8.4491	0.001172	0.010170	0.012623
3.7864	-8.0593	0.001091	0.010251	0.012583
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1.4992	-5.4689	0.000752	0.010590	0.012413
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42.3924	56.0240	0.007582	0.003760	0.015828
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26.9665	15.9708	0.003951	0.007391	0.014013
23.5094	9.8703	0.003449	0.007893	0.013762
20.1393	5.1042	0.003019	0.008323	0.013547
17.1434	0.8742	0.002653	0.008689	0.013364
14.4289	-1.8538	0.002345	0.008997	0.013210
12.0261	-4.1905	0.002088	0.009254	0.013081
9.9732	-6.6318	0.001875	0.009467	0.012975
8.2788	-8.0413	0.001698	0.009644	0.012886
6.8695	-8.7246	0.001551	0.009791	0.012813
5.7736	-9.3210	0.001428	0.009914	0.012751
4.8642	-9.3681	0.001324	0.010018	0.012699
4.1772	-9.4351	0.001234	0.010108	0.012654
3.5913	-9.1367	0.001157	0.010185	0.012616
3.1623	-8.9841	0.001090	0.010252	0.012582
2.7711	-8.5345	0.001030	0.010312	0.012552
2.4634	-8.1598	0.000978	0.010364	0.012526
2.1701	-7.5859	0.000931	0.010411	0.012503

8-26

595017

9-41

9	42	944.32	949.40	958.32	91.87	0.010054	9.4194
9	43	941.03	944.32	953.41	92.22	0.010092	8.3274
9	44	936.42	941.03	948.50	92.53	0.010126	8.1279
9	45	933.25	936.42	944.10	92.82	0.010158	7.3019
9	46	929.04	933.25	939.70	93.08	0.010186	7.1750
9	47	926.16	929.04	935.76	93.32	0.010213	6.4589
9	48	923.03	926.16	932.04	93.55	0.010237	6.0644
10	3	410.01	400.00	403.64	0.00	0.000000	-4.2849
10	4	420.93	410.01	409.93	0.00	0.000000	-7.4004
10	5	435.61	420.93	419.28	0.00	0.000000	-10.9964
10	6	452.67	435.61	431.41	0.00	0.000000	-14.3084
10	7	472.41	452.67	446.29	0.00	0.000000	-17.5788
10	8	494.14	472.41	463.62	0.00	0.000000	-20.5405
10	9	517.89	494.14	483.24	0.00	0.000000	-23.3207
10	10	542.81	517.89	504.72	0.00	0.000000	-25.6390
10	11	569.44	542.81	527.99	0.00	0.000000	-27.9002
10	12	596.44	569.44	552.52	0.00	0.000000	-29.5585
10	13	625.65	596.44	578.64	0.00	0.000000	-31.6368
10	14	656.65	625.65	606.40	0.00	0.000000	-33.8169
10	15	689.02	656.65	635.68	0.00	0.000000	-35.8970
10	16	725.36	689.02	667.33	0.00	0.000000	-39.0543
10	17	767.13	725.36	708.37	2.25	0.000246	-39.5448
10	18	812.11	767.13	755.95	6.56	0.000717	-37.7991
10	19	857.49	812.11	809.52	13.55	0.001483	-32.2866
10	20	899.19	857.49	863.09	22.27	0.002437	-24.2956
10	21	934.85	899.19	910.44	31.09	0.003402	-16.4335
10	22	964.50	934.85	950.52	39.53	0.004326	-9.4083
10	23	987.56	964.50	982.98	47.31	0.005178	-3.0773
10	24	1005.40	987.56	1008.50	54.35	0.005947	2.0858
10	25	1017.90	1005.40	1027.48	60.56	0.006627	6.4480
10	26	1026.21	1017.90	1040.70	65.92	0.007213	9.7490
10	27	1030.74	1026.21	1048.96	70.47	0.007712	12.2591
10	28	1031.91	1030.74	1052.89	74.26	0.008126	14.1188
10	29	1030.95	1031.91	1053.43	77.35	0.008465	15.1334
10	30	1028.95	1030.95	1051.59	79.84	0.008737	15.2343
10	31	1023.43	1028.95	1047.28	81.84	0.008955	16.0462
10	32	1017.81	1023.43	1041.55	83.45	0.009132	15.9775
10	33	1011.87	1017.81	1034.99	84.76	0.009275	15.5555
10	34	1005.24	1011.87	1027.86	85.86	0.009396	15.2230
10	35	998.84	1005.24	1020.55	86.79	0.009498	14.6077
10	36	992.15	998.84	1013.14	87.61	0.009587	14.1265
10	37	985.87	992.15	1005.85	88.32	0.009665	13.4449
10	38	979.43	985.87	998.66	88.97	0.009736	12.9440
10	39	973.52	979.43	991.73	89.55	0.009799	12.2542
10	40	967.72	973.52	985.03	90.08	0.009857	11.6531
10	41	962.47	967.72	978.69	90.55	0.009909	10.9124
10	42	956.90	962.47	972.51	91.00	0.009958	10.5066
10	43	952.58	956.90	966.83	91.39	0.010001	9.5865
10	44	947.53	952.58	961.29	91.76	0.010041	9.2608
10	45	943.53	947.53	956.17	92.09	0.010077	8.5086
10	46	938.95	943.53	951.18	92.40	0.010112	8.2340
10	47	935.94	938.95	946.79	92.69	0.010143	7.2990
10	48	931.69	935.94	942.37	92.95	0.010171	7.1908
11	3	405.88	400.00	402.14	0.00	0.000000	-2.5193
11	4	413.31	405.88	406.20	0.00	0.000000	-4.7804
11	5	423.75	413.31	412.59	0.00	0.000000	-7.5104
11	6	436.59	423.75	421.31	0.00	0.000000	-10.2771
11	7	452.72	436.59	432.72	0.00	0.000000	-13.4580
11	8	470.60	452.72	446.47	0.00	0.000000	-16.2435
11	9	490.68	470.60	462.48	0.00	0.000000	-18.9778
11	10	512.40	490.68	480.53	0.00	0.000000	-21.4504
11	11	536.01	512.40	500.54	0.00	0.000000	-23.8697
11	12	560.60	536.01	522.15	0.00	0.000000	-25.8831

1.9956	-7.4237	0.000888	0.010454	0.012481
1.7877	-6.5396	0.000850	0.010492	0.012462
1.6014	-6.5265	0.000816	0.010526	0.012445
1.4705	-5.8314	0.000784	0.010558	0.012429
1.3319	-5.8430	0.000756	0.010586	0.012415
1.2338	-5.2250	0.000729	0.010613	0.012402
1.1310	-4.9334	0.000705	0.010637	0.012390
0.0000	4.2849	0.010943	0.000400	0.017509
0.0000	7.4004	0.010943	0.000400	0.017509
0.0000	10.9964	0.010943	0.000400	0.017509
0.0000	14.3084	0.010943	0.000400	0.017509
0.0000	17.5788	0.010943	0.000400	0.017509
0.0000	20.5405	0.010943	0.000400	0.017509
0.0000	23.3207	0.010943	0.000400	0.017509
0.0000	25.6390	0.010943	0.000400	0.017509
0.0000	27.9002	0.010943	0.000400	0.017509
0.0000	29.5585	0.010943	0.000400	0.017509
0.0000	31.6368	0.010943	0.000400	0.017509
0.0000	33.8169	0.010943	0.000400	0.017509
0.0000	35.8970	0.010943	0.000400	0.017509
0.0000	39.0543	0.010943	0.000400	0.017509
11.4687	51.0136	0.010696	0.000646	0.017385
21.9062	59.7053	0.010225	0.001117	0.017150
35.6755	67.9621	0.009459	0.001883	0.016767
44.4991	68.7948	0.008505	0.002837	0.016290
45.0931	61.5267	0.007540	0.003802	0.015807
43.2020	52.6103	0.006616	0.004726	0.015345
39.8576	42.9350	0.005764	0.005578	0.014919
36.0400	33.9541	0.004995	0.006347	0.014535
31.8242	25.3762	0.004315	0.007027	0.014195
27.4842	17.7351	0.003729	0.007613	0.013902
23.3622	11.1031	0.003230	0.008112	0.013652
19.4188	5.3000	0.002816	0.008526	0.013445
15.8651	0.7316	0.002477	0.008865	0.013276
12.7506	-2.4837	0.002205	0.009137	0.013140
10.2304	-5.8158	0.001987	0.009355	0.013031
8.2541	-7.7234	0.001810	0.009532	0.012942
6.7226	-8.8329	0.001667	0.009675	0.012871
5.6286	-9.5943	0.001546	0.009796	0.012810
4.7770	-9.8306	0.001444	0.009898	0.012759
4.1731	-9.9533	0.001355	0.009987	0.012715
3.6692	-9.7756	0.001277	0.010065	0.012676
3.3067	-9.6373	0.001206	0.010136	0.012640
2.9700	-9.2842	0.001143	0.010199	0.012608
2.6990	-8.9541	0.001085	0.010257	0.012580
2.4344	-8.4780	0.001033	0.010309	0.012554
2.2616	-8.2449	0.000984	0.010358	0.012529
2.0115	-7.5749	0.000941	0.010401	0.012508
1.8841	-7.3767	0.000901	0.010441	0.012488
1.6970	-6.8115	0.000865	0.010477	0.012470
1.5981	-6.6358	0.000830	0.010512	0.012452
1.4566	-5.8424	0.000799	0.010543	0.012437
1.3281	-5.8627	0.000771	0.010571	0.012423
0.0000	2.5193	0.010943	0.000400	0.017509
0.0000	4.7804	0.010943	0.000400	0.017509
0.0000	7.5104	0.010943	0.000400	0.017509
0.0000	10.2771	0.010943	0.000400	0.017509
0.0000	13.4580	0.010943	0.000400	0.017509
0.0000	16.2435	0.010943	0.000400	0.017509
0.0000	18.9778	0.010943	0.000400	0.017509
0.0000	21.4504	0.010943	0.000400	0.017509
0.0000	23.8697	0.010943	0.000400	0.017509
0.0000	25.8831	0.010943	0.000400	0.017509

9-42

11-12

11	13	586.62	560.60	545.27	0.00	0.000000	-27.8272
11	14	614.88	586.62	570.16	0.00	0.000000	-30.0953
11	15	644.68	614.88	596.71	0.00	0.000000	-32.2870
11	16	677.65	644.68	625.44	0.00	0.000000	-35.1373
11	17	714.90	677.65	657.05	0.00	0.000000	-38.9295
11	18	758.14	714.90	697.02	1.65	0.000181	-41.1337
11	19	805.65	758.14	746.24	5.90	0.000646	-39.9826
11	20	855.13	805.65	802.94	13.09	0.001433	-35.1206
11	21	900.75	855.13	860.62	22.29	0.002439	-27.0079
11	22	940.44	900.75	912.10	31.63	0.003462	-19.0685
11	23	972.80	940.44	955.56	40.51	0.004434	-11.5977
11	24	998.63	972.80	991.02	48.68	0.005327	-5.1204
11	25	1018.00	998.63	1018.70	55.97	0.006124	0.4721
11	26	1031.86	1018.00	1039.27	62.31	0.006818	4.9861
11	27	1041.39	1031.86	1053.60	67.66	0.007405	8.2183
11	28	1045.64	1041.39	1062.10	72.05	0.007885	11.0741
11	29	1046.89	1045.64	1065.89	75.54	0.008267	12.7906
11	30	1045.08	1046.89	1065.81	78.24	0.008562	13.9475
11	31	1040.88	1045.08	1062.82	80.33	0.008791	14.7660
11	32	1035.50	1040.88	1057.88	81.97	0.008970	15.0594
11	33	1029.45	1035.50	1051.74	83.28	0.009113	15.0009
11	34	1022.69	1029.45	1044.86	84.38	0.009234	14.9211
11	35	1015.94	1022.69	1037.63	85.33	0.009337	14.5959
11	36	1008.93	1015.94	1030.21	86.17	0.009430	14.3185
11	37	1002.19	1008.93	1022.80	86.93	0.009513	13.8695
11	38	995.34	1002.19	1015.41	87.63	0.009590	13.5081
11	39	988.88	995.34	1008.18	88.27	0.009660	12.9916
11	40	982.54	988.88	1001.12	88.87	0.009725	12.5080
11	41	976.63	982.54	994.32	89.41	0.009785	11.9061
11	42	970.58	976.63	987.67	89.92	0.009841	11.5028
11	43	965.44	970.58	981.41	90.39	0.009891	10.7468
11	44	959.91	965.44	975.31	90.82	0.009939	10.3640
11	45	955.16	959.91	969.56	91.22	0.009982	9.6921
11	46	950.13	955.16	963.99	91.59	0.010023	9.3288
11	47	946.91	950.13	959.12	91.93	0.010060	8.2168
11	48	941.66	946.91	954.05	92.24	0.010094	8.3407
12	3	403.89	400.46	401.41	0.00	0.000000	-1.6672
12	4	408.48	403.89	403.99	0.00	0.000000	-3.0246
12	5	415.75	408.48	408.27	0.00	0.000000	-5.0362
12	6	425.18	415.75	414.42	0.00	0.000000	-7.2413
12	7	437.35	425.18	422.76	0.00	0.000000	-9.8224
12	8	452.16	437.35	433.44	0.00	0.000000	-12.5990
12	9	468.72	452.16	446.24	0.00	0.000000	-15.1317
12	10	487.16	468.72	461.06	0.00	0.000000	-17.5646
12	11	507.59	487.16	477.88	0.00	0.000000	-19.9899
12	12	529.43	507.59	496.48	0.00	0.000000	-22.1723
12	13	552.86	529.43	516.77	0.00	0.000000	-24.2870
12	14	578.39	552.86	538.89	0.00	0.000000	-26.5834
12	15	604.93	578.39	562.52	0.00	0.000000	-28.5379
12	16	634.62	604.93	588.24	0.00	0.000000	-31.2149
12	17	667.84	634.62	616.52	0.00	0.000000	-34.5358
12	18	705.86	667.84	648.14	0.00	0.000000	-38.8480
12	19	749.88	705.86	686.90	1.10	0.000120	-42.3849
12	20	800.52	749.88	737.98	5.36	0.000586	-42.0873
12	21	853.57	800.52	797.73	12.80	0.001400	-37.5800
12	22	903.26	853.57	859.46	22.50	0.002463	-29.4771
12	23	946.02	903.26	914.42	32.30	0.003535	-21.2612
12	24	981.31	946.02	961.02	41.58	0.004551	-13.6579
12	25	1009.08	981.31	998.91	50.04	0.005476	-6.8476
12	26	1030.02	1009.08	1028.42	57.52	0.006294	-1.0721
12	27	1045.10	1030.02	1050.25	63.90	0.006992	3.4681
12	28	1054.02	1045.10	1064.77	69.11	0.007563	7.2336
12	29	1058.90	1054.02	1073.18	73.19	0.008010	9.6068

0.0000	27.8272	0.010943	0.000400	0.017509
0.0000	30.0953	0.010943	0.000400	0.017509
0.0000	32.2870	0.010943	0.000400	0.017509
0.0000	35.1373	0.010943	0.000400	0.017509
0.0000	38.9295	0.010943	0.000400	0.017509
8.4257	49.5594	0.010761	0.000581	0.017418
21.6211	61.6037	0.010296	0.001046	0.017185
36.6622	71.7829	0.009509	0.001833	0.016792
46.9487	73.9566	0.008503	0.002839	0.016289
47.8014	66.8699	0.007480	0.003862	0.015777
45.4567	57.0544	0.006509	0.004834	0.015291
41.8257	46.9461	0.005615	0.005727	0.014845
37.3667	36.8946	0.004818	0.006524	0.014446
32.5262	27.5401	0.004124	0.007218	0.014099
27.4804	19.2620	0.003537	0.007805	0.013806
22.5207	11.4465	0.003057	0.008285	0.013566
17.9081	5.1174	0.002675	0.008667	0.013375
13.8356	-0.1119	0.002380	0.008962	0.013227
10.7272	-4.0388	0.002151	0.009191	0.013113
8.3856	-6.6738	0.001972	0.009370	0.013023
6.7248	-8.2761	0.001829	0.009513	0.012952
5.6372	-9.2839	0.001708	0.009634	0.012891
4.8544	-9.7414	0.001605	0.009737	0.012840
4.3288	-9.9896	0.001512	0.009830	0.012793
3.8984	-9.9710	0.001429	0.009913	0.012752
3.5866	-9.9214	0.001352	0.009990	0.012713
3.2894	-9.7021	0.001282	0.010060	0.012678
3.0407	-9.4672	0.001217	0.010125	0.012646
2.7919	-9.1141	0.001157	0.010185	0.012616
2.6121	-8.8907	0.001101	0.010241	0.012588
2.3703	-8.3765	0.001051	0.010291	0.012563
2.2224	-8.1416	0.001003	0.010339	0.012539
2.0291	-7.6629	0.000960	0.010382	0.012517
1.9041	-7.4246	0.000919	0.010423	0.012497
1.7202	-6.4965	0.000882	0.010460	0.012478
1.6081	-6.7326	0.000848	0.010494	0.012461
0.0000	1.6672	0.010943	0.000400	0.017509
0.0000	3.0246	0.010943	0.000400	0.017509
0.0000	5.0362	0.010943	0.000400	0.017509
0.0000	7.2413	0.010943	0.000400	0.017509
0.0000	9.8224	0.010943	0.000400	0.017509
0.0000	12.5990	0.010943	0.000400	0.017509
0.0000	15.1317	0.010943	0.000400	0.017509
0.0000	17.5646	0.010943	0.000400	0.017509
0.0000	19.9899	0.010943	0.000400	0.017509
0.0000	22.1723	0.010943	0.000400	0.017509
0.0000	24.2870	0.010943	0.000400	0.017509
0.0000	26.5834	0.010943	0.000400	0.017509
0.0000	28.5379	0.010943	0.000400	0.017509
0.0000	31.2149	0.010943	0.000400	0.017509
0.0000	34.5358	0.010943	0.000400	0.017509
0.0000	38.8480	0.010943	0.000400	0.017509
5.5904	47.9754	0.010822	0.000520	0.017448
21.6928	63.7802	0.010356	0.000986	0.017215
37.9173	75.4974	0.009542	0.001800	0.016808
49.5854	79.0626	0.008479	0.002863	0.016277
50.1116	71.3728	0.007407	0.003935	0.015741
47.5394	61.1973	0.006391	0.004951	0.015233
43.3669	50.2146	0.005466	0.005876	0.014770
38.3206	39.3927	0.004648	0.006694	0.014361
32.7483	29.2801	0.003950	0.007392	0.014012
26.7722	19.5386	0.003379	0.007963	0.013727
20.9518	11.3450	0.002932	0.008410	0.013503

12	30	1059.29	1058.90	1076.35	76.26	0.008346	11.4812
12	31	1056.14	1059.29	1075.39	78.54	0.008594	12.9564
12	32	1051.45	1056.14	1071.76	80.24	0.008781	13.6689
12	33	1045.69	1051.45	1066.48	81.58	0.008927	13.9931
12	34	1039.84	1045.69	1060.47	82.70	0.009050	13.8825
12	35	1033.20	1039.84	1053.87	83.68	0.009157	13.9105
12	36	1026.23	1033.20	1046.91	84.56	0.009253	13.9136
12	37	1019.32	1026.23	1039.77	85.37	0.009342	13.7641
12	38	1012.31	1019.32	1032.54	86.13	0.009425	13.6143
12	39	1005.51	1012.31	1025.32	86.83	0.009502	13.3310
12	40	998.13	1005.51	1017.92	87.49	0.009574	13.3162
12	41	991.72	998.13	1010.74	88.11	0.009641	12.7953
12	42	985.25	991.72	1003.70	88.69	0.009705	12.4156
12	43	979.44	985.25	996.95	89.22	0.009764	11.7899
12	44	973.44	979.44	990.38	89.73	0.009819	11.3953
12	45	968.04	973.44	984.09	90.20	0.009870	10.7985
12	46	962.54	968.04	977.99	90.64	0.009919	10.3973
12	47	958.30	962.54	972.38	91.03	0.009961	9.4794
12	48	952.86	958.30	966.80	91.41	0.010003	9.3800

15.7625	4.2812	0.002596	0.008746	0.013335	12-30
11.6618	-1.2946	0.002348	0.008994	0.013211	
8.7614	-4.9075	0.002161	0.009181	0.013118	
6.8629	-7.1301	0.002015	0.009327	0.013044	
5.7580	-8.1244	0.001892	0.009450	0.012983	
4.9974	-8.9131	0.001785	0.009557	0.012930	
4.5211	-9.3925	0.001689	0.009653	0.012881	
4.1468	-9.6172	0.001600	0.009742	0.012837	
3.8777	-9.7366	0.001517	0.009825	0.012796	
3.6165	-9.7144	0.001440	0.009902	0.012757	
3.3684	-9.9477	0.001368	0.009974	0.012721	
3.1527	-9.6426	0.001301	0.010041	0.012687	
2.9786	-9.4370	0.001237	0.010105	0.012656	
2.7492	-9.0406	0.001178	0.010164	0.012626	
2.5892	-8.8060	0.001123	0.010219	0.012599	
2.3917	-8.4068	0.001072	0.010270	0.012573	
2.2463	-8.1509	0.001023	0.010319	0.012549	
2.0011	-7.4782	0.000981	0.010361	0.012528	
1.9325	-7.4474	0.000939	0.010403	0.012507	12-43

```
// JOB
// FOR
*IOCS(CARD,TYPEWRITER,1132PRINTER,DISK)
*ONE WORD INTEGERS
*ARITHMETIC TRACE
*TRANSFER TRACE
*LIST ALL
      DIMENSION TS(12, 48), TG(12, 48), XSO2(12,48)
      SHSO2 (TEMP) = 0.4474E01 + 0.2041E-01*TEMP - 0.1743E-04* TEMP**2
     1    + 0.5463E-08 *  TEMP**3 + 0.3838E05 /  TEMP **2
      SHO2(TEMP) = 0.4399E01 + 0.7895E-02 * TEMP - 0.5454E-05 * TEMP**2
     1   + 0.1399E-08 *  TEMP**3 + 0.7069E05 /  TEMP**2
      SHSO3(TEMP) = 0.4638E01 + 0.3266E-01 * TEMP - 0.2792E-04 * TEMP**2
     1       + 0.8782E-08 *  TEMP**3 - 0.1936E04 /  TEMP**2
      SHN2(TEMP) = 0.7543E01 - 0.34E-02 * TEMP + 0.636E-05 * TEMP**2
     1   -0.2702E-08 *  TEMP**3 - 0.3913E04 /  TEMP**2
      READ (2, 5) WSO2, WO2, WSO3, WN2, WS, SUMDF,TISOL, TIGAS, XINC,
     1 TTOL, I, M, IL, ML
      WRITE(3, 5) WSO2, WO2, WSO3, WN2, WS, SUMDF,TISOL, TIGAS, XINC,
     1 TTOL, I, M, IL, ML
    5 FORMAT (6F 10.6, 2F 6.0 / 2F 5.2, 4 I 4, F8.3)
      FSO2       = WSO2 / 64.0628
      FO2        = WO2 / 31.9988
      FN2 = WN2 / 28.0134
      FS = WS/60.0848
      FSO3 = WSO3 / 80.0622
      FSO3       = FSO3       + 0.0004
      FSO2       = FSO2       - 0.0004
      FSO2I = FSO2
      FO2 = FO2 - 0.0002
      DO 10 M = M, ML
      TG(M,I) = TIGAS
   10 XSO2(M,I) = 0.0
      M = 1
      DO 20 I = 1, IL
   20 TS(M,I) = TISOL
C     MATERIAL BALANCE
      WRITE ( 3, 25)
   25 FORMAT  ('     M     I TS(M,I) TS(M,I-1) TG(M,I) XSO2(M,I)  SUMDF
     1   QS          QEVOL       QG         FSO2     FSO3         FO2')
      I = 2
      M = 2
      TSEST = TISOL
      DO 100 M = 2, ML
      SUMDF = 0.0
      TSIN =(TS(M-1, I) + TS(M-1, I-1))/ 2.
   30 TSEST = TSEST - XINC
      GO TO 40
   35 TSEST = TSEST + XINC
   40 TSOUT = TSEST
      TSAV = (TSOUT  + TSIN) / 2.
      TCSAV = (TSAV - 32.) / 1.8
      TKSAV = TCSAV + 273.16
      FTOT = FSO2 + FO2 + FSO3 + FN2
      XLNKP = 22600. / (1.98719 * TKSAV) - 21.36 / 1.98719
      XKP = EXP (XLNKP)
      PSO2 = FSO2       / FTOT
      PO2 = FO2        / FTOT
      PSO3 = FSO3       / FTOT
      PN2 = FN2 / FTOT
      PTOT = PSO2 + PO2 + PSO3 + PN2
      TERM1 = SQRT (PSO2 / PSO3)
      DENOM = PSO2 * XKP
```

```
      TERM3 = (PSO3 / DENOM)**2
      PTERM = TERM1 * (PO2 - TERM3)
      IF (TKSAV - 680.) 510, 510, 520
  510 RATEK = 0.
      GO TO 550
  520 IF (TKSAV - 730.2355) 530, 530, 540
  530 RATEK = 1.56E-07 * TKSAV - 1.06E-04
      GO TO 550
  540 RATEK = 4.874E-07 * TKSAV - 3.48E-04
  550 RXRAT = RATEK * PTERM
      DFSO2 = RXRAT * 60. * WS
C     HEAT BALANCE
      IF (TKSAV - 848.) 50, 50, 55
   50 SHS = 11.22 + 8.20E-03*TKSAV - 2.70E+05 / TKSAV**2
      GO TO 60
   55 SHS = 14.41 + 2.04E-03 * TKSAV
   60 QRX = (3.3 * TKSAV + 44140.)
      QEVOL = QRX * DFSO2
      QS = FS * SHS * (TSOUT - TSIN)
      QG = QEVOL - QS
      TGIN = TG(M-1, I-1)
      CPGAS = SHSO2(TGIN)  * FSO2 + SHO2(TGIN)  * FO2 + SHSO3(TGIN) *
     1 FSO3 + SHN2(TGIN)  * FN2
      TGOUT = QG / CPGAS + TGIN
      TG(M,I) = TGOUT
      TGAV = (TG(M,I) + TG(M-1, I-1))/2.0
C     HTCON = H * A * THETA = 4.81 * 8.417 * 1.0/60.
      HTCON = 0.673
      TSAV1 = QG / HTCON + TGAV
      DELTA = ABS(TSAV - TSAV1)
      IF (DELTA -TTOL) 90, 90, 70
   70 TSEX = 2.0 * TSAV1 - TSIN
      IF (TSEX - TSEST) 80, 80, 85
   80 GO TO 30
   85 GO TO 35
   90 TS(M,I) = 1.5 * TSAV1 - 0.5 * TS(M-1,I)
      TS(M,I-1) = 2.0 * TSEX - TS(M,I)
      IF (TS(M,I-1) - TGIN) 92, 92, 93
   92 TS(M,I) = TGIN
      TS(M,I-1) = TGIN
   93 CONTINUE
      IF (TG(M,I) -XINC - TIGAS) 94, 94, 95
   94 TG(M,I) = TIGAS
   95 CONTINUE
      SUMDF = SUMDF + DFSO2
      DFSO3 = DFSO2
      DFO2 = DFSO2 / 2.
      FSO2       = FSO2       - DFSO2
      FSO3       = FSO3       + DFSO3
      FO2        = FO2        - DFO2
      XAV = DFSO2 / FSO2
      XSO2(M,I) = 100. * SUMDF / FSO2I
      WRITE(3,99) M, I, TS(M,I), TS(M,I-1), TG(M,I), XSO2(M,I), SUMDF,
     1 QS, QEVOL, QG, FSO2, FSO3, FO2
   99 FORMAT (2I5, 4F8.2, F12.6, 3F10.4, 3F11.6)
  100 CONTINUE
      SMDF1 = 0.000226
      DO 200 M = 2, ML
      SUMDF = 0.0 +SMDF1
      FSO2       = WSO2 / 64.0628
      FO2        = WO2 / 31.9988
```

```
      FN2 = WN2 / 28.0134
      FS = WS/60.0848
      FSO3 = WSO3 / 80.0622
      FSO3       = FSO3       + 0.0004
      FSO2       = FSO2       - 0.0004
      FSO2I = FSO2
      FO2 = FO2 - 0.0002
      DO 200 I = 3, IL
      TS(M,I)=TS(M,I-1)
      TSAV =  (TS(M,I) + TS(M-1, I))/2.
  141 TCSAV = (TSAV - 32.) / 1.8
      TKSAV = TCSAV + 273.16
      FTOT = FSO2 + FO2 + FSO3 + FN2
      XLNKP = 22600. / (1.98719 * TKSAV) - 21.36 / 1.98719
      XKP = EXP (XLNKP)
      PSO2 = FSO2       / FTOT
      PO2 = FO2       / FTOT
      PSO3 = FSO3       / FTOT
      PN2 = FN2 / FTOT
      PTOT = PSO2 + PO2 + PSO3 + PN2
      TERM1 = SQRT (PSO2 / PSO3)
      DENOM = PSO2 * XKP
      TERM3 = (PSO3 / DENOM)**2
      PTERM = TERM1 * (PO2 - TERM3)
      IF (TKSAV - 680.) 610, 610, 620
  610 RATEK = 0.
      GO TO 650
  620 IF (TKSAV - 730.2355) 630, 630, 640
  630 RATEK = 1.56E-07 * TKSAV - 1.06E-04
      GO TO 650
  640 RATEK = 4.874E-07 * TKSAV - 3.48E-04
  650 RXRAT = RATEK * PTERM
      DFSO2 = RXRAT * 60. * WS
C     HEAT BALANCE
      IF (TKSAV - 848.) 150, 150, 155
  150 SHS = 11.22 + 8.20E-03*TKSAV - 2.70E+05 / TKSAV**2
      GO TO 160
  155 SHS = 14.41 + 2.04E-03 * TKSAV
  160 QRX = (3.3 * TKSAV + 44140.)
      QEVOL = QRX * DFSO2
      QS = FS * SHS * (TS(M,I) - TS(M-1,I))
      QG = QEVOL - QS
      TGIN = TG(M,I-1)
      CPGAS = SHSO2(TGIN)  * FSO2 + SHO2(TGIN)  * FO2 + SHSO3(TGIN) *
     1 FSO3 + SHN2(TGIN)  * FN2
      TG(M,I) = QG / CPGAS + TG(M,I-1)
      TS1  =-QS / HTCON +TG(M,I)
      DELTA = ABS (TS1       - TS(M,I))
      IF (DELTA -TTOL) 190, 190, 170
  170 TS2= (TS1       + TS(M,I)) / 2.
      TS(M,I) = TS2
      TSAV = (TS2+ TS(M-1, I)) / 2.
      GO TO 141
  190 TS(M,I) = TS1
      SUMDF = SUMDF + DFSO2
      DFSO3 = DFSO2
      DFO2 = DFSO2 / 2.
      FSO2       = FSO2       - DFSO2
      FSO3       = FSO3       + DFSO3
      FO2       = FO2       - DFO2
      XAV = DFSO2 / FSO2
```

```
      XSO2(M,I) = 100. * SUMDF / FSO2I
      WRITE(3,196)M, I, TS(M,I), TS(M,I-1), TG(M,I), XSO2(M,I), SUMDF,
     1 QS, QEVOL, QG, FSO2, FSO3, FO2
  196 FORMAT (2I5, 4F8.2, F12.6, 3F10.4, 3F11.6)
      SMDF1 = 0.0
  200 CONTINUE
      CALL EXIT
      END
```

```
// JOB
// FOR
*IOCS(CARD,TYPEWRITER,1132PRINTER,DISK)
*ONE WORD INTEGERS
*ARITHMETIC TRACE
*TRANSFER TRACE
*LIST ALL
      DIMENSION TS(13, 48), TG(13,48), XSO2 (13,48)
      SHSO2 (TEMP) = 0.4474E01 + 0.2041E-01*TEMP - 0.1743E-04* TEMP**2
     1    + 0.5463E-08 *  TEMP**3 + 0.3838E05 /  TEMP **2
      SHO2(TEMP) = 0.4399E01 + 0.7895E-02 * TEMP - 0.5454E-05 * TEMP**2
     1  + 0.1399E-08 *  TEMP**3 + 0.7069E05 /  TEMP**2
      SHSO3(TEMP) = 0.4638E01 + 0.3266E-01 * TEMP - 0.2792E-04 * TEMP**2
     1     + 0.8782E-08 *  TEMP**3 - 0.1936E04 /  TEMP**2
      SHN2(TEMP) = 0.7543E01 - 0.34E-02 * TEMP + 0.636E-05 * TEMP**2
     1  -0.2702E-08 *  TEMP**3 - 0.3913E04 /  TEMP**2
      READ (2,5) WSO2, WO2, WN2, WS, WSO3, TTOL, ML, IL
    5 FORMAT (5F10.6, F5.2, 2I4)
      WRITE(3,5) WSO2, WO2, WN2, WS, WSO3, TTOL, ML, IL
      HTCON = 0.673
      M = 11
      READ (2,30)  (TS(M,I), I = 2, 48)
   30 FORMAT (8F8.2/8F8.2/8F8.2/8F8.2/8F8.2/7F8.2)
      WRITE(3,30)  (TS(M,I), I = 2, 48)
      SMDF1 = 0.0
      M = 12
      I = 2
      ML = 24
      TS(M,I) = 450.0
      TIGAS = 450.0
      DO 10 M = M,ML
      TG(M,I) = TIGAS
   10 XSO2(M,I) = 0.0
      TS(12,2) = 450.47
      DO 200 M = 12, ML
      SUMDF = 0.0 +SMDF1
      FSO2      = WSO2 / 64.0628
      FO2       = WO2 / 31.9988
      FN2 = WN2 / 28.0134
      FS = WS/60.0848
      FSO3 = WSO3 / 80.0622
      FSO3      = FSO3      + 0.0004
      FSO2      = FSO2      - 0.0004
      FSO2I = FSO2
      FO2 = FO2 - 0.0002
```

```
      DO 200 I = 3,40
      TS(M,I)=TS(M,I-1)
      TSAV =  (TS(M,I) + TS(M-1, I))/2.
  141 TCSAV = (TSAV - 32.) / 1.8
      TKSAV = TCSAV + 273.16
      FTOT = FSO2 + FO2 + FSO3 + FN2
      XLNKP = 22600. / (1.98719 * TKSAV) - 21.36 / 1.98719
      XKP = EXP (XLNKP)
      PSO2 = FSO2       / FTOT
      PO2 = FO2       / FTOT
      PSO3 = FSO3       / FTOT
      PN2 = FN2 / FTOT
      PTOT = PSO2 + PO2 + PSO3 + PN2
      TERM1 = SQRT (PSO2 / PSO3)
      DENOM = PSO2 * XKP
      TERM3 = (PSO3 / DENOM)**2
      PTERM = TERM1 * (PO2 - TERM3)
      IF (TKSAV - 680.) 610, 610, 620



  610 RATEK = 0.
      GO TO 650
  620 IF (TKSAV - 730.2355) 630, 630, 640
  630 RATEK = 1.56E-07 * TKSAV - 1.06E-04
      GO TO 650
  640 RATEK = 4.874E-07 * TKSAV - 3.48E-04
  650 RXRAT = RATEK * PTERM
      DFSO2 = RXRAT * 60. * WS
C     HEAT BALANCE
      IF (TKSAV - 848.) 150, 150, 155
  150 SHS = 11.22 + 8.20E-03*TKSAV - 2.70E+05 / TKSAV**2
      GO TO 160
  155 SHS = 14.41 + 2.04E-03 * TKSAV
  160 QRX = (3.3 * TKSAV + 44140.)
      QEVOL = QRX * DFSO2
      QS = FS * SHS * (TS(M,I) - TS(M-1,I))
      QG = QEVOL - QS
      TGIN = TG(M,I-1)
      CPGAS = SHSO2(TGIN)  * FSO2 + SHO2(TGIN)  * FO2 + SHSO3(TGIN) *
     1 FSO3 + SHN2(TGIN)  * FN2
      TG(M,I) = QG / CPGAS + TG(M,I-1)
      TS1  =-QS / HTCON +TG(M,I)
      DELTA = ABS (TS1      - TS(M,I))
      IF (DELTA -TTOL) 190, 190, 170
  170 TS2= (TS1      + TS(M,I)) / 2.
```

```
      TS(M,I) = TS2
      TSAV = (TS2+ TS(M-1, I)) / 2.
      GO TO 141
  190 TS(M,I) = TS1
      SUMDF = SUMDF + DFSO2
      DFSO3 = DFSO2
      DFO2 = DFSO2 / 2.
      FSO2       = FSO2       - DFSO2
      FSO3       = FSO3       + DFSO3
      FO2       = FO2       - DFO2
      XAV = DFSO2 / FSO2
      XSO2(M,I) = 100. * SUMDF / FSO2I
      WRITE(3,196)M, I, TS(M,I), TS(M,I-1), TG(M,I), XSO2(M,I), SUMDF,
     1 QS, QEVOL, QG, FSO2, FSO3, FO2
  196 FORMAT (2I5, 4F8.2, F12.6, 3F10.4, 3F11.6)
      SMDF1 = 0.0
  200 CONTINUE
      CALL EXIT
      END
```

```
// XEQ
  0.726667   0.566667   0.000000   3.716667   2.816667   0.000000   900.
  0.25  0.75     1     1    48    12
     M     I  TS(M,I)  TS(M,I-1)  TG(M,I)  XSO2(M,I)    SUMDF        QS
     2     2  734.96    623.90     600.30     2.06      0.000226  -167.7271
     3     2  559.55    552.33     524.28     0.00      0.000000   -88.0848
     4     2  509.88    482.68     483.79     0.00      0.000000   -40.0731
     5     2  469.83    469.04     464.67     0.00      0.000000   -17.3970
     6     2  460.73    454.17     456.08     0.00      0.000000    -7.2179
     7     2  452.24    451.85     452.24     0.00      0.000000    -2.6590
     8     2  450.00    450.00     450.45     0.00      0.000000    -0.5365
     9     2  450.00    450.00     450.00     0.00      0.000000     0.1676
    10     2  450.00    450.00     450.00     0.00      0.000000     0.0000
    11     2  450.00    450.00     450.00     0.00      0.000000    -0.1676
    12     2  450.47    452.07     450.00     0.00      0.000000    -0.1676
     2     3  802.74    734.96     690.07     8.75      0.000957   -75.8304
     2     4  833.10    802.74     754.60    14.21      0.001555   -52.8281
     2     5  855.96    833.10     803.90    19.61      0.002146   -35.0349
     2     6  873.19    855.96     841.24    24.78      0.002712   -21.5056
     2     7  886.08    873.19     869.27    29.68      0.003248   -11.3095
     2     8  895.62    886.08     890.11    34.27      0.003750    -3.7084
     2     9  902.01    895.62     905.23    38.56      0.004220     2.1659
     2    10  907.07    902.01     916.15    42.56      0.004658     6.1058
     2    11  910.69    907.07     923.87    46.29      0.005066     8.8682
     2    12  913.18    910.69     929.16    49.76      0.005446    10.7527
     2    13  915.35    913.18     932.78    53.00      0.005799    11.7302
     2    14  915.58    915.35     934.72    56.02      0.006131    12.8845
     2    15  916.57    915.58     935.83    58.85      0.006440    12.9637
     2    16  916.47    916.57     936.08    61.50      0.006730    13.1934
     2    17  916.25    916.47     935.75    63.98      0.007002    13.1184
     2    18  915.73    916.25     934.97    66.32      0.007257    12.9438
     2    19  915.34    915.73     933.96    68.51      0.007497    12.5300
     2    20  915.24    915.34     932.92    70.57      0.007723    11.8988
     2    21  914.98    915.24     931.84    72.51      0.007935    11.3411
     2    22  913.73    914.98     930.43    74.35      0.008136    11.2372
     2    23  913.59    913.73     929.17    76.08      0.008325    10.4868
     2    24  912.53    913.59     927.74    77.71      0.008504    10.2375
     2    25  912.39    912.53     926.51    79.26      0.008673     9.5054
     2    26  911.33    912.39     925.13    80.72      0.008833     9.2829
     2    27  911.20    911.33     923.95    82.09      0.008984     8.5819
     2    28  910.21    911.20     922.65    83.40      0.009126     8.3722
     2    29  910.08    910.21     921.55    84.63      0.009261     7.7156
     2    30  909.16    910.08     920.33    85.78      0.009387     7.5215
     2    31  909.05    909.16     919.31    86.87      0.009507     6.9105
     2    32  908.82    909.05     918.39    87.90      0.009619     6.4422
     2    33  907.71    908.82     917.26    88.86      0.009724     6.4219
     2    34  906.98    907.71     916.10    89.77      0.009823     6.1372
     2    35  906.89    906.98     915.14    90.61      0.009915     5.5501
     2    36  906.78    906.89     914.32    91.39      0.010001     5.0741
     2    37  906.58    906.78     913.55    92.11      0.010080     4.6943
     2    38  905.58    906.58     912.57    92.78      0.010153     4.7022
     2    39  904.96    905.58     911.56    93.39      0.010219     4.4405
     2    40  904.84    904.96     910.71    93.94      0.010280     3.9494
     2    41  904.75    904.84     909.98    94.44      0.010335     3.5164
     2    42  904.59    904.75     909.30    94.88      0.010383     3.1701
     2    43  903.69    904.59     908.41    95.28      0.010426     3.1771
     2    44  903.15    903.69     907.52    95.62      0.010464     2.9363
     2    45  903.04    903.15     906.76    95.92      0.010497     2.5087
     2    46  902.32    903.04     905.91    96.17      0.010524     2.4161
     2    47  902.59    902.32     905.34    96.39      0.010548     1.8478
     2    48  902.47    902.59     904.83    96.57      0.010567     1.5863
     3     3  702.06    559.55     588.03     0.00      0.000000   -76.7450
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450.

QEVOL	QG	FSO2	FSO3	FO2	
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0.0000	88.0848	0.010716	0.000626	0.017395	
0.0000	40.0731	0.010716	0.000626	0.017395	
0.0000	17.3970	0.010716	0.000626	0.017395	
0.0000	7.2179	0.010716	0.000626	0.017395	
0.0000	2.6590	0.010716	0.000626	0.017395	
0.0000	0.5365	0.010716	0.000626	0.017395	
0.0000	-0.1676	0.010716	0.000626	0.017395	
0.0000	0.0000	0.010716	0.000626	0.017395	
0.0000	0.1676	0.010716	0.000626	0.017395	
0.0000	0.1676	0.010716	0.000626	0.017395	
34.0646	109.8950	0.010211	0.001131	0.017143	594999
27.8407	80.6689	0.009613	0.001729	0.016844	
27.5207	62.5557	0.009022	0.002320	0.016548	
26.3977	47.9033	0.008456	0.002886	0.016265	
24.9570	36.2665	0.007920	0.003422	0.015997	
23.4142	27.1226	0.007418	0.003924	0.015746	
21.9292	19.7632	0.006948	0.004394	0.015511	
20.4270	14.3211	0.006510	0.004832	0.015292	
19.0212	10.1529	0.006102	0.005240	0.015088	
17.7219	6.9692	0.005722	0.005620	0.014898	
16.4968	4.7666	0.005369	0.005973	0.014722	
15.4569	2.5723	0.005037	0.006305	0.014556	
14.4216	1.4578	0.004728	0.006614	0.014401	
13.5202	0.3268	0.004438	0.006904	0.014256	
12.6820	-0.4363	0.004166	0.007176	0.014120	
11.9156	-1.0281	0.003911	0.007431	0.013993	
11.1976	-1.3324	0.003671	0.007671	0.013873	
10.5234	-1.3754	0.003445	0.007897	0.013760	
9.9094	-1.4317	0.003233	0.008109	0.013654	
9.3733	-1.8639	0.003032	0.008310	0.013553	
8.8288	-1.6580	0.002843	0.008499	0.013459	
8.3526	-1.8848	0.002664	0.008678	0.013369	
7.8751	-1.6302	0.002495	0.008847	0.013285	
7.4544	-1.8285	0.002335	0.009007	0.013205	
7.0290	-1.5528	0.002184	0.009158	0.013129	
6.6496	-1.7225	0.002042	0.009300	0.013058	
6.2652	-1.4503	0.001907	0.009435	0.012991	
5.9172	-1.6043	0.001781	0.009561	0.012927	
5.5642	-1.3463	0.001661	0.009681	0.012868	
5.2291	-1.2130	0.001549	0.009793	0.012812	
4.9187	-1.5031	0.001444	0.009898	0.012759	
4.6055	-1.5316	0.001345	0.009997	0.012710	
4.2907	-1.2594	0.001253	0.010089	0.012664	
3.9859	-1.0882	0.001167	0.010175	0.012621	
3.6888	-1.0054	0.001088	0.010254	0.012581	
3.4020	-1.3002	0.001015	0.010327	0.012545	
3.1132	-1.3272	0.000949	0.010393	0.012512	
2.8266	-1.1227	0.000888	0.010454	0.012481	
2.5468	-0.9696	0.000833	0.010509	0.012454	
2.2745	-0.8956	0.000785	0.010557	0.012430	
2.0095	-1.1675	0.000742	0.010600	0.012408	
1.7555	-1.1807	0.000704	0.010638	0.012389	
1.5177	-0.9910	0.000671	0.010671	0.012373	
1.2924	-1.1237	0.000644	0.010698	0.012359	
1.0952	-0.7525	0.000620	0.010722	0.012347	
0.9136	-0.6727	0.000601	0.010741	0.012337	
0.0000	76.7450	0.010943	0.000400	0.017509	3-3

3	4	747.46	702.06	650.19	2.05	0.000224	-65.4674
3	5	786.78	747.46	707.54	5.52	0.000604	-53.3335
3	6	818.96	786.78	756.46	9.32	0.001020	-42.0593
3	7	846.65	818.96	800.17	14.07	0.001539	-31.2822
3	8	869.46	846.65	838.24	19.51	0.002135	-21.0110
3	9	887.23	869.46	869.29	25.01	0.002737	-12.0714
3	10	901.33	887.23	894.04	30.36	0.003323	-4.9067
3	11	912.06	901.33	913.25	35.44	0.003878	0.7989
3	12	920.03	912.06	927.79	40.21	0.004400	5.2241
3	13	925.54	920.03	938.48	44.67	0.004888	8.7121
3	14	929.15	925.54	945.85	48.77	0.005337	11.2398
3	15	932.05	929.15	950.95	52.58	0.005754	12.7171
3	16	934.03	932.05	954.21	56.09	0.006138	13.5820
3	17	934.13	934.03	955.73	59.33	0.006492	14.5371
3	18	934.25	934.13	956.13	62.31	0.006819	14.7225
3	19	934.08	934.25	955.76	65.07	0.007121	14.5883
3	20	933.09	934.08	954.68	67.64	0.007402	14.5302
3	21	932.89	933.09	953.42	70.02	0.007662	13.8198
3	22	930.50	932.89	951.32	72.22	0.007903	14.0109
3	23	930.31	930.50	949.46	74.26	0.008126	12.8889
3	24	928.56	930.31	947.25	76.14	0.008333	12.5773
3	25	927.00	928.56	944.94	77.91	0.008525	12.0725
3	26	925.28	927.00	942.48	79.54	0.008704	11.5781
3	27	924.32	925.28	940.25	81.06	0.008870	10.7216
3	28	922.56	924.32	937.88	82.46	0.009024	10.3125
3	29	922.33	922.56	935.98	83.77	0.009167	9.1856
3	30	920.64	922.33	933.90	84.98	0.009299	8.9224
3	31	919.21	920.64	931.82	86.10	0.009422	8.4818
3	32	918.32	919.21	929.91	87.13	0.009535	7.8058
3	33	916.64	918.32	927.87	88.08	0.009639	7.5562
3	34	915.42	916.64	925.89	88.95	0.009734	7.0497
3	35	915.23	915.42	924.33	89.75	0.009821	6.1221
3	36	913.76	915.23	922.62	90.47	0.009900	5.9578
3	37	913.61	913.76	921.25	91.12	0.009972	5.1423
3	38	911.58	913.61	919.48	91.71	0.010036	5.3191
3	39	911.38	911.58	918.08	92.23	0.010092	4.5097
3	40	909.91	911.38	916.49	92.69	0.010143	4.4308
3	41	909.80	909.91	915.26	93.09	0.010186	3.6753
3	42	908.64	909.80	913.91	93.43	0.010224	3.5440
3	43	907.53	908.64	912.52	93.73	0.010257	3.3579
3	44	907.34	907.53	911.42	93.98	0.010285	2.7467
3	45	906.06	907.34	910.15	94.20	0.010308	2.7567
3	46	905.19	906.06	908.94	94.38	0.010328	2.5220
3	47	904.87	905.19	907.94	94.52	0.010344	2.0656
3	48	904.12	904.87	906.96	94.64	0.010357	1.9073
4	3	621.58	509.88	533.46	0.00	0.000000	-59.2983
4	4	668.52	621.58	581.83	0.00	0.000000	-58.3421
4	5	711.63	668.52	628.00	0.00	0.000000	-56.2854
4	6	752.72	711.63	676.53	1.67	0.000183	-51.2726
4	7	790.11	752.72	725.43	5.09	0.000557	-43.5268
4	8	823.10	790.11	769.75	9.00	0.000985	-35.9071
4	9	852.88	823.10	812.27	14.26	0.001560	-27.3327
4	10	878.44	852.88	850.92	20.36	0.002228	-18.5246
4	11	899.31	878.44	883.57	26.58	0.002909	-10.5908
4	12	915.76	899.31	910.06	32.60	0.003567	-3.8369
4	13	928.19	915.76	930.80	38.27	0.004188	1.7532
4	14	937.27	928.19	946.50	43.53	0.004764	6.2123
4	15	944.13	937.27	958.18	48.41	0.005297	9.4575
4	16	948.43	944.13	966.40	52.90	0.005789	12.0903
4	17	951.02	948.43	971.68	57.00	0.006237	13.9052
4	18	953.16	951.02	974.99	60.73	0.006646	14.6863
4	19	953.73	953.16	976.55	64.14	0.007019	15.3582
4	20	952.66	953.73	976.45	67.25	0.007359	16.0142

10.4179	75.8853	0.010718	0.000624	0.017396
17.6817	71.0153	0.010338	0.001004	0.017206
19.3381	61.3974	0.009922	0.001420	0.016998
24.1907	55.4729	0.009403	0.001939	0.016739
27.7810	48.7920	0.008807	0.002535	0.016441
28.0667	40.1381	0.008205	0.003137	0.016140
27.2933	32.2000	0.007619	0.003723	0.015847
25.9326	25.1336	0.007064	0.004278	0.015569
24.3245	19.1003	0.006542	0.004800	0.015308
22.7959	14.0838	0.006054	0.005288	0.015064
20.9658	9.7259	0.005605	0.005737	0.014840
19.4608	6.7436	0.005188	0.006154	0.014631
17.9045	4.3224	0.004804	0.006538	0.014439
16.5534	2.0163	0.004450	0.006892	0.014262
15.2509	0.5284	0.004123	0.007219	0.014099
14.0935	-0.4948	0.003821	0.007521	0.013948
13.1058	-1.4243	0.003540	0.007802	0.013807
12.1444	-1.6754	0.003280	0.008062	0.013677
11.2249	-2.7860	0.003039	0.008303	0.013557
10.4216	-2.4673	0.002816	0.008526	0.013445
9.6453	-2.9320	0.002609	0.008733	0.013342
9.0031	-3.0693	0.002417	0.008925	0.013246
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7.1788	-3.1336	0.001918	0.009424	0.012996
6.6651	-2.5185	0.001775	0.009567	0.012925
6.1638	-2.7585	0.001643	0.009699	0.012859
5.7259	-2.7559	0.001520	0.009822	0.012797
5.2907	-2.5150	0.001407	0.009935	0.012741
4.8485	-2.7077	0.001303	0.010039	0.012689
4.4369	-2.6127	0.001208	0.010134	0.012641
4.0548	-2.0673	0.001121	0.010221	0.012598
3.6937	-2.2640	0.001042	0.010300	0.012558
3.3327	-1.8096	0.000970	0.010372	0.012522
2.9848	-2.3342	0.000906	0.010436	0.012490
2.6548	-1.8548	0.000850	0.010492	0.012462
2.3407	-2.0901	0.000799	0.010543	0.012437
2.0443	-1.6310	0.000756	0.010586	0.012415
1.7619	-1.7821	0.000718	0.010624	0.012396
1.5194	-1.8384	0.000685	0.010657	0.012380
1.3021	-1.4445	0.000657	0.010685	0.012366
1.0844	-1.6723	0.000634	0.010708	0.012354
0.9215	-1.6005	0.000614	0.010728	0.012344
0.7480	-1.3175	0.000598	0.010744	0.012336
0.6095	-1.2977	0.000585	0.010757	0.012330
0.0000	59.2983	0.010943	0.000400	0.017509
0.0000	58.3421	0.010943	0.000400	0.017509
0.0000	56.2854	0.010943	0.000400	0.017509
8.5120	59.7846	0.010759	0.000583	0.017417
17.3969	60.9237	0.010385	0.000957	0.017230
19.9273	55.8344	0.009957	0.001385	0.017016
26.7833	54.1160	0.009382	0.001960	0.016728
31.1405	49.6651	0.008714	0.002628	0.016394
31.7327	42.3235	0.008033	0.003309	0.016054
30.7317	34.5687	0.007375	0.003967	0.015725
28.9688	27.2155	0.006754	0.004588	0.015414
26.9045	20.6921	0.006178	0.005164	0.015126
24.9072	15.4497	0.005645	0.005697	0.014860
22.9816	10.8912	0.005153	0.006189	0.014614
20.9220	7.0167	0.004705	0.006637	0.014390
19.0785	4.3921	0.004296	0.007046	0.014185
17.4359	2.0776	0.003923	0.007419	0.013999
15.8892	-0.1250	0.003583	0.007759	0.013829

4	21	952.55	952.66	975.68	70.09	0.007670	15.5638
4	22	950.41	952.55	973.75	72.66	0.007952	15.7086
4	23	948.72	950.41	971.37	75.02	0.008210	15.2399
4	24	947.00	948.72	968.65	77.17	0.008444	14.5689
4	25	944.82	947.00	965.61	79.11	0.008658	13.9959
4	26	942.42	944.82	962.34	80.88	0.008851	13.4052
4	27	940.38	942.42	959.08	82.50	0.009028	12.5852
4	28	937.93	940.38	955.70	83.96	0.009188	11.9623
4	29	936.31	937.93	952.60	85.30	0.009335	10.9598
4	30	934.02	936.31	949.43	86.51	0.009467	10.3716
4	31	931.80	934.02	946.28	87.60	0.009586	9.7425
4	32	929.91	931.80	943.27	88.58	0.009693	8.9914
4	33	927.67	929.91	940.26	89.45	0.009789	8.4731
4	34	925.65	927.67	937.33	90.23	0.009874	7.6636
4	35	923.68	925.65	934.50	90.92	0.009950	7.2852
4	36	921.58	923.68	931.70	91.53	0.010016	6.8145
4	37	920.61	921.58	929.32	92.06	0.010074	5.8602
4	38	918.81	920.61	926.96	92.52	0.010125	5.4854
4	39	917.14	918.81	924.66	92.92	0.010168	5.0625
4	40	915.25	917.14	922.36	93.26	0.010206	4.7844
4	41	915.10	915.25	920.65	93.55	0.010237	3.7347
4	42	913.50	915.10	918.87	93.80	0.010264	3.6105
4	43	911.42	913.50	916.89	94.00	0.010287	3.6614
4	44	911.30	911.42	915.45	94.18	0.010306	2.7887
4	45	909.83	911.30	913.94	94.33	0.010323	2.7632
4	46	908.12	909.83	912.30	94.46	0.010337	2.8124
4	47	908.01	908.12	911.13	94.57	0.010348	2.1027
4	48	906.41	908.01	909.77	94.66	0.010359	2.2647
5	3	562.75	469.83	500.11	0.00	0.000000	-42.1537
5	4	605.52	562.75	538.03	0.00	0.000000	-45.4169
5	5	647.17	605.52	577.09	0.00	0.000000	-47.1619
5	6	687.93	647.17	616.54	0.00	0.000000	-48.0432
5	7	726.47	687.93	655.45	0.00	0.000000	-47.8016
5	8	766.32	726.47	700.70	2.34	0.000257	-44.1638
5	9	803.32	766.32	746.53	6.12	0.000669	-38.2195
5	10	837.79	803.32	789.96	10.59	0.001159	-32.1848
5	11	869.72	837.79	834.39	17.07	0.001868	-23.7805
5	12	896.92	869.72	873.88	24.02	0.002628	-15.5088
5	13	918.82	896.92	906.87	30.85	0.003376	-8.0431
5	14	935.84	918.82	933.38	37.34	0.004086	-1.6534
5	15	949.00	935.84	954.18	43.38	0.004747	3.4798
5	16	958.39	949.00	969.80	48.93	0.005354	7.6828
5	17	964.84	958.39	981.05	53.98	0.005907	10.9096
5	18	968.96	964.84	988.75	58.59	0.006411	13.3179
5	19	971.59	968.96	993.60	62.75	0.006867	14.8146
5	20	972.51	971.59	996.02	66.47	0.007274	15.8264
5	21	972.81	972.51	996.81	69.84	0.007642	16.1484
5	22	970.55	972.81	995.66	72.84	0.007971	16.9009
5	23	968.72	970.55	993.48	75.53	0.008265	16.6637
5	24	967.05	968.72	990.74	77.93	0.008528	15.9449
5	25	964.43	967.05	987.37	80.07	0.008762	15.4376
5	26	961.42	964.43	983.52	81.97	0.008970	14.8683
5	27	958.46	961.42	979.42	83.66	0.009155	14.1084
5	28	955.20	958.46	975.10	85.15	0.009318	13.3954
5	29	952.34	955.20	970.84	86.47	0.009463	12.4457
5	30	949.17	952.34	966.52	87.64	0.009590	11.6768
5	31	946.02	949.17	962.23	88.65	0.009701	10.9104
5	32	943.07	946.02	958.05	89.54	0.009798	10.0822
5	33	940.00	943.07	953.95	90.30	0.009882	9.3863
5	34	937.08	940.00	949.97	90.97	0.009955	8.6769
5	35	934.25	937.08	946.14	91.54	0.010017	8.0019
5	36	931.43	934.25	942.45	92.03	0.010071	7.4153
5	37	929.30	931.43	939.09	92.45	0.010117	6.5884

14.5367	-1.0271	0.003272	0.008070	0.013673
13.1341	-2.5744	0.002990	0.008352	0.013532
12.0693	-3.1706	0.002732	0.008610	0.013403
10.9471	-3.6217	0.002498	0.008844	0.013286
9.9568	-4.0390	0.002284	0.009058	0.013179
9.0452	-4.3599	0.002091	0.009251	0.013083
8.2514	-4.3338	0.001914	0.009428	0.012994
7.4790	-4.4832	0.001754	0.009588	0.012914
6.8292	-4.1305	0.001608	0.009735	0.012841
6.1649	-4.2067	0.001475	0.009867	0.012775
5.5584	-4.1841	0.001356	0.009986	0.012715
5.0047	-3.9866	0.001249	0.010093	0.012662
4.4724	-4.0006	0.001153	0.010189	0.012614
3.9850	-3.8786	0.001068	0.010274	0.012571
3.5338	-3.7513	0.000992	0.010350	0.012533
3.1080	-3.7064	0.000926	0.010416	0.012500
2.7082	-3.1519	0.000868	0.010474	0.012471
2.3637	-3.1216	0.000817	0.010525	0.012446
2.0205	-3.0420	0.000774	0.010568	0.012424
1.7419	-3.0425	0.000736	0.010606	0.012405
1.4717	-2.2630	0.000705	0.010637	0.012390
1.2539	-2.3566	0.000678	0.010664	0.012376
1.0633	-2.6181	0.000655	0.010687	0.012365
0.8892	-1.8994	0.000636	0.010706	0.012355
0.7715	-1.9916	0.000619	0.010723	0.012347
0.6536	-2.1587	0.000605	0.010737	0.012340
0.5550	-1.5476	0.000594	0.010748	0.012334
0.4697	-1.7949	0.000583	0.010759	0.012329
0.0000	42.1537	0.010943	0.000400	0.017509
0.0000	45.4169	0.010943	0.000400	0.017509
0.0000	47.1619	0.010943	0.000400	0.017509
0.0000	48.0432	0.010943	0.000400	0.017509
0.0000	47.8016	0.010943	0.000400	0.017509
11.9377	56.1016	0.010685	0.000657	0.017380
19.1903	57.4098	0.010273	0.001069	0.017174
22.8011	54.9859	0.009783	0.001559	0.016929
33.0197	56.8002	0.009075	0.002268	0.016574
35.4791	50.9880	0.008314	0.003028	0.016194
34.9252	42.9684	0.007566	0.003776	0.015820
33.1203	34.7737	0.006856	0.004486	0.015465
30.8937	27.4139	0.006195	0.005147	0.015135
28.3738	20.6909	0.005588	0.005754	0.014831
25.8479	14.9382	0.005035	0.006307	0.014555
23.5690	10.2510	0.004531	0.006811	0.014303
21.2826	6.4679	0.004075	0.007267	0.014075
19.0577	3.2312	0.003668	0.007674	0.013871
17.2003	1.0518	0.003300	0.008042	0.013687
15.3712	-1.5297	0.002971	0.008371	0.013523
13.7481	-2.9155	0.002677	0.008665	0.013376
12.2772	-3.6676	0.002414	0.008928	0.013244
10.9388	-4.4988	0.002180	0.009162	0.013127
9.7226	-5.1456	0.001972	0.009370	0.013023
8.6374	-5.4709	0.001787	0.009555	0.012931
7.6396	-5.7557	0.001624	0.009718	0.012849
6.7528	-5.6929	0.001479	0.009863	0.012777
5.9322	-5.7446	0.001352	0.009990	0.012713
5.1913	-5.7191	0.001241	0.010101	0.012658
4.5229	-5.5593	0.001144	0.010198	0.012609
3.9245	-5.4618	0.001060	0.010282	0.012567
3.3908	-5.2860	0.000987	0.010355	0.012531
2.9196	-5.0822	0.000925	0.010417	0.012500
2.5123	-4.9029	0.000871	0.010471	0.012473
2.1285	-4.4598	0.000825	0.010517	0.012450

5	38	926.90	929.30	935.90	92.80	0.010156	6.0569
5	39	924.60	926.90	932.87	93.11	0.010189	5.5692
5	40	922.26	924.60	929.97	93.38	0.010218	5.1948
5	41	920.28	922.26	927.26	93.59	0.010242	4.6969
5	42	918.23	920.28	924.70	93.78	0.010263	4.3542
5	43	916.64	918.23	922.42	93.96	0.010282	3.8947
5	44	915.15	916.64	920.33	94.10	0.010297	3.4870
5	45	913.37	915.15	918.30	94.22	0.010311	3.3212
5	46	911.52	913.37	916.32	94.34	0.010324	3.2274
5	47	911.42	911.52	914.92	94.44	0.010335	2.3561
5	48	909.81	911.42	913.43	94.53	0.010345	2.4394
6	3	521.90	460.73	479.89	0.00	0.000000	-28.2676
6	4	557.95	521.90	508.05	0.00	0.000000	-33.5841
6	5	594.91	557.95	539.26	0.00	0.000000	-37.4490
6	6	632.48	594.91	572.62	0.00	0.000000	-40.2873
6	7	669.46	632.48	607.11	0.00	0.000000	-41.9624
6	8	707.68	669.46	642.75	0.00	0.000000	-43.6987
6	9	746.10	707.68	681.49	0.86	0.000094	-43.4789
6	10	785.97	746.10	726.84	4.16	0.000455	-39.7958
6	11	824.18	785.97	771.81	8.36	0.000915	-35.2489
6	12	861.82	824.18	820.10	14.92	0.001633	-28.0766
6	13	894.68	861.82	865.28	22.44	0.002455	-19.7825
6	14	921.09	894.68	903.86	29.98	0.003281	-11.5975
6	15	942.76	921.09	935.64	37.19	0.004070	-4.7942
6	16	959.36	942.76	960.85	43.89	0.004803	1.0032
6	17	972.21	959.36	980.34	50.01	0.005473	5.4709
6	18	980.86	972.21	994.67	55.55	0.006079	9.2939
6	19	986.78	980.86	1004.73	60.53	0.006624	12.0842
6	20	989.66	986.78	1011.02	64.98	0.007111	14.3782
6	21	991.52	989.66	1014.56	68.94	0.007544	15.5085
6	22	991.33	991.52	1015.61	72.41	0.007923	16.3411
6	23	989.71	991.33	1014.70	75.45	0.008257	16.8149
6	24	987.84	989.71	1012.50	78.12	0.008549	16.5984
6	25	985.04	987.84	1009.22	80.44	0.008803	16.2742
6	26	981.62	985.04	1005.10	82.45	0.009023	15.8047
6	27	977.21	981.62	1000.18	84.18	0.009212	15.4611
6	28	973.04	977.21	994.88	85.67	0.009375	14.6980
6	29	969.70	973.04	989.69	86.94	0.009514	13.4527
6	30	964.86	969.70	984.13	88.03	0.009633	12.9708
6	31	960.67	964.86	978.62	88.95	0.009734	12.0814
6	32	957.31	960.67	973.47	89.73	0.009820	10.8782
6	33	952.63	957.31	968.18	90.40	0.009892	10.4647
6	34	949.43	952.63	963.34	90.97	0.009955	9.3642
6	35	945.11	949.43	958.46	91.46	0.010008	8.9896
6	36	942.11	945.11	954.05	91.88	0.010055	8.0360
6	37	939.08	942.11	949.94	92.24	0.010094	7.3091
6	38	936.01	939.08	946.06	92.56	0.010129	6.7639
6	39	933.08	936.01	942.40	92.83	0.010159	6.2746
6	40	930.21	933.08	938.93	93.08	0.010186	5.8656
6	41	927.62	930.21	935.68	93.30	0.010210	5.4211
6	42	925.10	927.62	932.62	93.49	0.010231	5.0572
6	43	922.91	925.10	929.79	93.67	0.010250	4.6312
6	44	920.89	922.91	927.19	93.82	0.010267	4.2381
6	45	918.81	920.89	924.73	93.97	0.010283	3.9835
6	46	916.73	918.81	922.37	94.10	0.010297	3.7974
6	47	915.13	916.73	920.20	94.21	0.010309	3.4152
6	48	913.25	915.13	918.12	94.31	0.010320	3.2756
7	3	494.99	452.24	467.71	0.00	0.000000	-18.3596
7	4	523.98	494.99	488.04	0.00	0.000000	-24.1877
7	5	554.36	523.98	511.94	0.00	0.000000	-28.5514
7	6	587.07	554.36	538.93	0.00	0.000000	-32.4032
7	7	620.62	587.07	568.16	0.00	0.000000	-35.3037
7	8	655.81	620.62	599.40	0.00	0.000000	-37.9651

1.8244	-4.2325	0.000786	0.010556	0.012430	6-30
1.5637	-4.0054	0.000753	0.010589	0.012414	
1.3554	-3.8393	0.000724	0.010618	0.012399	
1.1026	-3.5943	0.000700	0.010642	0.012387	
0.9659	-3.3882	0.000679	0.010663	0.012377	
0.8871	-3.0076	0.000660	0.010682	0.012367	
0.7156	-2.7713	0.000645	0.010697	0.012360	
0.6465	-2.6747	0.000631	0.010711	0.012353	
0.6028	-2.6246	0.000618	0.010724	0.012346	
0.5065	-1.8495	0.000607	0.010735	0.012341	
0.4811	-1.9583	0.000597	0.010745	0.012336	
0.0000	28.2676	0.010943	0.000400	0.017509	
0.0000	33.5841	0.010943	0.000400	0.017509	
0.0000	37.4490	0.010943	0.000400	0.017509	
0.0000	40.2873	0.010943	0.000400	0.017509	
0.0000	41.9624	0.010943	0.000400	0.017509	
0.0000	43.6987	0.010943	0.000400	0.017509	
4.4059	47.8849	0.010848	0.000494	0.017461	
16.7586	56.5544	0.010487	0.000855	0.017281	
21.4186	56.6676	0.010027	0.001315	0.017051	
33.4189	61.4955	0.009309	0.002033	0.016692	
38.3754	58.1580	0.008487	0.002855	0.016281	
38.5553	50.1529	0.007661	0.003681	0.015868	
36.8505	41.6447	0.006872	0.004470	0.015473	
34.2576	33.2544	0.006139	0.005203	0.015107	
31.3106	25.8397	0.005470	0.005873	0.014772	
28.3582	19.0642	0.004863	0.006479	0.014469	
25.5148	13.4306	0.004318	0.007024	0.014196	
22.7836	8.4054	0.003831	0.007511	0.013953	
20.2469	4.7383	0.003398	0.007944	0.013736	
17.7472	1.4060	0.003019	0.008323	0.013547	
15.5913	-1.2235	0.002685	0.008657	0.013380	
13.6575	-2.9408	0.002393	0.008949	0.013234	
11.8783	-4.3958	0.002139	0.009203	0.013107	
10.2813	-5.5234	0.001919	0.009423	0.012997	
8.8666	-6.5945	0.001730	0.009612	0.012902	
7.6089	-7.0890	0.001567	0.009775	0.012821	
6.5062	-6.9465	0.001428	0.009914	0.012751	
5.5419	-7.4289	0.001309	0.010033	0.012692	
4.7152	-7.3662	0.001208	0.010134	0.012641	
4.0124	-6.8657	0.001123	0.010220	0.012598	
3.4077	-7.0570	0.001050	0.010292	0.012562	
2.9182	-6.4460	0.000987	0.010355	0.012531	
2.4901	-6.4995	0.000934	0.010408	0.012504	
2.1615	-5.8744	0.000887	0.010455	0.012481	
1.8515	-5.4576	0.000848	0.010494	0.012461	
1.6122	-5.1516	0.000813	0.010529	0.012444	
1.4140	-4.8605	0.000783	0.010559	0.012429	
1.2571	-4.6084	0.000756	0.010586	0.012415	
1.1127	-4.3083	0.000732	0.010610	0.012403	
1.0007	-4.0564	0.000711	0.010631	0.012393	
0.8875	-3.7437	0.000692	0.010650	0.012383	
0.7914	-3.4466	0.000675	0.010667	0.012375	
0.7282	-3.2553	0.000659	0.010683	0.012367	
0.6797	-3.1176	0.000645	0.010697	0.012360	
0.5458	-2.8694	0.000633	0.010709	0.012354	
0.5226	-2.7530	0.000622	0.010720	0.012348	
0.0000	18.3596	0.010943	0.000400	0.017509	
0.0000	24.1877	0.010943	0.000400	0.017509	
0.0000	28.5514	0.010943	0.000400	0.017509	
0.0000	32.4032	0.010943	0.000400	0.017509	
0.0000	35.3037	0.010943	0.000400	0.017509	
0.0000	37.9651	0.010943	0.000400	0.017509	7-8

7	9	691.88	655.81	632.21	0.00	0.000000	-40.1620
7	10	729.50	691.88	666.56	0.00	0.000000	-42.3597
7	11	770.78	729.50	710.06	2.59	0.000284	-40.8635
7	12	813.09	770.78	757.16	6.81	0.000746	-37.6382
7	13	855.09	813.09	808.21	13.33	0.001459	-31.5480
7	14	892.02	855.09	857.90	21.33	0.002334	-22.9607
7	15	923.79	892.02	901.54	29.49	0.003227	-14.9686
7	16	949.44	923.79	937.95	37.30	0.004082	-7.7283
7	17	969.86	949.44	967.44	44.59	0.004879	-1.6294
7	18	984.97	969.86	990.32	51.22	0.005605	3.5956
7	19	996.55	984.97	1007.62	57.18	0.006257	7.4482
7	20	1003.44	996.55	1019.67	62.46	0.006835	10.9265
7	21	1007.29	1003.44	1027.37	67.11	0.007344	13.5138
7	22	1009.28	1007.29	1031.60	71.15	0.007786	15.0209
7	23	1009.13	1009.28	1032.92	74.62	0.008166	16.0122
7	24	1007.40	1009.13	1031.93	77.59	0.008490	16.5098
7	25	1005.34	1007.40	1029.42	80.09	0.008764	16.2066
7	26	1001.19	1005.34	1025.33	82.19	0.008994	16.2479
7	27	996.41	1001.19	1020.13	83.95	0.009186	15.9688
7	28	991.48	996.41	1014.28	85.41	0.009346	15.3422
7	29	986.94	991.48	1008.23	86.62	0.009479	14.3262
7	30	981.37	986.94	1001.84	87.64	0.009590	13.7785
7	31	976.21	981.37	995.45	88.50	0.009684	12.9496
7	32	971.63	976.21	989.31	89.22	0.009763	11.9027
7	33	966.27	971.63	983.19	89.84	0.009832	11.3869
7	34	961.97	966.27	977.45	90.38	0.009890	10.4151
7	35	957.04	961.97	971.82	90.86	0.009943	9.9479
7	36	953.07	957.04	966.59	91.27	0.009988	9.0954
7	37	949.89	953.07	961.92	91.64	0.010028	8.1001
7	38	945.49	949.89	957.24	91.97	0.010064	7.9049
7	39	942.56	945.49	953.07	92.26	0.010097	7.0723
7	40	938.55	942.56	948.87	92.53	0.010126	6.9436
7	41	935.94	938.55	945.15	92.78	0.010153	6.1968
7	42	933.01	935.94	941.64	93.00	0.010177	5.8072
7	43	930.28	933.01	938.34	93.21	0.010200	5.4187
7	44	927.75	930.28	935.25	93.39	0.010220	5.0423
7	45	925.28	927.75	932.32	93.56	0.010238	4.7405
7	46	922.87	925.28	929.55	93.72	0.010256	4.4905
7	47	920.78	922.87	926.96	93.86	0.010272	4.1571
7	48	918.65	920.78	924.50	94.00	0.010286	3.9411
8	3	478.10	450.00	460.46	0.00	0.000000	-11.8726
8	4	499.88	478.10	474.71	0.00	0.000000	-16.9355
8	5	524.34	499.88	492.63	0.00	0.000000	-21.3444
8	6	551.75	524.34	513.92	0.00	0.000000	-25.4604
8	7	580.33	551.75	537.77	0.00	0.000000	-28.6488
8	8	611.52	580.33	564.16	0.00	0.000000	-31.8726
8	9	644.27	611.52	592.73	0.00	0.000000	-34.6857
8	10	678.82	644.27	623.30	0.00	0.000000	-37.3630
8	11	716.46	678.82	656.24	0.00	0.000000	-40.5311
8	12	758.55	716.46	696.78	1.71	0.000187	-41.5749
8	13	803.79	758.55	745.02	5.80	0.000635	-39.5494
8	14	848.70	803.79	797.53	12.08	0.001322	-34.4374
8	15	890.65	848.70	851.74	20.55	0.002249	-26.1878
8	16	926.70	890.65	899.99	29.27	0.003203	-17.9779
8	17	956.44	926.70	940.81	37.66	0.004122	-10.5235
8	18	979.75	956.44	973.93	45.44	0.004973	-3.9149
8	19	997.95	979.75	1000.12	52.52	0.005747	1.4581
8	20	1010.58	997.95	1019.65	58.80	0.006435	6.1082
8	21	1019.43	1010.58	1033.54	64.28	0.007034	9.4978
8	22	1024.42	1019.43	1042.50	69.00	0.007551	12.1664
8	23	1026.04	1024.42	1047.16	73.00	0.007988	14.2098
8	24	1025.63	1026.04	1048.41	76.32	0.008351	15.8309
8	25	1023.74	1025.63	1047.09	79.04	0.008649	15.7169

0.0000	40.1620	0.010943	0.000400	0.017509
0.0000	42.3597	0.010943	0.000400	0.017509
13.1949	54.0584	0.010658	0.000684	0.017366
21.4941	59.1324	0.010196	0.001146	0.017135
33.2402	64.7883	0.009483	0.001859	0.016779
40.8264	63.7871	0.008608	0.002734	0.016341
41.6828	56.6514	0.007715	0.003627	0.015895
39.9635	47.6918	0.006860	0.004482	0.015467
37.2777	38.9071	0.006063	0.005279	0.015069
33.9611	30.3655	0.005337	0.006005	0.014706
30.5102	23.0620	0.004685	0.006657	0.014380
27.0455	16.1190	0.004107	0.007235	0.014091
23.8297	10.3159	0.003598	0.007744	0.013836
20.6949	5.6740	0.003156	0.008186	0.013615
17.7897	1.7775	0.002776	0.008566	0.013425
15.1836	-1.3261	0.002452	0.008890	0.013263
12.8262	-3.3804	0.002178	0.009164	0.013126
10.7564	-5.4914	0.001948	0.009394	0.013011
8.9824	-6.9864	0.001756	0.009586	0.012915
7.4835	-7.8587	0.001596	0.009746	0.012835
6.2036	-8.1226	0.001463	0.009879	0.012769
5.2138	-8.5646	0.001352	0.009990	0.012713
4.3915	-8.5580	0.001258	0.010084	0.012666
3.6889	-8.2137	0.001179	0.010163	0.012627
3.2048	-8.1820	0.001110	0.010232	0.012592
2.7406	-7.6744	0.001052	0.010290	0.012563
2.4382	-7.5097	0.000999	0.010343	0.012537
2.1230	-6.9724	0.000954	0.010388	0.012514
1.8865	-6.2135	0.000914	0.010428	0.012494
1.6697	-6.2352	0.000878	0.010464	0.012476
1.5199	-5.5523	0.000845	0.010497	0.012460
1.3668	-5.5768	0.000816	0.010526	0.012445
1.2545	-4.9422	0.000789	0.010553	0.012432
1.1462	-4.6610	0.000765	0.010577	0.012420
1.0395	-4.3792	0.000742	0.010600	0.012408
0.9441	-4.0981	0.000722	0.010620	0.012398
0.8705	-3.8699	0.000704	0.010638	0.012389
0.8102	-3.6802	0.000686	0.010656	0.012380
0.7361	-3.4209	0.000670	0.010672	0.012372
0.6901	-3.2509	0.000656	0.010686	0.012365
0.0000	11.8726	0.010943	0.000400	0.017509
0.0000	16.9355	0.010943	0.000400	0.017509
0.0000	21.3444	0.010943	0.000400	0.017509
0.0000	25.4604	0.010943	0.000400	0.017509
0.0000	28.6488	0.010943	0.000400	0.017509
0.0000	31.8726	0.010943	0.000400	0.017509
0.0000	34.6857	0.010943	0.000400	0.017509
0.0000	37.3630	0.010943	0.000400	0.017509
0.0000	40.5311	0.010943	0.000400	0.017509
8.6930	50.2679	0.010755	0.000587	0.017415
20.8316	60.3810	0.010307	0.001035	0.017191
32.0147	66.4521	0.009620	0.001722	0.016847
43.2368	69.4247	0.008693	0.002649	0.016384
44.5709	62.5488	0.007739	0.003603	0.015907
42.9247	53.4482	0.006821	0.004522	0.015447
39.8253	43.7403	0.005969	0.005373	0.015022
36.2448	34.7866	0.005195	0.006147	0.014635
32.1937	26.0855	0.004508	0.006835	0.014291
28.1018	18.6039	0.003908	0.007434	0.013991
24.2021	12.0357	0.003391	0.007951	0.013733
20.4729	6.2630	0.002954	0.008388	0.013514
17.0213	1.6903	0.002591	0.008751	0.013333
13.9379	-1.7789	0.002293	0.009049	0.013184

8	26	1020.86	1023.74	1043.95	81.24	0.008890	15.5415
8	27	1015.30	1020.86	1038.93	83.03	0.009086	15.9023
8	28	1009.92	1015.30	1032.93	84.47	0.009244	15.4919
8	29	1004.51	1009.92	1026.45	85.66	0.009373	14.7697
8	30	998.33	1004.51	1019.59	86.65	0.009482	14.3073
8	31	992.40	998.33	1012.65	87.49	0.009574	13.6309
8	32	986.85	992.40	1005.87	88.21	0.009653	12.7961
8	33	980.88	986.85	999.14	88.85	0.009723	12.2930
8	34	975.67	980.88	992.73	89.42	0.009785	11.4797
8	35	970.14	975.67	986.47	89.93	0.009841	10.9925
8	36	965.34	970.14	980.56	90.39	0.009891	10.2455
8	37	961.15	965.34	975.09	90.79	0.009936	9.3803
8	38	956.31	961.15	969.76	91.17	0.009977	9.0485
8	39	953.21	956.31	965.08	91.52	0.010015	7.9865
8	40	948.20	953.21	960.22	91.83	0.010049	8.0903
8	41	945.43	948.20	955.99	92.12	0.010081	7.1078
8	42	941.38	945.43	951.75	92.38	0.010110	6.9797
8	43	938.69	941.38	947.98	92.63	0.010136	6.2528
8	44	935.73	938.69	944.43	92.85	0.010161	5.8573
8	45	932.84	935.73	941.06	93.06	0.010184	5.5334
8	46	930.05	932.84	937.84	93.25	0.010205	5.2464
8	47	927.50	930.05	934.81	93.43	0.010224	4.9211
8	48	925.02	927.50	931.93	93.59	0.010242	4.6549
9	3	467.39	450.00	456.29	0.00	0.000000	-7.4664
9	4	483.24	467.39	466.04	0.00	0.000000	-11.5760
9	5	502.21	483.24	479.11	0.00	0.000000	-15.5456
9	6	524.35	502.21	495.43	0.00	0.000000	-19.4630
9	7	548.52	524.35	514.54	0.00	0.000000	-22.8673
9	8	575.45	548.52	536.41	0.00	0.000000	-26.2747
9	9	603.72	575.45	560.51	0.00	0.000000	-29.0834
9	10	634.61	603.72	586.94	0.00	0.000000	-32.0763
9	11	668.36	634.61	615.88	0.00	0.000000	-35.3165
9	12	705.90	668.36	647.74	0.00	0.000000	-39.1415
9	13	748.35	705.90	685.76	0.97	0.000106	-42.1195
9	14	795.49	748.35	734.64	4.91	0.000537	-40.9562
9	15	844.00	795.49	788.98	11.10	0.001215	-37.0287
9	16	890.21	844.00	847.31	20.06	0.002195	-28.8690
9	17	930.44	890.21	899.83	29.33	0.003210	-20.6027
9	18	963.46	930.44	944.38	38.22	0.004183	-12.8384
9	19	989.99	963.46	980.92	46.46	0.005084	-6.1000
9	20	1009.89	989.99	1009.59	53.86	0.005894	-0.1973
9	21	1024.51	1009.89	1031.21	60.38	0.006607	4.5055
9	22	1034.79	1024.51	1046.61	65.96	0.007218	7.9562
9	23	1039.79	1034.79	1056.19	70.62	0.007728	11.0358
9	24	1041.24	1039.79	1060.84	74.42	0.008144	13.1943
9	25	1041.16	1041.24	1061.94	77.43	0.008474	13.9863
9	26	1038.89	1041.16	1060.23	79.78	0.008731	14.3583
9	27	1033.24	1038.89	1055.91	81.62	0.008932	15.2569
9	28	1027.75	1033.24	1050.24	83.08	0.009091	15.1361
9	29	1021.86	1027.75	1043.78	84.26	0.009221	14.7534
9	30	1015.32	1021.86	1036.83	85.26	0.009330	14.4778
9	31	1008.88	1015.32	1029.70	86.12	0.009424	14.0166
9	32	1002.67	1008.88	1022.61	86.88	0.009507	13.4215
9	33	996.21	1002.67	1015.55	87.57	0.009583	13.0136
9	34	990.31	996.21	1008.70	88.19	0.009651	12.3756
9	35	984.26	990.31	1001.99	88.76	0.009713	11.9337
9	36	978.76	984.26	995.56	89.29	0.009771	11.3021
9	37	973.75	978.76	989.47	89.76	0.009823	10.5772
9	38	968.43	973.75	983.56	90.21	0.009872	10.1813
9	39	964.34	968.43	978.12	90.60	0.009915	9.2793
9	40	959.11	964.34	972.72	90.98	0.009957	9.1603
9	41	956.10	959.11	968.02	91.33	0.009994	8.0209
9	42	951.06	956.10	963.15	91.65	0.010029	8.1329

11.3098	-4.2317	0.002052	0.009290	0.013063
9.1388	-6.7635	0.001856	0.009486	0.012965
7.4208	-8.0710	0.001698	0.009644	0.012886
6.0520	-8.7177	0.001569	0.009773	0.012822
5.0782	-9.2290	0.001460	0.009882	0.012767
4.3153	-9.3156	0.001368	0.009974	0.012721
3.6941	-9.1019	0.001289	0.010053	0.012682
3.2818	-9.0112	0.001219	0.010123	0.012647
2.8857	-8.5940	0.001157	0.010185	0.012616
2.6239	-8.3686	0.001101	0.010241	0.012588
2.3474	-7.8980	0.001051	0.010291	0.012563
2.0737	-7.3065	0.001006	0.010336	0.012540
1.9390	-7.1095	0.000965	0.010377	0.012520
1.7476	-6.2388	0.000927	0.010415	0.012501
1.6262	-6.4641	0.000893	0.010449	0.012483
1.4739	-5.6338	0.000861	0.010481	0.012468
1.3396	-5.6400	0.000832	0.010510	0.012453
1.2468	-5.0060	0.000806	0.010536	0.012440
1.1444	-4.7129	0.000781	0.010561	0.012428
1.0566	-4.4767	0.000758	0.010584	0.012416
0.9813	-4.2651	0.000737	0.010605	0.012406
0.9020	-4.0191	0.000718	0.010624	0.012396
0.8403	-3.8145	0.000700	0.010642	0.012387
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0.0000	19.4630	0.010943	0.000400	0.017509
0.0000	22.8673	0.010943	0.000400	0.017509
0.0000	26.2747	0.010943	0.000400	0.017509
0.0000	29.0834	0.010943	0.000400	0.017509
0.0000	32.0763	0.010943	0.000400	0.017509
0.0000	35.3165	0.010943	0.000400	0.017509
0.0000	39.1415	0.010943	0.000400	0.017509
4.9351	47.0547	0.010836	0.000506	0.017455
20.0536	61.0098	0.010405	0.000937	0.017240
31.5752	68.6040	0.009727	0.001615	0.016901
45.7037	74.5727	0.008747	0.002595	0.016411
47.4123	68.0150	0.007732	0.003610	0.015903
45.4987	58.3372	0.006759	0.004583	0.015417
42.1811	48.2812	0.005858	0.005484	0.014966
37.9440	38.1413	0.005048	0.006294	0.014561
33.4019	28.8964	0.004335	0.007007	0.014205
28.6343	20.6781	0.003724	0.007618	0.013899
23.9205	12.8846	0.003214	0.008128	0.013644
19.4723	6.2780	0.002798	0.008544	0.013436
15.4659	1.4795	0.002468	0.008874	0.013271
12.0438	-2.3144	0.002211	0.009131	0.013143
9.4342	-5.8227	0.002010	0.009332	0.013042
7.4780	-7.6581	0.001851	0.009491	0.012962
6.0507	-8.7027	0.001721	0.009621	0.012898
5.1126	-9.3652	0.001612	0.009730	0.012843
4.4220	-9.5945	0.001518	0.009824	0.012796
3.8831	-9.5384	0.001435	0.009907	0.012755
3.5266	-9.4870	0.001359	0.009983	0.012717
3.1811	-9.1944	0.001291	0.010051	0.012683
2.9408	-8.9929	0.001229	0.010113	0.012651
2.6845	-8.6175	0.001171	0.010171	0.012623
2.4295	-8.1477	0.001119	0.010223	0.012597
2.2767	-7.9045	0.001070	0.010272	0.012572
2.0194	-7.2598	0.001027	0.010315	0.012551
1.9522	-7.2081	0.000985	0.010357	0.012530
1.7516	-6.2692	0.000948	0.010394	0.012511
1.6392	-6.4937	0.000913	0.010429	0.012494

8-28

595013

9-12

9	43	948.25	951.06	958.89	91.94	0.010061	7.1601
9	44	944.16	948.25	954.62	92.21	0.010090	7.0406
9	45	941.38	944.16	950.81	92.46	0.010118	6.9453
9	46	938.25	941.38	947.18	92.69	0.010143	6.0083
9	47	935.27	938.25	943.72	92.90	0.010166	5.6877
9	48	932.40	935.27	940.42	93.10	0.010188	5.3983
10	3	460.24	450.00	453.70	0.00	0.000000	-4.3991
10	4	471.37	460.24	460.10	0.00	0.000000	-7.5843
10	5	486.14	471.37	469.52	0.00	0.000000	-11.1905
10	6	503.53	486.14	481.80	0.00	0.000000	-14.6240
10	7	523.33	503.53	496.78	0.00	0.000000	-17.8698
10	8	545.94	523.33	514.47	0.00	0.000000	-21.1789
10	9	570.46	545.94	534.58	0.00	0.000000	-24.1514
10	10	596.94	570.46	556.91	0.00	0.000000	-26.9408
10	11	626.63	596.94	581.79	0.00	0.000000	-30.1743
10	12	659.72	626.63	609.51	0.00	0.000000	-33.7907
10	13	697.02	659.72	640.51	0.00	0.000000	-38.0324
10	14	739.37	697.02	676.22	0.31	0.000034	-42.5033
10	15	788.92	739.37	726.00	4.18	0.000457	-42.3446
10	16	840.67	788.92	782.33	10.40	0.001138	-39.2639
10	17	891.05	840.67	844.70	19.88	0.002176	-31.1932
10	18	934.76	891.05	900.90	29.66	0.003245	-22.7835
10	19	971.08	934.76	948.87	39.01	0.004269	-14.9439
10	20	999.75	971.08	988.10	47.60	0.005209	-7.8437
10	21	1021.74	999.75	1019.00	55.27	0.006048	-1.8429
10	22	1037.89	1021.74	1042.27	61.92	0.006776	2.9499
10	23	1047.87	1037.89	1058.25	67.47	0.007383	6.9840
10	24	1053.49	1047.87	1067.98	71.92	0.007871	9.7566
10	25	1054.92	1053.49	1072.38	75.37	0.008248	11.7532
10	26	1053.80	1054.92	1072.75	77.95	0.008530	12.7524
10	27	1049.43	1053.80	1069.95	79.91	0.008744	13.8096
10	28	1044.23	1049.43	1065.21	81.41	0.008909	14.1196
10	29	1038.31	1044.23	1059.31	82.61	0.009040	14.1364
10	30	1031.73	1038.31	1052.73	83.63	0.009152	14.1313
10	31	1025.09	1031.73	1045.80	84.53	0.009250	13.9383
10	32	1018.55	1025.09	1038.77	85.34	0.009339	13.6119
10	33	1011.82	1018.55	1031.68	86.08	0.009420	13.3655
10	34	1005.47	1011.82	1024.69	86.77	0.009495	12.9301
10	35	999.05	1005.47	1017.77	87.41	0.009566	12.5950
10	36	993.04	999.05	1011.03	88.01	0.009631	12.1060
10	37	987.39	993.04	1004.53	88.56	0.009691	11.5322
10	38	981.62	987.39	998.19	89.08	0.009748	11.1482
10	39	976.73	981.62	992.20	89.55	0.009799	10.4141
10	40	971.19	976.73	986.31	90.00	0.009849	10.1783
10	41	967.18	971.19	980.92	90.39	0.009892	9.2447
10	42	961.94	967.18	975.54	90.78	0.009934	9.1506
10	43	958.93	961.94	970.86	91.13	0.009972	8.0242
10	44	953.86	958.93	965.98	91.45	0.010008	8.1590
10	45	951.01	953.86	961.72	91.75	0.010040	7.2063
10	46	946.79	951.01	957.40	92.02	0.010070	7.1423
10	47	943.96	946.79	953.54	92.28	0.010098	6.4500
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11	3	456.03	450.00	452.18	0.00	0.000000	-2.5908
11	4	463.63	456.03	456.32	0.00	0.000000	-4.9148
11	5	474.18	463.63	462.78	0.00	0.000000	-7.6709
11	6	487.99	474.18	471.89	0.00	0.000000	-10.8295
11	7	503.79	487.99	483.41	0.00	0.000000	-13.7150
11	8	522.32	503.79	497.44	0.00	0.000000	-16.7434
11	9	543.03	522.32	513.85	0.00	0.000000	-19.6420
11	10	565.92	543.03	532.55	0.00	0.000000	-22.4615
11	11	591.76	565.92	553.76	0.00	0.000000	-25.5793
11	12	619.99	591.76	577.41	0.00	0.000000	-28.6556
11	13	652.45	619.99	604.12	0.00	0.000000	-32.5269

1.4929	-5.6671	0.000881	0.010461	0.012478
1.3592	-5.6814	0.000852	0.010490	0.012463
1.2770	-5.0683	0.000825	0.010518	0.012449
1.1863	-4.8219	0.000799	0.010543	0.012437
1.0963	-4.5914	0.000776	0.010566	0.012425
1.0192	-4.3790	0.000754	0.010588	0.012414
0.0000	4.3991	0.010943	0.000400	0.017509
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0.0000	14.6240	0.010943	0.000400	0.017509
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1.6091	44.1125	0.010908	0.000434	0.017491
19.6619	62.0065	0.010485	0.000857	0.017280
31.7080	70.9720	0.009804	0.001538	0.016939
48.4216	79.6148	0.008766	0.002576	0.016420
49.9641	72.7477	0.007697	0.003645	0.015886
47.8884	62.8323	0.006673	0.004669	0.015374
44.0238	51.8675	0.005733	0.005609	0.014904
39.3202	41.1631	0.004894	0.006448	0.014484
34.1094	31.1595	0.004166	0.007176	0.014120
28.4644	21.4804	0.003559	0.007783	0.013817
22.8788	13.1221	0.003071	0.008271	0.013573
17.6921	5.9388	0.002694	0.008648	0.013384
13.2432	0.4908	0.002412	0.008930	0.013243
10.0323	-3.7773	0.002198	0.009144	0.013136
7.7110	-6.4085	0.002033	0.009309	0.013054
6.1729	-7.9635	0.001902	0.009440	0.012988
5.2392	-8.8920	0.001790	0.009552	0.012932
4.6035	-9.3347	0.001692	0.009650	0.012883
4.1332	-9.4787	0.001603	0.009739	0.012839
3.8219	-9.5436	0.001522	0.009820	0.012798
3.5187	-9.4114	0.001447	0.009895	0.012761
3.2962	-9.2988	0.001376	0.009966	0.012725
3.0564	-9.0495	0.001311	0.010031	0.012693
2.8155	-8.7166	0.001251	0.010091	0.012663
2.6492	-8.4990	0.001194	0.010148	0.012634
2.4028	-8.0113	0.001143	0.010199	0.012609
2.2981	-7.8801	0.001093	0.010249	0.012584
2.0314	-7.2133	0.001050	0.010292	0.012562
1.9739	-7.1767	0.001008	0.010334	0.012541
1.7742	-6.2500	0.000970	0.010372	0.012522
1.6650	-6.4939	0.000934	0.010408	0.012504
1.5229	-5.6833	0.000902	0.010440	0.012488
1.3959	-5.7464	0.000872	0.010470	0.012473
1.3159	-5.1340	0.000844	0.010498	0.012459
1.2248	-4.8963	0.000817	0.010525	0.012446
0.0000	2.5908	0.010943	0.000400	0.017509
0.0000	4.9148	0.010943	0.000400	0.017509
0.0000	7.6709	0.010943	0.000400	0.017509
0.0000	10.8295	0.010943	0.000400	0.017509
0.0000	13.7150	0.010943	0.000400	0.017509
0.0000	16.7434	0.010943	0.000400	0.017509
0.0000	19.6420	0.010943	0.000400	0.017509
0.0000	22.4615	0.010943	0.000400	0.017509
0.0000	25.5793	0.010943	0.000400	0.017509
0.0000	28.6556	0.010943	0.000400	0.017509
0.0000	32.5269	0.010943	0.000400	0.017509

11	14	689.30	652.45	634.32	0.00	0.000000	-37.0037
11	15	732.16	689.30	668.85	0.00	0.000000	-42.6063
11	16	783.91	732.16	719.14	3.72	0.000407	-43.5931
11	17	838.98	783.91	777.71	10.09	0.001104	-41.2361
11	18	892.91	838.98	843.63	20.05	0.002194	-33.1669
11	19	939.95	892.91	903.17	30.28	0.003314	-24.7519
11	20	978.69	939.95	953.90	40.00	0.004377	-16.6884
11	21	1009.56	978.69	995.46	48.88	0.005349	-9.4874
11	22	1033.19	1009.56	1028.17	56.73	0.006208	-3.3757
11	23	1049.54	1033.19	1052.25	63.37	0.006935	1.8216
11	24	1059.97	1049.54	1068.48	68.75	0.007523	5.7313
11	25	1065.51	1059.97	1077.95	72.86	0.007974	8.3707
11	26	1066.54	1065.51	1081.78	75.87	0.008302	10.2515
11	27	1063.41	1066.54	1081.16	78.03	0.008539	11.9424
11	28	1058.96	1063.41	1077.82	79.62	0.008713	12.6934
11	29	1053.40	1058.96	1072.85	80.87	0.008849	13.0916
11	30	1047.83	1053.40	1067.21	81.92	0.008965	13.0392
11	31	1041.43	1047.83	1061.00	82.85	0.009066	13.1686
11	32	1034.90	1041.43	1054.46	83.70	0.009159	13.1655
11	33	1028.19	1034.90	1047.73	84.49	0.009246	13.1523
11	34	1021.63	1028.19	1040.92	85.23	0.009327	12.9812
11	35	1015.03	1021.63	1034.08	85.94	0.009404	12.8206
11	36	1007.99	1015.03	1027.05	86.60	0.009476	12.8304
11	37	1001.89	1007.99	1020.23	87.21	0.009544	12.3426
11	38	995.72	1001.89	1013.54	87.80	0.009608	11.9909
11	39	990.19	995.72	1007.12	88.34	0.009668	11.3931
11	40	984.30	990.19	1000.81	88.86	0.009724	11.1096
11	41	979.49	984.30	994.88	89.33	0.009776	10.3556
11	42	973.96	979.49	989.03	89.78	0.009825	10.1413
11	43	969.96	973.96	983.66	90.18	0.009869	9.2193
11	44	964.72	969.96	978.31	90.58	0.009912	9.1463
11	45	961.70	964.72	973.64	90.93	0.009950	8.0329
11	46	956.54	961.70	968.75	91.26	0.009987	8.2177
11	47	953.67	956.54	964.47	91.56	0.010020	7.2673
11	48	949.38	953.67	960.11	91.84	0.010050	7.2233
12	3	454.08	450.47	451.47	0.00	0.000000	-1.7524
12	4	458.72	454.08	454.10	0.00	0.000000	-3.1136
12	5	466.10	458.72	458.44	0.00	0.000000	-5.1560
12	6	476.15	466.10	464.85	0.00	0.000000	-7.6087
12	7	488.93	476.15	473.55	0.00	0.000000	-10.3498
12	8	503.79	488.93	484.47	0.00	0.000000	-13.0022
12	9	520.89	503.79	497.60	0.00	0.000000	-15.6751
12	10	540.23	520.89	512.94	0.00	0.000000	-18.3661
12	11	562.31	540.23	530.67	0.00	0.000000	-21.2942
12	12	586.84	562.31	550.79	0.00	0.000000	-24.2576
12	13	614.28	586.84	573.47	0.00	0.000000	-27.4623
12	14	646.08	614.28	599.33	0.00	0.000000	-31.4614
12	15	682.92	646.08	628.99	0.00	0.000000	-36.2997
12	16	726.92	682.92	663.58	0.00	0.000000	-42.6259
12	17	780.64	726.92	714.11	3.53	0.000386	-44.7763
12	18	838.74	780.64	774.99	10.12	0.001108	-42.9040
12	19	895.97	838.74	844.11	20.54	0.002248	-34.8991
12	20	945.56	895.97	906.35	31.13	0.003406	-26.3847
12	21	986.57	945.56	959.44	41.15	0.004503	-18.2568
12	22	1019.19	986.57	1002.92	50.25	0.005499	-10.9523
12	23	1043.41	1019.19	1036.69	58.16	0.006364	-4.5210
12	24	1060.19	1043.41	1061.21	64.70	0.007080	0.6819
12	25	1071.41	1060.19	1077.52	69.78	0.007636	4.1089
12	26	1075.47	1071.41	1086.15	73.45	0.008038	7.1856
12	27	1075.52	1075.47	1089.07	76.00	0.008316	9.1220
12	28	1071.61	1075.52	1087.79	77.78	0.008511	10.3868
12	29	1066.79	1071.61	1084.16	79.10	0.008656	11.6925
12	30	1061.52	1066.79	1079.30	80.15	0.008771	11.9681

0.0000	37.0037	0.010943	0.000400	0.017509
0.0000	42.6063	0.010943	0.000400	0.017509
18.9330	62.5261	0.010535	0.000807	0.017305
32.4563	73.6924	0.009838	0.001504	0.016956
50.8849	84.0518	0.008748	0.002594	0.016411
52.3001	77.0520	0.007629	0.003714	0.015851
49.7810	66.4694	0.006565	0.004777	0.015320
45.5312	55.0186	0.005593	0.005749	0.014834
40.2487	43.6244	0.004734	0.006608	0.014404
34.1103	32.2887	0.004007	0.007335	0.014041
27.5898	21.8584	0.003419	0.007923	0.013747
21.1483	12.7775	0.002968	0.008374	0.013521
15.4251	5.1735	0.002640	0.008702	0.013357
11.1063	-0.8360	0.002403	0.008939	0.013239
8.1725	-4.5209	0.002229	0.009113	0.013152
6.3754	-6.7162	0.002093	0.009249	0.013084
5.4108	-7.6283	0.001977	0.009365	0.013026
4.7729	-8.3956	0.001876	0.009466	0.012975
4.3423	-8.8231	0.001783	0.009559	0.012929
4.0683	-9.0839	0.001696	0.009646	0.012885
3.8060	-9.1751	0.001615	0.009727	0.012845
3.6099	-9.2106	0.001538	0.009804	0.012806
3.3672	-9.4632	0.001466	0.009876	0.012770
3.1667	-9.1759	0.001398	0.009944	0.012736
3.0079	-8.9830	0.001334	0.010008	0.012704
2.7801	-8.6129	0.001274	0.010068	0.012674
2.6559	-8.4537	0.001218	0.010124	0.012646
2.4067	-7.9488	0.001166	0.010176	0.012620
2.3130	-7.8283	0.001117	0.010225	0.012596
2.0453	-7.1739	0.001073	0.010269	0.012574
1.9973	-7.1489	0.001030	0.010312	0.012552
1.7986	-6.2342	0.000992	0.010350	0.012533
1.6987	-6.5189	0.000955	0.010387	0.012515
1.5565	-5.7108	0.000922	0.010420	0.012498
1.4293	-5.7940	0.000892	0.010450	0.012483
0.0000	1.7524	0.010943	0.000400	0.017509
0.0000	3.1136	0.010943	0.000400	0.017509
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0.0000	7.6087	0.010943	0.000400	0.017509
0.0000	10.3498	0.010943	0.000400	0.017509
0.0000	13.0022	0.010943	0.000400	0.017509
0.0000	15.6751	0.010943	0.000400	0.017509
0.0000	18.3661	0.010943	0.000400	0.017509
0.0000	21.2942	0.010943	0.000400	0.017509
0.0000	24.2576	0.010943	0.000400	0.017509
0.0000	27.4623	0.010943	0.000400	0.017509
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0.0000	36.2997	0.010943	0.000400	0.017509
0.0000	42.6259	0.010943	0.000400	0.017509
17.9770	62.7534	0.010556	0.000786	0.017315
33.6047	76.5088	0.009834	0.001508	0.016954
53.1822	88.0814	0.008694	0.002648	0.016384
54.1732	80.5580	0.007536	0.003806	0.015805
51.3544	69.6112	0.006439	0.004903	0.015257
46.6525	57.6048	0.005443	0.005899	0.014759
40.5853	45.1063	0.004578	0.006764	0.014326
33.5996	32.9176	0.003862	0.007480	0.013968
26.0984	21.9894	0.003306	0.008036	0.013690
18.8455	11.6598	0.002904	0.008438	0.013489
13.0832	3.9611	0.002626	0.008716	0.013350
9.1514	-1.7354	0.002431	0.008911	0.013253
6.7789	-4.9135	0.002286	0.009056	0.013180
5.3876	-6.5804	0.002171	0.009171	0.013123

12	31	1056.22	1061.52	1074.00	81.08	0.008873	11.9653
12	32	1050.07	1056.22	1068.22	81.94	0.008967	12.2184
12	33	1043.64	1050.07	1062.12	82.76	0.009056	12.4340
12	34	1037.20	1043.64	1055.80	83.53	0.009141	12.5175
12	35	1030.67	1037.20	1049.33	84.28	0.009223	12.5616
12	36	1023.82	1030.67	1042.70	85.02	0.009303	12.7061
12	37	1017.47	1023.82	1036.05	85.71	0.009379	12.5085
12	38	1010.40	1017.47	1029.16	86.36	0.009451	12.6304
12	39	1004.43	1010.40	1022.48	86.98	0.009518	12.1455
12	40	998.24	1004.43	1015.89	87.57	0.009583	11.8773
12	41	992.80	998.24	1009.56	88.12	0.009643	11.2807
12	42	986.95	992.80	1003.34	88.64	0.009700	11.0249
12	43	982.18	986.95	997.47	89.11	0.009752	10.2885
12	44	976.66	982.18	991.67	89.57	0.009801	10.0975
12	45	972.69	976.66	986.34	89.97	0.009846	9.1907
12	46	967.40	972.69	981.01	90.37	0.009889	9.1595
12	47	963.68	967.40	976.10	90.72	0.009928	8.3579
12	48	959.13	963.68	971.28	91.06	0.009965	8.1790

4.7940	-7.1713	0.002069	0.009273	0.013072
4.4053	-7.8131	0.001975	0.009367	0.013025
4.1821	-8.2518	0.001886	0.009456	0.012980
3.9867	-8.5307	0.001801	0.009541	0.012938
3.8375	-8.7241	0.001719	0.009623	0.012897
3.7679	-8.9381	0.001639	0.009703	0.012857
3.5515	-8.9570	0.001563	0.009779	0.012819
3.3560	-9.2744	0.001491	0.009851	0.012783
3.1557	-8.9897	0.001424	0.009918	0.012749
3.0235	-8.8538	0.001359	0.009983	0.012717
2.7908	-8.4899	0.001299	0.010043	0.012687
2.6734	-8.3514	0.001242	0.010100	0.012658
2.4232	-7.8652	0.001191	0.010152	0.012632
2.3363	-7.7611	0.001141	0.010201	0.012607
2.0654	-7.1252	0.001096	0.010246	0.012585
2.0299	-7.1295	0.001053	0.010289	0.012564
1.8100	-6.5479	0.001014	0.010328	0.012544
1.7419	-6.4371	0.000977	0.010365	0.012526

12-31

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// XEQ
 0.726667  0.566667  3.716667  2.816667  0.000000 0.75  24  48
 450.00  456.03  463.63  474.18  487.99  503.79  522.32  543.03
 565.92  591.76  619.99  652.45  689.30  732.16  783.91  838.98
 892.91  939.95  978.69 1009.56 1033.19 1049.54 1059.97 1065.51
1066.54 1063.41 1058.96 1053.40 1047.83 1041.43 1034.90 1028.19
1021.63 1015.03 1007.99 1001.89  995.72  990.19  984.30  979.49
 973.96  969.96  964.72  961.70  956.54  953.67  949.38
  12    3  454.08  450.47  451.47    0.00    0.000000   -1.7517
  12    4  458.72  454.08  454.10    0.00    0.000000   -3.1136
  12    5  466.10  458.72  458.44    0.00    0.000000   -5.1544
  12    6  476.15  466.10  464.85    0.00    0.000000   -7.6090
  12    7  488.93  476.15  473.55    0.00    0.000000  -10.3489
  12    8  503.78  488.93  484.46    0.00    0.000000  -13.0022
  12    9  520.88  503.78  497.59    0.00    0.000000  -15.6736
  12   10  540.22  520.88  512.93    0.00    0.000000  -18.3652
  12   11  562.30  540.22  530.66    0.00    0.000000  -21.2927
  12   12  586.83  562.30  550.79    0.00    0.000000  -24.2584
  12   13  614.28  586.83  573.47    0.00    0.000000  -27.4633
  12   14  646.07  614.28  599.32    0.00    0.000000  -31.4613
  12   15  682.92  646.07  628.98    0.00    0.000000  -36.2997
  12   16  726.91  682.92  663.57    0.00    0.000000  -42.6257
  12   17  780.63  726.91  714.10    3.53    0.000386  -44.7757
  12   18  838.73  780.63  774.98   10.12    0.001108  -42.9051
  12   19  895.96  838.73  844.10   20.54    0.002247  -34.9002
  12   20  945.55  895.96  906.35   31.13    0.003406  -26.3853
  12   21  986.56  945.55  959.43   41.15    0.004503  -18.2578
  12   22 1019.18  986.56 1002.91   50.25    0.005499  -10.9532
  12   23 1043.41 1019.18 1036.69   58.16    0.006364   -4.5208
  12   24 1060.19 1043.41 1061.20   64.70    0.007080    0.6813
  12   25 1071.41 1060.19 1077.51   69.78    0.007636    4.1100
  12   26 1075.46 1071.41 1086.14   73.45    0.008038    7.1877
  12   27 1075.51 1075.46 1089.07   76.00    0.008316    9.1231
  12   28 1071.61 1075.51 1087.79   77.78    0.008511   10.8856
  12   29 1066.78 1071.61 1084.16   79.10    0.008656   11.6931
  12   30 1061.51 1066.78 1079.30   80.15    0.008771   11.9707
  12   31 1056.22 1061.51 1074.00   81.08    0.008873   11.9655
  12   32 1050.06 1056.22 1068.22   81.94    0.008967   12.2188
  12   33 1043.64 1050.06 1062.11   82.76    0.009056   12.4330
  12   34 1037.19 1043.64 1055.79   83.53    0.009141   12.5190
  12   35 1030.66 1037.19 1049.33   84.28    0.009223   12.5629
  12   36 1023.82 1030.66 1042.70   85.02    0.009303   12.7047
  12   37 1017.47 1023.82 1036.05   85.71    0.009379   12.5072
  12   38 1010.39 1017.47 1029.16   86.36    0.009451   12.6307
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0.0000	13.0022	0.010943	0.000400	0.017509	
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0.0000	24.2584	0.010943	0.000400	0.017509	
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0.0000	31.4613	0.010943	0.000400	0.017509	
0.0000	36.2997	0.010943	0.000400	0.017509	
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17.9735	62.7493	0.010556	0.000786	0.017315	
33.6000	76.5052	0.009834	0.001508	0.016954	
53.1820	88.0823	0.008695	0.002647	0.016385	
54.1728	80.5582	0.007536	0.003806	0.015805	
51.3548	69.6126	0.006439	0.004903	0.015257	
46.6533	57.6065	0.005443	0.005899	0.014759	
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33.6008	32.9195	0.003862	0.007480	0.013968	
26.0999	21.9898	0.003306	0.008036	0.013690	
18.8476	11.6599	0.002904	0.008438	0.013489	
13.0854	3.9622	0.002626	0.008716	0.013350	
9.1519	-1.7337	0.002431	0.008911	0.013253	
6.7797	-4.9133	0.002286	0.009056	0.013180	
5.3892	-6.5815	0.002171	0.009171	0.013123	
4.7938	-7.1717	0.002069	0.009273	0.013072	
4.4051	-7.8136	0.001975	0.009367	0.013025	
4.1813	-8.2517	0.001886	0.009456	0.012980	
3.9876	-8.5313	0.001801	0.009541	0.012938	
3.8379	-8.7249	0.001719	0.009623	0.012897	
3.7672	-8.9375	0.001639	0.009703	0.012857	
3.5510	-8.9562	0.001563	0.009779	0.012819	
3.3561	-9.2746	0.001491	0.009851	0.012783	12-33

12	39	1004.43	1010.39	1022.47	86.98	0.009518	12.1455
12	40	998.23	1004.43	1015.88	87.57	0.009583	11.8790
13	3	452.72	0.00	450.98	0.00	0.000000	-1.1711
13	4	456.08	452.72	452.83	0.00	0.000000	-2.1899
13	5	460.76	456.08	455.70	0.00	0.000000	-3.4072
13	6	467.94	460.76	460.13	0.00	0.000000	-5.2574
13	7	477.41	467.94	466.38	0.00	0.000000	-7.4235
13	8	489.51	477.41	474.74	0.00	0.000000	-9.9423
13	9	503.34	489.51	485.06	0.00	0.000000	-12.3010
13	10	519.35	503.34	497.42	0.00	0.000000	-14.7581
13	11	537.88	519.35	511.98	0.00	0.000000	-17.4322
13	12	558.83	537.88	528.81	0.00	0.000000	-20.2041
13	13	582.51	558.83	548.05	0.00	0.000000	-23.1914
13	14	609.23	582.51	569.92	0.00	0.000000	-26.4556
13	15	640.70	609.23	595.14	0.00	0.000000	-30.6649
13	16	678.02	640.70	624.56	0.00	0.000000	-35.9791
13	17	723.83	678.02	659.65	0.00	0.000000	-43.1935
13	18	778.95	723.83	710.80	3.46	0.000378	-45.8659
13	19	840.15	778.95	774.44	10.46	0.001144	-44.2285
13	20	899.95	840.15	846.13	21.25	0.002326	-36.2211
13	21	951.80	899.95	910.62	32.15	0.003519	-27.7152
13	22	994.62	951.80	965.59	42.42	0.004642	-19.5376
13	23	1028.81	994.62	1010.49	51.63	0.005650	-12.3245
13	24	1052.93	1028.81	1044.86	59.52	0.006513	-5.4313
13	25	1070.39	1052.93	1069.54	65.87	0.007208	-0.5726
13	26	1080.17	1070.39	1085.02	70.57	0.007722	3.2589
13	27	1083.27	1080.17	1092.55	73.76	0.008072	6.2421
13	28	1082.20	1083.27	1094.50	75.89	0.008305	8.2792
13	29	1079.51	1082.20	1093.25	77.36	0.008465	9.2460
13	30	1074.68	1079.51	1089.85	78.45	0.008585	10.2059
13	31	1069.50	1074.68	1085.44	79.38	0.008686	10.7257
13	32	1063.88	1069.50	1080.43	80.22	0.008779	11.1347
13	33	1057.92	1063.88	1075.00	81.03	0.008867	11.4966
13	34	1051.81	1057.92	1069.29	81.82	0.008953	11.7618
13	35	1045.55	1051.81	1063.34	82.58	0.009037	11.9735
13	36	1039.03	1045.55	1057.18	83.34	0.009120	12.2173
13	37	1032.70	1039.03	1050.89	84.08	0.009200	12.2420
13	38	1025.92	1032.70	1044.42	84.80	0.009280	12.4531
13	39	1019.70	1025.92	1037.93	85.49	0.009355	12.2653
13	40	1012.67	1019.70	1031.17	86.14	0.009427	12.4482
14	3	451.90	0.00	450.68	0.00	0.000000	-0.8158
14	4	454.24	451.90	451.97	0.00	0.000000	-1.5265
14	5	457.73	454.24	454.06	0.00	0.000000	-2.4737
14	6	462.37	457.73	457.06	0.00	0.000000	-3.5703
14	7	469.25	462.37	461.47	0.00	0.000000	-5.2348

3.1557	-8.9898	0.001424	0.009918	0.012749	12-39
3.0240	-8.8550	0.001359	0.009983	0.012717	
0.0000	1.1711	0.010943	0.000400	0.017509	
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0.0000	35.9791	0.010943	0.000400	0.017509	
0.0000	43.1935	0.010943	0.000400	0.017509	
17.6039	63.4698	0.010564	0.000778	0.017319	

35.6746	79.9032	0.009798	0.001544	0.016936	
55.1343	91.3554	0.008616	0.002726	0.016345	
55.7904	83.5056	0.007423	0.003919	0.015749	
52.6060	72.1436	0.006300	0.005042	0.015187	
47.2406	59.5651	0.005292	0.006050	0.014683	
40.5166	45.9479	0.004429	0.006913	0.014252	
32.6179	33.1906	0.003734	0.007608	0.013904	
24.1427	20.8838	0.003220	0.008122	0.013647	
16.4269	10.1847	0.002870	0.008472	0.013472	
10.9269	2.6477	0.002637	0.008705	0.013356	
7.5477	-1.6983	0.002477	0.008865	0.013276	
5.6031	-4.6027	0.002357	0.008985	0.013216	
4.7566	-5.9691	0.002256	0.009086	0.013165	
4.3449	-6.7897	0.002163	0.009179	0.013119	
4.1586	-7.3380	0.002075	0.009267	0.013075	
4.0296	-7.7321	0.001989	0.009353	0.013032	
3.9372	-8.0362	0.001905	0.009437	0.012990	
3.8970	-8.3203	0.001822	0.009520	0.012948	
3.7516	-8.4904	0.001742	0.009600	0.012908	
3.7305	-8.7225	0.001662	0.009680	0.012868	
3.5169	-8.7483	0.001587	0.009755	0.012831	
3.3461	-9.1021	0.001515	0.009827	0.012795	
0.0000	0.8158	0.010943	0.000400	0.017509	
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0.0000	5.2348	0.010943	0.000400	0.017509	14-7

14	8	478.30	469.25	467.56	0.00	0.000000	-7.2311
14	9	489.09	478.30	475.34	0.00	0.000000	-9.2563
14	10	502.61	489.09	485.18	0.00	0.000000	-11.7317
14	11	517.93	502.61	496.99	0.00	0.000000	-14.0952
14	12	535.53	517.93	510.86	0.00	0.000000	-16.6061
14	13	555.68	535.53	526.96	0.00	0.000000	-19.3282
14	14	578.62	555.68	545.48	0.00	0.000000	-22.3044
14	15	604.87	578.62	566.71	0.00	0.000000	-25.6812
14	16	636.40	604.87	591.55	0.00	0.000000	-30.1819
14	17	674.72	636.40	621.09	0.00	0.000000	-36.0933
14	18	721.49	674.72	656.60	0.00	0.000000	-43.6698
14	19	778.84	721.49	708.94	3.51	0.000384	-47.0445
14	20	842.87	778.84	775.58	11.03	0.001207	-45.2890
14	21	904.90	842.87	849.48	22.17	0.002426	-37.2977
14	22	958.56	904.90	915.79	33.33	0.003647	-28.7880
14	23	1003.62	958.56	972.48	43.77	0.004790	-20.9560
14	24	1037.50	1003.62	1018.09	53.03	0.005803	-13.0612
14	25	1062.83	1037.50	1052.97	60.83	0.006657	-6.6399
14	26	1079.02	1062.83	1077.06	66.88	0.007319	-1.3191
14	27	1087.24	1079.02	1091.27	71.15	0.007786	2.7155
14	28	1089.25	1087.24	1097.58	73.90	0.008087	5.6065
14	29	1089.08	1089.25	1099.12	75.62	0.008275	6.7591
14	30	1085.87	1089.08	1097.73	76.81	0.008405	7.9786
14	31	1081.10	1085.87	1094.53	77.72	0.008505	9.0333
14	32	1076.24	1081.10	1090.52	78.53	0.008594	9.6070
14	33	1070.13	1076.24	1085.78	79.33	0.008681	10.5300
14	34	1065.03	1070.13	1080.88	80.12	0.008767	10.6665
14	35	1059.26	1065.03	1075.65	80.89	0.008852	11.0307
14	36	1053.20	1059.26	1070.13	81.65	0.008935	11.3958
14	37	1047.13	1053.20	1064.39	82.40	0.009018	11.6107
14	38	1040.73	1047.13	1058.42	83.15	0.009099	11.9024
14	39	1034.56	1040.73	1052.31	83.87	0.009178	11.9441
14	40	1027.88	1034.56	1046.01	84.60	0.009257	12.2010
15	3	451.39	0.00	450.50	0.00	0.000000	-0.5984
15	4	452.95	451.39	451.39	0.00	0.000000	-1.0537
15	5	455.55	452.95	452.89	0.00	0.000000	-1.7865
15	6	459.08	455.55	455.13	0.00	0.000000	-2.6554
15	7	463.59	459.08	458.19	0.00	0.000000	-3.6340
15	8	470.25	463.59	462.55	0.00	0.000000	-5.1772
15	9	478.49	470.25	468.32	0.00	0.000000	-6.8501
15	10	488.95	478.49	475.77	0.00	0.000000	-8.8704
15	11	501.89	488.95	485.20	0.00	0.000000	-11.2359
15	12	516.46	501.89	496.47	0.00	0.000000	-13.4572
15	13	533.36	516.46	509.75	0.00	0.000000	-15.8916
15	14	552.80	533.36	525.22	0.00	0.000000	-18.5662

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0.0000	25.6812	0.010943	0.000400	0.017509
0.0000	30.1819	0.010943	0.000400	0.017509
0.0000	36.0933	0.010943	0.000400	0.017509
0.0000	43.6698	0.010943	0.000400	0.017509
17.8600	64.9046	0.010558	0.000784	0.017316
38.3494	83.6384	0.009735	0.001607	0.016905
56.8971	94.1949	0.008516	0.002826	0.016295
57.1312	85.9193	0.007295	0.004047	0.015685
53.5369	74.4929	0.006152	0.005190	0.015113
47.5143	60.5756	0.005139	0.006203	0.014607
40.0478	46.6877	0.004286	0.007057	0.014180
31.1154	32.4345	0.003623	0.007719	0.013849
21.9177	19.2022	0.003156	0.008186	0.013615
14.1487	8.5422	0.002855	0.008487	0.013465
8.8484	2.0892	0.002667	0.008675	0.013371
6.0895	-1.8890	0.002537	0.008805	0.013306
4.6892	-4.3440	0.002437	0.008905	0.013256
4.1764	-5.4306	0.002348	0.008994	0.013211
4.1086	-6.4213	0.002261	0.009081	0.013168
4.0357	-6.6307	0.002175	0.009167	0.013125
3.9554	-7.0753	0.002090	0.009252	0.013082
3.9321	-7.4637	0.002007	0.009335	0.013040
3.8458	-7.7649	0.001925	0.009418	0.012999
3.8398	-8.0626	0.001843	0.009499	0.012959
3.6995	-8.2445	0.001764	0.009578	0.012919
3.7031	-8.4978	0.001685	0.009657	0.012880
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0.0000	1.0537	0.010943	0.000400	0.017509
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10241

0.0000	2.6554	0.010943	0.000400	0.017509
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0.0000	15.8916	0.010943	0.000400	0.017509
0.0000	18.5662	0.010943	0.000400	0.017509

15	15	575.21	552.80	543.14	0.00	0.000000	-21.5813
15	16	601.28	575.21	563.93	0.00	0.000000	-25.1344
15	17	633.27	601.28	588.66	0.00	0.000000	-30.0233
15	18	672.16	633.27	618.33	0.00	0.000000	-36.2263
15	19	720.41	672.16	654.45	0.00	0.000000	-44.3966
15	20	780.05	720.41	708.39	3.66	0.000400	-48.2303
15	21	846.85	780.05	778.30	11.82	0.001293	-46.1334
15	22	910.67	846.85	854.01	23.25	0.002545	-38.1302
15	23	966.34	910.67	922.07	34.67	0.003794	-29.7984
15	24	1011.63	966.34	979.54	45.21	0.004947	-21.5927
15	25	1046.46	1011.63	1025.78	54.48	0.005961	-13.9138
15	26	1069.86	1046.46	1059.93	62.08	0.006794	-6.6859
15	27	1085.54	1069.86	1082.93	67.77	0.007416	-1.7557
15	28	1092.52	1085.54	1095.81	71.59	0.007834	2.2079
15	29	1094.57	1092.52	1101.18	73.87	0.008084	4.4526
15	30	1093.24	1094.57	1102.06	75.25	0.008235	5.9357
15	31	1090.66	1093.24	1100.80	76.25	0.008344	6.8194
15	32	1086.30	1090.66	1097.99	77.04	0.008430	7.8636
15	33	1081.38	1086.30	1094.44	77.81	0.008515	8.7852
15	34	1076.80	1081.38	1090.40	78.53	0.008593	9.1523
15	35	1070.88	1076.80	1085.80	79.27	0.008674	10.0396
15	36	1065.89	1070.88	1081.09	80.02	0.008757	10.2302
15	37	1060.32	1065.89	1076.07	80.76	0.008838	10.6026
15	38	1054.42	1060.32	1070.77	81.51	0.008919	11.0019
15	39	1048.54	1054.42	1065.23	82.24	0.009000	11.2374
15	40	1042.28	1048.54	1059.47	82.98	0.009080	11.5665
16	3	451.08	0.00	450.39	0.00	0.000000	-0.4655
16	4	451.57	451.08	450.82	0.00	0.000000	-0.5069
16	5	453.97	451.57	451.96	0.00	0.000000	-1.3546
16	6	456.60	453.97	453.64	0.00	0.000000	-1.9928
16	7	460.12	456.60	455.98	0.00	0.000000	-2.7824
16	8	464.54	460.12	459.08	0.00	0.000000	-3.6743
16	9	470.72	464.54	463.29	0.00	0.000000	-5.0038
16	10	478.70	470.72	468.86	0.00	0.000000	-6.6240
16	11	488.73	478.70	476.04	0.00	0.000000	-8.5436
16	12	501.08	488.73	485.08	0.00	0.000000	-10.7709
16	13	515.06	501.08	495.88	0.00	0.000000	-12.9037
16	14	531.33	515.06	508.64	0.00	0.000000	-15.2693
16	15	550.24	531.33	523.59	0.00	0.000000	-17.9338
16	16	572.33	550.24	541.07	0.00	0.000000	-21.0368
16	17	598.53	572.33	561.62	0.00	0.000000	-24.8358
16	18	630.78	598.53	586.29	0.00	0.000000	-29.9391
16	19	670.59	630.78	616.26	0.00	0.000000	-36.5672
16	20	720.44	670.59	653.13	0.00	0.000000	-45.3030
16	21	782.52	720.44	709.07	3.90	0.000427	-49.4344
16	22	851.92	782.52	782.40	12.78	0.001398	-46.7859
16	23	917.60	851.92	859.87	24.53	0.002684	-38.8548
16	24	974.42	917.60	928.94	36.07	0.003947	-30.6062

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18.6219	66.8522	0.010542	0.000800	0.017308
41.6136	87.7470	0.009649	0.001693	0.016862
58.4275	96.5578	0.008397	0.002945	0.016236
58.4770	88.2754	0.007148	0.004194	0.015611
54.0184	75.6111	0.005995	0.005347	0.015035
47.5797	61.4935	0.004981	0.006361	0.014528
39.0814	45.7673	0.004148	0.007194	0.014111
29.2476	31.0033	0.003526	0.007816	0.013800
19.6121	17.4041	0.003108	0.008234	0.013591
11.7387	7.2861	0.002858	0.008484	0.013466
7.1187	1.1829	0.002707	0.008635	0.013391
5.1093	-1.7101	0.002598	0.008744	0.013336
4.0569	-3.8066	0.002512	0.008830	0.013293
3.9720	-4.8131	0.002427	0.008915	0.013251
3.6837	-5.4685	0.002349	0.008993	0.013212
3.8026	-6.2370	0.002268	0.009074	0.013171
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3.8131	-6.7895	0.002104	0.009238	0.013089
3.8283	-7.1736	0.002023	0.009319	0.013048
3.7570	-7.4804	0.001942	0.009400	0.013008
3.7751	-7.7914	0.001862	0.009480	0.012968
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0.0000	29.9391	0.010943	0.000400	0.017509
0.0000	36.5672	0.010943	0.000400	0.017509
0.0000	45.3030	0.010943	0.000400	0.017509
19.8726	69.3070	0.010515	0.000827	0.017295
45.2646	92.0506	0.009544	0.001798	0.016809
60.0432	98.8981	0.008258	0.003084	0.016166
59.1067	89.7129	0.006995	0.004347	0.015535

16	25	1019.99	974.42	987.07	46.67	0.005108	-22.1570
16	26	1053.53	1019.99	1032.83	55.83	0.006109	-13.9312
16	27	1076.26	1053.53	1066.10	63.18	0.006914	-6.8398
16	28	1090.61	1076.26	1087.75	68.49	0.007495	-1.9206
16	29	1097.03	1090.61	1099.40	71.86	0.007864	1.5916
16	30	1098.64	1097.03	1104.10	73.82	0.008078	3.6735
16	31	1096.83	1098.64	1104.52	74.94	0.008200	5.1770
16	32	1094.58	1096.83	1103.33	75.77	0.008291	5.8869
16	33	1090.35	1094.58	1100.82	76.47	0.008369	7.0430
16	34	1087.14	1090.35	1097.96	77.14	0.008441	7.2866
16	35	1081.69	1087.14	1094.31	77.83	0.008517	8.4888
16	36	1077.23	1081.69	1090.33	78.49	0.008590	8.8210
16	37	1071.50	1077.23	1085.87	79.20	0.008667	9.6705
16	38	1066.67	1071.50	1081.33	79.92	0.008746	9.8685
16	39	1061.27	1066.67	1076.49	80.64	0.008825	10.2420
16	40	1055.54	1061.27	1071.38	81.37	0.008905	10.6562
17	3	450.89	0.00	450.32	0.00	0.000000	-0.3842
17	4	451.38	450.89	450.70	0.00	0.000000	-0.4551
17	5	452.86	451.38	451.48	0.00	0.000000	-0.9261
17	6	454.82	452.86	452.69	0.00	0.000000	-1.4340
17	7	457.53	454.82	454.44	0.00	0.000000	-2.0765
17	8	461.00	457.53	456.82	0.00	0.000000	-2.8171
17	9	465.16	461.00	459.84	0.00	0.000000	-3.5853
17	10	471.15	465.16	463.93	0.00	0.000000	-4.8627
17	11	478.83	471.15	469.32	0.00	0.000000	-6.4039
17	12	488.43	478.83	476.22	0.00	0.000000	-8.2166
17	13	500.27	488.43	484.90	0.00	0.000000	-10.3462
17	14	513.72	500.27	495.29	0.00	0.000000	-12.4055
17	15	529.50	513.72	507.60	0.00	0.000000	-14.7345
17	16	548.03	529.50	522.13	0.00	0.000000	-17.4299
17	17	570.04	548.03	539.32	0.00	0.000000	-20.6770
17	18	596.30	570.04	559.71	0.00	0.000000	-24.6255
17	19	629.07	596.30	584.46	0.00	0.000000	-30.0241
17	20	669.92	629.07	614.84	0.00	0.000000	-37.0694
17	21	721.53	669.92	652.61	0.00	0.000000	-46.3652
17	22	786.11	721.53	710.87	4.23	0.000463	-50.6319
17	23	858.32	786.11	787.99	13.94	0.001525	-47.3342
17	24	925.16	858.32	866.73	25.93	0.002838	-39.3227
17	25	982.44	925.16	936.41	37.58	0.004112	-30.9783
17	26	1027.15	982.44	994.25	48.13	0.005267	-22.1421
17	27	1058.82	1027.15	1038.90	57.11	0.006250	-13.4070
17	28	1081.26	1058.82	1071.04	64.17	0.007022	-6.6784
17	29	1094.72	1081.26	1091.41	69.09	0.007560	-2.2270
17	30	1100.37	1094.72	1101.92	72.05	0.007885	1.0436
17	31	1101.27	1100.37	1105.91	73.71	0.008067	3.1214

54.4137	76.5707	0.005834	0.005508	0.014954
47.0085	60.9397	0.004833	0.006509	0.014454
37.7990	44.6388	0.004028	0.007314	0.014051
27.2898	29.2105	0.003447	0.007895	0.013761
17.3430	15.7514	0.003078	0.008264	0.013576
10.0511	6.3775	0.002864	0.008478	0.013469
5.7505	0.5734	0.002742	0.008600	0.013408
4.2670	-1.6199	0.002651	0.008691	0.013363
3.6368	-3.4062	0.002573	0.008769	0.013324
3.4158	-3.8708	0.002501	0.008841	0.013288
3.5338	-4.9549	0.002425	0.008917	0.013250
3.4367	-5.3843	0.002352	0.008990	0.013213
3.6224	-6.0481	0.002275	0.009067	0.013175
3.7224	-6.1461	0.002196	0.009146	0.013135
3.6973	-6.5446	0.002117	0.009225	0.013096
3.7345	-6.9216	0.002037	0.009305	0.013056
0.0000	0.3842	0.010943	0.000400	0.017509
0.0000	0.4551	0.010943	0.000400	0.017509
0.0000	0.9261	0.010943	0.000400	0.017509
0.0000	1.4340	0.010943	0.000400	0.017509
0.0000	2.0765	0.010943	0.000400	0.017509
0.0000	2.8171	0.010943	0.000400	0.017509
0.0000	3.5853	0.010943	0.000400	0.017509
0.0000	4.8627	0.010943	0.000400	0.017509
0.0000	6.4039	0.010943	0.000400	0.017509
0.0000	8.2166	0.010943	0.000400	0.017509
0.0000	10.3462	0.010943	0.000400	0.017509
0.0000	12.4055	0.010943	0.000400	0.017509
0.0000	14.7345	0.010943	0.000400	0.017509
0.0000	17.4299	0.010943	0.000400	0.017509
0.0000	20.6770	0.010943	0.000400	0.017509
0.0000	24.6255	0.010943	0.000400	0.017509
0.0000	30.0241	0.010943	0.000400	0.017509
0.0000	37.0694	0.010943	0.000400	0.017509
0.0000	46.3852	0.010943	0.000400	0.017509
21.5508	72.1828	0.010479	0.000863	0.017277
49.4965	96.8307	0.009417	0.001925	0.016746
61.3328	100.6555	0.008104	0.003238	0.016089
59.6673	90.6456	0.006830	0.004512	0.015452
54.1635	76.3057	0.005675	0.005667	0.014875
46.1219	59.5289	0.004692	0.006650	0.014383
36.2888	43.1673	0.003920	0.007422	0.013997
25.2696	27.4966	0.003382	0.007960	0.013728
15.2646	14.2209	0.003057	0.008285	0.013566
8.5347	5.4133	0.002876	0.008467	0.013475

17	32	1099.75	1101.27	1106.20	74.64	0.008167	4.3454
17	33	1097.59	1099.75	1105.17	75.36	0.008246	5.1023
17	34	1095.03	1097.59	1103.24	75.92	0.008308	5.5239
17	35	1090.36	1095.03	1100.52	76.53	0.008375	6.8413
17	36	1087.22	1090.36	1097.67	77.15	0.008443	7.0336
17	37	1081.93	1087.22	1094.10	77.80	0.008514	8.1909
17	38	1077.60	1081.93	1090.25	78.45	0.008584	8.5133
17	39	1073.22	1077.60	1086.29	79.11	0.008658	8.7960
17	40	1067.56	1073.22	1081.87	79.82	0.008735	9.6260
18	3	450.77	0.00	450.28	0.00	0.000000	-0.3345
18	4	451.22	450.77	450.62	0.00	0.000000	-0.4058
18	5	451.65	451.22	450.99	0.00	0.000000	-0.4423
18	6	453.54	451.65	451.91	0.00	0.000000	-1.0935
18	7	455.57	453.54	453.24	0.00	0.000000	-1.5684
18	8	458.28	455.57	455.06	0.00	0.000000	-2.1675
18	9	461.61	458.28	457.43	0.00	0.000000	-2.8124
18	10	465.67	461.61	460.41	0.00	0.000000	-3.5385
18	11	471.46	465.67	464.41	0.00	0.000000	-4.7481
18	12	478.84	471.46	469.62	0.00	0.000000	-6.2018
18	13	488.06	478.84	476.28	0.00	0.000000	-7.9277
18	14	499.47	488.06	484.65	0.00	0.000000	-9.9710
18	15	512.48	499.47	494.68	0.00	0.000000	-11.9784
18	16	527.89	512.48	506.64	0.00	0.000000	-14.3007
18	17	546.23	527.89	520.87	0.00	0.000000	-17.0691
18	18	568.16	546.23	537.83	0.00	0.000000	-20.4089
18	19	594.66	568.16	558.17	0.00	0.000000	-24.5564
18	20	628.07	594.66	583.12	0.00	0.000000	-30.2525
18	21	670.12	628.07	614.06	0.00	0.000000	-37.7294
18	22	723.57	670.12	652.83	0.00	0.000000	-47.6121
18	23	790.97	723.57	713.87	4.66	0.000510	-51.8914
18	24	865.56	790.97	794.63	15.19	0.001663	-47.7382
18	25	932.97	865.56	874.22	27.39	0.002997	-39.5402
18	26	989.77	932.97	943.82	39.05	0.004273	-30.9245
18	27	1033.02	989.77	1000.77	49.48	0.005414	-21.7056
18	28	1063.68	1033.02	1044.35	58.27	0.006376	-13.0093
18	29	1085.42	1063.68	1075.27	65.02	0.007115	-6.8336
18	30	1097.85	1085.42	1094.33	69.56	0.007613	-2.3754
18	31	1102.61	1097.85	1103.76	72.20	0.007901	0.7769
18	32	1102.76	1102.61	1106.97	73.60	0.008054	2.8333
18	33	1102.63	1102.76	1107.57	74.40	0.008142	3.3182
18	34	1100.75	1102.63	1106.66	74.93	0.008200	3.9780
18	35	1097.69	1100.75	1105.12	75.50	0.008262	4.9983
18	36	1094.98	1097.69	1102.99	75.99	0.008315	5.3920
18	37	1090.35	1094.98	1100.25	76.56	0.008378	6.6584
18	38	1087.30	1090.35	1097.44	77.14	0.008442	6.8229

4.7425	0.3971	0.002775	0.008567	0.013425
3.7058	-1.3965	0.002696	0.008646	0.013385
2.9011	-2.6228	0.002634	0.008708	0.013354
3.1589	-3.6824	0.002567	0.008775	0.013321
3.1609	-3.8727	0.002499	0.008843	0.013287
3.3561	-4.8347	0.002428	0.008914	0.013251
3.3008	-5.2125	0.002358	0.008984	0.013216
3.4331	-5.3628	0.002285	0.009058	0.013179
3.6324	-5.9936	0.002207	0.009135	0.013141
0.0000	0.3345	0.010943	0.000400	0.017509
0.0000	0.4058	0.010943	0.000400	0.017509
0.0000	0.4423	0.010943	0.000400	0.017509
0.0000	1.0935	0.010943	0.000400	0.017509
0.0000	1.5684	0.010943	0.000400	0.017509
0.0000	2.1675	0.010943	0.000400	0.017509
0.0000	2.8124	0.010943	0.000400	0.017509
0.0000	3.5385	0.010943	0.000400	0.017509
0.0000	4.7481	0.010943	0.000400	0.017509
0.0000	6.2018	0.010943	0.000400	0.017509
0.0000	7.9277	0.010943	0.000400	0.017509
0.0000	9.9710	0.010943	0.000400	0.017509
0.0000	11.9784	0.010943	0.000400	0.017509
0.0000	14.3007	0.010943	0.000400	0.017509
0.0000	17.0691	0.010943	0.000400	0.017509
0.0000	20.4089	0.010943	0.000400	0.017509
0.0000	24.5564	0.010943	0.000400	0.017509
0.0000	30.2525	0.010943	0.000400	0.017509
0.0000	37.7294	0.010943	0.000400	0.017509
0.0000	47.6121	0.010943	0.000400	0.017509
23.7356	75.6270	0.010432	0.000910	0.017253
53.7447	101.4830	0.009279	0.002063	0.016677
62.3536	101.8938	0.007945	0.003397	0.016010
59.7609	90.6855	0.006669	0.004673	0.015372
53.5318	75.2374	0.005528	0.005814	0.014801
45.1613	58.1706	0.004566	0.006776	0.014320
34.7297	41.5634	0.003827	0.007515	0.013951
23.3609	25.7364	0.003330	0.008013	0.013702
13.5563	12.7793	0.003041	0.008301	0.013558
7.1857	4.3523	0.002888	0.008454	0.013481
4.1218	0.8035	0.002801	0.008542	0.013437
2.7466	-1.2313	0.002742	0.008600	0.013408
2.9096	-2.0887	0.002680	0.008662	0.013377
2.5097	-2.8822	0.002627	0.008715	0.013351
2.9371	-3.7213	0.002564	0.008778	0.013319
3.0122	-3.8106	0.002500	0.008842	0.013287

17-32

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18-28

18	39	1082.84	1087.30	1094.03	77.71	0.008504	7.5222
18	40	1078.12	1082.84	1090.37	78.35	0.008574	8.2450
19	3	450.70	0.00	450.25	0.00	0.000000	-0.3041
19	4	451.06	450.70	450.55	0.00	0.000000	-0.3482
19	5	451.46	451.06	450.88	0.00	0.000000	-0.3940
19	6	452.63	451.46	451.51	0.00	0.000000	-0.7526
19	7	454.16	452.63	452.47	0.00	0.000000	-1.1351
19	8	456.25	454.16	453.84	0.00	0.000000	-1.6248
19	9	458.88	456.25	455.66	0.00	0.000000	-2.1656
19	10	462.15	458.88	458.01	0.00	0.000000	-2.7855
19	11	466.09	462.15	460.93	0.00	0.000000	-3.4702
19	12	471.68	466.09	464.82	0.00	0.000000	-4.6173
19	13	478.78	471.68	469.87	0.00	0.000000	-6.0028
19	14	487.67	478.78	476.30	0.00	0.000000	-7.6565
19	15	498.11	487.67	484.17	0.00	0.000000	-9.3816
19	16	511.30	498.11	493.95	0.00	0.000000	-11.6759
19	17	526.48	511.30	505.66	0.00	0.000000	-14.0105
19	18	544.68	526.48	519.69	0.00	0.000000	-16.8195
19	19	566.68	544.68	536.55	0.00	0.000000	-20.2799
19	20	593.55	566.68	556.95	0.00	0.000000	-24.6274
19	21	627.73	593.55	582.22	0.00	0.000000	-30.6316
19	22	671.08	627.73	613.82	0.00	0.000000	-38.5347
19	23	726.63	671.08	653.76	0.00	0.000000	-49.0389
19	24	796.75	726.63	717.82	5.16	0.000564	-53.1204
19	25	873.27	796.75	801.94	16.48	0.001803	-48.0099
19	26	940.46	873.27	881.83	28.79	0.003151	-39.4552
19	27	996.21	940.46	950.85	40.41	0.004422	-30.5284
19	28	1038.48	996.21	1006.89	50.71	0.005549	-21.2545
19	29	1068.26	1038.48	1049.40	59.30	0.006489	-12.6907
19	30	1088.83	1068.26	1078.99	65.75	0.007195	-6.6226
19	31	1100.16	1088.83	1096.72	69.96	0.007655	-2.3128
19	32	1103.44	1100.16	1104.95	72.32	0.007914	1.0163
19	33	1104.91	1103.44	1107.88	73.48	0.008041	1.9933
19	34	1104.78	1104.91	1108.50	74.13	0.008112	2.5025
19	35	1102.73	1104.78	1107.83	74.62	0.008166	3.4313
19	36	1100.68	1102.73	1106.51	75.04	0.008211	3.9273
19	37	1096.88	1100.68	1104.58	75.54	0.008266	5.1849
19	38	1094.72	1096.88	1102.50	76.01	0.008317	5.2341
19	39	1090.69	1094.72	1099.89	76.52	0.008374	6.1920
19	40	1087.50	1090.69	1097.25	77.10	0.008437	6.5609
20	3	450.66	0.00	450.24	0.00	0.000000	-0.2855
20	4	450.86	450.66	450.46	0.00	0.000000	-0.2699
20	5	451.40	450.86	450.80	0.00	0.000000	-0.4013
20	6	451.69	451.40	451.12	0.00	0.000000	-0.3807
20	7	453.13	451.69	451.85	0.00	0.000000	-0.8630

2.9136	-4.6186	0.002438	0.008904	0.013256
3.2859	-4.9590	0.002368	0.008974	0.013221
0.0000	0.3041	0.010943	0.000400	0.017509
0.0000	0.3482	0.010943	0.000400	0.017509
0.0000	0.3940	0.010943	0.000400	0.017509
0.0000	0.7526	0.010943	0.000400	0.017509
0.0000	1.1351	0.010943	0.000400	0.017509
0.0000	1.6248	0.010943	0.000400	0.017509
0.0000	2.1656	0.010943	0.000400	0.017509
0.0000	2.7855	0.010943	0.000400	0.017509
0.0000	3.4702	0.010943	0.000400	0.017509
0.0000	4.6173	0.010943	0.000400	0.017509
0.0000	6.0028	0.010943	0.000400	0.017509
0.0000	7.6565	0.010943	0.000400	0.017509
0.0000	9.3816	0.010943	0.000400	0.017509
0.0000	11.6759	0.010943	0.000400	0.017509
0.0000	14.0105	0.010943	0.000400	0.017509
0.0000	16.8195	0.010943	0.000400	0.017509
0.0000	20.2799	0.010943	0.000400	0.017509
0.0000	24.6274	0.010943	0.000400	0.017509
0.0000	30.6316	0.010943	0.000400	0.017509
0.0000	38.5347	0.010943	0.000400	0.017509
0.0000	49.0389	0.010943	0.000400	0.017509
26.2613	79.3817	0.010378	0.000964	0.017226
57.7900	105.8000	0.009139	0.002203	0.016607
63.0065	102.4618	0.007791	0.003551	0.015933
59.5286	90.0570	0.006520	0.004822	0.015297
52.8936	74.1482	0.005393	0.005949	0.014734
44.1117	56.8024	0.004453	0.006889	0.014264
33.1847	39.8073	0.003747	0.007595	0.013911
21.6433	23.9562	0.003287	0.008055	0.013681
12.1602	11.1438	0.003028	0.008314	0.013551
5.9609	3.9676	0.002901	0.008441	0.013488
3.3489	0.8463	0.002830	0.008512	0.013452
2.5260	-0.9053	0.002776	0.008566	0.013425
2.1387	-1.7885	0.002731	0.008611	0.013402
2.5649	-2.6200	0.002676	0.008666	0.013375
2.4115	-2.8225	0.002625	0.008717	0.013350
2.6516	-3.5403	0.002568	0.008774	0.013321
2.9809	-3.5799	0.002505	0.008837	0.013290
0.0000	0.2855	0.010943	0.000400	0.017509
0.0000	0.2699	0.010943	0.000400	0.017509

0.0000	0.4013	0.010943	0.000400	0.017509
0.0000	0.3807	0.010943	0.000400	0.017509
0.0000	0.8630	0.010943	0.000400	0.017509

20	8	454.71	453.13	452.89	0.00	0.000000	-1.2289
20	9	456.78	454.71	454.29	0.00	0.000000	-1.6706
20	10	459.39	456.78	456.14	0.00	0.000000	-2.1863
20	11	462.58	459.39	458.47	0.00	0.000000	-2.7678
20	12	466.40	462.58	461.34	0.00	0.000000	-3.4082
20	13	471.81	466.40	465.12	0.00	0.000000	-4.4993
20	14	478.67	471.81	470.02	0.00	0.000000	-5.8235
20	15	486.92	478.67	476.13	0.00	0.000000	-7.2677
20	16	497.31	486.92	483.77	0.00	0.000000	-9.1137
20	17	510.27	497.31	493.33	0.00	0.000000	-11.4038
20	18	525.27	510.27	504.83	0.00	0.000000	-13.7585
20	19	543.44	525.27	518.71	0.00	0.000000	-16.6429
20	20	565.62	543.44	535.54	0.00	0.000000	-20.2399
20	21	592.95	565.62	556.10	0.00	0.000000	-24.8045
20	22	628.02	592.95	581.77	0.00	0.000000	-31.1244
20	23	672.86	628.02	614.17	0.00	0.000000	-39.4965
20	24	729.93	672.86	655.15	0.00	0.000000	-50.3266
20	25	803.05	729.93	722.35	5.69	0.000622	-54.3127
20	26	880.21	803.05	809.14	17.72	0.001940	-47.8352
20	27	947.24	880.21	888.97	30.10	0.003294	-39.2121
20	28	1002.20	947.24	957.41	41.66	0.004559	-30.1463
20	29	1043.59	1002.20	1012.61	51.84	0.005673	-20.8496
20	30	1072.21	1043.59	1053.96	60.22	0.006589	-12.2835
20	31	1091.55	1072.21	1082.18	66.38	0.007264	-6.3078
20	32	1101.44	1091.55	1098.57	70.31	0.007694	-1.9323
20	33	1105.70	1101.44	1106.24	72.40	0.007923	0.3633
20	34	1107.02	1105.70	1108.99	73.38	0.008030	1.3208
20	35	1105.43	1107.02	1109.17	73.92	0.008089	2.5145
20	36	1104.04	1105.43	1108.43	74.30	0.008131	2.9587
20	37	1102.13	1104.04	1107.50	74.75	0.008180	3.6134
20	38	1100.29	1102.13	1106.03	75.12	0.008221	3.8672
20	39	1097.48	1100.29	1104.35	75.58	0.008270	4.6260
20	40	1094.81	1097.48	1102.31	76.02	0.008319	5.0469
21	3	450.63	-0.00	450.23	0.00	0.000000	-0.2742
21	4	450.59	450.63	450.36	0.00	0.000000	-0.1549
21	5	450.81	450.59	450.52	0.00	0.000000	-0.1962
21	6	451.05	450.81	450.71	0.00	0.000000	-0.2261
21	7	452.33	451.05	451.30	0.00	0.000000	-0.6946
21	8	453.51	452.33	452.10	0.00	0.000000	-0.9506
21	9	455.14	453.51	453.20	0.00	0.000000	-1.3032
21	10	457.21	455.14	454.65	0.00	0.000000	-1.7216
21	11	459.78	457.21	456.51	0.00	0.000000	-2.2052
21	12	462.91	459.78	458.82	0.00	0.000000	-2.7497
21	13	466.62	462.91	461.65	0.00	0.000000	-3.3511
21	14	471.87	466.62	465.34	0.00	0.000000	-4.3920
21	15	478.31	471.87	470.03	0.00	0.000000	-5.5758
21	16	486.44	478.31	475.96	0.00	0.000000	-7.0575
21	17	496.62	486.44	483.42	0.00	0.000000	-8.8892

0.0000	1.2289	0.010943	0.000400	0.017509	20-3
0.0000	1.6706	0.010943	0.000400	0.017509	
0.0000	2.1863	0.010943	0.000400	0.017509	
0.0000	2.7678	0.010943	0.000400	0.017509	
0.0000	3.4082	0.010943	0.000400	0.017509	
0.0000	4.4993	0.010943	0.000400	0.017509	
0.0000	5.8235	0.010943	0.000400	0.017509	
0.0000	7.2677	0.010943	0.000400	0.017509	
0.0000	9.1137	0.010943	0.000400	0.017509	
0.0000	11.4038	0.010943	0.000400	0.017509	
0.0000	13.7585	0.010943	0.000400	0.017509	
0.0000	16.6429	0.010943	0.000400	0.017509	
0.0000	20.2399	0.010943	0.000400	0.017509	
0.0000	24.8045	0.010943	0.000400	0.017509	
0.0000	31.1244	0.010943	0.000400	0.017509	
0.0000	39.4965	0.010943	0.000400	0.017509	
0.0000	50.3266	0.010943	0.000400	0.017509	
28.9811	83.2938	0.010320	0.001022	0.017197	
61.4414	109.2767	0.009003	0.002340	0.016539	
63.3384	102.5505	0.007648	0.003694	0.015861	
59.2897	89.4360	0.006383	0.004959	0.015229	
52.2716	73.1212	0.005269	0.006073	0.014672	
43.0171	55.3007	0.004353	0.006989	0.014214	
31.6895	37.9973	0.003678	0.007664	0.013876	
20.2191	22.1514	0.003248	0.008094	0.013661	
10.7577	10.3943	0.003019	0.008323	0.013547	
5.0458	3.7250	0.002912	0.008430	0.013493	
2.7591	0.2445	0.002853	0.008489	0.013464	
1.9625	-0.9961	0.002811	0.008531	0.013443	
2.3420	-1.2714	0.002762	0.008580	0.013418	
1.8854	-1.9818	0.002722	0.008621	0.013398	
2.3461	-2.2798	0.002672	0.008670	0.013373	
2.2684	-2.7784	0.002623	0.008719	0.013349	
0.0000	0.2742	0.010943	0.000400	0.017509	
0.0000	0.1549	0.010943	0.000400	0.017509	
0.0000	0.1962	0.010943	0.000400	0.017509	
0.0000	0.2261	0.010943	0.000400	0.017509	
0.0000	0.6946	0.010943	0.000400	0.017509	
0.0000	0.9506	0.010943	0.000400	0.017509	
0.0000	1.3032	0.010943	0.000400	0.017509	
0.0000	1.7216	0.010943	0.000400	0.017509	
0.0000	2.2052	0.010943	0.000400	0.017509	
0.0000	2.7497	0.010943	0.000400	0.017509	
0.0000	3.3511	0.010943	0.000400	0.017509	
0.0000	4.3920	0.010943	0.000400	0.017509	
0.0000	5.5758	0.010943	0.000400	0.017509	
0.0000	7.0575	0.010943	0.000400	0.017509	
0.0000	8.8892	0.010943	0.000400	0.017509	21-17

21	18	509.38	496.62	492.78	0.00	0.000000	-11.1745
21	19	524.29	509.38	504.13	0.00	0.000000	-13.5707
21	20	542.51	524.29	517.93	0.00	0.000000	-16.5426
21	21	564.95	542.51	534.80	0.00	0.000000	-20.2902
21	22	592.85	564.95	555.59	0.00	0.000000	-25.0799
21	23	628.95	592.85	581.78	0.00	0.000000	-31.7468
21	24	674.97	628.95	614.93	0.00	0.000000	-40.4082
21	25	735.10	674.97	658.66	0.44	0.000048	-51.4491
21	26	809.00	735.10	727.01	6.26	0.000685	-55.1774
21	27	887.03	809.00	815.89	18.82	0.002060	-47.8789
21	28	953.60	887.03	895.72	31.28	0.003423	-38.9504
21	29	1007.86	953.60	963.63	42.80	0.004684	-29.7606
21	30	1048.20	1007.86	1017.93	52.86	0.005784	-20.3716
21	31	1075.66	1048.20	1058.09	61.02	0.006677	-11.8232
21	32	1093.52	1075.66	1084.91	66.91	0.007322	-5.7955
21	33	1103.47	1093.52	1100.30	70.55	0.007720	-2.1332
21	34	1106.67	1103.47	1107.07	72.38	0.007921	0.2697
21	35	1107.58	1106.67	1109.61	73.32	0.008023	1.3670
21	36	1106.53	1107.58	1109.79	73.79	0.008075	2.1998
21	37	1105.11	1106.53	1109.11	74.13	0.008113	2.6856
21	38	1103.61	1105.11	1108.02	74.42	0.008144	2.9652
21	39	1102.14	1103.61	1106.96	74.78	0.008183	3.2463
21	40	1100.15	1102.14	1105.61	75.13	0.008222	3.6730
22	3	450.62	0.00	450.22	0.00	0.000000	-0.2672
22	4	450.17	450.62	450.20	0.00	0.000000	0.0202
22	5	450.40	450.17	450.27	0.00	0.000000	-0.0839
22	6	450.59	450.40	450.39	0.00	0.000000	-0.1372
22	7	451.14	450.59	450.66	0.00	0.000000	-0.3231
22	8	452.56	451.14	451.35	0.00	0.000000	-0.8137
22	9	453.80	452.56	452.23	0.00	0.000000	-1.0511
22	10	455.45	453.80	453.40	0.00	0.000000	-1.3827
22	11	457.53	455.45	454.90	0.00	0.000000	-1.7738
22	12	460.08	457.53	456.77	0.00	0.000000	-2.2259
22	13	463.14	460.08	459.08	0.00	0.000000	-2.7363
22	14	466.76	463.14	461.85	0.00	0.000000	-3.3017
22	15	471.74	466.76	465.43	0.00	0.000000	-4.2465
22	16	478.06	471.74	469.99	0.00	0.000000	-5.4282
22	17	486.01	478.06	475.78	0.00	0.000000	-6.8879
22	18	496.01	486.01	483.08	0.00	0.000000	-8.7043
22	19	508.64	496.01	492.30	0.00	0.000000	-10.9999
22	20	523.52	508.64	503.54	0.00	0.000000	-13.4472
22	21	541.87	523.52	517.32	0.00	0.000000	-16.5188
22	22	564.67	541.87	534.32	0.00	0.000000	-20.4257
22	23	593.26	564.67	555.42	0.00	0.000000	-25.4625
22	24	630.23	593.26	582.13	0.00	0.000000	-32.3691

0.0000	11.1745	0.010943	0.000400	0.017509
0.0000	13.5707	0.010943	0.000400	0.017509
0.0000	16.5426	0.010943	0.000400	0.017509
0.0000	20.2902	0.010943	0.000400	0.017509
0.0000	25.0799	0.010943	0.000400	0.017509
0.0000	31.7468	0.010943	0.000400	0.017509
0.0000	40.4082	0.010943	0.000400	0.017509
2.2629	53.7120	0.010894	0.000448	0.017484
29.6212	84.7987	0.010257	0.001085	0.017166
64.1523	112.0312	0.008882	0.002460	0.016478
63.7517	102.7021	0.007520	0.003823	0.015797
59.1164	88.8770	0.006258	0.005084	0.015166

10245

51.6327	72.0044	0.005158	0.006184	0.014616
41.9385	55.7617	0.004265	0.007077	0.014170
30.3255	36.1210	0.003620	0.007722	0.013847
18.6838	20.8170	0.003222	0.008120	0.013648
9.4464	9.1767	0.003021	0.008321	0.013548
4.8078	3.4408	0.002919	0.008423	0.013497
2.4512	0.2513	0.002867	0.008475	0.013471
1.7505	-0.9350	0.002830	0.008513	0.013452
1.4884	-1.4768	0.002798	0.008544	0.013436
1.8166	-1.4297	0.002759	0.008583	0.013417
1.8395	-1.8335	0.002720	0.008622	0.013397
0.0000	0.2672	0.010943	0.000400	0.017509
0.0000	-0.0202	0.010943	0.000400	0.017509
0.0000	0.0839	0.010943	0.000400	0.017509
0.0000	0.1372	0.010943	0.000400	0.017509
0.0000	0.3231	0.010943	0.000400	0.017509
0.0000	0.8137	0.010943	0.000400	0.017509
0.0000	1.0511	0.010943	0.000400	0.017509
0.0000	1.3827	0.010943	0.000400	0.017509
0.0000	1.7738	0.010943	0.000400	0.017509
0.0000	2.2259	0.010943	0.000400	0.017509
0.0000	2.7363	0.010943	0.000400	0.017509
0.0000	3.3017	0.010943	0.000400	0.017509
0.0000	4.2465	0.010943	0.000400	0.017509
0.0000	5.4282	0.010943	0.000400	0.017509
0.0000	6.8879	0.010943	0.000400	0.017509
0.0000	8.7043	0.010943	0.000400	0.017509
0.0000	10.9999	0.010943	0.000400	0.017509
0.0000	13.4472	0.010943	0.000400	0.017509
0.0000	16.5188	0.010943	0.000400	0.017509
0.0000	20.4257	0.010943	0.000400	0.017509
0.0000	25.4625	0.010943	0.000400	0.017509
0.0000	32.3691	0.010943	0.000400	0.017509

22	25	678.39	630.23	616.37	0.00	0.000000	-41.7431
22	26	740.11	678.39	662.46	0.86	0.000094	-52.2539
22	27	815.09	740.11	731.96	6.82	0.000746	-55.9449
22	28	893.58	815.09	822.56	19.84	0.002171	-47.7978
22	29	959.71	893.58	902.33	32.37	0.003543	-38.6150
22	30	1013.12	959.71	969.62	43.86	0.004799	-29.2762
22	31	1052.36	1013.12	1022.93	53.78	0.005885	-19.8067
22	32	1078.45	1052.36	1061.80	61.73	0.006755	-11.2048
22	33	1095.79	1078.45	1087.46	67.37	0.007372	-5.6049
22	34	1104.67	1095.79	1101.80	70.76	0.007744	-1.9288
22	35	1107.42	1104.67	1107.93	72.45	0.007928	0.3486
22	36	1108.46	1107.42	1110.18	73.26	0.008017	1.1613
22	37	1107.31	1108.46	1110.30	73.69	0.008064	2.0090
22	38	1106.25	1107.31	1109.69	73.98	0.008095	2.3191
22	39	1104.98	1106.25	1108.74	74.22	0.008122	2.5315
22	40	1103.30	1104.98	1107.59	74.47	0.008150	2.8845
23	3	450.61	0.00	450.22	0.00	0.000000	-0.2630
23	4	450.37	450.61	450.27	0.00	0.000000	-0.0673
23	5	450.31	450.37	450.29	0.00	0.000000	-0.0169
23	6	450.73	450.31	450.45	0.00	0.000000	-0.1883
23	7	451.10	450.73	450.68	0.00	0.000000	-0.2791
23	8	451.50	451.10	450.98	0.00	0.000000	-0.3533
23	9	452.85	451.50	451.66	0.00	0.000000	-0.8014
23	10	454.11	452.85	452.55	0.00	0.000000	-1.0559
23	11	455.77	454.11	453.71	0.00	0.000000	-1.3860
23	12	457.83	455.77	455.20	0.00	0.000000	-1.7678
23	13	460.33	457.83	457.06	0.00	0.000000	-2.2037
23	14	463.33	460.33	459.33	0.00	0.000000	-2.6929
23	15	466.79	463.33	462.03	0.00	0.000000	-3.2040
23	16	471.65	466.79	465.51	0.00	0.000000	-4.1359
23	17	477.83	471.65	469.96	0.00	0.000000	-5.2963
23	18	485.63	477.83	475.62	0.00	0.000000	-6.7382
23	19	495.50	485.63	482.79	0.00	0.000000	-8.5525
23	20	508.06	495.50	491.90	0.00	0.000000	-10.8708
23	21	522.98	508.06	503.09	0.00	0.000000	-13.3813
23	22	541.52	522.98	516.91	0.00	0.000000	-16.5625
23	23	564.77	541.52	534.09	0.00	0.000000	-20.6474
23	24	593.97	564.77	555.54	0.00	0.000000	-25.8681
23	25	632.43	593.97	582.99	0.00	0.000000	-33.2762
23	26	681.91	632.43	618.17	0.00	0.000000	-42.8975
23	27	745.36	681.91	666.62	1.29	0.000141	-52.9944
23	28	822.11	745.36	738.51	7.78	0.000852	-56.2640
23	29	900.04	822.11	829.34	20.94	0.002292	-47.5767
23	30	966.17	900.04	908.93	33.47	0.003663	-38.5231
23	31	1018.04	966.17	975.41	44.88	0.004912	-28.6899

0.0000	41.7431	0.010943	0.000400	0.017509
4.3745	56.6334	0.010848	0.000494	0.017461
30.3506	86.2956	0.010196	0.001146	0.017135
66.5355	114.3334	0.008771	0.002571	0.016423
64.1593	102.7743	0.007399	0.003943	0.015737
58.8994	88.1757	0.006143	0.005199	0.015109
50.9756	70.7823	0.005057	0.006285	0.014566
40.8630	52.0678	0.004187	0.007155	0.014131
28.9904	34.5954	0.003570	0.007772	0.013822
17.4659	19.3948	0.003198	0.008144	0.013636
8.6584	8.3097	0.003014	0.008328	0.013544
4.2114	3.0501	0.002925	0.008417	0.013500
2.1693	0.1602	0.002878	0.008464	0.013476
1.4959	-0.8231	0.002847	0.008495	0.013461
1.2347	-1.2967	0.002820	0.008522	0.013447
1.3240	-1.5604	0.002792	0.008550	0.013433
0.0000	0.2630	0.010943	0.000400	0.017509
0.0000	0.0673	0.010943	0.000400	0.017509
0.0000	0.0169	0.010943	0.000400	0.017509
0.0000	0.1883	0.010943	0.000400	0.017509
0.0000	0.2791	0.010943	0.000400	0.017509
0.0000	0.3533	0.010943	0.000400	0.017509
0.0000	0.8014	0.010943	0.000400	0.017509
0.0000	1.0559	0.010943	0.000400	0.017509
0.0000	1.3860	0.010943	0.000400	0.017509
0.0000	1.7678	0.010943	0.000400	0.017509
0.0000	2.2037	0.010943	0.000400	0.017509
0.0000	2.6929	0.010943	0.000400	0.017509
0.0000	3.2040	0.010943	0.000400	0.017509
0.0000	4.1359	0.010943	0.000400	0.017509

0.0000	5.2963	0.010943	0.000400	0.017509
0.0000	6.7382	0.010943	0.000400	0.017509
0.0000	8.5525	0.010943	0.000400	0.017509
0.0000	10.8708	0.010943	0.000400	0.017509
0.0000	13.3813	0.010943	0.000400	0.017509
0.0000	16.5625	0.010943	0.000400	0.017509
0.0000	20.6474	0.010943	0.000400	0.017509
0.0000	25.8681	0.010943	0.000400	0.017509
0.0000	33.2762	0.010943	0.000400	0.017509
0.0000	42.8975	0.010943	0.000400	0.017509
6.5618	59.5562	0.010801	0.000541	0.017438
33.0848	89.3489	0.010091	0.001252	0.017082
67.2301	114.8068	0.008651	0.002692	0.016362
64.1690	102.6921	0.007279	0.004063	0.015677
58.5470	87.2370	0.006030	0.005312	0.015052

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*ONE WORD INTEGERS
*ARITHMETIC TRACE
*TRANSFER TRACE
*LIST ALL
      DIMENSION TS(12, 48), TG(12, 48), XSO2(12,48)
      SHSO2 (TEMP) = 0.4474E01 + 0.2041E-01*TEMP - 0.1743E-04* TEMP**2
     1    + 0.5463E-08 *  TEMP**3 + 0.3838E05 /  TEMP **2
      SHO2(TEMP) = 0.4399E01 + 0.7895E-02 * TEMP - 0.5454E-05 * TEMP**2
     1   + 0.1399E-08 *  TEMP**3 + 0.7069E05 /  TEMP**2
      SHSO3(TEMP) = 0.4638E01 + 0.3266E-01 * TEMP - 0.2792E-04 * TEMP**2
     1       + 0.8782E-08 *  TEMP**3 - 0.1936E04 /  TEMP**2
      SHN2(TEMP) = 0.7543E01 - 0.34E-02 * TEMP + 0.636E-05 * TEMP**2
     1   -0.2702E-08 *  TEMP**3 - 0.3913E04 /  TEMP**2
      READ (2, 5) WSO2, WO2, WSO3, WN2, WS, SUMDF,TISOL, TIGAS, XINC,
     1  TTOL, I, M, IL, ML
      WRITE(3, 5) WSO2, WO2, WSO3, WN2, WS, SUMDF,TISOL, TIGAS, XINC,
     1  TTOL, I, M, IL, ML
    5 FORMAT (6F 10.6, 2F 6.0 / 2F 5.2, 4 I 4, F8.3)
      FSO2       = WSO2 / 64.0628
      FO2        = WO2 / 31.9988
      FN2 = WN2 / 28.0134
      FS = WS/60.0848
      FSO3 = WSO3 / 80.0622
      FSO3       = FSO3       + 0.0004
      FSO2       = FSO2       - 0.0004
      FSO2I = FSO2
      FO2 = FO2 - 0.0002
      DO 10 M = M, ML
      TG(M,I) = TIGAS
   10 XSO2(M,I) = 0.0
      M = 1
      DO 20 I = 1, IL
   20 TS(M,I) = TISOL
C     MATERIAL BALANCE
      WRITE ( 3, 25)
   25 FORMAT ('      M     I TS(M,I) TS(M,I-1) TG(M,I) XSO2(M,I)   SUMDF
     1   QS          QEVOL       QG         FSO2    FSO3        FO2')
      I = 2
      M = 2
      TSEST = TISOL
      DO 100 M = 2, ML
      SUMDF = 0.0
      TSIN =(TS(M-1, I) + TS(M-1, I-1))/ 2.
   30 TSEST = TSEST - XINC
      GO TO 40
   35 TSEST = TSEST + XINC
   40 TSOUT = TSEST
      TSAV = (TSOUT  + TSIN) / 2.
      TCSAV = (TSAV - 32.) / 1.8
      TKSAV = TCSAV + 273.16
      FTOT = FSO2 + FO2 + FSO3 + FN2
      XLNKP = 22600. / (1.98719 * TKSAV) - 21.36 / 1.98719
      XKP = EXP (XLNKP)
      PSO2 = FSO2       / FTOT
      PO2 = FO2        / FTOT
      PSO3 = FSO3       / FTOT
      PN2 = FN2 / FTOT
      PTOT = PSO2 + PO2 + PSO3 + PN2
      TERM1 = SQRT (PSO2 / PSO3)
      DENOM = PSO2 * XKP


      TERM3 = (PSO3 / DENOM)**2
      PTERM = TERM1 * (PO2 - TERM3)
      IF (TKSAV - 680.) 510, 510, 520
  510 RATEK = 0.
      GO TO 550
```

```
      DO 200 I = 3, IL
      TS(M,I)=TS(M,I-1)
      TSAV =  (TS(M,I) + TS(M-1, I))/2.
  141 TCSAV = (TSAV - 32.) / 1.8
      TKSAV = TCSAV + 273.16
      FTOT = FSO2 + FO2 + FSO3 + FN2
      XLNKP = 22600. / (1.98719 * TKSAV) - 21.36 / 1.98719
      XKP = EXP (XLNKP)
      PSO2 = FSO2       / FTOT
      PO2 = FO2       / FTOT
      PSO3 = FSO3       / FTOT
      PN2 = FN2 / FTOT
      PTOT = PSO2 + PO2 + PSO3 + PN2
      TERM1 = SQRT (PSO2 / PSO3)
      DENOM = PSO2 * XKP
      TERM3 = (PSO3 / DENOM)**2
      PTERM = TERM1 * (PO2 - TERM3)
      IF (TKSAV - 680.) 610, 610, 620
  610 RATEK = 0.
      GO TO 650
  620 IF (TKSAV - 730.2355) 630, 630, 640
  630 RATEK = 1.56E-07 * TKSAV - 1.06E-04
      GO TO 650
  640 RATEK = 4.874E-07 * TKSAV - 3.48E-04
  650 RXRAT = RATEK * PTERM
      DFSO2 = RXRAT * 60. * WS
C     HEAT BALANCE
      IF (TKSAV - 848.) 150, 150, 155
  150 SHS = 11.22 + 8.20E-03*TKSAV - 2.70E+05 / TKSAV**2
      GO TO 160
  155 SHS = 14.41 + 2.04E-03 * TKSAV
  160 QRX = (3.3 * TKSAV + 44140.)
      QEVOL = QRX * DFSO2
      QS = FS * SHS * (TS(M,I) - TS(M-1,I))
      QG = QEVOL - QS
      TGIN = TG(M,I-1)
      CPGAS = SHSO2(TGIN)  * FSO2 + SHO2(TGIN)  * FO2 + SHSO3(TGIN) *
     1 FSO3 + SHN2(TGIN)  * FN2
      TG(M,I) = QG / CPGAS + TG(M,I-1)
      TS1  =-QS / HTCON +TG(M,I)
      DELTA = ABS (TS1      - TS(M,I))
      IF (DELTA -TTOL) 190, 190, 170
  170 TS2= (TS1       + TS(M,I)) / 2.
      TS(M,I) = TS2
      TSAV = (TS2+ TS(M-1, I)) / 2.
      GO TO 141
  190 TS(M,I) = TS1
      SUMDF = SUMDF + DFSO2
      DFSO3 = DFSO2
      DFO2 = DFSO2 / 2.
      FSO2       = FSO2       - DFSO2
      FSO3       = FSO3       + DFSO3
      FO2       = FO2       - DFO2
      XAV = DFSO2 / FSO2



      XSO2(M,I) = 100. * SUMDF / FSO2I
      WRITE(3,196)M, I, TS(M,I), TS(M,I-1), TG(M,I), XSO2(M,I), SUMDF,
     1 QS, QEVOL, QG, FSO2, FSO3, FO2
  196 FORMAT (2I5, 4F8.2, F12.6, 3F10.4, 3F11.6)
      SMDF1 = 0.0
  200 CONTINUE
      CALL EXIT
      END
```

```
  520 IF (TKSAV - 730.2355) 530, 530, 540
  530 RATEK = 1.56E-07 * TKSAV - 1.06E-04
      GO TO 550
  540 RATEK = 4.874E-07 * TKSAV - 3.48E-04
  550 RXRAT = RATEK * PTERM
      DFSO2 = RXRAT * 60. * WS
C     HEAT BALANCE
      IF (TKSAV - 848.) 50, 50, 55
   50 SHS = 11.22 + 8.20E-03*TKSAV - 2.70E+05 / TKSAV**2
      GO TO 60
   55 SHS = 14.41 + 2.04E-03 * TKSAV
   60 QRX = (3.3 * TKSAV + 44140.)
      QEVOL = QRX * DFSO2
      QS = FS * SHS * (TSOUT - TSIN)
      QG = QEVOL - QS
      TGIN = TG(M-1, I-1)
      CPGAS = SHSO2(TGIN)  * FSO2 + SHO2(TGIN)  * FO2 + SHSO3(TGIN) *
     1 FSO3 + SHN2(TGIN)  * FN2
      TGOUT = QG / CPGAS + TGIN
      TG(M,I) = TGOUT
      TGAV = (TG(M,I) + TG(M-1, I-1))/2.0
C     HTCON = H * A * THETA = 4.81 *  8.417 * 1.0/60.
      HTCON = 0.673
      TSAV1 = QG / HTCON + TGAV
      DELTA = ABS(TSAV - TSAV1)
      IF (DELTA -TTOL) 90, 90, 70
   70 TSEX = 2.0 * TSAV1 - TSIN
      IF (TSEX - TSEST) 80, 80, 85
   80 GO TO 30
   85 GO TO 35
   90 TS(M,I) = 1.5 * TSAV1 - 0.5 * TS(M-1,I)
      TS(M,I-1) = 2.0 * TSEX - TS(M,I)
      IF (TS(M,I-1) - TGIN) 92, 92, 93
   92 TS(M,I) = TGIN
      TS(M,I-1) = TGIN
   93 CONTINUE
      IF (TG(M,I) -XINC - TIGAS) 94, 94, 95
   94 TG(M,I) = TIGAS
   95 CONTINUE
      SUMDF = SUMDF + DFSO2
      DFSO3 = DFSO2
      DFO2 = DFSO2 / 2.
      FSO2       = FSO2       - DFSO2
      FSO3       = FSO3       + DFSO3
      FO2        = FO2        - DFO2
      XAV = DFSO2 / FSO2
      XSO2(M,I) = 100. * SUMDF / FSO2I
      WRITE(3,99) M, I, TS(M,I), TS(M,I-1), TG(M,I), XSO2(M,I), SUMDF,
     1 QS, QEVOL, QG, FSO2, FSO3, FO2
   99 FORMAT (2I5, 4F8.2, F12.6, 3F10.4, 3F11.6)
  100 CONTINUE
      SMDF1 = 0.000554
      DO 200 M = 2, ML
      SUMDF = 0.0 +SMDF1
      FSO2       = WSO2 / 64.0628
      FO2        = WO2 / 31.9988



      FN2 = WN2 / 28.0134
      FS = WS/60.0848
      FSO3 = WSO3 / 80.0622
      FSO3       = FSO3       + 0.0004
      FSO2       = FSO2       - 0.0004
      FSO2I = FSO2
      FO2 = FO2 - 0.0002
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// XEQ
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```
 0.726667   0.566667   0.000000   3.716667   2.816667   0.000000   925.
0.25  0.75     1     1    48    12
     M     I  TS(M,I)  TS(M,I-1)  TG(M,I)  XSO2(M,I)    SUMDF        QS
     2     2   781.88     685.41    644.58       5.06   0.000554  -147.3920
     3     2   616.68     601.65    575.33       0.00   0.000000   -90.2384
     4     2   560.58     536.87    534.77       0.00   0.000000   -41.6545
     5     2   522.40     519.34    515.40       0.00   0.000000   -18.4579
     6     2   510.74     504.72    506.41       0.00   0.000000    -7.6874
     7     2   502.45     501.63    502.28       0.00   0.000000    -2.7406
     8     2   500.00     500.00    500.45       0.00   0.000000    -0.5464
     9     2   500.00     500.00    500.00       0.00   0.000000     0.1716
    10     2   500.00     500.00    500.00       0.00   0.000000     0.0000
    11     2   500.00     500.00    500.00       0.00   0.000000    -0.1715
    12     2   500.48     502.12    500.00       0.00   0.000000    -0.1715
     2     3   845.95     781.88    753.69      19.34   0.002116   -62.0941
     2     4   874.39     845.95    814.00      26.37   0.002886   -40.6430
     2     5   894.77     874.39    858.32      32.73   0.003582   -24.3272
     2     6   909.67     894.77    890.91      38.55   0.004218   -12.6279
     2     7   920.51     909.67    914.70      43.87   0.004801    -3.9096
     2     8   928.31     920.51    931.87      48.76   0.005336     2.6964
     2     9   933.24     928.31    943.85      53.25   0.005827     7.1423
     2    10   937.08     933.24    952.13      57.37   0.006278    10.1279
     2    11   939.68     937.08    957.64      61.17   0.006693    12.0853
     2    12   941.90     939.68    961.25      64.65   0.007075    13.0236
     2    13   942.07     941.90    963.04      67.88   0.007428    14.1092
     2    14   942.29     942.07    963.66      70.86   0.007754    14.3873
     2    15   942.39     942.29    963.54      73.61   0.008055    14.2282
     2    16   942.07     942.39    962.82      76.15   0.008333    13.9618
     2    17   941.97     942.07    961.81      78.51   0.008591    13.6549
     2    18   940.95     941.97    960.36      80.68   0.008829    13.0630
     2    19   940.78     940.95    958.92      82.70   0.009050    12.2064
     2    20   939.41     940.78    957.11      84.56   0.009254    11.9178
     2    21   939.23     939.41    955.48      86.28   0.009442    10.9378
     2    22   937.77     939.23    953.57      87.86   0.009615    10.6315
     2    23   937.60     937.77    951.90      89.31   0.009773     9.6235
     2    24   936.13     937.60    949.98      90.64   0.009919     9.2222
     2    25   935.97     936.13    948.34      91.84   0.010050     8.3271
     2    26   934.53     935.97    946.48      92.93   0.010169     8.0367
     2    27   934.39     934.53    944.89      93.90   0.010276     7.0708
     2    28   932.99     934.39    943.09      94.76   0.010370     6.7940
     2    29   932.86     932.99    941.57      95.52   0.010453     5.8650
     2    30   931.52     932.86    939.85      96.17   0.010524     5.6045
     2    31   931.40     931.52    938.42      96.72   0.010584     4.7237
     2    32   930.15     931.40    936.81      97.18   0.010635     4.4847
     2    33   930.04     930.15    935.50      97.56   0.010676     3.6748
     2    34   928.92     930.04    934.06      97.87   0.010710     3.4646
     2    35   928.83     928.92    932.92      98.11   0.010736     2.7555
     2    36   927.87     928.83    931.70      98.30   0.010757     2.5804
     2    37   927.80     927.87    930.77      98.45   0.010773     1.9959
     2    38   927.66     927.80    930.01      98.56   0.010786     1.5851
     2    39   926.68     927.66    929.10      98.65   0.010795     1.6333
     2    40   926.34     926.68    928.33      98.71   0.010802     1.3450
     2    41   926.12     926.34    927.71      98.76   0.010807     1.0733
     2    42   925.84     926.12    927.18      98.80   0.010811     0.9003
     2    43   925.77     925.84    926.78      98.83   0.010815     0.6777
     2    44   925.47     925.77    926.39      98.85   0.010817     0.6234
     2    45   925.62     925.47    926.18      98.87   0.010819     0.3779
     2    46   925.11     925.62    925.85      98.88   0.010820     0.4972
     2    47   925.69     925.11    925.83      98.89   0.010822     0.0907
     2    48   925.60     925.69    925.77      98.90   0.010823     0.1175
```

500.

QEVOL	QG	FSO2	FSO3	FO2	
25.7722	173.1643	0.010388	0.000954	0.017231	1-2
0.0000	90.2384	0.010388	0.000954	0.017231	
0.0000	41.6545	0.010388	0.000954	0.017231	
0.0000	18.4579	0.010388	0.000954	0.017231	
0.0000	7.6874	0.010388	0.000954	0.017231	
0.0000	2.7406	0.010388	0.000954	0.017231	
0.0000	0.5464	0.010388	0.000954	0.017231	
0.0000	-0.1716	0.010388	0.000954	0.017231	
0.0000	0.0000	0.010388	0.000954	0.017231	
0.0000	0.1715	0.010388	0.000954	0.017231	
0.0000	0.1715	0.010388	0.000954	0.017231	
72.8341	134.9283	0.009380	0.001962	0.016727	
35.8764	76.5195	0.008610	0.002732	0.016342	
32.4778	57.0050	0.007914	0.003428	0.015994	
29.6914	42.3194	0.007278	0.004064	0.015676	
27.2061	31.1158	0.006695	0.004647	0.015385	
24.9543	22.5579	0.006160	0.005182	0.015117	
22.9475	15.8051	0.005669	0.005673	0.014872	
21.0734	10.9455	0.005218	0.006124	0.014646	
19.3796	7.2943	0.004803	0.006539	0.014439	
17.8214	4.7977	0.004421	0.006921	0.014248	
16.4791	2.3699	0.004068	0.007274	0.014071	
15.2187	0.8313	0.003742	0.007600	0.013908	
14.0577	-0.1704	0.003441	0.007901	0.013758	
13.0031	-0.9587	0.003163	0.008179	0.013618	
12.0200	-1.3348	0.002905	0.008437	0.013490	
11.1372	-1.9257	0.002667	0.008675	0.013371	
10.2866	-1.9197	0.002446	0.008896	0.013260	
9.5227	-2.3950	0.002242	0.009100	0.013158	
8.7706	-2.1671	0.002055	0.009288	0.013064	
8.0869	-2.5445	0.001881	0.009461	0.012978	
7.4076	-2.2159	0.001723	0.009619	0.012899	
6.7779	-2.5442	0.001577	0.009765	0.012826	
6.1506	-2.1765	0.001446	0.009896	0.012760	
5.5568	-2.4798	0.001327	0.010015	0.012701	
4.9684	-2.1024	0.001220	0.010122	0.012647	
4.4027	-2.3913	0.001126	0.010216	0.012600	
3.8527	-2.0122	0.001043	0.010299	0.012559	
3.3221	-2.2823	0.000972	0.010370	0.012523	
2.8261	-1.8976	0.000912	0.010430	0.012493	
2.3542	-2.1304	0.000861	0.010481	0.012468	
1.9395	-1.7352	0.000820	0.010522	0.012447	
1.5560	-1.9086	0.000786	0.010556	0.012430	
1.2446	-1.5108	0.000760	0.010582	0.012417	
0.9649	-1.6154	0.000739	0.010603	0.012407	
0.7564	-1.2394	0.000723	0.010619	0.012399	
0.5847	-1.0003	0.000710	0.010632	0.012392	
0.4296	-1.2036	0.000701	0.010641	0.012388	
0.3290	-1.0160	0.000694	0.010648	0.012384	
0.2532	-0.8200	0.000689	0.010653	0.012382	
0.1923	-0.7080	0.000685	0.010657	0.012379	
0.1504	-0.5272	0.000681	0.010661	0.012378	
0.1109	-0.5124	0.000679	0.010663	0.012377	
0.0929	-0.2850	0.000677	0.010665	0.012376	
0.0598	-0.4374	0.000676	0.010666	0.012375	
0.0652	-0.0255	0.000674	0.010668	0.012374	
0.0450	-0.0724	0.000673	0.010669	0.012374	2-1/8

3	3	752.65	616.68	645.76	2.71	0.000297	-71.9341
3	4	798.12	752.65	710.40	6.82	0.000747	-59.0354
3	5	836.76	798.12	768.52	12.13	0.001328	-45.9285
3	6	868.99	836.76	820.48	18.70	0.002046	-32.6495
3	7	894.69	868.99	863.39	25.39	0.002779	-21.0690
3	8	914.59	894.69	897.55	31.84	0.003484	-11.4700
3	9	929.25	914.59	923.84	37.87	0.004144	-3.6386
3	10	940.39	929.25	943.79	43.45	0.004755	2.2866
3	11	948.47	940.39	958.54	48.59	0.005317	6.7783
3	12	954.52	948.47	969.27	53.32	0.005834	9.9304
3	13	957.38	954.52	976.25	57.61	0.006305	12.6994
3	14	959.59	957.38	980.61	61.52	0.006732	14.1881
3	15	961.24	959.59	983.18	65.08	0.007122	14.7677
3	16	961.03	961.24	984.01	68.32	0.007476	15.4668
3	17	960.95	961.03	983.80	71.27	0.007799	15.3774
3	18	959.62	960.95	982.51	73.95	0.008092	15.4052
3	19	959.43	959.62	980.97	76.38	0.008359	14.4971
3	20	957.48	959.43	978.69	78.58	0.008599	14.2769
3	21	955.66	957.48	976.06	80.58	0.008818	13.7277
3	22	954.09	955.66	973.26	82.37	0.009014	12.9005
3	23	952.12	954.09	970.29	83.99	0.009191	12.2273
3	24	950.51	952.12	967.32	85.43	0.009349	11.3154
3	25	948.48	950.51	964.27	86.71	0.009489	10.6265
3	26	946.91	948.48	961.32	87.85	0.009613	9.6993
3	27	944.92	946.91	958.34	88.83	0.009721	9.0295
3	28	943.43	944.92	955.52	89.69	0.009815	8.1345
3	29	941.53	943.43	952.68	90.42	0.009895	7.5059
3	30	939.47	941.53	949.82	91.04	0.009963	6.9688
3	31	938.47	939.47	947.32	91.56	0.010020	5.9603
3	32	936.40	938.47	944.75	91.99	0.010067	5.6159
3	33	936.25	936.40	942.78	92.34	0.010105	4.3998
3	34	934.52	936.25	940.74	92.63	0.010137	4.1861
3	35	933.06	934.52	938.73	92.86	0.010161	3.8198
3	36	931.69	933.06	936.84	93.04	0.010182	3.4656
3	37	931.58	931.69	935.45	93.19	0.010198	2.6060
3	38	930.30	931.58	934.01	93.31	0.010211	2.4967
3	39	929.17	930.30	932.64	93.41	0.010222	2.3329
3	40	929.06	929.17	931.65	93.49	0.010231	1.7449
3	41	927.92	929.06	930.56	93.56	0.010238	1.7777
3	42	927.84	927.92	929.79	93.62	0.010245	1.6107
3	43	927.70	927.84	929.20	93.66	0.010250	1.0093
3	44	926.59	927.70	928.41	93.70	0.010254	1.2278
3	45	926.77	926.59	927.93	93.73	0.010257	0.7794
3	46	926.62	926.77	927.57	93.76	0.010260	0.6356
3	47	925.94	926.62	927.05	93.77	0.010261	0.7457
3	48	926.49	925.94	926.90	93.78	0.010263	0.2710
4	3	673.13	560.58	584.31	0.00	0.000000	-59.7735
4	4	719.90	673.13	632.52	0.00	0.000000	-58.8069
4	5	767.17	719.90	687.89	2.93	0.000321	-53.3524
4	6	809.78	767.17	741.72	7.14	0.000781	-43.8091
4	7	848.85	809.78	794.71	13.14	0.001438	-36.4375
4	8	882.46	848.85	843.80	20.36	0.002228	-26.0192
4	9	908.88	882.46	884.99	27.65	0.003025	-16.0765
4	10	930.22	908.88	918.41	34.63	0.003789	-7.9518
4	11	947.22	930.22	944.91	41.14	0.004502	-1.5591
4	12	959.74	947.22	965.32	47.15	0.005159	3.7565
4	13	967.93	959.74	980.14	52.60	0.005756	8.2133
4	14	973.80	967.93	990.61	57.53	0.006296	11.3131
4	15	977.39	973.80	997.57	62.00	0.006785	13.5867
4	16	979.26	977.39	1001.63	66.00	0.007223	15.0578
4	17	980.57	979.26	1003.71	69.59	0.007615	15.5722
4	18	979.40	980.57	1003.71	72.79	0.007965	16.3626
4	19	979.30	979.40	1002.81	75.64	0.008278	15.6229

13.8065	85.7406	0.010645	0.000697	0.017360
20.9306	79.9661	0.010195	0.001147	0.017135
27.0497	72.9783	0.009614	0.001728	0.016844
33.4826	66.1322	0.008896	0.002446	0.016485
34.1887	55.2577	0.008163	0.003179	0.016119
32.9323	44.4024	0.007458	0.003884	0.015766
30.7799	34.4187	0.006798	0.004544	0.015436
28.5455	26.2588	0.006187	0.005155	0.015131
26.2723	19.4939	0.005625	0.005717	0.014850
24.1598	14.2294	0.005108	0.006234	0.014591
21.9691	9.2696	0.004637	0.006705	0.014356
19.9933	5.8052	0.004210	0.007132	0.014142
18.1923	3.4246	0.003820	0.007522	0.013947
16.5686	1.1017	0.003466	0.007876	0.013770
15.0951	-0.2823	0.003143	0.008199	0.013609
13.6862	-1.7189	0.002850	0.008492	0.013462
12.4406	-2.0565	0.002583	0.008759	0.013329
11.2420	-3.0348	0.002343	0.008999	0.013209
10.2128	-3.5149	0.002124	0.009218	0.013099
9.1678	-3.7326	0.001928	0.009414	0.013001
8.2692	-3.9581	0.001751	0.009591	0.012913
7.3659	-3.9495	0.001593	0.009749	0.012834
6.5641	-4.0621	0.001453	0.009889	0.012764
5.7786	-3.9207	0.001329	0.010013	0.012702
5.0557	-3.9737	0.001221	0.010121	0.012648
4.3799	-3.7546	0.001127	0.010215	0.012601
3.7375	-3.7684	0.001047	0.010295	0.012561
3.1736	-3.7952	0.000979	0.010363	0.012527
2.6384	-3.3221	0.000922	0.010420	0.012498
2.1985	-3.4174	0.000875	0.010467	0.012475
1.7922	-2.6075	0.000837	0.010505	0.012456
1.4759	-2.7101	0.000805	0.010537	0.012440
1.1555	-2.6642	0.000781	0.010561	0.012428
0.9598	-2.5057	0.000760	0.010582	0.012417
0.7650	-1.8409	0.000744	0.010598	0.012409
0.5837	-1.9129	0.000731	0.010611	0.012403
0.5169	-1.8160	0.000720	0.010622	0.012397
0.4367	-1.3081	0.000711	0.010631	0.012393
0.3346	-1.4430	0.000704	0.010638	0.012389
0.2910	-1.0197	0.000697	0.010645	0.012386
0.2323	-0.7770	0.000692	0.010650	0.012383
0.1821	-1.0457	0.000688	0.010654	0.012381
0.1422	-0.6371	0.000685	0.010657	0.012380
0.1543	-0.4813	0.000682	0.010660	0.012378
0.0526	-0.6931	0.000681	0.010661	0.012378
0.0725	-0.1985	0.000679	0.010663	0.012377
0.0000	59.7735	0.010943	0.000400	0.017509
0.0000	58.8069	0.010943	0.000400	0.017509
14.9350	68.2875	0.010621	0.000721	0.017348
21.4199	67.2291	0.010161	0.001181	0.017118
30.5778	67.0153	0.009504	0.001838	0.016789
36.8299	62.8491	0.008714	0.002628	0.016394
37.2279	53.3044	0.007917	0.003425	0.015996
35.6774	43.6293	0.007153	0.004189	0.015614
33.2772	34.8363	0.006440	0.004902	0.015257
30.7324	26.9759	0.005783	0.005559	0.014929
27.8780	19.6646	0.005186	0.006156	0.014630
25.2518	13.9387	0.004646	0.006696	0.014360
22.8744	9.2876	0.004157	0.007185	0.014116
20.4801	5.4223	0.003719	0.007623	0.013897
18.3504	2.7782	0.003327	0.008015	0.013701
16.3609	-0.0017	0.002977	0.008365	0.013526
14.6178	-1.2050	0.002664	0.008678	0.013369

3-3

595029

4	20	977.30	979.30	1000.71	78.17	0.008554	15.75320
4	21	975.02	977.30	997.79	80.40	0.008799	15.32218
4	22	972.64	975.02	994.37	82.37	0.009014	14.92264
4	23	969.88	972.64	990.54	84.09	0.009202	14.56078
4	24	967.16	969.88	986.52	85.58	0.009365	14.23194
4	25	964.21	967.18	982.33	86.87	0.009507	13.93974
4	26	961.44	964.21	978.15	87.98	0.009628	13.68250
4	27	958.48	961.44	973.95	88.92	0.009731	13.45137
4	28	955.79	958.48	969.88	89.71	0.009817	13.24840
4	29	952.97	955.79	965.90	90.38	0.009890	13.07064
4	30	950.09	952.97	962.02	90.94	0.009952	12.91289
4	31	947.84	950.09	958.43	91.40	0.010002	12.77288
4	32	945.20	947.84	954.98	91.79	0.010044	12.65821
4	33	943.60	945.20	951.94	92.10	0.010078	12.56154
4	34	941.43	943.60	949.08	92.36	0.010107	12.47711
4	35	939.39	941.43	946.39	92.58	0.010131	12.40367
4	36	937.50	939.39	943.89	92.77	0.010152	12.33773
4	37	935.78	937.50	941.54	92.92	0.010169	12.28476
4	38	934.11	935.78	939.38	93.06	0.010183	12.23130
4	39	932.64	934.11	937.41	93.18	0.010196	12.18914
4	40	932.53	932.64	936.02	93.27	0.010207	12.14949
4	41	931.15	932.53	934.61	93.36	0.010217	12.11300
4	42	930.11	931.15	933.27	93.43	0.010224	12.08249
4	43	930.03	930.11	932.33	93.49	0.010231	12.05461
4	44	928.32	930.03	931.12	93.55	0.010237	12.02899
4	45	928.53	928.32	930.37	93.59	0.010242	12.00844
4	46	928.41	928.53	929.80	93.63	0.010246	11.99402
4	47	927.05	928.41	928.97	93.67	0.010250	11.98210
4	48	927.13	927.05	928.40	93.69	0.010252	11.97523
5	3	614.65	522.40	551.03	0.00	0.000000	-142.81123
5	4	657.26	614.65	588.98	0.00	0.000000	-145.94911
5	5	701.55	657.26	628.98	0.00	0.000000	-148.84435
5	6	745.61	701.55	673.10	1.09	0.000119	-148.80016
5	7	790.74	745.61	724.29	4.82	0.000528	-144.72344
5	8	832.93	790.74	774.75	9.52	0.001052	-139.15291
5	9	871.96	832.93	827.83	17.05	0.001866	-129.69511
5	10	904.79	871.96	874.93	25.01	0.002737	-120.09877
5	11	932.18	904.79	914.58	32.80	0.003589	-111.84266
5	12	953.62	932.18	946.66	40.12	0.004391	-104.68599
5	13	969.42	953.62	971.54	46.83	0.005125	-98.42799
5	14	981.71	969.42	990.50	52.91	0.005790	-92.91533
5	15	989.75	981.71	1004.18	58.36	0.006387	-87.70883
5	16	994.89	989.75	1013.46	63.23	0.006919	-82.49978
5	17	997.74	994.89	1019.21	67.55	0.007392	-77.44344
5	18	998.88	997.74	1022.03	71.33	0.007806	-72.57809
5	19	999.04	998.88	1022.78	74.65	0.008169	-67.97592
5	20	997.52	999.04	1021.64	77.52	0.008483	-63.71232
5	21	995.23	997.52	1019.10	79.99	0.008753	-59.80636
5	22	992.39	995.23	1015.54	82.10	0.008984	-56.25797
5	23	988.33	992.39	1011.00	83.89	0.009180	-53.06214
5	24	985.25	988.33	1006.23	85.40	0.009346	-50.21188
5	25	980.63	985.25	1000.88	86.66	0.009484	-47.68303
5	26	976.70	980.63	995.47	87.72	0.009599	-45.46334
5	27	972.63	976.70	990.06	88.59	0.009695	-43.52008
5	28	968.78	972.63	984.79	89.32	0.009775	-41.83222
5	29	964.93	968.78	979.69	89.93	0.009841	-40.37220
5	30	961.83	964.93	975.03	90.45	0.009898	-39.11807
5	31	957.92	961.83	970.40	90.89	0.009946	-38.03959
5	32	955.13	957.92	966.24	91.26	0.009987	-37.12725
5	33	952.51	955.13	962.43	91.58	0.010021	-36.36788
5	34	949.73	952.51	958.87	91.85	0.010052	-35.73508
5	35	947.09	949.73	955.53	92.10	0.010078	-35.20841
5	36	944.61	947.09	952.41	92.31	0.010102	-34.77506

12.9354	-2.8166	0.002388	0.008954	0.013231
11.4199	-3.9019	0.002143	0.009199	0.013109
10.0505	-4.5759	0.001928	0.009414	0.013001
8.7893	-5.1185	0.001740	0.009602	0.012907
7.6462	-5.3732	0.001577	0.009765	0.012826
6.6024	-5.5949	0.001435	0.009907	0.012755
5.6570	-5.5879	0.001314	0.010028	0.012694
4.8138	-5.5999	0.001211	0.010131	0.012643
4.0556	-5.4284	0.001125	0.010217	0.012599
3.4062	-5.3002	0.001052	0.010290	0.012563
2.8591	-5.1698	0.000990	0.010352	0.012532
2.3507	-4.7781	0.000940	0.010402	0.012507
1.9839	-4.5982	0.000898	0.010444	0.012486
1.5770	-4.0364	0.000864	0.010478	0.012469
1.3441	-3.8030	0.000835	0.010507	0.012455
1.1434	-3.5666	0.000811	0.010531	0.012442
0.9807	-3.3230	0.000790	0.010552	0.012432
0.7568	-3.1205	0.000773	0.010569	0.012424
0.6797	-2.8679	0.000759	0.010583	0.012417
0.6097	-2.6032	0.000746	0.010596	0.012410
0.5006	-1.8485	0.000735	0.010607	0.012405
0.4620	-1.8679	0.000725	0.010617	0.012400
0.3530	-1.7719	0.000718	0.010624	0.012396
0.2985	-1.2476	0.000711	0.010631	0.012393
0.2935	-1.5964	0.000705	0.010637	0.012390
0.2312	-1.0032	0.000700	0.010642	0.012387
0.1954	-0.7447	0.000696	0.010646	0.012385
0.1815	-1.1094	0.000692	0.010650	0.012383
0.1049	-0.7473	0.000690	0.010652	0.012382
0.0000	42.8113	0.010943	0.000400	0.017509
0.0000	45.9491	0.010943	0.000400	0.017509
0.0000	48.8413	0.010943	0.000400	0.017509
5.5649	54.3666	0.010823	0.000519	0.017449
18.9942	63.7176	0.010414	0.000928	0.017244
24.4059	63.5588	0.009890	0.001452	0.016982
37.9438	67.6389	0.009076	0.002266	0.016575
40.6337	60.7325	0.008205	0.003137	0.016140
39.8120	51.6546	0.007353	0.003989	0.015714
37.4478	42.1337	0.006551	0.004791	0.015313
34.3185	32.8905	0.005817	0.005525	0.014946
31.1028	25.1875	0.005152	0.006190	0.014613
27.9469	18.2385	0.004555	0.006787	0.014315
24.9071	12.4092	0.004023	0.007319	0.014049
22.1300	7.6866	0.003550	0.007792	0.013812
19.3640	3.7860	0.003136	0.008206	0.013605
16.9807	1.0048	0.002773	0.008569	0.013424
14.7038	-1.5274	0.002459	0.008883	0.013267
12.6511	-3.4125	0.002189	0.009153	0.013132
10.8106	-4.7690	0.001958	0.009384	0.013016
9.1684	-6.0930	0.001762	0.009580	0.012918
7.7233	-6.3954	0.001596	0.009746	0.012835
6.4626	-7.1677	0.001458	0.009884	0.012766
5.3844	-7.2489	0.001343	0.009999	0.012709
4.4847	-7.2460	0.001247	0.010095	0.012661
3.7294	-7.0427	0.001167	0.010175	0.012621
3.1227	-6.8093	0.001101	0.010241	0.012588
2.6556	-6.2250	0.001044	0.010298	0.012559
2.2154	-6.1805	0.000996	0.010346	0.012535
1.9276	-5.5449	0.000955	0.010387	0.012515
1.6144	-5.0624	0.000921	0.010421	0.012497
1.4101	-4.7406	0.000890	0.010452	0.012482
1.2414	-4.4426	0.000864	0.010478	0.012469
1.1010	-4.1496	0.000840	0.010502	0.012457

4-20

5238

5	37	942.33	944.61	949.51	92.50	0.010123	4.8339
5	38	940.17	942.33	946.81	92.68	0.010142	4.4679
5	39	938.21	940.17	944.32	92.83	0.010159	4.1067
5	40	936.49	938.21	941.99	92.95	0.010172	3.6970
5	41	934.77	936.49	939.85	93.06	0.010184	3.4187
5	42	933.42	934.77	937.95	93.17	0.010195	3.0492
5	43	933.31	933.42	936.60	93.25	0.010205	2.2162
5	44	931.65	933.31	935.16	93.34	0.010214	2.3645
5	45	930.79	931.65	933.85	93.41	0.010221	2.0637
5	46	930.70	930.79	932.93	93.46	0.010227	1.5007
5	47	928.78	930.70	931.68	93.52	0.010234	1.9541
5	48	928.92	928.78	930.87	93.56	0.010239	1.5140
6	3	573.56	510.74	530.55	0.00	0.000000	-28.9452
6	4	609.72	573.56	558.91	0.00	0.000000	-34.1930
6	5	648.45	609.72	590.86	0.00	0.000000	-38.7538
6	6	688.41	648.45	625.51	0.00	0.000000	-42.3507
6	7	730.15	688.41	662.49	0.00	0.000000	-45.5295
6	8	775.73	730.15	710.57	3.11	0.000341	-43.8515
6	9	820.24	775.73	760.76	7.62	0.000834	-40.0326
6	10	864.35	820.24	816.23	15.09	0.001651	-32.3864
6	11	902.73	864.35	868.11	23.60	0.002582	-23.2953
6	12	934.76	902.73	912.64	32.01	0.003503	-14.8881
6	13	959.98	934.76	949.09	39.93	0.004370	-7.3329
6	14	979.93	959.98	978.22	47.24	0.005169	-1.1507
6	15	994.45	979.93	1000.51	53.82	0.005890	4.0830
6	16	1005.23	994.45	1017.03	59.67	0.006530	7.9382
6	17	1011.79	1005.23	1028.38	64.82	0.007094	11.1673
6	18	1014.53	1011.79	1035.27	69.30	0.007583	13.6657
6	19	1016.77	1014.53	1038.86	73.14	0.008004	14.8645
6	20	1016.05	1016.77	1039.50	76.39	0.008359	15.7851
6	21	1014.08	1016.05	1037.92	79.10	0.008656	16.0471
6	22	1011.88	1014.08	1034.94	81.35	0.008902	15.5196
6	23	1007.06	1011.88	1030.32	83.19	0.009104	15.6562
6	24	1003.02	1007.06	1025.02	84.69	0.009268	14.8066
6	25	997.74	1003.02	1019.05	85.93	0.009403	14.3414
6	26	992.82	997.74	1012.87	86.94	0.009514	13.4932
6	27	987.77	992.82	1006.63	87.79	0.009606	12.6919
6	28	982.92	987.77	1000.51	88.50	0.009684	11.8388
6	29	978.14	982.92	994.57	89.10	0.009751	11.0594
6	30	973.95	978.14	988.98	89.62	0.009807	10.1202
6	31	969.35	973.95	983.58	90.08	0.009857	9.5779
6	32	965.60	969.35	978.57	90.48	0.009901	8.7309
6	33	962.74	965.60	974.17	90.83	0.009940	7.6895
6	34	958.65	962.74	969.76	91.14	0.009974	7.4785
6	35	955.99	958.65	965.87	91.43	0.010005	6.6504
6	36	953.02	955.99	962.22	91.69	0.010034	6.1907
6	37	950.19	953.02	958.78	91.93	0.010059	5.7784
6	38	947.52	950.19	955.54	92.14	0.010083	5.3969
6	39	945.05	947.52	952.51	92.33	0.010104	5.0223
6	40	942.80	945.05	949.70	92.51	0.010123	4.6402
6	41	940.65	942.80	947.07	92.67	0.010141	4.3182
6	42	938.78	940.65	944.65	92.82	0.010157	3.9511
6	43	937.12	938.78	942.40	92.93	0.010169	3.5534
6	44	935.18	937.12	940.25	93.04	0.010181	3.4121
6	45	934.04	935.18	938.42	93.14	0.010192	2.9478
6	46	933.93	934.04	937.12	93.22	0.010201	2.1469
6	47	932.15	933.93	935.67	93.31	0.010211	2.3729
6	48	931.20	932.15	934.33	93.38	0.010218	2.1114
7	3	546.29	502.45	518.11	0.00	0.000000	-18.9656
7	4	575.04	546.29	538.54	0.00	0.000000	-24.5637
7	5	607.14	575.04	563.09	0.00	0.000000	-29.6454
7	6	641.64	607.14	591.11	0.00	0.000000	-34.0118
7	7	678.61	641.64	622.19	0.00	0.000000	-37.9724

0.9792	-3.8546	0.000819	0.010523	0.012447
0.8813	-3.5866	0.000800	0.010542	0.012437
0.7902	-3.3164	0.000783	0.010559	0.012429
0.6085	-3.0884	0.000770	0.010572	0.012422
0.5780	-2.8407	0.000758	0.010584	0.012416
0.5294	-2.5197	0.000747	0.010595	0.012411
0.4363	-1.7799	0.000737	0.010605	0.012406
0.4565	-1.9080	0.000728	0.010614	0.012401
0.3282	-1.7354	0.000721	0.010621	0.012397
0.2784	-1.2223	0.000715	0.010627	0.012394
0.2949	-1.6591	0.000708	0.010634	0.012391
0.2398	-1.0742	0.000703	0.010639	0.012389
0.0000	28.9452	0.010943	0.000400	0.017509
0.0000	34.1930	0.010943	0.000400	0.017509
0.0000	38.7538	0.010943	0.000400	0.017509
0.0000	42.3307	0.010943	0.000400	0.017509
0.0000	45.5295	0.010943	0.000400	0.017509
15.8477	59.6992	0.010601	0.000741	0.017338
22.9739	63.0065	0.010108	0.001234	0.017091
38.0678	70.4543	0.009291	0.002051	0.016683
43.4430	66.7383	0.008360	0.002982	0.016217
43.0365	57.9246	0.007439	0.003903	0.015757
40.5184	47.8514	0.006572	0.004770	0.015323
37.3753	38.5261	0.005773	0.005569	0.014924
33.7284	29.6453	0.005052	0.006290	0.014563
29.9902	22.0519	0.004412	0.006930	0.014243
26.3748	15.2075	0.003848	0.007494	0.013961
22.9307	9.2450	0.003359	0.007983	0.013717
19.6836	4.8190	0.002939	0.008404	0.013506
16.6555	0.8703	0.002583	0.008759	0.013329
13.9185	-2.1286	0.002286	0.009056	0.013180
11.5052	-4.0143	0.002040	0.009302	0.013057
9.4447	-6.2115	0.001838	0.009504	0.012956
7.6854	-7.1212	0.001674	0.009668	0.012874
6.3167	-8.0247	0.001539	0.009803	0.012807
5.1926	-8.3005	0.001428	0.009914	0.012751
4.3212	-8.3706	0.001336	0.010006	0.012705
3.6328	-8.2060	0.001258	0.010084	0.012666
3.1055	-7.9539	0.001192	0.010151	0.012633
2.6450	-7.4751	0.001135	0.010207	0.012605
2.3541	-7.2237	0.001085	0.010257	0.012579
2.0447	-6.6862	0.001041	0.010301	0.012558
1.8084	-5.8810	0.001002	0.010340	0.012538
1.5979	-5.8806	0.000968	0.010374	0.012521
1.4638	-5.1866	0.000937	0.010405	0.012506
1.3249	-4.8658	0.000908	0.010434	0.012491
1.1997	-4.5787	0.000883	0.010459	0.012478
1.0924	-4.3044	0.000859	0.010483	0.012467
0.9939	-4.0284	0.000838	0.010504	0.012456
0.8988	-3.7413	0.000819	0.010523	0.012447
0.8252	-3.4929	0.000801	0.010541	0.012438
0.7398	-3.2112	0.000785	0.010557	0.012430
0.5685	-2.9848	0.000773	0.010569	0.012424
0.5669	-2.8451	0.000761	0.010581	0.012418
0.5120	-2.4357	0.000750	0.010592	0.012412
0.4220	-1.7249	0.000741	0.010601	0.012408
0.4610	-1.9118	0.000731	0.010611	0.012403
0.3357	-1.7756	0.000724	0.010618	0.012399
0.0000	18.9656	0.010943	0.000400	0.017509
0.0000	24.5637	0.010943	0.000400	0.017509
0.0000	29.6454	0.010943	0.000400	0.017509
0.0000	34.0118	0.010943	0.000400	0.017509
0.0000	37.9724	0.010943	0.000400	0.017509

7	8	719.21	678.61	656.50	0.00	0.0000000	-42.2081	
7	9	763.98	719.21	700.12	2.18	0.0000239	-42.9729	
7	10	811.42	763.98	750.68	6.59	0.0000721	-40.6823	
7	11	859.36	811.42	807.89	14.02	0.0001534	-34.6364	
7	12	902.07	859.36	863.61	22.96	0.0002512	-25.8853	
7	13	937.98	902.07	912.10	31.87	0.0003488	-17.4177	
7	14	967.29	937.98	952.59	40.33	0.0004413	-9.8949	
7	15	989.98	967.29	985.09	48.08	0.0005262	-3.2909	
7	16	1007.34	989.98	1010.40	55.06	0.0006025	2.0557	
7	17	1019.38	1007.34	1029.05	61.19	0.0006697	6.5051	
7	18	1027.38	1019.38	1041.94	66.48	0.0007275	9.7955	
7	19	1031.87	1027.38	1049.96	70.96	0.0007765	12.7724	
7	20	1033.33	1031.87	1053.84	74.66	0.0008171	13.7994	
7	21	1031.75	1033.33	1054.12	77.68	0.0008500	15.0604	
7	22	1030.26	1031.75	1052.27	80.08	0.0008763	14.8129	
7	23	1025.28	1030.26	1048.13	81.99	0.0008972	15.3744	
7	24	1020.70	1025.28	1042.83	83.50	0.0009137	14.6875	
7	25	1014.97	1020.70	1036.65	84.72	0.0009271	14.5900	
7	26	1009.34	1014.97	1030.10	85.73	0.0009381	13.9746	
7	27	1003.55	1009.34	1023.40	86.58	0.0009474	13.3597	
7	28	997.91	1003.55	1016.75	87.31	0.0009554	12.6808	
7	29	992.37	997.91	1010.25	87.95	0.0009625	12.0289	
7	30	987.30	992.37	1004.02	88.52	0.0009687	11.5222	
7	31	982.06	987.30	997.98	89.03	0.0009743	10.7192	
7	32	977.48	982.06	992.30	89.50	0.0009794	9.9742	
7	33	973.58	977.48	987.06	89.90	0.0009838	9.0709	
7	34	969.02	973.58	981.98	90.28	0.0009879	8.7252	
7	35	966.18	969.02	977.56	90.62	0.0009917	7.6584	
7	36	961.94	966.18	973.11	90.93	0.0009950	7.5118	
7	37	959.19	961.94	969.17	91.21	0.0009982	6.7150	
7	38	955.39	959.19	965.21	91.47	0.0010010	6.6080	
7	39	952.96	955.39	961.71	91.72	0.0010037	5.8945	
7	40	950.27	952.96	958.44	91.94	0.0010061	5.4951	
7	41	947.68	950.27	955.35	92.14	0.0010083	5.1578	
7	42	945.31	947.68	952.45	92.33	0.0010104	4.8020	
7	43	943.16	945.31	949.76	92.50	0.0010122	4.4408	
7	44	940.95	943.16	947.20	92.66	0.0010139	4.2081	
7	45	939.20	940.95	944.86	92.80	0.0010155	3.8130	
7	46	937.60	939.20	942.69	92.90	0.0010166	3.4284	
7	47	935.59	937.60	940.58	93.01	0.0010178	3.2608	
7	48	934.41	935.59	938.76	93.11	0.0010189	2.9284	
8	3	529.19	500.00	510.79	0.00	0.0000000	-12.3855	
8	4	550.99	529.19	525.23	0.00	0.0000000	-17.3363	
8	5	576.70	550.99	543.69	0.00	0.0000000	-22.2153	
8	6	604.79	576.70	565.54	0.00	0.0000000	-26.4149	
8	7	636.34	604.79	590.78	0.00	0.0000000	-30.6615	
8	8	671.51	636.34	619.46	0.00	0.0000000	-35.0346	
8	9	710.67	671.51	651.72	0.00	0.0000000	-39.6730	
8	10	755.57	710.67	692.36	1.53	0.0001168	-42.5378	
8	11	805.34	755.57	743.41	5.88	0.0006644	-41.6751	
8	12	856.44	805.34	802.38	13.38	0.0001464	-36.3876	
8	13	902.79	856.44	861.36	22.72	0.0002487	-27.8821	
8	14	942.59	902.79	913.49	32.14	0.0003517	-19.5867	
8	15	974.87	942.59	957.22	41.03	0.0004490	-11.8810	
8	16	1000.45	974.87	992.68	49.18	0.0005382	-5.2252	
8	17	1019.50	1000.45	1020.21	56.43	0.0006175	0.4774	
8	18	1033.08	1019.50	1040.54	62.72	0.0006863	5.0243	
8	19	1042.49	1033.08	1054.67	68.02	0.0007443	8.1947	
8	20	1046.86	1042.49	1063.05	72.34	0.0007917	10.6972	
8	21	1046.96	1046.86	1066.38	75.76	0.0008291	13.0700	
8	22	1046.87	1046.96	1066.55	78.39	0.0008579	13.2461	
8	23	1042.19	1046.87	1063.56	80.41	0.0008799	14.3809	
8	24	1037.56	1042.19	1058.84	81.96	0.0008969	14.3228	

0.0000	42.2081	0.010943	0.000400	0.017509
11.1238	54.0968	0.010703	0.000639	0.017389
22.4371	63.3194	0.010221	0.001121	0.017148
37.8678	72.5042	0.009408	0.001934	0.016741
45.6400	71.5253	0.008430	0.002912	0.016252
45.5986	63.0164	0.007454	0.003888	0.015764
43.2684	53.1633	0.006529	0.004813	0.015302
39.7149	43.0059	0.005680	0.005662	0.014877
35.7507	33.6950	0.004917	0.006425	0.014496
31.4530	24.9479	0.004245	0.007097	0.014160
27.0871	17.2915	0.003667	0.007675	0.013871
22.9638	10.7914	0.003177	0.008165	0.013626
19.0198	5.2204	0.002771	0.008571	0.013423
15.4467	0.3862	0.002442	0.008900	0.013258
12.3142	-2.4986	0.002179	0.009163	0.013127
9.7870	-5.5873	0.001970	0.009372	0.013022
7.7436	-7.1439	0.001805	0.009537	0.012940
6.2742	-8.3157	0.001671	0.009671	0.012873
5.1577	-8.8169	0.001561	0.009781	0.012818
4.3521	-9.0076	0.001468	0.009874	0.012771
3.7458	-8.9349	0.001388	0.009954	0.012731
3.2921	-8.7368	0.001317	0.010025	0.012696
2.8979	-8.3542	0.001255	0.010087	0.012665
2.6362	-8.0829	0.001199	0.010143	0.012637
2.3580	-7.6161	0.001148	0.010194	0.012611
2.0648	-7.0061	0.001104	0.010238	0.012589
1.9441	-6.7811	0.001063	0.010279	0.012569
1.7456	-5.9128	0.001025	0.010317	0.012550
1.5711	-5.9407	0.000992	0.010350	0.012533
1.4664	-5.2485	0.000960	0.010382	0.012517
1.3283	-5.2796	0.000932	0.010410	0.012503
1.2418	-4.6527	0.000905	0.010437	0.012490
1.1357	-4.3594	0.000881	0.010461	0.012478
1.0433	-4.1144	0.000859	0.010483	0.012467
0.9495	-3.8525	0.000838	0.010504	0.012456
0.8603	-3.5804	0.000820	0.010522	0.012447
0.8110	-3.3972	0.000805	0.010539	0.012438
0.7132	-3.0998	0.000787	0.010555	0.012431
0.5479	-2.8804	0.000776	0.010566	0.012425
0.5593	-2.8015	0.000764	0.010578	0.012419
0.5128	-2.4155	0.000753	0.010589	0.012413
0.0000	12.3855	0.010943	0.000400	0.017509
0.0000	17.3363	0.010943	0.000400	0.017509
0.0000	22.2183	0.010943	0.000400	0.017509
0.0000	26.4149	0.010943	0.000400	0.017509
0.0000	30.6615	0.010943	0.000400	0.017509
0.0000	35.0346	0.010943	0.000400	0.017509
0.0000	39.6730	0.010943	0.000400	0.017509
7.8005	50.3383	0.010774	0.000568	0.017424
22.1497	63.8248	0.010298	0.001044	0.017186
38.2036	74.5912	0.009478	0.001864	0.016776
47.7488	75.6309	0.008455	0.002887	0.016265
48.1274	67.7141	0.007425	0.003917	0.015750
45.5474	57.4284	0.006452	0.004890	0.015263
41.7457	46.9710	0.005560	0.005782	0.014817
37.1724	36.6949	0.004767	0.006575	0.014421
32.2625	27.2382	0.004079	0.007263	0.014077
27.1832	18.9884	0.003499	0.007843	0.013787
22.1937	11.2964	0.003025	0.008317	0.013550
17.5540	4.4840	0.002651	0.008691	0.013363
13.4851	0.2390	0.002363	0.008979	0.013219
10.3386	-4.0422	0.002143	0.009199	0.013109
7.9473	-6.3754	0.001973	0.009369	0.013024

8	25	1031.70	1037.56	1052.95	83.20	0.009104	14.3039
8	26	1025.69	1031.70	1046.47	84.22	0.009216	13.9862
8	27	1019.47	1025.69	1039.71	85.10	0.009313	13.6186
8	28	1013.33	1019.47	1032.89	85.88	0.009397	13.1634
8	29	1007.26	1013.33	1026.11	86.57	0.009474	12.6900
8	30	1001.54	1007.26	1019.52	87.21	0.009543	12.1019
8	31	995.77	1001.54	1013.07	87.79	0.009607	11.6458
8	32	990.51	995.77	1006.89	88.32	0.009665	11.0268
8	33	985.77	990.51	1001.06	88.80	0.009718	10.2847
8	34	980.72	985.77	995.40	89.26	0.009767	9.8842
8	35	976.88	980.72	990.22	89.65	0.009811	8.9751
8	36	972.25	976.88	985.17	90.03	0.009853	8.6947
8	37	969.39	972.25	980.76	90.38	0.009890	7.6552
8	38	964.60	969.39	976.17	90.70	0.009926	7.7876
8	39	962.04	964.60	972.18	91.00	0.009958	6.8231
8	40	958.24	962.04	968.18	91.26	0.009987	6.6936
8	41	955.74	958.24	964.65	91.51	0.010014	5.9961
8	42	952.96	955.74	961.31	91.74	0.010040	5.6177
8	43	950.34	952.96	958.16	91.95	0.010063	5.2676
8	44	947.76	950.34	955.17	92.15	0.010084	4.9861
8	45	945.50	947.76	952.37	92.33	0.010104	4.6288
8	46	943.42	945.50	949.78	92.49	0.010121	4.2789
8	47	941.21	943.42	947.29	92.65	0.010138	4.0937
8	48	939.46	941.21	945.01	92.78	0.010153	3.7300
9	3	518.25	500.00	506.56	0.00	0.000000	-7.8643
9	4	534.27	518.25	516.52	0.00	0.000000	-11.9471
9	5	554.18	534.27	530.04	0.00	0.000000	-16.2460
9	6	576.98	554.18	546.86	0.00	0.000000	-20.2719
9	7	602.64	576.98	566.80	0.00	0.000000	-24.1199
9	8	632.31	602.64	590.15	0.00	0.000000	-28.3757
9	9	665.85	632.31	617.04	0.00	0.000000	-32.8456
9	10	704.40	665.85	647.95	0.00	0.000000	-37.9883
9	11	749.58	704.40	686.62	1.07	0.000117	-42.3725
9	12	801.39	749.58	738.32	5.42	0.000593	-42.4417
9	13	855.39	801.39	799.24	13.11	0.001434	-37.7872
9	14	905.32	855.39	861.39	22.91	0.002507	-29.5634
9	15	948.09	905.32	916.49	32.74	0.003583	-21.2678
9	16	983.22	948.09	963.02	42.03	0.004599	-13.5902
9	17	1010.72	983.22	1000.72	50.47	0.005523	-6.7295
9	18	1031.39	1010.72	1029.99	57.90	0.006336	-0.9440
9	19	1046.29	1031.39	1051.56	64.23	0.007029	3.5447
9	20	1055.18	1046.29	1065.87	69.38	0.007593	7.1941
9	21	1059.20	1055.18	1073.85	73.40	0.008032	9.8590
9	22	1060.73	1059.20	1077.06	76.39	0.008359	10.9899
9	23	1057.11	1060.73	1076.01	78.59	0.008600	12.7242
9	24	1052.93	1057.11	1072.48	80.22	0.008779	13.1562
9	25	1047.31	1052.93	1067.35	81.50	0.008918	13.4832
9	26	1041.30	1047.31	1061.35	82.55	0.009033	13.4924
9	27	1034.98	1041.30	1054.90	83.46	0.009133	13.4014
9	28	1028.63	1034.98	1048.24	84.28	0.009223	13.1957
9	29	1022.29	1028.63	1041.51	85.04	0.009306	12.9340
9	30	1016.18	1022.29	1034.84	85.73	0.009382	12.5567
9	31	1010.06	1016.18	1028.23	86.39	0.009453	12.2314
9	32	1004.31	1010.06	1021.79	86.99	0.009520	11.7675
9	33	998.95	1004.31	1015.59	87.55	0.009581	11.1965
9	34	993.45	998.95	1009.53	88.08	0.009638	10.8212
9	35	988.83	993.45	1003.82	88.55	0.009690	10.0908
9	36	983.78	988.83	998.27	89.01	0.009740	9.7556
9	37	979.96	983.78	993.16	89.40	0.009784	8.8814
9	38	975.00	979.96	988.08	89.80	0.009827	8.8045
9	39	972.25	975.00	983.67	90.15	0.009865	7.6877
9	40	967.47	972.25	979.09	90.48	0.009901	7.8171
9	41	964.89	967.47	975.09	90.78	0.009934	6.8676

6.3552	-7.9486	0.0001838	0.009504	0.012956
5.2484	-8.7377	0.0001726	0.009616	0.012900
4.5064	-9.1122	0.0001629	0.009713	0.012852
3.9730	-9.1903	0.0001545	0.009797	0.012810
3.5788	-9.1111	0.0001468	0.009874	0.012771
3.2348	-8.8671	0.0001399	0.009943	0.012737
2.9914	-8.6544	0.0001335	0.010007	0.012705
2.7323	-8.2945	0.0001277	0.010065	0.012676
2.4619	-7.8228	0.0001224	0.010118	0.012649
2.3154	-7.5687	0.0001175	0.010167	0.012625
2.0367	-6.9383	0.0001131	0.010211	0.012603
1.9465	-6.7481	0.0001089	0.010253	0.012582
1.7606	-5.8945	0.0001052	0.010290	0.012563
1.6562	-6.1314	0.0001016	0.010326	0.012545
1.5029	-5.3201	0.0000984	0.010358	0.012529
1.3612	-5.3324	0.0000955	0.010387	0.012515
1.2811	-4.7150	0.0000928	0.010414	0.012501
1.1779	-4.4397	0.0000902	0.010440	0.012488
1.0784	-4.1891	0.0000879	0.010463	0.012477
1.0046	-3.9815	0.0000858	0.010484	0.012466
0.9102	-3.7186	0.0000838	0.010504	0.012456
0.8260	-3.4529	0.0000821	0.010521	0.012448
0.7909	-3.3027	0.0000804	0.010538	0.012439
0.6997	-3.0303	0.0000789	0.010553	0.012432
0.0000	7.8643	0.010943	0.000400	0.017509
0.0000	11.9471	0.010943	0.000400	0.017509
0.0000	16.2460	0.010943	0.000400	0.017509
0.0000	20.2719	0.010943	0.000400	0.017509
0.0000	24.1199	0.010943	0.000400	0.017509
0.0000	28.3757	0.010943	0.000400	0.017509
0.0000	32.8456	0.010943	0.000400	0.017509
0.0000	37.9883	0.010943	0.000400	0.017509
5.4734	47.8460	0.010825	0.000517	0.017450
22.1193	64.5610	0.010349	0.000993	0.017212
39.1895	76.9767	0.009508	0.001834	0.016791
50.0698	79.6333	0.008435	0.002907	0.016255
50.3086	71.5765	0.007359	0.003983	0.015717
47.5541	61.1444	0.006343	0.004999	0.015209
43.2557	49.9853	0.005419	0.005923	0.014747
38.1220	39.0660	0.004606	0.006736	0.014340
32.4886	28.9438	0.003913	0.007429	0.013994
26.4629	19.2688	0.003349	0.007993	0.013712
20.6184	10.7594	0.002910	0.008432	0.013492
15.3355	4.3455	0.002583	0.008759	0.013329
11.3064	-1.4178	0.002342	0.009000	0.013208
8.3739	-4.7822	0.002163	0.009179	0.013119
6.5469	-6.9362	0.002024	0.009318	0.013049
5.3946	-8.0977	0.001909	0.009433	0.012992
4.6866	-8.7148	0.001809	0.009533	0.012942
4.2095	-8.9861	0.001719	0.009623	0.012897
3.8662	-9.0678	0.001636	0.009706	0.012855
3.5675	-8.9892	0.001560	0.009782	0.012817
3.3450	-8.8863	0.001489	0.009853	0.012782
3.1064	-8.6610	0.001422	0.009920	0.012748
2.8573	-8.3392	0.001361	0.009981	0.012718
2.6968	-8.1243	0.001304	0.010038	0.012689
2.4367	-7.6541	0.001252	0.010090	0.012663
2.3142	-7.4414	0.001202	0.010140	0.012638
2.0406	-6.8408	0.001158	0.010184	0.012616
2.0100	-6.7945	0.001115	0.010227	0.012595
1.7938	-5.8938	0.001077	0.010265	0.012576
1.6878	-6.1292	0.001041	0.010301	0.012558
1.5364	-5.3311	0.0001008	0.010334	0.012541

9	42	961.00	964.89	971.06	91.05	0.009964	6.7700
9	43	958.48	961.00	967.50	91.31	0.009992	6.0675
9	44	955.59	958.48	964.11	91.55	0.010018	5.7388
9	45	952.87	955.59	960.90	91.77	0.010042	5.4029
9	46	950.33	952.87	957.86	91.97	0.010064	5.0697
9	47	947.81	950.33	954.97	92.16	0.010085	4.8205
9	48	945.58	947.81	952.26	92.33	0.010104	4.4909
10	3	511.38	500.00	504.09	0.00	0.000000	-4.9064
10	4	522.88	511.38	510.85	0.00	0.000000	-8.0967
10	5	537.88	522.88	520.56	0.00	0.000000	-11.6579
10	6	555.86	537.88	533.22	0.00	0.000000	-15.2337
10	7	576.80	555.86	548.83	0.00	0.000000	-18.8235
10	8	601.45	576.80	567.63	0.00	0.000000	-22.7605
10	9	629.05	601.45	589.52	0.00	0.000000	-26.5993
10	10	661.62	629.05	615.14	0.00	0.000000	-31.2844
10	11	699.86	661.62	645.13	0.00	0.000000	-36.8374
10	12	745.54	699.86	682.57	0.77	0.000084	-42.3752
10	13	799.33	745.54	735.14	5.17	0.000565	-43.2007
10	14	856.48	799.33	798.60	13.24	0.001449	-38.9517
10	15	909.25	856.48	863.42	23.46	0.002567	-30.8447
10	16	954.73	909.25	921.07	33.68	0.003685	-22.6528
10	17	991.87	954.73	969.74	43.26	0.004734	-14.8982
10	18	1021.03	991.87	1009.16	51.91	0.005680	-7.9914
10	19	1042.98	1021.03	1039.67	59.42	0.006503	-2.2253
10	20	1057.74	1042.98	1061.54	65.64	0.007183	2.5599
10	21	1066.26	1057.74	1075.47	70.51	0.007716	6.1985
10	22	1070.97	1066.26	1083.03	74.08	0.008106	8.8172
10	23	1069.82	1070.97	1085.08	76.62	0.008384	10.2691
10	24	1066.29	1069.82	1083.37	78.40	0.008580	11.4970
10	25	1061.33	1066.29	1079.45	79.74	0.008726	12.1917
10	26	1055.67	1061.33	1074.29	80.83	0.008845	12.5325
10	27	1050.31	1055.67	1068.73	81.78	0.008949	12.3961
10	28	1044.15	1050.31	1062.73	82.63	0.009043	12.6036
10	29	1037.86	1044.15	1056.47	83.43	0.009130	12.5276
10	30	1031.63	1037.86	1050.10	84.17	0.009211	12.4277
10	31	1025.38	1031.63	1043.66	84.88	0.009289	12.3066
10	32	1018.62	1025.38	1037.00	85.54	0.009361	12.3664
10	33	1012.85	1018.62	1030.53	86.17	0.009429	11.9011
10	34	1006.99	1012.85	1024.19	86.76	0.009494	11.5757
10	35	1001.75	1006.99	1018.09	87.31	0.009554	10.9973
10	36	996.30	1001.75	1012.15	87.83	0.009612	10.6636
10	37	991.74	996.30	1006.53	88.31	0.009663	9.9974
10	38	986.50	991.74	1001.00	88.76	0.009714	9.7625
10	39	982.78	986.50	995.93	89.17	0.009758	8.8490
10	40	977.83	982.78	990.89	89.56	0.009801	8.7850
10	41	975.09	977.83	986.50	89.92	0.009840	7.6819
10	42	970.26	975.09	981.92	90.26	0.009877	7.8472
10	43	967.67	970.26	977.92	90.56	0.009910	6.8976
10	44	963.70	967.67	973.87	90.84	0.009941	6.8424
10	45	961.13	963.70	970.27	91.11	0.009970	6.1508
10	46	958.24	961.13	966.86	91.35	0.009997	5.8006
10	47	955.37	958.24	963.59	91.58	0.010022	5.5294
10	48	952.72	955.37	960.48	91.79	0.010045	5.2234
11	3	506.70	500.00	502.41	0.00	0.000000	-2.8904
11	4	514.66	506.70	506.81	0.00	0.000000	-5.2790
11	5	526.16	514.66	513.77	0.00	0.000000	-8.3383
11	6	540.02	526.16	523.19	0.00	0.000000	-11.3251
11	7	556.72	540.02	535.22	0.00	0.000000	-14.4728
11	8	576.79	556.72	550.10	0.00	0.000000	-17.9619
11	9	599.84	576.79	567.87	0.00	0.000000	-21.5118
11	10	626.47	599.84	588.76	0.00	0.000000	-25.3790
11	11	658.46	626.47	613.52	0.00	0.000000	-30.2404
11	12	696.68	658.46	642.97	0.00	0.000000	-36.1528

1.3965	-5.3735	0.000978	0.010364	0.012526
1.3156	-4.7518	0.000950	0.010392	0.012512
1.2242	-4.5116	0.000924	0.010418	0.012499
1.1243	-4.2796	0.000900	0.010442	0.012487
1.0313	-4.0384	0.000878	0.010464	0.012476
0.9691	-3.8513	0.000857	0.010485	0.012466
0.8825	-3.6084	0.000838	0.010504	0.012456
0.0000	4.9064	0.010943	0.000400	0.017509
0.0000	8.0967	0.010943	0.000400	0.017509
0.0000	11.6579	0.010943	0.000400	0.017509
0.0000	15.2337	0.010943	0.000400	0.017509
0.0000	18.8235	0.010943	0.000400	0.017509
0.0000	22.7605	0.010943	0.000400	0.017509
0.0000	26.5993	0.010943	0.000400	0.017509
0.0000	31.2844	0.010943	0.000400	0.017509
0.0000	36.8374	0.010943	0.000400	0.017509
3.9350	46.3102	0.010858	0.000484	0.017466
22.3730	65.5737	0.010377	0.000965	0.017226
41.1787	80.1304	0.009493	0.001849	0.016784
52.2052	83.0470	0.008375	0.002967	0.016225
52.2709	74.9237	0.007257	0.004085	0.015666
49.1062	64.0045	0.006208	0.005134	0.015141
44.3410	52.3325	0.005262	0.006080	0.014666
38.5686	40.7940	0.004439	0.006903	0.014257
31.9395	29.3796	0.003759	0.007583	0.013917
24.9808	18.7823	0.003226	0.008116	0.013650
18.3334	10.2162	0.002836	0.008506	0.013455
13.0422	2.7730	0.002558	0.008784	0.013316
9.1802	-2.3167	0.002362	0.008980	0.013218
6.8835	-5.3081	0.002216	0.009126	0.013145
5.5580	-6.9745	0.002097	0.009245	0.013086
4.8676	-7.5284	0.001993	0.009349	0.013034
4.3964	-8.1071	0.001899	0.009443	0.012987
4.0829	-8.4447	0.001812	0.009530	0.012943
3.8241	-8.6035	0.001731	0.009611	0.012903
3.6303	-8.6763	0.001653	0.009689	0.012864
3.3885	-8.9779	0.001581	0.009761	0.012828
3.1919	-8.7091	0.001513	0.009829	0.012794
3.0434	-8.5322	0.001448	0.009894	0.012761
2.8109	-8.1864	0.001388	0.009954	0.012731
2.6759	-7.9876	0.001331	0.010012	0.012702
2.4253	-7.5321	0.001279	0.010063	0.012677
2.3508	-7.4116	0.001228	0.010114	0.012651
2.0586	-6.7904	0.001184	0.010158	0.012629
2.0331	-6.7518	0.001141	0.010201	0.012608
1.8170	-5.8648	0.001102	0.010240	0.012588
1.7180	-6.1292	0.001065	0.010277	0.012570
1.5647	-5.3329	0.001032	0.010310	0.012555
1.4313	-5.4111	0.001001	0.010341	0.012538
1.3549	-4.7959	0.000972	0.010370	0.012523
1.2540	-4.5466	0.000945	0.010397	0.012510
1.1714	-4.3579	0.000920	0.010422	0.012497
1.0807	-4.1426	0.000897	0.010445	0.012486
0.0000	2.8904	0.010943	0.000400	0.017509
0.0000	5.2790	0.010943	0.000400	0.017509
0.0000	8.3383	0.010943	0.000400	0.017509
0.0000	11.3251	0.010943	0.000400	0.017509
0.0000	14.4728	0.010943	0.000400	0.017509
0.0000	17.9619	0.010943	0.000400	0.017509
0.0000	21.5118	0.010943	0.000400	0.017509
0.0000	25.3790	0.010943	0.000400	0.017509
0.0000	30.2404	0.010943	0.000400	0.017509
0.0000	36.1528	0.010943	0.000400	0.017509

11	13	743.17	696.66	679.90	0.60	0.000066	-42.5767	
11	14	799.27	743.17	733.74	5.13	0.000561	-44.0975	
11	15	859.30	799.27	800.05	13.72	0.001501	-39.8786	
11	16	914.63	859.30	867.27	24.34	0.002664	-31.8764	
11	17	962.11	914.63	926.90	34.36	0.003815	-23.6972	
11	18	1000.90	962.11	977.21	44.68	0.004889	-15.9419	
11	19	1031.31	1000.90	1017.87	53.45	0.005849	-9.04267	
11	20	1053.37	1031.31	1048.81	60.92	0.006667	-3.06271	
11	21	1068.67	1053.37	1070.68	66.91	0.007322	1.34942	
11	22	1077.40	1068.67	1084.22	71.36	0.007809	4.58922	
11	23	1079.36	1077.40	1090.42	74.44	0.008146	7.44488	
11	24	1077.92	1079.36	1091.53	76.52	0.008373	9.15622	
11	25	1074.99	1077.92	1089.75	77.98	0.008534	9.93022	
11	26	1069.41	1074.99	1085.89	79.12	0.008659	11.0905	
11	27	1064.29	1069.41	1081.08	80.06	0.008761	11.3054	
11	28	1058.52	1064.29	1075.74	80.91	0.008854	11.5883	
11	29	1052.52	1058.52	1070.06	81.71	0.008942	11.8042	
11	30	1046.44	1052.52	1064.15	82.48	0.009026	11.9192	
11	31	1040.28	1046.44	1058.09	83.22	0.009107	11.9869	
11	32	1033.78	1040.28	1051.86	83.95	0.009187	12.1706	
11	33	1027.77	1033.78	1045.60	84.64	0.009263	11.9979	
11	34	1021.73	1027.77	1039.33	85.31	0.009335	11.8422	
11	35	1015.42	1021.73	1032.92	85.92	0.009402	11.7772	
11	36	1009.66	1015.42	1026.66	86.51	0.009467	11.4422	
11	37	1004.49	1009.66	1020.65	87.06	0.009527	10.6748	
11	38	998.95	1004.49	1014.75	87.58	0.009584	10.6306	
11	39	994.48	998.95	1009.19	88.06	0.009636	9.90110	
11	40	989.26	994.48	1003.71	88.52	0.009687	9.72095	
11	41	985.57	989.26	998.67	88.93	0.009731	8.81185	
11	42	980.60	985.57	993.65	89.33	0.009776	8.78836	
11	43	977.87	980.60	989.29	89.69	0.009815	7.86820	
11	44	972.98	977.87	984.70	90.03	0.009852	7.88854	
11	45	970.38	972.98	980.70	90.34	0.009886	6.94418	
11	46	966.40	970.38	976.63	90.63	0.009918	6.88877	
11	47	963.75	966.40	973.01	90.90	0.009948	6.82283	
11	48	960.08	963.75	969.31	91.15	0.009975	6.82092	
12	3	503.97	500.48	501.42	0.00	0.000000	-1.71113	
12	4	509.33	503.97	504.27	0.00	0.000000	-3.40668	
12	5	517.39	509.33	508.99	0.00	0.000000	-5.65558	
12	6	528.31	517.39	515.93	0.00	0.000000	-8.33513	
12	7	541.38	528.31	525.06	0.00	0.000000	-10.9775	
12	8	557.42	541.38	536.67	0.00	0.000000	-13.9689	
12	9	576.31	557.42	550.86	0.00	0.000000	-17.1279	
12	10	598.48	576.31	567.87	0.00	0.000000	-20.5993	
12	11	624.46	598.48	588.04	0.00	0.000000	-24.5143	
12	12	656.17	624.46	612.25	0.00	0.000000	-29.5580	
12	13	694.70	656.17	641.45	0.00	0.000000	-35.6387	
12	14	742.53	694.70	678.63	0.58	0.000063	-43.0025	
12	15	800.89	742.53	733.95	5.27	0.000577	-45.0482	
12	16	863.84	800.89	803.45	14.50	0.001587	-40.8457	
12	17	921.11	863.84	872.62	25.48	0.002788	-32.6339	
12	18	970.18	921.11	933.80	36.25	0.003967	-24.4860	
12	19	1010.87	970.18	985.50	46.22	0.005058	-17.0740	
12	20	1041.67	1010.87	1026.87	55.01	0.006020	-9.96033	
12	21	1064.17	1041.67	1058.06	62.35	0.006823	-4.11116	
12	22	1078.57	1064.17	1079.28	68.00	0.007442	0.47800	
12	23	1085.15	1078.57	1091.32	71.98	0.007877	4.15388	
12	24	1086.94	1085.15	1096.44	74.57	0.008161	6.39552	
12	25	1084.85	1086.94	1096.73	76.21	0.008339	8.00006	
12	26	1081.68	1084.85	1094.79	77.41	0.008471	8.81163	
12	27	1076.76	1081.68	1091.15	78.34	0.008572	9.68955	
12	28	1070.83	1076.76	1086.56	79.19	0.008665	10.5893	
12	29	1065.79	1070.83	1081.71	80.00	0.008754	10.7161	

3.0838	45.6606	0.010876	0.000466	0.017475
23.0227	67.1202	0.010381	0.000961	0.017225
43.8144	83.6931	0.009441	0.001901	0.016758
54.2763	86.1528	0.008278	0.003064	0.016176
53.8701	77.5673	0.007127	0.004215	0.015601
50.2967	66.2387	0.006053	0.005289	0.015064
45.0094	54.0520	0.005093	0.006249	0.014584
38.3628	41.4256	0.004275	0.007067	0.014175
30.7679	29.4185	0.003620	0.007722	0.013847
22.8673	18.2780	0.003133	0.008209	0.013604
15.8303	8.3854	0.002796	0.008546	0.013435
10.6573	1.5011	0.002569	0.008773	0.013322
7.5218	-2.4083	0.002408	0.008934	0.013241
5.8673	-5.2231	0.002283	0.009059	0.013179
4.7971	-6.5083	0.002181	0.009161	0.013128
4.3591	-7.2292	0.002088	0.009254	0.013081
4.1167	-7.6874	0.002000	0.009342	0.013037
3.9364	-7.9827	0.001916	0.009426	0.012995
3.8014	-8.1855	0.001835	0.009507	0.012955
3.7644	-8.4062	0.001755	0.009587	0.012915
3.5493	-8.4486	0.001679	0.009663	0.012877
3.3940	-8.4481	0.001607	0.009735	0.012841
3.1450	-8.6322	0.001540	0.009802	0.012807
3.0225	-8.4196	0.001475	0.009867	0.012775
2.7984	-8.0763	0.001415	0.009927	0.012745
2.7002	-7.9303	0.001358	0.009984	0.012716
2.4376	-7.4633	0.001306	0.010036	0.012690
2.3692	-7.3512	0.001255	0.010087	0.012665
2.0739	-6.7445	0.001211	0.010131	0.012642
2.0606	-6.7229	0.001166	0.010176	0.012620
1.8407	-5.8413	0.001127	0.010215	0.012601
1.7502	-6.1351	0.001090	0.010252	0.012582
1.5973	-5.3444	0.001056	0.010286	0.012565
1.4586	-5.4291	0.001024	0.010318	0.012549
1.3940	-4.8343	0.000995	0.010348	0.012534
1.2769	-4.9323	0.000967	0.010375	0.012521
0.0000	1.7113	0.010943	0.000400	0.017509
0.0000	3.4068	0.010943	0.000400	0.017509
0.0000	5.6558	0.010943	0.000400	0.017509
0.0000	8.3313	0.010943	0.000400	0.017509
0.0000	10.9775	0.010943	0.000400	0.017509
0.0000	13.9689	0.010943	0.000400	0.017509
0.0000	17.1279	0.010943	0.000400	0.017509
0.0000	20.5993	0.010943	0.000400	0.017509
0.0000	24.5143	0.010943	0.000400	0.017509
0.0000	29.5580	0.010943	0.000400	0.017509
0.0000	35.8387	0.010943	0.000400	0.017509
2.9503	45.9528	0.010879	0.000463	0.017477
23.8978	68.9461	0.010365	0.000977	0.017220
47.0777	87.7234	0.009355	0.001987	0.016715
56.0955	88.7294	0.008154	0.003188	0.016114
55.1763	79.6624	0.006975	0.004367	0.015525
51.0933	68.1673	0.005884	0.005458	0.014979
45.1196	55.0800	0.004922	0.006420	0.014498
37.6964	41.8081	0.004119	0.007223	0.014097
29.0731	28.5950	0.003500	0.007842	0.013787
20.4287	16.2748	0.003065	0.008277	0.013570
13.3261	6.9308	0.002782	0.008561	0.013428
8.3972	0.3966	0.002603	0.008739	0.013339
6.1741	-2.6422	0.002471	0.008871	0.013273
4.7677	-4.9218	0.002370	0.008972	0.013222
4.3704	-6.2189	0.002277	0.009065	0.013175
4.1522	-6.5638	0.002188	0.009154	0.013131

12	30	1060.13	1065.79	1076.51	80.77	0.0088839	11.02301
12	31	1054.29	1060.13	1071.05	81.53	0.0089224	11.27516
12	32	1048.16	1054.29	1065.34	82.28	0.0090004	11.56335
12	33	1042.22	1048.16	1059.49	83.00	0.0090833	11.62306
12	34	1036.22	1042.22	1053.53	83.71	0.0091160	11.64776
12	35	1030.03	1036.22	1047.46	84.40	0.0092236	11.73056
12	36	1023.40	1030.03	1041.10	85.05	0.0093307	11.91566
12	37	1017.86	1023.40	1034.92	85.66	0.0093374	11.47977
12	38	1012.08	1017.86	1028.82	86.26	0.0094439	11.55577
12	39	1007.03	1012.08	1022.94	86.81	0.0094997	11.07905
12	40	1001.55	1007.03	1017.15	87.34	0.0095557	11.04985
12	41	997.12	1001.55	1011.68	87.82	0.0096107	9.794707
12	42	991.93	997.12	1006.26	88.28	0.0096611	9.649900
12	43	988.27	991.93	1001.29	88.69	0.0097057	8.759838
12	44	983.28	988.27	996.30	89.10	0.0097500	8.763220
12	45	980.57	983.28	991.97	89.46	0.0097900	7.672203
12	46	975.67	980.57	987.39	89.81	0.0098287	7.891353
12	47	973.04	975.67	983.40	90.13	0.0098637	6.966855
12	48	968.53	973.04	979.19	90.43	0.0098967	7.173202

3.9846	-7.0383	0.002103	0.009239	0.013089
3.8813	-7.3938	0.002020	0.009322	0.013047
3.8560	-7.7074	0.001938	0.009404	0.013006
3.7143	-7.9086	0.001859	0.009483	0.012967
3.6017	-8.0459	0.001782	0.009560	0.012928
3.5413	-8.1892	0.001706	0.009636	0.012890
3.3471	-8.5684	0.001635	0.009707	0.012855
3.1558	-8.3238	0.001568	0.009774	0.012821
3.0463	-8.2193	0.001503	0.009839	0.012789
2.8093	-7.8996	0.001443	0.009899	0.012759
2.7142	-7.7843	0.001385	0.009957	0.012730
2.4494	-7.3453	0.001332	0.010010	0.012703
2.3900	-7.2589	0.001281	0.010061	0.012678
2.0888	-6.6710	0.001237	0.010105	0.012655
2.0882	-6.6750	0.001192	0.010150	0.012633
1.8658	-5.8062	0.001152	0.010190	0.012613
1.7763	-6.1149	0.001114	0.010228	0.012594
1.6282	-5.3403	0.001079	0.010263	0.012577
1.5561	-5.6171	0.001046	0.010296	0.012560

```
// JOB
// FOR
*IOCS(CARD,TYPEWRITER,1132PRINTER,DISK)
*ONE WORD INTEGERS
*ARITHMETIC TRACE
*TRANSFER TRACE
*LIST ALL
      DIMENSION TS(12, 48), TG(12, 48), XSO2(12,48)
      SHSO2 (TEMP) = 0.4474E01 + 0.2041E-01*TEMP - 0.1763E-04* TEMP**2
     1    + 0.5463E-08 *  TEMP**3 + 0.3838E05 /  TEMP **2
      SHO2(TEMP) = 0.4399E01 + 0.7895E-02 * TEMP - 0.5454E-05 * TEMP**2
     1   + 0.1399E-08 *  TEMP**3 + 0.7069E05 /  TEMP**2
      SHSO3(TEMP) = 0.4636E01 + 0.3266E-01 * TEMP - 0.2792E-04 * TEMP**2
     1       + 0.8782E-08 *  TEMP**3 - 0.1936E04 /  TEMP**2
      SHN2(TEMP) = 0.7543E01 - 0.34E-02 * TEMP + 0.636E-05 * TEMP**2
     1   -0.2702E-08 *  TEMP**3 - 0.3913E04 /  TEMP**2
      READ (2,5) WSO2, WO2, WN2, WS, WSO3, TTOL, ML, IL
    5 FORMAT (5F10.6, F5.2, 2I4)
      WRITE(3,5) WSO2, WO2, WN2, WS, WSO3, TTOL, ML, IL
      FSO2      = WSO2 / 64.0628
      FO2       = WO2 / 31.9988
      FN2 = WN2 / 28.0134
      FS = WS/60.0848
      FSO3 = WSO3 / 80.0622
      FSO3      = FSO3      + 0.0004
      FSO2      = FSO2      - 0.0004
      FSO2I = FSO2
      FO2 = FO2 - 0.0002
      HTCON = 0.673
      I = 1
      DO 111 M = 1,12
  111 TG(M,I) = 971.28
      DO 112 M = 1,12
  112 TS(M,I) = 955.
      M = 1
      READ (2,30)  (TS(M,I), I = 2, 48)
   30 FORMAT (8F8.2/8F8.2/8F8.2/8F8.2/8F8.2/7F8.2)
      WRITE(3,30)  (TS(M,I), I = 2, 48)
      WRITE ( 3, 25)
   25 FORMAT  ('     M     I TS(M,I) TS(M,I-1) TG(M,I) XSO2(M,I)   SUMDF
     1  QS          QEVOL       QG         FSO2    FSO3        FO2')
      DO 200 M = 2, 12
```

```
      SUMDF = 0.009965
      FSO2 = 0.000977
      FSO3 = 0.010365
      FO2 = 0.012526
      DO 200 I = 2, IL
      TS(M,I)=TS(M,I-1)
      TSAV =  (TS(M,I) + TS(M-1, I))/2.
  141 TCSAV = (TSAV - 32.) / 1.8
      TKSAV = TCSAV + 273.16
      FTOT = FSO2 + FO2 + FSO3 + FN2
      XLNKP = 22600. / (1.98719 * TKSAV) - 21.36 / 1.98719
      XKP = EXP (XLNKP)
      PSO2 = FSO2       / FTOT
      PO2 = FO2       / FTOT
      PSO3 = FSO3       / FTOT
      PN2 = FN2 / FTOT
      PTOT = PSO2 + PO2 + PSO3 + PN2
      TERM1 = SQRT (PSO2 / PSO3)
      DENOM = PSO2 * XKP
      TERM3 = (PSO3 / DENOM)**2
      PTERM = TERM1 * (PO2 - TERM3)



      IF (TKSAV - 680.) 610, 610, 620
  610 RATEK = 0.
      GO TO 650
  620 IF (TKSAV - 730.2355) 630, 630, 640
  630 RATEK = 1.56E-07 * TKSAV - 1.06E-04
      GO TO 650
  640 RATEK = 4.874E-07 * TKSAV - 3.48E-04
  650 RXRAT = RATEK * PTERM
      DFSO2 = RXRAT * 60. * WS
C     HEAT BALANCE
      IF (TKSAV - 848.) 150, 150, 155
  150 SHS = 11.22 + 8.20E-03*TKSAV - 2.70E+05 / TKSAV**2
      GO TO 160
  155 SHS = 14.41 + 2.04E-03 * TKSAV
  160 QRX = (3.3 * TKSAV + 44140.)
      QEVOL = QRX * DFSO2
      QS = FS * SHS * (TS(M,I) - TS(M-1,I))
      QG = QEVOL - QS
      TGIN = TG(M,I-1)
      CPGAS = SHSO2(TGIN)  * FSO2 + SHO2(TGIN)  * FO2 + SHSO3(TGIN) *
     1 FSO3 + SHN2(TGIN)  * FN2
      TG(M,I) = QG / CPGAS + TG(M,I-1)
      TS1  =-QS / HTCON +TG(M,I)
```

```
      DELTA = ABS (TS1       - TS(M,I))
      IF (DELTA -TTOL) 190, 190, 170
  170 TS2= (TS1       + TS(M,I)) / 2.
      TS(M,I) = TS2
      TSAV = (TS2+ TS(M-1, I)) / 2.
      GO TO 141
  190 TS(M,I) = TS1
      SUMDF = SUMDF + DFSO2
      DFSO3 = DFSO2
      DFO2 = DFSO2 / 2.
      FSO2       = FSO2       - DFSO2
      FSO3       = FSO3       + DFSO3
      FO2       = FO2       - DFO2
      XAV = DFSO2 / FSO2
      XSO2(M,I) = 100. * SUMDF / FSO2I
      WRITE(3,196)M, I, TS(M,I), TS(M,I-1), TG(M,I), XSO2(M,I), SUMDF,
     1 QS, QEVOL, QG, FSO2, FSO3, FO2
  196 FORMAT (2I5, 4F8.2, F12.6, 3F10.4, 3F11.6)
      SMDF1 = 0.0
  200 CONTINUE
      CALL EXIT
      END
```

```
// XEQ

 0.726667  0.566667  3.716667  2.816667  0.000000 0.75   12   48
 959.13  963.68  967.40  972.69  976.66  982.18  986.95  992.80
 998.24 1004.43 1010.40 1017.47 1023.82 1030.67 1037.20 1043.64
1050.07 1056.22 1061.52 1066.79 1071.61 1075.52 1075.47 1071.41
1060.19 1043.41 1019.19  986.57  945.56  895.97  838.74  780.64
 726.92  682.92  646.08  614.28  586.84  562.31  540.23  520.89
 503.79  488.93  476.15  466.10  458.72  454.08  450.00
   M     I  TS(M,I)  TS(M,I-1)  TG(M,I)  XSO2(M,I)   SUMDF      QS
   2     2  963.34    955.00    968.83    91.14    0.009974    3.6979
   2     3  965.14    963.34    967.51    91.11    0.009970    1.5917
   2     4  966.96    965.14    967.05    91.00    0.009958    0.0622
   2     5  970.65    966.96    967.74    90.80    0.009936   -1.9564
   2     6  972.75    970.65    968.79    90.55    0.009909   -2.6606
   2     7  977.32    972.75    970.85    90.24    0.009875   -4.3531
   2     8  981.03    977.32    973.37    89.89    0.009836   -5.1560
   2     9  985.69    981.03    976.43    89.47    0.009791   -6.2333
   2    10  990.25    985.69    979.90    89.01    0.009741   -6.9644
   2    11  995.48    990.25    983.81    88.50    0.009684   -7.8508
   2    12 1000.69    995.48    988.06    87.95    0.009624   -8.5005
   2    13 1005.97   1000.69    992.41    87.30    0.009554   -9.1254
   2    14 1011.58   1005.97    997.14    86.64    0.009481   -9.7175
   2    15 1017.59   1011.58   1002.17    85.93    0.009403  -10.3795
   2    16 1023.56   1017.59   1007.45    85.19    0.009323  -10.8435
   2    17 1029.56   1023.56   1012.91    84.44    0.009240  -11.2045
   2    18 1035.61   1029.56   1018.51    83.66    0.009154  -11.5120
   2    19 1041.56   1035.61   1024.19    82.87    0.009068  -11.6868
   2    20 1047.07   1041.56   1029.91    82.11    0.008986  -11.5471
   2    21 1052.51   1047.07   1035.56    81.37    0.008904  -11.4089
   2    22 1057.68   1052.51   1041.11    80.65    0.008826  -11.1484
   2    23 1062.31   1057.68   1046.65    80.05    0.008760  -10.5353
   2    24 1063.97   1062.31   1051.49    79.69    0.008721   -8.3962
   2    25 1064.05   1063.97   1055.69    79.70    0.008721   -5.6273
   2    26 1059.57   1064.05   1058.34    80.23    0.008780   -0.8269
   2    27 1050.39   1059.57   1058.24    81.22    0.008888    5.2664
   2    28 1034.53   1050.39   1053.79    82.59    0.009038   12.9639
   2    29 1012.24   1034.53   1043.93    84.15    0.009209   21.3268
   2    30  982.41   1012.24   1027.21    85.64    0.009372   30.1526
   2    31  944.44    982.41   1002.44    86.77    0.009495   39.0372
   2    32  898.66    944.44    969.09    87.31    0.009554   47.4031
   2    33  849.76    898.66    929.57    87.51    0.009577   53.7098
   2    34  801.71    849.76    886.47    87.52    0.009577   57.0458
   2    35  759.19    801.71    843.32    87.52    0.009577   56.6200
   2    36  720.40    759.19    801.41    87.52    0.009577   54.5171
   2    37  685.15    720.40    761.53    87.52    0.009577   51.4028
   2    38  653.30    685.15    724.18    87.52    0.009577   47.7043
```

QEVOL	QG	FSO2	FSO3	FO2	
0.4399	-3.2580	0.000967	0.010374	0.012521	2-2
-0.1739	-1.7657	0.000971	0.010370	0.012523	
-0.5472	-0.6094	0.000983	0.010358	0.012529	
-1.0297	0.9266	0.001005	0.010336	0.012540	
-1.2625	1.3981	0.001032	0.010309	0.012553	
-1.6122	2.7408	0.001066	0.010275	0.012570	
-1.8023	3.3537	0.001105	0.010236	0.012590	
-2.1472	4.0861	0.001150	0.010191	0.012612	
-2.3297	4.6347	0.001200	0.010141	0.012637	
-2.6366	5.2142	0.001256	0.010084	0.012665	
-2.8263	5.6741	0.001317	0.010024	0.012696	
-3.3043	6.8210	0.001387	0.009954	0.012731	
-3.3945	6.3229	0.001460	0.009881	0.012767	
-3.6497	6.7297	0.001538	0.009803	0.012806	
-3.7706	7.0729	0.001618	0.009723	0.012846	
-3.8830	7.3215	0.001701	0.009640	0.012888	
-4.0093	7.5027	0.001787	0.009554	0.012930	
-4.0529	7.6338	0.001873	0.009468	0.012974	
-3.8623	7.6846	0.001955	0.009386	0.013015	
-3.8173	7.5915	0.002037	0.009304	0.013056	
-3.6825	7.4658	0.002115	0.009226	0.013095	
-3.0734	7.4619	0.002181	0.009160	0.013127	
-1.8749	6.5212	0.002220	0.009121	0.013147	
0.0332	5.6606	0.002220	0.009121	0.013147	
2.7447	3.5717	0.002161	0.009180	0.013118	
5.0978	-0.1686	0.002053	0.009288	0.013064	
7.0004	-5.9634	0.001903	0.009438	0.012989	
8.0204	-13.3064	0.001732	0.009609	0.012903	
7.6239	-22.5287	0.001569	0.009772	0.012822	
5.7470	-33.2901	0.001446	0.009895	0.012760	
2.7282	-44.6749	0.001387	0.009954	0.012731	
1.0564	-52.6533	0.001364	0.009977	0.012719	
0.0215	-57.0243	0.001364	0.009977	0.012719	
0.0000	-56.6200	0.001364	0.009977	0.012719	
0.0000	-54.5171	0.001364	0.009977	0.012719	
0.0000	-51.4028	0.001364	0.009977	0.012719	
0.0000	-47.7043	0.001364	0.009977	0.012719	2-38

2	39	624.16	653.30	689.47	87.52	0.009577	43.9564
2	40	596.90	624.16	657.17	87.52	0.009577	40.5646
2	41	572.89	596.90	627.62	87.52	0.009577	36.8347
2	42	551.23	572.89	600.70	87.52	0.009577	33.2993
2	43	531.90	551.23	576.36	87.52	0.009577	29.9204
2	44	514.80	531.90	554.50	87.52	0.009577	26.7152
2	45	500.29	514.80	535.18	87.52	0.009577	23.4808
2	46	488.94	500.29	518.65	87.52	0.009577	19.9942
2	47	479.61	488.94	504.66	87.52	0.009577	16.8585
2	48	471.63	479.61	492.80	87.52	0.009577	14.2466
3	2	965.83	955.00	969.43	91.05	0.009964	2.4191
3	3	966.89	965.83	968.49	91.02	0.009960	1.0759
3	4	966.99	966.89	967.82	90.95	0.009953	0.0568
3	5	969.07	966.99	967.90	90.81	0.009938	-0.7918
3	6	970.56	969.07	968.43	90.68	0.009923	-1.4276
3	7	974.11	970.56	969.80	90.46	0.009899	-2.9054
3	8	976.27	974.11	971.32	90.21	0.009872	-3.3506
3	9	980.49	976.27	973.63	89.91	0.009839	-4.6145
3	10	984.17	980.49	976.30	89.57	0.009802	-5.2986
3	11	988.47	984.17	979.37	89.17	0.009758	-6.1267
3	12	992.90	988.47	982.79	88.74	0.009710	-6.8033
3	13	997.51	992.90	986.52	88.26	0.009659	-7.3960
3	14	1002.44	997.51	990.54	87.75	0.009603	-8.0090
3	15	1007.74	1002.44	994.86	87.19	0.009541	-8.6685
3	16	1013.11	1007.74	999.43	86.58	0.009475	-9.2061
3	17	1017.84	1013.11	1003.93	85.93	0.009404	-9.3572
3	18	1023.27	1017.84	1008.69	85.26	0.009330	-9.8173
3	19	1028.77	1023.27	1013.64	84.57	0.009254	-10.1846
3	20	1034.10	1028.77	1018.72	83.88	0.009179	-10.3499
3	21	1039.40	1034.10	1023.86	83.19	0.009103	-10.4614
3	22	1044.57	1039.40	1029.02	82.50	0.009028	-10.4670
3	23	1049.44	1044.57	1034.15	81.84	0.008955	-10.2927
3	24	1053.33	1049.44	1039.38	81.38	0.008905	-9.3884
3	25	1054.60	1053.33	1043.68	81.07	0.008872	-7.3509
3	26	1053.82	1054.60	1047.18	81.12	0.008877	-4.4662
3	27	1049.44	1053.82	1049.04	81.56	0.008925	-0.2716
3	28	1041.16	1049.44	1048.64	82.44	0.009021	5.0367
3	29	1027.19	1041.16	1044.58	83.65	0.009154	11.7001
3	30	1006.10	1027.19	1035.30	85.05	0.009307	19.6545
3	31	978.47	1006.10	1019.81	86.41	0.009456	27.8229
3	32	943.43	978.47	997.02	87.48	0.009573	36.0673
3	33	903.73	943.43	967.33	88.08	0.009639	42.8012
3	34	862.35	903.73	932.75	88.34	0.009667	47.3816
3	35	823.62	862.35	896.24	88.45	0.009679	48.8734
3	36	785.91	823.62	858.69	88.45	0.009679	49.2146

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0.0000	-26.7152	0.001364	0.009977	0.012719
0.0000	-23.4808	0.001364	0.009977	0.012719
0.0000	-19.9942	0.001364	0.009977	0.012719
0.0000	-16.8585	0.001364	0.009977	0.012719
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-0.6859	0.1059	0.001003	0.010338	0.012539
-0.7108	0.7168	0.001018	0.010323	0.012546
-1.0899	1.8155	0.001042	0.010299	0.012558
-1.3008	2.0298	0.001069	0.010272	0.012572
-1.5320	3.0824	0.001102	0.010239	0.012588
-1.7459	3.5526	0.001139	0.010202	0.012607
-2.0268	4.0999	0.001183	0.010158	0.012629
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-2.4152	4.9807	0.001282	0.010059	0.012678
-2.6325	5.3764	0.001338	0.010003	0.012706
-2.8980	5.7705	0.001400	0.009941	0.012737
-3.0928	6.1133	0.001466	0.009875	0.012770
-3.3265	6.0306	0.001537	0.009804	0.012806
-3.4503	6.3670	0.001611	0.009730	0.012843
-3.5475	6.6370	0.001687	0.009654	0.012880
-3.5320	6.8178	0.001762	0.009579	0.012918
-3.5592	6.9022	0.001838	0.009503	0.012956
-3.5349	6.9321	0.001913	0.009428	0.012994
-3.3966	6.8961	0.001985	0.009355	0.013030
-2.3496	7.0338	0.002036	0.009305	0.013055
-1.5625	5.7883	0.002069	0.009272	0.013072
0.2488	4.7150	0.002064	0.009277	0.013069
2.2313	2.5030	0.002016	0.009325	0.013045
4.5024	-0.5342	0.001920	0.009421	0.012997
6.2196	-5.4805	0.001787	0.009554	0.012931
7.1585	-12.4960	0.001634	0.009707	0.012854
6.9692	-20.8537	0.001485	0.009856	0.012780
5.4619	-30.6053	0.001368	0.009973	0.012721
3.0630	-39.7381	0.001302	0.010039	0.012688
1.3296	-46.0519	0.001274	0.010067	0.012674
0.5360	-48.3373	0.001262	0.010079	0.012668
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3	37	750.21	785.91	821.91	88.45	0.009679	48.2541
3	38	716.75	750.21	785.94	88.45	0.009679	46.5683
3	39	685.33	716.75	751.35	88.45	0.009679	44.4364
3	40	655.56	685.33	718.25	88.45	0.009679	42.1888
3	41	628.32	655.56	687.02	88.45	0.009679	39.9011
3	42	602.65	628.32	657.57	88.45	0.009679	36.9624
3	43	579.72	602.65	630.28	88.45	0.009679	34.0223
3	44	558.92	579.72	605.15	88.45	0.009679	31.1116
3	45	540.50	558.92	582.29	88.45	0.009679	28.1276
3	46	524.84	540.50	561.91	88.45	0.009679	24.9434
3	47	511.34	524.84	543.91	88.45	0.009679	21.9181
3	48	499.55	511.34	528.07	88.45	0.009679	19.1953
4	2	967.31	955.00	969.77	90.99	0.009957	1.6556
4	3	967.40	967.31	968.82	90.93	0.009950	0.9495
4	4	967.94	967.40	968.44	90.90	0.009947	0.3370
4	5	969.04	967.94	968.47	90.83	0.009939	-0.3862
4	6	969.93	969.04	968.75	90.74	0.009930	-0.7989
4	7	971.67	969.93	969.33	90.59	0.009913	-1.5712
4	8	973.28	971.67	970.25	90.43	0.009896	-2.0371
4	9	976.80	973.28	971.89	90.21	0.009872	-2.3040
4	10	979.01	976.80	973.61	89.95	0.009843	-3.6355
4	11	983.09	979.01	976.03	89.65	0.009811	-4.7518
4	12	986.73	983.09	978.76	89.31	0.009774	-5.3678
4	13	990.66	986.73	981.79	88.94	0.009733	-5.9698
4	14	994.91	990.66	985.12	88.52	0.009687	-6.5841
4	15	999.49	994.91	988.76	88.06	0.009636	-7.2243
4	16	1004.23	999.49	992.66	87.56	0.009581	-7.7844
4	17	1008.65	1004.23	996.73	87.05	0.009526	-8.0226
4	18	1013.62	1008.65	1001.00	86.51	0.009467	-8.4955
4	19	1018.67	1013.62	1005.43	85.93	0.009404	-8.9059
4	20	1023.67	1018.67	1010.01	85.34	0.009338	-9.1963
4	21	1028.73	1023.67	1014.70	84.72	0.009271	-9.4432
4	22	1032.98	1028.73	1019.17	84.08	0.009201	-9.2900
4	23	1037.70	1032.98	1023.76	83.45	0.009132	-9.3806
4	24	1041.94	1037.70	1028.37	82.83	0.009070	-9.1305
4	25	1045.21	1041.94	1033.00	82.49	0.009027	-8.2231
4	26	1046.72	1045.21	1037.06	82.29	0.009005	-6.5013
4	27	1045.52	1046.72	1040.06	82.36	0.009012	-3.6780
4	28	1040.87	1045.52	1041.28	82.73	0.009053	0.2776
4	29	1033.46	1040.87	1040.57	83.48	0.009135	4.7881
4	30	1020.17	1033.46	1036.51	84.56	0.009253	10.9980
4	31	1000.54	1020.17	1027.71	85.82	0.009391	18.2850
4	32	974.98	1000.54	1013.30	87.07	0.009528	25.7855
4	33	944.27	974.98	992.85	88.10	0.009641	32.6918
4	34	910.26	944.27	966.90	88.77	0.009714	38.1193

0.0000	-48.2541	0.001262	0.010079	0.012668
0.0000	-46.5683	0.001262	0.010079	0.012668
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0.0000	-31.1116	0.001262	0.010079	0.012668
0.0000	-28.1276	0.001262	0.010079	0.012668
0.0000	-24.9434	0.001262	0.010079	0.012668
0.0000	-21.9181	0.001262	0.010079	0.012668
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1.9222	1.6445	0.001888	0.009453	0.012981
3.8363	-0.9518	0.001806	0.009535	0.012940
5.5277	-5.4702	0.001688	0.009653	0.012881
6.4468	-11.8382	0.001550	0.009791	0.012812
6.4010	-19.3845	0.001413	0.009928	0.012744
5.2598	-27.4320	0.001300	0.010041	0.012687
3.4149	-34.7043	0.001227	0.010114	0.012651

4	35	876.65	910.26	937.39	89.08	0.009748	40.8825
4	36	842.06	876.65	905.75	89.26	0.009768	42.8624
4	37	807.96	842.06	872.82	89.31	0.009774	43.6539
4	38	774.91	807.96	839.57	89.31	0.009774	43.5160
4	39	743.08	774.91	806.66	89.31	0.009774	42.7867
4	40	712.40	743.08	774.35	89.31	0.009774	41.6937
4	41	683.49	712.40	743.06	89.31	0.009774	40.0909
4	42	655.93	683.49	712.92	89.31	0.009774	38.3533
4	43	630.45	655.93	684.25	89.31	0.009774	36.2061
4	44	606.30	630.45	657.03	89.31	0.009774	34.1467
4	45	584.75	606.30	631.69	89.31	0.009774	31.9896
4	46	565.57	584.75	608.41	89.31	0.009774	29.8309
4	47	548.46	565.57	587.23	89.31	0.009774	26.0884
4	48	533.18	548.46	568.07	89.31	0.009774	23.4781
5	2	968.17	955.00	969.96	90.95	0.009953	1.2039
5	3	968.35	968.17	969.27	90.89	0.009946	0.6226
5	4	968.36	968.35	968.84	90.85	0.009941	0.3263
5	5	968.46	968.36	968.56	90.79	0.009935	0.0717
5	6	969.70	968.46	968.81	90.73	0.009929	-0.5977
5	7	970.84	969.70	969.29	90.65	0.009920	-1.0453
5	8	972.05	970.84	969.98	90.56	0.009910	-1.3974
5	9	973.81	972.05	970.84	90.39	0.009892	-2.0006
5	10	975.54	973.81	971.98	90.22	0.009873	-2.3959
5	11	979.09	975.54	973.79	90.00	0.009848	-3.5688
5	12	981.32	979.09	975.63	89.73	0.009819	-3.8321
5	13	985.22	981.32	978.11	89.44	0.009787	-4.7906
5	14	988.77	985.22	980.84	89.11	0.009751	-5.3408
5	15	992.69	988.77	983.86	88.73	0.009710	-5.9413
5	16	996.79	992.69	987.15	88.32	0.009665	-6.4926
5	17	1000.80	996.79	990.64	87.90	0.009619	-6.8422
5	18	1005.25	1000.80	994.35	87.43	0.009568	-7.3375
5	19	1009.81	1005.25	998.26	86.94	0.009514	-7.7742
5	20	1014.42	1009.81	1002.34	86.42	0.009457	-8.1308
5	21	1019.13	1014.42	1006.57	85.87	0.009397	-8.4523
5	22	1023.37	1019.13	1010.85	85.35	0.009340	-8.4261
5	23	1027.96	1023.37	1015.18	84.81	0.009280	-8.6006
5	24	1032.23	1027.96	1019.51	84.27	0.009222	-8.5591
5	25	1035.89	1032.23	1023.74	83.78	0.009169	-8.1770
5	26	1038.40	1035.89	1027.69	83.41	0.009128	-7.2044
5	27	1039.32	1038.40	1031.14	83.24	0.009109	-5.5039
5	28	1037.94	1039.32	1033.65	83.34	0.009120	-2.8861

1.5769	-39.3055	0.001193	0.010148	0.012634
0.9264	-41.9360	0.001173	0.010168	0.012624
0.2841	-43.3697	0.001167	0.010174	0.012621
0.0000	-43.5160	0.001167	0.010174	0.012621
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5	29	1033.61	1037.94	1034.49	83.68	0.009157	0.5924
5	30	1026.41	1033.61	1033.52	84.35	0.009231	4.7855
5	31	1013.92	1026.41	1029.45	85.33	0.009338	10.4567
5	32	996.33	1013.92	1021.31	86.47	0.009463	16.8146
5	33	973.12	996.33	1008.15	87.62	0.009589	23.5727
5	34	947.19	973.12	990.30	88.62	0.009698	29.0090
5	35	919.08	947.19	968.32	89.35	0.009778	33.1373
5	36	888.84	919.08	942.70	89.77	0.009824	36.2493
5	37	857.85	888.84	914.75	90.01	0.009849	38.2883
5	38	826.76	857.85	885.35	90.13	0.009863	39.4360
5	39	795.91	826.76	855.08	90.15	0.009866	39.8236
5	40	765.61	795.91	824.63	90.15	0.009866	39.7205
5	41	736.35	765.61	794.45	90.15	0.009866	39.1018
5	42	708.03	736.35	764.78	90.15	0.009866	38.1930
5	43	681.18	708.03	735.95	90.15	0.009866	36.8598
5	44	655.46	681.18	708.07	90.15	0.009866	35.4097
5	45	631.08	655.46	681.29	90.15	0.009866	33.7894
5	46	609.26	631.08	656.13	90.15	0.009866	31.9453
5	47	589.27	609.26	632.68	90.15	0.009866	29.2158
5	48	571.03	589.27	610.98	90.15	0.009866	26.8872
6	2	968.68	955.00	970.07	90.93	0.009950	0.9383
6	3	969.19	968.68	969.59	90.86	0.009942	0.2693
6	4	969.11	969.19	969.32	90.81	0.009938	0.1422
6	5	969.04	969.11	969.15	90.78	0.009935	0.0766
6	6	969.11	969.04	969.00	90.73	0.009929	-0.0740
6	7	970.47	969.11	969.35	90.67	0.009922	-0.7531
6	8	970.56	970.47	969.56	90.60	0.009914	-0.6726
6	9	971.92	970.56	970.11	90.50	0.009904	-1.2155
6	10	973.22	971.92	970.88	90.39	0.009892	-1.5758
6	11	975.49	973.22	971.98	90.22	0.009873	-2.3644
6	12	977.39	975.49	973.34	90.04	0.009853	-2.7254
6	13	980.95	977.39	975.31	89.81	0.009828	-3.7940
6	14	983.18	980.95	977.26	89.54	0.009799	-3.9806
6	15	987.11	983.18	979.82	89.25	0.009767	-4.9101
6	16	990.60	987.11	982.59	88.92	0.009731	-5.3909
6	17	994.15	990.60	985.56	88.57	0.009692	-5.7814
6	18	998.07	994.15	988.76	88.18	0.009650	-6.2658
6	19	1002.14	998.07	992.17	87.76	0.009604	-6.7061
6	20	1006.31	1002.14	995.77	87.31	0.009555	-7.0956
6	21	1010.62	1006.31	999.53	86.84	0.009503	-7.4599
6	22	1014.68	1010.62	1003.40	86.37	0.009452	-7.5948
6	23	1019.03	1014.68	1007.37	85.88	0.009397	-7.8497
6	24	1023.19	1019.03	1011.39	85.38	0.009343	-7.9396
6	25	1026.99	1023.19	1015.40	84.91	0.009291	-7.8021
6	26	1030.05	1026.99	1019.25	84.50	0.009247	-7.2656
6	27	1031.47	1030.05	1022.55	84.19	0.009213	-5.9992
6	28	1032.77	1031.47	1025.67	84.03	0.009200	-4.7782
6	29	1031.32	1032.77	1027.80	84.17	0.009211	-2.3646

1.7247	1.1323	0.001784	0.009557	0.012929 5-29
3.4756	-1.3098	0.001710	0.009631	0.012892
4.9895	-5.4671	0.001603	0.009738	0.012839
5.8688	-10.9458	0.001478	0.009863	0.012776
5.8863	-17.6863	0.001352	0.009989	0.012713
5.0779	-23.9310	0.001243	0.010098	0.012659
3.7473	-29.3899	0.001163	0.010178	0.012619
2.1210	-34.1283	0.001117	0.010224	0.012596
1.2045	-37.0838	0.001092	0.010249	0.012583
0.6508	-38.7851	0.001078	0.010263	0.012576
0.1026	-39.7210	0.001075	0.010266	0.012575
0.0000	-39.7205	0.001075	0.010266	0.012575
0.0000	-39.1018	0.001075	0.010266	0.012575
0.0000	-38.1930	0.001075	0.010266	0.012575
0.0000	-36.8598	0.001075	0.010266	0.012575
0.0000	-35.4097	0.001075	0.010266	0.012575
0.0000	-33.7894	0.001075	0.010266	0.012575
0.0000	-31.5453	0.001075	0.010266	0.012575
0.0000	-29.2158	0.001075	0.010266	0.012575
0.0000	-26.8872	0.001075	0.010266	0.012575
-0.6639	-1.6022	0.000991	0.010350	0.012533
-0.3694	-0.6390	0.000999	0.010342	0.012537
-0.2206	-0.3629	0.001003	0.010338	0.012539
-0.1480	-0.2246	0.001006	0.010335	0.012540
-0.2766	-0.2025	0.001012	0.010329	0.012543
-0.2908	0.4623	0.001019	0.010322	0.012547
-0.3887	0.2839	0.001027	0.010314	0.012551
-0.4809	0.7346	0.001037	0.010304	0.012556
-0.5559	1.0198	0.001049	0.010292	0.012562
-0.8920	1.4724	0.001068	0.010273	0.012571
-0.9078	1.8175	0.001088	0.010253	0.012581
-1.1693	2.6247	0.001113	0.010228	0.012594
-1.3806	2.6001	0.001142	0.010199	0.012608
-1.4992	3.4109	0.001174	0.010167	0.012624
-1.6914	3.6995	0.001210	0.010131	0.012642
-1.8087	3.9727	0.001249	0.010092	0.012662
-1.9902	4.2756	0.001291	0.010050	0.012683
-2.1507	4.5553	0.001337	0.010004	0.012706
-2.2868	4.8088	0.001386	0.009955	0.012730
-2.4192	5.0406	0.001438	0.009903	0.012756
-2.4194	5.1753	0.001489	0.009852	0.012782
-2.5326	5.3171	0.001544	0.009797	0.012809
-2.5480	5.3915	0.001598	0.009743	0.012836
-2.4309	5.3712	0.001650	0.009691	0.012862
-2.0922	5.1733	0.001694	0.009647	0.012884
-1.5679	4.4312	0.001728	0.009613	0.012901
-0.5956	4.1826	0.001741	0.009600	0.012907
0.5057	2.8704	0.001730	0.009611	0.012902 6-29

6	30	1026.97	1031.32	1028.33	84.49	0.009246	0.9151
6	31	1020.09	1026.97	1027.16	85.11	0.009314	4.7538
6	32	1008.77	1020.09	1023.23	85.98	0.009409	9.7359
6	33	992.74	1008.77	1015.69	87.02	0.009522	15.4435
6	34	973.48	992.74	1004.27	88.07	0.009638	20.7234
6	35	951.32	973.48	989.00	89.03	0.009743	25.3580
6	36	926.35	951.32	969.97	89.80	0.009827	29.3562
6	37	899.52	926.35	947.65	90.32	0.009884	32.3941
6	38	871.49	899.52	922.73	90.59	0.009914	34.4847
6	39	842.89	871.49	896.26	90.78	0.009934	35.9198
6	40	814.06	842.89	868.65	90.86	0.009943	36.7414
6	41	785.51	814.06	840.40	90.86	0.009943	36.9457
6	42	757.42	785.51	812.10	90.86	0.009943	36.8001
6	43	730.23	757.42	784.06	90.86	0.009943	36.2324
6	44	703.83	730.23	756.47	90.86	0.009943	35.4308
6	45	678.43	703.83	729.53	90.86	0.009943	34.3885
6	46	654.83	678.43	703.63	90.86	0.009943	32.8429
6	47	632.20	654.83	678.77	90.86	0.009943	31.3414
6	48	611.65	632.20	655.32	90.86	0.009943	29.3861
7	2	968.97	955.00	970.14	90.91	0.009949	0.7825
7	3	969.05	968.97	969.53	90.82	0.009938	0.3222
7	4	969.45	969.05	969.38	90.77	0.009933	-0.0474
7	5	969.39	969.45	969.31	90.74	0.009930	-0.0538
7	6	968.71	969.39	969.04	90.72	0.009927	0.2243
7	7	970.32	968.71	969.37	90.67	0.009922	-0.6459
7	8	969.65	970.32	969.36	90.64	0.009918	-0.1905
7	9	971.40	969.65	969.92	90.58	0.009913	-0.9985
7	10	971.49	971.40	970.25	90.51	0.009904	-0.8391
7	11	973.16	971.49	970.94	90.40	0.009892	-1.4940
7	12	974.65	973.16	971.87	90.27	0.009879	-1.8717
7	13	977.01	974.65	973.11	90.08	0.009858	-2.6207
7	14	978.96	977.01	974.60	89.90	0.009838	-2.9372
7	15	982.61	978.96	976.68	89.66	0.009812	-3.9916
7	16	984.83	982.61	978.71	89.38	0.009781	-4.1187
7	17	988.57	984.83	981.29	89.10	0.009750	-4.9081
7	18	991.95	988.57	984.04	88.78	0.009715	-5.8233
7	19	995.54	991.95	987.00	88.43	0.009677	-5.7468
7	20	999.27	995.54	990.15	88.05	0.009635	-6.1403
7	21	1003.16	999.27	993.47	87.64	0.009591	-6.5185
7	22	1006.95	1003.16	996.93	87.23	0.009546	-6.7477
7	23	1010.99	1006.95	1000.51	86.79	0.009498	-7.0489
7	24	1014.93	1010.99	1004.19	86.34	0.009449	-7.2268
7	25	1018.69	1014.93	1007.91	85.90	0.009400	-7.2565
7	26	1022.00	1018.69	1011.59	85.49	0.009355	-7.0135
7	27	1023.61	1022.00	1014.76	85.16	0.009319	-5.9508

1.6291	0.7140	0.001695	0.009646	0.012885
3.1754	-1.5733	0.001627	0.009714	0.012851
4.4588	-5.2751	0.001532	0.009809	0.012805
5.3045	-10.1389	0.001419	0.009922	0.012747
5.3978	-15.3256	0.001303	0.010038	0.012689
4.8944	-20.4633	0.001198	0.010143	0.012636
3.9254	-25.4208	0.001114	0.010227	0.012594
2.6440	-29.7500	0.001057	0.010284	0.012566

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1.4002	-33.0844	0.001027	0.010314	0.012551
0.9275	-34.9922	0.001007	0.010334	0.012541
0.4581	-36.5052	0.000998	0.010343	0.012536
0.0000	-36.9457	0.000998	0.010343	0.012536
0.0000	-36.8301	0.000998	0.010343	0.012536
0.0000	-36.2224	0.000998	0.010343	0.012536
0.0000	-35.4308	0.000998	0.010343	0.012536
0.0000	-34.3385	0.000998	0.010343	0.012536
0.0000	-32.8429	0.000998	0.010343	0.012536
0.0000	-31.3414	0.000998	0.010343	0.012536
0.0000	-29.3851	0.000998	0.010343	0.012536
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-0.4872	-0.8095	0.001003	0.010338	0.012539
-0.2519	-0.2045	0.001008	0.010333	0.012541
-0.1454	-0.0926	0.001011	0.010330	0.012543
-0.1309	-0.3552	0.001014	0.010327	0.012544
-0.2133	0.4326	0.001018	0.010323	0.012546
-0.1941	-0.0035	0.001023	0.010318	0.012549
-0.2615	0.7370	0.001028	0.010313	0.012551
-0.3957	0.4433	0.001037	0.010304	0.012556
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-0.9594	1.9818	0.001103	0.010238	0.012589
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-1.4635	3.4595	0.001191	0.010150	0.012633
-1.6436	3.6796	0.001226	0.010115	0.012650
-1.7979	3.9486	0.001264	0.010077	0.012669
-1.9369	4.2033	0.001306	0.010035	0.012690
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-2.1277	4.6199	0.001395	0.009946	0.012735
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-2.1008	4.9126	0.001586	0.009755	0.012830
-1.6772	4.2736	0.001622	0.009719	0.012848

7	28	1026.33	1023.61	1017.98	84.91	0.009292	-5.6201
7	29	1026.77	1026.33	1020.66	84.81	0.009280	-4.1124
7	30	1025.26	1026.77	1022.45	84.91	0.009292	-1.8848
7	31	1020.99	1025.26	1022.72	85.21	0.009324	1.1693
7	32	1014.68	1020.99	1021.45	85.76	0.009385	4.5581
7	33	1004.28	1014.68	1017.70	86.54	0.009471	9.0307
7	34	990.78	1004.28	1011.04	87.46	0.009571	13.6521
7	35	974.28	990.78	1001.19	88.42	0.009675	18.1096
7	36	954.76	974.28	987.97	89.33	0.009775	22.3543
7	37	932.75	954.76	971.46	90.11	0.009861	26.0528
7	38	908.76	932.75	951.92	90.69	0.009925	29.0502
7	39	883.27	908.76	929.74	91.05	0.009963	31.2747
7	40	856.88	883.27	905.75	91.27	0.009988	32.8867
7	41	830.06	856.88	880.51	91.41	0.010003	33.9554
7	42	803.08	830.06	854.38	91.46	0.010009	34.5258
7	43	776.39	803.08	827.83	91.46	0.010009	34.6180
7	44	750.12	776.39	801.28	91.46	0.010009	34.4303
7	45	724.47	750.12	774.94	91.46	0.010009	33.9640
7	46	700.01	724.47	749.14	91.46	0.010009	33.3660
7	47	676.34	700.01	723.98	91.46	0.010009	32.8578
7	48	653.60	676.34	699.56	91.46	0.010009	30.9321
8	2	969.15	955.00	970.18	90.91	0.009948	0.6913
8	3	969.68	969.15	969.80	90.82	0.009939	0.0781
8	4	969.12	969.68	969.40	90.76	0.009932	0.1910
8	5	969.77	969.12	969.44	90.73	0.009928	-0.2189
8	6	968.67	969.77	969.16	90.72	0.009927	0.3292

8	7	970.28	968.67	969.44	90.68	0.009923	-0.5660
8	8	969.30	970.28	969.35	90.66	0.009921	0.0369
8	9	971.07	969.30	969.61	90.61	0.009916	-0.8506
8	10	970.41	971.07	969.90	90.57	0.009911	-0.3441
8	11	971.68	970.41	970.32	90.50	0.009904	-0.9120
8	12	973.48	971.68	971.18	90.42	0.009895	-1.5488
8	13	975.25	973.48	972.24	90.30	0.009882	-2.0233
8	14	976.81	975.25	973.43	90.17	0.009867	-2.2774
8	15	978.70	976.81	974.67	89.96	0.009845	-2.7114
8	16	980.58	978.70	976.14	89.76	0.009823	-2.9852
8	17	984.09	980.58	978.20	89.52	0.009797	-3.9680
8	18	986.25	984.09	980.20	89.25	0.009767	-4.0760
8	19	990.00	986.25	982.75	88.96	0.009735	-4.8771
8	20	993.24	990.00	985.46	88.65	0.009701	-5.2381
8	21	996.70	993.24	988.35	88.30	0.009663	-5.6202
8	22	1000.17	996.70	991.40	87.95	0.009624	-5.9044
8	23	1003.85	1000.17	994.59	87.56	0.009582	-6.2328
8	24	1007.52	1003.85	997.90	87.17	0.009539	-6.4723
8	25	1011.12	1007.52	1001.30	86.76	0.009495	-6.6104

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-0.5202	3.5921	0.001660	0.009680	0.012867
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1.5275	0.3622	0.001617	0.009724	0.012846
2.8446	-1.7134	0.001556	0.009785	0.012815
3.9981	-5.0326	0.001470	0.009871	0.012772
4.6860	-8.9460	0.001370	0.009971	0.012722
4.8991	-13.2104	0.001266	0.010075	0.012670
4.6534	-17.7009	0.001166	0.010175	0.012620
3.9856	-22.0672	0.001080	0.010261	0.012577
2.9972	-26.0530	0.001016	0.010325	0.012545
1.7988	-29.4759	0.000978	0.010363	0.012526
1.1346	-31.7521	0.000953	0.010388	0.012514
0.7058	-33.2495	0.000938	0.010403	0.012506
0.2671	-34.2586	0.000932	0.010409	0.012503
0.0000	-34.6180	0.000932	0.010409	0.012503
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0.0000	-30.9321	0.000932	0.010409	0.012503
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-0.4232	-0.5013	0.001002	0.010339	0.012538
-0.3389	-0.5300	0.001009	0.010332	0.012542
-0.1618	0.0571	0.001013	0.010328	0.012544
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8	26	1014.46	1011.12	1004.71	86.37	0.009452	-6.5640
8	27	1016.11	1014.46	1007.71	86.05	0.009417	-5.6534
8	28	1019.66	1016.11	1010.91	85.74	0.009383	-5.8875
8	29	1020.64	1019.66	1013.59	85.52	0.009359	-4.7399
8	30	1020.67	1020.64	1015.75	85.44	0.009349	-3.3162
8	31	1019.56	1020.67	1017.31	85.55	0.009362	-1.5149
8	32	1015.60	1019.56	1017.46	85.83	0.009392	1.2017
8	33	1009.15	1015.68	1015.94	86.32	0.009446	4.5744
8	34	1000.87	1009.15	1012.64	87.00	0.009521	7.9215
8	35	989.31	1000.87	1006.90	87.81	0.009609	11.8368
8	36	974.85	989.31	998.40	88.68	0.009704	15.8444
8	37	957.74	974.85	986.97	89.53	0.009798	19.6752
8	38	938.23	957.74	972.62	90.31	0.009883	23.1397
8	39	916.67	938.23	955.45	90.94	0.009951	26.1000
8	40	893.49	916.67	935.75	91.38	0.010000	28.4401
8	41	869.16	893.49	913.96	91.63	0.010027	30.1514
8	42	844.13	869.16	890.84	91.81	0.010047	31.4324
8	43	818.81	844.13	866.70	91.91	0.010058	32.2346
8	44	793.37	818.81	841.85	91.94	0.010061	32.6236
8	45	768.16	793.37	816.72	91.94	0.010061	32.6542
8	46	743.60	768.16	791.70	91.94	0.010061	32.3706
8	47	719.59	743.60	766.93	91.94	0.010061	31.8642
8	48	696.23	719.59	742.56	91.94	0.010061	31.1792
9	2	969.25	955.00	970.20	90.90	0.009947	0.6381
9	3	969.33	969.25	969.64	90.80	0.009936	0.2073
9	4	969.07	969.33	969.33	90.75	0.009931	0.1759
9	5	969.16	969.07	969.16	90.71	0.009926	-0.0008
9	6	969.10	969.16	969.15	90.71	0.009926	0.0324
9	7	970.08	969.10	969.37	90.67	0.009922	-0.4702
9	8	969.05	970.08	969.25	90.67	0.009922	0.1362
9	9	970.83	969.05	969.68	90.63	0.009917	-0.7791
9	10	969.88	970.83	969.70	90.61	0.009916	-0.1202
9	11	971.29	969.68	970.14	90.57	0.009911	-0.7768
9	12	972.51	971.29	970.74	90.50	0.009903	-1.1899
9	13	973.28	972.51	971.55	90.40	0.009893	-1.5666
9	14	975.13	973.88	972.47	90.29	0.009881	-1.7869
9	15	976.75	975.13	973.59	90.17	0.009867	-2.1279
9	16	978.34	976.75	974.83	90.03	0.009852	-2.3587
9	17	980.16	978.34	976.10	89.83	0.009830	-2.7362
9	18	982.01	980.16	977.58	89.63	0.009808	-2.9841
9	19	985.52	982.01	979.63	89.39	0.009782	-3.9664
9	20	987.61	985.52	981.61	89.12	0.009752	-4.0373
9	21	991.25	987.61	984.12	88.84	0.009721	-4.7970
9	22	994.31	991.25	986.76	88.53	0.009688	-5.0818

-1.9979	4.5660	0.001489	0.009852	0.012782
-1.6390	4.0144	0.001524	0.009817	0.012799
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-1.1454	3.5945	0.001582	0.009759	0.012828
-0.4256	2.8876	0.001592	0.009749	0.012833
0.5760	2.0909	0.001579	0.009762	0.012827
1.4155	0.2138	0.001549	0.009792	0.012812
2.5329	-2.0414	0.001495	0.009846	0.012785
3.4928	-4.4287	0.001420	0.009921	0.012747
4.1297	-7.7071	0.001332	0.010009	0.012703
4.4454	-11.3989	0.001237	0.010104	0.012656
4.3823	-15.2929	0.001143	0.010198	0.012609
3.9537	-19.1860	0.001058	0.010283	0.012566
3.2138	-22.8861	0.000990	0.010351	0.012532
2.2414	-26.1987	0.000941	0.010400	0.012508
1.2874	-28.8640	0.000914	0.010427	0.012494
0.9180	-30.5144	0.000894	0.010447	0.012484
0.5252	-31.7093	0.000883	0.010458	0.012479
0.1265	-32.4971	0.000880	0.010461	0.012477
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0.0000	-32.3706	0.000880	0.010461	0.012477
0.0000	-31.8642	0.000880	0.010461	0.012477
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-0.7991	-1.4372	0.000994	0.010347	0.012534
-0.5320	-0.7394	0.001005	0.010336	0.012540
-0.2341	-0.4100	0.001010	0.010331	0.012542
-0.2340	-0.2332	0.001015	0.010326	0.012545
0.0217	-0.0107	0.001015	0.010326	0.012545
-0.1890	0.2901	0.001019	0.010322	0.012547
-0.0241	-0.1604	0.001019	0.010322	0.012547
-0.2079	0.5712	0.001024	0.010317	0.012549
-0.0903	0.0298	0.001025	0.010316	0.012550
-0.1948	0.5819	0.001030	0.010311	0.012552
-0.3786	0.8113	0.001038	0.010303	0.012556
-0.4959	1.0706	0.001048	0.010293	0.012561
-0.5536	1.2332	0.001060	0.010281	0.012567
-0.6364	1.4914	0.001074	0.010267	0.012574
-0.7022	1.6565	0.001089	0.010252	0.012582
-1.0480	1.6881	0.001111	0.010230	0.012593
-1.0102	1.9738	0.001133	0.010208	0.012604
-1.2306	2.7357	0.001159	0.010182	0.012617
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-1.4440	3.3529	0.001220	0.010121	0.012647
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9	23	997.62	994.31	989.56	88.20	0.009652	-5.4229
9	24	1000.97	997.62	992.50	87.86	0.009614	-5.7015
9	25	1004.34	1000.97	995.55	87.50	0.009575	-5.9116
9	26	1007.57	1004.34	998.66	87.14	0.009536	-5.9956
9	27	1009.17	1007.57	1001.42	86.84	0.009503	-5.2157
9	28	1013.12	1009.17	1004.50	86.52	0.009466	-5.8014
9	29	1014.31	1013.12	1007.13	86.26	0.009440	-4.8325
9	30	1015.41	1014.31	1009.48	86.10	0.009422	-3.9913
9	31	1015.47	1015.41	1011.31	86.03	0.009414	-2.7993
9	32	1013.78	1015.47	1012.37	86.12	0.009425	-0.9501
9	33	1010.41	1013.78	1012.41	86.40	0.009455	1.3518
9	34	1005.16	1010.41	1011.06	86.82	0.009501	3.9753
9	35	998.03	1005.16	1008.20	87.41	0.009565	6.8415
9	36	987.93	998.03	1003.23	88.11	0.009642	10.2922
9	37	975.30	987.93	995.88	88.90	0.009728	13.8466
9	38	960.23	975.30	985.98	89.70	0.009815	17.6282
9	39	942.87	960.23	973.45	90.45	0.009898	20.5838
9	40	923.47	942.87	958.34	91.10	0.009969	23.4682
9	41	902.38	923.47	940.82	91.60	0.010024	25.8687
9	42	879.94	902.38	921.13	91.91	0.010058	27.7201
9	43	856.68	879.94	899.92	92.13	0.010081	29.1037
9	44	832.83	856.68	877.59	92.27	0.010097	30.1225
9	45	808.72	832.83	854.41	92.34	0.010105	30.7490
9	46	784.72	808.72	830.69	92.34	0.010105	30.9382
9	47	760.96	784.72	806.88	92.34	0.010105	30.9005
9	48	737.53	760.96	783.13	92.34	0.010105	30.6546
10	2	969.31	955.00	970.21	90.90	0.009947	0.6070
10	3	969.92	969.31	969.89	90.81	0.009938	-0.0214
10	4	969.07	969.92	969.48	90.76	0.009932	0.2782
10	5	969.54	969.07	969.43	90.73	0.009929	-0.0726
10	6	969.47	969.54	969.40	90.71	0.009927	-0.0486
10	7	969.53	969.47	969.34	90.68	0.009923	-0.1254
10	8	969.46	969.53	969.40	90.68	0.009923	-0.0483
10	9	970.55	969.46	969.68	90.64	0.009919	-0.5875
10	10	969.53	970.55	969.61	90.63	0.009918	0.0519
10	11	971.04	969.53	970.00	90.60	0.009914	-0.7003
10	12	971.13	971.04	970.22	90.53	0.009907	-0.6128
10	13	972.97	971.13	970.96	90.46	0.009900	-1.3476
10	14	973.06	972.97	971.44	90.37	0.009890	-1.0929
10	15	974.46	973.06	972.20	90.27	0.009879	-1.5256
10	16	975.76	974.46	973.11	90.16	0.009867	-1.7841
10	17	977.21	975.76	974.16	90.04	0.009853	-2.0507
10	18	978.74	977.21	975.34	89.90	0.009838	-2.2847
10	19	981.87	978.74	977.04	89.71	0.009817	-3.2492
10	20	983.31	981.87	978.64	89.51	0.009795	-3.1396
10	21	986.71	983.31	980.73	89.27	0.009769	-4.0186
10	22	988.72	986.71	982.73	89.00	0.009740	-4.0275

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-1.6722	4.1292	0.001473	0.009868	0.012774
-1.3044	3.5280	0.001501	0.009840	0.012788
-0.8421	3.1492	0.001519	0.009822	0.012797
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0.4755	1.4256	0.001516	0.009825	0.012795
1.4129	0.0610	0.001486	0.009855	0.012780
2.1645	-1.8107	0.001440	0.009901	0.012757
2.9963	-3.8451	0.001376	0.009965	0.012725
3.6262	-6.6660	0.001299	0.010042	0.012686
4.0040	-9.8426	0.001213	0.010128	0.012644
4.0809	-13.2472	0.001126	0.010215	0.012600
3.8449	-16.7388	0.001043	0.010298	0.012559
3.3182	-20.1499	0.000972	0.010369	0.012523
2.5513	-23.3174	0.000917	0.010424	0.012496
1.6074	-25.1127	0.000883	0.010458	0.012479
1.0825	-28.0211	0.000859	0.010481	0.012467
0.7356	-29.3869	0.000844	0.010497	0.012459
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0.0000	-30.9005	0.000836	0.010505	0.012455
0.0000	-30.6546	0.000836	0.010505	0.012455
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10	23	992.25	988.72	985.22	88.73	0.009710	-4.7266
10	24	995.23	992.25	987.82	88.43	0.009677	-4.9868
10	25	998.31	995.23	990.54	88.12	0.009643	-5.2329
10	26	1001.36	998.31	993.35	87.80	0.009608	-5.3936
10	27	1002.87	1001.36	995.85	87.53	0.009579	-4.7258
10	28	1006.92	1002.87	998.74	87.21	0.009544	-5.5060
10	29	1008.18	1006.92	1001.24	86.96	0.009516	-4.6655
10	30	1009.76	1008.18	1003.56	86.75	0.009493	-4.1721
10	31	1010.83	1009.76	1005.64	86.61	0.009478	-3.4912
10	32	1010.95	1010.83	1007.35	86.59	0.009475	-2.4235
10	33	1009.73	1010.95	1008.39	86.68	0.009486	-0.9013
10	34	1006.35	1009.73	1008.27	86.90	0.009510	1.2699
10	35	1001.81	1006.35	1007.00	87.25	0.009548	3.4937
10	36	994.92	1001.81	1004.23	87.75	0.009603	5.2666
10	37	986.65	994.92	999.93	88.37	0.009671	8.9395
10	38	975.60	986.65	993.58	89.08	0.009748	12.1046
10	39	962.27	975.60	984.98	89.81	0.009828	15.2836
10	40	946.79	962.27	974.02	90.54	0.009907	18.3299
10	41	929.32	946.79	960.69	91.19	0.009979	21.1153
10	42	910.10	929.32	945.08	91.73	0.010038	23.5386
10	43	889.50	910.10	927.37	92.12	0.010081	25.4841
10	44	867.81	889.50	907.89	92.35	0.010106	26.9727
10	45	845.43	867.81	887.24	92.53	0.010126	28.1324
10	46	822.69	845.43	865.66	92.65	0.010138	28.9129
10	47	799.78	822.69	843.39	92.70	0.010144	29.3520
10	48	776.88	799.78	820.72	92.70	0.010144	29.5020
11	2	969.34	955.00	970.22	90.90	0.009947	0.5868
11	3	969.44	969.34	969.68	90.79	0.009935	0.1607
11	4	968.85	969.44	969.29	90.74	0.009930	0.2975
11	5	968.95	968.85	969.08	90.71	0.009926	0.0878
11	6	969.01	968.95	969.01	90.69	0.009924	-0.0055
11	7	969.07	969.01	968.99	90.67	0.009922	-0.0526
11	8	969.70	969.07	969.23	90.67	0.009922	-0.3168
11	9	969.76	969.70	969.31	90.64	0.009918	-0.2982
11	10	969.70	969.76	969.46	90.64	0.009919	-0.1620
11	11	970.69	969.70	969.79	90.61	0.009916	-0.6070
11	12	970.47	970.69	969.94	90.58	0.009912	-0.3547
11	13	972.28	970.47	970.57	90.52	0.009906	-1.1525
11	14	971.79	972.28	970.85	90.47	0.009900	-0.6821
11	15	973.56	971.79	971.59	90.40	0.009893	-1.3217
11	16	974.39	973.56	972.32	90.32	0.009884	-1.3593
11	17	975.69	974.39	973.21	90.23	0.009874	-1.6673
11	18	976.98	975.69	974.21	90.12	0.009862	-1.6645
11	19	978.60	976.98	975.25	89.95	0.009844	-2.2560
11	20	979.97	978.60	976.45	89.80	0.009827	-2.3719

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1.8028	-1.6909	0.001393	0.009948	0.012734
2.5445	-3.7221	0.001358	0.010003	0.012706
3.1870	-5.7525	0.001270	0.010071	0.012672
3.5995	-8.5050	0.001193	0.010148	0.012634

3.7759	-11.5077	0.001112	0.010228	0.012593
3.6884	-14.6414	0.001033	0.010307	0.012554
3.3386	-17.7766	0.000962	0.010379	0.012518
2.7533	-20.7852	0.000903	0.010438	0.012489
1.9802	-23.5039	0.000860	0.010481	0.012467
1.2048	-25.7673	0.000834	0.010506	0.012454
0.9066	-27.2258	0.000815	0.010526	0.012445
0.5811	-28.3318	0.000802	0.010538	0.012438
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11	21	982.31	979.97	977.89	89.60	0.009805	-2.9774
11	22	984.23	982.31	979.52	89.40	0.009783	-3.1682
11	23	987.67	984.23	981.65	89.17	0.009758	-4.0465
11	24	989.65	987.67	983.67	88.91	0.009729	-4.0241
11	25	993.03	989.65	986.13	88.64	0.009700	-4.5419
11	26	995.12	993.03	988.41	88.36	0.009669	-4.5190
11	27	997.02	995.12	990.69	88.12	0.009643	-4.2577
11	28	1001.11	997.02	993.43	87.83	0.009611	-5.1680
11	29	1002.36	1001.11	995.80	87.59	0.009585	-4.4112
11	30	1004.13	1002.36	998.04	87.37	0.009561	-4.1024
11	31	1005.71	1004.13	1000.14	87.19	0.009541	-3.7466
11	32	1006.73	1005.71	1002.03	87.06	0.009527	-3.1645
11	33	1007.39	1006.73	1003.74	87.03	0.009524	-2.4557
11	34	1005.87	1007.39	1004.67	87.12	0.009533	-0.8095
11	35	1003.57	1005.87	1004.79	87.31	0.009554	0.8254
11	36	998.49	1003.57	1003.49	87.62	0.009589	3.3643
11	37	992.83	998.49	1001.01	88.05	0.009636	5.5062
11	38	984.87	992.83	996.99	88.59	0.009695	8.1584
11	39	975.72	984.87	991.48	89.23	0.009764	10.6051
11	40	963.93	975.72	983.99	89.91	0.009838	13.5007
11	41	950.09	963.93	974.37	90.59	0.009913	16.3415
11	42	934.33	950.09	962.59	91.24	0.009984	19.0152
11	43	916.87	934.33	948.67	91.80	0.010046	21.3994
11	44	897.91	916.87	932.72	92.24	0.010094	23.4271
11	45	877.76	897.91	914.95	92.53	0.010126	25.0253
11	46	856.84	877.76	895.84	92.73	0.010148	26.2334
11	47	835.35	856.84	875.75	92.88	0.010164	27.1800
11	48	813.51	835.35	854.85	92.97	0.010174	27.8206
12	2	969.36	955.00	970.22	90.90	0.009947	0.5782
12	3	970.02	969.36	969.93	90.81	0.009937	-0.0616
12	4	968.87	970.02	969.46	90.75	0.009932	0.3954
12	5	969.51	968.87	969.42	90.74	0.009930	-0.0633
12	6	969.44	969.51	969.38	90.72	0.009928	-0.0401
12	7	969.39	969.44	969.35	90.71	0.009926	-0.0258
12	8	969.82	969.39	969.45	90.69	0.009924	-0.2481
12	9	969.25	969.82	969.33	90.66	0.009921	0.0489
12	10	969.31	969.25	969.29	90.65	0.009920	-0.0114
12	11	970.46	969.31	969.61	90.63	0.009917	-0.5661
12	12	970.40	970.46	969.84	90.61	0.009916	-0.3749
12	13	971.68	970.40	970.32	90.56	0.009910	-0.9155
12	14	971.60	971.68	970.68	90.53	0.009907	-0.6151
12	15	972.75	971.60	971.21	90.47	0.009900	-1.0366
12	16	972.82	972.75	971.57	90.40	0.009892	-0.8431
12	17	974.60	972.82	972.40	90.32	0.009884	-1.4797
12	18	975.46	974.60	973.20	90.23	0.009874	-1.5214

-1.0523	1.9251	0.001136	0.010205	0.012605
-0.9949	2.1752	0.001157	0.010163	0.012616
-1.1992	2.8493	0.001183	0.010158	0.012629
-1.3334	2.6906	0.001212	0.010129	0.012643
-1.3547	3.2872	0.001241	0.010100	0.012658
-1.4752	3.0437	0.001272	0.010069	0.012673
-1.2035	3.0541	0.001298	0.010043	0.012686
-1.5055	3.6629	0.001330	0.010011	0.012702
-1.2400	3.1711	0.001356	0.009985	0.012715
-1.1146	2.9877	0.001380	0.009961	0.012727
-0.9296	2.8170	0.001400	0.009941	0.012737
-0.6308	2.5537	0.001414	0.009927	0.012744
-0.1676	2.2881	0.001417	0.009924	0.012746
0.4344	1.2439	0.001408	0.009933	0.012741
0.9930	0.1676	0.001387	0.009954	0.012731
1.6171	-1.7472	0.001352	0.009989	0.012713
2.1858	-3.3204	0.001305	0.010036	0.012690
2.7704	-5.3850	0.001246	0.010095	0.012660
3.2345	-7.3736	0.001177	0.010164	0.012626
3.4770	-10.0236	0.001103	0.010238	0.012589
3.5016	-12.3398	0.001028	0.010313	0.012551
3.2959	-15.7192	0.000957	0.010384	0.012516
2.8692	-18.5302	0.000895	0.010446	0.012485
2.2504	-21.1766	0.000847	0.010494	0.012461
1.4798	-23.2455	0.000815	0.010526	0.012445
1.0416	-25.2117	0.000793	0.010548	0.012434
0.7547	-26.4332	0.000777	0.010564	0.012426
0.4475	-27.3751	0.000767	0.010574	0.012421
-0.3265	-1.4047	0.000904	0.010347	0.012554
-0.4531	-0.3914	0.001004	0.010337	0.012559
-0.2316	-0.6270	0.001009	0.010332	0.012562
-0.1171	-0.0537	0.001011	0.010330	0.012563
-0.0868	-0.0466	0.001013	0.010328	0.012564
-0.0654	-0.0395	0.001015	0.010326	0.012565

11211

-0.1181	0.1299	0.001017	0.010324	0.012546
-0.1134	-0.1623	0.001020	0.010321	0.012547
-0.0572	-0.0457	0.001021	0.010320	0.012548
-0.1385	0.4276	0.001024	0.010317	0.012549
-0.0710	0.3038	0.001025	0.010316	0.012550
-0.2647	0.6307	0.001031	0.010310	0.012553
-0.1268	0.4882	0.001034	0.010307	0.012554
-0.3285	0.7080	0.001041	0.010300	0.012558
-0.3638	0.4793	0.001049	0.010292	0.012562
-0.3804	1.0992	0.001057	0.010284	0.012566
-0.4524	1.0689	0.001067	0.010274	0.012571

13-13

12	19	976.94	975.46	974.19	90.13	0.009863	-1.8492
12	20	978.08	976.94	975.21	90.02	0.009851	-1.9265
12	21	979.35	978.08	976.22	89.87	0.009835	-2.1010
12	22	980.88	979.35	977.39	89.72	0.009818	-2.3443
12	23	983.97	980.88	979.08	89.52	0.009796	-3.2890
12	24	985.35	983.97	980.68	89.32	0.009774	-3.1489
12	25	988.57	985.35	982.73	89.09	0.009749	-3.9330
12	26	990.10	988.57	984.62	88.86	0.009724	-3.6909
12	27	991.95	990.10	986.53	88.65	0.009701	-3.6446
12	28	995.88	991.95	988.97	88.37	0.009671	-4.6546
12	29	997.06	995.88	991.10	88.15	0.009646	-4.0090
12	30	998.84	997.06	993.15	87.94	0.009623	-3.8200
12	31	1000.61	998.84	995.15	87.74	0.009602	-3.6733
12	32	1002.09	1000.61	997.06	87.58	0.009584	-3.3073
12	33	1003.29	1002.09	998.81	87.44	0.009569	-3.0190
12	34	1003.40	1003.29	1000.26	87.41	0.009566	-2.1147
12	35	1002.09	1003.40	1000.99	87.46	0.009570	-0.7442
12	36	1000.05	1002.09	1001.16	87.65	0.009591	0.7466
12	37	995.87	1000.05	1000.09	87.92	0.009622	2.8442
12	38	990.45	995.87	997.86	88.31	0.009664	4.9887
12	39	983.82	990.45	994.38	88.79	0.009716	7.1029
12	40	975.74	983.82	989.58	89.36	0.009778	9.3150
12	41	965.27	975.74	983.02	89.98	0.009847	11.9508
12	42	952.88	965.27	974.57	90.62	0.009917	14.5934
12	43	938.68	952.88	964.13	91.25	0.009986	17.1298
12	44	922.78	938.68	951.70	91.82	0.010048	19.4642
12	45	905.36	922.78	937.34	92.30	0.010100	21.5204
12	46	886.72	905.36	921.19	92.65	0.010139	23.1971
12	47	867.11	886.72	903.52	92.88	0.010164	24.5015
12	48	846.83	867.11	884.80	93.05	0.010183	25.5532

−0.5287	1.3204	0.001078	0.010263	0.012576
−0.5598	1.3666	0.001090	0.010251	0.012582
−0.7532	1.5478	0.001106	0.010235	0.012590
−0.7848	1.5594	0.001123	0.010218	0.012599
−1.0304	2.2586	0.001145	0.010196	0.012610
−1.0197	2.1257	0.001167	0.010174	0.012621
−1.1980	2.7352	0.001192	0.010149	0.012633
−1.1667	2.5242	0.001217	0.010124	0.012646
−1.0837	2.5866	0.001240	0.010101	0.012657
−1.4008	3.2538	0.001270	0.010071	0.012672
−1.1571	2.8518	0.001295	0.010046	0.012685
−1.0847	2.7442	0.001318	0.010023	0.012696
−0.9979	2.6756	0.001339	0.010002	0.012707
−0.8407	2.5465	0.001357	0.009984	0.012716
−0.6786	2.3403	0.001372	0.009969	0.012723
−0.1631	1.9515	0.001375	0.009966	0.012725
0.2267	0.9710	0.001371	0.009970	0.012722
0.9798	0.2331	0.001350	0.009991	0.012712
1.4148	−1.4294	0.001319	0.010022	0.012697
1.9962	−2.9925	0.001277	0.010064	0.012676
2.4401	−4.6628	0.001225	0.010116	0.012649
2.8989	−6.4160	0.001163	0.010178	0.012618
3.1852	−8.7656	0.001094	0.010247	0.012584
3.2946	−11.2987	0.001024	0.010317	0.012549
3.2046	−13.9211	0.000955	0.010386	0.012515
2.9134	−16.5507	0.000893	0.010448	0.012484
2.4349	−19.0854	0.000841	0.010500	0.012457
1.7993	−21.3978	0.000802	0.010539	0.012438
1.1426	−23.3587	0.000777	0.010564	0.012426
0.8970	−24.6252	0.000758	0.010583	0.012416

```
// JOB
// FOR
*IOCS(CARD,TYPEWRITER,1132PRINTER,DISK)
*ONE WORD INTEGERS
*ARITHMETIC TRACE
*TRANSFER TRACE
*LIST ALL
      DIMENSION TS(12, 48), TG(12, 46), XSO2(12,46)
      SHSO2 (TEMP) = 0.4474E01 + 0.2041E-01*TEMP - 0.1743E-04* TEMP**2
     1    + 0.5463E-08 *  TEMP**3 + 0.3838E05 /  TEMP **2
      SHO2(TEMP) = 0.4399E01 + 0.7895E-02 * TEMP - 0.5454E-05 * TEMP**2
     1  + 0.1399E-08 *  TEMP**3 + 0.7069E05 /  TEMP**2
      SHSO3(TEMP) = 0.4638E01 + 0.3266E-01 * TEMP - 0.2792E-04 * TEMP**2
     1      + 0.8782E-08 *  TEMP**3 - 0.1936E04 /  TEMP**2
      SHN2(TEMP) = 0.7543E01 - 0.34E-02 * TEMP + 0.636E-05 * TEMP**2
     1  -0.2702E-08 *  TEMP**3 - 0.3913E04 /  TEMP**2
      READ (2,5) WSO2, WO2, WN2, WS, WSO3, TTOL, ML, IL
    5 FORMAT (5F10.6, F5.2, 2I4)
      WRITE(3,5) WSO2, WO2, WN2, WS, WSO3, TTOL, ML, IL
      FSO2      = WSO2 / 64.0628
      FO2       = WO2 / 31.9988
      FN2 = WN2 / 28.0134
      FS = WS/60.0848
      FSO3 = WSO3 / 80.0622
      FSO3      = FSO3      + 0.0004
      FSO2      = FSO2      - 0.0004
      FSO2I = FSO2
      FO2 = FO2 - 0.0002
      HTCON = 0.673
      I = 1
      DO 111 M = 1,12
  111 TG(M,I) = 971.28
      DO 112 M = 1,12
  112 TS(M,I) = 955.
      M = 1
      READ (2,30)  (TS(M,I), I = 2, 48)
   30 FORMAT (8F8.2/8F8.2/8F8.2/8F8.2/8F8.2/7F8.2)
      WRITE(3,30)  (TS(M,I), I = 2, 48)
      WRITE ( 3, 25)
   25 FORMAT  ('     M     I TS(M,I) TS(M,I-1) TG(M,I) XSO2(M,I)   SUMDF
     1  QS          QEVOL       QG        FSO2     FSO3        FO2')
      DO 35 I = 2, 48
   35 TS(M,I) = TS(M,I) - 200.
      DO 200 M = 2, 12
      SUMDF = 0.009965
```

```
      FSO2 = 0.000977
      FSO3 = 0.010365
      FO2 = 0.012526
      DO 200 I = 2, IL
      TS(M,I)=TS(M,I-1)
      TSAV =  (TS(M,I) + TS(M-1, I))/2.
  141 TCSAV = (TSAV - 32.) / 1.8
      TKSAV = TCSAV + 273.16
      FTOT = FSO2 + FO2 + FSO3 + FN2
      XLNKP = 22600. / (1.98719 * TKSAV) - 21.36 / 1.98719
      XKP = EXP (XLNKP)
      PSO2 = FSO2      / FTOT
      PO2 = FO2       / FTOT
      PSO3 = FSO3      / FTOT
      PN2 = FN2 / FTOT
      PTOT = PSO2 + PO2 + PSO3 + PN2
      TERM1 = SQRT (PSO2 / PSO3)
      DENOM = PSO2 * XKP


      TERM3 = (PSO3 / DENOM)**2
      PTERM = TERM1 * (PO2 - TERM3)
      IF (TKSAV - 680.) 610, 610, 620
  610 RATEK = 0.
      GO TO 650
  620 IF (TKSAV - 730.2355) 630, 630, 640
  630 RATEK = 1.56E-07 * TKSAV - 1.06E-04
      GO TO 650
  640 RATEK = 4.674E-07 * TKSAV - 3.48E-04
  650 RXRAT = RATEK * PTERM
      DFSO2 = RXRAT * 60. * WS
C     HEAT BALANCE
      IF (TKSAV - 848.) 150, 150, 155
  150 SHS = 11.22 + 8.20E-03*TKSAV - 2.70E+05 / TKSAV**2
      GO TO 160
  155 SHS = 14.41 + 2.04E-03 * TKSAV
  160 QRX = (3.3 * TKSAV + 44140.)
      QEVOL = QRX * DFSO2
      QS = FS * SHS * (TS(M,I) - TS(M-1,I))
      QG = QEVOL - QS
      TGIN = TG(M,I-1)
      CPGAS = SHSO2(TGIN)  * FSO2 + SHO2(TGIN)  * FO2 + $HSO3(TGIN) *
     1 FSO3 + SHN2(TGIN)  * FN2
      TG(M,I) = QG / CPGAS + TG(M,I-1)
      TS1  =-QS / HTCON +TG(M,I)
```

```
      DELTA = ABS (TS1       - TS(M,I))
      IF (DELTA -TTOL) 190, 190, 170
  170 TS2= (TS1       + TS(M,I)) / 2.
      TS(M,I) = TS2
      TSAV = (TS2+ TS(M-1, I)) / 2.
      GO TO 141
  190 TS(M,I) = TS1
      SUMDF = SUMDF + DFSO2
      DFSO3 = DFSO2
      DFO2 = DFSO2 / 2.
      FSO2       = FSO2       - DFSO2
      FSO3       = FSO3       + DFSO3
      FO2       = FO2       - DFO2
      XAV = DFSO2 / FSO2
      XSO2(M,I) = 100. * SUMDF / FSO2I
      WRITE(3,196)M, I, TS(M,I), TS(M,I-1), TG(M,I), XSO2(M,1), SUMDF,
     1 QS, QEVOL, QG, FSO2, FSO3, FO2
  196 FORMAT (2I5, 4F8.2, F12.6, 3F10.4, 3F11.6)
      SMDF1 = 0.0
  200 CONTINUE
      CALL EXIT
      END
```

```
// XEQ
```

```
 0.726667  0.566667  3.716667  2.816667  0.000000 0.75   12   48
 959.13   963.68   967.40   972.69   976.66   982.18   986.55   992.80
 998.24  1004.43  1010.40  1017.47  1023.82  1030.67  1037.20  1043.64
1050.07  1056.22  1061.52  1066.79  1071.61  1075.52  1075.47  1071.41
1060.19  1043.41  1019.19   986.57   945.56   895.97   838.74   780.64
 726.92   682.92   646.03   614.28   586.84   562.31   540.23   520.89
 503.79   488.93   476.15   466.10   458.72   454.03   450.00
```

M	I	TS(M,I)	TS(M,I-1)	TG(M,I)	XSO2(M,I)	SUMDF	XS
2	2	837.50	955.00	926.68	91.17	0.000977	60.0174
2	3	823.30	837.50	892.07	91.27	0.000987	46.2829
2	4	813.00	823.30	865.51	91.35	0.000997	35.3372
2	5	806.67	813.00	845.73	91.44	0.010006	26.2814
2	6	802.48	806.67	831.20	91.52	0.010015	19.3267
2	7	800.44	802.48	820.92	91.60	0.010024	13.7805
2	8	799.29	800.44	813.76	91.70	0.010034	9.7566
2	9	800.91	799.29	809.62	91.80	0.010046	5.8650
2	10	802.94	800.91	807.62	91.91	0.010058	3.1549
2	11	805.53	802.94	807.23	92.04	0.010072	1.1463
2	12	809.10	805.53	808.23	92.17	0.010087	-0.5859
2	13	813.86	809.10	810.55	92.33	0.010103	-2.2257
2	14	819.41	813.86	814.01	92.49	0.010121	-3.6218
2	15	825.06	819.41	818.25	92.67	0.010141	-4.8790
2	16	830.78	825.06	823.03	92.86	0.010162	-5.9193
2	17	836.65	830.78	828.20	93.06	0.010183	-5.6877
2	18	842.65	836.65	833.66	93.26	0.010206	-6.0459
2	19	848.56	842.65	839.29	93.47	0.010229	-6.2414
2	20	853.98	848.56	844.88	93.69	0.010253	-6.1795
2	21	859.40	853.98	850.45	93.93	0.010279	-6.0272
2	22	864.51	859.40	855.88	94.18	0.010306	-5.8073
2	23	868.35	864.51	860.75	94.43	0.010333	-5.1145
2	24	870.27	868.35	864.58	94.66	0.010358	-3.8502
2	25	868.96	870.27	866.60	94.86	0.010381	-1.5904
2	26	862.52	868.96	865.66	95.04	0.010400	2.1147
2	27	851.28	862.52	861.15	95.18	0.010416	6.6394
2	28	834.85	851.28	852.52	95.30	0.010429	11.8904
2	29	811.09	834.85	838.60	95.38	0.010437	18.3143
2	30	780.19	811.09	818.68	95.38	0.010437	25.9053
2	31	741.95	780.19	792.43	95.38	0.010437	33.9760
2	32	696.83	741.95	759.61	95.38	0.010437	42.2515
2	33	648.91	696.83	721.41	95.38	0.010437	48.7948
2	34	601.81	648.91	679.90	95.38	0.010437	52.5990
2	35	559.39	601.81	637.31	95.38	0.010437	52.7753
2	36	521.07	559.39	596.76	95.38	0.010437	50.9393
2	37	485.68	521.07	557.44	95.38	0.010437	48.2971
2	38	454.10	485.68	520.64	95.38	0.010437	44.7778

CEVOL	CG	FSO2	FSO3	FO2
0.5662	-59.4491	0.000964	0.010377	0.012519
0.4945	-45.7883	0.000954	0.010387	0.012514
0.4372	-34.9000	0.000944	0.010397	0.012509
0.4248	-25.8266	0.000935	0.010406	0.012505
0.4133	-18.9133	0.000926	0.010415	0.012500
0.4406	-13.6399	0.000917	0.010424	0.012496
0.4707	-9.2658	0.000907	0.010434	0.012491
0.5184	-5.3466	0.000895	0.010446	0.012485
0.5697	-2.5831	0.000883	0.010458	0.012479
0.6370	-0.5093	0.000869	0.010472	0.012472
0.7005	1.2864	0.000854	0.010487	0.012464
0.7764	3.0021	0.000838	0.010503	0.012456
0.8390	4.4708	0.000820	0.010521	0.012447
0.9056	5.4846	0.000800	0.010541	0.012437
0.9622	6.1815	0.000779	0.010562	0.012427
1.0090	6.6967	0.000758	0.010583	0.012416
1.0444	7.0903	0.000735	0.010606	0.012405
1.0640	7.3054	0.000712	0.010629	0.012393
1.1324	7.2620	0.000686	0.010653	0.012381
1.2268	7.2540	0.000662	0.010679	0.012368
1.2669	7.0742	0.000635	0.010706	0.012354
1.2487	6.3632	0.000608	0.010733	0.012341
1.1621	4.9923	0.000583	0.010758	0.012329
1.0528	2.6433	0.000560	0.010781	0.012317
0.8903	-1.2244	0.000541	0.010800	0.012308
0.7344	-5.9050	0.000525	0.010816	0.012300
0.6176	-11.2728	0.000512	0.010829	0.012293
0.3726	-18.1417	0.000504	0.010837	0.012289
0.0000	-25.9053	0.000504	0.010837	0.012289
0.0000	-33.9760	0.000504	0.010837	0.012289
0.0000	-42.2515	0.000504	0.010837	0.012289
0.0000	-48.7948	0.000504	0.010837	0.012289
0.0000	-52.5590	0.000504	0.010837	0.012289
0.0000	-52.7753	0.000504	0.010837	0.012289
0.0000	-50.9993	0.000504	0.010837	0.012289
0.0000	-48.2971	0.000504	0.010837	0.012289
0.0000	-44.7778	0.000504	0.010837	0.012289

2	39	425.17	454.10	486.44	95.38	0.010437	41.2332
2	40	398.67	425.17	454.83	95.38	0.010437	37.7067
2	41	374.75	398.67	425.86	95.38	0.010437	34.3920
2	42	353.16	374.75	399.44	95.38	0.010437	31.1466
2	43	334.34	353.16	375.70	95.38	0.010437	27.8337
2	44	317.22	334.34	354.30	95.38	0.010437	24.9586
2	45	302.60	317.22	335.33	95.38	0.010437	22.0323
2	46	290.49	302.60	318.34	95.38	0.010437	19.0798
2	47	280.98	290.49	304.89	95.38	0.010437	16.0936
2	48	272.84	280.98	293.06	95.38	0.010437	13.6106
3	2	886.18	955.00	943.58	91.39	0.010001	38.6314
3	3	867.66	886.18	918.65	91.64	0.010028	34.2162
3	4	852.00	867.66	896.68	91.84	0.010050	30.0653
3	5	839.35	852.00	877.72	92.02	0.010070	25.8273
3	6	829.87	839.35	861.88	92.17	0.010087	21.5483
3	7	822.86	829.87	848.98	92.31	0.010102	17.5783
3	8	818.08	822.86	838.79	92.44	0.010116	13.9346
3	9	815.20	818.08	831.07	92.57	0.010130	10.6811
3	10	812.96	815.20	825.21	92.70	0.010144	8.2463
3	11	812.77	812.96	821.29	92.83	0.010158	5.7321
3	12	813.96	812.77	819.12	92.96	0.010173	3.4758
3	13	815.80	813.96	818.35	93.10	0.010188	1.7153
3	14	818.93	815.80	816.93	93.25	0.010204	0.0006
3	15	822.68	818.93	820.61	93.40	0.010221	-1.3890
3	16	826.90	822.68	823.19	93.57	0.010239	-2.4975
3	17	831.54	826.90	826.49	93.74	0.010258	-3.5989
3	18	837.24	831.54	830.62	93.91	0.010277	-4.4553
3	19	842.50	837.24	835.14	94.09	0.010297	-4.9552
3	20	846.95	842.50	839.64	94.28	0.010317	-4.9203
3	21	852.72	846.95	844.57	94.46	0.010337	-5.4832
3	22	857.11	852.72	849.35	94.65	0.010358	-5.2245
3	23	861.31	857.11	853.93	94.85	0.010380	-4.9664
3	24	864.31	861.31	857.95	95.04	0.010400	-4.2300
3	25	865.47	864.31	860.95	95.21	0.010419	-3.0401
3	26	862.50	865.47	861.87	95.37	0.010436	-0.4180
3	27	855.03	862.50	859.88	95.50	0.010450	3.2650
3	28	843.72	855.03	854.70	95.62	0.010464	7.3917
3	29	827.34	843.72	845.65	95.72	0.010475	12.3217
3	30	804.52	827.34	831.78	95.78	0.010481	18.3469
3	31	775.39	804.52	812.53	95.78	0.010481	24.9941
3	32	740.17	775.39	787.76	95.78	0.010481	32.0284
3	33	701.28	740.17	758.05	95.78	0.010481	38.2028
3	34	661.17	701.28	724.62	95.78	0.010481	42.6961
3	35	622.61	661.17	689.23	95.78	0.010481	44.8349
3	36	585.86	622.61	653.18	95.78	0.010481	45.3043

0.0000	-41.2332	0.000504	0.010837	0.012289
0.0000	-37.7987	0.000504	0.010837	0.012289
0.0000	-34.3920	0.000504	0.010837	0.012289
0.0000	-31.1466	0.000504	0.010837	0.012289
0.0000	-27.8337	0.000504	0.010837	0.012289
0.0000	-24.9538	0.000504	0.010837	0.012289
0.0000	-22.0323	0.000504	0.010837	0.012289
0.0000	-19.0798	0.000504	0.010837	0.012289
0.0000	-16.0936	0.000504	0.010837	0.012289
0.0000	-13.6106	0.000504	0.010837	0.012289
1.7104	-36.9209	0.000940	0.010401	0.012507
1.2564	-33.0807	0.000913	0.010428	0.012494
1.0420	-29.0232	0.000891	0.010450	0.012483
0.9017	-24.9255	0.000871	0.010470	0.012473
0.7923	-20.7559	0.000854	0.010487	0.012464
0.7179	-16.8603	0.000839	0.010502	0.012457

11219

0.6605	-13.2741	0.000825	0.010516	0.012450
0.6462	-10.0343	0.000811	0.010530	0.012443
0.6451	-7.6011	0.000797	0.010544	0.012436
0.6505	-5.0815	0.000783	0.010558	0.012429
0.6705	-2.8052	0.000768	0.010573	0.012421
0.7083	-1.0070	0.000753	0.010588	0.012414
0.7529	0.7522	0.000737	0.010604	0.012406
0.7964	2.1855	0.000720	0.010621	0.012397
0.8369	3.3345	0.000702	0.010639	0.012388
0.8726	4.2716	0.000683	0.010658	0.012379
0.8994	5.3548	0.000664	0.010677	0.012369
0.9171	5.8724	0.000644	0.010697	0.012359
0.9201	5.8404	0.000624	0.010717	0.012349
0.9308	6.4140	0.000604	0.010737	0.012339
0.9979	6.2224	0.000583	0.010758	0.012329
1.0019	5.9704	0.000561	0.010780	0.012318
0.9572	5.2373	0.000541	0.010800	0.012308
0.8824	3.9225	0.000522	0.010819	0.012296
0.7866	1.2047	0.000505	0.010836	0.012290
0.6622	-2.6027	0.000491	0.010850	0.012283
0.6269	-6.7648	0.000477	0.010864	0.012276
0.5133	-11.8083	0.000466	0.010875	0.012270
0.2883	-18.0586	0.000460	0.010881	0.012267
0.0000	-24.9941	0.000460	0.010881	0.012267
0.0000	-32.0284	0.000460	0.010881	0.012267
0.0000	-38.2028	0.000460	0.010881	0.012267
0.0000	-42.6961	0.000460	0.010881	0.012267
0.0000	-44.8349	0.000460	0.010881	0.012267
0.0000	-45.3043	0.000460	0.010881	0.012267

3	37	550.66	585.86	617.22	95.78	0.010481	44.7942
3	38	517.27	550.66	581.96	95.78	0.010481	43.5324
3	39	486.36	517.27	548.04	95.78	0.010481	41.5137
3	40	457.38	486.36	515.70	95.78	0.010481	39.2530
3	41	430.53	457.38	485.17	95.78	0.010481	36.7723
3	42	405.73	430.53	456.56	95.78	0.010481	34.2046
3	43	383.30	405.73	430.06	95.78	0.010481	31.4672
3	44	362.68	383.30	405.59	95.78	0.010481	28.8819
3	45	344.78	362.68	383.43	95.78	0.010481	26.0135
3	46	328.68	344.78	363.42	95.78	0.010481	23.3776
3	47	314.94	328.68	345.66	95.78	0.010481	20.6689
3	48	302.92	314.94	329.96	95.78	0.010481	18.1991
4	2	917.38	955.00	954.66	91.63	0.010028	25.0868
4	3	899.98	917.38	937.45	92.09	0.010077	25.2146
4	4	883.65	899.98	920.19	92.43	0.010115	24.5955
4	5	869.22	883.65	903.59	92.66	0.010140	23.1342
4	6	856.52	869.22	888.21	92.87	0.010163	21.3292
4	7	846.56	856.52	874.58	93.06	0.010184	18.8541
4	8	838.63	846.56	862.81	93.23	0.010202	16.2743
4	9	832.56	838.63	852.93	93.39	0.010220	13.7066
4	10	828.16	832.56	844.87	93.53	0.010236	11.2450
4	11	824.98	828.16	838.45	93.67	0.010251	9.0664
4	12	822.62	824.98	833.40	93.81	0.010266	7.2599
4	13	822.03	822.62	829.87	93.95	0.010281	5.2795
4	14	823.37	822.03	828.01	94.08	0.010296	3.1217
4	15	825.17	823.37	827.40	94.22	0.010311	1.5005
4	16	827.09	825.17	827.67	94.37	0.010327	0.3852
4	17	830.04	827.09	828.86	94.51	0.010343	-0.7968
4	18	834.00	830.04	831.00	94.67	0.010359	-2.0162
4	19	838.12	834.00	833.83	94.82	0.010376	-2.8905
4	20	842.00	838.12	837.01	94.97	0.010392	-3.3610
4	21	847.43	842.00	840.94	95.12	0.010409	-4.2670
4	22	851.07	847.43	844.76	95.26	0.010424	-4.2456
4	23	855.10	851.07	848.66	95.40	0.010440	-4.3367
4	24	858.48	855.10	852.37	95.54	0.010455	-4.1157
4	25	860.68	858.48	855.54	95.67	0.010470	-3.4614
4	26	860.51	860.68	857.54	95.79	0.010483	-1.9985
4	27	856.52	860.51	857.47	95.90	0.010495	0.6281
4	28	848.57	856.52	854.71	96.01	0.010506	4.1349
4	29	837.04	848.57	848.96	96.11	0.010517	8.0210
4	30	821.05	837.04	839.67	96.19	0.010526	12.9266
4	31	799.27	821.05	826.00	96.23	0.010531	17.9895
4	32	772.12	799.27	807.59	96.23	0.010531	23.8729
4	33	741.06	772.12	784.80	96.23	0.010531	29.4370
4	34	707.70	741.06	758.30	96.23	0.010531	34.0551

0.0000	-44.7942	0.000460	0.010881	0.012267
0.0000	-43.5324	0.000460	0.010881	0.012267
0.0000	-41.5137	0.000460	0.010881	0.012267
0.0000	-39.2530	0.000460	0.010881	0.012267
0.0000	-36.7723	0.000460	0.010881	0.012267
0.0000	-34.2046	0.000460	0.010881	0.012267
0.0000	-31.4672	0.000460	0.010881	0.012267
0.0000	-28.8819	0.000460	0.010881	0.012267
0.0000	-26.0135	0.000460	0.010881	0.012267
0.0000	-23.3776	0.000460	0.010881	0.012267
0.0000	-20.6689	0.000460	0.010881	0.012267
0.0000	-18.1991	0.000460	0.010881	0.012267
2.9396	-22.1492	0.000913	0.010428	0.012494
2.3285	-22.8860	0.000863	0.010477	0.012469
1.7248	-22.8706	0.000826	0.010515	0.012450
1.2025	-21.9316	0.000801	0.010540	0.012438
1.0687	-20.2605	0.000778	0.010563	0.012426
0.9538	-17.9003	0.000757	0.010584	0.012416
0.8634	-15.4109	0.000739	0.010602	0.012407
0.7963	-12.9102	0.000721	0.010620	0.012398
0.7390	-10.5059	0.000706	0.010635	0.012390
0.7069	-8.3574	0.000690	0.010651	0.012382
0.6977	-6.5621	0.000675	0.010666	0.012375
0.6924	-4.5870	0.000660	0.010681	0.012367
0.6989	-2.4223	0.000645	0.010696	0.012360
0.7133	-0.7871	0.000630	0.010711	0.012352
0.7319	0.3466	0.000614	0.010727	0.012344
0.7488	1.5456	0.000598	0.010743	0.012336
0.7667	2.7850	0.000582	0.010759	0.012328
0.7735	3.6641	0.000565	0.010776	0.012320
0.7673	4.1283	0.000549	0.010792	0.012312
0.7527	5.1197	0.000532	0.010809	0.012303
0.7224	4.9680	0.000517	0.010824	0.012296
0.7363	5.0730	0.000501	0.010840	0.012288

0.7163	4.8320	0.000486	0.010855	0.012280
0.6699	4.1313	0.000471	0.010870	0.012273
0.6138	2.6123	0.000458	0.010883	0.012266
0.5450	-0.0931	0.000446	0.010895	0.012260
0.5396	-3.5951	0.000435	0.010906	0.012255
0.5152	-7.5058	0.000424	0.010917	0.012249
0.4174	-12.1092	0.000415	0.010926	0.012245
0.2208	-17.7687	0.000410	0.010931	0.012242
0.0000	-23.8729	0.000410	0.010931	0.012242
0.0000	-29.4370	0.000410	0.010931	0.012242
0.0000	-34.0551	0.000410	0.010931	0.012242

4	35	673.98	707.70	729.20	96.23	0.010531	37.1667
4	36	640.45	673.98	696.44	96.23	0.010531	39.0271
4	37	607.28	640.45	666.69	96.23	0.010531	39.9815
4	38	574.83	607.28	634.55	96.23	0.010531	40.1612
4	39	543.29	574.83	602.45	96.23	0.010531	39.8128
4	40	513.52	543.29	571.00	96.23	0.010531	38.6331
4	41	485.28	513.52	540.54	96.23	0.010531	37.1896
4	42	458.62	485.28	511.28	96.23	0.010531	35.4414
4	43	433.83	458.62	483.50	96.23	0.010531	33.4257
4	44	410.67	433.83	457.26	96.23	0.010531	31.3574
4	45	389.70	410.67	432.83	96.23	0.010531	29.0211
4	46	370.49	389.70	410.20	96.23	0.010531	26.7223
4	47	353.84	370.49	389.67	96.23	0.010531	24.1191
4	48	338.46	353.84	370.97	96.23	0.010531	21.8812
5	2	937.80	955.00	961.48	91.62	0.010026	15.9337
5	3	923.07	937.80	949.92	92.15	0.010084	18.0743
5	4	908.40	923.07	937.14	92.61	0.010134	19.3402
5	5	894.49	908.40	923.76	92.99	0.010176	19.6958
5	6	881.46	894.49	910.26	93.30	0.010210	19.3861
5	7	869.57	881.46	897.11	93.53	0.010235	18.5556
5	8	859.79	869.57	884.98	93.73	0.010257	16.9584
5	9	851.58	859.79	874.12	93.91	0.010276	15.1739
5	10	844.88	851.58	864.63	94.08	0.010295	13.2897
5	11	839.44	844.88	856.47	94.23	0.010312	11.4636
5	12	835.54	839.44	849.72	94.38	0.010328	9.5473
5	13	832.60	835.54	844.29	94.52	0.010343	7.6421
5	14	830.81	832.60	840.02	94.66	0.010358	6.2037
5	15	830.69	830.81	837.19	94.79	0.010373	4.3757
5	16	831.42	830.69	835.57	94.93	0.010388	2.7914
5	17	832.44	831.42	834.84	95.06	0.010402	1.6172
5	18	834.31	832.44	835.00	95.19	0.010417	0.4700
5	19	836.91	834.31	836.00	95.33	0.010432	-0.6140
5	20	839.71	836.91	837.60	95.46	0.010446	-1.4220
5	21	843.63	839.71	839.99	95.58	0.010460	-2.4554
5	22	846.88	843.63	842.65	95.70	0.010473	-2.8482
5	23	850.38	846.88	845.57	95.82	0.010485	-3.2325
5	24	853.62	850.38	848.59	95.92	0.010497	-3.3335
5	25	856.17	853.62	851.43	96.02	0.010508	-3.1904
5	26	857.67	856.17	853.79	96.12	0.010518	-2.6055
5	27	855.85	857.67	854.72	96.20	0.010527	-0.7645
5	28	850.73	855.85	853.58	96.29	0.010537	1.9184
5	29	842.90	850.73	850.18	96.38	0.010547	4.8990
5	30	831.39	842.90	844.00	96.46	0.010556	8.4880
5	31	815.90	831.39	834.60	96.53	0.010564	12.5854
5	32	795.33	815.90	821.29	96.57	0.010567	17.4700
5	33	770.91	795.33	804.06	96.57	0.010567	22.3111
5	34	743.71	770.91	783.38	96.57	0.010567	26.6964
5	35	715.05	743.71	759.89	96.57	0.010567	30.1749
5	36	685.52	715.05	734.23	96.57	0.010567	32.7025
5	37	655.45	685.52	706.94	96.57	0.010567	34.6528
5	38	625.26	655.45	678.53	96.57	0.010567	35.8532
5	39	595.17	625.26	649.41	96.57	0.010567	36.5010

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0.0000	-39.0271	0.000410	0.010931	0.012242
0.0000	-39.9815	0.000410	0.010931	0.012242
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0.0000	-39.8128	0.000410	0.010931	0.012242
0.0000	-38.6831	0.000410	0.010931	0.012242
0.0000	-37.1896	0.000410	0.010931	0.012242
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0.0000	-33.4257	0.000410	0.010931	0.012242
0.0000	-31.3574	0.000410	0.010931	0.012242
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0.0000	-26.7429	0.000410	0.010931	0.012242
0.0000	-24.1191	0.000410	0.010931	0.012242
0.0000	-21.8812	0.000410	0.010931	0.012242
2.8734	-19.0603	0.000915	0.010426	0.012495
2.6945	-15.3796	0.000857	0.010484	0.012466
2.3578	-16.9823	0.000807	0.010534	0.012441
1.9571	-17.7386	0.000765	0.010576	0.012420
1.5472	-17.8388	0.000731	0.010610	0.012403
1.1880	-17.5476	0.000705	0.010635	0.012390
1.0033	-15.9550	0.000684	0.010657	0.012379
0.9211	-14.2527	0.000669	0.010676	0.012370
0.8519	-12.4378	0.000646	0.010695	0.012360
0.7945	-10.6660	0.000629	0.010712	0.012352
0.7454	-8.8019	0.000613	0.010728	0.012344
0.7144	-7.1276	0.000598	0.010743	0.012336
0.7011	-5.5025	0.000583	0.010758	0.012329
0.6902	-3.6855	0.000568	0.010773	0.012321
0.6806	-2.1107	0.000553	0.010788	0.012314
0.6785	-0.9387	0.000539	0.010802	0.012307
0.6790	0.2039	0.000524	0.010817	0.012299
0.6745	1.2585	0.000509	0.010832	0.012292
0.6628	2.0848	0.000495	0.010846	0.012285
0.6448	3.1003	0.000481	0.010860	0.012278
0.6147	3.4629	0.000468	0.010873	0.012271
0.5739	3.6065	0.000456	0.010885	0.012265
0.5436	3.9274	0.000444	0.010897	0.012259
0.5141	3.7046	0.000433	0.010908	0.012254
0.4747	3.0803	0.000423	0.010918	0.012249
0.4386	1.2031	0.000413	0.010927	0.012244
0.4410	-1.4774	0.000404	0.010937	0.012239
0.4540	-4.4450	0.000394	0.010947	0.012234
0.4351	-8.0528	0.000385	0.010956	0.012230
0.3486	-12.2567	0.000377	0.010964	0.012226
0.1759	-17.2940	0.000374	0.010967	0.012224
0.0000	-22.3111	0.000374	0.010967	0.012224
0.0000	-26.6964	0.000374	0.010967	0.012224
0.0000	-30.1749	0.000374	0.010967	0.012224
0.0000	-32.7825	0.000374	0.010967	0.012224
0.0000	-34.6558	0.000374	0.010967	0.012224
0.0000	-35.8552	0.000374	0.010967	0.012224
0.0000	-36.5010	0.000374	0.010967	0.012224

5	40	565.38	595.17	619.92	96.57	0.010567	36.7046
5	41	537.02	565.38	590.69	96.57	0.010567	36.1152
5	42	509.72	537.02	562.00	96.57	0.010567	35.1851
5	43	483.75	509.72	534.15	96.57	0.010567	33.9227
5	44	459.06	483.75	507.31	96.57	0.010567	32.4739
5	45	436.06	459.06	481.73	96.57	0.010567	30.7381
5	46	414.59	436.06	457.54	96.57	0.010567	28.9053
5	47	395.15	414.59	434.97	96.57	0.010567	26.8004
5	48	377.65	395.15	414.17	96.57	0.010567	24.5775
6	2	950.08	955.00	965.23	91.47	0.010010	10.1941
6	3	939.03	950.08	957.63	91.94	0.010061	12.6159
6	4	926.94	939.03	948.52	92.41	0.010113	14.5202
6	5	914.74	926.94	938.28	92.85	0.010161	15.8401
6	6	902.67	914.74	927.28	93.24	0.010204	16.5632
6	7	890.41	902.67	915.71	93.58	0.010240	17.0214
6	8	880.02	890.41	904.37	93.85	0.010271	16.9853
6	9	870.68	880.02	893.56	94.08	0.010295	15.8942
6	10	862.49	870.68	883.51	94.26	0.010315	14.1448
6	11	855.42	862.49	874.43	94.44	0.010334	12.7918
6	12	849.68	855.42	866.44	94.60	0.010352	11.2796
6	13	845.54	849.68	859.73	94.75	0.010368	9.5516
6	14	841.90	845.54	854.04	94.89	0.010384	8.1707
6	15	839.60	841.90	849.46	95.03	0.010399	6.6477
6	16	837.81	839.60	845.86	95.17	0.010414	5.4117
6	17	837.71	837.81	843.42	95.30	0.010429	3.8422
6	18	837.95	837.71	841.88	95.43	0.010443	2.6474
6	19	839.13	837.95	841.26	95.55	0.010456	1.4857
6	20	840.78	839.13	841.41	95.67	0.010469	0.4251
6	21	842.78	840.78	842.18	95.79	0.010482	-0.4047
6	22	845.09	842.78	843.46	95.90	0.010494	-1.0963
6	23	847.73	845.09	845.19	96.00	0.010506	-1.7146
6	24	850.41	847.73	847.21	96.10	0.010516	-2.1508
6	25	852.79	850.41	849.34	96.19	0.010526	-2.3253
6	26	854.57	852.79	851.33	96.27	0.010535	-2.1836
6	27	853.88	854.57	852.39	96.34	0.010543	-1.8013
6	28	851.68	853.88	852.34	96.42	0.010551	0.4460
6	29	846.24	851.68	850.47	96.50	0.010560	2.8463
6	30	838.15	846.24	846.48	96.58	0.010569	5.6054
6	31	826.77	838.15	839.97	96.66	0.010577	8.8810
6	32	811.91	826.77	830.55	96.72	0.010584	12.5480
6	33	793.06	811.91	817.83	96.75	0.010587	16.6723
6	34	771.27	793.06	801.90	96.75	0.010587	20.6169
6	35	747.46	771.27	783.24	96.75	0.010587	24.0764
6	36	722.14	747.46	762.23	96.75	0.010587	26.9832
6	37	695.64	722.14	739.27	96.75	0.010587	29.3595
6	38	668.38	695.64	714.73	96.75	0.010587	31.1968
6	39	640.62	668.38	688.99	96.75	0.010587	32.9511

0.0000	-36.7046	0.000374	0.010967	0.012224
0.0000	-36.1152	0.000374	0.010967	0.012224
0.0000	-35.1851	0.000374	0.010967	0.012224
0.0000	-33.9227	0.000374	0.010967	0.012224
0.0000	-32.4739	0.000374	0.010967	0.012224
0.0000	-30.7381	0.000374	0.010967	0.012224
0.0000	-28.9053	0.000374	0.010967	0.012224
0.0000	-26.8004	0.000374	0.010967	0.012224
0.0000	-24.5775	0.000374	0.010967	0.012224
2.1289	-8.0651	0.000931	0.010410	0.012505
2.3963	-10.1175	0.000880	0.010461	0.012477
2.3994	-12.1208	0.000828	0.010513	0.012451
2.2392	-13.6009	0.000780	0.010561	0.012427
1.9907	-14.5724	0.000737	0.010604	0.012406
1.7032	-15.3181	0.000701	0.010640	0.012388
1.4169	-14.9684	0.000670	0.010671	0.012372
1.1518	-14.2423	0.000646	0.010695	0.012360
0.9367	-13.2081	0.000626	0.010715	0.012350
0.8752	-11.9166	0.000607	0.010734	0.012341
0.8211	-10.4584	0.000589	0.010752	0.012332
0.7729	-8.7787	0.000573	0.010768	0.012323
0.7345	-7.4361	0.000557	0.010784	0.012315
0.7070	-5.9406	0.000542	0.010799	0.012308
0.6862	-4.7254	0.000527	0.010814	0.012301
0.6658	-3.1764	0.000512	0.010829	0.012293
0.6499	-1.9975	0.000498	0.010843	0.012286
0.6349	-0.8038	0.000485	0.010856	0.012280
0.6174	0.1923	0.000472	0.010869	0.012273
0.5965	1.0012	0.000459	0.010882	0.012267
0.5681	1.6645	0.000447	0.010894	0.012260
0.5321	2.2468	0.000435	0.010906	0.012255
0.4888	2.6396	0.000424	0.010916	0.012250
0.4419	2.7673	0.000414	0.010926	0.012245
0.4119	2.9956	0.000406	0.010935	0.012240
0.3818	1.5632	0.000398	0.010943	0.012236
0.3861	-0.0598	0.000390	0.010951	0.012232
0.4014	-2.4448	0.000381	0.010960	0.012228
0.4117	-5.1946	0.000372	0.010969	0.012223
0.3897	-8.4912	0.000364	0.010977	0.012219
0.3066	-12.2413	0.000357	0.010984	0.012216
0.1548	-16.5175	0.000354	0.010987	0.012214
0.0000	-20.6169	0.000354	0.010987	0.012214
0.0000	-24.0764	0.000354	0.010987	0.012214
0.0000	-26.9832	0.000354	0.010987	0.012214
0.0000	-29.3395	0.000354	0.010987	0.012214
0.0000	-31.1968	0.000354	0.010987	0.012214
0.0000	-32.5511	0.000354	0.010987	0.012214

6	40	612.61	640.62	662.35	96.75	0.010587	33.4747
6	41	584.58	612.61	635.11	96.75	0.010587	34.0074
6	42	557.62	584.58	607.85	96.75	0.010587	33.8031
6	43	531.46	557.62	580.86	96.75	0.010587	33.2432
6	44	506.18	531.46	554.36	96.75	0.010587	32.4259
6	45	482.11	506.18	528.62	96.75	0.010587	31.3010
6	46	459.23	482.11	503.79	96.75	0.010587	29.9921
6	47	437.91	459.23	480.13	96.75	0.010587	28.4128
6	48	418.20	437.91	457.81	96.75	0.010587	26.6583
7	2	957.37	955.00	967.32	91.31	0.009992	6.5634
7	3	949.18	957.37	962.13	91.66	0.010051	8.7149
7	4	939.63	949.18	955.62	92.07	0.010075	10.7589
7	5	929.52	939.63	947.93	92.49	0.010122	12.3903
7	6	919.05	929.52	939.27	92.91	0.010167	13.6085
7	7	908.08	919.05	929.75	93.29	0.010209	14.5858
7	8	898.03	908.08	919.04	93.64	0.010247	14.7444
7	9	888.53	898.03	910.12	93.94	0.010280	14.3270
7	10	879.75	888.53	900.52	94.20	0.010308	13.9778
7	11	871.77	879.75	891.35	94.42	0.010332	13.1627
7	12	864.79	871.77	882.83	94.60	0.010352	12.1978
7	13	859.03	864.79	875.20	94.77	0.010370	10.8455
7	14	854.66	859.09	868.62	94.92	0.010387	9.3959
7	15	850.76	854.66	862.93	95.07	0.010403	8.2955
7	16	847.47	850.76	858.04	95.21	0.010419	7.1097
7	17	845.49	847.47	854.11	95.34	0.010433	5.8076
7	18	843.62	845.49	850.88	95.47	0.010448	4.8820
7	19	843.46	843.62	848.68	95.60	0.010461	3.9064
7	20	843.58	843.46	847.25	95.72	0.010474	2.4608
7	21	844.81	843.58	846.72	95.83	0.010487	1.2805
7	22	846.09	844.81	846.79	95.94	0.010499	0.4668
7	23	847.91	846.09	847.43	96.04	0.010510	-0.3170
7	24	849.87	847.91	848.51	96.14	0.010521	-0.9136
7	25	851.75	849.87	849.84	96.23	0.010530	-1.2866
7	26	853.29	851.75	851.22	96.31	0.010539	-1.3924
7	27	852.55	853.29	851.86	96.38	0.010547	-0.4601
7	28	852.32	852.55	852.21	96.45	0.010555	-0.0779
7	29	848.88	852.32	851.26	96.53	0.010563	1.6041
7	30	842.80	848.88	848.58	96.60	0.010572	3.8865
7	31	834.52	842.80	843.99	96.68	0.010580	6.3706
7	32	823.33	834.52	837.14	96.75	0.010588	9.2877
7	33	808.80	823.33	827.61	96.81	0.010594	12.6635
7	34	792.17	808.80	815.58	96.84	0.010597	15.7251
7	35	772.77	792.17	800.93	96.84	0.010597	18.9550
7	36	751.51	772.77	783.98	96.84	0.010597	21.8530
7	37	728.69	751.51	764.98	96.84	0.010597	24.4204

0.0000	-33.4747	0.000354	0.010987	0.012214
0.0000	-34.0074	0.000354	0.010987	0.012214
0.0000	-33.8031	0.000354	0.010987	0.012214
0.0000	-33.2452	0.000354	0.010987	0.012214
0.0000	-32.4259	0.000354	0.010987	0.012214
0.0000	-31.3010	0.000354	0.010987	0.012214
0.0000	-29.9921	0.000354	0.010987	0.012214
0.0000	-28.4128	0.000354	0.010987	0.012214
0.0000	-26.6583	0.000354	0.010987	0.012214
1.2892	-5.2742	0.000949	0.010392	0.012512
1.8058	-6.9091	0.000910	0.010431	0.012492
2.0848	-8.6740	0.000866	0.010475	0.012470
2.1639	-10.2263	0.000819	0.010522	0.012447
2.1084	-11.5001	0.000774	0.010567	0.012424
1.9658	-12.6180	0.000732	0.010609	0.012403
1.7625	-12.9818	0.000694	0.010647	0.012384

1.5413	-12.9857	0.000661	0.010680	0.012368
1.3219	-12.6559	0.000633	0.010708	0.012354
1.1158	-12.0669	0.000609	0.010732	0.012342
0.9341	-11.2037	0.000589	0.010752	0.012332
0.8322	-10.0132	0.000571	0.010770	0.012323
0.7876	-8.6083	0.000554	0.010787	0.012314
0.7490	-7.4465	0.000538	0.010803	0.012306
0.7139	-6.3958	0.000522	0.010819	0.012298
0.6854	-5.1222	0.000508	0.010833	0.012291
0.6596	-4.2223	0.000493	0.010848	0.012284
0.6355	-2.8709	0.000480	0.010861	0.012277
0.6118	-1.8569	0.000467	0.010874	0.012271
0.5866	-0.6939	0.000454	0.010887	0.012264
0.5586	0.0918	0.000442	0.010899	0.012258
0.5263	0.8438	0.000431	0.010910	0.012253
0.4888	1.4025	0.000420	0.010921	0.012247
0.4474	1.7340	0.000411	0.010930	0.012243
0.4053	1.7977	0.000402	0.010939	0.012238
0.3776	0.8377	0.000394	0.010947	0.012234
0.3674	0.4453	0.000386	0.010955	0.012230
0.3752	-1.2288	0.000378	0.010963	0.012226
0.3879	-3.4985	0.000369	0.010972	0.012222
0.3916	-5.9791	0.000361	0.010980	0.012218
0.3637	-8.9239	0.000353	0.010988	0.012214
0.2849	-12.3786	0.000347	0.010994	0.012211
0.1492	-15.6058	0.000344	0.010997	0.012209
0.0000	-18.9950	0.000344	0.010997	0.012209
0.0000	-21.8580	0.000344	0.010997	0.012209
0.0000	-24.4204	0.000344	0.010997	0.012209

7	38	704.66	728.69	744.19	96.84	0.010597	26.5982
7	39	679.69	704.66	721.88	96.84	0.010597	28.3950
7	40	654.02	679.69	698.33	96.84	0.010597	29.8232
7	41	627.89	654.02	673.80	96.84	0.010597	30.8959
7	42	601.49	627.89	648.32	96.84	0.010597	31.6509
7	43	575.95	601.49	623.05	96.84	0.010597	31.6955
7	44	550.87	575.95	597.61	96.84	0.010597	31.4544
7	45	526.54	550.87	572.46	96.84	0.010597	30.9033
7	46	503.04	526.54	547.79	96.84	0.010597	30.1196
7	47	480.67	503.04	523.85	96.84	0.010597	29.0621
7	48	459.52	480.67	500.82	96.84	0.010597	27.7916
8	2	963.09	955.00	968.34	91.18	0.009978	3.0727
8	3	956.14	963.09	965.19	91.42	0.010004	6.0938
8	4	948.82	956.14	960.53	92.75	0.010040	7.8763
8	5	940.72	948.82	954.82	92.12	0.010080	9.4910
8	6	931.99	940.72	948.15	92.51	0.010123	10.8710
8	7	922.53	931.99	940.55	92.90	0.010166	12.0903
8	8	913.44	922.53	932.38	93.27	0.010207	12.7409
8	9	904.43	913.44	923.84	93.62	0.010245	13.0662
8	10	895.74	904.43	915.16	93.93	0.010279	13.0710
8	11	887.50	895.74	906.53	94.21	0.010309	12.8073
8	12	879.94	887.50	898.17	94.45	0.010336	12.2694
8	13	873.27	879.94	890.29	94.67	0.010359	11.4506
8	14	867.62	873.27	883.08	94.85	0.010380	10.4099
8	15	863.16	867.62	876.74	95.01	0.010397	9.1391
8	16	858.76	863.16	871.02	95.16	0.010413	8.2479
8	17	855.31	858.76	866.04	95.30	0.010428	7.2239
8	18	852.27	855.31	861.71	95.43	0.010443	6.3522
8	19	850.45	852.27	858.21	95.56	0.010457	5.2194
8	20	848.70	850.45	855.29	95.68	0.010470	4.4329
8	21	848.91	848.70	853.42	95.80	0.010483	3.0360
8	22	848.90	848.91	852.17	95.91	0.010495	2.1963
8	23	849.13	848.90	851.40	96.01	0.010507	1.5280
8	24	850.93	849.13	851.49	96.11	0.010517	0.3784
8	25	852.01	850.93	851.90	96.20	0.010527	-0.0727
8	26	853.14	852.01	852.53	96.28	0.010536	-0.4055
8	27	852.98	853.14	852.89	96.36	0.010545	-0.0633
8	28	852.87	852.98	853.06	96.43	0.010553	0.1342
8	29	850.73	852.87	852.46	96.50	0.010561	1.1607
8	30	846.83	850.73	850.73	96.58	0.010569	2.6257
8	31	840.29	846.83	847.37	96.65	0.010577	4.7661
8	32	831.90	840.29	842.29	96.73	0.010585	6.9944
8	33	820.74	831.90	835.12	96.80	0.010593	9.6775
8	34	807.54	820.74	825.85	96.85	0.010599	12.3219
8	35	791.82	807.54	814.30	96.88	0.010602	15.1320

0.0000	-26.5982	0.000344	0.010997	0.012209
0.0000	-28.3950	0.000344	0.010997	0.012209
0.0000	-29.8232	0.000344	0.010997	0.012209
0.0000	-30.8959	0.000344	0.010997	0.012209
0.0000	-31.6509	0.000344	0.010997	0.012209
0.0000	-31.6955	0.000344	0.010997	0.012209
0.0000	-31.4544	0.000344	0.010997	0.012209
0.0000	-30.9033	0.000344	0.010997	0.012209
0.0000	-30.1196	0.000344	0.010997	0.012209
0.0000	-29.0621	0.000344	0.010997	0.012209
0.0000	-27.7916	0.000344	0.010997	0.012209
0.6274	-5.2452	0.000963	0.010378	0.012519
1.2321	-4.6617	0.000937	0.010404	0.012506
1.6610	-6.2152	0.000901	0.010440	0.012488
1.8978	-7.5932	0.000861	0.010480	0.012468
1.9963	-8.8746	0.000818	0.010523	0.012446
1.9985	-10.0917	0.000775	0.010566	0.012425
1.9047	-10.8362	0.000734	0.010607	0.012404
1.7632	-11.3029	0.000696	0.010645	0.012385
1.5953	-11.4765	0.000662	0.010679	0.012368
1.4174	-11.3899	0.000632	0.010709	0.012353
1.2424	-11.0269	0.000605	0.010736	0.012340
1.0821	-10.3685	0.000582	0.010759	0.012328
0.9437	-9.4661	0.000561	0.010780	0.012318
0.8172	-8.3218	0.000544	0.010797	0.012309
0.7466	-7.5013	0.000528	0.010813	0.012301
0.7126	-6.5113	0.000513	0.010828	0.012294
0.6803	-5.6713	0.000498	0.010843	0.012286
0.6507	-4.5687	0.000484	0.010857	0.012279
0.6221	-3.8108	0.000471	0.010870	0.012273
0.5935	-2.4425	0.000458	0.010883	0.012266
0.5638	-1.6324	0.000446	0.010895	0.012260
0.5313	-0.9967	0.000434	0.010907	0.012254
0.4971	0.1186	0.000424	0.010917	0.012249

0.4589	0.5317	0.000414	0.010927	0.012244
0.4203	0.8259	0.000405	0.010936	0.012240
0.3957	0.4591	0.000396	0.010945	0.012235
0.3688	0.2346	0.000388	0.010953	0.012231
0.3658	-0.7949	0.000380	0.010961	0.012227
0.3763	-2.2494	0.000372	0.010969	0.012223
0.3850	-4.3811	0.000364	0.010977	0.012219
0.3820	-6.6124	0.000356	0.010985	0.012215
0.3482	-9.3292	0.000348	0.010993	0.012211
0.2745	-12.0474	0.000342	0.010999	0.012208
0.1556	-14.9763	0.000339	0.011002	0.012207

7-30

11223

8	36	774.81	791.32	800.79	96.88	0.010602	17.4830
8	37	755.53	774.81	785.27	96.88	0.010602	20.0124
8	38	734.77	755.53	767.92	96.88	0.010602	22.3035
8	39	712.77	734.77	746.91	96.88	0.010602	24.3251
8	40	689.74	712.77	728.46	96.88	0.010602	26.0623
8	41	665.91	689.74	706.78	96.88	0.010602	27.5064
8	42	641.46	665.91	684.06	96.88	0.010602	28.6665
8	43	616.59	641.46	660.51	96.83	0.010602	29.5563
8	44	592.34	616.59	636.63	96.88	0.010602	29.8029
8	45	568.43	592.34	613.64	96.88	0.010602	29.7568
8	46	544.98	568.43	588.76	96.83	0.010602	29.4597
8	47	522.26	544.98	565.19	96.88	0.010602	28.8915
8	48	500.41	522.26	542.15	96.88	0.010602	28.0908
9	2	965.69	955.00	969.40	91.06	0.009964	2.4952
9	3	960.79	965.69	966.90	91.21	0.009981	4.1141
9	4	955.30	960.79	963.63	91.46	0.010008	5.6068
9	5	948.99	955.30	959.50	91.76	0.010042	7.0740
9	6	941.95	948.99	954.49	92.11	0.010079	8.4378
9	7	934.14	941.95	948.59	92.48	0.010120	9.7230
9	8	926.19	934.14	942.00	92.85	0.010160	10.6372
9	9	918.06	926.19	934.86	93.20	0.010199	11.3062
9	10	909.93	918.06	927.33	93.54	0.010237	11.7086
9	11	901.96	909.93	919.58	93.86	0.010271	11.8623
9	12	894.33	901.96	911.80	94.15	0.010303	11.7564
9	13	887.27	894.33	904.17	94.41	0.010331	11.3791
9	14	880.91	887.27	896.90	94.64	0.010356	10.7641
9	15	875.44	880.91	890.17	94.85	0.010379	9.9089
9	16	870.19	875.44	883.87	95.03	0.010399	9.2080
9	17	866.29	870.19	878.33	95.19	0.010417	8.0990
9	18	862.33	866.29	873.27	95.34	0.010433	7.3628
9	19	859.23	862.33	868.84	95.47	0.010447	6.4665
9	20	856.48	859.23	864.96	95.59	0.010461	5.7139
9	21	854.48	856.48	861.71	95.71	0.010474	4.8627
9	22	853.50	854.48	859.21	95.82	0.010486	3.8427
9	23	853.31	853.50	857.48	95.93	0.010498	2.8043
9	24	853.67	853.31	856.44	96.03	0.010509	1.8860
9	25	853.88	853.67	855.91	96.13	0.010519	1.3016
9	26	853.99	853.88	855.41	96.21	0.010529	0.9583
9	27	853.95	853.99	855.12	96.29	0.010537	0.7918
9	28	853.51	853.95	854.77	96.37	0.010546	0.8489
9	29	851.98	853.51	854.01	96.44	0.010554	1.3640
9	30	849.77	851.98	852.76	96.52	0.010562	2.0073
9	31	845.39	849.77	850.44	96.59	0.010570	3.4022
9	32	838.51	845.39	846.57	96.67	0.010578	5.4304
9	33	829.96	838.51	841.11	96.74	0.010586	7.4993
9	34	819.54	829.96	833.93	96.81	0.010594	9.6618
9	35	806.90	819.54	824.84	96.86	0.010600	12.0748
9	36	792.78	806.90	813.97	96.89	0.010603	14.2593

0.0000	-17.4830	0.000339	0.011002	0.012207
0.0000	-20.0124	0.000339	0.011002	0.012207
0.0000	-22.3035	0.000339	0.011002	0.012207
0.0000	-24.3251	0.000339	0.011002	0.012207
0.0000	-26.0623	0.000339	0.011002	0.012207
0.0000	-27.5064	0.000339	0.011002	0.012207
0.0000	-28.6685	0.000339	0.011002	0.012207
0.0000	-29.5563	0.000339	0.011002	0.012207
0.0000	-29.8029	0.000339	0.011002	0.012207
0.0000	-29.7568	0.000339	0.011002	0.012207
0.0000	-29.4597	0.000339	0.011002	0.012207
0.0000	-28.8915	0.000339	0.011002	0.012207
0.0000	-28.0908	0.000339	0.011002	0.012207
-0.0109	-2.5061	0.000977	0.010364	0.012526
0.7884	-3.3256	0.000960	0.010381	0.012517
1.2564	-4.3504	0.000923	0.010408	0.012504
1.5707	-5.5033	0.000899	0.010442	0.012487
1.7675	-6.6702	0.000862	0.010479	0.012468
1.8779	-7.8451	0.000821	0.010520	0.012448
1.8867	-8.7505	0.000781	0.010560	0.012428
1.8342	-9.4719	0.000742	0.010599	0.012408
1.7371	-9.9715	0.000704	0.010637	0.012389
1.6109	-10.2513	0.000670	0.010671	0.012372
1.4684	-10.2880	0.000638	0.010703	0.012356
1.3213	-10.0578	0.000610	0.010731	0.012342
1.1797	-9.5843	0.000585	0.010756	0.012330
1.0518	-8.8571	0.000562	0.010779	0.012318
0.9325	-8.2754	0.000542	0.010799	0.012308
0.8270	-7.2720	0.000524	0.010817	0.012299
0.7358	-6.6279	0.000508	0.010833	0.012291
0.6679	-5.7985	0.000494	0.010847	0.012284
0.6387	-5.0746	0.000480	0.010861	0.012277
0.6071	-4.2556	0.000467	0.010874	0.012271
0.5771	-3.2656	0.000455	0.010886	0.012265
0.5475	-2.2567	0.000443	0.010898	0.012259
0.5116	-1.3544	0.000432	0.010909	0.012253
0.4768	-0.8248	0.000422	0.010919	0.012248
0.4403	-0.5180	0.000412	0.010929	0.012243
0.4126	-0.3791	0.000404	0.010937	0.012239
0.3846	-0.4623	0.000395	0.010946	0.012235
0.3726	-0.9914	0.000387	0.010954	0.012231
0.3737	-1.6336	0.000379	0.010962	0.012227
0.3836	-3.0187	0.000371	0.010970	0.012223
0.3879	-5.0425	0.000363	0.010978	0.012219
0.3788	-7.1210	0.000354	0.010986	0.012214
0.3425	-9.3592	0.000347	0.010994	0.012211
0.2706	-11.8041	0.000341	0.011000	0.012208
0.1659	-14.0953	0.000338	0.011003	0.012206

9	37	776.53	792.78	801.19	96.90	0.010604	16.5600
9	38	759.47	776.53	786.98	96.90	0.010604	16.4485
9	39	740.42	759.47	770.92	96.90	0.010604	20.5256
9	40	720.13	740.42	753.42	96.90	0.010604	22.4093
9	41	698.79	720.13	734.56	96.90	0.010604	24.0730
9	42	676.57	698.79	714.47	96.90	0.010604	25.5088
9	43	653.66	676.57	693.35	96.90	0.010604	26.7136
9	44	630.17	653.66	671.33	96.90	0.010604	27.6934
9	45	607.19	630.17	648.90	96.90	0.010604	28.0661
9	46	584.35	607.19	626.24	96.90	0.010604	28.1926
9	47	561.87	584.35	603.56	96.90	0.010604	28.1603
9	48	539.91	561.87	581.06	96.90	0.010604	27.6918
10	2	967.22	985.00	969.75	90.99	0.009957	1.7308
10	3	964.55	967.22	968.22	91.08	0.009967	2.4675
10	4	959.87	964.55	965.85	91.24	0.009985	4.3250
10	5	955.06	959.87	962.83	91.43	0.010011	5.2293
10	6	949.50	955.06	959.09	91.77	0.010042	6.4498
10	7	943.18	949.50	954.57	92.09	0.010078	7.6827
10	8	936.49	943.18	949.36	92.43	0.010115	8.6619
10	9	929.42	936.49	943.54	92.78	0.010153	9.5017
10	10	922.14	929.42	937.21	93.12	0.010190	10.1462
10	11	914.76	922.14	930.50	93.45	0.010227	10.5905
10	12	907.46	914.76	923.53	93.76	0.010261	10.8141
10	13	900.44	907.46	916.49	94.06	0.010293	10.7083
10	14	893.84	900.44	909.52	94.22	0.010322	10.5556
10	15	887.84	893.84	902.82	94.56	0.010348	10.0787
10	16	882.05	887.84	896.36	94.78	0.010372	9.6258
10	17	877.00	882.05	890.62	94.98	0.010394	8.5600
10	18	872.61	877.00	884.98	95.18	0.010413	8.3222
10	19	869.15	872.61	880.02	95.32	0.010431	7.3179
10	20	865.59	869.15	875.50	95.46	0.010447	6.6708
10	21	862.60	865.59	871.46	95.60	0.010461	5.9652
10	22	860.41	862.60	868.02	95.72	0.010474	5.1215
10	23	858.33	860.41	865.03	95.83	0.010487	4.4780
10	24	856.24	858.33	862.09	95.94	0.010498	3.8078
10	25	854.08	856.24	861.24	96.03	0.010509	2.7973
10	26	856.97	857.08	860.02	96.12	0.010519	2.0539
10	27	856.74	856.97	859.12	96.21	0.010528	1.6051
10	28	855.37	856.74	858.05	96.29	0.010537	1.3099
10	29	854.01	855.37	856.37	96.37	0.010545	1.9288
10	30	852.05	854.01	855.42	96.44	0.010553	2.2705
10	31	849.42	852.05	853.57	96.51	0.010562	2.7965
10	32	843.88	849.42	850.47	96.59	0.010570	4.4324
10	33	837.30	843.88	846.18	96.67	0.010578	5.9814
10	34	829.07	837.30	840.54	96.74	0.010587	7.7223

0.0256	-16.5343	0.000337	0.011004	0.012206
0.0000	-18.4485	0.000337	0.011004	0.012206
0.0000	-20.5256	0.000337	0.011004	0.012206
0.0000	-22.4093	0.000337	0.011004	0.012206
0.0000	-24.0730	0.000337	0.011004	0.012206
0.0000	-25.5088	0.000337	0.011004	0.012206
0.0000	-26.7106	0.000337	0.011004	0.012206
0.0000	-27.6984	0.000337	0.011004	0.012206
0.0000	-28.0661	0.000337	0.011004	0.012206
0.0000	-28.1926	0.000337	0.011004	0.012206
0.0000	-28.0602	0.000337	0.011004	0.012206
0.0000	-27.6918	0.000337	0.011004	0.012206
-0.3340	-2.0349	0.000954	0.010357	0.012579
0.4309	-2.0367	0.000977	0.010367	0.012574
0.8607	-2.1642	0.000956	0.010389	0.012515
1.2124	-4.0169	0.000930	0.010411	0.012502
1.4060	-4.9837	0.000899	0.010442	0.012487
1.6489	-6.0148	0.000863	0.010478	0.012469
1.7411	-6.9208	0.000826	0.010515	0.012450
1.7715	-7.7302	0.000788	0.010553	0.012431
1.7497	-8.3965	0.000751	0.010590	0.012413
1.6877	-8.9028	0.000714	0.010627	0.012394
1.5953	-9.2188	0.000680	0.010661	0.012377
1.4826	-9.3156	0.000646	0.010693	0.012361
1.3602	-9.1955	0.000619	0.010722	0.012347
1.2365	-8.8421	0.000593	0.010748	0.012334
1.1181	-8.5087	0.000569	0.010772	0.012322
1.0080	-7.5519	0.000547	0.010794	0.012311
0.9079	-7.4143	0.000528	0.010813	0.012301
0.8174	-6.9005	0.000510	0.010831	0.012292
0.7377	-5.9331	0.000494	0.010847	0.012284
0.6703	-5.2929	0.000480	0.010861	0.012277
0.6164	-4.5050	0.000467	0.010874	0.012271
0.5742	-3.9017	0.000454	0.010887	0.012264
0.5355	-2.6673	0.000443	0.010898	0.012259
0.5008	-2.2964	0.000432	0.010909	0.012253
0.4662	-1.5876	0.000422	0.010919	0.012248
0.4337	-1.1714	0.000413	0.010928	0.012244
0.4038	-1.3991	0.000404	0.010937	0.012239
0.3875	-1.5413	0.000398	0.010945	0.012235
0.3767	-1.8938	0.000388	0.010953	0.012231
0.3808	-2.4156	0.000379	0.010962	0.012227
0.3890	-4.0433	0.000371	0.010970	0.012223
0.3911	-5.5892	0.000363	0.010978	0.012219
0.3779	-7.3444	0.000354	0.010987	0.012214

10	35	818.94	829.07	833.35	96.81	0.010594	9.6986
10	36	807.33	818.94	824.61	96.86	0.010600	11.6284
10	37	793.83	807.33	814.18	96.90	0.010604	13.6937
10	38	779.18	793.83	802.23	96.91	0.010605	15.8119
10	39	762.76	779.18	788.70	96.91	0.010605	17.9454
10	40	745.04	762.76	773.70	96.91	0.010605	19.2009
10	41	726.78	745.04	757.55	96.91	0.010605	20.7043
10	42	706.94	726.78	740.05	96.91	0.010605	22.3046
10	43	686.19	706.94	721.43	96.91	0.010605	23.7211
10	44	664.04	686.19	701.52	96.91	0.010605	25.2222
10	45	642.40	664.04	680.94	96.91	0.010605	25.9341
10	46	620.60	642.40	659.87	96.91	0.010605	26.4267
10	47	598.85	620.60	638.49	96.91	0.010605	26.6776
10	48	577.30	598.85	616.97	96.91	0.010605	26.1093
11	2	968.12	955.30	969.95	90.95	0.009953	1.2250
11	3	966.74	968.12	968.90	90.96	0.009954	1.4555
11	4	963.01	966.74	967.21	91.08	0.009966	2.0240
11	5	960.12	963.01	965.29	91.26	0.009986	2.4430
11	6	955.17	960.12	962.47	91.48	0.010011	4.9157
11	7	950.17	955.17	959.03	91.75	0.010041	5.9647
11	8	944.67	950.17	954.97	92.05	0.010074	6.9316
11	9	938.70	944.67	950.31	92.37	0.010108	7.0148

11	10	932.37	938.70	945.11	92.70	0.010144	8.0707
11	11	925.79	932.37	939.44	93.02	0.010180	9.1930
11	12	919.08	925.79	933.40	93.34	0.010215	9.1370
11	13	912.42	919.08	927.12	93.65	0.010248	9.0895
11	14	905.94	912.42	920.71	93.94	0.010280	9.0445
11	15	899.80	905.94	914.34	94.21	0.010309	9.7887
11	16	893.80	899.80	908.04	94.45	0.010336	9.0872
11	17	888.89	893.80	902.15	94.68	0.010361	8.9259
11	18	883.35	888.89	896.33	94.89	0.010384	8.7326
11	19	879.65	883.35	891.17	95.08	0.010405	7.7813
11	20	875.53	879.65	886.31	95.25	0.010423	7.2550
11	21	871.81	875.53	881.30	95.41	0.010440	6.7291
11	22	868.69	871.81	877.72	95.53	0.010456	6.0778
11	23	865.87	868.69	874.03	95.68	0.010470	5.4997
11	24	863.66	865.87	870.82	95.80	0.010483	4.8169
11	25	861.83	863.66	868.05	95.91	0.010496	4.1874
11	26	861.60	861.83	866.12	96.01	0.010507	3.4483
11	27	859.92	861.60	864.26	96.11	0.010517	2.9181
11	28	858.40	859.92	862.49	96.19	0.010526	2.7533
11	29	856.88	858.40	860.79	96.27	0.010535	2.6117
11	30	854.92	856.88	858.99	96.35	0.010544	2.4409
11	31	853.18	854.92	857.21	96.42	0.010552	2.7104
11	32	849.25	853.18	854.70	96.50	0.010560	3.6672

0.3403	-9.3583	0.000347	0.010994	0.012211
0.2743	-11.3540	0.000341	0.011000	0.012208
0.1759	-13.5177	0.000337	0.011004	0.012206
0.0524	-15.4589	0.000336	0.011005	0.012205
0.0000	-17.4554	0.000336	0.011005	0.012205
0.0000	-19.2889	0.000336	0.011005	0.012205
0.0000	-20.7043	0.000336	0.011005	0.012205
0.0000	-22.3046	0.000336	0.011005	0.012205
0.0000	-23.7211	0.000336	0.011005	0.012205
0.0000	-25.2222	0.000336	0.011005	0.012205
0.0000	-25.9341	0.000336	0.011005	0.012205
0.0000	-26.4267	0.000336	0.011005	0.012205
0.0000	-26.6776	0.000336	0.011005	0.012205
0.0000	-26.6993	0.000336	0.011005	0.012205
-0.5351	-1.7656	0.000988	0.010353	0.012531
0.0572	-1.3996	0.000987	0.010354	0.012531
0.5710	-2.2529	0.000975	0.010366	0.012525
0.9290	-2.5559	0.000952	0.010386	0.012515
1.1618	-3.7539	0.000930	0.010411	0.012502
1.3823	-4.5823	0.000900	0.010441	0.012487
1.5284	-5.4031	0.000867	0.010474	0.012471
1.6214	-6.1934	0.000833	0.010508	0.012454

11225

1.6646	-6.9090	0.000797	0.010544	0.012436
1.6650	-7.5249	0.000761	0.010580	0.012418
1.6284	-8.0085	0.000726	0.010615	0.012400
1.5617	-8.3278	0.000693	0.010648	0.012384
1.4737	-8.4709	0.000661	0.010680	0.012368
1.3720	-8.4166	0.000632	0.010709	0.012353
1.2684	-8.3158	0.000605	0.010736	0.012340
1.1582	-7.7656	0.000580	0.010761	0.012327
1.0634	-7.6732	0.000557	0.010784	0.012316
0.9645	-6.7868	0.000536	0.010805	0.012305
0.8766	-6.3784	0.000518	0.010823	0.012296
0.7968	-5.9262	0.000501	0.010840	0.012287
0.7263	-5.3515	0.000485	0.010856	0.012280
0.6632	-4.8304	0.000471	0.010870	0.012273
0.6117	-4.2051	0.000458	0.010883	0.012266
0.5624	-3.6250	0.000445	0.010896	0.012260
0.5189	-2.5244	0.000434	0.010907	0.012254
0.4792	-2.4388	0.000424	0.010917	0.012249
0.4428	-2.3105	0.000414	0.010926	0.012244
0.4099	-2.2217	0.000406	0.010935	0.012240
0.3883	-2.3525	0.000397	0.010944	0.012236
0.3829	-2.3274	0.000389	0.010952	0.012232
0.3913	-3.2758	0.000381	0.010960	0.012228

11	33	843.52	849.25	851.09	96.58	0.010569	5.0970
11	34	836.96	843.52	846.48	96.66	0.010577	6.4094
11	35	828.80	836.96	840.65	96.73	0.010585	7.5757
11	36	819.27	828.80	833.53	96.80	0.010593	9.0995
11	37	808.07	819.27	824.99	96.85	0.010599	11.2817
11	38	795.65	808.07	815.06	96.89	0.010603	13.0640
11	39	781.59	795.65	803.64	96.91	0.010605	14.8402
11	40	766.21	781.59	790.31	96.91	0.010605	16.6595
11	41	750.02	766.21	776.80	96.91	0.010605	18.0246
11	42	732.41	750.02	761.53	96.91	0.010605	19.5958
11	43	713.79	732.41	745.06	96.91	0.010605	21.0467
11	44	693.87	713.79	727.36	96.91	0.010605	22.5384
11	45	673.86	693.87	708.81	96.91	0.010605	23.5238
11	46	653.43	673.86	689.56	96.91	0.010605	24.3140
11	47	632.78	653.43	669.75	96.91	0.010605	24.8859
11	48	612.06	632.78	649.57	96.91	0.010605	25.2441
12	2	968.65	958.00	970.07	90.93	0.009950	0.9538
12	3	967.60	968.65	969.14	90.89	0.009946	1.0407
12	4	968.63	967.60	968.15	90.96	0.009954	1.6910
12	5	963.50	965.63	966.88	91.08	0.009967	2.2750
12	6	959.34	963.50	964.80	91.25	0.009986	3.0710
12	7	955.47	959.34	962.23	91.47	0.010010	4.5474
12	8	951.04	955.47	959.12	91.73	0.010038	5.4333
12	9	946.12	951.04	955.46	92.00	0.010068	6.2881
12	10	940.76	946.12	951.28	92.30	0.010101	7.0701
12	11	935.05	940.76	946.61	92.61	0.010134	7.7749
12	12	929.09	935.05	941.50	92.92	0.010168	8.3551
12	13	922.99	929.09	936.05	93.22	0.010201	8.7096
12	14	916.89	922.99	930.36	93.52	0.010234	9.0852
12	15	910.92	916.89	924.53	93.80	0.010265	9.1629
12	16	904.97	910.92	918.62	94.07	0.010294	9.1849
12	17	899.72	904.97	912.88	94.32	0.010322	8.8554
12	18	894.09	899.72	907.13	94.55	0.010347	8.7737
12	19	890.30	894.09	901.99	94.77	0.010371	7.0661
12	20	885.15	890.30	896.80	94.96	0.010392	7.8398
12	21	881.50	885.15	892.08	95.15	0.010412	7.1252
12	22	877.79	881.50	887.67	95.31	0.010430	6.6472
12	23	874.35	877.79	883.54	95.46	0.010446	6.18[illegible]
12	24	871.38	874.35	879.77	95.60	0.010462	5.6512
12	25	868.78	871.38	876.37	95.73	0.010476	5.1066
12	26	866.66	868.78	873.38	95.84	0.010488	4.5171
12	27	864.49	866.66	870.63	95.95	0.010500	4.1365
12	28	862.57	864.49	868.15	96.05	0.010511	3.7559
12	29	860.70	862.57	865.85	96.14	0.010521	3.4672
12	30	858.55	860.70	863.59	96.22	0.010530	3.3896

0.3958	-4.7012	0.000372	0.010969	0.012223
0.3948	-6.0142	0.000364	0.010977	0.012219
0.3795	-7.5962	0.000356	0.010985	0.012215
0.3430	-9.2565	0.000348	0.010993	0.012211
0.2601	-11.1015	0.000342	0.010999	0.012208
0.1918	-12.8722	0.000338	0.011003	0.012206
0.0756	-14.7646	0.000336	0.011005	0.012205
0.0000	-16.5595	0.000336	0.011005	0.012205
0.0000	-18.0246	0.000336	0.011005	0.012205
0.0000	-19.5958	0.000336	0.011005	0.012205
0.0000	-21.0467	0.000336	0.011005	0.012205
0.0000	-22.5584	0.000336	0.011005	0.012205
0.0000	-23.5238	0.000336	0.011005	0.012205
0.0000	-24.3140	0.000336	0.011005	0.012205
0.0000	-24.8859	0.000336	0.011005	0.012205
0.0000	-25.2441	0.000336	0.011005	0.012205
-0.6569	-1.6108	0.000991	0.010350	0.012533
-0.1912	-1.2320	0.000995	0.010346	0.012535
0.3657	-1.3253	0.000987	0.010354	0.012531
0.5838	-1.6911	0.000974	0.010367	0.012524
0.9005	-2.7706	0.000955	0.010386	0.012515
1.1226	-3.4248	0.000931	0.010410	0.012503
1.2935	-4.1397	0.000903	0.010438	0.012489
1.4243	-4.8637	0.000873	0.010468	0.012474
1.5144	-5.5617	0.000840	0.010501	0.012457
1.5660	-6.2088	0.000807	0.010534	0.012441
1.5809	-6.7741	0.000773	0.010568	0.012424
1.5624	-7.2272	0.000740	0.010601	0.012407
1.5162	-7.5489	0.000707	0.010634	0.012391
1.4479	-7.7150	0.000676	0.010665	0.012375
1.3701	-7.8148	0.000647	0.010694	0.012361
1.2734	-7.5819	0.000619	0.010722	0.012347
1.1885	-7.5902	0.000594	0.010747	0.012334
1.0913	-6.7743	0.000570	0.010771	0.012322
1.0020	-6.8377	0.000549	0.010792	0.012312
0.9206	-6.2026	0.000529	0.010812	0.012302
0.8425	-5.8047	0.000511	0.010830	0.012293
0.7710	-5.4179	0.000494	0.010846	0.012284
0.7056	-4.9455	0.000479	0.010862	0.012277
0.6466	-4.4599	0.000465	0.010875	0.012270

0.5914	-3.9256	0.000453	0.010888	0.012264
0.5445	-3.5920	0.000441	0.010900	0.012258
0.5021	-3.2537	0.000430	0.010911	0.012252
0.4639	-3.0032	0.000420	0.010921	0.012247
0.4297	-2.9599	0.000411	0.010930	0.012243

12	31	856.67	858.55	861.44	96.30	0.010538	3.2076
12	32	854.06	856.67	859.13	96.38	0.010547	3.4125
12	33	849.76	854.06	856.15	96.46	0.010556	4.3008
12	34	843.83	849.76	852.16	96.54	0.010564	5.6094
12	35	837.17	843.83	847.26	96.62	0.010573	6.7914
12	36	829.30	837.17	841.34	96.70	0.010581	8.1026
12	37	820.00	829.30	834.24	96.76	0.010589	9.5849
12	38	809.50	820.00	825.95	96.82	0.010595	11.0681
12	39	797.54	809.50	816.35	96.86	0.010600	12.6594
12	40	784.26	797.54	805.42	96.88	0.010602	14.2397
12	41	770.02	784.26	793.29	96.88	0.010602	15.6615
12	42	754.47	770.02	779.97	96.88	0.010602	17.1535
12	43	737.88	754.47	765.49	96.88	0.010602	18.5512
12	44	720.06	737.88	749.83	96.88	0.010602	20.0333
12	45	701.78	720.06	733.23	96.88	0.010602	21.4641
12	46	682.90	701.78	715.80	96.88	0.010602	22.1393
12	47	663.58	682.90	697.66	96.88	0.010602	22.9936
12	48	643.98	663.58	678.96	96.88	0.010602	23.5433

0.3982	-2.8093	0.000403	0.010938	0.012233
0.3971	-3.0154	0.000394	0.010947	0.012234
0.4051	-3.8957	0.000385	0.010956	0.012235
0.4075	-5.2018	0.000377	0.010964	0.012225
0.4042	-6.3872	0.000368	0.010973	0.012221
0.3871	-7.7144	0.000359	0.010981	0.012217
0.3507	-9.2342	0.000352	0.010989	0.012213
0.2921	-10.7759	0.000346	0.010995	0.012210
0.2084	-12.4510	0.000341	0.011000	0.012208
0.1005	-14.1591	0.000339	0.011002	0.012207
0.0000	-15.6615	0.000339	0.011002	0.012207
0.0000	-17.1555	0.000339	0.011002	0.012207
0.0000	-18.5812	0.000339	0.011002	0.012207
0.0000	-20.0333	0.000339	0.011002	0.012207
0.0000	-21.1641	0.000339	0.011002	0.012207
0.0000	-22.1393	0.000339	0.011002	0.012207
0.0000	-22.9336	0.000339	0.011002	0.012207
0.0000	-23.5433	0.000339	0.011002	0.012207

```
// JOB
// FOR
*IOCS(CARD,TYPEWRITER,1132PRINTER,DISK)
*ONE WORD INTEGERS
*ARITHMETIC TRACE
*TRANSFER TRACE
*LIST ALL
      DIMENSION TS(12, 48), TG(12, 48), XSO2(12,48)
      SHSO2 (TEMP) = 0.4474E01 + 0.2041E-01*TEMP - 0.1743E-04* TEMP**2
     1    + 0.5463E-08 *  TEMP**3 + 0.3933E05 /  TEMP **2
      SHO2(TEMP) = 0.4399E01 + 0.7395E-02 * TEMP - 0.5454E-05 * TEMP**2
     1  + 0.1399E-08 *  TEMP**3 + 0.7069E05 /  TEMP**2
      SHSO3(TEMP) = 0.4638E01 + 0.3266E-01 * TEMP - 0.2792E-04 * TEMP**2
     1      + 0.8782E-08 *  TEMP**3 - 0.1936E04 /  TEMP**2
      SHN2(TEMP) = 0.7543E01 - 0.34E-02 * TEMP + 0.636E-05 * TEMP**2
     1  -0.2702E-08 *  TEMP**3 - 0.3913E04 /  TEMP**2
      READ (2,5) WSO2, WO2, WN2, WS, WSO3, TTOL, ML, IL
    5 FORMAT (5F10.6, F5.2, 2I4)
      WRITE(3,5) WSO2, WO2, WN2, WS, WSO3, TTOL, ML, IL
      FSO2      = WSO2 / 64.0628
      FO2       = WO2 / 31.9988
      FN2 = WN2 / 28.0134
      FS = WS/60.0848
      FSO3 = WSO3 / 80.0622
      FSO3      = FSO3      + 0.0004
      FSO2      = FSO2      - 0.0004
      FSO2I = FSO2
      FO2 = FO2 - 0.0002
      HTCON = 0.673
      I = 1
      DO 111 M = 1,12
  111 TG(M,I) = 971.28
      DO 112 M = 1,12
  112 TS(M,I) = 955.
      M = 1
      READ (2,30)  (TS(M,I), I = 2, 48)
   30 FORMAT (8F8.2/8F8.2/8F8.2/8F8.2/8F8.2/7F8.2)
      WRITE(3,30)  (TS(M,I), I = 2, 48)
      WRITE ( 3, 25)
   25 FORMAT  ('     M     I TS(M,I) TS(M,I-1) TG(M,I) XSO2(M,I)  SUMDF
     1  QS          QEVOL       QG        FSO2     FSO3       FO2')
      DO 35 I = 2, 48
   35 TS(M,I) = TS(M,I) - 250.
      DO 200 M = 2, 12
      SUMDF = 0.009965
      FSO2 = 0.000977
      FSO3 = 0.010365
```

```
      FO2 = 0.012526
      DO 200 I = 2, IL
      TS(M,I)=TS(M,I-1)
      TSAV =  (TS(M,I) + TS(M-1, I))/2.
  141 TCSAV = (TSAV - 32.) / 1.8
      TKSAV = TCSAV + 273.16
      FTOT = FSO2 + FO2 + FSO3 + FN2
      XLNKP = 22600. / (1.98719 * TKSAV) - 21.36 / 1.98719
      XKP = EXP (XLNKP)
      PSO2 = FSO2       / FTOT
      PO2 = FO2         / FTOT
      PSO3 = FSO3       / FTOT
      PN2 = FN2 / FTOT
      PTOT = PSO2 + PO2 + PSO3 + PN2
      TERM1 = SQRT (PSO2 / PSO3)
      DENOM = PSO2 * XKP


      TERM3 = (PSO3 / DENOM)**2
      PTERM = TERM1 * (PO2 - TERM3)
      IF (TKSAV - 680.) 610, 610, 620
  610 RATEK = 0.
      GO TO 650
  620 IF (TKSAV - 730.2355) 630, 630, 640
  630 RATEK = 1.56E-07 * TKSAV - 1.06E-04
      GO TO 650
  640 RATEK = 4.874E-07 * TKSAV - 3.48E-04
  650 RXRAT = RATEK * PTERM
      DFSO2 = RXRAT * 60. * WS
C     HEAT BALANCE
      IF (TKSAV - 848.) 150, 150, 155
  150 SHS = 11.22 + 8.20E-03*TKSAV - 2.70E+05 / TKSAV**2
      GO TO 160
  155 SHS = 14.41 + 2.04E-03 * TKSAV
  160 QRX = (3.3 * TKSAV + 44140.)
      QEVOL = QRX * DFSO2
      QS = FS * SHS * (TS(M,I) - TS(M-1,I))
      QG = QEVOL - QS
      TGIN = TG(M,I-1)
      CPGAS = SHSO2(TGIN)  * FSO2 + SHO2(TGIN)  * FO2 + SHSO3(TGIN) *
     1 FSO3 + SHN2(TGIN)  * FN2
      TG(M,I) = QG / CPGAS + TG(M,I-1)
      TS1  =-QS / HTCON +TG(M,I)
```

```
      DELTA = ABS (TS1       - TS(M,I))
      IF (DELTA -TTOL) 190, 190, 170
  170 TS2= (TS1       + TS(M,I)) / 2.
      TS(M,I) = TS2
      TSAV = (TS2+ TS(M-1, I)) / 2.
      GO TO 141
  190 TS(M,I) = TS1
      SUMDF = SUMDF + DFSO2
      DFSO3 = DFSO2
      DFO2 = DFSO2 / 2.
      FSO2       = FSO2       - DFSO2
      FSO3       = FSO3       + DFSO3
      FO2        = FO2        - DFO2
      XAV = DFSO2 / FSO2
      XSO2(M,I) = 100. * SUMDF / FSO2I
      WRITE(3,196)M, I, TS(M,I), TS(M,I-1), TG(M,I), XSO2(M,I), SUMDF,
     1 QS, QEVOL, QG, FSO2, FSO3, FO2
  196 FORMAT (2I5, 4F8.2, F12.6, 3F10.4, 3F11.6)
      SMDF1 = 0.0
  200 CONTINUE
      CALL EXIT
      END
```

```
// XEQ
```

```
 0.726667  0.566667  3.716667  2.816667  0.000000 0.75   12   48
 959.13   963.68   967.40   972.69   976.66   982.18   986.95   992.80
 998.24  1004.43  1010.40  1017.47  1023.82  1030.67  1037.20  1043.64
1050.07  1056.22  1061.52  1066.79  1071.61  1075.52  1075.47  1071.41
1060.19  1043.41  1019.19   986.57   945.56   895.97   838.74   780.64
 726.92   682.92   646.08   614.28   586.84   562.31   540.23   520.89
 503.79   488.93   476.15   466.10   458.72   454.06   450.00
```

M	I	TS(M,I)	TS(M,I-1)	TG(M,I)	XSO2(M,I)	SUMDF	GS
2	2	806.59	955.00	916.03	91.06	0.009965	73.6515
2	3	788.88	806.59	873.10	91.06	0.009965	56.6768
2	4	774.69	788.88	839.68	91.06	0.009965	43.7417
2	5	765.74	774.69	814.46	91.06	0.009965	32.7895
2	6	758.94	765.74	795.45	91.06	0.009965	24.5754
2	7	755.81	758.94	781.85	91.06	0.009965	17.5208
2	8	753.69	755.81	772.16	91.06	0.009965	12.4297
2	9	753.49	753.69	765.73	91.06	0.009965	8.2370
2	10	754.94	753.49	762.01	91.06	0.009965	4.7587
2	11	757.03	754.94	760.29	91.06	0.009965	2.1044
2	12	760.09	757.03	760.22	91.06	0.009965	0.0901
2	13	764.45	760.09	761.70	91.07	0.009966	-1.8450
2	14	769.02	764.45	764.30	91.09	0.009968	-3.1756
2	15	774.27	769.02	767.86	91.14	0.009974	-4.3172
2	16	780.40	774.27	772.35	91.21	0.009981	-5.4133
2	17	785.52	780.40	777.11	91.29	0.009990	-5.6597
2	18	792.03	785.52	782.51	91.39	0.010001	-5.4077
2	19	797.93	792.03	788.13	91.51	0.010014	-6.5906
2	20	802.73	797.93	793.50	91.65	0.010029	-6.2151
2	21	808.71	802.73	799.11	91.80	0.010046	-6.4624
2	22	813.22	808.71	804.37	91.96	0.010064	-5.9534
2	23	817.64	813.22	809.37	92.13	0.010082	-5.5693
2	24	819.66	817.64	813.33	92.31	0.010101	-4.2562
2	25	818.47	819.66	815.51	92.47	0.010119	-1.9913
2	26	812.12	818.47	814.70	92.60	0.010134	1.7377
2	27	800.99	812.12	810.26	92.70	0.010144	6.2389
2	28	784.49	800.99	801.53	92.74	0.010148	11.4678
2	29	760.79	784.49	787.56	92.74	0.010148	18.0179
2	30	730.04	760.79	767.79	92.74	0.010148	25.4094
2	31	691.96	730.04	741.66	92.74	0.010148	33.4470
2	32	647.00	691.96	708.91	92.74	0.010148	41.6608
2	33	599.25	647.00	670.77	92.74	0.010148	48.1257
2	34	552.28	599.25	629.32	92.74	0.010148	51.8449
2	35	509.96	552.28	587.29	92.74	0.010148	52.0404
2	36	471.22	509.96	546.14	92.74	0.010148	50.4200
2	37	436.40	471.22	506.99	92.74	0.010148	47.5025
2	38	404.87	436.40	470.33	92.74	0.010148	44.0517

QEVOL	QG	FSO2	FSO3	FO2
0.0000	-73.6515	0.000977	0.010365	0.012526
0.0000	-56.6768	0.000977	0.010365	0.012526
0.0000	-43.7417	0.000977	0.010365	0.012526
0.0000	-32.7895	0.000977	0.010365	0.012526
0.0000	-24.5754	0.000977	0.010365	0.012526
0.0000	-17.5208	0.000977	0.010365	0.012526
0.0000	-12.4297	0.000977	0.010365	0.012526
0.0000	-8.2370	0.000977	0.010365	0.012526
0.0000	-4.7587	0.000977	0.010365	0.012526
0.0000	-2.1944	0.000977	0.010365	0.012526
0.0000	-0.0901	0.000977	0.010365	0.012526
0.0474	1.8924	0.000975	0.010366	0.012525
0.1377	3.3134	0.000973	0.010368	0.012524
0.2376	4.5548	0.000967	0.010374	0.012521
0.3314	5.7468	0.000960	0.010381	0.012517
0.4311	6.0909	0.000951	0.010390	0.012513
0.5230	6.9307	0.000940	0.010401	0.012507
0.6131	7.2098	0.000927	0.010414	0.012500
0.6923	6.9075	0.000912	0.010429	0.012493
0.7610	7.2235	0.000895	0.010446	0.012485
0.8262	6.7797	0.000877	0.010464	0.012476
0.8728	6.4421	0.000859	0.010482	0.012467
0.8705	5.1268	0.000840	0.010501	0.012457
0.8227	2.8141	0.000822	0.010519	0.012448
0.6927	-1.0449	0.000807	0.010534	0.012441
0.4935	-5.7454	0.000797	0.010544	0.012436
0.1938	-11.2739	0.000793	0.010548	0.012434
0.0000	-18.0179	0.000793	0.010548	0.012434
0.0000	-25.4094	0.000793	0.010548	0.012434
0.0000	-33.4470	0.000793	0.010548	0.012434
0.0000	-41.6608	0.000793	0.010548	0.012434
0.0000	-48.1357	0.000793	0.010548	0.012434
0.0000	-51.8449	0.000793	0.010548	0.012434
0.0000	-52.0404	0.000793	0.010548	0.012434
0.0000	-50.4200	0.000793	0.010548	0.012434
0.0000	-47.5025	0.000793	0.010548	0.012434
0.0000	-44.0517	0.000793	0.010548	0.012434

2	39	375.99	404.87	436.27	92.74	0.010148	40.5726
2	40	349.52	375.99	404.80	92.74	0.010148	37.2028
2	41	325.63	349.52	375.95	92.74	0.010148	33.8619
2	42	304.51	325.63	349.81	92.74	0.010148	30.4911
2	43	285.20	304.51	326.10	92.74	0.010148	27.5230
2	44	268.05	285.20	304.73	92.74	0.010148	24.6347
2	45	253.40	268.05	285.79	92.74	0.010148	21.7971
2	46	241.25	253.40	269.32	92.74	0.010148	18.8687
2	47	231.68	241.25	255.38	92.74	0.010148	15.9499
2	48	222.99	231.68	243.37	92.74	0.010148	13.7160
3	2	866.56	955.00	936.72	91.28	0.009989	47.2223
3	3	843.51	866.56	905.74	91.45	0.010007	41.6860
3	4	823.16	843.51	878.10	91.56	0.010019	36.9781
3	5	807.30	823.16	854.26	91.63	0.010027	31.6069
3	6	793.66	807.30	833.74	91.67	0.010032	26.9731
3	7	784.25	793.66	816.90	91.69	0.010034	21.9746
3	8	776.76	784.25	803.18	91.70	0.010035	17.7830
3	9	772.18	776.76	792.55	91.70	0.010035	13.7095
3	10	769.05	772.18	784.48	91.70	0.010035	10.3837
3	11	766.69	769.05	778.36	91.70	0.010035	7.8559
3	12	767.00	766.69	774.45	91.70	0.010035	5.0167
3	13	768.38	767.00	772.39	91.71	0.010036	2.6933
3	14	770.70	768.38	771.86	91.73	0.010038	0.7762
3	15	773.21	770.70	772.41	91.76	0.010041	-0.5418
3	16	777.19	773.21	774.18	91.81	0.010047	-2.0240
3	17	781.11	777.19	776.73	91.87	0.010053	-2.9473
3	18	786.10	781.11	780.16	91.95	0.010062	-3.9975
3	19	791.11	786.10	784.17	92.04	0.010073	-4.6708
3	20	795.69	791.11	788.41	92.15	0.010084	-4.8978
3	21	801.68	795.69	793.29	92.28	0.010098	-5.6456
3	22	805.76	801.68	797.92	92.41	0.010112	-5.2777
3	23	810.24	805.76	802.52	92.55	0.010128	-5.1923
3	24	813.34	810.24	806.52	92.70	0.010145	-4.5219
3	25	814.61	813.34	809.74	92.85	0.010161	-3.2825
3	26	811.72	814.61	810.76	92.98	0.010175	-0.6479
3	27	804.49	811.72	808.89	93.09	0.010187	2.9637
3	28	793.19	804.49	803.70	93.16	0.010195	7.0704
3	29	776.75	793.19	794.50	93.18	0.010196	11.9414
3	30	754.08	776.75	780.62	93.18	0.010196	17.8613
3	31	725.20	754.08	761.56	93.18	0.010196	24.4694
3	32	690.24	725.20	736.96	93.18	0.010196	31.4424
3	33	651.61	690.24	707.40	93.18	0.010196	37.9511
3	34	611.73	651.61	674.13	93.18	0.010196	41.9906
3	35	573.36	611.73	638.89	93.18	0.010196	44.1041
3	36	536.47	573.36	602.88	93.18	0.010196	44.6949

0.0000	-40.5726	0.000793	0.010548	0.012434
0.0000	-37.2028	0.000793	0.010548	0.012434
0.0000	-33.8619	0.000793	0.010548	0.012434
0.0000	-30.4911	0.000793	0.010548	0.012434
0.0000	-27.5230	0.000793	0.010548	0.012434
0.0000	-24.6847	0.000793	0.010548	0.012434
0.0000	-21.7971	0.000793	0.010548	0.012434
0.0000	-18.8887	0.000793	0.010548	0.012434
0.0000	-15.9499	0.000793	0.010548	0.012434
0.0000	-13.7160	0.000793	0.010548	0.012434
1.1561	-46.0641	0.000952	0.010389	0.012513
0.8340	-41.0519	0.000934	0.010407	0.012504
0.5612	-36.4168	0.000922	0.010419	0.012498
0.3644	-31.2424	0.000914	0.010427	0.012494
0.2093	-26.7637	0.000909	0.010432	0.012492
0.1084	-21.8862	0.000907	0.010434	0.012491

0.0316	-17.7513	0.000906	0.010435	0.012490
0.0000	-13.7095	0.000906	0.010435	0.012490
0.0000	-10.3837	0.000906	0.010435	0.012490
0.0000	-7.8559	0.000906	0.010435	0.012490
0.0000	-5.0167	0.000906	0.010435	0.012490
0.0447	-2.6486	0.000905	0.010436	0.012490
0.0968	-0.6793	0.000903	0.010438	0.012489
0.1657	0.7076	0.000900	0.010441	0.012487
0.2457	2.2698	0.000894	0.010447	0.012484
0.3147	3.2621	0.000887	0.010454	0.012481
0.4025	4.4001	0.000879	0.010462	0.012477
0.4824	5.1533	0.000868	0.010473	0.012471
0.5479	5.4457	0.000857	0.010484	0.012465
0.6228	6.2684	0.000843	0.010498	0.012459
0.6834	5.9611	0.000829	0.010512	0.012451
0.7367	5.9295	0.000813	0.010528	0.012444
0.7596	5.2816	0.000796	0.010545	0.012435
0.7440	4.0265	0.000780	0.010561	0.012427
0.6736	1.3216	0.000766	0.010575	0.012420
0.5501	-2.4126	0.000754	0.010587	0.012414
0.3590	-6.7113	0.000746	0.010595	0.012410
0.0737	-11.8677	0.000745	0.010596	0.012410
0.0000	-17.8613	0.000745	0.010596	0.012410
0.0000	-24.4694	0.000745	0.010596	0.012410
0.0000	-31.4424	0.000745	0.010596	0.012410
0.0000	-37.5511	0.000745	0.010596	0.012410
0.0000	-41.9906	0.000745	0.010596	0.012410
0.0000	-44.1041	0.000745	0.010596	0.012410
0.0000	-44.6949	0.000745	0.010596	0.012410 3-36

3	37	501.15	536.47	566.90	93.18	0.010196	44.2540
3	38	468.43	501.15	531.88	93.18	0.010196	42.7084
3	39	437.63	468.43	498.18	93.18	0.010196	40.7482
3	40	408.76	437.63	466.03	93.18	0.010196	38.9404
3	41	382.00	408.76	435.68	93.18	0.010196	36.1266
3	42	357.53	382.00	407.32	93.18	0.010196	33.5095
3	43	334.90	357.53	380.94	93.18	0.010196	30.9850
3	44	314.74	334.90	356.74	93.18	0.010196	28.2651
3	45	296.34	314.74	334.58	93.18	0.010196	25.7413
3	46	280.19	296.34	314.58	93.18	0.010196	23.1049
3	47	266.38	280.19	296.81	93.18	0.010196	20.4796
3	48	254.00	266.38	281.00	93.18	0.010196	18.1706
4	2	904.80	955.00	980.26	91.56	0.010020	30.5996
4	3	882.97	904.80	928.46	91.89	0.010058	30.6148
4	4	862.08	882.97	905.66	92.11	0.010080	30.0089
4	5	844.03	862.08	885.94	92.29	0.010100	28.2084
4	6	827.79	844.03	866.584	92.43	0.010115	26.1044
4	7	814.13	827.79	849.03	92.53	0.010126	23.4658
4	8	803.03	814.13	833.56	92.61	0.010134	20.9439
4	9	794.53	803.03	820.38	92.67	0.010141	17.3988
4	10	787.76	794.53	809.34	92.71	0.010145	14.5227
4	11	782.83	787.76	800.34	92.74	0.010149	11.7852
4	12	779.57	782.83	793.29	92.77	0.010152	9.2334
4	13	777.11	779.57	787.81	92.80	0.010155	7.1959
4	14	776.86	777.11	784.12	92.83	0.010158	4.8581
4	15	777.01	776.86	781.77	92.86	0.010162	3.1994
4	16	779.36	777.01	781.04	92.90	0.010166	1.1348
4	17	781.56	779.36	781.35	92.95	0.010172	-0.1446
4	18	784.21	781.56	782.49	93.01	0.010179	-1.1551
4	19	787.74	784.21	784.49	93.09	0.010187	-2.1914
4	20	791.38	787.74	787.07	93.17	0.010196	-2.8995
4	21	796.05	791.38	790.41	93.27	0.010206	-3.7960
4	22	799.95	796.05	793.96	93.37	0.010218	-4.0254
4	23	804.08	799.95	797.73	93.49	0.010230	-4.2701
4	24	807.50	804.08	801.40	93.61	0.010244	-4.1040
4	25	809.76	807.50	804.59	93.73	0.010257	-3.4813
4	26	809.59	809.76	806.61	93.85	0.010270	-2.0088
4	27	805.78	809.59	806.59	93.96	0.010282	0.5493
4	28	797.97	805.78	803.85	94.04	0.010290	3.9564
4	29	786.41	797.97	797.99	94.08	0.010296	7.7921
4	30	769.76	786.41	788.31	94.08	0.010296	12.4737
4	31	748.74	769.76	774.71	94.08	0.010296	17.4772
4	32	721.91	748.74	756.53	94.08	0.010296	23.6039
4	33	691.16	721.91	733.97	94.08	0.010296	28.8075
4	34	658.10	691.16	707.69	94.08	0.010296	33.2734

0.0000	-44.2540	0.000745	0.010596	0.012410
0.0000	-42.7034	0.000745	0.010596	0.012410
0.0000	-40.7482	0.000745	0.010596	0.012410
0.0000	-38.5464	0.000745	0.010596	0.012410
0.0000	-36.1268	0.000745	0.010596	0.012410
0.0000	-33.5095	0.000745	0.010596	0.012410
0.0000	-30.9850	0.000745	0.010596	0.012410
0.0000	-28.2651	0.000745	0.010596	0.012410
0.0000	-25.7413	0.000745	0.010596	0.012410
0.0000	-23.1449	0.000745	0.010596	0.012410
0.0000	-20.4796	0.000745	0.010596	0.012410
0.0000	-18.1706	0.000745	0.010596	0.012410
2.5723	-23.0182	0.000921	0.010420	0.012498
1.6607	-28.9541	0.000886	0.010455	0.012480
1.1454	-28.8555	0.000861	0.010480	0.012466
0.9091	-27.2972	0.000841	0.010500	0.012458
0.6932	-25.4111	0.000826	0.010515	0.012450
0.5502	-22.9555	0.000815	0.010526	0.012445
0.3922	-20.1517	0.000807	0.010534	0.012441
0.2947	-17.1040	0.000800	0.010541	0.012437
0.2213	-14.3013	0.000796	0.010545	0.012435
0.1606	-11.6225	0.000792	0.010549	0.012433
0.1405	-9.0928	0.000789	0.010552	0.012432
0.1409	-7.0550	0.000786	0.010555	0.012430
0.1521	-4.7360	0.000783	0.010558	0.012429
0.1719	-3.0275	0.000779	0.010562	0.012427
0.2087	-0.9260	0.000774	0.010566	0.012424
0.2516	0.3944	0.000769	0.010572	0.012422
0.3112	1.4663	0.000762	0.010579	0.012418
0.3695	2.5610	0.000754	0.010587	0.012414
0.4230	3.3226	0.000745	0.010596	0.012410
0.4917	4.2830	0.000735	0.010606	0.012405
0.5381	4.5675	0.000723	0.010618	0.012399
0.5868	4.8569	0.000710	0.010630	0.012392

11233

0.6188	4.7238	0.000697	0.010644	0.012386
0.6305	4.1118	0.000684	0.010657	0.012379
0.5992	2.6080	0.000671	0.010670	0.012373
0.5261	-0.0232	0.000659	0.010682	0.012367
0.4118	-3.5448	0.000651	0.010690	0.012362
0.2362	-7.5558	0.000645	0.010696	0.012360
0.0000	-12.4782	0.000645	0.010696	0.012360
0.0000	-17.4772	0.000645	0.010696	0.012360
0.0000	-23.3039	0.000645	0.010696	0.012360
0.0000	-28.8075	0.000645	0.010696	0.012360
0.0000	-33.3734	0.000645	0.010696	0.012360

4	35	624.63	658.10	678.80	94.08	0.010296	36.4548
4	36	591.15	624.63	648.18	94.08	0.010296	38.3777
4	37	558.01	591.15	616.52	94.08	0.010296	39.3757
4	38	525.56	558.01	584.43	94.08	0.010296	39.6173
4	39	494.72	525.56	552.61	94.08	0.010296	39.9621
4	40	465.13	494.72	521.43	94.08	0.010296	37.8879
4	41	437.05	465.13	491.21	94.08	0.010296	36.4479
4	42	410.69	437.05	462.23	94.08	0.010296	34.6887
4	43	385.88	410.69	434.64	94.08	0.010296	32.8109
4	44	363.06	385.88	408.66	94.08	0.010296	30.6901
4	45	342.44	363.06	384.54	94.08	0.010296	28.3367
4	46	323.21	342.44	362.13	94.08	0.010296	26.1912
4	47	306.02	323.21	341.56	94.08	0.010296	23.9295
4	48	290.39	306.02	322.76	94.08	0.010296	21.7836
5	2	929.94	955.00	958.91	91.65	0.010029	19.5011
5	3	911.34	929.94	944.23	92.16	0.010085	22.1345
5	4	892.60	911.34	927.85	92.55	0.010128	23.7265
5	5	875.04	892.60	910.73	92.82	0.010157	24.0184
5	6	858.46	875.04	893.59	93.02	0.010179	23.6423
5	7	843.52	858.46	877.08	93.19	0.010198	22.5823
5	8	829.82	843.52	861.40	93.33	0.010213	21.2538
5	9	818.79	829.82	847.21	93.45	0.010226	19.1219
5	10	809.36	818.79	834.55	93.54	0.010236	16.9547
5	11	801.65	809.36	823.52	93.62	0.010244	14.7139
5	12	795.58	801.65	814.13	93.68	0.010251	12.4845
5	13	791.16	795.58	806.41	93.73	0.010257	10.2609
5	14	788.04	791.16	800.24	93.78	0.010263	8.2097
5	15	785.79	788.04	795.41	93.83	0.010268	6.4683
5	16	785.61	785.79	792.17	93.86	0.010273	4.4131
5	17	785.36	785.61	789.97	93.93	0.010279	3.0971
5	18	786.63	785.36	786.97	93.98	0.010285	1.5695
5	19	788.66	786.63	789.02	94.04	0.010291	0.2432
5	20	791.07	788.66	789.90	94.11	0.010299	-0.7864
5	21	793.68	791.07	791.40	94.19	0.010307	-1.6339
5	22	796.67	793.68	793.43	94.28	0.010317	-2.1797
5	23	800.01	796.67	795.93	94.37	0.010327	-2.7464
5	24	803.13	800.01	798.66	94.47	0.010338	-3.0065
5	25	805.62	803.13	801.31	94.57	0.010349	-2.9011
5	26	806.98	805.62	803.52	94.67	0.010360	-2.6313
5	27	804.64	806.98	804.15	94.77	0.010370	-0.5306
5	28	800.71	804.64	803.18	94.85	0.010379	1.6603
5	29	792.38	800.71	799.63	94.91	0.010386	4.8782
5	30	780.42	792.38	793.11	94.93	0.010389	8.5427
5	31	764.64	780.42	783.34	94.93	0.010389	12.5854
5	32	744.83	764.64	770.10	94.93	0.010389	17.0053
5	33	720.74	744.83	753.09	94.93	0.010389	21.7739
5	34	693.86	720.74	732.64	94.93	0.010389	26.0957
5	35	665.50	693.86	709.38	94.93	0.010389	29.5292
5	36	636.13	665.50	683.91	94.93	0.010389	32.1541
5	37	606.19	636.13	656.78	94.93	0.010389	34.0462
5	38	576.07	606.19	628.46	94.93	0.010389	35.2735
5	39	545.98	576.07	599.43	94.93	0.010389	35.9690

0.0000	-36.4548	0.000645	0.010696	0.012360
0.0000	-38.3777	0.000645	0.010696	0.012360
0.0000	-39.3757	0.000645	0.010696	0.012360
0.0000	-39.6173	0.000645	0.010696	0.012360
0.0000	-38.9621	0.000645	0.010696	0.012360
0.0000	-37.8879	0.000645	0.010696	0.012360
0.0000	-36.4479	0.000645	0.010696	0.012360
0.0000	-34.6887	0.000645	0.010696	0.012360
0.0000	-32.8109	0.000645	0.010696	0.012360
0.0000	-30.6901	0.000645	0.010696	0.012360
0.0000	-28.3367	0.000645	0.010696	0.012360
0.0000	-26.1912	0.000645	0.010696	0.012360
0.0000	-23.9233	0.000645	0.010696	0.012360
0.0000	-21.7336	0.000645	0.010696	0.012360
3.0218	-16.4793	0.000912	0.010429	0.012493
2.5987	-19.5357	0.000856	0.010485	0.012465
1.9947	-21.7517	0.000813	0.010528	0.012444
1.3535	-22.6644	0.000784	0.010557	0.012429
1.0444	-22.5978	0.000762	0.010579	0.012418
0.8686	-21.7457	0.000743	0.010598	0.012409
0.7137	-20.5401	0.000728	0.010613	0.012401
0.5826	-18.5592	0.000715	0.010626	0.012395
0.4730	-16.4815	0.000705	0.010636	0.012390
0.3871	-14.3298	0.000697	0.010644	0.012386
0.3233	-12.1611	0.000690	0.010651	0.012382
0.2708	-9.9901	0.000684	0.010657	0.012379
0.2467	-7.8	0.000676	0.010663	0.012376
0.2347	-5.7	0.000673	0.010668	0.012374
0.2465	-4.1965	0.000668	0.010673	0.012371
0.2624	-2.8346	0.000662	0.010679	0.012368
0.2819	-1.2876	0.000656	0.010685	0.012365
0.3135	0.0703	0.000650	0.010691	0.012362
0.3480	1.1344	0.000642	0.010699	0.012358
0.3958	1.9267	0.000634	0.010707	0.012354
0.4331	2.6128	0.000624	0.010717	0.012349
0.4716	3.2181	0.000614	0.010727	0.012344
0.5020	3.5106	0.000603	0.010738	0.012339
0.5204	3.4215	0.000592	0.010749	0.012333
0.5153	2.8466	0.000581	0.010760	0.012328
0.4822	0.8128	0.000571	0.010770	0.012323
0.4080	-1.2522	0.000562	0.010779	0.012318
0.3017	-4.5764	0.000555	0.010786	0.012315
0.1395	-8.4032	0.000552	0.010789	0.012313
0.0000	-12.5834	0.000552	0.010789	0.012313
0.0000	-17.0053	0.000552	0.010789	0.012313
0.0000	-21.7739	0.000552	0.010789	0.012313
0.0000	-26.0957	0.000552	0.010789	0.012313
0.0000	-29.5292	0.000552	0.010789	0.012313
0.0000	-32.1541	0.000552	0.010789	0.012313
0.0000	-34.0462	0.000552	0.010789	0.012313
0.0000	-35.2735	0.000552	0.010789	0.012313
0.0000	-35.9690	0.000552	0.010789	0.012313

5	40	516.99	545.98	570.26	94.93	0.010389	35.8501
5	41	488.87	516.99	541.33	94.93	0.010389	35.3083
5	42	461.87	488.87	512.96	94.93	0.010389	34.3836
5	43	436.01	461.87	485.36	94.93	0.010389	33.2132
5	44	411.63	436.01	458.80	94.93	0.010389	31.7511
5	45	388.94	411.63	433.54	94.93	0.010389	30.0175
5	46	367.57	388.94	409.60	94.93	0.010389	28.2240
5	47	348.43	367.57	387.32	94.93	0.010389	26.1748
5	48	330.25	348.43	366.47	94.93	0.010389	24.3763
6	2	945.59	955.00	963.91	91.55	0.010018	12.3260
6	3	931.18	945.59	954.23	92.06	0.010074	15.5148
6	4	915.70	931.18	942.50	92.54	0.010127	18.0385
6	5	900.19	915.70	929.30	92.95	0.010172	19.5943
6	6	884.76	900.19	915.10	93.27	0.010206	20.4200
6	7	869.99	884.76	900.44	93.49	0.010231	20.4914
6	8	855.94	869.99	885.87	93.68	0.010251	20.1691
6	9	843.01	855.94	871.76	93.84	0.010269	19.3480
6	10	831.95	843.01	858.60	93.98	0.010285	17.9353
6	11	822.30	831.95	846.56	94.10	0.010297	16.3227
6	12	814.10	822.30	835.76	94.20	0.010309	14.5764
6	13	807.39	814.10	826.30	94.29	0.010318	12.7298
6	14	802.60	807.39	818.40	94.36	0.010326	10.8346
6	15	798.23	802.60	811.67	94.43	0.010334	9.0487
6	16	795.50	798.23	806.30	94.50	0.010341	7.2721
6	17	793.32	795.50	802.01	94.56	0.010348	5.8308
6	18	792.12	793.32	798.78	94.62	0.010354	4.4787
6	19	792.25	792.12	796.70	94.68	0.010361	2.9997
6	20	793.45	792.25	795.76	94.75	0.010368	1.5519
6	21	794.79	793.45	795.61	94.82	0.010376	0.5500
6	22	796.76	794.79	796.20	94.89	0.010384	-0.3811
6	23	799.20	796.76	797.43	94.97	0.010393	-1.1877
6	24	801.63	799.20	799.09	95.06	0.010402	-1.7121
6	25	803.78	801.63	800.92	95.14	0.010412	-1.9190
6	26	805.17	803.78	802.61	95.23	0.010421	-1.7221
6	27	803.75	805.17	803.22	95.32	0.010431	-0.3561
6	28	801.27	803.75	802.75	95.40	0.010439	1.0010
6	29	796.69	801.27	800.84	95.46	0.010446	2.7915
6	30	787.70	796.69	796.45	95.50	0.010451	5.0892
6	31	776.01	787.70	789.47	95.52	0.010453	9.0609
6	32	760.86	776.01	779.64	95.52	0.010453	12.6426
6	33	742.72	760.86	766.94	95.52	0.010453	16.3089
6	34	721.23	742.72	751.19	95.52	0.010453	20.1628
6	35	697.71	721.23	732.71	95.52	0.010453	23.9547
6	36	672.60	697.71	711.89	95.52	0.010453	26.4386
6	37	646.30	672.60	689.09	95.52	0.010453	28.8004

0.0000	-35.8501	0.000552	0.010789	0.012313
0.0000	-35.3083	0.000552	0.010789	0.012313
0.0000	-34.8336	0.000552	0.010789	0.012313
0.0000	-33.2132	0.000552	0.010789	0.012313
0.0000	-31.7511	0.000552	0.010789	0.012313
0.0000	-30.0175	0.000552	0.010789	0.012313
0.0000	-28.2840	0.000552	0.010789	0.012313
0.0000	-26.1748	0.000552	0.010789	0.012313
0.0000	-24.3763	0.000552	0.010789	0.012313
2.5047	-9.8212	0.000923	0.010418	0.012499
2.6289	-12.6859	0.000667	0.010474	0.012471
2.4459	-15.5926	0.000814	0.010527	0.012444
2.0811	-17.5131	0.000769	0.010572	0.012422
1.6243	-18.7965	0.000735	0.010606	0.012405
1.1389	-19.3524	0.000710	0.010631	0.012392
0.9564	-19.1827	0.000690	0.010651	0.012382
0.8290	-18.5190	0.000672	0.010669	0.012373
0.7081	-17.2272	0.000656	0.010685	0.012365
0.6022	-15.7204	0.000644	0.010697	0.012359
0.5133	-14.0630	0.000632	0.010709	0.012353
0.4431	-12.2857	0.000623	0.010718	0.012349
0.3868	-10.2478	0.000615	0.010726	0.012345
0.3451	-8.7035	0.000607	0.010734	0.012341
0.3268	-6.9453	0.000600	0.010741	0.012337
0.3107	-5.5401	0.000593	0.010748	0.012334
0.3126	-4.1660	0.000587	0.010754	0.012331
0.3223	-2.6773	0.000580	0.010761	0.012327
0.3362	-1.2156	0.000573	0.010768	0.012323
0.3548	-0.1951	0.000565	0.010776	0.012320
0.3772	0.7584	0.000557	0.010784	0.012316
0.4029	1.5907	0.000548	0.010793	0.012311
0.4264	2.1586	0.000539	0.010802	0.012307
0.4441	2.3632	0.000529	0.010812	0.012302
0.4520	2.1742	0.000520	0.010821	0.012297
0.4320	0.7882	0.000510	0.010831	0.012292
0.3978	-0.6032	0.000502	0.010839	0.012288
0.3246	-2.4668	0.000495	0.010846	0.012285
0.2224	-3.6667	0.000490	0.010851	0.012282
0.0778	-8.9830	0.000488	0.010853	0.012281
0.0000	-12.6426	0.000488	0.010853	0.012281
0.0000	-16.3039	0.000488	0.010853	0.012281
0.0000	-20.1628	0.000488	0.010853	0.012281
0.0000	-23.5547	0.000488	0.010853	0.012281
0.0000	-26.4386	0.000488	0.010853	0.012281
0.0000	-28.8004	0.000488	0.010853	0.012281

6	38	619.18	646.30	664.71	95.52	0.010453	30.6406
6	39	590.91	619.18	638.07	95.52	0.010453	32.2746
6	40	563.45	590.91	612.83	95.52	0.010453	34.0315
6	41	536.27	563.45	581.48	95.52	0.010453	35.8241
6	42	509.65	536.27	555.60	95.52	0.010453	37.6721
6	43	483.71	509.65	531.93	95.52	0.010453	39.4919
6	44	458.75	483.71	505.76	95.52	0.010453	41.6407
6	45	434.99	458.75	480.39	95.52	0.010453	43.5555
6	46	412.30	434.99	455.82	95.52	0.010453	45.4907
6	47	391.27	412.30	432.47	95.52	0.010453	47.7271
6	48	371.26	391.27	410.29	95.52	0.010453	49.8394
7	2	955.56	955.00	966.83	91.38	0.010000	7.5829
7	3	944.74	955.56	960.49	91.80	0.010046	10.6619
7	4	932.62	944.74	952.30	92.26	0.010096	13.8548
7	5	919.76	932.62	942.51	92.71	0.010146	15.3080
7	6	906.35	919.76	931.38	93.12	0.010190	16.8464
7	7	892.84	906.35	919.26	93.46	0.010228	17.7076
7	8	879.44	892.84	906.53	93.74	0.010258	18.2323

7	9	865.85	879.44	893.28	93.93	0.010279	18.4490
7	10	854.07	865.85	880.46	94.11	0.010299	17.7176
7	11	843.32	854.07	868.26	94.27	0.010316	16.7858
7	12	833.71	843.32	856.83	94.41	0.010331	15.8714
7	13	825.34	833.71	846.46	94.53	0.010344	14.9136
7	14	818.55	825.34	837.23	94.63	0.010356	12.9716
7	15	812.42	818.55	829.01	94.73	0.010366	11.1640
7	16	808.26	812.42	822.14	94.81	0.010376	9.3434
7	17	804.34	808.26	816.26	94.89	0.010384	8.0204
7	18	801.33	804.34	811.34	94.97	0.010392	6.7147
7	19	798.86	801.33	807.25	95.04	0.010400	5.6483
7	20	796.14	798.86	804.32	95.11	0.010408	4.8145
7	21	794.77	796.14	802.60	95.18	0.010416	2.9771
7	22	794.40	794.77	801.09	95.25	0.010424	1.5440
7	23	794.41	794.40	801.49	95.33	0.010432	0.0007
7	24	795.98	794.41	801.83	95.41	0.010441	-1.0778
7	25	797.67	795.98	802.80	95.49	0.010450	-2.5419
7	26	800.56	797.67	803.49	95.57	0.010458	-4.7249
7	27	803.58	800.56	803.72	95.65	0.010467	-6.3351
7	28	807.96	803.58	805.31	95.73	0.010475	-8.0114
7	29	799.44	807.96	802.16	95.79	0.010483	-1.1169
7	30	792.86	799.44	799.11	95.84	0.010486	4.2026
7	31	784.27	792.86	794.11	95.89	0.010492	6.0111
7	32	772.76	784.27	786.80	95.89	0.010493	9.4770
7	33	758.57	772.76	777.10	95.89	0.010493	12.4080
7	34	741.45	758.57	764.83	95.89	0.010493	15.4564
7	35	722.82	741.45	750.35	95.89	0.010493	18.9272

0.0000	-30.6406	0.000488	0.010853	0.012281
0.0000	-32.2746	0.000488	0.010853	0.012281
0.0000	-32.9085	0.000488	0.010853	0.012281
0.0000	-33.1241	0.000488	0.010853	0.012281
0.0000	-32.9421	0.000488	0.010853	0.012281
0.0000	-32.4519	0.000488	0.010853	0.012281
0.0000	-31.6407	0.000488	0.010853	0.012281
0.0000	-30.5300	0.000488	0.010853	0.012281
0.0000	-29.2907	0.000488	0.010853	0.012281
0.0000	-27.7271	0.000488	0.010853	0.012281
0.0000	-26.2394	0.000488	0.010853	0.012281
1.6536	-5.9287	0.000941	0.010400	0.012508
2.1597	-8.4412	0.000895	0.010446	0.012485
2.3476	-10.8967	0.000845	0.010496	0.012460
2.2914	-13.0165	0.000795	0.010546	0.012435
2.0774	-14.7590	0.000751	0.010590	0.012413
1.7632	-16.0244	0.000713	0.010628	0.012394
1.3919	-16.8404	0.000683	0.010658	0.012379

11235

1.0037	-17.4601	0.000662	0.010679	0.012368
0.8998	-16.8577	0.000642	0.010699	0.012358
0.7966	-15.9890	0.000625	0.010716	0.012350
0.6998	-14.8916	0.000610	0.010731	0.012342
0.6141	-13.5984	0.000597	0.010744	0.012336
0.5457	-12.0260	0.000585	0.010756	0.012330
0.4838	-10.6810	0.000575	0.010766	0.012325
0.4369	-8.9065	0.000565	0.010776	0.012320
0.3999	-7.6235	0.000557	0.010784	0.012316
0.3743	-6.3604	0.000549	0.010792	0.012312
0.3643	-5.2840	0.000541	0.010800	0.012308
0.3630	-3.7912	0.000533	0.010808	0.012304
0.3623	-2.2151	0.000525	0.010816	0.012300
0.3714	-1.1726	0.000517	0.010824	0.012296
0.3855	-0.3142	0.000509	0.010832	0.012292
0.3989	0.4967	0.000500	0.010841	0.012287
0.4102	0.9921	0.000491	0.010850	0.012283
0.4157	1.1387	0.000482	0.010858	0.012278
0.4019	0.3058	0.000474	0.010867	0.012274
0.3794	-0.5300	0.000466	0.010875	0.012270
0.3398	-1.4871	0.000458	0.010883	0.012266
0.2689	-3.9337	0.000453	0.010888	0.012264
0.1710	-6.4472	0.000449	0.010892	0.012262
0.0378	-9.4092	0.000448	0.010893	0.012261
0.0000	-12.4686	0.000448	0.010893	0.012261
0.0000	-15.7364	0.000448	0.010893	0.012261
0.0000	-18.5272	0.000448	0.010893	0.012261

7-25

7	36	701.79	722.82	733.57	95.89	0.010493	21.3872
7	37	679.20	701.79	714.74	95.89	0.010493	23.9188
7	38	655.36	679.20	694.11	95.89	0.010493	26.0804
7	39	630.17	655.36	671.82	95.89	0.010493	28.0347
7	40	604.30	630.17	648.21	95.89	0.010493	29.8512
7	41	578.75	604.30	623.82	95.89	0.010493	30.3358
7	42	553.26	578.75	598.95	95.89	0.010493	30.7552
7	43	528.01	553.26	573.85	95.89	0.010493	30.8505
7	44	503.28	528.01	548.78	95.89	0.010493	30.6243
7	45	479.29	503.28	524.00	95.89	0.010493	30.0907
7	46	456.05	479.29	499.67	95.89	0.010493	29.3572
7	47	433.98	456.05	476.06	95.89	0.010493	28.3221
7	48	412.79	433.98	453.24	95.89	0.010493	27.2236
8	2	961.77	955.00	968.50	91.22	0.009982	4.5285
8	3	953.16	961.77	964.11	91.52	0.010015	7.3602
8	4	943.95	953.16	958.32	91.90	0.010057	9.6727
8	5	933.67	943.95	951.11	92.32	0.010103	11.7366
8	6	923.20	933.67	942.81	92.75	0.010149	13.2006
8	7	911.58	923.20	933.32	93.15	0.010193	14.6363
8	8	899.56	911.58	922.87	93.51	0.010233	15.6866
8	9	887.06	899.56	911.56	93.81	0.010266	16.4935
8	10	874.79	887.06	899.76	94.05	0.010292	16.8076
8	11	863.65	874.79	888.02	94.24	0.010313	16.8979
8	12	853.31	863.65	876.69	94.41	0.010331	15.7331
8	13	843.91	853.31	865.96	94.56	0.010348	14.8370
8	14	835.73	843.91	856.04	94.70	0.010363	13.6678
8	15	828.24	835.73	846.90	94.82	0.010376	12.5528
8	16	822.32	828.24	838.81	94.93	0.010388	11.0992
8	17	817.52	822.32	831.81	95.02	0.010399	9.6135
8	18	813.03	817.52	825.63	95.12	0.010409	8.4859
8	19	809.13	813.03	820.22	95.21	0.010419	7.4588
8	20	806.57	809.13	815.76	95.29	0.010428	6.1687
8	21	804.74	806.57	812.19	95.37	0.010436	5.0164
8	22	804.54	804.74	809.78	95.45	0.010445	3.5239
8	23	804.32	804.54	808.11	95.53	0.010453	2.5479
8	24	804.34	804.32	807.02	95.60	0.010462	1.6051
8	25	804.53	804.34	806.37	95.68	0.010471	1.2293
8	26	805.53	804.53	806.29	95.76	0.010479	0.5132
8	27	804.48	805.53	805.87	95.84	0.010488	0.9349
8	28	803.26	804.48	805.16	95.91	0.010496	1.2817
8	29	801.25	803.26	804.00	95.98	0.010503	1.6519
8	30	797.38	801.25	801.58	96.04	0.010510	3.0291
8	31	790.58	797.38	798.13	96.09	0.010515	5.0772
8	32	781.85	790.58	792.61	96.11	0.010518	7.2431
8	33	770.78	781.85	785.12	96.12	0.010518	9.6535

0.0000	-21.3872	0.000448	0.010893	0.012261
0.0000	-23.9188	0.000448	0.010893	0.012261
0.0000	-26.0804	0.000448	0.010893	0.012261
0.0000	-28.0347	0.000448	0.010893	0.012261
0.0000	-29.5512	0.000448	0.010893	0.012261
0.0000	-30.9358	0.000448	0.010893	0.012261
0.0000	-30.7532	0.000448	0.010893	0.012261
0.0000	-30.8505	0.000448	0.010893	0.012261
0.0000	-30.6243	0.000448	0.010893	0.012261
0.0000	-30.0907	0.000448	0.010893	0.012261
0.0000	-29.3572	0.000448	0.010893	0.012261
0.0000	-28.3221	0.000448	0.010893	0.012261
0.0000	-27.2236	0.000448	0.010893	0.012261
0.8233	-3.7052	0.000959	0.010382	0.012517
1.5253	-5.8428	0.000926	0.010415	0.012500
1.9567	-7.7139	0.000854	0.010457	0.012479
2.1506	-9.5860	0.000838	0.010503	0.012456
2.1714	-11.0292	0.000792	0.010549	0.012433
2.0492	-12.5872	0.000748	0.010593	0.012411
1.8232	-13.8533	0.000708	0.010633	0.012391
1.5461	-14.9443	0.000675	0.010666	0.012375
1.2391	-15.5584	0.000649	0.010692	0.012362
0.9411	-15.4268	0.000628	0.010713	0.012351
0.8578	-14.8753	0.000610	0.010731	0.012342
0.7736	-14.0633	0.000593	0.010748	0.012334
0.6965	-12.9713	0.000578	0.010763	0.012326
0.6240	-11.9288	0.000565	0.010776	0.012320
0.5669	-10.5323	0.000553	0.010788	0.012314
0.5124	-9.1010	0.000542	0.010799	0.012308
0.4695	-8.0163	0.000532	0.010809	0.012303
0.4331	-7.0257	0.000522	0.010819	0.012298
0.4126	-5.7731	0.000513	0.010828	0.012294
0.4059	-4.6104	0.000505	0.010836	0.012290
0.3974	-3.1265	0.000496	0.010845	0.012285
0.3955	-2.1524	0.000488	0.010853	0.012281
0.3996	-1.4054	0.000479	0.010862	0.012277

0.4034	-0.8358	0.000470	0.010871	0.012272
0.4024	-0.1108	0.000462	0.010879	0.012268
0.3904	-0.5445	0.000453	0.010888	0.012264
0.3732	-0.9085	0.000445	0.010896	0.012260
0.3504	-1.5014	0.000438	0.010903	0.012256
0.2977	-2.7314	0.000431	0.010910	0.012253
0.2315	-4.8456	0.000426	0.010915	0.012250
0.1373	-7.1057	0.000423	0.010918	0.012249
0.0152	-9.6382	0.000423	0.010918	0.012249

8	34	757.18	770.78	775.52	96.12	0.010518	12.3433
8	35	741.91	757.18	763.95	96.12	0.010518	14.8330
8	36	724.44	741.91	750.33	96.12	0.010518	17.4251
8	37	705.26	724.44	734.76	96.12	0.010518	19.8500
8	38	684.63	705.26	717.39	96.12	0.010518	22.0538
8	39	662.52	684.63	698.34	96.12	0.010518	24.1071
8	40	639.40	662.52	677.81	96.12	0.010518	25.8525
8	41	615.95	639.40	656.20	96.12	0.010518	27.0831
8	42	592.16	615.95	633.74	96.12	0.010518	27.9865
8	43	568.22	592.16	610.69	96.12	0.010518	28.5332
8	44	544.37	568.22	587.27	96.12	0.010518	28.8700
8	45	520.85	544.37	563.72	96.12	0.010518	28.8963
8	46	497.74	520.85	540.24	96.12	0.010518	28.6082
8	47	475.36	497.74	517.07	96.12	0.010518	28.0724
8	48	453.63	475.36	494.34	96.12	0.010518	27.3927
9	2	964.91	955.00	969.21	91.09	0.009968	2.8969
9	3	958.81	964.91	966.23	91.29	0.009989	4.9944
9	4	951.94	958.81	962.20	91.58	0.010022	6.9022
9	5	943.96	951.94	957.00	91.95	0.010062	8.7716
9	6	935.43	943.96	950.75	92.34	0.010105	10.3087
9	7	925.74	935.43	943.36	92.74	0.010148	11.8574
9	8	915.40	925.74	934.95	93.13	0.010191	13.1564
9	9	904.36	915.40	925.57	93.49	0.010231	14.3747
9	10	893.12	904.36	915.45	93.81	0.010266	15.0259
9	11	882.36	893.12	904.98	94.09	0.010296	15.2219
9	12	871.96	882.36	894.38	94.31	0.010320	15.0903
9	13	862.11	871.96	883.90	94.48	0.010339	14.6692
9	14	853.13	862.11	873.89	94.64	0.010357	13.9674
9	15	844.76	853.13	864.38	94.79	0.010373	13.2052
9	16	837.57	844.76	855.62	94.93	0.010388	12.1441
9	17	831.37	837.57	847.58	95.05	0.010402	10.9824
9	18	825.63	831.37	840.46	95.17	0.010414	9.9840
9	19	821.15	825.63	834.15	95.27	0.010426	8.7469
9	20	817.15	821.15	828.60	95.37	0.010436	7.7008
9	21	813.89	817.15	823.81	95.46	0.010446	6.6746
9	22	811.89	813.89	819.96	95.55	0.010456	5.4328
9	23	809.74	811.89	816.68	95.63	0.010465	4.6759
9	24	808.78	809.74	814.19	95.71	0.010474	3.6450
9	25	808.56	808.78	812.47	95.80	0.010483	2.8336
9	26	808.42	808.56	811.30	95.88	0.010492	1.9327
9	27	808.76	808.42	809.94	95.95	0.010500	2.1444
9	28	805.58	806.76	808.64	96.05	0.010508	2.0607
9	29	803.68	805.58	807.12	96.10	0.010516	2.3151
9	30	801.26	803.68	805.28	96.16	0.010523	2.7051
9	31	796.48	801.26	802.40	96.22	0.010529	3.9963
9	32	789.22	796.48	797.99	96.26	0.010533	5.9025

0.0000	-12.3433	0.000423	0.010918	0.012249
0.0000	-14.3330	0.000423	0.010918	0.012249
0.0000	-17.4251	0.000423	0.010918	0.012249
0.0000	-19.6503	0.000423	0.010918	0.012249
0.0000	-22.0538	0.000423	0.010918	0.012249
0.0000	-24.1071	0.000423	0.010918	0.012249
0.0000	-25.8525	0.000423	0.010918	0.012249
0.0000	-27.0031	0.000423	0.010918	0.012249
0.0000	-27.9865	0.000423	0.010918	0.012249
0.0000	-28.5832	0.000423	0.010918	0.012249
0.0000	-28.8700	0.000423	0.010918	0.012249
0.0000	-28.8563	0.000423	0.010918	0.012249
0.0000	-28.6082	0.000423	0.010918	0.012249
0.0000	-28.0724	0.000423	0.010918	0.012249
0.0000	-27.3927	0.000423	0.010918	0.012249
0.1446	-2.7522	0.000975	0.010388	0.012524
1.0222	-3.9721	0.000952	0.010389	0.012513
1.5306	-5.3716	0.000919	0.010422	0.012497
1.8497	-6.9219	0.000879	0.010462	0.012477
1.9938	-8.3148	0.000836	0.010505	0.012455
2.0450	-9.6124	0.000793	0.010548	0.012434
1.9908	-11.1656	0.000750	0.010591	0.012412
1.8519	-12.4227	0.000710	0.010631	0.012392
1.6423	-13.5635	0.000675	0.010666	0.012375
1.3942	-13.8277	0.000645	0.010696	0.012360
1.1287	-13.9615	0.000621	0.010720	0.012346
0.8919	-13.7773	0.000602	0.010739	0.012338
0.8239	-13.1435	0.000584	0.010757	0.012329
0.7536	-12.4516	0.000568	0.010773	0.012321
0.6895	-11.4546	0.000553	0.010788	0.012314
0.6325	-10.3498	0.000539	0.010802	0.012307
0.5788	-9.4051	0.000527	0.010814	0.012301
0.5292	-8.2196	0.000515	0.010826	0.012295
0.4925	-7.2082	0.000505	0.010836	0.012290
0.4631	-6.2119	0.000495	0.010846	0.012285
0.4470	-4.9857	0.000485	0.010856	0.012280
0.4338	-4.2421	0.000476	0.010865	0.012275
0.4214	-3.2236	0.000467	0.010874	0.012271
0.4108	-2.2228	0.000458	0.010883	0.012266
0.4081	-1.5245	0.000449	0.010892	0.012262
0.3943	-1.7501	0.000441	0.010900	0.012258
0.3781	-1.6826	0.000433	0.010908	0.012254
0.3580	-1.9570	0.000425	0.010916	0.012250
0.3250	-2.5801	0.000418	0.010923	0.012246
0.2731	-3.7131	0.000412	0.010929	0.012243
0.2073	-5.6951	0.000408	0.010933	0.012241

9	33	780.55	789.22	792.07	96.28	0.010536	7.7531
9	34	769.70	780.55	784.39	96.28	0.010536	9.8844
9	35	757.23	769.70	775.05	96.28	0.010536	11.9949
9	36	742.77	757.23	763.94	96.28	0.010536	14.2464
9	37	726.63	742.77	751.07	96.28	0.010536	16.4534
9	38	708.95	726.63	736.52	96.28	0.010536	18.5563
9	39	689.75	708.95	720.33	96.28	0.010536	20.5767
9	40	669.35	689.75	702.64	96.28	0.010536	22.3997
9	41	648.22	669.35	683.70	96.28	0.010536	23.8736
9	42	626.43	648.22	663.71	96.28	0.010536	25.0854
9	43	604.18	626.43	642.86	96.28	0.010536	26.0443
9	44	581.67	604.18	621.36	96.28	0.010536	26.7107
9	45	559.14	581.67	599.42	96.28	0.010536	27.1142
9	46	536.69	559.14	577.23	96.28	0.010536	27.2316
9	47	514.61	536.69	555.00	96.28	0.010536	27.1616
9	48	492.90	514.61	532.87	96.28	0.010536	26.8998
10	2	966.76	955.00	960.64	91.01	0.009959	1.9399
10	3	962.58	966.76	967.56	91.13	0.009972	3.3571
10	4	957.52	962.58	964.74	91.34	0.009996	4.8611
10	5	951.45	957.52	961.02	91.63	0.010027	6.4392
10	6	944.69	951.45	956.39	91.97	0.010064	7.8751
10	7	936.83	944.69	950.76	92.33	0.010104	9.3686
10	8	928.20	936.83	944.14	92.71	0.010146	10.7296
10	9	918.75	928.20	936.56	93.09	0.010187	11.9857
10	10	908.84	918.75	928.15	93.45	0.010227	12.9042
10	11	898.92	908.84	919.14	93.78	0.010263	13.6039
10	12	889.02	898.92	909.72	94.07	0.010295	13.9317
10	13	879.31	889.02	900.08	94.32	0.010322	13.9787
10	14	870.09	879.31	890.46	94.53	0.010344	13.7097
10	15	861.25	870.09	881.00	94.69	0.010363	13.2902
10	16	853.27	861.25	871.99	94.85	0.010380	12.5990
10	17	846.08	853.27	863.57	94.99	0.010395	11.7662
10	18	839.39	846.09	855.69	95.13	0.010410	10.9719
10	19	833.70	839.39	848.53	95.25	0.010424	9.9769
10	20	829.19	833.70	842.24	95.37	0.010436	8.7782
10	21	824.80	829.19	836.57	95.47	0.010448	7.9165
10	22	821.36	824.80	831.64	95.57	0.010459	6.9150
10	23	818.17	821.36	827.29	95.67	0.010469	6.1344
10	24	815.88	818.17	823.62	95.76	0.010479	5.2114
10	25	813.77	815.88	820.48	95.85	0.010489	4.5167
10	26	812.74	813.77	818.06	95.93	0.010498	3.5750
10	27	810.57	812.74	815.71	96.01	0.010507	3.4537
10	28	809.10	810.57	813.65	96.09	0.010515	3.0597
10	29	807.03	809.10	811.57	96.16	0.010523	3.0540
10	30	804.67	807.03	809.39	96.23	0.010531	3.1728

0.1179	-7.6351	0.000405	0.010936	0.012240
0.0000	-9.8844	0.000405	0.010936	0.012240
0.0000	-11.9949	0.000405	0.010936	0.012240
0.0000	-14.2464	0.000405	0.010936	0.012240
0.0000	-16.4534	0.000405	0.010936	0.012240
0.0000	-18.5568	0.000405	0.010936	0.012240
0.0000	-20.5767	0.000405	0.010936	0.012240
0.0000	-22.3997	0.000405	0.010936	0.012240

11237

0.0000	-23.3736	0.000405	0.010936	0.012240
0.0000	-25.0854	0.000405	0.010936	0.012240
0.0000	-26.0343	0.000405	0.010936	0.012240
0.0000	-26.7107	0.000405	0.010936	0.012240
0.0000	-27.1142	0.000405	0.010936	0.012240
0.0000	-27.2516	0.000405	0.010936	0.012240
0.0000	-27.1016	0.000405	0.010936	0.012240
0.0000	-26.8998	0.000405	0.010936	0.012240
-0.2546	-2.1746	0.000962	0.010859	0.012228
0.5857	-2.7714	0.000969	0.010872	0.012242
1.1037	-3.7574	0.000945	0.010896	0.012510
1.4789	-4.9602	0.000914	0.010427	0.012494
1.7142	-6.1609	0.000877	0.010464	0.012476
1.8751	-7.4934	0.000857	0.010534	0.012496
1.9422	-8.7873	0.000795	0.010546	0.012493
1.9291	-10.0565	0.000754	0.010567	0.012414
1.8373	-11.1969	0.000714	0.010627	0.012394
1.6826	-11.9213	0.000678	0.010663	0.012376
1.4687	-12.4430	0.000646	0.010695	0.012350
1.2713	-12.7074	0.000619	0.010722	0.012347
1.0463	-12.8683	0.000597	0.010744	0.012330
0.8409	-12.9413	0.000578	0.010763	0.012326
0.7922	-11.8067	0.000561	0.010780	0.012318
0.7353	-11.0311	0.000546	0.010795	0.012310
0.6791	-10.2928	0.000531	0.010810	0.012306
0.6291	-9.3478	0.000517	0.010824	0.012298
0.5817	-8.1964	0.000505	0.010836	0.012290
0.5417	-7.3748	0.000493	0.010848	0.012284
0.5110	-6.4039	0.000482	0.010859	0.012278
0.4812	-5.6522	0.000472	0.010869	0.012273
0.4603	-4.7510	0.000462	0.010879	0.012268
0.4466	-4.0701	0.000452	0.010889	0.012263
0.4326	-3.1423	0.000443	0.010898	0.012259
0.4121	-3.0416	0.000434	0.010907	0.012254
0.3944	-2.6653	0.000426	0.010915	0.012250
0.3740	-2.6840	0.000418	0.010923	0.012246
0.3509	-2.8218	0.000410	0.010931	0.012242

10	31	801.58	804.67	806.87	96.29	0.010538	3.5626
10	32	795.57	801.58	803.13	96.35	0.010543	5.0906
10	33	788.67	795.57	798.27	96.38	0.010547	6.4632
10	34	779.96	788.67	792.05	96.40	0.010550	8.1021
10	35	769.74	779.96	784.39	96.40	0.010550	9.8575
10	36	757.78	769.74	775.24	96.40	0.010550	11.7507
10	37	744.24	757.78	764.37	96.40	0.010550	13.8635
10	38	729.19	744.24	752.37	96.40	0.010550	15.6012
10	39	712.65	729.19	738.68	96.40	0.010550	17.4988
10	40	694.82	712.65	723.48	96.40	0.010550	19.2467
10	41	676.03	694.82	707.02	96.40	0.010550	20.8571
10	42	656.36	676.03	689.40	96.40	0.010550	22.2045
10	43	636.00	656.36	670.78	96.40	0.010550	23.4055
10	44	615.12	636.00	651.31	96.40	0.010550	24.3934
10	45	593.92	615.12	631.17	96.40	0.010550	25.0689
10	46	572.55	593.92	610.54	96.40	0.010550	25.5673
10	47	551.21	572.55	589.56	96.40	0.010550	25.8266
10	48	529.99	551.21	568.47	96.40	0.010550	25.8955
11	2	967.85	953.00	969.89	90.96	0.009954	1.3718
11	3	965.64	967.85	968.60	91.02	0.009960	1.9925
11	4	961.41	965.64	966.55	91.16	0.009976	3.4577
11	5	956.88	961.41	963.86	91.38	0.010000	4.6095
11	6	951.62	956.88	960.45	91.65	0.010029	5.9398
11	7	945.38	951.62	956.19	91.97	0.010064	7.2791
11	8	938.34	945.38	951.08	92.31	0.010102	8.5697
11	9	930.46	938.34	945.07	92.67	0.010141	9.8294
11	10	921.96	930.46	938.22	93.04	0.010181	10.9446
11	11	913.16	921.96	930.69	93.39	0.010220	11.7944
11	12	904.11	913.16	922.57	93.72	0.010256	12.4292
11	13	894.97	904.11	914.04	94.02	0.010289	12.8601
11	14	885.99	894.97	905.25	94.29	0.010319	12.9810
11	15	877.16	885.99	896.34	94.52	0.010344	12.9128
11	16	868.84	877.16	887.53	94.72	0.010365	12.5777
11	17	861.05	868.84	878.97	94.88	0.010382	12.0571
11	18	853.70	861.05	870.78	95.03	0.010399	11.4940
11	19	847.14	853.70	863.11	95.17	0.010414	10.7555
11	20	841.51	847.14	856.11	95.30	0.010428	9.8222
11	21	836.18	841.51	849.64	95.42	0.010442	9.0393
11	22	832.22	836.18	844.01	95.53	0.010454	7.9320
11	23	828.14	832.22	838.99	95.64	0.010466	7.2255
11	24	824.74	828.14	834.32	95.74	0.010477	6.4457
11	25	821.69	824.74	830.26	95.84	0.010488	5.7622
11	26	819.47	821.69	826.81	95.93	0.010498	4.9379
11	27	816.87	819.47	823.64	96.02	0.010507	4.2591
11	28	814.73	816.87	820.81	96.10	0.010517	4.0919

0.3125	-3.2501	0.000403	0.010938	0.012239
0.2601	-4.8304	0.000398	0.010943	0.012235
0.1938	-6.2694	0.000394	0.010947	0.012234
0.1076	-6.0245	0.000391	0.010950	0.012233
0.0000	-5.8575	0.000391	0.010950	0.012233
0.0000	-11.7507	0.000391	0.010950	0.012233
0.0000	-13.6835	0.000391	0.010950	0.012233
0.0000	-15.6012	0.000391	0.010950	0.012233
0.0000	-17.4988	0.000391	0.010950	0.012233
0.0000	-19.2687	0.000391	0.010950	0.012233
0.0000	-20.8571	0.000391	0.010950	0.012233
0.0000	-22.2345	0.000391	0.010950	0.012233
0.0000	-23.4000	0.000391	0.010950	0.012233
0.0000	-24.3534	0.000391	0.010950	0.012233
0.0000	-25.0688	0.000391	0.010950	0.012233
0.0000	-25.5673	0.000391	0.010950	0.012233
0.0000	-25.8268	0.000391	0.010950	0.012233
0.0000	-25.8955	0.000391	0.010950	0.012233
-0.4740	-1.2458	0.000987	0.010354	0.012331
0.2750	-1.7194	0.000981	0.010360	0.012328
0.7291	-2.7285	0.000965	0.010376	0.012320
1.1150	-3.5844	0.000941	0.010400	0.012308
1.3922	-4.5475	0.000912	0.010429	0.012293
1.6153	-5.6598	0.000877	0.010464	0.012276
1.7649	-6.6047	0.000839	0.010502	0.012257
1.8485	-7.9809	0.000800	0.010541	0.012237

1.8591	-9.0855	0.000760	0.010581	0.012417
1.8000	-9.9943	0.000721	0.010620	0.012398
1.6901	-10.7390	0.000685	0.010656	0.012380
1.5413	-11.2838	0.000652	0.010689	0.012363
1.3666	-11.5944	0.000622	0.010719	0.012348
1.1760	-11.7368	0.000597	0.010744	0.012336
0.9825	-11.5951	0.000575	0.010765	0.012325
0.8115	-11.2456	0.000559	0.010782	0.012317
0.7633	-10.7314	0.000542	0.010799	0.012308
0.7145	-10.0363	0.000527	0.010814	0.012301
0.6689	-9.1533	0.000515	0.010828	0.012294
0.6243	-8.4349	0.000499	0.010842	0.012287
0.5840	-7.3480	0.000487	0.010854	0.012281
0.5474	-6.6781	0.000475	0.010866	0.012275
0.5169	-5.9288	0.000464	0.010877	0.012269
0.4889	-5.2733	0.000453	0.010888	0.012264
0.4680	-4.4699	0.000443	0.010898	0.012259
0.4424	-4.1126	0.000434	0.010907	0.012254
0.4218	-3.6701	0.000424	0.010917	0.012249

11	29	812.39	814.72	810.13	96.18	0.010525	3.8639
11	30	809.93	812.39	813.52	96.25	0.010533	2.7018
11	31	807.04	809.93	812.79	96.32	0.010541	3.8716
11	32	802.39	807.04	809.39	96.38	0.010547	4.7009
11	33	796.13	802.39	804.98	96.43	0.010553	5.9542
11	34	788.97	796.13	799.59	96.47	0.010557	7.1469
11	35	780.43	788.97	793.09	96.49	0.010559	8.4866
11	36	770.49	780.48	785.38	96.49	0.010559	9.9906
11	37	759.07	770.49	776.31	96.49	0.010559	11.6020
11	38	746.26	759.07	765.96	96.49	0.010559	13.2628
11	39	732.04	746.26	754.27	96.49	0.010559	14.9600
11	40	716.54	732.04	741.24	96.49	0.010559	16.6247
11	41	699.97	716.54	726.96	96.49	0.010559	18.1691
11	42	682.40	699.97	711.51	96.49	0.010559	19.5940
11	43	663.98	682.40	694.99	96.49	0.010559	20.8692
11	44	644.87	663.98	677.53	96.49	0.010559	21.9781
11	45	625.22	644.87	659.25	96.49	0.010559	22.9022
11	46	605.17	625.22	640.30	96.49	0.010559	23.6424
11	47	584.90	605.17	620.83	96.49	0.010559	24.1781
11	48	564.52	584.90	600.97	96.49	0.010559	24.5340
12	2	963.49	955.00	970.03	90.94	0.009951	1.0269
12	3	966.73	963.49	968.89	90.92	0.009950	1.4536
12	4	964.58	966.73	967.69	91.02	0.009960	2.0931
12	5	960.72	964.58	965.76	91.18	0.009978	3.3671
12	6	956.73	960.72	963.27	91.39	0.010001	4.4027
12	7	951.86	956.73	960.10	91.65	0.010030	5.5483
12	8	946.23	951.86	956.21	91.95	0.010062	6.7122
12	9	939.80	946.23	951.53	92.28	0.010098	7.8930
12	10	932.68	939.80	946.07	92.62	0.010136	9.0019
12	11	925.10	932.68	939.90	92.97	0.010174	9.9657
12	12	917.08	925.10	933.10	93.31	0.010211	10.7768
12	13	908.79	917.08	925.75	93.64	0.010247	11.4123
12	14	900.40	908.79	917.98	93.95	0.010281	11.8355
12	15	891.94	900.40	909.91	94.22	0.010311	12.0916
12	16	883.71	891.94	901.69	94.48	0.010339	12.1035
12	17	875.76	883.71	893.47	94.69	0.010362	11.9233
12	18	868.08	875.76	885.35	94.88	0.010382	11.6139
12	19	860.94	868.08	877.47	95.03	0.010399	11.1205
12	20	854.53	860.94	870.06	95.17	0.010415	10.4491
12	21	848.46	854.53	863.37	95.31	0.010430	9.8341
12	22	844.07	848.46	856.94	95.44	0.010444	8.6664
12	23	838.59	844.07	851.01	95.56	0.010457	8.3575
12	24	834.84	838.59	845.80	95.67	0.010470	7.3761
12	25	831.01	834.84	841.03	95.78	0.010481	6.7498

0.3989	-3.4650	0.000416	0.010925	0.012245
0.5754	-3.3664	0.000406	0.010933	0.012241
0.3484	-3.5231	0.000400	0.010941	0.012237
0.3045	-4.4053	0.000394	0.010947	0.012234
0.2549	-5.6993	0.000388	0.010953	0.012231
0.1890	-6.9579	0.000384	0.010957	0.012229
0.1081	-8.3765	0.000382	0.010959	0.012228
0.0089	-9.9618	0.000382	0.010959	0.012228
0.0000	-11.6020	0.000382	0.010959	0.012228
0.0000	-13.2628	0.000382	0.010959	0.012228
0.0000	-14.9600	0.000382	0.010959	0.012228
0.0000	-16.6247	0.000382	0.010959	0.012228
0.0000	-18.1691	0.000382	0.010959	0.012228
0.0000	-19.5920	0.000382	0.010959	0.012228
0.0000	-20.8692	0.000382	0.010959	0.012228
0.0000	-21.9761	0.000382	0.010959	0.012228
0.0000	-22.9322	0.000382	0.010959	0.012228
0.0000	-23.6422	0.000382	0.010959	0.012228
0.0000	-24.1781	0.000382	0.010959	0.012228
0.0000	-24.5340	0.000382	0.010959	0.012228
-0.6201	-1.6271	0.000990	0.010351	0.012552
-0.0748	-1.5284	0.000991	0.010350	0.012553
0.4979	-1.5951	0.000981	0.010360	0.012528
0.0114	-2.5756	0.000963	0.010378	0.012519
1.0915	-3.3112	0.000940	0.010401	0.012507
1.3342	-4.2140	0.000911	0.010430	0.012493
1.5262	-5.1860	0.000879	0.010462	0.012477
1.6708	-6.2222	0.000843	0.010498	0.012459
1.7572	-7.2517	0.000805	0.010536	0.012440
1.7801	-8.1855	0.000767	0.010574	0.012421
1.7510	-9.0257	0.000730	0.010611	0.012402
1.6763	-9.7364	0.000694	0.010647	0.012384
1.5642	-10.2712	0.000660	0.010681	0.012367
1.4253	-10.6664	0.000630	0.010711	0.012352
1.2683	-10.8851	0.000602	0.010739	0.012338
1.1045	-10.9310	0.000579	0.010762	0.012327
0.9350	-10.8258	0.000559	0.010782	0.012317
0.7775	-10.5430	0.000542	0.010799	0.012308
0.7271	-9.7119	0.000526	0.010815	0.012300
0.6950	-9.1591	0.000511	0.010830	0.012293
0.6549	-8.0105	0.000497	0.010844	0.012286
0.6166	-7.7403	0.000484	0.010857	0.012279
0.5799	-6.7962	0.000471	0.010870	0.012273
0.5465	-6.2052	0.000460	0.010881	0.012267

11239

12	26	827.79	831.01	836.78	95.88	0.010493	6.0510
12	27	824.58	827.79	832.87	95.96	0.010503	5.5772
12	28	821.75	824.58	829.31	96.07	0.010513	5.0874
12	29	818.95	821.75	825.99	96.16	0.010522	4.7372
12	30	816.17	818.95	822.85	96.24	0.010531	4.4919
12	31	813.20	816.17	819.75	96.31	0.010540	4.4036
12	32	809.21	813.20	816.32	96.38	0.010547	4.7874
12	33	803.41	809.21	812.06	96.44	0.010554	5.8209
12	34	797.30	803.41	807.14	96.49	0.010559	6.6217
12	35	790.08	797.30	801.39	96.53	0.010564	7.6127
12	36	781.61	790.08	794.67	96.55	0.010566	8.7966
12	37	771.89	781.61	786.86	96.56	0.010567	10.0779
12	38	760.91	771.89	777.94	96.56	0.010567	11.4630
12	39	748.67	760.91	767.87	96.56	0.010567	12.9248
12	40	735.20	748.67	756.61	96.56	0.010567	14.4104
12	41	720.64	735.20	744.20	96.56	0.010567	15.8521
12	42	705.05	720.64	730.66	96.56	0.010567	17.2338
12	43	688.53	705.05	716.06	96.56	0.010567	18.5269
12	44	671.20	688.53	700.48	96.56	0.010567	19.7051
12	45	653.19	671.20	684.01	96.56	0.010567	20.7476
12	46	634.61	653.19	666.77	96.56	0.010567	21.6449
12	47	615.61	634.61	648.86	96.56	0.010567	22.3770
12	48	596.31	615.61	630.42	96.56	0.010567	22.9516

0.5180	−5.5360	0.000448	0.010893	0.012261
0.4892	−5.0880	0.000435	0.010905	0.012256
0.4636	−4.6258	0.000428	0.010913	0.012251
0.4382	−4.2989	0.000419	0.010922	0.012246
0.4132	−4.0786	0.000410	0.010931	0.012242
0.3870	−4.0166	0.000401	0.010940	0.012238
0.3521	−4.4558	0.000394	0.010947	0.012234
0.3088	−5.5120	0.000387	0.010954	0.012231
0.2567	−6.3650	0.000382	0.010959	0.012228
0.1930	−7.4197	0.000377	0.010964	0.012226
0.1148	−8.6720	0.000375	0.010966	0.012225
0.0210	−10.0569	0.000374	0.010967	0.012224
0.0000	−11.4639	0.000374	0.010967	0.012224
0.0000	−12.9246	0.000374	0.010967	0.012224
0.0000	−14.4104	0.000374	0.010967	0.012224
0.0000	−15.8521	0.000374	0.010967	0.012224
0.0000	−17.2338	0.000374	0.010967	0.012224
0.0000	−18.5259	0.000374	0.010967	0.012224
0.0000	−19.7051	0.000374	0.010967	0.012224
0.0000	−20.7476	0.000374	0.010967	0.012224
0.0000	−21.6449	0.000374	0.010967	0.012224
0.0000	−22.3770	0.000374	0.010967	0.012224
0.0000	−22.9516	0.000374	0.010967	0.012224

```
// JOB
// FOR
*IOCS(CARD,TYPEWRITER,1132PRINTER,DISK)
*ONE WORD INTEGERS
*ARITHMETIC TRACE
*TRANSFER TRACE
*LIST ALL
      DIMENSION TS(12, 48), TG(12, 48), XSO2(12,48)
      SHSO2 (TEMP) = 0.4474E01 + 0.2041E-01*TEMP - 0.1743E-04* TEMP**2
     1    + 0.5463E-08 *  TEMP**3 + 0.3838E05 /  TEMP **2
      SHO2(TEMP) = 0.4399E01 + 0.7695E-02 * TEMP - 0.5454E-05 * TEMP**2
     1  + 0.1399E-08 *  TEMP**3 + 0.7069E05 /  TEMP**2
      SHSO3(TEMP) = 0.4633E01 + 0.3265E-01 * TEMP - 0.2792E-04 * TEMP**2
     1      + 0.8782E-08 *  TEMP**3 - 0.1936E04 /  TEMP**2
      SHN2(TEMP) = 0.7543E01 - 0.34E-02 * TEMP + 0.636E-05 * TEMP**2
     1  -0.2702E-08 *  TEMP**3 - 0.3913E04 /  TEMP**2
      READ (2,5) WSO2, WO2, WN2, WS, WSO3, TTOL, ML, IL
    5 FORMAT (5F10.6, F5.2, 2I4)
      WRITE(3,5) WSO2, WO2, WN2, WS, WSO3, TTOL, ML, IL
      FSO2      = WSO2 / 64.0628
      FO2       = WO2 / 31.9988
      FN2 = WN2 / 28.0134
      FS = WS/60.0848
      FSO3 = WSO3 / 80.0622
      FSO3      = FSO3      + 0.0004
      FSO2      = FSO2      - 0.0004
      FSO2I = FSO2
      FO2 = FO2 - 0.0002
      HTCON = 0.673
      I = 1
      DO 111 M = 1,12
  111 TG(M,I) = 971.28
      DO 112 M = 1,12
  112 TS(M,I) = 955.
      M = 1
      READ (2,30)  (TS(M,I), I = 2, 48)
   30 FORMAT (8F8.2/8F8.2/8F8.2/8F8.2/8F8.2/7F8.2)
      WRITE(3,30)  (TS(M,I), I = 2, 48)
      WRITE ( 3, 25)
   25 FORMAT  ('     M     I TS(M,I) TS(M,I-1) TG(M,I) XSO2(M,I)   SUMDF
     1  GS          QEVOL       QG        FSO2    FSO3       FO2')
      DO 200 M = 2, 12
      SUMDF = 0.009965
      FSO2 = 0.000977
      FSO3 = 0.010365
      FO2 = 0.012526
```

```
      DO 200 I = 2, IL
      TS(M,I)=TS(M,I-1)
      TSAV =  (TS(M,I) + TS(M-1, I))/2.
  141 TCSAV = (TSAV - 32.) / 1.8
      TKSAV = TCSAV + 273.16
      FTOT = FSO2 + FO2 + FSO3 + FN2
      XLNKP = 22600. / (1.98719 * TKSAV) - 21.36 / 1.98719
      XKP = EXP (XLNKP)
      PSO2 = FSO2       / FTOT
      PO2 = FO2       / FTOT
      PSO3 = FSO3       / FTOT
      PN2 = FN2 / FTOT
      PTOT = PSO2 + PO2 + PSO3 + PN2
      TERM1 = SQRT (PSO2 / PSO3)
      DENOM = PSO2 * XKP
      TERM3 = (PSO3 / DENOM)**2
      PTERM = TERM1 * (PO2 - TERM3)

      IF (TKSAV - 680.) 610, 610, 620
  610 RATEK = 0.
      GO TO 650
  620 IF (TKSAV - 730.2355) 630, 630, 640
  630 RATEK = 1.56E-07 * TKSAV - 1.06E-04
      GO TO 650
  640 RATEK = 4.874E-07 * TKSAV - 3.48E-04
  650 RXRAT = RATEK * PTERM
      DFSO2 = RXRAT * 60. * WS
C     HEAT BALANCE
      IF (TKSAV - 848.) 150, 150, 155
  150 SHS = 11.22 + 8.20E-03*TKSAV - 2.70E+05 / TKSAV**2
      GO TO 160
  155 SHS = 14.41 + 2.04E-03 * TKSAV
  160 QRX = (3.3 * TKSAV + 44140.)
      QEVOL = QRX * DFSO2
      QS = FS * SHS * (TS(M,I) - TS(M-1,I))
      QG = QEVOL - QS
      TGIN = TG(M,I-1)
      CPGAS = SHSO2(TGIN)  * FSO2 + SHO2(TGIN)  * FO2 + SHSO3(TGIN) *
     1 FSO3 + SHN2(TGIN)  * FN2
      TG(M,I) = QG / CPGAS + TG(M,I-1)
      TS1  =-QS / HTCON +TG(M,I)
      DELTA = ABS (TS1       - TS(M,I))
      IF (DELTA -TTOL) 190, 190, 170
  170 TS2= (TS1       + TS(M,I)) / 2.
      TS(M,I) = TS2
```

```
      TSAV = (TS2+ TS(M-1, I)) / 2.
      GO TO 141
  190 TS(M,I) = TS1
      SUMDF = SUMDF + DFSO2
      DFSO3 = DFSO2
      DFO2 = DFSO2 / 2.
      FSO2       = FSO2       - DFSO2
      FSO3       = FSO3       + DFSO3
      FO2        = FO2        - DFO2
      XAV = DFSO2 / FSO2
      XSO2(M,I) = 100. * SUMDF / FSO2I
      WRITE(3,196)M, I, TS(M,I), TS(M,I-1), TG(M,I), XSO2(M,I), SUMDF,
     1 QS, QEVOL, QG, FSO2, FSO3, FO2
  196 FORMAT (2I5, 4F8.2, F12.6, 3F10.4, 3F11.6)
      SMDF1 = 0.0
  200 CONTINUE
      CALL EXIT
      END
```

```
// XEQ

 0.726667  0.566667  3.716667  2.816667  0.000000 0.75   12   48
 959.13  963.68  967.40  972.69  976.66  982.18  986.95  992.80
 450.00  454.08  458.72  466.10  476.15  488.93  503.79  520.89
 540.23  562.31  586.84  614.28  646.08  682.92  726.92  780.64
 838.74  895.97  945.86  986.57 1019.19 1043.41 1060.19 1071.41
1075.47 1075.52 1071.61 1066.79 1061.52 1056.22 1050.07 1043.64
1037.20 1030.67 1023.82 1017.47 1010.40 1004.43  998.24

  M     I  TS(M,I) TS(M,I-1) TG(M,I) XSO2(M,I)   SUMDF        QS
  2     2  963.34  955.00  968.83   91.14    0.009974    3.6979
  2     3  963.14  963.34  967.51   91.11    0.009970    1.5917
  2     4  966.96  965.14  967.05   91.00    0.009958    0.0622
  2     5  970.65  966.96  967.74   90.80    0.009936   -1.9864
  2     6  972.75  970.65  968.79   90.55    0.009909   -2.6636
  2     7  977.32  972.75  970.85   90.24    0.009875   -4.0351
  2     8  981.03  977.32  973.37   89.89    0.009836   -5.1560
  2     9  985.69  981.03  976.45   89.47    0.009791   -6.2333
  2    10  655.07  985.69  868.68   89.47    0.009791  146.7567
  2    11  615.69  655.07  732.72   89.47    0.009791  112.4106
  2    12  584.37  615.69  714.50   89.47    0.009791   87.5792
  2    13  562.34  584.37  661.62   89.47    0.009791   66.8181
  2    14  547.89  562.34  621.77   89.47    0.009791   49.7285
  2    15  540.64  547.89  593.16   89.47    0.009791   35.3438
  2    16  537.39  540.64  573.58   89.47    0.009791   24.0240
  2    17  540.98  537.89  562.00   89.47    0.009791   14.1472
  2    18  548.20  540.98  557.09   89.47    0.009791    5.9833
  2    19  560.51  548.20  558.30   89.47    0.009791   -1.4818
  2    20  576.28  560.51  564.71   89.47    0.009791   -7.7912
  2    21  595.95  576.28  575.82   89.47    0.009791  -13.5441
  2    22  619.61  595.95  591.38   89.47    0.009791  -19.0031
  2    23  648.66  619.61  611.67   89.47    0.009791  -24.8508
  2    24  684.09  648.66  637.25   89.47    0.009791  -31.5280
  2    25  727.77  684.09  669.09   89.47    0.009791  -39.4955
  2    26  777.78  727.77  707.55   89.63    0.009808  -47.2676
  2    27  829.19  777.78  750.57   90.01    0.009850  -52.7110
  2    28  877.57  829.19  796.49   90.71    0.009926  -54.5645
  2    29  920.24  877.57  839.92   91.38    0.009999  -54.0584
  2    30  954.41  920.24  876.52   90.13    0.009863  -52.4263
  2    31  981.42  954.41  906.57   87.98    0.009628  -50.3742
  2    32 1002.95  981.42  933.47   85.77    0.009386  -46.7618
  2    33 1020.24 1002.95  957.82   83.87    0.009178  -42.0038
  2    34 1032.99 1020.24  979.71   82.55    0.009034  -35.8577
  2    35 1041.13 1032.99  998.11   81.70    0.008940  -28.9438
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0.0000	-14.1472	0.001150	0.010191	0.012612	
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0.0000	7.7912	0.001150	0.010191	0.012612	
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0.0000	19.0031	0.001150	0.010191	0.012612	
0.0000	24.6908	0.001150	0.010191	0.012612	
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0.0000	39.4955	0.001150	0.010191	0.012612	
0.8069	48.0745	0.001133	0.010208	0.012604	
1.9441	54.6552	0.001091	0.010250	0.012583	
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2	37	1048.08	1045.11	1024.39	81.21	0.008687	-15.9481
2	38	1048.90	1048.08	1032.83	81.32	0.008898	-10.8163
2	39	1048.05	1048.90	1038.47	81.54	0.008923	-6.4460
2	40	1046.82	1048.05	1042.18	81.90	0.008962	-3.1212
2	41	1043.42	1046.82	1043.72	82.35	0.009011	0.2331
2	42	1039.87	1043.42	1043.74	82.86	0.009067	2.9295
2	43	1035.67	1039.87	1042.46	83.41	0.009128	4.6700
2	44	1030.80	1035.67	1040.03	84.00	0.009193	6.2470
2	45	1025.87	1030.80	1036.87	84.60	0.009260	7.4009
2	46	1020.16	1025.87	1032.88	85.23	0.009327	8.5602
2	47	1014.92	1020.16	1028.43	85.83	0.009393	9.0875
2	48	1009.33	1014.92	1023.56	86.42	0.009457	9.5765
3	2	965.83	955.00	969.43	91.05	0.009964	2.4191
3	3	966.89	965.83	968.49	91.02	0.009960	1.0759
3	4	966.99	966.89	967.82	90.95	0.009953	0.5568
3	5	969.07	966.99	967.98	90.21	0.009938	-0.7915
3	6	970.56	969.07	968.43	90.68	0.009923	-1.4276
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3	11	725.95	774.63	845.71	89.91	0.009839	80.6038
3	12	683.85	725.95	790.55	89.91	0.009839	71.8065
3	13	649.53	683.85	742.10	89.91	0.009839	62.3028
3	14	622.26	649.53	700.63	89.91	0.009839	52.7425
3	15	601.53	622.26	666.12	89.91	0.009839	43.4700
3	16	586.75	601.53	638.33	89.91	0.009839	34.7134
3	17	578.65	586.75	617.34	89.91	0.009839	26.8339
3	18	574.81	578.65	602.33	89.91	0.009839	19.9240
3	19	576.71	574.81	593.27	89.91	0.009839	11.1478
3	20	582.42	576.71	589.43	89.91	0.009839	4.7160
3	21	593.67	582.42	590.93	89.91	0.009839	-1.8459
3	22	609.10	593.67	597.37	89.91	0.009839	-7.8939
3	23	629.87	609.10	608.87	89.91	0.009839	-14.1300
3	24	655.92	629.87	625.50	89.91	0.009839	-20.4755
3	25	689.74	655.92	648.13	89.91	0.009839	-26.3011
3	26	729.95	689.74	676.86	89.91	0.009839	-35.7276
3	27	774.34	729.95	711.29	90.04	0.009853	-42.4374
3	28	818.37	774.34	749.25	90.32	0.009884	-46.5190
3	29	860.18	818.37	789.10	90.90	0.009947	-47.8392
3	30	896.73	860.18	827.63	91.49	0.010012	-46.5035
3	31	927.43	896.73	862.05	91.61	0.010025	-44.0014
3	32	952.57	927.43	890.92	90.87	0.009944	-41.4901
3	33	973.19	952.57	915.17	89.47	0.009791	-39.0520
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11245

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3	36	1012.53	1002.92	972.10	85.64	0.009371	-27.2078
3	37	1019.87	1012.53	986.02	84.81	0.009281	-22.7864
3	38	1025.71	1019.87	997.80	84.22	0.009216	-18.7797
3	39	1030.36	1025.71	1007.77	83.85	0.009176	-15.2080
3	40	1033.04	1030.36	1015.62	83.62	0.009150	-11.7256
3	41	1033.84	1033.04	1021.60	83.58	0.009146	-8.2367
3	42	1033.82	1033.84	1025.89	83.66	0.009155	-5.3382
3	43	1032.75	1033.82	1028.66	83.85	0.009175	-2.7545
3	44	1030.88	1032.75	1030.12	84.13	0.009207	-0.5098
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3	46	1023.94	1027.55	1029.10	84.88	0.009288	3.4716
3	47	1020.23	1023.94	1027.26	85.32	0.009336	4.7265
3	48	1015.98	1020.23	1024.68	85.78	0.009387	5.8561
4	2	967.31	955.00	969.77	90.99	0.009957	1.8596
4	3	967.40	967.31	968.82	90.93	0.009950	0.4495
4	4	967.94	967.40	968.44	90.90	0.009947	0.3570
4	5	969.04	967.94	968.47	90.83	0.009939	-0.3862
4	6	969.93	969.04	968.75	90.74	0.009930	-0.7969
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4	11	801.46	847.44	887.03	90.37	0.009889	57.5926
4	12	759.97	801.46	843.97	90.37	0.009889	56.5315
4	13	722.75	759.97	802.64	90.37	0.009889	53.7698
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4	15	663.23	690.47	729.36	90.37	0.009889	44.5064
4	16	640.41	663.23	698.52	90.37	0.009889	39.1107
4	17	623.88	640.41	672.52	90.37	0.009889	33.7350
4	18	611.73	623.88	651.26	90.37	0.009889	28.6014
4	19	605.39	611.73	635.16	90.37	0.009889	24.0365
4	20	602.89	605.39	623.70	90.37	0.009889	14.2080
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4	33	928.97	904.96	875.49	92.13	0.010082	-35.9974
4	34	948.83	928.97	898.77	91.51	0.010014	-33.6877
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4	42	1020.25	1017.09	1003.08	85.28	0.009333	-11.5515
4	43	1021.67	1020.25	1009.78	85.03	0.009310	-8.6774
4	44	1022.73	1021.67	1013.23	85.00	0.009301	-6.3002
4	45	1022.32	1022.73	1016.40	85.05	0.009307	-3.9792
4	46	1021.14	1022.32	1018.36	85.20	0.009323	-1.8751
4	47	1020.10	1021.14	1019.49	85.41	0.009347	-0.4111
4	48	1018.05	1020.10	1019.71	85.69	0.009377	1.1243
5	2	968.17	955.00	969.96	90.55	0.009953	1.2039
5	3	968.35	968.17	959.27	90.89	0.009946	0.6226
5	4	968.36	968.35	968.84	90.85	0.009942	0.3263
5	5	968.46	968.36	968.56	90.79	0.009935	0.0717
5	6	969.70	968.46	968.81	90.73	0.009929	-0.5977
5	7	970.84	969.70	969.29	90.65	0.009920	-1.0485
5	8	972.05	970.84	969.08	90.56	0.009910	-1.3974
5	9	973.81	972.05	970.84	90.39	0.009892	-2.0006
5	10	892.32	973.81	945.58	90.82	0.009938	35.6418
5	11	854.20	892.32	915.36	91.02	0.009961	41.1603
5	12	817.65	854.20	882.57	91.11	0.009970	43.6911
5	13	782.27	817.65	848.56	91.11	0.009970	44.0085
5	14	749.62	782.27	814.85	91.11	0.009970	43.8999
5	15	720.19	749.62	782.45	91.11	0.009970	41.9011
5	16	693.95	720.19	752.01	91.11	0.009970	39.0753
5	17	671.67	693.95	724.26	91.11	0.009970	35.8870
5	18	653.85	671.67	699.63	91.11	0.009970	30.9434
5	19	640.82	653.85	679.28	91.11	0.009970	25.8806
5	20	631.40	640.82	662.55	91.11	0.009970	20.9634
5	21	627.28	631.40	650.19	91.11	0.009970	15.4217
5	22	626.10	627.28	641.74	91.11	0.009970	10.5205
5	23	630.79	626.10	637.89	91.11	0.009970	4.7796
5	24	640.87	630.79	638.94	91.11	0.009970	-1.3018
5	25	656.38	640.87	645.07	91.11	0.009970	-7.6102
5	26	677.43	656.38	656.44	91.11	0.009970	-14.1265
5	27	704.08	677.43	673.14	91.11	0.009970	-20.0219
5	28	734.13	704.08	694.47	91.11	0.009970	-26.6388
5	29	766.70	734.13	719.86	91.19	0.009978	-31.5277
5	30	799.09	766.70	747.85	91.37	0.009998	-34.5870
5	31	830.25	799.09	777.02	91.63	0.010027	-35.8815
5	32	859.31	830.25	806.52	92.06	0.010077	-35.5256
5	33	885.45	859.31	834.81	92.56	0.010129	-34.0846

-0.0290	35.9584	0.0000259	0.010482	0.012467
-5.1899	30.4977	0.0000927	0.010414	0.012501
-5.1946	26.0612	0.0001038	0.010383	0.012556
-5.5123	22.9130	0.0001156	0.010135	0.012615
-5.1444	20.3380	0.0001256	0.010075	0.012670
-4.6203	17.6810	0.0001366	0.009975	0.012720
-4.0906	15.5729	0.0001452	0.009888	0.012764
-3.2765	13.7200	0.0001525	0.009818	0.012799
-2.3145	12.0840	0.0001573	0.009768	0.012824
-1.6704	9.6611	0.0001655	0.009733	0.012841
-1.0535	7.6289	0.0001731	0.009710	0.012853
-0.4181	5.9720	0.0001840	0.009701	0.012857
0.2758	4.2551	0.0001937	0.009707	0.012854
0.7490	2.6441	0.0001618	0.009723	0.012846
1.1128	1.5239	0.0001594	0.009747	0.012834
1.4155	0.2961	0.0001564	0.009777	0.012819
-0.5467	-1.7507	0.0000988	0.010353	0.012531
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-0.2430	-0.5692	0.0001005	0.010341	0.012537
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-0.2669	0.3307	0.0001012	0.010329	0.012543
-0.4056	0.6596	0.0001021	0.010320	0.012548
-0.4856	0.9117	0.0001031	0.010310	0.012552
-0.8542	1.1484	0.0001040	0.010302	0.012562
2.1715	-33.6703	0.0001003	0.010356	0.012539
1.0463	-40.1119	0.0000960	0.010361	0.012527
0.4128	-43.2702	0.0000971	0.010370	0.012523
0.0000	-44.6035	0.0000971	0.010370	0.012523
0.0000	-43.8999	0.0000971	0.010370	0.012523
0.0000	-41.9011	0.0000971	0.010370	0.012523
0.0000	-39.0753	0.0000971	0.010370	0.012523
0.0000	-35.3370	0.0000971	0.010370	0.012523
0.0000	-30.9434	0.0000971	0.010370	0.012523
0.0000	-25.8806	0.0000971	0.010370	0.012523
0.0000	-20.9634	0.0000971	0.010370	0.012523
0.0000	-15.4417	0.0000971	0.010370	0.012523
0.0000	-10.5205	0.0000971	0.010370	0.012523
0.0000	-4.7796	0.0000971	0.010370	0.012523
0.0000	1.3018	0.0000971	0.010370	0.012523
0.0000	7.5112	0.0000971	0.010370	0.012523
0.0000	14.1265	0.0000971	0.010370	0.012523
0.0000	20.8215	0.0000971	0.010370	0.012523
0.0000	26.6688	0.0000971	0.010370	0.012523
0.4004	31.9281	0.0000963	0.010378	0.012519
0.9510	35.4160	0.0000942	0.010398	0.012508
1.3414	37.1629	0.0000914	0.010427	0.012494
2.2985	37.8269	0.0000864	0.010477	0.012469
2.4263	36.5109	0.0000814	0.010529	0.012443

5	34	909.11	885.45	860.53	92.83	0.010158	-32.0218
5	35	927.92	908.11	883.11	92.70	0.010144	-30.1570
5	36	943.89	927.92	902.28	92.14	0.010083	-28.0055
5	37	957.47	943.89	918.85	91.32	0.009994	-25.9953
5	38	968.23	957.47	933.24	90.44	0.009897	-23.9436
5	39	978.46	968.23	946.22	89.55	0.009800	-21.7036
5	40	987.23	978.46	957.93	88.74	0.009711	-19.7154
5	41	994.87	987.23	968.45	88.00	0.009630	-17.7777
5	42	1000.89	994.87	977.78	87.39	0.009564	-15.9541
5	43	1006.02	1000.89	986.10	86.94	0.009514	-14.4095
5	44	1009.63	1006.02	993.05	86.58	0.009474	-13.1558
5	45	1011.27	1009.63	998.51	86.33	0.009447	-12.0847
5	46	1012.65	1011.27	1002.89	86.19	0.009432	-11.3578
5	47	1013.69	1012.65	1006.32	86.12	0.009424	-10.9616
5	48	1014.39	1013.69	1009.07	86.14	0.009426	-10.9844
6	2	958.66	955.00	970.07	90.93	0.009950	0.9361
6	3	969.19	965.68	969.56	90.86	0.009942	0.3695
6	4	969.11	969.19	969.32	90.81	0.009938	0.1422
6	5	969.04	969.11	969.15	90.78	0.009935	0.0766
6	6	969.11	969.04	969.00	90.73	0.009929	-0.0740
6	7	970.47	969.11	969.35	90.67	0.009922	-0.7531
6	8	970.56	970.47	969.56	90.60	0.009914	-0.6726
6	9	971.92	970.56	970.11	90.50	0.009904	-1.2185
6	10	920.86	971.92	955.22	91.14	0.009974	23.1219
6	11	891.76	920.86	934.94	91.56	0.010019	29.0655
6	12	861.10	891.76	910.64	91.78	0.010044	33.5400
6	13	829.86	861.10	883.67	91.91	0.010058	36.2145
6	14	799.38	829.86	855.18	91.94	0.010061	37.5497
6	15	770.47	799.38	826.35	91.94	0.010061	37.5074
6	16	743.45	770.47	798.02	91.94	0.010061	36.7252
6	17	719.06	743.45	770.92	91.94	0.010061	34.9061
6	18	697.87	719.06	745.76	91.94	0.010061	32.2269
6	19	679.83	697.87	722.96	91.94	0.010061	29.0274
6	20	665.53	679.83	703.03	91.94	0.010061	25.2370
6	21	655.53	665.53	686.51	91.94	0.010061	20.8135
6	22	649.25	655.56	673.51	91.94	0.010061	16.2280
6	23	646.40	649.25	664.03	91.94	0.010061	11.8522
6	24	649.36	646.40	658.59	91.94	0.010061	6.4131
6	25	657.49	649.36	653.40	91.94	0.010061	0.6181
6	26	670.63	657.49	662.69	91.94	0.010061	-5.3452
6	27	689.17	670.63	671.97	91.94	0.010061	-11.8314
6	28	711.00	689.17	685.62	91.94	0.010061	-17.0829
6	29	736.71	711.00	703.45	91.94	0.010061	-22.3618
6	30	764.00	736.71	724.67	92.00	0.010067	-26.4565
6	31	791.82	764.00	748.34	92.14	0.010083	-29.2609

1.3852	33.4090	0.000783	0.010558	0.012429
-0.6701	29.4668	0.000797	0.010544	0.012436
-2.8533	25.1521	0.000853	0.010433	0.012460
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-4.5505	19.0130	0.001044	0.010297	0.012559
-4.5237	17.1799	0.001141	0.010200	0.012603

11247

-4.1663	15.5491	0.001230	0.010111	0.012652
-3.7828	13.9949	0.001311	0.010030	0.012693
-3.1173	12.4293	0.001377	0.009964	0.012726
-2.3171	11.0921	0.001427	0.009914	0.012751
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0.0972	3.6800	0.001519	0.009826	0.012795
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3.2719	-19.8500	0.000967	0.010374	0.012521
2.1102	-26.9552	0.000912	0.010419	0.012498
1.1383	-32.2017	0.000897	0.010444	0.012486
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0.0000	11.5814	0.000880	0.010461	0.012477
0.0000	17.0823	0.000880	0.010461	0.012477
0.0000	22.3818	0.000880	0.010461	0.012477
0.2839	26.7504	0.000874	0.010467	0.012474
0.7211	29.9821	0.000856	0.010483	0.012466

6	32	819.18	791.82	773.38	92.35	0.010106	-30.8213
6	33	843.24	819.18	798.95	92.67	0.010141	-31.1536
6	34	869.18	843.24	824.09	93.07	0.010185	-30.3491
6	35	890.88	869.18	847.78	93.40	0.010221	-29.0066
6	36	909.35	890.88	869.00	93.50	0.010251	-27.1561
6	37	925.20	909.35	887.43	93.24	0.010203	-25.4229
6	38	938.36	925.20	903.30	92.70	0.010144	-23.5938
6	39	950.37	938.36	917.35	91.97	0.010065	-22.2222
6	40	960.98	950.37	930.06	91.19	0.009979	-20.8121
6	41	970.47	960.98	941.66	90.40	0.009892	-19.3696
6	42	978.61	970.47	952.24	89.67	0.009813	-17.7521
6	43	985.80	978.61	961.81	89.00	0.009740	-16.1459
6	44	991.71	985.80	970.39	88.43	0.009677	-14.3517
6	45	996.64	991.71	978.09	87.99	0.009629	-12.4856
6	46	1000.26	996.64	984.61	87.64	0.009590	-10.5309
6	47	1003.27	1000.26	990.11	87.34	0.009558	-8.8960
6	48	1005.07	1003.27	994.50	87.10	0.009531	-7.1156
7	2	968.97	955.00	970.14	90.91	0.009949	0.7825
7	3	969.05	968.97	969.53	90.82	0.009938	0.3222
7	4	969.45	969.05	969.38	90.77	0.009933	-0.0474
7	5	969.39	969.45	969.31	90.74	0.009930	-0.0538
7	6	968.71	969.39	969.04	90.72	0.009927	0.2243
7	7	970.32	968.71	969.37	90.67	0.009922	-0.6459
7	8	969.65	970.32	969.36	90.64	0.009918	-0.1905
7	9	971.40	969.65	969.92	90.58	0.009913	-0.9985
7	10	939.03	971.40	961.14	91.21	0.009981	14.8784
7	11	917.66	939.03	948.05	91.78	0.010043	20.8196
7	12	893.47	917.86	930.74	92.19	0.010088	25.3851
7	13	867.22	893.47	909.92	92.42	0.010113	28.7400
7	14	840.33	867.22	886.81	92.58	0.010131	31.2824
7	15	813.60	840.33	862.21	92.66	0.010140	32.7138
7	16	787.53	813.60	836.33	92.66	0.010140	33.1011
7	17	762.92	787.53	811.61	92.66	0.010140	32.7700
7	18	740.35	762.92	787.21	92.66	0.010140	31.8349
7	19	720.04	740.35	764.12	92.66	0.010140	29.6714
7	20	701.96	720.04	742.69	92.66	0.010140	27.4093
7	21	687.88	701.96	723.73	92.66	0.010140	24.1267
7	22	676.92	687.88	707.49	92.66	0.010140	20.3696
7	23	669.14	676.92	694.15	92.66	0.010140	16.8814
7	24	666.33	669.14	684.45	92.66	0.010140	12.1937
7	25	667.81	666.33	678.64	92.66	0.010140	7.2891
7	26	673.24	667.81	676.75	92.66	0.010140	2.3662
7	27	684.82	673.24	679.57	92.66	0.010140	-3.5524
7	28	699.73	684.82	686.61	92.66	0.010140	-8.8241
7	29	718.07	699.73	697.59	92.66	0.010140	-13.7815

1.0839	31.9052	0.000835	0.010506	0.012455
1.6019	32.7556	0.000800	0.010541	0.012437
2.0484	32.3975	0.000756	0.010585	0.012415
1.7014	30.7080	0.000720	0.010621	0.012397
0.4738	27.6299	0.000710	0.010631	0.012392
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-4.0335	16.7785	0.000962	0.010379	0.012518
-4.0277	15.3618	0.001049	0.010292	0.012561
-2.7289	14.0231	0.001123	0.010215	0.012601
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-1.0268	8.7021	0.001351	0.009990	0.012713
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3.1847	-11.6937	0.000960	0.010381	0.012517
2.9003	-17.4193	0.000898	0.010443	0.012486
2.0989	-22.9862	0.000853	0.010488	0.012464
1.1767	-27.5633	0.000828	0.010513	0.012451
0.8072	-30.4752	0.000810	0.010531	0.012442
0.4141	-32.2997	0.000801	0.010540	0.012438
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7	30	739.42	718.07	712.16	92.66	0.010140	-18.3417
7	31	762.54	739.42	729.78	92.70	0.010145	-22.0469
7	32	786.56	762.54	749.75	92.82	0.010157	-24.7715
7	33	810.61	786.56	771.24	92.99	0.010176	-25.4098
7	34	833.85	810.61	793.37	93.21	0.010200	-27.2415
7	35	855.96	833.85	815.67	93.52	0.010234	-27.1121
7	36	875.90	855.96	837.12	93.84	0.010269	-26.0991
7	37	893.64	875.90	856.92	94.04	0.010291	-24.7165
7	38	908.90	893.64	874.51	94.01	0.010287	-23.1401
7	39	922.53	908.90	889.98	93.68	0.010252	-21.9042
7	40	934.60	922.53	903.69	93.14	0.010192	-20.8925
7	41	945.45	934.60	916.08	92.46	0.010118	-19.7689
7	42	955.11	945.45	927.44	91.76	0.010041	-18.6198
7	43	963.83	955.11	937.91	91.05	0.009964	-17.4426
7	44	971.47	963.83	947.53	90.40	0.009892	-16.1112
7	45	978.17	971.47	956.29	89.79	0.009826	-14.7265
7	46	983.77	978.17	964.18	89.27	0.009768	-13.1890
7	47	989.26	983.77	971.44	88.81	0.009719	-11.9522
7	48	992.96	989.26	977.70	88.44	0.009678	-10.2700
8	2	969.15	955.00	970.18	90.91	0.009948	0.6918
8	3	969.68	969.15	969.80	90.82	0.009939	0.0791
8	4	969.12	969.68	969.40	90.76	0.009932	0.1910
8	5	969.77	969.12	969.44	90.73	0.009928	-0.2189
8	6	968.67	969.77	969.16	90.72	0.009927	0.3092
8	7	970.28	968.67	969.44	90.68	0.009923	-0.5660
8	8	969.30	970.28	969.35	90.66	0.009921	0.0969
8	9	971.07	969.30	969.81	90.61	0.009916	-0.8506
8	10	951.16	971.07	964.84	91.12	0.009971	9.2050
8	11	935.76	951.16	956.49	91.68	0.010032	13.9556
8	12	917.18	935.76	944.61	92.20	0.010089	18.4660
8	13	896.06	917.18	929.32	92.61	0.010134	22.3660
8	14	873.27	896.06	911.05	92.85	0.010161	25.4266
8	15	849.68	873.27	890.78	93.03	0.010181	27.6582
8	16	825.78	849.68	869.06	93.15	0.010193	29.1301
8	17	802.27	825.78	846.50	93.20	0.010199	29.7718
8	18	779.76	802.27	823.76	93.20	0.010199	29.6144
8	19	758.65	779.76	801.50	93.20	0.010199	28.8414
8	20	739.11	758.65	780.11	93.20	0.010199	27.5908
8	21	721.79	739.11	760.04	93.20	0.010199	25.7460
8	22	707.59	721.79	741.94	93.20	0.010199	23.1222
8	23	696.06	707.59	726.07	93.20	0.010199	20.1952
8	24	688.48	696.06	713.03	93.20	0.010199	16.5241
8	25	684.95	688.48	703.27	93.20	0.010199	12.3297
8	26	684.74	684.95	696.82	93.20	0.010199	8.1335
8	27	688.98	684.74	694.09	93.20	0.010199	3.4402

0.0000	18.3417	0.000801	0.010540	0.012438
0.2042	22.2531	0.000796	0.010545	0.012435
0.5668	25.3384	0.000784	0.010557	0.012429
0.8818	27.3817	0.000765	0.010576	0.012420
1.1013	28.3428	0.000741	0.010600	0.012408
1.5995	28.7116	0.000707	0.010634	0.012391
1.6395	27.7386	0.000672	0.010669	0.012373
1.0168	25.7334	0.000650	0.010691	0.012362
-0.1782	22.9619	0.000654	0.010687	0.012364
-1.6402	20.2639	0.000689	0.010652	0.012382
-2.8020	18.0004	0.000749	0.010592	0.012412
-3.4444	16.3245	0.000823	0.010518	0.012449
-3.6193	15.0005	0.000900	0.010441	0.012487
-3.5695	13.8531	0.000977	0.010364	0.012526
-3.3695	12.7417	0.001049	0.010292	0.012562
-3.0912	11.6352	0.001115	0.010226	0.012595
-2.6939	10.4890	0.001173	0.010168	0.012623
-2.3201	9.6721	0.001222	0.010119	0.012648
-1.9248	8.8451	0.001263	0.010078	0.012669
-0.7749	-1.4663	0.000993	0.010348	0.012534
-0.4232	-0.5013	0.001002	0.010339	0.012530
-0.3389	-0.5300	0.001009	0.010332	0.012542
-0.1618	0.0571	0.001013	0.010328	0.012544
-0.0486	-0.3778	0.001014	0.010327	0.012544
-0.1994	0.3665	0.001018	0.010323	0.012546
-0.0766	-0.1136	0.001020	0.010321	0.012547
-0.2419	0.6087	0.001025	0.010316	0.012550
2.5865	-6.6184	0.000970	0.010371	0.012522
2.8409	-11.1147	0.000909	0.010432	0.012492
2.6613	-15.3026	0.000852	0.010489	0.012463
2.0904	-20.2926	0.000807	0.010534	0.012441
1.2470	-24.1795	0.000780	0.010561	0.012427
0.9159	-26.7423	0.000760	0.010581	0.012417
0.5936	-28.5365	0.000748	0.010593	0.012411
0.2651	-29.5067	0.000742	0.010599	0.012408
0.0000	-29.6144	0.000742	0.010599	0.012408
0.0000	-28.8414	0.000742	0.010599	0.012408
0.0000	-27.5908	0.000742	0.010599	0.012408
0.0000	-25.7480	0.000742	0.010599	0.012408
0.0000	-23.1222	0.000742	0.010599	0.012408
0.0000	-20.1952	0.000742	0.010599	0.012408
0.0000	-16.5241	0.000742	0.010599	0.012408

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0.0000	-12.3297	0.000742	0.010599	0.012408
0.0000	-8.1335	0.000742	0.010599	0.012408
0.0000	-3.4402	0.000742	0.010599	0.012408

8	28	697.84	688.98	695.40	93.20	0.010199	-1.6472
8	29	709.98	697.84	700.48	93.20	0.010199	-6.3959
8	30	725.47	709.98	709.18	93.20	0.010199	-10.9630
8	31	742.78	725.47	720.86	93.20	0.010199	-14.7467
8	32	762.38	742.78	735.56	93.23	0.010203	-18.1577
8	33	783.11	762.38	752.13	93.32	0.010212	-20.8464
8	34	804.15	783.11	770.48	93.47	0.010228	-22.6629
8	35	825.05	804.15	789.76	93.63	0.010248	-23.7457
8	36	844.92	825.05	809.31	93.88	0.010274	-23.9648
8	37	863.45	844.92	828.58	94.16	0.010304	-23.4590
8	38	880.15	863.45	846.81	94.40	0.010330	-22.4386
8	39	895.26	880.15	863.54	94.49	0.010340	-21.3467
8	40	908.72	895.26	878.54	94.35	0.010325	-20.3056
8	41	920.76	908.72	891.92	93.98	0.010285	-19.4118
8	42	931.55	920.76	903.98	93.45	0.010227	-18.5552
8	43	941.38	931.55	915.04	92.84	0.010159	-17.7252
8	44	950.25	941.38	925.29	92.20	0.010089	-16.7931
8	45	958.26	950.25	934.80	91.57	0.010021	-15.7090
8	46	965.34	958.26	943.57	90.98	0.009956	-14.3475
8	47	972.04	965.34	951.69	90.41	0.009893	-13.6992
8	48	978.13	972.04	959.31	89.91	0.009839	-12.6603
9	2	969.25	955.00	970.20	90.90	0.009947	0.6381
9	3	969.33	969.25	969.64	90.80	0.009936	0.2073
9	4	969.07	969.33	969.33	90.75	0.009931	0.1759
9	5	969.16	969.07	969.16	90.71	0.009926	-0.0008
9	6	969.10	969.16	969.15	90.71	0.009926	0.0084
9	7	970.08	969.10	969.37	90.67	0.009922	-0.4792
9	8	969.05	970.08	969.25	90.67	0.009922	0.1 [illegible]
9	9	970.83	969.05	969.68	90.63	0.009917	-0.7791
9	10	953.56	970.83	966.87	90.99	0.009957	5.5090
9	11	947.75	958.56	961.63	91.45	0.010008	9.5429
9	12	934.07	947.75	953.67	91.96	0.010063	13.1908
9	13	917.74	934.07	942.85	92.45	0.010117	16.8070
9	14	899.24	917.74	929.22	92.86	0.010162	20.1765
9	15	879.17	899.24	913.07	93.15	0.010193	22.8148
9	16	858.09	879.17	895.00	93.34	0.010214	24.8410
9	17	836.60	858.09	875.60	93.48	0.010230	26.2447
9	18	815.26	836.60	855.35	93.57	0.010240	26.9794
9	19	794.49	815.26	834.73	93.61	0.010244	27.0782
9	20	774.60	794.49	814.21	93.61	0.010244	26.6526
9	21	756.17	774.60	794.34	93.61	0.010244	25.6878
9	22	739.34	756.17	775.46	93.61	0.010244	24.3138
9	23	725.22	739.34	758.17	93.61	0.010244	22.1711
9	24	714.15	725.22	742.97	93.61	0.010244	19.4011
9	25	706.37	714.15	730.31	93.61	0.010244	16.1116
9	26	702.03	706.37	720.51	93.61	0.010244	12.4364
9	27	700.44	702.03	713.54	93.61	0.010244	8.6191
9	28	703.45	700.44	710.03	93.61	0.010244	4.4341

0.0000	1.6472	0.000742	0.010599	0.012408
0.0000	6.3959	0.000742	0.010599	0.012408
0.0000	10.9630	0.000742	0.010599	0.012408
0.0000	14.7467	0.000742	0.010599	0.012408
0.1570	18.3447	0.000738	0.010603	0.012406
0.4603	21.3067	0.000729	0.010612	0.012402
0.7325	23.3955	0.000713	0.010628	0.012394
0.9423	24.6910	0.000693	0.010648	0.012383
1.1783	25.1431	0.000667	0.010674	0.012371
1.4296	24.8987	0.000637	0.010704	0.012356
1.2033	23.6420	0.000611	0.010730	0.012343
0.4481	21.7948	0.000601	0.010740	0.012338
-0.7002	19.6054	0.000616	0.010725	0.012345
-1.8808	17.5309	0.000656	0.010685	0.012365
-2.7116	15.8475	0.000714	0.010627	0.012394
-3.1460	14.5791	0.000782	0.010559	0.012428
-3.2625	13.5305	0.000852	0.010489	0.012463
-3.2131	12.5758	0.000920	0.010421	0.012497
-3.0255	11.6220	0.000965	0.010356	0.012530
-2.9383	10.7609	0.001046	0.010293	0.012561
-2.5248	10.1554	0.001102	0.010239	0.012588
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-0.2341	-0.4100	0.001010	0.010331	0.012542
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0.0217	-0.0107	0.001015	0.010326	0.012545
-0.1890	0.2901	0.001019	0.010322	0.012547
-0.0241	-0.1604	0.001019	0.010322	0.012547
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1.8415	-5.7479	0.000964	0.010377	0.012519
2.3674	-6.9755	0.000933	0.010408	0.012504
2.6021	-10.5886	0.000878	0.010463	0.012476
2.5028	-14.3941	0.000824	0.010517	0.012449
2.0949	-18.0815	0.000779	0.010562	0.012427
1.4493	-21.3656	0.000748	0.010593	0.012411
0.9916	-23.8493	0.000727	0.010614	0.012401
0.7313	-25.9134	0.000711	0.010630	0.012393
0.4523	-26.5270	0.000701	0.010640	0.012388
0.1751	-26.9031	0.000697	0.010644	0.012386
0.0000	-26.6528	0.000697	0.010644	0.012386
0.0000	-25.6878	0.000697	0.010644	0.012386
0.0000	-24.3108	0.000697	0.010644	0.012386
0.0000	-22.1711	0.000697	0.010644	0.012386
0.0000	-19.4011	0.000697	0.010644	0.012386
0.0000	-16.1116	0.000697	0.010644	0.012386
0.0000	-12.4364	0.000697	0.010644	0.012386
0.0000	-8.8191	0.000697	0.010644	0.012386
0.0000	-4.4341	0.000697	0.010644	0.012386

9	29	710.17	703.45	710.08	93.61	0.010244	-0.0591
9	30	720.04	710.17	713.54	93.61	0.010244	-4.3712
9	31	732.33	720.04	720.07	93.61	0.010244	-8.2525
9	32	747.27	732.33	729.51	93.61	0.010244	-11.9479
9	33	763.37	747.27	741.32	93.63	0.010246	-14.8400
9	34	781.16	763.37	755.30	93.71	0.010255	-17.6997
9	35	799.66	781.16	770.94	93.83	0.010268	-19.3303
9	36	818.12	799.66	787.61	93.99	0.010286	-20.5823
9	37	836.08	818.12	804.74	94.18	0.010306	-21.0913
9	38	853.07	836.08	821.90	94.41	0.010331	-20.9774
9	39	868.98	853.07	838.60	94.64	0.010357	-20.4432
9	40	883.53	868.98	854.33	94.79	0.010373	-19.6551
9	41	896.70	883.53	868.73	94.79	0.010373	-18.8236
9	42	908.54	896.70	881.72	94.58	0.010350	-18.0461
9	43	919.27	908.54	893.46	94.20	0.010308	-17.3704
9	44	929.03	919.27	904.21	93.69	0.010253	-16.7047
9	45	937.97	929.03	914.18	93.13	0.010191	-16.0106
9	46	946.10	937.97	923.48	92.56	0.010126	-15.2160
9	47	953.74	946.10	932.20	91.98	0.010065	-14.4933
9	48	960.80	953.74	940.38	91.41	0.010003	-13.7420
10	2	969.31	955.00	970.21	90.90	0.009947	0.6670
10	3	969.92	969.31	969.89	90.81	0.009938	-0.0214
10	4	969.07	969.92	969.48	90.76	0.009932	0.2702
10	5	969.54	969.07	969.43	90.73	0.009929	-0.0723
10	6	969.47	969.54	969.40	90.71	0.009927	-0.0486
10	7	969.53	969.47	969.34	90.68	0.009923	-0.1254
10	8	969.46	969.53	969.40	90.68	0.009923	-0.0433
10	9	970.55	969.46	969.68	90.64	0.009919	-0.9875
10	10	962.36	970.55	967.82	90.87	0.009944	3.6696
10	11	954.98	962.36	964.40	91.22	0.009982	6.3355
10	12	945.71	954.98	959.23	91.65	0.010030	9.0999
10	13	933.50	945.71	951.80	92.13	0.010082	12.3165
10	14	919.03	933.50	941.98	92.60	0.010133	15.4436
10	15	902.65	919.03	929.79	93.01	0.010178	18.2659
10	16	884.73	902.65	915.40	93.32	0.010212	20.6492
10	17	865.77	884.73	899.17	93.53	0.010235	22.4793
10	18	846.32	865.77	881.71	93.69	0.010253	23.8169
10	19	826.79	846.32	863.39	93.81	0.010266	24.6331
10	20	807.49	826.79	844.57	93.88	0.010274	24.9512
10	21	788.93	807.49	825.66	93.91	0.010276	24.7242
10	22	771.37	788.93	807.11	93.91	0.010276	24.0811
10	23	755.07	771.37	789.28	93.91	0.010276	23.0240
10	24	741.64	755.07	772.91	93.91	0.010276	21.6498
10	25	730.78	741.64	758.40	93.91	0.010276	18.5893
10	26	722.76	730.78	746.10	93.91	0.010276	15.7102

0.0000	0.0591	0.000697	0.010644	0.012366
0.0000	4.3712	0.000697	0.010644	0.012366
0.0000	8.2525	0.000697	0.010644	0.012366
0.0000	11.9479	0.000697	0.010644	0.012366
0.1343	14.9743	0.000694	0.010646	0.012364
0.3883	17.7681	0.000686	0.010655	0.012356
0.6254	19.9557	0.000673	0.010668	0.012374
0.8169	21.8400	0.000652	0.010686	0.012365
0.9326	22.0240	0.000635	0.010706	0.012355
1.1745	22.1520	0.000610	0.010731	0.012342
1.1901	21.6333	0.000584	0.010757	0.012329
0.7654	20.4566	0.000568	0.010773	0.012321

-0.0297	18.7933	0.000568	0.010773	0.012321
-1.0521	16.9949	0.000591	0.010750	0.012333
-1.9750	15.3965	0.000633	0.010708	0.012354
-2.5758	14.1282	0.000688	0.010653	0.012381
-2.8722	13.1383	0.000750	0.010591	0.012412
-2.9406	12.4772	0.000813	0.010528	0.012443
-2.9635	11.9300	0.000870	0.010469	0.012475
-2.9113	10.8506	0.000938	0.010403	0.012508
-0.0133	-1.4203	0.000994	0.010347	0.012534
-0.4450	-0.4235	0.001003	0.010338	0.012539
-0.2643	-0.5425	0.001009	0.010332	0.012542
-0.1455	-0.0722	0.001012	0.010329	0.012545
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-0.2017	-0.0702	0.001013	0.010328	0.012546
0.0275	0.3709	0.001013	0.010328	0.012546
-0.2124	0.3750	0.001022	0.010319	0.012548
1.1878	-2.4818	0.000997	0.010344	0.012536
1.7796	-4.5559	0.000959	0.010382	0.012517
2.2222	-6.8771	0.000911	0.010430	0.012493
2.4304	-9.0660	0.000859	0.010482	0.012467
2.3873	-13.0562	0.000808	0.010533	0.012441
2.0989	-16.1069	0.000765	0.010576	0.012419
1.6022	-19.0430	0.000729	0.010612	0.012401
1.0455	-21.4337	0.000706	0.010635	0.012390
0.8366	-22.9783	0.000698	0.010643	0.012386
0.6023	-24.0308	0.000675	0.010666	0.012375
0.3569	-24.5943	0.000667	0.010674	0.012371
0.1180	-24.6042	0.000665	0.010676	0.012370
0.0000	-24.5511	0.000665	0.010676	0.012370
0.0000	-23.0240	0.000665	0.010676	0.012370
0.0000	-21.0498	0.000665	0.010676	0.012370
0.0000	-18.5093	0.000665	0.010676	0.012370
0.0000	-15.7102	0.000665	0.010676	0.012370

10	27	717.78	722.76	736.31	93.91	0.010276	12.4695
10	28	715.20	717.78	729.00	93.91	0.010276	9.2693
10	29	717.55	715.20	725.03	93.91	0.010276	6.0325
10	30	721.56	717.55	723.83	93.91	0.010276	1.5242
10	31	729.40	721.56	725.76	93.91	0.010276	-2.4487
10	32	739.63	729.40	730.57	93.91	0.010276	-6.0946
10	33	751.67	739.63	737.88	93.91	0.010276	-9.2770
10	34	765.76	751.67	747.60	93.93	0.010279	-12.2210
10	35	781.23	765.76	759.40	94.00	0.010286	-14.6903
10	36	796.73	781.23	772.56	94.11	0.010298	-16.2651
10	37	813.04	796.73	786.87	94.25	0.010314	-17.6115
10	38	829.15	813.04	801.83	94.41	0.010332	-18.3658
10	39	844.79	829.15	817.03	94.59	0.010352	-18.6039
10	40	859.67	844.79	832.17	94.81	0.010375	-18.5066
10	41	873.55	859.67	846.77	94.99	0.010395	-18.0230
10	42	886.26	873.55	860.43	95.07	0.010403	-17.3364
10	43	897.85	886.26	872.95	94.99	0.010395	-16.7566
10	44	908.38	897.85	884.34	94.74	0.010368	-16.1619
10	45	918.03	908.38	894.76	94.35	0.010325	-15.6595
10	46	926.89	918.03	904.42	93.88	0.010274	-15.1176
10	47	935.21	926.89	913.50	93.36	0.010217	-14.6115
10	48	942.98	935.21	922.07	92.82	0.010158	-14.0751
11	2	969.34	955.00	970.22	90.93	0.009947	0.5888
11	3	969.44	969.34	969.68	90.79	0.009935	0.1607
11	4	968.85	969.44	969.29	90.74	0.009930	0.2975
11	5	968.95	968.85	969.08	90.71	0.009926	0.0878
11	6	969.01	968.95	969.01	90.69	0.009924	-0.0055
11	7	969.07	969.01	968.99	90.67	0.009922	-0.0526
11	8	969.70	969.07	969.23	90.67	0.009922	-0.3168
11	9	969.76	969.70	969.31	90.64	0.009916	-0.2982
11	10	964.76	969.76	968.20	90.80	0.009936	2.3139
11	11	959.76	964.76	966.02	91.05	0.009964	4.2133
11	12	953.06	959.76	962.52	91.39	0.010001	6.3702
11	13	943.98	953.06	957.33	91.80	0.010045	8.9854
11	14	933.57	943.98	950.49	92.24	0.010094	11.3836
11	15	920.68	933.57	941.61	92.69	0.010143	14.0621
11	16	906.03	920.68	930.68	93.10	0.010188	16.5696
11	17	889.93	906.03	917.80	93.43	0.010225	18.7572
11	18	872.79	889.93	903.20	93.67	0.010250	20.4672
11	19	855.07	872.79	887.39	93.85	0.010270	21.7497
11	20	837.07	855.07	870.70	93.99	0.010285	22.6336
11	21	819.21	837.07	853.47	94.09	0.010296	23.0575
11	22	801.78	819.21	836.02	94.15	0.010303	23.0437
11	23	785.06	801.78	818.67	94.16	0.010304	22.6223
11	24	769.61	785.06	801.89	94.16	0.010304	21.7240

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0.1274	12.3484	0.000662	0.010679	0.012368
0.3425	15.0328	0.000655	0.010686	0.012365
0.5467	16.8138	0.000643	0.010698	0.012359
0.7215	18.3330	0.000627	0.010714	0.012351
0.8404	19.2263	0.000609	0.010732	0.012342
0.9275	19.6115	0.000589	0.010752	0.012332
1.0363	19.5929	0.000566	0.010775	0.012320
0.9225	18.9455	0.000546	0.010795	0.012310
0.4036	17.7901	0.000538	0.010803	0.012306
-0.3973	16.3595	0.000546	0.010795	0.012310
-1.2690	14.9129	0.000573	0.010768	0.012324
-1.9787	13.6807	0.000616	0.010725	0.012345
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-2.6598	11.9517	0.000724	0.010617	0.012399
-2.7611	11.3140	0.000783	0.010558	0.012429
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-0.5590	-0.7198	0.001006	0.010335	0.012540
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-0.1791	0.1190	0.001023	0.010318	0.012548

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1.3062	-2.9071	0.000977	0.010364	0.012526
1.7118	-4.6583	0.000940	0.010401	0.012507
2.0733	-6.9121	0.000896	0.010445	0.012485
2.2827	-9.1006	0.000847	0.010494	0.012461
2.2842	-11.7979	0.000798	0.010543	0.012436
2.0881	-14.5015	0.000753	0.010588	0.012414
1.7114	-17.0457	0.000716	0.010625	0.012395
1.1899	-19.2772	0.000691	0.010650	0.012383
0.9164	-20.8332	0.000671	0.010670	0.012373
0.7198	-21.9138	0.000656	0.010685	0.012365
0.5060	-22.5507	0.000645	0.010696	0.012360
0.2917	-22.7519	0.000638	0.010703	0.012356
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11	25	756.70	769.61	786.40	94.16	0.010304	19.9837
11	26	746.02	756.70	772.52	94.16	0.010304	17.8356
11	27	737.84	746.02	760.58	94.16	0.010304	15.3041
11	28	732.44	737.84	750.87	94.16	0.010304	12.4027
11	29	730.08	732.44	743.69	94.16	0.010304	9.[illegible]
11	30	729.95	730.08	738.93	94.16	0.010304	6.0485
11	31	732.70	729.95	736.77	94.16	0.010304	2.7449
11	32	738.12	732.70	737.24	94.16	0.010304	-0.5927
11	33	746.59	738.12	740.48	94.16	0.010304	-4.1146
11	34	756.77	746.59	746.12	94.16	0.010304	-7.1695
11	35	766.76	756.77	754.02	94.19	0.010307	-9.9207
11	36	781.61	768.76	763.71	94.25	0.010314	-12.0466
11	37	795.65	781.61	774.93	94.35	0.010325	-13.9154
11	38	810.13	795.65	787.41	94.48	0.010339	-15.2900
11	39	824.04	810.13	800.38	94.63	0.010355	-16.9196
11	40	838.28	824.04	813.80	94.79	0.010373	-18.4753
11	41	852.06	838.28	827.37	94.97	0.010393	-19.5193
11	42	865.12	852.06	840.73	95.15	0.010412	-18.4120
11	43	877.29	865.12	853.51	95.27	0.010426	-18.0045
11	44	888.50	877.29	865.44	95.28	0.010426	-15.5194
11	45	898.73	888.50	876.41	95.14	0.010411	-15.0548
11	46	908.22	898.73	886.49	94.86	0.010381	-14.6260
11	47	917.04	908.22	895.85	94.48	0.010339	-14.2612
11	48	925.31	917.04	904.66	94.02	0.010289	-13.9033
12	2	969.36	955.00	970.22	90.90	0.009947	0.5732
12	3	970.02	969.36	969.03	90.81	0.009937	-0.0616
12	4	968.87	970.02	969.46	90.76	0.009932	0.3954
12	5	969.51	968.87	969.42	90.74	0.009930	-0.0833
12	6	969.44	969.51	969.38	90.72	0.009928	-0.0401
12	7	969.39	969.44	969.35	90.71	0.009926	-0.0258
12	8	969.82	969.39	969.45	90.69	0.009924	-0.2481
12	9	969.25	969.82	969.33	90.66	0.009921	0.0489
12	10	966.94	969.25	968.80	90.77	0.009933	1.2534
12	11	962.99	966.94	967.30	90.95	0.009952	2.9006
12	12	958.20	962.99	964.88	91.20	0.009980	4.4929
12	13	951.53	958.20	961.23	91.52	0.010015	6.0275
12	14	943.58	951.53	956.27	91.90	0.010057	8.5291
12	15	933.53	943.58	949.69	92.32	0.010103	10.8770
12	16	922.50	933.53	941.64	92.75	0.010149	12.8894
12	17	909.32	922.50	931.79	93.15	0.010194	15.1223
12	18	894.80	909.32	920.22	93.50	0.010232	17.1081
12	19	879.25	894.80	907.08	93.77	0.010261	18.7306
12	20	862.98	879.25	892.66	93.96	0.010282	19.9753
12	21	846.40	862.98	877.40	94.12	0.010299	20.8677
12	22	829.78	846.40	861.56	94.24	0.010313	21.3905
12	23	813.39	829.78	845.40	94.33	0.010322	21.5456
12	24	797.68	813.39	829.27	94.38	0.010328	21.2568
12	25	783.00	797.68	813.51	94.39	0.010330	20.5292

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0.1440	10.0647	0.000634	0.010707	0.012354
0.3182	12.3646	0.000627	0.010714	0.012351
0.4921	14.4078	0.000616	0.010725	0.012345
0.6453	15.9954	0.000602	0.010739	0.012336
0.7620	16.6816	0.000586	0.010755	0.012330
0.8175	17.2922	0.000568	0.010773	0.012321
0.9314	17.5512	0.000548	0.010793	0.012311
0.9198	17.3319	0.000529	0.010812	0.012301
0.6170	16.6216	0.000515	0.010826	0.012295
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2.1340	-8.7429	0.000838	0.010503	0.012456
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12	26	770.54	783.00	798.60	94.39	0.010330	19.0197
12	27	760.04	770.54	785.50	94.39	0.010330	17.1356
12	28	751.81	760.04	773.92	94.39	0.010330	14.8795
12	29	746.70	751.81	764.55	94.39	0.010330	12.0118
12	30	743.04	746.70	757.13	94.39	0.010330	9.4878
12	31	741.43	743.04	751.71	94.39	0.010330	6.9191
12	32	743.50	741.43	748.88	94.39	0.010330	3.6161
12	33	747.13	743.50	748.27	94.39	0.010330	0.7717
12	34	753.83	747.13	750.19	94.39	0.010330	-2.4438
12	35	762.19	753.83	754.35	94.40	0.010330	-5.2756
12	36	771.96	762.19	760.52	94.43	0.010334	-7.7026
12	37	783.25	771.96	768.52	94.49	0.010340	-9.9134
12	38	795.48	783.25	778.08	94.58	0.010350	-11.7033
12	39	807.89	795.48	788.62	94.70	0.010363	-12.9701
12	40	820.90	807.89	800.06	94.83	0.010378	-14.0256
12	41	833.91	820.90	812.06	94.98	0.010394	-14.7090
12	42	846.62	833.91	824.20	95.13	0.010411	-15.0347
12	43	858.87	846.62	836.53	95.30	0.010429	-15.0356
12	44	870.45	858.87	848.46	95.44	0.010444	-14.8014
12	45	881.25	870.45	859.78	95.50	0.010450	-14.4480
12	46	891.22	881.25	870.32	95.44	0.010444	-14.0648
12	47	900.50	891.22	880.09	95.25	0.010423	-13.7373
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0.7554	-15.4645	0.000547	0.010794	0.012311
0.7668	-15.8016	0.000530	0.010811	0.012302
0.8475	-15.8831	0.000512	0.010829	0.012293
0.6965	-15.4980	0.000497	0.010844	0.012286
0.2985	-14.7466	0.000491	0.010850	0.012283
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-0.9545	-12.7827	0.000518	0.010823	0.012296
-1.5370	-11.9168	0.000551	0.010790	0.012312