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Theoretical Investigation of the Lowest Five Ionization Potentials of Uranium

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NO. OF PAGES 55

COPY NO. 17

FOREWORD

An exploratory experimental and theoretical investigation of gaseous nuclear rocket technology is being conducted by the United Aircraft Corporation Research Laboratories under Contract NASw-847 with the joint AEC-NASA Space Nuclear Propulsion Office. The Technical Supervisor of the Contract for NASA is Captain W. A. Yingling (USAF). Results of the investigation conducted during the period between September 15, 1964 and September 15, 1965 are described in the following eleven reports (including the present report) which comprise the required third Interim Summary Technical Report under the Contract:

1. McFarlin, D. J.: Experimental Investigation of the Effect of Peripheral Wall Injection Technique on Turbulence in an Air Vortex Tube. UAC Research Laboratories Report D-910091-5, September 1965. (Unclassified)

2. Johnson, B. V.: Analytical Study of Propellant Flow Requirements for Reducing Heat Transfer to the End Walls of Vortex-Stabilized Gaseous Nuclear Rocket Engines (U). UAC Research Laboratories Report D-910091-6, September 1965. (report classified Confidential)

3. Travers, A.: Experimental Investigation of Peripheral Wall Injection Techniques in a Water Vortex Tube. UAC Research Laboratories Report D-910091-7, September 1965. (Unclassified)

4. Johnson, B. V., and A. Travers: Analytical and Experimental Investigation of Flow Control in a Vortex Tube by End-Wall Suction and Injection (U). UAC Research Laboratories Report D-910091-8, September 1965. (report classified Confidential)

5. Mensing, A. E., and J. S. Kendall: Experimental Investigation of the Effect of Heavy-to-Light-Gas Density Ratio on Two-Component Vortex Tube Containment Characteristics (U). UAC Research Laboratories Report D-910091-9, September 1965. (report classified Confidential)

6. Krascella, N. L.: Theoretical Investigation of the Opacity of Heavy-Atom Gases. UAC Research Laboratories Report D-910092-4, September 1965. (Unclassified)

7. Kesten, A. S., and R. B. Kinney: Theoretical Effect of Changes in Constituent Opacities on Radiant Heat Transfer in a Vortex-Stabilized Gaseous Nuclear Rocket (U). UAC Research Laboratories Report D-910092-5, September 1965. (report classified Confidential)

8. Marteney, P. J., N. L. Krascella, and W. G. Burwell: Experimental Refractive Indices and Theoretical Small-Particle Spectral Properties of Selected Metals. UAC Research Laboratories Report D-910092-6, September 1965. (Unclassified)

9. Williamson, H. A., H. H. Michels, and S. B. Schneiderman: Theoretical Investigation of the Lowest Five Ionization Potentials of Uranium. UAC Research Laboratories Report D-910099-2, September 1965. (Unclassified)(present report)

10. McLafferty, G. H., H. H. Michels, T. S. Latham, and R. Roback: Analytical Study of Hydrogen Turbopump Cycles for Advanced Nuclear Rockets. UAC Research Laboratories Report D-910093-19, September 1965. (Unclassified)

11. McLafferty, G. H.: Analytical Study of the Performance Characteristics of Vortex-Stabilized Gaseous Nuclear Rocket Engines (U). UAC Research Laboratories Report D-910093-20, September 1965. (report classified Confidential)

Report D-910099-2

Theoretical Investigation of the Lowest Five Ionization Potentials of Uranium

TABLE OF CONTENTS

Report D-910099-2

Theoretical Investigation of the Lowest Five Ionization Potentials of Uranium

TABLE OF CONTENTS

Page

APPENDIXES

Report D-910099-2

Theoretical Investigation of the Lowest Five Ionization Potentials of Uranium

SUMMARY

14582

Ionization potentials were calculated for uranium and its first four positive ions using approximate quantum mechanical methods. A range of values was obtained for each ionization potential, with the individual values depending upon the approximations entering into the calculations. The final suggested values are: U(I) - 6.11 e.v.; U(II) - 17.5 e.v.; U(III) - 37.5 e.v.; U(IV) - 61 e.v.; U(V) - 118 e.v.

Ionization potentials for U(I) through U(III), differing only slightly from these final suggested values, were employed in an evaluation of the following properties of equilibrium mixtures of hydrogen and uranium: species concentration, coefficients of viscosity and diffusion, and effective Schmidt number. The calculations were performed at pressures of 100, 500, and 1000 atm., temperatures of 20,000 K, 60,000 K, and 100,000 K, and fuel partial pressure fractions of 0.09, 0.1, 0.233, 0.367, 0.5, 0.633, 0.767, and 0.9. The results of these calculations indicate that the uranium ions of lower valency play an important role in the determination of the properties of the mixture up to temperatures higher than had been indicated in preceding studies, thereby raising significantly both the mixture viscosity and effective hydrogen-uranium binary diffusivity at temperatures below about 60,000 K. Since the changes in these two quantities are in the same direction, however, changes in the effective Schmidt number are small.

INTRODUCTION

In studies of gaseous nuclear reactor concepts, the ionization potentials of neutral uranium and several of its positive ions are required in order to evaluate the transport properties, optical opacity, and radiant heat transfer characteristics of uranium as a fuel. Previous investigators (Refs. 1, 2, and 3) in attempting to evaluate these properties of uranium have found it necessary to assume values for ionization potentials other than the first, for which a value near 6 e.v. (Refs. 4, 5, and 6) seems to be rather well established. In general, the values assumed for the ionization potentials above the first have been based on interpretations of trends in heavy elements reported in the literature rather than on experimental data or detailed calculations for uranium. Because of the effect of the ionization potentials on those physical properties which determine the feasibility of using uranium as a fuel, improved estimates of these potentials were necessary.

Owing to the enormous experimental problems involved and the difficulty of interpreting the extremely complex spectrum of uranium, it was considered more reasonable to estimate the higher ionization potentials by an approximate theoretical method. The details of the approximate quantum mechanical method which was used and the results obtained therewith are described in the following sections.

METHOD

In all time-independent problems of quantum mechanics, the central problem is obtaining a solution to Schrodinger's Equation

$$H\psi_n = E_n\psi_n$$

where H is the Hamiltonian operator for the system and E_n and ψ_n are the corresponding eigenvalues and eigenfunctions of the system in the quantum state denoted by n. Exact solutions of this equation for atomic states exist only for the isoelectronic series of the hydrogen atom; for all other atomic systems, only an approximate solution is possible. The expectation value for the energy in the quantum state, n, of the system is given by

$$E_n = \frac{\int \psi_n^* H \psi_n \, d\tau}{\int \psi_n^* \psi_n \, d\tau}$$

If the expectation value of the energy for an atom in its ground state configuration and the expectation value of the energy for the ground state configuration of the first positive ion of that atom are calculated, the ionization potential

(I.P.) of the atom will be the difference between these two expectation values. Letting the subscript o designate the ground state, then the ionization potential of neutral uranium is given by

$$I.P. = \left| E_o \text{ (atom)} - E_o \text{ (+ ion)} \right|$$

A similar expression exists for each of the successively higher ionization potentials. In this study, the expectation value of the ground state energy for the atom and ions was obtained in three steps. In the first step only the average energy of the electrons was obtained, without regard to the splitting of energy levels in the ground state configuration of the atom or ion. In the second step, the core energy obtained from the first step was used as a basis for a more accurate calculation of the energy in which the splitting of the energy levels in the ground state configuration was accounted for. Further refinements to the calculation, which were obtained in step three, were the inclusion of relativistic corrections. Of the corrections added to the average energy, those obtained from step two are by far the more important. This is particularly true for uranium which has an extremely complex spectrum in which the energy levels for a given configuration may be widely spaced and, in fact, may overlap the levels of another configuration. It is this feature which precludes the use of spectral data to obtain the higher ionization potentials. The effects due to changes in the core electrons (relativistic mass change, spin-orbit coupling, and Darwin correction) can be expected to be relatively unimportant since the effective nuclear charge (or scaled nuclear charge as used here) will change by a very small amount for the core electrons in going from the n to the $n + 1$ ionized state. Consequently, the relativistic corrections which, by the present method, are based upon the scaled nuclear charges obtained from the non-relativisitic Hamiltonian will, similarly, be changed by only a very small amount. Hence, the relativistic correction terms which are added to the energy of the atom and ion are very nearly equal. The first ionization potential, which is just the difference between the energies of the atom and ion will, therefore, be changed by only the difference in the two correction terms. This argument could also be made for any higher ionization potential considered in this study.

The mathematical formulation is particularly simple when only the electrostatic energy or the average energy for a configuration is considered. It was this average energy and the corresponding approximate eigenfunctions which were obtained in the first stage of obtaining a solution for the ionization potentials of uranium. Several methods are available for obtaining these approximate eigenfunctions including three which were considered in detail.

The first of these, a simplified Hartree-Fock-Slater approximation (Ref. 7) predicted the removal of a 7s electron from the $6d5f^37s^2$ outer shells to form normal U(II). (Note: The ground state uranium atom is designated as U(I) and the successive ionization levels as U(II), U(III), etc). However, the normal state of U(II) is generally accepted as having a $5f^37s^2$ configuration which results from the removal of a 6d electron. The simplified Hartree-Fock-Slater method was therefore ruled out as being too crude an approximation for this study. The second method, a more accurate Hartree-Fock treatment (Ref. 8) which includes spin-orbit and relativistic effects, does indeed predict the correct configuration for U(II). This approach may be quite exact in many cases, but has the disadvantage of requiring a great amount of computation time. This approach was therefore rejected. The third method, a perturbation-variation method due to Layzer (Ref. 9) was chosen because of its relative mathematical simplicity, which indicated that less computation time would be required than with the second method, and also because of the success with which the method had been used by Naqvi and Victor (Ref. 10), to calculate approximate wave functions and energy levels, for both ground and excited states for all the atoms and the first 20 positive ions along the corresponding isoelectronic series which contain from three to fifty-five electrons. Their results were in good agreement with Hartree-Fock calculations where comparison was possible and, in some cases (for the smaller systems), yielded better values for the energy. The theory of this perturbation-variation method is described in Appendix I. A description of the computer program developed to perform the calculation is presented in Appendix II.

After the total average energy for a given electron configuration had been obtained by this perturbation-variation approach, the optimized one-electron orbitals (hydrogen-like orbitals) obtained from this approach were used to construct a properly antisymmetrized wave function for the valence electrons in the field of a central core defined by the average energy calculation. (Electrons in closed shells do not contribute to the splitting in the electronic energy levels and the core electrons could therefore be ignored except for their effect on nuclear charge.) This wave function was then used in a separate proprietary UAC computer program, which had been previously developed by UARL as part of its internal research program, to determine the relative separations of the energy levels for the various possible sublevels of the electronic energy state. The analysis upon which this program is based is described in Ref. 11.

Relativistic corrections were calculated for the atom using the formulas given by Herman and Skillman (Ref. 7). These formulas allow for mass, Darwin, and spin-orbit corrections to the energy. They are based upon the use of hydrogenic orbitals as the basis set for the wave function and treat the relativistic corrections as a first order perturbation. The correction terms by this first order perturbation calculation are correct to order γ^2 where γ is the fine structure constant (= 1/137.037). The ionization potentials for all ions of interest were calculated both with and without these relativistic corrections.

PROCEDURE

Ground state configurations for uranium and its first four positive ions, based on an analysis of their spectra, have been proposed in the literature (Ref. 12). Because of the enormous difficulty in analyzing the spectra for a member of the rare earth series, however, the proposed configurations are subject to question. For this reason, verification of the proposed configurations was attempted as part of this study.

In order to verify the proposed electronic configuration for a particular ion, several of the most probable electronic configurations for that ion were assumed and the total average energy (electrostatic energy) for each of these configurations was then calculated by the perturbation-variation approximation. For each specified configuration of the atom or ion of interest, the scaled nuclear charge was calculated by the perturbation-variation method. (The scaled nuclear charge is defined as $z_\alpha = \frac{2}{n_\alpha}(Z - S_\alpha)$ where n_α is the principle quantum number and S_α is the screening constant for the electron shell designated by α, and Z is the true nuclear charge.) By an iterative procedure, the values of the scaled nuclear charges were varied until the field which was set up by these charges was consistent with the values of the charges. Since an iterative scheme was used, it was necessary to set up some criteria to determine when the convergence of the scaled nuclear charge had been completed. The criteria which was decided upon was that values of the scaled nuclear charges determined in two successive iterations should differ by no more than .0001. This criteria was maintained for all calculations. After this convergence criteria had been satisfied, the average energy for the atom (or ion) was determined by the simple relation

$$W = -\frac{1}{8} \sum_{\alpha} q_\alpha z_\alpha^2 \qquad (1)$$

where q_α is the number of electrons in the electron shell designated by α, and z_α is the scaled nuclear charge for that shell. The summation is taken over all shells which contain electrons. Ideally, this procedure would yield a sequence of values of average energy for a number of specified configurations for the atom or ion, with the lowest energy corresponding to the ground state configuration. However, the present method of calculation is sufficiently inexact that our results were sometimes in disagreement with the ordering of the levels proposed from interpretation of spectral studies. It was then necessary to use other criteria to determine which of the two was most likely to be correct. The additional criteria which were used were: (1) the agreement of either our calculations or the results of spectral analysis with the Hartree-Fock calculations (Ref. 8); and (2) the regular behavior of the core energy as electron was removed to form the proposed configuration. It was expected that the core energy would increase in a near-linear fashion as the valence electrons were removed. Since the lowest configurations for both U(I) and U(II) are fairly well established, the calculations for these two systems give an approximate measure of how much the core energy should increase with the removal of each successive electron (Fig. 1). Since the removal of the first valence electron had increased the core energy by about 2.5 Hartree units (1 Hartree = twice the ionization potential of the hydrogen atom), the removal of the second electron was therefore expected to further increase the core energy by approximately 2.5 Hartree units. It should be emphasized that this method for determining the lowest configuration is intimately tied up with the energy calculation itself and was not a method which permitted the determination of the configuration before the energy calculation was completed.

For the ions, U(III) and U(V), the calculated total average energies led to the prediction of a configuration in disagreement with the configuration of Ref. 12. For the U(III) ion, it had been assumed that the electronic configuration would be a radon core for the core atoms plus one of the three possible configurations: (1) $5f^37s$, (2) $5f^27s^2$, or (3) $5f^36d$ for the outer electrons. Of these three configurations, the second one produced the lowest average energy; it was, in fact, about 3.9 electron volts below the average energy for U(II). Upon examination of the wave function for this configuration, however, it was noted that the core electrons were changed drastically from those calculated from configurations (1) or (3). This strongly indicated that the calculation for configuration (2) should not be considered valid. To verify this conclusion, calculations were carried out considering only the valence electrons for the three configurations with the same computer program which was used to determine the splitting of the levels. These calculations indicated that configuration (2) was an excited state of the system. In addition, the near-linear increase of the core energy as the valence electrons were removed was satisfied by both the $5f^37s$ and the $5f^36d$ configurations, but this trend was not satisfied by the $5f^27s^2$ configuration, again indicating that it was not the lowest configuration for this ionization level. The choice of the $5f^37s$ configuration rather than the $5f^36d$ was then confirmed by both the averaged energy calculation and the more exact calculation which considered only valence electrons. This choice is in disagreement with the assigned configuration of Ref. 12, but agrees with the implied configuration of Ref. 13.

The results of the perturbation-variation approach also failed to agree with the spectral prediction of Ref. 12 for the lowest configuration for U(V). The suggestion is made in Ref. 12 that U(V) would be produced in its ground state by the removal of a 5f electron from U(IV), the 6d and 7s electrons having all been removed. The treatment of Ref. 8 also suggests the removal of a 5f electron. Our results, however, indicated that a 6p electron would be released from the core prior to the removal of a 5f electron. To establish whether the 6p or 5f electron lies lower in energy, calculations were performed on two possible configurations using the exact analysis with splitting of energy levels, first on the configuration $6p^25f^2$ and second on the configuration $6p5f^3$. It was not necessary to consider the more complete configurations $6p^55f^3$ and $6p^65f^2$ in this calculation. Since the p shell can hold only 6 electrons, four of which are paired, the configuration $6p^55f^3$

and $6p5f^3$ and the $6p^65f^2$ and $6p^25f^2$ configurations can be constructed to be equivalent insofar as the splitting of the energy levels is concerned. The $6p^25f^2$ configuration was lower in energy, in agreement with the spectral assignment of Ref. 12. Therefore, the perturbation-variation method was abandoned and the lowest configuration was taken to be $5f^2$. To get a value for the core energy for U(V), the scaled nuclear charges obtained from the calculation for a $6p^55f^3$ configuration were used and the summation in Eq. (1) carried out over the desired $6p^65f^2$ core. Some error was introduced in this manner, but the increase in core energy versus the degree of ionization fell very close to the expected near-linear behavior.

Since the perturbation-variation procedure had predicted incorrectly the energy ordering for 6p and 5f electrons, it was no longer possible to obtain a rigorous variational calculation to determine the probable electronic configurations for U(VI). It was necessary, therefore, to assume a configuration for U(VI) which, with the help of Ref. 8, was taken to be 5f.

The core energy for U(VI) was determined in a more approximate manner. Both the maximum and minimum change in core energy in going from one ion to the next most positive ion was determined from the data on the neutral atom and first four ions. By adding each of these quantities to the core potential obtained for U(V), limits for the maximum and minimum value of the core potential for U(VI) were set. These limits are indicated in Fig. 1. The value for the core potential which was used to determine the average energy for U(VI) was taken as the arithmetic mean of the maximum and minimum values defined by this method. The difference between the two limits is only about 11 e.v., so that the error introduced by this approximation is at most about 6 e.v., if the linear extrapolation is valid. The ground state configurations chosen for the atom and ions are summarized in column I of Table I.

After the above calculations had been completed, the energy levels for the various possible sublevels of the selected ground state configurations were calculated using a properly antisymmetrized wave function for the valence electrons only, based upon a representation using the optimized screened hydrogenic orbitals from the perturbation-variation calculation. An existing proprietary UAC computer program (Ref. 11) was used in carrying out this phase of the calculation. To match the effect of the core electrons which were left out, an effective charge was needed; this effective charge was specified by a single parameter, the magnitude of which was fixed at three different values, which corresponded to a first ionization potential of the atom being calculated as 6.11 e.v. (experimental - Ref. 6), 5.76 e.v. (approximate screened hydrogenic), and 4.39 e.v. (Hartree-Fock-Slater approximation - Ref. 8). No optimization of the one-electron orbitals was performed during this stage of the calculation.

The optimized scaled nuclear charges obtained from the perturbation-variation calculation were used to calculate the relativistic corrections to the total energy using the formulas given by Herman and Skillman (Ref. 7). The results of the present calculations both with and without these corrections are given in Table I.

RESULTS AND DISCUSSION

The converged values of the scaled nuclear charges for neutral uranium and the first three positive ions are listed in Table II. The scaled nuclear charges for U(V) and U(VI) are not included here, since the perturbation-variation method had failed to predict the correct ordering of the energy levels for U(V).

It may be seen from Table II that these scaled nuclear charges do not change by large amounts in progressing from one ionic species to the next species with one higher degree of ionization. The scaled nuclear charges indicate that the 6s and 6p shells contract very rapidly as the degree of ionization increases; the other closed shells are affected to a considerably less degree, the general trend being toward a slight expansion rather than a contraction as observed for the 6s and 6p shells. The behavior of the 5f shell is particularly interesting since, with only three electrons in the shell, it may be considered as one of the valence shells. Yet the removal of the 6d and 7s electrons results in the 5f shell remaining almost unaffected. This indicates that the 5f electrons are buried deep in the core.

In every theoretical determination of the ground state energy some errors are introduced just by the approximation method used to carry out the calculation. The largest error introduced in this way by the present calculation is that due to correlation effects. Since such effects are well understood and are discussed in advanced texts on atomic structure calculations (e.g., Ref. 14) they will not be discussed here. Only those errors which have been introduced within the framework of the various approximations used will be discussed.

The errors introduced into the calculation of the first three ionization potentials are probably not serious. Some improvement could have been obtained by treating the level splitting within the perturbation-variation method. This would have allowed complete optimization of the scaled nuclear charges. Even so, it is not felt that any serious error was introduced by the approach which was used.

The relativistic corrections were only minor corrections, as expected, for the first three ionization levels; however, the ionization potential of U(IV) was decreased by some 7 e.v. when these corrections were made. Since these corrections are made using the scaled nuclear charges obtained from the nonrelativistic calculation, and since the scaled nuclear charges which were used were those obtained for the $6p^5 5f^3$ configuration and not the ones obtained for the $6p^6 5f^2$ configuration, some error is introduced. It is felt that the relativistic corrections for this case have been overestimated; consequently, the suggested value (Table I) for this ionization potential was chosen more in accord with the nonrelativistic values.

Values of the uranium ionization potentials derived in this study for U(II) and U(III) were used to recalculate the species concentrations, coefficients of viscosity and diffusion, and related quantities which were previously reported (Refs. 1 and 2) for a number of equilibrium mixtures of hydrogen and uranium. Revised values for these quantities are shown in Tables III-XIII at pressures of 100, 500, and 1000 atm, temperatures of 20,000, 60,000, and 100,000 K, and for P_{FUEL}/P ratios of 0.09, 0.1, 0.233, 0.367, 0.5, 0.633, 0.767, and 0.9. At the time these calculations were initiated, the relativistic corrections to the energies had not been computed so a set of preliminary values were used. These values are indicated in the fourth column of Table I. These values are sufficiently close to the values finally suggested that the error introduced by the discrepancy is expected to be quite small (Ref. 15). The effect of the revised ionization potentials upon the relative concentrations of the various uranium species is typified by the behavior of the curves shown in Fig. 2 where these concentrations are plotted against temperature for a pressure of 1000 atm and a P_{FUEL}/P ratio of 0.5 using both the new data and the old data from Ref. 1. The data in Table III and Fig. 2 indicate that, as would be expected, the increased values for the ionization potentials of U(II) and U(III) causes the uranium ions of the lower valences to play an increased role in the determination of the properties of a given mixture out to higher temperatures than had been indicated previously. The changes in concentrations are, however, most significant in the regions of lower temperature; at the highest temperatures considered the uranium mixtures are again predominantly U^{+++} and electrons. A complete evaluation of the effects of the revised values of the ionization potential on the concentrations of more highly ionized states has not been possible since the computer program used for making these calculations (Ref. 3) is able to consider only states through U^{+++}. The trends shown in Fig. 2 indicate that states above U^{+++} will be much less important than had previously been considered possible even at temperatures near 10^5 K. Nevertheless some contribution from states above U^{+++} may still occur near this temperature.

The changes in the concentrations are reflected in the recomputed values of the transport data. Thus, without exception, all of the quantities reported in Tables IV-XIII are seen to agree well with the corresponding values in Refs. 1 or 2 at 100,000 K, but to differ more significantly from these corresponding values at 20,000 K. (Reference 2 was published subsequent to the release of Ref. 1 and contains values of the mixture properties such as viscosity, effective binary diffusivity, and Schmidt number which were revised when more sophisticated calculation procedures became available. The data contained therein are, however, still based on the old values for the uranium ionization potentials.) For those properties such as component viscosities (Table IV) and binary interionic diffusivities (Table V) which are not strongly dependent upon composition, the changes are, for the most part, small. However, for those properties such as mixture viscosity (Table VI) and effective hydrogen-uranium binary diffusivity (Table VIII), which are strongly composition dependent, the changes are more significant, some of the values increasing by as much as a factor of 3 1/2 at the lowest pressure, temperature, and P_{FUEL}/P ratios studied. Changes in the Schmidt number which is, in general, also strongly composition dependent, are, however, much less marked due to the tendency for viscosity and diffusivity to both increase in the same direction. This is indicated by the curves in Fig. 3 which show that the broad range of Schmidt numbers encountered does not change significantly, although the values for a specified temperature, pressure and fuel partial pressure may change by as much as 50% in some cases. Schmidt numbers and effective binary diffusivities are not reported for the fuel-rich mixtures at 20,000 ^{o}K. As can be seen from Fig. 2, at this temperature the changes brought about in the concentrations of the uranium ions of higher valency by the use of new values for the corresponding ionization potentials are rather severe. This causes spurious values for the effective gradients calculated for these species in the fuel-rich mixtures at this temperature, thereby leading to anomalous values for $\mathfrak{D}_{eff}^{U-H}$ and the Schmidt number. The use of more closely spaced points in the calculation of the concentration gradients should eliminate this problem.

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LIST OF SYMBOLS

a_0	One Bohr radius ($\cong .52 \times 10^{-8}$ cm)
b_i	The ith member of a set of expansion coefficients
$C_{\ell_\alpha \ell_\beta k}$	Integral over three Legendre functions
$\mathcal{D}_{ij}$	Binary diffusivity describing mutual diffusion of species i and j, ft^2/sec
$\mathcal{D}_{eff}^{U-H}$	Effective binary diffusivity describing mutual diffusion of hydrogen-based and uranium-based constituents, ft^2/sec
$\mathcal{D}_L$	Binary diffusivity calculated using a Coulomb potential with a cutoff at the Debye length, ft^2/sec
$\mathcal{D}_{SC}$	Binary diffusivity calculated using a shielded Coulomb potential, ft^2/sec
$\mathcal{D}_R$	Binary diffusivity calculated using a Coulomb potential with a cutoff at the outer radius of an ionic cell, ft^2/sec
D_{ij}	Coefficient of diffusion in a multicomponent mixture, ft^2/sec
D_{i-MIX}^{m}	Effective mass diffusivity for species i, $\frac{\text{lb}}{\text{lb mole}} \cdot \frac{\text{ft}^2}{\text{sec}}$
E_n	Eigenvalue of the Hamiltonian operator, specifying the expectation value of the energy for the quantum state labeled by n, atomic units
$E(N,Z)$	One-electron energy operator showing explicit dependence upon number of electrons, N, and atomic number, Z, atomic units
$F^\circ(\alpha\beta)$	Slater coulomb integral between electrons in shells α and β
$G^k(\alpha\beta)$	Slater exchange integral between electrons in shells α and β
H	Quantum mechanical Hamiltonian operator
$H(N,Z)$	Hamiltonian operator showing explicit dependence upon number of electrons, N, and atomic number, Z.
i, j, k	Used as summation indices

LIST OF SYMBOLS
(cont'd)

I.P.	Ionization potential, electron volts
ℓ	Angular momentum quantum number
ℓ_α	Angular momentum quantum number for electron in shell denoted by α
m_i	Particle mass of species i, lb/particle
m_i^{eff}	Effective particle mass of pseudo-species i, lb/particle
M_i	Molecular weight of species i, lb/lb-mole
n	Total number density of particles in a system, $\frac{\text{particles}}{\text{cm}^3}$
n_α	Principle quantum number of shell α
n_i	Number density of species i, particles/cm^3
n_{ions}	Number density of ions, particles/cm^3
N	Number of electrons on atom or ion
N_{SC}	Schmidt number
o	Subscript indicating set of quantum numbers for the ground state atom or ion
p	Parity
P	Total pressure, atm
P_{FUEL}	Pressure of fuel-based constituents, atm
q_α	Number of electrons in shell α
r_i	Radial coordinate of electron labeled by i, Bohr radii
r_{ij}	Interparticle separation of electrons labeled by i and j, Bohr radii
R	Contribution to the two-electron energy that depends on quantum numbers other than the principle and angular momentum quantum numbers

LIST OF SYMBOLS
(cont'd)

S	Total spin for two electrons
S_α	Screening constant for electrons in shell specified by the α set of quantum numbers
T	Temperature, K
U(I)	Neutral uranium atom
U(II), U^+	Singly ionized uranium
U(III), U^{++}	Doubly ionized uranium
$U(\alpha,\beta)$	Matrix defined by Eq. (11b) of Appendix II
$V(N)$	Two-electron potential energy operator for an N electron atom, Hartree
$V_{(n),pSL}$	Eigenvalues of the two-electron interaction matrix
W	Calculated average energy, Hartree
$W(S)$	Calculated average energy showing explicit dependence on the set of screening constants, Hartree
z_α	Scaled nuclear charge $(= \frac{2}{n_\alpha}(Z - S_\alpha))$
Z	Atomic number or nuclear charge
Z_α	Effective nuclear charge for electrons in the shell denoted by α
α OR β	Set of numbers specifying the principle and angular momentum quantum numbers for an electron
$\delta_{\alpha\beta}$	Kronecker delta $(= 1$ if $\alpha = \beta$, $= 0$ if $\alpha \neq \beta)$
γ	Fine structure constant (= 1/137.037)
Δ	Increment
η_i	Viscosity of component i, lb/ft-sec

LIST OF SYMBOLS
(cont'd)

η_{ij}	Binary viscosity term used in calculation of mixture viscosity for a binary system, lb/ft-sec
η_L	Viscosity calculated using a coulomb potential with a cutoff at the Debye length, lb/ft-sec
η_{SC}	Viscosity calculated using a shielded-coulomb potential, lb/ft-sec
η_R	Viscosity calculated using a coulomb potential with a cutoff at the outer radius of an ionic cell, lb/ft-sec
η_{MIX}	Mixture viscosity, lb/ft-sec
ρ	Total mass density, lb/ft^3
$\sum$	Summation symbol
ψ_n	Wave function for system in quantum state specified by the set of quantum numbers n
ψ_n^*	Complex conjugate of ψ_n
∇_i^2	Laplacian operator
$\frac{\partial}{\partial x}$	Partial derivative with respect to the independent variable x (x is arbitrary)

APPENDIX I

LAYZER'S METHOD

The method for determining the electronic energy of an atom which was introduced by Layzer (Ref. 9) and used in the present study is described in the following paragraphs. In this method, a model is assumed such that each electron of the system is considered to move in its own stationary orbit in a central field produced by some effective nuclear charge and the interelectron repulsion is treated as a perturbation. The wave equation for the system of N particles then separates into N , uncoupled, hydrogen-like equations and the total energy is just the sum of the expectation values of the N one-electron Hamiltonians. A minimum value for the total energy is determined variationally.

As in all time-independent problems in quantum mechanics, Layzer's approach is concerned with the solution of Schrödinger's equation.

$$H\psi_n = E_n\psi_n \tag{1}$$

where H is the Hamiltonian operator for the system and E_n and ψ_n are the corresponding eigenvalues and wavefunctions of the system, for the quantum state denoted by n . Exact solutions of Eq. (1) exist for the isoelectronic series of the hydrogen atom only; for all other systems, only an approximate solution is possible. Following Layzer, the development presented here is restricted to the use of a non-relativistic Hamiltonian for an atom or ion containing a nuclear charge Z and N electrons. With these restrictions, the Hamiltonian is of the form (in atomic units)

$$\begin{aligned} H(N,Z) &= \sum_i^N \left(\frac{1}{2}\nabla_i^2 - \frac{Z}{r_i} \right) + \sum_{i<j=1}^N \frac{1}{r_{ij}} \\ &= E(N,Z) + V(N) \end{aligned} \tag{2}$$

where

$$E(N,Z) \equiv \sum_i^N \left(\frac{1}{2}\nabla_i^2 - \frac{Z}{r_i} \right)$$

$$V(N) \equiv \sum_{i<j}^N \frac{1}{r_{ij}}$$

If the unit of length is changed from a_0 (the Bohr radius) to a_0/z the Hamiltonian may be expressed as

$$H(N,z) = z^2 \left\{ E(N,1) + z^{-1} V(N) \right\} \tag{3}$$

Using $\lambda = z^{-1}$ as the expansion parameter by which the system wavefunction and eigenvalues are expanded in the conventional perturbation scheme yields a hydrogenic eigenvalue and eigenvector as the leading term in both expansions as indicated in Eqs (4).

$$\Psi = |H'\rangle = \sum_{n=0}^{\infty} z^{-n} |n\rangle \tag{4a}$$

$$E = H' = z^2 \sum_{n=0}^{\infty} b_n z^{-n} \tag{4b}$$

Since this is true, it is obvious that b_0 must then be of the form

$$b_0 = -\sum_{i=1}^{N} \frac{1}{2n_i^2}$$

to yield the sum of hydrogenic Hamiltonians, while the terms $b_1, b_2, \cdots$ are identified with the matrix $V(n)$ whose elements have been evaluated in a representation based upon hydrogenic orbitals. This is the conventional perturbation theory, which Layzer altered slightly in order to allow for the screening experienced by the electrons. If the effective nuclear charge, z_α, and the screening parameters, S_α, for the electron shell designated by α are defined by the relationship

$$z_\alpha = z - S_\alpha \tag{5}$$

then the expectation value for the hydrogen-like Hamiltonian is $\langle \alpha | E(z) | \alpha \rangle$ If there are q_α electrons in the shell designated by α, then the total one-electron energy for that shell is $q_\alpha \langle \alpha | E(z) | \alpha \rangle$, while the sum of such energies over all occupied shells is just

$$\begin{aligned}\sum_\alpha q_\alpha \langle \alpha | E(z) | \alpha \rangle &= \sum_\alpha q_\alpha \langle \alpha | \tfrac{1}{2} p_\alpha^2 - \tfrac{z}{r} | \alpha \rangle \\ &= \sum_\alpha q_\alpha \langle \alpha | \tfrac{1}{2} p_\alpha^2 - \tfrac{z_\alpha}{r} - \tfrac{s_\alpha}{r} | \alpha \rangle \\ &= \sum_\alpha q_\alpha \left\{ \langle \alpha | E(z_\alpha)\, \alpha \rangle - s_\alpha \langle \alpha | \tfrac{1}{r} | \alpha \rangle \right\} \\ &= \sum_\alpha q_\alpha \left\{ - \frac{z_\alpha^2}{2 n_\alpha^2} - s_\alpha \frac{z_\alpha}{n_\alpha^2} \right\} \\ &= - \sum_\alpha \frac{q_\alpha (z^2 - s_\alpha^2)}{2 n_\alpha^2}\end{aligned} \tag{6}$$

Considering the Coulombic repulsion between the electrons as a perturbation and denoting as $V_1 \, (\cdots z_\alpha \cdots)$ the lowest eigenvalue of the interaction matrix, the total energy for the system may be written simply as

$$W(s) = - \sum_\alpha \frac{q_\alpha (z^2 - s_\alpha^2)}{2 n_\alpha^2} + V_1 (\cdots z_\alpha \cdots) \tag{7}$$

where the matrix elements $V_1 \, (\cdots z_\alpha \cdots)$ are evaluated using screened hydrogenic orbitals (hydrogenic orbitals with nonintegral values of Z). In order to find the set of screening parameters which minimizes W(s), it is necessary to set

$$\frac{dW(s)}{ds_\alpha} = 0 = \frac{q_\alpha s_\alpha}{n_\alpha^2} + \frac{\partial V_1}{\partial s_\alpha} = \frac{q_\alpha s_\alpha}{n_\alpha^2} - \frac{\partial V_1}{\partial z_\alpha}, \text{ (for all } \alpha \text{)} \tag{8}$$

But, using Euler's relations for homogeneous functions, V_1 may be expressed as

$$V_1 = \sum_\alpha z_\alpha \frac{\partial V_1}{\partial z_\alpha} = \sum_\alpha \frac{q_\alpha s_\alpha z_\alpha}{n_\alpha^2}$$

These eigenvalues are eigenvalues of the matrices $V_{(n),pSL}$, where pSL is the set of quantum numbers specifying the parity, spin, and angular momentum, respectively, and n indicates that the elements connect terms belonging to the same set of radial quantum numbers. The eigenvalue, V_1, may be written as

$$V_1 = \sum_{\alpha \geq \beta} q_{\alpha\beta} [\alpha\beta] + R \tag{9}$$

where α and/or β designate the quantum state specified by the pair of quantum numbers n and ℓ ; $q_{\alpha\beta}$ is the number of distinct pairs of electrons with one electron drawn from each of the groups α, β; $[\alpha\beta]$ is the two-electron interaction energy; and R represents contributions that depend on quantum numbers other than n and ℓ .

From Ref. 9

$$q_{\alpha\beta} = \begin{array}{ll} \left(\frac{q_\alpha}{2}\right) , & \alpha = \beta \\ q_\alpha q_\beta , & \alpha \neq \beta \end{array} \tag{10a}$$

and
$$[\alpha\beta] = F^\circ(\alpha\beta) - \frac{1}{4}\left(1 + \frac{\delta_{\alpha\beta}}{4\ell_\alpha + 1}\right) \sum_k c_{\ell_\alpha \ell_\beta k}\, G^k(\alpha\beta) \tag{10b}$$

where $F^\circ(\alpha\beta)$ and $G^k(\alpha\beta)$ are the so-called Slater integrals which are evaluated using screened hydrogenic orbitals. With these expressions, then, equation (8) may be written in the form

$$S_\alpha = \frac{n_\alpha^2}{q_\alpha} \frac{\partial V_1}{\partial Z_\alpha} = \sum_\beta (q_\beta - \delta_{\alpha\beta})\, U(\alpha\beta) \tag{11a}$$

where
$$U(\alpha\beta) \equiv \left(1 - \frac{\delta_{\alpha\beta}}{2}\right) n_\alpha^2 \frac{\partial [\alpha\beta]}{\partial Z_\alpha} \tag{11b}$$

and
$$\delta_{\alpha\beta} = \begin{bmatrix} 1 \text{ if } \alpha = \beta \\ 0 \text{ if } \alpha \neq \beta \end{bmatrix}$$

Since $U(\alpha\beta)$ is evaluated using the screening parameters S_β (for all values of β including $\beta = \alpha$), a self-consistent set of screening parameters must be obtained to satisfy equation 11 . These N coupled linear equations may be solved by an iterative scheme which is far simpler than the set of N coupled integro-differential equations which is encountered in the Hartree-Fock method.

Using this set of screening parameters which satisfied Eq. 11 and substituting the above expression for V_1 into the expression for the minimum energy yields

$$
\begin{aligned}
W(S)_{MIN} &= -\sum_{\alpha} \frac{q_{\alpha}(Z^{2} - S_{\alpha}^{2})}{2n_{\alpha}^{2}} + \sum_{\alpha} \frac{q_{\alpha} S_{\alpha} Z_{\alpha}}{n_{\alpha}^{2}} \\
&= -\sum_{\alpha} \frac{q_{\alpha}(Z - S_{\alpha})^{2}}{2n_{\alpha}^{2}} \\
&= -\sum_{\alpha} \frac{q_{\alpha} Z_{\alpha}^{2}}{2n_{\alpha}^{2}} \qquad (12) \\
&= -\sum_{\alpha} \frac{q_{\alpha} z_{\alpha}^{2}}{8}
\end{aligned}
$$

APPENDIX II

COMPUTER PROGRAM

A computer program to calculate electronic energies following Layzer's method (Ref. 9) as modified by Naqvi and Victor (Ref. 10) was prepared at UARL.

This program was written in FORTRAN using double-precision arithmetic for an IBM-7094. A listing of the program source deck is presented in Table XIV. The results from this program were checked, using the results of Naqvi and Victor (Ref. 10) which had been obtained with a program coded in single precision for the CDC-1604 computer. These results were in agreement to the eight digits that appeared in the UARL printout for the orbitals with a small number of radial nodes, but did not agree for the orbitals with a large number of nodes. Since the quantity being compared (Table 3.2, Ref. 10) was determined by numerous additions and subtractions of nearly equal numbers, it was understandable that the single precision arithmetic would introduce a round-off error.

The program is written to solve for the set of screening parameters given by equation (11) in Appendix I by an iterative method until a consistent set of parameters results.

The steps used in the iterative scheme are

(i) Let $Z \rightarrow \infty$
then

$$\left(\frac{z_\alpha}{z_\beta}\right) = \frac{\frac{2}{n_\alpha} Z_\alpha}{\frac{2}{n_\beta} Z_\beta} = \frac{\frac{2}{n_\alpha}(Z - S_\alpha)}{\frac{2}{n_\beta}(Z - S_\beta)} \longrightarrow \frac{\frac{1}{n_\alpha}}{\frac{1}{n_\beta}}$$

so that

$$z_\alpha^\circ = \frac{1}{n_\alpha} \quad (\text{for all } \alpha)$$

may be used as an initial value to start the iterative calculation.

(ii) Evaluate the right side of

$$z_\alpha = \frac{2Z}{n_\alpha} - \frac{2}{n_\alpha} \sum_\beta (q_\beta - \delta_{\alpha\beta})\, U(\alpha\beta)$$

where $U(\alpha\beta)$ and $\delta_{\alpha\beta}$ are as defined by equation (11) in Appendix I

(iii) Iterate, using the set of values for z_{α}^{i} which was obtained from the i^{th} iteration to evaluate the right hand side of the above relation and thus produce the set of values for z_{α}^{i+1}, until

(a) i reaches a maximum value, M, read in as input data, or
(b) convergence was completed by

$$| z^{i}(\alpha) - z^{i-1}(\alpha) | \leq \epsilon$$

where ϵ may be any arbitrarily selected value. Throughout the present calculation a value of $\epsilon = .0001$ was used.

The converged set of scaled nuclear charges obtained for U(I) was used as the initial guess for the scaled nuclear charges for U(II). The iterative process was then carried out as was outlined above for U(I). For each successive ion, the set of scaled nuclear charges of the previous ion (with one less degree of ionization) was used as the initial values to start the iterative process.

The convergence rate of the screening parameters was extremely slow for some of the ionic species. To assist this slow process, plots of the screening parameters versus number of iterations were made and extrapolations for from five to ten iterations ahead of the calculation were performed. These extrapolated values were then read in and from three to six more machine iterations were performed. This process was repeated until the convergence criteria was satisfied.

LIST OF TABLES

TABLE I

CALCULATED IONIZATION POTENTIALS FOR URANIUM

Atomic Configuration		Ionization Potential, e.v. Non-Relativistic Calculation	Ionization Potential, e.v. Relativistic Calculation	Suggested Values Preliminary*	Suggested Values Final
U(I) $^5L(5f^37s^26d)$	(a)	6.11	6.11	6.1	6.11
	(b)	5.76	5.80		
	(c)	4.39	4.43		
U(II) $^4I(5f^37s^2)$	(a)	17.1	17.9	17.1	17.5
	(b)	16.6	17.5		
	(c)	15.2	15.9		
U(III) $^5I(5f^37s)$	(a)	38.8	36.2	38.8	37.5
	(b)	38.3	35.8		
	(c)	36.8	34.3		
U(IV) $^4I(5f^3)$	(a)	65.6	58.6	65.6	61
	(b)	64.1	57.4		
	(c)	59.6	52.6		
U(V) $^3H(5f^2)$		119	118	---	118

(a) Screening adjusted to reproduce the experimental value for the first ionization potential (Ref. 6).

(b) Screened hydrogenic approximation (this calculation).

(c) Screening adjusted to reproduce the first Hartree-Fock ionization potential (Ref. 8).

* Used to calculate composition and transport properties.

TABLE II

SCALED NUCLEAR CHARGES FOR THE GROUND STATE CONFIGURATIONS OF NEUTRAL URANIUM AND ITS FIRST THREE POSITIVE IONS

Shell Designation	Species (Configuration)			
	U (I) ($5f^36d7s^2$)	U (II) ($5f^37s^2$)	U (III) ($5f^37s$)	U (IV) ($5f^3$)
1s	182.9136	182.9136	182.9139	182.9142
2s	86.8670	86.8658	86.8644	86.8638
2p	86.9718	86.9712	86.9712	86.9714
3s	51.0886	51.0842	51.0741	51.0678
3p	50.8834	50.8789	50.8734	50.8713
3d	50.7429	50.7425	50.7431	50.7439
4s	30.4516	30.4385	30.4047	30.3859
4p	29.7749	29.7610	29.7362	29.7261
4d	28.5622	28.5625	28.5616	28.5632
4f	27.1099	27.1142	27.1196	27.1238
5s	18.3161	18.2488	18.1187	18.0631
5p	17.5000	17.4390	17.3598	17.3378
5d	15.6338	15.6206	15.5989	15.5977
5f	11.4396	11.4443	11.4271	11.4351
6s	9.0911	9.3812	9.9250	10.2161
6p	8.8599	9.2190	9.6774	9.8789
6d	4.8477			
7s	6.1269	6.1984	6.2328	

TABLE III

CALCULATED COMPOSITIONS FOR EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

CONCENTRATION (PARTICLES/CM^3)

P = 100 ATM

P_{FUEL}/P	n_e	n_{H^+}	n_{U^+}	$n_{U^{++}}$	$n_{U^{+++}}$	n_U	n_H
T = 20,000 DEG K							
0.09	1.2778 E19	1.0933 E19	1.0670 E18	3.8926 E17	4.8514 E11	4.9548 E15	1.1659 E19
0.1	1.2804 E19	1.0767 E19	1.2259 E18	4.0530 E17	4.5774 E11	6.2825 E15	1.1499 E19
0.233	1.3901 E19	9.3816 E18	3.4823 E18	5.1874 E17	2.6398 E11	3.9607 E16	9.3873 E18
0.367	1.4927 E19	7.9543 E18	5.8441 E18	5.6431 E17	1.8614 E11	1.0254 E17	7.3234 E18
0.5	1.5878 E19	6.4954 E18	8.2051 E18	5.8879 E17	1.4433 E11	1.9372 E17	5.3600 E18
0.633	1.6751 E19	4.9767 E18	1.0566 E19	6.0419 E17	1.1803 E11	3.1303 E17	3.5166 E18
0.767	1.7520 E19	3.3534 E18	1.2937 E19	6.1485 E17	9.9823 E10	4.6120 E17	1.8446 E18
0.9	1.8107 E19	1.5802 E18	1.5282 E19	6.2256 E17	8.6642 E10	6.3553 E17	5.0972 E17
T = 60,000 DEG K							
0.09	6.3834 E18	5.5582 E18	1.8087 E12	5.7078 E15	2.7127 E17	6.8330 E7	1.7478 E16
0.1	6.4140 E18	5.4972 E18	2.4759 E12	7.0332 E15	3.0089 E17	1.0391 E8	1.7142 E16
0.233	6.8164 E18	4.6856 E18	3.0470 E13	3.7239 E16	6.8543 E17	2.9722 E9	1.3080 E16
0.367	7.2159 E18	3.8676 E18	1.1591 E14	9.0151 E16	1.0560 E18	1.7767 E10	9.6305 E15
0.5	7.6070 E18	3.0554 E18	2.8562 E14	1.6342 E17	1.4081 E18	5.9512 E10	6.5522 E15
0.633	7.9931 E18	2.2432 E18	5.6512 E14	2.5594 E17	1.7458 E18	1.4875 E11	3.9373 E15
0.767	8.3770 E18	1.4244 E18	9.8079 E14	3.6736 E17	2.0723 E18	3.1216 E11	1.8761 E15
0.9	8.7536 E18	6.1152 E17	1.5471 E15	4.9484 E17	2.3836 E18	5.7667 E11	4.6626 E14
T = 100,000 DEG K							
0.09	3.8348 E18	3.3389 E18	1.1400 E9	4.8331 E13	1.6530 E17	7.5051 E3	2.4862 E16
0.1	3.8533 E18	3.3022 E18	1.5637 E9	5.9666 E13	1.8366 E17	1.1439 E4	2.4346 E15
0.233	4.0983 E18	2.8143 E18	1.9772 E10	3.2380 E14	4.2778 E17	3.3698 E5	1.8924 E15
0.367	4.3451 E18	2.3227 E18	7.7234 E10	8.0306 E14	6.7358 E17	2.0733 E6	1.3962 E15
0.5	4.5899 E18	1.8347 E18	1.9523 E11	1.4900 E15	9.1739 E17	7.1399 E6	9.8502 E14
0.633	4.8347 E18	1.3468 E18	3.9598 E11	2.3873 E15	1.1610 E18	1.8333 E7	5.9903 E14
0.767	5.0812 E18	8.5508 E17	7.0417 E11	3.5038 E15	1.4064 E18	3.9502 E7	2.8857 E14
0.9	5.3257 E18	3.6701 E17	1.1372 E12	4.8225 E15	1.6497 E18	7.4854 E7	7.7068 E13

TABLE III (CONT'D)

CALCULATED COMPOSITIONS FOR EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

CONCENTRATION (PARTICLES/CM^3)

P = 500 ATM

P_{FUEL}/P	n_e	n_{H^+}	n_{U^+}	$n_{U^{++}}$	$n_{U^{+++}}$	n_U	n_H
			T = 20,000 DEG K				
0.09	4.8634 E19	4.6788 E19	1.0670 E18	3.8926 E17	4.8514 E11	4.9548 E15	7.3388 E19
0.1	5.5665 E19	4.6282 E19	8.2051 E18	5.8879 E17	1.4433 E11	1.9372 E17	7.2569 E19
0.233	6.0795 E19	3.9608 E19	1.9921 E19	6.3305 E17	6.8724 E10	1.0621 E18	6.1518 E19
0.367	6.5739 E19	3.3002 E19	3.1444 E19	6.4669 E17	4.5434 E10	2.5904 E18	5.0101 E19
0.5	7.0424 E19	2.6525 E19	4.2593 E19	6.5325 E17	3.4226 E10	4.7052 E18	3.8698 E19
0.633	7.4852 E19	2.0067 E19	5.3470 E19	6.5714 E17	2.7589 E10	7.3714 E18	2.7212 E19
0.767	7.8953 E19	1.3461 E19	6.4172 E19	6.5973 E17	2.3169 E10	1.0576 E19	1.5835 E19
0.9	8.2374 E19	6.4954 E18	7.4556 E19	6.6155 E17	2.0053 E10	1.4236 E19	5.3600 E18
			T = 60,000 DEG K				
0.09	3.1812 E19	2.7711 E19	2.1024 E14	1.3354 E17	1.2775 E18	3.9458 E10	2.4712 E17
0.1	3.1960 E19	2.7408 E19	2.8562 E14	1.6342 E17	1.4081 E18	5.9512 E10	2.4288 E17
0.233	3.3866 E19	2.3366 E19	3.2052 E15	7.9490 E17	2.9691 E18	1.5407 E12	1.8850 E17
0.367	3.5695 E19	1.9293 E19	1.1254 E16	1.7868 E18	4.2725 E18	8.4504 E12	1.3819 E17
0.5	3.7437 E19	1.5246 E19	2.5866 E16	3.0354 E18	5.3648 E18	2.6276 E13	9.4924 E16
0.633	3.9122 E19	1.1197 E19	4.8110 E16	4.4866 E18	6.3013 E18	6.1502 E13	5.7561 E16
0.767	4.0771 E19	7.1134 E18	7.8968 E16	6.1099 E18	7.1197 E18	1.2167 E14	2.6804 E16
0.9	4.2366 E19	3.0554 E18	1.1849 E17	7.8494 E18	7.8313 E18	2.1324 E14	6.5522 E15
			T = 100,000 DEG K				
0.09	1.9165 E19	1.6685 E19	1.4234 E11	1.2071 E15	8.2575 E17	4.6852 E6	3.2973 E16
0.1	1.9253 E19	1.6501 E19	1.9523 E11	1.4900 E15	9.1739 E17	7.1399 E6	3.2441 E16
0.233	2.0482 E19	1.4064 E19	2.4646 E12	8.0747 E15	2.1341 E18	2.0998 E8	2.5376 E16
0.367	2.1715 E19	1.1607 E19	9.6122 E12	1.9997 E16	3.3559 E18	1.2897 E9	1.8741 E16
0.5	2.2938 E19	9.1696 E18	2.4259 E13	3.7051 E16	4.5647 E18	4.4336 E9	1.2769 E16
0.633	2.4159 E19	6.7316 E18	4.9128 E13	5.9277 E16	5.7697 E18	1.1365 E10	7.5766 E15
0.767	2.5386 E19	4.2743 E18	8.7226 E13	8.6874 E16	6.9798 E18	2.4445 E10	3.6466 E15
0.9	2.6605 E19	1.8347 E18	1.4065 E14	1.1940 E17	8.1770 E18	4.6244 E10	9.8501 E14

TABLE III (CONT'D)

CALCULATED COMPOSITIONS FOR EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

CONCENTRATION (PARTICLES/CM^3)

P = 1000 ATM

P_{FUEL}/P	n_e	n_{H^+}	n_{U^+}	$n_{U^{++}}$	$n_{U^{+++}}$	n_U	n_H
T = 20,000 DEG K							
0.09	1.1672 E20	1.0019 E20	1.5282 E19	6.2256 E17	8.6642 E10	6.3553 E17	1.3449 E20
0.1	1.1716 E20	9.8870 E19	1.7037 E19	6.2712 E17	7.8855 E10	7.8421 E17	1.3378 E20
0.233	1.2323 E20	8.2160 E19	3.9769 E19	6.5192 E17	3.6506 E10	4.1104 E18	1.1808 E20
0.367	1.2933 E20	6.6448 E19	6.1560 E19	6.5917 E17	2.4112 E10	9.7403 E18	1.0004 E20
0.5	1.3494 E20	5.1391 E19	8.2215 E19	6.6261 E17	1.8243 E10	1.7283 E19	8.0692 E19
0.633	1.4132 E20	3.7972 E19	1.0202 E20	6.6463 E17	1.4791 E10	2.6532 E19	5.8739 E19
0.767	1.4741 E20	2.4875 E19	1.2121 E20	6.6597 E17	1.2500 E10	3.7378 E19	3.5760 E19
0.9	1.5270 E20	1.1783 E19	1.3958 E20	6.6692 E17	1.0885 E10	4.9497 E19	1.3117 E19
T = 60,000 DEG K							
0.09	6.3448 E19	5.5306 E19	1.5471 E15	4.9484 E17	2.3836 E18	5.7667 E11	7.2642 E17
0.1	6.3735 E19	5.4701 E19	2.0853 E15	6.0113 E17	2.6098 E18	8.6237 E11	7.1320 E17
0.233	6.7365 E19	4.6648 E19	2.1439 E16	2.6949 E18	5.1019 E18	2.0332 E13	5.4589 E17
0.367	7.0772 E19	3.8522 E19	7.0551 E16	5.6970 E18	6.9284 E18	1.0416 E14	4.0346 E17
0.5	7.3985 E19	3.0444 E19	1.5427 E17	9.2268 E18	8.3112 E18	3.0750 E14	2.8624 E17
0.633	7.7086 E19	2.2363 E19	2.7569 E17	1.3120 E19	9.4028 E18	6.9065 E14	1.7567 E17
0.767	8.0117 E19	1.4211 E19	4.3771 E17	1.7295 E19	1.0292 E19	1.3206 E15	8.4841 E16
0.9	8.3011 E19	6.1072 E18	6.3875 E17	2.1620 E19	1.1021 E19	2.2498 E15	2.0595 E16
T = 100,000 DEG K							
0.09	3.8312 E19	3.3353 E19	1.1372 E12	4.8225 E15	1.6497 E18	7.4854 E7	9.6828 E16
0.1	3.8491 E19	3.2987 E19	1.9523 E12	1.4900 E15	1.8348 E18	7.1399 E8	9.5198 E16
0.233	4.0948 E19	2.8115 E19	1.9649 E13	3.2198 E16	4.2561 E18	3.3470 E9	7.4269 E16
0.367	4.3413 E19	2.3207 E19	7.6482 E13	7.9595 E16	6.6821 E18	2.0513 E10	5.4705 E16
0.5	4.5851 E19	1.8333 E19	1.9265 E14	1.4721 E17	9.0746 E18	7.0371 E10	3.7947 E16
0.633	4.8285 E19	1.3459 E19	3.8939 E14	2.3511 E17	1.1452 E19	1.8000 E11	2.3693 E16
0.767	5.0729 E19	8.5464 E18	6.9001 E14	3.4396 E17	1.3832 E19	3.8636 E11	1.1356 E16
0.9	5.3150 E19	3.6690 E18	1.1105 E15	4.7193 E17	1.6179 E19	7.2938 E11	2.8794 E15

TABLE IV

VISCOSITIES OF H^+, U^+, U^{++}, AND U^{+++} IONS CALCULATED BY THREE DIFFERENT PROCEDURES

VISCOSITY IN LB/(FT-SEC)

M	Z	T-DEG K	P = 100 ATM η_L	P = 100 ATM η_{SC}	P = 100 ATM η_R	P = 500 ATM η_L	P = 500 ATM η_{SC}	P = 500 ATM η_R	P = 1000 ATM η_L	P = 1000 ATM η_{SC}	P = 1000 ATM η_R
$P_{FUEL}/P = 0.09$											
1.0	1.	0.1000E 06	0.1745E-03	0.1731E-03	0.1902E-03	0.2107E-03	0.2086E-03	0.2173E-03	0.2314E-03	0.2289E-03	0.2316E-03
1.0	1.	0.6000E 05	0.6223E-04	0.6158E-04	0.6300E-04	0.7966E-04	0.7862E-04	0.7380E-04	0.9049E-04	0.8919E-04	0.7954E-04
1.0	1.	0.2000E 05	0.8495E-05	0.8364E-05	0.5923E-05	0.1333E-04	0.1339E-04	0.7076E-05	0.2042E-04	0.2231E-04	0.8195E-05
238.0	1.	0.1000E 06	0.2682E-02	0.2659E-02	0.2923E-02	0.3238E-02	0.3206E-02	0.3340E-02	0.3556E-02	0.3517E-02	0.3558E-02
238.0	1.	0.6000E 05	0.9563E-03	0.9462E-03	0.9680E-03	0.1224E-02	0.1208E-02	0.1134E-02	0.1390E-02	0.1370E-02	0.1222E-02
238.0	1.	0.2000E 05	0.1305E-03	0.1285E-03	0.9101E-04	0.2049E-03	0.2057E-03	0.1087E-03	0.3138E-03	0.3428E-03	0.1259E-03
238.0	2.	0.1000E 06	0.2381E-03	0.2354E-03	0.2178E-03	0.3148E-03	0.3103E-03	0.2559E-03	0.3652E-03	0.3595E-03	0.2767E-03
238.0	2.	0.6000E 05	0.9606E-04	0.9460E-04	0.7484E-04	0.1467E-03	0.1448E-03	0.9131E-04	0.1876E-03	0.1874E-03	0.1006E-03
238.0	2.	0.2000E 05	0.2858E-04	0.3893E-04	0.7876E-05	0.9655E-04	-0.4756E-04	0.1010E-04	0.3088E-03	-0.1918E-04	0.1253E-04
238.0	3.	0.1000E 06	0.6234E-04	0.6144E-04	0.4848E-04	0.9163E-04	0.9023E-04	0.5823E-04	0.1142E-03	0.1130E-03	0.6373E-04
238.0	3.	0.6000E 05	0.2916E-04	0.2878E-04	0.1715E-04	0.5745E-04	0.6176E-04	0.2167E-04	0.8855E-04	0.1213E-03	0.2435E-04
238.0	3.	0.2000E 05	0.2793E-04	-0.6151E-05	0.1995E-05	0.2029E-03	-0.2506E-05	0.2739E-05	0.9694E-03	-0.1797E-05	0.3633E-05
$P_{FUEL}/P = 0.1$											
1.0	1.	0.1000E 06	0.1748E-03	0.1734E-03	0.1910E-03	0.2112E-03	0.2091E-03	0.2184E-03	0.2320E-03	0.2294E-03	0.2328E-03
1.0	1.	0.6000E 05	0.6237E-04	0.6172E-04	0.6333E-04	0.7988E-04	0.7883E-04	0.7422E-04	0.9075E-04	0.8945E-04	0.8000E-04
1.0	1.	0.2000E 05	0.8494E-05	0.8362E-05	0.5929E-05	0.1414E-04	0.1429E-04	0.7249E-05	0.2047E-04	0.2237E-04	0.8201E-05
238.0	1.	0.1000E 06	0.2686E-02	0.2664E-02	0.2936E-02	0.3245E-02	0.3213E-02	0.3357E-02	0.3564E-02	0.3525E-02	0.3577E-02
238.0	1.	0.6000E 05	0.9584E-03	0.9484E-03	0.9731E-03	0.1227E-02	0.1211E-02	0.1140E-02	0.1395E-02	0.1374E-02	0.1229E-02
238.0	1.	0.2000E 05	0.1305E-03	0.1285E-03	0.9111E-04	0.2173E-03	0.2195E-03	0.1114E-03	0.3145E-03	0.3438E-03	0.1260E-03
238.0	2.	0.1000E 06	0.2387E-03	0.2360E-03	0.2190E-03	0.3158E-03	0.3113E-03	0.2575E-03	0.3666E-03	0.3609E-03	0.2786E-03
238.0	2.	0.6000E 05	0.9641E-04	0.9494E-04	0.7532E-04	0.1475E-03	0.1456E-03	0.9199E-04	0.1888E-03	0.1886E-03	0.1014E-03
238.0	2.	0.2000E 05	0.2857E-04	0.3890E-04	0.7888E-05	0.1138E-03	-0.3857E-04	0.1046E-04	0.3105E-03	-0.1913E-04	0.1254E-04
238.0	3.	0.1000E 06	0.6255E-04	0.6165E-04	0.4877E-04	0.9207E-04	0.9067E-04	0.5865E-04	0.1149E-03	0.1137E-03	0.6424E-04
238.0	3.	0.6000E 05	0.2932E-04	0.2894E-04	0.1728E-04	0.5795E-04	0.6247E-04	0.2186E-04	0.8951E-04	0.1239E-03	0.2458E-04
238.0	3.	0.2000E 05	0.2791E-04	-0.6156E-05	0.1999E-05	0.2572E-03	-0.2359E-05	0.2865E-05	0.9763E-03	-0.1795E-05	0.3639E-05

TABLE IV (CONT'D)

VISCOSITIES OF H^+, U^+, U^{++}, AND U^{+++} IONS CALCULATED BY THREE DIFFERENT PROCEDURES

VISCOSITY IN LB/(FT-SEC)

			P = 100 ATM			P = 500 ATM			P = 1000 ATM		
M	Z	T-DEG K	η_L	η_{SC}	η_R	η_L	η_{SC}	η_R	η_L	η_{SC}	η_R
$P_{FUEL}/P = 0.233$											
1.0	1.	0.1000E 06	0.1787E-03	0.1771E-03	0.1997E-03	0.2168E-03	0.2146E-03	0.2298E-03	0.2387E-03	0.2361E-03	0.2457E-03
1.0	1.	0.6000E 05	0.6409E-04	0.6340E-04	0.6667E-04	0.8249E-04	0.8139E-04	0.7847E-04	0.9388E-04	0.9250E-04	0.8455E-04
1.0	1.	0.2000E 05	0.8710E-05	0.8578E-05	0.6019E-05	0.1471E-04	0.1493E-04	0.7353E-05	0.2107E-04	0.2327E-04	0.8277E-05
238.0	1.	0.1000E 06	0.2745E-02	0.2722E-02	0.3068E-02	0.3331E-02	0.3297E-02	0.3530E-02	0.3668E-02	0.3627E-02	0.3775E-02
238.0	1.	0.6000E 05	0.9849E-03	0.9743E-03	0.1024E-02	0.1268E-02	0.1251E-02	0.1206E-02	0.1443E-02	0.1421E-02	0.1299E-02
238.0	1.	0.2000E 05	0.1338E-03	0.1318E-03	0.9248E-04	0.2260E-03	0.2294E-03	0.1130E-03	0.3238E-03	0.3576E-03	0.1272E-03
238.0	2.	0.1000E 06	0.2462E-03	0.2433E-03	0.2308E-03	0.3291E-03	0.3242E-03	0.2740E-03	0.3844E-03	0.3783E-03	0.2979E-03
238.0	2.	0.6000E 05	0.1007E-03	0.9916E-04	0.8029E-04	0.1567E-03	0.1549E-03	0.9885E-04	0.2023E-03	0.2033E-03	0.1091E-03
238.0	2.	0.2000E 05	0.3045E-04	0.4428E-04	0.8051E-05	0.1269E-03	-0.3441E-04	0.1068E-04	0.3350E-03	-0.1850E-04	0.1271E-04
238.0	3.	0.1000E 06	0.6518E-04	0.6421E-04	0.5177E-04	0.9773E-04	0.9632E-04	0.6302E-04	0.1235E-03	0.1227E-03	0.6950E-04
238.0	3.	0.6000E 05	0.3132E-04	0.3098E-04	0.1862E-04	0.6430E-04	0.7188E-04	0.2383E-04	0.1015E-03	0.1632E-03	0.2686E-04
238.0	3.	0.2000E 05	0.3129E-04	-0.5609E-05	0.2051E-05	0.2999E-03	-0.2274E-05	0.2944E-05	0.1073E-02	-0.1766E-05	0.3706E-05
$P_{FUEL}/P = 0.367$											
1.0	1.	0.1000E 06	0.1820E-03	0.1804E-03	0.2056E-03	0.2217E-03	0.2194E-03	0.2377E-03	0.2447E-03	0.2419E-03	0.2547E-03
1.0	1.	0.6000E 05	0.6559E-04	0.6486E-04	0.6897E-04	0.8469E-04	0.8353E-04	0.8130E-04	0.9646E-04	0.9502E-04	0.8752E-04
1.0	1.	0.2000F 05	0.8895E-05	0.8762E-05	0.6080E-05	0.1524E-04	0.1555E-04	0.7446E-05	0.2167E-04	0.2420E-04	0.8350E-05
238.0	1.	0.1000E 06	0.2797E-02	0.2773E-02	0.3160E-02	0.3407E-02	0.3372E-02	0.3652E-02	0.3760E-02	0.3717E-02	0.3914E-02
238.0	1.	0.6000F 05	0.1008E-02	0.9967E-03	0.1060E-02	0.1301E-02	0.1284E-02	0.1249E-02	0.1482E-02	0.1460E-02	0.1345E-02
238.0	1.	0.2000E 05	0.1367E-03	0.1346E-03	0.9342E-04	0.2341E-03	0.2389E-03	0.1144E-03	0.3330E-03	0.3718E-03	0.1283E-03
238.0	2.	0.1000E 06	0.2529E-03	0.2498E-03	0.2392E-03	0.3410E-03	0.3358E-03	0.2858E-03	0.4006E-03	0.3942E-03	0.3119E-03
238.0	2.	0.6000E 05	0.1046E-03	0.1029E-03	0.8379E-04	0.1647E-03	0.1632E-03	0.1035E-03	0.2140E-03	0.2165E-03	0.1142E-03
238.0	2.	0.2000E 05	0.3213E-04	0.4993E-04	0.8163E-05	0.1400E-03	-0.3142E-04	0.1087E-04	0.3603E-03	-0.1793E-04	0.1288E-04
238.0	3.	0.1000E 06	0.6755E-04	0.6652E-04	0.5390E-04	0.1030E-03	0.1016E-03	0.6619E-04	0.1317E-03	0.1315E-03	0.7335E-04
238.0	3.	0.6000F 05	0.3316E-04	0.3289E-04	0.1957E-04	0.7020E-04	0.8164E-04	0.2521E-04	0.1125E-03	0.2166E-03	0.2843E-04
238.0	3.	0.2000E 05	0.3443E-04	-0.5230E-05	0.2087E-05	0.3439E-03	-0.2204E-05	0.3014E-05	0.1174E-02	-0.1739E-05	0.3771E-05

TABLE IV (CONT'D)

VISCOSITIES OF H^{+}, U^{+}, U^{++}, AND U^{+++} IONS CALCULATED BY THREE DIFFERENT PROCEDURES

VISCOSITY IN LB/(FT-SEC)

			P = 100 ATM			P = 500 ATM			P = 1000 ATM		
M	Z	T-DEG K	η_L	η_{SC}	η_R	η_L	η_{SC}	η_R	η_L	η_{SC}	η_R
						$P_{FUEL}/P = 0.5$					
1.0	1.	0.1000E 06	0.1849E-03	0.1833E-03	0.2102E-03	0.2261E-03	0.2237E-03	0.2438E-03	0.2500E-03	0.2471E-03	0.2618E-03
1.0	1.	0.6000E 05	0.6689E-04	0.6614E-04	0.7074E-04	0.8657E-04	0.8537E-04	0.8341E-04	0.9866E-04	0.9717E-04	0.8972E-04
1.0	1.	0.2000E 05	0.9059E-05	0.8926E-05	0.6129E-05	0.1573E-04	0.1613E-04	0.7528E-05	0.2223E-04	0.2508E-04	0.8415E-05
238.0	1.	0.1000E 06	0.2842E-02	0.2817E-02	0.3230E-02	0.3474E-02	0.3437E-02	0.3746E-02	0.3842E-02	0.3797E-02	0.4022E-02
238.0	1.	0.6000E 05	0.1028E-02	0.1016E-02	0.1087E-02	0.1330E-02	0.1312E-02	0.1282E-02	0.1516E-02	0.1493E-02	0.1379E-02
238.0	1.	0.2000E 05	0.1392E-03	0.1371E-03	0.9418E-04	0.2417E-03	0.2479E-03	0.1157E-03	0.3416E-03	0.3853E-03	0.1293E-03
238.0	2.	0.1000E 06	0.2588E-03	0.2556E-03	0.2457E-03	0.3518E-03	0.3464E-03	0.2951E-03	0.4154E-03	0.4088E-03	0.3229E-03
238.0	2.	0.6000E 05	0.1080E-03	0.1063E-03	0.8651E-04	0.1719E-03	0.1707E-03	0.1071E-03	0.2244E-03	0.2285E-03	0.1181E-03
238.0	2.	0.2000E 05	0.3368E-04	0.5601E-04	0.8254E-05	0.1529E-03	-0.2919E-04	0.1105E-04	0.3844E-03	-0.1746E-04	0.1303E-04
238.0	3.	0.1000E 06	0.6970E-04	0.6863E-04	0.5558E-04	0.1079E-03	0.1066E-03	0.6871E-04	0.1395E-03	0.1399E-03	0.7643E-04
238.0	3.	0.6000E 05	0.3487E-04	0.3467E-04	0.2033E-04	0.7569E-04	0.9183E-04	0.2628E-04	0.1228E-03	0.2951E-03	0.2964E-04
238.0	3.	0.2000E 05	0.3740E-04	-0.4945E-05	0.2116E-05	0.3883E-03	-0.2146E-05	0.3079E-05	0.1270E-02	-0.1716E-05	0.3830E-05
						$P_{FUEL}/P = 0.633$					
1.0	1.	0.1000E 06	0.1876E-03	0.1859E-03	0.2140E-03	0.2301E-03	0.2276E-03	0.2489E-03	0.2548E-03	0.2518E-03	0.2676E-03
1.0	1.	0.6000E 05	0.6806E-04	0.6729E-04	0.7218E-04	0.8824E-04	0.8700E-04	0.8511E-04	0.1006E-03	0.9909E-04	0.9150E-04
1.0	1.	0.2000E 05	0.9204E-05	0.9071E-05	0.6170E-05	0.1620E-04	0.1669E-04	0.7603E-05	0.2286E-04	0.2611E-04	0.8487E-05
238.0	1.	0.1000E 06	0.2883E-02	0.2857E-02	0.3288E-02	0.3535E-02	0.3497E-02	0.3825E-02	0.3916E-02	0.3870E-02	0.4112E-02
238.0	1.	0.6000E 05	0.1046E-02	0.1034E-02	0.1109E-02	0.1356E-02	0.1337E-02	0.1308E-02	0.1546E-02	0.1523E-02	0.1406E-02
238.0	1.	0.2000E 05	0.1414E-03	0.1394E-03	0.9482E-04	0.2489E-03	0.2565E-03	0.1168E-03	0.3512E-03	0.4012E-03	0.1304E-03
238.0	2.	0.1000E 06	0.2643E-03	0.2609E-03	0.2511E-03	0.3618E-03	0.3562E-03	0.3029E-03	0.4292E-03	0.4224E-03	0.3322E-03
238.0	2.	0.6000E 05	0.1112E-03	0.1095E-03	0.8877E-04	0.1785E-03	0.1776E-03	0.1100E-03	0.2341E-03	0.2398E-03	0.1213E-03
238.0	2.	0.2000E 05	0.3511E-04	0.6258E-04	0.8331E-05	0.1657E-03	-0.2746E-04	0.1121E-04	0.4127E-03	-0.1697E-04	0.1320E-04
238.0	3.	0.1000E 06	0.7169E-04	0.7058E-04	0.5698E-04	0.1126E-03	0.1114E-03	0.7085E-04	0.1470E-03	0.1482E-03	0.7905E-04
238.0	3.	0.6000E 05	0.3648E-04	0.3639E-04	0.2095E-04	0.8093E-04	0.1027E-03	0.2715E-04	0.1328E-03	0.4275E-03	0.3063E-04
238.0	3.	0.2000E 05	0.4021E-04	-0.4724E-05	0.2141E-05	0.4327E-03	-0.2097E-05	0.3137E-05	0.1385E-02	-0.1692E-05	0.3896E-05

TABLE IV (CONT'D)

VISCOSITIES OF H^+, U^+, U^{++}, AND U^{+++} IONS CALCULATED BY THREE DIFFERENT PROCEDURES

VISCOSITY IN LB/(FT-SEC)

$P_{FUEL}/P = 0.767$

			P = 100 ATM			P = 500 ATM			P = 1000 ATM		
M	Z	T-DEG K	η_L	η_{SC}	η_R	η_L	η_{SC}	η_R	η_L	η_{SC}	η_R
1.0	1.	0.1000E 06	0.1900E-03	0.1883E-03	0.2173E-03	0.2337E-03	0.2312E-03	0.2533E-03	0.2593E-03	0.2562E-03	0.2727E-03
1.0	1.	0.6000E 05	0.6913E-04	0.6833E-04	0.7342E-04	0.8976E-04	0.8848E-04	0.8654E-04	0.1024E-03	0.1008E-03	0.9301E-04
1.0	1.	0.2000E 05	0.9329E-05	0.9197E-05	0.6205E-05	0.1662E-04	0.1721E-04	0.7670E-05	0.2346E-04	0.2713E-04	0.8553E-05
238.0	1.	0.1000E 06	0.2920E-02	0.2894E-02	0.3339E-02	0.3591E-02	0.3552E-02	0.3892E-02	0.3985E-02	0.3937E-02	0.4190E-02
238.0	1.	0.6000E 05	0.1062E-02	0.1050E-02	0.1128E-02	0.1379E-02	0.1360E-02	0.1330E-02	0.1574E-02	0.1550E-02	0.1429E-02
238.0	1.	0.2000E 05	0.1434E-03	0.1413E-03	0.9535E-04	0.2554E-03	0.2644E-03	0.1179E-03	0.3605E-03	0.4168E-03	0.1314E-03
238.0	2.	0.1000E 06	0.2693E-03	0.2659E-03	0.2558E-03	0.3712E-03	0.3654E-03	0.3097E-03	0.4423E-03	0.4354E-03	0.3403E-03
238.0	2.	0.6000E 05	0.1142E-03	0.1124E-03	0.9071E-04	0.1846E-03	0.1842E-03	0.1125E-03	0.2433E-03	0.2508E-03	0.1240E-03
238.0	2.	0.2000E 05	0.3637E-04	0.6937E-04	0.8396E-05	0.1778E-03	-0.2611E-04	0.1135E-04	0.4407E-03	-0.1655E-04	0.1336E-04
238.0	3.	0.1000E 06	0.7358E-04	0.7242E-04	0.5820E-04	0.1171E-03	0.1160E-03	0.7273E-04	0.1543E-03	0.1564E-03	0.8137E-04
238.0	3.	0.6000E 05	0.3802E-04	0.3805E-04	0.2150E-04	0.8600E-04	0.1147E-03	0.2791E-04	0.1426E-03	0.7081E-03	0.3150E-04
238.0	3.	0.2000E 05	0.4276E-04	-0.4553E-05	0.2162E-05	0.4759E-03	-0.2055E-05	0.3191E-05	0.1500E-02	-0.1671E-05	0.3958E-05

$P_{FUEL}/P = 0.9$

			P = 100 ATM			P = 500 ATM			P = 1000 ATM		
M	Z	T-DEG K	η_L	η_{SC}	η_R	η_L	η_{SC}	η_R	η_L	η_{SC}	η_R
1.0	1.	0.1000E 06	0.1923E-03	0.1905E-03	0.2201E-03	0.2371E-03	0.2345E-03	0.2571E-03	0.2634E-03	0.2602E-03	0.2771E-03
1.0	1.	0.6000E 05	0.7011E-04	0.6929E-04	0.7448E-04	0.9114E-04	0.8982E-04	0.8777E-04	0.1041E-03	0.1025E-03	0.9431E-04
1.0	1.	0.2000E 05	0.9423E-05	0.9291E-05	0.6231E-05	0.1697E-04	0.1765E-04	0.7724E-05	0.2398E-04	0.2804E-04	0.8609E-05
238.0	1.	0.1000E 06	0.2954E-02	0.2928E-02	0.3382E-02	0.3643E-02	0.3603E-02	0.3951E-02	0.4048E-02	0.3999E-02	0.4258E-02
238.0	1.	0.6000E 05	0.1077E-02	0.1065E-02	0.1144E-02	0.1400E-02	0.1380E-02	0.1349E-02	0.1599E-02	0.1574E-02	0.1449E-02
238.0	1.	0.2000E 05	0.1448E-03	0.1428E-03	0.9575E-04	0.2608E-03	0.2712E-03	0.1187E-03	0.3685E-03	0.4308E-03	0.1323E-03
238.0	2.	0.1000E 06	0.2740E-03	0.2704E-03	0.2599E-03	0.3800E-03	0.3740E-03	0.3157E-03	0.4547E-03	0.4477E-03	0.3475E-03
238.0	2.	0.6000E 05	0.1169E-03	0.1151E-03	0.9241E-04	0.1904E-03	0.1903E-03	0.1147E-03	0.2519E-03	0.2615E-03	0.1264E-03
238.0	2.	0.2000E 05	0.3733E-04	0.7539E-04	0.8444E-05	0.1883E-03	-0.2512E-04	0.1147E-04	0.4656E-03	-0.1622E-04	0.1349E-04
238.0	3.	0.1000E 06	0.7534E-04	0.7415E-04	0.5928E-04	0.1213E-03	0.1205E-03	0.7440E-04	0.1614E-03	0.1646E-03	0.8344E-04
238.0	3.	0.6000E 05	0.3949E-04	0.3965E-04	0.2198E-04	0.9089E-04	0.1278E-03	0.2857E-04	0.1521E-03	0.1690E-02	0.3226E-04
238.0	3.	0.2000E 05	0.4475E-04	-0.4435E-05	0.2178E-05	0.5135E-03	-0.2024E-05	0.3234E-05	0.1602E-02	-0.1653E-05	0.4011E-05

TABLE V

BINARY INTERIONIC DIFFUSIVITIES CALCULATED USING THREE DIFFERENT PROCEDURES

DIFFUSIVITY, $\mathcal{D}_{ij}$, IN FT^2/SEC

P = 100 ATM, T = 20,000 DEG K

				P_{FUEL}/P 0.09			P_{FUEL}/P 0.1			P_{FUEL}/P 0.233		
M_1	M_2	Z_1	Z_2	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$
1.0	0.0	1	1	0.2037E-00	0.3617E-00	0.1521E-00	0.2037E-00	0.3616E-00	0.1522E-00	0.2077E-00	0.3748E-00	0.1541E-00
238.0	0.0	1	1	0.2036E-00	0.3616E-00	0.1520E-00	0.2036E-00	0.3615E-00	0.1522E-00	0.2077E-00	0.3747E-00	0.1541E-00
238.0	0.0	2	1	0.7327E-01	0.2036E-00	0.4207E-01	0.7325E-01	0.2035E-00	0.4211E-01	0.7530E-01	0.2210E-00	0.4270E-01
238.0	0.0	3	1	0.4315E-01	0.3383E-00	0.1955E-01	0.4314E-01	0.3375E-00	0.1957E-01	0.4466E-01	0.4791E-00	0.1986E-01
238.0	1.0	1	1	0.4761E-02	0.8453E-02	0.3554E-02	0.4760E-02	0.8451E-02	0.3557E-02	0.4855E-02	0.8759E-02	0.3602E-02
238.0	1.0	2	1	0.1713E-02	0.4760E-02	0.9836E-03	0.1713E-02	0.4757E-02	0.9846E-03	0.1763E-02	0.5166E-02	0.9982E-03
238.0	1.0	3	1	0.1009E-02	0.7908E-02	0.4572E-03	0.1009E-02	0.7891E-02	0.4576E-03	0.1044E-02	0.1120E-01	0.4643E-03
238.0	238.0	2	1	0.1573E-03	0.4371E-03	0.9034E-04	0.1573E-03	0.4369E-03	0.9042E-04	0.1617E-03	0.4745E-03	0.9168E-04
238.0	238.0	3	1	0.9265E-04	0.7263E-03	0.4199E-04	0.9263E-04	0.7247E-03	0.4203E-04	0.9588E-04	0.1029E-02	0.4264E-04
238.0	238.0	3	2	0.4507E-04	-0.4932E-04	0.1283E-04	0.4505E-04	-0.4935E-04	0.1284E-04	0.4745E-04	-0.4568E-04	0.1307E-04

				0.367			0.5			0.633		
M_1	M_2	Z_1	Z_2	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$
1.0	0.0	1	1	0.2112E-00	0.3863E-00	0.1554E-00	0.2142E-00	0.3967E-00	0.1565E-00	0.2168E-00	0.4060E-00	0.1573E-00
238.0	0.0	1	1	0.2111E-00	0.3862E-00	0.1554E-00	0.2141E-00	0.3965E-00	0.1564E-00	0.2168E-00	0.4059E-00	0.1573E-00
238.0	0.0	2	1	0.7705E-01	0.2377E-00	0.4310E-01	0.7860E-01	0.2540E-00	0.4342E-01	0.7998E-01	0.2700E-00	0.4369E-01
238.0	0.0	3	1	0.4596E-01	0.7291E 00	0.2005E-01	0.4713E-01	0.1312E 01	0.2021E-01	0.4818E-01	0.4211E 01	0.2034E-01
238.0	1.0	1	1	0.4935E-02	0.9028E-02	0.3632E-02	0.5006E-02	0.9271E-02	0.3657E-02	0.5068E-02	0.9490E-02	0.3677E-02
238.0	1.0	2	1	0.1801E-02	0.5556E-02	0.1008E-02	0.1837E-02	0.5939E-02	0.1015E-02	0.1870E-02	0.6313E-02	0.1021E-02
238.0	1.0	3	1	0.1075E-02	0.1704E-01	0.4688E-03	0.1102E-02	0.3068E-01	0.4724E-03	0.1126E-02	0.9846E-01	0.4755E-03
238.0	238.0	2	1	0.1654E-03	0.5103E-03	0.9254E-04	0.1688E-03	0.5454E-03	0.9322E-04	0.1717E-03	0.5798E-03	0.9380E-04
238.0	238.0	3	1	0.9869E-04	0.1565E-02	0.4305E-04	0.1012E-03	0.2818E-02	0.4339E-04	0.1034E-03	0.9042E-02	0.4367E-04
238.0	238.0	3	2	0.4955E-04	-0.4306E-04	0.1322E-04	0.5144E-04	-0.4105E-04	0.1335E-04	0.5316E-04	-0.3947E-04	0.1346E-04

				0.767			0.9		
M_1	M_2	Z_1	Z_2	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$
1.0	0.0	1	1	0.2191E-00	0.4142E-00	0.1581E-00	0.2208E-00	0.4205E-00	0.1586E-00
238.0	0.0	1	1	0.2191E-00	0.4141E-00	0.1580E-00	0.2208E-00	0.4204E-00	0.1586E-00
238.0	0.0	2	1	0.8116E-01	0.2850E-00	0.4391E-01	0.8206E-01	0.2972E-00	0.4408E-01
238.0	0.0	3	1	0.4908E-01	-0.4970E 01	0.2045E-01	0.4976E-01	-0.1911E 01	0.2053E-01
238.0	1.0	1	1	0.5121E-02	0.9682E-02	0.3694E-02	0.5161E-02	0.9827E-02	0.3707E-02
238.0	1.0	2	1	0.1897E-02	0.6664E-02	0.1027E-02	0.1918E-02	0.6947E-02	0.1031E-02
238.0	1.0	3	1	0.1147E-02	-0.1162E-00	0.4781E-03	0.1163E-02	-0.4467E-01	0.4800E-03
238.0	238.0	2	1	0.1743E-03	0.6120E-03	0.9429E-04	0.1762E-03	0.6380E-03	0.9465E-04
238.0	238.0	3	1	0.1054E-03	-0.1067E-01	0.4391E-04	0.1069E-03	-0.4102E-02	0.4408E-04
238.0	238.0	3	2	0.5466E-04	-0.3823E-04	0.1354E-04	0.5580E-04	-0.3737E-04	0.1361E-04

P = 100 ATM, T = 60,000 DEG K

				P_{FUEL}/P 0.09			P_{FUEL}/P 0.1			P_{FUEL}/P 0.233		
M_1	M_2	Z_1	Z_2	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$
1.0	0.0	1	1	0.5070E 01	0.6594E 01	0.5125E 01	0.5080E 01	0.6611E 01	0.5148E 01	0.5203E 01	0.6820E 01	0.5385E 01
238.0	0.0	1	1	0.5069E 01	0.6592E 01	0.5123E 01	0.5079E 01	0.6609E 01	0.5147E 01	0.5201E 01	0.6818E 01	0.5384E 01
238.0	0.0	2	1	0.1520E 01	0.2104E 01	0.1377E 01	0.1524E 01	0.2111E 01	0.1384E 01	0.1568E 01	0.2197E 01	0.1453E 01
238.0	0.0	3	1	0.7651E 00	0.1116E 01	0.6315E 00	0.7672E 00	0.1120E 01	0.6347E 00	0.7925E 00	0.1175E 01	0.6672E 00
238.0	1.0	1	1	0.1185E-00	0.1541E-00	0.1198E-00	0.1187E-00	0.1545E-00	0.1203E-00	0.1216E-00	0.1594E-00	0.1259E-00
238.0	1.0	2	1	0.3554E-01	0.4919E-01	0.3219E-01	0.3563E-01	0.4935E-01	0.3235E-01	0.3667E-01	0.5137E-01	0.3396E-01
238.0	1.0	3	1	0.1789E-01	0.2608E-01	0.1476E-01	0.1793E-01	0.2619E-01	0.1484E-01	0.1853E-01	0.2747E-01	0.1560E-01
238.0	238.0	2	1	0.3264E-02	0.4517E-02	0.2957E-02	0.3272E-02	0.4532E-02	0.2971E-02	0.3368E-02	0.4718E-02	0.3119E-02
238.0	238.0	3	1	0.1643E-02	0.2395E-02	0.1356E-02	0.1647E-02	0.2405E-02	0.1363E-02	0.1702E-02	0.2523E-02	0.1433E-02
238.0	238.0	3	2	0.5301E-03	0.8940E-03	0.3881E-03	0.5320E-03	0.8993E-03	0.3903E-03	0.5548E-03	0.9672E-03	0.4134E-03

				0.367			0.5			0.633		
M_1	M_2	Z_1	Z_2	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$
1.0	0.0	1	1	0.5309E 01	0.7003E 01	0.5547E 01	0.5401E 01	0.7165E 01	0.5670E 01	0.5483E 01	0.7310E 01	0.5770E 01
238.0	0.0	1	1	0.5307E 01	0.7002E 01	0.5546E 01	0.5399E 01	0.7163E 01	0.5668E 01	0.5482E 01	0.7308E 01	0.5768E 01
238.0	0.0	2	1	0.1607E 01	0.2274E 01	0.1500E 01	0.1641E 01	0.2342E 01	0.1536E 01	0.1671E 01	0.2405E 01	0.1565E 01
238.0	0.0	3	1	0.8148E 00	0.1225E 01	0.6897E 00	0.8344E 00	0.1270E 01	0.7068E 00	0.8521E 00	0.1312E 01	0.7208E 00
238.0	1.0	1	1	0.1241E-00	0.1637E-00	0.1296E-00	0.1262E-00	0.1675E-00	0.1325E-00	0.1282E-00	0.1709E-00	0.1349E-00
238.0	1.0	2	1	0.3757E-01	0.5316E-01	0.3506E-01	0.3836E-01	0.5476E-01	0.3590E-01	0.3907E-01	0.5623E-01	0.3659E-01
238.0	1.0	3	1	0.1905E-01	0.2864E-01	0.1612E-01	0.1951E-01	0.2969E-01	0.1652E-01	0.1992E-01	0.3066E-01	0.1685E-01
238.0	238.0	2	1	0.3451E-02	0.4882E-02	0.3220E-02	0.3523E-02	0.5029E-02	0.3297E-02	0.3589E-02	0.5164E-02	0.3361E-02
238.0	238.0	3	1	0.1749E-02	0.2630E-02	0.1481E-02	0.1791E-02	0.2727E-02	0.1518E-02	0.1830E-02	0.2816E-02	0.1548E-02
238.0	238.0	3	2	0.5750E-03	0.1031E-02	0.4295E-03	0.5932E-03	0.1092E-02	0.4419E-03	0.6098E-03	0.1151E-02	0.4521E-03

				0.767			0.9		
M_1	M_2	Z_1	Z_2	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$
1.0	0.0	1	1	0.5558E 01	0.7444E 01	0.5855E 01	0.5626E 01	0.7567E 01	0.5928E 01
238.0	0.0	1	1	0.5557E 01	0.7442E 01	0.5853E 01	0.5625E 01	0.7565E 01	0.5926E 01
238.0	0.0	2	1	0.1699E 01	0.2463E 01	0.1590E 01	0.1725E 01	0.2517E 01	0.1612E 01
238.0	0.0	3	1	0.8684E 00	0.1351E 01	0.7328E 00	0.8834E 00	0.1388E 01	0.7431E 00
238.0	1.0	1	1	0.1299E-00	0.1740E-00	0.1368E-00	0.1315E-00	0.1769E-00	0.1386E-00
238.0	1.0	2	1	0.3973E-01	0.5759E-01	0.3718E-01	0.4032E-01	0.5885E-01	0.3768E-01
238.0	1.0	3	1	0.2030E-01	0.3158E-01	0.1713E-01	0.2065E-01	0.3244E-01	0.1737E-01
238.0	238.0	2	1	0.3649E-02	0.5289E-02	0.3414E-02	0.3703E-02	0.5405E-02	0.3461E-02
238.0	238.0	3	1	0.1865E-02	0.2900E-02	0.1573E-02	0.1897E-02	0.2979E-02	0.1596E-02
238.0	238.0	3	2	0.6252E-03	0.1208E-02	0.4609E-03	0.6396E-03	0.1264E-02	0.4685E-03

TABLE V (CONT'D)

BINARY INTERIONIC DIFFUSIVITIES CALCULATED USING THREE DIFFERENT PROCEDURES

DIFFUSIVITY, $\mathcal{D}_{ij}$, IN FT^2/SEC

P = 100 ATM, T = 100,000 DEG K

				P_{FUEL}/P 0.09			P_{FUEL}/P 0.1			P_{FUEL}/P 0.233		
M_1	M_2	Z_1	Z_2	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$
1.0	0.0	1	1	0.2433E 02	0.2987E 02	0.2629E 02	0.2437E 02	0.2993E 02	0.2640E 02	0.2485E 02	0.3066E 02	0.2746E 02
238.0	0.0	1	1	0.2433E 02	0.2987E 02	0.2628E 02	0.2436E 02	0.2993E 02	0.2639E 02	0.2485E 02	0.3066E 02	0.2745E 02
238.0	0.0	2	1	0.7021E 01	0.8935E 01	0.6990E 01	0.7034E 01	0.8956E 01	0.7020E 01	0.7195E 01	0.9219E 01	0.7321E 01
238.0	0.0	3	1	0.3430E 01	0.4487E 01	0.3190E 01	0.3437E 01	0.4499E 01	0.3204E 01	0.3524E 01	0.4649E 01	0.3345E 01
238.0	1.0	1	1	0.5687E 00	0.6982E 00	0.6145E 00	0.5696E 00	0.6996E 00	0.6169E 00	0.5809E 00	0.7167E 00	0.6417E 00
238.0	1.0	2	1	0.1641E-00	0.2089E-00	0.1634E-00	0.1644E-00	0.2094E-00	0.1641E-00	0.1682E-00	0.2155E-00	0.1712E-00
238.0	1.0	3	1	0.8019E-01	0.1049E-00	0.7458E-01	0.8036E-01	0.1052E-00	0.7491E-01	0.8239E-01	0.1087E-00	0.7821E-01
238.0	238.0	2	1	0.1507E-01	0.1918E-01	0.1501E-01	0.1510E-01	0.1923E-01	0.1507E-01	0.1545E-01	0.1979E-01	0.1572E-01
238.0	238.0	3	1	0.7365E-02	0.9634E-02	0.6850E-02	0.7380E-02	0.9660E-02	0.6880E-02	0.7567E-02	0.9982E-02	0.7183E-02
238.0	238.0	3	2	0.2218E-02	0.3096E-02	0.1918E-02	0.2223E-02	0.3107E-02	0.1927E-02	0.2291E-02	0.3241E-02	0.2023E-02

				0.367			0.5			0.633		
1.0	0.0	1	1	0.2527E 02	0.3130E 02	0.2819E 02	0.2564E 02	0.3187E 02	0.2874E 02	0.2597E 02	0.3238E 02	0.2920E 02
238.0	0.0	1	1	0.2526E 02	0.3130E 02	0.2818E 02	0.2563E 02	0.3186E 02	0.2874E 02	0.2596E 02	0.3237E 02	0.2919E 02
238.0	0.0	2	1	0.7336E 01	0.9451E 01	0.7529E 01	0.7460E 01	0.9658E 01	0.7688E 01	0.7572E 01	0.9846E 01	0.7819E 01
238.0	0.0	3	1	0.3600E 01	0.4782E 01	0.3443E 01	0.3667E 01	0.4902E 01	0.3518E 01	0.3728E 01	0.5011E 01	0.3580E 01
238.0	1.0	1	1	0.5907E 00	0.7316E 00	0.6588E 00	0.5992E 00	0.7448E 00	0.6718E 00	0.6069E 00	0.7568E 00	0.6825E 00
238.0	1.0	2	1	0.1715E-00	0.2210E-00	0.1760E-00	0.1744E-00	0.2258E-00	0.1797E-00	0.1770E-00	0.2302E-00	0.1828E-00
238.0	1.0	3	1	0.8417E-01	0.1118E-00	0.8049E-01	0.8574E-01	0.1146E-00	0.8225E-01	0.8716E-01	0.1172E-00	0.8369E-01
238.0	238.0	2	1	0.1575E-01	0.2029E-01	0.1617E-01	0.1602E-01	0.2074E-01	0.1651E-01	0.1626E-01	0.2114E-01	0.1679E-01
238.0	238.0	3	1	0.7730E-02	0.1027E-01	0.7393E-02	0.7874E-02	0.1052E-01	0.7554E-02	0.8005E-02	0.1076E-01	0.7686E-02
238.0	238.0	3	2	0.2351E-02	0.3363E-02	0.2090E-02	0.2405E-02	0.3474E-02	0.2141E-02	0.2454E-02	0.3578E-02	0.2184E-02

				0.767			0.9		
1.0	0.0	1	1	0.2627E 02	0.3285E 02	0.2959E 02	0.2655E 02	0.3328E 02	0.2994E 02
238.0	0.0	1	1	0.2626E 02	0.3284E 02	0.2959E 02	0.2654E 02	0.3328E 02	0.2993E 02
238.0	0.0	2	1	0.7675E 01	0.1002E 02	0.7932E 01	0.7769E 01	0.1018E 02	0.8030E 01
238.0	0.0	3	1	0.3785E 01	0.5114E 01	0.3633E 01	0.3836E 01	0.5208E 01	0.3679E 01
238.0	1.0	1	1	0.6140E 00	0.7678E 00	0.6917E 00	0.6205E 00	0.7779E 00	0.6997E 00
238.0	1.0	2	1	0.1794E-00	0.2343E-00	0.1854E-00	0.1816E-00	0.2381E-00	0.1877E-00
238.0	1.0	3	1	0.8848E-01	0.1195E-00	0.8494E-01	0.8969E-01	0.1218E-00	0.8602E-01
238.0	238.0	2	1	0.1648E-01	0.2152E-01	0.1703E-01	0.1668E-01	0.2186E-01	0.1724E-01
238.0	238.0	3	1	0.8126E-02	0.1098E-01	0.7801E-02	0.8237E-02	0.1118E-01	0.7900E-02
238.0	238.0	3	2	0.2499E-02	0.3675E-02	0.2221E-02	0.2541E-02	0.3767E-02	0.2253E-02

P = 500 ATM, T = 20,000 DEG K

				P_{FUEL}/P 0.09			P_{FUEL}/P 0.1			P_{FUEL}/P 0.233		
M_1	M_2	Z_1	Z_2	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$
1.0	0.0	1	1	0.5729E-01	0.1525E-00	0.3520E-01	0.5978E-01	0.1726E-00	0.3590E-01	0.6148E-01	0.1885E-00	0.3632E-01
238.0	0.0	1	1	0.5727E-01	0.1525E-00	0.3519E-01	0.5976E-01	0.1725E-00	0.3589E-01	0.6146E-01	0.1884E-00	0.3631E-01
238.0	0.0	2	1	0.2394E-01	-0.2213E-00	0.9902E-02	0.2550E-01	-0.1321E-00	0.1012E-01	0.2659E-01	-0.1050E-00	0.1025E-01
238.0	0.0	3	1	0.1607E-01	-0.1975E-01	0.4638E-02	0.1742E-01	-0.1739E-01	0.4746E-02	0.1836E-01	-0.1615E-01	0.4811E-02
238.0	1.0	1	1	0.1339E-02	0.3565E-02	0.8228E-03	0.1397E-02	0.4034E-02	0.8390E-03	0.1437E-02	0.4405E-02	0.8488E-03
238.0	1.0	2	1	0.5596E-03	-0.5174E-02	0.2315E-03	0.5961E-03	-0.3088E-02	0.2366E-03	0.6216E-03	-0.2455E-02	0.2397E-03
238.0	1.0	3	1	0.3758E-03	-0.4616E-03	0.1084E-03	0.4072E-03	-0.4065E-03	0.1110E-03	0.4293E-03	-0.3777E-03	0.1125E-03
238.0	238.0	2	1	0.5139E-04	-0.4752E-03	0.2126E-04	0.5475E-04	-0.2836E-03	0.2173E-04	0.5709E-04	-0.2255E-03	0.2201E-04
238.0	238.0	3	1	0.3451E-04	-0.4240E-04	0.9958E-05	0.3739E-04	-0.3734E-04	0.1019E-04	0.3943E-04	-0.3469E-04	0.1033E-04
238.0	238.0	3	2	0.2231E-04	-0.4479E-05	0.3163E-05	0.2491E-04	-0.4237E-05	0.3255E-05	0.2677E-04	-0.4095E-05	0.3311E-05

				0.367			0.5			0.633		
1.0	0.0	1	1	0.6306E-01	0.2051E-00	0.3668E-01	0.6450E-01	0.2224E-00	0.3701E-01	0.6584E-01	0.2403E-00	0.3730E-01
238.0	0.0	1	1	0.6304E-01	0.2050E-00	0.3667E-01	0.6449E-01	0.2223E-00	0.3700E-01	0.6582E-01	0.2402E-00	0.3729E-01
238.0	0.0	2	1	0.2761E-01	-0.8893E-01	0.1037E-01	0.2857E-01	-0.7838E-01	0.1047E-01	0.2946E-01	-0.7092E-01	0.1057E-01
238.0	0.0	3	1	0.1926E-01	-0.1520E-01	0.4869E-02	0.2010E-01	-0.1445E-01	0.4920E-02	0.2089E-01	-0.1385E-01	0.4967E-02
238.0	1.0	1	1	0.1474E-02	0.4793E-02	0.8573E-03	0.1508E-02	0.5197E-02	0.8650E-03	0.1539E-02	0.5616E-02	0.8719E-03
238.0	1.0	2	1	0.6455E-03	-0.2079E-02	0.2424E-03	0.6678E-03	-0.1832E-02	0.2449E-03	0.6887E-03	-0.1658E-02	0.2471E-03
238.0	1.0	3	1	0.4503E-03	-0.3554E-03	0.1138E-03	0.4700E-03	-0.3379E-03	0.1150E-03	0.4885E-03	-0.3238E-03	0.1161E-03
238.0	238.0	2	1	0.5929E-04	-0.1910E-03	0.2226E-04	0.6134E-04	-0.1683E-03	0.2249E-04	0.6325E-04	-0.1523E-03	0.2269E-04
238.0	238.0	3	1	0.4135E-04	-0.3264E-04	0.1045E-04	0.4316E-04	-0.3103E-04	0.1056E-04	0.4486E-04	-0.2974E-04	0.1066E-04
238.0	238.0	3	2	0.2855E-04	-0.3977E-05	0.3360E-05	0.3023E-04	-0.3879E-05	0.3405E-05	0.3182E-04	-0.3796E-05	0.3446E-05

				0.767			0.9		
1.0	0.0	1	1	0.6705E-01	0.2585E-00	0.3757E-01	0.6804E-01	0.2751E-00	0.3778E-01
238.0	0.0	1	1	0.6703E-01	0.2584E-00	0.3756E-01	0.6802E-01	0.2750E-00	0.3777E-01
238.0	0.0	2	1	0.3027E-01	-0.6547E-01	0.1065E-01	0.3095E-01	-0.6170E-01	0.1072E-01
238.0	0.0	3	1	0.2162E-01	-0.1336E-01	0.5008E-02	0.2223E-01	-0.1300E-01	0.5041E-02
238.0	1.0	1	1	0.1567E-02	0.6042E-02	0.8780E-03	0.1590E-02	0.6430E-02	0.8829E-03
238.0	1.0	2	1	0.7077E-03	-0.1531E-02	0.2490E-03	0.7235E-03	-0.1442E-02	0.2506E-03
238.0	1.0	3	1	0.5055E-03	-0.3124E-03	0.1171E-03	0.5197E-03	-0.3038E-03	0.1179E-03
238.0	238.0	2	1	0.6500E-04	-0.1406E-03	0.2287E-04	0.6645E-04	-0.1325E-03	0.2301E-04
238.0	238.0	3	1	0.4643E-04	-0.2869E-04	0.1075E-04	0.4773E-04	-0.2790E-04	0.1082E-04
238.0	238.0	3	2	0.3328E-04	-0.3727E-05	0.3482E-05	0.3450E-04	-0.3673E-05	0.3511E-05

TABLE V (CONT'D)

BINARY INTERIONIC DIFFUSIVITIES CALCULATED USING THREE DIFFERENT PROCEDURES

DIFFUSIVITY, $\mathcal{D}_{ij}$, IN FT^2/SEC

P = 500 ATM, T = 60,000 DEG K

				P_{FUEL}/P 0.09			P_{FUEL}/P 0.1			P_{FUEL}/P 0.233		
M_1	M_2	Z_1	Z_2	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$
1.0	0.0	1	1	0.1256E 01	0.1760E 01	0.1176E 01	0.1259E 01	0.1765E 01	0.1182E 01	0.1294E 01	0.1835E 01	0.1240E 01
238.0	0.0	1	1	0.1255E 01	0.1759E 01	0.1176E 01	0.1258E 01	0.1765E 01	0.1182E 01	0.1293E 01	0.1835E 01	0.1239E 01
238.0	0.0	2	1	0.3952E-00	0.6187E 00	0.3196E-00	0.3964E-00	0.6216E 00	0.3213E-00	0.4103E-00	0.6567E 00	0.3384E-00
238.0	0.0	3	1	0.2069E-00	0.3609E-00	0.1473E-00	0.2076E-00	0.3631E-00	0.1481E-00	0.2162E-00	0.3905E-00	0.1563E-00
238.0	1.0	1	1	0.2935E-01	0.4113E-01	0.2749E-01	0.2942E-01	0.4126E-01	0.2763E-01	0.3024E-01	0.4289E-01	0.2898E-01
238.0	1.0	2	1	0.9240E-02	0.1447E-01	0.7471E-02	0.9267E-02	0.1453E-01	0.7512E-02	0.9592E-02	0.1535E-01	0.7912E-02
238.0	1.0	3	1	0.4836E-02	0.8437E-02	0.3443E-02	0.4853E-02	0.8489E-02	0.3463E-02	0.5054E-02	0.9130E-02	0.3654E-02
238.0	238.0	2	1	0.8486E-03	0.1328E-02	0.6862E-03	0.8511E-03	0.1335E-02	0.6899E-03	0.8810E-03	0.1410E-02	0.7267E-03
238.0	238.0	3	1	0.4442E-03	0.7749E-03	0.3162E-03	0.4457E-03	0.7796E-03	0.3180E-03	0.4641E-03	0.8385E-03	0.3356E-03
238.0	238.0	3	2	0.1584E-03	0.4157E-03	0.9272E-04	0.1592E-03	0.4212E-03	0.9333E-04	0.1684E-03	0.4965E-03	0.9943E-04

				0.367			0.5			0.633		
1.0	0.0	1	1	0.1323E 01	0.1894E 01	0.1278E 01	0.1348E 01	0.1946E 01	0.1306E 01	0.1369E 01	0.1992E 01	0.1328E 01
238.0	0.0	1	1	0.1322E 01	0.1894E 01	0.1277E 01	0.1347E 01	0.1945E 01	0.1306E 01	0.1369E 01	0.1991E 01	0.1328E 01
238.0	0.0	2	1	0.4220E-00	0.6875E 00	0.3498E-00	0.4321E-00	0.7149E 00	0.3582E-00	0.4411E-00	0.7399E 00	0.3650E-00
238.0	0.0	3	1	0.2235E-00	0.4154E-00	0.1618E-00	0.2298E-00	0.4382E-00	0.1658E-00	0.2355E-00	0.4597E-00	0.1691E-00
238.0	1.0	1	1	0.3092E-01	0.4427E-01	0.2986E-01	0.3150E-01	0.4547E-01	0.3052E-01	0.3201E-01	0.4655E-01	0.3105E-01
238.0	1.0	2	1	0.9866E-02	0.1607E-01	0.8178E-02	0.1010E-01	0.1671E-01	0.8375E-02	0.1031E-01	0.1730E-01	0.8533E-02
238.0	1.0	3	1	0.5224E-02	0.9711E-02	0.3782E-02	0.5372E-02	0.1024E-01	0.3877E-02	0.5505E-02	0.1075E-01	0.3953E-02
238.0	238.0	2	1	0.9061E-03	0.1476E-02	0.7510E-03	0.9278E-03	0.1535E-02	0.7692E-03	0.9470E-03	0.1589E-02	0.7837E-03
238.0	238.0	3	1	0.4798E-03	0.8919E-03	0.3473E-03	0.4934E-03	0.9409E-03	0.3561E-03	0.5056E-03	0.9870E-03	0.3631E-03
238.0	238.0	3	2	0.1764E-03	0.5786E-03	0.1036E-03	0.1835E-03	0.6690E-03	0.1067E-03	0.1900E-03	0.7715E-03	0.1092E-03

				0.767			0.9		
1.0	0.0	1	1	0.1389E 01	0.2034E 01	0.1347E 01	0.1407E 01	0.2072E 01	0.1363E 01
238.0	0.0	1	1	0.1389E 01	0.2033E 01	0.1347E 01	0.1407E 01	0.2072E 01	0.1363E 01
238.0	0.0	2	1	0.4492E-00	0.7634E 00	0.3707E-00	0.4567E-00	0.7853E 00	0.3756E-00
238.0	0.0	3	1	0.2407E-00	0.4804E-00	0.1718E-00	0.2454E-00	0.5001E 00	0.1742E-00
238.0	1.0	1	1	0.3247E-01	0.4753E-01	0.3149E-01	0.3288E-01	0.4843E-01	0.3186E-01
238.0	1.0	2	1	0.1050E-01	0.1785E-01	0.8666E-02	0.1068E-01	0.1836E-01	0.8780E-02
238.0	1.0	3	1	0.5626E-02	0.1123E-01	0.4017E-02	0.5738E-02	0.1169E-01	0.4072E-02
238.0	238.0	2	1	0.9646E-03	0.1639E-02	0.7959E-03	0.9805E-03	0.1686E-02	0.8063E-03
238.0	238.0	3	1	0.5167E-03	0.1031E-02	0.3690E-03	0.5270E-03	0.1074E-02	0.3740E-03
238.0	238.0	3	2	0.1960E-03	0.8914E-03	0.1113E-03	0.2016E-03	0.1033E-02	0.1131E-03

P = 500 ATM, T = 100,000 DEG K

				P_{FUEL}/P 0.09			P_{FUEL}/P 0.1			P_{FUEL}/P 0.233		
M_1	M_2	Z_1	Z_2	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$
1.0	0.0	1	1	0.5761E 01	0.7383E 01	0.5920E 01	0.5772E 01	0.7401E 01	0.5947E 01	0.5908E 01	0.7625E 01	0.6217E 01
238.0	0.0	1	1	0.5759E 01	0.7381E 01	0.5919E 01	0.5771E 01	0.7399E 01	0.5945E 01	0.5906E 01	0.7623E 01	0.6216E 01
238.0	0.0	2	1	0.1711E 01	0.2315E 01	0.1587E 01	0.1715E 01	0.2322E 01	0.1595E 01	0.1763E 01	0.2411E 01	0.1673E 01
238.0	0.0	3	1	0.8543E 00	0.1209E 01	0.7268E 00	0.8565E 00	0.1214E 01	0.7305E 00	0.8836E 00	0.1269E 01	0.7673E 00
238.0	1.0	1	1	0.1346E-00	0.1725E-00	0.1384E-00	0.1349E-00	0.1730E-00	0.1390E-00	0.1381E-00	0.1782E-00	0.1453E-00
238.0	1.0	2	1	0.4000E-01	0.5413E-01	0.3710E-01	0.4009E-01	0.5429E-01	0.3728E-01	0.4121E-01	0.5638E-01	0.3910E-01
238.0	1.0	3	1	0.1997E-01	0.2827E-01	0.1699E-01	0.2002E-01	0.2837E-01	0.1708E-01	0.2066E-01	0.2966E-01	0.1794E-01
238.0	238.0	2	1	0.3673E-02	0.4971E-02	0.3407E-02	0.3682E-02	0.4986E-02	0.3424E-02	0.3785E-02	0.5178E-02	0.3591E-02
238.0	238.0	3	1	0.1834E-02	0.2596E-02	0.1561E-02	0.1839E-02	0.2606E-02	0.1568E-02	0.1897E-02	0.2724E-02	0.1648E-02
238.0	238.0	3	2	0.5811E-03	0.9263E-03	0.4443E-03	0.5830E-03	0.9311E-03	0.4468E-03	0.6064E-03	0.9928E-03	0.4727E-03

				0.367			0.5			0.633		
1.0	0.0	1	1	0.6026E 01	0.7824E 01	0.6404E 01	0.6130E 01	0.8000E 01	0.6548E 01	0.6224E 01	0.8162E 01	0.6667E 01
238.0	0.0	1	1	0.6024E 01	0.7822E 01	0.6403E 01	0.6129E 01	0.7998E 01	0.6546E 01	0.6223E 01	0.8159E 01	0.6665E 01
238.0	0.0	2	1	0.1805E 01	0.2491E 01	0.1727E 01	0.1843E 01	0.2564E 01	0.1769E 01	0.1877E 01	0.2630E 01	0.1803E 01
238.0	0.0	3	1	0.9075E 00	0.1319E 01	0.7931E 00	0.9289E 00	0.1364E 01	0.8130E 00	0.9484E 00	0.1407E 01	0.8294E 00
238.0	1.0	1	1	0.1408E-00	0.1829E-00	0.1497E-00	0.1433E-00	0.1870E-00	0.1530E-00	0.1455E-00	0.1908E-00	0.1558E-00
238.0	1.0	2	1	0.4220E-01	0.5824E-01	0.4037E-01	0.4306E-01	0.5993E-01	0.4135E-01	0.4387E-01	0.6149E-01	0.4216E-01
238.0	1.0	3	1	0.2122E-01	0.3083E-01	0.1854E-01	0.2172E-01	0.3190E-01	0.1901E-01	0.2217E-01	0.3290E-01	0.1939E-01
238.0	238.0	2	1	0.3876E-02	0.5349E-02	0.3708E-02	0.3956E-02	0.5504E-02	0.3798E-02	0.4030E-02	0.5647E-02	0.3872E-02
238.0	238.0	3	1	0.1949E-02	0.2831E-02	0.1703E-02	0.1994E-02	0.2930E-02	0.1745E-02	0.2036E-02	0.3021E-02	0.1781E-02
238.0	238.0	3	2	0.6275E-03	0.1051E-02	0.4910E-03	0.6465E-03	0.1106E-02	0.5052E-03	0.6641E-03	0.1159E-02	0.5171E-03

				0.767			0.9		
1.0	0.0	1	1	0.6311E 01	0.8311E 01	0.6769E 01	0.6390E 01	0.8450E 01	0.6858E 01
238.0	0.0	1	1	0.6309E 01	0.8309E 01	0.6767E 01	0.6389E 01	0.8447E 01	0.6856E 01
238.0	0.0	2	1	0.1908E 01	0.2693E 01	0.1833E 01	0.1937E 01	0.2751E 01	0.1859E 01
238.0	0.0	3	1	0.9666E 00	0.1448E 01	0.8437E 00	0.9834E 00	0.1486E 01	0.8561E 00
238.0	1.0	1	1	0.1475E-00	0.1943E-00	0.1582E-00	0.1494E-00	0.1975E-00	0.1603E-00
238.0	1.0	2	1	0.4461E-01	0.6295E-01	0.4286E-01	0.4529E-01	0.6431E-01	0.4347E-01
238.0	1.0	3	1	0.2260E-01	0.3384E-01	0.1972E-01	0.2299E-01	0.3473E-01	0.2001E-01
238.0	238.0	2	1	0.4097E-02	0.5781E-02	0.3936E-02	0.4160E-02	0.5907E-02	0.3992E-02
238.0	238.0	3	1	0.2075E-02	0.3108E-02	0.1811E-02	0.2111E-02	0.3190E-02	0.1838E-02
238.0	238.0	3	2	0.5806E-03	0.1211E-02	0.5274E-03	0.5961E-03	0.1251E-02	0.5344E-03

TABLE V (CONT'D)

BINARY INTERIONIC DIFFUSIVITIES CALCULATED USING THREE DIFFERENT PROCEDURES

DIFFUSIVITY, $\mathcal{D}_{ij}$, IN FT²/SEC

P = 1000 ATM, T = 20,000 DEG K

				P_{FUEL}/P 0.09			P_{FUEL}/P 0.1			P_{FUEL}/P 0.233		
M_1	M_2	Z_1	Z_2	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$
1.0	0.0	1	1	0.3864E-01	0.2911E-00	0.1980E-01	0.3870E-01	0.2947E-00	0.1981E-01	0.3947E-01	0.3529E-00	0.1996E-01
238.0	0.0	1	1	0.3863E-01	0.2910E-00	0.1979E-01	0.3869E-01	0.2946E-00	0.1981E-01	0.3946E-01	0.3528E-00	0.1995E-01
238.0	0.0	2	1	0.1874E-01	-0.2094E-01	0.5653E-02	0.1878E-01	-0.2086E-01	0.5656E-02	0.1935E-01	-0.1993E-01	0.5703E-02
238.0	0.0	3	1	0.1410E-01	-0.5308E-02	0.2667E-02	0.1414E-01	-0.5297E-02	0.2668E-02	0.1466E-01	-0.5159E-02	0.2692E-02
238.0	1.0	1	1	0.9031E-03	0.6803E-02	0.4628E-03	0.9045E-03	0.6988E-02	0.4630E-03	0.9225E-03	0.8247E-02	0.4664E-03
238.0	1.0	2	1	0.4381E-03	-0.4895E-03	0.1321E-03	0.4391E-03	-0.4878E-03	0.1322E-03	0.4523E-03	-0.4660E-03	0.1333E-03
238.0	1.0	3	1	0.3296E-03	-0.1241E-03	0.6234E-04	0.3305E-03	-0.1238E-03	0.6238E-04	0.3427E-03	-0.1206E-03	0.6293E-04
238.0	238.0	2	1	0.4024E-04	-0.4496E-04	0.1214E-04	0.4033E-04	-0.4480E-04	0.1214E-04	0.4154E-04	-0.4280E-04	0.1225E-04
238.0	238.0	3	1	0.3027E-04	-0.1140E-04	0.5725E-05	0.3035E-04	-0.1137E-04	0.5729E-05	0.3147E-04	-0.1108E-04	0.5779E-05
238.0	238.0	3	2	0.2336E-04	-0.1643E-05	0.1885E-05	0.2344E-04	-0.1641E-05	0.1887E-05	0.2453E-04	-0.1616E-05	0.1908E-05

				0.367			0.5			0.633		
1.0	0.0	1	1	0.4023E-01	0.4347E-00	0.2009E-01	0.4091E-01	0.5459E 00	0.2022E-01	0.4169E-01	0.7567E 00	0.2035E-01
238.0	0.0	1	1	0.4022E-01	0.4346E-00	0.2009E-01	0.4090E-01	0.5457E 00	0.2021E-01	0.4168E-01	0.7565E 00	0.2035E-01
238.0	0.0	2	1	0.1991E-01	-0.1912E-01	0.5748E-02	0.2042E-01	-0.1846E-01	0.5788E-02	0.2100E-01	-0.1779E-01	0.5832E-02
238.0	0.0	3	1	0.1518E-01	-0.5035E-02	0.2714E-02	0.1566E-01	-0.4930E-02	0.2734E-02	0.1621E-01	-0.4821E-02	0.2756E-02
238.0	1.0	1	1	0.9402E-03	0.1016E-01	0.4696E-03	0.9563E-03	0.1276E-01	0.4725E-03	0.9743E-03	0.1769E-01	0.4757E-03
238.0	1.0	2	1	0.4654E-03	-0.4470E-03	0.1344E-03	0.4774E-03	-0.4315E-03	0.1353E-03	0.4910E-03	-0.4159E-03	0.1363E-03
238.0	1.0	3	1	0.3549E-03	-0.1177E-03	0.6345E-04	0.3661E-03	-0.1153E-03	0.6392E-04	0.3789E-03	-0.1127E-03	0.6443E-04
238.0	238.0	2	1	0.4274E-04	-0.4105E-04	0.1234E-04	0.4384E-04	-0.3963E-04	0.1243E-04	0.4509E-04	-0.3819E-04	0.1252E-04
238.0	238.0	3	1	0.3260E-04	-0.1081E-04	0.5827E-05	0.3363E-04	-0.1058E-04	0.5870E-05	0.3479E-04	-0.1035E-04	0.5917E-05
238.0	238.0	3	2	0.2561E-04	-0.1593E-05	0.1928E-05	0.2661E-04	-0.1573E-05	0.1946E-05	0.2774E-04	-0.1552E-05	0.1966E-05

				0.767			0.9		
1.0	0.0	1	1	0.4242E-01	0.1169E 01	0.2048E-01	0.4304E-01	0.2143E 01	0.2058E-01
238.0	0.0	1	1	0.4240E-01	0.1169E 01	0.2047E-01	0.4303E-01	0.2142E 01	0.2058E-01
238.0	0.0	2	1	0.2155E-01	-0.1722E-01	0.5873E-02	0.2203E-01	-0.1677E-01	0.5907E-02
238.0	0.0	3	1	0.1672E-01	-0.4725E-02	0.2776E-02	0.1717E-01	-0.4648E-02	0.2794E-02
238.0	1.0	1	1	0.9913E-03	0.2733E-01	0.4786E-03	0.1006E-02	0.5009E-01	0.4811E-03
238.0	1.0	2	1	0.5039E-03	-0.4025E-03	0.1373E-03	0.5150E-03	-0.3920E-03	0.1381E-03
238.0	1.0	3	1	0.3910E-03	-0.1105E-03	0.6491E-04	0.4015E-03	-0.1087E-03	0.6531E-04
238.0	238.0	2	1	0.4628E-04	-0.3697E-04	0.1261E-04	0.4730E-04	-0.3600E-04	0.1268E-04
238.0	238.0	3	1	0.3591E-04	-0.1015E-04	0.5961E-05	0.3687E-04	-0.9980E-05	0.5998E-05
238.0	238.0	3	2	0.2883E-04	-0.1534E-05	0.1985E-05	0.2976E-04	-0.1518E-05	0.2000E-05

P = 1000 ATM, T = 60,000 DEG K

				P_{FUEL}/P 0.09			P_{FUEL}/P 0.1			P_{FUEL}/P 0.233		
M_1	M_2	Z_1	Z_2	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$	$\mathcal{D}_L$	$\mathcal{D}_{SC}$	$\mathcal{D}_R$
1.0	0.0	1	1	0.6993E 00	0.1027E 01	0.6271E 00	0.7010E 00	0.1031E 01	0.6302E 00	0.7211E 00	0.1075E 01	0.6605E 00
238.0	0.0	1	1	0.6991E 00	0.1027E 01	0.6269E 00	0.7008E 00	0.1030E 01	0.6301E 00	0.7209E 00	0.1075E 01	0.6603E 00
238.0	0.0	2	1	0.2266E-00	0.3875E-00	0.1714E-00	0.2273E-00	0.3896E-00	0.1723E-00	0.2358E-00	0.4154E-00	0.1814E-00
238.0	0.0	3	1	0.1216E-00	0.2453E-00	0.7919E-01	0.1221E-00	0.2473E-00	0.7964E-01	0.1275E-00	0.2713E-00	0.8401E-01
238.0	1.0	1	1	0.1634E-01	0.2400E-01	0.1466E-01	0.1638E-01	0.2409E-01	0.1473E-01	0.1685E-01	0.2512E-01	0.1544E-01
238.0	1.0	2	1	0.5297E-02	0.9058E-02	0.4006E-02	0.5314E-02	0.9108E-02	0.4028E-02	0.5512E-02	0.9711E-02	0.4240E-02
238.0	1.0	3	1	0.2843E-02	0.5736E-02	0.1851E-02	0.2853E-02	0.5781E-02	0.1862E-02	0.2981E-02	0.6343E-02	0.1964E-02
238.0	238.0	2	1	0.4865E-03	0.8319E-03	0.3680E-03	0.4880E-03	0.8365E-03	0.3700E-03	0.5062E-03	0.8919E-03	0.3894E-03
238.0	238.0	3	1	0.2611E-03	0.5268E-03	0.1700E-03	0.2621E-03	0.5309E-03	0.1710E-03	0.2738E-03	0.5826E-03	0.1804E-03
238.0	238.0	3	2	0.9946E-04	0.4806E-03	0.5050E-04	0.1000E-03	0.4948E-03	0.5083E-04	0.1065E-03	0.7390E-03	0.5417E-04

				0.367			0.5			0.633		
1.0	0.0	1	1	0.7375E 00	0.1112E 01	0.6800E 00	0.7514E 00	0.1144E 01	0.6943E 00	0.7637E 00	0.1173E 01	0.7058E 00
238.0	0.0	1	1	0.7373E 00	0.1111E 01	0.6798E 00	0.7512E 00	0.1143E 01	0.6941E 00	0.7635E 00	0.1172E 01	0.7056E 00
238.0	0.0	2	1	0.2427E-00	0.4379E-00	0.1873E-00	0.2487E-00	0.4581E-00	0.1916E-00	0.2541E-00	0.4769E-00	0.1951E-00
238.0	0.0	3	1	0.1321E-00	0.2935E-00	0.8685E-01	0.1360E-00	0.3144E-00	0.8896E-01	0.1396E-00	0.3348E-00	0.9066E-01
238.0	1.0	1	1	0.1724E-01	0.2598E-01	0.1589E-01	0.1756E-01	0.2673E-01	0.1623E-01	0.1785E-01	0.2741E-01	0.1650E-01
238.0	1.0	2	1	0.5675E-02	0.1024E-01	0.4378E-02	0.5815E-02	0.1071E-01	0.4480E-02	0.5941E-02	0.1115E-01	0.4562E-02
238.0	1.0	3	1	0.3087E-02	0.6861E-02	0.2031E-02	0.3180E-02	0.7350E-02	0.2080E-02	0.3263E-02	0.7827E-02	0.2119E-02
238.0	238.0	2	1	0.5212E-03	0.9402E-03	0.4021E-03	0.5341E-03	0.9836E-03	0.4114E-03	0.5456E-03	0.1024E-02	0.4190E-03
238.0	238.0	3	1	0.2835E-03	0.6302E-03	0.1865E-03	0.2920E-03	0.6751E-03	0.1910E-03	0.2996E-03	0.7188E-03	0.1946E-03
238.0	238.0	3	2	0.1121E-03	0.1198E-02	0.5637E-04	0.1170E-03	0.2424E-02	0.5802E-04	0.1215E-03	0.1930E-01	0.5936E-04

				0.767			0.9		
1.0	0.0	1	1	0.7749E 00	0.1199E 01	0.7155E 00	0.7850E 00	0.1224E 01	0.7238E 00
238.0	0.0	1	1	0.7746E 00	0.1199E 01	0.7153E 00	0.7848E 00	0.1224E 01	0.7236E 00
238.0	0.0	2	1	0.2590E-00	0.4948E-00	0.1981E-00	0.2635E-00	0.5119E 00	0.2006E-00
238.0	0.0	3	1	0.1428E-00	0.3551E-00	0.9210E-01	0.1459E-00	0.3753E-00	0.9334E-01
238.0	1.0	1	1	0.1811E-01	0.2803E-01	0.1672E-01	0.1835E-01	0.2861E-01	0.1692E-01
238.0	1.0	2	1	0.6055E-02	0.1157E-01	0.4631E-02	0.6151E-02	0.1197E-01	0.4691E-02
238.0	1.0	3	1	0.3339E-02	0.8302E-02	0.2153E-02	0.3410E-02	0.8773E-02	0.2182E-02
238.0	238.0	2	1	0.5561E-03	0.1062E-02	0.4253E-03	0.5658E-03	0.1099E-02	0.4308E-03
238.0	238.0	3	1	0.3067E-03	0.7624E-03	0.1977E-03	0.3132E-03	0.8058E-03	0.2004E-03
238.0	238.0	3	2	0.1257E-03	-0.3751E-02	0.6050E-04	0.1297E-03	-0.1823E-02	0.6149E-04

TABLE V (CONT'D)

BINARY INTERIONIC DIFFUSIVITIES CALCULATED USING THREE DIFFERENT PROCEDURES

DIFFUSIVITY, $\mathfrak{D}_{ij}$, IN FT^2/SEC

$P = 1000$ ATM, $T = 100{,}000$ DEG K

M_1	M_2	Z_1	Z_2	P_{FUEL}/P 0.09			P_{FUEL}/P 0.1			P_{FUEL}/P 0.233		
				$\mathfrak{D}_L$	$\mathfrak{D}_{SC}$	$\mathfrak{D}_R$	$\mathfrak{D}_L$	$\mathfrak{D}_{SC}$	$\mathfrak{D}_R$	$\mathfrak{D}_L$	$\mathfrak{D}_{SC}$	$\mathfrak{D}_R$
1.0	0.0	1	1	0.3128E 01	0.4108E 01	0.3130E 01	0.3135E 01	0.4119E 01	0.3145E 01	0.3215E 01	0.4259E 01	0.3296E 01
238.0	0.0	1	1	0.3127E 01	0.4107E 01	0.3129E 01	0.3134E 01	0.4118E 01	0.3144E 01	0.3214E 01	0.4257E 01	0.3295E 01
238.0	0.0	2	1	0.9441E 00	0.1326E 01	0.8424E 00	0.9465E 00	0.1331E 01	0.8467E 00	0.9758E 00	0.1390E 01	0.8907E 00
238.0	0.0	3	1	0.4775E-00	0.7109E 00	0.3866E-00	0.4789E-00	0.7139E 00	0.3886E-00	0.4958E-00	0.7523E 00	0.4095E-00
238.0	1.0	1	1	0.7311E-01	0.9601E-01	0.7315E-01	0.7326E-01	0.9628E-01	0.7350E-01	0.7513E-01	0.9953E-01	0.7703E-01
238.0	1.0	2	1	0.2207E-01	0.3101E-01	0.1969E-01	0.2213E-01	0.3112E-01	0.1980E-01	0.2281E-01	0.3249E-01	0.2082E-01
238.0	1.0	3	1	0.1116E-01	0.1662E-01	0.9038E-02	0.1120E-01	0.1669E-01	0.9086E-02	0.1159E-01	0.1759E-01	0.9574E-02
238.0	238.0	2	1	0.2027E-02	0.2848E-02	0.1809E-02	0.2032E-02	0.2858E-02	0.1818E-02	0.2095E-02	0.2984E-02	0.1913E-02
238.0	238.0	3	1	0.1025E-02	0.1526E-02	0.8300E-03	0.1028E-02	0.1533E-02	0.8344E-03	0.1065E-02	0.1615E-02	0.8793E-03
238.0	238.0	3	2	0.3351E-03	0.5889E-03	0.2384E-03	0.3363E-03	0.5928E-03	0.2399E-03	0.3519E-03	0.6436E-03	0.2548E-03

				0.367			0.5			0.633		
1.0	0.0	1	1	0.3285E 01	0.4383E 01	0.3401E 01	0.3346E 01	0.4493E 01	0.3482E 01	0.3402E 01	0.4595E 01	0.3549E 01
238.0	0.0	1	1	0.3284E 01	0.4381E 01	0.3400E 01	0.3346E 01	0.4492E 01	0.3481E 01	0.3401E 01	0.4594E 01	0.3548E 01
238.0	0.0	2	1	0.1002E 01	0.1443E 01	0.9215E 00	0.1025E 01	0.1492E 01	0.9453E 00	0.1046E 01	0.1537E 01	0.9650E 00
238.0	0.0	3	1	0.5109E 00	0.7878E 00	0.4242E-00	0.5244E 00	0.8205E 00	0.4355E-00	0.5368E 00	0.8514E 00	0.4449E-00
238.0	1.0	1	1	0.7677E-01	0.1024E-00	0.7949E-01	0.7821E-01	0.1050E-00	0.8138E-01	0.7952E-01	0.1074E-00	0.8294E-01
238.0	1.0	2	1	0.2342E-01	0.3374E-01	0.2154E-01	0.2396E-01	0.3487E-01	0.2210E-01	0.2445E-01	0.3593E-01	0.2256E-01
238.0	1.0	3	1	0.1194E-01	0.1842E-01	0.9916E-02	0.1226E-01	0.1918E-01	0.1018E-01	0.1255E-01	0.1990E-01	0.1040E-01
238.0	238.0	2	1	0.2151E-02	0.3099E-02	0.1979E-02	0.2200E-02	0.3203E-02	0.2030E-02	0.2245E-02	0.3300E-02	0.2072E-02
238.0	238.0	3	1	0.1097E-02	0.1691E-02	0.9107E-03	0.1126E-02	0.1762E-02	0.9351E-03	0.1153E-02	0.1828E-02	0.9553E-03
238.0	238.0	3	2	0.3660E-03	0.6932E-03	0.2654E-03	0.3788E-03	0.7418E-03	0.2737E-03	0.3908E-03	0.7901E-03	0.2806E-03

				0.767			0.9		
1.0	0.0	1	1	0.3454E 01	0.4689E 01	0.3606E 01	0.3501E 01	0.4777E 01	0.3656E 01
238.0	0.0	1	1	0.3453E 01	0.4688E 01	0.3605E 01	0.3500E 01	0.4776E 01	0.3655E 01
238.0	0.0	2	1	0.1065E 01	0.1579E 01	0.9821E 00	0.1083E 01	0.1619E 01	0.9970E 00
238.0	0.0	3	1	0.5484E 00	0.8810E 00	0.4531E-00	0.5591E 00	0.9093E 00	0.4602E-00
238.0	1.0	1	1	0.8073E-01	0.1096E-00	0.8429E-01	0.8183E-01	0.1117E-00	0.8546E-01
238.0	1.0	2	1	0.2491E-01	0.3692E-01	0.2296E-01	0.2533E-01	0.3786E-01	0.2331E-01
238.0	1.0	3	1	0.1282E-01	0.2060E-01	0.1059E-01	0.1307E-01	0.2126E-01	0.1076E-01
238.0	238.0	2	1	0.2287E-02	0.3391E-02	0.2109E-02	0.2326E-02	0.3477E-02	0.2141E-02
238.0	238.0	3	1	0.1177E-02	0.1892E-02	0.9728E-03	0.1200E-02	0.1952E-02	0.9881E-03
238.0	238.0	3	2	0.4021E-03	0.8388E-03	0.2867E-03	0.4127E-03	0.8877E-03	0.2920E-03

TABLE VI

VISCOSITIES OF EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

VISCOSITY IN LB/(FT-SEC)

T-DEG K	P_{FUEL}/P = 0.09	0.1	0.233	0.367	0.5	0.633	0.767	0.9
				P = 100 ATM				
0.1000E 06	0.1752E-03	0.1711E-03	0.1404E-03	0.1175E-03	0.1003E-03	0.8567E-04	0.7559E-04	0.6549E-04
0.6000E 05	0.6219E-04	0.6139E-04	0.5252E-04	0.4556E-04	0.4250E-04	0.3963E-04	0.3756E-04	0.3508E-04
0.2000E 05	0.9458E-04	0.9535E-04	0.1061E-03	0.1064E-03	0.1035E-03	0.9948E-04	0.9516E-04	0.9147E-04
				P = 500 ATM				
0.1000E 06	0.2078E-03	0.2047E-03	0.1590E-03	0.1428E-03	0.1232E-03	0.1080E-03	0.9563E-04	0.8560E-04
0.6000E 05	0.7992E-04	0.7969E-04	0.7712E-04	0.7513E-04	0.7613E-04	0.7665E-04	0.7746E-04	0.7841E-04
0.2000E 05	0.1054E-03	0.1469E-03	0.1568E-03	0.1542E-03	0.1480E-03	0.1402E-03	0.1314E-03	0.1224E-03
				P = 1000 ATM				
0.1000E 06	0.2270E-03	0.2233E-03	0.1856E-03	0.1580E-03	0.1377E-03	0.1219E-03	0.1093E-03	0.9930E-04
0.6000E 05	0.9234E-04	0.9272E-04	0.9577E-04	0.1000E-03	0.1028E-03	0.1052E-03	0.1075E-03	0.1096E-03
0.2000E 05	0.1545E-03	0.1573E-03	0.1711E-03	0.1707E-03	0.1660E-03	0.1584E-03	0.1491E-03	0.1386E-03

TABLE VII

COEFFICIENTS OF DIFFUSION IN EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

COEFFICIENT OF DIFFUSION, D_{ij}, IN FT^2/SEC

P = 100 ATM, T = 20,000 DEG K

P_{FUEL}/P

M_1	M_2	Z_1	Z_2	0.09	0.1	0.233	0.367	0.5	0.633	0.767	0.9
0.0	1.0	-1	1	0.4066E 01	0.4500E 01	0.9852E 01	0.1467E 02	0.1899E 02	0.2298E 02	0.2678E 02	0.3052E 02
0.0	238.0	-1	1	0.1949E-01	0.2135E-01	0.4424E-01	0.6484E-01	0.8330E-01	0.1003E-00	0.1165E-00	0.1324E-00
0.0	238.0	-1	2	0.1860E-01	0.2052E-01	0.4370E-01	0.6442E-01	0.8294E-01	0.9998E-01	0.1162E-00	0.1321E-00
0.0	238.0	-1	3	0.1839E-01	0.2032E-01	0.4357E-01	0.6432E-01	0.8286E-01	0.9992E-01	0.1161E-00	0.1321E-00
0.0	1.0	-1	0	0.4252E 01	0.4705E 01	0.1018E 02	0.1509E 02	0.1950E 02	0.2355E 02	0.2741E 02	0.3121E 02
1.0	0.0	1	-1	0.1493E 03	0.1673E 03	0.3922E 03	0.6011E 03	0.7921E 03	0.9701E 03	0.1141E 04	0.1308E 04
1.0	238.0	1	1	0.2287E-02	0.2306E-02	0.2615E-02	0.2842E-02	0.3003E-02	0.3125E-02	0.3219E-02	0.3289E-02
1.0	238.0	1	2	0.1527E-02	0.1596E-02	0.2238E-02	0.2610E-02	0.2855E-02	0.3031E-02	0.3165E-02	0.3267E-02
1.0	238.0	1	3	0.1330E-02	0.1409E-02	0.2132E-02	0.2547E-02	0.2816E-02	0.3008E-02	0.3153E-02	0.3262E-02
1.0	1.0	1	0	0.1963E-00	0.2099E-00	0.3523E-00	0.4583E-00	0.5435E 00	0.6162E 00	0.6813E 00	0.7408E 00
238.0	0.0	1	-1	0.2129E 02	0.2098E 02	0.1643E 02	0.1299E 02	0.1050E 02	0.8608E 01	0.7088E 01	0.5823E 01
238.0	1.0	1	1	0.1205E-01	0.1194E-01	0.1013E-01	0.8747E-02	0.7766E-02	0.7035E-02	0.6472E-02	0.6047E-02
238.0	238.0	1	2	0.7031E-04	0.7172E-04	0.8171E-04	0.8633E-04	0.8915E-04	0.9113E-04	0.9264E-04	0.9383E-04
238.0	238.0	1	3	0.5734E-04	0.5752E-04	0.5611E-04	0.5412E-04	0.5257E-04	0.5137E-04	0.5044E-04	0.4976E-04
238.0	1.0	1	0	0.1559E-01	0.1594E-01	0.1933E-01	0.2211E-01	0.2457E-01	0.2681E-01	0.2891E-01	0.3093E-01
238.0	0.0	2	-1	0.1227E 02	0.1322E 02	0.2198E 02	0.2697E 02	0.3017E 02	0.3244E 02	0.3415E 02	0.3546E 02
238.0	1.0	2	1	0.6747E-02	0.7258E-02	0.1200E-01	0.1472E-01	0.1648E-01	0.1774E-01	0.1868E-01	0.1941E-01
238.0	238.0	2	1	0.6266E-04	0.6446E-04	0.7744E-04	0.8354E-04	0.8732E-04	0.9001E-04	0.9206E-04	0.9365E-04
238.0	238.0	2	3	0.3210E-04	0.3433E-04	0.5439E-04	0.6553E-04	0.7263E-04	0.7764E-04	0.8139E-04	0.8426E-04
238.0	1.0	2	0	0.6167E-02	0.6546E-02	0.1004E-01	0.1212E-01	0.1355E-01	0.1462E-01	0.1548E-01	0.1616E-01
238.0	0.0	3	-1	0.6880E 01	0.7325E 01	0.1132E 02	0.1356E 02	0.1500E 02	0.1602E 02	0.1679E 02	0.1737E 02
238.0	1.0	3	1	0.3744E-02	0.3987E-02	0.6161E-02	0.7379E-02	0.8163E-02	0.8720E-02	0.9139E-02	0.9456E-02
238.0	238.0	3	1	0.1586E-04	0.1688E-04	0.2609E-04	0.3125E-04	0.3457E-04	0.3693E-04	0.3871E-04	0.4005E-04
238.0	238.0	3	2	0.1586E-04	0.1688E-04	0.2609E-04	0.3125E-04	0.3457E-04	0.3693E-04	0.3871E-04	0.4005E-04
238.0	1.0	3	0	0.3744E-02	0.3987E-02	0.6161E-02	0.7379E-02	0.8163E-02	0.8720E-02	0.9139E-02	0.9456E-02
1.0	0.0	0	-1	0.1729E 04	0.1903E 04	0.3938E 04	0.5672E 04	0.7158E 04	0.8467E 04	0.9658E 04	0.1077E 05
1.0	1.0	0	1	0.8950E 00	0.9857E 00	0.2062E 01	0.2999E 01	0.3818E 01	0.4550E 01	0.5223E 01	0.5849E 01
1.0	238.0	0	1	0.5507E-02	0.5847E-02	0.9961E-02	0.1360E-01	0.1679E-01	0.1966E-01	0.2232E-01	0.2483E-01
1.0	238.0	0	2	0.4459E-02	0.4844E-02	0.9329E-02	0.1318E-01	0.1651E-01	0.1949E-01	0.2223E-01	0.2480E-01
1.0	238.0	0	3	0.3805E-02	0.4267E-02	0.8799E-02	0.1275E-01	0.1620E-01	0.1929E-01	0.2213E-01	0.2478E-01

P = 100 ATM, T = 60,000 DEG K

P_{FUEL}/P

M_1	M_2	Z_1	Z_2	0.09	0.1	0.233	0.367	0.5	0.633	0.767	0.9
0.0	1.0	-1	1	0.4560E 02	0.4926E 02	0.8844E 02	0.1160E 03	0.1388E 03	0.1569E 03	0.1725E 03	0.1860E 03
0.0	238.0	-1	1	0.2271E-00	0.2408E-00	0.3960E-00	0.5122E 00	0.6032E 00	0.6785E 00	0.7436E 00	0.8003E 00
0.0	238.0	-1	2	0.2086E-00	0.2237E-00	0.3868E-00	0.5055E 00	0.5978E 00	0.6739E 00	0.7394E 00	0.7965E 00
0.0	238.0	-1	3	0.2047E-00	0.2201E-00	0.3848E-00	0.5041E 00	0.5966E 00	0.6729E 00	0.7385E 00	0.7957E 00
0.0	1.0	-1	0	0.4756E 02	0.5125E 02	0.9053E 02	0.1188E 03	0.1407E 03	0.1588E 03	0.1743E 03	0.1878E 03
1.0	0.0	1	-1	0.1803E 04	0.1965E 04	0.3695E 04	0.4944E 04	0.5911E 04	0.6705E 04	0.7388E 04	0.7981E 04
1.0	238.0	1	1	0.3405E-01	0.3246E-01	0.2346E-01	0.2093E-01	0.1992E-01	0.1947E-01	0.1930E-01	0.1928E-01
1.0	238.0	1	2	0.1801E-01	0.1782E-01	0.1713E-01	0.1736E-01	0.1775E-01	0.1817E-01	0.1860E-01	0.1902E-01
1.0	238.0	1	3	0.1460E-01	0.1470E-01	0.1576E-01	0.1658E-01	0.1727E-01	0.1788E-01	0.1844E-01	0.1896E-01
1.0	1.0	1	0	0.2521E 01	0.2610E 01	0.3301E 01	0.3664E 01	0.3919E 01	0.4124E 01	0.4300E 01	0.4456E 01
238.0	0.0	1	-1	0.5212E 03	0.5308E 03	0.6075E 03	0.6519E 03	0.6853E 03	0.7133E 03	0.7382E 03	0.7606E 03
238.0	1.0	1	1	0.2836E-00	0.2889E-00	0.3307E-00	0.3548E-00	0.3730E-00	0.3882E-00	0.4018E-00	0.4140E-00
238.0	238.0	1	2	0.1201E-02	0.1223E-02	0.1400E-02	0.1503E-02	0.1580E-02	0.1644E-02	0.1702E-02	0.1754E-02
238.0	238.0	1	3	0.1201E-02	0.1223E-02	0.1400E-02	0.1503E-02	0.1580E-02	0.1644E-02	0.1702E-02	0.1753E-02
238.0	1.0	1	0	0.2836E-00	0.2889E-00	0.3307E-00	0.3548E-00	0.3730E-00	0.3882E-00	0.4018E-00	0.4140E-00
238.0	0.0	2	-1	0.1451E 03	0.1478E 03	0.1667E 03	0.1749E 03	0.1796E 03	0.1825E 03	0.1843E 03	0.1854E 03
238.0	1.0	2	1	0.7906E-01	0.8052E-01	0.9116E-01	0.9609E-01	0.9912E-01	0.1012E-00	0.1028E-00	0.1040E-00
238.0	238.0	2	1	0.3566E-03	0.3658E-03	0.4531E-03	0.5182E-03	0.5753E-03	0.6285E-03	0.6793E-03	0.7278E-03
238.0	238.0	2	3	0.3368E-03	0.3433E-03	0.3922E-03	0.4172E-03	0.4342E-03	0.4474E-03	0.4582E-03	0.4674E-03
238.0	1.0	2	0	0.7925E-01	0.8075E-01	0.9187E-01	0.9733E-01	0.1009E-00	0.1035E-00	0.1056E-00	0.1073E-00
238.0	0.0	3	-1	0.2040E 02	0.2006E 02	0.1713E 02	0.1608E 02	0.1610E 02	0.1677E 02	0.1787E 02	0.1927E 02
238.0	1.0	3	1	0.1507E-01	0.1524E-01	0.1721E-01	0.1900E-01	0.2068E-01	0.2229E-01	0.2385E-01	0.2536E-01
238.0	238.0	3	1	0.1099E-02	0.1125E-02	0.1307E-02	0.1383E-02	0.1427E-02	0.1456E-02	0.1477E-02	0.1492E-02
238.0	238.0	3	2	0.3223E-03	0.3300E-03	0.3863E-03	0.4138E-03	0.4321E-03	0.4461E-03	0.4575E-03	0.4670E-03
238.0	1.0	3	0	0.1207E-01	0.1205E-01	0.1217E-01	0.1263E-01	0.1319E-01	0.1381E-01	0.1446E-01	0.1512E-01
1.0	0.0	0	-1	0.3419E 04	0.3515E 04	0.4194E 04	0.4508E 04	0.4720E 04	0.4889E 04	0.5038E 04	0.5172E 04
1.0	1.0	0	1	0.1860E 01	0.1912E 01	0.2282E 01	0.2453E 01	0.2568E 01	0.2661E 01	0.2742E 01	0.2815E 01
1.0	238.0	0	1	0.7957E-02	0.8171E-02	0.9695E-02	0.1040E-01	0.1089E-01	0.1127E-01	0.1161E-01	0.1192E-01
1.0	238.0	0	2	0.7905E-02	0.8123E-02	0.9676E-02	0.1040E-01	0.1088E-01	0.1127E-01	0.1161E-01	0.1192E-01
1.0	238.0	0	3	0.7891E-02	0.8111E-02	0.9671E-02	0.1039E-01	0.1088E-01	0.1127E-01	0.1161E-01	0.1192E-01

TABLE VII (CONT'D)

COEFFICIENTS OF DIFFUSION IN EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

COEFFICIENT OF DIFFUSION, D_{ij}, IN FT^2/SEC

P = 100 ATM, T = 100,000 DEG K

M_1	M_2	Z_1	Z_2	P_{FUEL}/P							
				0.09	0.1	0.233	0.367	0.5	0.633	0.767	0.9
0.0	1.0	-1	1	0.2380E 03	0.2203E 03	0.4244E 03	0.5542E 03	0.6501E 03	0.7251E 03	0.7863E 03	0.8367E 03
0.0	238.0	-1	1	0.1169E 01	0.1102E 01	0.1903E 01	0.2433E 01	0.2828E 01	0.3138E 01	0.3392E 01	0.3601E 01
0.0	238.0	-1	2	0.1084E 01	0.1011E 01	0.1858E 01	0.2400E 01	0.2801E 01	0.3115E 01	0.3372E 01	0.3583E 01
0.0	238.0	-1	3	0.1066E 01	0.9917E 00	0.1849E 01	0.2393E 01	0.2796E 01	0.3111E 01	0.3368E 01	0.3579E 01
0.0	1.0	-1	0	0.2462E 03	0.2282E 03	0.4336E 03	0.5632E 03	0.6587E 03	0.7333E 03	0.7942E 03	0.8444E 03
1.0	0.0	1	-1	0.9496E 04	0.8690E 04	0.1773E 05	0.2346E 05	0.2768E 05	0.3099E 05	0.3368E 05	0.3590E 05
1.0	238.0	1	1	0.1613E-00	0.1690E-00	0.1147E-00	0.1005E-00	0.9397E-01	0.9038E-01	0.8819E-01	0.8679E-01
1.0	238.0	1	2	0.8896E-01	0.8976E-01	0.8357E-01	0.8308E-01	0.8349E-01	0.8414E-01	0.8485E-01	0.8555E-01
1.0	238.0	1	3	0.7348E-01	0.7283E-01	0.7699E-01	0.7942E-01	0.8129E-01	0.8282E-01	0.8414E-01	0.8529E-01
1.0	1.0	1	0	0.1137E 02	0.1083E 02	0.1517E 02	0.1697E 02	0.1809E 02	0.1888E 02	0.1950E 02	0.2000E 02
238.0	0.0	1	-1	0.2627E 04	0.2581E 04	0.2956E 04	0.3116E 04	0.3222E 04	0.3302E 04	0.3368E 04	0.3423E 04
238.0	1.0	1	1	0.1430E 01	0.1405E 01	0.1609E 01	0.1696E 01	0.1753E 01	0.1797E 01	0.1833E 01	0.1863E 01
238.0	238.0	1	2	0.6054E-02	0.5949E-02	0.6813E-02	0.7182E-02	0.7426E-02	0.7611E-02	0.7763E-02	0.7890E-02
238.0	238.0	1	3	0.6054E-02	0.5949E-02	0.6813E-02	0.7182E-02	0.7426E-02	0.7611E-02	0.7763E-02	0.7890E-02
238.0	1.0	1	0	0.1430E 01	0.1405E 01	0.1609E 01	0.1696E 01	0.1753E 01	0.1797E 01	0.1833E 01	0.1863E 01
238.0	0.0	2	-1	0.7393E 03	0.7258E 03	0.8336E 03	0.8807E 03	0.9124E 03	0.9367E 03	0.9567E 03	0.9735E 03
238.0	1.0	2	1	0.4024E-00	0.3950E-00	0.4537E-00	0.4794E-00	0.4967E-00	0.5099E 00	0.5209E 00	0.5301E 00
238.0	238.0	2	1	0.1706E-02	0.1674E-02	0.1926E-02	0.2038E-02	0.2115E-02	0.2175E-02	0.2224E-02	0.2267E-02
238.0	238.0	2	3	0.1704E-02	0.1673E-02	0.1922E-02	0.2031E-02	0.2105E-02	0.2161E-02	0.2208E-02	0.2247E-02
238.0	1.0	2	0	0.4024E-00	0.3950E-00	0.4537E-00	0.4794E-00	0.4968E-00	0.5101E 00	0.5210E 00	0.5303E 00
238.0	0.0	3	-1	0.9596E 02	0.9837E 02	0.6847E 02	0.4942E 02	0.3556E 02	0.2492E 02	0.1643E 02	0.9581E 01
238.0	1.0	3	1	0.7356E-01	0.7308E-01	0.7713E-01	0.7963E-01	0.8156E-01	0.8317E-01	0.8457E-01	0.8579E-01
238.0	238.0	3	1	0.5680E-02	0.5537E-02	0.6649E-02	0.7085E-02	0.7362E-02	0.7566E-02	0.7729E-02	0.7864E-02
238.0	238.0	3	2	0.1639E-02	0.1601E-02	0.1894E-02	0.2015E-02	0.2095E-02	0.2156E-02	0.2205E-02	0.2246E-02
238.0	1.0	3	0	0.5430E-01	0.5495E-01	0.4903E-01	0.4673E-01	0.4543E-01	0.4459E-01	0.4399E-01	0.4355E-01
1.0	0.0	0	-1	0.1254E 05	0.1206E 05	0.1570E 05	0.1695E 05	0.1761E 05	0.1803E 05	0.1831E 05	0.1852E 05
1.0	1.0	0	1	0.6825E 01	0.6557E 01	0.8545E 01	0.9224E 01	0.9585E 01	0.9810E 01	0.9966E 01	0.1008E 02
1.0	238.0	0	1	0.2899E-01	0.2872E-01	0.3623E-01	0.3909E-01	0.4060E-01	0.4155E-01	0.4221E-01	0.4269E-01
1.0	238.0	0	2	0.2894E-01	0.2812E-01	0.3621E-01	0.3907E-01	0.4060E-01	0.4155E-01	0.4221E-01	0.4269E-01
1.0	238.0	0	3	0.2893E-01	0.2796E-01	0.3620E-01	0.3907E-01	0.4060E-01	0.4155E-01	0.4221E-01	0.4269E-01

P = 500 ATM, T = 20,000 DEG K

M_1	M_2	Z_1	Z_2	P_{FUEL}/P							
				0.09	0.1	0.233	0.367	0.5	0.633	0,767	0.9
0.0	1.0	-1	1	0.3251E-00	0.1360E 01	0.2842E 01	0.4109E 01	0.5198E 01	0.6160E 01	0.7039E 01	0.7867E 01
0.0	238.0	-1	1	0.1972E-02	0.6399E-02	0.1273E-01	0.1814E-01	0.2278E-01	0.2688E-01	0.3062E-01	0.3415E-01
0.0	238.0	-1	2	0.1594E-02	0.6175E-02	0.1259E-01	0.1804E-01	0.2270E-01	0.2681E-01	0.3055E-01	0.3409E-01
0.0	238.0	-1	3	0.1515E-02	0.6110E-02	0.1255E-01	0.1801E-01	0.2267E-01	0.2679E-01	0.3054E-01	0.3407E-01
0.0	1.0	-1	0	0.3439E-00	0.1407E 01	0.2924E 01	0.4219E 01	0.5330E 01	0.6312E 01	0.7207E 01	0.8051E 01
1.0	0.0	1	-1	0.8662E 01	0.4845E 02	0.1092E 03	0.1637E 03	0.2121E 03	0.2561E 03	0.2971E 03	0.3360E 03
1.0	238.0	1	1	0.5997E-03	0.6498E-03	0.7098E-03	0.7494E-03	0.7791E-03	0.8033E-03	0.8237E-03	0.8401E-03
1.0	238.0	1	2	0.2316E-03	0.4557E-03	0.6122E-03	0.6926E-03	0.7442E-03	0.7820E-03	0.8118E-03	0.8351E-03
1.0	238.0	1	3	0.1509E-03	0.3909E-03	0.5752E-03	0.6715E-03	0.7322E-03	0.7755E-03	0.8086E-03	0.8340E-03
1.0	1.0	1	0	0.1925E-01	0.4895E-01	0.8494E-01	0.1130E-00	0.1358E-00	0.1554E-00	0.1727E-00	0.1883E-00
238.0	0.0	1	-1	0.4237E 01	0.3447E 01	0.2396E 01	0.1728E 01	0.1268E 01	0.9306E 00	0.6702E 00	0.4622E-00
238.0	1.0	1	1	0.2343E-02	0.2103E-02	0.1745E-02	0.1517E-02	0.1353E-02	0.1225E-02	0.1119E-02	0.1034E-02
238.0	238.0	1	2	0.1169E-04	0.1670E-04	0.1951E-04	0.2080E-04	0.2157E-04	0.2211E-04	0.2251E-04	0.2283E-04
238.0	238.0	1	3	0.1046E-04	0.1153E-04	0.1170E-04	0.1164E-04	0.1153E-04	0.1140E-04	0.1128E-04	0.1117E-04
238.0	1.0	1	0	0.2531E-02	0.3274E-02	0.4158E-02	0.4888E-02	0.5491E-02	0.6004E-02	0.6457E-02	0.6872E-02
238.0	0.0	2	-1	0.1608E 01	0.4794E 01	0.6931E 01	0.7953E 01	0.8569E 01	0.8997E 01	0.9320E 01	0.9570E 01
238.0	1.0	2	1	0.8807E-03	0.2602E-02	0.3762E-02	0.4320E-02	0.4659E-02	0.4896E-02	0.5075E-02	0.5214E-02
238.0	238.0	2	1	0.7438E-05	0.1405E-04	0.1788E-04	0.1971E-04	0.2084E-04	0.2164E-04	0.2226E-04	0.2275E-04
238.0	238.0	2	3	0.3988E-05	0.1136E-04	0.1622E-04	0.1853E-04	0.1994E-04	0.2091E-04	0.2165E-04	0.2222E-04
238.0	1.0	2	0	0.8756E-03	0.2441E-02	0.3508E-02	0.4041E-02	0.4374E-02	0.4613E-02	0.4797E-02	0.4940E-02
238.0	0.0	3	-1	0.6967E 00	0.2057E 01	0.3089E 01	0.3627E 01	0.3967E 01	0.4211E 01	0.4398E 01	0.4543E 01
238.0	1.0	3	1	0.3792E-03	0.1120E-02	0.1681E-02	0.1974E-02	0.2159E-02	0.2292E-02	0.2394E-02	0.2472E-02
238.0	238.0	3	1	0.1606E-05	0.4742E-05	0.7120E-05	0.8361E-05	0.9144E-05	0.9706E-05	0.1014E-04	0.1047E-04
238.0	238.0	3	2	0.1606E-05	0.4742E-05	0.7120E-05	0.8361E-05	0.9144E-05	0.9706E-05	0.1014E-04	0.1047E-04
238.0	1.0	3	0	0.3792E-03	0.1120E-02	0.1681E-02	0.1974E-02	0.2159E-02	0.2292E-02	0.2394E-02	0.2472E-02
1.0	0.0	0	-1	0.1250E 03	0.5765E 03	0.1173E 04	0.1636E 04	0.2000E 04	0.2298E 04	0.2551E 04	0.2774E 04
1.0	1.0	0	1	0.6245E-01	0.2875E-00	0.5950E 00	0.8430E 00	0.1046E 01	0.1217E 01	0.1367E 01	0.1502E 01
1.0	238.0	0	1	0.1132E-02	0.1955E-02	0.3095E-02	0.4005E-02	0.4742E-02	0.5362E-02	0.5905E-02	0.6400E-02
1.0	238.0	0	2	0.4957E-03	0.1523E-02	0.2808E-02	0.3804E-02	0.4604E-02	0.5273E-02	0.5857E-02	0.6385E-02
1.0	238.0	0	3	0.3047E-03	0.1248E-02	0.2541E-02	0.3586E-02	0.4439E-02	0.5161E-02	0.5794E-02	0.6364E-02

TABLE VII (CONT'D)

COEFFICIENTS OF DIFFUSION IN EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

COEFFICIENT OF DIFFUSION, D_{ij}, IN FT^2/SEC

P = 500 ATM, T = 60,000 DEG K

P_{FUEL}/P

M_1	M_2	Z_1	Z_2	0.09	0.1	0.233	0.367	0.5	0.633	0.767	0.9
0.0	1.0	-1	1	0.1087E 02	0.1180E 02	0.2237E 02	0.3074E 02	0.3771E 02	0.4378E 02	0.4925E 02	0.5419E 02
0.0	238.0	-1	1	0.5411E-01	0.5769E-01	0.1001E-00	0.1347E-00	0.1638E-00	0.1893E-00	0.2123E-00	0.2331E-00
0.0	238.0	-1	2	0.4977E-01	0.5365E-01	0.9788E-01	0.1331E-00	0.1625E-00	0.1881E-00	0.2113E-00	0.2321E-00
0.0	238.0	-1	3	0.4883E-01	0.5277E-01	0.9738E-01	0.1327E-00	0.1622E-00	0.1879E-00	0.2110E-00	0.2319E-00
0.0	1.0	-1	0	0.1133E 02	0.1228E 02	0.2290E 02	0.3128E 02	0.3825E 02	0.4433E 02	0.4980E 02	0.5474E 02
1.0	0.0	1	-1	0.4295E 03	0.4706E 03	0.9349E 03	0.1302E 04	0.1606E 04	0.1872E 04	0.2110E 04	0.2325E 04
1.0	238.0	1	1	0.8109E-02	0.7768E-02	0.5914E-02	0.5502E-02	0.5416E-02	0.5445E-02	0.5523E-02	0.5623E-02
1.0	238.0	1	2	0.4327E-02	0.4301E-02	0.4360E-02	0.4603E-02	0.4859E-02	0.5104E-02	0.5337E-02	0.5553E-02
1.0	238.0	1	3	0.3508E-02	0.3549E-02	0.4017E-02	0.4402E-02	0.4734E-02	0.5028E-02	0.5295E-02	0.5537E-02
1.0	1.0	1	0	0.5966E 00	0.6209E 00	0.8320E 00	0.9644E 00	0.1067E 01	0.1154E 01	0.1231E 01	0.1300E 01
238.0	0.0	1	-1	0.1258E 03	0.1288E 03	0.1555E 03	0.1735E 03	0.1878E 03	0.2001E 03	0.2111E 03	0.2208E 03
238.0	1.0	1	1	0.6849E-01	0.7010E-01	0.8465E-01	0.9442E-01	0.1022E-00	0.1089E-00	0.1149E-00	0.1202E-00
238.0	238.0	1	2	0.2901E-03	0.2969E-03	0.3586E-03	0.4001E-03	0.4333E-03	0.4619E-03	0.4873E-03	0.5100E-03
238.0	238.0	1	3	0.2901E-03	0.2969E-03	0.3585E-03	0.3999E-03	0.4331E-03	0.4616E-03	0.4868E-03	0.5093E-03
238.0	1.0	1	0	0.6849E-01	0.7011E-01	0.8465E-01	0.9443E-01	0.1023E-00	0.1090E-00	0.1150E-00	0.1203E-00
238.0	0.0	2	-1	0.3346E 02	0.3400E 02	0.3701E 02	0.3732E 02	0.3683E 02	0.3603E 02	0.3509E 02	0.3411E 02
238.0	1.0	2	1	0.1830E-01	0.1862E-01	0.2059E-01	0.2117E-01	0.2135E-01	0.2135E-01	0.2128E-01	0.2117E-01
238.0	238.0	2	1	0.1017E-03	0.1063E-03	0.1576E-03	0.2007E-03	0.2386E-03	0.2727E-03	0.3040E-03	0.3325E-03
238.0	238.0	2	3	0.7975E-04	0.8138E-04	0.9389E-04	0.1004E-03	0.1048E-03	0.1083E-03	0.1112E-03	0.1137E-03
238.0	1.0	2	0	0.1850E-01	0.1884E-01	0.2126E-01	0.2227E-01	0.2280E-01	0.2311E-01	0.2330E-01	0.2341E-01
238.0	0.0	3	-1	0.5826E 01	0.5898E 01	0.7253E 01	0.8972E 01	0.1077E 02	0.1256E 02	0.1432E 02	0.1599E 02
238.0	1.0	3	1	0.4045E-02	0.4158E-02	0.5606E-02	0.6944E-02	0.8163E-02	0.9286E-02	0.1033E-01	0.1130E-01
238.0	238.0	3	1	0.2484E-03	0.2540E-03	0.2867E-03	0.2949E-03	0.2964E-03	0.2954E-03	0.2930E-03	0.2902E-03
238.0	238.0	3	2	0.7623E-04	0.7815E-04	0.9237E-04	0.9940E-04	0.1041E-03	0.1077E-03	0.1106E-03	0.1130E-03
238.0	1.0	3	0	0.2968E-02	0.3002E-02	0.3585E-02	0.4250E-02	0.4917E-02	0.5573E-02	0.6218E-02	0.6840E-02
1.0	0.0	0	-1	0.7147E 03	0.7390E 03	0.9480E 03	0.1083E 04	0.1193E 04	0.1290E 04	0.1380E 04	0.1462E 04
1.0	1.0	0	1	0.3886E-00	0.4018E-00	0.5156E 00	0.5892E 00	0.6490E 00	0.7020E 00	0.7509E 00	0.7959E 00
1.0	238.0	0	1	0.1698E-02	0.1750E-02	0.2204E-02	0.2506E-02	0.2755E-02	0.2976E-02	0.3181E-02	0.3371E-02
1.0	238.0	0	2	0.1663E-02	0.1718E-02	0.2191E-02	0.2499E-02	0.2751E-02	0.2975E-02	0.3181E-02	0.3371E-02
1.0	238.0	0	3	0.1654E-02	0.1709E-02	0.2187E-02	0.2497E-02	0.2750E-02	0.2974E-02	0.3180E-02	0.3371E-02

P = 500 ATM, T = 100,000 DEG K

P_{FUEL}/P

M_1	M_2	Z_1	Z_2	0.09	0.1	0.233	0.367	0.5	0.633	0.767	0.9
0.0	1.0	-1	1	0.5166E 02	0.5577E 02	0.9914E 02	0.1294E 03	0.1518E 03	0.1695E 03	0.1841E 03	0.1961E 03
0.0	238.0	-1	1	0.2576E-00	0.2730E-00	0.4441E-00	0.5675E 00	0.6601E 00	0.7333E 00	0.7937E 00	0.8439E 00
0.0	238.0	-1	2	0.2365E-00	0.2535E-00	0.4336E-00	0.5600E 00	0.6540E 00	0.7281E 00	0.7890E 00	0.8398E 00
0.0	238.0	-1	3	0.2321E-00	0.2493E-00	0.4314E-00	0.5584E 00	0.6527E 00	0.7270E 00	0.7880E 00	0.8388E 00
0.0	1.0	-1	0	0.5342E 02	0.5759E 02	0.1012E 03	0.1314E 03	0.1538E 03	0.1714E 03	0.1858E 03	0.1979E 03
1.0	0.0	1	-1	0.2042E 04	0.2224E 04	0.4141E 04	0.5475E 04	0.6465E 04	0.7244E 04	0.7884E 04	0.8415E 04
1.0	238.0	1	1	0.3886E-01	0.3702E-01	0.2641E-01	0.2323E-01	0.2181E-01	0.2104E-01	0.2060E-01	0.2033E-01
1.0	238.0	1	2	0.2055E-01	0.2031E-01	0.1924E-01	0.1922E-01	0.1938E-01	0.1960E-01	0.1982E-01	0.2004E-01
1.0	238.0	1	3	0.1666E-01	0.1675E-01	0.1768E-01	0.1834E-01	0.1885E-01	0.1928E-01	0.1965E-01	0.1997E-01
1.0	1.0	1	0	0.2463E 01	0.2578E 01	0.3477E 01	0.3915E 01	0.4192E 01	0.4393E 01	0.4553E 01	0.4684E 01
238.0	0.0	1	-1	0.5929E 03	0.6033E 03	0.6808E 03	0.7205E 03	0.7477E 03	0.7688E 03	0.7864E 03	0.8015E 03
238.0	1.0	1	1	0.3227E-00	0.3283E-00	0.3705E-00	0.3921E-00	0.4069E-00	0.4184E-00	0.4280E-00	0.4362E-00
238.0	238.0	1	2	0.1367E-02	0.1391E-02	0.1569E-02	0.1661E-02	0.1723E-02	0.1772E-02	0.1813E-02	0.1848E-02
238.0	238.0	1	3	0.1367E-02	0.1391E-02	0.1569E-02	0.1661E-02	0.1723E-02	0.1772E-02	0.1813E-02	0.1848E-02
238.0	1.0	1	0	0.3227E-00	0.3283E-00	0.3705E-00	0.3921E-00	0.4069E-00	0.4184E-00	0.4280E-00	0.4362E-00
238.0	0.0	2	-1	0.1675E 03	0.1707E 03	0.1945E 03	0.2065E 03	0.2147E 03	0.2210E 03	0.2262E 03	0.2306E 03
238.0	1.0	2	1	0.9117E-01	0.9290E-01	0.1059E-00	0.1125E-00	0.1170E-00	0.1204E-00	0.1233E-00	0.1258E-00
238.0	238.0	2	1	0.3879E-03	0.3955E-03	0.4539E-03	0.4856E-03	0.5085E-03	0.5273E-03	0.5435E-03	0.5580E-03
238.0	238.0	2	3	0.3863E-03	0.3936E-03	0.4489E-03	0.4772E-03	0.4966E-03	0.5117E-03	0.5243E-03	0.5350E-03
238.0	1.0	2	0	0.9118E-01	0.9291E-01	0.1059E-00	0.1125E-00	0.1171E-00	0.1206E-00	0.1235E-00	0.1260E-00
238.0	0.0	3	-1	0.2229E 02	0.2171E 02	0.1567E 02	0.1157E 02	0.8648E 01	0.6457E 01	0.4756E 01	0.3426E 01
238.0	1.0	3	1	0.1671E-01	0.1681E-01	0.1781E-01	0.1855E-01	0.1914E-01	0.1966E-01	0.2012E-01	0.2054E-01
238.0	238.0	3	1	0.1271E-02	0.1303E-02	0.1527E-02	0.1632E-02	0.1699E-02	0.1749E-02	0.1790E-02	0.1823E-02
238.0	238.0	3	2	0.3697E-03	0.3785E-03	0.4423E-03	0.4735E-03	0.4944E-03	0.5104E-03	0.5235E-03	0.5347E-03
238.0	1.0	3	0	0.1184E-01	0.1166E-01	0.1030E-01	0.9734E-02	0.9441E-02	0.9269E-02	0.9165E-02	0.9104E-02
1.0	0.0	0	-1	0.2419E 04	0.2509E 04	0.3146E 04	0.3401E 04	0.3538E 04	0.3626E 04	0.3689E 04	0.3736E 04
1.0	1.0	0	1	0.1316E 01	0.1365E 01	0.1712E 01	0.1851E 01	0.1926E 01	0.1973E 01	0.2008E 01	0.2033E 01
1.0	238.0	0	1	0.5633E-02	0.5835E-02	0.7272E-02	0.7849E-02	0.8161E-02	0.8361E-02	0.8504E-02	0.8611E-02
1.0	238.0	0	2	0.5596E-02	0.5802E-02	0.7259E-02	0.7842E-02	0.8158E-02	0.8360E-02	0.8503E-02	0.8611E-02
1.0	238.0	0	3	0.5586E-02	0.5793E-02	0.7255E-02	0.7840E-02	0.8157E-02	0.8359E-02	0.8503E-02	0.8611E-02

TABLE VII (CONT'D)

COEFFICIENTS OF DIFFUSION IN EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

COEFFICIENT OF DIFFUSION, D_{ij}, IN FT^2/SEC

P = 1000 ATM, T = 20,000 DEG K

P_{FUEL}/P

M_1	M_2	Z_1	Z_2	0.09	0.1	0.233	0.367	0.5	0.633	0.767	0.9
0.0	1.0	-1	1	0.6554E 00	0.7208E 00	0.1527E 01	0.2239E 01	0.2859E 01	0.3398E 01	0.3886E 01	0.4336E 01
0.0	238.0	-1	1	0.3149E-02	0.3428E-02	0.6863E-02	0.9877E-02	0.1253E-01	0.1483E-01	0.1690E-01	0.1882E-01
0.0	238.0	-1	2	0.3007E-02	0.3293E-02	0.6782E-02	0.9817E-02	0.1249E-01	0.1479E-01	0.1687E-01	0.1879E-01
0.0	238.0	-1	3	0.2965E-02	0.3252E-02	0.6756E-02	0.9800E-02	0.1247E-01	0.1478E-01	0.1686E-01	0.1878E-01
0.0	1.0	-1	0	0.6779E 00	0.7450E 00	0.1570E 01	0.2294E 01	0.2931E 01	0.3481E 01	0.3978E 01	0.4437E 01
1.0	0.0	1	-1	0.2339E 02	0.2596E 02	0.5852E 02	0.8837E 02	0.1157E 03	0.1402E 03	0.1631E 03	0.1848E 03
1.0	238.0	1	1	0.3771E-03	0.3791E-03	0.4008E-03	0.4164E-03	0.4290E-03	0.4410E-03	0.4518E-03	0.4613E-03
1.0	238.0	1	2	0.2508E-03	0.2607E-03	0.3420E-03	0.3828E-03	0.4090E-03	0.4290E-03	0.4453E-03	0.4586E-03
1.0	238.0	1	3	0.2083E-03	0.2198E-03	0.3185E-03	0.3694E-03	0.4015E-03	0.4250E-03	0.4434E-03	0.4580E-03
1.0	1.0	1	0	0.2313E-01	0.2482E-01	0.4437E-01	0.6015E-01	0.7335E-01	0.8451E-01	0.9442E-01	0.1033E-00
238.0	0.0	1	-1	0.1642E 01	0.1600E 01	0.1147E 01	0.8324E 00	0.6000E 00	0.4244E-00	0.2875E-00	0.1793E-00
238.0	1.0	1	1	0.9993E-03	0.9873E-03	0.8589E-03	0.7707E-03	0.7015E-03	0.6394E-03	0.5842E-03	0.5359E-03
238.0	238.0	1	2	0.8650E-05	0.8880E-05	0.1064E-04	0.1142E-04	0.1187E-04	0.1218E-04	0.1241E-04	0.1258E-04
238.0	238.0	1	3	0.5715E-05	0.5771E-05	0.6151E-05	0.6261E-05	0.6275E-05	0.6239E-05	0.6183E-05	0.6121E-05
238.0	1.0	1	0	0.1521E-02	0.1562E-02	0.2046E-02	0.2445E-02	0.2777E-02	0.3046E-02	0.3279E-02	0.3488E-02
238.0	0.0	2	-1	0.2673E 01	0.2818E 01	0.3966E 01	0.4499E 01	0.4817E 01	0.5040E 01	0.5211E 01	0.5344E 01
238.0	1.0	2	1	0.1452E-02	0.1531E-02	0.2154E-02	0.2445E-02	0.2619E-02	0.2742E-02	0.2836E-02	0.2910E-02
238.0	238.0	2	1	0.7116E-05	0.7408E-05	0.9704E-05	0.1078E-04	0.1142E-04	0.1188E-04	0.1224E-04	0.1252E-04
238.0	238.0	2	3	0.6260E-05	0.6592E-05	0.9213E-05	0.1043E-04	0.1116E-04	0.1167E-04	0.1206E-04	0.1237E-04
238.0	1.0	2	0	0.1401E-02	0.1476E-02	0.2073E-02	0.2357E-02	0.2529E-02	0.2652E-02	0.2747E-02	0.2822E-02
238.0	0.0	3	-1	0.1099E 01	0.1165E 01	0.1730E 01	0.2021E 01	0.2205E 01	0.2341E 01	0.2448E 01	0.2533E 01
238.0	1.0	3	1	0.5980E-03	0.6339E-03	0.9415E-03	0.1100E-02	0.1200E-02	0.1274E-02	0.1332E-02	0.1379E-02
238.0	238.0	3	1	0.2533E-05	0.2685E-05	0.3988E-05	0.4660E-05	0.5084E-05	0.5397E-05	0.5643E-05	0.5839E-05
238.0	238.0	3	2	0.2533E-05	0.2685E-05	0.3988E-05	0.4660E-05	0.5084E-05	0.5397E-05	0.5643E-05	0.5839E-05
238.0	1.0	3	0	0.5980E-03	0.6339E-03	0.9415E-03	0.1100E-02	0.1200E-02	0.1274E-02	0.1332E-02	0.1379E-02
1.0	0.0	0	-1	0.2687E 03	0.2953E 03	0.6047E 03	0.8489E 03	0.1045E 04	0.1200E 04	0.1331E 04	0.1443E 04
1.0	1.0	0	1	0.1342E-00	0.1476E-00	0.3056E-00	0.4347E-00	0.5421E 00	0.6315E 00	0.7098E 00	0.7796E 00
1.0	238.0	0	1	0.9627E-03	0.1015E-02	0.1615E-02	0.2096E-02	0.2491E-02	0.2809E-02	0.3084E-02	0.3329E-02
1.0	238.0	0	2	0.7268E-03	0.7859E-03	0.1454E-02	0.1977E-02	0.2404E-02	0.2751E-02	0.3051E-02	0.3318E-02
1.0	238.0	0	3	0.5823E-03	0.6303E-03	0.1303E-02	0.1847E-02	0.2300E-02	0.2677E-02	0.3007E-02	0.3302E-02

P = 1000 ATM, T = 60,000 DEG K

P_{FUEL}/P

M_1	M_2	Z_1	Z_2	0.09	0.1	0.233	0.367	0.5	0.633	0.767	0.9
0.0	1.0	-1	1	0.5966E 01	0.6498E 01	0.1274E 02	0.1793E 02	0.2237E 02	0.2630E 02	0.2986E 02	0.3307E 02
0.0	238.0	-1	1	0.2971E-01	0.3178E-01	0.5706E-01	0.7865E-01	0.9726E-01	0.1138E-00	0.1288E-00	0.1423E-00
0.0	238.0	-1	2	0.2735E-01	0.2957E-01	0.5580E-01	0.7771E-01	0.9648E-01	0.1131E-00	0.1281E-00	0.1418E-00
0.0	238.0	-1	3	0.2683E-01	0.2909E-01	0.5552E-01	0.7750E-01	0.9630E-01	0.1129E-00	0.1280E-00	0.1416E-00
0.0	1.0	-1	0	0.6222E 01	0.6762E 01	0.1305E 02	0.1826E 02	0.2271E 02	0.2665E 02	0.3021E 02	0.3343E 02
1.0	0.0	1	-1	0.2356E 03	0.2590E 03	0.5325E 03	0.7594E 03	0.9532E 03	0.1124E 04	0.1279E 04	0.1419E 04
1.0	238.0	1	1	0.4463E-02	0.4290E-02	0.3398E-02	0.3242E-02	0.3243E-02	0.3294E-02	0.3364E-02	0.3439E-02
1.0	238.0	1	2	0.2401E-02	0.2396E-02	0.2528E-02	0.2731E-02	0.2923E-02	0.3097E-02	0.3255E-02	0.3398E-02
1.0	238.0	1	3	0.1949E-02	0.1980E-02	0.2333E-02	0.2616E-02	0.2851E-02	0.3052E-02	0.3231E-02	0.3388E-02
1.0	1.0	1	0	0.3274E-00	0.3422E-00	0.4782E-00	0.5683E 00	0.6386E 00	0.6976E 00	0.7491E 00	0.7945E 00
238.0	0.0	1	-1	0.7018E 02	0.7213E 02	0.9044E 02	0.1029E 03	0.1127E 03	0.1207E 03	0.1277E 03	0.1336E 03
238.0	1.0	1	1	0.3820E-01	0.3926E-01	0.4923E-01	0.5603E-01	0.6134E-01	0.6575E-01	0.6952E-01	0.7279E-01
238.0	238.0	1	2	0.1618E-03	0.1663E-03	0.2086E-03	0.2376E-03	0.2604E-03	0.2793E-03	0.2956E-03	0.3097E-03
238.0	238.0	1	3	0.1618E-03	0.1663E-03	0.2085E-03	0.2374E-03	0.2600E-03	0.2787E-03	0.2948E-03	0.3087E-03
238.0	1.0	1	0	0.3820E-01	0.3926E-01	0.4924E-01	0.5606E-01	0.6139E-01	0.6581E-01	0.6962E-01	0.7292E-01
238.0	0.0	2	-1	0.1755E 02	0.1777E 02	0.1855E 02	0.1800E 02	0.1720E 02	0.1637E 02	0.1557E 02	0.1484E 02
238.0	1.0	2	1	0.9642E-02	0.9784E-02	0.1051E-01	0.1057E-01	0.1048E-01	0.1037E-01	0.1025E-01	0.1015E-01
238.0	238.0	2	1	0.6536E-04	0.6912E-04	0.1116E-03	0.1456E-03	0.1738E-03	0.1980E-03	0.2191E-03	0.2375E-03
238.0	238.0	2	3	0.4315E-04	0.4405E-04	0.5102E-04	0.5471E-04	0.5732E-04	0.5941E-04	0.6123E-04	0.6284E-04
238.0	1.0	2	0	0.9827E-02	0.9998E-02	0.1110E-01	0.1145E-01	0.1158E-01	0.1162E-01	0.1161E-01	0.1158E-01
238.0	0.0	3	-1	0.3794E 01	0.3920E 01	0.5704E 01	0.7462E 01	0.9070E 01	0.1053E 02	0.1188E 02	0.1309E 02
238.0	1.0	3	1	0.2503E-02	0.2607E-02	0.3886E-02	0.4993E-02	0.5944E-02	0.6777E-02	0.7521E-02	0.8184E-02
238.0	238.0	3	1	0.1288E-03	0.1313E-03	0.1434E-03	0.1438E-03	0.1418E-03	0.1391E-03	0.1364E-03	0.1338E-03
238.0	238.0	3	2	0.4119E-04	0.4224E-04	0.5010E-04	0.5400E-04	0.5664E-04	0.5867E-04	0.6036E-04	0.6182E-04
238.0	1.0	3	0	0.1794E-02	0.1839E-02	0.2490E-02	0.3142E-02	0.3753E-02	0.4329E-02	0.4874E-02	0.5384E-02
1.0	0.0	0	-1	0.3752E 03	0.3903E 03	0.5330E 03	0.6349E 03	0.7195E 03	0.7941E 03	0.8617E 03	0.9230E 03
1.0	1.0	0	1	0.2039E-00	0.2121E-00	0.2898E-00	0.3453E-00	0.3914E-00	0.4320E-00	0.4689E-00	0.5023E 00
1.0	238.0	0	1	0.9060E-03	0.9372E-03	0.1244E-02	0.1472E-02	0.1663E-02	0.1833E-02	0.1987E-02	0.2128E-02
1.0	238.0	0	2	0.8780E-03	0.9117E-03	0.1234E-02	0.1466E-02	0.1660E-02	0.1831E-02	0.1987E-02	0.2128E-02
1.0	238.0	0	3	0.8700E-03	0.9043E-03	0.1230E-02	0.1464E-02	0.1659E-02	0.1830E-02	0.1986E-02	0.2128E-02

TABLE VII (CONT'D)

COEFFICIENTS OF DIFFUSION IN EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

COEFFICIENT OF DIFFUSION, D_{ij}, IN FT^2/SEC

P = 1000 ATM, T = 100,000 DEG K

P_{FUEL}/P

M_1	M_2	Z_1	Z_2	0.09	0.1	0.233	0.367	0.5	0.633	0.767	0.9
0.0	1.0	-1	1	0.2791E 02	0.3009E 02	0.5348E 02	0.6981E 02	0.8199E 02	0.9164E 02	0.9962E 02	0.1063E 03
0.0	238.0	-1	1	0.1389E-00	0.1470E-00	0.2394E-00	0.3061E-00	0.3563E-00	0.3963E-00	0.4295E-00	0.4574E-00
0.0	238.0	-1	2	0.1276E-00	0.1366E-00	0.2338E-00	0.3020E-00	0.3531E-00	0.3935E-00	0.4270E-00	0.4552E-00
0.0	238.0	-1	3	0.1252E-00	0.1343E-00	0.2326E-00	0.3011E-00	0.3523E-00	0.3929E-00	0.4264E-00	0.4547E-00
0.0	1.0	-1	0	0.2883E 02	0.3104E 02	0.5455E 02	0.7086E 02	0.8301E 02	0.9262E 02	0.1006E 03	0.1072E 03
1.0	0.0	1	-1	0.1103E 04	0.1199E 04	0.2233E 04	0.2954E 04	0.3491E 04	0.3916E 04	0.4267E 04	0.4562E 04
1.0	238.0	1	1	0.2075E-01	0.1975E-01	0.1413E-01	0.1247E-01	0.1173E-01	0.1135E-01	0.1113E-01	0.1101E-01
1.0	238.0	1	2	0.1094E-01	0.1081E-01	0.1029E-01	0.1031E-01	0.1043E-01	0.1057E-01	0.1072E-01	0.1086E-01
1.0	238.0	1	3	0.8859E-02	0.8902E-02	0.9454E-02	0.9839E-02	0.1014E-01	0.1040E-01	0.1062E-01	0.1082E-01
1.0	1.0	1	0	0.1307E 01	0.1367E 01	0.1857E 01	0.2099E 01	0.2254E 01	0.2369E 01	0.2461E 01	0.2538E 01
238.0	0.0	1	-1	0.3168E 03	0.3220E 03	0.3646E 03	0.3868E 03	0.4024E 03	0.4147E 03	0.4252E 03	0.4343E 03
238.0	1.0	1	1	0.1724E-00	0.1752E-00	0.1984E-00	0.2105E-00	0.2190E-00	0.2257E-00	0.2314E-00	0.2363E-00
238.0	238.0	1	2	0.7303E-03	0.7421E-03	0.8404E-03	0.8917E-03	0.9276E-03	0.9560E-03	0.9800E-03	0.1001E-02
238.0	238.0	1	3	0.7303E-03	0.7421E-03	0.8404E-03	0.8917E-03	0.9276E-03	0.9560E-03	0.9800E-03	0.1001E-02
238.0	1.0	1	0	0.1724E-00	0.1752E-00	0.1984E-00	0.2105E-00	0.2190E-00	0.2257E-00	0.2314E-00	0.2363E-00
238.0	0.0	2	-1	0.8963E 02	0.9145E 02	0.1046E 03	0.1113E 03	0.1159E 03	0.1194E 03	0.1223E 03	0.1246E 03
238.0	1.0	2	1	0.4879E-01	0.4977E-01	0.5694E-01	0.6065E-01	0.6319E-01	0.6515E-01	0.6677E-01	0.6813E-01
238.0	238.0	2	1	0.2085E-03	0.2113E-03	0.2470E-03	0.2668E-03	0.2816E-03	0.2942E-03	0.3054E-03	0.3160E-03
238.0	238.0	2	3	0.2068E-03	0.2109E-03	0.2417E-03	0.2578E-03	0.2689E-03	0.2776E-03	0.2849E-03	0.2912E-03
238.0	1.0	2	0	0.4880E-01	0.4978E-01	0.5698E-01	0.6072E-01	0.6329E-01	0.6529E-01	0.6695E-01	0.6835E-01
238.0	0.0	3	-1	0.1183E 02	0.1145E 02	0.8452E 01	0.6413E 01	0.5003E 01	0.3986E 01	0.3231E 01	0.2699E 01
238.0	1.0	3	1	0.8911E-02	0.8926E-02	0.9588E-02	0.1006E-01	0.1046E-01	0.1081E-01	0.1113E-01	0.1144E-01
238.0	238.0	3	1	0.6781E-03	0.6955E-03	0.8152E-03	0.8716E-03	0.9081E-03	0.9354E-03	0.9573E-03	0.9753E-03
238.0	238.0	3	2	0.1979E-03	0.2027E-03	0.2382E-03	0.2558E-03	0.2677E-03	0.2769E-03	0.2845E-03	0.2910E-03
238.0	1.0	3	0	0.6155E-02	0.6018E-02	0.5316E-02	0.5033E-02	0.4902E-02	0.4841E-02	0.4819E-02	0.4829E-02
1.0	0.0	0	-1	0.1210E 04	0.1253E 04	0.1577E 04	0.1707E 04	0.1779E 04	0.1826E 04	0.1861E 04	0.1888E 04
1.0	1.0	0	1	0.6583E 00	0.6818E 00	0.8578E 00	0.9289E 00	0.9681E 00	0.9939E 00	0.1013E 01	0.1028E 01
1.0	238.0	0	1	0.2833E-02	0.2929E-02	0.3650E-02	0.3943E-02	0.4105E-02	0.4212E-02	0.4290E-02	0.4352E-02
1.0	238.0	0	2	0.2804E-02	0.2903E-02	0.3640E-02	0.3938E-02	0.4102E-02	0.4210E-02	0.4290E-02	0.4352E-02
1.0	238.0	0	3	0.2797E-02	0.2896E-02	0.3637E-02	0.3936E-02	0.4102E-02	0.4210E-02	0.4289E-02	0.4352E-02

TABLE VIII

EFFECTIVE BINARY DIFFUSIVITIES IN EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

EFFECTIVE BINARY DIFFUSIVITY, $\mathcal{D}_{eff}^{U-H}$, IN FT^2/SEC

T-DEG K	$P_{FUEL}/P = 0.09$	0.1	0.233	0.367	0.5	0.633	0.767	0.9
				P = 100 ATM				
0.1000E 06	0.1667E-00	0.1678E-00	0.2015E-00	0.2321E-00	0.2595E-00	0.2846E-00	0.3076E-00	0.3289E-00
0.6000E 05	0.3323E-01	0.3386E-01	0.4153E-01	0.4832E-01	0.5451E-01	0.6014E-01	0.6538E-01	0.7021E-01
0.2000E 05	0.1030E-01	0.1026E-01	0.1375E-01	0.1505E-01	0.1488E-01	0.1038E-01		
				P = 500 ATM				
0.1000E 06	0.3755E-01	0.3802E-01	0.4625E-01	0.5355E-01	0.6010E-01	0.6609E-01	0.7162E-01	0.7686E-01
0.6000E 05	0.8279E-02	0.8441E-02	0.1072E-01	0.1268E-01	0.1442E-01	0.1598E-01	0.1744E-01	0.1877E-01
0.2000E 05	0.6119E-02	0.3538E-02	0.4719E-02	0.7795E-02	0.5946E-02		0.2154E-02	
				P = 1000 ATM				
0.1000E 06	0.1985E-01	0.2024E-01	0.2475E-01	0.2871E-01	0.3228E-01	0.3558E-01	0.3864E-01	0.4132E-01
0.6000E 05	0.4748E-02	0.4834E-02	0.6272E-02	0.7428E-02	0.8431E-02	0.9334E-02	0.1017E-01	0.1087E-01
0.2000E 05	0.1753E-02	0.1792E-02	0.2565E-02	0.3203E-02	0.3617E-02	0.3521E-02	0.2288E-02	

TABLE IX

FLUX CALCULATION COEFFICIENTS IN EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

FLUX CALCULATION COEFFICIENTS, $m_i^{eff} m_j^{eff} n/\rho$, IN LB/PARTICLE

T-DEG K	$P_{FUEL}/P = 0.09$	0.1	0.233	0.367	0.5	0.633	0.767	0.9
				P = 100 ATM				
0.1000E 06	0.1899E-25	0.1714E-25	0.7704E-26	0.4955E-26	0.3660E-26	0.2901E-26	0.2400E-26	0.2049E-26
0.6000E 05	0.1891E-25	0.1717E-25	0.7715E-26	0.4962E-26	0.3663E-26	0.2904E-26	0.2402E-26	0.2050E-26
0.2000E 05	0.2534E-25	0.2353E-25	0.1038E-25	0.6574E-26	0.4764E-26	0.3682E-26	0.2931E-26	0.2338E-26
				P = 500 ATM				
0.1000E 06	0.1889E-25	0.1717E-25	0.7709E-26	0.4958E-26	0.3661E-26	0.2902E-26	0.2401E-26	0.2049E-26
0.6000E 05	0.1898E-25	0.1724E-25	0.7743E-26	0.4977E-26	0.3673E-26	0.2910E-26	0.2405E-26	0.2051E-26
0.2000E 05	0.1015E-24	0.2534E-25	0.1135E-25	0.7292E-26	0.5351E-26	0.4177E-26	0.3352E-26	0.2672E-26
				P = 1000 ATM				
0.1000E 06	0.1890E-25	0.1718E-25	0.7711E-26	0.4960E-26	0.3663E-26	0.2903E-26	0.2401E-26	0.2050E-26
0.6000E 05	0.1905E-25	0.1730E-25	0.7763E-26	0.4988E-26	0.3680E-26	0.2914E-26	0.2408E-26	0.2053E-26
0.2000E 05	0.2757E-25	0.2507E-25	0.1144E-25	0.7464E-26	0.5548E-26	0.4365E-26	0.3525E-26	0.2830E-26

TABLE X

EFFECTIVE MASS OF URANIUM SPECIES IN EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

EFFECTIVE MASS, m_i^{eff}, IN LB/PARTICLE

T-DEG K	$P_{FUEL}/P = 0.09$	0.1	0.233	0.367	0.5	0.633	0.767	
				P = 100 ATM				
0.1000E 06	0.2178E-24	0.2178E-24	0.2178E-24	0.2179E-24	0.2179E-24	0.2179E-24	0.2179E-24	0.2180E-24
0.6000E 05	0.2189E-24	0.2190E-24	0.2205E-24	0.2222E-24	0.2236E-24	0.2250E-24	0.2264E-24	0.2276E-24
0.2000E 05	0.3730E-24	0.3874E-24	0.4091E-24	0.4172E-24	0.4215E-24	0.4241E-24	0.4259E-24	0.4272E-24
				P = 500 ATM				
0.1000E 06	0.2178E-24	0.2181E-24	0.2180E-24	0.2181E-24	0.2182E-24	0.2183E-24	0.2185E-24	0.2186E-24
0.6000E 05	0.2230E-24	0.2236E-24	0.2300E-24	0.2353E-24	0.2398E-24	0.2435E-24	0.2469E-24	0.2497E-24
0.2000E 05	0.3842E-24	0.4215E-24	0.4290E-24	0.4312E-24	0.4323E-24	0.4329E-24	0.4334E-24	0.4337E-24
				P = 1000 ATM				
0.1000E 06	0.2179E-24	0.2179E-24	0.2182E-24	0.2184E-24	0.2187E-24	0.2189E-24	0.2191E-24	0.2194E-24
0.6000E 05	0.2276E-24	0.2286E-24	0.2387E-24	0.2461E-24	0.2517E-24	0.2562E-24	0.2599E-24	0.2631E-24
0.2000E 05	0.4272E-24	0.4280E-24	0.4321E-24	0.4333E-24	0.4338E-24	0.4342E-24	0.4344E-24	0.4345E-24

TABLE XI

EFFECTIVE MASS OF HYDROGEN SPECIES IN EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

EFFECTIVE MASS, m_j^{eff}, IN LB/PARTICLE

T-DEG K	$P_{FUEL}/P = 0.09$	0.1	0.233	0.367	0.5	0.633	0.767	0.9
				P = 100 ATM				
0.1000E 06	0.1853E-26	0.1846E-26	0.1845E-26	0.1846E-26	0.1846E-26	0.1846E-26	0.1846E-26	0.1846E-26
0.6000E 05	0.1849E-26	0.1849E-26	0.1848E-26	0.1848E-26	0.1848E-26	0.1847E-26	0.1847E-26	0.1847E-26
0.2000E 05	0.2487E-26	0.2488E-26	0.2461E-26	0.2427E-26	0.2384E-26	0.2327E-26	0.2244E-26	0.2102E-26
				P = 500 ATM				
0.1000E 06	0.1848E-26	0.1848E-26	0.1847E-26	0.1847E-26	0.1847E-26	0.1847E-26	0.1847E-26	0.1846E-26
0.6000E 05	0.1854E-26	0.1854E-26	0.1853E-26	0.1852E-26	0.1852E-26	0.1851E-26	0.1849E-26	0.1848E-26
0.2000E 05	0.2656E-26	0.2656E-26	0.2652E-26	0.2641E-26	0.2623E-26	0.2591E-26	0.2529E-26	0.2384E-26
				P = 1000 ATM				
0.1000E 06	0.1848E-26	0.1848E-26	0.1848E-26	0.1848E-26	0.1848E-26	0.1847E-26	0.1847E-26	0.1847E-26
0.6000E 05	0.1858E-26	0.1858E-26	0.1857E-26	0.1855E-26	0.1854E-26	0.1853E-26	0.1851E-26	0.1849E-26
0.2000E 05	0.2586E-26	0.2590E-26	0.2617E-26	0.2638E-26	0.2657E-26	0.2650E-26	0.2617E-26	0.2505E-26

TABLE XII

EFFECTIVE BINARY SCHMIDT NUMBERS IN EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

T-DEGK	$P_{FUEL}/P = 0.09$	0.1	0.233	0.367	0.5	0.633	0.767	0.9
				P = 100 ATM				
0.1000E 06	0.2372E-00	0.2090E-00	0.6415E-01	0.3000E-01	0.1691E-01	0.1056E-01	0.7047E-02	0.4948E-02
0.6000E 05	0.2524E-00	0.2218E-00	0.6909E-01	0.3359E-01	0.1994E-01	0.1328E-01	0.9517E-02	0.7226E-02
0.2000E 05	0.2398E-00	0.2206E-00	0.7669E-01	0.4425E-01	0.3189E-01	0.3466E-01		
				P = 500 ATM				
0.1000E 06	0.2498E-00	0.2207E-00	0.6727E-01	0.3156E-01	0.1791E-01	0.1131E-01	0.7639E-02	0.5437E-02
0.6000E 05	0.2558E-00	0.2266E-00	0.7538E-01	0.3955E-01	0.2521E-01	0.1786E-01	0.1350E-01	0.1071E-01
0.2000E 05	0.3552E-00	0.1810E-00	0.6418E-01	0.2471E-01	0.2319E-01		0.3806E-01	
				P = 1000 ATM				
0.1000E 06	0.2581E-00	0.2262E-00	0.6899E-01	0.3253E-01	0.1858E-01	0.1192E-01	0.8068E-02	0.5842E-02
0.6000E 05	0.2529E-00	0.2255E-00	0.7800E-01	0.4244E-01	0.2773E-01	0.1996E-01	0.1526E-01	0.1227E-01
0.2000E 05	0.2114E-00	0.1908E-00	0.6553E-01	0.3432E-01	0.2229E-01	0.1769E-01	0.2162E-01	

TABLE XIII

EFFECTIVE MASS DIFFUSIVITIES FOR URANIUM SPECIES IN EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM

EFFECTIVE MASS DIFFUSIVITY OF URANIUM SPECIES, $D^{m}_{U\text{-}mix}$, IN $\left(\frac{LB}{LB/MOLE}\right)\left(\frac{FT^2}{SEC}\right)$

T-DEGK	$P_{FUEL}/P = 0.09$	0.1	0.233	0.367	0.5	0.633	0.767	0.9
				P = 100 ATM				
0.1000E 06	0.3076E 01	0.2746E 01	0.1286E 01	0.8519E 00	0.6430E 00	0.5190E 00	0.4356E-00	0.3767E-00
0.6000E 05	0.6020E 00	0.5498E 00	0.2617E-00	0.1752E-00	0.1337E-00	0.1088E-00	0.9214E-01	0.8033E-01
0.2000E 05	0.1416E-00	0.1285E-00	0.7100E-01	0.5005E-01	0.3483E-01	0.1977E-01		
				P = 500 ATM				
0.1000E 06	0.6847E 00	0.6221E 00	0.2950E-00	0.1964E-00	0.1489E-00	0.1205E-00	0.1014E-00	0.8804E-01
0.6000E 05	0.1465E-00	0.1338E-00	0.6533E-01	0.4457E-01	0.3450E-01	0.2846E-01	0.2439E-01	0.2147E-01
0.2000E 05	0.2065E-00	0.4426E-01	0.2540E-01	0.2355E-01	0.1413E-01		0.3791E-02	
				P = 1000 ATM				
0.1000E 06	0.3629E-00	0.3314E-00	0.1577E-00	0.1052E-00	0.7989E-01	0.6482E-01	0.5470E-01	0.4735E-01
0.6000E 05	0.8207E-01	0.7498E-01	0.3718E-01	0.2557E-01	0.1990E-01	0.1649E-01	0.1418E-01	0.1246E-01
0.2000E 05	0.2499E-01	0.2324E-01	0.1397E-01	0.1068E-01	0.8569E-02	0.6555E-02	0.3800E-02	

TABLE XIV

LIST OF PROGRAM SOURCE DECK FOR CALCULATING ELECTRONIC ENERGIES BY THE METHOD OF LAYZER (REF. 9)

```
$IBFTC MAIN     LIST,M94/2
C   SCRN
C
      DIMENSION  FACT(40), QLIST(10,10), DLIST(20,10,10),
     1              ALIST(20,10,10)
      DIMENSION DELZ(22), INDX(30), NINDX(30), ZLIST(22,30), XAP(60),
     1             TWO(45)
      DIMENSION PI(22,30), ZOLD(22,30), AGAIN(30)
      COMMON FACT, QLIST, DLIST, ALIST, XAP, TWO
      DOUBLE PRECISION  FACT   , QLIST  , DLIST  , ALIST, XAP, TWO
      DOUBLE  PRECISION   DELZ, FNIN, ZLIST, FNI, PI, QNI, PIAA, FI
      DOUBLE  PRECISION   SUM, PIAB, QNJ, ZOLD, ENER, FNEL, ZTEST, FN
      DOUBLE PRECISION ZO
    1OFORMAT(80H
     1
    2 FORMAT(6E12.8)
    3 FORMAT(20I4)
    4 FORMAT(11X,I3,3H = ,1PE20.8,9X,I3,3H = ,1PE20.8)
    5 FORMAT(11X,I3,3H = ,1PE20.8)
   80FORMAT(11X,I3,3H = ,1PE20.6,9X,I3,3H = ,1PE20.8,9X,I3,3H = 1PE20.8
     1)
   90FORMAT(7X,1HZ,3X,3HPHI,10X,3HZNL,15X,1HZ,3X,3HPHI,10X,3HZNL,15X,1H
     1Z,3X,3HPHI,10X,3HZNL)
  100FORMAT(10X,10HORBITAL = I4,5X,4HPI =E20.9,5X,5HZNL =E20.9,5X,3HZ =
     1E20.9/)
   11 FORMAT(5X,I3,32X,I3,32X,I3)
   15 FORMAT(//,15X,4HZ = I3,5X,14HTOTAL ENERGY =1PE20.8)
      CALL FACTX (40,FACT)
      CALL QNORM (10,10,QLIST)
      CALL DINL  (10,10,DLIST)
      CALL ALFA  (20,10,10,ALIST)
      TWO(1) = 1.0D0
      DO 118 I = 2, 45
  118 TWO(I) = 2.0D0*TWO(I-1)
      DO 119 I = 1,NELEC
  119 AGAIN(I) = 1.0
   18 NDATA = 0
      IPRT1 = 0
      ICALC = 0
      IDUM = 0
      DO 180 I =1, 22
      DO 180 J = 1, 50
  180 PI(I,J) = 0.0
      WRITE (6,1000)
 1000 FORMAT(1H1)
      READ (5,1)
      WRITE (6,1)
      READ  (5,1)
      WRITE (6,1)
      READ  (5,1)
      WRITE (6,1)
      READ (5,3)NELEC,NOZS,NDATA,IPRT1,ICALC,NOIT
C     NOZS IS THE NUMBER OF Z VALUES FOR WHICH OPTIMIZED SCREENING
C     CONSTANTS ARE CALCULATED
C     IF ICALC=1    CALCULATE ZLIST
C     IF ICALC=0    READ ZLIST
C      IPRT1=0 READ NEXT VALUES OF ZLIST
C      IPRT1=1  CONTINUE WITH ZLIST AS INITALLY SET UP
      READ (5,2) ZA, EPSI, DEL
C     ZO IS THE LOWEST ATOMIC NUMBER FOR WHICH CALCULATIONS ARE TO BE
C     CARRIED OUT
C      EPSI IS THE CONVERGENCE FACTOR
      READ  (5,3)(INDX(I),   I=1,NELEC)
C     INDX CONTAINS LIST OF CODED ORBITALS(  20*N + L    )
      READ  (5,3)(NINDX(I) ,  I=1,NELEC)
C     NINDX CONTAINS THE NUMBER OF ELECTRONS IN CORRESPONDING ORBITAL
C
      ZO = ZA
      DELZ(1) = 0.0D0
      DO 19 I = 2,20
   19 DELZ(I) = DELZ(I-1) + 1.0D0
      DELZ(21) = 40.0D0
C
C      STATEMENT 20 THRU 21 APPROXIMATE SCREENING CONSTANTS FOR INFINITE
C
      IF(ICALC) 20,92,20
   20 IZ = 22
      DO 211 I =1,NELEC
      DO 21 II = 1,20
      LI = INDX(I) - 20*II
      IF(LI - 19)  22,22,21
   22 NI = II
      DO 212 IA = 1,22
      FNIN = NI
  212 ZLIST(IA,I) = 1.0D0/FNIN
      GO TO 211
   21 CONTINUE
  211 CONTINUE
      GO TO 28
   92 READ  (5,3)IZ,IDUM
C      IF IDUM=0 CONTINUE TO NEXT IZ (READ IN OR CALCULATED)
C      IF IDUM=1 CALCULATION IS TERMINATED
      READ  (5,2)(ZLIST(IZ,I), I=1,NELEC)
      READ (5,2) (AGAIN(I), I = 1, NELEC)
      DO 359 I =1, NELEC
      DO 357 II = 1, 20
      LI = INDX(I) - 20*II
      IF (LI-19) 358, 358, 357
  357 CONTINUE
  358 NI = II
      FNI = NI
      PI(IZ,I) = 2.0D0 *(ZO+DELZ(IZ))/FNI - ZLIST(IZ,I)
  359 CONTINUE
C
C     STATEMENT 28 THRU 70 EVALUATE SCREENING CONSTANTS FOR ZO,ZO+1,....,
C      ZO+19, AND ZO+40
C
      ICOUNT = 0
   28 DO 70 I = 1,NELEC
      IF(AGAIN(I)) 120,70,120
  120 NA = INDX(I)
      QNI = NINDX(I)
      DO 23 II = 1,20
      LI = INDX(I) - 20*II + 1
      FI = LI
      IF(LI - 19)  24,24,23
   23 CONTINUE
   24 NI = II
      FNI = NI
      DO 250 III = 1, 60
```

TABLE XIV (CONT'D)

LIST OF PROGRAM SOURCE DECK FOR CALCULATING ELECTRONIC ENERGIES BY THE METHOD OF LAYZER (REF. 9)

```
  250 XAP(III) = 1.0D0
C
C       STATEMENTS 27 THRU 33 EVALUATE PIAA
C
   27 PIAA = 0.0D0
   29 KUP = 2*LI - 1
      DO 30 K = 1.KUP .2
      KR = K-1
      IF(KR)   31.31.32
   31 PIAA = PIAA + FPART(NA.NA.KR.I.I)
      GO TO 30
   32 PIAA = PIAA - .5D0*((2.0D0*FI-1.0D0) /(4.0D0*FI-3.0D0)) *
     1        CUVW(LI.LI.K) * FPART(NA.NA.KR.I.I)
   30 CONTINUE
   33 PIAA = 4.0D0 * PIAA
   34 CONTINUE
C
      SUM = 0.0D0
   39 DO 50 J = 1. NELEC
      PIAB = 0.0D0
      IF(I-J) 35.50.35
   35 NB = INDX(J)
      ONJ = NINDX(J)
      DO 25 JJ = 1.20
      LJ = INDX(J) - 20*JJ + 1
      FJ = LJ
      IF(LJ - 19)  26.26.25
   25 CONTINUE
   26 NJ = JJ
      XAP(1) = 1.0D0
      XAP(2) = ZLIST(IZ.I)/ZLIST(IZ.J)
      DO 251 LL = 3. 60
  251 XAP(LL) = XAP(2)*XAP(LL-1)
C
C       STATEMENTS 36 THRU 38 EVALUATE PIAB
   36 PIAB = PIAB + FPART(NA.NB.0.I.J)
      KUP = LI + LJ - 1
      DO 37 K = 1.KUP
      KR = K - 1
      IF(MOD((LI+LJ+K-3).2))  37.137.37
  137 PIAB = PIAB - .25D0 * CUVW(LI.LJ.K) * GPART(NA.NB.KR.I.J)
   37 CONTINUE
   38 PIAB = 4.0D0 * PIAB
   40 WRITE (6.6)I.J.IZ.PIAA.PIAB
    6 FORMAT (4X.3I5.1P2E20.7)
   50 SUM = SUM + ONJ*PIAB
      PI(IZ.I) = SUM + (ONI - 1.CD0) * PIAA
   70 CONTINUE
      IF(IZ-22) 77.68.77
   68 IZ = NOZS
      GO TO 28
   77 DO 71 I=1.NELEC
      NA = INDX(I)
      DO 72 II = 1.20
      LI = NA - 20*II + 1
      IF(LI - 19) 73.73.72
   72 CONTINUE
   73 NI = II
      FNI = NI
      ZOLD(IZ.I) = ZLIST(IZ.I)
```

```
   71 ZLIST(IZ.I) = 2.0D0 * (Z0 + DELZ(IZ)) /FNI - PI(IZ.I)
      WRITE (6.95)IZ.(ZLIST(IZ.I). I=1.NELEC)
      PRINT 95. IZ. (ZLIST(IZ.I). I=1.NELEC)
      IZA = Z0 + DELZ(IZ)
      ENER = 0.0D0
      DO 170 NN = 1.NELEC
      FNEL = NINDX(NN)
  170 ENER = ENER - .125D0 * FNEL*ZLIST(IZ.NN)*ZLIST(IZ.NN)
      WRITE(6.15) IZA.ENER
   95 FORMAT (5X.5HZLIST.5X.4HIZ =I2/(6E20.8))
C       TEST FOR CONVERGENCE
C
      ISPY = 0
   62 DO 125 I = 1.NELEC
      ZTEST = ZLIST(IZ.I) - ZOLD(IZ.I)
      IF(ABS (ZTEST) -  EPSI)  124.124.123
  123 AGAIN(I) = 1.0
      ISPY = 1
      GO TO 125
  124 AGAIN(I) = 0.0
  125 CONTINUE
      IF(ISPY) 126.63.126
  126 ICOUNT = ICOUNT + 1
      IF (NOIT-ICOUNT) 187. 187. 28
   63 CONTINUE
      IF(IZ-1) 67.67.65
   65 IF(IDUM)  167.166.167
  166 IF(IPRT1) 165.92.165
  165 IZ=IZ-1
      GO TO 28
   67 CONTINUE
C
C       OPTIMIZING OF SCREENING PARAMETERS COMPLETED
C
  167 WRITE (6.9)
      IUP = (NOZS + 2) / 3
      DO 75 I = 1. IUP
      FI = I
      IA = NOZS + 1 - I
      IB = IA - IUP
      IC = IB - IUP
      IZA = Z0 + DELZ(IA)
      IZB = Z0 + DELZ(IB)
      IZC = Z0 + DELZ(IC)
      IF (IC) 274.174.741
  741 WRITE (6.11)IZA.IZB.IZC
      DO 74 J = 1.NELEC
   74WRITE (6.8)INDX(J).ZLIST(IA.J).INDX(J).ZLIST(IB.J).INDX(J).ZLIST(I
     1C.J)
      GO TO 75
  174 WRITE (6.11)IZA.IZB
      DO 175 J = 1.NELEC
  175 WRITE (6.4)INDX(J).ZLIST(IA.J).INDX(J).ZLIST(IB.J)
      GO TO 75
  274 WRITE(6.11)IZA
      DO 275 J = 1.NELEC
  275 WRITE(6.5) INDX(J).ZLIST(IZ.J)
   75 CONTINUE
C       ENERGY CALCULATION
C
```

TABLE XIV (CONT'D)

LIST OF PROGRAM SOURCE DECK FOR CALCULATING ELECTRONIC ENERGIES BY THE METHOD OF LAYZER (REF. 9)

```
      IF(NOZS - 1)  184,185,184
  184 DO 80 I = 1,NOZS
      IZA = Z0 + DELZ(I)
      ENER = 0.0D0
      DO 85 J = 1,NELEC
      FN = NINDX(J)
   85 ENER = ENER - .125D0 * FN * ZLIST(I,J)**2
      WRITE (6,15)IZA,ENER
   80 CONTINUE
      GO TO 187
  185 ENER = 0.0D0
      DO 186 J = 1,NELEC
      FN = NINDX(J)
  186 ENER = ENER - .125D0 * FN * ZLIST(IZ,J)**2
      IZA = Z0 + DELZ(IZ)
      WRITE(6,15) IZA,ENER
  187 IF (NDATA)  90,90,18
   90 CALL EXIT
      STOP
      END
```

```
$IBFTC FPART   LIST,M94/2
C  FPRT
C     COMPUTES PARTIAL DERIVATIVES OF SLATER 2 ELECTRON F-FUNCTION WRT Z
C     PROGRAMMED FROM ANALYSIS DATED  1/26/65
C
      DOUBLE PRECISION FUNCTION FPART (N1,N2,KK,I1,I2)
      DIMENSION  FACT(40), QLIST(10,10), DLIST(20,10,10),
     1           ALIST(20,10,10)
      DIMENSION DELZ(22), INDX(30), NINDX(30), ZLIST(22,30), XAP(60),
     1          TWO(45)
      COMMON FACT, QLIST, DLIST, ALIST, XAP, TWO
      DOUBLE PRECISION FACT, QLIFT, DLIST, ALIST, XAP, TWO
      DOUBLE PRECISION  F2     , FNF9   , FNF8   , ACOEF  , B
      DOUBLE PRECISION ACOE, FN9X, F8M9, FDUM, FSUM, FNUM
      DOUBLE PRECISION F1
      K = KK
      FK=K
      DO 1 NA=1,20
      LA=N1-20*NA+1
      LA2 = LA+LA
      IF(LA-20) 2,2,1
    1 CONTINUE
    2 NA=NA
      DO 3 NB=1,20
      LB=N2-20*NB+1
      LB2 = LB+LB
      IF (LB-20) 4, 4, 3
    3 CONTINUE
    4 NB=NB
      F1 =(-FK * CAPA(K,NA,LA) * CAPA(-K-1,NB,LB)) / XAP(K+2)
      IPUP = NA+NA-LA-LA+1
      IOUP = NB+NB-LB-LB+1
      F2 = 0.0D0
      DO 10  IP = 1,IPUP
      IPR = IP-1
      NF4 = LA2+K+IP
      NF6 = LA2-K-1+IP
      ACOE = ALIST(IP,NA,LA)
      DO 10  IO = 1,IOUP
      IOR = IO-1
      ACOEF = ACOE*ALIST(IO,NB,LB)
      NF9 = LB2+IOR
      FNF9 = NF9
      FN9X = FNF9*XAP(2)
      IUP = LA2+K+IPR
      DO 10  I  = 1,IUP
      NF8 = LA2+IPR-1
      NF3 = LB2+IOR+NF8
      NF5 = NF4-1
      NF7 = NF6-1
      FNF8 = NF8
      F8M9 = (FNF8-FN9X)*ACOEF
      JUP = IPUP+IOUP-IP-IO+I+1
      NF1 = JUP
      DO 10  J  = 1,JUP
      JR=J-1
      NF2 = JUP-JR
   30 FDUM = (FACT(NF1)/FACT(NF2))*(FACT(NF3)/FACT(J))
      NF10 = NF8-1+JR
      IF(K+1-NF8) 7,7,8
    7 B = FACT(NF4)/FACT(NF5) - FACT(NF6)/FACT(NF7)
      GO TO 12
    8 B = FACT(NF4)/FACT(NF5)
   12 IF (NF10 - 1) 16, 15, 15
   16 NF100 = -NF10+1
      F2 = F2 + B*FDUM*F8M9 / XAP(NF100)
      GO TO 10
   15 F2 = F2 + B*FDUM*F8M9 * XAP(NF10+1)
   10 CONTINUE
   13 FPART = (QLIST(NA,LA) * QLIST(NB,LB))**2  * (F1-1.0D0/(1.0D0 *
     1           XAP(2)) **(2*NA + 2*NB+1) * F2)
      RETURN
      END
```

```
$IBFTC GPART   LIST,M94/2
C  GPRT
C
C     PROGRAMMED FROM ANALYSIS DATED  1/26/65
      DOUBLE PRECISION FUNCTION GPART (N1,N2,K,I1,I2)
      DIMENSION  FACT(40), QLIST(10,10), DLIST(20,10,10),
     1           ALIST(20,10,10)
      DIMENSION DELZ(22), INDX(30), NINDX(30), ZLIST(22,30), XAP(60),
     1          TWO(45)
      COMMON FACT, QLIST, DLIST, ALIST, XAP, TWO
      DOUBLE PRECISION FACT, QLIST, DLIST, ALIST, XAP, TWO
      DOUBLE PRECISION  G1     , FNF6   , COEF   , FNF7   , TERM
      DOUBLE PRECISION  T1     , T2     , T3     , T4     , T5
      DOUBLE PRECISION  T60    , T61    , T6     , T7
      DOUBLE  PRECISION  DL12, XL123, DL1
      DO 1 NA=1,20
      LA = N1-20*NA+1
      IF(LA-20) 2,2,1
    1 CONTINUE
```

TABLE XIV (CONT'D)

LIST OF PROGRAM SOURCE DECK FOR CALCULATING ELECTRONIC ENERGIES BY THE METHOD OF LAYZER (REF. 9)

```
 2 NA=NA
   LA2 = LA+LA
   T60= 1.0D0 + XAP(2)
   DO 3 NB=1,20
   LB - N2-20*NB+1
   IF(LB-20) 4,4,3
 3 CONTINUE
 4 NB=NB
   LB2 = LB+LB
   NASTR =  NA-LA
   NAST  =  NASTR + 1
   NBSTR =  NB-LB
   NBST  =  NBSTR +1
   G1 = 0.0D0
   KAB = K+LA+LB+1
   DO 10  IP = 1,NAST
   IPR = IP-1
   DL1 = DLIST(IP,NA,LA)
   DO 10  IQ = 1,NBST
   IQR = IQ-1
   DL12 = DLIST(IQ,NB,LB)*DL1
   ITZ = LA2+LB2+IQR+IPR
   NF2 = LA+LB-K+IPR+IQR
   LIQ = LB2+IQR
   DO 10  II = 1,NAST
   I = II-1
   DL123 = DLIST(II,NA,LA) * DL12
   NF4 = LA2+IPR+1
   T5 = XAP(NF4+1)
   FNF6 = LA2+1+IPR+1
   K1AB = KAB + 1
   NF3J = ITZ + 1 +1
   DO 10  JJ = 1,NBST
   J = JJ-1
   COEF = DLIST(JJ,NB,LB)*DL123
   NF1 = K1AB + J
   NF3 = NF3J + J
   NF5 = NF3+1
   FNF7 = LIQ + J
   TERM = 0.0D0
   DO 8 MM=1,NF1
   M = MM-1
   NF8 = NF3-MM
   NF9 = NF1-M
 8 TERM = TERM +           TWO(MM+1)*(FACT(NF8)/FACT(NF9))
   T2 = TWO(NF3+1)
   T3 = FACT(NF1)*(-TERM + FACT(NF2)*T2)
   T4 = FNF6 - FNF7*XAP(2)
   T61 = T60 ** NF5
   T6 = 1.0D0/T61
   T7 = T3 * T4 *T5 *T6
   G1 = G1 + COEF * T7
10 CONTINUE
13 GPART = 2.0D0 * (QLIST(NA,LA) * QLIST(NB,LB))**2 * G1
   RETURN
   END
```

```
$IBFTC ALFA    LIST,M94/2
C  ALFA
      SUBROUTINE ALFA(I,N,L,ALIST)
C     COMPUTES ALPHA(P,N,L) FOR HYPERGEOMETRIC FUNCTION SQUARED AND
C        STORES THEM IN ALIST(I,N,L+1
      DIMENSION  FACT(40), QLIST(10,10), DLIST(20,10,10),
     1           ALIST(20,10,10)
      COMMON  FACT   , QLIST  , DLIST  , ALIST
      DOUBLE PRECISION  FACT   , QLIST  , DLIST  , ALIST  , A
      DO 1 IN = 1,N
      DO 1 IL = 1,IN
      DO 1 II = 1,I
      IUP = IN-IL+1
      A = 0.0D0
      DO 1 IP = 1,IUP
      IPI = II - IP + 1
      IF(IPI-10) 3,3,1
    3 IF(IPI) 1,1,2
    2 A = DLIST(IP,IN,IL) * DLIST(IPI,IN,IL) + A
      ALIST(II,IN,IL) = A
    1 CONTINUE
      RETURN
      END
```

```
$IBFTC CAPA    LIST,M94/2
C  CAPA
C
      DOUBLE PRECISION FUNCTION CAPA (K,N,LL)
      DIMENSION  FACT(40), QLIST(10,10), DLIST(20,10,10),
     1           ALIST(20,10,10)
      COMMON  FACT   , QLIST  , DLIST  , ALIST
      DOUBLE PRECISION  FACT   , QLIST  , DLIST  , ALIST  , A
      DOUBLE PRECISION FAC
      L = LL
      A = 0.0D0
      NSTR=N-L
      IT1 = L+L+K
      NUP = NSTR+NSTR+1
      DO 11 I = 1, NUP
      NF1 = IT1+I
      IF (NF1) 11,11,3
    3 FAC = FACT(NF1)
    1 A = A + ALIST(I,N,L) * FAC
   11 CONTINUE
      CAPA = A
      RETURN
      END
```

```
$IBFTC CUVW    LIST,M94/2
C  CUVW
C
      DOUBLE PRECISION FUNCTION CUVW (L1,L2,KK)
      DIMENSION  FACT(40), QLIST(10,10), DLIST(20,10,10),
     1           ALIST(20,10,10)
```

TABLE XIV (CONT'D)

LIST OF PROGRAM SOURCE DECK FOR CALCULATING ELECTRONIC ENERGIES BY THE METHOD OF LAYZER (REF. 9)

```
      COMMON  FACT   . QLIST  . DLIST  . ALIST
      DOUBLE PRECISION  FACT   . QLIST  . DLIST  . ALIST  . CVW
      K = KK
      CUVW = 0.0D0
      L12 = L1+L2
      IG1 = L12+K-3
      IF(MOD(IG1.2)) 9.1.9
    1 IG = IG1/2
      L1K = L12 - K
      L2K = L2 + K - L1
      IF(L2K) 9.9.2
    2 KL1 = K + L1 - L2
      IF(KL1) 9.9.3
    3 IG1 = IG + IG + 2
      IT1 = IG+2
      IG2 = IT1-L1
      IG3 = IT1-L2
      IG4 = IT1-K
      CVW = (2.D0*FACT(IG+1)**2*FACT(L1K)*FACT(L2K)*FACT(KL1)) /
     1         (FACT(IG1)*FACT(IG2)**2*FACT(IG3)**2*FACT(IG4)**2)
      CUVW = CVW
    9 RETURN
      END


$IBFTC DINL    LIST.M94/2
C  DINL
      SUBROUTINE DINL(N.L.DLIST)
C     COMPUTES COEFFICIENTS FOR THE HYPERGEOMETRIC FUNCTIONS AND STORES
C       THEM IN DLIST(I.N.L)
      DIMENSION  FACT(40). QLIST(10.10). DLIST(20.10.10).
     1           ALIST(20.10.10)
      COMMON  FACT   . QLIST  . DLIST  . ALIST
      DOUBLE PRECISION  FACT   . QLIST  . DLIST  . ALIST  . D
      D = 0.0D0
      DO 1  IN=1.N
      DO 1  IL=1.IN
      I=IL-1
      IUP=IN-I
      DO 1  II=1.IUP
      IA = II-1
      NF1= IN-I
      NF2= NF1-IA
      NF3 = I+I+2
      NF4= NF3+IA
      D = (-1.D0)**IA*(FACT(NF1)*FACT(NF3))/(FACT(NF2)*FACT(NF4)*FACT(II
     1))
    1 DLIST(II.IN.IL) = D
      RETURN
      END


$IBFTC FACT    LIST.M94/2
C  FACT
      SUBROUTINE FACTX(I.FACT)
      DIMENSION  FACT(40)
      DOUBLE PRECISION  FACT   . FJ
      FACT(1) = 1.0D0
      DO  1  J = 2. I
      FJ = J-1
    1 FACT(J) = FACT(J-1) * FJ
      RETURN
      END


$IBFTC QNORM   LIST.M94/2
C  QNRM
      SUBROUTINE QNORM(N.L.QLIST)
C     GENERATES QLIST(N.L) CORRESPONDING TO Q(N.L-1)
      DIMENSION  FACT(40). QLIST(10.10). DLIST(20.10.10).
     1           ALIST(20.10.10)
      COMMON  FACT   . QLIST  . DLIST  . ALIST
      DOUBLE PRECISION  FACT   . QLIST  . DLIST  . ALIST  . Q
      DOUBLE PRECISION  FIN    . DSQRT
      Q = 0.0D0
      DO 1  IN=1.N
      IM1=IN-1
      FIN = IN
      DO 1  JL=1.IN
      J=JL-1
      J2 = J+J
      IJP = IN + JL
      IJM = IN- J
      Q = DSQRT(FACT(IJP) /((2.D0*FIN)*FACT(IJM)))*(1.D0/FACT(J2+2))
    1 QLIST(IN.JL) = Q
      RETURN
      END
```

FIG. 1

VARIATION OF CORE ENERGY WITH IONIZATION LEVEL FOR THE URANIUM ATOM

1 HARTREE = 2 • IONIZATION POTENTIAL OF HYDROGEN

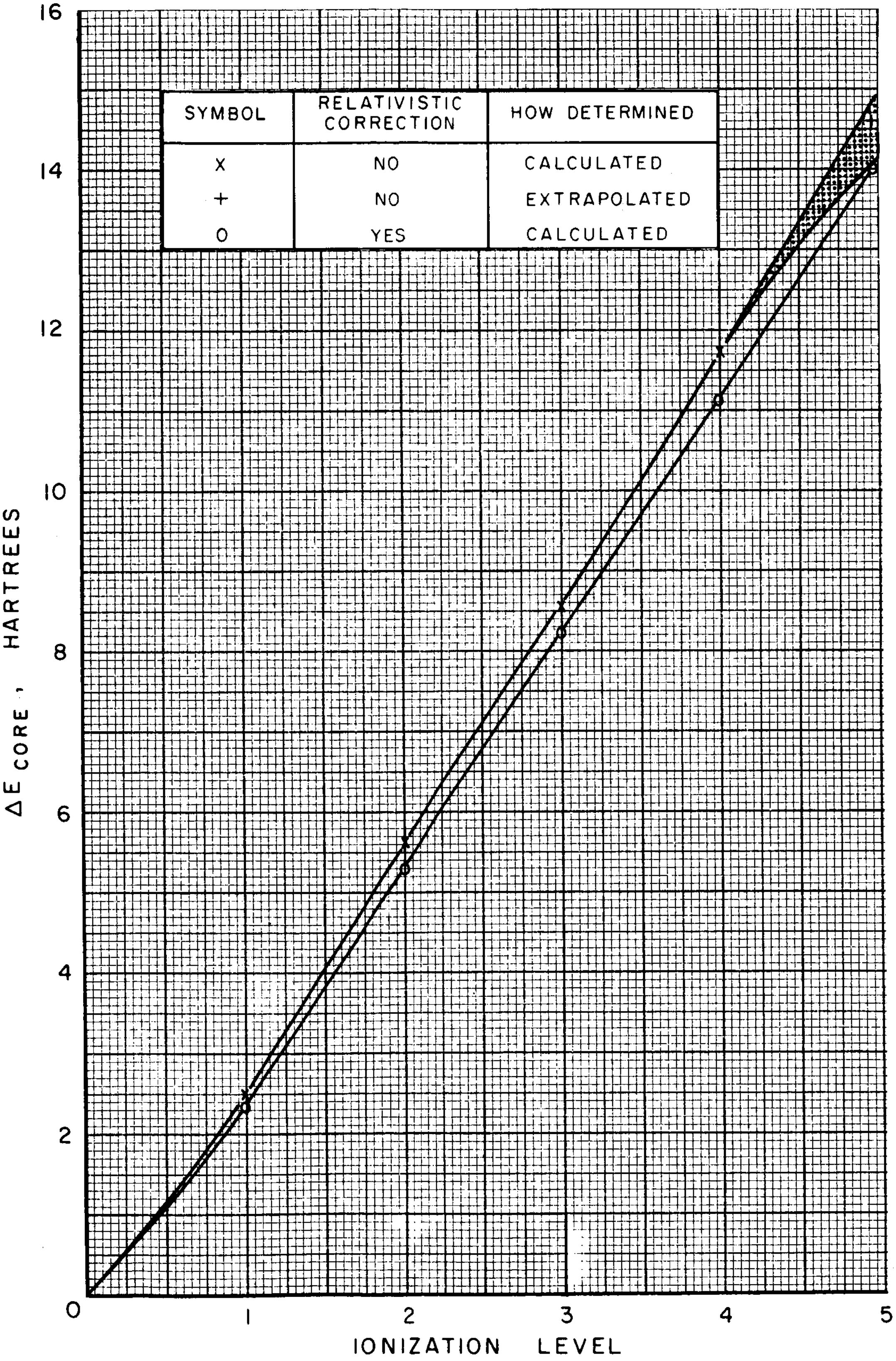

FIG. 2

COMPOSITIONS OF EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM USING TWO DIFFERENT SETS OF IONIZATION POTENTIALS FOR URANIUM IONS

$P = 1000$ ATM
$P_{FUEL}/P = 0.5$

—— U(I) = 6.0 ev., U(II) = 10.0 ev., U(III) = 18.0 ev.
– – – U(I) = 6.1 ev., U(II) = 17.1 ev., U(III) = 38.8 ev.

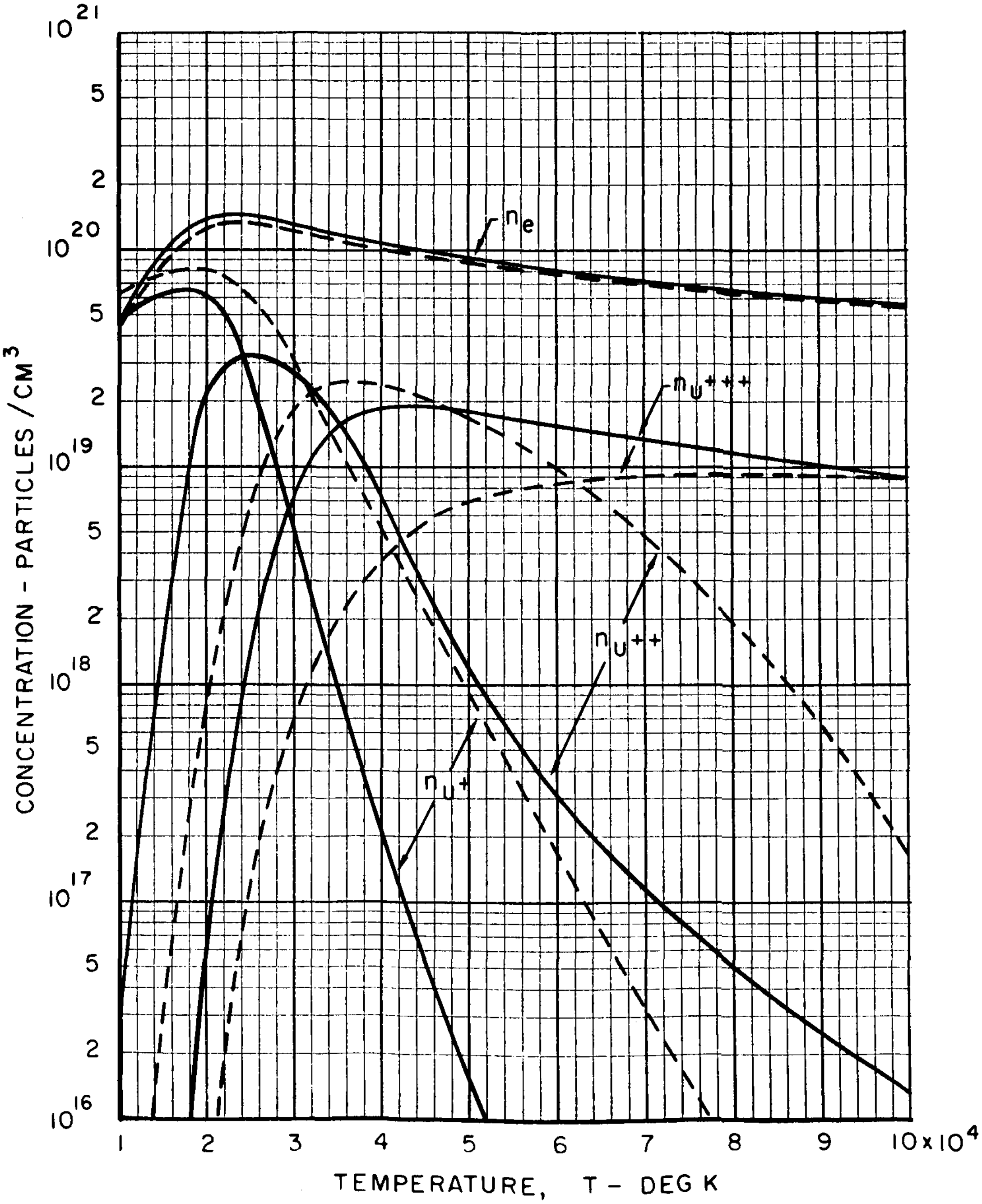

FIG. 3

RANGE OF SCHMIDT NUMBERS IN EQUILIBRIUM MIXTURES OF HYDROGEN AND URANIUM