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K-effective CALCULATIONS FOR INFINITE PLANAR SQUARE-PITCHED ARRAYS OF WASTE RECEPTACLES

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MASTER

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K_{effective} CALCULATIONS FOR INFINITE PLANAR SQUARE-PITCHED ARRAYS OF WASTE RECEPTACLES

B.A. Pohl and B.L. Koponen
Lawrence Livermore National Laboratory

Neutron multiplication factors (k_{eff}) have been calculated for arrays of three standard sizes of waste receptacles: 5, 30, and 55 gallon drums containing either 2% or 5% enriched uranium compounds mixed with either water or oil. The calculations demonstrate the effect of both the array pitch and the uranium concentration on k_{eff} . No container was subcritical for all possible sets of concentration and pitch. All were safe for both very low and very high uranium concentrations. Accident condition calculations, for which an extra drum is added to the system, show little effect on criticality.

1. CONTAINER ARRAY GEOMETRY

Carbon steel drums that would contain either a UO_2F_2 -water solution or a UF_4 -oil mixture are modeled as right cylinders. The containers and the air surrounding them are contained in a region directly above a horizontal slab of concrete flooring in a room with a ceiling eight feet high. The ceiling is modeled as a thick layer of water; the air in the room is modeled as a low density water mist. A unit cuboid is constructed from a three-element array containing the floor slab; the region between the floor and the ceiling containing the drums; and the ceiling slab. (Fig. 1) This unit cell is specularly reflected on the four of its vertical faces to effect an infinite planar square horizontal array. The array spacing of the containers (pitch) is determined by the horizontal dimensions of this unit cell. This system is treated as a squarepitch latticecell in which the drum walls are the cladding and the moist air, the moderator.

2. COMPUTER SYSTEMS

Throughout this study we used KENO V.a - CSAS4 in SCALE4.1, with the 27-group cross section library. Part of the calculations were remotely executed on the configuration controlled NCSS IBM 3090 system maintained by the Computing and Telecommunications Division of Martin Marietta Energy Systems, Inc. at Oak Ridge, Tennessee [Ref. 1] via INTERNET links to LLNL. Due to budget considerations, many of the calculations were run locally using the IBM PC 386/486 version of CSAS4 developed at Idaho National Engineering Laboratory [Ref. 2]. Figure 2 indicates which computer system was used for

each of the data sets and references the labeling scheme we used to index the calculations. Sufficient histories were run to obtain a typical error of less than 0.3%; this represented ~10 minutes per data point on the IBM 3090 and ~1 hour per point of PC time. Over 1000 data points were computed during this study.

3. DRUM DIMENSIONS

We modeled each drum as a nested set of two right circular cylinders; the skin thickness of the containers being derived from the differences in the heights and diameters of the two cylinders. The dimensions for the 5, 30, and 55 gallon drums to be incorporated in these models follow from ANSI standards [Ref. 3]. In instances where a choice of parameters needed to be made from a range of values, we adopted suggested values [Ref. 4]. These choices involved selection of the thickness of the carbon steel stock from a set of possible DOT Designated Gages, and the definition of the effective height of the drum. The ambiguity in defining the heights is due to typical drum construction where the upper and lower lid of the drums are not true planes and do not necessarily intersect the cylindrical shell at its full length (rim height). The amount of the uncertainty is different for each size of drum and was dealt with individually. It should be noted that at the aspect ratio of all of the drums, small changes to the height of the drums has little effect on reactivity; for elongated cylinders the diameter is the sensitive parameter. There was no uncertainty in the diameters of the drums. The applicable parameters are listed below:

nominal container size	range of steel gages	selected steel gage	range of inside diameters	selected inside diameter	range of inside heights	selected inside height
5 Gallon	24 to 28	28	11.25"	11.25"	12.8125" to 13.6250"	13.4375"
30 Gallon	12 to 18	18	18.25"	18.25"	28.00" to 28.75"	28.75"
55 Gallon	18 to 20	18	22.50"	22.50"	33.25" to 34.75"	34.00"

4. MATERIALS

4.1 UO₂F₂-water solution vs. UF₄-oil mixture

Neither composition proved to be consistently more reactive than the other for all combinations of pitch and uranium density; thus k_{eff} for both the UO₂F₂-water solutions and UF₄-oil mixtures were calculated. At uranium concentrations producing optimal reactivity (typically in the range between 1.5 and 3 grams of uranium per cc of solution) the UF₄-oil mixture was the more reactive. Enrichments of both 2% and 5% ²³⁵U by weight were considered. Uranium concentrations of the materials were varied from 0.2 grams of uranium per cc of solution to the full theoretical density of the dry uranium compounds.

The composition of the UO₂F₂-water mixture was derived from the density relationships in a recent ORNL publication [Ref. 5]. This treatment addresses the problem of experimental discrepancies found for uranium densities at very low H/U ratio where hydrate compounds begin to form. The specification of UF₄-oil mixture uses the KENO density multiplier option to specify its constituents. A description of these methods are found in Appendix 1.

4.2 Concrete Composition

The four concrete types contained in the KENO-V.a standard composition library were compared in a fixed array geometry. In contrast to the results from the geometry of the C-4 task involving the 42-unit storage tank arrays [Ref. 6], it was found that for this geometry, MG concrete was slightly more reactive than the other three choices. MG concrete was used for all subsequent calculations. See figures CON-1 and CON-2.

4.3 Air/Water Mist Concentration

The air in this array is modeled as water mist and occupies most of the volume in this calculation. The complete range of water mist concentration from full water flooding to extremely dry conditions were evaluated for its effect on the array reactivity. Calculation sets in which we varied the water mist density of the air surrounding the containers for several sets of pitch indicated little structure at low water densities but did indicate significant variation of k_{eff} at water densities above 0.01 gm/cc which changed markedly for each of the calculated pitches. Since no mist value was consistently more reactive for all of the calculated pitches, we chose a moisture content of 10^{-4} gm of water per cc of air. This value is representative of a normal humid environment, and was maintained throughout this study. See figures MD-1 to MD-4.

5. RESULTS

5.1 Pitch and Concentration Study—Normal Conditions

The intent of this study was to investigate the effects of uranium concentration and pitch for infinite planar arrays of three commonly used waste receptacle sizes. The containers were filled with homogeneous mixtures of either UO_2F_2 -dissolved into water, or UF_4 mixed with oil. Pitch was varied from essentially contact of the containers out to a distance where no significant change in reactivity was found by additional separation. The results of the completed calculations are seen in figures AA-AE through ZC-ZJ; tabular results are listed in Appendix 3. With the plot scaling we used, the error bars are contained within the plotting symbols and do not appear. All curves demonstrated the characteristic peak in reactivity near a uranium density of 2.0 gmU/cc, falling off for both high and low concentrations. Discontinuities in the k_{eff} curves are evident for the UO_2F_2 -water mixtures at concentrations above ~3.0 gmU/cc ($\text{H/U} < 4$) due to hydrate formation.

5.2 Extra Barrel—Accident Conditions

Two types of accident case were considered; one in which an extra barrel is double-stacked on top of another, and one in which an extra barrel is inserted in between the rows and columns of the barrel array. Since neither of these accident cases can be represented by a uniform infinite array lattice, a new geometry model was coded around a baseline normal case containing a 21 by 21 square array of individual barrels. Cell spaces filled with air (low density water mist) were provided in between and on top of the barrels that could be interchanged for the extra barrel for the accident calculation. The four vertical edges at the border of the large array were specularly reflected to maintain the properties of an infinite array although the true lattice cell treatment was no longer applicable due to the perturbation that would be caused by the extra barrel. Half size spaces were used at the edges of the array and quarter size spaces were used at the four corners to maintain spacing uniformity upon reflection.

All container size and material variables are identical to the standard non-accident case. With this 21 by 21 geometry, we calculated a "baseline normal" case in which we use the new array but omit the extra barrel. With the appropriate effective pitch constructed with the use of air space cells, the "baseline normal" k_{eff} agrees within 1% to the k_{eff} calculated for the simple infinite square lattice array used for the standard normal case.

Additional coding was provided in the KENO input to guarantee that neutrons were started in each of the 441 (442 for the accident case) fuel cells. When the spacing cells, between and on top of the fuel cells are included, the resultant array dimensions became 43 by 43 by 4. Figure 3 illustrates the normal and accident configuration of this array.

Three cases were chosen (one for each size barrel) to investigate the effects of the accidents. We chose cases that had just large enough pitch to allow an extra barrel to be interstitially inserted, and that had normal k_{eff} between 0.9 and 1.0. These cases were selected since they would be the most sensitive to array perturbations. All barrels contained 5% enriched UO_2F_2 -dissolved into water. The results are summarized below. As can be seen from the table, the effects on k_{eff} due to the accidents are barely above the one sigma statistical fluctuations; the worst offenders being the interstitial cases. At two sigma the accidents are insignificant.

All accident case calculations were run on the NCSS IBM-3090

case	Keffective $\pm$ 1 sigma		
	normal baseline	interstitial accident	double stacked accident
5-Gallon 75 cm pitch 1.5 gmsU/cc	0.91644 $\pm$ 0.00203	0.92201 $\pm$ 0.00201	0.91836 $\pm$ 0.00208
30 Gallon 100 cm pitch 0.4 gmsU/cc	0.93221 $\pm$ 0.00169	0.93766 $\pm$ 0.00172	0.93754 $\pm$ 0.00178
55 Gallon 150 cm pitch 0.4gmsU/cc	0.96845 $\pm$ 0.00232	0.97588 $\pm$ 0.00242	0.96877 $\pm$ 0.00221

6. CONCLUSIONS

The comments below are generalizations. For precise data refer to the applicable graphs and tables appearing later in this article.

6.1 5 Gallon Drums

This is the only size barrel that could be spaced far enough apart to remain subcritical at all uranium densities. At 5% enrichment, square pitch spacing could be as close as 100 cm for the most reactive UF_4 -oil mixture and 75 cm for the most reactive UO_2F_2 -water mixture. At 2% enrichment, the spacing for both materials could be safely reduced to 50 cm for all uranium densities.

6.2 30 Gallon Drums

At 5% enrichment only uranium densities below ~ 0.3 gmU/cc or above ~ 4.5 gmU/cc were subcritical at all values of pitch. At 2% the lower limit could be raised to ~ 1.0 gmU/cc. At the greatest separation considered (200cm), the subcritical density could be raised to ~ 0.45 gmsU/cc for the 5% case and any density for the 2% case.

6.3 55 Gallon Drums

The 55 gallon results are quite similar to the 30 gallon case. At 5% enrichment only uranium densities below ~ 0.3 gmU/cc or above ~ 4.5 gmU/cc were subcritical at all values of pitch. At 2% the lower limit could be raised to ~ 1.0 gmU/cc. At the greatest separation considered (500cm), the subcritical density could be raised to ~ 0.4 gmsU/cc for the 5% case but not above 1.0 gmU/cc for the 2% case.

7. REFERENCES

1. SCALE: *A Modular Code System of Performing Standardized Computer Analysis for Licensing Evaluation*, NUREG/CR-0200, Revision 4 (ORNL/NUREG/CSD-2/R4), Vols. I, II, and III (April, 1991). Available from Radiation Shielding Information Center as CCC-545
2. D.W. Nigg, C.A. Atkinson, J. Blair Briggs, J. Todd Taylor, "A PC-Based Version of Keno 5.a," Trans. Am. Nucl. Soc. **61**, 188 (1990)
3. ANSI/ASC MH2-1985:
 - Section 7.1 American National Standard for 5-Gallon (19-Liter) Tight-Head Steel (Double-Seam Chime) Pails (DOT-17E, DOT-37B60, UFC-Rule 40, NMFC-Item 260)
 - Section 4.3 American National Standard for 30-Gallon (114-Liter) Full-Removable-Head Steel (Double-Seam Chime) Drums (DOT-17H, UFC-Rule 40, NMFC-Item 260)
 - Section 3.1 American National Standard for 55-Gallon (208-Liter) Tight-Head Steel (Double-Seam Chime) Drums (DOT-17E, UFC-Rule 40, NMFC-Item 260)
4. Telephone conversation between Howard Dyer and Bill Lloyd on July 29, 1992
5. W.C. Jordan and J.C. Turner, "Minimum Mass of Moderator Required for Criticality of Homogeneous Low-Enriched Uranium Systems," ORNL/CSD/TM-284, Martin Marietta Energy Systems, Inc., Oak Ridge National Laboratory, December 1992.
6. W.R. Lloyd and B.A. Pohl, "K-effective Evaluation of the C-400/409 Acidification and Storage Tank Arrays at the Paducah Gaseous Diffusion Plant," UCRL-ID-112338, January 29, 1993

Not to scale

Container Volume (gal)	Dimension (cm)			
	R 1	R 2	T 1	T 2
5	14.2875	14.3202	34.1313	34.1968
30	23.1775	23.2862	73.025	73.2424
55	28.575	28.684	86.36	86.577

Figure 1

Task C-3 KENO RUNS

Labeling Convention for Calculation Sets

NCSS IBM 3090
IBM pc 386/486

PITCH cm.	5 Gallon				30 Gallon				55 Gallon			
	2%		5%		2%		5%		2%		5%	
	UO2F2 water	UF4 oil	UO2F2 water	UF4 oil	UO2F2 water	UF4 oil	UO2F2 water	UF4 oil	UO2F2 water	UF4 oil	UO2F2 water	UF4 oil
30	XA	UA	DA	AA								
50	XB	UB	DB	AB	YB	VB	EB	BB				
60									ZC	WC	FC	CC
75	XD	UD	DD	AD	YD	VD	ED	BD	ZD	WD	FD	CD
100	XE	UE	DE	AE	YE	VE	EE	BE	ZE	WE	FE	CE
150	XF	UF	DF	AF	YF	VF	EF	BF	ZF	WF	FF	CF
200					YG	VG	EG	BG	ZG	WG	FG	CG
300									ZH	WH	FH	CH
400									ZI	WI	FI	CI
500									ZJ	WJ	FJ	CJ

Figure 2

Array Structure for the Accident Cases

Uniform Array - Normal Condition

- Location for the Extra Interstitial Container
- ⊙ Location for the Extra Double Stacked Container

Figure 3

Graphical Results

Infinite Planar Array of 5 Gallon Containers

Figure CON-1 $K_{\text{effective}}$ vs. Concrete Type

Infinite Planar Array of 5 Gallon Containers

Figure CON-2 $K_{\text{effective}}$ vs. Concrete Type

Figure MD-1 $K_{\text{effective}}$ vs. Mist Density

Figure MD-2 $K_{\text{effective}}$ vs. Mist Density

Infinite Planar Array of 5 Gallon Containers

Figure MD-3 $K_{\text{effective}}$ vs. Mist Density

Infinite Planar Array of 5 Gallon Containers

Figure MD-4 $K_{\text{effective}}$ vs. Mist Density

Figure AA-AF $K_{\text{effective}}$ vs. Uranium Density

Figure DA-DF $K_{\text{effective}}$ vs. Uranium Density

Figure UA-UF $K_{\text{effective}}$ vs. Uranium Density

Figure XA-XF $K_{\text{effective}}$ vs. Uranium Density

Figure BB-BG $K_{\text{effective}}$ vs. Uranium Density

Figure EB-EG $K_{\text{effective}}$ vs. Uranium Density

Figure VB-VC $K_{\text{effective}}$ vs. Uranium Density

Figure YB-YG $K_{\text{effective}}$ vs. Uranium Density

Figure CC-C1 $K_{\text{effective}}$ vs. Uranium Density

Figure CD-CJ $K_{\text{effective}}$ vs. Uranium Density

Infinite Planar Array of Containers

Figure FC-FI $K_{\text{effective}}$ vs. Uranium Density

Figure FD-FJ $K_{\text{effective}}$ vs. Uranium Density

Figure WC-WI $K_{\text{effective}}$ vs. Uranium Density

Figure WD-WJ $K_{\text{effective}}$ vs. Uranium Density

Figure ZC-ZI $K_{\text{effective}}$ vs. Uranium Density

Infinite Planar Array of Containers

Figure ZD-ZJ $K_{\text{effective}}$ vs. Uranium Density

Appendix 1

Material Specifications

Material Specifications for UF₄ and C₅H₁₂ Mixture using KENO Density Multiplier Method of SCALE Section M7.5.5.4

The KENO Density Multiplier is defined as the Actual density/Theoretical density. If we assume in this case that the volume of the mixture equals the sum of the UF₄ volume and the C₅H₁₂ volume, than the density multiplier is the volume fraction.

Volume Fraction of UF₄ + Volume Fraction of C₅H₁₂ = 1.0

Use an oil density of 0.87 gms of C₅H₁₂ / cc

Use KENO theoretical densities from SCALE Table M.8.2.1

KENO Density Multiplier for UF₄

let variable value of Φ = gms of U / cc of soln then :

$$\text{Actual UF}_4 \text{ density} = \text{gms UF}_4 / \text{cc of soln} = \frac{\Phi \text{ gms of U / cc of soln}}{\text{gms of U / gm of UF}_4} \quad \text{eq.}\{1\}$$

$$\text{For 5\% enriched UF}_4; \quad \text{gms of U / gm of UF}_4 = \frac{237.89882}{237.89882 + 4 \cdot 18.99820} = 0.7579$$

$$\text{For 2\% enriched UF}_4; \quad \text{gms of U / gm of UF}_4 = \frac{237.99010}{237.99010 + 4 \cdot 18.99820} = 0.7580$$

$$\text{KENO theoretical UF}_4 \text{ density} = 6.7 \text{ gms of UF}_4 / \text{cc of UF}_4 \quad \text{eq.}\{2\}$$

$$\text{KENO Density Multiplier for UF}_4 = \text{eq.}\{1\} / \text{eq.}\{2\}$$

Since we assume that volume is conserved, the density multiplier is also the Volume Fraction (VF) representing ccs of UF₄ / cc of soln .

KENO Density Multiplier for C

The remaining Volume Fraction for the C₅H₁₂ = (1 - VF of UF₄)

$$\text{Actual C density} = \text{gms of C / gm of C}_5\text{H}_{12} \cdot \text{gms C}_5\text{H}_{12} / \text{cc} \cdot (1 - \text{VF of UF}_4) \quad \text{eq.}\{3\}$$

$$\text{For C}_5\text{H}_{12}; \quad \text{gms of C / gm of C}_5\text{H}_{12} = \frac{5 \cdot 12.00000}{5 \cdot 12.00000 + 12 \cdot 1.00780} = 0.832$$

$$\text{KENO theoretical C density} = 2.3 \text{ gms of C / cc of C} \quad \text{eq.}\{4\}$$

$$\text{KENO Density Multiplier for C} = \text{eq.}\{3\} / \text{eq.}\{4\}$$

KENO Density Multiplier for H

The remaining KENO Density Multiplier for the C₅H₁₂ = (1 - VF of UF₄)

$$\text{Actual H density} = \text{gms of H / gm of C}_5\text{H}_{12} \cdot \text{gms C}_5\text{H}_{12} / \text{cc} \cdot (1 - \text{VF of UF}_4) \quad \text{eq.}\{5\}$$

$$\text{For C}_5\text{H}_{12}; \quad \text{gms of H / gm of C}_5\text{H}_{12} = \frac{12 \cdot 1.00780}{5 \cdot 12.00000 + 12 \cdot 1.00780} = 0.168$$

$$\text{KENO theoretical H density} = 1.0 \text{ gm of H / cc of H} \quad \text{eq.}\{6\}$$

$$\text{KENO Density Multiplier for H} = \text{eq.}\{5\} / \text{eq.}\{6\}$$

KENO Material Specifications for UF₄-C₅H₁₂ Mixture

Using a density of 0.87 gms of C₅H₁₂ / cc

2% enriched gms U / cc of soln	KENO Density Multiplier		
	UF ₄	C	H
0.10	0.0197	0.3085	0.1433
0.20	0.0394	0.3023	0.1404
0.30	0.0591	0.2961	0.1375
0.40	0.0788	0.2899	0.1346
0.50	0.0985	0.2837	0.1318
0.60	0.1181	0.2775	0.1289
0.70	0.1378	0.2713	0.1260
0.80	0.1575	0.2651	0.1231
0.90	0.1772	0.2589	0.1203
1.00	0.1969	0.2527	0.1174
1.50	0.2954	0.2218	0.1030
2.00	0.3938	0.1908	0.0886
2.50	0.4923	0.1598	0.0742
3.00	0.5907	0.1288	0.0598
4.00	0.7876	0.0668	0.0310
5.00	0.9845	0.0049	0.0023

5% enriched gms U / cc of soln	KENO Density Multiplier		
	UF ₄	C	H
0.10	0.0197	0.3085	0.1433
0.20	0.0394	0.3023	0.1404
0.30	0.0591	0.2961	0.1375
0.40	0.0788	0.2899	0.1346
0.50	0.0985	0.2837	0.1318
0.60	0.1182	0.2775	0.1289
0.70	0.1379	0.2713	0.1260
0.80	0.1575	0.2651	0.1231
0.90	0.1772	0.2589	0.1203
1.00	0.1969	0.2527	0.1174
1.50	0.2954	0.2217	0.1030
2.00	0.3939	0.1908	0.0886
2.50	0.4923	0.1598	0.0742
3.00	0.5908	0.1288	0.0598
4.00	0.7877	0.0668	0.0310
5.00	0.9847	0.0048	0.0022

UO₂F₂-H₂O Densities using the Jordan/Turner Method

2 Percent Enriched UO₂F₂-H₂O Mixture

Using KENO Masses

U235 Mass== 235.04419

U238 Mass== 238.05099

Mixed Uranium Molecular Weight= 237.99010
 Fluorine Molecular Weight= 18.9982
 Hydrogen Molecular Weight= 1.0078
 Oxygen Molecular Weight= 15.9954
 Water Molecular Weight= 18.011

KENO Theoretical Density for UO₂F₂= 6.37
 KENO Theoretical Density for water= 0.9982

For H/U greater than 4.0

U density	H/U	UO ₂ F ₂ Density	KENO vf for UO ₂ F ₂	H ₂ O Density
0.2000	127.7908	0.259	0.041	0.967
0.3000	83.8586	0.388	0.061	0.952
0.4000	61.8925	0.518	0.081	0.937
0.5000	48.7129	0.647	0.102	0.922
0.6000	39.9265	0.776	0.122	0.906
0.7000	33.6504	0.906	0.142	0.891
0.8000	28.9434	1.035	0.163	0.876
0.9000	25.2824	1.165	0.183	0.861
1.0000	22.3536	1.294	0.203	0.846
1.5000	13.5672	1.941	0.305	0.770
2.0000	9.1740	2.588	0.406	0.694
2.5000	6.5380	3.235	0.508	0.618
3.0000	4.7807	3.882	0.609	0.543

For H/U less than 4.0

U density	H/U	UO ₂ F ₂ Density	KENO vf for UO ₂ F ₂	H ₂ O Density
4.0000	3.0000	5.176	0.813	0.454
4.5000	1.4375	5.823	0.914	0.245
4.9600	0.0000	6.419	1.008	0.000

UO₂F₂-H₂O Densities using the Jordan/Turner Method

5 Percent Enriched UO₂F₂-H₂O Mixture

Using KENO Masses

U235 Mass== 235.04419

U238 Mass== 238.05099

Mixed Uranium Molecular Weight= 237.89882
 Fluorine Molecular Weight= 18.9982
 Hydrogen Molecular Weight= 1.0078
 Oxygen Molecular Weight= 15.9954
 Water Molecular Weight= 18.011

KENO Theoretical Density for UO₂F₂= 6.37
 KENO Theoretical Density for water= 0.9982

For H/U greater than 4.0

U density	H/U	UO ₂ F ₂ Density	KENO vf for UO ₂ F ₂	H ₂ O Density
0.2000	127.7402	0.259	0.041	0.967
0.3000	83.8249	0.388	0.061	0.952
0.4000	61.8673	0.518	0.081	0.937
0.5000	48.6927	0.647	0.102	0.922
0.6000	39.9096	0.777	0.122	0.906
0.7000	33.6360	0.906	0.142	0.891
0.8000	28.9308	1.035	0.163	0.876
0.9000	25.2712	1.165	0.183	0.861
1.0000	22.3435	1.294	0.203	0.846
1.5000	13.5604	1.941	0.305	0.770
2.0000	9.1689	2.588	0.406	0.694
2.5000	6.5340	3.235	0.508	0.618
3.0000	4.7774	3.883	0.610	0.543

For H/U less than 4.0

U density	H/U	UO ₂ F ₂ Density	KENO vf for UO ₂ F ₂	H ₂ O Density
4.0000	3.0000	5.177	0.813	0.454
4.5000	1.4375	5.824	0.914	0.245
4.9600	0.0000	6.419	1.008	0.000

Appendix 2

Typical SCALE Input Files

Scale Input for a 5 gallon container--Normal Conditions
5% enrichment 1.5gm of U/cc of UO₂F₂-Water Mixture
100cm pitch

```
=CSAS25
JOB ID C3      5 Gallon Waste Drums      1.5 gm/cc U/UO2F2-H2O Mix      Pitch=100.0 cm
27GROUPNDF4      LATTICECELL

UO2F2          1  0.305 293 92235 5 92238 95 END
H2O             1  0.770 293 END
CARBONSTEEL     2  1.0 293 END
H2O             3  1.E-4 293 END
H2O             4  1.0 293 END
MGCONCRETE      5  1.0 293 END
END COMP

SQUAREPITCH    100  28.575 1  3  28.641 2  END

READ PARM
  TME=500 RUN=yes PLT=no  gen=203
END PARM

READ GEOM
  UNIT 1
    COM=!Storage room with fuel inside a carbon steel barrel!
    CYLINDER  1 1 14.2875 34.1640 .0328
    CYLINDER  2 1 14.3202 34.1968 .00001
    CUBOID     3 1 50.0 -50.0 50.0 -50.0 243.84 0
  UNIT 2
    COM=!Concrete floor of storage room!
    CUBOID     5 1 50.0 -50.0 50.0 -50.0 25 -25
  UNIT 3
    COM=!Ceiling above storage room composed of water!
    CUBOID     4 1 50.0 -50.0 50.0 -50.0 25 -25
END GEOM

'Form an array composed of the ceiling, storage room, and floor
READ ARRAY
  GBL=1 ARA=1 NUX=1 NUY=1 NUZ=3
  COM=!STACKED UNITS 2 1 and 3!
  FILL
    2 1 3
  END FILL
END ARRAY

'Reflect the X and Y faces to create an infinite planar array
READ BNDS
  +XB=REFLECT -XB=REFLECT +YB=REFLECT -YB=REFLECT
  +ZB=VACUUM -ZB=VACUUM
END BNDS

END DATA
END
```

Scale Input for a 5 gallon container--Normal Conditions
2% enrichment 1.5gm of U/cc of UF₄-Oil Mixture
100cm pitch

```
=CSAS25
JOB ID C3      5 Gallon Waste Drums      1.5 gm/cc U/UF4-OIL Mix      Pitch=100.0 cm
27GROUPNDF4      LATTICECELL

UF4      1  0.295  293 92235 2 92238 98 END
C      1  0.222  293 END
H      1  0.103  293 END
CARBONSTEEL  2  1.0 293 END
H2O      3  1.E-4 293 END
H2O      4  1.0 293 END
mgCONCRETE  5  1.0 293 END
END COMP

SQUAREPITCH  100 28.575 1 3 28.641 2 END

READ FARM
TME=500 RUN=yes PLT=no gen=203
END FARM

READ GEOM
UNIT 1
COM=!Storage room with fuel inside a carbon steel barrel!
CYLINDER  1 1 14.2875 34.1640 .0328
CYLINDER  2 1 14.3202 34.1968 .00001
CUBOID  3 1 50 -50 50 -50 243.84 0
UNIT 2
COM=!Concrete floor of storage room!
CUBOID  5 1 50 -50 50 -50 25 -25
UNIT 3
COM=!Ceiling above storage room composed of water!
CUBOID  4 1 50 -50 50 -50 25 -25
END GEOM

'Form an array composed of the ceiling, storage room, and floor
READ ARRAY
GBL=1 ARA=1 NUX=1 NUY=1 NUZ=3
COM=!STACKED UNITS 2 1 and 3!
FILL
2 1 3
END FILL
END ARRAY

'Reflect the X and Y faces to create an infinite planar array
READ BNDS
+XB=REFLECT -XB=REFLECT +YB=REFLECT -YB=REFLECT
+ZB=VACUUM -ZB=VACUUM
END BNDS

READ PLOT
TTL=!X-Z Slice through the middle of the barrel!
PLT=YES PIC=MIXTURE
XUL=-10 YUL=50 ZUL=350 XLR=110 YLR=50 ZLR=-10
UAX=1 WDN=-1 NAX=130 NDN=100
NCH='XS.~C'
END PLOT

END DATA
END
```

Scale Input for a 5 gallon container--Extra Interstitial Drum Accident Conditions
5% enrichment 0.4gm of U/cc of UO₂F₂-Water Mixture
100cm pitch

```
=CSAS25
JOB ID C3    30 Gallon Drums; 0.4 gm/cc U/UO2F2-H2O Mix; Pitch=100.0
'
'  21X21 Array  of barrels in 50cm cuboids surrounded by 50cm air cells
'    to effect a 100cm pitch geometry. Edge units are half size.
'  One central extra interstitial barrel accident study
'
27GROUPNDF4          infhommedium

UO2F2          1 0.081 293 92235 5 92238 95 END
H2O            1 0.937 293 END
CARBONSTEEL    2 1.0 293 END
H2O            3 1.E-4 293 END
H2O            4 1.0 293 END
mgCONCRETE     5 1.0 293 END
END COMP

READ PARM
  TME=500 RUN=yes PLT=no  gen=203 npg=442
END PARM

READ GEOM
UNIT 1
  COM=!Ceiling above storage room composed of water!
  CUBOID      4 1      25.0 -25.0 25.0 -25.0 25 -25

UNIT 11
  COM=!x edge Ceiling above storage room composed of water!
  CUBOID      4 1      12.5 -12.5 25.0 -25.0 25 -25

UNIT 12
  COM=!y edge Ceiling above storage room composed of water!
  CUBOID      4 1      25.0 -25.0 12.5 -12.5 25 -25

UNIT 13
  COM=!corner Ceiling above storage room composed of water!
  CUBOID      4 1      12.5 -12.5 12.5 -12.5 25 -25

UNIT 2
  COM=!Air up to the 8ft ceiling above barrels inside of storage room!
  CUBOID      3 1      25.0 -25.0 25.0 -25.0 243.84 75

UNIT 21
  COM=!x edge Air up to the 8ft ceiling above barrels inside of storage room!
  CUBOID      3 1      12.5 -12.5 25.0 -25.0 243.84 75

UNIT 22
  COM=!y edge Air up to the 8ft ceiling above barrels inside of storage room!
  CUBOID      3 1      25.0 -25.0 12.5 -12.5 243.84 75

UNIT 23
  COM=!corner Air up to the 8ft ceiling above barrels inside of storage room!
  CUBOID      3 1      12.5 -12.5 12.5 -12.5 243.84 75

UNIT 3
  COM=!Bottom of Storage room with fuel inside a carbon steel barrel!
  CYLINDER    1 1 23.1775 73.1337 .0328
  CYLINDER    2 1 23.2862 73.2424 .00001
  CUBOID      3 1      25.0 -25.0 25.0 -25.0 75 0

UNIT 4
  COM=!Concrete floor of storage room!
  CUBOID      5 1      25.0 -25.0 25.0 -25.0 25 -25

UNIT 41
```

```

COM=!x edge Concrete floor of storage room!
CUBOID      5 1      12.5 -12.5 25.0 -25.0 25 -25

UNIT 42
COM=!y edge Concrete floor of storage room!
CUBOID      5 1      25.0 -25.0 12.5 -12.5 25 -25

UNIT 43
COM=!corner Concrete floor of storage room!
CUBOID      5 1      12.5 -12.5 12.5 -12.5 25 -25

UNIT 9
COM=!Empty space used between the barrels the same size and the UNIT 3!
CUBOID      3 1      25.0 -25.0 25.0 -25.0 75 0

UNIT 91
COM=!x edge space used between the barrels !
CUBOID      3 1      12.5 -12.5 25.0 -25.0 75 0

UNIT 92
COM=!y edge space used between the barrels !
CUBOID      3 1      25.0 -25.0 12.5 -12.5 75 0

UNIT 93
COM=!corner space used between the barrels !
CUBOID      3 1      12.5 -12.5 12.5 -12.5 75 0

END GEOM

' Form an array composed of the ceiling, storage room, and floor
' For the accident case substitute UNIT 3 for UNIT 9

READ ARRAY
GBL=1 ARA=1 NUX=43 NUY=43 NUZ=4
COM=!441 array of STACKED UNITS and the extra UNIT 3 as an accident!
FILL

43 41r42 43
41 41r4 41
40q43
43 41r42 43

93 41r92 93
91 3 9 19q2 3 91
91 41r9 91
8q86
91 3 9 19q2 3 91
91 19r9 3 21r9 91
91 3 9 19q2 3 91
91 41r9 91
91 3 9 19q2 3 91
9q86
93 41r92 93

23 41r22 23
21 41r2 21
40q43
23 41r22 23

13 41r12 13
11 41r1 11
40q43
13 41r12 13

END FILL
END ARRAY

```

READ START NST=6

NXS= 2	NYS= 2	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=1
NXS= 2	NYS= 4	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=2
NXS= 2	NYS= 6	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=3
NXS= 2	NYS= 8	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=4
NXS= 2	NYS=10	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=5
NXS= 2	NYS=12	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=6
NXS= 2	NYS=14	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=7
NXS= 2	NYS=16	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=8
NXS= 2	NYS=18	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=9
NXS= 2	NYS=20	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=10
NXS= 2	NYS=22	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=11
NXS= 2	NYS=24	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=12
NXS= 2	NYS=26	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=13
NXS= 2	NYS=28	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=14
NXS= 2	NYS=30	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=15
NXS= 2	NYS=32	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=16
NXS= 2	NYS=34	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=17
NXS= 2	NYS=36	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=18
NXS= 2	NYS=38	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=19
NXS= 2	NYS=40	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=20
NXS= 2	NYS=42	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=21

NXS= 4	NYS= 2	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=22
NXS= 4	NYS= 4	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=23
NXS= 4	NYS= 6	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=24
NXS= 4	NYS= 8	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=25
NXS= 4	NYS=10	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=26
NXS= 4	NYS=12	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=27
NXS= 4	NYS=14	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=28
NXS= 4	NYS=16	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=29
NXS= 4	NYS=18	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=30
NXS= 4	NYS=20	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=31
NXS= 4	NYS=22	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=32
NXS= 4	NYS=24	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=33
NXS= 4	NYS=26	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=34
NXS= 4	NYS=28	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=35
NXS= 4	NYS=30	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=36
NXS= 4	NYS=32	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=37
NXS= 4	NYS=34	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=38
NXS= 4	NYS=36	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=39
NXS= 4	NYS=38	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=40
NXS= 4	NYS=40	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=41
NXS= 4	NYS=42	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=42

NXS= 6	NYS= 2	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=43
NXS= 6	NYS= 4	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=44
NXS= 6	NYS= 6	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=45
NXS= 6	NYS= 8	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=46
NXS= 6	NYS=10	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=47
NXS= 6	NYS=12	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=48
NXS= 6	NYS=14	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=49
NXS= 6	NYS=16	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=50
NXS= 6	NYS=18	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=51
NXS= 6	NYS=20	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=52
NXS= 6	NYS=22	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=53
NXS= 6	NYS=24	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=54
NXS= 6	NYS=26	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=55
NXS= 6	NYS=28	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=56
NXS= 6	NYS=30	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=57
NXS= 6	NYS=32	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=58
NXS= 6	NYS=34	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=59
NXS= 6	NYS=36	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=60
NXS= 6	NYS=38	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=61
NXS= 6	NYS=40	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=62
NXS= 6	NYS=42	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=63

NXS= 8	NYS= 2	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=64
NXS= 8	NYS= 4	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=65
NXS= 8	NYS= 6	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=66
NXS= 8	NYS= 8	NZS=2	TFX=0.	TFY=0.	TFZ=40.	LNU=67

Appendix 2—vi

Appendix 2–vii

Appendix 2—viii

Appendix 2--ix

Appendix 2—x

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NXS=40  NYS=26  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=412
NXS=40  NYS=28  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=413
NXS=40  NYS=30  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=414
NXS=40  NYS=32  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=415
NXS=40  NYS=34  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=416
NXS=40  NYS=36  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=417
NXS=40  NYS=38  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=418
NXS=40  NYS=40  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=419
NXS=40  NYS=42  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=410

NXS=42  NYS= 2  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=421
NXS=42  NYS= 4  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=422
NXS=42  NYS= 6  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=423
NXS=42  NYS= 8  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=424
NXS=42  NYS=10  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=425
NXS=42  NYS=12  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=426
NXS=42  NYS=14  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=427
NXS=42  NYS=16  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=428
NXS=42  NYS=18  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=429
NXS=42  NYS=20  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=430
NXS=42  NYS=22  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=431
NXS=42  NYS=24  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=432
NXS=42  NYS=26  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=433
NXS=42  NYS=28  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=434
NXS=42  NYS=30  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=435
NXS=42  NYS=32  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=436
NXS=42  NYS=34  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=437
NXS=42  NYS=36  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=438
NXS=42  NYS=38  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=439
NXS=42  NYS=40  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=440
NXS=42  NYS=42  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=441

NXS=21  NYS=21  NZS=2  TFX=0.  TFY=0.  TFZ=40.  LNU=442

END START

READ ENDS
+XB=REFLECT -XB=REFLECT +YB=REFLECT -YB=REFLECT
+ZB=VACUUM -ZB=VACUUM
END ENDS

READ PLOT
TTL='!X-Z vertical slice through the symmetry axis of the barrels!
PLT=YES PIC=MIXTURE
XUL=-10 YUL=1050 ZUL=350 XLR=1210 YLR=1050 ZLR=-10
UAX=1 WDN=-1 NAX=130 NDN=100
NCH='XS.-C'
END

TTL='!Y-Z vertical slice through the symmetry axis of the barrels!
PLT=YES PIC=MIXTURE
XUL=1050 YUL=-10 ZUL=350 XLR=1050 YLR=1210 ZLR=-10
VAX=1 WDN=-1 NAX=130 NDN=100
NCH='XS.-C'
END

TTL='!Low X-Y horizontal cut through the main array of barrels!
PLT=YES PIC=MIXTURE
XUL=-10 YUL=1210 ZUL=70 XLR=1210 YLR=-10 ZLR=70
UAX=1 VDN=-1 NAX=130 NDN=100
NCH='XS.-C'
END

END PLOT

END DATA

END

```

Appendix 3

Tabular Results

Table CON-1

K-effective Vs Concrete Type
5 Gallon Steel Drums filled with Uranyl Fluoride - Water Mixture
30 cm Pitch 5% Enrichment 1.5gm of U /cc of solution

KENO V.a Standard Concrete Type	K-effective mean value	1 Sigma value
OR-concrete	1.22036	0.00197
RF-concrete	1.21440	0.00184
MG-concrete	1.22901	0.00185
REG-concrete	1.21530	0.00198

Table Con-2

K-effective Vs Concrete Type
5 Gallon Steel Drums filled with Uranyl Fluoride - Water Mixture
100 cm Pitch 5% Enrichment 1.5gm of U /cc of solution

KENO V.a Standard Concrete Type	K-effective mean value	1 Sigma value
OR-concrete	0.85349	0.00221
RF-concrete	0.84916	0.00211
MG-concrete	0.85674	0.00218
REG-concrete	0.84921	0.00220

Table MD-1

**K-effective Vs Mist Density
Infinite Array of 5 Gallon Waste Containers
1.5 Gms U/cc of $\text{UO}_2\text{F}_2\text{-H}_2\text{O}$ 5% enrichment
30 cm Pitch**

Mist Density Grams $\text{H}_2\text{O/cc}$ Air-Water Mix	K-effective mean value	1 Sigma value
1.e-0	1.14477	0.00280
1.e-1	1.22690	0.00268
1.e-1	1.22141	0.00266
1.e-3	1.22123	0.00267
1.e-4	1.21656	0.00266
1.e-5	1.21686	0.00280
1.e-6	1.22375	0.00253

Table MD-2

**K-effective Vs Mist Density
Infinite Array of 5 Gallon Waste Containers
1.5 Gms U/cc of $\text{UO}_2\text{F}_2\text{-H}_2\text{O}$ 5% enrichment
50 cm Pitch**

Mist Density Grams $\text{H}_2\text{O/cc}$ Air-Water Mix	K-effective mean value	1 Sigma value
1.e-0	0.91668	0.00323
1.e-1	1.00063	0.00277
1.e-1	1.03335	0.00322
1.e-3	1.03877	0.00267
1.e-4	1.03615	0.00314
1.e-5	1.02961	0.00301
1.e-6	1.02734	0.00301

Table MD-3

**K-effective Vs Mist Density
Infinite Array of 5 Gallon Waste Containers
1.5 Gms U/cc of $\text{UO}_2\text{F}_2\text{-H}_2\text{O}$ 5% enrichment
75 cm Pitch**

Mist Density Grams H₂O/cc Air-Water Mix	K-effective mean value	1 Sigma value
1.e-0	0.90772	0.00330
1.e-1	0.86407	0.00345
1.e-1	0.91783	0.00289
1.e-3	0.91086	0.00320
1.e-4	0.91783	0.00289
1.e-5	0.90966	0.00301
1.e-6	0.91470	0.00323

Table MD-4

**K-effective Vs Mist Density
Infinite Array of 5 Gallon Waste Containers
1.5 Gms U/cc of $\text{UO}_2\text{F}_2\text{-H}_2\text{O}$ 5% enrichment
100 cm Pitch**

Mist Density Grams H₂O/cc Air-Water Mix	K-effective mean value	1 Sigma value
1.e-0	0.90989	0.00344
1.e-1	0.83192	0.00378
1.e-1	0.84604	0.00348
1.e-3	0.84647	0.00329
1.e-4	0.85285	0.00317
1.e-5	0.85060	0.00327
1.e-6	0.85333	0.00314

Table AA
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
30 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.61623	0.00147
0.3	0.77786	0.00170
0.4	0.89364	0.00194
0.5	0.97991	0.00207
0.6	1.04325	0.00200
0.7	1.09347	0.00198
0.8	1.13489	0.00232
0.9	1.15998	0.00234
1.0	1.18604	0.00230
1.5	1.25158	0.00255
2.0	1.26092	0.00268
2.5	1.22632	0.00297
3.0	1.17814	0.00290
4.0	1.00422	0.00265
5.0	0.72161	0.00220

Table UA
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
30 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.31127	0.00099
0.3	0.42446	0.00110
0.4	0.51827	0.00110
0.5	0.59491	0.00138
0.6	0.65957	0.00174
0.7	0.71405	0.00155
0.8	0.76600	0.00155
0.9	0.80416	0.00169
1.0	0.84010	0.00175
1.5	0.95430	0.00187
2.0	1.00104	0.00215
2.5	1.01293	0.00236
3.0	0.99583	0.00230
4.0	0.85390	0.00230
5.0	0.56283	0.00216

Table AB
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
50 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.53573	0.00182
0.3	0.67677	0.00210
0.4	0.78197	0.00216
0.5	0.85325	0.00222
0.6	0.91345	0.00253
0.7	0.95573	0.00260
0.8	0.99459	0.00273
0.9	1.01533	0.00278
1.0	1.04357	0.00250
1.5	1.08574	0.00294
2.0	1.08954	0.00295
2.5	1.04899	0.00296
3.0	0.99436	0.00281
4.0	0.83098	0.00298
5.0	0.62693	0.00266

Table UB
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
50 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.26950	0.00103
0.3	0.36835	0.00123
0.4	0.44692	0.00144
0.5	0.51298	0.00147
0.6	0.56713	0.00179
0.7	0.61870	0.00187
0.8	0.65867	0.00209
0.9	0.69077	0.00215
1.0	0.72357	0.00226
1.5	0.82014	0.00230
2.0	0.85712	0.00247
2.5	0.84939	0.00228
3.0	0.82410	0.00256
4.0	0.69023	0.00223
5.0	0.50230	0.00227

Table AD
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
75 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.49651	0.00148
0.3	0.62870	0.00178
0.4	0.72153	0.00220
0.5	0.78866	0.00243
0.6	0.84007	0.00237
0.7	0.87797	0.00267
0.8	0.91229	0.00271
0.9	0.93650	0.00289
1.0	0.95061	0.00293
1.5	0.98397	0.00315
2.0	0.96923	0.00338
2.5	0.91686	0.00317
3.0	0.86488	0.00300
4.0	0.69285	0.00273
5.0	0.50830	0.00224

Table UD
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
75 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.24844	0.00076
0.3	0.33910	0.00103
0.4	0.41435	0.00123
0.5	0.47227	0.00138
0.6	0.52043	0.00166
0.7	0.56789	0.00163
0.8	0.60146	0.00185
0.9	0.63242	0.00185
1.0	0.66464	0.00210
1.5	0.74480	0.00239
2.0	0.76191	0.00246
2.5	0.74647	0.00252
3.0	0.70915	0.00259
4.0	0.56199	0.00228
5.0	0.40176	0.00198

Table AE
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
100 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.47671	0.00172
0.3	0.60160	0.00248
0.4	0.69619	0.00234
0.5	0.76445	0.00254
0.6	0.81404	0.00314
0.7	0.85061	0.00267
0.8	0.87432	0.00297
0.9	0.89448	0.00296
1.0	0.91293	0.00308
1.5	0.92905	0.00318
2.0	0.91755	0.00319
2.5	0.86556	0.00297
3.0	0.78939	0.00312
4.0	0.60935	0.00332
5.0	0.40941	0.00228

Table UE
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
100 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.24010	0.00114
0.3	0.32900	0.00144
0.4	0.39849	0.00163
0.5	0.45609	0.00177
0.6	0.50418	0.00194
0.7	0.54511	0.00231
0.8	0.58381	0.00209
0.9	0.60636	0.00232
1.0	0.63250	0.00209
1.5	0.70519	0.00254
2.0	0.71647	0.00262
2.5	0.69349	0.00267
3.0	0.64989	0.00265
4.0	0.49275	0.00260
5.0	0.31987	0.00210

Table AF
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
150 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.46738	0.00161
0.3	0.58446	0.00192
0.4	0.67848	0.00229
0.5	0.73161	0.00260
0.6	0.77802	0.00259
0.7	0.82424	0.00284
0.8	0.84975	0.00297
0.9	0.86835	0.00197
1.0	0.88384	0.00314
1.5	0.89717	0.00306
2.0	0.87022	0.00295
2.5	0.81094	0.00309
3.0	0.73694	0.00329
4.0	0.52788	0.00237
5.0	0.30787	0.00168

Table UF
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
150 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.23434	0.00075
0.3	0.31884	0.00105
0.4	0.38847	0.00123
0.5	0.44362	0.00154
0.6	0.48930	0.00156
0.7	0.53071	0.00185
0.8	0.56292	0.00192
0.9	0.58488	0.00192
1.0	0.61341	0.00213
1.5	0.67494	0.00227
2.0	0.68598	0.00265
2.5	0.65501	0.00278
3.0	0.60475	0.00236
4.0	0.42250	0.00211
5.0	0.23784	0.00145

Table DA
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
30 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.68242	0.00184
0.3	0.83369	0.00190
0.4	0.93676	0.00202
0.5	1.01706	0.00211
0.6	1.07169	0.00211
0.7	1.11195	0.00216
0.8	1.13866	0.00242
0.9	1.16538	0.00261
1.0	1.18639	0.00245
1.5	1.22999	0.00257
2.0	1.22528	0.00266
2.5	1.21163	0.00292
3.0	1.17589	0.00295
4.0	1.12269	0.00261
4.5	0.97011	0.00266

Table XA
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
30 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.35863	0.00102
0.3	0.47422	0.00125
0.4	0.56631	0.00144
0.5	0.64327	0.00164
0.6	0.70379	0.00183
0.7	0.74997	0.00187
0.8	0.79382	0.00184
0.9	0.83537	0.00174
1.0	0.86050	0.00187
1.5	0.95966	0.00208
2.0	0.99361	0.00210
2.5	1.00180	0.00225
3.0	0.99422	0.00236
4.0	0.95680	0.00231
4.5	0.82418	0.00237

Table DB
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
50 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.56337	0.00206
0.3	0.69350	0.00230
0.4	0.78132	0.00246
0.5	0.85279	0.00246
0.6	0.89524	0.00270
0.7	0.93174	0.00262
0.8	0.96329	0.00270
0.9	0.98804	0.00261
1.0	1.00489	0.00256
1.5	1.04363	0.00289
2.0	1.04262	0.00306
2.5	1.02380	0.00293
3.0	0.98766	0.00303
4.0	0.95104	0.00270
4.5	0.80826	0.00292

Table XB
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
50 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.29497	0.00127
0.3	0.38536	0.00131
0.4	0.46471	0.00180
0.5	0.53340	0.00196
0.6	0.58348	0.00212
0.7	0.62743	0.00222
0.8	0.66502	0.00208
0.9	0.69532	0.00213
1.0	0.71597	0.00222
1.5	0.79335	0.00234
2.0	0.83482	0.00241
2.5	0.83590	0.00234
3.0	0.82699	0.00258
4.0	0.80405	0.00226
4.5	0.67105	0.00261

Table DD
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
MG type concrete 10^{-4} (gm water/cc of air) mist density
75 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.49944	0.00154
0.3	0.61393	0.00202
0.4	0.69837	0.00226
0.5	0.75629	0.00260
0.6	0.80149	0.00281
0.7	0.83184	0.00295
0.8	0.85162	0.00289
0.9	0.87316	0.00302
1.0	0.88599	0.00308
1.5	0.92723	0.00301
2.0	0.92003	0.00300
2.5	0.89457	0.00334
3.0	0.86429	0.00307
4.0	0.82425	0.00300
4.5	0.66677	0.00270

Table XD
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
MG type concrete 10^{-4} (gm water/cc of air) mist density
75 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.25947	0.00091
0.3	0.34473	0.00119
0.4	0.41231	0.00139
0.5	0.46822	0.00150
0.6	0.51471	0.00177
0.7	0.55599	0.00185
0.8	0.58289	0.00193
0.9	0.61135	0.00197
1.0	0.62784	0.00213
1.5	0.70384	0.00224
2.0	0.72244	0.00260
2.5	0.71920	0.00245
3.0	0.70468	0.00241
4.0	0.67919	0.00246
4.5	0.54608	0.00242

Table DE
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
100 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.47233	0.00184
0.3	0.57995	0.00192
0.4	0.65891	0.00250
0.5	0.71243	0.00251
0.6	0.75442	0.00247
0.7	0.77588	0.00277
0.8	0.80775	0.00276
0.9	0.81824	0.00316
1.0	0.83668	0.00312
1.5	0.86329	0.00322
2.0	0.85027	0.00333
2.5	0.82776	0.00314
3.0	0.78644	0.00290
4.0	0.76143	0.00293
4.5	0.57866	0.00259

Table XE
K-effective Vs Uranium Concentration
5 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
100 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.24652	0.00082
0.3	0.32586	0.00130
0.4	0.38863	0.00140
0.5	0.44239	0.00157
0.6	0.48394	0.00184
0.7	0.51784	0.00182
0.8	0.54880	0.00205
0.9	0.57426	0.00212
1.0	0.59392	0.00223
1.5	0.65621	0.00246
2.0	0.67353	0.00265
2.5	0.67063	0.00268
3.0	0.65418	0.00256
4.0	0.62728	0.00244
4.5	0.46491	0.00218

Table DF
K-effective Vs Uranium Concentration
 5 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 150 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.45250	0.00176
0.3	0.55602	0.00200
0.4	0.62343	0.00259
0.5	0.68013	0.00250
0.6	0.71857	0.00264
0.7	0.74745	0.00275
0.8	0.76636	0.00301
0.9	0.78140	0.00324
1.0	0.78882	0.00324
1.5	0.81224	0.00356
2.0	0.80215	0.00341
2.5	0.77766	0.00323
3.0	0.72927	0.00307
4.0	0.70203	0.00316
4.5	0.50376	0.00250

Table XF
K-effective Vs Uranium Concentration
 5 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 150 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.23480	0.00099
0.3	0.30999	0.00125
0.4	0.37250	0.00147
0.5	0.42318	0.00172
0.6	0.46196	0.00178
0.7	0.49688	0.00187
0.8	0.52359	0.00205
0.9	0.54475	0.00207
1.0	0.56673	0.00230
1.5	0.61831	0.00258
2.0	0.63289	0.00263
2.5	0.62873	0.00267
3.0	0.60193	0.00274
4.0	0.58092	0.00266
4.5	0.39940	0.00194

Table BB
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
50 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.66980	0.00121
0.3	0.84210	0.00140
0.4	0.96622	0.00162
0.5	1.05820	0.00167
0.6	1.12811	0.00174
0.7	1.17893	0.00199
0.8	1.22145	0.00213
0.9	1.24984	0.00193
1.0	1.28003	0.00208
1.5	1.34687	0.00236
2.0	1.35145	0.00240
2.5	1.32797	0.00239
3.0	1.27772	0.00255
4.0	1.09559	0.00243
5.0	0.74377	0.00177

Table VB
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
50 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.34169	0.00080
0.3	0.46349	0.00091
0.4	0.56490	0.00116
0.5	0.64775	0.00119
0.6	0.71717	0.00129
0.7	0.77800	0.00128
0.8	0.83232	0.00153
0.9	0.87620	0.00127
1.0	0.91115	0.00164
1.5	1.03649	0.00173
2.0	1.08908	0.00201
2.5	1.10870	0.00213
3.0	1.08867	0.00203
4.0	0.94118	0.00211
5.0	0.54040	0.00162

Table BD
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
75 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.64496	0.00129
0.3	0.80768	0.00154
0.4	0.92486	0.00199
0.5	1.00875	0.00186
0.6	1.07669	0.00189
0.7	1.13060	0.00226
0.8	1.16433	0.00219
0.9	1.19629	0.00228
1.0	1.22125	0.00205
1.5	1.28176	0.00274
2.0	1.28254	0.00256
2.5	1.24840	0.00265
3.0	1.18570	0.00262
4.0	1.00883	0.00284
5.0	0.70541	0.00206

Table VD
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
75 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.32793	0.00084
0.3	0.44542	0.00102
0.4	0.54223	0.00137
0.5	0.61913	0.00147
0.6	0.68498	0.00134
0.7	0.74391	0.00148
0.8	0.78971	0.00159
0.9	0.83407	0.00162
1.0	0.86754	0.00167
1.5	0.98563	0.00197
2.0	1.03011	0.00210
2.5	1.03947	0.00225
3.0	1.01310	0.00237
4.0	0.85643	0.00245
5.0	0.52911	0.00188

Table BE
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
100 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.63059	0.00160
0.3	0.79155	0.00174
0.4	0.90211	0.00184
0.5	0.98628	0.00197
0.6	1.04869	0.00213
0.7	1.10202	0.00208
0.8	1.13170	0.00237
0.9	1.16161	0.00251
1.0	1.18453	0.00262
1.5	1.24248	0.00299
2.0	1.23601	0.00267
2.5	1.20121	0.00295
3.0	1.14373	0.00298
4.0	0.94936	0.00291
5.0	0.64522	0.00229

Table VE
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
100 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.31996	0.00086
0.3	0.43448	0.00112
0.4	0.52509	0.00129
0.5	0.60358	0.00149
0.6	0.66808	0.00180
0.7	0.72174	0.00156
0.8	0.76953	0.00183
0.9	0.80996	0.00176
1.0	0.84435	0.00183
1.5	0.95109	0.00204
2.0	0.99531	0.00246
2.5	0.99172	0.00261
3.0	0.96399	0.00246
4.0	0.79780	0.00251
5.0	0.49056	0.00199

Table BF
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
150 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.61484	0.00166
0.3	0.77151	0.00204
0.4	0.88712	0.00212
0.5	0.96308	0.00202
0.6	1.02378	0.00206
0.7	1.07662	0.00257
0.8	1.10808	0.00235
0.9	1.13641	0.00245
1.0	1.15458	0.00281
1.5	1.19481	0.00270
2.0	1.18868	0.00314
2.5	1.14771	0.00292
3.0	1.08445	0.00308
4.0	0.87038	0.00292
5.0	0.54657	0.00213

Table VF
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
150 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.31348	0.00103
0.3	0.42465	0.00122
0.4	0.51641	0.00130
0.5	0.58603	0.00147
0.6	0.65525	0.00162
0.7	0.70517	0.00166
0.8	0.74962	0.00198
0.9	0.78928	0.00184
1.0	0.82302	0.00188
1.5	0.91884	0.00222
2.0	0.95833	0.00245
2.5	0.95403	0.00253
3.0	0.91497	0.00280
4.0	0.73475	0.00244
5.0	0.40870	0.00183

Table BG
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
200 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.61020	0.00145
0.3	0.76682	0.00170
0.4	0.87757	0.00192
0.5	0.95043	0.00219
0.6	1.01258	0.00231
0.7	1.05502	0.00228
0.8	1.09646	0.00248
0.9	1.12058	0.00252
1.0	1.14245	0.00269
1.5	1.18304	0.00289
2.0	1.17662	0.00337
2.5	1.12954	0.00312
3.0	1.07337	0.00314
4.0	0.83029	0.00267
5.0	0.48024	0.00185

Table VG
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
200 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.31135	0.00065
0.3	0.42062	0.00095
0.4	0.51399	0.00117
0.5	0.58249	0.00136
0.6	0.64423	0.00151
0.7	0.70329	0.00163
0.8	0.74821	0.00164
0.9	0.78271	0.00196
1.0	0.81724	0.00200
1.5	0.90853	0.00229
2.0	0.94338	0.00254
2.5	0.93637	0.00250
3.0	0.89630	0.00261
4.0	0.70378	0.00255
5.0	0.35277	0.00155

Table EB
K-effective Vs Uranium Concentration
 30 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 50 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.75879	0.00116
0.3	0.92177	0.00154
0.4	1.03216	0.00187
0.5	1.11422	0.00193
0.6	1.17557	0.00205
0.7	1.21316	0.00222
0.8	1.24740	0.00197
0.9	1.27436	0.00229
1.0	1.29242	0.00211
1.5	1.33824	0.00234
2.0	1.33754	0.00245
2.5	1.31725	0.00260
3.0	1.27729	0.00240
4.0	1.20676	0.00233
4.5	1.05633	0.00245

Table YB
K-effective Vs Uranium Concentration
 30 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 50 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.40485	0.00070
0.3	0.53082	0.00093
0.4	0.63046	0.00100
0.5	0.71696	0.00129
0.6	0.78101	0.00150
0.7	0.83198	0.00150
0.8	0.87957	0.00162
0.9	0.91845	0.00165
1.0	0.95044	0.00156
1.5	1.05025	0.00184
2.0	1.09116	0.00200
2.5	1.10243	0.00204
3.0	1.08776	0.00221
4.0	1.04389	0.00222
4.5	0.90229	0.00233

Table ED
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
75 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.71378	0.00161
0.3	0.86213	0.00177
0.4	0.96890	0.00197
0.5	1.04704	0.00214
0.6	1.09737	0.00217
0.7	1.14296	0.00240
0.8	1.17832	0.00234
0.9	1.19724	0.00257
1.0	1.21433	0.00240
1.5	1.25684	0.00265
2.0	1.25232	0.00259
2.5	1.23128	0.00277
3.0	1.19010	0.00269
4.0	1.13494	0.00272
4.5	0.97681	0.00250

Table YD
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
75 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.37903	0.00076
0.3	0.49844	0.00097
0.4	0.59350	0.00122
0.5	0.67108	0.00150
0.6	0.72977	0.00153
0.7	0.78220	0.00160
0.8	0.82749	0.00162
0.9	0.86111	0.00197
1.0	0.89241	0.00175
1.5	0.98316	0.00201
2.0	1.01998	0.00236
2.5	1.02477	0.00247
3.0	1.01346	0.00250
4.0	0.97526	0.00255
4.5	0.82725	0.00239

Table EE
K-effective Vs Uranium Concentration
 30 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 100 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.68507	0.00162
0.3	0.83384	0.00168
0.4	0.93366	0.00201
0.5	1.01132	0.00224
0.6	1.05763	0.00247
0.7	1.10156	0.00233
0.8	1.12734	0.00265
0.9	1.14995	0.00273
1.0	1.17325	0.00256
1.5	1.19681	0.00298
2.0	1.20360	0.00318
2.5	1.17769	0.00289
3.0	1.14748	0.00303
4.0	1.08255	0.00304
4.5	0.91245	0.00259

Table YE
K-effective Vs Uranium Concentration
 30 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 100 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.36554	0.00082
0.3	0.48134	0.00111
0.4	0.56904	0.00127
0.5	0.64861	0.00149
0.6	0.70741	0.00148
0.7	0.74974	0.00164
0.8	0.79518	0.00183
0.9	0.82530	0.00189
1.0	0.86048	0.00188
1.5	0.94230	0.00215
2.0	0.97738	0.00252
2.5	0.98622	0.00239
3.0	0.96715	0.00251
4.0	0.93035	0.00247
4.5	0.76847	0.00237

Table EF
K-effective Vs Uranium Concentration
 30 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 150 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.66445	0.00155
0.3	0.80594	0.00208
0.4	0.90326	0.00233
0.5	0.96951	0.00241
0.6	1.02157	0.00261
0.7	1.05983	0.00280
0.8	1.08514	0.00194
0.9	1.10727	0.00242
1.0	1.12031	0.00284
1.5	1.15975	0.00295
2.0	1.15786	0.00305
2.5	1.12476	0.00292
3.0	1.08571	0.00297
4.0	1.02511	0.00284
4.5	0.83552	0.00265

Table YF
K-effective Vs Uranium Concentration
 30 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 150 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.35096	0.00088
0.3	0.46498	0.00121
0.4	0.55446	0.00140
0.5	0.62489	0.00159
0.6	0.67991	0.00180
0.7	0.72437	0.00194
0.8	0.76234	0.00181
0.9	0.79632	0.00188
1.0	0.82765	0.00198
1.5	0.90973	0.00228
2.0	0.92819	0.00252
2.5	0.93328	0.00258
3.0	0.91655	0.00268
4.0	0.88167	0.00262
4.5	0.70079	0.00256

Table EG
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
200 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.65356	0.00177
0.3	0.79378	0.00210
0.4	0.89267	0.00247
0.5	0.95946	0.00240
0.6	0.99961	0.00278
0.7	1.04452	0.00269
0.8	1.07314	0.00275
0.9	1.09672	0.00289
1.0	1.10717	0.00267
1.5	1.13105	0.00290
2.0	1.12097	0.00319
2.5	1.09107	0.00298
3.0	1.05719	0.00319
4.0	0.99436	0.00304
4.5	0.79874	0.00295

Table YG
K-effective Vs Uranium Concentration
30 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
200 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.34859	0.00092
0.3	0.45677	0.00115
0.4	0.54137	0.00141
0.5	0.61449	0.00161
0.6	0.66878	0.00163
0.7	0.71459	0.00191
0.8	0.75382	0.00207
0.9	0.78257	0.00193
1.0	0.80816	0.00232
1.5	0.88633	0.00242
2.0	0.91930	0.00173
2.5	0.91588	0.00257
3.0	0.89129	0.00264
4.0	0.85997	0.00262
4.5	0.66918	0.00255

Table CC
K-effective Vs Uranium Concentration
 55 Gallon Steel Drums filled with UF₄ - Oil Mixture
 MG type concrete 10⁻⁴ (gm water/cc of air) mist density
 60 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.68484	0.00102
0.3	0.85981	0.00125
0.4	0.98805	0.00144
0.5	1.07531	0.00168
0.6	1.14604	0.00180
0.7	1.19864	0.00197
0.8	1.24349	0.00199
0.9	1.27510	0.00197
1.0	1.29636	0.00227
1.5	1.36573	0.00210
2.0	1.37693	0.00225
2.5	1.34957	0.00243
3.0	1.29921	0.00253
4.0	1.11876	0.00238
5.0	0.75191	0.00176

Table WC
K-effective Vs Uranium Concentration
 55 Gallon Steel Drums filled with UF₄ - Oil Mixture
 MG type concrete 10⁻⁴ (gm water/cc of air) mist density
 60 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.35015	0.00052
0.3	0.47432	0.00078
0.4	0.57921	0.00088
0.5	0.66202	0.00102
0.6	0.73480	0.00111
0.7	0.79363	0.00129
0.8	0.84776	0.00123
0.9	0.89108	0.00142
1.0	0.93292	0.00156
1.5	1.05904	0.00180
2.0	1.11699	0.00184
2.5	1.12725	0.00195
3.0	1.10977	0.00198
4.0	0.96444	0.00224
5.0	0.54060	0.00162

Table CD
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
75 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.67098	0.00110
0.3	0.84692	0.00136
0.4	0.96951	0.00157
0.5	1.05438	0.00167
0.6	1.12093	0.00200
0.7	1.17589	0.00201
0.8	1.21283	0.00221
0.9	1.24302	0.00203
1.0	1.27186	0.00199
1.5	1.34231	0.00257
2.0	1.33808	0.00256
2.5	1.31639	0.00268
3.0	1.26019	0.00264
4.0	1.07289	0.00226
5.0	0.73883	0.00192

Table WD
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
75 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.34422	0.00060
0.3	0.46597	0.00081
0.4	0.56979	0.00091
0.5	0.65068	0.00112
0.6	0.71970	0.00120
0.7	0.77848	0.00130
0.8	0.82871	0.00149
0.9	0.87188	0.00148
1.0	0.90967	0.00158
1.5	1.03148	0.00175
2.0	1.08898	0.00214
2.5	1.10104	0.00205
3.0	1.07562	0.00217
4.0	0.92833	0.00249
5.0	0.54548	0.00176

Table CE
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
100 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.66202	0.00120
0.3	0.83120	0.00164
0.4	0.95024	0.00161
0.5	1.03636	0.00185
0.6	1.09462	0.00196
0.7	1.14984	0.00212
0.8	1.19600	0.00225
0.9	1.21610	0.00234
1.0	1.24684	0.00230
1.5	1.30444	0.00253
2.0	1.30150	0.00276
2.5	1.27543	0.00277
3.0	1.21900	0.00269
4.0	1.03426	0.00238
5.0	0.70110	0.00194

Table WE
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
100 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.33794	0.00062
0.3	0.45587	0.00081
0.4	0.55785	0.00112
0.5	0.63661	0.00117
0.6	0.70522	0.00126
0.7	0.76674	0.00141
0.8	0.81572	0.00152
0.9	0.85540	0.00172
1.0	0.88660	0.00167
1.5	1.00719	0.00189
2.0	1.05196	0.00235
2.5	1.06088	0.00231
3.0	1.03537	0.00253
4.0	0.87851	0.00227
5.0	0.52266	0.00191

Table CF
K-effective Vs Uranium Concentration
 55 Gallon Steel Drums filled with UF₄ - Oil Mixture
 MG type concrete 10⁻⁴ (gm water/cc of air) mist density
 150 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.64993	0.00130
0.3	0.81349	0.00169
0.4	0.92866	0.00181
0.5	1.01745	0.00204
0.6	1.08023	0.00212
0.7	1.12416	0.00237
0.8	1.16524	0.00267
0.9	1.18843	0.00229
1.0	1.21676	0.00264
1.5	1.27073	0.00278
2.0	1.26418	0.00284
2.5	1.22869	0.00272
3.0	1.16669	0.00311
4.0	0.96570	0.00270
5.0	0.61537	0.00214

Table WF
K-effective Vs Uranium Concentration
 55 Gallon Steel Drums filled with UF₄ - Oil Mixture
 MG type concrete 10⁻⁴ (gm water/cc of air) mist density
 150 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.33129	0.00067
0.3	0.44956	0.00093
0.4	0.54802	0.00109
0.5	0.62265	0.00117
0.6	0.69022	0.00132
0.7	0.74868	0.00148
0.8	0.79096	0.00149
0.9	0.83735	0.00178
1.0	0.87099	0.00163
1.5	0.98180	0.00222
2.0	1.02619	0.00241
2.5	1.02514	0.00238
3.0	0.99101	0.00225
4.0	0.82525	0.00242
5.0	0.46033	0.00167

Table CG
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
200 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.64345	0.00139
0.3	0.80771	0.00170
0.4	0.92328	0.00203
0.5	1.00968	0.00215
0.6	1.06293	0.00211
0.7	1.11795	0.00231
0.8	1.15954	0.00226
0.9	1.18185	0.00237
1.0	1.20931	0.00238
1.5	1.25416	0.00270
2.0	1.25383	0.00295
2.5	1.20829	0.00281
3.0	1.15172	0.00303
4.0	0.93712	0.00306
5.0	0.55986	0.00213

Table WG
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
200 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.33008	0.00066
0.3	0.44649	0.00088
0.4	0.54214	0.00116
0.5	0.61683	0.00129
0.6	0.68536	0.00139
0.7	0.74302	0.00159
0.8	0.78741	0.00180
0.9	0.83240	0.00181
1.0	0.86807	0.00179
1.5	0.97277	0.00214
2.0	1.01532	0.00249
2.5	1.00764	0.00265
3.0	0.97171	0.00275
4.0	0.79726	0.00258
5.0	0.40642	0.00168

Table CH
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
300 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.64059	0.00122
0.3	0.80682	0.00164
0.4	0.91756	0.00202
0.5	0.99652	0.00214
0.6	1.06067	0.00233
0.7	1.10925	0.00246
0.8	1.14551	0.00248
0.9	1.18001	0.00265
1.0	1.19825	0.00264
1.5	1.24271	0.00278
2.0	1.23979	0.00303
2.5	1.19369	0.00295
3.0	1.13124	0.00313
4.0	0.91115	0.00280
5.0	0.50260	0.00175

Table WH
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
300 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.32814	0.00073
0.3	0.44496	0.00086
0.4	0.53941	0.00110
0.5	0.61817	0.00130
0.6	0.68197	0.00150
0.7	0.74167	0.00155
0.8	0.78662	0.00166
0.9	0.82280	0.00183
1.0	0.85697	0.00195
1.5	0.95737	0.00233
2.0	1.00131	0.00256
2.5	1.00057	0.00253
3.0	0.96109	0.00262
4.0	0.77237	0.00262
5.0	0.35451	0.00150

Table CI
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
400 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.63828	0.00134
0.3	0.80531	0.00160
0.4	0.91973	0.00206
0.5	1.00023	0.00220
0.6	1.06009	0.00231
0.7	1.10364	0.00255
0.8	1.15175	0.00246
0.9	1.16832	0.00254
1.0	1.20064	0.00249
1.5	1.23975	0.00269
2.0	1.23297	0.00302
2.5	1.18824	0.00294
3.0	1.12439	0.00306
4.0	0.89398	0.00282
5.0	0.48295	0.00175

Table WI
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
400 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.32604	0.00070
0.3	0.44354	0.00094
0.4	0.53833	0.00108
0.5	0.61338	0.00141
0.6	0.68401	0.00149
0.7	0.73372	0.00165
0.8	0.78574	0.00179
0.9	0.81870	0.00184
1.0	0.85958	0.00191
1.5	0.96370	0.00212
2.0	0.99617	0.00222
2.5	0.99111	0.00266
3.0	0.95980	0.00278
4.0	0.76144	0.00248
5.0	0.33358	0.00140

Table CJ
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
500 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.63983	0.00129
0.3	0.79969	0.00186
0.4	0.91700	0.00211
0.5	0.99519	0.00216
0.6	1.06723	0.00234
0.7	1.10859	0.00227
0.8	1.14189	0.00263
0.9	1.17207	0.00250
1.0	1.19074	0.00301
1.5	1.23841	0.00292
2.0	1.23357	0.00341
2.5	1.18082	0.00309
3.0	1.12689	0.00327
4.0	0.89404	0.00294
5.0	0.47478	0.00154

Table WJ
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UF₄ - Oil Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
500 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.32786	0.00067
0.3	0.44225	0.00091
0.4	0.53889	0.00114
0.5	0.61383	0.00151
0.6	0.68081	0.00157
0.7	0.74083	0.00164
0.8	0.78034	0.00174
0.9	0.82321	0.00177
1.0	0.85905	0.00196
1.5	0.96031	0.00223
2.0	0.99418	0.00260
2.5	0.98958	0.00251
3.0	0.94943	0.00299
4.0	0.76408	0.00275
5.0	0.32505	0.00140

Table FC
K-effective Vs Uranium Concentration
 55 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 60 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.77923	0.00191
0.3	0.94228	0.00191
0.4	1.05668	0.00256
0.5	1.13394	0.00299
1.0	1.31671	0.00311
1.5	1.36719	0.00333
2.0	1.35639	0.00323
2.5	1.33872	0.00287
3.0	1.30616	0.00369
4.0	1.23043	0.00325
4.5	1.07048	0.00345
5.0	0.73663	0.00263

Table ZC
K-effective Vs Uranium Concentration
 55 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 60 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.41446	0.00095
0.3	0.54587	0.00131
0.4	0.64942	0.00152
0.5	0.73315	0.00178
1.0	0.97385	0.00238
1.5	1.07411	0.00259
2.0	1.11424	0.00256
2.5	1.12035	0.00281
3.0	1.10415	0.00310
4.0	1.06583	0.00304
4.5	0.92393	0.00320
5.0	0.53282	0.00306

Table FD
K-effective Vs Uranium Concentration
 55 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 75 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.75670	0.00196
0.3	0.92138	0.00239
0.4	1.02247	0.00274
0.5	1.11116	0.00261
1.0	1.27561	0.00338
1.5	1.32603	0.00351
2.0	1.31761	0.00349
2.5	1.29872	0.00376
3.0	1.26519	0.00394
4.0	1.19893	0.00340
4.5	1.03816	0.00383
5.0	0.72735	0.00282

Table ZD
K-effective Vs Uranium Concentration
 55 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 75 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.40029	0.00092
0.3	0.52959	0.00145
0.4	0.63258	0.00160
0.5	0.71770	0.00203
1.0	0.94737	0.00266
1.5	1.04523	0.00318
2.0	1.07348	0.00285
2.5	1.08393	0.00285
3.0	1.07298	0.00319
4.0	1.02818	0.00334
4.5	0.88312	0.00305
5.0	0.53744	0.00280

Table FE
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
100 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.73197	0.00211
0.3	0.89164	0.00237
0.4	0.99870	0.00290
0.5	1.07837	0.00293
1.0	1.24479	0.00329
1.5	1.28088	0.00360
2.0	1.28279	0.00377
2.5	1.26204	0.00384
3.0	1.21552	0.00384
4.0	1.15911	0.00370
4.5	0.99409	0.00363
5.0	0.68340	0.00304

Table ZE
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
100 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.39027	0.00120
0.3	0.51559	0.00134
0.4	0.61544	0.00179
0.5	0.69106	0.00194
1.0	0.91813	0.00257
1.5	1.01342	0.00250
2.0	1.04360	0.00315
2.5	1.04991	0.00333
3.0	1.04087	0.00302
4.0	0.99815	0.00328
4.5	0.84454	0.00354
5.0	0.52822	0.00277

Table FF
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
150 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.71350	0.00245
0.3	0.86426	0.00263
0.4	0.96549	0.00292
0.5	1.04446	0.00305
1.0	1.20727	0.00419
1.5	1.23902	0.00381
2.0	1.22885	0.00366
2.5	1.20685	0.00395
3.0	1.16948	0.00439
4.0	1.11273	0.00335
4.5	0.93230	0.00378
5.0	0.59892	0.00309

Table ZF
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
150 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.38045	0.00138
0.3	0.49979	0.00150
0.4	0.59608	0.00199
0.5	0.66616	0.00227
1.0	0.88432	0.00279
1.5	0.97615	0.00314
2.0	1.00487	0.00290
2.5	1.01340	0.00345
3.0	0.99881	0.00338
4.0	0.96070	0.00325
4.5	0.79089	0.00337
5.0	0.45893	0.00302

Table FG
K-effective Vs Uranium Concentration
 55 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 200 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.70160	0.00253
0.3	0.85394	0.00262
0.4	0.95393	0.00292
0.5	1.03221	0.00318
1.0	1.18252	0.00391
1.5	1.22285	0.00432
2.0	1.22309	0.00440
2.5	1.19263	0.00370
3.0	1.14166	0.00446
4.0	1.09038	0.00400
4.5	0.89347	0.00371
5.0	0.53621	0.00307

Table ZG
K-effective Vs Uranium Concentration
 55 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 200 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.37518	0.00122
0.3	0.49451	0.00169
0.4	0.58558	0.00179
0.5	0.66506	0.00210
1.0	0.87197	0.00312
1.5	0.96089	0.00336
2.0	0.99265	0.00339
2.5	0.99476	0.00343
3.0	0.97677	0.00329
4.0	0.94062	0.00373
4.5	0.75801	0.00323
5.0	0.40291	0.00214

Table FH
K-effective Vs Uranium Concentration
 55 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 300 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.69899	0.00223
0.3	0.84823	0.00262
0.4	0.94953	0.00308
0.5	1.01179	0.00333
1.0	1.17543	0.00378
1.5	1.20031	0.00440
2.0	1.20610	0.00419
2.5	1.16571	0.00435
3.0	1.12871	0.00456
4.0	1.06608	0.00411
4.5	0.87333	0.00375
5.0	0.47322	0.00270

Table ZH
K-effective Vs Uranium Concentration
 55 Gallon Steel Drums filled with UO_2F_2 - Water Mixture
 MG type concrete 10^{-4} (gm water/cc of air) mist density
 300 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.37450	0.00134
0.3	0.49201	0.00162
0.4	0.58302	0.00186
0.5	0.65367	0.00235
1.0	0.87373	0.00308
1.5	0.95378	0.00337
2.0	0.98769	0.00343
2.5	0.97872	0.00379
3.0	0.96356	0.00373
4.0	0.93404	0.00405
4.5	0.73421	0.00417
5.0	0.34102	0.00209

Table FI
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
400 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.69540	0.00279
0.3	0.84335	0.00266
0.4	0.94684	0.00347
0.5	1.02255	0.00352
1.0	1.16745	0.00422
1.5	1.20475	0.00441
2.0	1.19027	0.00426
2.5	1.17173	0.00447
3.0	1.12013	0.00423
4.0	1.06839	0.00372
4.5	0.86641	0.00386
5.0	0.44977	0.00234

Table ZI
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
400 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.37050	0.00116
0.3	0.49030	0.00158
0.4	0.58104	0.00174
0.5	0.65542	0.00220
1.0	0.86352	0.00279
1.5	0.94630	0.00339
2.0	0.98311	0.00376
2.5	0.97765	0.00400
3.0	0.95974	0.00339
4.0	0.91251	0.00344
4.5	0.72300	0.00387
5.0	0.31738	0.00209

Table FJ
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
500 cm Pitch 5% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.69342	0.00239
0.3	0.84629	0.00292
0.4	0.94869	0.00359
0.5	1.01481	0.00362
1.0	1.16371	0.00434
1.5	1.19111	0.00391
2.0	1.19769	0.00433
2.5	1.16598	0.00372
3.0	1.10933	0.00446
4.0	1.05859	0.00418
4.5	0.85931	0.00402
5.0	0.43588	0.00232

Table ZJ
K-effective Vs Uranium Concentration
55 Gallon Steel Drums filled with UO₂F₂ - Water Mixture
MG type concrete 10⁻⁴ (gm water/cc of air) mist density
500 cm Pitch 2% Enrichment

Uranium Concentration Grams U/cc Solution	K-effective mean value	1 Sigma value
0.2	0.37037	0.00125
0.3	0.49257	0.00142
0.4	0.58492	0.00195
0.5	0.65527	0.00220
1.0	0.85878	0.00315
1.5	0.94735	0.00337
2.0	0.97193	0.00352
2.5	0.97530	0.00389
3.0	0.94602	0.00428
4.0	0.91181	0.00372
4.5	0.72003	0.00303
5.0	0.30717	0.00211

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