IRRADIATION PARAMETERS FOR THE FFTF MATERIALS OPEN TEST ASSEMBLIES FROM 1983 THROUGH 1992 - A. M. Ermi (Westinghouse Hanford Company), L. R. Greenwood and H. L. Heinisch (Pacific Northwest Laboratory)[a]

OBJECTIVE

The objective of this effort was to report on the final irradiation parameters for all Materials Open Test Assemblies (MOTAs) irradiated in the Fast Flux Test Facility (FFTF). The report covers all nine MOTAs irradiated from 1983 through 1992.

SUMMARY

Results from final analyses of MOTA dosimetry were used to generate listings of irradiation damage parameters for all test locations in all nine MOTAs. Temperature information for all MOTAs is also summarized, and issues regarding temperature transients and gradients are discussed. This report serves as an official reference on the temperatures and damage parameters for all MOTAs and is the basis for more detailed listings of irradiation histories for all MOTA specimens.

PROGRESS AND STATUS

Introduction

From 1983 through 1992, nine MOTAs were irradiated in the FFTF at Hanford, Washington: MOTAs 1A through 1G, and MOTAs 2A and 2B. Each test vehicle was irradiated for approximately one year, except MOTA-1B which was irradiated for only four months to obtain low fluence data. The complete MOTA operating history is detailed in Table 1.

At the conclusion of each FFTF cycle or MOTA irradiation, reports were issued which detailed (a) operation of the test and support hardware in the FFTF, (b) the performance of the MOTA vehicle, and (c) the temperature histories. The complete listing of these reports is included as references 1 through 15. References 1, 2, 3, 5, and 7 are summary reports for MOTAs 1A, 1B, 1C, and the first half of MOTA-1D; references 4, 6, and 8 through 15 are comprehensive reports for MOTAs 1C through 2B, and contain complete sets of temperature plots. Deficiencies in the original data acquisition system prevented generation of comprehensive temperature plots for MOTAs 1A and 1B.

Although the MOTA temperatures have been well documented, no official reports have documented key irradiation damage parameters, specifically fast fluence and dpa, for all of the MOTA test positions and specimens. This report uses the final results of the MOTA dosimetry analyses to specify these damage parameters for the MOTA test positions. All of the details regarding the MOTA configurations and parameters have been specified elsewhere.[16] It is beyond the scope of this report to list the detailed irradiation histories of all MOTA specimens; that information is available through the Pacific Northwest Laboratory (PNL) program coordinators. Copies of these specimen listings, customized for specific experimenters, have also been transmitted to each experimenter.

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Table 1. MOTA Operating History

MOTA	FFTF Cycle Number	Cycle Startup	Cycle Shutdown	Cycle EFPD	MOTA EFPD
1A	2	Jan. 18, 1983	May 22, 1983	100.5	202.0
	3	July 01, 1983	Oct. 23, 1983	101.5	
1B	4	Jan. 01, 1984	Apr. 23, 1984	109.5	109.5
1C	5	June 16, 1984	Nov. 03, 1984	122.7	256.7
	6	Dec. 26, 1984	June 24, 1985	134.0	
1D	7	Aug. 17, 1985	Jan. 03, 1986	122.8	185.8
	8	Feb. 05, 1986	July 19, 1986	63.0	
1E	9A	Sep. 10, 1986	Feb. 05, 1987	137.7	341.8
	9B	Mar. 04, 1987	June 20, 1987	106.4	
	9C	July 01, 1987	Oct. 10, 1987	97.7	
1F	10A	Nov. 18, 1987	May 08, 1988	151.8	335.4
	10B	June 11, 1988	Oct. 17, 1988	126.7	
	10C.1	Nov. 09, 1988	Jan. 08, 1989	56.9	
1G & 2A	11B.1	Jan. 04, 1990	Apr. 09, 1990	85.5	299.7
	11B.2	May 29, 1990	Oct. 28, 1990	132.7	
	11C	Dec. 20, 1990	Mar. 19, 1991	81.5	
2B	12A-1	May 27, 1991	July 20, 1991	52.8	203.3
	12A-2	July 30, 1991	Sep. 21, 1991	48.6	
	12B-1	Nov. 21, 1991	Jan. 15, 1992	50.3	
	12B-2	Jan. 26, 1992	Mar. 19, 1992	51.6	

Note: FFTF reactor power was 400 MWth through Cycle 8, and 291 MWth thereafter.

MOTA Configuration

Each MOTA vehicle consisted of nine levels: a below-core (BC) level, in-core levels 1 through 5, and above-core levels 6 through 8. Each level was approximately 21.5 cm (8.5 inches) in axial length, although there were exceptions (below-core levels and special tests in level 5). Each level could accommodate up to six instrumented MOTA canisters or special capsules, except the MOTA-1 series below-core level which could accommodate 7 uninstrumented canisters. The specimen regions in the canisters (or capsules in some cases) were typically 12.7 to 16.2 cm (5 to 6.4 inches) long by approximately 2.8 cm (1.1 inches) in diameter. Canisters typically contained stacks of baskets of various lengths that contained the test specimens. Some of the canisters were instrumented with temperature control gas lines, thermocouples, or other gas and electrical lines.

Information used to describe each MOTA canister location is as follows:

(a) The canister number (e.g., BCA, 1F, 8E);

(b) The operating temperature (from the temperature analysis reports);

(c) The program sponsor (e.g., Fusion, Monbusho, Surveillance, High Heat Flux);

(d) Type of canister (e.g., Weeper or Gas-gapped);

(e) Thermocouple type (e.g., Type K, Type C, Offset Type K, none);

(f) Basket numbers and basket lengths;

(g) The axial location (z-value) of the top of the top basket with respect to the core horizontal midplane; and

(h) Canister footnote (information pertaining to the entire canister, such as any over-temperatures or temperature change tests).

The information described above was reproduced in various formats with a MOTA canister matrix layout which shows the canister levels vertically (from bottom to top: BC, 1, 2, . . . 7, 8, similar to their positions in reactor), and the individual canister positions for each level (A, B, . . . E, F and O, where O represents the MOTA-1 below-core central position). The program sponsor matrices, thermocouple matrices, basket (or capsule) length matrices, and the axial position z-values matrices are provided in reference 16.

Temperature Results

As stated, reports were generated after each MOTA irradiation tabulating detailed temperature information for each canister containing a thermocouple (and plotted for MOTA-1C and beyond). The temperatures listed in these reports reflected averages at the thermocouple locations. However, the single temperature value assigned to a particular MOTA canister may not always give the complete picture. Experimenters using this temperature information to describe their irradiation conditions should consider transients, radial gradients, and axial gradients.

A. Transients

The temperatures recorded from the thermocouples were time-averaged over the duration of the irradiation. Values below 300°C were not used in the calculations since they normally represented a zero reactor power condition (the zero power, standby heatup temperature was 325°C; the coolant temperature during shutdowns was approximately 210°C). The reported temperatures were nearly always equal to the average temperatures at the thermocouples at full reactor power, because the times spent at lower temperatures and lower power levels during startups and shutdowns were much shorter than the duration of the irradiation. The exception was during FFTF Cycle 8 (see below).

However, as pointed out in the performance reports, the experimenters should always review the temperature plots to become aware of the temperature fluctuations and transients that cannot easily be quantified in tabular form. This is especially true for specimens that were irradiated in MOTA-1D during FFTF Cycles 7 and 8. During Cycle 7, all 25 temperature-controlled gas-gapped canisters experienced over-temperatures of 63° to 280°C for 50 to 70 minutes due to an inadvertent purge of the gas gaps with argon instead of helium (Table 2).[8] Specimens in the 18 weeper canisters were unaffected. During Cycle 8, a series of reactor transient tests resulted in temperature profiles for all canisters (gas-gapped and weeper) that mirrored these tests.[9]

In addition to these off-normal circumstances, the manner in which the reactor and/or the MOTA control system were routinely shut down at the end of cycles has affected specimen substructures and materials behavior.[17] Again, the experimenters should review the shutdown histories for each MOTA when interpreting their data.

Table 2. Canister Footnotes for all MOTAs

No.	FOOTNOTE DESCRIPTION
aa	MOTA-1A, Can. 1B: 155°C over-temp. to 695°C for 4 min due to oper. error
ab	MOTA-1A, Can. 1F: TC blanketed; read 540°C, but specimens est. at 410°C
ac	MOTA-1A, Can. 2E: Temp. change experiment: 575 -> 570 -> 560 -> 555°C
ad	MOTA-1A, Can. 3A: Specimens blanketed from P.T. gas; temp. exceeded 900°C
ae	MOTA-1A, Can. 3C: 183°C over-temp. to 758°C for 4 min due to oper. error
af	MOTA-1A, Can. 3F: Specimens blanketed from P.T. gas; canister failed
ag	MOTA-1A, Can. 6D: 53°C over-temp. to 558°C for 4 min due to oper. error
ah	MOTA-1B, Can. 2B: 215°C over-temp. to 820°C for 6 min due to P.T. gas
ai	MOTA-1B, Can. 2E: Temp. change experiment: 555 -> 545 -> 540 -> 535°C
aj	MOTA-1B, Can. 3A: Specimens blanketed from P.T. gas; canister failed
ak	MOTA-1C, Can. 1B: Temp. change experiment: 550 -> 535 -> 525°C
al	MOTA-1C, Can. 1C: Bad TC; He purged; over-temp. @ Ar back-leak. indeterm.
am	MOTA-1C, Can. 4A: 85°C over-temp. to 755°C for 1.5 min due to P.T. gas
an	MOTA-1C, Can. 4F: Interm. bad TC; max. over-temp. of 73°C @ Ar back-leak.
ao	MOTA-1D, Can. 1A: 216°C over-temp. to 766°C for 50 min due to Ar purge
ap	MOTA-1D, Can. 1B: 156°C over-temp. to 676°C for 50 min due to Ar purge
aq	MOTA-1D, Can. 1C: 187°C over-temp. to 657°C for 70 min due to Ar purge
ar	MOTA-1D, Can. 1D: 134°C over-temp. to 629°C for 50 min due to Ar purge
as	MOTA-1D, Can. 1E: 186°C over-temp. to 771°C for 50 min due to Ar purge
at	MOTA-1D, Can. 2A: 201°C over-temp. to 721°C for 50 min due to Ar purge
au	MOTA-1D, Can. 2B: 249°C over-temp. to 849°C for 50 min due to Ar purge
av	MOTA-1D, Can. 3A: 235°C over-temp. to 840°C for 50 min due to Ar purge
aw	MOTA-1D, Can. 3B: 215°C over-temp. to 765°C for 60 min due to Ar purge
ax	MOTA-1D, Can. 3C: 206°C over-temp. to 811°C for 50 min due to Ar purge
ay	MOTA-1D, Can. 3D: 250°C over-temp. to 920°C for 50 min due to Ar purge
az	MOTA-1D, Can. 3E: 255°C over-temp. to 890°C for 50 min due to Ar purge
ba	MOTA-1D, Can. 3F: 184°C over-temp. to 934°C for 50 min due to Ar purge
bb	MOTA-1D, Can. 4A: 271°C over-temp. to 941°C for 50 min due to Ar purge
bc	MOTA-1D, Can. 4B: 280°C over-temp. to 1010°C for 50 min due to Ar purge
bd	MOTA-1D, Can. 4C: 193°C over-temp. to 733°C for 50 min due to Ar purge
be	MOTA-1D, Can. 4D: 199°C over-temp. to 749°C for 50 min due to Ar purge
bf	MOTA-1D, Can. 4E: 179°C over-temp. to 754°C for 50 min due to Ar purge
bg	MOTA-1D, Can. 4F: 278°C over-temp. to 928°C for 50 min due to Ar purge
bh	MOTA-1D, Can. 5A: 171°C over-temp. to 706°C for 50 min due to Ar purge
bi	MOTA-1D, Can. 5B: 206°C over-temp. to 756°C for 50 min due to Ar purge
bj	MOTA-1D, Can. 5C: 181°C over-temp. to 751°C for 50 min due to Ar purge
bk	MOTA-1D, Can. 5D: 206°C over-temp. to 806°C for 50 min due to Ar purge
bl	MOTA-1D, Can. 5E: 218°C over-temp. to 818°C for 50 min due to Ar purge
bm	MOTA-1D, Can. 6E: 63°C over-temp. to 553°C for 50 min due to Ar purge
bn	MOTA-1E, Can. 2A: 83°C over-temp. to 603°C for <1 min due to faulty blender
bo	MOTA-1E, Can. 3C: Frequent temp. spikes & drop in He % (exit line loose)
bp	MOTA-1E, Can. 3D: Failed during Cycle 9A; Na entered gap; Temp --> 440°C
bq	MOTA-1E, Can. 5A: Cycles 9A, 9B & 9C temps: 799, 775, & 784°C @ 100% Ar
br	MOTA-1F, Can. 5F: Cyc 10A,B,C & 10 temps: 1244,1263,1232,1250°C (TC failed)
bs	MOTA-1G, Can. BD: Canister bottom burned when removed from Below-Core Can
bt	MOTA-1G, Can. BE: Canister bottom burned when removed from Below-Core Can
bu	MOTA-1G, Can. 5A: Over-temp. 17 times (1-4°C) due to vent & blender problem
bv	MOTA-2A, Can. 1C: BEATRIX-II Solid Sample; Cycle 11 temps 920-1040°C
bw	MOTA-2A, Can. 1E: BEATRIX-II Ring Sample; Cycle 11 temps 550-670°C
bx	MOTA-2A, Can. 2F: Over-temp. 8 times (2-13°C) due to faulty solenoid valve
by	MOTA-2A, Can. 5A: Over-temp. 7 times (1-9°C) due to blender problem
bz	MOTA-2A, Can. 5D: Over-temp. 7 times (1-10°C): gas buildup/blender problems
ca	MOTA-2B, Can. 1B: BEATRIX-II Ring Sample; Cycle 12 temps 530-645°C
cb	MOTA-2B, Can. 2C: BEATRIX-II Solid Sample; Cycle 12 temps 1025-1110°C

B. Radial Gradients

Radial gradients across MOTA gas-gapped canisters are inherent to the design and are nearly impossible to avoid. The magnitude of the gradient from the center of a canister to the inner wall varies with the axial location in reactor, the design temperature, the specimen compositions, and the specimen mass distribution. For most of the typical MOTA canisters, the gradients were 5° to 20°C, with most in the 10° to 15°C range. Since these values were across the radius of the canister (1.3 cm or 0.5 inch), the actual temperature gradients across typical, smaller specimens were proportionally smaller.

As stated, reported temperatures were at the thermocouple locations. Therefore, for most MOTA canisters that contained a centerline thermocouple, the temperatures represented a maximum at that axial location and some specimens were slightly cooler. Conversely, for the few offset thermocouple canisters, the temperatures represented a minimum and some specimens were slightly warmer.

The radial temperature gradients are for gas-gapped canisters and weeper canisters, in which the specimens are in contact with reactor sodium. The arguments would also apply to specimens in lithium-filled subcapsules. However, temperatures of specimens in helium-filled subcapsules could be expected to be even higher due to the gradients caused by the presence of the additional helium-filled gaps. The exact magnitude of the temperatures would depend on several factors and would require separate, complex calculations.

C. Axial Gradients

Weeper canisters exhibit unavoidable axial temperature gradients of about 5° to 10°C from the bottoms to the tops of the canisters because the sodium coolant heats up as it travels through the MOTA.

For gas-gapped canisters, the coolant temperature profile is factored into the design, and in theory, centerline axial temperatures should be fairly uniform. However, pressurized-tube diameter measurement data from MOTAs 1A through 1E suggest axial temperature gradients on the order of 30°C; both ends of the canisters were apparently running hotter than the readings of the central thermocouples. The axial gradient at the top of canisters was confirmed during a multi-thermocouple test in MOTA-1E. No conclusion could be made regarding the bottom of canisters because the thermocouple braze failed and the bottom of the test canister filled with sodium.[10]

As a result of this knowledge, much effort went into reviewing the original MOTA canister design, and performing new, detailed two-dimensional design calculations. The canister design was changed to flatten the axial temperature profiles by shortening the large insulating gap at the tops of canisters, and by adding shims at the sodium inlet ends of canisters.[18] The changes preceded the design of the MOTA-1F canisters. Axial gradients for canisters irradiated in MOTA-1F and beyond should be on the order of ±10°C.

In conclusion, if test specimen data are sensitive to temperature variations and the types of temperature uncertainties described, experimenters should (a) make an effort to "correct" their temperature values, if possible, and (b) factor pertinent temperature transient information into the interpretation of their results.

Dosimetry Results

Each MOTA vehicle contained a variety of dosimeters at several radial and axial positions along the specimen regions.[16] The dosimeters were to be analyzed shortly after each irradiation to characterize the irradiation environment for each MOTA. However, for various reasons (related to manpower and budgetary considerations), the analyses were incomplete and results were sometimes inconsistent.

These inconsistencies and the resulting lack of comprehensive, final MOTA dosimetry reports delayed this report. Unofficial listings for MOTA test locations and MOTA specimens, based on available dosimetry results or physics calculations, have been available to the experimenters on request, but the authors were reluctant to publish and distribute a detailed report until the dosimetry analysis issues had been resolved.

On completion of the MOTA 1F, 1G, 2A and 2B dosimetry analyses, all past dosimetry (except for that from MOTA-1D) was re-analyzed with a consistent code and correction factors. The temperature excursion that resulted in suspect data from most specimens in temperature controlled canisters and a lack of resources during that period of time led to the failure to analyze the MOTA-1D data. In this case, the fluence and dpa profiles were based on the flux and dpa-rate curves generated for MOTAs 1A, 1B and 1C. [Note that the FFTF operated at 400 MW thermal (MWth) through Cycle 8 (MOTAs 1A through 1D), and at 291 MWth for the Core Demonstration Experiment during Cycle 9 and beyond (MOTAs 1E through 2B).]

The details of the radiometric counting, raw data, and numerical analysis of the MOTA dosimetry are described elsewhere.[19-27] The fast fluence and dpa data that resulted from the analyses were used to generate smooth curves depicting axial flux, fluence, dpa rate and dpa profiles for each MOTA. The axial region of interest was typically -78 to +129 cm (-31 to +51 inches) from the FFTF core horizontal midplane (HMP). The FFTF core extends ±46.1 cm (±18.1 inches) from the HMP.

From the smooth curves, flux and dpa-rate values were assigned to axial position "z-values" approximately every 5 to 10 cm (2 to 4 inches). These flux and dpa-rate values were used for calculating all damage parameters of MOTA test positions. Note that the fast flux and fast fluence values are for energies greater than 0.1 MeV, and the dpa rates and dpa values are for an Fe-18Cr-8Ni stainless steel.

Plots of the fast flux versus distance from the horizontal midplane were generated for all MOTAs except MOTA-1D.[16] Data from MOTAs 1A, 1B and 1C were combined to generate a single fast flux profile for MOTAs 1A through 1D. The points shown with the curves in reference 16 represent the results from the analysis of the dosimetry spectral sets. All six of the fast flux profiles are replotted in Figure 1 for comparison.

Similar to the fast flux plots, plots of the dpa rate versus distance from the horizontal midplane for all MOTAs (except MOTA-1D) were also generated.[16] Again, data from MOTAs 1A, 1B and 1C were combined to generate a single profile that was used for MOTAs 1A through 1D. All six of the dpa rate profiles are replotted in Figure 2 for comparison.

Close examination of the curves in Figures 1 and 2 reveals that the MOTA 1A (1B, 1C) curve is, in general, higher than the curves for MOTAs 1E through 2B particularly from below-core to near the top of the core. This is to be expected because the FFTF operated at 400 MWth during irradiation of MOTAs 1A through 1D and at 291 MWth during irradiation of MOTAs 1E through 2B. When the data are normalized for power by comparing the fast fluence per MWD or dpa/MWD for all of the MOTAs (Table 3), the differences diminish.

The variations in neutron flux for the different MOTAs are greater than the uncertainties in the measured neutron fluxes from the dosimetry analyses. These differences in the fluxes (normalized by the reactor power, as shown in Table 3) are greatest in the regions below and above the FFTF core. Major environmental effects on these fluxes in the out-of-core regions include the specimen test matrices in each MOTA, the local power distribution in the core, and the characteristics of the nearest neighbor assemblies. For example, MOTA-1E contained significant quantities of europium oxide in level 6 (just above the

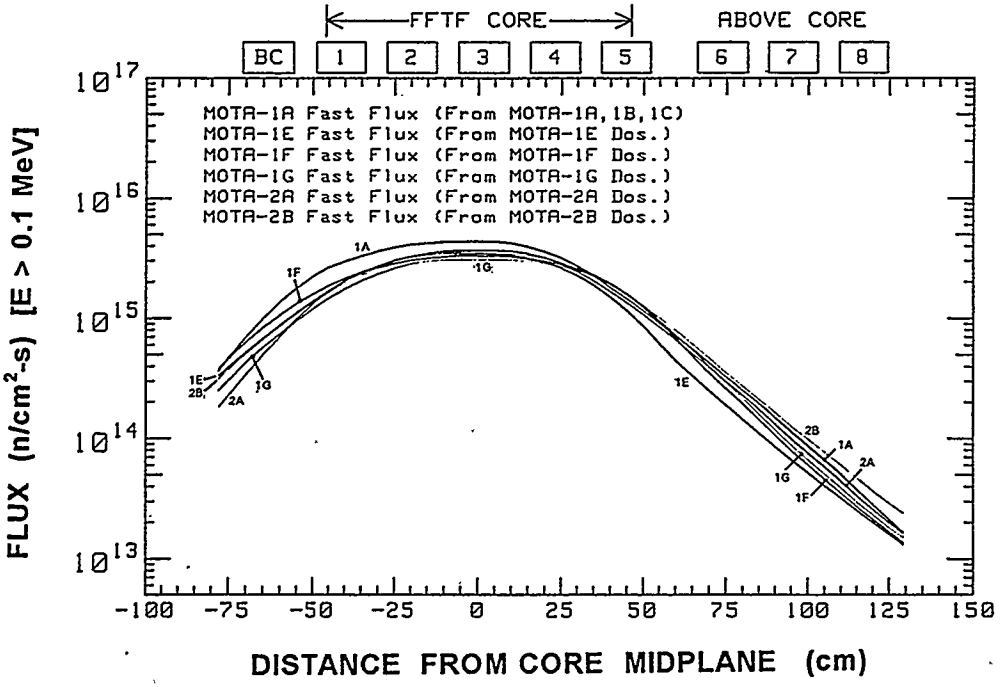

Figure 1. Fast Flux vs. Distance from Core Midplane for MOTAs 1A-1C, 1E-1G, 2A and 2B.

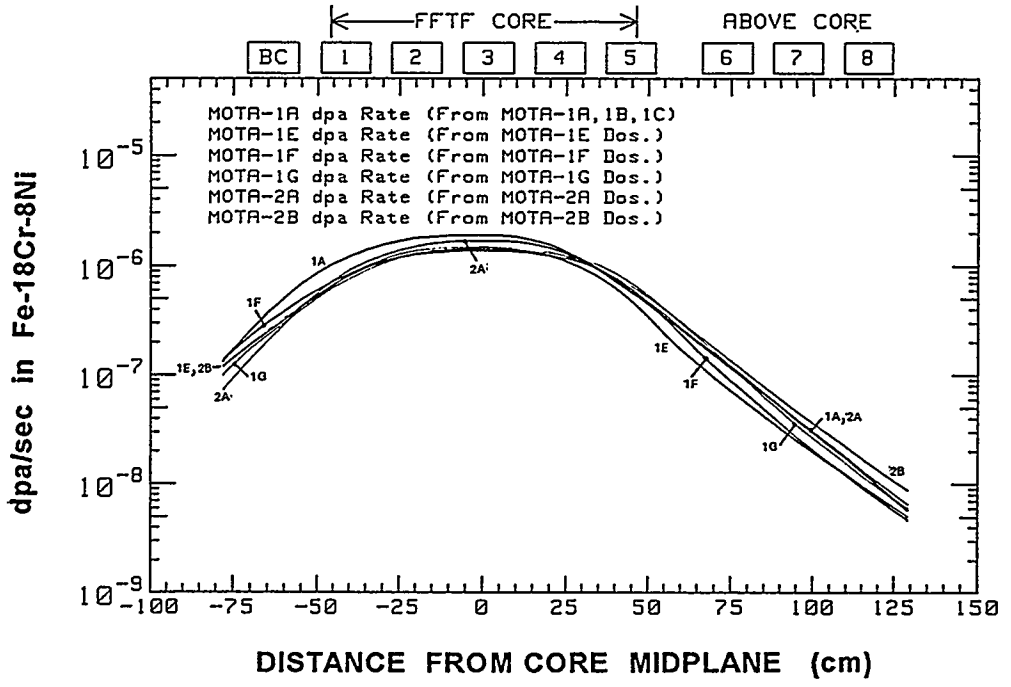

Figure 2. Dpa Rate vs. Distance from Core Midplane for MOTAs 1A-1C, 1E-1G, 2A and 2B.

core). Europium oxide has a large neutron-capture cross-section; therefore, one would expect the neutron flux in the above core region for this MOTA to be depressed relative to other MOTA fluxes at this level. Indeed, this flux suppression is clearly obvious in the flux and dpa plots shown in Figures 1 and 2, respectively. Similarly, MOTA-2A contained significantly more enriched lithium-6 ceramics at and near the bottom of the core than the other MOTAs (including MOTA-2B). Again the neutron flux for MOTA-2A would likely be suppressed in the below-core region, and indeed flux suppression is obvious in the flux and dpa plots of Figures 1 and 2, respectively.

Table 3. Comparison of MOTA Fluence/MWD and dpa/MWD Values

MOTA	Fast Fluence/MWD (10^{17} n/cm^2 per MWD)			Dpa/MWD (10^{-4} dpa per MWD)		
	BELOW CORE z = -65 cm	CORE CENTER z = 0 cm	ABOVE CORE z = +122 cm	BELOW CORE z = -65 cm	CORE CENTER z = 0 cm	ABOVE CORE z = +122 cm
1A,1B,1C	2.16	9.40	0.0538	0.808	4.13	0.0187
1E	2.01	10.2	0.0531	0.733	4.39	0.0205
1F	2.51	9.80	0.0564	0.909	4.13	0.0195
1G	1.72	9.17	0.0621	0.698	4.28	0.0251
2A	1.50	10.8	0.0680	0.621	5.05	0.0278
2B	2.00	10.2	0.0977	0.763	4.39	0.0360
	↓	↓	↓	↓	↓	↓
Max. Difference Between MOTAs	67%	18%	84%	46%	22%	92%

The locations of the MOTAs in the reactor and the nearest neighbor assemblies influence the neutron environment for each MOTA. The core positions for all MOTAs and the neighboring assemblies for each MOTA irradiation cycle are shown in Figures 3 and 4, respectively. A quick glance at Figure 4 reveals numerous changes from cycle-to-cycle in the core assemblies surrounding the MOTAs. Even when the general configuration appears unchanged, rotation and movement of fuel assemblies routinely occurred.

Power distribution in the FFTF core was changed to accommodate different reactor missions and specific experimenter needs, or to optimize fuel utilization. This impacted the axial and radial flux distributions at the MOTA positions. For example the axial power distribution for the FFTF core when operated at 400 MWth peaked more toward the lower end of the core than when the FFTF was operated at 291 MWth. Comparison of the flux distribution for MOTA-1A (B and C) to the axial flux profiles for the other MOTA irradiations provides evidence of the shift in power distribution.

The effect of the nearest neighbor fuel assemblies on the MOTA fluxes is more complex. A typical driver assembly has axial reflectors at the top and bottom of the fuel region. Several test fuel assemblies located next to the MOTA positions, however, had different geometries. For example, the Core Demonstration Experiment (CDE) test assemblies included axial blankets above and below the fuel region. These blankets absorbed neutrons early during the irradiation and then became a source of neutrons as

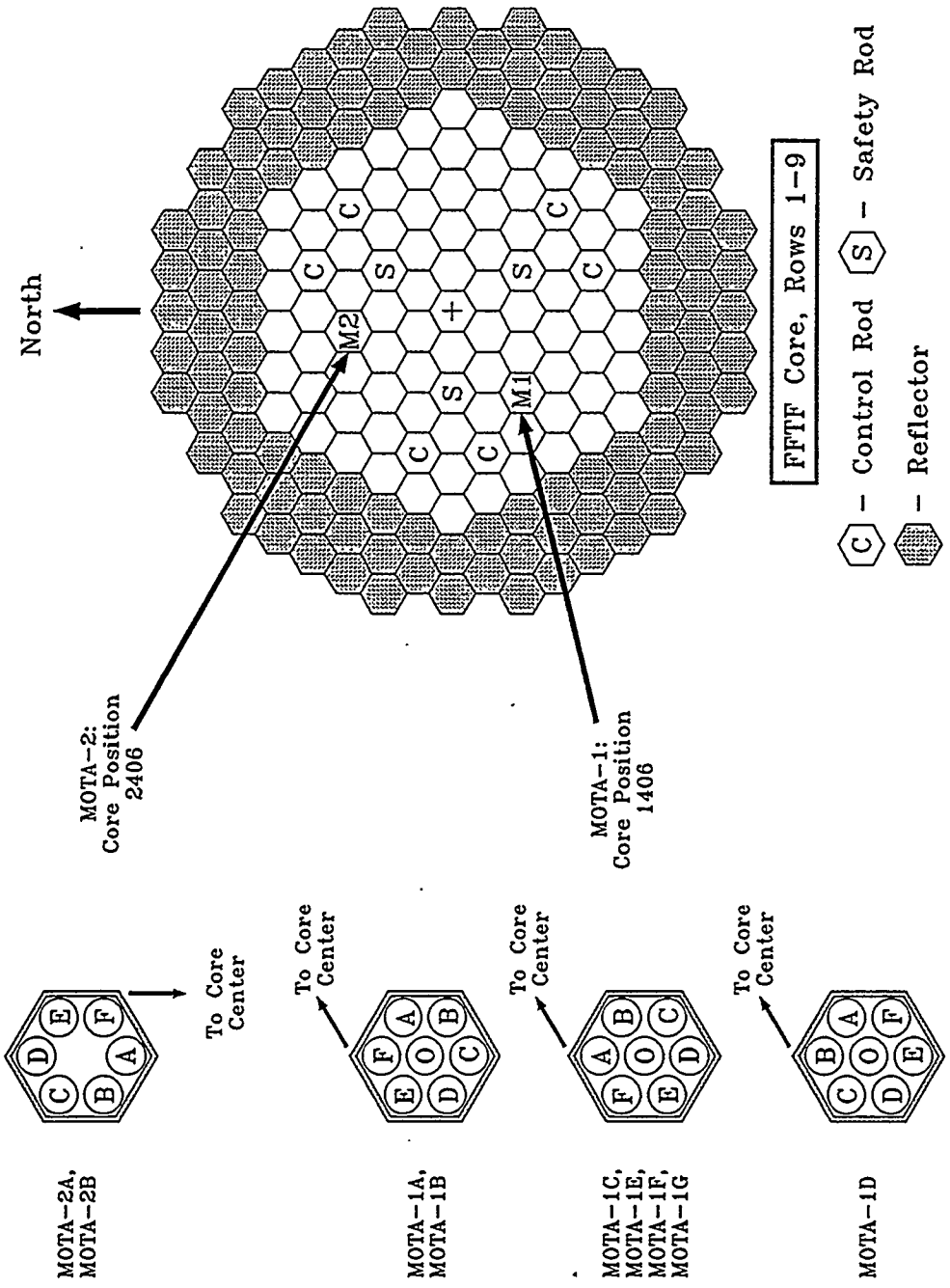

Figure 3. Locations and Orientations of the MOTA Vehicles in FFTF.

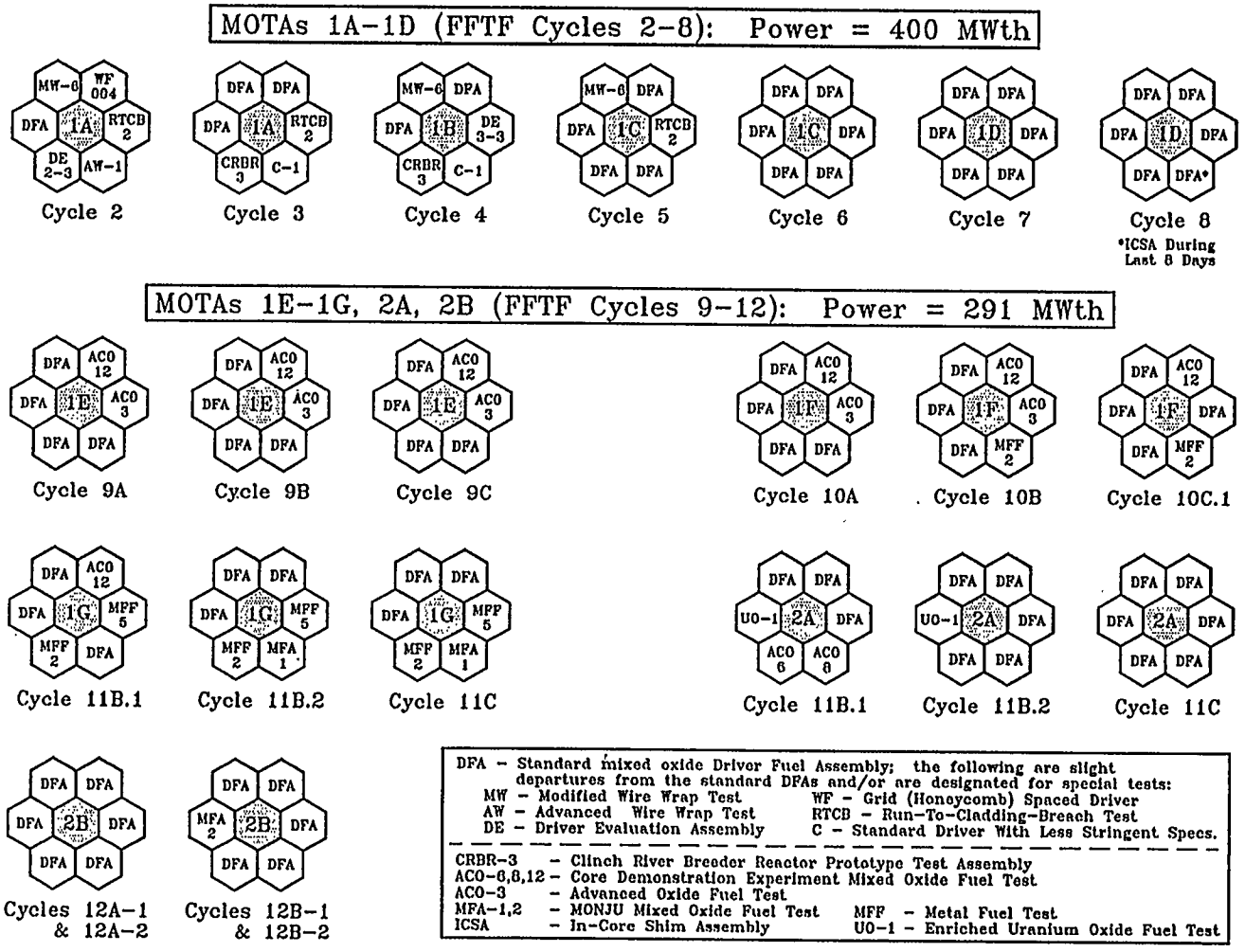

Figure 4. Assemblies Surrounding the MOTA Vehicles During FFTF Cycles 2-12.

plutonium was "bred" into the blanket. The Metal Fuel test assemblies contained a fuel that produced a higher mean energy for the neutrons and did not have axial reflectors above the fuel region. These differences would influence the neutron fluxes and would have a measurable impact in the flux regions outside the core.

As seen in Figure 3, each MOTA consists of specimen canisters in radial positions designated by A through G (and O for MOTA-1). Since the dosimeters were in various canisters, radial effects became a concern. Radial effects as high as 10% were observed at some axial locations where multiple-gradient-set dosimeters were located.[21] However, due to a lack of a comprehensive radial mapping of the MOTAs, radial effects were not factored into the final "smooth data" flux and dpa rate curves for the MOTA axial locations. The flux and dpa rate values depicted by the curves are therefore considered to be average values for each axial location.

In summary, there are uncertainties associated with the flux and dpa rate data; but there are also valid explanations for the differences illustrated in Figures 1 and 2 and tabulated in Table 3. Therefore, these curves were accepted on their own merit and were used to determine fast fluence and dpa values for all MOTA axial locations. Plots of the fast fluence versus distance from the horizontal midplane for all MOTAs are shown in Figures 5, 6 and 7; plots of the dpa (in an Fe-18Cr-8Ni stainless steel) versus distance from the horizontal midplane for all MOTAs are shown in Figures 8, 9 and 10.

Finally, one parameter of interest to experimenters is the ratio of the dpa to fluence, a value that is frequently used to quickly estimate dpa given the fluence, or vice versa. Smoothed curves of dpa/(10^{22} n/cm^2) [E>0.1 MeV], based on the described dpa and fluence curves, are shown in Figure 11. Since these curves were generated from the ratio of two curves, they are highly sensitive to small deviations in either curve. Consequently, one should not be concerned by the differences exhibited among the MOTAs. For most of the in-core region, the value for an Fe-18Cr-8Ni stainless steel was 4.2 to 4.6, or an average of about 4.4 dpa/(10^{22} n/cm^2). The average out-of-core value was about 3.8 dpa/(10^{22} n/cm^2).

The "smooth curve" dosimetry information for all MOTAs is listed in reference 16.

MOTA Damage Parameters

Matrices showing the fast fluence and dpa values for each basket (or capsule) were generated from the dosimetry information, the basket length information, and the basket z-values. Values were calculated for the tops of the top baskets, the bottoms of the bottom baskets, and the centers of all baskets. The values were determined by linear interpolation (on a semi-log scale) of the dosimetry curves.

Tables 4 through 12 list canister matrices of the fast fluence information. Again note that the values are for energies greater than 0.1 MeV. Tables 13 through 21 list the dpa information for an Fe-18Cr-8Ni stainless steel; experimenters will need to apply an appropriate dpa correction factor for other materials.[28]

Finally, the values in Tables 4 through 21 may not exactly match those values in the detailed specimen listings that are available to the MOTA experimenters. The values in Tables 4 through 21 are for the centers of the baskets or capsules. Values assigned to the specimens were calculated for the center of each specimen (or subcapsule). Therefore, short specimens and longer specimens located side-by-side in the same basket may have slightly different fluence and dpa values. Similarly, specimens that were stacked vertically in a basket or capsule may also have slightly different fluence and dpa values.

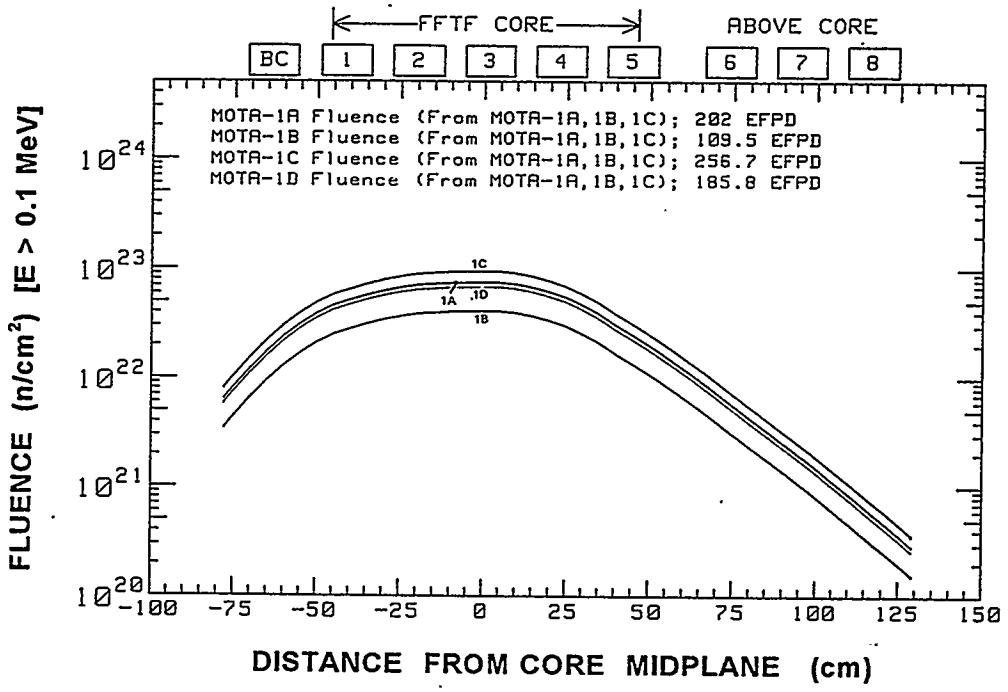

Figure 5. Fast Fluence vs. Distance from Core Midplane for MOTAs 1A, 1B, 1C and 1D.

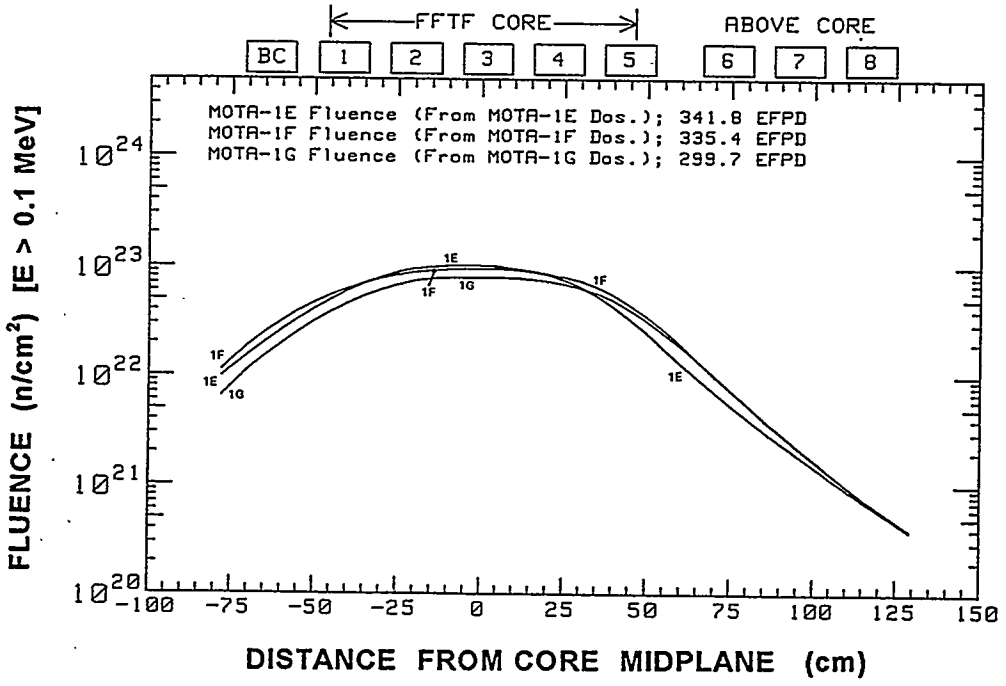

Figure 6. Fast Fluence vs. Distance from Core Midplane for MOTAs 1E, 1F, and 1G.

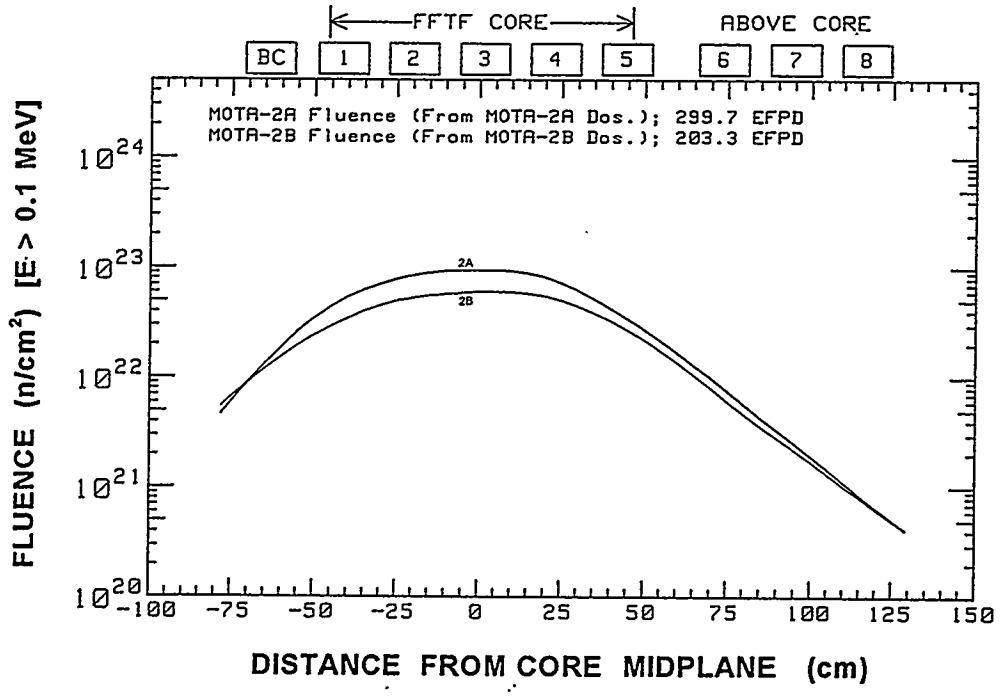

Figure 7. Fast Fluence vs. Distance from Core Midplane for MOTAs 2A and 2B.

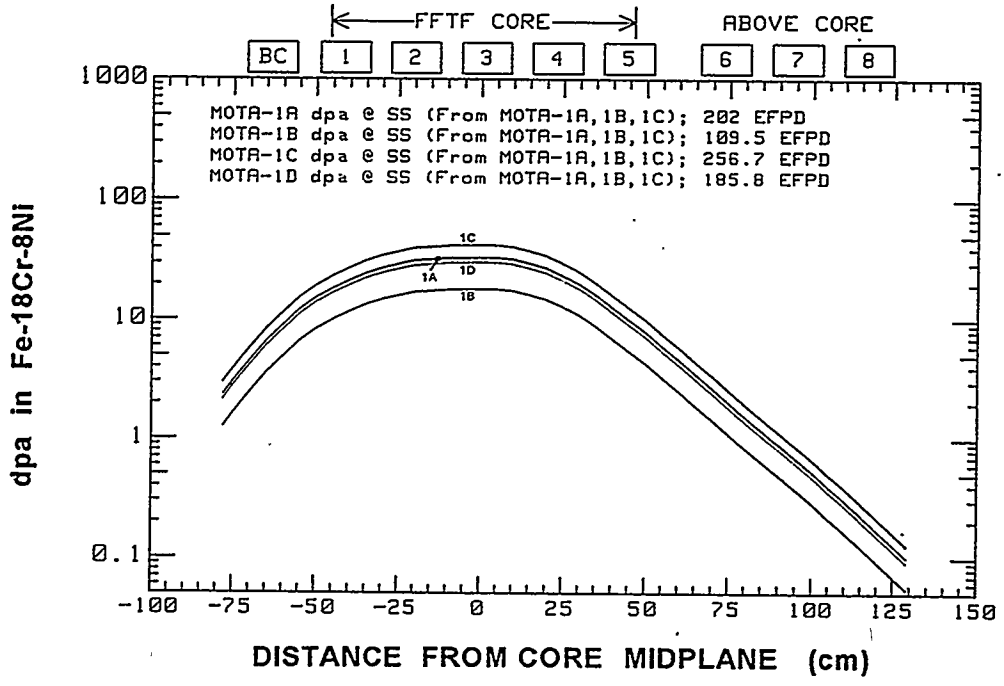

Figure 8. Dpa (in Stainless Steel) vs. Distance from Core Midplane for MOTAs 1A, 1B, 1C and 1D.

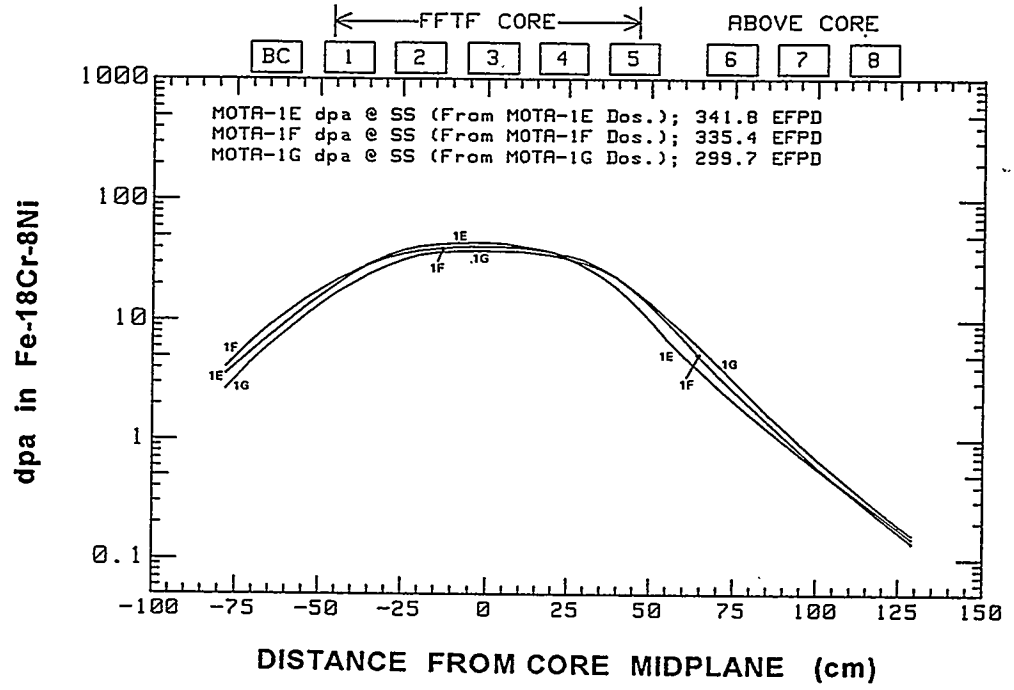

Figure 9. Dpa (in Stainless Steel) vs. Distance from Core Midplane for MOTAs 1E, 1F, and 1G.

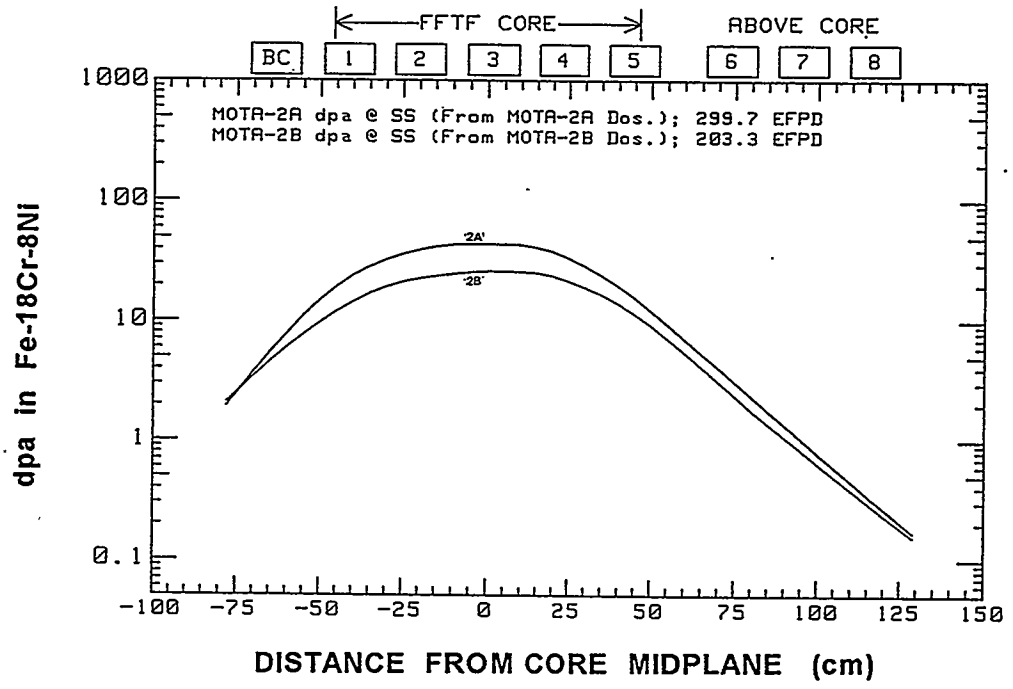

Figure 10. Dpa (in Stainless Steel) vs. Distance from Core Midplane for MOTAs 2A and 2B.

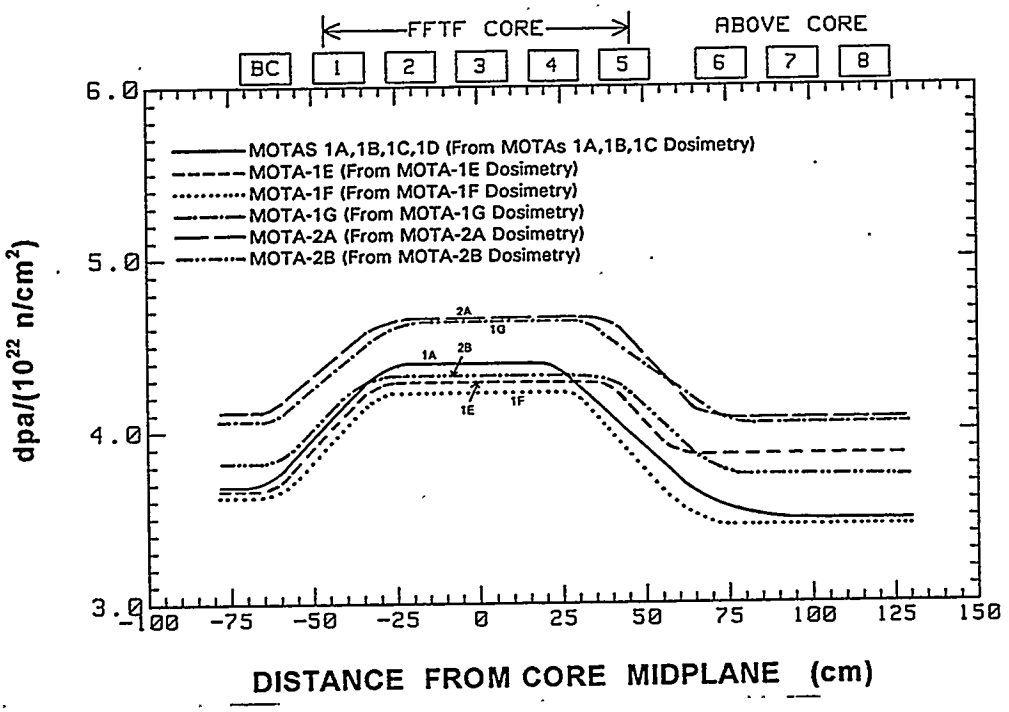

Figure 11. Dpa per 10^{22} n/cm^2 vs. Distance from Midplane for MOTAs 1A-1C, 1E-1G, 2A, and 2B.

CONCLUSIONS

Irradiation parameters (temperatures, fluences and dpa values) for all test locations in all nine MOTAs were reported and discussed. Additional details regarding the irradiation conditions for each MOTA have been published.[16] Details regarding individual specimens are on file at PNL.

FUTURE WORK

Issuance of this report concludes the last major activity associated with the operation of the MOTA in the FFTF.

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Table 4. MOTA-1A Canister Matrix Showing Fast Fluence Information

MOTA LEVELS 8 TO BC @ 202 EFPD Units: n/cm^2 [E>0.1 MeV]

8-A 465°C T: 3.80E20 1: 4.42E20 2: 5.94E20 3: 7.98E20 B: 9.22E20	8-B 458°C T: 3.80E20 1: 4.42E20 2: 5.94E20 3: 7.98E20 B: 9.22E20	8-C 459°C T: 3.80E20 1: 4.42E20 2: 5.94E20 3: 7.98E20 B: 9.22E20	8-D 460°C T: 3.80E20 1: 4.42E20 2: 5.94E20 3: 7.98E20 B: 9.22E20	8-E 460°C NO CANIST.	8-F 460°C NO CANIST.
7-A 455°C NO CANIST.	7-B 455°C NO CANIST.	7-C 455°C NO CANIST.	7-D 455°C NO CANIST.	7-E 455°C NO CANIST.	7-F 455°C NO CANIST.
6-A 504°C T: 4.68E21 1: 6.24E21 B: 8.32E21	6-B 440°C T: 4.06E21 1: 4.53E21 2: 5.66E21 3: 6.75E21 B: 7.20E21	6-C 504°C T: 4.68E21 1: 6.24E21 B: 8.32E21	6-D 503°C T: 4.68E21 1: 6.24E21 B: 8.32E21	6-E 481°C T: 4.68E21 1: 5.36E21 2: 6.87E21 3: 8.19E21 B: 8.73E21	6-F 483°C T: 4.68E21 1: 5.23E21 2: 6.70E21 3: 8.19E21 B: 8.73E21
5-A 534°C T: 2.05E22 1: 2.30E22 2: 2.88E22 3: 3.40E22 B: 3.59E22	5-B 597°C T: 2.05E22 1: 2.30E22 2: 2.88E22 3: 3.40E22 B: 3.59E22	5-C 567°C T: 2.05E22 1: 2.30E22 2: 2.88E22 3: 3.40E22 B: 3.59E22	5-D 597°C T: 2.05E22 1: 2.30E22 2: 2.88E22 3: 3.40E22 B: 3.59E22	5-E 596°C T: 2.05E22 1: 2.30E22 2: 2.88E22 3: 3.40E22 B: 3.59E22	5-F 445°C T: 1.80E22 1: 2.03E22 2: 2.56E22 3: 3.19E22 B: 3.58E22
4-A 665°C T: 4.99E22 1: 5.18E22 2: 5.57E22 3: 5.90E22 4: 6.23E22 5: 6.53E22 B: 6.68E22	4-B 547°C T: 4.99E22 1: 5.18E22 2: 5.57E22 3: 5.90E22 4: 6.23E22 5: 6.53E22 B: 6.68E22	4-C 549°C T: 4.99E22 1: 5.33E22 2: 5.81E22 3: 6.16E22 4: 6.45E22 B: 6.60E22	4-D 583°C T: 4.99E22 1: 5.33E22 2: 5.81E22 3: 6.16E22 4: 6.45E22 B: 6.60E22	4-E 646°C T: 4.99E22 1: 5.33E22 2: 5.81E22 3: 6.16E22 4: 6.45E22 B: 6.60E22	4-F 722°C T: 4.99E22 1: 5.33E22 2: 5.81E22 3: 6.16E22 4: 6.45E22 B: 6.60E22
3-A 730°C T: 7.44E22 1: 7.51E22 2: 7.56E22 3: 7.58E22 4: 7.56E22 B: 7.55E22	3-B 547°C T: 7.44E22 1: 7.51E22 2: 7.56E22 3: 7.58E22 4: 7.56E22 B: 7.55E22	3-C 572°C T: 7.44E22 1: 7.51E22 2: 7.56E22 3: 7.58E22 4: 7.56E22 B: 7.55E22	3-D 601°C T: 7.44E22 1: 7.51E22 2: 7.56E22 3: 7.58E22 4: 7.56E22 B: 7.55E22	3-E 665°C T: 7.44E22 1: 7.51E22 2: 7.56E22 3: 7.58E22 4: 7.56E22 B: 7.55E22	3-F 745°C T: 7.44E22 1: 7.50E22 2: 7.54E22 3: 7.59E22 4: 7.58E22 5: 7.56E22 B: 7.55E22
2-A 603°C T: 7.32E22 1: 7.28E22 2: 7.20E22 3: 7.06E22 4: 6.87E22 5: 6.67E22 B: 6.55E22	2-B 572°C T: 7.32E22 1: 7.28E22 2: 7.20E22 3: 7.06E22 4: 6.87E22 5: 6.67E22 B: 6.55E22	2-C 494°C T: 7.32E22 1: 7.27E22 2: 7.17E22 3: 6.94E22 4: 6.70E22 B: 6.55E22	2-D 569°C T: 7.32E22 1: 7.25E22 2: 7.11E22 3: 6.92E22 4: 6.73E22 B: 6.61E22	2-E 575->555°C T: 7.32E22 1: 7.27E22 2: 7.17E22 3: 6.94E22 4: 6.70E22 B: 6.55E22	2-F 427°C T: 7.42E22 1: 7.37E22 2: 7.26E22 3: 7.15E22 4: 6.92E22 B: 6.80E22
1-A 489°C T: 5.55E22 1: 5.41E22 2: 5.13E22 3: 4.86E22 4: 4.60E22 5: 4.22E22 B: 4.04E22	1-B 537°C T: 5.55E22 1: 5.41E22 2: 5.13E22 3: 4.86E22 4: 4.60E22 5: 4.22E22 B: 4.04E22	1-C 469°C T: 5.55E22 1: 5.30E22 2: 4.93E22 3: 4.67E22 4: 4.31E22 B: 4.13E22	1-D 405°C T: 5.87E22 1: 5.74E22 2: 5.44E22 3: 5.16E22 4: 4.89E22 5: 4.64E22 B: 4.45E22	1-E 403°C T: 5.87E22 1: 5.63E22 2: 5.24E22 3: 4.96E22 4: 4.70E22 B: 4.55E22	1-F 410°C T: 5.87E22 1: 5.76E22 2: 5.51E22 3: 5.28E22 4: 5.05E22 5: 4.82E22 6: 4.60E22 7: 4.28E22 8: 3.99E22 B: 3.84E22

BC-1 370°C NO CANIST.	BC-2 370°C NO CANIST.	BC-3 370°C NO CANIST.	BC-4 370°C NO CANIST.	BC-5 370°C NO CANIST.	BC-6 370°C NO CANIST.	BC-0 370°C NO CANIST.

Table 5. MOTA-1B Canister Matrix Showing Fast Fluence Information

MOTA LEVELS 8 TO BC @ 109.5 EFPD Units: n/cm^2 (E>0.1 MeV)

8-A 470°C T: 2.06E20 1: 2.40E20 2: 3.22E20 3: 4.33E20 B: 5.00E20	8-B 472°C T: 2.06E20 1: 2.40E20 2: 3.22E20 3: 4.33E20 B: 5.00E20	8-C 469°C T: 2.06E20 1: 2.40E20 2: 3.22E20 3: 4.33E20 B: 5.00E20	8-D 470°C T: 2.06E20 1: 2.40E20 2: 3.22E20 3: 4.33E20 B: 5.00E20	8-E 470°C NO CANIST.	8-F 470°C NO CANIST.	
7-A 460°C NO CANIST.	7-B 460°C NO CANIST.	7-C 460°C NO CANIST.	7-D 460°C NO CANIST.	7-E 460°C NO CANIST.	7-F 460°C NO CANIST.	
6-A 485°C T: 2.54E21 1: 2.90E21 2: 3.80E21 3: 4.65E21 B: 4.97E21	6-B 504°C T: 2.54E21 1: 3.38E21 B: 4.51E21	6-C 503°C T: 2.54E21 1: 3.38E21 B: 4.51E21	6-D 505°C T: 2.54E21 1: 3.38E21 B: 4.51E21	6-E 487°C T: 2.54E21 1: 2.90E21 2: 3.80E21 3: 4.65E21 B: 4.97E21	6-F 496°C T: 2.54E21 1: 2.90E21 2: 3.80E21 3: 4.65E21 B: 4.97E21	
5-A 535°C T: 1.11E22 1: 1.24E22 2: 1.55E22 3: 1.84E22 B: 1.95E22	5-B 596°C T: 1.11E22 1: 1.24E22 2: 1.55E22 3: 1.84E22 B: 1.95E22	5-C 568°C T: 1.11E22 1: 1.24E22 2: 1.55E22 3: 1.84E22 B: 1.95E22	5-D 595°C T: 1.11E22 1: 1.24E22 2: 1.55E22 3: 1.84E22 B: 1.95E22	5-E 597°C T: 1.11E22 1: 1.24E22 2: 1.55E22 3: 1.84E22 B: 1.95E22	5-F 445°C T: 9.75E21 1: 1.10E22 2: 1.39E22 3: 1.73E22 B: 1.94E22	
4-A 663°C T: 2.70E22 1: 2.81E22 2: 3.02E22 3: 3.20E22 4: 3.38E22 5: 3.54E22 B: 3.62E22	4-B 548°C T: 2.70E22 1: 2.81E22 2: 3.02E22 3: 3.20E22 4: 3.38E22 5: 3.54E22 B: 3.62E22	4-C 541°C T: 2.70E22 1: 2.81E22 2: 3.02E22 3: 3.20E22 4: 3.38E22 5: 3.54E22 B: 3.62E22	4-D 569°C T: 2.70E22 1: 2.89E22 2: 3.15E22 3: 3.34E22 4: 3.50E22 B: 3.58E22	4-E 645°C T: 2.70E22 1: 2.89E22 2: 3.15E22 3: 3.34E22 4: 3.50E22 B: 3.58E22	4-F 722°C T: 2.70E22 1: 2.89E22 2: 3.15E22 3: 3.34E22 4: 3.50E22 B: 3.58E22	
3-A 750°C T: 4.03E22 1: 4.07E22 2: 4.10E22 3: 4.11E22 4: 4.10E22 B: 4.09E22	3-B 547°C T: 4.03E22 1: 4.07E22 2: 4.10E22 3: 4.11E22 4: 4.10E22 B: 4.09E22	3-C 571°C T: 4.03E22 1: 4.07E22 2: 4.10E22 3: 4.11E22 4: 4.10E22 B: 4.09E22	3-D 603°C T: 4.03E22 1: 4.07E22 2: 4.10E22 3: 4.11E22 4: 4.10E22 B: 4.09E22	3-E 664°C T: 4.03E22 1: 4.07E22 2: 4.10E22 3: 4.11E22 4: 4.10E22 B: 4.09E22	3-F 743°C T: 4.03E22 1: 4.06E22 2: 4.09E22 3: 4.11E22 4: 4.11E22 5: 4.10E22 B: 4.09E22	
2-A 600°C T: 3.97E22 1: 3.95E22 2: 3.90E22 3: 3.83E22 4: 3.73E22 5: 3.61E22 B: 3.55E22	2-B 595°C T: 3.97E22 1: 3.94E22 2: 3.89E22 3: 3.79E22 4: 3.63E22 B: 3.52E22	2-C 518°C T: 3.97E22 1: 3.94E22 2: 3.89E22 3: 3.79E22 4: 3.63E22 B: 3.52E22	2-D 580°C T: 3.97E22 1: 3.93E22 2: 3.85E22 3: 3.75E22 4: 3.65E22 B: 3.58E22	2-E 555->535°C T: 3.97E22 1: 3.94E22 2: 3.88E22 3: 3.75E22 4: 3.61E22 B: 3.53E22	2-F 431°C T: 4.02E22 1: 3.98E22 2: 3.91E22 3: 3.82E22 4: 3.69E22 5: 3.55E22 B: 3.49E22	
1-A 490°C T: 3.01E22 1: 2.93E22 2: 2.78E22 3: 2.64E22 4: 2.49E22 5: 2.29E22 B: 2.19E22	1-B 493°C T: 3.01E22 1: 2.91E22 2: 2.71E22 3: 2.53E22 4: 2.27E22 B: 2.15E22	1-C 471°C T: 3.01E22 1: 2.88E22 2: 2.67E22 3: 2.53E22 4: 2.34E22 B: 2.24E22	1-D 401°C T: 3.18E22 1: 3.09E22 2: 2.88E22 3: 2.71E22 4: 2.57E22 5: 2.39E22 6: 2.19E22 8: 2.10E22	1-E 407°C T: 3.18E22 1: 3.09E22 2: 2.89E22 3: 2.72E22 4: 2.55E22 5: 2.28E22 B: 2.12E22	1-F 409°C T: 3.18E22 1: 3.12E22 2: 2.99E22 3: 2.86E22 4: 2.74E22 5: 2.62E22 6: 2.50E22 7: 2.32E22 8: 2.16E22 B: 2.08E22	
BC-1 370°C T: 1.60E22 1: 1.49E22 2: 1.03E22 B: 7.19E21	BC-2 370°C T: 1.60E22 1: 1.49E22 2: 1.30E22 3: 9.42E21 B: 7.19E21	BC-3 370°C T: 1.60E22 1: 1.49E22 2: 1.30E22 3: 9.42E21 B: 7.19E21	BC-4 370°C T: 1.60E22 1: 1.49E22 2: 1.03E22 B: 7.19E21	BC-5 370°C T: 1.60E22 1: 1.49E22 2: 1.03E22 B: 7.19E21	BC-6 370°C T: 1.60E22 1: 1.32E22 2: 8.74E21 B: 7.19E21	BC-0 370°C NO CANIST.

Table 6. MOTA-1C Canister Matrix Showing Fast Fluence Information

MOTA LEVELS 8 TO BC @ 256.7 EFPD Units: n/cm^2 (E>0.1 MeV)

8-A 455°C No Baskets	8-B 455°C No Baskets	8-C 455°C No Baskets	8-D 455°C No Baskets	8-E 455°C NO CANIST.	8-F 455°C NO CANIST.
7-A 450°C NO CANIST.	7-B 450°C NO CANIST.	7-C 450°C NO CANIST.	7-D 450°C NO CANIST.	7-E 450°C NO CANIST.	7-F 450°C NO CANIST.
6-A 470°C T: 5.95E21 1: 6.81E21 2: 8.94E21 3: 1.09E22 B: 1.16E22	6-B 570°C T: 5.95E21 1: 6.47E21 2: 7.58E21 3: 8.80E21 4: 1.01E22 B: 1.08E22	6-C 473°C T: 5.95E21 1: 6.34E21 2: 7.21E21 3: 8.20E21 4: 9.33E21 5: 1.06E22 B: 1.13E22	6-D 474°C T: 5.95E21 1: 6.47E21 2: 7.65E21 3: 9.04E21 4: 1.07E22 B: 1.16E22	6-E 490°C T: 5.95E21 1: 6.81E21 2: 8.73E21 3: 1.06E22 B: 1.15E22	6-F 487°C T: 5.95E21 1: 6.81E21 2: 8.94E21 3: 1.09E22 B: 1.16E22
5-A 535°C T: 2.60E22 1: 2.92E22 2: 3.65E22 3: 4.32E22 B: 4.56E22	5-B 550°C T: 2.60E22 1: 2.75E22 2: 3.07E22 3: 3.54E22 4: 4.09E22 B: 4.32E22	5-C 570°C T: 2.60E22 1: 2.92E22 2: 3.65E22 3: 4.32E22 B: 4.56E22	5-D 600°C T: 2.60E22 1: 2.92E22 3: 3.45E22 2: 4.06E22 B: 4.56E22	5-E 599°C T: 2.60E22 1: 2.92E22 2: 3.65E22 3: 4.32E22 B: 4.56E22	5-F 438°C T: 2.29E22 1: 2.58E22 2: 3.25E22 3: 4.06E22 B: 4.56E22
4-A 670°C T: 6.34E22 1: 6.59E22 2: 7.07E22 3: 7.50E22 4: 7.92E22 5: 8.29E22 B: 8.49E22	4-B 730°C T: 6.34E22 1: 6.78E22 2: 7.38E22 3: 7.83E22 4: 8.20E22 B: 8.39E22	4-C 540°C T: 6.34E22 1: 6.59E22 2: 7.07E22 3: 7.50E22 4: 7.92E22 5: 8.29E22 B: 8.49E22	4-D 550°C T: 6.34E22 1: 6.78E22 2: 7.38E22 3: 7.83E22 4: 8.20E22 B: 8.39E22	4-E 575°C T: 6.34E22 1: 6.67E22 2: 7.26E22 3: 7.84E22 4: 8.32E22 B: 8.57E22	4-F 652°C T: 6.34E22 1: 6.78E22 2: 7.38E22 3: 7.83E22 4: 8.20E22 B: 8.39E22
3-A 550°C T: 9.45E22 1: 9.54E22 2: 9.61E22 3: 9.63E22 4: 9.61E22 B: 9.59E22	3-B 550°C T: 9.45E22 1: 9.53E22 2: 9.59E22 3: 9.64E22 4: 9.63E22 5: 9.61E22 B: 9.59E22	3-C 605°C T: 9.45E22 1: 9.54E22 2: 9.61E22 3: 9.63E22 4: 9.61E22 B: 9.59E22	3-D 670°C T: 9.45E22 1: 9.54E22 2: 9.61E22 3: 9.63E22 4: 9.61E22 B: 9.59E22	3-E 635°C T: 9.45E22 1: 9.54E22 2: 9.61E22 3: 9.63E22 4: 9.61E22 B: 9.59E22	3-F 750°C T: 9.45E22 1: 9.54E22 2: 9.61E22 3: 9.63E22 4: 9.61E22 B: 9.59E22
2-A 520°C T: 9.31E22 4: 9.24E22 2: 9.12E22 3: 8.87E22 1: 8.52E22 B: 8.26E22	2-B 600°C T: 9.31E22 4: 9.24E22 2: 9.12E22 3: 8.87E22 1: 8.52E22 B: 8.26E22	2-C 425°C T: 9.43E22 1: 9.36E22 2: 9.22E22 3: 9.08E22 4: 8.80E22 5: 8.42E22 B: 8.17E22	2-D 439°C T: 9.43E22 1: 9.38E22 2: 9.29E22 3: 9.20E22 4: 9.11E22 5: 8.94E22 6: 8.74E22 7: 8.53E22 8: 8.28E22 B: 8.16E22	2-E 605°C T: 9.31E22 1: 9.25E22 2: 9.15E22 3: 8.97E22 4: 8.73E22 5: 8.47E22 B: 8.33E22	2-F 420°C T: 9.43E22 1: 9.34E22 2: 9.17E22 3: 8.95E22 4: 8.65E22 5: 8.32E22 B: 8.17E22
1-A 490°C T: 7.06E22 1: 6.87E22 2: 6.52E22 3: 6.18E22 4: 5.84E22 5: 5.36E22 B: 5.14E22	1-B 550->525°C T: 7.06E22 1: 6.82E22 2: 6.36E22 3: 5.93E22 4: 5.33E22 B: 5.04E22	1-C 470°C T: 7.06E22 1: 6.74E22 2: 6.27E22 3: 5.94E22 4: 5.48E22 B: 5.25E22	1-D 495°C T: 7.06E22 1: 6.82E22 2: 6.36E22 3: 5.93E22 4: 5.33E22 B: 5.04E22	1-E 585°C T: 7.06E22 1: 6.74E22 2: 6.27E22 3: 5.94E22 4: 5.48E22 B: 5.25E22	1-F 396°C T: 7.46E22 1: 7.23E22 2: 6.75E22 3: 6.35E22 4: 6.02E22 5: 5.61E22 6: 5.14E22 B: 4.93E22
BC-A 370°C T: 3.49E22 1: 3.25E22 2: 2.75E22 3: 2.14E22 B: 1.78E22	BC-B 370°C T: 3.73E22 1: 3.46E22 2: 2.96E22 3: 2.44E22 4: 1.99E22 B: 1.78E22	BC-C 370°C T: 3.71E22 1: 3.12E22 2: 2.31E22 3: 1.93E22 B: 1.78E22	BC-D 370°C T: 3.49E22 1: 3.24E22 2: 2.73E22 3: 2.12E22 B: 1.78E22	BC-E 370°C T: 4.00E22 1: 2.78E22 B: 1.78E22	BC-F 370°C T: 4.00E22 1: 2.78E22 B: 1.78E22	BC-O 370°C T: 3.49E22 1: 3.25E22 2: 2.75E22 3: 2.14E22 B: 1.78E22

Table 7. MOTA-1D Canister Matrix Showing Fast Fluence Information

MOTA LEVELS 8 TO BC @ 185.8 EFPD Units: n/cm^2 (E>0.1 MeV)

8-A 460°C NO CANIST.	8-B 460°C NO CANIST.	8-C 460°C NO CANIST.	8-D 462°C T: 3.50E20 1: 5.55E20 B: 8.73E20	8-E 462°C T: 3.50E20 1: 5.55E20 B: 8.73E20	8-F 456°C T: 3.50E20 1: 3.76E20 B: 4.03E20
7-A 455°C NO CANIST.	7-B 455°C NO CANIST.	7-C 455°C NO CANIST.	7-D 455°C NO CANIST.	7-E 455°C NO CANIST.	7-F 455°C NO CANIST.
6-A 445°C NO CANIST.	6-B 445°C NO CANIST.	6-C 445°C NO CANIST.	6-D 446°C No Baskets	6-E 490°C T: 4.31E21 1: 4.93E21 2: 6.32E21 3: 7.61E21 B: 8.20E21	6-F 443°C T: 3.74E21 1: 5.22E21 B: 7.30E21
5-A 534°C T: 1.88E22 1: 2.11E22 2: 2.64E22 3: 3.12E22 B: 3.30E22	5-B 549°C T: 1.88E22 1: 1.99E22 2: 2.22E22 3: 2.56E22 4: 2.96E22 B: 3.13E22	5-C 571°C T: 1.88E22 1: 2.11E22 2: 2.64E22 3: 3.12E22 B: 3.30E22	5-D 601°C T: 1.88E22 1: 1.97E22 2: 2.32E22 3: 2.89E22 B: 3.24E22	5-E 600°C T: 1.88E22 1: 2.11E22 2: 2.64E22 3: 3.12E22 B: 3.30E22	5-F 438°C T: 1.65E22 1: 1.87E22 2: 2.35E22 3: 2.94E22 B: 3.30E22
4-A 670°C T: 4.59E22 1: 4.82E22 2: 5.26E22 3: 5.67E22 4: 6.02E22 B: 6.20E22	4-B 730°C T: 4.59E22 1: 4.91E22 2: 5.34E22 3: 5.67E22 4: 5.93E22 B: 6.07E22	4-C 539°C T: 4.59E22 1: 4.77E22 2: 5.12E22 3: 5.43E22 4: 5.73E22 5: 6.00E22 B: 6.14E22	4-D 549°C T: 4.59E22 1: 4.91E22 2: 5.34E22 3: 5.67E22 4: 5.93E22 B: 6.07E22	4-E 575°C T: 4.59E22 1: 4.82E22 2: 5.26E22 3: 5.67E22 4: 6.02E22 B: 6.20E22	4-F 650°C T: 4.59E22 1: 4.91E22 2: 5.34E22 3: 5.67E22 4: 5.93E22 B: 6.07E22
3-A 605°C T: 6.84E22 1: 6.91E22 2: 6.96E22 3: 6.97E22 4: 6.95E22 B: 6.94E22	3-B 548°C T: 6.84E22 1: 6.91E22 2: 6.96E22 3: 6.97E22 4: 6.95E22 B: 6.94E22	3-C 604°C T: 6.84E22 1: 6.91E22 2: 6.96E22 3: 6.97E22 4: 6.95E22 B: 6.94E22	3-D 670°C T: 6.84E22 1: 6.91E22 2: 6.96E22 3: 6.97E22 4: 6.95E22 B: 6.94E22	3-E 635°C T: 6.84E22 1: 6.91E22 2: 6.96E22 3: 6.97E22 4: 6.95E22 B: 6.94E22	3-F 750°C T: 6.84E22 1: 6.91E22 2: 6.96E22 3: 6.97E22 4: 6.95E22 B: 6.94E22
2-A 521°C T: 6.74E22 1: 6.69E22 2: 6.60E22 3: 6.12E22 4: 6.16E22 B: 5.98E22	2-B 600°C T: 6.74E22 1: 6.69E22 2: 6.58E22 3: 6.28E22 4: 6.04E22 B: 5.98E22	2-C 406°C T: 6.82E22 1: 6.77E22 2: 6.68E22 3: 6.54E22 4: 6.25E22 B: 6.07E22	2-D 408°C T: 6.82E22 1: 6.79E22 2: 6.73E22 3: 6.66E22 4: 6.60E22 5: 6.47E22 6: 6.33E22 7: 6.17E22 8: 5.99E22 B: 5.91E22	2-E 404°C T: 6.82E22 1: 6.79E22 2: 6.71E22 3: 6.52E22 4: 6.23E22 B: 6.00E22	2-F 404°C T: 6.82E22 1: 6.76E22 2: 6.64E22 3: 6.48E22 4: 6.26E22 5: 6.02E22 B: 5.92E22
1-A 550°C T: 5.11E22 1: 4.83E22 2: 4.36E22 3: 3.88E22 B: 3.67E22	1-B 520°C T: 5.11E22 1: 4.88E22 2: 4.52E22 3: 4.07E22 B: 3.71E22	1-C 470°C T: 5.11E22 1: 4.88E22 2: 4.54E22 3: 4.30E22 4: 3.97E22 B: 3.80E22	1-D 495°C T: 5.11E22 1: 4.93E22 2: 4.60E22 3: 4.29E22 4: 3.86E22 B: 3.65E22	1-E 585°C T: 5.11E22 1: 4.88E22 2: 4.54E22 3: 4.30E22 4: 3.97E22 B: 3.80E22	1-F 386°C T: 5.40E22 1: 5.28E22 2: 5.01E22 3: 4.71E22 4: 4.39E22 5: 4.06E22 6: 3.72E22 B: 3.57E22
BC-A 370°C T: 2.55E22 1: 2.24E22 2: 1.75E22 3: 1.43E22 B: 1.29E22	BC-B 370°C T: 2.69E22 1: 2.48E22 2: 2.10E22 3: 1.75E22 4: 1.44E22 B: 1.29E22	BC-C 370°C T: 2.69E22 1: 2.26E22 2: 1.69E22 3: 1.40E22 B: 1.29E22	BC-D 370°C T: 2.56E22 1: 2.37E22 2: 2.00E22 3: 1.69E22 4: 1.41E22 B: 1.29E22	BC-E 370°C T: 2.89E22 1: 2.02E22 B: 1.29E22	BC-F 370°C T: 2.89E22 1: 2.02E22 B: 1.29E22	BC-O 370°C T: 2.55E22 1: 2.37E22 2: 2.00E22 3: 1.66E22 4: 1.39E22 B: 1.29E22

Values Based on Results from MOTAs 1A, 1B and 1C.

Table 8. MOTA-1E Canister Matrix Showing Fast Fluence Information

MOTA LEVELS 8 TO BC @ 341.8 EFPD Units: n/cm^2 [E>0.1 MeV]

8-A 440°C NO CANIST.	8-B 440°C NO CANIST.	8-C 440°C NO CANIST.	8-D 440°C No Baskets	8-E 438°C T: 4.77E20 1: 6.87E20 B: 1.00E21	8-F 439°C T: 4.77E20 1: 5.04E20 B: 5.32E20
7-A 435°C NO CANIST.	7-B 435°C NO CANIST.	7-C 435°C NO CANIST.	7-D 435°C NO CANIST.	7-E 435°C NO CANIST.	7-F 435°C NO CANIST.
6-A 470°C T: 3.89E21 1: 6.04E21 B: 9.65E21	6-B 470°C T: 3.89E21 1: 6.04E21 B: 9.65E21	6-C 470°C T: 3.89E21 1: 6.04E21 B: 9.65E21	6-D 460°C T: 3.89E21 1: 6.04E21 B: 9.65E21	6-E 489°C T: 4.50E21 1: 5.04E21 2: 6.12E21 3: 7.15E21 4: 8.44E21 B: 9.18E21	6-F 460°C T: 3.89E21 1: 6.04E21 B: 9.65E21
5-A 787°C T: 2.58E22 1: 3.57E22 B: 4.74E22	5-B 800°C T: 2.58E22 1: 3.57E22 B: 4.74E22	5-C 800°C T: 2.58E22 1: 3.57E22 B: 4.74E22	5-D 800°C T: 2.58E22 1: 3.57E22 B: 4.74E22	5-E 730°C T: 2.58E22 1: 2.92E22 2: 3.69E22 3: 4.56E22 B: 5.01E22	5-F 425°C T: 2.16E22 1: 2.56E22 2: 3.44E22 3: 4.47E22 B: 5.02E22
4-A 670°C T: 6.94E22 1: 7.19E22 2: 7.75E22 3: 8.36E22 4: 8.77E22 B: 8.95E22	4-B 800°C T: 6.94E22 1: 8.07E22 B: 8.89E22	4-C 539°C T: 6.94E22 1: 7.19E22 2: 7.68E22 3: 8.14E22 4: 8.57E22 5: 8.84E22 B: 8.98E22	4-D 539°C T: 6.94E22 1: 7.38E22 2: 8.19E22 3: 8.80E22 B: 9.04E22	4-E 574°C T: 6.94E22 1: 7.38E22 2: 8.19E22 3: 8.74E22 B: 8.91E22	4-F 650°C T: 6.94E22 1: 7.38E22 2: 8.19E22 3: 8.80E22 B: 9.04E22
3-A 604°C T: 9.85E22 1: 9.97E22 2: 1.01E23 3: 1.02E23 4: 1.02E23 B: 1.02E23	3-B 549°C T: 9.85E22 1: 9.97E22 2: 1.01E23 3: 1.02E23 4: 1.02E23 B: 1.02E23	3-C 602°C T: 9.85E22 1: 9.97E22 2: 1.01E23 3: 1.02E23 4: 1.02E23 B: 1.02E23	3-D 669°C T: 9.85E22 1: 9.97E22 2: 1.01E23 3: 1.02E23 4: 1.02E23 B: 1.02E23	3-E 635°C T: 9.85E22 1: 9.95E22 2: 1.01E23 3: 1.02E23 4: 1.02E23 B: 1.02E23	3-F 750°C T: 9.85E22 1: 1.00E23 2: 1.02E23 3: 1.02E23 B: 1.02E23
2-A 519°C T: 9.85E22 1: 9.74E22 2: 9.53E22 3: 9.19E22 4: 8.70E22 B: 8.32E22	2-B 599°C T: 9.85E22 1: 9.74E22 2: 9.47E22 3: 8.87E22 B: 8.41E22	2-C 403°C T: 9.98E22 1: 9.91E22 2: 9.71E22 3: 9.49E22 4: 8.99E22 B: 8.58E22	2-D 410°C T: 9.98E22 1: 9.93E22 2: 9.82E22 3: 9.67E22 4: 9.51E22 5: 9.27E22 6: 9.01E22 7: 8.72E22 8: 8.35E22 B: 8.17E22	2-E 396°C T: 9.98E22 1: 9.92E22 2: 9.76E22 3: 9.49E22 4: 8.84E22 B: 8.37E22	2-F 414°C T: 9.98E22 1: 9.88E22 2: 9.61E22 3: 9.23E22 4: 8.63E22 B: 8.25E22
1-A 494°C T: 6.62E22 1: 6.30E22 2: 5.65E22 3: 5.01E22 4: 4.42E22 B: 4.16E22	1-B 520°C T: 6.62E22 1: 6.41E22 2: 5.68E22 3: 4.66E22 B: 4.22E22	1-C 469°C T: 6.62E22 1: 6.19E22 2: 5.32E22 3: 4.52E22 B: 4.16E22	1-D 494°C T: 6.62E22 1: 6.30E22 2: 5.65E22 3: 5.01E22 4: 4.42E22 B: 4.16E22	1-E 550°C T: 6.62E22 1: 6.30E22 2: 5.65E22 3: 5.01E22 4: 4.42E22 B: 4.16E22	1-F 384°C T: 7.17E22 1: 6.95E22 2: 6.43E22 3: 5.87E22 4: 5.21E22 5: 4.68E22 6: 4.25E22 B: 4.05E22

BC-A 370°C T: 2.96E22 1: 2.78E22 2: 2.44E22 3: 2.12E22 4: 1.83E22 B: 1.70E22	BC-B 370°C T: 3.09E22 1: 2.86E22 2: 2.47E22 3: 2.14E22 4: 1.85E22 B: 1.72E22	BC-C 370°C T: 3.14E22 1: 2.70E22 2: 2.14E22 3: 1.84E22 B: 1.70E22	BC-D 370°C T: 2.96E22 1: 2.77E22 2: 2.41E22 3: 2.11E22 4: 1.83E22 B: 1.70E22	BC-E 370°C T: 3.31E22 1: 2.40E22 B: 1.70E22	BC-F 370°C T: 3.17E22 1: 2.35E22 B: 1.70E22	BC-O 370°C T: 2.96E22 4: 2.77E22 2: 2.41E22 3: 2.09E22 1: 1.82E22 B: 1.70E22

Table 9. MOTA-1F Canister Matrix Showing Fast Fluence Information

MOTA LEVELS 8 TO BC @ 335.4 EFPD Units: n/cm^2 (E>0.1 MeV)

8-A 435°C NO CANIST.	8-B 435°C NO CANIST.	8-C 435°C NO CANIST.	8-D 435°C NO CANIST.	8-E 433°C T: 4.94E20 1: 7.25E20 B: 1.09E21	8-F 435°C T: 4.94E20 1: 5.23E20 2: 6.33E20 3: 8.35E20 4: 1.05E21 B: 1.14E21
7-A 430°C NO CANIST.	7-B 430°C NO CANIST.	7-C 430°C NO CANIST.	7-D 430°C NO CANIST.	7-E 430°C NO CANIST.	7-F 430°C NO CANIST.
6-A 425°C NO CANIST.	6-B 425°C NO CANIST.	6-C 425°C NO CANIST.	6-D 425°C NO CANIST.	6-E 490°C T: 6.01E21 1: 6.81E21 2: 8.41E21 3: 9.96E21 4: 1.19E22 B: 1.31E22	6-F 426°C T: 5.11E21 1: 5.95E21 2: 8.08E21 3: 1.11E22 B: 1.31E22
5-A 1017°C T: 3.65E22 1: 4.91E22 B: 6.21E22	5-B 1016°C T: 3.65E22 1: 4.91E22 B: 6.21E22	5-C 1077°C T: 3.65E22 1: 4.91E22 B: 6.21E22	5-D 1077°C T: 3.65E22 1: 4.91E22 B: 6.21E22	5-E 1128°C T: 3.65E22 1: 4.91E22 B: 6.21E22	5-F 1250°C T: 3.65E22 1: 4.91E22 B: 6.21E22
4-A 1077°C T: 7.95E22 1: 8.52E22 B: 8.96E22	4-B 1125°C T: 7.71E22 1: 8.42E22 B: 8.96E22	4-C 799°C T: 7.64E22 1: 8.34E22 B: 8.89E22	4-D 550°C T: 7.64E22 1: 7.84E22 2: 8.14E22 3: 8.36E22 4: 8.57E22 5: 8.74E22 6: 8.89E22 B: 8.95E22	4-E 670°C T: 7.64E22 1: 7.84E22 2: 8.20E22 3: 8.54E22 4: 8.81E22 B: 8.94E22	4-F 670°C T: 7.64E22 1: 7.90E22 2: 8.37E22 3: 8.76E22 B: 8.94E22
3-A 605°C T: 9.41E22 1: 9.46E22 2: 9.52E22 3: 9.55E22 4: 9.55E22 B: 9.51E22	3-B 550°C T: 9.41E22 1: 9.46E22 2: 9.52E22 3: 9.55E22 4: 9.55E22 B: 9.51E22	3-C 605°C T: 9.41E22 1: 9.46E22 2: 9.52E22 3: 9.55E22 4: 9.55E22 B: 9.51E22	3-D 670°C T: 9.41E22 1: 9.46E22 2: 9.52E22 3: 9.55E22 4: 9.55E22 B: 9.51E22	3-E 550°C T: 9.41E22 1: 9.47E22 2: 9.55E22 3: 9.55E22 B: 9.51E22	3-F 750°C T: 9.41E22 1: 9.47E22 2: 9.55E22 3: 9.55E22 B: 9.51E22
2-A 520°C T: 9.15E22 1: 9.06E22 2: 8.88E22 3: 8.66E22 4: 8.30E22 B: 7.98E22	2-B 600°C T: 9.15E22 1: 9.06E22 2: 8.80E22 3: 8.29E22 B: 7.97E22	2-C 406°C T: 9.28E22 1: 9.22E22 2: 9.07E22 3: 8.88E22 4: 8.61E22 5: 8.19E22 B: 7.88E22	2-D 404°C T: 9.28E22 1: 9.23E22 2: 9.13E22 3: 8.97E22 4: 8.77E22 5: 8.37E22 B: 8.04E22	2-E 404°C T: 9.28E22 1: 9.23E22 2: 9.13E22 3: 9.00E22 4: 8.85E22 5: 8.56E22 B: 8.42E22	2-F 405°C T: 9.28E22 1: 9.18E22 2: 8.95E22 3: 8.70E22 4: 8.33E22 B: 8.05E22
1-A 799°C T: 6.72E22 1: 5.77E22 B: 4.82E22	1-B 799°C T: 6.72E22 1: 5.77E22 B: 4.82E22	1-C 495°C T: 6.72E22 1: 6.39E22 2: 5.72E22 3: 5.05E22 B: 4.72E22	1-D 494°C T: 6.72E22 1: 6.47E22 2: 5.97E22 3: 5.48E22 4: 4.96E22 B: 4.72E22	1-E 520°C T: 6.72E22 1: 6.50E22 2: 5.88E22 3: 5.10E22 B: 4.72E22	1-F 386°C T: 7.14E22 1: 6.97E22 2: 6.52E22 3: 6.02E22 4: 5.58E22 5: 5.19E22 6: 4.81E22 B: 4.62E22

BC-A 370°C T: 3.52E22 1: 3.31E22 2: 2.91E22 3: 2.55E22 4: 2.22E22 B: 2.07E22	BC-B 370°C T: 3.64E22 1: 3.38E22 2: 2.95E22 3: 2.58E22 4: 2.24E22 B: 2.07E22	BC-C 370°C T: 3.72E22 1: 3.23E22 2: 2.59E22 3: 2.22E22 B: 2.07E22	BC-D 370°C T: 3.68E22 1: 2.81E22 B: 2.07E22	BC-E 370°C T: 3.90E22 1: 2.90E22 B: 2.07E22	BC-F 370°C T: 3.73E22 1: 2.83E22 B: 2.07E22	BC-O 370°C T: 3.52E22 1: 3.31E22 2: 2.91E22 3: 2.55E22 4: 2.22E22 B: 2.07E22

Table 10. MOTA-1G Canister Matrix Showing Fast Fluence Information

MOTA LEVELS 8 TO BC @ 299.7 EFPD Units: n/cm^2 (E>0.1 MeV)

8-A 440°C	8-B 440°C	8-C 440°C	8-D 440°C	8-E 449°C	8-F 435°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	T: 4.83E20 1: 5.14E20 2: 6.20E20 3: 7.99E20 4: 9.97E20 B: 1.08E21	T: 4.83E20 1: 5.14E20 2: 6.20E20 3: 7.99E20 4: 9.97E20 B: 1.08E21
7-A 435°C	7-B 435°C	7-C 435°C	7-D 435°C	7-E 435°C	7-F 435°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
6-A 430°C	6-B 430°C	6-C 430°C	6-D 430°C	6-E 491°C	6-F 426°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	T: 6.07E21 1: 6.62E21 2: 7.79E21 3: 9.06E21 4: 1.05E22 5: 1.22E22 B: 1.32E22	T: 5.12E21 1: 5.53E21 2: 6.42E21 3: 7.63E21 B: 8.42E21
5-A 671°C	5-B 550°C	5-C 551°C	5-D 635°C	5-E 670°C	5-F 424°C
T: 3.33E22 1: 3.44E22 2: 3.93E22 3: 4.67E22 4: 5.26E22 B: 5.48E22	T: 3.33E22 1: 3.52E22 2: 3.92E22 3: 4.28E22 4: 4.64E22 5: 5.01E22 6: 5.31E22 B: 5.47E22	T: 3.33E22 1: 3.56E22 2: 4.03E22 3: 4.45E22 4: 4.89E22 5: 5.27E22 B: 5.46E22	T: 3.33E22 1: 3.59E22 2: 4.16E22 3: 4.71E22 4: 5.24E22 B: 5.48E22	T: 3.33E22 1: 3.52E22 2: 4.03E22 3: 4.67E22 4: 5.26E22 B: 5.48E22	T: 2.88E22 1: 3.08E22 2: 3.47E22 3: 3.97E22 4: 4.61E22 5: 5.24E22 B: 5.48E22
4-A 600°C	4-B 635->605°C	4-C 750°C	4-D 550°C	4-E 670°C	4-F 670°C
T: 6.64E22 1: 6.80E22 2: 7.07E22 3: 7.28E22 4: 7.51E22 B: 7.66E22	T: 6.64E22 1: 6.81E22 2: 7.12E22 3: 7.38E22 4: 7.57E22 B: 7.67E22	T: 6.64E22 1: 6.81E22 2: 7.12E22 3: 7.38E22 4: 7.57E22 B: 7.67E22	T: 6.64E22 1: 6.77E22 2: 7.05E22 3: 7.31E22 4: 7.47E22 5: 7.59E22 B: 7.66E22	T: 6.64E22 1: 6.81E22 2: 7.12E22 3: 7.38E22 4: 7.57E22 B: 7.67E22	T: 6.64E22 1: 6.81E22 2: 7.12E22 3: 7.38E22 4: 7.57E22 B: 7.67E22
3-A 431°C	3-B 427°C	3-C 606°C	3-D 670°C	3-E 550°C	3-F 750°C
T: 7.94E22 1: 7.96E22 2: 8.00E22 3: 8.00E22 4: 8.00E22 5: 8.00E22 B: 7.99E22	T: 7.94E22 1: 7.99E22 2: 8.00E22 3: 8.00E22 4: 8.00E22 5: 8.00E22 B: 7.99E22	T: 7.98E22 1: 8.00E22 2: 8.00E22 3: 8.00E22 4: 8.00E22 B: 8.00E22	T: 7.98E22 1: 8.00E22 2: 8.00E22 3: 8.00E22 4: 8.00E22 B: 8.00E22	T: 7.98E22 1: 8.00E22 2: 8.00E22 3: 8.00E22 B: 8.00E22	T: 7.98E22 1: 8.00E22 2: 8.00E22 3: 8.00E22 B: 8.00E22
2-A 520°C	2-B 605°C	2-C 635°C	2-D 550°C	2-E 417°C	2-F 520°C
T: 7.81E22 1: 7.69E22 2: 7.48E22 3: 7.21E22 4: 6.76E22 B: 6.39E22	T: 7.81E22 1: 7.68E22 2: 7.43E22 3: 7.03E22 4: 6.62E22 B: 6.39E22	T: 7.81E22 1: 7.68E22 2: 7.43E22 3: 7.03E22 4: 6.62E22 B: 6.39E22	T: 7.81E22 1: 7.68E22 2: 7.43E22 3: 7.03E22 4: 6.62E22 B: 6.39E22	T: 7.90E22 1: 7.83E22 2: 7.56E22 3: 7.24E22 4: 6.89E22 5: 6.59E22 6: 6.33E22 B: 6.21E22	T: 7.81E22 1: 7.69E22 2: 7.36E22 3: 6.74E22 B: 6.38E22
1-A 750°C	1-B 495°C	1-C 495°C	1-D 495°C	1-E 383°C	1-F 384°C
T: 5.07E22 1: 4.88E22 2: 4.37E22 3: 3.84E22 4: 3.41E22 B: 3.22E22	T: 5.07E22 1: 4.74E22 2: 4.18E22 3: 3.79E22 4: 3.41E22 B: 3.22E22	T: 5.07E22 1: 4.74E22 2: 4.11E22 3: 3.50E22 B: 3.22E22	T: 5.07E22 1: 4.82E22 2: 4.34E22 3: 3.89E22 4: 3.43E22 B: 3.22E22	T: 5.50E22 1: 5.17E22 2: 4.60E22 3: 4.12E22 4: 3.69E22 5: 3.30E22 B: 3.11E22	T: 5.50E22 1: 5.32E22 2: 4.87E22 3: 4.39E22 4: 3.98E22 5: 3.63E22 6: 3.29E22 B: 3.13E22

BC-A 370°C	BC-B 370°C	BC-C 370°C	BC-D 370°C	BC-E 370°C	BC-F 370°C	BC-O 370°C
T: 2.24E22 1: 2.11E22 2: 1.86E22 3: 1.67E22 4: 1.43E22 B: 1.26E22	T: 2.42E22 1: 2.25E22 2: 1.95E22 3: 1.69E22 4: 1.44E22 B: 1.31E22	T: 2.42E22 1: 2.23E22 2: 1.93E22 3: 1.73E22 4: 1.55E22 5: 1.36E22 B: 1.27E22	T: 2.24E22 1: 1.70E22 B: 1.26E22	T: 2.42E22 1: 1.77E22 B: 1.27E22	T: 2.42E22 1: 2.22E22 2: 1.90E22 3: 1.65E22 4: 1.42E22 B: 1.31E22	T: 2.24E22 1: 2.10E22 2: 1.88E22 3: 1.72E22 4: 1.56E22 5: 1.37E22 B: 1.26E22

Table 11. MOTA-2A Canister Matrix Showing Fast Fluence Information

MOTA LEVELS 8 TO BC @ 299.7 EFPD Units: n/cm^2 [E>0.1 MeV]

8-A 433°C	8-B 436°C	8-C 440°C	8-D 440°C	8-E 440°C	8-F 440°C
T: 5.28E20 1: 7.99E20 B: 1.25E21	T: 5.28E20 1: 5.67E20 2: 6.79E20 3: 8.04E20 4: 9.20E20 5: 1.10E21 B: 1.24E21	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
7-A 435°C	7-B 434°C	7-C 435°C	7-D 435°C	7-E 435°C	7-F 435°C
NO CANIST.	T: 1.66E21 1: 1.77E21 2: 2.12E21 3: 2.54E21 4: 2.91E21 5: 3.49E21 B: 3.92E21	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
6-A 428°C	6-B 430°C	6-C 430°C	6-D 430°C	6-E 430°C	6-F 430°C
T: 5.41E21 1: 8.43E21 B: 1.29E22	T: 5.41E21 1: 5.79E21 2: 6.93E21 3: 8.30E21 4: 9.49E21 5: 1.13E22 B: 1.26E22	T: 5.41E21 1: 8.43E21 B: 1.29E22	NO CANIST.	NO CANIST.	NO CANIST.
5-A 579°C	5-B 422°C	5-C 581°C	5-D 800°C	5-E 430°C	5-F 600°C
T: 2.82E22 1: 3.62E22 B: 4.60E22	T: 2.48E22 1: 3.57E22 B: 5.00E22	T: 2.82E22 1: 3.62E22 B: 4.60E22	T: 2.82E22 1: 3.19E22 2: 3.94E22 3: 4.53E22 B: 4.75E22	T: 2.48E22 1: 2.65E22 2: 3.10E22 3: 3.59E22 4: 3.99E22 5: 4.57E22 B: 4.97E22	T: 2.82E22 1: 3.24E22 2: 4.26E22 B: 4.84E22
4-A 425°C	4-B 600°C	4-C 600°C	4-D 430°C	4-E 520°C	4-F 601°C
T: 6.05E22 1: 6.33E22 2: 6.85E22 3: 7.41E22 4: 8.14E22 5: 8.63E22 B: 8.84E22	T: 6.59E22 1: 6.83E22 2: 7.32E22 3: 7.83E22 4: 8.45E22 B: 8.78E22	T: 6.59E22 1: 6.87E22 2: 7.64E22 3: 8.46E22 B: 8.79E22	T: 6.05E22 1: 6.30E22 2: 6.77E22 3: 7.27E22 4: 7.73E22 5: 8.20E22 6: 8.52E22 B: 8.68E22	T: 6.59E22 1: 7.02E22 2: 7.67E22 3: 8.16E22 4: 8.47E22 B: 8.63E22	T: 6.59E22 1: 7.17E22 2: 7.94E22 3: 8.45E22 B: 8.73E22
3-A 605°C	3-B 549°C	3-C 423°C	3-D 427°C	3-E 519°C	3-F 600°C
T: 9.39E22 1: 9.43E22 2: 9.45E22 3: 9.46E22 4: 9.44E22 B: 9.42E22	T: 9.39E22 1: 9.42E22 2: 9.45E22 3: 9.45E22 4: 9.46E22 5: 9.45E22 6: 9.44E22 B: 9.41E22	T: 9.29E22 1: 9.34E22 2: 9.44E22 3: 9.45E22 4: 9.46E22 5: 9.45E22 6: 9.44E22 B: 9.40E22	T: 9.29E22 1: 9.37E22 2: 9.45E22 3: 9.46E22 4: 9.45E22 5: 9.43E22 B: 9.41E22	T: 9.39E22 1: 9.43E22 2: 9.45E22 3: 9.46E22 4: 9.44E22 B: 9.41E22	T: 9.39E22 1: 9.44E22 2: 9.46E22 3: 9.44E22 B: 9.42E22
2-A 406°C	2-B 412°C	2-C 521°C	2-D 406°C	2-E 407°C	2-F 519°C
T: 9.16E22 1: 9.01E22 2: 8.64E22 3: 8.35E22 4: 8.03E22 5: 7.58E22 B: 7.32E22	T: 9.16E22 1: 9.05E22 2: 8.81E22 3: 8.60E22 4: 8.30E22 5: 7.98E22 6: 7.70E22 B: 7.53E22	T: 8.96E22 1: 8.81E22 2: 8.52E22 3: 8.18E22 4: 7.72E22 B: 7.38E22	T: 9.16E22 1: 8.96E22 2: 8.36E22 3: 7.86E22 4: 7.47E22 B: 7.28E22	T: 9.16E22 1: 8.96E22 2: 8.36E22 3: 7.86E22 4: 7.47E22 B: 7.28E22	T: 8.96E22 1: 8.63E22 2: 7.88E22 B: 7.37E22
1-A 390°C	1-B 380°C	1-C 385->1000C	1-D 395°C	1-E 550->670°C	1-F 459°C
T: 6.40E22 1: 6.05E22 2: 5.48E22 3: 5.00E22 4: 4.52E22 5: 4.04E22 6: 3.60E22 B: 3.38E22	T: 6.40E22 1: 4.94E22 B: 3.40E22	T: 6.15E22 1: 4.81E22 B: 3.44E22	T: 6.40E22 1: 4.94E22 B: 3.40E22	T: 5.88E22 1: 4.79E22 B: 3.67E22	T: 5.94E22 1: 5.73E22 2: 5.31E22 3: 4.81E22 4: 4.35E22 5: 3.86E22 B: 3.64E22

BC-A 377°C	BC-B 374°C	BC-C 375°C	BC-D 375°C	BC-E 373°C	BC-F 411°C	BC-O 370°C
T: 2.52E22 1: 2.29E22 2: 1.89E22 3: 1.56E22 4: 1.28E22 5: 1.06E22 B: 9.85E21	T: 2.52E22 1: 2.37E22 2: 2.10E22 3: 1.80E22 4: 1.55E22 5: 1.20E22 B: 9.74E21	T: 2.52E22 1: 2.18E22 2: 1.76E22 3: 1.53E22 4: 1.33E22 5: 1.10E22 B: 9.73E21	T: 2.52E22 1: 2.29E22 2: 1.94E22 3: 1.69E22 4: 1.45E22 5: 1.23E22 6: 1.06E22 B: 9.81E21	T: 2.52E22 1: 2.32E22 2: 1.97E22 3: 1.67E22 4: 1.41E22 B: 1.29E22	T: 2.09E22 1: 1.93E22 2: 1.63E22 3: 1.38E22 4: 1.15E22 B: 1.05E22	NO CANIST.

Table 12. MOTA-2B Canister Matrix Showing Fast Fluence Information

MOTA LEVELS 8 TO BC @ 203.3 EFPD Units: n/cm^2 (E>0.1 MeV)

8-A 440°C	8-B 444°C	8-C 440°C	8-D 440°C	8-E 440°C	8-F 440°C
NO CANIST.	T: 5.20E20 1: 5.73E20 2: 6.73E20 3: 7.58E20 4: 8.89E20 5: 1.04E21 B: 1.11E21	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
7-A 435°C	7-B 437°C	7-C 435°C	7-D 435°C	7-E 435°C	7-F 435°C
NO CANIST.	T: 1.49E21 1: 1.66E21 2: 1.95E21 3: 2.19E21 4: 2.60E21 5: 3.08E21 B: 3.27E21	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
6-A 431°C	6-B 431°C	6-C 423°C	6-D 423°C	6-E 425°C	6-F 425°C
T: 4.41E21 1: 6.77E21 B: 1.05E22	T: 4.41E21 1: 4.92E21 2: 5.85E21 3: 6.67E21 4: 8.02E21 5: 9.57E21 B: 1.02E22	T: 4.41E21 1: 6.77E21 B: 1.05E22	T: 4.41E21 1: 6.77E21 B: 1.05E22	T: 4.41E21 1: 6.77E21 B: 1.05E22	T: 4.41E21 1: 6.77E21 B: 1.05E22
5-A 495°C	5-B 599°C	5-C 599°C	5-D 500°C	5-E 435°C	5-F 424°C
T: 2.25E22 1: 2.40E22 2: 2.74E22 3: 3.09E22 4: 3.45E22 B: 3.63E22	T: 2.25E22 1: 2.40E22 2: 2.74E22 3: 3.07E22 4: 3.34E22 5: 3.54E22 B: 3.64E22	T: 2.25E22 1: 2.57E22 2: 3.29E22 B: 3.64E22	T: 2.25E22 1: 2.57E22 2: 3.29E22 B: 3.64E22	T: 1.99E22 1: 2.14E22 2: 2.45E22 3: 2.78E22 4: 3.14E22 5: 3.50E22 B: 3.68E22	T: 1.99E22 1: 2.38E22 2: 3.03E22 3: 3.50E22 B: 3.74E22
4-A 430°C	4-B 428°C	4-C 599°C	4-D 430°C	4-E 519°C	4-F 599°C
T: 4.35E22 1: 5.22E22 B: 5.77E22	T: 4.35E22 1: 4.73E22 2: 5.30E22 3: 5.57E22 4: 5.72E22 B: 5.77E22	T: 4.65E22 1: 4.83E22 2: 5.14E22 3: 5.43E22 4: 5.58E22 5: 5.68E22 B: 5.73E22	T: 4.35E22 1: 4.49E22 2: 4.75E22 3: 5.02E22 4: 5.25E22 5: 5.59E22 B: 5.76E22	T: 4.65E22 1: 4.99E22 2: 5.48E22 3: 5.66E22 B: 5.73E22	T: 4.65E22 1: 4.79E22 2: 5.05E22 3: 5.30E22 4: 5.59E22 B: 5.73E22
3-A 433°C	3-B 670°C	3-C 399°C	3-D 427°C	3-E 519°C	3-F 601°C
T: 5.94E22 1: 5.96E22 2: 5.99E22 3: 6.00E22 4: 5.98E22 5: 5.89E22 B: 5.81E22	T: 5.97E22 1: 5.99E22 2: 6.00E22 3: 5.96E22 4: 5.89E22 B: 5.84E22	T: 5.94E22 1: 5.99E22 2: 5.97E22 3: 5.88E22 B: 5.81E22	T: 5.94E22 1: 5.96E22 2: 5.99E22 3: 5.99E22 4: 6.00E22 5: 5.98E22 6: 5.89E22 B: 5.81E22	T: 5.97E22 1: 5.99E22 2: 6.00E22 3: 5.98E22 4: 5.90E22 B: 5.84E22	T: 5.97E22 1: 5.99E22 2: 5.99E22 3: 6.00E22 4: 5.91E22 B: 5.84E22
2-A 519°C	2-B 549°C	2-C 385->1110C	2-D 799°C	2-E 408°C	2-F 519°C
T: 5.53E22 1: 5.43E22 2: 5.26E22 3: 5.08E22 4: 4.94E22 5: 4.76E22 B: 4.68E22	T: 5.53E22 1: 5.43E22 2: 5.25E22 3: 5.05E22 4: 4.82E22 B: 4.68E22	T: 5.58E22 1: 5.16E22 B: 4.61E22	T: 5.53E22 1: 5.40E22 2: 5.15E22 3: 4.87E22 B: 4.68E22	T: 5.63E22 1: 5.59E22 2: 5.47E22 3: 5.33E22 4: 5.12E22 5: 4.81E22 B: 4.60E22	T: 5.53E22 1: 5.44E22 2: 5.27E22 3: 5.09E22 4: 4.87E22 B: 4.67E22
1-A 387°C	1-B 530->645°C	1-C 393°C	1-D 519°C	1-E 599°C	1-F 460°C
T: 4.09E22 1: 3.97E22 2: 3.68E22 3: 3.41E22 4: 3.14E22 5: 2.90E22 6: 2.56E22 B: 2.36E22	T: 3.75E22 1: 3.10E22 B: 2.51E22	T: 4.09E22 1: 3.95E22 2: 3.61E22 3: 3.30E22 4: 3.00E22 5: 2.72E22 6: 2.48E22 B: 2.38E22	T: 3.79E22 1: 3.62E22 2: 3.19E22 3: 2.69E22 B: 2.45E22	T: 3.79E22 1: 3.62E22 2: 3.19E22 3: 2.69E22 B: 2.45E22	T: 3.79E22 1: 3.62E22 2: 3.31E22 3: 3.01E22 4: 2.65E22 B: 2.45E22

BC-A 370°C	BC-B 371°C	BC-C 378°C	BC-D 378°C	BC-E 373°C	BC-F 410°C	BC-O 370°C
T: 1.89E22 1: 1.61E22 2: 1.14E22 B: 9.46E21	T: 1.89E22 1: 1.36E22 B: 9.50E21	T: 1.89E22 1: 1.75E22 2: 1.55E22 3: 1.38E22 4: 1.20E22 5: 1.02E22 B: 9.47E21	T: 1.89E22 1: 1.75E22 2: 1.55E22 3: 1.38E22 4: 1.20E22 5: 1.02E22 B: 9.47E21	T: 1.89E22 1: 1.78E22 2: 1.59E22 3: 1.41E22 4: 1.24E22 B: 1.17E22	T: 1.66E22 1: 1.56E22 2: 1.39E22 3: 1.23E22 4: 1.07E22 B: 1.00E22	NO CANIST.

Table 13. MOTA-1A Canister Matrix Showing displacements per atom Information

MOTA LEVELS 8 TO BC @ 202 EFPD Units: dpa

8-A 465°C	8-B 458°C	8-C 459°C	8-D 460°C	8-E 460°C	8-F 460°C
T: 0.13 1: 0.15 2: 0.20 3: 0.27 B: 0.32	T: 0.13 1: 0.15 2: 0.20 3: 0.27 B: 0.32	T: 0.13 1: 0.15 2: 0.20 3: 0.27 B: 0.32	T: 0.13 1: 0.15 2: 0.20 3: 0.27 B: 0.32	NO CANIST.	NO CANIST.
7-A 455°C	7-B 455°C	7-C 455°C	7-D 455°C	7-E 455°C	7-F 455°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
6-A 504°C	6-B 440°C	6-C 504°C	6-D 503°C	6-E 481°C	6-F 483°C
T: 1.66 1: 2.23 B: 3.01	T: 1.44 1: 1.61 2: 2.02 3: 2.43 B: 2.60	T: 1.66 1: 2.23 B: 3.01	T: 1.66 1: 2.23 B: 3.01	T: 1.66 1: 1.91 2: 2.47 3: 2.96 B: 3.16	T: 1.66 1: 1.86 2: 2.41 3: 2.96 B: 3.16
5-A 534°C	5-B 597°C	5-C 567°C	5-D 597°C	5-E 596°C	5-F 445°C
T: 8.02 1: 9.08 2: 11.6 3: 14.0 B: 14.9	T: 8.02 1: 9.08 2: 11.6 3: 14.0 B: 14.9	T: 8.02 1: 9.08 2: 11.6 3: 14.0 B: 14.9	T: 8.02 1: 9.08 2: 11.6 3: 14.0 B: 14.9	T: 8.02 1: 9.08 2: 11.6 3: 14.0 B: 14.9	T: 6.96 1: 7.96 2: 10.2 3: 13.1 B: 14.8
4-A 665°C	4-B 547°C	4-C 549°C	4-D 583°C	4-E 646°C	4-F 722°C
T: 21.3 1: 22.2 2: 23.9 3: 25.7 4: 27.4 5: 28.6 B: 29.3	T: 21.3 1: 22.2 2: 23.9 3: 25.7 4: 27.4 5: 28.6 B: 29.3	T: 21.3 1: 22.8 2: 25.2 3: 27.0 4: 28.3 B: 28.9	T: 21.3 1: 22.8 2: 25.2 3: 27.0 4: 28.3 B: 28.9	T: 21.3 1: 22.8 2: 25.2 3: 27.0 4: 28.3 B: 28.9	T: 21.3 1: 22.8 2: 25.2 3: 27.0 4: 28.3 B: 28.9
3-A 730°C	3-B 547°C	3-C 572°C	3-D 601°C	3-E 665°C	3-F 745°C
T: 32.7 1: 33.0 2: 33.2 3: 33.3 4: 33.2 B: 33.1	T: 32.7 1: 33.0 2: 33.2 3: 33.3 4: 33.2 B: 33.1	T: 32.7 1: 33.0 2: 33.2 3: 33.3 4: 33.2 B: 33.1	T: 32.7 1: 33.0 2: 33.2 3: 33.3 4: 33.2 B: 33.1	T: 32.7 1: 33.0 2: 33.2 3: 33.3 4: 33.2 B: 33.1	T: 32.7 1: 33.0 2: 33.1 3: 33.3 4: 33.3 5: 33.2 B: 33.1
2-A 603°C	2-B 572°C	2-C 494°C	2-D 569°C	2-E 575->555°C	2-F 427°C
T: 32.1 1: 31.9 2: 31.6 3: 30.9 4: 29.9 5: 28.9 B: 28.3	T: 32.1 1: 31.9 2: 31.6 3: 30.9 4: 29.9 5: 28.9 B: 28.3	T: 32.1 1: 31.9 2: 31.5 3: 30.2 4: 29.0 B: 28.3	T: 32.1 1: 31.8 2: 31.2 3: 30.1 4: 29.1 B: 28.6	T: 32.1 1: 31.9 2: 31.5 3: 30.2 4: 29.0 B: 28.3	T: 32.6 1: 32.3 2: 31.8 3: 31.4 4: 30.1 B: 29.5
1-A 489°C	1-B 537°C	1-C 469°C	1-D 405°C	1-E 403°C	1-F 410°C
T: 23.5 1: 22.7 2: 21.2 3: 19.6 4: 18.2 5: 16.6 B: 15.9	T: 23.5 1: 22.7 2: 21.2 3: 19.6 4: 18.2 5: 16.6 B: 15.9	T: 23.5 1: 22.1 2: 20.0 3: 18.6 4: 17.0 B: 16.3	T: 25.1 1: 24.5 2: 22.9 3: 21.4 4: 19.8 5: 18.4 B: 17.6	T: 25.1 1: 23.9 2: 21.8 3: 20.2 4: 18.8 B: 18.0	T: 25.1 1: 24.6 2: 23.3 3: 22.0 4: 20.7 5: 19.4 6: 18.2 7: 16.9 8: 15.7 B: 15.0

BC-1 370°C	BC-2 370°C	BC-3 370°C	BC-4 370°C	BC-5 370°C	BC-6 370°C	BC-O 370°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.

Table 14. MOTA-1B Canister Matrix Showing displacements per atom Information

MOTA LEVELS 8 TO BC @ 109.5 EFPD Units: dpa

8-A 470°C	8-B 472°C	8-C 469°C	8-D 470°C	8-E 470°C	8-F 470°C
T: 0.071 1: 0.083 2: 0.11 3: 0.15 B: 0.17	T: 0.071 1: 0.083 2: 0.11 3: 0.15 B: 0.17	T: 0.071 1: 0.083 2: 0.11 3: 0.15 B: 0.17	T: 0.071 1: 0.083 2: 0.11 3: 0.15 B: 0.17	NO CANIST.	NO CANIST.
7-A 460°C	7-B 460°C	7-C 460°C	7-D 460°C	7-E 460°C	7-F 460°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
6-A 485°C	6-B 504°C	6-C 503°C	6-D 505°C	6-E 487°C	6-F 496°C
T: 0.90 1: 1.03 2: 1.37 3: 1.68 B: 1.80	T: 0.90 1: 1.21 B: 1.63	T: 0.90 1: 1.21 B: 1.63	T: 0.90 1: 1.21 B: 1.63	T: 0.90 1: 1.03 2: 1.37 3: 1.68 B: 1.80	T: 0.90 1: 1.03 2: 1.37 3: 1.68 B: 1.80
5-A 535°C	5-B 596°C	5-C 568°C	5-D 595°C	5-E 597°C	5-F 445°C
T: 4.35 1: 4.92 2: 6.28 3: 7.56 B: 8.06	T: 4.35 1: 4.92 2: 6.28 3: 7.56 B: 8.06	T: 4.35 1: 4.92 2: 6.28 3: 7.56 B: 8.06	T: 4.35 1: 4.92 2: 6.28 3: 7.56 B: 8.06	T: 4.35 1: 4.92 2: 6.28 3: 7.56 B: 8.06	T: 3.76 1: 4.31 2: 5.53 3: 7.08 B: 8.04
4-A 663°C	4-B 548°C	4-C 541°C	4-D 569°C	4-E 645°C	4-F 722°C
T: 11.6 1: 12.0 2: 13.0 3: 13.9 4: 14.8 5: 15.5 B: 15.9	T: 11.6 1: 12.0 2: 13.0 3: 13.9 4: 14.8 5: 15.5 B: 15.9	T: 11.6 1: 12.0 2: 13.0 3: 13.9 4: 14.8 5: 15.5 B: 15.9	T: 11.6 1: 12.4 2: 13.7 3: 14.7 4: 15.3 B: 15.7	T: 11.6 1: 12.4 2: 13.7 3: 14.7 4: 15.3 B: 15.7	T: 11.6 1: 12.4 2: 13.7 3: 14.7 4: 15.3 B: 15.7
3-A 750°C	3-B 547°C	3-C 571°C	3-D 603°C	3-E 664°C	3-F 743°C
T: 17.7 1: 17.9 2: 18.0 3: 18.0 4: 18.0 B: 18.0	T: 17.7 1: 17.9 2: 18.0 3: 18.0 4: 18.0 B: 18.0	T: 17.7 1: 17.9 2: 18.0 3: 18.0 4: 18.0 B: 18.0	T: 17.7 1: 17.9 2: 18.0 3: 18.0 4: 18.0 B: 18.0	T: 17.7 1: 17.9 2: 18.0 3: 18.0 4: 18.0 B: 18.0	T: 17.7 1: 17.9 2: 18.0 3: 18.1 4: 18.0 5: 18.0 B: 18.0
2-A 600°C	2-B 595°C	2-C 518°C	2-D 580°C	2-E 555->535°C	2-F 431°C
T: 17.4 1: 17.3 2: 17.1 3: 16.7 4: 16.2 5: 15.6 B: 15.4	T: 17.4 1: 17.3 2: 17.1 3: 16.5 4: 15.7 B: 15.2	T: 17.4 1: 17.3 2: 17.1 3: 16.5 4: 15.7 B: 15.2	T: 17.4 1: 17.2 2: 16.9 3: 16.3 4: 15.8 B: 15.5	T: 17.4 1: 17.3 2: 17.0 3: 16.3 4: 15.6 B: 15.2	T: 17.6 1: 17.5 2: 17.2 3: 16.7 4: 16.0 5: 15.4 B: 15.1
1-A 490°C	1-B 493°C	1-C 471°C	1-D 401°C	1-E 407°C	1-F 409°C
T: 12.7 1: 12.3 2: 11.5 3: 10.6 4: 9.87 5: 9.01 B: 8.61	T: 12.7 1: 12.2 2: 11.1 3: 10.1 4: 8.96 B: 8.44	T: 12.7 1: 12.0 2: 10.9 3: 10.1 4: 9.23 B: 8.82	T: 13.6 1: 13.1 2: 12.0 3: 11.1 4: 10.3 5: 9.45 6: 8.62 B: 8.24	T: 13.6 1: 13.1 2: 12.1 3: 11.1 4: 10.2 5: 8.98 B: 8.30	T: 13.6 1: 13.3 2: 12.6 3: 11.9 4: 11.2 5: 10.5 6: 9.89 7: 9.16 8: 8.49 B: 8.15

BC-1 370°C	BC-2 370°C	BC-3 370°C	BC-4 370°C	BC-5 370°C	BC-6 370°C	BC-O 370°C
T: 6.16 1: 5.69 2: 3.83 B: 2.65	T: 6.16 1: 5.69 2: 4.85 3: 3.52 B: 2.65	T: 6.16 1: 5.69 2: 4.85 3: 3.52 B: 2.65	T: 6.16 1: 5.69 2: 3.83 B: 2.65	T: 6.16 1: 5.69 2: 3.83 B: 2.65	T: 6.16 1: 4.93 2: 3.26 B: 2.65	NO CANIST.

Table 15. MOTA-1C Canister Matrix Showing displacements per atom Information

MOTA LEVELS 8 TO BC @ 256.7 EFPD Units: dpa

8-A 455°C	8-B 455°C	8-C 455°C	8-D 455°C	8-E 455°C	8-F 455°C
No Baskets	No Baskets	No Baskets	No Baskets	NO CANIST.	NO CANIST.
7-A 450°C	7-B 450°C	7-C 450°C	7-D 450°C	7-E 450°C	7-F 450°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
6-A 470°C	6-B 570°C	6-C 473°C	6-D 474°C	6-E 490°C	6-F 487°C
T: 2.11 1: 2.42 2: 3.22 3: 3.96 B: 4.22	T: 2.11 1: 2.30 2: 2.71 3: 3.17 4: 3.66 B: 3.90	T: 2.11 1: 2.25 2: 2.57 3: 2.94 4: 3.37 5: 3.84 B: 4.10	T: 2.11 1: 2.30 2: 2.73 3: 3.26 4: 3.87 B: 4.21	T: 2.11 1: 2.42 2: 3.14 3: 3.84 B: 4.18	T: 2.11 1: 2.42 2: 3.22 3: 3.96 B: 4.22
5-A 535°C	5-B 550°C	5-C 570°C	5-D 600°C	5-E 599°C	5-F 438°C
T: 10.2 1: 11.5 2: 14.8 3: 17.8 B: 18.9	T: 10.2 1: 10.8 2: 12.2 3: 14.3 4: 16.7 B: 17.8	T: 10.2 1: 11.5 2: 14.8 3: 17.8 B: 18.9	T: 10.2 1: 11.5 2: 13.8 3: 16.6 B: 18.9	T: 10.2 1: 11.5 2: 14.8 3: 17.8 B: 18.9	T: 8.82 1: 10.1 2: 13.0 3: 16.6 B: 18.9
4-A 670°C	4-B 730°C	4-C 540°C	4-D 550°C	4-E 575°C	4-F 652°C
T: 27.1 1: 28.2 2: 30.4 3: 32.6 4: 34.8 5: 36.4 B: 37.2	T: 27.1 1: 29.0 2: 32.0 3: 34.4 4: 35.9 B: 36.8	T: 27.1 1: 28.2 2: 30.4 3: 32.6 4: 34.8 5: 36.4 B: 37.2	T: 27.1 1: 29.0 2: 32.0 3: 34.4 4: 35.9 B: 36.8	T: 27.1 1: 28.5 2: 31.4 3: 34.4 4: 36.5 B: 37.6	T: 27.1 1: 29.0 2: 32.0 3: 34.4 4: 35.9 B: 36.8
3-A 550°C	3-B 550°C	3-C 605°C	3-D 670°C	3-E 635°C	3-F 750°C
T: 41.6 1: 41.9 2: 42.2 3: 42.3 4: 42.2 B: 42.1	T: 41.6 1: 41.9 2: 42.1 3: 42.3 4: 42.3 5: 42.2 B: 42.1	T: 41.6 1: 41.9 2: 42.2 3: 42.3 4: 42.2 B: 42.1	T: 41.6 1: 41.9 2: 42.2 3: 42.3 4: 42.2 B: 42.1	T: 41.6 1: 41.9 2: 42.2 3: 42.3 4: 42.2 B: 42.1	T: 41.6 1: 41.9 2: 42.2 3: 42.3 4: 42.2 B: 42.1
2-A 520°C	2-B 600°C	2-C 425°C	2-D 439°C	2-E 605°C	2-F 420°C
T: 40.8 4: 40.5 2: 40.0 3: 38.7 1: 36.9 B: 35.7	T: 40.8 4: 40.5 2: 40.0 3: 38.7 1: 36.9 B: 35.7	T: 41.4 1: 41.0 2: 40.4 3: 39.8 4: 38.3 5: 36.4 B: 35.3	T: 41.4 1: 41.2 2: 40.7 3: 40.4 4: 40.0 5: 39.1 6: 38.0 7: 36.9 8: 35.8 B: 35.3	T: 40.8 1: 40.6 2: 40.1 3: 39.3 4: 38.0 5: 36.7 B: 36.0	T: 41.6 1: 40.9 2: 40.2 3: 39.2 4: 37.5 5: 36.0 B: 35.3
1-A 490°C	1-B 550->525°C	1-C 470°C	1-D 495°C	1-E 585°C	1-F 396°C
T: 29.8 1: 28.8 2: 26.9 3: 25.0 4: 23.1 5: 21.1 B: 20.2	T: 29.8 1: 28.5 2: 26.0 3: 23.6 4: 21.0 B: 19.8	T: 29.8 1: 28.1 2: 25.5 3: 23.6 4: 21.6 B: 20.7	T: 29.8 1: 28.5 2: 26.0 3: 23.6 4: 21.0 B: 19.8	T: 29.8 1: 28.1 2: 25.5 3: 23.6 4: 21.6 B: 20.7	T: 31.9 1: 30.8 2: 28.2 3: 26.0 4: 24.1 5: 22.1 6: 20.2 B: 19.3
BC-A 370°C	BC-B 370°C	BC-C 370°C	BC-D 370°C	BC-E 370°C	BC-F 370°C	BC-D 370°C
T: 13.3 1: 12.2 2: 10.3 3: 7.98 B: 6.58	T: 14.3 1: 13.2 2: 11.0 3: 9.12 4: 7.39 B: 6.58	T: 14.2 1: 11.7 2: 8.64 3: 7.15 B: 6.58	T: 13.3 1: 12.2 2: 10.2 3: 7.90 B: 6.58	T: 15.5 1: 10.4 B: 6.58	T: 15.5 1: 10.4 B: 6.58	T: 13.3 1: 12.2 2: 10.3 3: 7.98 B: 6.58

Table 16. MOTA-1D Canister Matrix Showing displacements per atom Information

MOTA LEVELS 8 TO BC @ 185.8 EFPD Units: dpa

8-A 460°C	8-B 460°C	8-C 460°C	8-D 462°C	8-E 462°C	8-F 456°C
NO CANIST.	NO CANIST.	NO CANIST.	T: 0.12 1: 0.19 B: 0.30	T: 0.12 1: 0.19 B: 0.30	T: 0.12 1: 0.13 B: 0.14
7-A 455°C	7-B 455°C	7-C 455°C	7-D 455°C	7-E 455°C	7-F 455°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
6-A 445°C	6-B 445°C	6-C 445°C	6-D 446°C	6-E 490°C	6-F 443°C
NO CANIST.	NO CANIST.	NO CANIST.	No Baskets	T: 1.53 1: 1.75 2: 2.27 3: 2.75 B: 2.97	T: 1.32 1: 1.86 B: 2.64
5-A 534°C	5-B 549°C	5-C 571°C	5-D 601°C	5-E 600°C	5-F 438°C
T: 7.38 1: 8.35 2: 10.7 3: 12.9 B: 13.7	T: 7.38 1: 7.82 2: 8.80 3: 10.3 4: 12.1 B: 12.9	T: 7.38 1: 8.35 2: 10.7 3: 12.9 B: 13.7	T: 7.38 1: 7.75 2: 9.21 3: 11.8 B: 13.4	T: 7.38 1: 8.35 2: 10.7 3: 12.9 B: 13.7	T: 6.38 1: 7.32 2: 9.38 3: 12.0 B: 13.6
4-A 670°C	4-B 730°C	4-C 539°C	4-D 549°C	4-E 575°C	4-F 650°C
T: 19.6 1: 20.6 2: 22.7 3: 24.9 4: 26.4 B: 27.2	T: 19.6 1: 21.0 2: 23.2 3: 24.9 4: 26.0 B: 26.6	T: 19.6 1: 20.4 2: 22.0 3: 23.6 4: 25.2 5: 26.3 B: 26.9	T: 19.6 1: 21.0 2: 23.2 3: 24.9 4: 26.0 B: 26.6	T: 19.6 1: 20.6 2: 22.7 3: 24.9 4: 26.4 B: 27.2	T: 19.6 1: 21.0 2: 23.2 3: 24.9 4: 26.0 B: 26.6
3-A 605°C	3-B 548°C	3-C 604°C	3-D 670°C	3-E 635°C	3-F 750°C
T: 30.1 1: 30.4 2: 30.6 3: 30.6 4: 30.5 B: 30.5	T: 30.1 1: 30.4 2: 30.6 3: 30.6 4: 30.5 B: 30.5	T: 30.1 1: 30.4 2: 30.6 3: 30.6 4: 30.5 B: 30.5	T: 30.1 1: 30.4 2: 30.6 3: 30.6 4: 30.5 B: 30.5	T: 30.1 1: 30.4 2: 30.6 3: 30.6 4: 30.5 B: 30.5	T: 30.1 1: 30.4 2: 30.6 3: 30.6 4: 30.5 B: 30.5
2-A 521°C	2-B 600°C	2-C 406°C	2-D 408°C	2-E 404°C	2-F 404°C
T: 29.5 1: 29.3 2: 29.0 3: 28.0 4: 26.7 B: 25.9	T: 29.5 1: 29.3 2: 28.9 3: 27.2 4: 26.1 B: 25.9	T: 29.9 1: 29.7 2: 29.3 3: 28.7 4: 27.1 B: 26.2	T: 29.9 1: 29.8 2: 29.5 3: 29.2 4: 29.0 5: 28.3 6: 27.5 7: 26.7 8: 25.9 B: 25.5	T: 29.9 1: 29.8 2: 29.4 3: 28.9 4: 27.0 B: 26.0	T: 29.9 1: 29.6 2: 29.1 3: 28.3 4: 27.1 5: 26.0 B: 25.6
1-A 550°C	1-B 520°C	1-C 470°C	1-D 495°C	1-E 585°C	1-F 386°C
T: 21.6 1: 20.1 2: 17.4 3: 15.3 B: 14.4	T: 21.6 1: 20.3 2: 18.3 3: 16.1 B: 14.6	T: 21.6 1: 20.3 2: 18.4 3: 17.1 4: 15.7 B: 15.0	T: 21.6 1: 20.7 2: 18.8 3: 17.1 4: 15.2 B: 14.3	T: 21.6 1: 20.3 2: 18.4 3: 17.1 4: 15.7 B: 15.0	T: 23.1 1: 22.5 2: 21.0 3: 19.4 4: 17.6 5: 16.0 6: 14.6 B: 14.0
BC-A 370°C	BC-B 370°C	BC-C 370°C	BC-D 370°C	BC-E 370°C	BC-F 370°C	BC-O 370°C
T: 9.74 1: 8.37 2: 6.52 3: 5.32 B: 4.76	T: 10.3 1: 9.42 2: 7.83 3: 6.55 4: 5.34 B: 4.77	T: 10.3 1: 8.48 2: 6.31 3: 5.21 B: 4.76	T: 9.76 1: 8.94 2: 7.48 3: 6.30 4: 5.25 B: 4.77	T: 11.2 1: 7.52 B: 4.76	T: 11.2 1: 7.52 B: 4.76	T: 9.74 1: 8.92 2: 7.46 3: 6.22 4: 5.17 B: 4.76

Values Based on Results from MOTAs 1A, 1B and 1C.

Table 17. MOTA-1E Canister Matrix Showing displacements per atom Information

MOTA LEVELS 8 TO BC @ 341.8 EFPD Units: dpa

8-A 440°C	8-B 440°C	8-C 440°C	8-D 440°C	8-E 438°C	8-F 439°C
NO CANIST.	NO CANIST.	NO CANIST.	No Baskets	T: 0.18 1: 0.26 B: 0.38	T: 0.18 1: 0.19 B: 0.20
7-A 435°C	7-B 435°C	7-C 435°C	7-D 435°C	7-E 435°C	7-F 435°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
6-A 470°C	6-B 470°C	6-C 470°C	6-D 460°C	6-E 489°C	6-F 460°C
T: 1.50 1: 2.32 B: 3.72	T: 1.50 1: 2.32 B: 3.72	T: 1.50 1: 2.32 B: 3.72	T: 1.50 1: 2.32 B: 3.72	T: 1.73 1: 1.94 2: 2.35 3: 2.75 4: 3.25 B: 3.54	T: 1.50 1: 2.32 B: 3.72
5-A 787°C	5-B 800°C	5-C 800°C	5-D 800°C	5-E 730°C	5-F 425°C
T: 10.4 1: 14.9 B: 20.2	T: 10.4 1: 14.9 B: 20.2	T: 10.4 1: 14.9 B: 20.2	T: 10.4 1: 14.9 B: 20.2	T: 10.4 1: 11.9 2: 15.4 3: 19.4 B: 21.4	T: 8.57 1: 10.3 2: 14.3 3: 19.0 B: 21.4
4-A 670°C	4-B 800°C	4-C 539°C	4-D 539°C	4-E 574°C	4-F 650°C
T: 29.7 1: 30.8 2: 33.2 3: 35.8 4: 37.6 B: 38.3	T: 29.7 1: 34.6 B: 38.1	T: 29.7 1: 30.8 2: 32.9 3: 34.9 4: 36.7 5: 37.9 B: 38.4	T: 29.7 1: 31.6 2: 35.1 3: 37.7 B: 38.7	T: 29.7 1: 31.6 2: 35.1 3: 37.4 B: 38.2	T: 29.7 1: 31.6 2: 35.1 3: 37.7 B: 38.7
3-A 604°C	3-B 549°C	3-C 602°C	3-D 669°C	3-E 635°C	3-F 750°C
T: 42.1 1: 42.7 2: 43.4 3: 43.7 4: 43.7 B: 43.6	T: 42.1 1: 42.7 2: 43.4 3: 43.7 4: 43.7 B: 43.6	T: 42.1 1: 42.7 2: 43.4 3: 43.7 4: 43.7 B: 43.6	T: 42.1 1: 42.7 2: 43.4 3: 43.7 4: 43.7 B: 43.6	T: 42.1 1: 42.6 2: 43.2 3: 43.7 4: 43.7 B: 43.7	T: 42.1 1: 42.8 2: 43.7 3: 43.7 B: 43.7
2-A 519°C	2-B 599°C	2-C 403°C	2-D 410°C	2-E 396°C	2-F 414°C
T: 42.1 1: 41.7 2: 40.8 3: 39.3 4: 37.2 B: 35.5	T: 42.1 1: 41.7 2: 40.6 3: 37.9 B: 35.9	T: 42.7 1: 42.4 2: 41.6 3: 40.7 4: 38.5 B: 36.7	T: 42.7 1: 42.5 2: 42.0 3: 41.4 4: 40.7 5: 39.7 6: 38.6 7: 37.3 8: 35.7 B: 34.9	T: 42.7 1: 42.4 2: 41.8 3: 40.7 4: 37.8 B: 35.8	T: 42.7 1: 42.3 2: 41.2 3: 39.5 4: 36.9 B: 35.2
1-A 494°C	1-B 520°C	1-C 469°C	1-D 494°C	1-E 550°C	1-F 384°C
T: 27.6 1: 26.0 2: 23.0 3: 20.1 4: 17.4 B: 16.2	T: 27.6 1: 26.5 2: 23.1 3: 18.5 B: 16.4	T: 27.6 1: 25.5 2: 21.5 3: 17.8 B: 16.2	T: 27.6 1: 26.0 2: 23.0 3: 20.1 4: 17.4 B: 16.2	T: 27.6 1: 26.0 2: 23.0 3: 20.1 4: 17.4 B: 16.2	T: 30.2 1: 29.1 2: 26.7 3: 24.0 4: 21.0 5: 18.5 6: 16.6 B: 15.7

BC-A 370°C	BC-B 370°C	BC-C 370°C	BC-D 370°C	BC-E 370°C	BC-F 370°C	BC-O 370°C
T: 11.1 1: 10.3 2: 8.97 3: 7.75 4: 6.68 B: 6.20	T: 11.7 1: 10.7 2: 9.07 3: 7.84 4: 6.75 B: 6.27	T: 11.8 1: 9.99 2: 7.83 3: 6.70 B: 6.20	T: 11.1 1: 10.3 2: 8.86 3: 7.70 4: 6.68 B: 6.20	T: 12.6 1: 8.82 B: 6.20	T: 12.0 1: 8.61 B: 6.20	T: 11.1 4: 10.3 2: 8.86 3: 7.65 1: 6.63 B: 6.20

Table 18. MOTA-1F Canister Matrix Showing displacements per atom Information

MOTA LEVELS 8 TO BC @ 335.4 EFPD Units: dpa

8-A 435°C	8-B 435°C	8-C 435°C	8-D 435°C	8-E 433°C	8-F 435°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	T: 0.17 1: 0.25 B: 0.37	T: 0.17 1: 0.18 2: 0.21 3: 0.28 4: 0.36 B: 0.39
7-A 430°C	7-B 430°C	7-C 430°C	7-D 430°C	7-E 430°C	7-F 430°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
6-A 425°C	6-B 425°C	6-C 425°C	6-D 425°C	6-E 490°C	6-F 426°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	T: 2.07 1: 2.35 2: 2.90 3: 3.44 4: 4.13 B: 4.53	T: 1.76 1: 2.05 2: 2.79 3: 3.83 B: 4.53
5-A 1017°C	5-B 1016°C	5-C 1077°C	5-D 1077°C	5-E 1128°C	5-F 1250°C
T: 13.8 1: 19.4 B: 25.4	T: 13.8 1: 19.4 B: 25.4	T: 13.8 1: 19.4 B: 25.4	T: 13.8 1: 19.4 B: 25.4	T: 13.8 1: 19.4 B: 25.4	T: 13.8 1: 19.4 B: 25.4
4-A 1077°C	4-B 1125°C	4-C 799°C	4-D 550°C	4-E 670°C	4-F 670°C
T: 33.6 1: 36.0 B: 37.9	T: 32.5 1: 35.6 B: 37.9	T: 32.2 1: 35.2 B: 37.6	T: 32.2 1: 33.1 2: 34.4 3: 35.3 4: 36.2 5: 37.0 6: 37.6 B: 37.8	T: 32.2 1: 33.1 2: 34.6 3: 36.1 4: 37.2 B: 37.8	T: 32.2 1: 33.4 2: 35.4 3: 37.1 B: 37.8
3-A 605°C	3-B 550°C	3-C 605°C	3-D 670°C	3-E 550°C	3-F 750°C
T: 39.8 1: 40.0 2: 40.3 3: 40.4 4: 40.4 B: 40.2	T: 39.8 1: 40.0 2: 40.3 3: 40.4 4: 40.4 B: 40.2	T: 39.8 1: 40.0 2: 40.3 3: 40.4 4: 40.4 B: 40.2	T: 39.8 1: 40.0 2: 40.3 3: 40.4 4: 40.4 B: 40.2	T: 39.8 1: 40.1 2: 40.4 3: 40.4 B: 40.2	T: 39.8 1: 40.1 2: 40.4 3: 40.4 B: 40.2
2-A 520°C	2-B 600°C	2-C 406°C	2-D 404°C	2-E 404°C	2-F 405°C
T: 38.6 1: 38.3 2: 37.6 3: 36.6 4: 35.0 B: 33.6	T: 38.6 1: 38.3 2: 37.2 3: 35.0 B: 33.6	T: 39.2 1: 39.0 2: 38.3 3: 37.6 4: 36.4 5: 34.6 B: 33.2	T: 39.2 1: 39.0 2: 38.6 3: 37.9 4: 37.1 5: 35.3 B: 33.9	T: 39.2 1: 39.0 2: 38.6 3: 38.0 4: 37.4 5: 36.2 B: 35.6	T: 39.2 1: 38.8 2: 37.9 3: 36.8 4: 35.2 B: 34.0
1-A 799°C	1-B 799°C	1-C 495°C	1-D 494°C	1-E 520°C	1-F 386°C
T: 27.5 1: 22.8 B: 18.5	T: 27.5 1: 22.8 B: 18.5	T: 27.5 1: 25.8 2: 22.6 3: 19.5 B: 18.0	T: 27.5 1: 26.2 2: 23.8 3: 21.5 4: 19.1 B: 18.0	T: 27.5 1: 26.4 2: 23.4 3: 19.8 B: 18.0	T: 29.6 1: 28.8 2: 26.5 3: 24.0 4: 22.0 5: 20.2 6: 18.4 B: 17.6

BC-A 370°C	BC-B 370°C	BC-C 370°C	BC-D 370°C	BC-E 370°C	BC-F 370°C	BC-O 370°C
T: 13.0 1: 12.1 2: 10.6 3: 9.27 4: 8.04 B: 7.50	T: 13.5 1: 12.4 2: 10.7 3: 9.38 4: 8.10 B: 7.50	T: 13.8 1: 11.8 2: 9.38 3: 8.04 B: 7.50	T: 13.6 1: 10.2 B: 7.50	T: 14.6 1: 10.6 B: 7.50	T: 13.9 1: 10.3 B: 7.50	T: 13.0 1: 12.1 2: 10.6 3: 9.27 4: 8.04 B: 7.50

Table 19. MOTA-1G Canister Matrix Showing displacements per atom Information

MOTA LEVELS 8 TO BC @ 299.7 EFPD Units: dpa

8-A 440°C	8-B 440°C	8-C 440°C	8-D 440°C	8-E 449°C	8-F 435°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	T: 0.19 1: 0.20 2: 0.25 3: 0.32 4: 0.40 B: 0.44	T: 0.19 1: 0.20 2: 0.25 3: 0.32 4: 0.40 B: 0.44
7-A 435°C	7-B 435°C	7-C 435°C	7-D 435°C	7-E 435°C	7-F 435°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
6-A 430°C	6-B 430°C	6-C 430°C	6-D 430°C	6-E 491°C	6-F 426°C
NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.	T: 2.50 1: 2.73 2: 3.23 3: 3.77 4: 4.40 5: 5.10 B: 5.50	T: 2.10 1: 2.28 2: 2.65 3: 3.16 B: 3.50
5-A 671°C	5-B 550°C	5-C 551°C	5-D 635°C	5-E 670°C	5-F 424°C
T: 14.5 1: 15.0 2: 17.2 3: 20.9 4: 23.9 B: 25.1	T: 14.5 1: 15.4 2: 17.2 3: 18.9 4: 20.7 5: 22.6 6: 24.2 B: 25.0	T: 14.5 1: 15.6 2: 17.7 3: 19.7 4: 22.0 5: 24.0 B: 25.0	T: 14.5 1: 15.7 2: 18.3 3: 21.1 4: 23.8 B: 25.1	T: 14.5 1: 15.4 2: 17.7 3: 20.9 4: 23.9 B: 25.1	T: 12.5 1: 13.4 2: 15.2 3: 17.4 4: 20.6 5: 23.8 B: 25.1
4-A 600°C	4-B 635->605°C	4-C 750°C	4-D 550°C	4-E 670°C	4-F 670°C
T: 30.8 1: 31.5 2: 32.8 3: 33.8 4: 34.8 B: 35.4	T: 30.8 1: 31.6 2: 33.0 3: 34.3 4: 35.1 B: 35.4	T: 30.8 1: 31.6 2: 33.0 3: 34.3 4: 35.1 B: 35.4	T: 30.8 1: 31.4 2: 32.7 3: 33.9 4: 34.7 5: 35.2 B: 35.4	T: 30.8 1: 31.6 2: 33.0 3: 34.3 4: 35.1 B: 35.4	T: 30.8 1: 31.6 2: 33.0 3: 34.3 4: 35.1 B: 35.4
3-A 431°C	3-B 427°C	3-C 606°C	3-D 670°C	3-E 550°C	3-F 750°C
T: 36.8 1: 36.9 2: 37.0 3: 37.1 4: 37.2 5: 37.4 B: 37.2	T: 36.8 1: 37.0 2: 37.2 3: 37.3 4: 37.3 5: 37.5 B: 37.2	T: 36.9 1: 37.0 2: 37.1 3: 37.3 4: 37.4 B: 37.3	T: 36.9 1: 37.0 2: 37.1 3: 37.3 4: 37.4 B: 37.3	T: 36.9 1: 37.0 2: 37.2 3: 37.4 B: 37.3	T: 36.9 1: 37.0 2: 37.2 3: 37.4 B: 37.3
2-A 520°C	2-B 605°C	2-C 635°C	2-D 550°C	2-E 417°C	2-F 520°C
T: 36.1 1: 35.7 2: 34.8 3: 33.4 4: 31.1 B: 29.3	T: 36.1 1: 35.6 2: 34.5 3: 32.5 4: 30.4 B: 29.2	T: 36.1 1: 35.6 2: 34.5 3: 32.5 4: 30.4 B: 29.2	T: 36.1 1: 35.6 2: 34.5 3: 32.5 4: 30.4 B: 29.2	T: 36.6 1: 36.3 2: 35.1 3: 33.6 4: 31.8 5: 30.3 6: 29.0 B: 28.3	T: 36.1 1: 35.7 2: 34.2 3: 31.0 B: 29.2
1-A 750°C	1-B 495°C	1-C 495°C	1-D 495°C	1-E 383°C	1-F 384°C
T: 22.6 1: 21.6 2: 19.1 3: 16.8 4: 14.6 B: 13.7	T: 22.6 1: 20.9 2: 18.3 3: 16.5 4: 14.6 B: 13.7	T: 22.6 1: 20.9 2: 17.9 3: 15.1 B: 13.7	T: 22.6 1: 21.3 2: 19.0 3: 17.0 4: 14.7 B: 13.7	T: 24.7 1: 23.1 2: 20.2 3: 18.0 4: 16.0 5: 14.1 B: 13.2	T: 24.7 1: 23.9 2: 21.5 3: 19.2 4: 17.4 5: 15.7 6: 14.1 B: 13.3

BC-A 370°C	BC-B 370°C	BC-C 370°C	BC-D 370°C	BC-E 370°C	BC-F 370°C	BC-O 370°C
T: 9.26 1: 8.68 2: 7.63 3: 6.82 4: 5.78 B: 5.12	T: 10.0 1: 9.31 2: 8.01 3: 6.89 4: 5.84 B: 5.33	T: 10.0 1: 9.21 2: 7.91 3: 7.04 4: 6.29 5: 5.51 B: 5.16	T: 9.27 1: 6.92 B: 5.12	T: 10.0 1: 7.22 B: 5.16	T: 10.0 1: 9.18 2: 7.79 3: 6.71 4: 5.76 B: 5.33	T: 9.27 1: 8.66 2: 7.71 3: 7.01 4: 6.33 5: 5.54 B: 5.12

Table 20. MOTA-2A Canister Matrix Showing displacements per atom Information

MOTA LEVELS 8 TO BC @ 299.7 EFPD Units: dpa

8-A 433°C	8-B 436°C	8-C 440°C	8-D 440°C	8-E 440°C	8-F 440°C
T: 0.21 1: 0.32 B: 0.50	T: 0.21 1: 0.23 2: 0.27 3: 0.32 4: 0.37 5: 0.44 B: 0.50	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
7-A 435°C	7-B 434°C	7-C 435°C	7-D 435°C	7-E 435°C	7-F 435°C
NO CANIST.	T: 0.67 1: 0.71 2: 0.86 3: 1.04 4: 1.18 5: 1.42 B: 1.59	NO CANIST.	NO CANIST.	NO CANIST.	NO CANIST.
6-A 428°C	6-B 430°C	6-C 430°C	6-D 430°C	6-E 430°C	6-F 430°C
T: 2.20 1: 3.43 B: 5.31	T: 2.20 1: 2.36 2: 2.82 3: 3.38 4: 3.87 5: 4.62 B: 5.16	T: 2.20 1: 3.43 B: 5.31	NO CANIST.	NO CANIST.	NO CANIST.
5-A 579°C	5-B 422°C	5-C 581°C	5-D 800°C	5-E 430°C	5-F 600°C
T: 12.5 1: 16.6 B: 21.2	T: 10.8 1: 16.3 B: 23.2	T: 12.5 1: 16.6 B: 21.2	T: 12.5 1: 14.4 2: 18.1 3: 20.9 B: 22.0	T: 10.8 1: 11.7 2: 14.0 3: 16.4 4: 18.3 5: 21.1 B: 23.0	T: 12.5 1: 14.7 2: 19.6 B: 22.4
4-A 425°C	4-B 600°C	4-C 600°C	4-D 430°C	4-E 520°C	4-F 601°C
T: 28.1 1: 29.4 2: 31.9 3: 34.5 4: 37.8 5: 40.1 B: 41.1	T: 30.6 1: 31.8 2: 34.1 3: 36.4 4: 39.3 B: 40.8	T: 30.6 1: 32.0 2: 35.5 3: 39.3 B: 40.9	T: 28.1 1: 29.2 2: 31.5 3: 33.8 4: 35.9 5: 38.1 6: 39.6 B: 40.3	T: 30.6 1: 32.6 2: 35.6 3: 37.9 4: 39.4 B: 40.1	T: 30.6 1: 33.3 2: 36.9 3: 39.3 B: 40.6
3-A 605°C	3-B 549°C	3-C 423°C	3-D 427°C	3-E 519°C	3-F 600°C
T: 43.7 1: 43.8 2: 43.9 3: 44.0 4: 43.9 B: 43.8	T: 43.7 1: 43.8 2: 43.9 3: 44.0 4: 44.0 5: 44.0 6: 43.9 B: 43.8	T: 43.3 1: 43.5 2: 43.9 3: 43.9 4: 44.0 5: 44.0 6: 43.9 B: 43.7	T: 43.3 1: 43.6 2: 43.9 3: 44.0 4: 43.9 5: 43.8 B: 43.7	T: 43.7 1: 43.9 2: 43.9 3: 44.0 4: 43.9 B: 43.8	T: 43.7 1: 43.9 2: 44.0 3: 43.9 B: 43.8
2-A 406°C	2-B 412°C	2-C 521°C	2-D 406°C	2-E 407°C	2-F 519°C
T: 42.6 1: 41.9 2: 40.2 3: 38.8 4: 37.2 5: 35.1 B: 33.8	T: 42.6 1: 42.1 2: 41.0 3: 40.0 4: 38.5 5: 37.0 6: 35.6 B: 34.8	T: 41.7 1: 41.0 2: 39.6 3: 38.0 4: 35.7 B: 34.1	T: 42.6 1: 41.7 2: 38.8 3: 36.4 4: 34.5 B: 33.6	T: 42.6 1: 41.7 2: 38.8 3: 36.4 4: 34.5 B: 33.6	T: 41.7 1: 40.1 2: 36.5 B: 34.1
1-A 390°C	1-B 380°C	1-C 385->1000C	1-D 395°C	1-E 550->670°C	1-F 459°C
T: 29.2 1: 27.4 2: 24.5 3: 22.2 4: 20.0 5: 17.7 6: 15.6 B: 14.6	T: 29.2 1: 21.9 B: 14.7	T: 27.9 1: 21.3 B: 14.9	T: 29.2 1: 21.9 B: 14.7	T: 26.5 1: 21.2 B: 16.0	T: 26.8 1: 25.8 2: 23.7 3: 21.3 4: 19.1 5: 16.9 B: 15.8

BC-A 377°C	BC-B 374°C	BC-C 375°C	BC-D 375°C	BC-E 373°C	BC-F 411°C	BC-O 370°C
T: 10.6 1: 9.63 2: 7.88 3: 6.45 4: 5.27 5: 4.38 B: 4.05	T: 10.6 1: 9.99 2: 8.81 3: 7.48 4: 6.41 5: 4.95 B: 4.01	T: 10.6 1: 9.17 2: 7.34 3: 6.35 4: 5.49 5: 4.51 B: 4.00	T: 10.6 1: 9.63 2: 8.11 3: 7.01 4: 5.98 5: 5.09 6: 4.36 B: 4.03	T: 10.6 1: 9.77 2: 8.22 3: 6.92 4: 5.82 B: 5.33	T: 8.77 1: 8.05 2: 6.77 3: 5.69 4: 4.75 B: 4.33	NO CANIST.

Table 21. MOTA-2B Canister Matrix Showing displacements per atom Information

MOTA LEVELS 8 TO BC @ 203.3 EFPD Units: dpa

8-A 440°C NO CANIST.	8-B 444°C T: 0.19 1: 0.21 2: 0.24 3: 0.27 4: 0.32 5: 0.38 B: 0.41	8-C 440°C NO CANIST.	8-D 440°C NO CANIST.	8-E 440°C NO CANIST.	8-F 440°C NO CANIST.
7-A 435°C NO CANIST.	7-B 437°C T: 0.55 1: 0.61 2: 0.73 3: 0.82 4: 0.97 5: 1.16 B: 1.23	7-C 435°C NO CANIST.	7-D 435°C NO CANIST.	7-E 435°C NO CANIST.	7-F 435°C NO CANIST.
6-A 431°C T: 1.67 1: 2.61 B: 4.08	6-B 431°C T: 1.67 1: 1.87 2: 2.25 3: 2.57 4: 3.08 5: 3.70 B: 3.96	6-C 423°C T: 1.67 1: 2.61 B: 4.08	6-D 423°C T: 1.67 1: 2.61 B: 4.08	6-E 425°C T: 1.67 1: 2.61 B: 4.08	6-F 425°C T: 1.67 1: 2.61 B: 4.08
5-A 495°C T: 9.31 1: 9.99 2: 11.5 3: 13.0 4: 14.6 B: 15.4	5-B 599°C T: 9.31 1: 9.99 2: 11.5 3: 12.9 4: 14.1 5: 15.0 B: 15.5	5-C 599°C T: 9.31 1: 10.7 2: 13.9 B: 15.5	5-D 500°C T: 9.31 1: 10.7 2: 13.9 B: 15.5	5-E 435°C T: 8.14 1: 8.82 2: 10.2 3: 11.7 4: 13.2 5: 14.8 B: 15.7	5-F 424°C T: 8.14 1: 9.88 2: 12.8 3: 14.8 B: 15.9
4-A 430°C T: 18.6 1: 22.4 B: 25.1	4-B 428°C T: 18.6 1: 20.2 2: 22.8 3: 24.2 4: 24.9 B: 25.1	4-C 599°C T: 19.9 1: 20.7 2: 22.1 3: 23.5 4: 24.2 5: 24.7 B: 24.9	4-D 430°C T: 18.6 1: 19.2 2: 20.3 3: 21.5 4: 22.6 5: 24.2 B: 25.0	4-E 519°C T: 19.9 1: 21.4 2: 23.7 3: 24.6 B: 24.9	4-F 599°C T: 19.9 1: 20.5 2: 21.6 3: 22.8 4: 24.2 B: 24.9
3-A 433°C T: 25.7 1: 25.8 2: 25.9 3: 25.9 4: 25.8 5: 25.5 B: 25.1	3-B 670°C T: 25.8 1: 25.9 2: 25.9 3: 25.8 4: 25.5 B: 25.3	3-C 399°C T: 25.7 1: 25.9 2: 25.8 3: 25.5 B: 25.1	3-D 427°C T: 25.7 1: 25.7 2: 25.9 3: 25.9 4: 25.9 5: 25.8 6: 25.5 B: 25.2	3-E 519°C T: 25.8 1: 25.9 2: 25.9 3: 25.9 4: 25.6 B: 25.3	3-F 601°C T: 25.8 1: 25.9 2: 25.9 3: 25.9 4: 25.6 B: 25.3
2-A 519°C T: 23.7 1: 23.3 2: 22.7 3: 21.8 4: 21.1 5: 20.4 B: 20.0	2-B 549°C T: 23.7 1: 23.3 2: 22.6 3: 21.7 4: 20.6 B: 20.0	2-C 385->1110C T: 23.9 1: 22.2 B: 19.8	2-D 799°C T: 23.7 1: 23.2 2: 22.1 3: 20.8 B: 20.0	2-E 408°C T: 24.2 1: 24.0 2: 23.5 3: 22.9 4: 22.0 5: 20.5 B: 19.7	2-F 519°C T: 23.7 1: 23.3 2: 22.7 3: 21.9 4: 20.8 B: 20.0
1-A 387°C T: 17.4 1: 16.8 2: 15.5 3: 14.3 4: 13.1 5: 12.0 6: 10.4 B: 9.47	1-B 530->645°C T: 15.8 1: 12.9 B: 10.2	1-C 393°C T: 17.4 1: 16.7 2: 15.2 3: 13.8 4: 12.4 5: 11.1 6: 9.99 B: 9.56	1-D 519°C T: 16.0 1: 15.2 2: 13.3 3: 11.0 B: 9.87	1-E 599°C T: 16.0 1: 15.2 2: 13.3 3: 11.0 B: 9.87	1-F 460°C T: 16.0 1: 15.2 2: 13.8 3: 12.5 4: 10.8 B: 9.87
BC-A 370°C T: 7.43 1: 6.28 2: 4.38 B: 3.62	BC-B 371°C T: 7.43 1: 5.27 B: 3.63	BC-C 378°C T: 7.43 1: 6.86 2: 6.06 3: 5.35 4: 4.60 5: 3.92 B: 3.62	BC-D 378°C T: 7.43 1: 6.86 2: 6.06 3: 5.35 4: 4.60 5: 3.92 B: 3.62	BC-E 373°C T: 7.43 1: 6.99 2: 6.19 3: 5.45 4: 4.78 B: 4.48	BC-F 410°C T: 6.48 1: 6.10 2: 5.36 3: 4.71 4: 4.11 B: 3.83	BC-O 370°C NO CANIST.