

LA-10203-MS

C. 2

Los Alamos National Laboratory is operated by the University of California for the United States Department of Energy under contract W-7405-ENG-36

*The Three-Dimensional Hydrodynamic Hot-Spot Model  
Applied to PETN, HMX, TATB, and NO*

LOS ALAMOS NATIONAL LABORATORY



3 9338 00318 6250

**Los Alamos** Los Alamos National Laboratory  
Los Alamos, New Mexico 87545

**DISCLAIMER**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

LA-10203-MIS

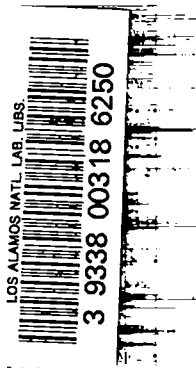
UC-45

Issued: September 1984

# The Three-Dimensional Hydrodynamic Hot-Spot Model Applied to PETN, HMX, TATB, and NQ



Charles L. Mader  
James D. Kershner



**Los Alamos** Los Alamos National Laboratory  
Los Alamos, New Mexico 87545

# THE THREE-DIMENSIONAL HYDRODYNAMIC HOT-SPOT MODEL APPLIED TO PETN, HMX, TATB, AND NQ

by

Charles L. Mader and James D. Kershner

## ABSTRACT

The interaction of a shock wave with a single air hole and a matrix of air holes in PETN, HMX, and TATB has been numerically modeled. The hot-spot formation, interaction, and the resulting build up toward detonation were computed using three-dimensional numerical Eulerian hydrodynamics with Arrhenius chemical reaction and accurate equations of state according to the hydrodynamic hot-spot model.

The basic differences between shock sensitive explosives such as PETN or HMX and shock insensitive explosives such as TATB or NQ may be described using the hydrodynamic hot-spot model.

---

## I. INTRODUCTION

The hydrodynamic stability of one-dimensional detonations in an ideal gas of constant heat capacity undergoing an exothermic, irreversible, unimolecular reaction with an Arrhenius-law temperature dependence has been studied analytically by Erpenbeck.<sup>1</sup> The analysis gives no information about the nature of the time-dependent behavior of the flow for finite perturbations (the stability) of the ideal gas reaction zone using a one-dimensional characteristic method. In those cases for which Erpenbeck's linearized analysis has shown the steady-state solution to be unstable to infinitesimal longitudinal perturbations, flows started in a configuration approximating the steady-state solution exhibited nondecaying oscillations; in those cases for which Erpenbeck's analysis showed the steady-state solution to be stable, perturbations were found to decay.<sup>2</sup>

In Reference 3 we described the results of our studies of the time-dependent behavior of the flow (the stability) of the ideal gas, nitromethane, and liquid TNT reaction zones to finite longitudinal and transverse perturbations using finite difference methods to solve the reactive Navier-Stokes equations of fluid dynamics. We also described the time-dependent behavior of

the flow of stable overdriven nitromethane detonations formed by pistons of various configurations.

The constant velocity piston calculations with a resolved reaction zone show details of the process of shock initiation of nitromethane. The basic features are identical to those of the flow computed with an unresolved reaction zone.<sup>4</sup> The shocked nitromethane first completely decomposes at the piston and achieves a detonation with a peak pressure that builds up toward the C-J pressure of the high-density shocked nitromethane. The detonation wave overtakes the shock wave, and the pressure at the end of the reaction zone decays toward the piston pressure.

If one introduces gas bubbles or grit into a homogeneous explosive such as a liquid or a single crystal, thereby producing a heterogeneous explosive, the minimum shock pressure necessary to initiate propagating detonation can be decreased by one order of magnitude.

Heterogeneous explosives, such as PBX 9404 or PBX 9502, show a different behavior than homogeneous explosives show when propagating along confining surfaces. A heterogeneous explosive can turn sharp corners and propagate outward, and depending upon its sensitivity, it may show either very little or much curvature when propagating along a metal surface. The mechanism of initiation for heterogeneous explosives is different from the simple Arrhenius kinetic model found adequate for homogeneous explosives. Heterogeneous explosives are initiated and may propagate by the process of shock interaction with density discontinuities such as voids. These interactions result in hot regions that decompose and produce increasing pressures that cause more and hotter decomposing regions. The shock wave increases in strength, releasing more and more energy, until it becomes strong enough that all of the explosive reacts and detonation begins.

This process is described by the "hydrodynamic hot-spot" model, which models the hot-spot formation from the shock interactions that occur at density discontinuities and describes the decomposition using the Arrhenius rate law and the temperature from the HOM equation of state.<sup>5</sup>

The numerical modeling of the interaction of a shock wave with a single density discontinuity was reported in Reference 5, where an 8.5-GPa shock interacting with a single spherical hole in nitromethane was studied. The study was extended to four rectangular holes.<sup>5</sup> It was determined that 0.0032-mm-radius cylindrical voids would build toward detonation and 0.001-mm-

radius voids would form hot spots that failed to propagate because of rarefactions cooling the reactive wave.

The process of shock initiation of heterogeneous explosives has been investigated<sup>6</sup> numerically by studying the interaction of shock waves with a cube of nitromethane containing 91 holes. An 8.5-GPa shock interacting with a single 0.002-mm hole did not build toward detonation. When the shock wave interacted with a matrix of 0.002-mm holes, it became strong enough to build toward detonation. Reducing the size of the holes to 0.0004 mm resulted in a sufficient amount of the explosive decomposing to compensate for the loss in energy to the flow caused by the interaction of the shock wave with the holes. The shock wave slowly grew stronger, but it did not build to detonation in the time of the calculation.

A 5.5-GPa shock wave interacting with a matrix of 0.002-mm holes resulted in insufficient heating of the resulting hot spots to cause significant decomposition.

The process of desensitization by preshocking was found to be a result of the holes being closed by the low-pressure initial shock wave without resulting in appreciable explosive decomposition. The higher pressure shock that arrived later did not have holes with which to interact and behaved like a shock wave in a homogeneous explosive until it caught up with the lower pressure preshock wave.

The basic processes in the shock initiation of heterogeneous explosives have been numerically modeled in three dimensions. The interaction of a shock wave with density discontinuities, the resulting hot-spot formation, interaction, and the build up toward detonation or failure have been modeled. In this report the hydrodynamic hot-spot model is used to investigate other explosives and other kinetics to study the basic differences between shock sensitive and shock insensitive explosives.

## II. NUMERICAL MODELING

The three-dimensional Eulerian reactive hydrodynamic code 3DE is described in Reference 7. It uses techniques identical to those described in detail in Reference 5 and used successfully for describing two-dimensional Eulerian flow with mixed cells and multicomponent equations of state and for modeling reactive flow.

The three-dimensional code has been used to study the interaction of two, three, and five colliding, diverging spherical detonation waves in PBX 9404. As described in Reference 8, the size and magnitude of the high-pressure double, triple, quadruple, and quintuple interactions depend upon the number and relative location of the initiators. The initiation of propagating detonation in the insensitive explosive PBX 9502 by triple shock wave interaction resulting from three initiators has also been studied. The reactive hydrodynamics of a matrix of tungsten particles in HMX was described in Reference 9.

The Arrhenius reactive rate law was used with the constants determined experimentally by Raymond N. Rogers and described in Reference 5. The constants used are given in Table I.

TABLE I. Arrhenius Constants

Explosive	Activation Energy (kcal/mole)	Frequency Factor ( $\mu\text{s}^{-1}$ )
Nitroguanidine	20.9	28.4
TATB	59.9	$3.18 \times 10^{13}$
HMX	52.7	$5.0 \times 10^{13}$
PETN	47.0	$6.3 \times 10^{13}$

The HOM equation of state constants used for PETN are described in Reference 5. The BKW detonation product and the solid equation of state constants used in the HOM equation of state are given in Table II for HMX, in Table III for TATB, and in Table IV for Nitroguanidine (NQ).

A constant velocity piston was applied to the bottom of the explosive cube, shocking the explosive initially to the desired pressure. When the shock wave interacts with a hole, a hot spot with temperatures several hundred degrees hotter than the surrounding explosive is formed in the region above the hole when it is collapsed by the shock wave. The hot region decomposes and contributes energy to the shock wave, which has been degraded by the hole interaction.

Whether this energy is sufficient to compensate for the loss from the hole interaction depends upon the magnitude of the initial shock wave, the hole size, and the interaction with the flow from nearest neighbor hot spots. The

objective of the study was to investigate the nature of this complicated interaction and to determine if the hydrodynamic hot-spot model was adequate to describe the experimentally observed sensitivity to shock initiation of the heterogeneous explosives PETN, HMX, TATB, and Nitroguanidine with PETN being the most sensitive and Nitroguanidine the least sensitive.

For example, to initiate PBX-9404 (HMX-based explosive) or PBX-9502 (TATB-based explosive) at maximum pressed density within 4 mm of shock run requires a shock wave in PBX-9404 of 5 GPa and in PBX-9502 of 16 GPa as determined from the experimental Pop plots.<sup>10</sup>

To initiate PETN at  $1.75 \text{ g/cm}^3$  (crystal density is 1.778) within 4 mm of shock run requires a pressure of only 2 GPa, while to initiate Nitroguanidine at  $1.723 \text{ g/cm}^3$  (crystal density is 1.774) within 4 mm of shock run requires a pressure of 25 GPa.<sup>10</sup>

The hole size present in such pressed explosives varies from holes of 20 to 600 Å in the TATB crystals to holes as large as 0.5 mm in the explosive-binder matrix. Most of the holes vary in size from 0.05 to 0.005 mm in diameter, so we examined holes in that range of diameters.

As shown in Reference 5, the hot spot formed when a shock wave interacts with a spherical hole scales with the radius of the hole as long as no chemical reaction occurs. Using hot-spot temperatures in the calculated range of 700 to 1300 K and calculating the adiabatic explosion times, one observes the ordering according to sensitivity (time to explosion) shown in Table V. The ordering is identical to that observed experimentally.

TABLE V. Adiabatic Explosion Times

Explosive	Hot-Spot Temperature		
	700 K	1000 K	1300 K
Nitroguanidine	5504 $\mu\text{s}$	124 $\mu\text{s}$	18.47 $\mu\text{s}$
TATB	1290 $\mu\text{s}$	$6 \times 10^{-3} \mu\text{s}$	$1 \times 10^{-5} \mu\text{s}$
HMX	5.26 $\mu\text{s}$	$1 \times 10^{-4} \mu\text{s}$	$5 \times 10^{-7} \mu\text{s}$
PETN	0.08 $\mu\text{s}$	$7 \times 10^{-6} \mu\text{s}$	$5 \times 10^{-8} \mu\text{s}$

The interaction of shock waves of various pressures with single cubical air holes of various sizes in PETN, HMX, TATB, and NQ was investigated. The



calculations model the hot-spot explosion and failure to propagate because of rarefactions cooling the reactive wave. If the reaction becomes too fast to numerically resolve the cooling by rarefactions, the flow builds toward a detonation too quickly.

A summary of the results of the study is shown in Table VI. The ordering of shock sensitivity of the explosives is again observed experimentally correlating well with the observed Pop plot data.<sup>10</sup>

To evaluate the sensitivity to shock more realistically, we studied the interaction of a 5-GPa shock wave in HMX with a matrix of spherical holes of  $4 \times 10^{-3}$ -mm diameter. The void fraction is 10%. While a single hole fails to build toward a detonation as shown in Figure 1, the matrix of holes builds toward a detonation as shown in Figure 2. The experimental run to detonation for a 5-GPa shock wave in  $1.71 \text{ g/cm}^3$  HMX is 0.17 cm. While a propagating detonation would not be expected to occur experimentally in this geometry (the computed detonation is the result of insufficient numerical resolution to resolve the reaction at high pressures and temperature), the enhancement of the shock wave would occur.

The interaction of a 12.5-GPa shock wave in TATB with a single spherical hole of  $4 \times 10^{-3}$ -mm diameter is shown in Figure 3. It fails to build toward a detonation. The interaction of a 12.5-GPa shock wave in TATB with a matrix of spherical holes of  $4 \times 10^{-3}$ -mm diameter with a void fraction of 10% is shown in Figure 4. The flow builds toward a detonation. The experimental run to detonation for a 12.5-GPa shock wave in  $1.71 \text{ g/cm}^3$  TATB is 0.30 cm. The computed detonation occurs too quickly because of insufficient numerical resolution when the shock wave is enhanced to high enough pressures and temperatures by the interacting hot spots.

The interaction of a 2.0-GPa shock wave in PETN with a single spherical hole of  $4 \times 10^{-3}$ -mm diameter is shown in Figure 5. Build up toward a detonation did not occur. The interaction of a 2.0-GPa shock wave in PETN with a matrix of spherical holes of  $4 \times 10^{-3}$ -mm diameter with a void fraction of 10% is shown in Figure 6. The flow builds towards a detonation after the hot spots interact. The computed detonation in this geometry is a result of insufficient numerical resolution at high decomposition rates. The experimental run to detonation for a 2.0-GPa shock wave in  $1.60 \text{ g/cm}^3$  PETN is 0.20 cm.

The experimental run to detonation values are about the same for a 12.5-GPa shock wave interacting with TATB with 10% voids, for a 5.0-GPa shock

TABLE VI. Single Cubical Air-Hole Study

Explosive	Air Cube Size (mm)	Pressure (GPa)	Result
HMX	$5 \times 10^{-3}$	2.5	Fails to build toward a detonation
	$5 \times 10^{-3}$	5.0	Fails to build toward a detonation
	$5 \times 10^{-3}$	7.5	Builds toward a detonation
	$5 \times 10^{-2}$	2.5	Fails to build toward a detonation
	$5 \times 10^{-2}$	5.0	Marginal
	$5 \times 10^{-2}$	7.5	Builds toward a detonation
TATB	$5 \times 10^{-3}$	5.0	Fails
	$5 \times 10^{-3}$	12.5	Fails
	$5 \times 10^{-3}$	15.0	Builds toward a detonation
	$5 \times 10^{-2}$	7.5	Fails
PETN	$5 \times 10^{-3}$	2.5	Builds toward a detonation
	$5 \times 10^{-3}$	7.5	Builds toward a detonation
Nitroguanidine	$5 \times 10^{-2}$	25.0	Fails
	5.0	25.0	Builds toward a detonation

wave interacting with HMX with 10% voids, and for a 2.0 GPa shock wave interacting with PETN with 10% voids.

The computational grid contained 24 x 22 by 36 cells, each  $1 \times 10^{-3}$  mm on a side. The 36 air holes were described by 4 cells per sphere diameter. Numerical tests with 2 to 6 cells per sphere diameter showed the results were independent of grid size for more than 3 cells per sphere diameter. The air holes were located on a hexagonal close-packed lattice (HCP). The closest distance for the HCP matrix between holes was  $3.8 \times 10^{-3}$  mm. The time step was  $1.0 \times 10^{-5}$   $\mu$ s.

### III. CONCLUSIONS

The hydrodynamic hot-spot model describes the basic difference between shock sensitive and shock insensitive explosives. The interaction of a shock wave with air holes in PETN, HMX, TATB, and NQ, the resulting hot-spot formation, interaction, and the build up toward detonation or failure have been modeled. Increased hole size results in larger hot spots that decompose more of the explosive and add their energy to the shock wave and result in increased sensitivity of the explosive to shock. Increased number of holes also causes more hot spots that decompose more explosive and increase the sensitivity of the explosive to shock. The interaction between hole size and number of holes is complicated and requires numerical modeling for adequate evaluation of specific cases. The hole size can become sufficiently small (the critical hole size) that the hot spot is cooled by side rarefactions before appreciable decomposition can occur. Since increasing the number of holes while holding the percentage of voids present constant results in smaller holes, we have competing processes that may result in either a more or less shock sensitive explosive. If the hole size is below the critical hole size, then the explosive will become less sensitive with increasing number of holes of decreasing diameter.

To evaluate the potential shock sensitivity of an explosive for engineering purposes, one needs to determine experimentally the Arrhenius constants. One then calculates the adiabatic explosion times for several assumed hot-spot temperatures to determine the relative sensitivity of the explosive compared with explosives of known sensitivity. A more detailed evaluation can be obtained from calculations using the hydrodynamic hot-spot model.

## REFERENCES

1. J. J. Erpenbeck, *Phys. Fluids* 4, 481 (1961); 5, 604 (1962); 7, 684, 1424 (1964); 8, 1192 (1965); and 9, 1293 (1966).
2. W. Fickett and W. W. Wood, *Phys. Fluids* 9, 903 (1966).
3. Charles L. Mader, "One- and Two-Dimensional Flow Calculations of Reaction Zones of Ideal Gas, Nitromethane, and Liquid TNT Detonation," Twelfth Symposium (International) on Combustion, Williams and Wilkins, 1968, p. 701.
4. Charles L. Mader, *Phys. Fluids* 6, 375 (1963).
5. Charles L. Mader, Numerical Modeling of Detonations, University of California Press (1979).
6. Charles L. Mader and James D. Kershner, "Three-Dimensional Modeling of Shock Initiation of Heterogeneous Explosives," Nineteenth Symposium (International) on Combustion, Williams and Wilkins, 1982, p. 685.
7. Charles L. Mader and James D. Kershner, "Three-Dimensional Eulerian Calculations of Triple-Wave Initiated PBX 9404," Los Alamos Scientific Laboratory report LA-8206 (1980).
8. Charles L. Mader, "Detonation Wave Interactions," Seventh Symposium (International) on Detonation, NSWC MP82-334, 1981, p. 669.
9. Charles L. Mader, James D. Kershner, and George H. Pimbley, *J. Energetic Material* 1, 293 (1984).
10. Terry R. Gibbs and Alphonse Popolato, LASL Explosive Property Data, University of California Press (1980).

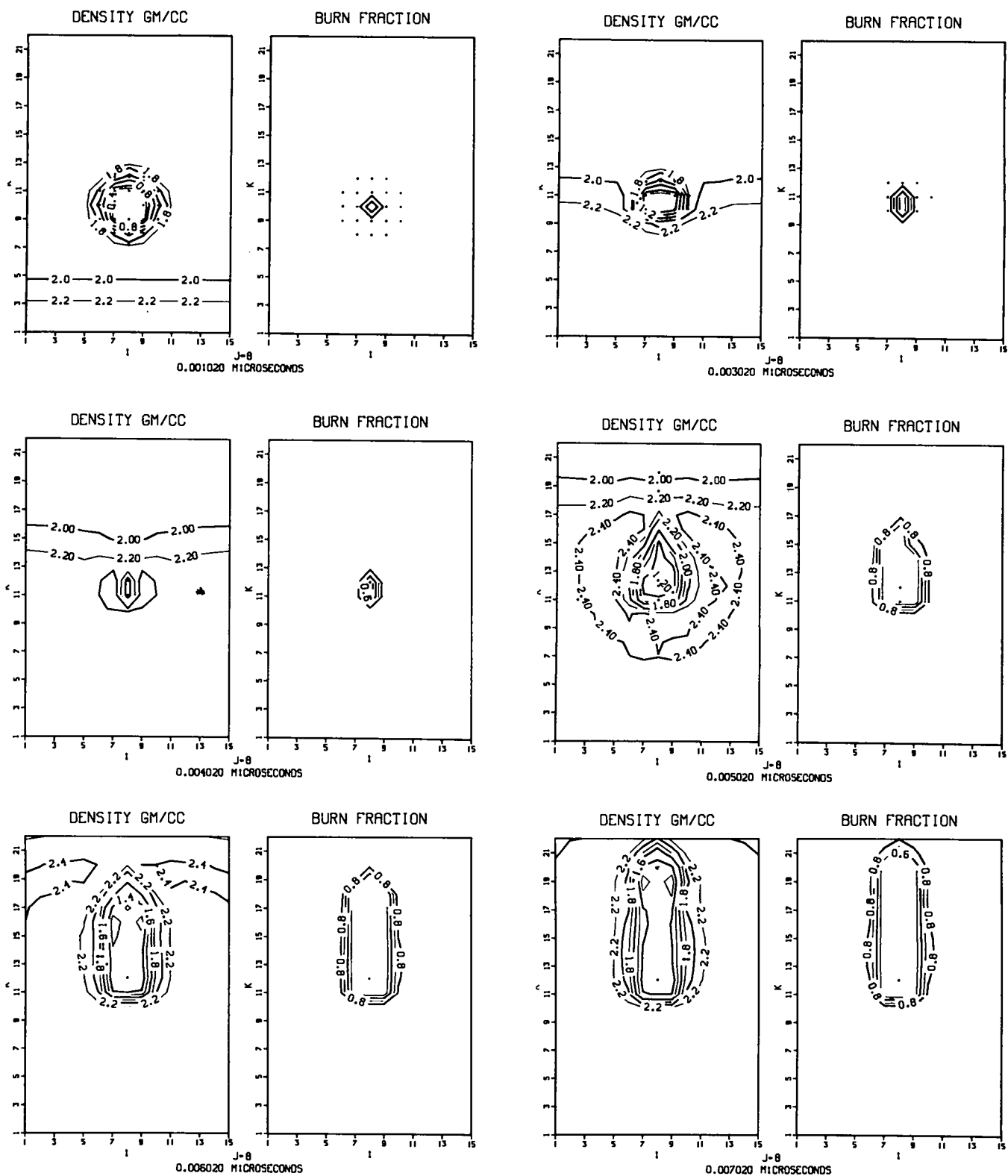


Fig. 1. A  $4 \times 10^{-3}$ -mm diameter spherical air hole in HMX. The initial shock pressure is 5.0 GPa. The density and burn fraction cross sections through the center of the hole are shown at various times. The flow does not build toward detonation.

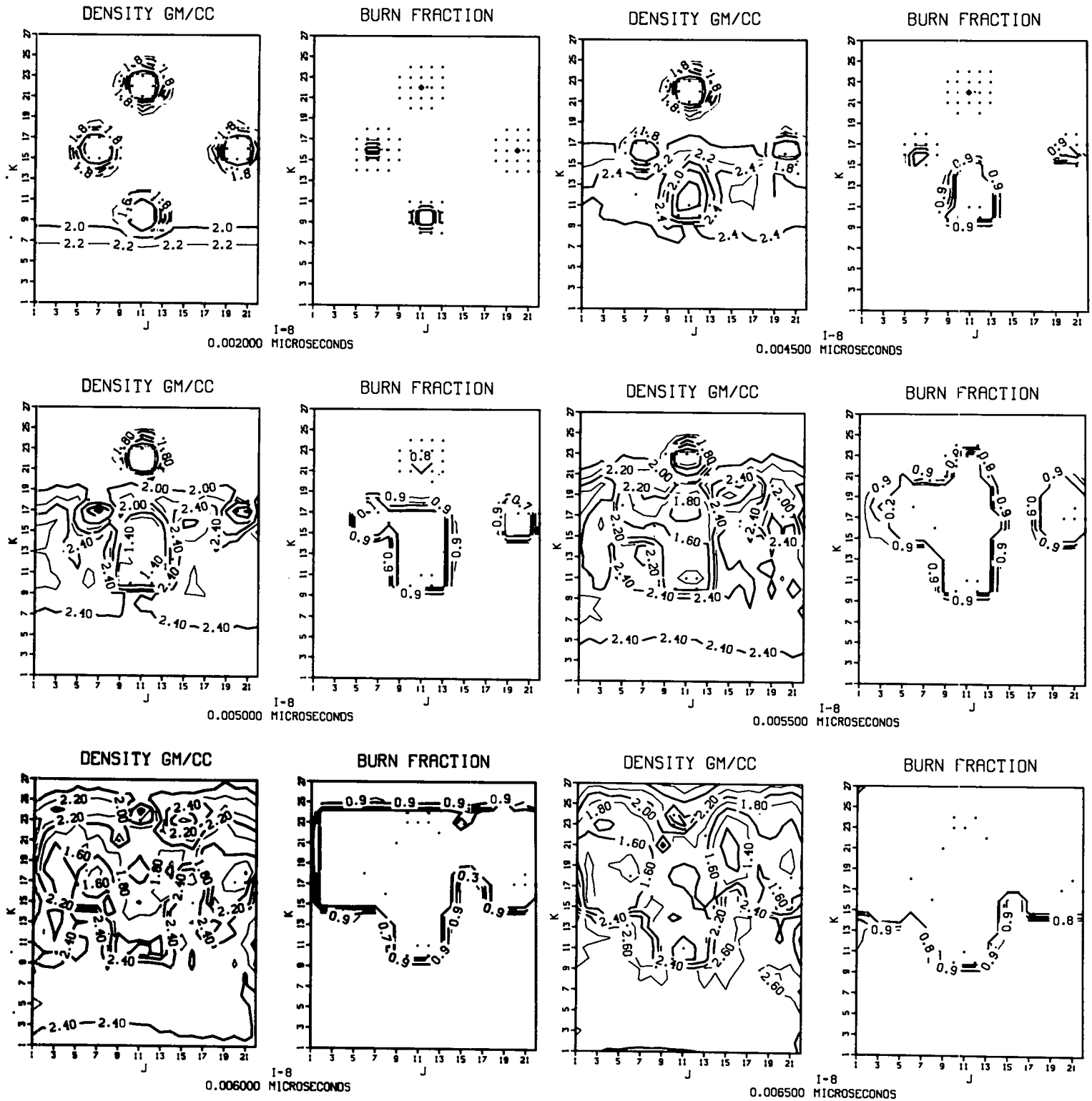


Fig. 2. A matrix of 10% air holes in HMX. The spherical air holes have a diameter of  $4 \times 10^{-3}$  mm. The initial shock pressure is 5.0 GPa. The density and mass fraction contours are shown for a cross section through the center of the matrix. The flow builds toward a propagating detonation.

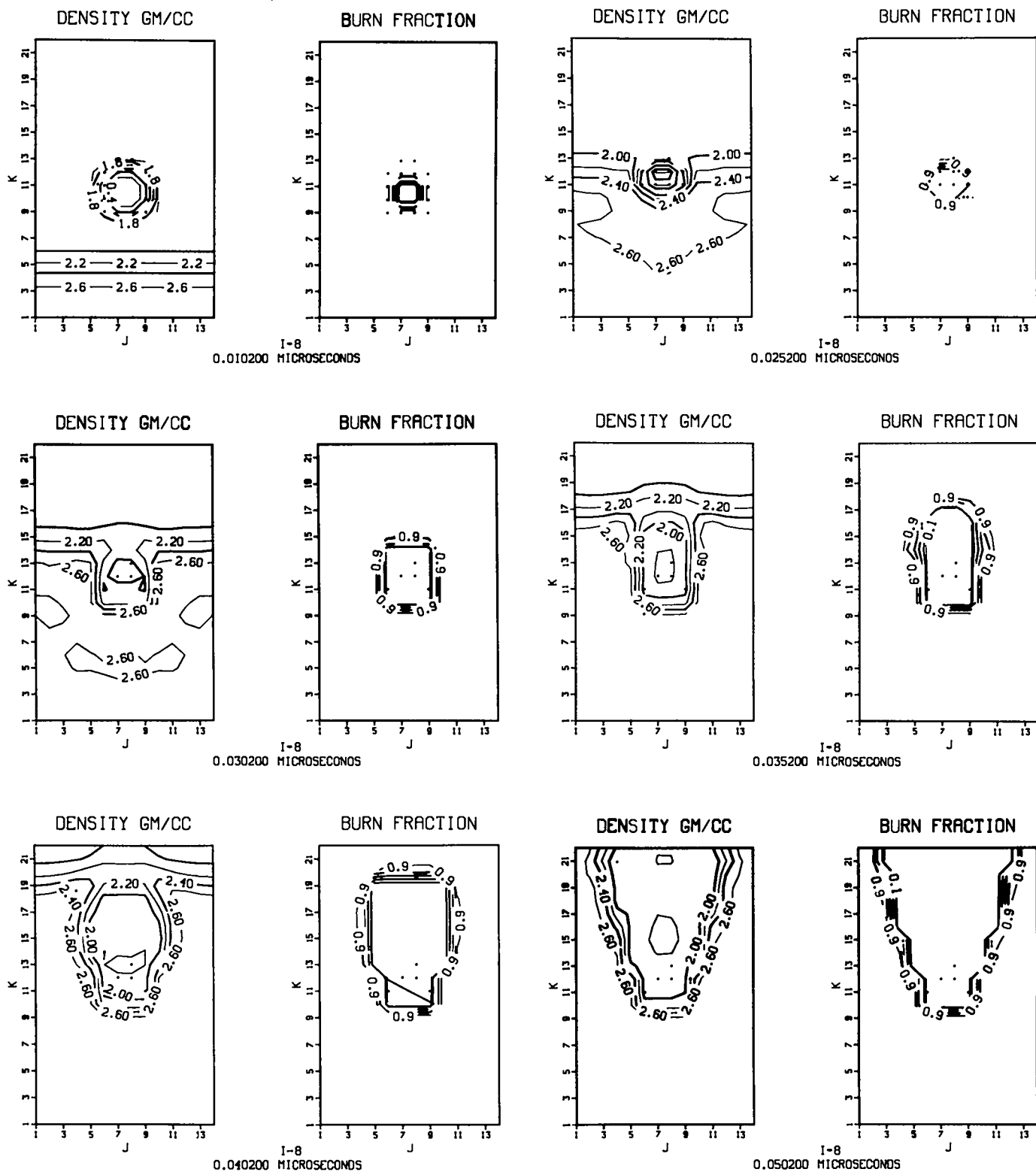


Fig. 3. A  $4 \times 10^{-3}$ -mm diameter spherical hole in TATB. The initial pressure is 12.5 GPa. The density and burn fraction cross sections through the center of the hole are shown at various times. The flow does not build toward a detonation.

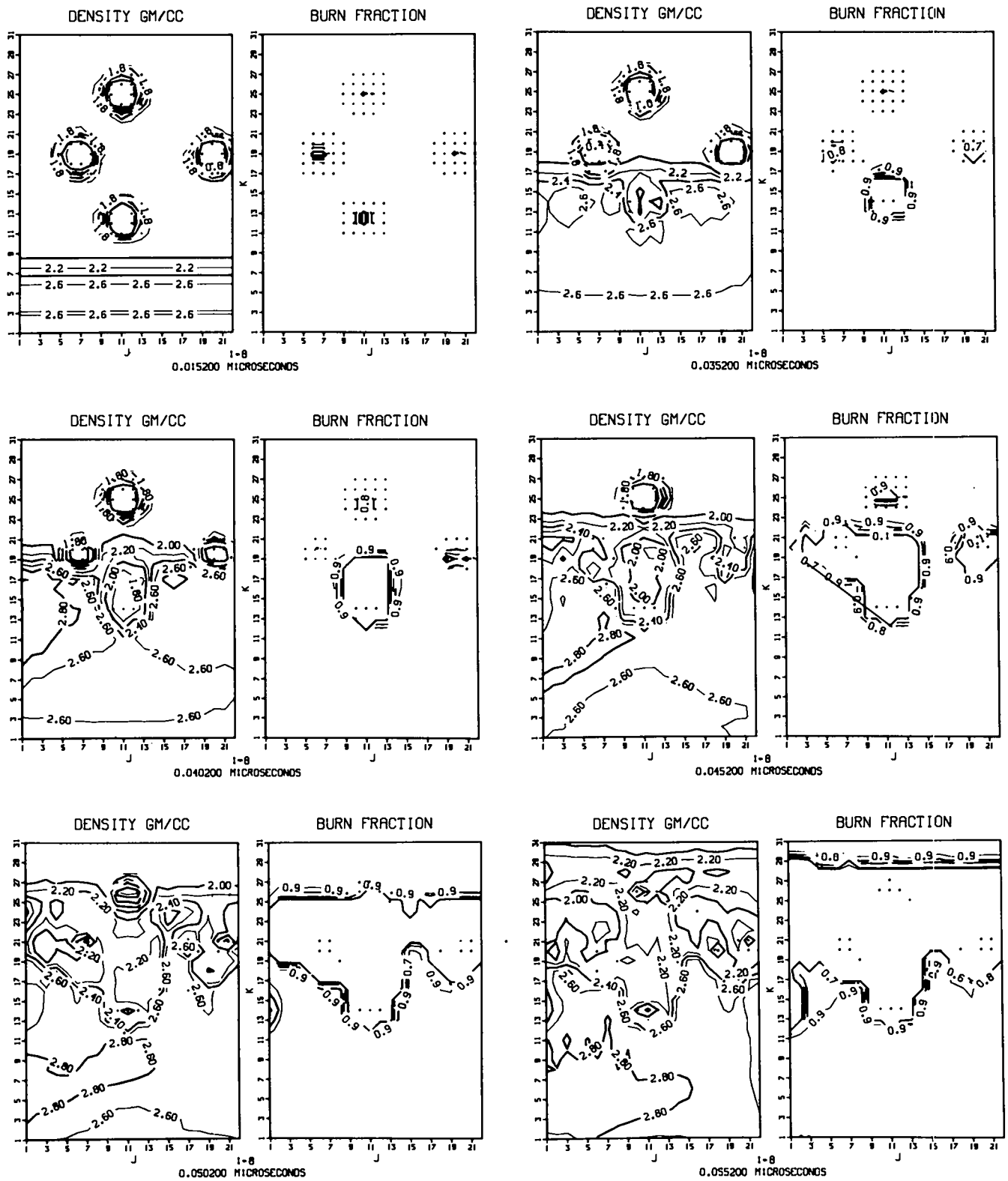


Fig. 4. A matrix of 10% air holes in TATB. The spherical air holes have a diameter of  $4 \times 10^{-3}$  mm. The initial shock pressure is 12.5 GPa. The density and mass fraction contours are shown for a cross section through the center of the matrix. The flow builds towards a detonation.



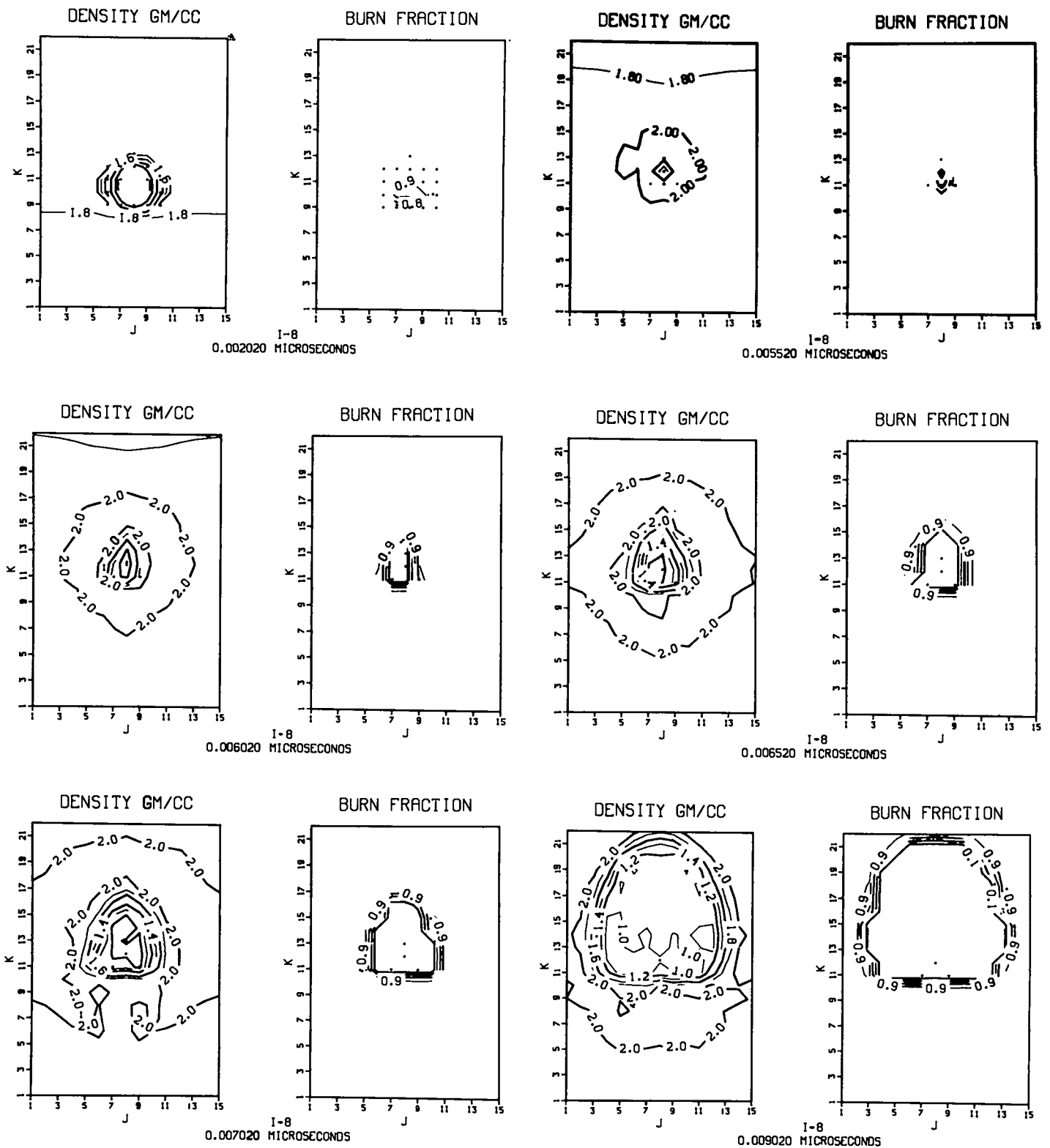


Fig. 5. A  $4 \times 10^{-3}$ -mm diameter spherical air hole in PETN. The initial shock pressure is 2.0 GPa. The density and burn fraction cross sections through the center of the hole are shown at various times. The flow does not build toward a detonation.

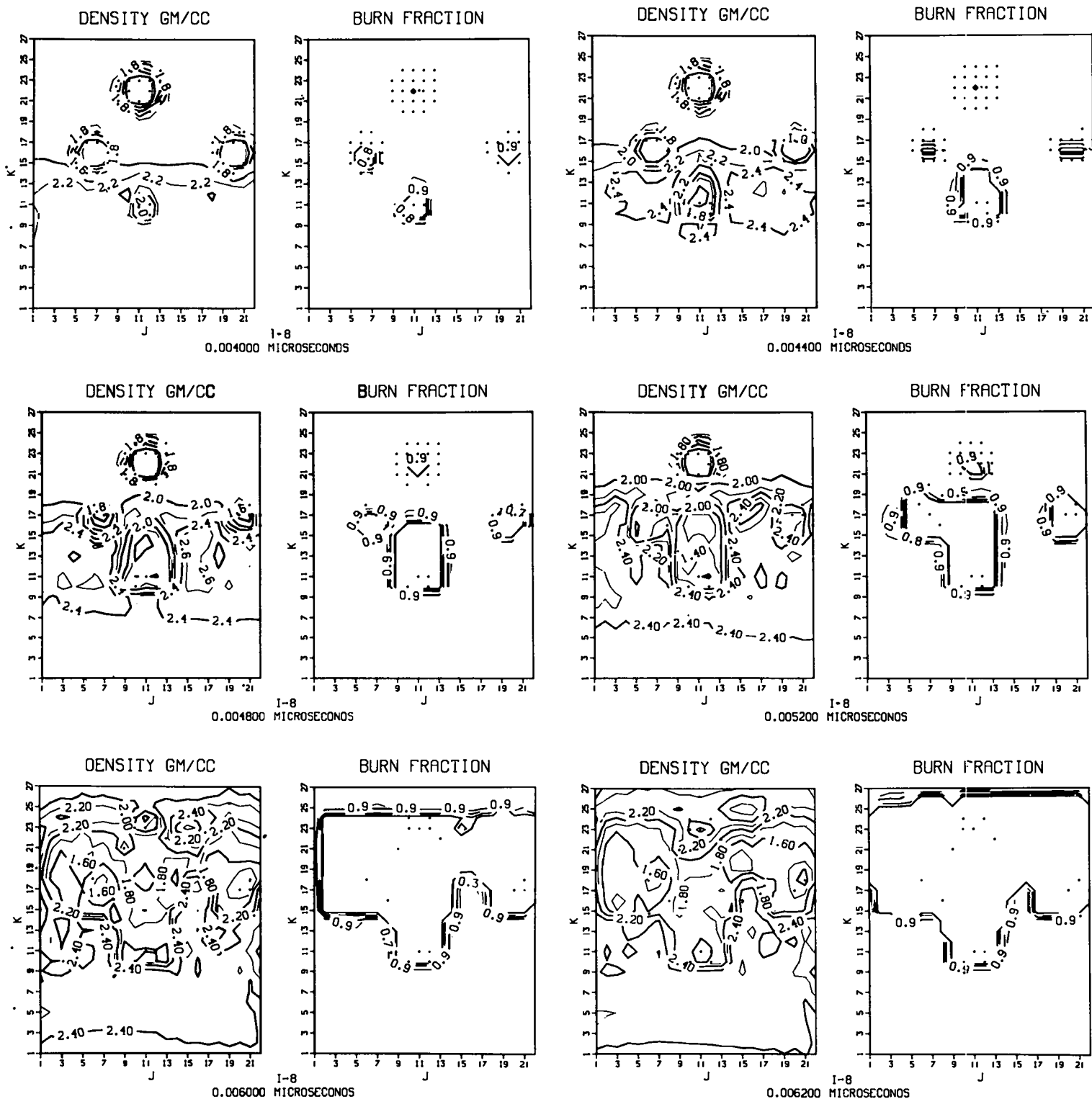


Fig. 6. A matrix of 10% air holes in PETN. The spherical air holes have a diameter of  $4 \times 10^{-3}$  mm. The initial shock pressure is 2.0 GPa. The density and mass fraction contours are shown for a cross section through the center of the matrix. The flow builds toward a detonation.

TABLE II. The BKW Detonation Product and the Solid Equation used in the HOM Equation of State for HMX

A FORTRAN BKW CALCULATION FOR THE EXPLOSIVE  
HMX FOR HDT SPOT STUDY

THE NUMBER OF ELEMENTS IS 4

THE NUMBER OF GAS SPECIES IS 11

THE NUMBER OF SOLID SPECIES IS 1

THE BKW EQUATION OF STATE PARAMETERS ARE

ALPHA= 5.0000000000E-01 BETA= 1.6000000000E-01 THETA= 4.0000000000E+02 KAPPA= 1.09097784436E+01

THE COMPOSITION OF THE EXPLOSIVE IS

4.0000000000E+00 MOLES OF C  
8.0000000000E+00 MOLES OF H  
8.0000000000E+00 MOLES OF N  
8.0000000000E+00 MOLES OF O

THE DENSITY OF THE EXPLOSIVE IS 1.9000000000E+00. GRAMS/CC

THE MOLECULAR WEIGHT IS 2.9616800000E+02 GRAMS

THE HEAT OF FORMATION AT 0 DEG K IS 4.3460000000E+04 CALORIES PER FORMULA WEIGHT

THE SOLID (COWAN) EQUATION OF STATE PARAMETERS VD, AS, BS, CS, DS, ES, A1, A2, C1, C2, C3, ATOMIC WT

SOL C	4.4444444444E-01	8.30935837268E-01	-1.39381809219E+00	6.72569716021E-01	-1.13537262508E-01	6.49155882007E-03
	-2.26705345948E-01	1.20516569525E-01	8.3160000000E-02	-1.7559000000E-01	1.5531000000E-01	1.2010000000E+01

THE INPUT DETONATION PRODUCT ELEMENTAL COMPOSITION MATRIX

0.	2.0E+00	0.	1.0E+00	0.	2.0E+00	0.	0.	0.	0.	0.	2.0E+00
1.0E+00	0.	0.	2.0E+00	1.0E+00	0.	0.	1.0E+00	0.	3.0E+00	1.0E+00	0.
0.	1.0E+00	0.	0.	0.	0.	1.0E+00	1.0E+00	0.	0.	2.0E+00	0.
0.	1.0E+00	0.	1.0E+00	1.0E+00	4.0E+00	0.	0.	1.0E+00	0.	0.	0.

TABLE II (cont)

A FORTRAN BKW CALCULATION FOR THE EXPLOSIVE  
HMX FOR HOT SPOT STUDY

THE COMPUTED CJ PRESSURE IS 3.95297455950E-01 MEGABARS

THE COMPUTED DETONATION VELOCITY IS 9.15990904706E-01 CM/MICROSECOND

THE COMPUTED CJ TEMPERATURE IS 2.36399302951E+03 DEGREES KELVIN

THE COMPUTED CJ VOLUME 3.95808912840E-01 CC/GM OF EXPLOSIVE

THE COMPUTED GAMMA IS 3.03284847211E+00

THE VOLUME OF THE GAS IS 1.10714101659E+01 CC/MOLE OF GAS AND THERE ARE 1.00040768619E+01 MOLES OF GAS

SOLID VOLUME IN CC/GM  
SOL C 2.69769202201E-01

THE C-J COMPOSITION OF THE DETONATION PRODUCTS AND THE INPUT COEFFICIENTS TO THE THERMODYNAMIC FITS FOR EACH SPECIE

SPECIE	NO OF MOLES	COEFFICIENTS A,B,C,D,E, THE INTEGRATION CONSTANT, HEAT OF FORMATION IN CAL/MOLE, COVOLUME				
H2O	3.99969167322E+00	4.25884200000E+01	1.48080500000E-02	-2.63918100000E-06	1.92045300000E-10	0.
		1.34282835156E+03	-5.71070000000E+04	2.50000000000E+02		
H2	3.00785481617E-04	2.97034700000E+01	1.14382900000E-02	-2.20122200000E-06	1.67776100000E-10	0.
		1.17589615365E+03	0.	8.00000000000E+01		
O2	1.72706386324E-06	4.70309000000E+01	1.28714700000E-02	-2.50021700000E-06	1.90157000000E-10	0.
		1.03537647396E+03	0.	3.50000000000E+02		
CO2	1.99620646967E+00	4.74811200000E+01	1.95446300000E-02	-3.72129600000E-06	2.77030000000E-10	0.
		7.46280968750E+02	-9.39680000000E+04	6.00000000000E+02		
CO	7.85547399588E-03	4.53308200000E+01	1.23816100000E-02	-2.41640300000E-06	1.82818100000E-10	0.
		1.12158830990E+03	-2.72010000000E+04	3.90000000000E+02		
NH3	5.02657664451E-06	4.20181600000E+01	1.91166200000E-02	-3.16433000000E-06	2.19780100000E-10	0.
		1.20696121615E+03	-9.36800000000E+03	4.76000000000E+02		
H	4.55896867699E-10	2.63911000000E+01	8.12137200000E-03	-1.69074000000E-06	1.31682300000E-10	0.
		7.94631617188E+02	5.16190000000E+04	4.00000000000E+01		
NO	3.64591252410E-05	4.84149800000E+01	1.26938600000E-02	-2.49460000000E-06	1.89321300000E-10	0.
		1.20924970573E+03	2.14770000000E+04	3.86000000000E+02		
N2	3.99997925715E+00	4.39234000000E+01	1.22250100000E-02	-2.37900500000E-06	1.79832200000E-10	0.
		1.13916134896E+03	0.	3.80000000000E+02		
DH	1.95105799379E-10	4.24179200000E+01	1.15684700000E-02	-2.22665900000E-06	1.68915500000E-10	0.
		1.18351754427E+03	3.56000000000E+03	4.13000000000E+02		
CH4	5.54443943519E-10	3.87568600000E+01	2.36401300000E-02	-3.70795700000E-06	2.47071400000E-10	0.
		1.04242791146E+03	-1.60000000000E+04	5.28000000000E+02		
SOL C	1.99593805578E+00	-2.48151900000E-01	7.17985500000E-03	1.29755000000E-06	9.34999500000E-11	0.
		-2.58204389323E+02	0.	0.		

TABLE II (cont)

A BKW ISENTROPE THRU BKW CJ PRESSURE FOR  
HMX FOR HOT SPOT STUDY

LN(P)= -3.55509543822E+00    -2.61960281451E+00LNV    2.58547645615E-01LNV\*2    1.68500783172E-02LNV\*3    -1.32289515033E-02LNV\*4

LN(T)= 7.30335258685E+00    -5.23513876650E-01LNV    2.31072890527E-02LNV\*2    3.80034981025E-02LNV\*3    -1.37636592031E-02LNV\*4

LN(E)= -1.63673439174E+00    5.29626507194E-01LNP    6.78174917781E-02LNP\*2    4.13077884727E-03LNP\*3    9.73859220954E-05LNP\*4

THE CONSTANT ADDED TO ENERGIES WAS 1.00000000000E-01

PRESSURE (MBARS)	VOLUME (CC/GM)	TEMPERATURE (DEG K)	ENERGY+C (MB-CC/GM)	GAMMA (-DLNP/OLNV)	PARTICLE VELOCITY
3.95297455950E-01	3.95808914045E-01	2.36399302951E+03	1.25794579543E-01	3.01330765232E+00	2.27132200089E-01
2.76708219165E-01	4.45302055890E-01	2.24315211136E+03	1.09402017897E-01	2.97683194546E+00	3.03217539746E-01
1.93695753416E-01	5.01614881534E-01	2.11454089701E+03	9.63468006890E-02	2.93491951335E+00	3.71172304703E-01
1.35587027391E-01	5.66200983201E-01	1.98462225198E+03	8.58676721785E-02	2.88763656882E+00	4.32243774685E-01
9.49109191737E-02	6.40747140925E-01	1.85725538093E+03	7.74026431265E-02	2.83509005269E+00	4.87330367022E-01
6.64376434216E-02	7.27289366949E-01	1.73478765262E+03	7.05247999467E-02	2.77742764302E+00	5.377147420913E-01
4.65063503951E-02	8.28374195491E-01	1.61921951103E+03	6.49176135572E-02	2.71482143295E+00	5.82312558401E-01
3.25544452766E-02	9.46899039937E-01	1.50970268520E+03	6.02938580988E-02	2.64765789379E+00	6.23267828079E-01
2.27881116936E-02	1.08673650591E+00	1.40761059131E+03	5.64758721139E-02	2.57627196261E+00	6.60500701437E-01
1.59516781855E-02	1.25264101308E+00	1.31282146856E+03	5.33061017989E-02	2.50116486199E+00	6.94410934030E-01
1.11661747299E-02	1.45060553636E+00	1.22492481545E+03	5.06600086977E-02	2.42298214629E+00	7.25357384539E-01
7.81632231090E-03	1.68818318051E+00	1.14331184106E+03	4.84389601794E-02	2.34256115302E+00	7.53658677563E-01
5.47142561763E-03	1.97485699778E+00	1.06727061035E+03	4.65648330821E-02	2.26098786039E+00	7.79594016736E-01
3.82999793234E-03	2.32248163746E+00	9.96065895218E+02	4.49756491654E-02	2.17964671081E+00	8.03407337171E-01
2.68099855264E-03	2.74584957577E+00	9.28996896388E+02	4.36219870229E-02	2.10024808955E+00	8.25314850550E-01
1.87669898685E-03	3.26344719897E+00	8.65436020333E+02	4.24641348660E-02	2.02483127739E+00	8.45513135312E-01
1.31368929079E-03	3.89844770012E+00	8.04850998678E+02	4.14699464742E-02	1.95575413689E+00	8.64184489436E-01
9.19582503555E-04	4.67994589703E+00	7.46809129562E+02	4.06132954815E-02	1.89568189881E+00	8.81498148730E-01
6.43707752489E-04	5.64437499469E+00	6.90963753525E+02	3.98729690820E-02	1.84757629920E+00	8.97607920122E-01
4.50595426742E-04	6.83693873274E+00	6.37029543558E+02	3.92318391239E-02	1.81467015673E+00	9.12647532575E-01
3.15416798720E-04	8.31272376418E+00	5.84758420293E+02	3.86762010297E-02	1.80039751983E+00	9.26724904598E-01
2.20791759104E-04	1.01368786153E+01	5.33924076243E+02	3.81952288517E-02	1.80824068771E+00	9.39916015706E-01
1.54554231373E-04	1.23827290649E+01	4.84312776704E+02	3.77805359365E-02	1.84145185247E+00	9.52258499688E-01
1.08187961961E-04	1.51301206135E+01	4.35881499034E+02	3.74269078584E-02	1.90270933777E+00	9.63761104709E-01
4.54592074343E-01	3.77960291365E-01	2.40722208102E+03	1.33360279828E-01	3.02612575855E+00	0.
5.22780885494E-01	3.60798492886E-01	2.44737927816E+03	1.41730090723E-01	3.03815239021E+00	0.
6.01198018318E-01	3.44011892281E-01	2.48442579933E+03	1.51148395323E-01	3.04953024956E+00	0.
6.91377721066E-01	3.26205389039E-01	2.52533314240E+03	1.62648060706E-01	3.06104310900E+00	0.
7.95084379226E-01	3.11632858789E-01	2.54951379152E+03	1.73472136195E-01	3.06991274858E+00	0.
9.14347036110E-01	2.98614023338E-01	2.55400904520E+03	1.84546555213E-01	3.07730674537E+00	0.

TABLE II (cont)

SOLID EQUATION OF STATE CALCULATION FOR HMX FOR HOT SPDT STUDY

US = 2.42300000000E-01 + 1.88300000000E+00 S FROM PD TO 2.00000000000E+00 MEGABARS

THE INITIAL DENSITY IS 1.90000000000E+00 GM/CC

THE COMPRESSIBILITY IS 7.20000000000E+00

THE LINEAR COEFFICIENT OF EXPANSION IS 5.00000000000E-05

THE INITIAL TEMPERATURE IS 3.00000000000E+02

THE HEAT CAPACITY IS 4.00000000000E-01

THE VOLUME INCREMENT IS 1.00000000000E-04

THE TEMPERATURE FIT IS BETWEEN 2.00000000000E-06 AND 1.00000000000E+00 MEGABARS

LN(T)= -1.54776820894E+01 -9.79588209446E+01LNV -1.64606758011E+02LNV\*2 -1.16621007952E+02LNV\*3 -2.78630338857E+01LNV\*4

VOLUME IN CC/GM	PRESSURE IN MEGABARS	TEMPERATURE DEG K	SHOCK VELOCITY	PARTICLE VELOCITY
5.26315789474E-01	0.	3.00000000000E+02	2.42300000000E-01	0.
5.25315789474E-01	2.13465233699E-04	3.00373528800E+02	2.43169989271E-01	4.62022979629E-04
5.24315789474E-01	4.30012885667E-04	3.00747615005E+02	2.44046248527E-01	9.27375744432E-04
5.23315789474E-01	6.49693210833E-04	3.01122354423E+02	2.44928845795E-01	1.39609442108E-03
5.22315789474E-01	8.72557438729E-04	3.01497846070E+02	2.45817850089E-01	1.86821566074E-03
5.21315789474E-01	1.09865779572E-03	3.01874192270E+02	2.46713331429E-01	2.34377664866E-03
5.20315789473E-01	1.32804752782E-03	3.02251498745E+02	2.47615360859E-01	2.82281511389E-03
5.19315789473E-01	1.56078092412E-03	3.02629874719E+02	2.48524010466E-01	3.30536933931E-03
5.18315789473E-01	1.79691334081E-03	3.03009433020E+02	2.49439353397E-01	3.79147817177E-03
5.17315789473E-01	2.03650122589E-03	3.03390290185E+02	2.50361463884E-01	4.28118103256E-03
5.16315789473E-01	2.27960214447E-03	3.03772566571E+02	2.51290417259E-01	4.77451792807E-03
5.15315789473E-01	2.52627480486E-03	3.04156386465E+02	2.52226289974E-01	5.27152946064E-03
5.14315789473E-01	2.77657908523E-03	3.04541878205E+02	2.53169159629E-01	5.77225683974E-03
5.13315789473E-01	3.03057606110E-03	3.04929174295E+02	2.54119104985E-01	6.27674189334E-03
5.12315789473E-01	3.28832803351E-03	3.05318411528E+02	2.55076205991E-01	6.78502707958E-03
5.11315789473E-01	3.54989855799E-03	3.05709731120E+02	2.56040543804E-01	7.29715549866E-03
5.10315789473E-01	3.81535247430E-03	3.06103278832E+02	2.57012200814E-01	7.81317090501E-03
5.09315789473E-01	4.08475593704E-03	3.06499205114E+02	2.57991260666E-01	8.33311771980E-03
5.08315789473E-01	4.35817644701E-03	3.06897665240E+02	2.58977808285E-01	8.85704104365E-03
5.07315789473E-01	4.63568288352E-03	3.07298819450E+02	2.59971929899E-01	9.38498666966E-03
5.06315789473E-01	4.91734553754E-03	3.07702833107E+02	2.60973713065E-01	9.91700109681E-03
5.05315789473E-01	5.20323614585E-03	3.08109876839E+02	2.61983246696E-01	1.04531315435E-02
5.04315789473E-01	5.49342792603E-03	3.08520126706E+02	2.63000621086E-01	1.09934259618E-02
5.03315789473E-01	5.78799561255E-03	3.08933764361E+02	2.64025927935E-01	1.15379330512E-02
5.02315789473E-01	6.08701549378E-03	3.09350977216E+02	2.65059260382E-01	1.20867022738E-02
5.01315789473E-01	6.39056545013E-03	3.09771958617E+02	2.66100713026E-01	1.26397838691E-02
5.00315789473E-01	6.69872499320E-03	3.10196908025E+02	2.67150381961E-01	1.31972288693E-02
4.99315789473E-01	7.01157530609E-03	3.10626031200E+02	2.68208364803E-01	1.37590891149E-02
4.98315789473E-01	7.32919928487E-03	3.11059540390E+02	2.69274760721E-01	1.43254172708E-02
4.97315789473E-01	7.65168158119E-03	3.11497654533E+02	2.70349670466E-01	1.48962668431E-02
4.96315789473E-01	7.97910864618E-03	3.11940599457E+02	2.71433196404E-01	1.54716921955E-02
4.95315789473E-01	8.31156877556E-03	3.12388608090E+02	2.72525442551E-01	1.60517485568E-02
4.94315789473E-01	8.64915215614E-03	3.12841920682E+02	2.73626514602E-01	1.66364920883E-02
4.93315789473E-01	8.99195091357E-03	3.13300785022E+02	2.74736519968E-01	1.72259798025E-02

TABLE II (cont)

4.92315789473E-01	9.34005916160E-03	3.13765456677E+02	2.75855567809E-01	1.78202696810E-02
4.91315789473E-01	9.69357305272E-03	3.14236199227E+02	2.76983769072E-01	1.84194206438E-02
4.90315789473E-01	1.00525908303E-02	3.14713284514E+02	2.78121236526E-01	1.90234925789E-02
4.89315789473E-01	1.04172128823E-02	3.15196992895E+02	2.79268084800E-01	1.96325463620E-02
4.88315789473E-01	1.07875417965E-02	3.15687613509E+02	2.80424430420E-01	2.02466438769E-02
4.87315789473E-01	1.11636824176E-02	3.16185444550E+02	2.81590391854E-01	2.08658480369E-02
4.86315789473E-01	1.15457419059E-02	3.16690793547E+02	2.82766089543E-01	2.14902228059E-02
4.85315789473E-01	1.19338297972E-02	3.17203977654E+02	2.83951645954E-01	2.21198332204E-02
4.84315789473E-01	1.23280580659E-02	3.17725323956E+02	2.85147185612E-01	2.27547454124E-02
4.83315789473E-01	1.27285411886E-02	3.18255169777E+02	2.86352835149E-01	2.33950266323E-02
4.82315789473E-01	1.31353962101E-02	3.18793863002E+02	2.87568723348E-01	2.40407452725E-02
4.81315789473E-01	1.35487428119E-02	3.19341762411E+02	2.88794981190E-01	2.46919708924E-02
4.80315789473E-01	1.39687033823E-02	3.19899238023E+02	2.90031741899E-01	2.53487742426E-02
4.79315789472E-01	1.43954030886E-02	3.20466671454E+02	2.91279140989E-01	2.60112272910E-02
4.78315789472E-01	1.48289699520E-02	3.21044456281E+02	2.92537316318E-01	2.66794032488E-02
4.77315789472E-01	1.52695349243E-02	3.21632998427E+02	2.93806408134E-01	2.73533765980E-02
4.76315789472E-01	1.57172319675E-02	3.22232716554E+02	2.95086559132E-01	2.80332231182E-02
4.75315789472E-01	1.61721981355E-02	3.22844042471E+02	2.96377914502E-01	2.87190199159E-02
4.74315789472E-01	1.66345736586E-02	3.23467421556E+02	2.97680621988E-01	2.94108454532E-02
4.73315789472E-01	1.71045020307E-02	3.24103313193E+02	2.98994831945E-01	3.01087795775E-02
4.72315789472E-01	1.75821300989E-02	3.24752191226E+02	3.00320697390E-01	3.08129035530E-02
4.71315789472E-01	1.80676081567E-02	3.25414544425E+02	3.01658374072E-01	3.15233000913E-02
4.70315789472E-01	1.85610900394E-02	3.26090876971E+02	3.03008020523E-01	3.22400533844E-02
4.69315789472E-01	1.90627332228E-02	3.26781708960E+02	3.04369798127E-01	3.29632491379E-02
4.68315789472E-01	1.95726989259E-02	3.27487576922E+02	3.05743871181E-01	3.36929746050E-02
4.67315789472E-01	2.00911522155E-02	3.28209034358E+02	3.07130406964E-01	3.44293186215E-02
4.66315789472E-01	2.06182621153E-02	3.28946652301E+02	3.08529575802E-01	3.51723716423E-02
4.65315789472E-01	2.11542017182E-02	3.29701019892E+02	3.09941551140E-01	3.59222257779E-02
4.64315789472E-01	2.16991483027E-02	3.30472744978E+02	3.11366509610E-01	3.66789748330E-02
4.63315789472E-01	2.22532834521E-02	3.31262454735E+02	3.12804631111E-01	3.74427143449E-02
4.62315789472E-01	2.28167931790E-02	3.32070796309E+02	3.14256098879E-01	3.82135416246E-02
4.61315789472E-01	2.33898680533E-02	3.32898437485E+02	3.15721099566E-01	3.89915557973E-02
4.60315789472E-01	2.39727033339E-02	3.33746067377E+02	3.17199823323E-01	3.97768578456E-02
4.59315789472E-01	2.45654991064E-02	3.34614397144E+02	3.18692463879E-01	4.05695506527E-02
4.58315789472E-01	2.51684604238E-02	3.35504160734E+02	3.20199218626E-01	4.13697390474E-02
4.57315789472E-01	2.57817974531E-02	3.36416115655E+02	3.21720288709E-01	4.21775298507E-02
4.56315789472E-01	2.64057256266E-02	3.37351043776E+02	3.23255879110E-01	4.29930319226E-02
4.55315789472E-01	2.70404657979E-02	3.38309752153E+02	3.24806198747E-01	4.38163562119E-02
4.54315789472E-01	2.76862444043E-02	3.39293073893E+02	3.26371460563E-01	4.46476158059E-02
4.53315789472E-01	2.83432936340E-02	3.40301869046E+02	3.27951881625E-01	4.54869259823E-02
4.52315789472E-01	2.90118515991E-02	3.41337025532E+02	3.29547683227E-01	4.63344042627E-02
4.51315789472E-01	2.96921625154E-02	3.42399460104E+02	3.31159090989E-01	4.71901704670E-02
4.50315789472E-01	3.03844768881E-02	3.43490119346E+02	3.32786334969E-01	4.80543467706E-02
4.49315789472E-01	3.10890517035E-02	3.44609980711E+02	3.34429649765E-01	4.89270577617E-02
4.48315789472E-01	3.18061506285E-02	3.45760053600E+02	3.36089274635E-01	4.98084305020E-02
4.47315789472E-01	3.25360442167E-02	3.46941380479E+02	3.37765453609E-01	5.06985945878E-02
4.46315789472E-01	3.32790101219E-02	3.48155038042E+02	3.39458435608E-01	5.15976822135E-02
4.45315789472E-01	3.40353333193E-02	3.49402138420E+02	3.41168474572E-01	5.25058282377E-02
4.44315789472E-01	3.48053063350E-02	3.50683830437E+02	3.42895829580E-01	5.34231702497E-02
4.43315789472E-01	3.55892294833E-02	3.52001300914E+02	3.44640764989E-01	5.43498486399E-02
4.42315789472E-01	3.63874111134E-02	3.53355776022E+02	3.46403550561E-01	5.52860066707E-02
4.41315789472E-01	3.72001678644E-02	3.54748522700E+02	3.48184461607E-01	5.62317905507E-02
4.40315789472E-01	3.80278249303E-02	3.56180850115E+02	3.49983779129E-01	5.71873495109E-02
4.39315789472E-01	3.88707163350E-02	3.57654111189E+02	3.51801789967E-01	5.81528358828E-02
4.38315789472E-01	3.97291852164E-02	3.59169704188E+02	3.53638786954E-01	5.91284051799E-02
4.37315789472E-01	4.06035841230E-02	3.60729074370E+02	3.55495069068E-01	6.01142161807E-02
4.36315789472E-01	4.14942753197E-02	3.62333715703E+02	3.57370941601E-01	6.11104310151E-02

TABLE II (cont)

4.35315789472E-01	4.24016311072E-02	3.63985172656E+02	3.59266716322E-01	6.21172152534E-02
4.34315789472E-01	4.33260341516E-02	3.65685042059E+02	3.61182711650E-01	6.31347379976E-02
4.33315789472E-01	4.42678778284E-02	3.67434975038E+02	3.63119252832E-01	6.41631719768E-02
4.32315789472E-01	4.52275665782E-02	3.69236679037E+02	3.65076672132E-01	6.52026936441E-02
4.31315789472E-01	4.62055162779E-02	3.71091919920E+02	3.67055309013E-01	6.62534832782E-02
4.30315789472E-01	4.72021546243E-02	3.73002524157E+02	3.69055510339E-01	6.73157250873E-02
4.29315789472E-01	4.82179215346E-02	3.74970381111E+02	3.71077630578E-01	6.83896073168E-02
4.28315789472E-01	4.92532695616E-02	3.76997445411E+02	3.73122032005E-01	6.94753223608E-02
4.27315789472E-01	5.03086643257E-02	3.79085739436E+02	3.75189084928E-01	7.05730668764E-02
4.26315789472E-01	5.13845849638E-02	3.81237355895E+02	3.77279167904E-01	7.16830419031E-02
4.25315789472E-01	5.24815245966E-02	3.83454460525E+02	3.79392667971E-01	7.28054529851E-02
4.24315789472E-01	5.35999908143E-02	3.85739294899E+02	3.81529980892E-01	7.39405102983E-02
4.23315789472E-01	5.47405061824E-02	3.88094179361E+02	3.83691511396E-01	7.50884287817E-02
4.22315789472E-01	5.59036087674E-02	3.90521516086E+02	3.85877673438E-01	7.62494282728E-02
4.21315789472E-01	5.70898526849E-02	3.93023792269E+02	3.88088890460E-01	7.74237336482E-02
4.20315789472E-01	5.82998086692E-02	3.95603583466E+02	3.90325595666E-01	7.86115749687E-02
4.19315789472E-01	5.95340646677E-02	3.98263557067E+02	3.92588232306E-01	7.98131876294E-02
4.18315789472E-01	6.07932264589E-02	4.01006475935E+02	3.94877253967E-01	8.10288125156E-02
4.17315789472E-01	6.20779182969E-02	4.03835202204E+02	3.97193124876E-01	8.22586961634E-02
4.16315789472E-01	6.33887835831E-02	4.06752701242E+02	3.99536320215E-01	8.35030909265E-02
4.15315789471E-01	6.47264855659E-02	4.09762045800E+02	4.01907326446E-01	8.47622551491E-02
4.14315789471E-01	6.60917080706E-02	4.12866420345E+02	4.04306641647E-01	8.60364533442E-02
4.13315789471E-01	6.74851562603E-02	4.16069125589E+02	4.06734775862E-01	8.73259563793E-02
4.12315789471E-01	6.89075574302E-02	4.19373583231E+02	4.09192251461E-01	8.86310416683E-02
4.11315789471E-01	7.03596618353E-02	4.22783340908E+02	4.11679603516E-01	8.99519933699E-02
4.10315789471E-01	7.18422435551E-02	4.26302077385E+02	4.14197380186E-01	9.12891025948E-02
4.09315789471E-01	7.33561013961E-02	4.29933607980E+02	4.16746143126E-01	9.26426676187E-02
4.08315789471E-01	7.49020598339E-02	4.33681890245E+02	4.19326467900E-01	9.40129941049E-02
4.07315789471E-01	7.64809699971E-02	4.37551029915E+02	4.21938944413E-01	9.54003953337E-02
4.06315789471E-01	7.80937106958E-02	4.41545287136E+02	4.24584177368E-01	9.68051924417E-02
4.05315789471E-01	7.97411894957E-02	4.45669082995E+02	4.27262786722E-01	9.82277146694E-02
4.04315789471E-01	8.14243438412E-02	4.49927006354E+02	4.29975408181E-01	9.96682996184E-02
4.03315789471E-01	8.31441422292E-02	4.54323821020E+02	4.32722693695E-01	1.01127293519E-01
4.02315789471E-01	8.49015854378E-02	4.58864473262E+02	4.35505311985E-01	1.02605051506E-01
4.01315789471E-01	8.66977078100E-02	4.63554099686E+02	4.38323949083E-01	1.04101937909E-01
4.00315789471E-01	8.85335785989E-02	4.68398035511E+02	4.41179308898E-01	1.05618326552E-01
3.99315789471E-01	9.04103033741E-02	4.73401823236E+02	4.44072113800E-01	1.07154601062E-01
3.98315789471E-01	9.23290254955E-02	4.78571221749E+02	4.47003105231E-01	1.08711155194E-01
3.97315789471E-01	9.42909276561E-02	4.83912215885E+02	4.49973044338E-01	1.10288393169E-01
3.96315789471E-01	9.62972334986E-02	4.89431026467E+02	4.52982712632E-01	1.11886730022E-01
3.95315789471E-01	9.83492093098E-02	4.95134120848E+02	4.56032912673E-01	1.13506591966E-01
3.94315789471E-01	1.00448165796E-01	5.01028223997E+02	4.59124468784E-01	1.15148416773E-01
3.93315789471E-01	1.02595459947E-01	5.07120330146E+02	4.62258227794E-01	1.16812654166E-01
3.92315789471E-01	1.04792496988E-01	5.13417715040E+02	4.65435059812E-01	1.18499766230E-01
3.91315789471E-01	1.07040732428E-01	5.19927948816E+02	4.68655859029E-01	1.20210227843E-01
3.90315789471E-01	1.09341674217E-01	5.26658909563E+02	4.71921544561E-01	1.21944527117E-01
3.89315789471E-01	1.11696884998E-01	5.33618797580E+02	4.75233061323E-01	1.23703165865E-01
3.88315789471E-01	1.14107984485E-01	5.40816150401E+02	4.78591380939E-01	1.25486660085E-01
3.87315789471E-01	1.16576651954E-01	5.48259858608E+02	4.81997502693E-01	1.27295540464E-01
3.86315789471E-01	1.19104628864E-01	5.55959182493E+02	4.85452454519E-01	1.29130352905E-01
3.85315789471E-01	1.21693721610E-01	5.63923769622E+02	4.88957294039E-01	1.30991659076E-01
3.84315789471E-01	1.24345804425E-01	5.72163673343E+02	4.92513109639E-01	1.32880036983E-01
3.83315789471E-01	1.27062822423E-01	5.80689372315E+02	4.96121021597E-01	1.34796081570E-01
3.82315789471E-01	1.29846794812E-01	5.89511791096E+02	4.99782183260E-01	1.36740405342E-01
3.81315789471E-01	1.32699818272E-01	5.98642321885E+02	5.03497782272E-01	1.38713639018E-01
3.80315789471E-01	1.35624070513E-01	6.08092847469E+02	5.07269041860E-01	1.40716432215E-01



TABLE II (cont)

3.79315789471E-01	1.38621814025E-01	6.17875765455E+02	5.11097222177E-01	1.42749454157E-01
3.78315789471E-01	1.41695400032E-01	6.28004013877E+02	5.14983621704E-01	1.44813394426E-01
3.77315789471E-01	1.44847272659E-01	6.38491098260E+02	5.18929578719E-01	1.46908963738E-01
3.76315789471E-01	1.48079973329E-01	6.49351120228E+02	5.22936472834E-01	1.49036894760E-01
3.75315789471E-01	1.51396145408E-01	6.60598807779E+02	5.27005726604E-01	1.51197942966E-01
3.74315789471E-01	1.54798539097E-01	6.72249547307E+02	5.31138807209E-01	1.53392887525E-01
3.73315789471E-01	1.58290016617E-01	6.84319417506E+02	5.35337228220E-01	1.55622532246E-01
3.72315789471E-01	1.61873557668E-01	6.96825225279E+02	5.39602551444E-01	1.57887706555E-01
3.71315789471E-01	1.65552265218E-01	7.09784543780E+02	5.43936388863E-01	1.60189266523E-01
3.70315789471E-01	1.69329371612E-01	7.23215752732E+02	5.48340404667E-01	1.62528095946E-01
3.69315789471E-01	1.73208245043E-01	7.37138081193E+02	5.52816317380E-01	1.64905107478E-01
3.68315789471E-01	1.77192396399E-01	7.51571652908E+02	5.57365902102E-01	1.67321243814E-01
3.67315789471E-01	1.81285486514E-01	7.66537534460E+02	5.61990992850E-01	1.69777478943E-01
3.66315789471E-01	1.85491333853E-01	7.82057786385E+02	5.66693485027E-01	1.72274819451E-01
3.65315789471E-01	1.89813922652E-01	7.98155517481E+02	5.71475338011E-01	1.74814305901E-01
3.64315789471E-01	1.94257411561E-01	8.14854942524E+02	5.76338577878E-01	1.77397014274E-01
3.63315789471E-01	1.98826142799E-01	8.32181443639E+02	5.81285300262E-01	1.80024057494E-01
3.62315789471E-01	2.03524651889E-01	8.50161635596E+02	5.86317673367E-01	1.82696587025E-01
3.61315789471E-01	2.08357677988E-01	8.68823435302E+02	5.91437941138E-01	1.85415794550E-01
3.60315789471E-01	2.13330174862E-01	8.88196135808E+02	5.96648426593E-01	1.88182913751E-01
3.59315789471E-01	2.18447322561E-01	9.08310485159E+02	6.01951535341E-01	1.90999222167E-01
3.58315789471E-01	2.23714539836E-01	9.29198770452E+02	6.07349759283E-01	1.93866043167E-01
3.57315789471E-01	2.29137497347E-01	9.50894907488E+02	6.12845680517E-01	1.96784748018E-01
3.56315789471E-01	2.34722131745E-01	9.73434536448E+02	6.18441975458E-01	1.99756758077E-01
3.55315789471E-01	2.40474660655E-01	9.96855124053E+02	6.24141419181E-01	2.02783547096E-01
3.54315789471E-01	2.46401598666E-01	1.02119607270E+03	6.29946890010E-01	2.05866643659E-01
3.53315789471E-01	2.52509774383E-01	1.04649883713E+03	6.35861374366E-01	2.09007633758E-01
3.52315789471E-01	2.58806348621E-01	1.07280704923E+03	6.41887971892E-01	2.12208163511E-01
3.51315789471E-01	2.65298833841E-01	1.10016665154E+03	6.48029900863E-01	2.15469942041E-01
3.50315789470E-01	2.71995114926E-01	1.12862604033E+03	6.54290503924E-01	2.18794744516E-01
3.49315789470E-01	2.78903471382E-01	1.15823621879E+03	6.60673254151E-01	2.22184415375E-01
3.48315789470E-01	2.86032601108E-01	1.18905096137E+03	6.67181761480E-01	2.25640871737E-01
3.47315789470E-01	2.93391645831E-01	1.22112699005E+03	6.73819779510E-01	2.29166107016E-01
3.46315789470E-01	3.00990218373E-01	1.25452416362E+03	6.80591212727E-01	2.32762194757E-01
3.45315789470E-01	3.08838431867E-01	1.28930568099E+03	6.87500124159E-01	2.36431292702E-01
3.44315789470E-01	3.16946931115E-01	1.32553829979E+03	6.94550743505E-01	2.40175647108E-01
3.43315789470E-01	3.25326926243E-01	1.36329257151E+03	7.01747475775E-01	2.43997597331E-01
3.42315789470E-01	3.33990228864E-01	1.40264309467E+03	7.09094910461E-01	2.47899580702E-01
3.41315789470E-01	3.42949290960E-01	1.44366878751E+03	7.16597831304E-01	2.51884137708E-01
3.40315789470E-01	3.52217246709E-01	1.48645318210E+03	7.24261226673E-01	2.55953917511E-01
3.39315789470E-01	3.61807957528E-01	1.53108474151E+03	7.32090300631E-01	2.60111683819E-01
3.38315789470E-01	3.71736060612E-01	1.57765720244E+03	7.40090484718E-01	2.64360321146E-01
3.37315789470E-01	3.82017021276E-01	1.62626994534E+03	7.48267450517E-01	2.68702841486E-01
3.36315789470E-01	3.92667189451E-01	1.67702839480E+03	7.56627123066E-01	2.73142391432E-01
3.35315789470E-01	4.03703860713E-01	1.73004445285E+03	7.65175695169E-01	2.77682259782E-01
3.34315789470E-01	4.15145342263E-01	1.78543696837E+03	7.73919642705E-01	2.82325885664E-01
3.33315789470E-01	4.27011024315E-01	1.84333224606E+03	7.82865740980E-01	2.87076867222E-01
3.32315789470E-01	4.39321457422E-01	1.90386459874E+03	7.92021082241E-01	2.91938970919E-01
3.31315789470E-01	4.52098436286E-01	1.96717694712E+03	8.01393094426E-01	2.96916141490E-01
3.30315789470E-01	4.65365090700E-01	2.03342147246E+03	8.10989561263E-01	3.02012512620E-01
3.29315789470E-01	4.79145984310E-01	2.10276032528E+03	8.20818643831E-01	3.07232418391E-01
3.28315789470E-01	4.93467221976E-01	2.17536639931E+03	8.30888903708E-01	3.12580405581E-01
3.27315789470E-01	5.08356566605E-01	2.25142417377E+03	8.41209327844E-01	3.18061246863E-01
3.26315789470E-01	5.23843566408E-01	2.33113063334E+03	8.51789355308E-01	3.23679955023E-01
3.25315789470E-01	5.39959693661E-01	2.41469627306E+03	8.62638906086E-01	3.29441798240E-01
3.24315789470E-01	5.56738496178E-01	2.50234619745E+03	8.73768412104E-01	3.35352316572E-01
3.23315789470E-01	5.74215762833E-01	2.59432132392E+03	8.85188850681E-01	3.41417339714E-01

TABLE II (cont)

3.22315789470E-01	5.92429704639E-01	2.69087970181E+03	8.96911780644E-01	3.47643006184E-01
3.21315789470E-01	6.11421153080E-01	2.79229795989E+03	9.08949381355E-01	3.54035784044E-01
3.20315789470E-01	6.31233777586E-01	2.89887289671E+03	9.21314494912E-01	3.60602493315E-01
3.19315789470E-01	6.51914324302E-01	3.01092322989E+03	9.34020671856E-01	3.67350330247E-01
3.18315789470E-01	6.73512878552E-01	3.12879152278E+03	9.47082220701E-01	3.74286893627E-01
3.17315789470E-01	6.96083153722E-01	3.25284630914E+03	9.60514261685E-01	3.81420213322E-01
3.16315789470E-01	7.19682809644E-01	3.38348443910E+03	9.74332785164E-01	3.88758781287E-01
3.15315789470E-01	7.44373803960E-01	3.52113367323E+03	9.88554715109E-01	3.96311585294E-01
3.14315789470E-01	7.70222780431E-01	3.66625555466E+03	1.00319797826E+00	4.04088145649E-01
3.13315789470E-01	7.97301498686E-01	3.81934859383E+03	1.01828157950E+00	4.12098555231E-01
3.12315789470E-01	8.25687310532E-01	3.98095180482E+03	1.03382568416E+00	4.20353523188E-01
3.11315789470E-01	8.55463688673E-01	4.15164863827E+03	1.04985170797E+00	4.28864422712E-01
3.10315789470E-01	8.86720814529E-01	4.33207136209E+03	1.06638241545E+00	4.37643343308E-01
3.09315789470E-01	9.19556232799E-01	4.52290594862E+03	1.08344202787E+00	4.46703148098E-01
3.08315789470E-01	9.54075581571E-01	4.72489753615E+03	1.10105634162E+00	4.56057536706E-01
3.07315789470E-01	9.90393408089E-01	4.93885654241E+03	1.11925285837E+00	4.65721114376E-01

TABLE III. The BKW Detonation Product and the Solid Equation of State for TATB

A FORTRAN BKW CALCULATION FOR THE EXPLOSIVE  
TATB FOR HOT SPOT CALCULATION

THE NUMBER OF ELEMENTS IS 4

THE NUMBER OF GAS SPECIES IS 11

THE NUMBER OF SOLID SPECIES IS 1

THE BKW EQUATION OF STATE PARAMETERS ARE

ALPHA= 5.0000000000E-01 BETA= 9.5850000000E-02 THETA= 4.0000000000E+02 KAPPA= 1.26847111054E+01

THE COMPOSITION OF THE EXPLOSIVE IS

6.0000000000E+00 MOLES OF C  
6.0000000000E+00 MOLES OF H  
6.0000000000E+00 MOLES OF N  
6.0000000000E+00 MOLES OF O

THE DENSITY OF THE EXPLOSIVE IS 1.9370000000E+00. GRAMS/CC

THE MOLECULAR WEIGHT IS 2.5817400000E+02 GRAMS

THE HEAT OF FORMATION AT 0 DEG K IS -1.7000000000E+04 CALORIES PER FORMULA WEIGHT

THE SOLID (COWAN) EQUATION OF STATE PARAMETERS VO. AS, BS, CS, DS, ES. A1, A2, C1, C2, C3, ATOMIC WT

SOL C	4.4444444444E-01	8.30935837268E-01	-1.39381809219E+00	6.72569716021E-01	-1.13537262508E-01	6.49155882007E-03
	-2.26705345948E-01	1.20516569525E-01	8.3160000000E-02	-1.7559000000E-01	1.5531000000E-01	1.2010000000E+01

THE INPUT DETONATION PRODUCT ELEMENTAL COMPOSITION MATRIX

0.	2.0E+00	0.	1.0E+00	0.	2.0E+00	0.	0.	0.	0.	0.	2.0E+00
1.0E+00	0.	0.	2.0E+00	1.0E+00	0.	0.	1.0E+00	0.	3.0E+00	1.0E+00	0.
0.	1.0E+00	0.	0.	0.	0.	1.0E+00	1.0E+00	0.	0.	2.0E+00	0.
0.	1.0E+00	0.	1.0E+00	1.0E+00	4.0E+00	0.	0.	1.0E+00	0.	0.	0.

TABLE III (cont)

A FORTRAN BKW CALCULATION FOR THE EXPLOSIVE  
TATB FOR HOT SPOT CALCULATION

THE COMPUTED CJ PRESSURE IS 3.13681441917E-01 MEGABARS

THE COMPUTED DETONATION VELOCITY IS 7.97437239312E-01 CM/MICROSECOND

THE COMPUTED CJ TEMPERATURE IS 2.07746161423E+03 DEGREES KELVIN

THE COMPUTED CJ VOLUME 3.84789684700E-01 CC/GM OF EXPLOSIVE

THE COMPUTED GAMMA IS 2.92675513815E+00

THE VOLUME OF THE GAS IS 1.11407520767E+01 CC/MOLE OF GAS AND THERE ARE 7.50205496198E+00 MOLES OF GAS

SOLID VOLUME IN CC/GM  
SOL C 2.91820030034E-01

THE C-J COMPOSITION OF THE DETONATION PRODUCTS AND THE INPUT COEFFICIENTS TO THE THERMODYNAMIC FITS FOR EACH SPECIE

SPECIE	NO OF MOLES	COEFFICIENTS A,B,C,D,E.	THE INTEGRATION CONSTANT,	HEAT OF FORMATION IN CAL/MOLE,	COVOLUME
H2O	2.99975441292E+00	4.25884200000E+01 1.34282835156E+03	1.48080500000E-02 -5.71070000000E+04	-2.63918100000E-06 2.50000000000E+02	1.92045300000E-10 0.
H2	2.20855579970E-04	2.97034700000E+01 1.17589615365E+03	1.14382900000E-02 0.	-2.20122200000E-06 8.00000000000E+01	1.67776100000E-10 0.
O2	6.31144645577E-10	4.70309000000E+01 1.03537647396E+03	1.28714700000E-02 0.	-2.50021700000E-06 3.50000000000E+02	1.90157000000E-10 0.
CO2	1.49817281918E+00	4.74811200000E+01 7.46280968750E+02	1.95446300000E-02 -9.39680000000E+04	-3.72129600000E-06 6.00000000000E+02	2.77030000000E-10 0.
CO	3.89732066525E-03	4.53308200000E+01 1.12158830990E+03	1.23816100000E-02 -2.72010000000E+04	-2.41640300000E-06 3.90000000000E+02	1.82818100000E-10 0.
NH3	1.62887717110E-05	4.20181600000E+01 1.20696121615E+03	1.91166200000E-02 -9.36800000000E+03	-3.16433000000E-06 4.76000000000E+02	2.19780100000E-10 0.
H	2.40676038670E-10	2.63911000000E+01 7.94631617188E+02	8.12137200000E-03 5.16190000000E+04	-1.69074000000E-06 4.00000000000E+01	1.31682300000E-10 0.
NO	2.62666966588E-06	4.84149800000E+01 1.20924970573E+03	1.26938600000E-02 2.14770000000E+04	-2.49460000000E-06 3.86000000000E+02	1.89321300000E-10 0.
N2	2.99999054228E+00	4.39234000000E+01 1.13916134896E+03	1.22250100000E-02 0.	-2.37900500000E-06 3.80000000000E+02	1.79832200000E-10 0.
OH	1.16717698079E-10	4.24179200000E+01 1.18351754427E+03	1.15684700000E-02 3.56000000000E+03	-2.22665900000E-06 4.13000000000E+02	1.68915500000E-10 0.
CH4	1.49081068462E-07	3.87568600000E+01 1.04242791146E+03	2.36401300000E-02 -1.60000000000E+04	-3.70795700000E-06 5.28000000000E+02	2.47071400000E-10 0.
SDL C	4.49792971107E+00	-2.46151900000E-01 -2.58204389323E+02	7.17985500000E-03 0.	-1.29755000000E-06 0.	9.34999500000E-11 0.

TABLE III (cont)

A BKW ISENTROPE THRU BKW CJ PRESSURE FOR  
TATB FOR HDT SPOT CALCULATION

LN(P)= -3.88140921593E+00 -2.72831569507E+00LN 2.58742595507E-01LN\*2 9.55540836644E-02LN\*3 -4.41074776292E-02LN\*4

LN(T)= 7.082B7221259E+00 -5.50986222160E-01LN 5.37173124913E-02LN\*2 1.21556582406E-02LN\*3 -1.03975493849E-02LN\*4

LN(E)= -1.59944273845E+00 5.49283786861E-01LN 1.00453581123E-01LN\*2 9.27336840032E-03LN\*3 3.43164406021E-04LN\*4

THE CONSTANT ADDED TO ENERGIES WAS 1.0000000000E-01

PRESSURE (MBARS)	VOLUME (CC/GM)	TEMPERATURE (DEG K)	ENERGY+C (MB-CC/GM)	GAMMA (-DLNP/DLNV)	PARTICLE VELOCITY
3.13681441917E-01	3.84789686378E-01	2.07746161423E+03	1.20620315937E-01	2.80737337663E+00	2.03077589552E-01
2.19577009342E-01	4.34070177008E-01	1.93216706572E+03	1.07658843822E-01	2.85798205512E+00	2.69812153436E-01
1.53703906539E-01	4.89072357817E-01	1.79618091662E+03	9.75356075953E-02	2.88723904604E+00	3.29337621199E-01
1.07592734578E-01	5.51263880398E-01	1.66937151702E+03	8.95257750864E-02	2.89756357556E+00	3.82882628544E-01
7.53149142043E-02	6.22317829713E-01	1.55145303842E+03	8.31217233046E-02	2.89044693647E+00	4.31275143793E-01
5.27204399430E-02	7.04230324940E-01	1.44202616725E+03	7.79551109655E-02	2.86691849598E+00	4.75126447731E-01
3.69043079601E-02	7.99410364857E-01	1.34061236538E+03	7.37536241122E-02	2.82782265037E+00	5.14909543895E-01
2.58330155721E-02	9.10913653425E-01	1.24744410200E+03	7.03266203002E-02	2.77396170266E+00	5.51046054999E-01
1.80831109005E-02	1.04203550835E+00	1.16021150385E+03	6.74878175023E-02	2.70653400587E+00	5.83779912399E-01
1.26581776303E-02	1.19726950279E+00	1.07930595857E+03	6.51360668058E-02	2.62688315884E+00	6.13456539067E-01
8.86072434123E-03	1.38198369300E+00	1.00408062196E+03	6.31778522268E-02	2.53686951812E+00	6.40355314131E-01
6.20250703886E-03	1.60280203760E+00	9.33912961559E+02	6.15397640165E-02	2.43891652409E+00	6.64744012180E-01
4.34175492720E-03	1.86789813759E+00	8.68223626698E+02	6.01636421464E-02	2.33610829243E+00	6.86879671701E-01
3.03922844904E-03	2.18735555649E+00	8.06497989149E+02	5.90031326219E-02	2.23226714259E+00	7.07008592121E-01
2.12745991433E-03	2.57362149448E+00	7.48290413279E+02	5.80210510481E-02	2.13200215361E+00	7.25366275452E-01
1.48922194003E-03	3.04208420375E+00	6.93213604463E+02	5.71873634724E-02	2.04072768161E+00	7.42177100044E-01
1.04245535802E-03	3.61178397691E+00	6.40921309565E+02	5.64776691053E-02	1.96466033033E+00	7.57652837411E-01
7.29718750615E-04	4.30622575203E+00	5.91093137254E+02	5.58720845216E-02	1.91079794855E+00	7.71989359790E-01
5.10803125430E-04	5.15419629015E+00	5.43425530117E+02	5.53544256246E-02	1.88686211695E+00	7.85361068796E-01
3.57562187801E-04	6.19037612679E+00	4.97627635532E+02	5.49115985442E-02	1.90115445002E+00	7.97912231527E-01
2.50293531461E-04	7.45532007401E+00	4.53418252378E+02	5.45331351197E-02	1.96224179710E+00	8.09744151667E-01
1.75205472023E-04	8.99398616945E+00	4.10521451647E+02	5.42108256450E-02	2.07834266314E+00	8.20898256852E-01
1.22643830416E-04	1.08513738498E+01	3.68663296009E+02	5.39384044044E-02	2.25623884273E+00	8.31338843143E-01
3.60733658205E-01	3.66719915582E-01	2.13694342076E+03	1.26698153008E-01	2.78085339625E+00	0.
4.14843706936E-01	3.49186069336E-01	2.19818401265E+03	1.33484278888E-01	2.74994990654E+00	0.
4.77070262976E-01	3.32012660708E-01	2.26141858196E+03	1.41129038286E-01	2.71390811438E+00	0.
5.48630802422E-01	3.14849165123E-01	2.32771472055E+03	1.49918652614E-01	2.67119020131E+00	0.
6.30925422786E-01	2.96374729641E-01	2.40232528215E+03	1.60817662826E-01	2.61634804944E+00	0.
7.25564236203E-01	2.75959380555E-01	2.49508882779E+03	1.74563840045E-01	2.54284621880E+00	0.
8.34398871634E-01	2.62696630119E-01	2.56246065495E+03	1.84869563256E-01	2.48639320029E+00	0.
9.59558702379E-01	2.50994355526E-01	2.62302417762E+03	1.95338349358E-01	2.42986997049E+00	0.

TABLE III (cont)

SOLID EQUATION OF STATE CALCULATION FOR TATB FOR HOT SPOT STUDY

US = 2.4000000000E-01 + 2.0500000000E+00 S FROM PD TO 2.0000000000E+00 MEGABARS

THE INITIAL DENSITY IS 1.9370000000E+00 GM/CC

THE COMPRESSIBILITY IS 1.0000000000E+01

THE LINEAR COEFFICIENT OF EXPANSION IS 5.0000000000E-05

THE INITIAL TEMPERATURE IS 3.0000000000E+02

THE HEAT CAPACITY IS 3.0000000000E-01

THE VOLUME INCREMENT IS 1.0000000000E-04

THE TEMPERATURE FIT IS BETWEEN 2.0000000000E-06 AND 1.0000000000E+00 MEGABARS

LN(T)= -2.88596711376E+01 -1.59922698043E+02LNV -2.69498534753E+02LNV\*2 -1.92695519549E+02LNV\*3 -4.74565667780E+01LNV\*4

VOLUME IN CC/GM	PRESSURE IN MEGABARS	TEMPERATURE DEG K	SHOCK VELOCITY	PARTICLE VELOCITY
5.16262261229E-01	0.	3.0000000000E+02	2.4000000000E-01	0.
5.15262261229E-01	2.17839999507E-04	3.00358587101E+02	2.40956803323E-01	4.66733328051E-04
5.14262261229E-01	4.39174717510E-04	3.00717742423E+02	2.41921266119E-01	9.37202984977E-04
5.13262261229E-01	6.64067480296E-04	3.01077610931E+02	2.42893480734E-01	1.41145401659E-03
5.12262261229E-01	8.92582979655E-04	3.01438342972E+02	2.43873541001E-01	1.88953219574E-03
5.11262261229E-01	1.12478730753E-03	3.01800094451E+02	2.44861542276E-01	2.37148403702E-03
5.10262261229E-01	1.36074799168E-03	3.02163027013E+02	2.45857581464E-01	2.85735681187E-03
5.09262261228E-01	1.60053403239E-03	3.02527308226E+02	2.46861757056E-01	3.34719856404E-03
5.08262261228E-01	1.84421594026E-03	3.02893111781E+02	2.47874169157E-01	3.84105812538E-03
5.07262261228E-01	2.09186577516E-03	3.03260617688E+02	2.48894919521E-01	4.33898513215E-03
5.06262261228E-01	2.34355718626E-03	3.03630012482E+02	2.49924111585E-01	4.84103004157E-03
5.05262261228E-01	2.59936545336E-03	3.04001489443E+02	2.50961850505E-01	5.34724414889E-03
5.04262261228E-01	2.85936752938E-03	3.04375248810E+02	2.52008243190E-01	5.85767960490E-03
5.03262261228E-01	3.12364208420E-03	3.04751498017E+02	2.53063398339E-01	6.37238943379E-03
5.02262261228E-01	3.39226954974E-03	3.05130451926E+02	2.54127426481E-01	6.89142755153E-03
5.01262261228E-01	3.66533216654E-03	3.05512333074E+02	2.55200440009E-01	7.41484878470E-03
5.00262261228E-01	3.94291403161E-03	3.05897371928E+02	2.56282553224E-01	7.94270888978E-03
4.99262261228E-01	4.22510114788E-03	3.06285807143E+02	2.57373882375E-01	8.47506457299E-03
4.98262261228E-01	4.51198147512E-03	3.06677885843E+02	2.58474545697E-01	9.01197351054E-03
4.97262261228E-01	4.80364498240E-03	3.07073863892E+02	2.59584663458E-01	9.55349436952E-03
4.96262261228E-01	5.10018370226E-03	3.07474006194E+02	2.60704358000E-01	1.00996868292E-02
4.95262261228E-01	5.40169178649E-03	3.07878586992E+02	2.61833753786E-01	1.06506116031E-02
4.94262261228E-01	5.70826556371E-03	3.08287890180E+02	2.62972977445E-01	1.12063304612E-02
4.93262261228E-01	6.02000359874E-03	3.08702209625E+02	2.64122157819E-01	1.17669062533E-02
4.92262261228E-01	6.33700675386E-03	3.09121849508E+02	2.65281426012E-01	1.23324029328E-02
4.91262261228E-01	6.65937825199E-03	3.09547124667E+02	2.66450915440E-01	1.29028855805E-02
4.90262261228E-01	6.98722374192E-03	3.09978360956E+02	2.67630761882E-01	1.34784204303E-02
4.89262261228E-01	7.32065136558E-03	3.10415895621E+02	2.68821103533E-01	1.40590748940E-02
4.88262261228E-01	7.65977182751E-03	3.10860077685E+02	2.70022081057E-01	1.46449175886E-02
4.87262261228E-01	8.00469846656E-03	3.11311268348E+02	2.71233837643E-01	1.52360183623E-02
4.86262261228E-01	8.35554732992E-03	3.11769841403E+02	2.72456519062E-01	1.58324483231E-02
4.85262261228E-01	8.71243724958E-03	3.12236183664E+02	2.73690273727E-01	1.64342798669E-02
4.84262261228E-01	9.07548992120E-03	3.12710695414E+02	2.74935252749E-01	1.70415867068E-02
4.83262261228E-01	9.44482998573E-03	3.13193790867E+02	2.7619161002E-01	1.76544439034E-02

TABLE III (cont)

4.82262261228E-01	9.82058511357E-03	3.13685898647E+02	2.77459502186E-01	1.82729278954E-02
4.81262261228E-01	1.02028860916E-02	3.14187462285E+02	2.78739088890E-01	1.88971165318E-02
4.80262261228E-01	1.05918669131E-02	3.14698940733E+02	2.80030532664E-01	1.95270891041E-02
4.79262261228E-01	1.09876648707E-02	3.15220808906E+02	2.81333999080E-01	2.01629263805E-02
4.78262261228E-01	1.13904206525E-02	3.15753558226E+02	2.82649656811E-01	2.08047106397E-02
4.77262261228E-01	1.18002784409E-02	3.16297697208E+02	2.83977677699E-01	2.14525257069E-02
4.76262261228E-01	1.22173860161E-02	3.16853752051E+02	2.85318236830E-01	2.21064569901E-02
4.75262261228E-01	1.26418948613E-02	3.17422267263E+02	2.86671512611E-01	2.27665915175E-02
4.74262261228E-01	1.30739602734E-02	3.18003806301E+02	2.88037686852E-01	2.34330179767E-02
4.73262261228E-01	1.35137414759E-02	3.18598952240E+02	2.89416944845E-01	2.41058267536E-02
4.72262261228E-01	1.39614017365E-02	3.19208308472E+02	2.90809475446E-01	2.47851099739E-02
4.71262261228E-01	1.44171084890E-02	3.19832499419E+02	2.92215471167E-01	2.54709615448E-02
4.70262261228E-01	1.48810334588E-02	3.20472171287E+02	2.93635128257E-01	2.61634771985E-02
4.69262261228E-01	1.53533527932E-02	3.21127992843E+02	2.95068646800E-01	2.68627545366E-02
4.68262261228E-01	1.58342471962E-02	3.21800656222E+02	2.96516230806E-01	2.75688930760E-02
4.67262261228E-01	1.63239020683E-02	3.22490877767E+02	2.97978088307E-01	2.82819942961E-02
4.66262261228E-01	1.68225076505E-02	3.23199398898E+02	2.99454431459E-01	2.90021616874E-02
4.65262261228E-01	1.73302591747E-02	3.23926987027E+02	3.00945476644E-01	2.97295008018E-02
4.64262261228E-01	1.78473570180E-02	3.24674436492E+02	3.02451444573E-01	3.04641193038E-02
4.63262261228E-01	1.83740068642E-02	3.25442569541E+02	3.03972560399E-01	3.12061270237E-02
4.62262261228E-01	1.89104198696E-02	3.26232237353E+02	3.05509053826E-01	3.19556304128E-02
4.61262261228E-01	1.94568128361E-02	3.27044321094E+02	3.07061159228E-01	3.27127605990E-02
4.60262261228E-01	2.00134083898E-02	3.27879733022E+02	3.08629115764E-01	3.34776174458E-02
4.59262261228E-01	2.05804351663E-02	3.28739417633E+02	3.10213167504E-01	3.42503256116E-02
4.58262261228E-01	2.11581280036E-02	3.29624352858E+02	3.11813563554E-01	3.50310066118E-02
4.57262261228E-01	2.17467281411E-02	3.30535551299E+02	3.13430558188E-01	3.58197844822E-02
4.56262261227E-01	2.23464834267E-02	3.31474061527E+02	3.15064410983E-01	3.66167858451E-02
4.55262261227E-01	2.29576485315E-02	3.32440969427E+02	3.16715386953E-01	3.74221399769E-02
4.54262261227E-01	2.35804851729E-02	3.33437399601E+02	3.18383756700E-01	3.82359788778E-02
4.53262261227E-01	2.42152623452E-02	3.34464516822E+02	3.20069796556E-01	3.90584373443E-02
4.52262261227E-01	2.48622565604E-02	3.35523527563E+02	3.21773788738E-01	3.98896530431E-02
4.51262261227E-01	2.55217520974E-02	3.36615681575E+02	3.23496021507E-01	4.07297665886E-02
4.50262261227E-01	2.61940412603E-02	3.37742273538E+02	3.25236789324E-01	4.15789216216E-02
4.49262261227E-01	2.68794246484E-02	3.38904644787E+02	3.26996393028E-01	4.24372648916E-02
4.48262261227E-01	2.75782114346E-02	3.40104185095E+02	3.28775139999E-01	4.33049463410E-02
4.47262261227E-01	2.82907196567E-02	3.41342334553E+02	3.30573344345E-01	4.41821191926E-02
4.46262261227E-01	2.90172765183E-02	3.42620585513E+02	3.32391327082E-01	4.50689400399E-02
4.45262261227E-01	2.97582187035E-02	3.43940484622E+02	3.34229416327E-01	4.59655689401E-02
4.44262261227E-01	3.05138927026E-02	3.45303634944E+02	3.36087947497E-01	4.68721695106E-02
4.43262261227E-01	3.12846551515E-02	3.46711698174E+02	3.37967263508E-01	4.77889090282E-02
4.42262261227E-01	3.20708731849E-02	3.48166396946E+02	3.39867714991E-01	4.87159585324E-02
4.41262261227E-01	3.28729248033E-02	3.49669517242E+02	3.41789660510E-01	4.96534929315E-02
4.40262261227E-01	3.36911992556E-02	3.51222910913E+02	3.43733466781E-01	5.06016911128E-02
4.39262261227E-01	3.45260974364E-02	3.52828498301E+02	3.45699508915E-01	5.15607360562E-02
4.38262261227E-01	3.53780323010E-02	3.54488270989E+02	3.47688170652E-01	5.25308149521E-02
4.37262261227E-01	3.62474292962E-02	3.56204294667E+02	3.49699844612E-01	5.35121193232E-02
4.36262261227E-01	3.71347268099E-02	3.57978712126E+02	3.51734932558E-01	5.45048451502E-02
4.35262261227E-01	3.80403766393E-02	3.59813746392E+02	3.53793845656E-01	5.55091930030E-02
4.34262261227E-01	3.89648444786E-02	3.61711703995E+02	3.55877004759E-01	5.65253681749E-02
4.33262261227E-01	3.99086104280E-02	3.63674978398E+02	3.57984840688E-01	5.75535808233E-02
4.32262261227E-01	4.08721695233E-02	3.65706053568E+02	3.60117794534E-01	5.85940461141E-02
4.31262261227E-01	4.18560322896E-02	3.67807507729E+02	3.62276317963E-01	5.96469843721E-02
4.30262261227E-01	4.28607253175E-02	3.69982017271E+02	3.64460873534E-01	6.07126212362E-02
4.29262261227E-01	4.38867918650E-02	3.72232360855E+02	3.66671935033E-01	6.17911878210E-02
4.28262261227E-01	4.49347924860E-02	3.74561423703E+02	3.68909987811E-01	6.28829208835E-02
4.27262261227E-01	4.60053056855E-02	3.76972202090E+02	3.71175529143E-01	6.39880629968E-02
4.26262261227E-01	4.70989286043E-02	3.79467808053E+02	3.73469068595E-01	6.51068627294E-02

TABLE III (cont)

4. 25262261227E-01	4. 82162777343E-02	3. 82051474317E+02	3. 75791128405E-01	6. 62395748318E-02
4. 24262261227E-01	4. 93579896650E-02	3. 84726559465E+02	3. 78142243881E-01	6. 73864604299E-02
4. 23262261227E-01	5. 05247218645E-02	3. 87496553347E+02	3. 80522963812E-01	6. 85477872253E-02
4. 2262261227E-01	5. 17171534952E-02	3. 90365082759E+02	3. 82933850894E-01	6. 97238297044E-02
4. 21262261227E-01	5. 29359862671E-02	3. 93335917393E+02	3. 85375482175E-01	7. 09148693538E-02
4. 20262261227E-01	5. 41819453296E-02	3. 96412976079E+02	3. 87848449516E-01	7. 21211948857E-02
4. 19262261227E-01	5. 54557802052E-02	3. 99600333340E+02	3. 90353360065E-01	7. 33431024705E-02
4. 18262261227E-01	5. 67582657661E-02	4. 02902226258E+02	3. 92890836759E-01	7. 45808959800E-02
4. 17262261227E-01	5. 80902032563E-02	4. 06323061695E+02	3. 95461518839E-01	7. 58348872385E-02
4. 16262261227E-01	5. 94524213622E-02	4. 09867423868E+02	3. 98066062385E-01	7. 71053962854E-02
4. 15262261227E-01	6. 08457773336E-02	4. 13540082310E+02	4. 00705140877E-01	7. 83927516471E-02
4. 14262261227E-01	6. 22711581579E-02	4. 17346000227E+02	4. 03379445772E-01	7. 96972906204E-02
4. 13262261227E-01	6. 37294817914E-02	4. 21290343291E+02	4. 06089687112E-01	8. 10193595669E-02
4. 12262261227E-01	6. 52216984488E-02	4. 25378488873E+02	4. 08836594151E-01	8. 23593142200E-02
4. 11262261227E-01	6. 67487919567E-02	4. 29616035763E+02	4. 11620916008E-01	8. 37175200037E-02
4. 10262261227E-01	6. 83117811723E-02	4. 34008814383E+02	4. 14443422348E-01	8. 50943523649E-02
4. 09262261227E-01	6. 99117214729E-02	4. 38562897544E+02	4. 17304904095E-01	8. 64901971193E-02
4. 08262261227E-01	7. 15497063182E-02	4. 43284611764E+02	4. 20206174165E-01	8. 79054508122E-02
4. 07262261227E-01	7. 32268688915E-02	4. 48180549177E+02	4. 23148068242E-01	8. 93405210938E-02
4. 06262261227E-01	7. 49443838234E-02	4. 53257580092E+02	4. 26131445577E-01	9. 07958271107E-02
4. 05262261227E-01	7. 67034690022E-02	4. 58522866212E+02	4. 29157189824E-01	9. 22717999142E-02
4. 04262261227E-01	7. 85053874773E-02	4. 63983874565E+02	4. 32226209915E-01	9. 37688828856E-02
4. 03262261227E-01	8. 03514494597E-02	4. 69648392202E+02	4. 35339440971E-01	9. 52875321808E-02
4. 02262261227E-01	8. 22430144270E-02	4. 75524541688E+02	4. 38497845246E-01	9. 68282171934E-02
4. 01262261227E-01	8. 41814933368E-02	4. 81620797447E+02	4. 41702413128E-01	9. 83914210381E-02
4. 00262261227E-01	8. 61683509574E-02	4. 87946003013E+02	4. 44954164166E-01	9. 99776410566E-02
3. 99262261227E-01	8. 82051083212E-02	4. 94509389245E+02	4. 48254148156E-01	1. 01587389344E-01
3. 98262261227E-01	9. 02933453086E-02	5. 01320593558E+02	4. 51603446268E-01	1. 03221193302E-01
3. 97262261227E-01	9. 24347033713E-02	5. 08389680242E+02	4. 55003172233E-01	1. 04879596211E-01
3. 96262261227E-01	9. 46308884018E-02	5. 15727161946E+02	4. 58454473568E-01	1. 06563157838E-01
3. 95262261227E-01	9. 68836737601E-02	5. 23344022378E+02	4. 61958532877E-01	1. 08272455062E-01
3. 94262261227E-01	9. 91949034661E-02	5. 31251740327E+02	4. 65516569197E-01	1. 10008082535E-01
3. 93262261227E-01	1. 01566495569E-01	5. 39462315076E+02	4. 69129839412E-01	1. 11770653372E-01
3. 92262261227E-01	1. 04000445702E-01	5. 47988293301E+02	4. 72799639735E-01	1. 13560799871E-01
3. 91262261226E-01	1. 06498830843E-01	5. 56842797560E+02	4. 76527307257E-01	1. 15379174272E-01
3. 90262261226E-01	1. 09063813280E-01	5. 66039556471E+02	4. 80314221572E-01	1. 17226449547E-01
3. 89262261226E-01	1. 11697644808E-01	5. 75592936696E+02	4. 84161806481E-01	1. 19103320235E-01
3. 88262261226E-01	1. 14402671168E-01	5. 85517976856E+02	4. 88071531773E-01	1. 21010503304E-01
3. 87262261226E-01	1. 17181336739E-01	5. 95830423499E+02	4. 92044915099E-01	1. 22948739073E-01
3. 86262261226E-01	1. 20036189506E-01	6. 06546769279E+02	4. 96083523939E-01	1. 24918792165E-01
3. 85262261226E-01	1. 22969886324E-01	6. 17684293479E+02	5. 00188977658E-01	1. 26921452516E-01
3. 84262261226E-01	1. 25985198493E-01	6. 29261105058E+02	5. 04362949676E-01	1. 28957536427E-01
3. 83262261226E-01	1. 29085017662E-01	6. 41296188399E+02	5. 08607169739E-01	1. 31027887678E-01
3. 82262261226E-01	1. 32272362096E-01	6. 53809451933E+02	5. 12923426313E-01	1. 33133378689E-01
3. 81262261226E-01	1. 35550383327E-01	6. 66821779868E+02	5. 17313569092E-01	1. 35274911752E-01
3. 80262261226E-01	1. 38922373202E-01	6. 80355087230E+02	5. 21779511643E-01	1. 37453420313E-01
3. 79262261226E-01	1. 42391771382E-01	6. 94432378469E+02	5. 26323234188E-01	1. 39669870336E-01
3. 78262261226E-01	1. 45962173297E-01	7. 09077809881E+02	5. 30946786533E-01	1. 41925261724E-01
3. 77262261226E-01	1. 49637338616E-01	7. 24316756136E+02	5. 35652291147E-01	1. 44220629828E-01
3. 76262261226E-01	1. 53421200243E-01	7. 40175881220E+02	5. 40441946413E-01	1. 46557047031E-01
3. 75262261226E-01	1. 57317873902E-01	7. 56683214114E+02	5. 45318030055E-01	1. 48935624417E-01
3. 74262261226E-01	1. 61331668330E-01	7. 73868229582E+02	5. 50282902746E-01	1. 51357513534E-01
3. 73262261226E-01	1. 65467096153E-01	7. 91761934451E+02	5. 55339011919E-01	1. 53823908253E-01
3. 72262261226E-01	1. 69728885461E-01	8. 10396959809E+02	5. 60488895794E-01	1. 56336046729E-01
3. 71262261226E-01	1. 74121992170E-01	8. 23907659590E+02	5. 65735187622E-01	1. 58895213474E-01
3. 70262261226E-01	1. 78651613205E-01	8. 50030216039E+02	5. 71080620179E-01	1. 61502741551E-01
3. 69262261226E-01	1. 83323200581E-01	8. 71102752608E+02	5. 76528030507E-01	1. 64160014881E-01



TABLE III (cont)

3.68262261226E-01	1.88142476447E-01	8.93065454886E+02	5.82080364940E-01	1.66868470702E-01
3.67262261226E-01	1.93115449172E-01	9.15960700199E+02	5.87740684417E-01	1.69629602155E-01
3.66262261226E-01	1.98248430554E-01	9.39833196599E+02	5.93512170106E-01	1.72444961027E-01
3.65262261226E-01	2.03548054243E-01	9.64730132022E+02	5.99398129369E-01	1.75316160668E-01
3.64262261226E-01	2.09021295473E-01	9.90701334440E+02	6.05402002080E-01	1.78244879064E-01
3.63262261226E-01	2.14675492216E-01	1.01779944396E+03	6.11527367331E-01	1.81232862113E-01
3.62262261226E-01	2.20518367877E-01	1.04608009787E+03	6.17777950544E-01	1.84281927094E-01
3.61262261226E-01	2.26558055648E-01	1.07560212974E+03	6.24157631027E-01	1.87393966355E-01
3.60262261226E-01	2.32803124675E-01	1.10642778379E+03	6.30670450006E-01	1.90570951223E-01
3.59262261226E-01	2.39262608178E-01	1.13862294591E+03	6.37320619159E-01	1.93814936175E-01
3.58262261226E-01	2.45946033715E-01	1.17225739271E+03	6.44112529698E-01	1.97128063267E-01
3.57262261226E-01	2.52863455746E-01	1.20740506035E+03	6.51050762040E-01	2.00512566849E-01
3.56262261226E-01	2.60025490735E-01	1.24414433477E+03	6.58140096108E-01	2.03970778589E-01
3.55262261226E-01	2.67443354983E-01	1.28255836542E+03	6.65385522313E-01	2.07505132835E-01
3.54262261226E-01	2.75128905464E-01	1.32273540457E+03	6.72792253267E-01	2.11118172325E-01
3.53262261226E-01	2.83094683923E-01	1.36476917463E+03	6.80365736293E-01	2.14812554289E-01
3.52262261226E-01	2.91353964545E-01	1.40875926613E+03	6.88111666783E-01	2.18591056967E-01
3.51262261226E-01	2.99920805522E-01	1.45481156921E+03	6.96036002485E-01	2.22456586578E-01
3.50262261226E-01	3.08810104890E-01	1.50303874193E+03	7.04144978780E-01	2.26412184771E-01
3.49262261226E-01	3.18037661046E-01	1.55356071901E+03	7.12445125051E-01	2.30461036610E-01
3.48262261226E-01	3.27620238384E-01	1.60650526488E+03	7.20943282215E-01	2.34606479129E-01
3.47262261226E-01	3.37575638575E-01	1.66200857559E+03	7.29646621526E-01	2.38852010501E-01
3.46262261226E-01	3.47922778022E-01	1.72021593446E+03	7.38562664760E-01	2.43201299883E-01
3.45262261226E-01	3.58681772134E-01	1.78128242692E+03	7.47699305897E-01	2.47658197999E-01
3.44262261226E-01	3.69874027087E-01	1.84537372079E+03	7.57064834429E-01	2.52226748502E-01
3.43262261226E-01	3.81522339864E-01	1.91266691875E+03	7.66667960448E-01	2.56911200218E-01
3.42262261226E-01	3.93651007424E-01	1.98335149073E+03	7.76517841659E-01	2.61716020322E-01
3.41262261226E-01	4.06285945958E-01	2.05763029476E+03	7.86624112518E-01	2.66645908545E-01
3.40262261226E-01	4.19454821321E-01	2.13572069591E+03	7.96996915654E-01	2.71705812514E-01
3.39262261226E-01	4.33187191845E-01	2.21785579429E+03	8.07646935829E-01	2.76900944307E-01
3.38262261226E-01	4.47514664888E-01	2.30428577401E+03	8.18585436648E-01	2.82236798365E-01
3.37262261226E-01	4.62471068653E-01	2.39527938714E+03	8.29824300298E-01	2.87719170877E-01
3.36262261226E-01	4.78092640998E-01	2.49112558784E+03	8.41376070599E-01	2.93354180780E-01
3.35262261226E-01	4.94418237176E-01	2.59213533444E+03	8.53253999710E-01	2.99148292541E-01
3.34262261226E-01	5.11489558703E-01	2.69864357914E+03	8.65472098841E-01	3.05108340898E-01
3.33262261226E-01	5.29351405848E-01	2.81101146773E+03	8.78045193392E-01	3.11241557752E-01
3.32262261226E-01	5.48051956562E-01	2.92962877508E+03	8.90988982962E-01	3.17555601445E-01
3.31262261226E-01	5.67643075039E-01	3.05491660524E+03	9.04320106752E-01	3.24058588660E-01
3.30262261226E-01	5.88180653586E-01	3.18733038933E+03	9.18056214921E-01	3.30759129230E-01
3.29262261226E-01	6.09724991931E-01	3.32736321911E+03	9.32216046552E-01	3.37666364172E-01
3.28262261226E-01	6.32341218750E-01	3.47554955947E+03	9.46819514944E-01	3.44790007290E-01
3.27262261225E-01	6.56099760840E-01	3.63246938939E+03	9.61887801047E-01	3.52140390755E-01
3.26262261225E-01	6.81076866197E-01	3.79875282865E+03	9.77443455965E-01	3.59728515105E-01
3.25262261225E-01	7.07355188163E-01	3.97508531572E+03	9.93510513567E-01	3.67566104179E-01
3.24262261225E-01	7.35024438940E-01	4.16221341273E+03	1.01011461439E+00	3.75665665558E-01
3.23262261225E-01	7.64182122000E-01	4.36095132528E+03	1.02728314219E+00	3.84040557166E-01
3.22262261225E-01	7.94934354479E-01	4.57218823848E+03	1.04504537462E+00	3.92705060792E-01
3.21262261225E-01	8.27396792359E-01	4.79689658766E+03	1.06343264988E+00	4.01674463357E-01
3.20262261225E-01	8.61695673402E-01	5.03614140096E+03	1.08247855120E+00	4.10965146928E-01
3.19262261225E-01	8.97968995207E-01	5.29109087485E+03	1.10221911158E+00	4.20594688577E-01
3.18262261225E-01	9.36367848779E-01	5.56302837045E+03	1.12269304129E+00	4.30581971361E-01
3.17262261225E-01	9.77057931463E-01	5.85336605193E+03	1.14394198124E+00	4.40947307923E-01

TABLE IV. The BKW Detonation Product and the Solid Equation of State used in the HOM Equation of State for Nitroguanidine (NQ)

A FORTRAN BKW CALCULATION FOR THE EXPLOSIVE  
NITROGUANIDINE FOR HOT SPOT STUDY

THE NUMBER OF ELEMENTS IS 4

THE NUMBER OF GAS SPECIES IS 11

THE NUMBER OF SOLID SPECIES IS 1

THE BKW EQUATION OF STATE PARAMETERS ARE

ALPHA= 5.0000000000E-01 BETA= 1.6000000000E-01 THETA= 4.0000000000E+02 KAPPA= 1.09097784436E+01

THE COMPOSITION OF THE EXPLOSIVE IS

1.0000000000E+00 MOLES OF C  
4.0000000000E+00 MOLES OF H  
4.0000000000E+00 MOLES OF N  
2.0000000000E+00 MOLES OF O

THE DENSITY OF THE EXPLOSIVE IS 1.7800000000E+00. GRAMS/CC

THE MOLECULAR WEIGHT IS 1.0407400000E+02 GRAMS

THE HEAT OF FORMATION AT 0 DEG K IS -1.1100000000E+04 CALORIES PER FORMULA WEIGHT

THE SOLID (COWAN) EQUATION OF STATE PARAMETERS VD. AS, BS, CS, DS, ES, A1, A2, C1, C2, C3, ATOMIC WT

SOL C	4.4444444444E-01	8.30935837268E-01	-1.39381809219E+00	6.72569716021E-01	-1.13537262508E-01	6.49155882007E-03
	-2.26705345948E-01	1.20516569525E-01	8.3160000000E-02	-1.7559000000E-01	1.5531000000E-01	1.2010000000E+01

THE INPUT DETONATION PRODUCT ELEMENTAL COMPOSITION MATRIX

0.	2.0E+00	0.	1.0E+00	0.	2.0E+00	0.	0.	0.	0.	0.	2.0E+00
1.0E+00	0.	0.	2.0E+00	1.0E+00	0.	0.	1.0E+00	0.	3.0E+00	1.0E+00	0.
0.	1.0E+00	0.	0.	0.	0.	1.0E+00	1.0E+00	0.	0.	2.0E+00	0.
0.	1.0E+00	0.	1.0E+00	1.0E+00	4.0E+00	0.	0.	1.0E+00	0.	0.	0.

TABLE IV (cont)

A FORTRAN BKW CALCULATION FOR THE EXPLOSIVE  
NITROGUANIDINE FOR HOT SPOT STUDY

THE COMPUTED CJ PRESSURE IS 3.20153607152E-01 MEGABARS

THE COMPUTED DETONATION VELOCITY IS 8.74552110855E-01 CM/MICROSECOND

THE COMPUTED CJ TEMPERATURE IS 1.34882375333E+03 DEGREES KELVIN

THE COMPUTED CJ VOLUME 4.29684722708E-01 CC/GM OF EXPLDSIVE

THE COMPUTED GAMMA IS 3.25238901569E+00

THE VOLUME OF THE GAS IS 1.03210003845E+01 CC/MOLE OF GAS AND THERE ARE 4.00003310625E+00 MOLES OF GAS

SOLID VOLUME IN CC/GM  
SOL C 2.85993335703E-01

THE C-J COMPOSITION OF THE DETONATION PRODUCTS AND THE INPUT COEFFICIENTS TO THE THERMODYNAMIC FITS FOR EACH SPECIE

SPECIE	NO OF MOLES	COEFFICIENTS A,B,C,D,E, THE INTEGRATION		CONSTANT, HEAT OF FORMATION IN CAL/MOLE, CDVOLUME
H2O	1.99993290164E+00	4.25884200000E+01	1.48080500000E-02	-2.63918100000E-06 1.92045300000E-10 0.
		1.34282835156E+03	-5.71070000000E+04	2.50000000000E+02
H2	6.63797519733E-05	2.97034700000E+01	1.14382900000E-02	-2.20122200000E-06 1.67776100000E-10 0.
		1.17589615365E+03	0.	8.00000000000E+01
O2	1.00000000000E-11	4.70309000000E+01	1.28714700000E-02	-2.50021700000E-06 1.90157000000E-10 0.
		1.03537647396E+03	0.	3.50000000000E+02
CO2	3.35134860655E-05	4.74811200000E+01	1.95446300000E-02	-3.72129600000E-06 2.77030000000E-10 0.
		7.46280968750E+02	-9.39680000000E+04	6.00000000000E+02
CO	7.16821161057E-08	4.53308200000E+01	1.23816100000E-02	-2.41640300000E-06 1.82818100000E-10 0.
		1.12158830990E+03	-2.72010000000E+04	3.90000000000E+02
NH3	4.78874254940E-07	4.20181600000E+01	1.91166200000E-02	-3.16433000000E-06 2.19780100000E-10 0.
		1.20696121615E+03	-9.36800000000E+03	4.76000000000E+02
H	1.00000000000E-11	2.63911000000E+01	8.12137200000E-03	-1.69074000000E-06 1.31682300000E-10 0.
		7.94631617188E+02	5.16190000000E+04	4.00000000000E+01
NO	1.00000000000E-11	4.84149800000E+01	1.26938600000E-02	-2.49460000000E-06 1.89321300000E-10 0.
		1.20924970573E+03	2.14770000000E+04	3.86000000000E+02
N2	1.99999976056E+00	4.39234000000E+01	1.22250100000E-02	-2.37900500000E-06 1.79832200000E-10 0.
		1.13916134896E+03	0.	3.80000000000E+02
OH	1.00000000000E-11	4.24179200000E+01	1.15684700000E-02	-2.22665900000E-06 1.68915500000E-10 0.
		1.18351754427E+03	3.56000000000E+03	4.13000000000E+02
CH4	1.90000710141E-10	3.87568600000E+01	2.36401300000E-02	-3.70795700000E-06 2.47071400000E-10 0.
		1.04242791146E+03	-1.60000000000E+04	5.28000000000E+02
SOL C	9.99966414642E-01	-2.46151900000E-01	7.17985500000E-03	-1.29755000000E-06 9.34999500000E-11 0.
		-2.58204389323E+02	0.	0.

TABLE IV (cont)

A BKW ISENTROPE THRU BKW CJ PRESSURE FOR  
NITROGUANIDINE FOR HDT SPOT STUDY

LN(P)= -3.80221315078E+00    -3.03340167888E+00LN    -1.65391777200E-01LN\*2    -7.32565659628E-01LN\*3    -4.37390057111E-01LN\*4  
LN(T)= 6.58875633994E+00    -8.78794236672E-01LN    -4.95338412534E-01LN\*2    -7.67088724704E-01LN\*3    -4.57755947826E-01LN\*4  
LN(E)= -1.61739144730E+00    5.24098450783E-01LN    8.70007472165E-02LN\*2    6.48331361468E-03LN\*3    1.83818053869E-04LN\*4

THE CONSTANT ADDED TO ENERGIES WAS 1.0000000000E-01

PRESSURE (MBARS)	VOLUME (CC/GM)	TEMPERATURE (DEG K)	ENERGY+C (MB-CC/GM)	GAMMA (-DLNP/DLNV)	PARTICLE VELOCITY
3.20153607152E-01	4.29684722582E-01	1.34882375333E+03	1.21148282850E-01	3.26760885077E+00	2.05661039428E-01
2.24107525007E-01	4.79339652101E-01	1.26590052437E+03	1.07820607670E-01	3.28285888956E+00	2.74716875538E-01
1.56875267505E-01	5.34805106681E-01	1.17856322481E+03	9.74460109963E-02	3.25831004057E+00	3.35700754692E-01
1.09812687253E-01	5.96960021554E-01	1.08723839121E+03	8.92623787519E-02	3.20744741444E+00	3.89488194083E-01
7.68688810773E-02	6.66922422755E-01	9.96601243543E+02	8.28150583894E-02	3.14373606763E+00	4.37052508367E-01
5.38082167541E-02	7.45862303609E-01	9.08185867869E+02	7.77227133332E-02	3.08125272751E+00	4.79228757475E-01
3.76657517279E-02	8.35054618402E-01	8.22935051691E+02	7.36949606194E-02	3.03493761668E+00	5.16769542922E-01
2.63660262095E-02	9.35676650436E-01	7.40641546522E+02	7.04978267525E-02	3.02060973405E+00	5.50280723704E-01
1.84562183467E-02	1.04962471110E+00	6.63710676467E+02	6.79908780168E-02	3.05477637287E+00	5.80469919251E-01
1.29193528427E-02	1.17760821677E+00	5.89924630648E+02	6.60066177174E-02	3.15386370380E+00	6.07603734119E-01
9.04354698986E-03	1.32080000810E+00	5.20062331875E+02	6.44522390774E-02	3.33326108512E+00	6.32032134352E-01
6.33048289290E-03	1.47957709843E+00	4.54037090676E+02	6.32447129620E-02	3.60546595694E+00	6.53896796918E-01
4.43133802503E-03	1.65337308905E+00	3.91816313581E+02	6.23183468697E-02	3.97777207127E+00	6.73208364082E-01
3.10193661752E-03	1.84220280968E+00	3.34501765136E+02	6.16276026504E-02	4.45484113203E+00	6.90048278150E-01
2.17135563227E-03	2.03890961886E+00	2.80045386496E+02	6.11150943962E-02	5.01706464014E+00	7.04023488042E-01
1.51994894259E-03	2.23706056764E+00	2.29375582373E+02	6.07533383807E-02	5.63770430703E+00	7.15181243653E-01
1.06396425981E-03	2.42424656396E+00	1.82640904256E+02	6.05138931304E-02	6.26449202652E+00	7.23551465309E-01
7.44774981867E-04	2.58260869960E+00	1.40265007666E+02	6.03721638173E-02	6.82001522158E+00	7.29281438002E-01
5.21342487307E-04	2.69091517968E+00	1.03040797580E+02	6.03049948331E-02	7.21127095425E+00	7.32596322977E-01
3.64939741115E-04	2.71846578530E+00	7.12107648381E+01	6.02896863574E-02	7.31211748983E+00	7.33369427516E-01
2.55457818780E-04	2.67073228809E+00	4.66882815032E+01	6.03040214361E-02	7.13772251486E+00	7.32012507535E-01
1.78820473146E-04	2.55774193540E+00	2.91567612261E+01	6.03287753741E-02	6.73142109607E+00	7.28454502663E-01
1.25174331202E-04	2.39292790254E+00	1.73679802158E+01	6.03526278985E-02	6.15721622785E+00	7.22279879034E-01
3.68176648225E-01	4.11587616367E-01	1.37991681004E+03	1.27405228923E-01	3.24770808552E+00	0.
4.23403145459E-01	3.94100855075E-01	1.40719450766E+03	1.34308633676E-01	3.21838771552E+00	0.
4.86913617278E-01	3.77099965286E-01	1.43178095992E+03	1.42029185598E-01	3.17822343680E+00	0.
5.59950659870E-01	3.60195778233E-01	1.45355876205E+03	1.50861381029E-01	3.12438627637E+00	0.
6.43943258850E-01	3.40861940375E-01	1.47795180782E+03	1.62513522605E-01	3.04190866711E+00	0.
7.405347478677E-01	3.26249658922E-01	1.48872541574E+03	1.72565662222E-01	2.96152502197E+00	0.
8.51614959829E-01	3.13482465533E-01	1.48872541574E+03	1.82685825197E-01	2.87600505077E+00	0.
9.79357203803E-01	3.01661168480E-01	1.47778655643E+03	1.93458361852E-01	2.78194526817E+00	0.

TABLE IV (cont)

SOLID EQUATION OF STATE CALCULATION FOR NITROGUANIDINE FOR HOT SPDT STUDY

US = 3.5000000000E-01 + 1.5000000000E+00 S FROM PD TO 2.0000000000E+00 MEGABARS

THE INITIAL DENSITY IS 1.7800000000E+00 GM/CC

THE COMPRESSIBILITY IS 1.0620000000E+01

THE LINEAR COEFFICIENT OF EXPANSION IS 2.3200000000E-04

THE INITIAL TEMPERATURE IS 3.0000000000E+02

THE HEAT CAPACITY IS 2.7000000000E-01

THE VOLUME INCREMENT IS 1.0000000000E-04

THE TEMPERATURE FIT IS BETWEEN 2.0000000000E-06 AND 5.0000000000E-01 MEGABARS

LN(T)= -3.25015171696E+00 -4.33294180901E+01LNV -8.22198344931E+01LNV\*2 -7.13666526892E+01LNV\*3 -2.14816519369E+01LNV\*4

VOLUME IN CC/GM	PRESSURE IN MEGABARS	TEMPERATURE DEG K	SHOCK VELOCITY	PARTICLE VELOCITY
5.61797752809E-01	0.	3.0000000000E+02	3.5000000000E-01	0.
5.60797752809E-01	3.90209939321E-04	3.01744720353E+02	3.50937001795E-01	6.24667863215E-04
5.59797752809E-01	7.84615317844E-04	3.03499773788E+02	3.51879034042E-01	1.25268936123E-03
5.58797752809E-01	1.18326701916E-03	3.05265411066E+02	3.52826137360E-01	1.88409157357E-03
5.57797752809E-01	1.58621666024E-03	3.07041889019E+02	3.53778352808E-01	2.51890187208E-03
5.56797752809E-01	1.99351660388E-03	3.08829470684E+02	3.54735721887E-01	3.15714792490E-03
5.55797752809E-01	2.40521997135E-03	3.10628425445E+02	3.55698286551E-01	3.79885770049E-03
5.54797752809E-01	2.82138065530E-03	3.12439029171E+02	3.56666089208E-01	4.44405947167E-03
5.53797752809E-01	3.24205333296E-03	3.14261564360E+02	3.57639172730E-01	5.09278181984E-03
5.52797752809E-01	3.66729347950E-03	3.16096320291E+02	3.58617580459E-01	5.74505363914E-03
5.51797752809E-01	4.09715738180E-03	3.17943593169E+02	3.59601356211E-01	6.40090414077E-03
5.50797752809E-01	4.53170215235E-03	3.19803686286E+02	3.60590544286E-01	7.06036285735E-03
5.49797752809E-01	4.97098574353E-03	3.21676910173E+02	3.61585189471E-01	7.72345964736E-03
5.48797752809E-01	5.41506696211E-03	3.23563582767E+02	3.62585337049E-01	8.39022469960E-03
5.47797752809E-01	5.86400548408E-03	3.25464029573E+02	3.63591032807E-01	9.06068853784E-03
5.46797752808E-01	6.31786186974E-03	3.27378583832E+02	3.64602323038E-01	9.73488202544E-03
5.45797752808E-01	6.77669757915E-03	3.29307586699E+02	3.65619254555E-01	1.04128363701E-02
5.44797752808E-01	7.24057498781E-03	3.31251387415E+02	3.66641874693E-01	1.10945831286E-02
5.43797752808E-01	7.70955740275E-03	3.33210343491E+02	3.67670231318E-01	1.17801542118E-02
5.42797752808E-01	8.18370907885E-03	3.35184820890E+02	3.68704372835E-01	1.24695818897E-02
5.41797752808E-01	8.66309523560E-03	3.37175194220E+02	3.69744348194E-01	1.31628987962E-02
5.40797752808E-01	9.14778207407E-03	3.39181846926E+02	3.70790206902E-01	1.38601379344E-02
5.39797752808E-01	9.63783679435E-03	3.41205171489E+02	3.71841999023E-01	1.45613326822E-02
5.38797752808E-01	1.01333276133E-02	3.43245569627E+02	3.72899775196E-01	1.52665167970E-02
5.37797752808E-01	1.06343237826E-02	3.45303452504E+02	3.73963586632E-01	1.59757244215E-02
5.36797752808E-01	1.11408956073E-02	3.47379240943E+02	3.75033485133E-01	1.66889900890E-02
5.35797752808E-01	1.16531144646E-02	3.49473365642E+02	3.76109523094E-01	1.74063487294E-02
5.34797752808E-01	1.21710528232E-02	3.51586267397E+02	3.77191753512E-01	1.81278356744E-02
5.33797752808E-01	1.26947842630E-02	3.53718397330E+02	3.78280229995E-01	1.88534866636E-02
5.32797752808E-01	1.32243834948E-02	3.55870217120E+02	3.79375006776E-01	1.95833378504E-02
5.31797752808E-01	1.37599263815E-02	3.58042199243E+02	3.80476138712E-01	2.03174258079E-02
5.30797752808E-01	1.43014899582E-02	3.60234827217E+02	3.81583681302E-01	2.10557875350E-02
5.29797752808E-01	1.48491524539E-02	3.62448595848E+02	3.82697690694E-01	2.17984604627E-02

TABLE IV (cont)

5. 28797752808E-01	1. 54029933137E-02	3. 64684011489E+02	3. 83818223690E-01	2. 25454824603E-02
5. 27797752808E-01	1. 59630932203E-02	3. 6694 1592301E+02	3. 84945337763E-01	2. 32968918422E-02
5. 26797752808E-01	1. 65295341172E-02	3. 6922 1868517E+02	3. 86079091061E-01	2. 40527273739E-02
5. 25797752808E-01	1. 71023992321E-02	3. 71525382723E+02	3. 87219542419E-01	2. 48130282790E-02
5. 24797752808E-01	1. 76817730999E-02	3. 73852690132E+02	3. 88366751369E-01	2. 55778342460E-02
5. 23797752808E-01	1. 826774 15876E-02	3. 76204358876E+02	3. 89520778 153E-01	2. 63471854351E-02
5. 22797752808E-01	1. 88603919189E-02	3. 78580970295E+02	3. 9068 1683728E-01	2. 7121 1224853E-02
5. 21797752808E-01	1. 94598126992E-02	3. 80983119245E+02	3. 91849529782E-01	2. 78996865214E-02
5. 20797752808E-01	2. 006609394 15E-02	3. 834 11414401E+02	3. 93024378742E-01	2. 86829191616E-02
5. 19797752808E-01	2. 06793270930E-02	3. 85866478572E+02	3. 94206293787E-01	2. 94708625245E-02
5. 18797752808E-01	2. 129960506 19E-02	3. 88348949029E+02	3. 95395338856E-01	3. 02635592370E-02
5. 17797752808E-01	2. 19270222447E-02	3. 90859477835E+02	3. 96591578663E-01	3. 10610524419E-02
5. 16797752807E-01	2. 256 16745547E-02	3. 93398732179E+02	3. 97795078708E-01	3. 18633858056E-02
5. 15797752807E-01	2. 32036594506E-02	3. 95967394729E+02	3. 99005905289E-01	3. 26706035262E-02
5. 14797752807E-01	2. 38530759658E-02	3. 98566163987E+02	4. 00224125512E-01	3. 34827503415E-02
5. 13797752807E-01	2. 45100247384E-02	4. 01195754649E+02	4. 01449807306E-01	3. 42998715374E-02
5. 12797752807E-01	2. 51746080420E-02	4. 03856897982E+02	4. 02683019434E-01	3. 51220129562E-02
5. 11797752807E-01	2. 58469298171E-02	4. 06550342207E+02	4. 03923831508E-01	3. 59492210054E-02
5. 10797752807E-01	2. 65270957029E-02	4. 09276852886E+02	4. 05172313999E-01	3. 67815426661E-02
5. 09797752807E-01	2. 72152130705E-02	4. 12037213329E+02	4. 06428538253E-01	3. 76190255019E-02
5. 08797752807E-01	2. 79113910560E-02	4. 14832225001E+02	4. 07692576503E-01	3. 84617176686E-02
5. 07797752807E-01	2. 86157405947E-02	4. 17662707942E+02	4. 08964501884E-01	3. 93096679223E-02
5. 06797752807E-01	2. 93283744567E-02	4. 20529501203E+02	4. 10244388445E-01	4. 01629256301E-02
5. 05797752807E-01	3. 00494072820E-02	4. 23433463285E+02	4. 11532311168E-01	4. 10215407786E-02
5. 04797752807E-01	3. 07789556177E-02	4. 26375472594E+02	4. 12828345976E-01	4. 18855639841E-02
5. 03797752807E-01	3. 15171379552E-02	4. 29356427901E+02	4. 14132569754E-01	4. 27550465028E-02
5. 02797752807E-01	3. 22640747683E-02	4. 32377248824E+02	4. 15445060361E-01	4. 36300402405E-02
5. 01797752807E-01	3. 30198885528E-02	4. 35438876311E+02	4. 16765896645E-01	4. 45105977631E-02
5. 00797752807E-01	3. 37847038663E-02	4. 38542273141E+02	4. 18095158461E-01	4. 53967723072E-02
4. 99797752807E-01	3. 45586473692E-02	4. 41688424439E+02	4. 19432926686E-01	4. 62886177906E-02
4. 98797752807E-01	3. 53418478670E-02	4. 44878338196E+02	4. 20779283235E-01	4. 71861888236E-02
4. 97797752807E-01	3. 61344363525E-02	4. 48113045813E+02	4. 22134311080E-01	4. 80895407198E-02
4. 96797752807E-01	3. 69365460505E-02	4. 51393602650E+02	4. 23498094261E-01	4. 89987295076E-02
4. 95797752807E-01	3. 77483124622E-02	4. 54721088592E+02	4. 24870717913E-01	4. 99138119420E-02
4. 94797752807E-01	3. 85698734112E-02	4. 58096608629E+02	4. 26252268274E-01	5. 08348455160E-02
4. 93797752807E-01	3. 94013690909E-02	4. 61521293452E+02	4. 27642832709E-01	5. 17618884727E-02
4. 92797752807E-01	4. 02429421123E-02	4. 64996300066E+02	4. 29042499727E-01	5. 26949998181E-02
4. 91797752807E-01	4. 10947375534E-02	4. 68522812408E+02	4. 30451359000E-01	5. 36342393330E-02
4. 90797752807E-01	4. 19569030099E-02	4. 72102041996E+02	4. 31869501379E-01	5. 45796675860E-02
4. 89797752807E-01	4. 28295886462E-02	4. 75735228585E+02	4. 33297018920E-01	5. 55313459464E-02
4. 88797752807E-01	4. 37129472492E-02	4. 79423640839E+02	4. 34734004897E-01	5. 64893365980E-02
4. 87797752807E-01	4. 46071342815E-02	4. 83168577030E+02	4. 36180553828E-01	5. 74537025520E-02
4. 86797752807E-01	4. 55123079375E-02	4. 86971365742E+02	4. 37636761491E-01	5. 84245076608E-02
4. 85797752807E-01	4. 64286291998E-02	4. 90833366602E+02	4. 39102724949E-01	5. 94018166329E-02
4. 84797752807E-01	4. 73562618977E-02	4. 94755971030E+02	4. 40578542570E-01	6. 03856950464E-02
4. 83797752807E-01	4. 82953727664E-02	4. 98740603003E+02	4. 42064314046E-01	6. 13762093639E-02
4. 82797752807E-01	4. 92461315078E-02	5. 02788719844E+02	4. 43560140422E-01	6. 23734269480E-02
4. 81797752807E-01	5. 02087108538E-02	5. 06901813029E+02	4. 45066124113E-01	6. 33774160756E-02
4. 80797752807E-01	5. 11832866292E-02	5. 11081409017E+02	4. 46582368932E-01	6. 43882459544E-02
4. 79797752807E-01	5. 21700378183E-02	5. 15329070098E+02	4. 48108980108E-01	6. 54059867384E-02
4. 78797752807E-01	5. 31691466311E-02	5. 19646395272E+02	4. 49646064316E-01	6. 64307095439E-02
4. 77797752807E-01	5. 41807985730E-02	5. 24035021138E+02	4. 51193729700E-01	6. 74624864667E-02
4. 76797752807E-01	5. 52051825148E-02	5. 28496622820E+02	4. 52752085897E-01	6. 85013905982E-02
4. 75797752807E-01	5. 62424907649E-02	5. 33032914910E+02	4. 54321244065E-01	6. 95474960435E-02
4. 74797752807E-01	5. 72929191438E-02	5. 37645652436E+02	4. 55901316907E-01	7. 06008779383E-02
4. 73797752807E-01	5. 93566670599E-02	5. 42336631959E+02	4. 57492418701E-01	7. 16616124673E-02
4. 72797752807E-01	5. 94339375871E-02	5. 47107692097E+02	4. 59094665324E-01	7. 27297768826E-02

TABLE IV (cont)

4.71797752806E-01	6.05249375448E-02	5.51960715571E+02	4.60708174283E-01	7.38054495222E-02
4.70797752806E-01	6.16298775796E-02	5.56897629289E+02	4.62333064744E-01	7.48887098293E-02
4.69797752806E-01	6.27489722493E-02	5.61920405946E+02	4.63969457558E-01	7.59796383717E-02
4.68797752806E-01	6.38824401090E-02	5.67031065070E+02	4.65617475293E-01	7.70783168621E-02
4.67797752806E-01	6.50305037990E-02	5.72231674182E+02	4.67277242267E-01	7.81848281783E-02
4.66797752806E-01	6.61933901355E-02	5.77524350004E+02	4.68948884576E-01	7.92992563839E-02
4.65797752806E-01	6.73713302034E-02	5.82911259684E+02	4.70632530125E-01	8.04216867499E-02
4.64797752806E-01	6.85645594513E-02	5.88394622071E+02	4.72328308664E-01	8.15522057761E-02
4.63797752806E-01	6.97733177895E-02	5.93976709011E+02	4.74036351821E-01	8.26909012138E-02
4.62797752806E-01	7.09978496898E-02	5.99659846688E+02	4.75756793132E-01	8.38378620879E-02
4.61797752806E-01	7.22384042885E-02	6.05446416997E+02	4.77489768081E-01	8.49931787207E-02
4.60797752806E-01	7.34952354920E-02	6.11338858957E+02	4.79235414133E-01	8.61569427550E-02
4.59797752806E-01	7.47686020849E-02	6.17339670164E+02	4.80993870769E-01	8.73292471790E-02
4.58797752806E-01	7.60587678409E-02	6.23451408284E+02	4.82765279526E-01	8.85101863506E-02
4.57797752806E-01	7.73660016374E-02	6.29676692587E+02	4.84549784034E-01	8.96998560227E-02
4.56797752806E-01	7.86905775721E-02	6.36018205525E+02	4.86347530054E-01	9.08983533695E-02
4.55797752806E-01	8.00327750834E-02	6.42478694356E+02	4.88158665519E-01	9.21057770124E-02
4.54797752806E-01	8.13928790739E-02	6.49060972807E+02	4.89983340571E-01	9.33222270476E-02
4.53797752806E-01	8.27711800367E-02	6.55767922796E+02	4.91821707610E-01	9.45478050734E-02
4.52797752806E-01	8.41679741861E-02	6.62602496193E+02	4.93673921328E-01	9.57826142184E-02
4.51797752806E-01	8.55835635908E-02	6.69567716635E+02	4.95540138756E-01	9.70267591710E-02
4.50797752806E-01	8.70182563114E-02	6.76666681391E+02	4.97420519312E-01	9.82803462082E-02
4.49797752806E-01	8.84723665414E-02	6.83902563287E+02	4.99315224840E-01	9.95434832266E-02
4.48797752806E-01	8.99462147519E-02	6.91278612676E+02	5.01224419659E-01	1.00816279773E-01
4.47797752806E-01	9.14401278408E-02	6.98798159476E+02	5.03148270613E-01	1.02098847075E-01
4.46797752806E-01	9.29544392854E-02	7.06464615255E+02	5.05086947116E-01	1.03391298077E-01
4.45797752806E-01	9.44894892995E-02	7.14281475393E+02	5.07040621203E-01	1.04693747469E-01
4.44797752806E-01	9.60456249954E-02	7.22252321288E+02	5.09009467582E-01	1.06006311721E-01
4.43797752806E-01	9.76232005495E-02	7.30380822643E+02	5.10993663684E-01	1.07329109123E-01
4.42797752806E-01	9.92225773731E-02	7.38670739810E+02	5.12993389720E-01	1.08662259813E-01
4.41797752806E-01	1.00844124288E-01	7.47125926208E+02	5.15008828729E-01	1.10005885819E-01
4.40797752806E-01	1.02488217707E-01	7.55750330812E+02	5.17040166641E-01	1.11360111094E-01
4.39797752806E-01	1.04155241818E-01	7.64548000713E+02	5.19087592330E-01	1.12725061553E-01
4.38797752806E-01	1.05845588778E-01	7.73523083757E+02	5.21151297673E-01	1.14100865115E-01
4.37797752806E-01	1.07559658906E-01	7.82679831264E+02	5.23231477612E-01	1.15487651741E-01
4.36797752806E-01	1.09297860887E-01	7.92022600824E+02	5.25328330213E-01	1.16885553475E-01
4.35797752806E-01	1.11060611977E-01	8.01555859183E+02	5.27442056729E-01	1.18294704486E-01
4.34797752806E-01	1.12848338220E-01	8.11284185213E+02	5.29572861667E-01	1.19715241111E-01
4.33797752806E-01	1.14661474667E-01	8.21212272969E+02	5.31720952851E-01	1.21147301900E-01
4.32797752806E-01	1.16500465599E-01	8.31344934845E+02	5.33886541490E-01	1.22591027660E-01
4.31797752806E-01	1.18365764765E-01	8.41687104828E+02	5.36069842249E-01	1.24046561499E-01
4.30797752806E-01	1.20257835617E-01	8.52243841831E+02	5.38271073319E-01	1.25514048880E-01
4.29797752806E-01	1.22177151558E-01	8.63020333172E+02	5.40490456490E-01	1.26993637660E-01
4.28797752806E-01	1.24124196200E-01	8.74021898108E+02	5.42728217222E-01	1.28485478148E-01
4.27797752806E-01	1.26099463619E-01	8.85253991516E+02	5.44984584729E-01	1.29989723153E-01
4.26797752806E-01	1.28103458628E-01	8.96722207675E+02	5.47259792049E-01	1.31506528032E-01
4.25797752806E-01	1.30136697054E-01	9.08432284166E+02	5.49554076128E-01	1.33036050752E-01
4.24797752806E-01	1.32199706025E-01	9.20390105896E+02	5.51867677906E-01	1.34578451937E-01
4.23797752806E-01	1.34293024261E-01	9.32601709247E+02	5.54200842393E-01	1.36133894929E-01
4.22797752806E-01	1.36417202379E-01	9.45073286359E+02	5.56553818762E-01	1.37702545841E-01
4.21797752806E-01	1.38572803208E-01	9.57811189545E+02	5.58926860436E-01	1.39284573624E-01
4.20797752806E-01	1.40760402106E-01	9.70821935848E+02	5.61320225177E-01	1.40880150118E-01
4.19797752806E-01	1.42980587295E-01	9.84112211743E+02	5.63734175184E-01	1.42489450123E-01
4.18797752806E-01	1.45233960203E-01	9.97688877993E+02	5.66168977183E-01	1.44112651456E-01
4.17797752806E-01	1.47521135818E-01	1.01155897465E+03	5.68624902530E-01	1.45749935020E-01
4.16797752806E-01	1.49842743047E-01	1.02572972625E+03	5.71102227307E-01	1.47401484871E-01
4.15797752806E-01	1.52199425095E-01	1.04020854711E+03	5.73601232432E-01	1.49067488288E-01

TABLE IV (cont.)

4. 14797752806E-01	1. 54591839853E-01	1. 05500304688E+03	5. 76122203758E-01	1. 50748135839E-01
4. 13797752806E-01	1. 57020660291E-01	1. 07012103620E+03	5. 78665432189E-01	1. 52443621459E-01
4. 12797752806E-01	1. 59486574877E-01	1. 08557053264E+03	5. 81231213786E-01	1. 54154142524E-01
4. 11797752806E-01	1. 61990287995E-01	1. 10135976669E+03	5. 83819849884E-01	1. 55879899923E-01
4. 10797752806E-01	1. 64532520388E-01	1. 11749718809E+03	5. 86431647212E-01	1. 57621098141E-01
4. 09797752806E-01	1. 67114009608E-01	1. 13399147230E+03	5. 89066918011E-01	1. 59377945341E-01
4. 08797752806E-01	1. 69735510482E-01	1. 15085152720E+03	5. 91725980161E-01	1. 61150653441E-01
4. 07797752806E-01	1. 72397795596E-01	1. 16808650000E+03	5. 94409157307E-01	1. 62939438205E-01
4. 06797752805E-01	1. 75101655792E-01	1. 18570578441E+03	5. 97116778991E-01	1. 64744519327E-01
4. 05797752805E-01	1. 77847900680E-01	1. 20371902801E+03	5. 99849180787E-01	1. 66566120525E-01
4. 04797752805E-01	1. 80637359169E-01	1. 22213613995E+03	6. 02606704440E-01	1. 68404469627E-01
4. 03797752805E-01	1. 83470880019E-01	1. 24096729879E+03	6. 05389698007E-01	1. 70259798671E-01
4. 02797752805E-01	1. 86349332400E-01	1. 26022296073E+03	6. 08198516006E-01	1. 72132344004E-01
4. 01797752805E-01	1. 89273606483E-01	1. 27991386806E+03	6. 11033519563E-01	1. 74022346375E-01
4. 00797752805E-01	1. 92244614044E-01	1. 30005105788E+03	6. 13895076572E-01	1. 75930051048E-01
3. 99797752805E-01	1. 95263289082E-01	1. 32064587117E+03	6. 16783561847E-01	1. 77855707898E-01
3. 98797752805E-01	1. 98330588475E-01	1. 34170996219E+03	6. 19699357294E-01	1. 79799571529E-01
3. 97797752805E-01	2. 01447492639E-01	1. 36325530812E+03	6. 22642852071E-01	1. 81761901381E-01
3. 96797752805E-01	2. 04615006223E-01	1. 38529421912E+03	6. 25614442767E-01	1. 83742961845E-01
3. 95797752805E-01	2. 07834158821E-01	1. 40783934874E+03	6. 28614533579E-01	1. 85743022386E-01
3. 94797752805E-01	2. 11106005713E-01	1. 43090370462E+03	6. 31643536493E-01	1. 87762357662E-01
3. 93797752805E-01	2. 14431628623E-01	1. 45450065970E+03	6. 34701871475E-01	1. 89801247650E-01
3. 92797752805E-01	2. 17812136517E-01	1. 47864396369E+03	6. 37789966664E-01	1. 91859777776E-01
3. 91797752805E-01	2. 21248666415E-01	1. 50334775506E+03	6. 40908258572E-01	1. 93938839048E-01
3. 90797752805E-01	2. 24742384239E-01	1. 52862657341E+03	6. 44057192291E-01	1. 96038128194E-01
3. 89797752805E-01	2. 28294485690E-01	1. 55449537228E+03	6. 47237221700E-01	1. 98158147800E-01
3. 88797752805E-01	2. 31906197155E-01	1. 58096953248E+03	6. 50448809691E-01	2. 00299206461E-01
3. 87797752805E-01	2. 35578776647E-01	1. 60806487582E+03	6. 53692428386E-01	2. 02461618924E-01
3. 86797752805E-01	2. 39313514774E-01	1. 63579767945E+03	6. 56968559374E-01	2. 04645706250E-01
3. 85797752805E-01	2. 43111735753E-01	1. 66418469064E+03	6. 60277693946E-01	2. 06851795964E-01
3. 84797752805E-01	2. 46974798448E-01	1. 69324314213E+03	6. 63620333340E-01	2. 09080222227E-01
3. 83797752805E-01	2. 50904097457E-01	1. 72299076810E+03	6. 66996988998E-01	2. 11331325999E-01
3. 82797752805E-01	2. 54901064229E-01	1. 75344582066E+03	6. 70408182824E-01	2. 13605455216E-01
3. 81797752805E-01	2. 58967168229E-01	1. 78462708702E+03	6. 73854447453E-01	2. 15902964969E-01
3. 80797752805E-01	2. 63103918141E-01	1. 81655390727E+03	6. 77336326528E-01	2. 18224217686E-01
3. 79797752805E-01	2. 67312863119E-01	1. 84924619287E+03	6. 80854374990E-01	2. 20569583326E-01
3. 78797752805E-01	2. 71595594084E-01	1. 88272444581E+03	6. 84409159364E-01	2. 22939439576E-01
3. 77797752805E-01	2. 75953745065E-01	1. 91700977853E+03	6. 88001258074E-01	2. 25334172049E-01
3. 76797752805E-01	2. 80388994596E-01	1. 95212393457E+03	6. 91631261747E-01	2. 27754174498E-01
3. 75797752805E-01	2. 84903067164E-01	1. 98808931010E+03	6. 95299773546E-01	2. 30199849030E-01
3. 74797752805E-01	2. 89497734709E-01	2. 02492897614E+03	6. 99007409493E-01	2. 32671606329E-01
3. 73797752805E-01	2. 94174818185E-01	2. 06266670186E+03	7. 02754798826E-01	2. 35169865884E-01
3. 72797752805E-01	2. 98936189182E-01	2. 10132697855E+03	7. 06542584346E-01	2. 37695056231E-01
3. 71797752805E-01	3. 03783771601E-01	2. 14093504475E+03	7. 10371422788E-01	2. 40247615192E-01
3. 70797752805E-01	3. 08719543409E-01	2. 18151691226E+03	7. 14241985200E-01	2. 42827990134E-01
3. 69797752805E-01	3. 13745538447E-01	2. 22309939321E+03	7. 18154957337E-01	2. 45436638225E-01
3. 68797752805E-01	3. 18863848321E-01	2. 26571012820E+03	7. 22111040062E-01	2. 48074026708E-01
3. 67797752805E-01	3. 24076624361E-01	2. 30937761564E+03	7. 26110949770E-01	2. 50740633180E-01
3. 66797752805E-01	3. 29386079658E-01	2. 35413124220E+03	7. 30155418813E-01	2. 53436945875E-01
3. 65797752805E-01	3. 34794491183E-01	2. 4000131455E+03	7. 34245195956E-01	2. 56163463970E-01
3. 64797752805E-01	3. 40304201994E-01	2. 44701909234E+03	7. 38381046831E-01	2. 58920697887E-01
3. 63797752805E-01	3. 45917623526E-01	2. 49521682264E+03	7. 42563754420E-01	2. 61709169613E-01
3. 62797752805E-01	3. 51637237977E-01	2. 54462777570E+03	7. 46794119547E-01	2. 64529413032E-01
3. 61797752805E-01	3. 57465600791E-01	2. 59528628226E+03	7. 51072961391E-01	2. 67381974261E-01
3. 60797752805E-01	3. 63405343244E-01	2. 6472277239E+03	7. 55401118012E-01	2. 70267412008E-01
3. 59797752805E-01	3. 69459175132E-01	2. 70046681597E+03	7. 59779446899E-01	2. 73186297933E-01



TABLE IV (cont.)

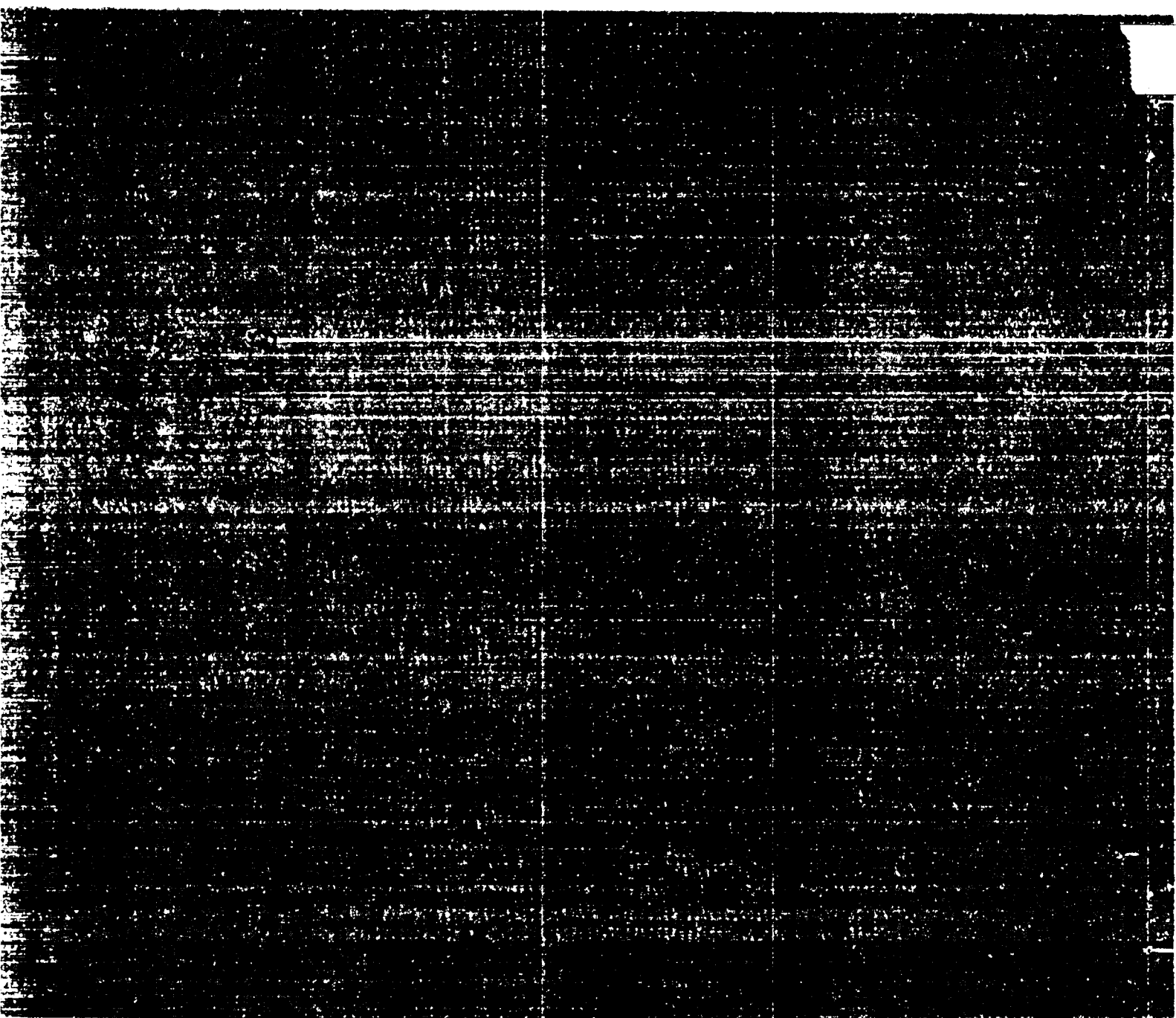
3.58797752805E-01	3.75629887577E-01	2.75510716494E+03	7.64208825539E-01	2.76139217026E-01
3.57797752805E-01	3.81920355944E-01	2.81112179720E+03	7.68690152000E-01	2.79126768000E-01
3.56797752805E-01	3.88333542882E-01	2.86857296257E+03	7.73224345540E-01	2.82149563694E-01
3.55797752805E-01	3.94872501495E-01	2.92750223060E+03	7.77812347235E-01	2.85208231490E-01
3.54797752805E-01	4.01540378648E-01	2.98795254046E+03	7.82455120630E-01	2.88303413753E-01
3.53797752805E-01	4.08340418407E-01	3.04996825310E+03	7.87153652413E-01	2.91435768276E-01
3.52797752805E-01	4.15275965637E-01	3.11359520555E+03	7.91908953117E-01	2.94605968745E-01
3.51797752805E-01	4.22350469750E-01	3.17888076770E+03	7.96722057840E-01	2.97814705227E-01
3.50797752805E-01	4.29567488612E-01	3.24587390158E+03	8.01594027001E-01	3.01062684667E-01
3.49797752805E-01	4.36930692628E-01	3.31462522326E+03	8.06525947114E-01	3.04350631409E-01
3.48797752805E-01	4.44443869004E-01	3.38518706756E+03	8.11518931599E-01	3.07679287733E-01
3.47797752805E-01	4.52110926195E-01	3.45761355559E+03	8.16574121622E-01	3.11049414415E-01
3.46797752805E-01	4.59935898553E-01	3.53196066548E+03	8.21692686958E-01	3.14461791305E-01
3.45797752805E-01	4.67922951185E-01	3.60828630620E+03	8.26875826899E-01	3.17917217933E-01
3.44797752805E-01	4.76076385027E-01	3.68665039489E+03	8.32124771189E-01	3.21416514126E-01
3.43797752805E-01	4.84400642149E-01	3.76711493765E+03	8.37440780997E-01	3.24960520665E-01
3.42797752805E-01	4.92900311305E-01	3.84974411416E+03	8.42825149927E-01	3.28550099951E-01
3.41797752804E-01	5.01580133729E-01	3.93460436623E+03	8.48279205066E-01	3.32186136711E-01
3.40797752804E-01	5.10445009216E-01	4.02176449051E+03	8.53804308078E-01	3.35869538718E-01
3.39797752804E-01	5.19500002464E-01	4.11129573555E+03	8.59401856334E-01	3.39601237556E-01
3.38797752804E-01	5.28750349734E-01	4.20327190358E+03	8.65073284091E-01	3.43382189394E-01
3.37797752804E-01	5.38201465810E-01	4.29776945707E+03	8.70820063721E-01	3.47213375814E-01
3.36797752804E-01	5.47858951295E-01	4.39486763049E+03	8.76643706977E-01	3.51095804652E-01
3.35797752804E-01	5.57728600254E-01	4.49464854743E+03	8.82545766329E-01	3.55030510886E-01
3.34797752804E-01	5.67816408228E-01	4.59719734354E+03	8.88527836335E-01	3.59018557557E-01
3.33797752804E-01	5.78128580629E-01	4.70260229546E+03	8.94591555084E-01	3.63061036723E-01
3.32797752804E-01	5.88671541555E-01	4.81095495608E+03	9.00738605685E-01	3.67159070457E-01
3.31797752804E-01	5.99451943026E-01	4.92235029667E+03	9.06970717832E-01	3.71313811888E-01
3.30797752804E-01	6.10476674685E-01	5.03688685603E+03	9.13289669419E-01	3.75526446279E-01
3.29797752804E-01	6.21752873981E-01	5.15466689723E+03	9.19697288237E-01	3.79798192158E-01
3.28797752804E-01	6.33287936857E-01	5.27579657232E+03	9.26195453734E-01	3.84130302489E-01
3.27797752804E-01	6.45089528983E-01	5.40038609544E+03	9.32786098853E-01	3.88524065902E-01
3.26797752804E-01	6.57165597561E-01	5.52854992493E+03	9.39471211950E-01	3.92980807966E-01
3.25797752804E-01	6.69524383727E-01	5.66040695479E+03	9.46252838791E-01	3.97501892527E-01
3.24797752804E-01	6.82174435602E-01	5.79608071629E+03	9.53133084644E-01	4.02088723096E-01
3.23797752804E-01	6.95124622015E-01	5.93569959004E+03	9.60114116454E-01	4.06742744303E-01
3.22797752804E-01	7.08384146948E-01	6.07939702949E+03	9.67198165121E-01	4.11465443414E-01
3.21797752804E-01	7.21962564736E-01	6.22731179621E+03	9.74387527874E-01	4.16258351916E-01
3.20797752804E-01	7.35869796084E-01	6.37958820791E+03	9.81684570759E-01	4.21123047173E-01
3.19797752804E-01	7.50116144936E-01	6.53637639995E+03	9.89091731229E-01	4.26061154153E-01
3.18797752804E-01	7.64712316247E-01	6.69783260100E+03	9.96611520866E-01	4.31074347244E-01
3.17797752804E-01	7.79669434738E-01	6.86411942405E+03	1.00424652821E+00	4.36164352142E-01
3.16797752804E-01	7.94999064657E-01	7.03540617336E+03	1.01199942175E+00	4.41332947835E-01
3.15797752804E-01	8.10713230647E-01	7.21186916871E+03	1.01987295301E+00	4.46581968672E-01
3.14797752804E-01	8.26824439762E-01	7.39369208784E+03	1.02786995981E+00	4.51913306537E-01
3.13797752804E-01	8.43345704730E-01	7.58106632828E+03	1.03599336968E+00	4.57328913122E-01
3.12797752804E-01	8.60290568513E-01	7.77419138994E+03	1.04424620346E+00	4.62830802307E-01
3.11797752804E-01	8.77673130281E-01	7.97327527969E+03	1.05263157899E+00	4.68421052660E-01
3.10797752804E-01	8.95508072868E-01	8.17853493942E+03	1.06115271508E+00	4.74101810052E-01
3.09797752804E-01	9.13810691819E-01	8.39019669922E+03	1.06981293561E+00	4.79875290407E-01
3.08797752804E-01	9.32596926131E-01	8.60849675719E+03	1.07861567387E+00	4.85743782581E-01
3.07797752804E-01	9.51883390801E-01	8.83368168794E+03	1.08756447708E+00	4.91709651388E-01
3.06797752804E-01	9.71687411308E-01	9.06600898143E+03	1.09666301117E+00	4.97775340780E-01
3.05797752804E-01	9.92027060151E-01	9.30574761447E+03	1.10591506577E+00	5.03943377180E-01

Printed in the United States of America  
 Available from  
 National Technical Information Service  
 US Department of Commerce  
 225 Port Royal Road  
 Springfield, VA 22161

Microfilm (A01)

NTIS		NTIS		NTIS		NTIS	
Page Range	Price Code	Page Range	Price Code	Page Range	Price Code	Page Range	Price Code
001-025	A02	151-175	A08	301-325	A14	451-475	A20
026-050	A03	176-200	A09	326-350	A15	476-500	A21
051-075	A04	201-225	A10	351-375	A16	501-525	A22
076-100	A05	226-250	A11	376-400	A17	526-550	A23
101-125	A06	251-275	A12	401-425	A18	551-575	A24
126-150	A07	276-300	A13	426-450	A19	576-600	A25
						601 up*	A99

\*Contact NTIS for a price quote.



Los Alamos