

SCALE Calculations Replicating ARH-600 Data

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1.0 INTRODUCTION

This report documents Standardized Computer Analyses for Licensing Evaluation (SCALE) calculations replicating data from the ARH-600 criticality handbook. These calculations complement those reproduced with MCNP in PRC-NS-00009. Calculations were performed with SCALE version 6.1, using the v7-238 cross section library. The original ARH-600 data were calculated by the Atlantic Richfield Hanford (ARH) Company starting in the 1960s, and Monte Carlo N-Particle (MCNP) calculations were performed by the Hanford Plateau Remediation Company in 2010. This report is not intended to replace final analysis of fissile systems by qualified criticality personnel.

The following data were calculated from SCALE models of various materials (metal plutonium in water, metal uranium in water, uranium dioxide in water), geometries (spheres, cylinders, slabs), and reflector thicknesses (0 inch, 1 inch, and 10 inches). The only isotopes considered were ^{235}U , ^{238}U , ^{239}Pu , and ^{240}Pu . For each isotopic composition and reflector thickness, the fissile concentration and diameter/slab thickness was varied. The dimension for which k_{eff} equals one (1.0) was then linearly interpolated from the resulting parametric output files and graphed as a function of fissile concentration.

One goal of these parametric calculations was to find a range of k_{eff} values from 0.95 to 1.005 to accurately determine $k_{\text{eff}} = 1$ and possibly return in the future to graph subcritical diameters, such as $k_{\text{eff}} = 0.98$.

The following pages describe the parametric calculations and how the data were obtained. The WORM/SCALE files, resulting data, and comparison with the corresponding ARH-600 curve are included in the appendices at the end of this document.

Appendix A contains a printout of the “Layered-worm” Powershell script. Appendix B contains a printout of the modified WORM PERL script. These two scripts were utilized to generate all SCALE input files. For each set of base parameters, Appendix C contains the following information for each case: an introductory page with the Case ID and the applicable base parameters (fissile material, geometry, enrichment, and reflector), a comparison curve of the calculated data (interpolated for $k_{\text{eff}} = 1.0$) vs the corresponding ARH-600 curve data, a table of the interpolated data results, the WORM/SCALE input file, the corresponding CritView database file, and a listing of the results from each parametric calculation

2.0 APPROACH

These parametric calculations were prepared in a similar fashion to those in PRC-NS-00009. Because PRC-NS-00009 outlines replicating ARH-600 with MCNP, appropriate diameters and deltas have already been identified for each system. If k_{eff} values from 0.95 to 1.005 were not found, additional configurations were evaluated. The multitude of parametric SCALE input files were generated using a special input file that describes the parameters to vary and their range and variation method. The WORM (write one run many) PERL script and another helper script were utilized to generate the individual input files. The helper script was written to aid in the

generation of SCALE files where a single pass through WORM was insufficient. This is discussed further in the next section.

First, a sample SCALE file was made for each geometry using GeeWiz, a user interface for creating input files. Then, the WORM-specific code was inserted, which contained the parametric dimensions and concentrations. The WORM files were then run with the helper script to generate all the SCALE input files.

As the fissile concentration was varied, the concentration of water needed to be adjusted, so the default value in SCALE could not be used. To calculate the water concentration, equations 1 through 3 (see Section 4.1) were used, assuming a 1 cc sample. The actual volume does not matter for this calculation as it is only used to calculate concentration.

The numerous resulting input files were run through SCALE. Once k_{eff} values were calculated, k_{eff} data, concentrations, and dimensions were imported to Excel. k_{eff} values of 1 were linearly interpolated from the two adjacent k_{eff} values closest to 1, and the resulting critical dimensions were compiled into a CritView file.

All SCALE calculations used the CSAS6 sequence, the v7-238 cross section library, and CENTRM for cross section processing.

3.0 AUTOMATION ROUTINE

Each system had a defined fissile material, geometry, enrichment, and reflector thickness. For each system, there were also a range of fissile concentrations with corresponding ranges of dimensions. To create the SCALE inputs efficiently, WORM was used, and a helper script was developed.

WORM generates many files from specified arrays and/or lists (defined using a start, stop, and delta). Each fissile concentration and corresponding start dimension, stop dimension, and delta were defined in an array. Each file for a given dimension was generated using the list function; however, it was not possible to specify lists based on values contained in arrays and an index variable. To enable this, lists were written enclosed in double curly brackets for use with a helper script.

The helper script was written in PowerShell and titled “layered-worm.” WORM was also modified to include a command line option (-a) to specify number format in the output filenames. Layered-worm and the modified version of WORM are included in Appendix A and B, respectively.

The helper script ran the specified file through WORM once to fill in the concentrations and specify a list with the associated start, stop, and delta using an index variable. Next, the script replaced any double curly brackets with angle brackets and ran WORM a second time to fill in dimensions using the specified list. Then, the script moved the first WORM files and all key files into a subfolder, and all generated input files were appended with “.inp” to prepare them for SCALE.

All SCALE calculations were run on computers that had successfully passed verification testing. The resulting output files were then parsed using another PowerShell script, and the filename, k_{eff} , sigma, $k_{\text{eff}}+2\sigma$, EALF, EALF sigma, normality, date modified, errors, and warning messages were outputted to a comma-separated values (CSV) file. The CSV files were imported to Excel, where a macro separated outputs by concentration and interpolated the $k_{\text{eff}}=1$ diameter.

4.0 CALCULATIONS

4.1 CALCULATING WATER CONCENTRATION ASSUMING 1CC SAMPLE

Volume of fissile material

$$\text{critVol}(\text{cc}) = \frac{\text{critConc} \left(\frac{\text{g}}{\text{cc}} \right) * 1(\text{cc})}{\text{critDensity} \left(\frac{\text{g}}{\text{cc}} \right)} \quad (1)$$

critVol = Volume of critical material

critConc = Concentration of critical material

critDensity = Density of critical material *See table below

Volume of water in sample

$$\text{waterVol}(\text{cc}) = 1(\text{cc}) - \text{critVol}(\text{cc}) \quad (2)$$

waterVol = Volume of water

Concentration of water in sample

$$\text{waterConc} \left(\frac{\text{g}}{\text{cc}} \right) = \frac{\text{waterVol}(\text{cc}) * \text{waterDensity} \left(\frac{\text{g}}{\text{cc}} \right)}{1(\text{cc})} \quad (3)$$

waterConc = Concentration of water

waterDensity = Density of water (1 g/cc)

Table 4–1 Material and Density Specification for the Fissile Region

Material	Density	Reference
Plutonium	19.6 g/cc	ARH-600 Handbook Volume II Section C.1-1
Uranium	18.9 g/cc	ARH-600 Handbook Volume II Section D.1-1
Uranium Dioxide	11 g/cc*	ARH-600 Handbook Volume II Section D.2-1

*Rounded up from 10.96 in handbook value to be consistent with PRC-NS-00009.

5.0 REFERENCES

ARH-600, 1980 Revision, *Criticality Handbook*, Atlantic Richfield Hanford Company, Richland, WA, 1968.

N-UG-G-00002, Rev. 1, *CritView User's Guide*, Savannah River Nuclear Solutions, Aiken, SC, March 2019.

PRC-NS-00009, Rev. 1, *MCNP Calculations Replicating ARH-600 Data*, CH2M HILL Plateau Remediation Company, Richland, WA, 2013.

APPENDIX A: WORM HELPER SCRIPT

```

<#
usage: layered-worm.psl FILENAME [First Suffix] [Second Suffix]
        Suffixes are optional, default is "in"

        This script needs to be run in the directory containing "layered" WORM file. The
"layered" WORM file should be the only file in the directory. This script and WORM will not run
correctly if the specified filename includes back-slashes.

        A modified version of WORM is used for this script. WORM is assumed to be located at
C:\bin\worm.bat
#>

#define variables
$StartTime = $(get-date)           #get current time to print elapsed time at end
$firstformat = "06.3"              #first number format to be used in naming files
$secondformat = "05.2"             #second number format to be used in naming files

#verifies a file is specified, otherwise exits
if ($args[0].length -ne 0) {
    $wormfile = $args[0]
} else {
    exit
}

#checks for optional suffixes
if ($args[1].length -ne 0) {
    $firstapp = $args[1]
} else {
    $firstapp = "in"
}
if ($args[2].length -ne 0) {
    $secondapp = $args[2]
} else {
    $secondapp = "in"
}

#define filename and location to be used later
$wormouts = $wormfile + ".*"
$currentdir = get-location

mkdir input_and_extras             #make directory for inputs and key-files
C:\bin\worm.bat -a $firstformat -s $firstapp $wormfile                 #run first "layer" of worm

write-host "First WORM execution done"                #print to powershell

#move first keyfile and input to folder
move-item $wormfile -destination .\input_and_extras\ -force
move-item *_key* -destination .\input_and_extras\ -force

$InputFiles = Get-Item $wormouts           #get all the newly generated WORM files

#Replace {{{}} for <>
$InputFiles | ForEach {
    (Get-Content -Path $_.FullName) | ForEach-Object {
        $_.replace('{{{', '<').replace('}}}', '>')
    } | Set-Content -Path $_.FullName
}

#run WORM a second time for each new file
$InputFiles | ForEach {
    write-host "Running WORM for:" $_.name
    C:\bin\worm.bat -a $secondformat -s $secondapp $_.name
    move-item $_.name -destination .\input_and_extras -force
}

```

```
write-host "Cleaning Up...."

move-item *_key* -destination .\input_and_extras -force           #move new key-files to folder

Get-ChildItem -path $currentdir -exclude input_and_extras,*_key,*.csv | Rename-Item -NewName
{$_ .Name + ".inp"}          #add .inp to all files

#calculate time elapsed
$elapsedTime = $(get-date) - $StartTime
$totalTime = "{0:HH:mm:ss}" -f ([datetime]$elapsedTime.Ticks)

#alert user process is complete
[System.Media.SystemSounds]::Asterisk.play()
write-host "DONE!"
write-host "Elapsed Time:" $totalTime
```

APPENDIX B: MODIFIED WORM

#This copy of worm has been modified by Alex Rodgers for Savannah River Nuclear Solutions 7/21
 #-a command line option was added to specify the number format when naming output files

```
#!/usr/bin/perl -w
#####
##   The WORM   /   LA-CC-99-69   /   Version 1.2.4, 24-Oct-2000   ##
##-----##
##   created by:  Tom Jones, <tom.jones@pobox.com>   ##
##-----##
##           The latest version (along with documentation, tutorials,   ##
##           and examples) can be found at worm.csirc.net   ##
#####

#####
##
## NOTE: These comments are somewhat out of date, so take them with a grain ##
##       of salt.  I'll try to update them as soon as possible.   ##
##
#####
##   This file was designed to be viewed with your editor/terminal set to ##
##   at least 132 columns wide.  The first 80 columns are used for code, the ##
##   remaining 52 for comments.   ##
##-----##
##   The WORM is composed of three parts, two of which are permanent and ##
##   one is temporary.  These three parts are:   ##
##
##       1. worm/worm.bat   "worm" is a bourne shell script for use on UNIX ##
##                          systems, and "worm.bat" is a DOS batch file   ##
##                          equivalent to worm for use on Windows/DOS     ##
##                          systems, that controls execution of "wormer" and ##
##                          ".worm"   ##
##
##       2. wormer         "wormer" is a perl program that does the majority ##
##                          of the work.  It parses your model and creates ##
##                          ".worm"   ##
##
##       3. .worm          ".worm" is a temporary perl program created by ##
##                          wormer and executed by worm/worm.bat.  It creates ##
##                          the input-decks described by your model   ##
##
## The program flow can be illustrated in the following diagram:   ##
##
##           #####
##           #   worm   #   +--> model_xxx_in   ##
##           #-----#   |   ##
## model --> #   #   --+--> model_yyy_in   ##
##           # wormer --> .worm #   |   ##
```

```

##          #          #  +--> model_zzz_in          ##
##          #####          ##
##-----##
##   The model is a text file template containing embedded worm code.  This ##
##   defines what your input decks will look like.  The worm code is enclosed ##
##   angle brackets ("less than" and "greater than" symbols) and has the ##
##   following form: ##
## ##
##   < name = change | options >   -or-   < name = change \ options > ##
## ##
##       name - (optional) may contain any alphanumeric character or the ##
##               underscore, "_", character; however names must begin with a ##
##               letter or the underscore. ##
##       = - (required if a name is specified, otherwise optional) ##
##       change - (required) a comma separated list of changes.  changes can be ##
##                 constants (numbers), variables (names), expressions (equations ##
##                 of constants, variables, operators, and functions), shorthand ##
##                 lists, or any combination of these. ##
##       options - (optional) options and format specification (see the WORM ##
##                 manual for more information). ##
## ##
##   There can be multiple changes per line and numbers can be expressed in ##
##   either standard or scientific notation (e.g., 0.025, 2.5e-2, 1000000, ##
##   1e6).  Additionally, whitespace within worm code is ignored. ##
##-----##
##   The following is a brief outline of wormer.  For a more detailed ##
##   description, please read the source and accompanying comments (the ##
##   comments are a bit rough and the variable names may seem cryptic as they ##
##   are a hold-over from a conceptual/developmental precursor to the WORM). ##
##   They will be changed to something clearer in a future version/rewrite. ##
## ##
##   main::wormer ##
##       define default parameters ##
##       initialize some counters ##
##       parse model line-by-line for each piece of worm code ##
##       sub::parse ##
##           extract name, changes, options & format ##
##           expand the change specification ##
##           expand the format specification ##
##       sort equations/changes, check for circular references ##
##       create .worm ##
##           define constants ##
##           define variables and create loops ##
##           write input-decks using format derived from model ##
##           close the loops ##
##           define the format ##
##       occasionally remind/request that people register ##
#####
#####

```

```

use diagnostics ;
use Getopt::Std ;
#-----#####
# default parameters                                # defaults # These values should probably go into a
#-----# $HOME/.wormrc file.
$reminder_probability = 1 ;                          # 1 # The approximate percentage of time you will be
# 5 # reminded to send email to wormkeeper@lanl.gov
$default_precision = 5 ;                             # 5 # The number of significant figures to display.
$default_justification = "left" ;                    # left # left, center, right
$list_endpoint_tolerance = 0.1 ;                     # 0.1 # If the last point calculated for a shorthand
$zeroleader = '1.2';

# list specification is less than the specified
# stop point by this percentage, the specified
# stop point will be added to the list.
$key_name_format = "long" ;                          # long # The "key" file and input-decks can have two
$inputdeck_name_format = "long" ;                    # long # different filename formats. "long" and "short"
# "long" includes the changing values in the
# filenames and "short" does not.
$inputdeck_suffix = "in" ;                           # _in # The suffix to use on "long" format input-decks.
$key_suffix = "key" ;                                # _key # The suffix to use on the "key" file.
$delimiter = "_" ;                                   # _ # The character to use as a delimiter in filenames
#-----#####
use vars qw($opt_v $opt_V $opt_h $opt_H $opt_n $opt_N) ;
use vars qw($opt_k $opt_K $opt_w $opt_W $opt_x $opt_X) ;
getopts('vVhHnNkKwWxXd:s:S:p:j:t:r:a:') || goto END ;
if ($opt_v && !$opt_V) {
    print ".\n. The WORM [Version 1.2.4, 24-Oct-2000]\n.\n" ;
    goto END ;
}
if ($opt_h && !$opt_H) { goto HELP }
if ($opt_n) { $inputdeck_name_format = "short" }
if ($opt_N) { $inputdeck_name_format = "long" }
if ($opt_k) { $key_name_format = "short" }
if ($opt_K) { $key_name_format = "long" }
if ($opt_d && $opt_d eq "none") { $delimiter = "" }
elseif ($opt_d) { $delimiter = $opt_d }
if ($opt_s && $opt_s eq "none") { $inputdeck_suffix = "" }
elseif ($opt_s) { $inputdeck_suffix = $opt_s }
if ($opt_S && $opt_S eq "none") { $key_suffix = "" }
elseif ($opt_S) { $key_suffix = $opt_S }
if ($opt_p) { $default_precision = $opt_p }
if ($opt_a) { $zeroleader = $opt_a }
if ($opt_j) { $default_justification = $opt_j }
if ($opt_t) { $list_endpoint_tolerance = $opt_t }
if (defined($opt_r)) { $reminder_probability = $opt_r }
if ($#ARGV == -1) { goto HELP }
#-----#
$inputdeck_suffix = "$delimiter".$inputdeck_suffix" ;
$key_suffix = "$delimiter".$key_suffix" ;
if ($default_justification =~ /^right$/i) {
    # Substitute ">" for right, "|" for center, and

```



```

    $default_justification = ">" ;
} elseif ($default_justification =~ /^center$/i) {
    $default_justification = "|" ;
} else {
    $default_justification = "<" ;
}
if ($default_precision lt 1 || $default_precision =~ /^[^0-9]/) {
    $default_precision = 5 ;
}
$default_format = $default_justification x ($default_precision + 7) ;

if ($key_suffix eq $inputdeck_suffix && $inputdeck_suffix ne "") {
    $inputdeck_suffix = "$delimiter"."in" ;
    $key_suffix = "$delimiter"."key" ;
}
foreach $model (@ARGV) {
    open MODEL, "<$model" || die "I turned it on, but nuttin happened" ;
    #-----#
    #   Initialize counters, etc.
    #-----#
    #@input_file = @ARGV ;
    $line = 0 ;
    $codeline = 0;
    $perlcode = 0;
    $loop = 0 ;
    $non_loop = 0 ;
    $null = "" ;
    $total_number_of_input_decks = 1 ;

    undef (@list) ;
    undef (@code) ;
    undef (@list_name) ;
    undef (@list_options) ;
    undef (@input) ;
    undef (@mods) ;
    #-----#
    #   Parse and reformat lines
    #-----#
    while (<MODEL) {
        chomp ;
        if ($_ =~ /^s*<perl>s*$/i) {
            ++$perlcode ;
            goto SKIP ;
        } elseif ($_ =~ /^s*</perl>s*$/i) {
            --$perlcode ;
            goto SKIP ;
        }
        if ($perlcode == 1) {
            # "<" for anything else.
            #
            #
            #
            # If the default precision is set to less than 1
            # or contains something other than a number, use
            # 5 for the precision.
            # Create the default format using the precision
            # and justification specified above. Seven is
            # added to the precision to make room for the
            # sign and sci. not. if needed. Don't change it.
            # If both the key and inputdeck suffices are ""
            # use "key" and "in" to prevent from destroying
            # each other when there would be only one input
            # created.

            # Initialize $line (the line counter), $loop (the
            # loop, or number of changes, counter),
            # $non_loop (arrays or single value changes) and
            # $null (used to initialize other variables),
            # $total_number_of_input_decks (the number of
            # input-decks to be created).

            # Read in input file one line at a time, remove
            # the CR/LF at the end of the line

```

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```

$sort_count = 0 ;
}
#~~~~~#
# print "\n";
# for ($i=0; $i<=$loop-1; ++$i) {print "$list_name[$i] = $list[$i]\n";}
#~~~~~#
#-----#
# Create unique filenames for changes and key file header
#-----#
$filename = "\"$model\"";
$key = $model ;
if ($inputdeck_name_format =~ /^short$/i) {
    $filename .= ".$wormLOOPcount" ;
} else {
    for ($i=0; $i<=$#list; ++$i) {
        if (($list[$i] =~ /,/ || $list_options[$i] =~ /n/i) &&
            $list_name[$i] !~ /^@/) {
            if ($list[$i] =~ /"|\\. $|^$dateANDtime$|^$time$|^$wday$|^$month$|^$date$/){
                $filename .= ".$delimiter\".$list_name[$i]" ;
            } else {
                $filename .=
                    ".$delimiter\".(sprintf \"%${zeroleader}f\",$list_name[$i])" ;
            }
            $key .= "$delimiter\".$list_name[$i]" ;
        }
    }
}
if ($key_name_format =~ /^short$/i) {
    $key_name = $model ;
} else {
    $key_name = $key ;
}
if ($key_name eq $model && $key_suffix eq "") {
    $key_suffix = "_key" ;
}

if (!$opt_x || $opt_X) {
    open LEGEND, ">$key_name\".$key_suffix" || die "can't create key file: $!" ;
    print LEGEND "$key\n\n" ;
}
#-----#
# Open temporary file ".worm" for writing and give the owner read, write, and
# execute privileges. Define constants and use POSIX for a few functions.
#-----#
open BUILDER, ">.worm" || die "can't create temporary file \".worm\": $!" ;
chmod (0700, ".worm") ;
print BUILDER "#!/usr/bin/perl -w\n" ;
print BUILDER "use POSIX qw(tan asin acos atan log10 sinh cosh tanh);\n" ;

```

dependencies above it. The unsorted_end is
decremented and the sort_counter reset to zero.

PRINT LISTS & NAMES POST-SORT |

If the short input-deck name format is to be
used then use this simpler, but still unique
filename scheme, if not then use the following
If an item is a multivalue change, or if the
options contain the "filename" flag, then
the value of the variable needs to be included

in the input deck filenames. If the value is
the result of concatenation or is a text value
then don't use sprintf to format it, if not
then it is a numerical value then sprintf
should be used. Additionally, these values
will be included in the key file so that it
can be determined what the values in the
filenames represent. The numerical values
are printed in the input deck filenames using
the default_precision.
If \$key_name_format = short then use the short
filename format for the key file, if not
use the long format.

If \$key_name is the same as the supplied input
file and the key_suffix is "", use "_key" for
the key_suffix to keep from destroying the
supplied input file.

Open the key file and add the filename
legend/key.

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```

print BUILDER "\$filename = \$filename.\\"$inputdeck_suffix\";\n" ;
print BUILDER "open INPUT_DECK, \">\$filename\";\n" ;
print BUILDER "write INPUT_DECK;\n" ;
#-----#
# Close loops
#-----#
print BUILDER "++\$wormLOOPcount;\n" ;
$loop_end = "}" x ($loop-$non_loop) ;
print BUILDER "$loop_end\n" ;
#-----#
# Define format based upon template file (that's the one that was supplied as
# an argument to this program)
#-----#
print BUILDER "format INPUT_DECK =\n" ;
for ($i=0; $i<=$#input; ++$i) {
    if ($input[$i] !~ /^#/ ) {

        print BUILDER "$input[$i] \n" ;
        if ($mods[$i]) {
            for ($j=0; $j<=$mods[$i]-1; ++$j) {
                if ($j < $mods[$i]-1) {
                    if ($name[$i][$j] =~ /^@/) {
                        print BUILDER "\"@\", " ;
                    } elseif ($unexpanded_format[$i][$j] eq "") {
                        print BUILDER "(sprintf \"%$.precision[$i][$j]g\", " ;
                        print BUILDER "\$${name[$i][$j]}, " ;
                    } elseif ($unexpanded_format[$i][$j] =~ /^[1-9]+[0-9]*s$/i) {
                        print BUILDER "(sprintf \"%$.precision[$i][$j]e\", " ;
                        print BUILDER "\$${name[$i][$j]}, " ;
                    } else {
                        print BUILDER "\$${name[$i][$j]}, " ;
                    }
                } else {
                    if ($name[$i][$j] =~ /^@/) {
                        print BUILDER "\"@\"\\n" ;
                    } elseif ($unexpanded_format[$i][$j] eq "") {
                        print BUILDER "(sprintf \"%$.precision[$i][$j]g\", " ;
                        print BUILDER "\$${name[$i][$j]}\\n" ;
                    } elseif ($unexpanded_format[$i][$j] =~ /^[1-9]+[0-9]*s$/i) {
                        print BUILDER "(sprintf \"%$.precision[$i][$j]e\", " ;
                        print BUILDER "\$${name[$i][$j]}\\n" ;
                    } else {
                        print BUILDER "\$${name[$i][$j]}\\n" ;
                    }
                }
            }
        }
    }
}
print BUILDER ".\n" ;

```

Increment .worm's loop counter.

Add the correct number of "}" to close the loops.

The format section of ".worm" is now going to be defined for each line of the worm model, unless the kill character (#) is the first character on the line.

The line from the worm model (with the change specification replaced by the expanded format) is added to the format. If the line contains a change(s) then it is followed by another line that contains the value to be inserted into the expanded format field. If the change is not the last one for the line then it is followed by a comma. If no format was specified or if a scientific notation format was specified, then use the "sprintf" function is used to properly format the value. Also, if an array is to be printed, "@" is added to the value line to compensate for the fact that "@" and "^" shouldn't be used the format section except to begin fields.

If the modification is the only or last one for a line then do exactly the same mess as above but add a CR/LF after the value instead of a comma.

Close the format section by placing a single "."

```

close BUILDER ;
system "perl .worm" ;
if (!$opt_w || $opt_W) { unlink ".worm" }
}
goto REMINDER ;                                     # on a line by itself.
#####

#####
sub parse {                                           #
#-----#
    ++$mod_number ;                                  # Increment the modifications per line counter
    $mod[$line][$mod_number] = shift(@_) ;           # Store the first value (there should only be one)
                                                    # of the subroutine argument array in $mod[x][y]
    $mod[$line][$mod_number] =~ s/\s//g ;           # Get rid of white space.
    $mod[$line][$mod_number] =~ s/^<//;             # Remove the leading "<"
#-----#
# Extract/Create $name                                #
#-----#
    $null =~ s/.*/ / ;                               # Initialize $& to ""
    $mod[$line][$mod_number] =~ /^.+=/ ;           # If the modification starts with one or more
    $name[$line][$mod_number] = $& ;                # characters followed by "=", then a variable
                                                    # name is specified and will be stored in
                                                    # $name[x][y]

    chop $name[$line][$mod_number] ;                # Remove the trailing "=" from $name[x][y]
    if ($& !~ /=/) {                                  # If the modification doesn't contain "=" then
        $name[$line][$mod_number] = "temp".$line."x".$mod_number ; # a variable name isn't specified and a name in
                                                    # the form tempNxM is created, where N=line #
                                                    # and M=modification number (remember, counting
                                                    # starts with 0).
#-----#
# Extract the unexpanded change/modification          #
#-----#
    $null =~ s/.*/ / ;                               # Initialize $& to "" again.
    $mod[$line][$mod_number] =~ /=.+?[\|>]/ ;       # Assign everything between "=" and either "\",
    $change[$line][$mod_number] = $& ;              # "|", or ">" to $change[x][y]
    if ($& !~ /=/) {                                  # If the modification doesn't contain "=" then
        $mod[$line][$mod_number] =~ /.+?[\|>]/ ;     # assign everything up to either "\", "|", or
        $change[$line][$mod_number] = $& ;           # ">" to $change[x][y]
    }
    $change[$line][$mod_number] =~ s/[<=\\|>]/g ;   # Remove "<", "=", "\", "|", and ">" from
                                                    # $change[x][y]
#-----#
# Extract options and the unexpanded format           #
#-----#
    $null =~ s/.*/ / ;                               # Initialize $& to "" again.
    $mod[$line][$mod_number] =~ /[\\|].+?>/ ;       # Assign everything between either "\" or "|" and
    $optionsANDformat[$line][$mod_number] = $& ;    # ">" to $optionsANDformat[x][y]
    $options[$line][$mod_number] = $optionsANDformat[$line][$mod_number] ;
    $format[$line][$mod_number] = $optionsANDformat[$line][$mod_number] ;
    $options[$line][$mod_number] =~ s/^[in]//ig ;    # Remove everything other than "i", "I", "n", or

```

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```
#~~~~~  
# print "$dependency[$i] ";  
#~~~~~  
    if ($dependency[$i] =~ /^[A-Za-z_]+/ &&  
        $dependency[$i] !~ /\$sin$\^cos$\^tan$\^asin$\^acos$\^atan$\  
            | ^ln$\^log$\^abs$\^rand$\^int$\^sinh$\^cosh$\^tanh$\^&/ ) {  
        $dependency[$i] = "\$".$dependency[$i] ;  
    }  
#~~~~~  
# print "$dependency[$i]\n";  
#~~~~~  
    if ($dependency[$i] eq "") { $dependency[$i] = "" }  
    elsif ($dependency[$i] eq "ln") { $dependency[$i] = "log" }  
    elsif ($dependency[$i] eq "log") { $dependency[$i] = "log10" }  
    $expanded_list .= $dependency[$i] ;  
}  
$expanded_list .= "," ;  
}  
chop $expanded_list ;  
$change[$line][$mod_number] = $expanded_list ;  
}  
#-----  
# Expand the supplied format specification or use the default_format  
#-----  
#~~~~~  
# print "$format[$line][$mod_number] ";  
#~~~~~  
if ($format[$line][$mod_number] =~ /[1-9]+[0-9]*\.[1-9]+[0-9]*$/) {  
    @format_elements = split /\./, $format[$line][$mod_number] ;  
    $format[$line][$mod_number] =  
        "#"$x$format_elements[0]."."."#$x$format_elements[1] ;  
} elsif ($format[$line][$mod_number] =~ /[1-9]+[0-9]*[#lcrs]$/i) {  
    @format_elements = split /([#lcrs])/i, $format[$line][$mod_number] ;  
    if ($format_elements[1] =~ /s/i ) {  
        $precision[$line][$mod_number] = $format_elements[0] - 1 ;  
        $format_elements[0] += 7 ;  
    }  
    $format[$line][$mod_number] = $format_elements[1] x $format_elements[0] ;  
} elsif ($format[$line][$mod_number] =~ /^f$/i) {  
    $format[$line][$mod_number] = "$default_justification" x 22 ;  
}  
else {  
    $format[$line][$mod_number] = "$default_justification" x 22 ;  
}
```

```

    $format[$line][$mod_number] =
        $default_justification x $format[$line][$mod_number]
} else {
    if ($change[$line][$mod_number] =~ /\.\$|^$dateANDtime$/) {
        $format[$line][$mod_number] = "$default_justification" x 24 ;
        $unexpanded_format[$line][$mod_number] = "24L" ;
    } elseif ($change[$line][$mod_number] =~ /\$^$time$/) {
        $format[$line][$mod_number] = "$default_justification" x 8 ;
        $unexpanded_format[$line][$mod_number] = "8L" ;
    } elseif ($change[$line][$mod_number] =~ /\$^$date$/) {
        $format[$line][$mod_number] = "$default_justification" x 11 ;
        $unexpanded_format[$line][$mod_number] = "11L" ;
    } elseif ($change[$line][$mod_number] =~ /\$^$wday|^$month$/) {
        $format[$line][$mod_number] = "$default_justification" x 3 ;
        $unexpanded_format[$line][$mod_number] = "3L" ;
    } elseif ($change[$line][$mod_number] =~
        /\$^$mday|^$hour|^$minute|^$second$/) {
        $format[$line][$mod_number] = "$default_justification" x 2 ;
        $unexpanded_format[$line][$mod_number] = "2L" ;
    } elseif ($change[$line][$mod_number] =~ /\$^$year$/) {
        $format[$line][$mod_number] = "$default_justification" x 4 ;
        $unexpanded_format[$line][$mod_number] = "4L" ;
    } else {
        $format[$line][$mod_number] = $default_format ;
        $precision[$line][$mod_number] = $default_precision ;
        $unexpanded_format[$line][$mod_number] = "" ;
    }
}
if ($name[$line][$mod_number] =~ /^@/) {
    $format[$line][$mod_number] =
        "<".$name[$line][$mod_number].">". $change[$line][$mod_number].">" ;
} else {
    $format[$line][$mod_number] =~ tr/lcrsLCRS/<|><|>< / ;
    $format[$line][$mod_number] =~ s/^./@/ ;
}
}
#~~~~~
# print "$format[$line][$mod_number]\n";
#~~~~~
#-----#
#   Store some values for use in the Equation Sorter and Loop Builder
#-----#
    $list[$loop] = $change[$line][$mod_number] ;
    $list_name[$loop] = $name[$line][$mod_number] ;
    $list_options[$loop] = $options[$line][$mod_number] ;
    ++$loop ;
#-----#
#   Return to main program
#-----#
    return $format[$line][$mod_number] ;
}

```

```

#   use the default justification with N
#   significant figures.
# Create "special" default formats.
# If the change contains "" or ".$" or is
#   "dateANDtime" use 24L.
#
# If the change is "time" use 8L.
#
#
# If the change is "wday" or "month" use 3L.
#
#
# If the change is "mday" or "hour" or "minute" or
#   "second" use 2L.
#
# If the change is "year" use 4L.
#
#
# If no format was specified, or if the format
#   specification was incorrect, use the default
#   format and precision.
#
#
# If the item is an array then ignore the format
#   and use <name=expanded change/list>,
#   otherwise swap "<" for "l", "|" for "c",
#   ">" for "r", and "<" for "s"; and replace the
#   first character of $format[x][y] with "@".
#
#
# PRINT FORMAT - POST-EXPANSION |
#~~~~~

```

```
#####

#####
CIRC REF: ; #
print ".\n. The WORM smugly refuses to eat your garbage.\n" ; # If there is a circular reference, print the
print ". Check for circular references.\n.\n" ; # error message, and create an empty ".worm"
open BUILDER, ">.worm" || # file. The empty file is to get rid of the
die "can't create temporary file \".worm\": $!" ; # "file not found error" that would come from
chmod (0700, ".worm") ; # the worm.bat/worm script trying to execute
print BUILDER "#!/usr/bin/perl -w\n" ; # ".worm". I should check for the file in worm
goto END ; # and act accordingly, instead of this.
#####

#####
REMINDER: ; # A gentle reminder/request to register with
if ($reminder_probability > 0 && int(rand(100/$reminder_probability)) == 0) { # the wormkeeper.
    print ".\n. If you haven't done so already, please take a moment to send\n"; #
    print ". an email message to: tom.jones@pobox.com\n.\n" ; #
    print ". Your name and email address will be added to the WORM User\n" ; #
    print ". email list so that you can be informed about updates and\n" ; #
    print ". issues regarding the WORM. Your comments and suggestions are\n" ; #
    print ". always welcome. Thanks for using the WORM!\n.\n" ; #
} #
goto END ; #
#####

#####
HELP: ; #
print ".\n. USAGE: worm [OPTION]... FILE...\n.\n" ; #
goto END ; #
#####
END: ;
END
#####
## <LANL legal mumbo-jumbo> ##
## ##
## This software and ancillary information (herein called "SOFTWARE") ##
## called "The WORM" is made available under the terms described here. ##
## The SOFTWARE has been approved for release with associated LA-CC Number, ##
## LA-CC-99-69. ##
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```
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## </LANL legal mumbo-jumbo>          ##
#####
```

APPENDIX C: CALCULATIONS AND DATA

The following data is presented in this appendix.

Mat	Geom	Pu239 wt%	Water Reflect
Pu	Sphere	100	0
			1
			10
		97	0
			1
			10
		95	0
			1
			10
	Cylinder	100	0
			1
			10
		97	0
			1
			10
		95	0
			1
			10
	Slab	100	0
			1
			10
		97	0
			1
			10
		95	0
			1
			10

Mat	Geom	U235 wt%	Water Reflect
U	Sphere	100	0
			1
			10
		93.5	0
			1
			10
	Cylinder	100	0
			1
			10
		93.5	0
			1
			10
	Slab	100	0
			1
			10
		93.5	0
			1
			10

Mat	Geom	U235 wt%	Water Reflect
UO2	Sphere	6	0
			1
			10
		5	0
			1
			10
		4	0
			1
			10
		3	0
			1
			10
		2.5	0
			1
			10

Pu-sph-100 (Cases with 0", 1", 10" Reflector)

Case ID: pu_sph_100_00ref

Material: Plutonium

Geometry: Sphere

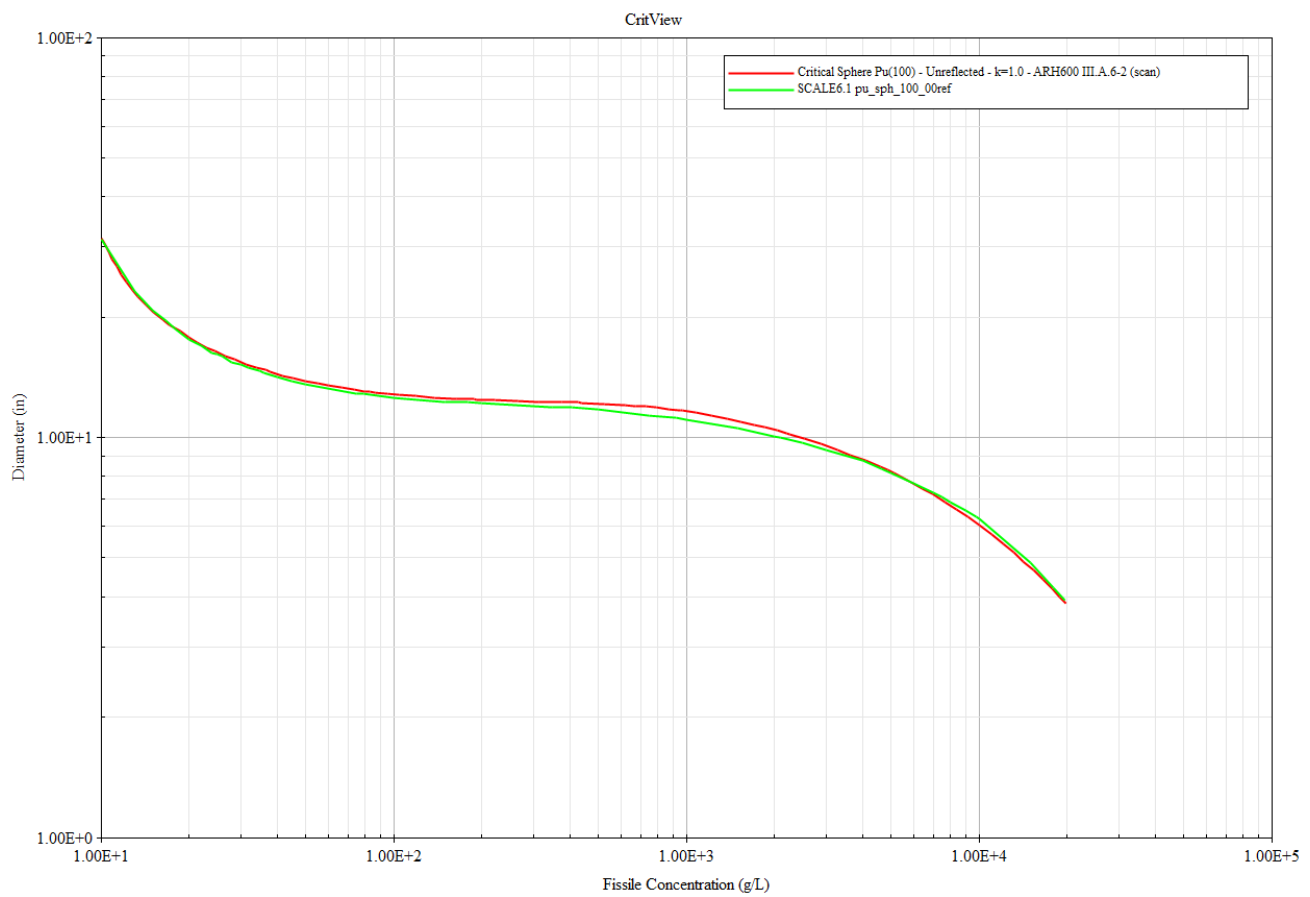
Isotopics: 100% ^{239}Pu

Reflector: Unreflected

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	25.000	33.400	0.400	31.3606
0.013	19.700	24.000	0.200	23.2467
0.015	18.000	21.400	0.100	20.7579
0.018	16.300	19.100	0.100	18.6455
0.020	15.600	18.100	0.100	17.6231
0.022	15.000	17.400	0.100	17.0000
0.024	14.600	16.800	0.100	16.2782
0.025	14.400	16.600	0.100	16.1271
0.026	14.200	16.300	0.100	15.9409
0.028	13.900	15.900	0.100	15.3927
0.030	13.600	15.600	0.100	15.2273
0.032	13.400	15.300	0.100	14.9369
0.036	13.100	14.900	0.100	14.5213
0.040	12.800	14.600	0.100	14.1534
0.045	12.500	14.200	0.050	13.8194
0.050	12.300	13.900	0.050	13.5467
0.075	11.700	13.200	0.050	12.8875
0.100	11.500	12.900	0.050	12.5450
0.150	11.200	12.600	0.050	12.2462
0.200	11.100	12.500	0.050	12.1676
0.350	10.900	12.300	0.050	11.8766
0.500	10.700	12.100	0.050	11.7256
0.750	10.400	11.700	0.050	11.3383
1.000	10.100	11.400	0.050	11.0883
1.500	9.700	10.900	0.050	10.5833
2.000	9.200	10.400	0.050	10.0887
2.500	8.900	10.000	0.050	9.7233
3.000	8.600	9.700	0.050	9.3100
4.000	8.000	9.000	0.050	8.7500
5.000	7.500	8.500	0.050	8.1741
6.000	7.100	8.000	0.050	7.6900
7.000	6.700	7.500	0.050	7.2887
7.500	6.500	7.300	0.050	7.0940
8.000	6.300	7.100	0.050	6.8973
9.000	6.000	6.800	0.050	6.5584
10.000	5.700	6.400	0.050	6.2472
15.000	4.400	5.000	0.050	4.8759
19.600	3.500	4.100	0.050	3.9270

WORM and SCALE Input File

```

'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.1.1.1.1-1. Critical Dimensions for 100% 239Pu Sphere - 0 Inches of Water Reflection
,
#index number = <index = 1:38:1>
,
#Concentration = <@conc =
0.01,0.013,0.015,0.018,0.02,0.022,0.024,0.025,0.026,0.028,0.03,0.032,0.036,0.04,0.045,0.05,0.075,
0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4,5,6,7,7.5,8,9,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
25,19.7,18,16.3,15.6,15,14.6,14.4,14.2,13.9,13.6,13.4,13.1,12.8,12.5,12.3,11.7,11.5,11.2,11.1,10.
9,10.7,10.4,10.1,9.7,9.2,8.9,8.6,8,7.5,7.1,6.7,6.5,6.3,6,5.7,4.4,3.5> in
#Ending Diameter = <@enddia =
33.4,24,21.4,19.1,18.1,17.4,16.8,16.6,16.3,15.9,15.6,15.3,14.9,14.6,14.2,13.9,13.2,12.9,12.6,12.5
,12.3,12.1,11.7,11.4,10.9,10.4,10,9.7,9,8.5,8,7.5,7.3,7.1,6.8,6.4,5,4.1> in
#Delta = <@delta =
0.4,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0
.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05> in
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
,
=csas6
template
v7-238
read composition
  pu          1 den=<critconc> 1 300
                94239 100
                94240 0   end
<&ZEROCHECK(wconc)\ll>h2o          1 den=<wconc> 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="sphere"
  sphere 1      {{{(diameter*in)/2}}}
  media 1 1 1
  boundary 1
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
  return '\';
}
}
</perl>

```


CritView compatible data file

```
reset:
title: SCALE6.1 pu_sph_100_00ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: sphere
modmat: H2O
critmat: plutonium
isomat: Pu239 1.0
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 31.3606
0.013 23.2467
0.015 20.7579
0.018 18.6455
0.020 17.6231
0.022 17.0000
0.024 16.2782
0.025 16.1271
0.026 15.9409
0.028 15.3927
0.030 15.2273
0.032 14.9369
0.036 14.5213
0.040 14.1534
0.045 13.8194
0.050 13.5467
0.075 12.8875
0.100 12.5450
0.150 12.2462
0.200 12.1676
0.350 11.8766
0.500 11.7256
0.750 11.3383
1.000 11.0883
1.500 10.5833
2.000 10.0887
2.500 9.7233
3.000 9.3100
4.000 8.7500
5.000 8.1741
6.000 7.6900
7.000 7.2887
7.500 7.0940
8.000 6.8973
9.000 6.5584
10.000 6.2472
15.000 4.8759
19.600 3.9270
```

0.01			0.013			0.015		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
25.00	0.9242	0.00190	19.70	0.9212	0.00160	18.00	0.9217	0.00150
25.4	0.9297	0.00110	19.9	0.9272	0.00170	18.1	0.9283	0.00260
25.8	0.9357	0.00150	20.1	0.9356	0.00160	18.2	0.9289	0.00190
26.2	0.9425	0.00150	20.3	0.9356	0.00280	18.3	0.9285	0.00200
26.6	0.9466	0.00150	20.5	0.9404	0.00160	18.4	0.9350	0.00180
27	0.9509	0.00130	20.7	0.9454	0.00160	18.5	0.9364	0.00190
27.4	0.9565	0.00150	20.9	0.9539	0.00160	18.6	0.9398	0.00160
27.8	0.9614	0.00160	21.1	0.9561	0.00170	18.7	0.9436	0.00200
28.2	0.9664	0.00150	21.3	0.9592	0.00170	18.8	0.9504	0.00180
28.6	0.9743	0.00190	21.5	0.9645	0.00150	18.9	0.9504	0.00170
29	0.9763	0.00140	21.7	0.9687	0.00170	19	0.9517	0.00180
29.4	0.9775	0.00140	21.9	0.9729	0.00180	19.1	0.9561	0.00160
29.8	0.9814	0.00130	22.1	0.9766	0.00290	19.2	0.9537	0.00170
30.2	0.9856	0.00150	22.3	0.9816	0.00200	19.3	0.9625	0.00160
30.6	0.9891	0.00140	22.5	0.9841	0.00160	19.4	0.9656	0.00210
31	0.9936	0.00180	22.7	0.9890	0.00170	19.5	0.9654	0.00180
31.4	1.0007	0.00130	22.9	0.9936	0.00150	19.6	0.9667	0.00210
31.8	1.0043	0.00150	23.1	0.9989	0.00140	19.7	0.9747	0.00180
32.2	1.0038	0.00200	23.3	1.0004	0.00150	19.8	0.9767	0.00170
32.6	1.0075	0.00150	23.5	1.0032	0.00170	19.9	0.9733	0.00220
33	1.0102	0.00170	23.7	1.0092	0.00150	20	0.9784	0.00200
33.4	1.0135	0.00120	23.9	1.0129	0.00190	20.1	0.9817	0.00190
			24	1.0139	0.00190	20.2	0.9841	0.00190
						20.3	0.9877	0.00230
						20.4	0.9923	0.00200
						20.5	0.9915	0.00200
						20.6	0.9930	0.00170
						20.7	0.9978	0.00160
						20.8	1.0016	0.00170
						20.9	1.0072	0.00180
						21	1.0033	0.00190
						21.1	1.0083	0.00160
						21.2	1.0116	0.00150
						21.3	1.0109	0.00160
						21.4	1.0115	0.00200

0.018			0.02			0.022		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
16.30	0.9193	0.00180	15.60	0.9157	0.00220	15.00	0.9180	0.00180
16.4	0.9220	0.00170	15.7	0.9223	0.00190	15.1	0.9216	0.00250
16.5	0.9251	0.00210	15.8	0.9257	0.00210	15.2	0.9237	0.00200
16.6	0.9276	0.00170	15.9	0.9323	0.00270	15.3	0.9325	0.00240
16.7	0.9332	0.00180	16	0.9362	0.00210	15.4	0.9334	0.00200
16.8	0.9346	0.00220	16.1	0.9415	0.00190	15.5	0.9379	0.00170
16.9	0.9385	0.00190	16.2	0.9471	0.00200	15.6	0.9442	0.00210
17	0.9442	0.00220	16.3	0.9469	0.00210	15.7	0.9500	0.00210
17.1	0.9506	0.00220	16.4	0.9497	0.00240	15.8	0.9525	0.00260
17.2	0.9495	0.00190	16.5	0.9574	0.00190	15.9	0.9577	0.00190
17.3	0.9517	0.00230	16.6	0.9616	0.00210	16	0.9625	0.00220
17.4	0.9571	0.00220	16.7	0.9658	0.00240	16.1	0.9668	0.00170
17.5	0.9608	0.00270	16.8	0.9698	0.00210	16.2	0.9687	0.00210
17.6	0.9683	0.00200	16.9	0.9727	0.00270	16.3	0.9738	0.00200
17.7	0.9664	0.00190	17	0.9768	0.00190	16.4	0.9824	0.00200
17.8	0.9733	0.00230	17.1	0.9827	0.00210	16.5	0.9848	0.00190
17.9	0.9762	0.00220	17.2	0.9825	0.00190	16.6	0.9862	0.00230
18	0.9803	0.00220	17.3	0.9866	0.00180	16.7	0.9920	0.00220
18.1	0.9820	0.00210	17.4	0.9878	0.00190	16.8	0.9936	0.00280
18.2	0.9858	0.00200	17.5	0.9931	0.00240	16.9	0.9990	0.00180
18.3	0.9881	0.00230	17.6	1.0003	0.00290	17	1.0000	0.00200
18.4	0.9917	0.00180	17.7	0.9990	0.00200	17.1	1.0047	0.00220
18.5	0.9947	0.00230	17.8	1.0029	0.00190	17.2	1.0108	0.00240
18.6	0.9975	0.00220	17.9	1.0099	0.00170	17.3	1.0130	0.00210
18.7	1.0030	0.00210	18	1.0136	0.00240	17.4	1.0187	0.00210
18.8	1.0080	0.00200	18.1	1.0152	0.00210			
18.9	1.0126	0.00230						
19	1.0147	0.00180						
19.1	1.0136	0.00210						

0.024			0.025			0.026		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.60	0.9166	0.00210	14.40	0.9179	0.00240	14.20	0.9125	0.00200
14.7	0.9260	0.00270	14.5	0.9242	0.00190	14.3	0.9219	0.00200
14.8	0.9265	0.00180	14.6	0.9281	0.00200	14.4	0.9268	0.00230
14.9	0.9315	0.00190	14.7	0.9370	0.00190	14.5	0.9384	0.00270
15	0.9427	0.00220	14.8	0.9377	0.00200	14.6	0.9349	0.00260
15.1	0.9453	0.00190	14.9	0.9459	0.00230	14.7	0.9405	0.00220
15.2	0.9450	0.00190	15	0.9460	0.00230	14.8	0.9506	0.00230
15.3	0.9529	0.00190	15.1	0.9521	0.00250	14.9	0.9553	0.00200
15.4	0.9571	0.00220	15.2	0.9591	0.00190	15	0.9583	0.00190
15.5	0.9625	0.00230	15.3	0.9609	0.00220	15.1	0.9631	0.00250
15.6	0.9641	0.00180	15.4	0.9688	0.00220	15.2	0.9687	0.00230
15.7	0.9697	0.00210	15.5	0.9711	0.00200	15.3	0.9728	0.00240
15.8	0.9743	0.00180	15.6	0.9744	0.00190	15.4	0.9774	0.00240
15.9	0.9801	0.00230	15.7	0.9809	0.00240	15.5	0.9823	0.00210
16	0.9834	0.00200	15.8	0.9839	0.00220	15.6	0.9899	0.00190
16.1	0.9889	0.00220	15.9	0.9883	0.00190	15.7	0.9920	0.00230
16.2	0.9907	0.00230	16	0.9994	0.00210	15.8	0.9962	0.00260
16.3	1.0026	0.00200	16.1	0.9984	0.00240	15.9	0.9991	0.00200
16.4	1.0003	0.00180	16.2	1.0043	0.00220	16	1.0013	0.00220
16.5	1.0047	0.00200	16.3	1.0069	0.00250	16.1	1.0124	0.00270
16.6	1.0052	0.00180	16.4	1.0118	0.00180	16.2	1.0121	0.00220
16.7	1.0119	0.00250	16.5	1.0175	0.00200	16.3	1.0199	0.00250
16.8	1.0215	0.00190	16.6	1.0244	0.00220			

0.028			0.03			0.032		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.90	0.9150	0.00190	13.60	0.9139	0.00220	13.40	0.9161	0.00270
14	0.9176	0.00260	13.7	0.9222	0.00250	13.5	0.9226	0.00220
14.1	0.9297	0.00220	13.8	0.9259	0.00220	13.6	0.9264	0.00220
14.2	0.9357	0.00180	13.9	0.9304	0.00200	13.7	0.9298	0.00300
14.3	0.9407	0.00250	14	0.9355	0.00200	13.8	0.9388	0.00280
14.4	0.9441	0.00260	14.1	0.9396	0.00200	13.9	0.9422	0.00210
14.5	0.9496	0.00210	14.2	0.9473	0.00250	14	0.9484	0.00190
14.6	0.9529	0.00230	14.3	0.9504	0.00210	14.1	0.9521	0.00200
14.7	0.9616	0.00210	14.4	0.9595	0.00220	14.2	0.9586	0.00250
14.8	0.9663	0.00240	14.5	0.9706	0.00260	14.3	0.9678	0.00250
14.9	0.9679	0.00210	14.6	0.9711	0.00180	14.4	0.9775	0.00210
15	0.9735	0.00220	14.7	0.9733	0.00260	14.5	0.9764	0.00250
15.1	0.9783	0.00200	14.8	0.9810	0.00200	14.6	0.9815	0.00220
15.2	0.9853	0.00190	14.9	0.9887	0.00210	14.7	0.9897	0.00220
15.3	0.9898	0.00230	15	0.9916	0.00190	14.8	0.9915	0.00230
15.4	1.0008	0.00220	15.1	0.9962	0.00220	14.9	0.9969	0.00200
15.5	1.0027	0.00210	15.2	0.9979	0.00250	15	1.0053	0.00200
15.6	1.0002	0.00200	15.3	1.0056	0.00280	15.1	1.0088	0.00240
15.7	1.0095	0.00190	15.4	1.0114	0.00210	15.2	1.0140	0.00210
15.8	1.0117	0.00220	15.5	1.0124	0.00200	15.3	1.0201	0.00210
15.9	1.0177	0.00220	15.6	1.0171	0.00200			

0.036			0.04			0.045		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.10	0.9171	0.00230	12.80	0.9159	0.00230	12.50	0.9130	0.00230
13.2	0.9264	0.00240	12.9	0.9245	0.00220	12.55	0.9206	0.00280
13.3	0.9314	0.00180	13	0.9269	0.00200	12.6	0.9245	0.00230
13.4	0.9384	0.00240	13.1	0.9383	0.00210	12.65	0.9250	0.00260
13.5	0.9429	0.00260	13.2	0.9410	0.00290	12.7	0.9290	0.00270
13.6	0.9472	0.00240	13.3	0.9503	0.00190	12.75	0.9334	0.00210
13.7	0.9549	0.00250	13.4	0.9548	0.00220	12.8	0.9337	0.00280
13.8	0.9605	0.00250	13.5	0.9634	0.00240	12.85	0.9398	0.00280
13.9	0.9690	0.00220	13.6	0.9714	0.00210	12.9	0.9433	0.00220
14	0.9741	0.00220	13.7	0.9750	0.00230	12.95	0.9445	0.00260
14.1	0.9758	0.00250	13.8	0.9861	0.00200	13	0.9470	0.00210
14.2	0.9837	0.00200	13.9	0.9848	0.00280	13.05	0.9521	0.00220
14.3	0.9898	0.00210	14	0.9901	0.00220	13.1	0.9553	0.00240
14.4	0.9938	0.00320	14.1	0.9969	0.00240	13.15	0.9587	0.00260
14.5	0.9990	0.00260	14.2	1.0027	0.00270	13.2	0.9604	0.00210
14.6	1.0037	0.00270	14.3	1.0135	0.00270	13.25	0.9626	0.00240
14.7	1.0130	0.00200	14.4	1.0107	0.00230	13.3	0.9660	0.00230
14.8	1.0174	0.00190	14.5	1.0162	0.00230	13.35	0.9696	0.00210
14.9	1.0246	0.00260	14.6	1.0266	0.00240	13.4	0.9748	0.00230
						13.45	0.9787	0.00260
						13.5	0.9743	0.00270
						13.55	0.9838	0.00270
						13.6	0.9848	0.00200
						13.65	0.9894	0.00230
						13.7	0.9879	0.00280
						13.75	0.9909	0.00230
						13.8	1.0012	0.00250
						13.85	0.9981	0.00240
						13.9	1.0030	0.00210
						13.95	1.0123	0.00260
						14	1.0094	0.00250
						14.05	1.0151	0.00310
						14.1	1.0135	0.00230
						14.15	1.0193	0.00230
						14.2	1.0222	0.00290

0.05			0.075			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.30	0.9206	0.00240	11.70	0.9158	0.00270	11.50	0.9135	0.00230
12.35	0.9179	0.00220	11.75	0.9134	0.00230	11.55	0.9251	0.00250
12.4	0.9204	0.00240	11.8	0.9228	0.00330	11.6	0.9273	0.00240
12.45	0.9238	0.00230	11.85	0.9270	0.00210	11.65	0.9318	0.00220
12.5	0.9282	0.00260	11.9	0.9311	0.00240	11.7	0.9332	0.00280
12.55	0.9324	0.00210	11.95	0.9350	0.00240	11.75	0.9367	0.00240
12.6	0.9316	0.00250	12	0.9358	0.00300	11.8	0.9472	0.00210
12.65	0.9399	0.00220	12.05	0.9405	0.00300	11.85	0.9466	0.00230
12.7	0.9376	0.00250	12.1	0.9433	0.00210	11.9	0.9463	0.00270
12.75	0.9485	0.00230	12.15	0.9467	0.00260	11.95	0.9543	0.00250
12.8	0.9492	0.00230	12.2	0.9479	0.00210	12	0.9579	0.00250
12.85	0.9549	0.00220	12.25	0.9592	0.00250	12.05	0.9601	0.00270
12.9	0.9568	0.00220	12.3	0.9555	0.00220	12.1	0.9643	0.00240
12.95	0.9634	0.00240	12.35	0.9626	0.00270	12.15	0.9694	0.00270
13	0.9606	0.00230	12.4	0.9632	0.00280	12.2	0.9708	0.00220
13.05	0.9674	0.00250	12.45	0.9722	0.00240	12.25	0.9694	0.00210
13.1	0.9693	0.00210	12.5	0.9704	0.00260	12.3	0.9814	0.00260
13.15	0.9668	0.00300	12.55	0.9821	0.00340	12.35	0.9821	0.00260
13.2	0.9746	0.00280	12.6	0.9826	0.00240	12.4	0.9916	0.00260
13.25	0.9807	0.00220	12.65	0.9851	0.00220	12.45	0.9875	0.00220
13.3	0.9826	0.00190	12.7	0.9862	0.00240	12.5	0.9902	0.00250
13.35	0.9854	0.00210	12.75	0.9871	0.00300	12.55	1.0011	0.00320
13.4	0.9920	0.00230	12.8	0.9958	0.00270	12.6	1.0047	0.00270
13.45	0.9936	0.00220	12.85	0.9967	0.00210	12.65	1.0065	0.00230
13.5	0.9914	0.00240	12.9	1.0011	0.00210	12.7	1.0083	0.00270
13.55	1.0006	0.00220	12.95	1.0078	0.00290	12.75	1.0107	0.00310
13.6	1.0026	0.00220	13	1.0066	0.00280	12.8	1.0181	0.00260
13.65	1.0021	0.00250	13.05	1.0081	0.00230	12.85	1.0209	0.00250
13.7	1.0067	0.00320	13.1	1.0163	0.00230	12.9	1.0244	0.00320
13.75	1.0108	0.00240	13.15	1.0189	0.00240			
13.8	1.0137	0.00220	13.2	1.0172	0.00340			
13.85	1.0145	0.00190						
13.9	1.0203	0.00230						

0.15			0.2			0.35		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.20	0.9162	0.00230	11.10	0.9147	0.00270	10.90	0.9217	0.00240
11.25	0.9197	0.00270	11.15	0.9227	0.00210	10.95	0.9284	0.00300
11.3	0.9187	0.00260	11.2	0.9260	0.00220	11	0.9299	0.00280
11.35	0.9310	0.00220	11.25	0.9333	0.00240	11.05	0.9359	0.00280
11.4	0.9315	0.00240	11.3	0.9373	0.00240	11.1	0.9412	0.00320
11.45	0.9399	0.00240	11.35	0.9390	0.00240	11.15	0.9451	0.00260
11.5	0.9363	0.00230	11.4	0.9422	0.00220	11.2	0.9471	0.00250
11.55	0.9414	0.00260	11.45	0.9482	0.00240	11.25	0.9492	0.00220
11.6	0.9505	0.00240	11.5	0.9504	0.00280	11.3	0.9522	0.00210
11.65	0.9512	0.00230	11.55	0.9525	0.00240	11.35	0.9538	0.00230
11.7	0.9542	0.00250	11.6	0.9601	0.00310	11.4	0.9624	0.00220
11.75	0.9605	0.00260	11.65	0.9638	0.00220	11.45	0.9646	0.00210
11.8	0.9653	0.00270	11.7	0.9636	0.00250	11.5	0.9723	0.00300
11.85	0.9695	0.00280	11.75	0.9737	0.00260	11.55	0.9739	0.00270
11.9	0.9702	0.00260	11.8	0.9711	0.00250	11.6	0.9766	0.00230
11.95	0.9746	0.00230	11.85	0.9734	0.00260	11.65	0.9809	0.00230
12	0.9735	0.00250	11.9	0.9786	0.00220	11.7	0.9812	0.00230
12.05	0.9760	0.00240	11.95	0.9841	0.00270	11.75	0.9887	0.00240
12.1	0.9864	0.00260	12	0.9875	0.00250	11.8	0.9875	0.00270
12.15	0.9879	0.00250	12.05	0.9918	0.00240	11.85	0.9958	0.00210
12.2	1.0012	0.00310	12.1	0.9948	0.00240	11.9	1.0037	0.00250
12.25	0.9965	0.00360	12.15	0.9969	0.00230	11.95	1.0046	0.00280
12.3	0.9986	0.00260	12.2	1.0057	0.00270	12	1.0098	0.00250
12.35	1.0049	0.00260	12.25	1.0086	0.00270	12.05	1.0129	0.00230
12.4	1.0055	0.00210	12.3	1.0129	0.00240	12.1	1.0163	0.00250
12.45	1.0130	0.00230	12.35	1.0137	0.00230	12.15	1.0184	0.00280
12.5	1.0135	0.00210	12.4	1.0190	0.00240	12.2	1.0230	0.00230
12.55	1.0208	0.00250	12.45	1.0157	0.00260	12.25	1.0233	0.00230
12.6	1.0239	0.00300	12.5	1.0229	0.00260	12.3	1.0300	0.00290

0.5			0.75			1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.70	0.9209	0.00220	10.40	0.9198	0.00200	10.10	0.9178	0.00250
10.75	0.9284	0.00240	10.45	0.9232	0.00250	10.15	0.9121	0.00220
10.8	0.9315	0.00310	10.5	0.9283	0.00250	10.2	0.9262	0.00260
10.85	0.9316	0.00260	10.55	0.9325	0.00210	10.25	0.9286	0.00260
10.9	0.9355	0.00280	10.6	0.9394	0.00290	10.3	0.9348	0.00230
10.95	0.9406	0.00240	10.65	0.9398	0.00240	10.35	0.9325	0.00200
11	0.9449	0.00270	10.7	0.9447	0.00210	10.4	0.9391	0.00220
11.05	0.9484	0.00300	10.75	0.9529	0.00220	10.45	0.9485	0.00240
11.1	0.9539	0.00290	10.8	0.9568	0.00260	10.5	0.9486	0.00230
11.15	0.9557	0.00270	10.85	0.9542	0.00240	10.55	0.9589	0.00200
11.2	0.9612	0.00210	10.9	0.9605	0.00240	10.6	0.9627	0.00260
11.25	0.9620	0.00270	10.95	0.9660	0.00230	10.65	0.9661	0.00250
11.3	0.9727	0.00230	11	0.9739	0.00210	10.7	0.9684	0.00230
11.35	0.9766	0.00280	11.05	0.9770	0.00280	10.75	0.9707	0.00240
11.4	0.9810	0.00220	11.1	0.9760	0.00210	10.8	0.9799	0.00220
11.45	0.9816	0.00240	11.15	0.9844	0.00200	10.85	0.9793	0.00220
11.5	0.9834	0.00240	11.2	0.9831	0.00240	10.9	0.9801	0.00200
11.55	0.9888	0.00230	11.25	0.9888	0.00250	10.95	0.9902	0.00250
11.6	0.9924	0.00210	11.3	0.9951	0.00250	11	0.9955	0.00230
11.65	0.9951	0.00220	11.35	1.0015	0.00230	11.05	0.9977	0.00210
11.7	0.9980	0.00260	11.4	1.0012	0.00250	11.1	1.0007	0.00270
11.75	1.0019	0.00320	11.45	1.0028	0.00230	11.15	1.0011	0.00230
11.8	1.0044	0.00250	11.5	1.0087	0.00240	11.2	1.0091	0.00210
11.85	1.0104	0.00250	11.55	1.0123	0.00230	11.25	1.0154	0.00220
11.9	1.0090	0.00260	11.6	1.0194	0.00230	11.3	1.0146	0.00240
11.95	1.0210	0.00220	11.65	1.0178	0.00210	11.35	1.0199	0.00230
12	1.0260	0.00220	11.7	1.0237	0.00300	11.4	1.0262	0.00240
12.05	1.0279	0.00230						
12.1	1.0328	0.00210						

1.5			2			2.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.70	0.9254	0.00230	9.20	0.9147	0.00250	8.90	0.9192	0.00230
9.75	0.9276	0.00210	9.25	0.9209	0.00200	8.95	0.9277	0.00190
9.8	0.9316	0.00220	9.3	0.9233	0.00280	9	0.9298	0.00230
9.85	0.9390	0.00250	9.35	0.9335	0.00230	9.05	0.9366	0.00210
9.9	0.9450	0.00270	9.4	0.9292	0.00210	9.1	0.9443	0.00240
9.95	0.9491	0.00220	9.45	0.9362	0.00220	9.15	0.9462	0.00350
10	0.9505	0.00210	9.5	0.9431	0.00210	9.2	0.9531	0.00210
10.05	0.9548	0.00230	9.55	0.9459	0.00340	9.25	0.9539	0.00200
10.1	0.9584	0.00240	9.6	0.9551	0.00210	9.3	0.9595	0.00220
10.15	0.9634	0.00230	9.65	0.9567	0.00300	9.35	0.9662	0.00240
10.2	0.9724	0.00270	9.7	0.9616	0.00220	9.4	0.9710	0.00220
10.25	0.9712	0.00210	9.75	0.9648	0.00220	9.45	0.9713	0.00230
10.3	0.9756	0.00230	9.8	0.9655	0.00280	9.5	0.9799	0.00250
10.35	0.9852	0.00200	9.85	0.9764	0.00220	9.55	0.9855	0.00270
10.4	0.9840	0.00210	9.9	0.9791	0.00200	9.6	0.9867	0.00260
10.45	0.9901	0.00260	9.95	0.9842	0.00270	9.65	0.9943	0.00250
10.5	0.9931	0.00240	10	0.9924	0.00280	9.7	0.9979	0.00290
10.55	0.9982	0.00220	10.05	0.9925	0.00230	9.75	1.0024	0.00220
10.6	1.0009	0.00220	10.1	1.0022	0.00240	9.8	1.0076	0.00260
10.65	1.0052	0.00260	10.15	1.0066	0.00210	9.85	1.0120	0.00260
10.7	1.0083	0.00240	10.2	1.0061	0.00280	9.9	1.0165	0.00210
10.75	1.0151	0.00250	10.25	1.0122	0.00280	9.95	1.0232	0.00230
10.8	1.0241	0.00270	10.3	1.0226	0.00250	10	1.0280	0.00270
10.85	1.0234	0.00210	10.35	1.0205	0.00250			
10.9	1.0273	0.00260	10.4	1.0254	0.00310			

3			4			5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.60	0.9210	0.00230	8.00	0.9176	0.00200	7.50	0.9206	0.00180
8.65	0.9307	0.00260	8.05	0.9251	0.00290	7.55	0.9244	0.00200
8.7	0.9331	0.00210	8.1	0.9335	0.00220	7.6	0.9282	0.00220
8.75	0.9390	0.00230	8.15	0.9374	0.00200	7.65	0.9350	0.00230
8.8	0.9454	0.00210	8.2	0.9408	0.00260	7.7	0.9418	0.00210
8.85	0.9496	0.00200	8.25	0.9475	0.00190	7.75	0.9458	0.00230
8.9	0.9552	0.00230	8.3	0.9531	0.00340	7.8	0.9575	0.00240
8.95	0.9611	0.00240	8.35	0.9601	0.00230	7.85	0.9581	0.00260
9	0.9612	0.00230	8.4	0.9692	0.00240	7.9	0.9670	0.00200
9.05	0.9687	0.00270	8.45	0.9753	0.00220	7.95	0.9715	0.00240
9.1	0.9735	0.00240	8.5	0.9739	0.00240	8	0.9775	0.00200
9.15	0.9802	0.00240	8.55	0.9821	0.00250	8.05	0.9822	0.00230
9.2	0.9867	0.00230	8.6	0.9849	0.00220	8.1	0.9908	0.00240
9.25	0.9886	0.00200	8.65	0.9890	0.00230	8.15	0.9972	0.00240
9.3	0.9989	0.00230	8.7	0.9970	0.00300	8.2	1.0030	0.00290
9.35	1.0044	0.00340	8.75	1.0000	0.00210	8.25	1.0026	0.00230
9.4	1.0091	0.00230	8.8	1.0076	0.00200	8.3	1.0106	0.00210
9.45	1.0093	0.00240	8.85	1.0143	0.00200	8.35	1.0170	0.00200
9.5	1.0082	0.00230	8.9	1.0183	0.00210	8.4	1.0229	0.00190
9.55	1.0245	0.00190	8.95	1.0222	0.00250	8.45	1.0307	0.00210
9.6	1.0239	0.00300	9	1.0310	0.00230	8.5	1.0303	0.00220
9.65	1.0291	0.00290						
9.7	1.0323	0.00230						

6			7			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.10	0.9235	0.00260	6.70	0.9184	0.00250	6.50	0.9201	0.00200
7.15	0.9298	0.00200	6.75	0.9295	0.00200	6.55	0.9274	0.00230
7.2	0.9331	0.00210	6.8	0.9339	0.00190	6.6	0.9312	0.00200
7.25	0.9429	0.00180	6.85	0.9422	0.00220	6.65	0.9397	0.00250
7.3	0.9464	0.00310	6.9	0.9498	0.00190	6.7	0.9458	0.00220
7.35	0.9549	0.00210	6.95	0.9546	0.00280	6.75	0.9541	0.00200
7.4	0.9597	0.00220	7	0.9624	0.00220	6.8	0.9584	0.00180
7.45	0.9656	0.00190	7.05	0.9673	0.00190	6.85	0.9679	0.00260
7.5	0.9761	0.00190	7.1	0.9736	0.00200	6.9	0.9761	0.00190
7.55	0.9809	0.00210	7.15	0.9792	0.00180	6.95	0.9811	0.00230
7.6	0.9807	0.00250	7.2	0.9850	0.00200	7	0.9860	0.00200
7.65	0.9916	0.00220	7.25	0.9921	0.00200	7.05	0.9941	0.00240
7.7	1.0021	0.00220	7.3	1.0023	0.00270	7.1	1.0008	0.00250
7.75	1.0031	0.00190	7.35	1.0080	0.00220	7.15	1.0076	0.00220
7.8	1.0127	0.00260	7.4	1.0138	0.00210	7.2	1.0126	0.00190
7.85	1.0168	0.00230	7.45	1.0182	0.00210	7.25	1.0218	0.00230
7.9	1.0218	0.00200	7.5	1.0258	0.00230	7.3	1.0269	0.00220
7.95	1.0284	0.00200						
8	1.0309	0.00200						

8			9			10		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.30	0.9161	0.00210	6.00	0.9191	0.00200	5.70	0.9221	0.00170
6.35	0.9227	0.00180	6.05	0.9240	0.00240	5.75	0.9272	0.00220
6.4	0.9287	0.00210	6.1	0.9323	0.00200	5.8	0.9353	0.00220
6.45	0.9345	0.00180	6.15	0.9466	0.00210	5.85	0.9420	0.00210
6.5	0.9464	0.00210	6.2	0.9514	0.00190	5.9	0.9509	0.00220
6.55	0.9498	0.00190	6.25	0.9569	0.00180	5.95	0.9618	0.00160
6.6	0.9603	0.00170	6.3	0.9664	0.00220	6	0.9673	0.00250
6.65	0.9684	0.00290	6.35	0.9696	0.00210	6.05	0.9717	0.00230
6.7	0.9717	0.00200	6.4	0.9773	0.00220	6.1	0.9792	0.00220
6.75	0.9774	0.00250	6.45	0.9811	0.00190	6.15	0.9853	0.00220
6.8	0.9876	0.00200	6.5	0.9929	0.00250	6.2	0.9950	0.00240
6.85	0.9931	0.00210	6.55	0.9983	0.00200	6.25	1.0003	0.00220
6.9	1.0004	0.00270	6.6	1.0084	0.00180	6.3	1.0094	0.00200
6.95	1.0041	0.00240	6.65	1.0137	0.00200	6.35	1.0175	0.00220
7	1.0085	0.00200	6.7	1.0201	0.00210	6.4	1.0306	0.00220
7.05	1.0139	0.00240	6.75	1.0285	0.00210			
7.1	1.0252	0.00220	6.8	1.0340	0.00230			

	15			19.6	
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.40	0.9131	0.00180	3.50	0.9029	0.00170
4.45	0.9234	0.00170	3.55	0.9176	0.00200
4.5	0.9321	0.00170	3.6	0.9247	0.00160
4.55	0.9389	0.00200	3.65	0.9396	0.00190
4.6	0.9511	0.00170	3.7	0.9455	0.00220
4.65	0.9595	0.00210	3.75	0.9633	0.00190
4.7	0.9723	0.00190	3.8	0.9711	0.00210
4.75	0.9794	0.00180	3.85	0.9807	0.00190
4.8	0.9848	0.00200	3.9	0.9912	0.00180
4.85	0.9940	0.00200	3.95	1.0075	0.00190
4.9	1.0056	0.00220	4	1.0165	0.00180
4.95	1.0158	0.00260	4.05	1.0264	0.00180
5	1.0239	0.00230	4.1	1.0347	0.00220

Case ID: pu_sph_100_01ref

Material: Plutonium

Geometry: Sphere

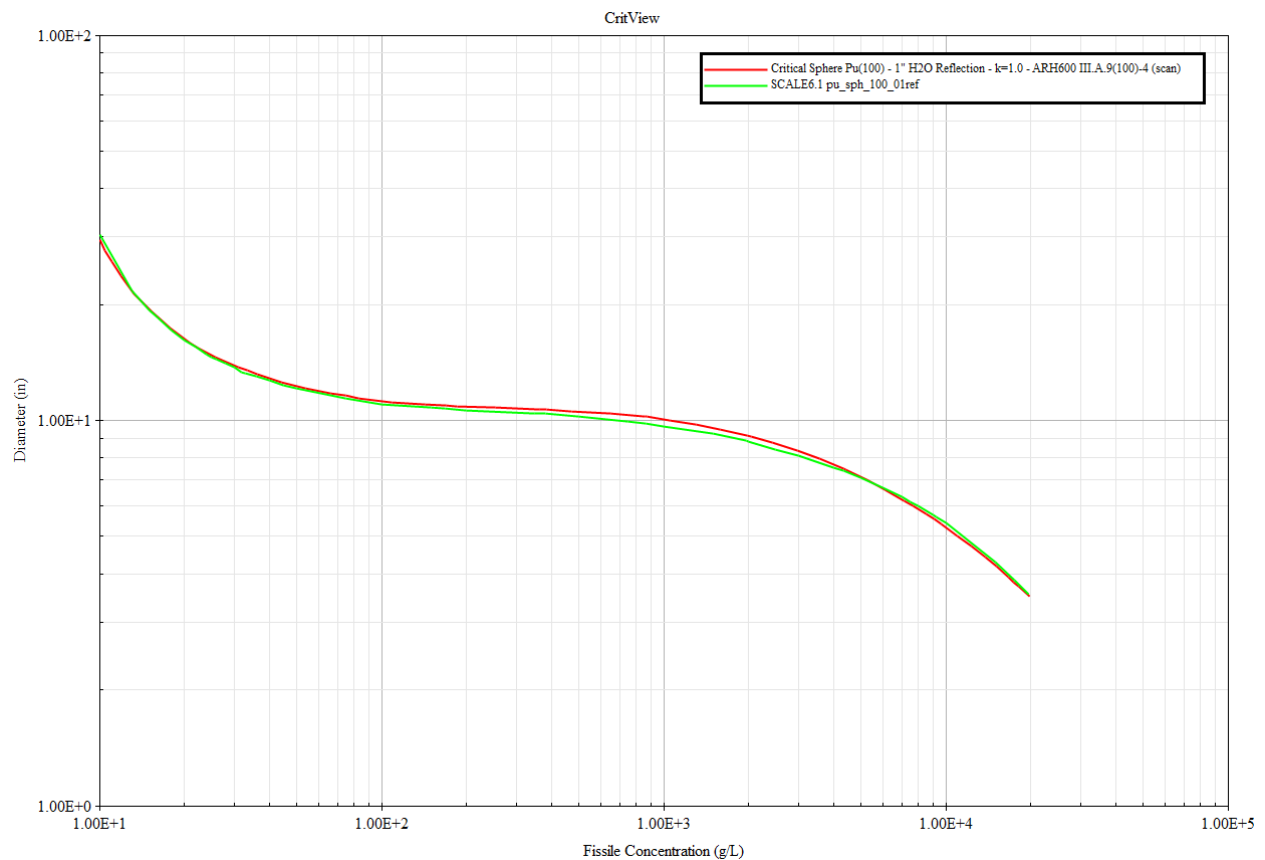
Isotopics: 100% ^{239}Pu

Reflector: 1" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	23.500	31.700	0.400	30.3138
0.013	18.300	22.500	0.200	21.7475
0.015	16.500	19.900	0.100	19.3132
0.018	14.800	17.600	0.100	17.1412
0.020	14.100	16.600	0.100	16.1386
0.022	13.600	15.800	0.100	15.4813
0.024	13.100	15.300	0.100	14.8487
0.025	12.900	15.000	0.100	14.6169
0.026	12.700	14.800	0.100	14.3933
0.028	12.400	14.400	0.100	14.1067
0.030	12.200	14.100	0.100	13.7242
0.032	12.000	13.800	0.100	13.3615
0.036	11.600	13.300	0.050	13.0313
0.040	11.300	13.000	0.050	12.6786
0.045	11.100	12.700	0.050	12.3520
0.050	10.800	12.400	0.050	12.0885
0.075	10.200	11.700	0.050	11.4118
0.100	10.000	11.400	0.050	11.0282
0.150	9.700	11.100	0.050	10.7851
0.200	9.600	11.000	0.050	10.6244
0.350	9.400	10.700	0.050	10.4500
0.500	9.200	10.500	0.050	10.2267
0.750	9.000	10.200	0.050	9.9167
1.000	8.700	10.000	0.050	9.6313
1.500	8.300	9.500	0.050	9.2400
2.000	7.900	9.100	0.050	8.7904
2.500	7.600	8.700	0.050	8.4208
3.000	7.300	8.400	0.050	8.1154
4.000	6.800	7.800	0.050	7.5577
5.000	6.400	7.300	0.050	7.0900
6.000	6.100	6.900	0.050	6.6808
7.000	5.700	6.500	0.050	6.3332
7.500	5.600	6.400	0.050	6.1464
8.000	5.400	6.200	0.050	5.9952
9.000	5.100	5.900	0.050	5.6951
10.000	4.900	5.600	0.050	5.4276
15.000	3.900	4.500	0.050	4.2895
19.600	3.200	3.700	0.020	3.5377


```

Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.1.1.1.2-1. Critical Dimensions for 100% 239Pu Sphere - 1 Inch of Water Reflection
,
#index number = <index = 1:38:1>
,
#Concentration = <@conc =
0.01,0.013,0.015,0.018,0.02,0.022,0.024,0.025,0.026,0.028,0.03,0.032,0.036,0.04,0.045,0.05,0.075,
0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4,5,6,7,7.5,8,9,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
23.5,18.3,16.5,14.8,14.1,13.6,13.1,12.9,12.7,12.4,12.2,12,11.6,11.3,11.1,10.8,10.2,10,9.7,9.6,9.4
,9.2,9,8.7,8.3,7.9,7.6,7.3,6.8,6.4,6.1,5.7,5.6,5.4,5.1,4.9,3.9,3.2> in
#Ending Diameter = <@enddia =
31.7,22.5,19.9,17.6,16.6,15.8,15.3,15,14.8,14.4,14.1,13.8,13.3,13,12.7,12.4,11.7,11.4,11.1,11,10.
7,10.5,10.2,10,9.5,9.1,8.7,8.4,7.8,7.3,6.9,6.5,6.4,6.2,5.9,5.6,4.5,3.7> in
#Delta = <@delta =
0.4,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05
,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02> in
,
'Reflector Thickness {{refthick = 1}}
,
'Diameter being Tested = {{diameter = <startdia[index]><enddia[index]><delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
Sphere Reflected
v7-238
read composition
pu          1 den=<critconc> 1 300
                                94239 100
                                94240 0   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
h2o          2 1 300   end
end composition
read parameter
htm=yes
end parameter
read geometry
global unit 1
com="Sphere"
sphere 1      {{(diameter*in)/2}}
sphere 2      {{(refdia*in)/2}}
media 1 1 1
media 2 1 2 -1
boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_sph_100_01ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: sphere
modmat: H2O
critmat: plutonium
isomat: Pu239 1.0
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 30.3138
0.013 21.7475
0.015 19.3132
0.018 17.1412
0.020 16.1386
0.022 15.4813
0.024 14.8487
0.025 14.6169
0.026 14.3933
0.028 14.1067
0.030 13.7242
0.032 13.3615
0.036 13.0313
0.040 12.6786
0.045 12.3520
0.050 12.0885
0.075 11.4118
0.100 11.0282
0.150 10.7851
0.200 10.6244
0.350 10.4500
0.500 10.2267
0.750 9.9167
1.000 9.6313
1.500 9.2400
2.000 8.7904
2.500 8.4208
3.000 8.1154
4.000 7.5577
5.000 7.0900
6.000 6.6808
7.000 6.3332
7.500 6.1464
8.000 5.9952
9.000 5.6951
10.000 5.4276
15.000 4.2895
19.600 3.5377
```

0.01			0.013			0.015		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
23.50	0.9249	0.00170	18.30	0.9210	0.00160	16.50	0.9211	0.00170
23.9	0.9302	0.00150	18.5	0.9270	0.00180	16.6	0.9232	0.00150
24.3	0.9337	0.00150	18.7	0.9311	0.00200	16.7	0.9280	0.00220
24.7	0.9427	0.00140	18.9	0.9388	0.00160	16.8	0.9308	0.00170
25.1	0.9468	0.00150	19.1	0.9422	0.00180	16.9	0.9340	0.00190
25.5	0.9500	0.00130	19.3	0.9504	0.00160	17	0.9340	0.00170
25.9	0.9557	0.00160	19.5	0.9555	0.00160	17.1	0.9418	0.00170
26.3	0.9611	0.00120	19.7	0.9562	0.00200	17.2	0.9429	0.00190
26.7	0.9676	0.00130	19.9	0.9639	0.00160	17.3	0.9485	0.00260
27.1	0.9688	0.00170	20.1	0.9662	0.00150	17.4	0.9490	0.00170
27.5	0.9737	0.00120	20.3	0.9726	0.00170	17.5	0.9528	0.00180
27.9	0.9783	0.00140	20.5	0.9743	0.00190	17.6	0.9572	0.00180
28.3	0.9800	0.00130	20.7	0.9759	0.00180	17.7	0.9576	0.00160
28.7	0.9880	0.00120	20.9	0.9812	0.00170	17.8	0.9559	0.00160
29.1	0.9891	0.00150	21.1	0.9877	0.00180	17.9	0.9630	0.00170
29.5	0.9934	0.00140	21.3	0.9955	0.00210	18	0.9645	0.00240
29.9	0.9985	0.00140	21.5	0.9942	0.00180	18.1	0.9685	0.00190
30.3	0.9998	0.00180	21.7	0.9976	0.00170	18.2	0.9737	0.00170
30.7	1.0056	0.00170	21.9	1.0077	0.00170	18.3	0.9771	0.00250
31.1	1.0067	0.00130	22.1	1.0046	0.00150	18.4	0.9772	0.00180
31.5	1.0110	0.00120	22.3	1.0112	0.00130	18.5	0.9811	0.00180
31.7	1.0156	0.00130	22.5	1.0127	0.00160	18.6	0.9817	0.00200
						18.7	0.9832	0.00180
						18.8	0.9890	0.00160
						18.9	0.9880	0.00190
						19	0.9903	0.00170
						19.1	0.9944	0.00210
						19.2	0.9996	0.00200
						19.3	0.9993	0.00180
						19.4	1.0046	0.00160
						19.5	1.0038	0.00190
						19.6	1.0065	0.00160
						19.7	1.0095	0.00170
						19.8	1.0140	0.00190
						19.9	1.0147	0.00200

0.018			0.02			0.022		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.80	0.9162	0.00200	14.10	0.9142	0.00210	13.60	0.9198	0.00180
14.9	0.9234	0.00230	14.2	0.9209	0.00180	13.7	0.9249	0.00190
15	0.9264	0.00180	14.3	0.9247	0.00190	13.8	0.9295	0.00180
15.1	0.9278	0.00160	14.4	0.9313	0.00230	13.9	0.9331	0.00220
15.2	0.9302	0.00180	14.5	0.9370	0.00190	14	0.9399	0.00210
15.3	0.9357	0.00200	14.6	0.9416	0.00170	14.1	0.9487	0.00180
15.4	0.9412	0.00220	14.7	0.9447	0.00190	14.2	0.9512	0.00190
15.5	0.9461	0.00230	14.8	0.9490	0.00180	14.3	0.9528	0.00260
15.6	0.9489	0.00210	14.9	0.9521	0.00170	14.4	0.9572	0.00200
15.7	0.9517	0.00190	15	0.9581	0.00220	14.5	0.9623	0.00190
15.8	0.9566	0.00280	15.1	0.9586	0.00270	14.6	0.9682	0.00170
15.9	0.9577	0.00170	15.2	0.9629	0.00160	14.7	0.9714	0.00210
16	0.9635	0.00150	15.3	0.9664	0.00210	14.8	0.9722	0.00190
16.1	0.9667	0.00160	15.4	0.9698	0.00200	14.9	0.9767	0.00270
16.2	0.9722	0.00220	15.5	0.9749	0.00180	15	0.9836	0.00180
16.3	0.9744	0.00200	15.6	0.9782	0.00220	15.1	0.9894	0.00210
16.4	0.9752	0.00250	15.7	0.9844	0.00210	15.2	0.9911	0.00190
16.5	0.9791	0.00180	15.8	0.9867	0.00240	15.3	0.9968	0.00240
16.6	0.9841	0.00180	15.9	0.9952	0.00200	15.4	0.9987	0.00180
16.7	0.9858	0.00180	16	0.9932	0.00220	15.5	1.0003	0.00220
16.8	0.9892	0.00190	16.1	0.9973	0.00210	15.6	1.0060	0.00210
16.9	0.9915	0.00180	16.2	1.0043	0.00190	15.7	1.0090	0.00200
17	0.9958	0.00190	16.3	1.0027	0.00220	15.8	1.0132	0.00200
17.1	0.9960	0.00180	16.4	1.0113	0.00240			
17.2	1.0057	0.00190	16.5	1.0115	0.00200			
17.3	1.0036	0.00200	16.6	1.0150	0.00180			
17.4	1.0090	0.00190						
17.5	1.0112	0.00190						
17.6	1.0160	0.00180						

0.024			0.025			0.026		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.10	0.9214	0.00210	12.90	0.9147	0.00230	12.70	0.9152	0.00240
13.2	0.9265	0.00220	13	0.9252	0.00190	12.8	0.9218	0.00220
13.3	0.9321	0.00210	13.1	0.9269	0.00210	12.9	0.9280	0.00200
13.4	0.9317	0.00230	13.2	0.9320	0.00190	13	0.9303	0.00220
13.5	0.9413	0.00210	13.3	0.9399	0.00180	13.1	0.9361	0.00250
13.6	0.9433	0.00210	13.4	0.9435	0.00200	13.2	0.9406	0.00280
13.7	0.9436	0.00200	13.5	0.9472	0.00210	13.3	0.9465	0.00170
13.8	0.9565	0.00260	13.6	0.9502	0.00200	13.4	0.9522	0.00250
13.9	0.9545	0.00200	13.7	0.9565	0.00240	13.5	0.9615	0.00190
14	0.9585	0.00200	13.8	0.9628	0.00240	13.6	0.9601	0.00190
14.1	0.9715	0.00210	13.9	0.9654	0.00240	13.7	0.9647	0.00180
14.2	0.9733	0.00270	14	0.9731	0.00200	13.8	0.9708	0.00190
14.3	0.9817	0.00200	14.1	0.9742	0.00250	13.9	0.9782	0.00210
14.4	0.9781	0.00220	14.2	0.9814	0.00210	14	0.9797	0.00220
14.5	0.9826	0.00240	14.3	0.9896	0.00190	14.1	0.9902	0.00210
14.6	0.9889	0.00200	14.4	0.9920	0.00290	14.2	0.9915	0.00220
14.7	0.9898	0.00170	14.5	0.9906	0.00200	14.3	0.9958	0.00200
14.8	0.9962	0.00230	14.6	0.9990	0.00250	14.4	1.0003	0.00240
14.9	1.0040	0.00200	14.7	1.0049	0.00240	14.5	1.0045	0.00200
15	1.0067	0.00180	14.8	1.0072	0.00230	14.6	1.0083	0.00190
15.1	1.0122	0.00220	14.9	1.0111	0.00190	14.7	1.0150	0.00230
15.2	1.0144	0.00180	15	1.0163	0.00170	14.8	1.0213	0.00190
15.3	1.0188	0.00190						

0.028			0.03			0.032		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.40	0.9193	0.00200	12.20	0.9185	0.00200	12.00	0.9230	0.00290
12.5	0.9191	0.00180	12.3	0.9271	0.00190	12.1	0.9282	0.00200
12.6	0.9269	0.00200	12.4	0.9316	0.00290	12.2	0.9330	0.00240
12.7	0.9321	0.00210	12.5	0.9334	0.00220	12.3	0.9389	0.00200
12.8	0.9375	0.00200	12.6	0.9385	0.00240	12.4	0.9485	0.00200
12.9	0.9418	0.00210	12.7	0.9471	0.00220	12.5	0.9505	0.00210
13	0.9476	0.00190	12.8	0.9498	0.00210	12.6	0.9604	0.00230
13.1	0.9520	0.00210	12.9	0.9581	0.00180	12.7	0.9611	0.00220
13.2	0.9563	0.00220	13	0.9643	0.00250	12.8	0.9676	0.00200
13.3	0.9620	0.00210	13.1	0.9709	0.00200	12.9	0.9709	0.00170
13.4	0.9634	0.00180	13.2	0.9744	0.00230	13	0.9755	0.00200
13.5	0.9710	0.00210	13.3	0.9796	0.00210	13.1	0.9818	0.00210
13.6	0.9798	0.00220	13.4	0.9881	0.00200	13.2	0.9860	0.00230
13.7	0.9854	0.00220	13.5	0.9931	0.00200	13.3	0.9960	0.00210
13.8	0.9943	0.00170	13.6	0.9963	0.00200	13.4	1.0025	0.00220
13.9	0.9931	0.00300	13.7	0.9985	0.00260	13.5	1.0046	0.00260
14	0.9969	0.00200	13.8	1.0047	0.00230	13.6	1.0067	0.00250
14.1	0.9994	0.00220	13.9	1.0099	0.00230	13.7	1.0005	0.00280
14.2	1.0083	0.00180	14	1.0208	0.00220	13.8	1.0215	0.00230
14.3	1.0084	0.00210	14.1	1.0208	0.00190			
14.4	1.0177	0.00210						

0.036			0.04			0.045		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.60	0.9194	0.00220	11.30	0.9151	0.00240	11.10	0.9227	0.00210
11.65	0.9194	0.00250	11.35	0.9196	0.00220	11.15	0.9262	0.00200
11.7	0.9237	0.00240	11.4	0.9268	0.00210	11.2	0.9263	0.00200
11.75	0.9279	0.00240	11.45	0.9244	0.00240	11.25	0.9297	0.00220
11.8	0.9305	0.00240	11.5	0.9299	0.00260	11.3	0.9353	0.00220
11.85	0.9375	0.00220	11.55	0.9321	0.00260	11.35	0.9386	0.00240
11.9	0.9332	0.00280	11.6	0.9343	0.00300	11.4	0.9400	0.00200
11.95	0.9382	0.00240	11.65	0.9420	0.00230	11.45	0.9417	0.00220
12	0.9432	0.00230	11.7	0.9443	0.00220	11.5	0.9463	0.00200
12.05	0.9434	0.00220	11.75	0.9450	0.00260	11.55	0.9484	0.00220
12.1	0.9494	0.00250	11.8	0.9463	0.00260	11.6	0.9531	0.00230
12.15	0.9472	0.00230	11.85	0.9489	0.00260	11.65	0.9535	0.00280
12.2	0.9559	0.00260	11.9	0.9571	0.00210	11.7	0.9626	0.00230
12.25	0.9579	0.00200	11.95	0.9597	0.00250	11.75	0.9650	0.00210
12.3	0.9587	0.00240	12	0.9604	0.00190	11.8	0.9688	0.00230
12.35	0.9640	0.00220	12.05	0.9609	0.00240	11.85	0.9707	0.00230
12.4	0.9668	0.00210	12.1	0.9649	0.00220	11.9	0.9723	0.00280
12.45	0.9693	0.00230	12.15	0.9650	0.00320	11.95	0.9770	0.00210
12.5	0.9750	0.00240	12.2	0.9771	0.00200	12	0.9783	0.00210
12.55	0.9793	0.00200	12.25	0.9768	0.00250	12.05	0.9813	0.00200
12.6	0.9764	0.00220	12.3	0.9812	0.00240	12.1	0.9848	0.00240
12.65	0.9804	0.00240	12.35	0.9820	0.00220	12.15	0.9899	0.00210
12.7	0.9869	0.00210	12.4	0.9851	0.00240	12.2	0.9954	0.00230
12.75	0.9860	0.00230	12.45	0.9851	0.00240	12.25	0.9985	0.00260
12.8	0.9905	0.00240	12.5	0.9926	0.00220	12.3	0.9991	0.00240
12.85	0.9913	0.00240	12.55	0.9937	0.00210	12.35	0.9997	0.00210
12.9	0.9975	0.00200	12.6	0.9970	0.00220	12.4	1.0072	0.00250
12.95	0.9991	0.00220	12.65	0.9952	0.00210	12.45	1.0096	0.00260
13	1.0005	0.00230	12.7	1.0036	0.00240	12.5	1.0113	0.00300
13.05	0.9997	0.00200	12.75	1.0061	0.00240	12.55	1.0098	0.00280
13.1	1.0070	0.00180	12.8	1.0088	0.00220	12.6	1.0163	0.00190
13.15	1.0089	0.00220	12.85	1.0089	0.00220	12.65	1.0211	0.00250
13.2	1.0150	0.00220	12.9	1.0127	0.00250	12.7	1.0230	0.00220
13.25	1.0124	0.00210	12.95	1.0163	0.00220			
13.3	1.0156	0.00270	13	1.0200	0.00270			

0.05			0.075			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.80	0.9168	0.00220	10.20	0.9147	0.00270	10.00	0.9207	0.00230
10.85	0.9166	0.00220	10.25	0.9165	0.00220	10.05	0.9187	0.00250
10.9	0.9229	0.00230	10.3	0.9176	0.00270	10.1	0.9321	0.00260
10.95	0.9267	0.00220	10.35	0.9242	0.00250	10.15	0.9306	0.00230
11	0.9277	0.00230	10.4	0.9351	0.00240	10.2	0.9393	0.00210
11.05	0.9343	0.00200	10.45	0.9328	0.00220	10.25	0.9367	0.00220
11.1	0.9365	0.00260	10.5	0.9379	0.00250	10.3	0.9429	0.00260
11.15	0.9395	0.00210	10.55	0.9425	0.00280	10.35	0.9509	0.00220
11.2	0.9431	0.00200	10.6	0.9447	0.00280	10.4	0.9483	0.00270
11.25	0.9418	0.00240	10.65	0.9493	0.00330	10.45	0.9563	0.00250
11.3	0.9539	0.00260	10.7	0.9508	0.00240	10.5	0.9582	0.00270
11.35	0.9512	0.00210	10.75	0.9503	0.00280	10.55	0.9637	0.00220
11.4	0.9568	0.00200	10.8	0.9587	0.00270	10.6	0.9679	0.00210
11.45	0.9595	0.00260	10.85	0.9622	0.00210	10.65	0.9691	0.00210
11.5	0.9588	0.00230	10.9	0.9642	0.00230	10.7	0.9751	0.00210
11.55	0.9690	0.00250	10.95	0.9716	0.00210	10.75	0.9793	0.00270
11.6	0.9668	0.00200	11	0.9773	0.00260	10.8	0.9778	0.00210
11.65	0.9719	0.00220	11.05	0.9752	0.00230	10.85	0.9878	0.00280
11.7	0.9750	0.00280	11.1	0.9782	0.00270	10.9	0.9869	0.00280
11.75	0.9803	0.00230	11.15	0.9872	0.00280	10.95	0.9877	0.00240
11.8	0.9868	0.00230	11.2	0.9886	0.00230	11	0.9952	0.00240
11.85	0.9858	0.00240	11.25	0.9880	0.00220	11.05	1.0037	0.00210
11.9	0.9896	0.00210	11.3	0.9968	0.00250	11.1	1.0052	0.00260
11.95	0.9898	0.00220	11.35	0.9971	0.00250	11.15	1.0068	0.00260
12	0.9970	0.00230	11.4	0.9976	0.00220	11.2	1.0066	0.00220
12.05	0.9953	0.00210	11.45	1.0078	0.00230	11.25	1.0103	0.00270
12.1	1.0014	0.00280	11.5	1.0130	0.00230	11.3	1.0160	0.00320
12.15	1.0047	0.00240	11.55	1.0074	0.00230	11.35	1.0236	0.00280
12.2	1.0050	0.00250	11.6	1.0176	0.00240	11.4	1.0231	0.00250
12.25	1.0101	0.00230	11.65	1.0174	0.00260			
12.3	1.0117	0.00190	11.7	1.0194	0.00220			
12.35	1.0161	0.00220						
12.4	1.0231	0.00220						

0.15			0.2			0.35		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.70	0.9164	0.00240	9.60	0.9213	0.00240	9.40	0.9212	0.00210
9.75	0.9169	0.00270	9.65	0.9225	0.00230	9.45	0.9196	0.00240
9.8	0.9228	0.00250	9.7	0.9286	0.00250	9.5	0.9318	0.00260
9.85	0.9290	0.00240	9.75	0.9314	0.00270	9.55	0.9353	0.00220
9.9	0.9335	0.00250	9.8	0.9388	0.00250	9.6	0.9402	0.00250
9.95	0.9352	0.00220	9.85	0.9411	0.00240	9.65	0.9456	0.00220
10	0.9417	0.00220	9.9	0.9463	0.00260	9.7	0.9448	0.00210
10.05	0.9428	0.00240	9.95	0.9478	0.00250	9.75	0.9473	0.00220
10.1	0.9473	0.00280	10	0.9513	0.00270	9.8	0.9547	0.00240
10.15	0.9517	0.00260	10.05	0.9558	0.00220	9.85	0.9560	0.00220
10.2	0.9614	0.00240	10.1	0.9629	0.00220	9.9	0.9630	0.00220
10.25	0.9596	0.00220	10.15	0.9595	0.00240	9.95	0.9629	0.00230
10.3	0.9620	0.00230	10.2	0.9642	0.00270	10	0.9683	0.00260
10.35	0.9655	0.00220	10.25	0.9700	0.00310	10.05	0.9741	0.00240
10.4	0.9674	0.00260	10.3	0.9754	0.00240	10.1	0.9790	0.00240
10.45	0.9736	0.00210	10.35	0.9788	0.00230	10.15	0.9842	0.00220
10.5	0.9791	0.00260	10.4	0.9835	0.00260	10.2	0.9861	0.00250
10.55	0.9826	0.00240	10.45	0.9822	0.00250	10.25	0.9908	0.00230
10.6	0.9841	0.00270	10.5	0.9895	0.00260	10.3	0.9939	0.00260
10.65	0.9915	0.00240	10.55	0.9964	0.00250	10.35	0.9947	0.00270
10.7	0.9921	0.00240	10.6	0.9979	0.00220	10.4	1.0003	0.00260
10.75	0.9967	0.00270	10.65	1.0022	0.00260	10.45	1.0000	0.00210
10.8	1.0014	0.00250	10.7	1.0032	0.00260	10.5	1.0097	0.00220
10.85	1.0044	0.00260	10.75	1.0100	0.00260	10.55	1.0116	0.00240
10.9	1.0069	0.00250	10.8	1.0075	0.00220	10.6	1.0102	0.00250
10.95	1.0089	0.00230	10.85	1.0103	0.00230	10.65	1.0223	0.00240
11	1.0122	0.00220	10.9	1.0166	0.00240	10.7	1.0220	0.00240
11.05	1.0175	0.00210	10.95	1.0223	0.00250			
11.1	1.0199	0.00270	11	1.0262	0.00310			

0.5			0.75			1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.20	0.9177	0.00220	9.00	0.9221	0.00210	8.70	0.9170	0.00240
9.25	0.9195	0.00260	9.05	0.9222	0.00240	8.75	0.9204	0.00210
9.3	0.9272	0.00250	9.1	0.9269	0.00250	8.8	0.9238	0.00240
9.35	0.9392	0.00250	9.15	0.9347	0.00190	8.85	0.9292	0.00270
9.4	0.9377	0.00300	9.2	0.9414	0.00220	8.9	0.9328	0.00290
9.45	0.9382	0.00290	9.25	0.9409	0.00280	8.95	0.9424	0.00210
9.5	0.9456	0.00230	9.3	0.9476	0.00210	9	0.9447	0.00220
9.55	0.9453	0.00220	9.35	0.9509	0.00220	9.05	0.9484	0.00260
9.6	0.9520	0.00240	9.4	0.9598	0.00220	9.1	0.9548	0.00220
9.65	0.9535	0.00220	9.45	0.9592	0.00370	9.15	0.9590	0.00220
9.7	0.9615	0.00240	9.5	0.9651	0.00230	9.2	0.9612	0.00240
9.75	0.9679	0.00250	9.55	0.9703	0.00230	9.25	0.9657	0.00240
9.8	0.9704	0.00250	9.6	0.9743	0.00210	9.3	0.9728	0.00240
9.85	0.9787	0.00240	9.65	0.9746	0.00220	9.35	0.9753	0.00290
9.9	0.9761	0.00290	9.7	0.9826	0.00260	9.4	0.9774	0.00230
9.95	0.9787	0.00220	9.75	0.9840	0.00260	9.45	0.9826	0.00220
10	0.9817	0.00230	9.8	0.9860	0.00340	9.5	0.9864	0.00260
10.05	0.9891	0.00230	9.85	0.9961	0.00230	9.55	0.9910	0.00200
10.1	0.9897	0.00220	9.9	0.9980	0.00260	9.6	0.9943	0.00230
10.15	0.9981	0.00260	9.95	1.0040	0.00250	9.65	1.0034	0.00210
10.2	0.9977	0.00240	10	1.0072	0.00250	9.7	1.0041	0.00310
10.25	1.0020	0.00220	10.05	1.0062	0.00280	9.75	1.0089	0.00240
10.3	1.0077	0.00220	10.1	1.0157	0.00240	9.8	1.0074	0.00270
10.35	1.0078	0.00260	10.15	1.0142	0.00250	9.85	1.0147	0.00250
10.4	1.0146	0.00220	10.2	1.0213	0.00230	9.9	1.0175	0.00210
10.45	1.0164	0.00220				9.95	1.0256	0.00280
10.5	1.0221	0.00210				10	1.0289	0.00230

1.5			2			2.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.30	0.9208	0.00230	7.90	0.9122	0.00230	7.60	0.9180	0.00190
8.35	0.9247	0.00220	7.95	0.9198	0.00190	7.65	0.9238	0.00210
8.4	0.9280	0.00200	8	0.9219	0.00190	7.7	0.9267	0.00190
8.45	0.9333	0.00210	8.05	0.9331	0.00240	7.75	0.9342	0.00220
8.5	0.9390	0.00190	8.1	0.9334	0.00210	7.8	0.9395	0.00230
8.55	0.9397	0.00210	8.15	0.9398	0.00210	7.85	0.9382	0.00250
8.6	0.9429	0.00210	8.2	0.9419	0.00230	7.9	0.9449	0.00260
8.65	0.9501	0.00230	8.25	0.9461	0.00200	7.95	0.9536	0.00240
8.7	0.9544	0.00230	8.3	0.9485	0.00260	8	0.9561	0.00250
8.75	0.9572	0.00210	8.35	0.9596	0.00230	8.05	0.9597	0.00210
8.8	0.9620	0.00220	8.4	0.9651	0.00270	8.1	0.9637	0.00200
8.85	0.9747	0.00220	8.45	0.9662	0.00200	8.15	0.9722	0.00240
8.9	0.9734	0.00210	8.5	0.9703	0.00220	8.2	0.9783	0.00230
8.95	0.9773	0.00230	8.55	0.9711	0.00200	8.25	0.9820	0.00200
9	0.9850	0.00220	8.6	0.9839	0.00200	8.3	0.9905	0.00210
9.05	0.9848	0.00210	8.65	0.9871	0.00240	8.35	0.9926	0.00220
9.1	0.9900	0.00230	8.7	0.9907	0.00250	8.4	0.9970	0.00310
9.15	0.9909	0.00210	8.75	0.9945	0.00270	8.45	1.0042	0.00210
9.2	0.9996	0.00270	8.8	1.0013	0.00240	8.5	1.0044	0.00230
9.25	1.0001	0.00300	8.85	1.0045	0.00200	8.55	1.0088	0.00220
9.3	1.0043	0.00230	8.9	1.0115	0.00240	8.6	1.0167	0.00200
9.35	1.0155	0.00210	8.95	1.0158	0.00250	8.65	1.0190	0.00220
9.4	1.0117	0.00240	9	1.0215	0.00230	8.7	1.0276	0.00220
9.45	1.0194	0.00260	9.05	1.0232	0.00220			
9.5	1.0231	0.00210	9.1	1.0266	0.00240			

3			4			5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.30	0.9113	0.00220	6.80	0.9124	0.00240	6.40	0.9106	0.00190
7.35	0.9199	0.00200	6.85	0.9197	0.00260	6.45	0.9210	0.00220
7.4	0.9231	0.00200	6.9	0.9252	0.00240	6.5	0.9285	0.00210
7.45	0.9293	0.00210	6.95	0.9331	0.00230	6.55	0.9381	0.00190
7.5	0.9392	0.00220	7	0.9347	0.00300	6.6	0.9404	0.00200
7.55	0.9409	0.00220	7.05	0.9403	0.00210	6.65	0.9472	0.00230
7.6	0.9478	0.00220	7.1	0.9489	0.00280	6.7	0.9552	0.00220
7.65	0.9550	0.00230	7.15	0.9518	0.00200	6.75	0.9591	0.00210
7.7	0.9581	0.00200	7.2	0.9609	0.00250	6.8	0.9668	0.00230
7.75	0.9617	0.00230	7.25	0.9646	0.00230	6.85	0.9702	0.00220
7.8	0.9649	0.00250	7.3	0.9693	0.00210	6.9	0.9745	0.00190
7.85	0.9745	0.00210	7.35	0.9779	0.00210	6.95	0.9848	0.00230
7.9	0.9799	0.00210	7.4	0.9814	0.00240	7	0.9876	0.00230
7.95	0.9802	0.00260	7.45	0.9897	0.00250	7.05	0.9944	0.00290
8	0.9893	0.00260	7.5	0.9924	0.00210	7.1	1.0014	0.00230
8.05	0.9944	0.00230	7.55	0.9994	0.00280	7.15	1.0076	0.00230
8.1	0.9988	0.00190	7.6	1.0033	0.00210	7.2	1.0136	0.00220
8.15	1.0027	0.00270	7.65	1.0109	0.00220	7.25	1.0171	0.00170
8.2	1.0057	0.00300	7.7	1.0120	0.00300	7.3	1.0260	0.00230
8.25	1.0102	0.00190	7.75	1.0232	0.00290			
8.3	1.0186	0.00270	7.8	1.0216	0.00210			
8.35	1.0202	0.00220						
8.4	1.0255	0.00240						

6			7			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.10	0.9247	0.00210	5.70	0.9135	0.00210	5.60	0.9237	0.00250
6.15	0.9303	0.00200	5.75	0.9240	0.00180	5.65	0.9310	0.00220
6.2	0.9360	0.00230	5.8	0.9324	0.00240	5.7	0.9350	0.00210
6.25	0.9409	0.00220	5.85	0.9363	0.00190	5.75	0.9431	0.00260
6.3	0.9508	0.00210	5.9	0.9442	0.00220	5.8	0.9520	0.00220
6.35	0.9610	0.00270	5.95	0.9507	0.00220	5.85	0.9559	0.00220
6.4	0.9628	0.00220	6	0.9550	0.00230	5.9	0.9648	0.00210
6.45	0.9712	0.00200	6.05	0.9638	0.00230	5.95	0.9697	0.00190
6.5	0.9766	0.00220	6.1	0.9693	0.00250	6	0.9784	0.00210
6.55	0.9851	0.00210	6.15	0.9810	0.00230	6.05	0.9857	0.00210
6.6	0.9917	0.00220	6.2	0.9829	0.00200	6.1	0.9883	0.00190
6.65	0.9934	0.00260	6.25	0.9888	0.00240	6.15	1.0009	0.00230
6.7	1.0041	0.00210	6.3	0.9933	0.00200	6.2	1.0010	0.00200
6.75	1.0089	0.00200	6.35	1.0034	0.00210	6.25	1.0154	0.00220
6.8	1.0147	0.00200	6.4	1.0109	0.00220	6.3	1.0181	0.00200
6.85	1.0277	0.00230	6.45	1.0154	0.00190	6.35	1.0276	0.00230
6.9	1.0291	0.00220	6.5	1.0237	0.00230	6.4	1.0361	0.00210

8			9			10		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.40	0.9101	0.00210	5.10	0.9077	0.00210	4.90	0.9175	0.00240
5.45	0.9222	0.00180	5.15	0.9182	0.00210	4.95	0.9236	0.00240
5.5	0.9251	0.00210	5.2	0.9262	0.00190	5	0.9339	0.00200
5.55	0.9375	0.00230	5.25	0.9324	0.00220	5.05	0.9410	0.00170
5.6	0.9422	0.00240	5.3	0.9408	0.00200	5.1	0.9498	0.00200
5.65	0.9566	0.00250	5.35	0.9459	0.00230	5.15	0.9603	0.00190
5.7	0.9567	0.00200	5.4	0.9556	0.00180	5.2	0.9674	0.00190
5.75	0.9639	0.00200	5.45	0.9612	0.00220	5.25	0.9749	0.00210
5.8	0.9740	0.00200	5.5	0.9720	0.00200	5.3	0.9812	0.00220
5.85	0.9814	0.00190	5.55	0.9763	0.00220	5.35	0.9911	0.00200
5.9	0.9861	0.00200	5.6	0.9809	0.00200	5.4	0.9957	0.00210
5.95	0.9925	0.00210	5.65	0.9899	0.00240	5.45	1.0035	0.00190
6	1.0008	0.00220	5.7	1.0011	0.00220	5.5	1.0122	0.00240
6.05	1.0061	0.00200	5.75	1.0136	0.00260	5.55	1.0196	0.00200
6.1	1.0160	0.00200	5.8	1.0155	0.00210	5.6	1.0264	0.00250
6.15	1.0193	0.00210	5.85	1.0258	0.00200			
6.2	1.0266	0.00210	5.9	1.0294	0.00240			

	15			19.6	
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.90	0.9210	0.00190	3.20	0.9179	0.00240
3.95	0.9287	0.00200	3.22	0.9251	0.00190
4	0.9427	0.00240	3.24	0.9274	0.00200
4.05	0.9507	0.00250	3.26	0.9326	0.00190
4.1	0.9671	0.00190	3.28	0.9353	0.00210
4.15	0.9730	0.00180	3.3	0.9410	0.00240
4.2	0.9846	0.00210	3.32	0.9468	0.00210
4.25	0.9884	0.00200	3.34	0.9523	0.00200
4.3	1.0031	0.00180	3.36	0.9552	0.00210
4.35	1.0088	0.00220	3.38	0.9638	0.00210
4.4	1.0209	0.00230	3.4	0.9653	0.00240
4.45	1.0306	0.00220	3.42	0.9739	0.00180
4.5	1.0387	0.00190	3.44	0.9782	0.00220
			3.46	0.9775	0.00260
			3.48	0.9842	0.00200
			3.5	0.9919	0.00200
			3.52	0.9954	0.00210
			3.54	1.0006	0.00220
			3.56	1.0062	0.00260
			3.58	1.0092	0.00240
			3.6	1.0134	0.00230
			3.62	1.0218	0.00220
			3.64	1.0223	0.00230
			3.66	1.0291	0.00230
			3.68	1.0258	0.00230
			3.7	1.0331	0.00230

Case ID: pu_sph_100_10ref

Material: Plutonium

Geometry: Sphere

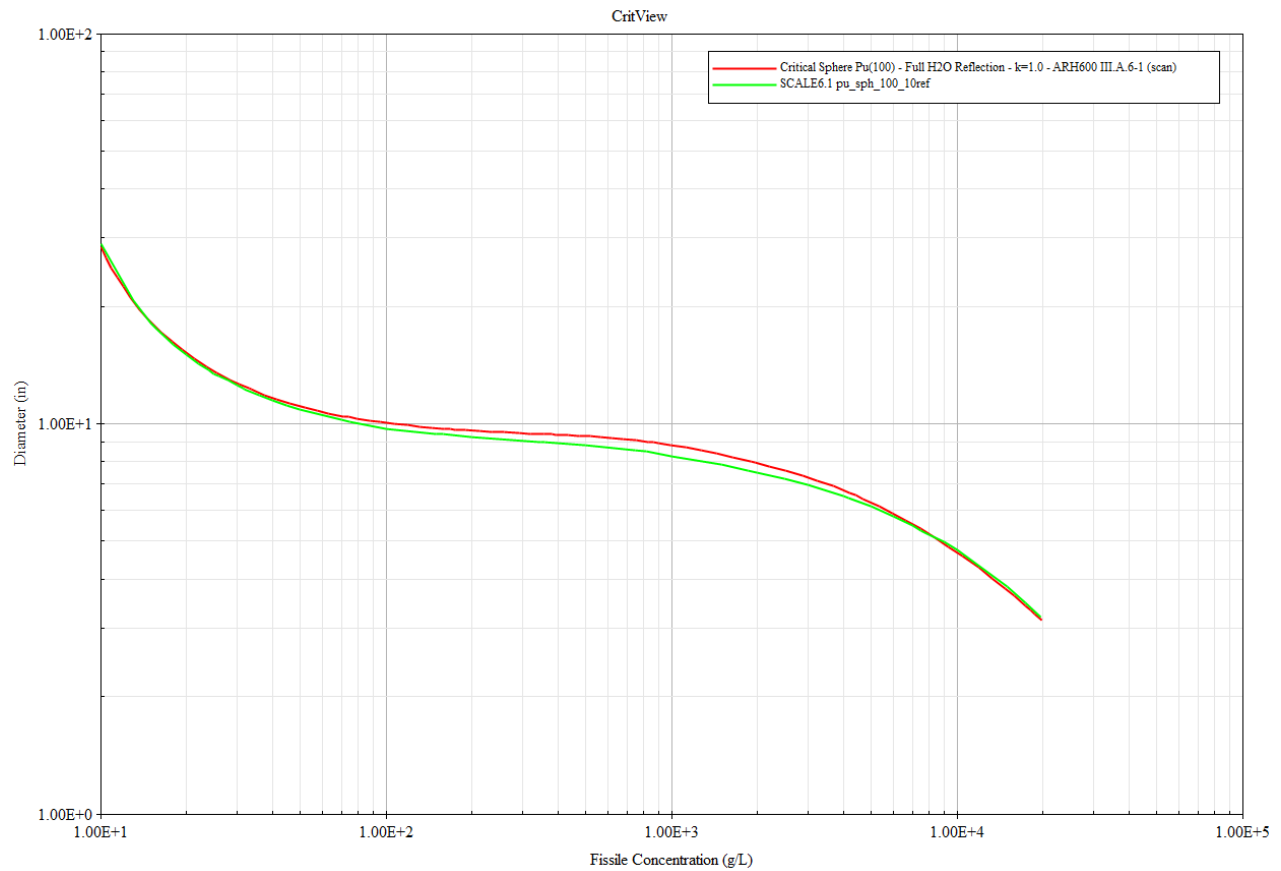
Isotopics: 100% ^{239}Pu

Reflector: 10" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	21.800	30.600	0.400	28.8875
0.013	17.200	21.300	0.200	20.6300
0.015	15.100	18.800	0.100	18.0759
0.018	13.700	16.500	0.100	15.9957
0.020	12.700	15.500	0.100	15.0119
0.022	11.800	14.700	0.100	14.2671
0.024	11.500	14.200	0.100	13.7098
0.025	11.100	13.800	0.100	13.4593
0.026	11.600	13.700	0.100	13.2273
0.028	11.300	13.500	0.100	12.9171
0.030	11.100	12.900	0.100	12.5280
0.032	10.800	12.800	0.100	12.2308
0.036	10.500	12.200	0.050	11.8553
0.040	10.200	11.800	0.050	11.4550
0.045	9.900	11.500	0.050	11.1312
0.050	9.700	11.200	0.050	10.9000
0.075	9.000	10.400	0.050	10.1224
0.100	8.700	10.100	0.050	9.6833
0.150	8.400	9.700	0.050	9.4179
0.200	8.300	9.600	0.050	9.2520
0.350	8.000	9.300	0.050	8.9607
0.500	7.900	9.100	0.050	8.8059
0.750	7.600	8.800	0.050	8.5471
1.000	7.400	8.500	0.050	8.2471
1.500	7.100	8.300	0.050	7.8741
2.000	6.800	7.800	0.050	7.5176
2.500	6.500	7.500	0.050	7.2296
3.000	6.300	7.300	0.050	6.9663
4.000	5.800	6.900	0.050	6.5232
5.000	5.500	6.300	0.050	6.1339
6.000	5.200	6.000	0.050	5.7851
7.000	4.900	5.700	0.050	5.4967
7.500	4.800	5.600	0.050	5.3367
8.000	4.700	5.400	0.050	5.1976
9.000	4.500	5.200	0.050	4.9741
10.000	4.300	4.900	0.050	4.7598
15.000	3.400	4.000	0.050	3.8189
19.600	2.900	3.300	0.020	3.1972

```

Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 SCALE
'WORM file written by Alex on 6/28/21
'Table B.1.1.1.3-1. Critical Dimensions for 100% 239Pu Sphere - 10 Inches of Water Reflection
,
#index number = <index = 1:38:1>
,
#Concentration = <@conc = 
0.01,0.013,0.015,0.018,0.02,0.022,0.024,0.025,0.026,0.028,0.03,0.032,0.036,0.04,0.045,0.05,0.075,
0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4,5,6,7,7.5,8,9,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia = 
21.8,17.2,15.1,13.7,12.7,11.8,11.5,11.1,11.6,11.3,11.1,10.8,10.5,10.2,9.9,9.7,9,8.7,8.4,8.3,8,7.9
,7.6,7.4,7.1,6.8,6.5,6.3,5.8,5.5,5.2,4.9,4.8,4.7,4.5,4.3,3.4,2.9> in
#Ending Diameter = <@enddia = 
30.6,21.3,18.8,16.5,15.5,14.7,14.2,13.8,13.7,13.5,12.9,12.8,12.2,11.8,11.5,11.2,10.4,10.1,9.7,9.6
,9.3,9.1,8.8,8.5,8.3,7.8,7.5,7.3,6.9,6.3,6,5.7,5.6,5.4,5.2,4.9,4,3.3> in
#Delta = <@delta = 
0.4,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05
,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02> in
,
'Reflector Thickness {{refthick = 10}}
,
'Diameter being Tested = {{diameter = <startdia[index]><enddia[index]><delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
=csas6
Sphere Reflected
v7-238
read composition
pu          1 den=<critconc> 1 300
                                94239 100
                                94240 0    end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300    end
h2o          2 1 300    end
end composition
read parameter
htm=yes
end parameter
read geometry
global unit 1
com="Sphere"
sphere 1      {{{(diameter*in)/2}}}
sphere 2      {{{(refdia*in)/2}}}
media 1 1 1
media 2 1 2 -1
boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_sph_100_10ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: sphere
modmat: H2O
critmat: plutonium
isomat: Pu239 1.0
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 28.8875
0.013 20.6300
0.015 18.0759
0.018 15.9957
0.020 15.0119
0.022 14.2671
0.024 13.7098
0.025 13.4593
0.026 13.2273
0.028 12.9171
0.030 12.5280
0.032 12.2308
0.036 11.8553
0.040 11.4550
0.045 11.1312
0.050 10.9000
0.075 10.1224
0.100 9.6833
0.150 9.4179
0.200 9.2520
0.350 8.9607
0.500 8.8059
0.750 8.5471
1.000 8.2471
1.500 7.8741
2.000 7.5176
2.500 7.2296
3.000 6.9663
4.000 6.5232
5.000 6.1339
6.000 5.7851
7.000 5.4967
7.500 5.3367
8.000 5.1976
9.000 4.9741
10.000 4.7598
15.000 3.8189
19.600 3.1972
```

0.01			0.013			0.015		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
21.80	0.9150	0.00170	17.20	0.9222	0.00190	15.10	0.9114	0.00140
22.2	0.9203	0.00150	17.4	0.9298	0.00150	15.2	0.9146	0.00170
22.6	0.9265	0.00120	17.6	0.9335	0.00180	15.3	0.9167	0.00160
23	0.9322	0.00170	17.8	0.9388	0.00170	15.4	0.9205	0.00170
23.4	0.9398	0.00140	18	0.9471	0.00160	15.5	0.9250	0.00160
23.8	0.9436	0.00130	18.2	0.9490	0.00210	15.6	0.9306	0.00170
24.2	0.9485	0.00140	18.4	0.9558	0.00150	15.7	0.9352	0.00190
24.6	0.9549	0.00130	18.6	0.9607	0.00190	15.8	0.9345	0.00160
25	0.9594	0.00130	18.8	0.9598	0.00180	15.9	0.9382	0.00170
25.4	0.9645	0.00140	19	0.9669	0.00190	16	0.9457	0.00150
25.8	0.9684	0.00130	19.2	0.9763	0.00160	16.1	0.9426	0.00170
26.2	0.9716	0.00140	19.4	0.9768	0.00200	16.2	0.9469	0.00200
26.6	0.9752	0.00140	19.6	0.9826	0.00170	16.3	0.9507	0.00190
27	0.9810	0.00140	19.8	0.9822	0.00150	16.4	0.9530	0.00150
27.4	0.9848	0.00150	20	0.9881	0.00130	16.5	0.9572	0.00170
27.8	0.9906	0.00140	20.2	0.9931	0.00140	16.6	0.9569	0.00190
28.2	0.9927	0.00160	20.4	0.9966	0.00190	16.7	0.9595	0.00160
28.6	0.9954	0.00130	20.6	0.9991	0.00120	16.8	0.9635	0.00200
29	1.0018	0.00140	20.8	1.0051	0.00220	16.9	0.9707	0.00150
29.4	1.0033	0.00160	21	1.0061	0.00160	17	0.9703	0.00190
29.8	1.0046	0.00120	21.2	1.0136	0.00160	17.1	0.9698	0.00170
30.2	1.0076	0.00140	21.3	1.0142	0.00180	17.2	0.9726	0.00160
30.6	1.0160	0.00110				17.3	0.9776	0.00180
						17.4	0.9816	0.00170
						17.5	0.9830	0.00150
						17.6	0.9873	0.00170
						17.7	0.9907	0.00170
						17.8	0.9932	0.00180
						17.9	0.9921	0.00160
						18	0.9940	0.00170
						18.1	1.0019	0.00190
						18.2	1.0006	0.00180
						18.3	1.0039	0.00180
						18.4	1.0076	0.00160
						18.5	1.0123	0.00200
						18.6	1.0118	0.00200
						18.7	1.0149	0.00170
						18.8	1.0181	0.00160

0.018			0.02			0.022		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.70	0.9187	0.00170	12.70	0.9056	0.00210	11.80	0.8861	0.00210
13.8	0.9225	0.00180	12.8	0.9059	0.00190	11.9	0.8923	0.00220
13.9	0.9245	0.00200	12.9	0.9118	0.00200	12	0.8978	0.00200
14	0.9270	0.00200	13	0.9176	0.00210	12.1	0.9033	0.00180
14.1	0.9299	0.00190	13.1	0.9231	0.00160	12.2	0.9084	0.00210
14.2	0.9387	0.00170	13.2	0.9268	0.00200	12.3	0.9106	0.00160
14.3	0.9372	0.00220	13.3	0.9316	0.00210	12.4	0.9209	0.00180
14.4	0.9441	0.00190	13.4	0.9405	0.00200	12.5	0.9222	0.00200
14.5	0.9461	0.00170	13.5	0.9371	0.00200	12.6	0.9253	0.00220
14.6	0.9549	0.00190	13.6	0.9445	0.00200	12.7	0.9314	0.00200
14.7	0.9540	0.00170	13.7	0.9450	0.00180	12.8	0.9352	0.00180
14.8	0.9593	0.00200	13.8	0.9543	0.00160	12.9	0.9419	0.00190
14.9	0.9699	0.00160	13.9	0.9556	0.00170	13	0.9451	0.00160
15	0.9682	0.00250	14	0.9611	0.00190	13.1	0.9502	0.00210
15.1	0.9735	0.00130	14.1	0.9638	0.00160	13.2	0.9518	0.00220
15.2	0.9729	0.00200	14.2	0.9673	0.00210	13.3	0.9602	0.00160
15.3	0.9766	0.00210	14.3	0.9710	0.00180	13.4	0.9676	0.00180
15.4	0.9805	0.00180	14.4	0.9803	0.00190	13.5	0.9693	0.00260
15.5	0.9849	0.00210	14.5	0.9849	0.00200	13.6	0.9711	0.00190
15.6	0.9899	0.00190	14.6	0.9858	0.00180	13.7	0.9696	0.00220
15.7	0.9895	0.00180	14.7	0.9869	0.00190	13.8	0.9796	0.00170
15.8	0.9939	0.00160	14.8	0.9942	0.00220	13.9	0.9851	0.00200
15.9	0.9978	0.00200	14.9	0.9977	0.00180	14	0.9897	0.00190
16	1.0001	0.00220	15	0.9992	0.00180	14.1	0.9925	0.00180
16.1	1.0012	0.00200	15.1	1.0059	0.00200	14.2	0.9949	0.00160
16.2	1.0097	0.00200	15.2	1.0075	0.00200	14.3	1.0025	0.00180
16.3	1.0101	0.00180	15.3	1.0088	0.00160	14.4	1.0070	0.00210
16.4	1.0132	0.00180	15.4	1.0148	0.00170	14.5	1.0071	0.00190
16.5	1.0173	0.00170	15.5	1.0191	0.00220	14.6	1.0136	0.00230
						14.7	1.0190	0.00180

0.024			0.025			0.026		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.50	0.8910	0.00200	11.10	0.8808	0.00180	11.60	0.9195	0.00200
11.6	0.8951	0.00240	11.2	0.8871	0.00190	11.7	0.9244	0.00270
11.7	0.9024	0.00190	11.3	0.8967	0.00250	11.8	0.9266	0.00200
11.8	0.9118	0.00200	11.4	0.9001	0.00180	11.9	0.9321	0.00190
11.9	0.9139	0.00220	11.5	0.9059	0.00170	12	0.9371	0.00200
12	0.9176	0.00190	11.6	0.9096	0.00190	12.1	0.9447	0.00190
12.1	0.9269	0.00200	11.7	0.9141	0.00210	12.2	0.9529	0.00200
12.2	0.9295	0.00190	11.8	0.9167	0.00190	12.3	0.9511	0.00220
12.3	0.9373	0.00200	11.9	0.9260	0.00210	12.4	0.9591	0.00200
12.4	0.9389	0.00210	12	0.9289	0.00240	12.5	0.9693	0.00200
12.5	0.9432	0.00180	12.1	0.9361	0.00220	12.6	0.9708	0.00210
12.6	0.9506	0.00220	12.2	0.9355	0.00180	12.7	0.9742	0.00190
12.7	0.9612	0.00240	12.3	0.9455	0.00220	12.8	0.9824	0.00270
12.8	0.9572	0.00250	12.4	0.9476	0.00200	12.9	0.9823	0.00200
12.9	0.9600	0.00180	12.5	0.9526	0.00200	13	0.9913	0.00190
13	0.9678	0.00170	12.6	0.9621	0.00180	13.1	0.9938	0.00220
13.1	0.9738	0.00190	12.7	0.9650	0.00210	13.2	0.9982	0.00210
13.2	0.9774	0.00170	12.8	0.9709	0.00270	13.3	1.0048	0.00170
13.3	0.9823	0.00170	12.9	0.9711	0.00260	13.4	1.0050	0.00180
13.4	0.9862	0.00160	13	0.9788	0.00240	13.5	1.0122	0.00230
13.5	0.9929	0.00190	13.1	0.9843	0.00210	13.6	1.0166	0.00220
13.6	0.9970	0.00240	13.2	0.9886	0.00260	13.7	1.0211	0.00210
13.7	0.9994	0.00180	13.3	0.9955	0.00180			
13.8	1.0055	0.00190	13.4	0.9965	0.00210			
13.9	1.0072	0.00210	13.5	1.0024	0.00200			
14	1.0132	0.00240	13.6	1.0010	0.00210			
14.1	1.0187	0.00250	13.7	1.0069	0.00220			
14.2	1.0217	0.00230	13.8	1.0185	0.00210			

0.028			0.03			0.032		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.30	0.9183	0.00200	11.10	0.9211	0.00180	10.80	0.9174	0.00230
11.4	0.9238	0.00190	11.2	0.9269	0.00230	10.9	0.9254	0.00180
11.5	0.9331	0.00180	11.3	0.9338	0.00220	11	0.9307	0.00180
11.6	0.9347	0.00210	11.4	0.9377	0.00220	11.1	0.9382	0.00170
11.7	0.9409	0.00200	11.5	0.9437	0.00270	11.2	0.9412	0.00220
11.8	0.9438	0.00190	11.6	0.9478	0.00210	11.3	0.9510	0.00210
11.9	0.9522	0.00210	11.7	0.9576	0.00170	11.4	0.9534	0.00200
12	0.9543	0.00220	11.8	0.9637	0.00220	11.5	0.9589	0.00190
12.1	0.9652	0.00200	11.9	0.9666	0.00200	11.6	0.9631	0.00180
12.2	0.9670	0.00200	12	0.9701	0.00210	11.7	0.9697	0.00210
12.3	0.9708	0.00230	12.1	0.9816	0.00220	11.8	0.9754	0.00190
12.4	0.9726	0.00190	12.2	0.9861	0.00210	11.9	0.9817	0.00200
12.5	0.9838	0.00210	12.3	0.9906	0.00220	12	0.9843	0.00280
12.6	0.9897	0.00200	12.4	0.9941	0.00180	12.1	0.9910	0.00220
12.7	0.9923	0.00200	12.5	0.9974	0.00220	12.2	0.9992	0.00230
12.8	0.9976	0.00220	12.6	1.0067	0.00230	12.3	1.0018	0.00270
12.9	0.9994	0.00210	12.7	1.0065	0.00230	12.4	1.0104	0.00190
13	1.0029	0.00220	12.8	1.0116	0.00200	12.5	1.0092	0.00210
13.1	1.0129	0.00240	12.9	1.0177	0.00240	12.6	1.0159	0.00210
13.2	1.0132	0.00220				12.7	1.0219	0.00270
13.3	1.0177	0.00200				12.8	1.0282	0.00200
13.4	1.0230	0.00170						
13.5	1.0327	0.00180						

0.036			0.04			0.045		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.50	0.9238	0.00230	10.20	0.9190	0.00220	9.90	0.9206	0.00200
10.55	0.9269	0.00220	10.25	0.9254	0.00200	9.95	0.9250	0.00240
10.6	0.9276	0.00220	10.3	0.9267	0.00220	10	0.9268	0.00200
10.65	0.9306	0.00190	10.35	0.9313	0.00210	10.05	0.9287	0.00240
10.7	0.9311	0.00210	10.4	0.9383	0.00210	10.1	0.9344	0.00210
10.75	0.9380	0.00200	10.45	0.9404	0.00240	10.15	0.9381	0.00220
10.8	0.9389	0.00210	10.5	0.9418	0.00210	10.2	0.9417	0.00300
10.85	0.9455	0.00210	10.55	0.9455	0.00210	10.25	0.9404	0.00180
10.9	0.9452	0.00200	10.6	0.9465	0.00220	10.3	0.9498	0.00190
10.95	0.9484	0.00250	10.65	0.9485	0.00190	10.35	0.9500	0.00200
11	0.9481	0.00180	10.7	0.9535	0.00240	10.4	0.9518	0.00200
11.05	0.9558	0.00230	10.75	0.9553	0.00210	10.45	0.9561	0.00180
11.1	0.9591	0.00200	10.8	0.9602	0.00190	10.5	0.9576	0.00210
11.15	0.9628	0.00180	10.85	0.9640	0.00200	10.55	0.9630	0.00260
11.2	0.9647	0.00190	10.9	0.9663	0.00190	10.6	0.9649	0.00220
11.25	0.9696	0.00200	10.95	0.9669	0.00190	10.65	0.9710	0.00220
11.3	0.9692	0.00220	11	0.9701	0.00220	10.7	0.9754	0.00230
11.35	0.9735	0.00210	11.05	0.9762	0.00210	10.75	0.9744	0.00230
11.4	0.9763	0.00180	11.1	0.9741	0.00270	10.8	0.9785	0.00200
11.45	0.9777	0.00240	11.15	0.9859	0.00240	10.85	0.9870	0.00200
11.5	0.9801	0.00190	11.2	0.9867	0.00210	10.9	0.9855	0.00200
11.55	0.9862	0.00220	11.25	0.9908	0.00240	10.95	0.9876	0.00220
11.6	0.9863	0.00220	11.3	0.9922	0.00220	11	0.9953	0.00190
11.65	0.9911	0.00220	11.35	0.9864	0.00280	11.05	0.9993	0.00220
11.7	0.9940	0.00240	11.4	0.9987	0.00170	11.1	0.9947	0.00230
11.75	0.9960	0.00220	11.45	0.9996	0.00220	11.15	1.0032	0.00240
11.8	0.9991	0.00210	11.5	1.0036	0.00210	11.2	1.0063	0.00250
11.85	0.9994	0.00200	11.55	1.0080	0.00230	11.25	1.0060	0.00220
11.9	1.0051	0.00190	11.6	1.0087	0.00250	11.3	1.0141	0.00240
11.95	1.0072	0.00200	11.65	1.0088	0.00180	11.35	1.0138	0.00260
12	1.0127	0.00210	11.7	1.0127	0.00210	11.4	1.0187	0.00250
12.05	1.0130	0.00250	11.75	1.0196	0.00230	11.45	1.0188	0.00210
12.1	1.0147	0.00210	11.8	1.0166	0.00180	11.5	1.0199	0.00200
12.15	1.0192	0.00220						
12.2	1.0200	0.00200						

0.05			0.075			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.70	0.9219	0.00190	9.00	0.9161	0.00230	8.70	0.9189	0.00200
9.75	0.9264	0.00320	9.05	0.9191	0.00240	8.75	0.9213	0.00270
9.8	0.9352	0.00210	9.1	0.9257	0.00190	8.8	0.9288	0.00260
9.85	0.9310	0.00250	9.15	0.9275	0.00220	8.85	0.9317	0.00220
9.9	0.9378	0.00190	9.2	0.9372	0.00190	8.9	0.9346	0.00250
9.95	0.9426	0.00200	9.25	0.9383	0.00210	8.95	0.9371	0.00200
10	0.9420	0.00210	9.3	0.9420	0.00230	9	0.9452	0.00280
10.05	0.9522	0.00210	9.35	0.9446	0.00270	9.05	0.9491	0.00240
10.1	0.9462	0.00210	9.4	0.9468	0.00250	9.1	0.9491	0.00230
10.15	0.9503	0.00210	9.45	0.9561	0.00230	9.15	0.9559	0.00280
10.2	0.9564	0.00280	9.5	0.9565	0.00240	9.2	0.9601	0.00230
10.25	0.9583	0.00220	9.55	0.9628	0.00200	9.25	0.9635	0.00210
10.3	0.9641	0.00230	9.6	0.9629	0.00270	9.3	0.9631	0.00200
10.35	0.9649	0.00230	9.65	0.9667	0.00210	9.35	0.9706	0.00210
10.4	0.9691	0.00250	9.7	0.9726	0.00260	9.4	0.9760	0.00230
10.45	0.9726	0.00270	9.75	0.9751	0.00280	9.45	0.9753	0.00260
10.5	0.9786	0.00250	9.8	0.9800	0.00220	9.5	0.9815	0.00210
10.55	0.9780	0.00260	9.85	0.9785	0.00210	9.55	0.9856	0.00210
10.6	0.9818	0.00280	9.9	0.9811	0.00260	9.6	0.9886	0.00220
10.65	0.9885	0.00230	9.95	0.9925	0.00240	9.65	0.9978	0.00210
10.7	0.9935	0.00240	10	0.9931	0.00260	9.7	1.0011	0.00210
10.75	0.9901	0.00200	10.05	0.9949	0.00240	9.75	1.0007	0.00250
10.8	1.0015	0.00260	10.1	0.9983	0.00200	9.8	1.0027	0.00200
10.85	0.9994	0.00250	10.15	1.0021	0.00250	9.85	1.0068	0.00220
10.9	1.0000	0.00220	10.2	1.0078	0.00230	9.9	1.0074	0.00240
10.95	1.0049	0.00210	10.25	1.0099	0.00250	9.95	1.0123	0.00210
11	1.0093	0.00210	10.3	1.0104	0.00220	10	1.0209	0.00220
11.05	1.0127	0.00260	10.35	1.0157	0.00280	10.05	1.0211	0.00210
11.1	1.0144	0.00220	10.4	1.0214	0.00290	10.1	1.0203	0.00210
11.15	1.0205	0.00210						
11.2	1.0253	0.00190						

0.15			0.2			0.35		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.40	0.9194	0.00230	8.30	0.9198	0.00200	8.00	0.9226	0.00210
8.45	0.9220	0.00210	8.35	0.9280	0.00240	8.05	0.9246	0.00220
8.5	0.9276	0.00210	8.4	0.9337	0.00210	8.1	0.9208	0.00230
8.55	0.9287	0.00210	8.45	0.9357	0.00250	8.15	0.9311	0.00230
8.6	0.9384	0.00240	8.5	0.9412	0.00210	8.2	0.9362	0.00270
8.65	0.9420	0.00200	8.55	0.9448	0.00280	8.25	0.9400	0.00270
8.7	0.9462	0.00220	8.6	0.9464	0.00220	8.3	0.9432	0.00270
8.75	0.9437	0.00250	8.65	0.9484	0.00260	8.35	0.9499	0.00210
8.8	0.9517	0.00240	8.7	0.9533	0.00220	8.4	0.9569	0.00220
8.85	0.9589	0.00220	8.75	0.9610	0.00260	8.45	0.9587	0.00270
8.9	0.9601	0.00210	8.8	0.9625	0.00240	8.5	0.9627	0.00230
8.95	0.9640	0.00220	8.85	0.9688	0.00210	8.55	0.9684	0.00240
9	0.9677	0.00250	8.9	0.9730	0.00260	8.6	0.9724	0.00210
9.05	0.9724	0.00290	8.95	0.9819	0.00200	8.65	0.9735	0.00200
9.1	0.9730	0.00220	9	0.9800	0.00260	8.7	0.9777	0.00230
9.15	0.9820	0.00200	9.05	0.9880	0.00210	8.75	0.9841	0.00230
9.2	0.9834	0.00220	9.1	0.9944	0.00250	8.8	0.9889	0.00220
9.25	0.9883	0.00320	9.15	0.9952	0.00250	8.85	0.9901	0.00270
9.3	0.9886	0.00330	9.2	0.9995	0.00210	8.9	0.9936	0.00290
9.35	0.9941	0.00220	9.25	0.9998	0.00240	8.95	0.9988	0.00250
9.4	0.9981	0.00210	9.3	1.0048	0.00220	9	1.0044	0.00210
9.45	1.0034	0.00230	9.35	1.0098	0.00280	9.05	1.0077	0.00250
9.5	1.0094	0.00250	9.4	1.0070	0.00210	9.1	1.0090	0.00220
9.55	1.0086	0.00270	9.45	1.0183	0.00250	9.15	1.0100	0.00200
9.6	1.0146	0.00240	9.5	1.0187	0.00230	9.2	1.0183	0.00290
9.65	1.0146	0.00240	9.55	1.0224	0.00230	9.25	1.0200	0.00240
9.7	1.0232	0.00230	9.6	1.0255	0.00210	9.3	1.0230	0.00230

0.5			0.75			1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.90	0.9294	0.00240	7.60	0.9206	0.00240	7.40	0.9229	0.00240
7.95	0.9285	0.00200	7.65	0.9234	0.00200	7.45	0.9270	0.00190
8	0.9342	0.00240	7.7	0.9313	0.00200	7.5	0.9291	0.00220
8.05	0.9394	0.00250	7.75	0.9338	0.00220	7.55	0.9367	0.00270
8.1	0.9433	0.00210	7.8	0.9395	0.00220	7.6	0.9413	0.00210
8.15	0.9498	0.00260	7.85	0.9382	0.00230	7.65	0.9451	0.00190
8.2	0.9529	0.00220	7.9	0.9485	0.00260	7.7	0.9491	0.00240
8.25	0.9562	0.00230	7.95	0.9498	0.00210	7.75	0.9536	0.00200
8.3	0.9594	0.00220	8	0.9561	0.00240	7.8	0.9584	0.00210
8.35	0.9647	0.00220	8.05	0.9551	0.00250	7.85	0.9643	0.00270
8.4	0.9699	0.00230	8.1	0.9625	0.00240	7.9	0.9649	0.00270
8.45	0.9721	0.00230	8.15	0.9668	0.00200	7.95	0.9691	0.00230
8.5	0.9759	0.00220	8.2	0.9738	0.00230	8	0.9757	0.00200
8.55	0.9775	0.00260	8.25	0.9748	0.00200	8.05	0.9760	0.00270
8.6	0.9854	0.00220	8.3	0.9826	0.00270	8.1	0.9836	0.00230
8.65	0.9921	0.00260	8.35	0.9870	0.00200	8.15	0.9858	0.00210
8.7	0.9929	0.00180	8.4	0.9880	0.00290	8.2	0.9887	0.00210
8.75	0.9976	0.00230	8.45	0.9944	0.00230	8.25	1.0007	0.00220
8.8	0.9994	0.00240	8.5	0.9934	0.00210	8.3	1.0009	0.00210
8.85	1.0045	0.00210	8.55	1.0004	0.00270	8.35	1.0044	0.00190
8.9	1.0098	0.00300	8.6	1.0083	0.00250	8.4	1.0152	0.00230
8.95	1.0114	0.00200	8.65	1.0076	0.00200	8.45	1.0137	0.00190
9	1.0105	0.00220	8.7	1.0174	0.00250	8.5	1.0137	0.00200
9.05	1.0216	0.00210	8.75	1.0202	0.00220			
9.1	1.0240	0.00210	8.8	1.0219	0.00240			

1.5			2			2.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.10	0.9268	0.00180	6.80	0.9238	0.00220	6.50	0.9241	0.00230
7.15	0.9328	0.00220	6.85	0.9354	0.00300	6.55	0.9307	0.00230
7.2	0.9363	0.00220	6.9	0.9365	0.00210	6.6	0.9306	0.00230
7.25	0.9394	0.00220	6.95	0.9392	0.00240	6.65	0.9366	0.00200
7.3	0.9458	0.00220	7	0.9489	0.00210	6.7	0.9456	0.00200
7.35	0.9529	0.00200	7.05	0.9487	0.00190	6.75	0.9477	0.00200
7.4	0.9554	0.00210	7.1	0.9559	0.00210	6.8	0.9554	0.00200
7.45	0.9607	0.00200	7.15	0.9605	0.00270	6.85	0.9585	0.00230
7.5	0.9666	0.00230	7.2	0.9664	0.00200	6.9	0.9635	0.00230
7.55	0.9678	0.00210	7.25	0.9735	0.00220	6.95	0.9703	0.00210
7.6	0.9760	0.00200	7.3	0.9794	0.00190	7	0.9770	0.00230
7.65	0.9799	0.00260	7.35	0.9837	0.00220	7.05	0.9826	0.00220
7.7	0.9845	0.00220	7.4	0.9895	0.00220	7.1	0.9878	0.00200
7.75	0.9860	0.00270	7.45	0.9950	0.00210	7.15	0.9897	0.00200
7.8	0.9933	0.00190	7.5	0.9967	0.00210	7.2	0.9958	0.00220
7.85	0.9973	0.00220	7.55	1.0061	0.00250	7.25	1.0029	0.00200
7.9	1.0029	0.00200	7.6	1.0044	0.00210	7.3	1.0063	0.00200
7.95	1.0044	0.00210	7.65	1.0147	0.00240	7.35	1.0131	0.00230
8	1.0112	0.00200	7.7	1.0124	0.00240	7.4	1.0146	0.00280
8.05	1.0124	0.00200	7.75	1.0225	0.00220	7.45	1.0203	0.00200
8.1	1.0180	0.00220	7.8	1.0235	0.00280	7.5	1.0248	0.00190
8.15	1.0209	0.00240						
8.2	1.0289	0.00200						
8.25	1.0344	0.00210						
8.3	1.0404	0.00220						

3			4			5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.30	0.9252	0.00210	5.80	0.9173	0.00240	5.50	0.9233	0.00210
6.35	0.9323	0.00240	5.85	0.9211	0.00210	5.55	0.9262	0.00210
6.4	0.9365	0.00190	5.9	0.9234	0.00190	5.6	0.9335	0.00190
6.45	0.9444	0.00230	5.95	0.9367	0.00220	5.65	0.9395	0.00240
6.5	0.9470	0.00220	6	0.9379	0.00210	5.7	0.9465	0.00190
6.55	0.9578	0.00240	6.05	0.9450	0.00190	5.75	0.9517	0.00210
6.6	0.9566	0.00210	6.1	0.9530	0.00210	5.8	0.9580	0.00210
6.65	0.9657	0.00220	6.15	0.9570	0.00220	5.85	0.9667	0.00330
6.7	0.9669	0.00240	6.2	0.9642	0.00220	5.9	0.9737	0.00240
6.75	0.9748	0.00220	6.25	0.9663	0.00210	5.95	0.9768	0.00200
6.8	0.9851	0.00220	6.3	0.9731	0.00200	6	0.9845	0.00250
6.85	0.9890	0.00210	6.35	0.9829	0.00230	6.05	0.9924	0.00210
6.9	0.9907	0.00210	6.4	0.9880	0.00220	6.1	0.9960	0.00200
6.95	0.9986	0.00260	6.45	0.9916	0.00220	6.15	1.0019	0.00200
7	1.0029	0.00240	6.5	0.9955	0.00210	6.2	1.0102	0.00200
7.05	1.0107	0.00200	6.55	1.0052	0.00210	6.25	1.0180	0.00200
7.1	1.0164	0.00220	6.6	1.0100	0.00210	6.3	1.0242	0.00230
7.15	1.0200	0.00240	6.65	1.0183	0.00180			
7.2	1.0236	0.00240	6.7	1.0203	0.00220			
7.25	1.0285	0.00320	6.75	1.0262	0.00230			
7.3	1.0349	0.00220	6.8	1.0290	0.00210			
			6.85	1.0404	0.00240			
			6.9	1.0401	0.00200			

6			7			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.20	0.9163	0.00190	4.90	0.9118	0.00180	4.80	0.9195	0.00190
5.25	0.9250	0.00190	4.95	0.9198	0.00220	4.85	0.9279	0.00210
5.3	0.9383	0.00210	5	0.9288	0.00200	4.9	0.9337	0.00180
5.35	0.9433	0.00200	5.05	0.9373	0.00190	4.95	0.9413	0.00260
5.4	0.9455	0.00240	5.1	0.9445	0.00280	5	0.9505	0.00200
5.45	0.9539	0.00190	5.15	0.9514	0.00240	5.05	0.9538	0.00220
5.5	0.9613	0.00210	5.2	0.9583	0.00210	5.1	0.9612	0.00190
5.55	0.9689	0.00230	5.25	0.9655	0.00180	5.15	0.9691	0.00190
5.6	0.9766	0.00200	5.3	0.9761	0.00200	5.2	0.9780	0.00210
5.65	0.9858	0.00200	5.35	0.9786	0.00210	5.25	0.9846	0.00280
5.7	0.9925	0.00210	5.4	0.9881	0.00240	5.3	0.9953	0.00200
5.75	0.9946	0.00230	5.45	0.9943	0.00220	5.35	1.0017	0.00260
5.8	1.0023	0.00260	5.5	1.0004	0.00250	5.4	1.0069	0.00240
5.85	1.0044	0.00200	5.55	1.0122	0.00210	5.45	1.0198	0.00200
5.9	1.0163	0.00240	5.6	1.0209	0.00210	5.5	1.0254	0.00270
5.95	1.0243	0.00260	5.65	1.0226	0.00200	5.55	1.0275	0.00210
6	1.0278	0.00210	5.7	1.0279	0.00210	5.6	1.0400	0.00200

8			9			10		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.70	0.9194	0.00190	4.50	0.9253	0.00170	4.30	0.9224	0.00190
4.75	0.9275	0.00200	4.55	0.9314	0.00210	4.35	0.9342	0.00180
4.8	0.9339	0.00200	4.6	0.9400	0.00200	4.4	0.9409	0.00190
4.85	0.9431	0.00200	4.65	0.9495	0.00220	4.45	0.9497	0.00180
4.9	0.9524	0.00240	4.7	0.9592	0.00230	4.5	0.9576	0.00200
4.95	0.9603	0.00200	4.75	0.9627	0.00210	4.55	0.9692	0.00200
5	0.9694	0.00200	4.8	0.9753	0.00220	4.6	0.9783	0.00190
5.05	0.9737	0.00220	4.85	0.9802	0.00180	4.65	0.9872	0.00240
5.1	0.9860	0.00190	4.9	0.9859	0.00230	4.7	0.9930	0.00200
5.15	0.9900	0.00180	4.95	0.9960	0.00280	4.75	0.9973	0.00210
5.2	1.0005	0.00220	5	1.0043	0.00200	4.8	1.0111	0.00220
5.25	1.0087	0.00230	5.05	1.0145	0.00210	4.85	1.0200	0.00200
5.3	1.0087	0.00190	5.1	1.0241	0.00220	4.9	1.0265	0.00210
5.35	1.0227	0.00190	5.15	1.0288	0.00190			
5.4	1.0287	0.00210	5.2	1.0351	0.00260			

15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.40	0.9104	0.00210	2.90	0.9188	0.00200
3.45	0.9223	0.00200	2.92	0.9251	0.00230
3.5	0.9314	0.00180	2.94	0.9295	0.00260
3.55	0.9427	0.00240	2.96	0.9385	0.00180
3.6	0.9569	0.00190	2.98	0.9434	0.00230
3.65	0.9636	0.00240	3	0.9480	0.00190
3.7	0.9758	0.00170	3.02	0.9525	0.00180
3.75	0.9857	0.00190	3.04	0.9576	0.00190
3.8	0.9958	0.00190	3.06	0.9625	0.00200
3.85	1.0069	0.00200	3.08	0.9663	0.00180
3.9	1.0186	0.00220	3.1	0.9758	0.00210
3.95	1.0280	0.00210	3.12	0.9798	0.00200
4	1.0354	0.00200	3.14	0.9821	0.00250
			3.16	0.9898	0.00200
			3.18	0.9975	0.00200
			3.2	1.0004	0.00200
			3.22	1.0057	0.00220
			3.24	1.0098	0.00190
			3.26	1.0120	0.00200
			3.28	1.0214	0.00200
			3.3	1.0242	0.00210

Pu-sph-97 (Cases with 0", 1", 10" Reflector)

Case ID: pu_sph_097_00ref

Material: Plutonium

Geometry: Sphere

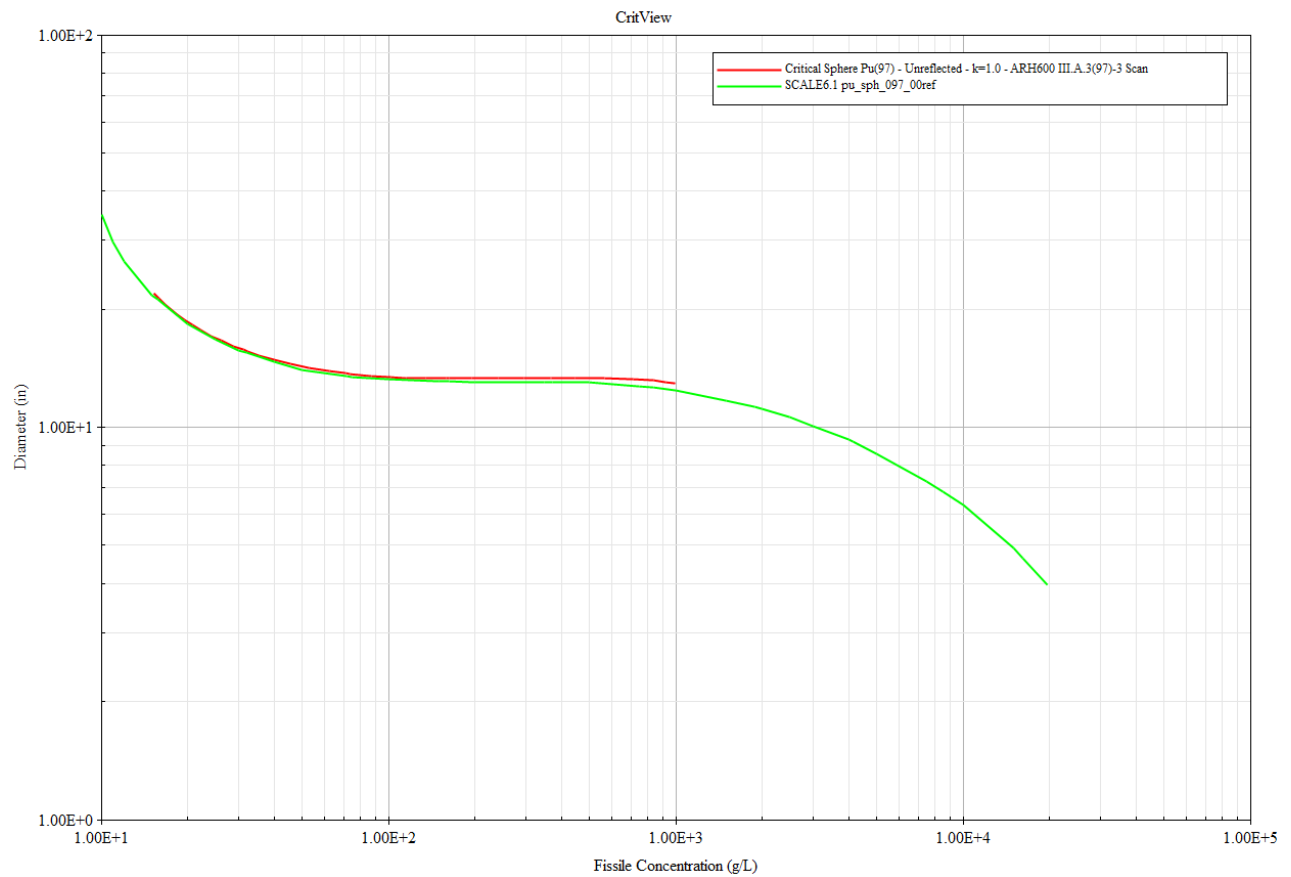
Isotopics: 97% ^{239}Pu 3% ^{240}Pu

Reflector: Unreflected

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	26.500	36.700	0.500	34.8387
0.011	23.900	31.000	0.300	29.6081
0.012	22.000	27.700	0.200	26.4929
0.015	18.700	22.400	0.100	21.7015
0.020	16.100	18.800	0.100	18.3170
0.025	14.800	17.100	0.100	16.7094
0.030	14.100	16.200	0.100	15.7085
0.040	13.200	15.000	0.100	14.6745
0.050	12.800	14.500	0.050	14.0306
0.075	12.200	13.800	0.050	13.4352
0.100	12.000	13.600	0.050	13.2532
0.150	11.900	13.400	0.050	13.1163
0.200	11.800	13.400	0.050	13.0226
0.350	11.800	13.400	0.050	12.9915
0.500	11.700	13.400	0.050	13.0026
0.750	11.500	13.100	0.050	12.7066
1.000	11.200	12.800	0.050	12.4186
1.500	10.600	12.200	0.050	11.6912
2.000	10.100	11.500	0.050	11.1276
2.500	9.600	10.900	0.050	10.5982
3.000	9.200	10.400	0.050	10.0837
4.000	8.400	9.500	0.050	9.2899
5.000	7.800	8.800	0.050	8.5486
7.500	6.700	7.500	0.050	7.2676
10.000	5.800	6.500	0.050	6.3194
15.000	4.400	5.100	0.050	4.9134
19.600	3.600	4.100	0.020	3.9653

WORM and SCALE Input File

```

'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.1.1.2.1-1. Critical Dimensions for Plutonium Sphere (97% 239Pu) - 0 Inches of Water
,
#index number = <index = 1:27:1>
,
#Concentration = <@conc =
0.01,0.011,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
26.5,23.9,22,18.7,16.1,14.8,14.1,13.2,12.8,12.2,12,11.9,11.8,11.8,11.7,11.5,11.2,10.6,10.1,9.6,9.
2,8.4,7.8,6.7,5.8,4.4,3.6> in
#Ending Diameter = <@enddia =
36.7,31,27.7,22.4,18.8,17.1,16.2,15,14.5,13.8,13.6,13.4,13.4,13.4,13.4,13.1,12.8,12.2,11.5,10.9,1
0.4,9.5,8.8,7.5,6.5,5.1,4.1> in
#Delta = <@delta =
0.5,0.3,0.2,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,
0.05,0.05,0.05,0.05,0.05,0.02> in
,
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
,
=csas6
template
v7-238
read composition
  pu          1 den=<critconc> 1 300
                94239 97
                94240 3   end
<&ZEROCHECK(wconc)\11>h2o          1 den=<wconc> 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="sphere"
  sphere 1      {{{(diameter*in)/2}}}
  media 1 1 1
  boundary 1
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
  return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_sph_097_00ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: sphere
modmat: H2O
critmat: plutonium
isomat: Pu239 0.97 Pu240 0.03
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 34.8387
0.011 29.6081
0.012 26.4929
0.015 21.7015
0.020 18.3170
0.025 16.7094
0.030 15.7085
0.040 14.6745
0.050 14.0306
0.075 13.4352
0.100 13.2532
0.150 13.1163
0.200 13.0226
0.350 12.9915
0.500 13.0026
0.750 12.7066
1.000 12.4186
1.500 11.6912
2.000 11.1276
2.500 10.5982
3.000 10.0837
4.000 9.2899
5.000 8.5486
7.500 7.2676
10.000 6.3194
15.000 4.9134
19.600 3.9653
```

0.01			0.011			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
26.50	0.9229	0.00150	23.90	0.9267	0.00160	22.00	0.9225	0.00150
27	0.9298	0.00170	24.2	0.9301	0.00190	22.2	0.9303	0.00180
27.5	0.9353	0.00210	24.5	0.9322	0.00190	22.4	0.9303	0.00160
28	0.9433	0.00150	24.8	0.9405	0.00130	22.6	0.9381	0.00140
28.5	0.9496	0.00150	25.1	0.9455	0.00160	22.8	0.9385	0.00130
29	0.9540	0.00120	25.4	0.9489	0.00130	23	0.9421	0.00160
29.5	0.9569	0.00150	25.7	0.9531	0.00180	23.2	0.9459	0.00150
30	0.9632	0.00170	26	0.9571	0.00140	23.4	0.9482	0.00180
30.5	0.9671	0.00120	26.3	0.9616	0.00120	23.6	0.9536	0.00160
31	0.9733	0.00160	26.6	0.9636	0.00130	23.8	0.9603	0.00150
31.5	0.9770	0.00120	26.9	0.9704	0.00130	24	0.9584	0.00190
32	0.9821	0.00160	27.2	0.9705	0.00170	24.2	0.9622	0.00160
32.5	0.9839	0.00120	27.5	0.9746	0.00180	24.4	0.9653	0.00170
33	0.9923	0.00160	27.8	0.9769	0.00160	24.6	0.9709	0.00130
33.5	0.9891	0.00120	28.1	0.9831	0.00180	24.8	0.9752	0.00190
34	0.9970	0.00220	28.4	0.9927	0.00150	25	0.9772	0.00170
34.5	0.9979	0.00140	28.7	0.9883	0.00180	25.2	0.9785	0.00180
35	1.0010	0.00130	29	0.9954	0.00140	25.4	0.9847	0.00160
35.5	1.0046	0.00130	29.3	0.9979	0.00130	25.6	0.9881	0.00190
36	1.0084	0.00160	29.6	0.9999	0.00160	25.8	0.9854	0.00140
36.5	1.0115	0.00110	29.9	1.0036	0.00160	26	0.9893	0.00160
36.7	1.0158	0.00150	30.2	1.0066	0.00150	26.2	0.9937	0.00170
			30.5	1.0074	0.00130	26.4	0.9987	0.00150
			30.8	1.0102	0.00190	26.6	1.0015	0.00170
			31	1.0123	0.00160	26.8	1.0013	0.00150
						27	1.0072	0.00160
						27.2	1.0104	0.00140
						27.4	1.0111	0.00250
						27.6	1.0158	0.00130
						27.7	1.0148	0.00150

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
18.70	0.9225	0.00190	16.10	0.9166	0.00200	14.80	0.9141	0.00210
18.8	0.9301	0.00210	16.2	0.9240	0.00180	14.9	0.9204	0.00220
18.9	0.9259	0.00220	16.3	0.9263	0.00180	15	0.9256	0.00220
19	0.9303	0.00190	16.4	0.9301	0.00180	15.1	0.9300	0.00200
19.1	0.9350	0.00180	16.5	0.9357	0.00210	15.2	0.9365	0.00200
19.2	0.9352	0.00180	16.6	0.9405	0.00170	15.3	0.9396	0.00220
19.3	0.9403	0.00190	16.7	0.9443	0.00200	15.4	0.9429	0.00290
19.4	0.9411	0.00160	16.8	0.9435	0.00180	15.5	0.9519	0.00230
19.5	0.9452	0.00190	16.9	0.9472	0.00220	15.6	0.9548	0.00200
19.6	0.9475	0.00240	17	0.9561	0.00220	15.7	0.9576	0.00210
19.7	0.9507	0.00210	17.1	0.9604	0.00190	15.8	0.9639	0.00170
19.8	0.9502	0.00200	17.2	0.9625	0.00220	15.9	0.9656	0.00190
19.9	0.9547	0.00190	17.3	0.9690	0.00180	16	0.9700	0.00220
20	0.9551	0.00190	17.4	0.9671	0.00190	16.1	0.9794	0.00210
20.1	0.9609	0.00160	17.5	0.9665	0.00200	16.2	0.9815	0.00190
20.2	0.9644	0.00180	17.6	0.9761	0.00180	16.3	0.9847	0.00220
20.3	0.9648	0.00180	17.7	0.9773	0.00230	16.4	0.9925	0.00260
20.4	0.9686	0.00210	17.8	0.9816	0.00240	16.5	0.9962	0.00230
20.5	0.9704	0.00170	17.9	0.9818	0.00210	16.6	0.9958	0.00240
20.6	0.9713	0.00210	18	0.9894	0.00200	16.7	0.9995	0.00310
20.7	0.9746	0.00190	18.1	0.9921	0.00230	16.8	1.0048	0.00160
20.8	0.9837	0.00230	18.2	0.9964	0.00200	16.9	1.0100	0.00240
20.9	0.9821	0.00200	18.3	0.9991	0.00290	17	1.0128	0.00210
21	0.9819	0.00230	18.4	1.0044	0.00240	17.1	1.0118	0.00230
21.1	0.9829	0.00180	18.5	1.0071	0.00230			
21.2	0.9887	0.00160	18.6	1.0080	0.00200			
21.3	0.9892	0.00180	18.7	1.0099	0.00170			
21.4	0.9930	0.00150	18.8	1.0113	0.00170			
21.5	0.9939	0.00190						
21.6	0.9979	0.00200						
21.7	0.9999	0.00170						
21.8	1.0067	0.00170						
21.9	1.0028	0.00200						
22	1.0050	0.00160						
22.1	1.0058	0.00250						
22.2	1.0120	0.00230						
22.3	1.0119	0.00240						
22.4	1.0137	0.00140						

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.10	0.9199	0.00220	13.20	0.9163	0.00200	12.80	0.9217	0.00210
14.2	0.9250	0.00250	13.3	0.9187	0.00230	12.85	0.9271	0.00210
14.3	0.9299	0.00210	13.4	0.9288	0.00230	12.9	0.9278	0.00330
14.4	0.9347	0.00240	13.5	0.9328	0.00200	12.95	0.9324	0.00230
14.5	0.9438	0.00200	13.6	0.9414	0.00210	13	0.9359	0.00230
14.6	0.9469	0.00240	13.7	0.9467	0.00190	13.05	0.9341	0.00210
14.7	0.9504	0.00220	13.8	0.9513	0.00260	13.1	0.9402	0.00240
14.8	0.9534	0.00190	13.9	0.9615	0.00220	13.15	0.9446	0.00260
14.9	0.9598	0.00200	14	0.9656	0.00240	13.2	0.9414	0.00210
15	0.9671	0.00200	14.1	0.9679	0.00210	13.25	0.9534	0.00270
15.1	0.9719	0.00180	14.2	0.9797	0.00190	13.3	0.9586	0.00230
15.2	0.9744	0.00190	14.3	0.9763	0.00230	13.35	0.9600	0.00210
15.3	0.9803	0.00210	14.4	0.9865	0.00250	13.4	0.9613	0.00210
15.4	0.9886	0.00230	14.5	0.9895	0.00220	13.45	0.9630	0.00240
15.5	0.9896	0.00260	14.6	0.9962	0.00320	13.5	0.9680	0.00280
15.6	0.9923	0.00220	14.7	1.0013	0.00240	13.55	0.9671	0.00240
15.7	0.9995	0.00230	14.8	1.0018	0.00210	13.6	0.9728	0.00240
15.8	1.0054	0.00200	14.9	1.0099	0.00230	13.65	0.9768	0.00240
15.9	1.0075	0.00240	15	1.0154	0.00230	13.7	0.9765	0.00250
16	1.0129	0.00290				13.75	0.9776	0.00270
16.1	1.0167	0.00260				13.8	0.9825	0.00360
16.2	1.0177	0.00190				13.85	0.9878	0.00250
						13.9	0.9903	0.00230
						13.95	0.9956	0.00200
						14	0.9956	0.00220
						14.05	1.0028	0.00240
						14.1	1.0034	0.00270
						14.15	1.0083	0.00250
						14.2	1.0030	0.00230
						14.25	1.0068	0.00210
						14.3	1.0101	0.00230
						14.35	1.0090	0.00200
						14.4	1.0142	0.00290
						14.45	1.0196	0.00230
						14.5	1.0241	0.00230

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.20	0.9179	0.00310	12.00	0.9212	0.00270	11.90	0.9233	0.00260
12.25	0.9191	0.00260	12.05	0.9250	0.00240	11.95	0.9294	0.00270
12.3	0.9217	0.00210	12.1	0.9249	0.00220	12	0.9293	0.00270
12.35	0.9313	0.00230	12.15	0.9370	0.00240	12.05	0.9347	0.00230
12.4	0.9337	0.00230	12.2	0.9313	0.00270	12.1	0.9365	0.00200
12.45	0.9386	0.00230	12.25	0.9400	0.00260	12.15	0.9417	0.00260
12.5	0.9383	0.00260	12.3	0.9464	0.00200	12.2	0.9403	0.00220
12.55	0.9351	0.00260	12.35	0.9446	0.00220	12.25	0.9477	0.00260
12.6	0.9464	0.00240	12.4	0.9499	0.00250	12.3	0.9505	0.00210
12.65	0.9520	0.00250	12.45	0.9496	0.00260	12.35	0.9523	0.00240
12.7	0.9485	0.00270	12.5	0.9534	0.00260	12.4	0.9571	0.00240
12.75	0.9517	0.00210	12.55	0.9547	0.00270	12.45	0.9586	0.00300
12.8	0.9635	0.00240	12.6	0.9624	0.00210	12.5	0.9648	0.00260
12.85	0.9591	0.00260	12.65	0.9625	0.00220	12.55	0.9665	0.00240
12.9	0.9694	0.00280	12.7	0.9681	0.00230	12.6	0.9683	0.00230
12.95	0.9677	0.00240	12.75	0.9657	0.00250	12.65	0.9729	0.00240
13	0.9689	0.00230	12.8	0.9764	0.00230	12.7	0.9797	0.00270
13.05	0.9812	0.00250	12.85	0.9742	0.00270	12.75	0.9797	0.00260
13.1	0.9794	0.00230	12.9	0.9766	0.00270	12.8	0.9846	0.00210
13.15	0.9842	0.00270	12.95	0.9837	0.00280	12.85	0.9855	0.00240
13.2	0.9854	0.00250	13	0.9914	0.00270	12.9	0.9883	0.00220
13.25	0.9870	0.00200	13.05	0.9860	0.00260	12.95	0.9934	0.00240
13.3	0.9869	0.00230	13.1	0.9905	0.00220	13	0.9928	0.00230
13.35	0.9962	0.00240	13.15	0.9995	0.00230	13.05	0.9987	0.00290
13.4	0.9957	0.00200	13.2	0.9976	0.00270	13.1	0.9971	0.00220
13.45	1.0018	0.00230	13.25	0.9996	0.00260	13.15	1.0060	0.00260
13.5	1.0033	0.00260	13.3	1.0058	0.00300	13.2	1.0102	0.00240
13.55	1.0083	0.00230	13.35	1.0055	0.00230	13.25	1.0133	0.00260
13.6	1.0085	0.00250	13.4	1.0133	0.00240	13.3	1.0185	0.00230
13.65	1.0101	0.00220	13.45	1.0143	0.00230	13.35	1.0206	0.00210
13.7	1.0142	0.00230	13.5	1.0145	0.00280	13.4	1.0216	0.00240
13.75	1.0201	0.00210	13.55	1.0241	0.00280			
13.8	1.0172	0.00230	13.6	1.0285	0.00220			

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.80	0.9176	0.00240	11.80	0.9214	0.00250	11.70	0.9245	0.00250
11.85	0.9232	0.00250	11.85	0.9223	0.00250	11.75	0.9251	0.00240
11.9	0.9238	0.00230	11.9	0.9304	0.00210	11.8	0.9255	0.00240
11.95	0.9308	0.00300	11.95	0.9312	0.00220	11.85	0.9300	0.00210
12	0.9343	0.00260	12	0.9357	0.00220	11.9	0.9341	0.00240
12.05	0.9360	0.00350	12.05	0.9376	0.00220	11.95	0.9359	0.00250
12.1	0.9383	0.00250	12.1	0.9418	0.00210	12	0.9410	0.00200
12.15	0.9435	0.00240	12.15	0.9455	0.00220	12.05	0.9450	0.00210
12.2	0.9431	0.00260	12.2	0.9482	0.00230	12.1	0.9486	0.00260
12.25	0.9489	0.00260	12.25	0.9494	0.00250	12.15	0.9521	0.00210
12.3	0.9527	0.00220	12.3	0.9538	0.00220	12.2	0.9481	0.00210
12.35	0.9569	0.00210	12.35	0.9588	0.00250	12.25	0.9541	0.00210
12.4	0.9583	0.00220	12.4	0.9610	0.00220	12.3	0.9569	0.00240
12.45	0.9608	0.00250	12.45	0.9630	0.00220	12.35	0.9647	0.00230
12.5	0.9693	0.00260	12.5	0.9690	0.00220	12.4	0.9650	0.00270
12.55	0.9707	0.00230	12.55	0.9689	0.00270	12.45	0.9709	0.00220
12.6	0.9751	0.00260	12.6	0.9794	0.00280	12.5	0.9705	0.00310
12.65	0.9748	0.00240	12.65	0.9765	0.00260	12.55	0.9774	0.00260
12.7	0.9814	0.00370	12.7	0.9780	0.00250	12.6	0.9752	0.00200
12.75	0.9816	0.00220	12.75	0.9829	0.00200	12.65	0.9852	0.00260
12.8	0.9868	0.00250	12.8	0.9865	0.00270	12.7	0.9883	0.00240
12.85	0.9870	0.00240	12.85	0.9869	0.00200	12.75	0.9827	0.00250
12.9	0.9853	0.00240	12.9	0.9928	0.00220	12.8	0.9937	0.00250
12.95	0.9980	0.00280	12.95	0.9932	0.00280	12.85	0.9957	0.00240
13	0.9986	0.00290	13	1.0014	0.00240	12.9	0.9966	0.00230
13.05	1.0017	0.00220	13.05	1.0006	0.00270	12.95	0.9977	0.00240
13.1	1.0054	0.00230	13.1	1.0084	0.00230	13	0.9997	0.00240
13.15	1.0079	0.00230	13.15	1.0085	0.00230	13.05	1.0054	0.00240
13.2	1.0062	0.00210	13.2	1.0083	0.00250	13.1	1.0078	0.00260
13.25	1.0095	0.00180	13.25	1.0163	0.00230	13.15	1.0119	0.00250
13.3	1.0132	0.00260	13.3	1.0143	0.00240	13.2	1.0170	0.00230
13.35	1.0165	0.00250	13.35	1.0174	0.00220	13.25	1.0197	0.00230
13.4	1.0187	0.00210	13.4	1.0208	0.00260	13.3	1.0182	0.00200
						13.35	1.0208	0.00260
						13.4	1.0289	0.00210

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.50	0.9211	0.00220	11.20	0.9166	0.00200	10.60	0.9183	0.00190
11.55	0.9237	0.00230	11.25	0.9229	0.00200	10.65	0.9218	0.00230
11.6	0.9317	0.00220	11.3	0.9246	0.00220	10.7	0.9258	0.00210
11.65	0.9303	0.00260	11.35	0.9320	0.00190	10.75	0.9303	0.00230
11.7	0.9348	0.00190	11.4	0.9310	0.00210	10.8	0.9308	0.00240
11.75	0.9372	0.00230	11.45	0.9363	0.00230	10.85	0.9396	0.00240
11.8	0.9427	0.00240	11.5	0.9419	0.00200	10.9	0.9438	0.00220
11.85	0.9466	0.00260	11.55	0.9431	0.00210	10.95	0.9468	0.00240
11.9	0.9475	0.00230	11.6	0.9439	0.00280	11	0.9494	0.00180
11.95	0.9542	0.00240	11.65	0.9525	0.00250	11.05	0.9520	0.00220
12	0.9506	0.00280	11.7	0.9549	0.00230	11.1	0.9552	0.00190
12.05	0.9548	0.00240	11.75	0.9575	0.00220	11.15	0.9621	0.00220
12.1	0.9619	0.00240	11.8	0.9595	0.00210	11.2	0.9575	0.00200
12.15	0.9605	0.00230	11.85	0.9670	0.00210	11.25	0.9648	0.00200
12.2	0.9694	0.00220	11.9	0.9676	0.00210	11.3	0.9694	0.00200
12.25	0.9720	0.00240	11.95	0.9725	0.00240	11.35	0.9759	0.00240
12.3	0.9801	0.00220	12	0.9756	0.00280	11.4	0.9787	0.00200
12.35	0.9783	0.00280	12.05	0.9800	0.00250	11.45	0.9787	0.00220
12.4	0.9832	0.00260	12.1	0.9814	0.00220	11.5	0.9811	0.00190
12.45	0.9799	0.00210	12.15	0.9810	0.00300	11.55	0.9846	0.00210
12.5	0.9852	0.00200	12.2	0.9865	0.00220	11.6	0.9896	0.00190
12.55	0.9860	0.00220	12.25	0.9919	0.00260	11.65	0.9939	0.00240
12.6	0.9878	0.00230	12.3	0.9961	0.00200	11.7	1.0013	0.00190
12.65	0.9951	0.00250	12.35	0.9972	0.00280	11.75	1.0011	0.00210
12.7	0.9992	0.00200	12.4	1.0019	0.00250	11.8	1.0025	0.00220
12.75	1.0053	0.00210	12.45	0.9968	0.00220	11.85	1.0052	0.00210
12.8	1.0009	0.00240	12.5	1.0049	0.00230	11.9	1.0073	0.00200
12.85	1.0065	0.00230	12.55	1.0089	0.00270	11.95	1.0104	0.00200
12.9	1.0100	0.00270	12.6	1.0126	0.00200	12	1.0184	0.00270
12.95	1.0136	0.00220	12.65	1.0113	0.00240	12.05	1.0204	0.00210
13	1.0173	0.00250	12.7	1.0160	0.00220	12.1	1.0221	0.00220
13.05	1.0246	0.00230	12.75	1.0195	0.00220	12.15	1.0287	0.00230
13.1	1.0255	0.00280	12.8	1.0225	0.00200	12.2	1.0319	0.00290

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.10	0.9200	0.00200	9.60	0.9174	0.00240	9.20	0.9191	0.00200
10.15	0.9304	0.00190	9.65	0.9254	0.00180	9.25	0.9231	0.00220
10.20	0.9339	0.00230	9.7	0.9300	0.00220	9.3	0.9334	0.00250
10.25	0.9325	0.00230	9.75	0.9354	0.00200	9.35	0.9373	0.00250
10.30	0.9381	0.00220	9.8	0.9330	0.00200	9.4	0.9413	0.00220
10.35	0.9393	0.00230	9.85	0.9424	0.00240	9.45	0.9477	0.00240
10.40	0.9474	0.00230	9.9	0.9444	0.00230	9.5	0.9514	0.00190
10.45	0.9527	0.00230	9.95	0.9513	0.00230	9.55	0.9578	0.00220
10.50	0.9535	0.00250	10	0.9498	0.00210	9.6	0.9563	0.00250
10.55	0.9587	0.00240	10.05	0.9605	0.00180	9.65	0.9631	0.00240
10.60	0.9576	0.00270	10.1	0.9608	0.00190	9.7	0.9678	0.00210
10.65	0.9669	0.00290	10.15	0.9659	0.00210	9.75	0.9712	0.00180
10.70	0.9638	0.00270	10.2	0.9701	0.00210	9.8	0.9767	0.00280
10.75	0.9743	0.00200	10.25	0.9748	0.00200	9.85	0.9834	0.00210
10.80	0.9763	0.00220	10.3	0.9791	0.00180	9.9	0.9878	0.00220
10.85	0.9825	0.00190	10.35	0.9827	0.00220	9.95	0.9911	0.00230
10.90	0.9843	0.00260	10.4	0.9827	0.00190	10	0.9947	0.00230
10.95	0.9890	0.00220	10.45	0.9868	0.00240	10.05	0.9967	0.00260
11.00	0.9873	0.00260	10.5	0.9930	0.00220	10.1	1.0016	0.00210
11.05	0.9933	0.00260	10.55	0.9945	0.00220	10.15	1.0052	0.00230
11.10	0.9984	0.00200	10.6	1.0002	0.00220	10.2	1.0078	0.00220
11.15	1.0013	0.00270	10.65	1.0015	0.00190	10.25	1.0125	0.00240
11.20	1.0059	0.00220	10.7	1.0073	0.00210	10.3	1.0239	0.00230
11.25	1.0133	0.00200	10.75	1.0122	0.00250	10.35	1.0227	0.00270
11.30	1.0093	0.00240	10.8	1.0183	0.00250	10.4	1.0270	0.00200
11.35	1.0176	0.00200	10.85	1.0236	0.00220			
11.40	1.0220	0.00210	10.9	1.0264	0.00200			
11.45	1.0230	0.00200						
11.50	1.0294	0.00200						

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.40	0.9136	0.00210	7.80	0.9168	0.00200	6.70	0.9306	0.00160
8.45	0.9220	0.00220	7.85	0.9299	0.00260	6.75	0.9328	0.00220
8.5	0.9303	0.00240	7.9	0.9313	0.00200	6.8	0.9410	0.00220
8.55	0.9314	0.00230	7.95	0.9286	0.00240	6.85	0.9483	0.00190
8.6	0.9395	0.00200	8	0.9416	0.00190	6.9	0.9534	0.00260
8.65	0.9412	0.00200	8.05	0.9437	0.00210	6.95	0.9572	0.00210
8.7	0.9458	0.00230	8.1	0.9516	0.00200	7	0.9699	0.00200
8.75	0.9488	0.00240	8.15	0.9614	0.00210	7.05	0.9725	0.00210
8.8	0.9568	0.00210	8.2	0.9618	0.00260	7.1	0.9799	0.00220
8.85	0.9590	0.00260	8.25	0.9671	0.00240	7.15	0.9878	0.00220
8.9	0.9666	0.00230	8.3	0.9756	0.00230	7.2	0.9903	0.00180
8.95	0.9748	0.00230	8.35	0.9784	0.00210	7.25	0.9975	0.00200
9	0.9738	0.00180	8.4	0.9817	0.00220	7.3	1.0046	0.00230
9.05	0.9801	0.00200	8.45	0.9865	0.00200	7.35	1.0114	0.00230
9.1	0.9860	0.00230	8.5	0.9966	0.00260	7.4	1.0148	0.00180
9.15	0.9909	0.00220	8.55	1.0001	0.00230	7.45	1.0208	0.00230
9.2	0.9947	0.00190	8.6	1.0022	0.00180	7.5	1.0319	0.00240
9.25	0.9945	0.00240	8.65	1.0088	0.00210			
9.3	1.0014	0.00250	8.7	1.0150	0.00250			
9.35	1.0120	0.00230	8.75	1.0237	0.00240			
9.4	1.0151	0.00230	8.8	1.0224	0.00220			
9.45	1.0200	0.00210						
9.5	1.0229	0.00200						

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.80	0.9193	0.00190	4.40	0.9071	0.00170	3.60	0.9195	0.00190
5.85	0.9333	0.00180	4.45	0.9171	0.00170	3.62	0.9204	0.00200
5.9	0.9420	0.00200	4.5	0.9262	0.00240	3.64	0.9300	0.00190
5.95	0.9463	0.00190	4.55	0.9345	0.00190	3.66	0.9293	0.00210
6	0.9528	0.00180	4.6	0.9418	0.00170	3.68	0.9385	0.00210
6.05	0.9584	0.00190	4.65	0.9498	0.00270	3.7	0.9428	0.00230
6.1	0.9709	0.00210	4.7	0.9621	0.00200	3.72	0.9459	0.00200
6.15	0.9740	0.00200	4.75	0.9664	0.00210	3.74	0.9471	0.00200
6.2	0.9829	0.00180	4.8	0.9775	0.00190	3.76	0.9529	0.00220
6.25	0.9903	0.00200	4.85	0.9871	0.00200	3.78	0.9592	0.00200
6.3	0.9972	0.00220	4.9	0.9965	0.00200	3.8	0.9648	0.00210
6.35	1.0044	0.00200	4.95	1.0096	0.00180	3.82	0.9652	0.00240
6.4	1.0117	0.00190	5	1.0187	0.00240	3.84	0.9716	0.00210
6.45	1.0189	0.00210	5.05	1.0264	0.00210	3.86	0.9812	0.00200
6.5	1.0258	0.00220	5.1	1.0381	0.00250	3.88	0.9807	0.00220
						3.9	0.9866	0.00220
						3.92	0.9906	0.00210
						3.94	0.9935	0.00200
						3.96	0.9986	0.00210
						3.98	1.0039	0.00210
						4	1.0053	0.00210
						4.02	1.0131	0.00180
						4.04	1.0148	0.00200
						4.06	1.0235	0.00230
						4.08	1.0262	0.00200
						4.1	1.0297	0.00210

Case ID: pu_sph_097_01ref

Material: Plutonium

Geometry: Sphere

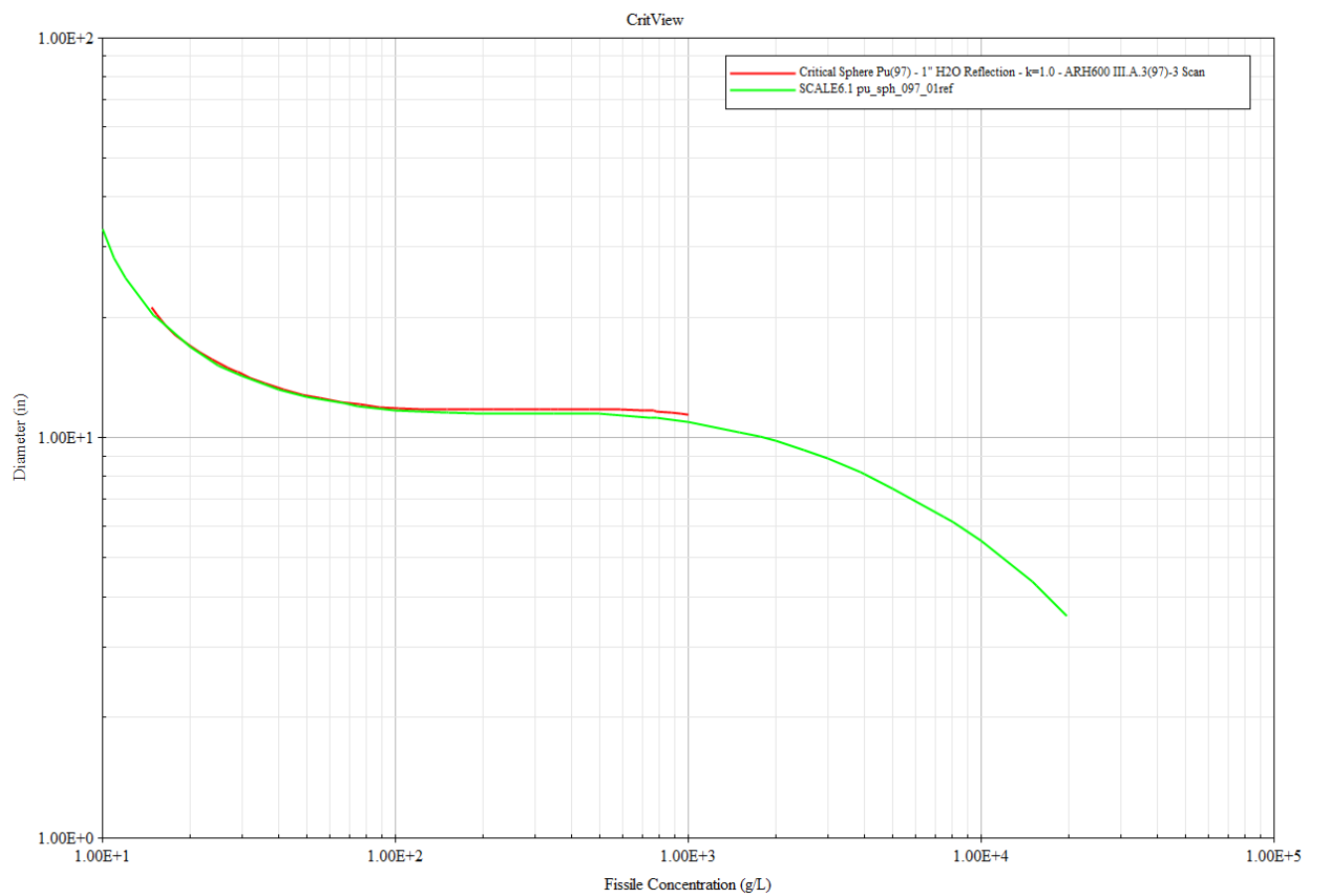
Isotopics: 97% ^{239}Pu 3% ^{240}Pu

Reflector: 1" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	25.100	35.400	0.500	33.2154
0.011	22.400	29.500	0.300	28.1623
0.012	20.400	26.100	0.200	25.0138
0.015	17.200	20.900	0.100	20.1923
0.020	14.700	17.300	0.100	16.8242
0.025	13.400	15.600	0.100	15.1684
0.030	12.600	14.600	0.100	14.2438
0.040	11.700	13.500	0.100	13.1500
0.050	11.200	12.900	0.050	12.6103
0.075	10.700	12.300	0.050	11.9458
0.100	10.500	12.000	0.050	11.6750
0.150	10.300	11.900	0.050	11.5275
0.200	10.300	11.900	0.050	11.4500
0.350	10.300	11.900	0.050	11.5095
0.500	10.200	11.800	0.050	11.4526
0.750	10.000	11.600	0.050	11.1956
1.000	9.800	11.300	0.050	10.9509
1.500	9.300	10.700	0.050	10.3307
2.000	8.800	10.100	0.050	9.7934
2.500	8.400	9.600	0.050	9.3051
3.000	7.900	9.100	0.050	8.8427
4.000	7.300	8.400	0.050	8.0847
5.000	6.800	7.700	0.050	7.4698
7.500	5.800	6.600	0.050	6.3428
10.000	5.000	5.700	0.050	5.5259
15.000	3.900	4.500	0.050	4.3579
19.600	3.200	3.700	0.020	3.5751

WORM and SCALE Input File

```

'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.1.1.2.2-1. Critical Dimensions for Plutonium Sphere (97% 239Pu) - 1 Inch of Water
Reflection
,
#index number = <index = 1:27:1>
,
#Concentration = <@conc =
0.01,0.011,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
25.1,22.4,20.4,17.2,14.7,13.4,12.6,11.7,11.2,10.7,10.5,10.3,10.3,10.3,10.2,10,9.8,9.3,8.8,8.4,7.9
,7.3,6.8,5.8,5,3.9,3.2> in
#Ending Diameter = <@enddia =
35.4,29.5,26.1,20.9,17.3,15.6,14.6,13.5,12.9,12.3,12,11.9,11.9,11.9,11.8,11.6,11.3,10.7,10.1,9.6,
9.1,8.4,7.7,6.6,5.7,4.5,3.7> in
#Delta = <@delta =
0.5,0.3,0.2,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,
0.05,0.05,0.05,0.05,0.05,0.02> in
,
'Reflector Thickness {{refthick = 1}}
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
Sphere Reflected
v7-238
read composition
  pu          1 den=<critconc> 1 300
                                94239 97
                                94240 3   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(refdia*in)/2}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```


CritView compatible data file

```
reset:
title: SCALE6.1 pu_sph_097_01ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: sphere
modmat: H2O
critmat: plutonium
isomat: Pu239 0.97 Pu240 0.03
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 33.2154
0.011 28.1623
0.012 25.0138
0.015 20.1923
0.020 16.8242
0.025 15.1684
0.030 14.2438
0.040 13.1500
0.050 12.6103
0.075 11.9458
0.100 11.6750
0.150 11.5275
0.200 11.4500
0.350 11.5095
0.500 11.4526
0.750 11.1956
1.000 10.9509
1.500 10.3307
2.000 9.7934
2.500 9.3051
3.000 8.8427
4.000 8.0847
5.000 7.4698
7.500 6.3428
10.000 5.5259
15.000 4.3579
19.600 3.5751
```

0.01			0.011			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
25.10	0.9232	0.00160	22.40	0.9247	0.00150	20.40	0.9218	0.00200
25.6	0.9326	0.00120	22.7	0.9301	0.00160	20.6	0.9292	0.00200
26.1	0.9386	0.00140	23	0.9360	0.00180	20.8	0.9303	0.00140
26.6	0.9454	0.00140	23.3	0.9378	0.00130	21	0.9360	0.00180
27.1	0.9487	0.00170	23.6	0.9454	0.00170	21.2	0.9380	0.00140
27.6	0.9526	0.00160	23.9	0.9476	0.00150	21.4	0.9431	0.00160
28.1	0.9572	0.00120	24.2	0.9547	0.00130	21.6	0.9467	0.00160
28.6	0.9653	0.00150	24.5	0.9546	0.00160	21.8	0.9469	0.00160
29.1	0.9681	0.00140	24.8	0.9642	0.00130	22	0.9515	0.00160
29.6	0.9700	0.00160	25.1	0.9653	0.00160	22.2	0.9569	0.00180
30.1	0.9782	0.00140	25.4	0.9699	0.00140	22.4	0.9618	0.00170
30.6	0.9855	0.00170	25.7	0.9693	0.00200	22.6	0.9646	0.00190
31.1	0.9863	0.00170	26	0.9759	0.00150	22.8	0.9649	0.00200
31.6	0.9903	0.00140	26.3	0.9815	0.00140	23	0.9684	0.00170
32.1	0.9935	0.00160	26.6	0.9820	0.00140	23.2	0.9721	0.00160
32.6	0.9960	0.00120	26.9	0.9849	0.00140	23.4	0.9761	0.00140
33.1	0.9988	0.00140	27.2	0.9917	0.00180	23.6	0.9778	0.00160
33.6	1.0040	0.00120	27.5	0.9907	0.00120	23.8	0.9796	0.00170
34.1	1.0088	0.00130	27.8	0.9960	0.00150	24	0.9850	0.00180
34.6	1.0114	0.00130	28.1	0.9989	0.00120	24.2	0.9897	0.00200
35.1	1.0105	0.00140	28.4	1.0042	0.00140	24.4	0.9964	0.00140
35.4	1.0168	0.00120	28.7	1.0064	0.00140	24.6	0.9938	0.00130
			29	1.0069	0.00170	24.8	0.9985	0.00130
			29.3	1.0141	0.00160	25	0.9998	0.00150
			29.5	1.0168	0.00110	25.2	1.0027	0.00220
						25.4	1.0040	0.00160
						25.6	1.0049	0.00140
						25.8	1.0057	0.00140
						26	1.0129	0.00150
						26.1	1.0130	0.00160

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.20	0.9224	0.00160	14.70	0.9195	0.00180	13.40	0.9250	0.00180
17.3	0.9232	0.00170	14.8	0.9279	0.00190	13.5	0.9237	0.00190
17.4	0.9284	0.00170	14.9	0.9308	0.00200	13.6	0.9312	0.00250
17.5	0.9301	0.00180	15	0.9364	0.00150	13.7	0.9341	0.00190
17.6	0.9320	0.00160	15.1	0.9381	0.00180	13.8	0.9393	0.00210
17.7	0.9349	0.00160	15.2	0.9439	0.00190	13.9	0.9439	0.00170
17.8	0.9397	0.00160	15.3	0.9466	0.00190	14	0.9498	0.00230
17.9	0.9407	0.00170	15.4	0.9504	0.00180	14.1	0.9523	0.00270
18	0.9410	0.00200	15.5	0.9510	0.00160	14.2	0.9592	0.00230
18.1	0.9479	0.00130	15.6	0.9577	0.00180	14.3	0.9624	0.00230
18.2	0.9512	0.00160	15.7	0.9586	0.00180	14.4	0.9679	0.00210
18.3	0.9512	0.00210	15.8	0.9650	0.00210	14.5	0.9714	0.00240
18.4	0.9567	0.00170	15.9	0.9693	0.00210	14.6	0.9780	0.00220
18.5	0.9580	0.00140	16	0.9738	0.00150	14.7	0.9828	0.00200
18.6	0.9610	0.00170	16.1	0.9789	0.00220	14.8	0.9864	0.00190
18.7	0.9632	0.00210	16.2	0.9836	0.00170	14.9	0.9920	0.00200
18.8	0.9642	0.00170	16.3	0.9864	0.00250	15	0.9952	0.00200
18.9	0.9653	0.00140	16.4	0.9875	0.00210	15.1	0.9961	0.00190
19	0.9734	0.00200	16.5	0.9889	0.00220	15.2	1.0018	0.00220
19.1	0.9714	0.00210	16.6	0.9918	0.00180	15.3	1.0060	0.00220
19.2	0.9744	0.00220	16.7	0.9965	0.00230	15.4	1.0083	0.00210
19.3	0.9778	0.00170	16.8	0.9992	0.00260	15.5	1.0103	0.00200
19.4	0.9783	0.00230	16.9	1.0025	0.00210	15.6	1.0135	0.00190
19.5	0.9816	0.00180	17	1.0071	0.00190			
19.6	0.9885	0.00170	17.1	1.0080	0.00170			
19.7	0.9877	0.00180	17.2	1.0118	0.00230			
19.8	0.9868	0.00180	17.3	1.0121	0.00190			
19.9	0.9966	0.00180						
20	0.9930	0.00170						
20.1	0.9952	0.00190						
20.2	1.0004	0.00150						
20.3	1.0004	0.00150						
20.4	1.0014	0.00180						
20.5	1.0055	0.00140						
20.6	1.0087	0.00180						
20.7	1.0098	0.00190						
20.8	1.0108	0.00140						
20.9	1.0100	0.00180						

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.60	0.9201	0.00180	11.70	0.9163	0.00260	11.20	0.9175	0.00210
12.7	0.9260	0.00230	11.8	0.9238	0.00190	11.25	0.9157	0.00220
12.8	0.9303	0.00190	11.9	0.9296	0.00210	11.3	0.9226	0.00180
12.9	0.9356	0.00210	12	0.9346	0.00240	11.35	0.9271	0.00230
13	0.9398	0.00210	12.1	0.9439	0.00220	11.4	0.9274	0.00240
13.1	0.9461	0.00210	12.2	0.9455	0.00220	11.45	0.9265	0.00280
13.2	0.9508	0.00250	12.3	0.9517	0.00240	11.5	0.9343	0.00220
13.3	0.9579	0.00220	12.4	0.9560	0.00220	11.55	0.9386	0.00220
13.4	0.9648	0.00210	12.5	0.9641	0.00220	11.6	0.9444	0.00230
13.5	0.9662	0.00230	12.6	0.9752	0.00260	11.65	0.9446	0.00190
13.6	0.9715	0.00230	12.7	0.9782	0.00250	11.7	0.9523	0.00250
13.7	0.9790	0.00200	12.8	0.9835	0.00240	11.75	0.9511	0.00200
13.8	0.9769	0.00230	12.9	0.9843	0.00190	11.8	0.9578	0.00240
13.9	0.9825	0.00200	13	0.9897	0.00200	11.85	0.9581	0.00220
14	0.9881	0.00230	13.1	0.9979	0.00250	11.9	0.9617	0.00210
14.1	0.9962	0.00200	13.2	1.0021	0.00240	11.95	0.9632	0.00220
14.2	0.9993	0.00200	13.3	1.0028	0.00240	12	0.9632	0.00200
14.3	1.0009	0.00270	13.4	1.0121	0.00210	12.05	0.9659	0.00240
14.4	1.0098	0.00230	13.5	1.0188	0.00240	12.1	0.9740	0.00290
14.5	1.0126	0.00210				12.15	0.9754	0.00240
14.6	1.0158	0.00200				12.2	0.9755	0.00210
						12.25	0.9776	0.00260
						12.3	0.9862	0.00210
						12.35	0.9864	0.00200
						12.4	0.9916	0.00270
						12.45	0.9920	0.00270
						12.5	0.9925	0.00210
						12.55	0.9968	0.00250
						12.6	0.9978	0.00260
						12.65	1.0085	0.00210
						12.7	1.0075	0.00250
						12.75	1.0101	0.00210
						12.8	1.0137	0.00210
						12.85	1.0139	0.00260
						12.9	1.0213	0.00240

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.70	0.9201	0.00240	10.50	0.9190	0.00220	10.30	0.9186	0.00220
10.75	0.9236	0.00270	10.55	0.9233	0.00250	10.35	0.9237	0.00250
10.8	0.9255	0.00200	10.6	0.9255	0.00230	10.4	0.9207	0.00230
10.85	0.9285	0.00250	10.65	0.9289	0.00230	10.45	0.9337	0.00210
10.9	0.9340	0.00240	10.7	0.9345	0.00200	10.5	0.9333	0.00230
10.95	0.9354	0.00240	10.75	0.9388	0.00240	10.55	0.9371	0.00240
11	0.9413	0.00250	10.8	0.9426	0.00220	10.6	0.9382	0.00250
11.05	0.9446	0.00260	10.85	0.9479	0.00220	10.65	0.9425	0.00250
11.1	0.9491	0.00240	10.9	0.9545	0.00330	10.7	0.9520	0.00320
11.15	0.9492	0.00250	10.95	0.9509	0.00290	10.75	0.9474	0.00230
11.2	0.9503	0.00260	11	0.9551	0.00210	10.8	0.9508	0.00320
11.25	0.9545	0.00230	11.05	0.9578	0.00220	10.85	0.9566	0.00220
11.3	0.9612	0.00290	11.1	0.9592	0.00260	10.9	0.9592	0.00240
11.35	0.9675	0.00260	11.15	0.9687	0.00260	10.95	0.9685	0.00300
11.4	0.9620	0.00220	11.2	0.9678	0.00240	11	0.9668	0.00250
11.45	0.9731	0.00210	11.25	0.9757	0.00230	11.05	0.9670	0.00240
11.5	0.9724	0.00220	11.3	0.9783	0.00270	11.1	0.9776	0.00280
11.55	0.9780	0.00250	11.35	0.9755	0.00270	11.15	0.9774	0.00250
11.6	0.9826	0.00220	11.4	0.9806	0.00240	11.2	0.9785	0.00270
11.65	0.9861	0.00200	11.45	0.9843	0.00250	11.25	0.9808	0.00330
11.7	0.9870	0.00310	11.5	0.9908	0.00200	11.3	0.9842	0.00240
11.75	0.9889	0.00270	11.55	0.9905	0.00250	11.35	0.9905	0.00230
11.8	0.9935	0.00230	11.6	0.9938	0.00240	11.4	0.9918	0.00240
11.85	0.9958	0.00280	11.65	1.0026	0.00260	11.45	0.9935	0.00220
11.9	0.9978	0.00290	11.7	0.9974	0.00270	11.5	1.0011	0.00260
11.95	1.0002	0.00200	11.75	1.0076	0.00230	11.55	0.9991	0.00290
12	1.0083	0.00240	11.8	1.0106	0.00200	11.6	1.0069	0.00240
12.05	1.0026	0.00210	11.85	1.0147	0.00280	11.65	1.0075	0.00240
12.1	1.0092	0.00270	11.9	1.0162	0.00270	11.7	1.0163	0.00250
12.15	1.0126	0.00300	11.95	1.0175	0.00200	11.75	1.0152	0.00240
12.2	1.0148	0.00260	12	1.0219	0.00270	11.8	1.0215	0.00200
12.25	1.0242	0.00200				11.85	1.0179	0.00230
12.3	1.0209	0.00250				11.9	1.0227	0.00250

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.30	0.9224	0.00220	10.30	0.9231	0.00280	10.20	0.9209	0.00220
10.35	0.9237	0.00230	10.35	0.9246	0.00230	10.25	0.9297	0.00230
10.4	0.9312	0.00220	10.4	0.9329	0.00230	10.3	0.9294	0.00200
10.45	0.9355	0.00250	10.45	0.9332	0.00250	10.35	0.9307	0.00230
10.5	0.9385	0.00230	10.5	0.9362	0.00240	10.4	0.9344	0.00240
10.55	0.9414	0.00180	10.55	0.9411	0.00210	10.45	0.9365	0.00260
10.6	0.9402	0.00190	10.6	0.9417	0.00210	10.5	0.9458	0.00240
10.65	0.9444	0.00230	10.65	0.9482	0.00210	10.55	0.9477	0.00260
10.7	0.9437	0.00220	10.7	0.9545	0.00240	10.6	0.9488	0.00200
10.75	0.9552	0.00270	10.75	0.9543	0.00200	10.65	0.9571	0.00210
10.8	0.9549	0.00190	10.8	0.9598	0.00250	10.7	0.9613	0.00200
10.85	0.9574	0.00230	10.85	0.9623	0.00200	10.75	0.9599	0.00260
10.9	0.9656	0.00240	10.9	0.9638	0.00250	10.8	0.9638	0.00240
10.95	0.9671	0.00230	10.95	0.9678	0.00210	10.85	0.9650	0.00240
11	0.9705	0.00260	11	0.9711	0.00260	10.9	0.9709	0.00190
11.05	0.9721	0.00260	11.05	0.9720	0.00210	10.95	0.9723	0.00240
11.1	0.9740	0.00210	11.1	0.9762	0.00240	11	0.9733	0.00210
11.15	0.9781	0.00280	11.15	0.9766	0.00220	11.05	0.9795	0.00200
11.2	0.9778	0.00250	11.2	0.9812	0.00260	11.1	0.9750	0.00230
11.25	0.9829	0.00250	11.25	0.9840	0.00240	11.15	0.9841	0.00250
11.3	0.9871	0.00240	11.3	0.9907	0.00260	11.2	0.9890	0.00230
11.35	0.9919	0.00230	11.35	0.9900	0.00220	11.25	0.9896	0.00250
11.4	0.9952	0.00200	11.4	0.9947	0.00220	11.3	0.9920	0.00240
11.45	1.0000	0.00290	11.45	0.9975	0.00220	11.35	0.9983	0.00240
11.5	1.0029	0.00240	11.5	0.9986	0.00220	11.4	0.9976	0.00210
11.55	1.0064	0.00200	11.55	1.0060	0.00210	11.45	0.9997	0.00230
11.6	1.0038	0.00270	11.6	1.0047	0.00220	11.5	1.0055	0.00210
11.65	1.0104	0.00280	11.65	1.0134	0.00270	11.55	1.0085	0.00260
11.7	1.0130	0.00220	11.7	1.0124	0.00230	11.6	1.0100	0.00190
11.75	1.0209	0.00240	11.75	1.0177	0.00230	11.65	1.0127	0.00210
11.8	1.0225	0.00250	11.8	1.0151	0.00250	11.7	1.0130	0.00220
11.85	1.0237	0.00230	11.85	1.0280	0.00220	11.75	1.0178	0.00220
11.9	1.0253	0.00250	11.9	1.0260	0.00230	11.8	1.0208	0.00240

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.00	0.9227	0.00200	9.80	0.9255	0.00190	9.30	0.9236	0.00230
10.05	0.9270	0.00200	9.85	0.9276	0.00180	9.35	0.9275	0.00210
10.1	0.9253	0.00200	9.9	0.9289	0.00210	9.4	0.9347	0.00180
10.15	0.9301	0.00240	9.95	0.9363	0.00180	9.45	0.9352	0.00240
10.2	0.9320	0.00230	10	0.9393	0.00250	9.5	0.9382	0.00210
10.25	0.9402	0.00200	10.05	0.9424	0.00270	9.55	0.9455	0.00250
10.3	0.9427	0.00240	10.1	0.9450	0.00220	9.6	0.9497	0.00220
10.35	0.9443	0.00210	10.15	0.9511	0.00230	9.65	0.9514	0.00220
10.4	0.9482	0.00280	10.2	0.9532	0.00230	9.7	0.9556	0.00180
10.45	0.9504	0.00240	10.25	0.9558	0.00220	9.75	0.9581	0.00230
10.5	0.9553	0.00270	10.3	0.9571	0.00190	9.8	0.9586	0.00210
10.55	0.9576	0.00230	10.35	0.9614	0.00230	9.85	0.9684	0.00210
10.6	0.9631	0.00210	10.4	0.9679	0.00240	9.9	0.9673	0.00270
10.65	0.9640	0.00280	10.45	0.9683	0.00200	9.95	0.9702	0.00270
10.7	0.9654	0.00180	10.5	0.9751	0.00180	10	0.9780	0.00190
10.75	0.9700	0.00230	10.55	0.9807	0.00200	10.05	0.9798	0.00190
10.8	0.9741	0.00260	10.6	0.9807	0.00210	10.1	0.9825	0.00220
10.85	0.9799	0.00210	10.65	0.9812	0.00220	10.15	0.9866	0.00200
10.9	0.9833	0.00210	10.7	0.9794	0.00190	10.2	0.9935	0.00230
10.95	0.9874	0.00220	10.75	0.9891	0.00200	10.25	0.9923	0.00250
11	0.9903	0.00260	10.8	0.9932	0.00210	10.3	0.9973	0.00180
11.05	0.9896	0.00210	10.85	0.9952	0.00210	10.35	1.0017	0.00220
11.1	0.9984	0.00220	10.9	0.9990	0.00210	10.4	1.0072	0.00200
11.15	0.9948	0.00220	10.95	0.9999	0.00200	10.45	1.0090	0.00200
11.2	1.0005	0.00240	11	1.0055	0.00260	10.5	1.0088	0.00200
11.25	1.0016	0.00240	11.05	1.0075	0.00240	10.55	1.0167	0.00250
11.3	1.0043	0.00250	11.1	1.0083	0.00190	10.6	1.0144	0.00180
11.35	1.0093	0.00200	11.15	1.0127	0.00230	10.65	1.0213	0.00190
11.4	1.0099	0.00210	11.2	1.0154	0.00230	10.7	1.0240	0.00220
11.45	1.0145	0.00210	11.25	1.0206	0.00220			
11.5	1.0165	0.00260	11.3	1.0207	0.00210			
11.55	1.0189	0.00220						
11.6	1.0265	0.00200						

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.80	0.9223	0.00250	8.40	0.9242	0.00210	7.90	0.9151	0.00260
8.85	0.9275	0.00190	8.45	0.9265	0.00220	7.95	0.9201	0.00190
8.9	0.9305	0.00280	8.5	0.9346	0.00190	8	0.9249	0.00190
8.95	0.9314	0.00210	8.55	0.9390	0.00230	8.05	0.9334	0.00200
9	0.9380	0.00220	8.6	0.9426	0.00230	8.1	0.9367	0.00200
9.05	0.9447	0.00210	8.65	0.9519	0.00220	8.15	0.9395	0.00210
9.1	0.9456	0.00200	8.7	0.9500	0.00190	8.2	0.9389	0.00200
9.15	0.9529	0.00260	8.75	0.9553	0.00220	8.25	0.9459	0.00190
9.2	0.9567	0.00230	8.8	0.9640	0.00220	8.3	0.9520	0.00190
9.25	0.9592	0.00200	8.85	0.9667	0.00250	8.35	0.9591	0.00250
9.3	0.9641	0.00230	8.9	0.9668	0.00210	8.4	0.9604	0.00230
9.35	0.9672	0.00200	8.95	0.9657	0.00220	8.45	0.9655	0.00230
9.4	0.9706	0.00200	9	0.9737	0.00190	8.5	0.9702	0.00250
9.45	0.9755	0.00200	9.05	0.9822	0.00180	8.55	0.9763	0.00190
9.5	0.9763	0.00220	9.1	0.9874	0.00220	8.6	0.9798	0.00250
9.55	0.9819	0.00220	9.15	0.9904	0.00210	8.65	0.9815	0.00210
9.6	0.9845	0.00200	9.2	0.9895	0.00250	8.7	0.9866	0.00200
9.65	0.9850	0.00280	9.25	0.9978	0.00220	8.75	0.9926	0.00220
9.7	0.9922	0.00200	9.3	0.9990	0.00210	8.8	0.9953	0.00230
9.75	0.9967	0.00190	9.35	1.0089	0.00220	8.85	1.0008	0.00190
9.8	1.0005	0.00210	9.4	1.0079	0.00220	8.9	1.0045	0.00180
9.85	1.0047	0.00250	9.45	1.0108	0.00270	8.95	1.0104	0.00190
9.9	1.0104	0.00190	9.5	1.0142	0.00200	9	1.0136	0.00200
9.95	1.0136	0.00210	9.55	1.0175	0.00260	9.05	1.0175	0.00210
10	1.0179	0.00230	9.6	1.0242	0.00220	9.1	1.0205	0.00190
10.05	1.0198	0.00190						
10.1	1.0245	0.00220						

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.30	0.9184	0.00180	6.80	0.9238	0.00190	5.80	0.9244	0.00220
7.35	0.9262	0.00210	6.85	0.9297	0.00200	5.85	0.9301	0.00200
7.4	0.9276	0.00200	6.9	0.9363	0.00260	5.9	0.9368	0.00220
7.45	0.9314	0.00220	6.95	0.9425	0.00240	5.95	0.9497	0.00190
7.5	0.9395	0.00190	7	0.9442	0.00190	6	0.9510	0.00190
7.55	0.9443	0.00180	7.05	0.9541	0.00200	6.05	0.9610	0.00210
7.6	0.9519	0.00190	7.1	0.9580	0.00240	6.1	0.9645	0.00220
7.65	0.9547	0.00210	7.15	0.9635	0.00190	6.15	0.9772	0.00200
7.7	0.9615	0.00220	7.2	0.9662	0.00260	6.2	0.9809	0.00200
7.75	0.9687	0.00220	7.25	0.9709	0.00180	6.25	0.9866	0.00200
7.8	0.9723	0.00210	7.3	0.9770	0.00180	6.3	0.9923	0.00200
7.85	0.9721	0.00230	7.35	0.9846	0.00270	6.35	1.0013	0.00190
7.9	0.9807	0.00230	7.4	0.9899	0.00200	6.4	1.0045	0.00260
7.95	0.9844	0.00210	7.45	0.9981	0.00210	6.45	1.0125	0.00200
8	0.9909	0.00240	7.5	1.0029	0.00200	6.5	1.0210	0.00230
8.05	0.9950	0.00200	7.55	1.0067	0.00240	6.55	1.0235	0.00200
8.1	1.0022	0.00220	7.6	1.0125	0.00220	6.6	1.0321	0.00240
8.15	1.0061	0.00210	7.65	1.0178	0.00190			
8.2	1.0095	0.00200	7.7	1.0238	0.00190			
8.25	1.0138	0.00210						
8.3	1.0174	0.00250						
8.35	1.0299	0.00220						
8.4	1.0312	0.00220						

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.00	0.9156	0.00180	3.90	0.9094	0.00220	3.20	0.9081	0.00190
5.05	0.9302	0.00170	3.95	0.9205	0.00190	3.22	0.9133	0.00180
5.1	0.9329	0.00190	4.05	0.9388	0.00210	3.24	0.9172	0.00220
5.15	0.9393	0.00290	4.1	0.9510	0.00200	3.26	0.9245	0.00210
5.2	0.9470	0.00220	4.15	0.9652	0.00190	3.28	0.9309	0.00190
5.25	0.9569	0.00220	4.2	0.9700	0.00200	3.3	0.9341	0.00220
5.3	0.9634	0.00210	4.25	0.9833	0.00180	3.32	0.9398	0.00190
5.35	0.9745	0.00260	4.3	0.9940	0.00210	3.34	0.9437	0.00200
5.4	0.9824	0.00190	4.35	0.9977	0.00210	3.36	0.9508	0.00230
5.45	0.9828	0.00210	4.4	1.0122	0.00240	3.38	0.9520	0.00190
5.5	0.9970	0.00210	4.45	1.0189	0.00210	3.4	0.9619	0.00190
5.55	1.0028	0.00220	4.5	1.0266	0.00240	3.42	0.9613	0.00220
5.6	1.0073	0.00210				3.44	0.9664	0.00180
5.65	1.0202	0.00220				3.46	0.9737	0.00190
5.7	1.0243	0.00210				3.48	0.9750	0.00210
						3.5	0.9860	0.00230
						3.52	0.9887	0.00170
						3.54	0.9935	0.00220
						3.56	0.9948	0.00180
						3.58	1.0017	0.00180
						3.6	1.0059	0.00210
						3.62	1.0102	0.00210
						3.64	1.0145	0.00190
						3.66	1.0202	0.00200
						3.68	1.0235	0.00230
						3.7	1.0292	0.00190

Case ID: pu_sph_097_10ref

Material: Plutonium

Geometry: Sphere

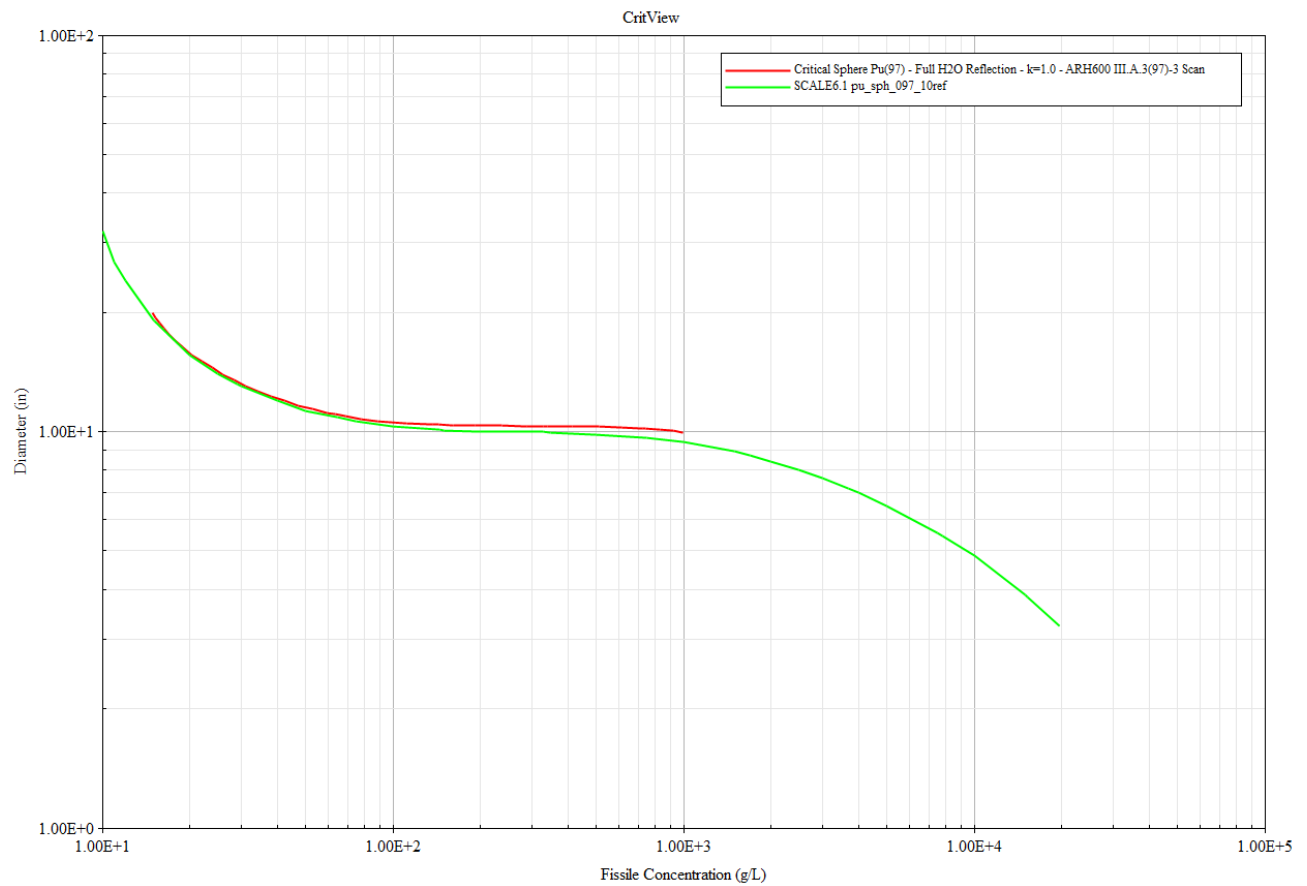
Isotopics: 97% ^{239}Pu 3% ^{240}Pu

Reflector: 10" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	24.000	34.000	0.500	31.9914
0.011	21.300	28.400	0.300	26.7714
0.012	19.500	25.100	0.200	24.0633
0.015	16.100	19.800	0.100	19.0853
0.020	13.500	16.200	0.100	15.6298
0.025	12.300	14.500	0.100	14.0356
0.030	11.500	13.500	0.100	13.0300
0.040	10.600	12.300	0.050	11.9595
0.050	10.000	11.700	0.050	11.2676
0.075	9.400	11.000	0.050	10.6129
0.100	9.200	10.600	0.050	10.2901
0.150	9.000	10.500	0.050	10.0674
0.200	8.900	10.400	0.050	10.0000
0.350	8.800	10.300	0.050	9.9293
0.500	8.700	10.300	0.050	9.8141
0.750	8.500	10.000	0.050	9.6192
1.000	8.300	9.800	0.050	9.3902
1.500	7.900	9.200	0.050	8.9211
2.000	7.500	8.700	0.050	8.4184
2.500	7.100	8.300	0.050	8.0093
3.000	6.800	7.900	0.050	7.6183
4.000	6.300	7.300	0.050	7.0168
5.000	5.800	6.700	0.050	6.4979
7.500	5.000	5.800	0.050	5.5529
10.000	4.400	5.000	0.050	4.8600
15.000	3.500	4.000	0.020	3.8819
19.600	2.900	3.400	0.020	3.2350

WORM and SCALE Input File

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'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.1.1.2.3-1. Critical Dimensions for Plutonium Sphere (97% 239Pu) - 10 Inches of Water
Reflection
,
#index number = <index = 1:27:1>
,
#Concentration = <@conc =
0.01,0.011,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
24,21.3,19.5,16.1,13.5,12.3,11.5,10.6,10,9.4,9.2,9,8.9,8.8,8.7,8.5,8.3,7.9,7.5,7.1,6.8,6.3,5.8,5,
4.4,3.5,2.9> in
#Ending Diameter = <@enddia =
34,28.4,25.1,19.8,16.2,14.5,13.5,12.3,11.7,11,10.6,10.5,10.4,10.3,10.3,10,9.8,9.2,8.7,8.3,7.9,7.3
,6.7,5.8,5,4,3.4> in
#Delta = <@delta =
0.5,0.3,0.2,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05
,0.05,0.05,0.05,0.05,0.02,0.02> in
,
'Reflector Thickness {{refthick = 10}}
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
Sphere Reflected
v7-238
read composition
  pu          1 den=<critconc> 1 300
                                94239 97
                                94240 3   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(refdia*in)/2}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_sph_097_10ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: sphere
modmat: H2O
critmat: plutonium
isomat: Pu239 0.97 Pu240 0.03
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 31.9914
0.011 26.7714
0.012 24.0633
0.015 19.0853
0.020 15.6298
0.025 14.0356
0.030 13.0300
0.040 11.9595
0.050 11.2676
0.075 10.6129
0.100 10.2901
0.150 10.0674
0.200 10.0000
0.350 9.9293
0.500 9.8141
0.750 9.6192
1.000 9.3902
1.500 8.9211
2.000 8.4184
2.500 8.0093
3.000 7.6183
4.000 7.0168
5.000 6.4979
7.500 5.5529
10.000 4.8600
15.000 3.8819
19.600 3.2350
```

0.01			0.011			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
24.00	0.9254	0.00140	21.30	0.9235	0.00120	19.50	0.9283	0.00170
24.5	0.9318	0.00130	21.6	0.9303	0.00150	19.7	0.9283	0.00160
25	0.9370	0.00150	21.9	0.9370	0.00160	19.9	0.9350	0.00150
25.5	0.9454	0.00140	22.2	0.9397	0.00140	20.1	0.9398	0.00130
26	0.9494	0.00140	22.5	0.9423	0.00120	20.3	0.9426	0.00190
26.5	0.9490	0.00230	22.8	0.9492	0.00140	20.5	0.9443	0.00150
27	0.9609	0.00120	23.1	0.9513	0.00150	20.7	0.9497	0.00190
27.5	0.9648	0.00140	23.4	0.9584	0.00120	20.9	0.9521	0.00120
28	0.9695	0.00150	23.7	0.9588	0.00130	21.1	0.9572	0.00140
28.5	0.9738	0.00160	24	0.9654	0.00140	21.3	0.9599	0.00130
29	0.9767	0.00180	24.3	0.9677	0.00130	21.5	0.9627	0.00160
29.5	0.9836	0.00120	24.6	0.9732	0.00120	21.7	0.9664	0.00150
30	0.9862	0.00140	24.9	0.9765	0.00130	21.9	0.9712	0.00200
30.5	0.9881	0.00140	25.2	0.9790	0.00170	22.1	0.9735	0.00160
31	0.9936	0.00140	25.5	0.9834	0.00190	22.3	0.9712	0.00150
31.5	0.9943	0.00110	25.8	0.9871	0.00200	22.5	0.9778	0.00170
32	1.0001	0.00120	26.1	0.9870	0.00180	22.7	0.9841	0.00130
32.5	1.0041	0.00130	26.4	0.9920	0.00130	22.9	0.9851	0.00200
33	1.0076	0.00130	26.7	1.0005	0.00140	23.1	0.9890	0.00180
33.5	1.0103	0.00110	27	0.9984	0.00140	23.3	0.9897	0.00120
34	1.0130	0.00150	27.3	1.0020	0.00170	23.5	0.9928	0.00230
			27.6	1.0055	0.00150	23.7	0.9993	0.00200
			27.9	1.0047	0.00190	23.9	0.9960	0.00160
			28.2	1.0166	0.00140	24.1	1.0009	0.00170
			28.4	1.0130	0.00150	24.3	1.0044	0.00150
						24.5	1.0038	0.00140
						24.7	1.0087	0.00160
						24.9	1.0151	0.00170
						25.1	1.0135	0.00150

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
16.10	0.9240	0.00210	13.50	0.9217	0.00170	12.30	0.9221	0.00190
16.2	0.9255	0.00130	13.6	0.9235	0.00190	12.4	0.9270	0.00170
16.3	0.9275	0.00190	13.7	0.9257	0.00180	12.5	0.9324	0.00200
16.4	0.9332	0.00160	13.8	0.9299	0.00210	12.6	0.9401	0.00180
16.5	0.9352	0.00160	13.9	0.9318	0.00190	12.7	0.9427	0.00170
16.6	0.9347	0.00150	14	0.9405	0.00190	12.8	0.9482	0.00200
16.7	0.9405	0.00230	14.1	0.9460	0.00190	12.9	0.9525	0.00170
16.8	0.9434	0.00160	14.2	0.9447	0.00180	13	0.9541	0.00210
16.9	0.9458	0.00160	14.3	0.9539	0.00220	13.1	0.9643	0.00220
17	0.9513	0.00150	14.4	0.9559	0.00170	13.2	0.9682	0.00200
17.1	0.9504	0.00150	14.5	0.9589	0.00160	13.3	0.9727	0.00200
17.2	0.9539	0.00170	14.6	0.9654	0.00160	13.4	0.9745	0.00200
17.3	0.9565	0.00170	14.7	0.9678	0.00160	13.5	0.9795	0.00250
17.4	0.9579	0.00170	14.8	0.9708	0.00200	13.6	0.9802	0.00190
17.5	0.9620	0.00190	14.9	0.9717	0.00180	13.7	0.9824	0.00190
17.6	0.9625	0.00180	15	0.9781	0.00230	13.8	0.9895	0.00230
17.7	0.9673	0.00170	15.1	0.9801	0.00180	13.9	0.9991	0.00170
17.8	0.9723	0.00210	15.2	0.9868	0.00180	14	0.9963	0.00240
17.9	0.9719	0.00170	15.3	0.9885	0.00160	14.1	1.0067	0.00180
18	0.9734	0.00190	15.4	0.9880	0.00190	14.2	1.0109	0.00180
18.1	0.9797	0.00160	15.5	0.9952	0.00200	14.3	1.0123	0.00230
18.2	0.9795	0.00160	15.6	0.9986	0.00170	14.4	1.0175	0.00220
18.3	0.9816	0.00170	15.7	1.0033	0.00200	14.5	1.0184	0.00190
18.4	0.9824	0.00150	15.8	1.0022	0.00170			
18.5	0.9847	0.00160	15.9	1.0083	0.00210			
18.6	0.9876	0.00160	16	1.0104	0.00170			
18.7	0.9904	0.00160	16.1	1.0139	0.00150			
18.8	0.9912	0.00160	16.2	1.0178	0.00170			
18.9	0.9954	0.00170						
19	1.0029	0.00220						
19.1	0.9995	0.00140						
19.2	1.0007	0.00180						
19.3	1.0062	0.00160						
19.4	1.0079	0.00150						
19.5	1.0081	0.00150						
19.6	1.0102	0.00160						
19.7	1.0062	0.00210						
19.8	1.0147	0.00170						

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.50	0.9223	0.00200	10.60	0.9218	0.00180	10.00	0.9178	0.00210
11.6	0.9291	0.00230	10.65	0.9277	0.00210	10.05	0.9220	0.00220
11.7	0.9336	0.00230	10.7	0.9340	0.00190	10.1	0.9276	0.00230
11.8	0.9407	0.00200	10.75	0.9324	0.00210	10.15	0.9294	0.00270
11.9	0.9427	0.00180	10.8	0.9325	0.00210	10.2	0.9288	0.00220
12	0.9495	0.00190	10.85	0.9380	0.00220	10.25	0.9371	0.00230
12.1	0.9573	0.00200	10.9	0.9419	0.00190	10.3	0.9413	0.00230
12.2	0.9567	0.00250	10.95	0.9480	0.00190	10.35	0.9384	0.00200
12.3	0.9664	0.00210	11	0.9498	0.00180	10.4	0.9466	0.00190
12.4	0.9673	0.00180	11.05	0.9536	0.00230	10.45	0.9485	0.00200
12.5	0.9733	0.00160	11.1	0.9571	0.00190	10.5	0.9531	0.00190
12.6	0.9811	0.00180	11.15	0.9529	0.00230	10.55	0.9509	0.00200
12.7	0.9839	0.00230	11.2	0.9581	0.00200	10.6	0.9574	0.00240
12.8	0.9869	0.00240	11.25	0.9619	0.00210	10.65	0.9594	0.00250
12.9	0.9932	0.00200	11.3	0.9637	0.00190	10.7	0.9598	0.00200
13	0.9994	0.00210	11.35	0.9656	0.00210	10.75	0.9694	0.00240
13.1	1.0014	0.00190	11.4	0.9725	0.00190	10.8	0.9709	0.00190
13.2	1.0078	0.00210	11.45	0.9750	0.00180	10.85	0.9686	0.00220
13.3	1.0131	0.00190	11.5	0.9764	0.00210	10.9	0.9770	0.00210
13.4	1.0181	0.00190	11.55	0.9803	0.00240	10.95	0.9788	0.00250
13.5	1.0197	0.00220	11.6	0.9833	0.00210	11	0.9800	0.00250
			11.65	0.9863	0.00220	11.05	0.9819	0.00200
			11.7	0.9870	0.00200	11.1	0.9839	0.00260
			11.75	0.9862	0.00210	11.15	0.9888	0.00220
			11.8	0.9922	0.00200	11.2	0.9973	0.00180
			11.85	0.9977	0.00220	11.25	0.9994	0.00270
			11.9	0.9940	0.00240	11.3	1.0011	0.00190
			11.95	0.9996	0.00220	11.35	1.0032	0.00180
			12	1.0017	0.00230	11.4	1.0039	0.00220
			12.05	1.0052	0.00240	11.45	1.0071	0.00180
			12.1	1.0077	0.00210	11.5	1.0083	0.00230
			12.15	1.0093	0.00220	11.55	1.0149	0.00210
			12.2	1.0126	0.00230	11.6	1.0128	0.00250
			12.25	1.0168	0.00210	11.65	1.0193	0.00210
			12.3	1.0203	0.00210	11.7	1.0177	0.00210

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.40	0.9194	0.00230	9.20	0.9231	0.00220	9.00	0.9259	0.00200
9.45	0.9186	0.00230	9.25	0.9251	0.00200	9.05	0.9241	0.00210
9.5	0.9264	0.00210	9.3	0.9309	0.00190	9.1	0.9344	0.00200
9.55	0.9288	0.00200	9.35	0.9354	0.00260	9.15	0.9363	0.00200
9.6	0.9314	0.00230	9.4	0.9383	0.00230	9.2	0.9416	0.00230
9.65	0.9374	0.00200	9.45	0.9432	0.00210	9.25	0.9422	0.00220
9.7	0.9402	0.00200	9.5	0.9434	0.00220	9.3	0.9476	0.00200
9.75	0.9449	0.00220	9.55	0.9498	0.00190	9.35	0.9501	0.00210
9.8	0.9458	0.00180	9.6	0.9490	0.00200	9.4	0.9588	0.00220
9.85	0.9494	0.00240	9.65	0.9557	0.00230	9.45	0.9590	0.00210
9.9	0.9502	0.00210	9.7	0.9599	0.00250	9.5	0.9616	0.00200
9.95	0.9574	0.00200	9.75	0.9636	0.00210	9.55	0.9665	0.00210
10	0.9595	0.00210	9.8	0.9638	0.00220	9.6	0.9598	0.00220
10.05	0.9623	0.00220	9.85	0.9680	0.00250	9.65	0.9698	0.00220
10.1	0.9684	0.00240	9.9	0.9703	0.00250	9.7	0.9734	0.00200
10.15	0.9677	0.00250	9.95	0.9789	0.00250	9.75	0.9768	0.00260
10.2	0.9696	0.00250	10	0.9827	0.00200	9.8	0.9849	0.00210
10.25	0.9761	0.00290	10.05	0.9853	0.00180	9.85	0.9882	0.00250
10.3	0.9784	0.00250	10.1	0.9856	0.00280	9.9	0.9884	0.00210
10.35	0.9828	0.00200	10.15	0.9911	0.00220	9.95	0.9905	0.00210
10.4	0.9879	0.00210	10.2	0.9917	0.00220	10	0.9920	0.00250
10.45	0.9891	0.00200	10.25	0.9923	0.00200	10.05	0.9985	0.00270
10.5	0.9888	0.00190	10.3	1.0019	0.00230	10.1	1.0028	0.00260
10.55	0.9978	0.00240	10.35	1.0017	0.00250	10.15	1.0017	0.00210
10.6	0.9991	0.00230	10.4	1.0032	0.00230	10.2	1.0090	0.00250
10.65	1.0026	0.00220	10.45	1.0093	0.00260	10.25	1.0098	0.00200
10.7	1.0055	0.00220	10.5	1.0165	0.00340	10.3	1.0150	0.00220
10.75	1.0085	0.00230	10.55	1.0156	0.00230	10.35	1.0150	0.00220
10.8	1.0120	0.00210	10.6	1.0140	0.00200	10.4	1.0209	0.00210
10.85	1.0154	0.00260				10.45	1.0208	0.00230
10.9	1.0194	0.00250				10.5	1.0284	0.00220
10.95	1.0224	0.00190						
11	1.0287	0.00200						

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.90	0.9271	0.00210	8.80	0.9260	0.00220	8.70	0.9209	0.00230
8.95	0.9264	0.00220	8.85	0.9315	0.00210	8.75	0.9279	0.00230
9	0.9302	0.00320	8.9	0.9261	0.00210	8.8	0.9318	0.00230
9.05	0.9347	0.00220	8.95	0.9380	0.00250	8.85	0.9346	0.00190
9.1	0.9403	0.00230	9	0.9418	0.00250	8.9	0.9376	0.00220
9.15	0.9422	0.00230	9.05	0.9375	0.00220	8.95	0.9403	0.00220
9.2	0.9464	0.00220	9.1	0.9461	0.00230	9	0.9445	0.00200
9.25	0.9499	0.00260	9.15	0.9457	0.00200	9.05	0.9485	0.00200
9.3	0.9537	0.00240	9.2	0.9535	0.00200	9.1	0.9537	0.00220
9.35	0.9560	0.00260	9.25	0.9589	0.00240	9.15	0.9536	0.00200
9.4	0.9561	0.00230	9.3	0.9590	0.00280	9.2	0.9602	0.00220
9.45	0.9667	0.00210	9.35	0.9648	0.00220	9.25	0.9601	0.00200
9.5	0.9654	0.00250	9.4	0.9659	0.00210	9.3	0.9680	0.00210
9.55	0.9730	0.00210	9.45	0.9758	0.00240	9.35	0.9670	0.00200
9.6	0.9764	0.00210	9.5	0.9731	0.00210	9.4	0.9732	0.00210
9.65	0.9789	0.00230	9.55	0.9771	0.00230	9.45	0.9764	0.00200
9.7	0.9803	0.00240	9.6	0.9829	0.00250	9.5	0.9785	0.00210
9.75	0.9846	0.00200	9.65	0.9818	0.00240	9.55	0.9825	0.00210
9.8	0.9875	0.00210	9.7	0.9888	0.00190	9.6	0.9825	0.00240
9.85	0.9909	0.00220	9.75	0.9895	0.00210	9.65	0.9896	0.00260
9.9	0.9939	0.00220	9.8	0.9933	0.00210	9.7	0.9933	0.00190
9.95	0.9996	0.00200	9.85	0.9951	0.00200	9.75	0.9965	0.00230
10	1.0000	0.00180	9.9	0.9983	0.00230	9.8	0.9991	0.00230
10.05	1.0020	0.00220	9.95	1.0012	0.00200	9.85	1.0023	0.00200
10.1	1.0103	0.00260	10	1.0106	0.00230	9.9	1.0048	0.00240
10.15	1.0080	0.00250	10.05	1.0088	0.00260	9.95	1.0060	0.00220
10.2	1.0115	0.00240	10.1	1.0065	0.00210	10	1.0117	0.00230
10.25	1.0189	0.00270	10.15	1.0162	0.00300	10.05	1.0120	0.00220
10.3	1.0191	0.00210	10.2	1.0172	0.00220	10.1	1.0149	0.00230
10.35	1.0248	0.00220	10.25	1.0231	0.00220	10.15	1.0176	0.00260
10.4	1.0286	0.00230	10.3	1.0190	0.00210	10.2	1.0225	0.00190
						10.25	1.0253	0.00210
						10.3	1.0298	0.00240

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.50	0.9193	0.00290	8.30	0.9208	0.00210	7.90	0.9224	0.00220
8.55	0.9285	0.00190	8.35	0.9264	0.00200	7.95	0.9340	0.00260
8.6	0.9318	0.00210	8.4	0.9322	0.00190	8	0.9328	0.00190
8.65	0.9335	0.00180	8.45	0.9317	0.00200	8.05	0.9358	0.00200
8.7	0.9338	0.00200	8.5	0.9353	0.00200	8.1	0.9425	0.00210
8.75	0.9398	0.00250	8.55	0.9403	0.00200	8.15	0.9483	0.00240
8.8	0.9427	0.00200	8.6	0.9436	0.00210	8.2	0.9484	0.00270
8.85	0.9502	0.00190	8.65	0.9511	0.00190	8.25	0.9520	0.00200
8.9	0.9504	0.00190	8.7	0.9524	0.00200	8.3	0.9599	0.00190
8.95	0.9542	0.00200	8.75	0.9565	0.00200	8.35	0.9613	0.00220
9	0.9598	0.00240	8.8	0.9644	0.00210	8.4	0.9619	0.00190
9.05	0.9605	0.00210	8.85	0.9585	0.00210	8.45	0.9683	0.00240
9.1	0.9690	0.00210	8.9	0.9688	0.00200	8.5	0.9698	0.00210
9.15	0.9698	0.00230	8.95	0.9688	0.00230	8.55	0.9747	0.00210
9.2	0.9744	0.00250	9	0.9719	0.00180	8.6	0.9787	0.00200
9.25	0.9754	0.00260	9.05	0.9771	0.00200	8.65	0.9838	0.00210
9.3	0.9794	0.00210	9.1	0.9796	0.00200	8.7	0.9865	0.00200
9.35	0.9811	0.00220	9.15	0.9861	0.00210	8.75	0.9874	0.00200
9.4	0.9893	0.00230	9.2	0.9867	0.00210	8.8	0.9913	0.00200
9.45	0.9896	0.00220	9.25	0.9916	0.00210	8.85	0.9949	0.00170
9.5	0.9916	0.00190	9.3	0.9942	0.00190	8.9	0.9981	0.00190
9.55	0.9924	0.00240	9.35	0.9963	0.00240	8.95	1.0026	0.00230
9.6	0.9962	0.00220	9.4	1.0009	0.00200	9	1.0085	0.00200
9.65	1.0061	0.00270	9.45	1.0031	0.00240	9.05	1.0121	0.00240
9.7	1.0030	0.00250	9.5	1.0079	0.00220	9.1	1.0132	0.00200
9.75	1.0084	0.00200	9.55	1.0078	0.00210	9.15	1.0189	0.00170
9.8	1.0170	0.00180	9.6	1.0146	0.00240	9.2	1.0208	0.00180
9.85	1.0086	0.00220	9.65	1.0176	0.00210			
9.9	1.0153	0.00200	9.7	1.0229	0.00200			
9.95	1.0177	0.00220	9.75	1.0216	0.00200			
10	1.0241	0.00240	9.8	1.0231	0.00230			

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.50	0.9277	0.00210	7.10	0.9194	0.00210	6.80	0.9206	0.00220
7.55	0.9267	0.00200	7.15	0.9292	0.00230	6.85	0.9267	0.00180
7.6	0.9312	0.00250	7.2	0.9269	0.00200	6.9	0.9341	0.00180
7.65	0.9396	0.00200	7.25	0.9347	0.00200	6.95	0.9342	0.00200
7.7	0.9395	0.00210	7.3	0.9418	0.00180	7	0.9446	0.00210
7.75	0.9470	0.00210	7.35	0.9436	0.00200	7.05	0.9471	0.00210
7.8	0.9493	0.00180	7.4	0.9493	0.00180	7.1	0.9505	0.00210
7.85	0.9523	0.00220	7.45	0.9570	0.00230	7.15	0.9542	0.00200
7.9	0.9598	0.00210	7.5	0.9576	0.00220	7.2	0.9630	0.00170
7.95	0.9623	0.00190	7.55	0.9595	0.00190	7.25	0.9670	0.00200
8	0.9678	0.00200	7.6	0.9666	0.00200	7.3	0.9694	0.00240
8.05	0.9721	0.00200	7.65	0.9717	0.00190	7.35	0.9750	0.00180
8.1	0.9789	0.00200	7.7	0.9750	0.00190	7.4	0.9809	0.00200
8.15	0.9812	0.00190	7.75	0.9808	0.00260	7.45	0.9825	0.00200
8.2	0.9824	0.00180	7.8	0.9823	0.00210	7.5	0.9925	0.00210
8.25	0.9863	0.00230	7.85	0.9848	0.00190	7.55	0.9978	0.00180
8.3	0.9891	0.00230	7.9	0.9887	0.00200	7.6	0.9989	0.00190
8.35	0.9967	0.00220	7.95	0.9957	0.00220	7.65	1.0019	0.00210
8.4	1.0007	0.00200	8	0.9987	0.00190	7.7	1.0079	0.00210
8.45	0.9988	0.00190	8.05	1.0057	0.00230	7.75	1.0131	0.00210
8.5	1.0054	0.00190	8.1	1.0098	0.00180	7.8	1.0139	0.00240
8.55	1.0098	0.00170	8.15	1.0147	0.00180	7.85	1.0165	0.00190
8.6	1.0153	0.00170	8.2	1.0195	0.00200	7.9	1.0285	0.00190
8.65	1.0161	0.00230	8.25	1.0229	0.00210			
8.7	1.0204	0.00190	8.3	1.0235	0.00210			

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.30	0.9251	0.00180	5.80	0.9156	0.00210	5.00	0.9211	0.00190
6.35	0.9326	0.00220	5.85	0.9265	0.00240	5.05	0.9283	0.00170
6.4	0.9385	0.00250	5.9	0.9287	0.00200	5.1	0.9355	0.00220
6.45	0.9428	0.00190	5.95	0.9415	0.00200	5.15	0.9409	0.00250
6.5	0.9494	0.00200	6	0.9424	0.00200	5.2	0.9500	0.00180
6.55	0.9520	0.00210	6.05	0.9470	0.00210	5.25	0.9550	0.00250
6.6	0.9576	0.00180	6.1	0.9538	0.00230	5.3	0.9671	0.00240
6.65	0.9661	0.00240	6.15	0.9622	0.00190	5.35	0.9720	0.00250
6.7	0.9702	0.00190	6.2	0.9650	0.00210	5.4	0.9805	0.00210
6.75	0.9749	0.00230	6.25	0.9732	0.00190	5.45	0.9901	0.00200
6.8	0.9775	0.00190	6.3	0.9784	0.00220	5.5	0.9919	0.00220
6.85	0.9848	0.00200	6.35	0.9813	0.00230	5.55	0.9993	0.00230
6.9	0.9914	0.00200	6.4	0.9883	0.00230	5.6	1.0115	0.00210
6.95	0.9897	0.00210	6.45	0.9954	0.00220	5.65	1.0127	0.00180
7	0.9968	0.00210	6.5	1.0002	0.00190	5.7	1.0214	0.00210
7.05	1.0063	0.00210	6.55	1.0077	0.00200	5.75	1.0262	0.00210
7.1	1.0107	0.00200	6.6	1.0099	0.00210	5.8	1.0320	0.00170
7.15	1.0183	0.00230	6.65	1.0146	0.00210			
7.2	1.0187	0.00250	6.7	1.0223	0.00180			
7.25	1.0244	0.00210						
7.3	1.0280	0.00230						

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.40	0.9240	0.00200	3.50	0.9187	0.00220	2.90	0.9085	0.00230
4.45	0.9334	0.00240	3.52	0.9228	0.00210	2.92	0.9151	0.00200
4.5	0.9372	0.00210	3.54	0.9258	0.00250	2.94	0.9202	0.00200
4.55	0.9511	0.00200	3.56	0.9307	0.00210	2.96	0.9311	0.00200
4.6	0.9565	0.00190	3.58	0.9375	0.00160	2.98	0.9354	0.00200
4.65	0.9640	0.00210	3.6	0.9416	0.00180	3	0.9349	0.00210
4.7	0.9747	0.00180	3.62	0.9480	0.00200	3.02	0.9460	0.00230
4.75	0.9802	0.00240	3.64	0.9498	0.00220	3.04	0.9483	0.00240
4.8	0.9901	0.00230	3.66	0.9560	0.00240	3.06	0.9517	0.00200
4.85	0.9990	0.00200	3.68	0.9542	0.00230	3.08	0.9592	0.00210
4.9	1.0040	0.00210	3.7	0.9606	0.00220	3.1	0.9622	0.00200
4.95	1.0177	0.00210	3.72	0.9667	0.00210	3.12	0.9675	0.00180
5	1.0203	0.00220	3.74	0.9678	0.00210	3.14	0.9732	0.00190
			3.76	0.9751	0.00240	3.16	0.9813	0.00290
			3.78	0.9808	0.00210	3.18	0.9853	0.00260
			3.8	0.9834	0.00230	3.2	0.9892	0.00190
			3.82	0.9857	0.00210	3.22	0.9937	0.00220
			3.84	0.9948	0.00180	3.24	1.0021	0.00200
			3.86	0.9921	0.00200	3.26	1.0016	0.00190
			3.88	0.9994	0.00200	3.28	1.0101	0.00230
			3.9	1.0057	0.00180	3.3	1.0142	0.00200
			3.92	1.0065	0.00240	3.32	1.0205	0.00250
			3.94	1.0100	0.00170	3.34	1.0206	0.00230
			3.96	1.0156	0.00190	3.36	1.0270	0.00180
			3.98	1.0209	0.00190	3.38	1.0348	0.00200
			4	1.0244	0.00180	3.4	1.0403	0.00240

Pu-sph-95 (Cases with 0", 1", 10" Reflector)

Case ID: pu_sph_095_00ref

Material: Plutonium

Geometry: Sphere

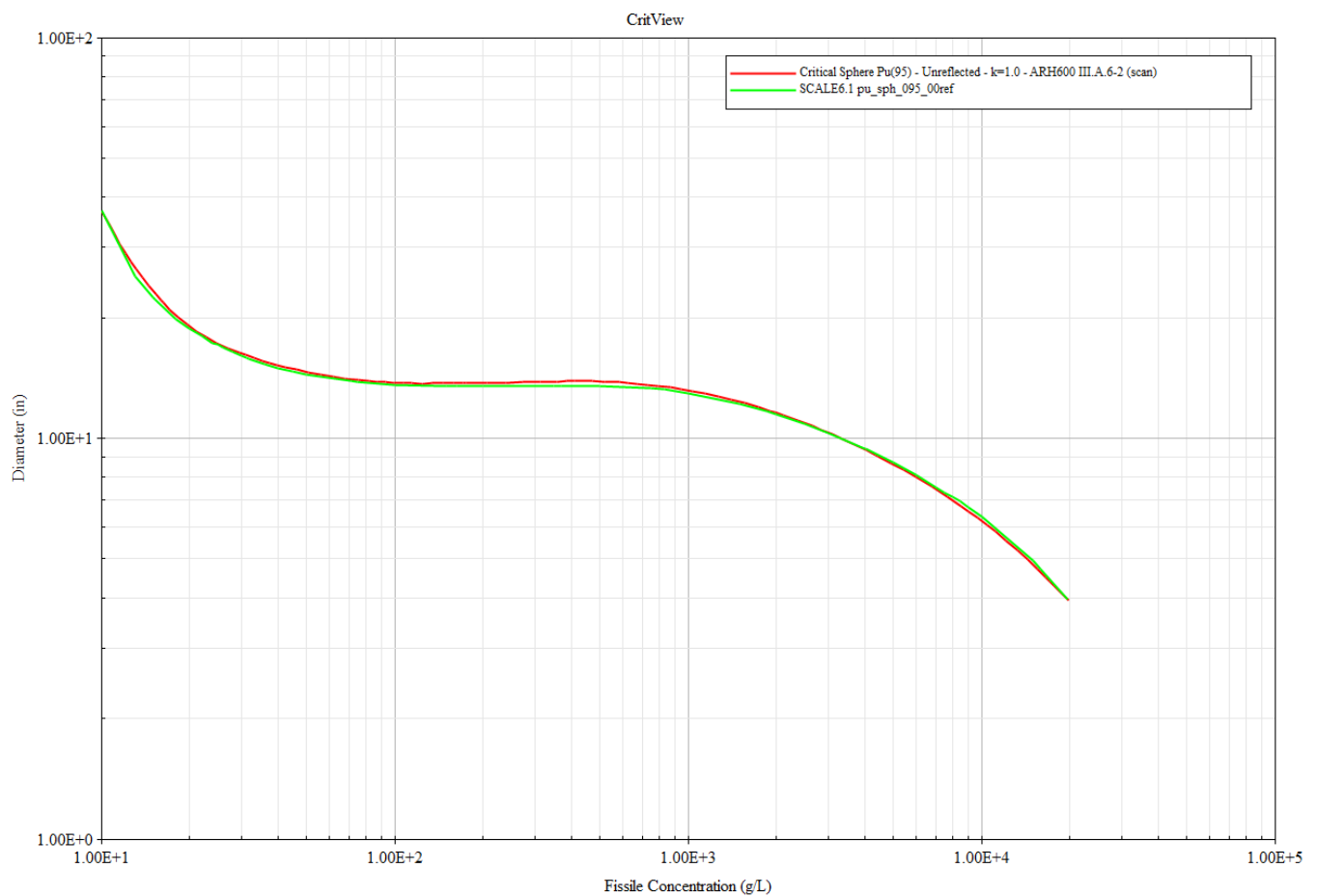
Isotopics: 95% ^{239}Pu 5% ^{240}Pu

Reflector: Unreflected

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	27.800	39.400	0.500	36.9486
0.013	20.500	26.500	0.300	25.4134
0.015	19.100	23.200	0.200	22.5393
0.018	17.300	21.500	0.200	19.8065
0.020	16.500	19.300	0.100	18.7293
0.022	15.900	18.500	0.100	18.0263
0.024	15.400	17.800	0.100	17.2984
0.025	15.200	17.500	0.100	17.1400
0.026	15.000	17.300	0.100	16.8673
0.028	14.600	16.900	0.100	16.4833
0.030	14.400	16.500	0.100	16.0824
0.032	14.100	16.200	0.100	15.7719
0.036	13.800	15.700	0.100	15.3423
0.040	13.500	15.400	0.100	14.9586
0.045	13.200	15.100	0.100	14.6643
0.050	13.000	14.800	0.100	14.3942
0.075	12.500	14.200	0.050	13.8523
0.100	12.300	14.000	0.050	13.5629
0.150	12.200	13.800	0.050	13.4660
0.200	12.200	13.900	0.050	13.4803
0.350	12.200	13.900	0.050	13.5057
0.500	12.200	13.900	0.050	13.4692
0.750	11.900	13.700	0.100	13.3037
1.000	11.600	13.300	0.050	12.9127
1.500	11.000	12.500	0.050	12.1856
2.000	10.400	11.900	0.050	11.4828
2.500	9.800	11.200	0.050	10.8709
3.000	9.400	10.700	0.050	10.3313
4.000	8.600	9.700	0.050	9.4445
5.000	7.900	9.000	0.050	8.7191
6.000	7.400	8.300	0.050	8.1073
7.000	6.900	7.800	0.050	7.5500
7.500	6.700	7.600	0.050	7.3307
8.000	6.500	7.300	0.050	7.1279
9.000	6.100	6.900	0.050	6.7263
10.000	5.800	6.600	0.050	6.3597
15.000	4.500	5.100	0.050	4.9439
19.600	3.600	4.100	0.020	3.9780

```

Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.1.1.3.1-1. Critical Dimensions for 95% 239Pu Sphere - 0 Inches of Water Reflection
,
#index number = <index = 1:38:1>
,
#Concentration = <@conc =
0.01,0.013,0.015,0.018,0.02,0.022,0.024,0.025,0.026,0.028,0.03,0.032,0.036,0.04,0.045,0.05,0.075,
0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4,5,6,7,7.5,8,9,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
27.8,20.5,19.1,17.3,16.5,15.9,15.4,15.2,15,14.6,14.4,14.1,13.8,13.5,13.2,13,12.5,12.3,12.2,12.2,1
2.2,12.2,11.9,11.6,11,10.4,9.8,9.4,8.6,7.9,7.4,6.9,6.7,6.5,6.1,5.8,4.5,3.6> in
#Ending Diameter = <@enddia =
39.4,26.5,23.2,21.5,19.3,18.5,17.8,17.5,17.3,16.9,16.5,16.2,15.7,15.4,15.1,14.8,14.2,14,13.8,13.9
,13.9,13.9,13.7,13.3,12.5,11.9,11.2,10.7,9.7,9,8.3,7.8,7.6,7.3,6.9,6.6,5.1,4.1> in
#Delta = <@delta =
0.5,0.3,0.2,0.2,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.1
,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02> in
,
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>)}} in
,
,
=csas6
template
v7-238
read composition
  pu          1 den=<critconc> 1 300
                        94239 95
                        94240 5   end
<&ZerocHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="sphere"
  sphere 1      {{(diameter*in)/2}}
  media 1 1 1
  boundary 1
end geometry
end data
end

<perl>
sub ZerocHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_sph_095_00ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: sphere
modmat: H2O
critmat: plutonium
isomat: Pu239 0.95 Pu240 0.05
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 36.9486
0.013 25.4134
0.015 22.5393
0.018 19.8065
0.020 18.7293
0.022 18.0263
0.024 17.2984
0.025 17.1400
0.026 16.8673
0.028 16.4833
0.030 16.0824
0.032 15.7719
0.036 15.3423
0.040 14.9586
0.045 14.6643
0.050 14.3942
0.075 13.8523
0.100 13.5629
0.150 13.4660
0.200 13.4803
0.350 13.5057
0.500 13.4692
0.750 13.3037
1.000 12.9127
1.500 12.1856
2.000 11.4828
2.500 10.8709
3.000 10.3313
4.000 9.4445
5.000 8.7191
6.000 8.1073
7.000 7.5500
7.500 7.3307
8.000 7.1279
9.000 6.7263
10.000 6.3597
15.000 4.9439
19.600 3.9780
```

0.01			0.013			0.015		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
27.80	0.9263	0.00170	20.50	0.9108	0.00180	19.10	0.9196	0.00170
28.3	0.9284	0.00170	20.8	0.9145	0.00160	19.3	0.9255	0.00180
28.8	0.9367	0.00150	21.1	0.9191	0.00150	19.5	0.9300	0.00200
29.3	0.9397	0.00130	21.4	0.9256	0.00130	19.7	0.9382	0.00200
29.8	0.9448	0.00130	21.7	0.9328	0.00150	19.9	0.9431	0.00220
30.3	0.9526	0.00160	22	0.9400	0.00140	20.1	0.9454	0.00190
30.8	0.9531	0.00140	22.3	0.9448	0.00210	20.3	0.9550	0.00170
31.3	0.9597	0.00130	22.6	0.9526	0.00170	20.5	0.9539	0.00230
31.8	0.9627	0.00170	22.9	0.9600	0.00160	20.7	0.9633	0.00160
32.3	0.9690	0.00140	23.2	0.9633	0.00150	20.9	0.9636	0.00240
32.8	0.9707	0.00150	23.5	0.9679	0.00160	21.1	0.9697	0.00180
33.3	0.9748	0.00140	23.8	0.9738	0.00180	21.3	0.9718	0.00180
33.8	0.9831	0.00160	24.1	0.9782	0.00180	21.5	0.9774	0.00190
34.3	0.9847	0.00110	24.4	0.9828	0.00220	21.7	0.9853	0.00200
34.8	0.9868	0.00180	24.7	0.9871	0.00150	21.9	0.9877	0.00190
35.3	0.9917	0.00150	25	0.9910	0.00210	22.1	0.9952	0.00190
35.8	0.9922	0.00140	25.3	0.9969	0.00180	22.3	0.9960	0.00180
36.3	0.9975	0.00120	25.6	1.0051	0.00170	22.5	0.9988	0.00160
36.8	1.0011	0.00140	25.9	1.0062	0.00190	22.7	1.0049	0.00150
37.3	0.9974	0.00170	26.2	1.0121	0.00180	22.9	1.0110	0.00170
37.8	1.0069	0.00120	26.5	1.0147	0.00250	23.1	1.0105	0.00180
38.3	1.0054	0.00150				23.2	1.0142	0.00140
38.8	1.0065	0.00180						
39.3	1.0113	0.00140						
39.4	1.0105	0.00110						

0.018			0.02			0.022		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.30	0.9212	0.00200	16.50	0.9249	0.00190	15.90	0.9196	0.00200
17.5	0.9268	0.00150	16.6	0.9274	0.00220	16	0.9228	0.00190
17.7	0.9362	0.00200	16.7	0.9293	0.00170	16.1	0.9292	0.00210
17.9	0.9421	0.00220	16.8	0.9336	0.00170	16.2	0.9297	0.00180
18.1	0.9496	0.00180	16.9	0.9362	0.00160	16.3	0.9377	0.00220
18.3	0.9550	0.00160	17	0.9426	0.00190	16.4	0.9396	0.00170
18.5	0.9619	0.00200	17.1	0.9419	0.00200	16.5	0.9459	0.00220
18.7	0.9653	0.00200	17.2	0.9430	0.00210	16.6	0.9463	0.00240
18.9	0.9707	0.00190	17.3	0.9483	0.00170	16.7	0.9526	0.00230
19.1	0.9769	0.00230	17.4	0.9553	0.00210	16.8	0.9581	0.00240
19.3	0.9853	0.00210	17.5	0.9574	0.00210	16.9	0.9590	0.00210
19.5	0.9876	0.00210	17.6	0.9648	0.00220	17	0.9664	0.00220
19.7	0.9959	0.00180	17.7	0.9645	0.00220	17.1	0.9679	0.00200
19.9	1.0036	0.00260	17.8	0.9660	0.00230	17.2	0.9742	0.00260
20.1	1.0057	0.00210	17.9	0.9722	0.00210	17.3	0.9745	0.00200
20.3	1.0109	0.00200	18	0.9737	0.00200	17.4	0.9814	0.00210
20.5	1.0145	0.00160	18.1	0.9814	0.00190	17.5	0.9823	0.00220
20.7	1.0222	0.00200	18.2	0.9741	0.00220	17.6	0.9860	0.00220
20.9	1.0246	0.00170	18.3	0.9824	0.00200	17.7	0.9925	0.00150
21.1	1.0280	0.00180	18.4	0.9852	0.00210	17.8	0.9953	0.00180
21.3	1.0359	0.00210	18.5	0.9951	0.00210	17.9	0.9986	0.00190
21.5	1.0377	0.00170	18.6	0.9934	0.00180	18	0.9985	0.00190
			18.7	0.9988	0.00200	18.1	1.0042	0.00180
			18.8	1.0029	0.00160	18.2	1.0043	0.00250
			18.9	1.0047	0.00220	18.3	1.0101	0.00180
			19	1.0076	0.00270	18.4	1.0163	0.00240
			19.1	1.0100	0.00190	18.5	1.0200	0.00170
			19.2	1.0132	0.00210			
			19.3	1.0116	0.00200			

0.024			0.025			0.026		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
15.40	0.9216	0.00210	15.20	0.9205	0.00200	15.00	0.9177	0.00200
15.5	0.9239	0.00200	15.3	0.9262	0.00230	15.1	0.9207	0.00190
15.6	0.9323	0.00180	15.4	0.9297	0.00260	15.2	0.9312	0.00230
15.7	0.9320	0.00170	15.5	0.9341	0.00180	15.3	0.9347	0.00190
15.8	0.9354	0.00220	15.6	0.9406	0.00200	15.4	0.9433	0.00200
15.9	0.9412	0.00220	15.7	0.9467	0.00210	15.5	0.9442	0.00200
16	0.9459	0.00220	15.8	0.9470	0.00210	15.6	0.9450	0.00200
16.1	0.9485	0.00190	15.9	0.9536	0.00190	15.7	0.9533	0.00210
16.2	0.9509	0.00180	16	0.9557	0.00190	15.8	0.9562	0.00210
16.3	0.9565	0.00200	16.1	0.9596	0.00180	15.9	0.9595	0.00200
16.4	0.9627	0.00180	16.2	0.9644	0.00240	16	0.9628	0.00210
16.5	0.9653	0.00220	16.3	0.9693	0.00230	16.1	0.9725	0.00250
16.6	0.9741	0.00220	16.4	0.9733	0.00170	16.2	0.9753	0.00210
16.7	0.9766	0.00210	16.5	0.9779	0.00180	16.3	0.9776	0.00210
16.8	0.9787	0.00210	16.6	0.9843	0.00230	16.4	0.9832	0.00230
16.9	0.9818	0.00250	16.7	0.9846	0.00240	16.5	0.9832	0.00210
17	0.9890	0.00190	16.8	0.9888	0.00170	16.6	0.9913	0.00370
17.1	0.9920	0.00210	16.9	0.9963	0.00260	16.7	0.9934	0.00200
17.2	0.9939	0.00200	17	0.9936	0.00220	16.8	0.9965	0.00200
17.3	1.0001	0.00200	17.1	0.9988	0.00230	16.9	1.0017	0.00200
17.4	1.0017	0.00200	17.2	1.0018	0.00240	17	1.0078	0.00270
17.5	1.0038	0.00210	17.3	1.0091	0.00190	17.1	1.0061	0.00330
17.6	1.0086	0.00200	17.4	1.0154	0.00230	17.2	1.0123	0.00240
17.7	1.0091	0.00190	17.5	1.0157	0.00180	17.3	1.0184	0.00240
17.8	1.0157	0.00170						

0.028			0.03			0.032		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.60	0.9192	0.00190	14.40	0.9199	0.00170	14.10	0.9141	0.00220
14.7	0.9188	0.00200	14.5	0.9234	0.00190	14.2	0.9224	0.00220
14.8	0.9292	0.00180	14.6	0.9314	0.00200	14.3	0.9246	0.00220
14.9	0.9277	0.00220	14.7	0.9345	0.00190	14.4	0.9332	0.00310
15	0.9350	0.00200	14.8	0.9364	0.00220	14.5	0.9365	0.00200
15.1	0.9396	0.00210	14.9	0.9431	0.00260	14.6	0.9454	0.00240
15.2	0.9419	0.00190	15	0.9503	0.00240	14.7	0.9455	0.00200
15.3	0.9501	0.00200	15.1	0.9601	0.00220	14.8	0.9550	0.00290
15.4	0.9586	0.00200	15.2	0.9625	0.00190	14.9	0.9548	0.00230
15.5	0.9576	0.00200	15.3	0.9628	0.00190	15	0.9633	0.00230
15.6	0.9644	0.00250	15.4	0.9671	0.00210	15.1	0.9714	0.00270
15.7	0.9674	0.00240	15.5	0.9798	0.00320	15.2	0.9731	0.00190
15.8	0.9769	0.00180	15.6	0.9770	0.00220	15.3	0.9772	0.00210
15.9	0.9785	0.00180	15.7	0.9824	0.00250	15.4	0.9781	0.00220
16	0.9807	0.00290	15.8	0.9852	0.00220	15.5	0.9861	0.00210
16.1	0.9893	0.00240	15.9	0.9893	0.00240	15.6	0.9891	0.00210
16.2	0.9906	0.00200	16	0.9916	0.00200	15.7	0.9931	0.00210
16.3	0.9941	0.00200	16.1	1.0018	0.00210	15.8	1.0027	0.00230
16.4	1.0015	0.00180	16.2	1.0067	0.00250	15.9	1.0059	0.00210
16.5	0.9997	0.00190	16.3	1.0067	0.00230	16	1.0065	0.00210
16.6	1.0059	0.00200	16.4	1.0139	0.00200	16.1	1.0046	0.00340
16.7	1.0094	0.00220	16.5	1.0127	0.00210	16.2	1.0186	0.00180
16.8	1.0125	0.00180						
16.9	1.0190	0.00240						

0.036			0.04			0.045		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.80	0.9181	0.00210	13.50	0.9208	0.00280	13.20	0.9163	0.00220
13.9	0.9248	0.00190	13.6	0.9247	0.00210	13.3	0.9238	0.00210
14	0.9282	0.00210	13.7	0.9303	0.00200	13.4	0.9284	0.00230
14.1	0.9406	0.00230	13.8	0.9353	0.00200	13.5	0.9345	0.00230
14.2	0.9426	0.00210	13.9	0.9430	0.00230	13.6	0.9436	0.00270
14.3	0.9477	0.00220	14	0.9488	0.00210	13.7	0.9501	0.00230
14.4	0.9548	0.00230	14.1	0.9497	0.00200	13.8	0.9511	0.00270
14.5	0.9588	0.00210	14.2	0.9564	0.00220	13.9	0.9553	0.00270
14.6	0.9664	0.00190	14.3	0.9672	0.00270	14	0.9659	0.00210
14.7	0.9658	0.00210	14.4	0.9705	0.00260	14.1	0.9713	0.00240
14.8	0.9724	0.00180	14.5	0.9706	0.00270	14.2	0.9733	0.00240
14.9	0.9790	0.00180	14.6	0.9763	0.00210	14.3	0.9823	0.00310
15	0.9839	0.00220	14.7	0.9849	0.00210	14.4	0.9858	0.00310
15.1	0.9906	0.00230	14.8	0.9899	0.00200	14.5	0.9902	0.00250
15.2	0.9938	0.00250	14.9	0.9983	0.00200	14.6	0.9955	0.00240
15.3	0.9967	0.00240	15	1.0012	0.00210	14.7	1.0025	0.00220
15.4	1.0045	0.00250	15.1	1.0074	0.00210	14.8	1.0090	0.00280
15.5	1.0096	0.00270	15.2	1.0111	0.00250	14.9	1.0118	0.00220
15.6	1.0160	0.00210	15.3	1.0136	0.00220	15	1.0220	0.00220
15.7	1.0160	0.00230	15.4	1.0193	0.00240	15.1	1.0218	0.00270

0.05			0.075			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.00	0.9209	0.00210	12.50	0.9195	0.00200	12.30	0.9136	0.00220
13.1	0.9266	0.00220	12.55	0.9238	0.00280	12.35	0.9231	0.00250
13.2	0.9298	0.00250	12.6	0.9250	0.00230	12.4	0.9276	0.00230
13.3	0.9360	0.00210	12.65	0.9303	0.00220	12.45	0.9335	0.00270
13.4	0.9402	0.00300	12.7	0.9333	0.00280	12.5	0.9332	0.00210
13.5	0.9451	0.00250	12.75	0.9382	0.00240	12.55	0.9352	0.00260
13.6	0.9559	0.00220	12.8	0.9416	0.00210	12.6	0.9436	0.00230
13.7	0.9590	0.00210	12.85	0.9463	0.00260	12.65	0.9460	0.00240
13.8	0.9670	0.00210	12.9	0.9473	0.00230	12.7	0.9486	0.00240
13.9	0.9724	0.00220	12.95	0.9484	0.00240	12.75	0.9506	0.00270
14	0.9781	0.00210	13	0.9551	0.00240	12.8	0.9541	0.00260
14.1	0.9881	0.00230	13.05	0.9536	0.00230	12.85	0.9587	0.00220
14.2	0.9910	0.00230	13.1	0.9613	0.00230	12.9	0.9604	0.00250
14.3	0.9951	0.00230	13.15	0.9619	0.00240	12.95	0.9641	0.00230
14.4	1.0003	0.00270	13.2	0.9574	0.00270	13	0.9722	0.00230
14.5	1.0079	0.00250	13.25	0.9687	0.00220	13.05	0.9660	0.00250
14.6	1.0085	0.00210	13.3	0.9676	0.00250	13.1	0.9739	0.00270
14.7	1.0175	0.00220	13.35	0.9718	0.00270	13.15	0.9810	0.00260
14.8	1.0223	0.00270	13.4	0.9728	0.00250	13.2	0.9827	0.00230
			13.45	0.9794	0.00210	13.25	0.9767	0.00260
			13.5	0.9837	0.00240	13.3	0.9829	0.00280
			13.55	0.9872	0.00260	13.35	0.9910	0.00240
			13.6	0.9878	0.00270	13.4	0.9911	0.00220
			13.65	0.9978	0.00240	13.45	0.9927	0.00200
			13.7	0.9987	0.00230	13.5	0.9939	0.00240
			13.75	0.9991	0.00320	13.55	0.9982	0.00290
			13.8	0.9988	0.00250	13.6	1.0052	0.00240
			13.85	0.9995	0.00220	13.65	1.0052	0.00240
			13.9	1.0104	0.00300	13.7	1.0091	0.00230
			13.95	1.0081	0.00230	13.75	1.0134	0.00220
			14	1.0120	0.00230	13.8	1.0158	0.00250
			14.05	1.0133	0.00220	13.85	1.0203	0.00290
			14.1	1.0185	0.00200	13.9	1.0207	0.00260
			14.15	1.0232	0.00230	13.95	1.0240	0.00290
			14.2	1.0248	0.00230	14	1.0252	0.00210

0.15			0.2			0.35		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.20	0.9198	0.00270	12.20	0.9239	0.00210	12.20	0.9176	0.00210
12.25	0.9268	0.00250	12.25	0.9277	0.00210	12.25	0.9272	0.00240
12.3	0.9309	0.00240	12.3	0.9289	0.00220	12.3	0.9273	0.00270
12.35	0.9343	0.00290	12.35	0.9313	0.00290	12.35	0.9309	0.00230
12.4	0.9381	0.00230	12.4	0.9375	0.00230	12.4	0.9317	0.00210
12.45	0.9380	0.00250	12.45	0.9369	0.00230	12.45	0.9332	0.00250
12.5	0.9410	0.00260	12.5	0.9415	0.00230	12.5	0.9475	0.00260
12.55	0.9397	0.00320	12.55	0.9473	0.00230	12.55	0.9392	0.00240
12.6	0.9464	0.00290	12.6	0.9523	0.00250	12.6	0.9446	0.00200
12.65	0.9531	0.00220	12.65	0.9493	0.00240	12.65	0.9460	0.00230
12.7	0.9532	0.00240	12.7	0.9511	0.00230	12.7	0.9565	0.00270
12.75	0.9592	0.00240	12.75	0.9573	0.00210	12.75	0.9557	0.00260
12.8	0.9575	0.00250	12.8	0.9573	0.00250	12.8	0.9630	0.00250
12.85	0.9664	0.00250	12.85	0.9638	0.00230	12.85	0.9658	0.00260
12.9	0.9676	0.00260	12.9	0.9692	0.00220	12.9	0.9632	0.00220
12.95	0.9677	0.00230	12.95	0.9756	0.00220	12.95	0.9667	0.00200
13	0.9692	0.00240	13	0.9727	0.00360	13	0.9737	0.00270
13.05	0.9728	0.00250	13.05	0.9743	0.00210	13.05	0.9701	0.00250
13.1	0.9772	0.00250	13.1	0.9791	0.00250	13.1	0.9815	0.00260
13.15	0.9867	0.00240	13.15	0.9821	0.00280	13.15	0.9809	0.00280
13.2	0.9826	0.00220	13.2	0.9843	0.00180	13.2	0.9827	0.00250
13.25	0.9853	0.00250	13.25	0.9854	0.00230	13.25	0.9848	0.00240
13.3	0.9900	0.00210	13.3	0.9901	0.00230	13.3	0.9896	0.00260
13.35	0.9923	0.00220	13.35	0.9953	0.00250	13.35	0.9906	0.00190
13.4	0.9990	0.00230	13.4	0.9932	0.00280	13.4	0.9948	0.00250
13.45	0.9976	0.00210	13.45	1.0040	0.00200	13.45	0.9938	0.00210
13.5	1.0051	0.00290	13.5	0.9974	0.00260	13.5	0.9996	0.00210
13.55	1.0116	0.00260	13.55	1.0047	0.00240	13.55	1.0031	0.00220
13.6	1.0095	0.00280	13.6	1.0130	0.00250	13.6	1.0078	0.00270
13.65	1.0154	0.00240	13.65	1.0138	0.00240	13.65	1.0107	0.00250
13.7	1.0121	0.00220	13.7	1.0098	0.00210	13.7	1.0141	0.00290
13.75	1.0179	0.00250	13.75	1.0146	0.00230	13.75	1.0101	0.00220
13.8	1.0242	0.00270	13.8	1.0208	0.00230	13.8	1.0135	0.00240
			13.85	1.0185	0.00270	13.85	1.0201	0.00290
			13.9	1.0251	0.00230	13.9	1.0192	0.00250

0.5			0.75			1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.20	0.9236	0.00230	11.90	0.9226	0.00230	11.60	0.9232	0.00210
12.25	0.9299	0.00260	12	0.9258	0.00250	11.65	0.9255	0.00230
12.3	0.9324	0.00250	12.1	0.9345	0.00270	11.7	0.9276	0.00260
12.35	0.9376	0.00210	12.2	0.9398	0.00320	11.75	0.9312	0.00260
12.4	0.9371	0.00220	12.3	0.9471	0.00200	11.8	0.9309	0.00250
12.45	0.9422	0.00200	12.4	0.9526	0.00270	11.85	0.9356	0.00230
12.5	0.9446	0.00220	12.5	0.9553	0.00230	11.9	0.9411	0.00240
12.55	0.9489	0.00240	12.6	0.9633	0.00240	11.95	0.9485	0.00200
12.6	0.9488	0.00280	12.7	0.9660	0.00210	12	0.9431	0.00200
12.65	0.9562	0.00260	12.8	0.9708	0.00220	12.05	0.9527	0.00230
12.7	0.9591	0.00220	12.9	0.9827	0.00200	12.1	0.9527	0.00210
12.75	0.9575	0.00230	13	0.9919	0.00220	12.15	0.9595	0.00200
12.8	0.9612	0.00220	13.1	0.9917	0.00230	12.2	0.9582	0.00210
12.85	0.9592	0.00240	13.2	0.9984	0.00190	12.25	0.9611	0.00210
12.9	0.9686	0.00300	13.3	0.9995	0.00230	12.3	0.9660	0.00220
12.95	0.9700	0.00230	13.4	1.0129	0.00260	12.35	0.9701	0.00210
13	0.9730	0.00240	13.5	1.0145	0.00230	12.4	0.9713	0.00190
13.05	0.9778	0.00270	13.6	1.0194	0.00290	12.45	0.9732	0.00200
13.1	0.9800	0.00200	13.7	1.0219	0.00200	12.5	0.9770	0.00210
13.15	0.9815	0.00220				12.55	0.9819	0.00190
13.2	0.9846	0.00240				12.6	0.9826	0.00230
13.25	0.9854	0.00220				12.65	0.9812	0.00240
13.3	0.9890	0.00190				12.7	0.9922	0.00280
13.35	0.9946	0.00270				12.75	0.9906	0.00230
13.4	0.9946	0.00290				12.8	0.9948	0.00220
13.45	1.0010	0.00250				12.85	0.9926	0.00210
13.5	0.9984	0.00220				12.9	0.9985	0.00240
13.55	1.0062	0.00280				12.95	1.0044	0.00250
13.6	1.0062	0.00210				13	1.0030	0.00250
13.65	1.0086	0.00220				13.05	1.0031	0.00230
13.7	1.0139	0.00240				13.1	1.0102	0.00210
13.75	1.0112	0.00220				13.15	1.0138	0.00200
13.8	1.0220	0.00240				13.2	1.0151	0.00200
13.85	1.0172	0.00210				13.25	1.0196	0.00220
13.9	1.0218	0.00210				13.3	1.0219	0.00270

1.5			2			2.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.00	0.9265	0.00210	10.40	0.9213	0.00180	9.80	0.9167	0.00200
11.05	0.9248	0.00230	10.45	0.9240	0.00210	9.85	0.9225	0.00220
11.1	0.9321	0.00190	10.5	0.9284	0.00240	9.90	0.9221	0.00220
11.15	0.9340	0.00190	10.55	0.9360	0.00190	9.95	0.9266	0.00210
11.2	0.9359	0.00250	10.6	0.9362	0.00210	10.00	0.9312	0.00210
11.25	0.9372	0.00200	10.65	0.9384	0.00220	10.05	0.9315	0.00220
11.3	0.9460	0.00200	10.7	0.9414	0.00220	10.10	0.9390	0.00190
11.35	0.9461	0.00180	10.75	0.9452	0.00220	10.15	0.9491	0.00190
11.4	0.9465	0.00210	10.8	0.9509	0.00230	10.20	0.9521	0.00200
11.45	0.9549	0.00190	10.85	0.9547	0.00200	10.25	0.9525	0.00230
11.5	0.9548	0.00200	10.9	0.9614	0.00200	10.30	0.9569	0.00220
11.55	0.9582	0.00210	10.95	0.9629	0.00200	10.35	0.9622	0.00230
11.6	0.9608	0.00190	11	0.9659	0.00200	10.40	0.9682	0.00240
11.65	0.9643	0.00300	11.05	0.9714	0.00190	10.45	0.9669	0.00230
11.7	0.9689	0.00240	11.1	0.9748	0.00210	10.50	0.9731	0.00200
11.75	0.9744	0.00200	11.15	0.9740	0.00190	10.55	0.9775	0.00230
11.8	0.9736	0.00220	11.2	0.9813	0.00210	10.60	0.9783	0.00230
11.85	0.9819	0.00220	11.25	0.9830	0.00210	10.65	0.9857	0.00160
11.9	0.9798	0.00200	11.3	0.9895	0.00220	10.70	0.9898	0.00190
11.95	0.9851	0.00250	11.35	0.9907	0.00210	10.75	0.9918	0.00210
12	0.9915	0.00310	11.4	0.9948	0.00200	10.80	0.9956	0.00250
12.05	0.9926	0.00270	11.45	0.9956	0.00230	10.85	0.9977	0.00200
12.1	0.9951	0.00210	11.5	1.0023	0.00170	10.90	1.0032	0.00190
12.15	0.9968	0.00180	11.55	1.0063	0.00180	10.95	1.0037	0.00190
12.2	1.0013	0.00220	11.6	1.0051	0.00190	11.00	1.0100	0.00190
12.25	1.0038	0.00220	11.65	1.0068	0.00210	11.05	1.0126	0.00260
12.3	1.0062	0.00200	11.7	1.0126	0.00210	11.10	1.0188	0.00220
12.35	1.0108	0.00230	11.75	1.0147	0.00230	11.15	1.0193	0.00170
12.4	1.0159	0.00180	11.8	1.0188	0.00210	11.20	1.0241	0.00220
12.45	1.0178	0.00200	11.85	1.0241	0.00200			
12.5	1.0168	0.00170	11.9	1.0224	0.00190			

3			4			5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.40	0.9227	0.00190	8.60	0.9163	0.00210	7.90	0.9161	0.00160
9.45	0.9278	0.00190	8.65	0.9258	0.00210	7.95	0.9250	0.00220
9.5	0.9354	0.00270	8.7	0.9342	0.00200	8.00	0.9280	0.00220
9.55	0.9354	0.00220	8.75	0.9397	0.00210	8.05	0.9338	0.00210
9.6	0.9399	0.00220	8.8	0.9477	0.00210	8.10	0.9359	0.00180
9.65	0.9443	0.00270	8.85	0.9451	0.00200	8.15	0.9452	0.00210
9.7	0.9486	0.00170	8.9	0.9533	0.00210	8.20	0.9494	0.00200
9.75	0.9533	0.00190	8.95	0.9575	0.00200	8.25	0.9565	0.00190
9.8	0.9614	0.00200	9	0.9613	0.00190	8.30	0.9557	0.00190
9.85	0.9581	0.00250	9.05	0.9639	0.00240	8.35	0.9696	0.00270
9.9	0.9661	0.00210	9.1	0.9689	0.00240	8.40	0.9692	0.00190
9.95	0.9663	0.00240	9.15	0.9734	0.00200	8.45	0.9741	0.00190
10	0.9720	0.00240	9.2	0.9772	0.00200	8.50	0.9812	0.00220
10.05	0.9742	0.00180	9.25	0.9843	0.00210	8.55	0.9887	0.00170
10.1	0.9810	0.00190	9.3	0.9871	0.00180	8.60	0.9941	0.00210
10.15	0.9869	0.00290	9.35	0.9950	0.00180	8.65	0.9908	0.00270
10.2	0.9897	0.00190	9.4	0.9927	0.00200	8.70	0.9955	0.00250
10.25	0.9835	0.00280	9.45	1.0009	0.00220	8.75	1.0073	0.00240
10.3	0.9995	0.00210	9.5	1.0056	0.00190	8.80	1.0133	0.00180
10.35	1.0003	0.00260	9.55	1.0121	0.00180	8.85	1.0131	0.00230
10.4	1.0024	0.00210	9.6	1.0145	0.00220	8.90	1.0190	0.00220
10.45	1.0096	0.00190	9.65	1.0193	0.00270	8.95	1.0255	0.00230
10.5	1.0106	0.00190	9.7	1.0266	0.00200	9.00	1.0308	0.00190
10.55	1.0153	0.00200						
10.6	1.0251	0.00190						
10.65	1.0233	0.00220						
10.7	1.0298	0.00180						

6			7			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.40	0.9237	0.00220	6.90	0.9202	0.00210	6.70	0.9189	0.00220
7.45	0.9288	0.00240	6.95	0.9204	0.00240	6.75	0.9239	0.00200
7.5	0.9327	0.00180	7	0.9302	0.00220	6.8	0.9302	0.00250
7.55	0.9392	0.00190	7.05	0.9347	0.00260	6.85	0.9334	0.00200
7.6	0.9424	0.00220	7.1	0.9448	0.00190	6.9	0.9468	0.00240
7.65	0.9515	0.00190	7.15	0.9492	0.00170	6.95	0.9518	0.00200
7.7	0.9558	0.00200	7.2	0.9537	0.00190	7	0.9578	0.00190
7.75	0.9605	0.00200	7.25	0.9570	0.00200	7.05	0.9618	0.00190
7.8	0.9666	0.00250	7.3	0.9696	0.00220	7.1	0.9696	0.00190
7.85	0.9716	0.00210	7.35	0.9753	0.00250	7.15	0.9801	0.00220
7.9	0.9820	0.00230	7.4	0.9814	0.00280	7.2	0.9861	0.00240
7.95	0.9819	0.00220	7.45	0.9845	0.00200	7.25	0.9895	0.00180
8	0.9907	0.00200	7.5	0.9893	0.00220	7.3	0.9954	0.00200
8.05	0.9976	0.00210	7.55	1.0000	0.00220	7.35	1.0029	0.00220
8.1	0.9987	0.00220	7.6	1.0019	0.00240	7.4	1.0054	0.00210
8.15	1.0076	0.00220	7.65	1.0103	0.00220	7.45	1.0164	0.00200
8.2	1.0126	0.00240	7.7	1.0132	0.00220	7.5	1.0175	0.00260
8.25	1.0183	0.00200	7.75	1.0232	0.00260	7.55	1.0268	0.00180
8.3	1.0201	0.00210	7.8	1.0309	0.00190	7.6	1.0316	0.00260

8			9			10		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.50	0.9175	0.00210	6.10	0.9123	0.00210	5.80	0.9125	0.00170
6.55	0.9256	0.00200	6.15	0.9186	0.00170	5.85	0.9219	0.00180
6.6	0.9322	0.00190	6.2	0.9262	0.00230	5.90	0.9320	0.00200
6.65	0.9394	0.00180	6.25	0.9353	0.00220	5.95	0.9389	0.00190
6.7	0.9450	0.00240	6.3	0.9440	0.00190	6.00	0.9513	0.00170
6.75	0.9514	0.00180	6.35	0.9475	0.00240	6.05	0.9553	0.00200
6.8	0.9592	0.00170	6.4	0.9568	0.00190	6.10	0.9629	0.00180
6.85	0.9622	0.00210	6.45	0.9608	0.00180	6.15	0.9698	0.00190
6.9	0.9716	0.00180	6.5	0.9648	0.00260	6.20	0.9779	0.00250
6.95	0.9791	0.00250	6.55	0.9781	0.00200	6.25	0.9835	0.00190
7	0.9846	0.00200	6.6	0.9821	0.00220	6.30	0.9903	0.00180
7.05	0.9923	0.00180	6.65	0.9927	0.00270	6.35	0.9982	0.00190
7.1	0.9976	0.00180	6.7	0.9970	0.00230	6.40	1.0075	0.00210
7.15	1.0019	0.00230	6.75	1.0027	0.00170	6.45	1.0131	0.00220
7.2	1.0103	0.00240	6.8	1.0107	0.00230	6.50	1.0177	0.00220
7.25	1.0169	0.00190	6.85	1.0182	0.00240	6.55	1.0234	0.00220
7.3	1.0212	0.00180	6.9	1.0257	0.00230	6.60	1.0327	0.00200

	15			19.6	
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.50	0.9221	0.00180	3.60	0.9157	0.00220
4.55	0.9284	0.00220	3.62	0.9201	0.00190
4.6	0.9391	0.00210	3.64	0.9270	0.00250
4.65	0.9499	0.00280	3.66	0.9298	0.00220
4.7	0.9604	0.00220	3.68	0.9353	0.00180
4.75	0.9669	0.00220	3.7	0.9338	0.00210
4.8	0.9740	0.00170	3.72	0.9418	0.00200
4.85	0.9830	0.00220	3.74	0.9479	0.00210
4.9	0.9907	0.00230	3.76	0.9488	0.00180
5	1.0112	0.00250	3.8	0.9631	0.00230
5.05	1.0185	0.00190	3.82	0.9651	0.00230
5.1	1.0279	0.00200	3.84	0.9645	0.00180
			3.86	0.9774	0.00220
			3.88	0.9768	0.00210
			3.9	0.9848	0.00200
			3.92	0.9826	0.00230
			3.94	0.9868	0.00260
			3.96	0.9964	0.00220
			3.98	1.0004	0.00200
			4	1.0035	0.00190
			4.02	1.0066	0.00220
			4.04	1.0107	0.00210
			4.06	1.0143	0.00210
			4.08	1.0222	0.00190
			4.1	1.0252	0.00190

Case ID: pu_sph_095_01ref

Material: Plutonium

Geometry: Sphere

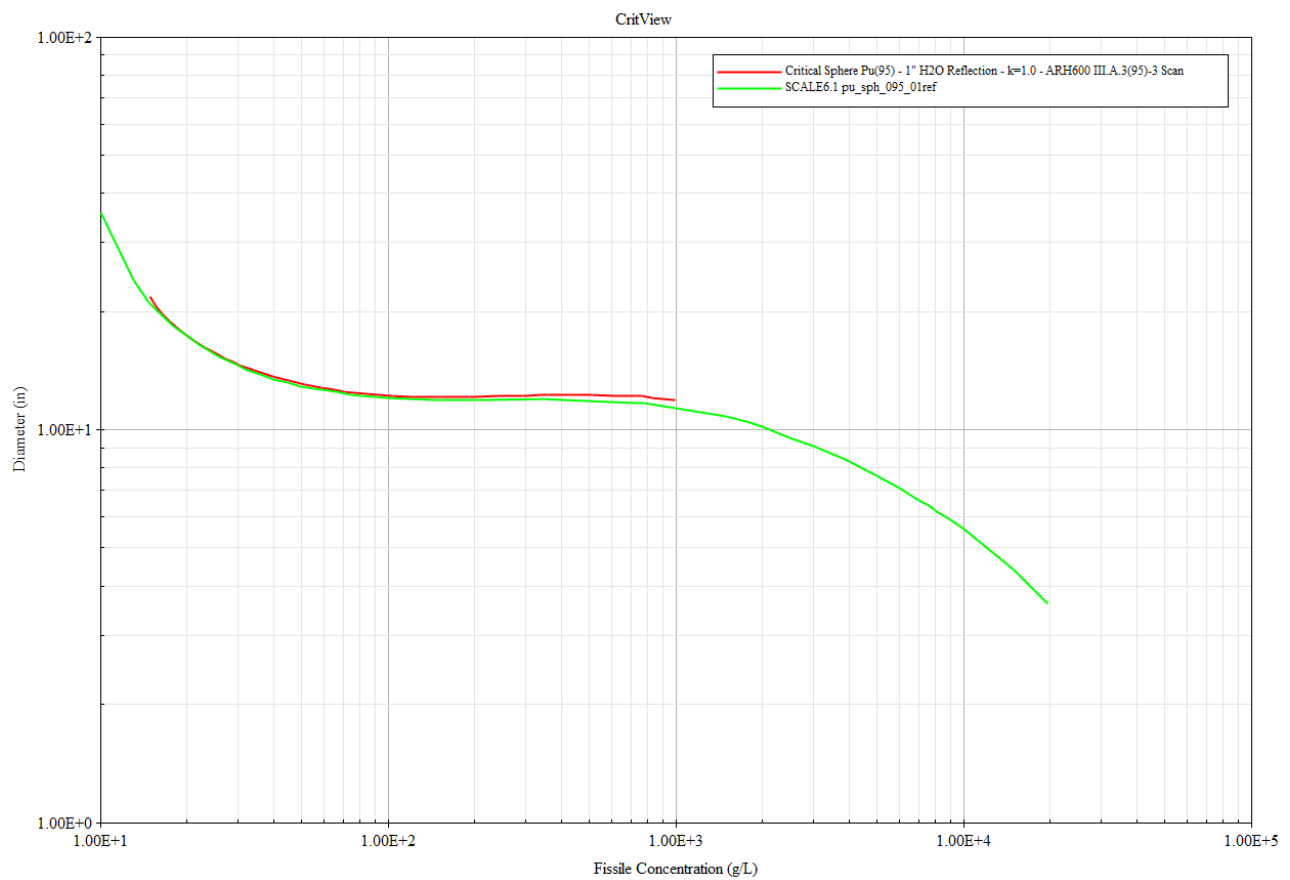
Isotopics: 95% ^{239}Pu 5% ^{240}Pu

Reflector: 1" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	26.300	37.900	0.500	35.7024
0.013	19.800	24.800	0.200	24.0810
0.015	17.700	21.700	0.200	20.8371
0.018	15.900	19.000	0.100	18.3146
0.020	15.000	17.800	0.100	17.3591
0.022	14.300	17.000	0.100	16.4552
0.024	13.700	16.300	0.100	15.8549
0.025	13.700	16.100	0.100	15.5575
0.026	13.500	15.700	0.100	15.2721
0.028	13.200	15.400	0.100	14.9357
0.030	12.900	15.000	0.100	14.5551
0.032	12.700	14.700	0.100	14.2817
0.036	12.300	14.200	0.100	13.8364
0.040	12.000	13.900	0.100	13.4591
0.045	11.700	13.500	0.100	13.2077
0.050	11.500	13.300	0.100	12.8924
0.075	11.000	12.600	0.050	12.2918
0.100	10.700	12.400	0.050	12.0667
0.150	10.700	12.300	0.050	11.8845
0.200	10.600	12.300	0.050	11.9200
0.350	10.800	12.400	0.050	11.9586
0.500	10.600	12.300	0.050	11.8412
0.750	10.400	12.100	0.050	11.6952
1.000	10.200	11.800	0.050	11.3686
1.500	9.600	11.100	0.050	10.8083
2.000	9.100	10.500	0.050	10.1588
2.500	8.600	9.900	0.050	9.5545
3.000	8.100	9.400	0.050	9.0799
4.000	7.500	8.600	0.050	8.2861
5.000	6.900	7.900	0.050	7.6100
6.000	6.400	7.300	0.050	7.0977
7.000	6.000	6.900	0.050	6.6189
7.500	5.800	6.700	0.050	6.4569
8.000	5.600	6.400	0.050	6.2311
9.000	5.300	6.100	0.050	5.8867
10.000	5.000	5.800	0.050	5.5872
15.000	3.900	4.500	0.050	4.3920
19.600	3.200	3.700	0.020	3.6008

WORM and SCALE Input File

```

'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.1.1.3.2-1. Critical Dimensions for 95% 239Pu Sphere - 1 Inch of Water Reflection
,
#index number = <index = 1:38:1>
,
#Concentration = <@conc =
0.01,0.013,0.015,0.018,0.02,0.022,0.024,0.025,0.026,0.028,0.03,0.032,0.036,0.04,0.045,0.05,0.075,
0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4,5,6,7,7.5,8,9,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
26.3,19.8,17.7,15.9,15,14.3,13.7,13.7,13.5,13.2,12.9,12.7,12.3,12,11.7,11.5,11,10.7,10.7,10.6,10.
8,10.6,10.4,10.2,9.6,9.1,8.6,8.1,7.5,6.9,6.4,6,5.8,5.6,5.3,5,3.9,3.2> in
#Ending Diameter = <@enddia =
37.9,24.8,21.7,19,17.8,17,16.3,16.1,15.7,15.4,15,14.7,14.2,13.9,13.5,13.3,12.6,12.4,12.3,12.3,12.
4,12.3,12.1,11.8,11.1,10.5,9.9,9.4,8.6,7.9,7.3,6.9,6.7,6.4,6.1,5.8,4.5,3.7> in
#Delta = <@delta =
0.5,0.2,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.0
5,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02> in
,
'Reflector Thickness {{refthick = 1}}
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
Sphere Reflected
v7-238
read composition
  pu          1 den=<critconc> 1 300
                                94239 95
                                94240 5   end
                                1 den=<wconc> 1 300   end
<&ZEROCHECK(wconc)\11>h2o
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere"
  sphere 1      {{{(diameter*in)/2}}}
  sphere 2      {{{(refdia*in)/2}}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_sph_095_01ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: sphere
modmat: H2O
critmat: plutonium
isomat: Pu239 0.95 Pu240 0.05
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 35.7024
0.013 24.0810
0.015 20.8371
0.018 18.3146
0.020 17.3591
0.022 16.4552
0.024 15.8549
0.025 15.5575
0.026 15.2721
0.028 14.9357
0.030 14.5551
0.032 14.2817
0.036 13.8364
0.040 13.4591
0.045 13.2077
0.050 12.8924
0.075 12.2918
0.100 12.0667
0.150 11.8845
0.200 11.9200
0.350 11.9586
0.500 11.8412
0.750 11.6952
1.000 11.3686
1.500 10.8083
2.000 10.1588
2.500 9.5545
3.000 9.0799
4.000 8.2861
5.000 7.6100
6.000 7.0977
7.000 6.6189
7.500 6.4569
8.000 6.2311
9.000 5.8867
10.000 5.5872
15.000 4.3920
19.600 3.6008
```

0.01			0.013			0.015		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
26.30	0.9247	0.00120	19.80	0.9256	0.00200	17.70	0.9253	0.00180
26.8	0.9305	0.00120	20	0.9288	0.00200	17.9	0.9271	0.00160
27.3	0.9338	0.00160	20.2	0.9340	0.00160	18.1	0.9344	0.00170
27.8	0.9408	0.00190	20.4	0.9412	0.00170	18.3	0.9425	0.00180
28.3	0.9465	0.00150	20.6	0.9398	0.00150	18.5	0.9436	0.00160
28.8	0.9505	0.00130	20.8	0.9435	0.00150	18.7	0.9501	0.00140
29.3	0.9553	0.00150	21	0.9490	0.00170	18.9	0.9576	0.00160
29.8	0.9597	0.00150	21.2	0.9518	0.00170	19.1	0.9607	0.00150
30.3	0.9626	0.00170	21.4	0.9543	0.00170	19.3	0.9616	0.00160
30.8	0.9699	0.00130	21.6	0.9617	0.00200	19.5	0.9698	0.00130
31.3	0.9723	0.00190	21.8	0.9642	0.00160	19.7	0.9742	0.00170
31.8	0.9772	0.00120	22	0.9670	0.00130	19.9	0.9790	0.00170
32.3	0.9795	0.00120	22.2	0.9715	0.00170	20.1	0.9841	0.00160
32.8	0.9833	0.00140	22.4	0.9774	0.00180	20.3	0.9873	0.00180
33.3	0.9830	0.00140	22.6	0.9771	0.00190	20.5	0.9873	0.00160
33.8	0.9908	0.00130	22.8	0.9846	0.00150	20.7	0.9952	0.00180
34.3	0.9924	0.00120	23	0.9858	0.00190	20.9	1.0022	0.00160
34.8	0.9984	0.00130	23.2	0.9857	0.00150	21.1	1.0001	0.00140
35.3	0.9967	0.00140	23.4	0.9929	0.00200	21.3	1.0097	0.00180
35.8	1.0008	0.00110	23.6	0.9927	0.00170	21.5	1.0107	0.00180
36.3	1.0050	0.00180	23.8	0.9962	0.00150	21.7	1.0134	0.00180
36.8	1.0084	0.00140	24	0.9983	0.00190			
37.3	1.0082	0.00130	24.2	1.0025	0.00150			
37.8	1.0108	0.00130	24.4	1.0061	0.00170			
37.9	1.0124	0.00120	24.6	1.0091	0.00160			
			24.8	1.0187	0.00230			

0.018			0.02			0.022		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
15.90	0.9240	0.00150	15.00	0.9199	0.00180	14.30	0.9179	0.00210
16	0.9262	0.00180	15.1	0.9203	0.00230	14.4	0.9219	0.00180
16.1	0.9323	0.00190	15.2	0.9305	0.00220	14.5	0.9243	0.00230
16.2	0.9323	0.00220	15.3	0.9319	0.00170	14.6	0.9320	0.00220
16.3	0.9357	0.00190	15.4	0.9364	0.00220	14.7	0.9349	0.00200
16.4	0.9423	0.00200	15.5	0.9379	0.00190	14.8	0.9392	0.00180
16.5	0.9418	0.00190	15.6	0.9422	0.00210	14.9	0.9386	0.00200
16.6	0.9472	0.00200	15.7	0.9477	0.00200	15	0.9427	0.00220
16.7	0.9502	0.00180	15.8	0.9468	0.00210	15.1	0.9482	0.00210
16.8	0.9570	0.00190	15.9	0.9537	0.00170	15.2	0.9545	0.00180
16.9	0.9550	0.00210	16	0.9587	0.00230	15.3	0.9593	0.00180
17	0.9623	0.00170	16.1	0.9627	0.00240	15.4	0.9601	0.00170
17.1	0.9648	0.00180	16.2	0.9644	0.00190	15.5	0.9635	0.00180
17.2	0.9687	0.00220	16.3	0.9665	0.00210	15.6	0.9705	0.00200
17.3	0.9705	0.00220	16.4	0.9703	0.00200	15.7	0.9728	0.00190
17.4	0.9731	0.00200	16.5	0.9728	0.00210	15.8	0.9763	0.00210
17.5	0.9718	0.00180	16.6	0.9746	0.00190	15.9	0.9801	0.00180
17.6	0.9793	0.00190	16.7	0.9789	0.00190	16	0.9827	0.00230
17.7	0.9811	0.00190	16.8	0.9867	0.00230	16.1	0.9874	0.00180
17.8	0.9797	0.00150	16.9	0.9875	0.00250	16.2	0.9915	0.00190
17.9	0.9892	0.00160	17	0.9922	0.00190	16.3	0.9939	0.00220
18	0.9890	0.00190	17.1	0.9951	0.00250	16.4	0.9963	0.00200
18.1	0.9933	0.00180	17.2	0.9958	0.00170	16.5	1.0030	0.00220
18.2	0.9987	0.00170	17.3	0.9987	0.00170	16.6	1.0030	0.00230
18.3	1.0006	0.00150	17.4	1.0009	0.00200	16.7	1.0062	0.00250
18.4	0.9965	0.00210	17.5	1.0042	0.00170	16.8	1.0079	0.00200
18.5	1.0013	0.00210	17.6	1.0072	0.00170	16.9	1.0161	0.00230
18.6	1.0060	0.00210	17.7	1.0157	0.00190	17	1.0197	0.00210
18.7	1.0111	0.00180	17.8	1.0154	0.00200			
18.8	1.0117	0.00180						
18.9	1.0137	0.00190						
19	1.0170	0.00180						

0.024			0.025			0.026		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.70	0.9120	0.00190	13.70	0.9205	0.00180	13.50	0.9200	0.00210
13.8	0.9150	0.00210	13.8	0.9258	0.00170	13.6	0.9249	0.00240
13.9	0.9174	0.00190	13.9	0.9304	0.00190	13.7	0.9255	0.00170
14	0.9246	0.00170	14	0.9340	0.00200	13.8	0.9319	0.00220
14.1	0.9312	0.00170	14.1	0.9376	0.00210	13.9	0.9371	0.00210
14.2	0.9339	0.00250	14.2	0.9437	0.00210	14	0.9445	0.00190
14.3	0.9394	0.00250	14.3	0.9481	0.00190	14.1	0.9489	0.00250
14.4	0.9432	0.00180	14.4	0.9503	0.00190	14.2	0.9517	0.00190
14.5	0.9456	0.00200	14.5	0.9570	0.00240	14.3	0.9575	0.00200
14.6	0.9483	0.00180	14.6	0.9618	0.00230	14.4	0.9618	0.00210
14.7	0.9552	0.00200	14.7	0.9628	0.00230	14.5	0.9635	0.00210
14.8	0.9561	0.00250	14.8	0.9711	0.00190	14.6	0.9665	0.00190
14.9	0.9649	0.00210	14.9	0.9735	0.00210	14.7	0.9781	0.00180
15	0.9680	0.00220	15	0.9780	0.00190	14.8	0.9738	0.00200
15.1	0.9699	0.00190	15.1	0.9845	0.00190	14.9	0.9808	0.00210
15.2	0.9744	0.00200	15.2	0.9869	0.00230	15	0.9890	0.00200
15.3	0.9773	0.00160	15.3	0.9882	0.00250	15.1	0.9915	0.00210
15.4	0.9856	0.00210	15.4	0.9953	0.00220	15.2	0.9956	0.00190
15.5	0.9878	0.00270	15.5	0.9977	0.00190	15.3	1.0017	0.00240
15.6	0.9907	0.00210	15.6	1.0017	0.00210	15.4	1.0017	0.00210
15.7	0.9915	0.00180	15.7	1.0062	0.00200	15.5	1.0072	0.00200
15.8	0.9972	0.00210	15.8	1.0063	0.00170	15.6	1.0091	0.00190
15.9	1.0023	0.00200	15.9	1.0125	0.00180	15.7	1.0105	0.00200
16	1.0089	0.00190	16	1.0165	0.00180			
16.1	1.0126	0.00170	16.1	1.0181	0.00170			
16.2	1.0104	0.00200						
16.3	1.0182	0.00190						

0.028			0.03			0.032		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.20	0.9212	0.00210	12.90	0.9214	0.00200	12.70	0.9168	0.00210
13.3	0.9241	0.00200	13	0.9234	0.00180	12.8	0.9277	0.00190
13.4	0.9301	0.00190	13.1	0.9327	0.00210	12.9	0.9311	0.00210
13.5	0.9393	0.00210	13.2	0.9345	0.00210	13	0.9408	0.00220
13.6	0.9434	0.00220	13.3	0.9428	0.00210	13.1	0.9429	0.00230
13.7	0.9431	0.00160	13.4	0.9469	0.00200	13.2	0.9485	0.00220
13.8	0.9527	0.00200	13.5	0.9502	0.00260	13.3	0.9536	0.00220
13.9	0.9532	0.00260	13.6	0.9563	0.00210	13.4	0.9624	0.00200
14	0.9602	0.00200	13.7	0.9606	0.00220	13.5	0.9668	0.00210
14.1	0.9618	0.00240	13.8	0.9629	0.00240	13.6	0.9651	0.00220
14.2	0.9685	0.00200	13.9	0.9685	0.00280	13.7	0.9702	0.00230
14.3	0.9745	0.00270	14	0.9743	0.00230	13.8	0.9789	0.00220
14.4	0.9772	0.00240	14.1	0.9798	0.00240	13.9	0.9805	0.00170
14.5	0.9795	0.00180	14.2	0.9892	0.00200	14	0.9855	0.00280
14.6	0.9855	0.00220	14.3	0.9856	0.00220	14.1	0.9874	0.00180
14.7	0.9916	0.00200	14.4	0.9911	0.00220	14.2	0.9951	0.00200
14.8	0.9919	0.00230	14.5	0.9951	0.00190	14.3	1.0011	0.00180
14.9	0.9975	0.00200	14.6	1.0040	0.00210	14.4	1.0034	0.00180
15	1.0045	0.00190	14.7	1.0040	0.00200	14.5	1.0053	0.00200
15.1	1.0070	0.00200	14.8	1.0117	0.00250	14.6	1.0164	0.00180
15.2	1.0092	0.00210	14.9	1.0134	0.00250	14.7	1.0169	0.00230
15.3	1.0189	0.00220	15	1.0171	0.00180			
15.4	1.0197	0.00270						

0.036			0.04			0.045		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.30	0.9147	0.00210	12.00	0.9184	0.00180	11.70	0.9172	0.00200
12.4	0.9282	0.00250	12.1	0.9267	0.00190	11.8	0.9231	0.00190
12.5	0.9351	0.00200	12.2	0.9323	0.00180	11.9	0.9319	0.00220
12.6	0.9346	0.00180	12.3	0.9369	0.00200	12	0.9387	0.00230
12.7	0.9453	0.00220	12.4	0.9434	0.00230	12.1	0.9425	0.00250
12.8	0.9466	0.00220	12.5	0.9477	0.00230	12.2	0.9466	0.00240
12.9	0.9547	0.00290	12.6	0.9537	0.00250	12.3	0.9563	0.00240
13	0.9615	0.00250	12.7	0.9564	0.00260	12.4	0.9595	0.00200
13.1	0.9659	0.00310	12.8	0.9618	0.00240	12.5	0.9644	0.00190
13.2	0.9693	0.00270	12.9	0.9710	0.00230	12.6	0.9690	0.00230
13.3	0.9757	0.00200	13	0.9760	0.00200	12.7	0.9750	0.00210
13.4	0.9775	0.00210	13.1	0.9832	0.00240	12.8	0.9797	0.00290
13.5	0.9860	0.00210	13.2	0.9850	0.00270	12.9	0.9894	0.00220
13.6	0.9887	0.00200	13.3	0.9939	0.00200	13	0.9918	0.00230
13.7	0.9952	0.00250	13.4	0.9974	0.00230	13.1	0.9959	0.00250
13.8	0.9988	0.00220	13.5	1.0018	0.00230	13.2	0.9991	0.00210
13.9	1.0021	0.00220	13.6	1.0101	0.00270	13.3	1.0108	0.00210
14	1.0086	0.00220	13.7	1.0123	0.00220	13.4	1.0122	0.00290
14.1	1.0133	0.00230	13.8	1.0192	0.00250	13.5	1.0197	0.00250
14.2	1.0203	0.00230	13.9	1.0248	0.00220			

0.05			0.075			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.50	0.9221	0.00220	11.00	0.9228	0.00220	10.70	0.9179	0.00260
11.6	0.9245	0.00200	11.05	0.9282	0.00210	10.75	0.9218	0.00250
11.7	0.9342	0.00200	11.1	0.9245	0.00220	10.8	0.9252	0.00200
11.8	0.9435	0.00260	11.15	0.9328	0.00230	10.85	0.9285	0.00250
11.9	0.9456	0.00220	11.2	0.9323	0.00220	10.9	0.9296	0.00240
12	0.9523	0.00200	11.25	0.9378	0.00260	10.95	0.9350	0.00210
12.1	0.9545	0.00200	11.3	0.9440	0.00340	11	0.9374	0.00230
12.2	0.9592	0.00210	11.35	0.9453	0.00230	11.05	0.9402	0.00230
12.3	0.9678	0.00210	11.4	0.9482	0.00240	11.1	0.9426	0.00220
12.4	0.9746	0.00210	11.45	0.9505	0.00210	11.15	0.9521	0.00260
12.5	0.9827	0.00230	11.5	0.9585	0.00260	11.2	0.9526	0.00240
12.6	0.9861	0.00210	11.55	0.9565	0.00270	11.25	0.9541	0.00210
12.7	0.9909	0.00240	11.6	0.9589	0.00280	11.3	0.9553	0.00270
12.8	0.9939	0.00250	11.65	0.9656	0.00260	11.35	0.9606	0.00240
12.9	1.0005	0.00210	11.7	0.9621	0.00220	11.4	0.9631	0.00290
13	1.0036	0.00220	11.75	0.9630	0.00260	11.45	0.9621	0.00190
13.1	1.0115	0.00200	11.8	0.9726	0.00210	11.5	0.9702	0.00230
13.2	1.0138	0.00240	11.85	0.9757	0.00250	11.55	0.9709	0.00220
13.3	1.0226	0.00250	11.9	0.9796	0.00230	11.6	0.9744	0.00210
			11.95	0.9812	0.00200	11.65	0.9780	0.00220
			12	0.9879	0.00290	11.7	0.9811	0.00220
			12.05	0.9856	0.00230	11.75	0.9882	0.00240
			12.1	0.9897	0.00230	11.8	0.9854	0.00260
			12.15	0.9962	0.00220	11.85	0.9906	0.00260
			12.2	0.9950	0.00210	11.9	0.9933	0.00270
			12.25	0.9944	0.00260	11.95	0.9995	0.00240
			12.3	1.0011	0.00230	12	0.9979	0.00220
			12.35	1.0043	0.00220	12.05	0.9993	0.00240
			12.4	1.0113	0.00250	12.1	1.0014	0.00210
			12.45	1.0135	0.00210	12.15	1.0073	0.00210
			12.5	1.0126	0.00220	12.2	1.0114	0.00230
			12.55	1.0205	0.00280	12.25	1.0159	0.00250
			12.6	1.0189	0.00220	12.3	1.0169	0.00260
						12.35	1.0179	0.00250
						12.4	1.0218	0.00220

0.15			0.2			0.35		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.70	0.9241	0.00220	10.60	0.9208	0.00200	10.80	0.9344	0.00210
10.75	0.9268	0.00260	10.65	0.9260	0.00300	10.85	0.9338	0.00200
10.8	0.9305	0.00240	10.7	0.9263	0.00210	10.9	0.9351	0.00230
10.85	0.9342	0.00200	10.75	0.9279	0.00230	10.95	0.9426	0.00220
10.9	0.9394	0.00220	10.8	0.9335	0.00250	11	0.9429	0.00260
10.95	0.9432	0.00250	10.85	0.9341	0.00230	11.05	0.9516	0.00210
11	0.9446	0.00210	10.9	0.9395	0.00220	11.1	0.9507	0.00250
11.05	0.9481	0.00220	10.95	0.9468	0.00210	11.15	0.9547	0.00240
11.1	0.9545	0.00270	11	0.9444	0.00190	11.2	0.9568	0.00240
11.15	0.9553	0.00230	11.05	0.9477	0.00250	11.25	0.9616	0.00250
11.2	0.9545	0.00260	11.1	0.9547	0.00240	11.3	0.9632	0.00240
11.25	0.9618	0.00220	11.15	0.9528	0.00230	11.35	0.9685	0.00250
11.3	0.9604	0.00210	11.2	0.9588	0.00240	11.4	0.9676	0.00320
11.35	0.9678	0.00280	11.25	0.9661	0.00240	11.45	0.9734	0.00210
11.4	0.9695	0.00220	11.3	0.9622	0.00240	11.5	0.9756	0.00210
11.45	0.9696	0.00230	11.35	0.9665	0.00260	11.55	0.9746	0.00240
11.5	0.9750	0.00220	11.4	0.9721	0.00220	11.6	0.9785	0.00240
11.55	0.9837	0.00220	11.45	0.9758	0.00200	11.65	0.9847	0.00220
11.6	0.9851	0.00230	11.5	0.9715	0.00220	11.7	0.9882	0.00210
11.65	0.9924	0.00230	11.55	0.9793	0.00230	11.75	0.9855	0.00210
11.7	0.9901	0.00280	11.6	0.9835	0.00230	11.8	0.9864	0.00250
11.75	0.9897	0.00230	11.65	0.9866	0.00260	11.85	0.9922	0.00210
11.8	0.9929	0.00280	11.7	0.9895	0.00280	11.9	0.9971	0.00240
11.85	0.9980	0.00220	11.75	0.9970	0.00250	11.95	0.9994	0.00260
11.9	1.0009	0.00240	11.8	0.9949	0.00250	12	1.0029	0.00230
11.95	1.0033	0.00240	11.85	0.9975	0.00270	12.05	1.0018	0.00210
12	1.0054	0.00250	11.9	0.9980	0.00280	12.1	1.0079	0.00280
12.05	1.0114	0.00270	11.95	1.0030	0.00260	12.15	1.0196	0.00220
12.1	1.0095	0.00280	12	1.0069	0.00210	12.2	1.0095	0.00240
12.15	1.0190	0.00210	12.05	1.0126	0.00200	12.25	1.0118	0.00240
12.2	1.0205	0.00200	12.1	1.0100	0.00270	12.3	1.0235	0.00230
12.25	1.0192	0.00210	12.15	1.0159	0.00220	12.35	1.0206	0.00220
12.3	1.0232	0.00290	12.2	1.0217	0.00310	12.4	1.0270	0.00250
			12.25	1.0161	0.00270			
			12.3	1.0201	0.00210			

0.5			0.75			1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.60	0.9195	0.00230	10.40	0.9227	0.00230	10.20	0.9262	0.00230
10.65	0.9220	0.00220	10.45	0.9249	0.00220	10.25	0.9252	0.00210
10.7	0.9298	0.00200	10.5	0.9283	0.00210	10.3	0.9307	0.00210
10.75	0.9343	0.00230	10.55	0.9310	0.00200	10.35	0.9365	0.00180
10.8	0.9369	0.00270	10.6	0.9375	0.00240	10.4	0.9372	0.00200
10.85	0.9365	0.00210	10.65	0.9395	0.00200	10.45	0.9405	0.00240
10.9	0.9448	0.00220	10.7	0.9423	0.00190	10.5	0.9469	0.00210
10.95	0.9435	0.00220	10.75	0.9466	0.00210	10.55	0.9444	0.00220
11	0.9485	0.00210	10.8	0.9483	0.00200	10.6	0.9499	0.00200
11.05	0.9543	0.00220	10.85	0.9507	0.00210	10.65	0.9558	0.00240
11.1	0.9522	0.00320	10.9	0.9522	0.00250	10.7	0.9567	0.00200
11.15	0.9574	0.00260	10.95	0.9547	0.00260	10.75	0.9570	0.00210
11.2	0.9566	0.00190	11	0.9596	0.00210	10.8	0.9608	0.00210
11.25	0.9652	0.00200	11.05	0.9610	0.00210	10.85	0.9634	0.00200
11.3	0.9635	0.00210	11.1	0.9603	0.00210	10.9	0.9695	0.00230
11.35	0.9657	0.00210	11.15	0.9656	0.00190	10.95	0.9740	0.00190
11.4	0.9701	0.00200	11.2	0.9725	0.00210	11	0.9786	0.00200
11.45	0.9764	0.00220	11.25	0.9752	0.00210	11.05	0.9760	0.00200
11.5	0.9755	0.00200	11.3	0.9763	0.00210	11.1	0.9786	0.00240
11.55	0.9788	0.00230	11.35	0.9821	0.00230	11.15	0.9867	0.00210
11.6	0.9825	0.00230	11.4	0.9799	0.00270	11.2	0.9878	0.00200
11.65	0.9859	0.00200	11.45	0.9865	0.00240	11.25	0.9923	0.00220
11.7	0.9881	0.00220	11.5	0.9868	0.00220	11.3	0.9901	0.00240
11.75	0.9886	0.00250	11.55	0.9938	0.00230	11.35	0.9981	0.00200
11.8	0.9944	0.00210	11.6	0.9911	0.00240	11.4	1.0032	0.00220
11.85	1.0012	0.00220	11.65	1.0019	0.00210	11.45	1.0033	0.00230
11.9	1.0006	0.00240	11.7	0.9998	0.00230	11.5	1.0042	0.00200
11.95	1.0056	0.00250	11.75	1.0012	0.00190	11.55	1.0099	0.00200
12	1.0041	0.00260	11.8	1.0024	0.00220	11.6	1.0098	0.00240
12.05	1.0116	0.00200	11.85	1.0082	0.00230	11.65	1.0132	0.00190
12.1	1.0098	0.00230	11.9	1.0079	0.00280	11.7	1.0177	0.00240
12.15	1.0136	0.00240	11.95	1.0098	0.00240	11.75	1.0132	0.00250
12.2	1.0128	0.00220	12	1.0172	0.00220	11.8	1.0193	0.00200
12.25	1.0234	0.00210	12.05	1.0150	0.00220			
12.3	1.0209	0.00240	12.1	1.0212	0.00230			

1.5			2			2.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.60	0.9237	0.00220	9.10	0.9257	0.00250	8.60	0.9222	0.00190
9.65	0.9245	0.00210	9.15	0.9256	0.00210	8.65	0.9266	0.00230
9.7	0.9303	0.00210	9.2	0.9298	0.00190	8.7	0.9321	0.00220
9.75	0.9345	0.00200	9.25	0.9392	0.00220	8.75	0.9309	0.00200
9.8	0.9372	0.00210	9.3	0.9402	0.00220	8.8	0.9409	0.00230
9.85	0.9415	0.00230	9.35	0.9426	0.00240	8.85	0.9455	0.00190
9.9	0.9430	0.00210	9.4	0.9475	0.00180	8.9	0.9441	0.00210
9.95	0.9493	0.00230	9.45	0.9501	0.00220	8.95	0.9490	0.00190
10	0.9487	0.00220	9.5	0.9523	0.00240	9	0.9558	0.00190
10.05	0.9559	0.00210	9.55	0.9576	0.00280	9.05	0.9654	0.00210
10.1	0.9553	0.00190	9.6	0.9615	0.00250	9.1	0.9665	0.00200
10.15	0.9590	0.00200	9.65	0.9659	0.00200	9.15	0.9675	0.00200
10.2	0.9626	0.00220	9.7	0.9712	0.00190	9.2	0.9720	0.00180
10.25	0.9701	0.00200	9.75	0.9761	0.00210	9.25	0.9775	0.00200
10.3	0.9672	0.00250	9.8	0.9760	0.00200	9.3	0.9786	0.00260
10.35	0.9740	0.00180	9.85	0.9803	0.00250	9.35	0.9844	0.00230
10.4	0.9782	0.00220	9.9	0.9834	0.00180	9.4	0.9853	0.00200
10.45	0.9789	0.00200	9.95	0.9855	0.00270	9.45	0.9901	0.00210
10.5	0.9825	0.00190	10	0.9884	0.00230	9.5	0.9932	0.00210
10.55	0.9809	0.00180	10.05	0.9896	0.00270	9.55	0.9996	0.00190
10.6	0.9909	0.00210	10.1	0.9975	0.00190	9.6	1.0040	0.00200
10.65	0.9960	0.00200	10.15	1.0003	0.00230	9.65	1.0024	0.00240
10.7	0.9955	0.00260	10.2	0.9986	0.00200	9.7	1.0114	0.00190
10.75	0.9997	0.00240	10.25	1.0097	0.00200	9.75	1.0109	0.00180
10.8	0.9993	0.00220	10.3	1.0095	0.00200	9.8	1.0151	0.00200
10.85	1.0035	0.00210	10.35	1.0134	0.00240	9.85	1.0200	0.00200
10.9	1.0073	0.00210	10.4	1.0177	0.00200	9.9	1.0201	0.00250
10.95	1.0093	0.00210	10.45	1.0199	0.00290			
11	1.0128	0.00210	10.5	1.0234	0.00200			
11.05	1.0136	0.00200						
11.1	1.0200	0.00230						

3			4			5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.10	0.9154	0.00250	7.50	0.9246	0.00200	6.90	0.9242	0.00210
8.15	0.9147	0.00230	7.55	0.9283	0.00280	6.95	0.9302	0.00190
8.2	0.9251	0.00180	7.6	0.9385	0.00230	7	0.9347	0.00190
8.25	0.9313	0.00200	7.65	0.9398	0.00200	7.05	0.9394	0.00190
8.3	0.9330	0.00240	7.7	0.9431	0.00250	7.1	0.9465	0.00190
8.35	0.9355	0.00240	7.75	0.9492	0.00230	7.15	0.9468	0.00210
8.4	0.9413	0.00240	7.8	0.9546	0.00290	7.2	0.9532	0.00240
8.45	0.9463	0.00210	7.85	0.9555	0.00190	7.25	0.9613	0.00240
8.5	0.9490	0.00180	7.9	0.9640	0.00230	7.3	0.9644	0.00200
8.55	0.9551	0.00230	7.95	0.9694	0.00240	7.35	0.9739	0.00220
8.6	0.9612	0.00200	8	0.9737	0.00190	7.4	0.9786	0.00190
8.65	0.9618	0.00200	8.05	0.9812	0.00180	7.45	0.9831	0.00200
8.7	0.9664	0.00210	8.1	0.9813	0.00210	7.5	0.9865	0.00220
8.75	0.9735	0.00200	8.15	0.9886	0.00200	7.55	0.9938	0.00210
8.8	0.9732	0.00190	8.2	0.9925	0.00190	7.6	0.9996	0.00210
8.85	0.9777	0.00200	8.25	0.9961	0.00280	7.65	1.0016	0.00220
8.9	0.9864	0.00250	8.3	1.0015	0.00210	7.7	1.0089	0.00180
8.95	0.9913	0.00200	8.35	1.0088	0.00230	7.75	1.0120	0.00210
9	0.9921	0.00180	8.4	1.0132	0.00190	7.8	1.0211	0.00220
9.05	0.9957	0.00220	8.45	1.0176	0.00220	7.85	1.0219	0.00210
9.1	1.0029	0.00220	8.5	1.0170	0.00200	7.9	1.0284	0.00230
9.15	1.0042	0.00200	8.55	1.0229	0.00210			
9.2	1.0080	0.00270	8.6	1.0305	0.00210			
9.25	1.0096	0.00230						
9.3	1.0182	0.00220						
9.35	1.0225	0.00220						
9.4	1.0237	0.00220						

6			7			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.40	0.9160	0.00190	6.00	0.9203	0.00190	5.80	0.9150	0.00210
6.45	0.9263	0.00230	6.05	0.9265	0.00200	5.85	0.9176	0.00200
6.5	0.9318	0.00250	6.1	0.9321	0.00170	5.9	0.9279	0.00240
6.55	0.9333	0.00170	6.15	0.9408	0.00210	5.95	0.9369	0.00180
6.6	0.9424	0.00220	6.2	0.9454	0.00220	6	0.9426	0.00220
6.65	0.9505	0.00230	6.25	0.9462	0.00210	6.05	0.9493	0.00200
6.7	0.9570	0.00190	6.3	0.9577	0.00220	6.1	0.9552	0.00190
6.75	0.9585	0.00200	6.35	0.9629	0.00200	6.15	0.9616	0.00190
6.8	0.9662	0.00180	6.4	0.9732	0.00210	6.2	0.9716	0.00180
6.85	0.9703	0.00170	6.45	0.9750	0.00210	6.25	0.9755	0.00260
6.9	0.9763	0.00230	6.5	0.9844	0.00250	6.3	0.9831	0.00220
6.95	0.9798	0.00190	6.55	0.9921	0.00220	6.35	0.9893	0.00180
7	0.9917	0.00230	6.6	0.9986	0.00200	6.4	0.9956	0.00210
7.05	0.9979	0.00240	6.65	1.0023	0.00200	6.45	0.9983	0.00200
7.1	1.0001	0.00330	6.7	1.0086	0.00240	6.5	1.0106	0.00220
7.15	1.0081	0.00220	6.75	1.0117	0.00210	6.55	1.0187	0.00200
7.2	1.0142	0.00210	6.8	1.0184	0.00170	6.6	1.0202	0.00180
7.25	1.0232	0.00180	6.85	1.0258	0.00220	6.65	1.0276	0.00190
7.3	1.0223	0.00180	6.9	1.0303	0.00190	6.7	1.0338	0.00180

8			9			10		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.60	0.9073	0.00220	5.30	0.9120	0.00200	5.00	0.9100	0.00190
5.65	0.9201	0.00180	5.35	0.9206	0.00200	5.05	0.9167	0.00210
5.7	0.9254	0.00240	5.4	0.9269	0.00240	5.1	0.9274	0.00180
5.75	0.9356	0.00210	5.45	0.9352	0.00200	5.15	0.9343	0.00260
5.8	0.9428	0.00210	5.5	0.9429	0.00220	5.2	0.9403	0.00180
5.85	0.9469	0.00190	5.55	0.9536	0.00200	5.25	0.9439	0.00180
5.9	0.9521	0.00220	5.6	0.9571	0.00190	5.3	0.9545	0.00220
5.95	0.9592	0.00290	5.65	0.9662	0.00190	5.35	0.9632	0.00200
6	0.9676	0.00210	5.7	0.9729	0.00230	5.4	0.9738	0.00240
6.05	0.9761	0.00190	5.75	0.9814	0.00190	5.45	0.9807	0.00170
6.1	0.9866	0.00230	5.8	0.9882	0.00180	5.5	0.9884	0.00180
6.15	0.9884	0.00200	5.85	0.9978	0.00170	5.55	0.9971	0.00270
6.2	0.9929	0.00210	5.9	1.0008	0.00230	5.6	1.0010	0.00190
6.25	1.0043	0.00240	5.95	1.0064	0.00200	5.65	1.0103	0.00220
6.3	1.0118	0.00190	6	1.0141	0.00230	5.7	1.0210	0.00190
6.35	1.0159	0.00250	6.05	1.0209	0.00210	5.75	1.0232	0.00230
6.4	1.0212	0.00250	6.1	1.0318	0.00200	5.8	1.0289	0.00200

15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.90	0.9054	0.00180	3.20	0.9070	0.00250
3.95	0.9154	0.00160	3.22	0.9101	0.00270
4	0.9214	0.00180	3.24	0.9150	0.00170
4.05	0.9364	0.00200	3.26	0.9212	0.00190
4.1	0.9444	0.00210	3.28	0.9253	0.00190
4.15	0.9572	0.00200	3.3	0.9294	0.00190
4.2	0.9631	0.00210	3.32	0.9338	0.00210
4.25	0.9742	0.00210	3.34	0.9399	0.00220
4.3	0.9886	0.00220	3.36	0.9433	0.00260
4.35	0.9926	0.00210	3.38	0.9452	0.00210
4.4	1.0014	0.00210	3.4	0.9528	0.00190
4.45	1.0142	0.00180	3.42	0.9602	0.00200
4.5	1.0214	0.00220	3.44	0.9594	0.00210
			3.46	0.9668	0.00190
			3.48	0.9767	0.00230
			3.5	0.9750	0.00220
			3.52	0.9834	0.00200
			3.54	0.9843	0.00230
			3.56	0.9926	0.00200
			3.58	0.9944	0.00190
			3.6	0.9997	0.00250
			3.62	1.0075	0.00210
			3.64	1.0131	0.00220
			3.66	1.0131	0.00190
			3.68	1.0191	0.00190
			3.7	1.0237	0.00230

Case ID: pu_sph_095_10ref

Material: Plutonium

Geometry: Sphere

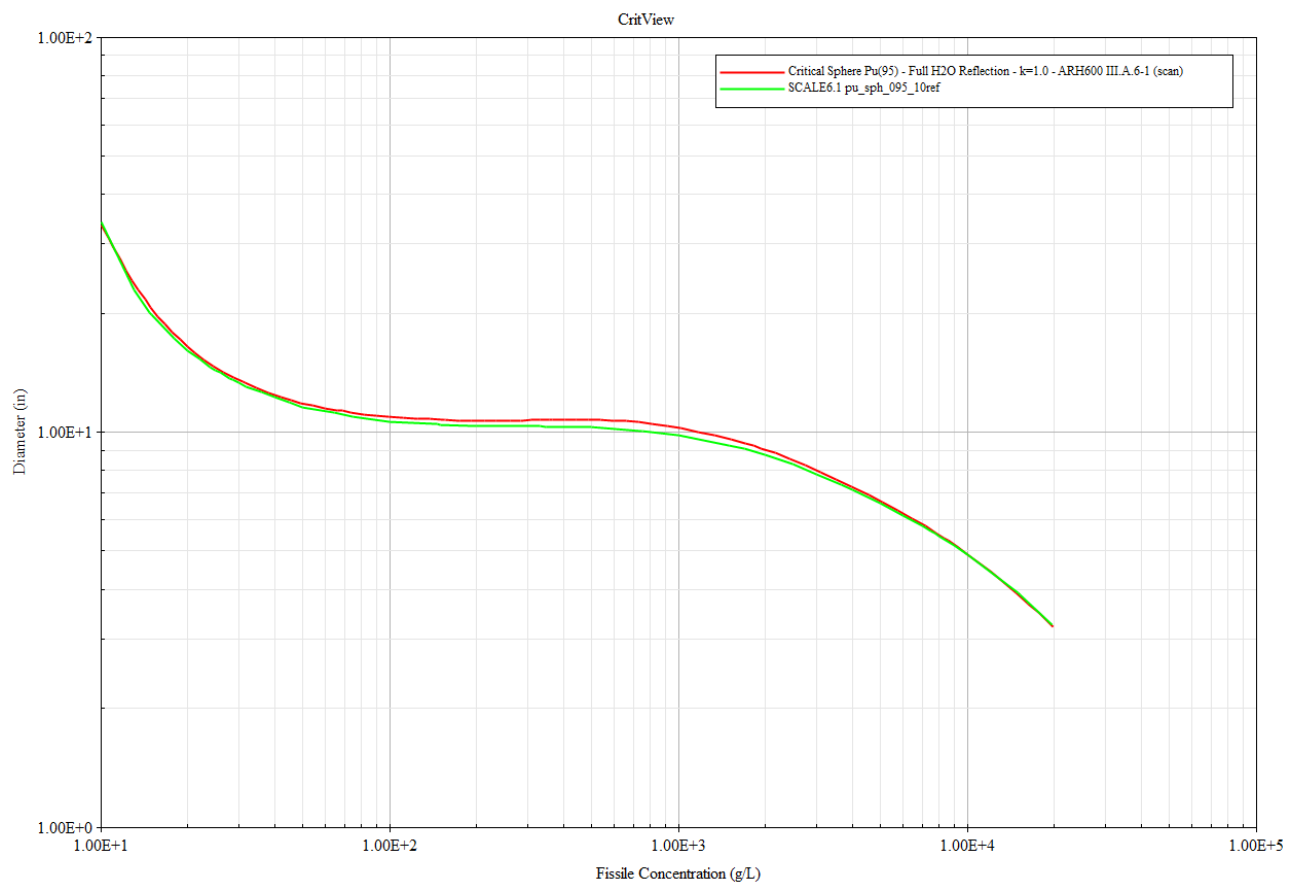
Isotopics: 95% ^{239}Pu 5% ^{240}Pu

Reflector: 10" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	25.300	36.700	0.500	34.0917
0.013	18.700	23.700	0.200	22.8452
0.015	16.600	20.600	0.200	19.8319
0.018	14.700	17.900	0.100	17.2677
0.020	13.900	16.700	0.100	16.0481
0.022	13.300	15.800	0.100	15.2947
0.024	12.800	15.100	0.100	14.6377
0.025	12.600	14.700	0.100	14.3720
0.026	12.300	15.200	0.100	14.1985
0.028	12.000	14.200	0.100	13.6898
0.030	11.700	13.800	0.100	13.3800
0.032	11.500	13.500	0.100	13.0426
0.036	11.100	13.000	0.100	12.6013
0.040	10.800	12.800	0.100	12.2296
0.045	10.500	12.300	0.100	11.8754
0.050	10.300	12.000	0.050	11.5838
0.075	9.700	11.300	0.050	10.9300
0.100	9.400	11.200	0.100	10.6035
0.150	9.200	10.800	0.050	10.4514
0.200	9.200	10.700	0.050	10.3375
0.350	9.200	10.800	0.050	10.3162
0.500	9.100	10.700	0.050	10.2799
0.750	8.900	10.500	0.050	10.0688
1.000	8.700	10.200	0.050	9.8360
1.500	8.200	9.600	0.050	9.2712
2.000	7.700	9.100	0.050	8.7364
2.500	7.300	8.600	0.050	8.3136
3.000	7.000	8.200	0.050	7.8404
4.000	6.400	7.400	0.050	7.1439
5.000	5.900	6.900	0.050	6.6132
6.000	5.500	6.400	0.050	6.1617
7.000	5.200	6.000	0.050	5.7951
7.500	5.000	5.800	0.050	5.6221
8.000	4.900	5.700	0.050	5.4630
9.000	4.600	5.400	0.050	5.1722
10.000	4.400	5.100	0.050	4.9057
15.000	3.500	4.100	0.050	3.9146
19.600	2.900	3.400	0.020	3.2609

WORM and SCALE Input File

```

'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.1.1.3.3-1. Critical Dimensions for 95% 239Pu Sphere - 10 Inches of Water Reflection
,
#index number = <index = 1:38:1>
,
#Concentration = <@conc =
0.01,0.013,0.015,0.018,0.02,0.022,0.024,0.025,0.026,0.028,0.03,0.032,0.036,0.04,0.045,0.05,0.075,
0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4,5,6,7,7.5,8,9,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
25.3,18.7,16.6,14.7,13.9,13.3,12.8,12.6,12.3,12,11.7,11.5,11.1,10.8,10.5,10.3,9.7,9.4,9.2,9.2,
9.1,8.9,8.7,8.2,7.7,7.3,7,6.4,5.9,5.5,5.2,5,4.9,4.6,4.4,3.5,2.9> in
#Ending Diameter = <@enddia =
36.7,23.7,20.6,17.9,16.7,15.8,15.1,14.7,15.2,14.2,13.8,13.5,13,12.8,12.3,12,11.3,11.2,10.8,10.7,1
0.8,10.7,10.5,10.2,9.6,9.1,8.6,8.2,7.4,6.9,6.4,6,5.8,5.7,5.4,5.1,4.1,3.4> in
#Delta = <@delta =
0.5,0.2,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.1,0.05,0.05,0.05,0.05,0.0
5,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02> in
,
'Reflector Thickness {{refthick = 10}}
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
Sphere Reflected
v7-238
read composition
  pu          1 den=<critconc> 1 300
                                94239 95
                                94240 5   end
                                1 den=<wconc> 1 300   end
<&ZEROCHECK(wconc)\11>h2o
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere"
  sphere 1      {{{(diameter*in)/2}}}
  sphere 2      {{{(refdia*in)/2}}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_sph_095_10ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: sphere
modmat: H2O
critmat: plutonium
isomat: Pu239 0.95 Pu240 0.05
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 34.0917
0.013 22.8452
0.015 19.8319
0.018 17.2677
0.020 16.0481
0.022 15.2947
0.024 14.6377
0.025 14.3720
0.026 14.1985
0.028 13.6898
0.030 13.3800
0.032 13.0426
0.036 12.6013
0.040 12.2296
0.045 11.8754
0.050 11.5838
0.075 10.9300
0.100 10.6035
0.150 10.4514
0.200 10.3375
0.350 10.3162
0.500 10.2799
0.750 10.0688
1.000 9.8360
1.500 9.2712
2.000 8.7364
2.500 8.3136
3.000 7.8404
4.000 7.1439
5.000 6.6132
6.000 6.1617
7.000 5.7951
7.500 5.6221
8.000 5.4630
9.000 5.1722
10.000 4.9057
15.000 3.9146
19.600 3.2609
```

0.01			0.013			0.015		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
25.30	0.9261	0.00140	18.70	0.9255	0.00190	16.60	0.9220	0.00170
25.8	0.9333	0.00130	18.9	0.9282	0.00150	16.8	0.9286	0.00190
26.3	0.9379	0.00130	19.1	0.9346	0.00140	17	0.9333	0.00170
26.8	0.9423	0.00140	19.3	0.9392	0.00160	17.2	0.9398	0.00140
27.3	0.9487	0.00130	19.5	0.9400	0.00170	17.4	0.9464	0.00190
27.8	0.9524	0.00200	19.7	0.9473	0.00150	17.6	0.9498	0.00150
28.3	0.9558	0.00140	19.9	0.9512	0.00150	17.8	0.9547	0.00140
28.8	0.9615	0.00130	20.1	0.9536	0.00150	18	0.9599	0.00210
29.3	0.9640	0.00150	20.3	0.9593	0.00150	18.2	0.9639	0.00180
29.8	0.9690	0.00110	20.5	0.9615	0.00170	18.4	0.9663	0.00190
30.3	0.9775	0.00170	20.7	0.9652	0.00180	18.6	0.9712	0.00160
30.8	0.9788	0.00140	20.9	0.9680	0.00140	18.8	0.9795	0.00240
31.3	0.9793	0.00160	21.1	0.9726	0.00140	19	0.9823	0.00160
31.8	0.9821	0.00130	21.3	0.9753	0.00120	19.2	0.9900	0.00160
32.3	0.9873	0.00190	21.5	0.9809	0.00130	19.4	0.9926	0.00150
32.8	0.9902	0.00130	21.7	0.9815	0.00150	19.6	0.9932	0.00170
33.3	0.9901	0.00130	21.9	0.9854	0.00130	19.8	0.9989	0.00150
33.8	0.9972	0.00110	22.1	0.9887	0.00190	20	1.0058	0.00160
34.3	1.0020	0.00150	22.3	0.9928	0.00160	20.2	1.0089	0.00220
34.8	1.0007	0.00140	22.5	0.9970	0.00150	20.4	1.0142	0.00190
35.3	1.0063	0.00170	22.7	0.9947	0.00150	20.6	1.0181	0.00150
35.8	1.0084	0.00140	22.9	1.0020	0.00180			
36.3	1.0106	0.00140	23.1	1.0066	0.00160			
36.7	1.0127	0.00120	23.3	1.0090	0.00120			
			23.5	1.0097	0.00170			
			23.7	1.0153	0.00150			

0.018			0.02			0.022		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.70	0.9191	0.00210	13.90	0.9210	0.00180	13.30	0.9247	0.00170
14.8	0.9217	0.00170	14	0.9218	0.00220	13.4	0.9275	0.00160
14.9	0.9298	0.00170	14.1	0.9307	0.00160	13.5	0.9322	0.00230
15	0.9330	0.00160	14.2	0.9332	0.00200	13.6	0.9355	0.00190
15.1	0.9396	0.00220	14.3	0.9386	0.00170	13.7	0.9392	0.00180
15.2	0.9372	0.00180	14.4	0.9397	0.00180	13.8	0.9442	0.00190
15.3	0.9413	0.00180	14.5	0.9444	0.00160	13.9	0.9495	0.00220
15.4	0.9428	0.00150	14.6	0.9502	0.00170	14	0.9530	0.00210
15.5	0.9475	0.00170	14.7	0.9512	0.00210	14.1	0.9546	0.00190
15.6	0.9501	0.00220	14.8	0.9565	0.00180	14.2	0.9588	0.00160
15.7	0.9537	0.00160	14.9	0.9587	0.00170	14.3	0.9713	0.00190
15.8	0.9569	0.00210	15	0.9651	0.00220	14.4	0.9677	0.00180
15.9	0.9588	0.00190	15.1	0.9667	0.00150	14.5	0.9746	0.00190
16	0.9652	0.00160	15.2	0.9694	0.00190	14.6	0.9765	0.00220
16.1	0.9684	0.00210	15.3	0.9721	0.00160	14.7	0.9773	0.00150
16.2	0.9692	0.00190	15.4	0.9763	0.00220	14.8	0.9814	0.00170
16.3	0.9761	0.00170	15.5	0.9817	0.00230	14.9	0.9870	0.00170
16.4	0.9729	0.00190	15.6	0.9821	0.00170	15	0.9907	0.00140
16.5	0.9813	0.00190	15.7	0.9846	0.00160	15.1	0.9899	0.00170
16.6	0.9810	0.00160	15.8	0.9912	0.00170	15.2	0.9946	0.00170
16.7	0.9842	0.00170	15.9	0.9933	0.00240	15.3	1.0003	0.00180
16.8	0.9876	0.00180	16	0.9962	0.00190	15.4	1.0035	0.00170
16.9	0.9885	0.00170	16.1	1.0041	0.00140	15.5	1.0080	0.00220
17	0.9954	0.00160	16.2	1.0022	0.00180	15.6	1.0085	0.00180
17.1	0.9953	0.00220	16.3	1.0045	0.00190	15.7	1.0172	0.00210
17.2	0.9979	0.00190	16.4	1.0064	0.00170	15.8	1.0177	0.00190
17.3	1.0010	0.00170	16.5	1.0103	0.00180			
17.4	1.0048	0.00190	16.6	1.0141	0.00200			
17.5	1.0109	0.00190	16.7	1.0154	0.00170			
17.6	1.0115	0.00130						
17.7	1.0137	0.00140						
17.8	1.0156	0.00180						
17.9	1.0161	0.00190						

0.024			0.025			0.026		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.80	0.9252	0.00160	12.60	0.9191	0.00170	12.30	0.9156	0.00180
12.9	0.9300	0.00170	12.7	0.9261	0.00190	12.4	0.9222	0.00170
13	0.9302	0.00250	12.8	0.9303	0.00170	12.5	0.9272	0.00250
13.1	0.9370	0.00170	12.9	0.9395	0.00210	12.6	0.9319	0.00190
13.2	0.9420	0.00160	13	0.9430	0.00180	12.7	0.9392	0.00160
13.3	0.9460	0.00170	13.1	0.9433	0.00180	12.8	0.9418	0.00190
13.4	0.9506	0.00180	13.2	0.9542	0.00200	12.9	0.9438	0.00170
13.5	0.9548	0.00200	13.3	0.9528	0.00210	13	0.9503	0.00200
13.6	0.9554	0.00190	13.4	0.9613	0.00200	13.1	0.9568	0.00180
13.7	0.9639	0.00270	13.5	0.9639	0.00210	13.2	0.9632	0.00190
13.8	0.9689	0.00220	13.6	0.9723	0.00190	13.3	0.9681	0.00170
13.9	0.9727	0.00190	13.7	0.9719	0.00190	13.4	0.9656	0.00180
14	0.9748	0.00210	13.8	0.9759	0.00160	13.5	0.9744	0.00210
14.1	0.9771	0.00240	13.9	0.9800	0.00160	13.6	0.9786	0.00200
14.2	0.9773	0.00180	14	0.9871	0.00160	13.7	0.9831	0.00220
14.3	0.9873	0.00180	14.1	0.9879	0.00180	13.8	0.9843	0.00210
14.4	0.9877	0.00250	14.2	0.9922	0.00200	13.9	0.9915	0.00200
14.5	0.9976	0.00200	14.3	0.9982	0.00200	14	0.9956	0.00180
14.6	0.9977	0.00170	14.4	1.0007	0.00180	14.1	0.9934	0.00180
14.7	1.0038	0.00180	14.5	1.0058	0.00200	14.2	1.0001	0.00160
14.8	1.0035	0.00190	14.6	1.0064	0.00190	14.3	1.0058	0.00160
14.9	1.0088	0.00200	14.7	1.0126	0.00210	14.4	1.0128	0.00200
15	1.0102	0.00190				14.5	1.0157	0.00200
15.1	1.0101	0.00210				14.6	1.0159	0.00170
						14.7	1.0203	0.00200
						14.8	1.0218	0.00160
						14.9	1.0305	0.00170
						15	1.0342	0.00200
						15.1	1.0386	0.00170
						15.2	1.0399	0.00190

0.028			0.03			0.032		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.00	0.9242	0.00200	11.70	0.9174	0.00180	11.50	0.9198	0.00210
12.1	0.9236	0.00230	11.8	0.9221	0.00190	11.6	0.9256	0.00190
12.2	0.9265	0.00190	11.9	0.9284	0.00230	11.7	0.9314	0.00230
12.3	0.9330	0.00190	12	0.9327	0.00230	11.8	0.9371	0.00180
12.4	0.9413	0.00190	12.1	0.9421	0.00190	11.9	0.9441	0.00180
12.5	0.9427	0.00230	12.2	0.9436	0.00190	12	0.9517	0.00210
12.6	0.9485	0.00160	12.3	0.9454	0.00220	12.1	0.9543	0.00200
12.7	0.9509	0.00190	12.4	0.9530	0.00200	12.2	0.9583	0.00240
12.8	0.9564	0.00210	12.5	0.9595	0.00170	12.3	0.9621	0.00180
12.9	0.9646	0.00200	12.6	0.9666	0.00210	12.4	0.9655	0.00190
13	0.9662	0.00170	12.7	0.9668	0.00200	12.5	0.9739	0.00250
13.1	0.9759	0.00230	12.8	0.9721	0.00200	12.6	0.9806	0.00180
13.2	0.9755	0.00150	12.9	0.9740	0.00200	12.7	0.9829	0.00200
13.3	0.9826	0.00200	13	0.9831	0.00210	12.8	0.9879	0.00200
13.4	0.9870	0.00230	13.1	0.9904	0.00180	12.9	0.9900	0.00190
13.5	0.9918	0.00200	13.2	0.9922	0.00180	13	0.9974	0.00180
13.6	0.9921	0.00190	13.3	0.9956	0.00250	13.1	1.0035	0.00220
13.7	1.0009	0.00230	13.4	1.0011	0.00200	13.2	1.0047	0.00220
13.8	1.0019	0.00220	13.5	1.0047	0.00180	13.3	1.0089	0.00210
13.9	1.0082	0.00180	13.6	1.0097	0.00190	13.4	1.0137	0.00240
14	1.0123	0.00250	13.7	1.0122	0.00210	13.5	1.0188	0.00190
14.1	1.0195	0.00160	13.8	1.0200	0.00240			
14.2	1.0186	0.00220						

0.036			0.04			0.045		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.10	0.9216	0.00220	10.80	0.9207	0.00220	10.50	0.9208	0.00190
11.2	0.9270	0.00220	10.9	0.9270	0.00260	10.6	0.9295	0.00210
11.3	0.9300	0.00210	11	0.9326	0.00200	10.7	0.9327	0.00200
11.4	0.9362	0.00220	11.1	0.9399	0.00200	10.8	0.9369	0.00190
11.5	0.9418	0.00210	11.2	0.9467	0.00250	10.9	0.9464	0.00210
11.6	0.9450	0.00210	11.3	0.9465	0.00260	11	0.9483	0.00230
11.7	0.9520	0.00190	11.4	0.9538	0.00200	11.1	0.9552	0.00230
11.8	0.9575	0.00200	11.5	0.9641	0.00200	11.2	0.9601	0.00250
11.9	0.9650	0.00190	11.6	0.9661	0.00220	11.3	0.9677	0.00170
12	0.9733	0.00200	11.7	0.9702	0.00210	11.4	0.9707	0.00180
12.1	0.9728	0.00190	11.8	0.9796	0.00370	11.5	0.9804	0.00230
12.2	0.9814	0.00200	11.9	0.9826	0.00190	11.6	0.9845	0.00200
12.3	0.9830	0.00200	12	0.9896	0.00210	11.7	0.9894	0.00220
12.4	0.9934	0.00260	12.1	0.9970	0.00190	11.8	0.9914	0.00200
12.5	0.9967	0.00270	12.2	0.9984	0.00200	11.9	1.0028	0.00200
12.6	0.9999	0.00200	12.3	1.0038	0.00260	12	1.0053	0.00240
12.7	1.0077	0.00210	12.4	1.0090	0.00190	12.1	1.0094	0.00230
12.8	1.0119	0.00230	12.5	1.0145	0.00210	12.2	1.0170	0.00230
12.9	1.0169	0.00200	12.6	1.0188	0.00210	12.3	1.0176	0.00190
13	1.0208	0.00180	12.7	1.0268	0.00180			
			12.8	1.0314	0.00170			

0.05			0.075			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.30	0.9190	0.00200	9.70	0.9260	0.00200	9.40	0.9188	0.00200
10.35	0.9223	0.00200	9.75	0.9261	0.00180	9.5	0.9244	0.00260
10.4	0.9267	0.00240	9.8	0.9299	0.00290	9.6	0.9356	0.00230
10.45	0.9323	0.00220	9.85	0.9358	0.00200	9.7	0.9398	0.00240
10.5	0.9342	0.00220	9.9	0.9367	0.00200	9.8	0.9477	0.00200
10.55	0.9392	0.00220	9.95	0.9406	0.00220	9.9	0.9562	0.00220
10.6	0.9444	0.00250	10	0.9453	0.00190	10	0.9628	0.00210
10.65	0.9423	0.00230	10.05	0.9479	0.00240	10.1	0.9669	0.00220
10.7	0.9501	0.00190	10.1	0.9523	0.00230	10.2	0.9748	0.00250
10.75	0.9497	0.00180	10.15	0.9556	0.00220	10.3	0.9798	0.00210
10.8	0.9517	0.00200	10.2	0.9550	0.00190	10.4	0.9893	0.00240
10.85	0.9578	0.00220	10.25	0.9602	0.00250	10.5	0.9941	0.00230
10.9	0.9628	0.00220	10.3	0.9619	0.00220	10.6	0.9997	0.00200
10.95	0.9613	0.00190	10.35	0.9683	0.00220	10.7	1.0083	0.00240
11	0.9648	0.00230	10.4	0.9704	0.00250	10.8	1.0067	0.00230
11.05	0.9681	0.00220	10.45	0.9751	0.00210	10.9	1.0158	0.00200
11.1	0.9720	0.00230	10.5	0.9802	0.00190	11	1.0215	0.00200
11.15	0.9736	0.00220	10.55	0.9797	0.00230	11.1	1.0298	0.00230
11.2	0.9741	0.00250	10.6	0.9837	0.00250	11.2	1.0297	0.00250
11.25	0.9806	0.00230	10.65	0.9849	0.00210			
11.3	0.9842	0.00210	10.7	0.9862	0.00200			
11.35	0.9871	0.00200	10.75	0.9872	0.00240			
11.4	0.9872	0.00210	10.8	0.9939	0.00190			
11.45	0.9916	0.00230	10.85	0.9958	0.00290			
11.5	0.9952	0.00240	10.9	0.9958	0.00240			
11.55	0.9973	0.00180	10.95	1.0028	0.00200			
11.6	1.0013	0.00230	11	1.0044	0.00240			
11.65	1.0010	0.00180	11.05	1.0080	0.00220			
11.7	1.0056	0.00230	11.1	1.0103	0.00200			
11.75	1.0054	0.00190	11.15	1.0134	0.00280			
11.8	1.0112	0.00200	11.2	1.0174	0.00320			
11.85	1.0121	0.00240	11.25	1.0224	0.00220			
11.9	1.0150	0.00200	11.3	1.0207	0.00220			
11.95	1.0165	0.00220						
12	1.0173	0.00230						

0.15			0.2			0.35		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.20	0.9201	0.00190	9.20	0.9270	0.00190	9.20	0.9301	0.00220
9.25	0.9208	0.00210	9.25	0.9324	0.00250	9.25	0.9327	0.00250
9.3	0.9264	0.00210	9.3	0.9357	0.00200	9.3	0.9376	0.00230
9.35	0.9307	0.00240	9.35	0.9402	0.00230	9.35	0.9455	0.00200
9.4	0.9366	0.00250	9.4	0.9373	0.00230	9.4	0.9430	0.00190
9.45	0.9375	0.00230	9.45	0.9436	0.00260	9.45	0.9472	0.00200
9.5	0.9391	0.00290	9.5	0.9464	0.00180	9.5	0.9526	0.00240
9.55	0.9443	0.00270	9.55	0.9482	0.00240	9.55	0.9480	0.00210
9.6	0.9477	0.00220	9.6	0.9534	0.00220	9.6	0.9594	0.00190
9.65	0.9499	0.00200	9.65	0.9563	0.00190	9.65	0.9583	0.00250
9.7	0.9519	0.00230	9.7	0.9596	0.00290	9.7	0.9634	0.00250
9.75	0.9568	0.00210	9.75	0.9592	0.00240	9.75	0.9647	0.00260
9.8	0.9644	0.00220	9.8	0.9655	0.00270	9.8	0.9694	0.00240
9.85	0.9631	0.00200	9.85	0.9696	0.00190	9.85	0.9750	0.00210
9.9	0.9642	0.00210	9.9	0.9714	0.00210	9.9	0.9754	0.00250
9.95	0.9722	0.00230	9.95	0.9722	0.00200	9.95	0.9786	0.00200
10	0.9725	0.00250	10	0.9754	0.00220	10	0.9816	0.00250
10.05	0.9769	0.00230	10.05	0.9816	0.00220	10.05	0.9830	0.00260
10.1	0.9760	0.00240	10.1	0.9870	0.00240	10.1	0.9842	0.00230
10.15	0.9818	0.00200	10.15	0.9878	0.00220	10.15	0.9897	0.00190
10.2	0.9860	0.00250	10.2	0.9883	0.00270	10.2	0.9908	0.00260
10.25	0.9905	0.00200	10.25	0.9951	0.00190	10.25	0.9911	0.00220
10.3	0.9908	0.00230	10.3	0.9946	0.00220	10.3	0.9978	0.00200
10.35	0.9953	0.00230	10.35	1.0018	0.00260	10.35	1.0046	0.00250
10.4	0.9996	0.00230	10.4	1.0034	0.00210	10.4	1.0047	0.00200
10.45	0.9998	0.00250	10.45	1.0052	0.00280	10.45	1.0053	0.00210
10.5	1.0070	0.00200	10.5	1.0057	0.00270	10.5	1.0095	0.00220
10.55	1.0079	0.00210	10.55	1.0127	0.00190	10.55	1.0119	0.00210
10.6	1.0117	0.00200	10.6	1.0119	0.00220	10.6	1.0122	0.00230
10.65	1.0120	0.00230	10.65	1.0162	0.00290	10.65	1.0238	0.00270
10.7	1.0169	0.00190	10.7	1.0221	0.00210	10.7	1.0157	0.00210
10.75	1.0225	0.00200				10.75	1.0201	0.00220
10.8	1.0242	0.00230				10.8	1.0262	0.00220

0.5			0.75			1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.10	0.9297	0.00210	8.90	0.9285	0.00240	8.70	0.9290	0.00230
9.15	0.9314	0.00210	8.95	0.9288	0.00180	8.75	0.9266	0.00210
9.2	0.9308	0.00290	9	0.9338	0.00210	8.8	0.9340	0.00200
9.25	0.9376	0.00240	9.05	0.9359	0.00240	8.85	0.9395	0.00210
9.3	0.9412	0.00240	9.1	0.9402	0.00250	8.9	0.9416	0.00200
9.35	0.9455	0.00210	9.15	0.9411	0.00210	8.95	0.9440	0.00190
9.4	0.9500	0.00230	9.2	0.9467	0.00230	9	0.9459	0.00180
9.45	0.9513	0.00220	9.25	0.9510	0.00210	9.05	0.9512	0.00220
9.5	0.9535	0.00210	9.3	0.9484	0.00210	9.1	0.9536	0.00220
9.55	0.9560	0.00190	9.35	0.9564	0.00220	9.15	0.9573	0.00190
9.6	0.9595	0.00210	9.4	0.9587	0.00200	9.2	0.9593	0.00200
9.65	0.9628	0.00260	9.45	0.9656	0.00200	9.25	0.9641	0.00190
9.7	0.9686	0.00220	9.5	0.9663	0.00220	9.3	0.9716	0.00200
9.75	0.9674	0.00200	9.55	0.9723	0.00190	9.35	0.9672	0.00170
9.8	0.9735	0.00180	9.6	0.9697	0.00210	9.4	0.9800	0.00190
9.85	0.9772	0.00220	9.65	0.9741	0.00210	9.45	0.9772	0.00230
9.9	0.9810	0.00200	9.7	0.9776	0.00210	9.5	0.9761	0.00250
9.95	0.9794	0.00200	9.75	0.9813	0.00230	9.55	0.9851	0.00190
10	0.9839	0.00210	9.8	0.9841	0.00200	9.6	0.9897	0.00200
10.05	0.9845	0.00220	9.85	0.9901	0.00200	9.65	0.9896	0.00200
10.1	0.9884	0.00210	9.9	0.9902	0.00200	9.7	0.9915	0.00230
10.15	0.9950	0.00210	9.95	0.9929	0.00250	9.75	0.9941	0.00200
10.2	0.9929	0.00220	10	0.9966	0.00250	9.8	0.9964	0.00220
10.25	0.9960	0.00200	10.05	0.9991	0.00200	9.85	1.0014	0.00190
10.3	1.0027	0.00210	10.1	1.0015	0.00200	9.9	1.0045	0.00220
10.35	1.0021	0.00280	10.15	1.0081	0.00240	9.95	1.0069	0.00220
10.4	1.0085	0.00220	10.2	1.0091	0.00200	10	1.0089	0.00210
10.45	1.0100	0.00200	10.25	1.0062	0.00210	10.05	1.0125	0.00200
10.5	1.0114	0.00200	10.3	1.0094	0.00220	10.1	1.0137	0.00230
10.55	1.0132	0.00230	10.35	1.0111	0.00240	10.15	1.0196	0.00220
10.6	1.0177	0.00200	10.4	1.0180	0.00220	10.2	1.0195	0.00230
10.65	1.0249	0.00240	10.45	1.0226	0.00220			
10.7	1.0212	0.00220	10.5	1.0251	0.00210			

1.5			2			2.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.20	0.9237	0.00220	7.70	0.9182	0.00190	7.30	0.9184	0.00210
8.25	0.9305	0.00190	7.75	0.9225	0.00200	7.35	0.9264	0.00240
8.3	0.9329	0.00210	7.8	0.9302	0.00180	7.4	0.9301	0.00190
8.35	0.9396	0.00200	7.85	0.9364	0.00170	7.45	0.9349	0.00230
8.4	0.9402	0.00230	7.9	0.9351	0.00210	7.5	0.9343	0.00220
8.45	0.9457	0.00200	7.95	0.9437	0.00190	7.55	0.9411	0.00230
8.5	0.9506	0.00170	8	0.9421	0.00200	7.6	0.9462	0.00170
8.55	0.9527	0.00210	8.05	0.9473	0.00210	7.65	0.9511	0.00200
8.6	0.9561	0.00200	8.1	0.9549	0.00230	7.7	0.9493	0.00190
8.65	0.9571	0.00200	8.15	0.9561	0.00180	7.75	0.9577	0.00200
8.7	0.9611	0.00250	8.2	0.9596	0.00190	7.8	0.9617	0.00180
8.75	0.9682	0.00180	8.25	0.9637	0.00210	7.85	0.9654	0.00180
8.8	0.9691	0.00210	8.3	0.9693	0.00190	7.9	0.9737	0.00230
8.85	0.9712	0.00220	8.35	0.9694	0.00210	7.95	0.9723	0.00210
8.9	0.9791	0.00210	8.4	0.9775	0.00170	8	0.9765	0.00190
8.95	0.9805	0.00210	8.45	0.9811	0.00190	8.05	0.9838	0.00180
9	0.9812	0.00190	8.5	0.9861	0.00210	8.1	0.9862	0.00190
9.05	0.9859	0.00240	8.55	0.9836	0.00190	8.15	0.9878	0.00230
9.1	0.9901	0.00200	8.6	0.9913	0.00200	8.2	0.9957	0.00260
9.15	0.9940	0.00250	8.65	0.9957	0.00220	8.25	0.9982	0.00190
9.2	0.9937	0.00180	8.7	0.9976	0.00200	8.3	0.9978	0.00210
9.25	0.9972	0.00210	8.75	1.0009	0.00230	8.35	1.0059	0.00230
9.3	1.0038	0.00240	8.8	1.0045	0.00210	8.4	1.0121	0.00190
9.35	1.0080	0.00180	8.85	1.0079	0.00190	8.45	1.0155	0.00240
9.4	1.0082	0.00240	8.9	1.0099	0.00250	8.5	1.0203	0.00220
9.45	1.0104	0.00190	8.95	1.0133	0.00200	8.55	1.0241	0.00220
9.5	1.0145	0.00200	9	1.0164	0.00190	8.6	1.0258	0.00210
9.55	1.0174	0.00190	9.05	1.0209	0.00210			
9.6	1.0225	0.00250	9.1	1.0180	0.00190			

3			4			5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.00	0.9219	0.00180	6.40	0.9224	0.00210	5.90	0.9197	0.00200
7.05	0.9295	0.00220	6.45	0.9302	0.00250	5.95	0.9258	0.00200
7.1	0.9357	0.00210	6.5	0.9300	0.00200	6	0.9277	0.00250
7.15	0.9369	0.00220	6.55	0.9386	0.00230	6.05	0.9424	0.00190
7.2	0.9411	0.00190	6.6	0.9433	0.00190	6.1	0.9430	0.00200
7.25	0.9463	0.00210	6.65	0.9467	0.00180	6.15	0.9457	0.00190
7.3	0.9505	0.00210	6.7	0.9550	0.00200	6.2	0.9511	0.00180
7.35	0.9571	0.00230	6.75	0.9599	0.00230	6.25	0.9581	0.00200
7.4	0.9598	0.00180	6.8	0.9651	0.00190	6.3	0.9636	0.00200
7.45	0.9672	0.00200	6.85	0.9708	0.00210	6.35	0.9735	0.00190
7.5	0.9699	0.00220	6.9	0.9753	0.00210	6.4	0.9782	0.00210
7.55	0.9740	0.00190	6.95	0.9813	0.00200	6.45	0.9813	0.00190
7.6	0.9774	0.00180	7	0.9840	0.00190	6.5	0.9865	0.00180
7.65	0.9840	0.00220	7.05	0.9847	0.00190	6.55	0.9943	0.00190
7.7	0.9882	0.00200	7.1	0.9907	0.00210	6.6	0.9982	0.00200
7.75	0.9881	0.00210	7.15	1.0013	0.00210	6.65	1.0050	0.00210
7.8	0.9962	0.00180	7.2	1.0004	0.00170	6.7	1.0097	0.00210
7.85	1.0009	0.00200	7.25	1.0069	0.00200	6.75	1.0148	0.00180
7.9	1.0039	0.00210	7.3	1.0124	0.00190	6.8	1.0198	0.00190
7.95	1.0093	0.00210	7.35	1.0150	0.00180	6.85	1.0244	0.00230
8	1.0129	0.00200	7.4	1.0243	0.00170	6.9	1.0305	0.00190
8.05	1.0169	0.00190						
8.1	1.0220	0.00200						
8.15	1.0231	0.00290						
8.2	1.0292	0.00200						

6			7			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.50	0.9135	0.00200	5.20	0.9160	0.00180	5.00	0.9120	0.00240
5.55	0.9225	0.00210	5.25	0.9239	0.00200	5.05	0.9216	0.00200
5.6	0.9278	0.00220	5.3	0.9340	0.00190	5.1	0.9275	0.00230
5.65	0.9348	0.00210	5.35	0.9400	0.00190	5.15	0.9341	0.00190
5.7	0.9393	0.00200	5.4	0.9481	0.00210	5.2	0.9366	0.00260
5.75	0.9486	0.00200	5.45	0.9554	0.00230	5.25	0.9476	0.00200
5.8	0.9542	0.00180	5.5	0.9609	0.00200	5.3	0.9564	0.00170
5.85	0.9614	0.00260	5.55	0.9645	0.00230	5.35	0.9631	0.00210
5.9	0.9673	0.00180	5.6	0.9762	0.00190	5.4	0.9666	0.00230
5.95	0.9733	0.00250	5.65	0.9797	0.00230	5.45	0.9792	0.00170
6	0.9805	0.00190	5.7	0.9861	0.00180	5.5	0.9851	0.00210
6.05	0.9867	0.00270	5.75	0.9936	0.00190	5.55	0.9923	0.00170
6.1	0.9944	0.00260	5.8	1.0007	0.00210	5.6	0.9958	0.00200
6.15	0.9993	0.00220	5.85	1.0094	0.00190	5.65	1.0053	0.00210
6.2	1.0023	0.00190	5.9	1.0164	0.00180	5.7	1.0093	0.00220
6.25	1.0108	0.00190	5.95	1.0212	0.00200	5.75	1.0145	0.00180
6.3	1.0118	0.00200	6	1.0322	0.00230	5.8	1.0259	0.00200
6.35	1.0184	0.00210						
6.4	1.0274	0.00200						

8			9			10		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.90	0.9156	0.00180	4.60	0.9104	0.00190	4.40	0.9116	0.00190
4.95	0.9224	0.00180	4.65	0.9191	0.00230	4.45	0.9252	0.00190
5	0.9285	0.00210	4.7	0.9287	0.00240	4.5	0.9331	0.00220
5.05	0.9408	0.00180	4.75	0.9325	0.00250	4.55	0.9385	0.00190
5.1	0.9472	0.00180	4.8	0.9413	0.00220	4.6	0.9467	0.00210
5.15	0.9578	0.00270	4.85	0.9503	0.00180	4.65	0.9576	0.00170
5.2	0.9653	0.00180	4.9	0.9581	0.00190	4.7	0.9653	0.00190
5.25	0.9683	0.00200	4.95	0.9662	0.00200	4.75	0.9738	0.00210
5.3	0.9768	0.00190	5	0.9733	0.00190	4.8	0.9789	0.00210
5.35	0.9863	0.00230	5.05	0.9811	0.00200	4.85	0.9889	0.00180
5.4	0.9920	0.00180	5.1	0.9899	0.00180	4.9	0.9991	0.00240
5.45	0.9980	0.00180	5.15	0.9965	0.00180	4.95	1.0070	0.00180
5.5	1.0057	0.00200	5.2	1.0044	0.00250	5	1.0158	0.00220
5.55	1.0142	0.00200	5.25	1.0137	0.00190	5.05	1.0235	0.00220
5.6	1.0206	0.00210	5.3	1.0190	0.00220	5.1	1.0297	0.00210
5.65	1.0289	0.00230	5.35	1.0251	0.00250			
5.7	1.0343	0.00180	5.4	1.0320	0.00190			

15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.50	0.9128	0.00180	2.90	0.9028	0.00230
3.55	0.9260	0.00210	2.92	0.9081	0.00190
3.6	0.9350	0.00220	2.94	0.9174	0.00240
3.65	0.9488	0.00190	2.96	0.9188	0.00220
3.7	0.9565	0.00190	2.98	0.9254	0.00200
3.75	0.9654	0.00200	3	0.9320	0.00230
3.8	0.9770	0.00170	3.02	0.9369	0.00230
3.85	0.9875	0.00200	3.04	0.9424	0.00190
3.9	0.9969	0.00180	3.06	0.9505	0.00230
3.95	1.0075	0.00180	3.08	0.9531	0.00190
4	1.0150	0.00230	3.1	0.9554	0.00250
4.05	1.0266	0.00190	3.12	0.9640	0.00240
4.1	1.0409	0.00220	3.14	0.9677	0.00170
			3.16	0.9698	0.00190
			3.18	0.9783	0.00200
			3.2	0.9820	0.00190
			3.22	0.9880	0.00180
			3.24	0.9922	0.00230
			3.26	0.9998	0.00240
			3.28	1.0044	0.00200
			3.3	1.0069	0.00290
			3.32	1.0145	0.00200
			3.34	1.0182	0.00190
			3.36	1.0274	0.00210
			3.38	1.0294	0.00190
			3.4	1.0342	0.00210

Pu-cyl-100 (Cases with 0", 1", 10" Reflector)

Case ID: pu_cyl_100_00ref

Material: Plutonium

Geometry: Infinite Cylinder

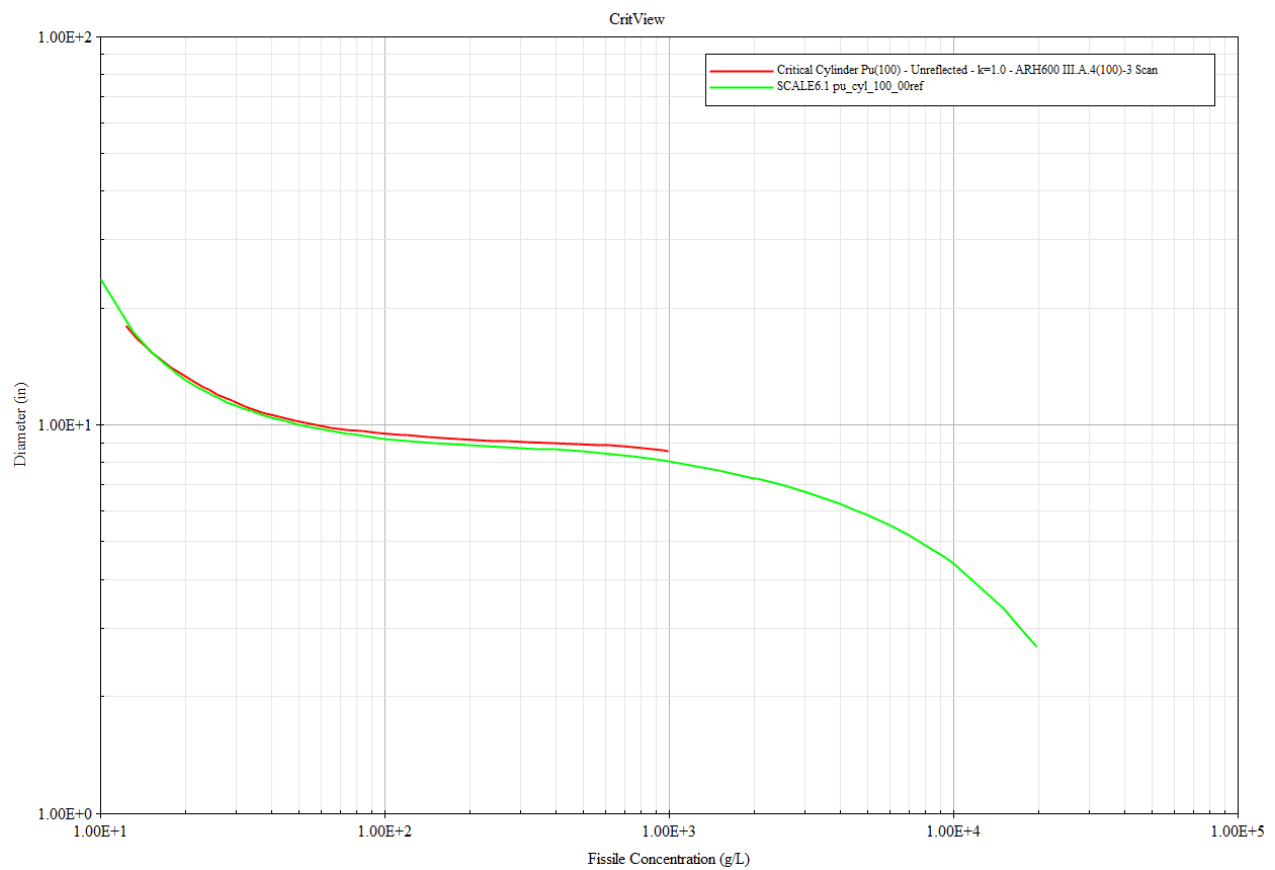
Isotopics: 100% ^{239}Pu

Reflector: Unreflected

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	18.700	25.000	0.300	23.7313
0.013	14.600	17.900	0.100	17.3295
0.015	13.300	16.000	0.100	15.5043
0.018	12.100	14.200	0.100	13.8213
0.020	11.500	13.400	0.100	13.0481
0.022	11.100	12.900	0.100	12.5000
0.024	10.800	12.400	0.050	12.1306
0.025	10.600	12.200	0.050	11.8899
0.026	10.500	12.100	0.050	11.7522
0.028	10.200	11.800	0.050	11.4352
0.030	10.000	11.500	0.050	11.1925
0.032	9.900	11.300	0.050	11.0120
0.036	9.600	11.000	0.050	10.7074
0.040	9.400	10.700	0.050	10.4261
0.045	9.200	10.500	0.050	10.2169
0.050	9.000	10.300	0.050	9.9978
0.075	8.600	9.700	0.050	9.4689
0.100	8.400	9.500	0.050	9.1890
0.150	8.200	9.300	0.050	8.9859
0.200	8.100	9.100	0.050	8.8650
0.350	7.900	9.000	0.050	8.6708
0.500	7.700	8.800	0.050	8.5398
0.750	7.500	8.600	0.050	8.2818
1.000	7.300	8.300	0.050	8.0727
1.500	7.000	7.900	0.050	7.6444
2.000	6.700	7.500	0.050	7.2926
2.500	6.400	7.200	0.050	7.0037
3.000	6.100	7.000	0.050	6.7291
4.000	5.700	6.500	0.050	6.2671
5.000	5.300	6.100	0.050	5.8555
6.000	5.000	5.700	0.050	5.5048
7.000	4.700	5.400	0.050	5.2040
7.500	4.600	5.200	0.050	5.0372
8.000	4.400	5.100	0.050	4.8919
9.000	4.200	4.800	0.050	4.6272
10.000	4.000	4.600	0.050	4.3986
15.000	3.000	3.500	0.020	3.3827
19.600	2.400	2.800	0.020	2.6868

WORM and SCALE Input File

```

'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.1.2.1.1-1. Critical Dimensions for 100% 239Pu Cylinder - 0 Inches of Water Reflection
,
#index number = <index = 1:38:1>
,
#Concentration = <@conc =
0.01,0.013,0.015,0.018,0.02,0.022,0.024,0.025,0.026,0.028,0.03,0.032,0.036,0.04,0.045,0.05,0.075,
0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4,5,6,7,7.5,8,9,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
18.7,14.6,13.3,12.1,11.5,11.1,10.8,10.6,10.5,10.2,10,9.9,9.6,9.4,9.2,9,8.6,8.4,8.2,8.1,7.9,7.7,7.
5,7.3,7,6.7,6.4,6.1,5.7,5.3,5,4.7,4.6,4.4,4.2,4,3,2.4> in
#Ending Diameter = <@enddia =
25,17.9,16,14.2,13.4,12.9,12.4,12.2,12.1,11.8,11.5,11.3,11,10.7,10.5,10.3,9.7,9.5,9.3,9.1,9,8.8,8
.6,8.3,7.9,7.5,7.2,7,6.5,6.1,5.7,5.4,5.2,5.1,4.8,4.6,3.5,2.8> in
#Delta = <@delta =
0.3,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.0
5,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02,0.02> in
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
,
=csas6
template
v7-238
read composition
  pu          1 den=<critconc> 1 300
                94239 100
                94240 0   end
<&ZEROCHECK(wconc)\11>h2o          1 den=<wconc> 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Cylinder"
  cylinder 1      {{(diameter*in)/2}}      10      -10
  media 1 1 1
  boundary 1
end geometry
read bnds
  body=1
    surface(1)=vacuum
    surface(2)=mirror
    surface(3)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_cyl_100_00ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infcyl
modmat: H2O
critmat: plutonium
isomat: Pu239 1.0
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 23.7313
0.013 17.3295
0.015 15.5043
0.018 13.8213
0.020 13.0481
0.022 12.5000
0.024 12.1306
0.025 11.8899
0.026 11.7522
0.028 11.4352
0.030 11.1925
0.032 11.0120
0.036 10.7074
0.040 10.4261
0.045 10.2169
0.050 9.9978
0.075 9.4689
0.100 9.1890
0.150 8.9859
0.200 8.8650
0.350 8.6708
0.500 8.5398
0.750 8.2818
1.000 8.0727
1.500 7.6444
2.000 7.2926
2.500 7.0037
3.000 6.7291
4.000 6.2671
5.000 5.8555
6.000 5.5048
7.000 5.2040
7.500 5.0372
8.000 4.8919
9.000 4.6272
10.000 4.3986
15.000 3.3827
19.600 2.6868
```

0.01			0.013			0.015		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
18.70	0.9225	0.00160	14.60	0.9203	0.00170	13.30	0.9163	0.00190
19	0.9307	0.00150	14.7	0.9230	0.00160	13.4	0.9221	0.00220
19.3	0.9362	0.00130	14.8	0.9252	0.00150	13.5	0.9273	0.00190
19.6	0.9421	0.00170	14.9	0.9277	0.00190	13.6	0.9320	0.00180
19.9	0.9471	0.00160	15	0.9311	0.00140	13.7	0.9351	0.00200
20.2	0.9514	0.00170	15.1	0.9352	0.00180	13.8	0.9389	0.00180
20.5	0.9570	0.00130	15.2	0.9388	0.00170	13.9	0.9436	0.00190
20.8	0.9594	0.00130	15.3	0.9408	0.00160	14	0.9453	0.00170
21.1	0.9634	0.00150	15.4	0.9475	0.00170	14.1	0.9488	0.00150
21.4	0.9706	0.00160	15.5	0.9506	0.00180	14.2	0.9559	0.00210
21.7	0.9737	0.00140	15.6	0.9520	0.00150	14.3	0.9581	0.00190
22	0.9789	0.00130	15.7	0.9552	0.00140	14.4	0.9630	0.00160
22.3	0.9796	0.00200	15.8	0.9621	0.00160	14.5	0.9706	0.00160
22.6	0.9878	0.00130	15.9	0.9621	0.00140	14.6	0.9699	0.00210
22.9	0.9905	0.00160	16	0.9657	0.00160	14.7	0.9723	0.00170
23.2	0.9915	0.00130	16.1	0.9676	0.00160	14.8	0.9753	0.00200
23.5	0.9963	0.00140	16.2	0.9694	0.00180	14.9	0.9822	0.00190
23.8	1.0011	0.00130	16.3	0.9751	0.00150	15	0.9835	0.00150
24.1	1.0057	0.00140	16.4	0.9761	0.00150	15.1	0.9897	0.00150
24.4	1.0073	0.00160	16.5	0.9797	0.00160	15.2	0.9887	0.00160
24.7	1.0098	0.00160	16.6	0.9781	0.00170	15.3	0.9922	0.00160
25	1.0110	0.00160	16.7	0.9848	0.00120	15.4	0.9963	0.00150
			16.8	0.9859	0.00170	15.5	0.9998	0.00180
			16.9	0.9899	0.00150	15.6	1.0044	0.00180
			17	0.9914	0.00150	15.7	1.0081	0.00220
			17.1	0.9924	0.00210	15.8	1.0114	0.00140
			17.2	0.9964	0.00180	15.9	1.0109	0.00210
			17.3	0.9987	0.00180	16	1.0169	0.00210
			17.4	1.0031	0.00140			
			17.5	1.0038	0.00130			
			17.6	1.0039	0.00180			
			17.7	1.0086	0.00160			
			17.8	1.0122	0.00150			
			17.9	1.0134	0.00170			

0.018			0.02			0.022		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.10	0.9213	0.00260	11.50	0.9165	0.00170	11.10	0.9158	0.00180
12.2	0.9257	0.00190	11.6	0.9215	0.00210	11.2	0.9215	0.00230
12.3	0.9297	0.00170	11.7	0.9279	0.00190	11.3	0.9293	0.00220
12.4	0.9355	0.00260	11.8	0.9364	0.00180	11.4	0.9369	0.00180
12.5	0.9412	0.00260	11.9	0.9374	0.00200	11.5	0.9414	0.00200
12.6	0.9417	0.00190	12	0.9429	0.00190	11.6	0.9526	0.00190
12.7	0.9511	0.00190	12.1	0.9491	0.00170	11.7	0.9569	0.00180
12.8	0.9523	0.00170	12.2	0.9564	0.00170	11.8	0.9562	0.00180
12.9	0.9612	0.00170	12.3	0.9612	0.00190	11.9	0.9629	0.00220
13	0.9614	0.00180	12.4	0.9659	0.00260	12	0.9708	0.00190
13.1	0.9673	0.00180	12.5	0.9733	0.00220	12.1	0.9760	0.00210
13.2	0.9739	0.00250	12.6	0.9773	0.00200	12.2	0.9814	0.00180
13.3	0.9779	0.00170	12.7	0.9803	0.00160	12.3	0.9861	0.00210
13.4	0.9818	0.00170	12.8	0.9849	0.00240	12.4	0.9936	0.00190
13.5	0.9851	0.00200	12.9	0.9905	0.00250	12.5	1.0000	0.00180
13.6	0.9899	0.00180	13	0.9974	0.00180	12.6	0.9971	0.00250
13.7	0.9954	0.00200	13.1	1.0028	0.00200	12.7	1.0078	0.00210
13.8	0.9980	0.00210	13.2	1.0011	0.00160	12.8	1.0128	0.00230
13.9	1.0074	0.00220	13.3	1.0115	0.00170	12.9	1.0193	0.00220
14	1.0059	0.00180	13.4	1.0125	0.00190			
14.1	1.0119	0.00180						
14.2	1.0129	0.00160						

0.024			0.025			0.026		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.80	0.9189	0.00180	10.60	0.9148	0.00200	10.50	0.9184	0.00190
10.85	0.9257	0.00190	10.65	0.9193	0.00210	10.55	0.9258	0.00230
10.9	0.9255	0.00210	10.7	0.9197	0.00190	10.6	0.9250	0.00240
10.95	0.9300	0.00190	10.75	0.9254	0.00190	10.65	0.9279	0.00220
11	0.9302	0.00240	10.8	0.9297	0.00170	10.7	0.9318	0.00190
11.05	0.9347	0.00200	10.85	0.9324	0.00170	10.75	0.9364	0.00210
11.1	0.9416	0.00200	10.9	0.9395	0.00190	10.8	0.9381	0.00290
11.15	0.9401	0.00190	10.95	0.9413	0.00180	10.85	0.9423	0.00220
11.2	0.9462	0.00200	11	0.9419	0.00220	10.9	0.9441	0.00220
11.25	0.9500	0.00190	11.05	0.9490	0.00200	10.95	0.9514	0.00190
11.3	0.9530	0.00200	11.1	0.9494	0.00220	11	0.9564	0.00180
11.35	0.9570	0.00280	11.15	0.9496	0.00230	11.05	0.9566	0.00190
11.4	0.9589	0.00260	11.2	0.9532	0.00190	11.1	0.9586	0.00240
11.45	0.9609	0.00210	11.25	0.9614	0.00190	11.15	0.9604	0.00190
11.5	0.9626	0.00200	11.3	0.9633	0.00200	11.2	0.9645	0.00220
11.55	0.9719	0.00250	11.35	0.9649	0.00230	11.25	0.9678	0.00240
11.6	0.9726	0.00240	11.4	0.9683	0.00210	11.3	0.9697	0.00200
11.65	0.9741	0.00200	11.45	0.9705	0.00210	11.35	0.9744	0.00210
11.7	0.9803	0.00190	11.5	0.9742	0.00200	11.4	0.9791	0.00200
11.75	0.9792	0.00240	11.55	0.9789	0.00200	11.45	0.9799	0.00210
11.8	0.9820	0.00200	11.6	0.9795	0.00190	11.5	0.9815	0.00270
11.85	0.9874	0.00200	11.65	0.9863	0.00220	11.55	0.9839	0.00180
11.9	0.9883	0.00200	11.7	0.9841	0.00170	11.6	0.9947	0.00190
11.95	0.9949	0.00210	11.75	0.9922	0.00190	11.65	0.9936	0.00220
12	0.9962	0.00190	11.8	0.9927	0.00170	11.7	0.9961	0.00180
12.05	0.9962	0.00170	11.85	0.9929	0.00200	11.75	0.9997	0.00230
12.1	0.9989	0.00190	11.9	1.0018	0.00220	11.8	1.0066	0.00190
12.15	1.0007	0.00200	11.95	1.0029	0.00200	11.85	1.0059	0.00250
12.2	1.0052	0.00200	12	1.0029	0.00220	11.9	1.0160	0.00230
12.25	1.0088	0.00210	12.05	1.0083	0.00240	11.95	1.0132	0.00210
12.3	1.0104	0.00240	12.1	1.0082	0.00180	12	1.0144	0.00210
12.35	1.0156	0.00210	12.15	1.0128	0.00230	12.05	1.0175	0.00230
12.4	1.0178	0.00240	12.2	1.0142	0.00200	12.1	1.0198	0.00240

0.028			0.03			0.032		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.20	0.9102	0.00200	10.00	0.9098	0.00230	9.90	0.9167	0.00190
10.25	0.9189	0.00240	10.05	0.9111	0.00200	9.95	0.9239	0.00200
10.3	0.9232	0.00190	10.1	0.9185	0.00220	10	0.9266	0.00200
10.35	0.9250	0.00200	10.15	0.9273	0.00210	10.05	0.9282	0.00180
10.4	0.9268	0.00200	10.2	0.9286	0.00190	10.1	0.9316	0.00250
10.45	0.9319	0.00230	10.25	0.9344	0.00200	10.15	0.9427	0.00190
10.5	0.9353	0.00240	10.3	0.9363	0.00220	10.2	0.9432	0.00200
10.55	0.9369	0.00190	10.35	0.9389	0.00190	10.25	0.9446	0.00180
10.6	0.9417	0.00180	10.4	0.9428	0.00200	10.3	0.9484	0.00200
10.65	0.9431	0.00200	10.45	0.9458	0.00210	10.35	0.9567	0.00230
10.7	0.9476	0.00200	10.5	0.9505	0.00240	10.4	0.9531	0.00230
10.75	0.9529	0.00200	10.55	0.9547	0.00230	10.45	0.9541	0.00240
10.8	0.9558	0.00230	10.6	0.9568	0.00230	10.5	0.9606	0.00210
10.85	0.9569	0.00230	10.65	0.9586	0.00210	10.55	0.9658	0.00210
10.9	0.9623	0.00190	10.7	0.9664	0.00200	10.6	0.9736	0.00210
10.95	0.9636	0.00210	10.75	0.9732	0.00200	10.65	0.9766	0.00240
11	0.9725	0.00220	10.8	0.9716	0.00230	10.7	0.9781	0.00210
11.05	0.9731	0.00250	10.85	0.9740	0.00240	10.75	0.9817	0.00200
11.1	0.9738	0.00220	10.9	0.9775	0.00210	10.8	0.9882	0.00200
11.15	0.9852	0.00230	10.95	0.9819	0.00190	10.85	0.9891	0.00270
11.2	0.9812	0.00210	11	0.9865	0.00180	10.9	0.9941	0.00240
11.25	0.9868	0.00260	11.05	0.9893	0.00200	10.95	0.9989	0.00190
11.3	0.9871	0.00200	11.1	0.9956	0.00300	11	0.9983	0.00200
11.35	0.9940	0.00190	11.15	0.9932	0.00190	11.05	1.0054	0.00240
11.4	0.9969	0.00180	11.2	1.0012	0.00200	11.1	1.0058	0.00190
11.45	1.0013	0.00200	11.25	1.0030	0.00190	11.15	1.0089	0.00200
11.5	1.0023	0.00190	11.3	1.0074	0.00200	11.2	1.0127	0.00210
11.55	1.0040	0.00180	11.35	1.0086	0.00210	11.25	1.0165	0.00200
11.6	1.0078	0.00250	11.4	1.0152	0.00230	11.3	1.0189	0.00210
11.65	1.0086	0.00200	11.45	1.0135	0.00320			
11.7	1.0172	0.00200	11.5	1.0131	0.00190			
11.75	1.0143	0.00170						
11.8	1.0193	0.00190						

0.036			0.04			0.045		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.60	0.9151	0.00240	9.40	0.9191	0.00260	9.20	0.9157	0.00210
9.65	0.9205	0.00220	9.45	0.9199	0.00210	9.25	0.9211	0.00240
9.7	0.9263	0.00270	9.5	0.9268	0.00220	9.3	0.9236	0.00230
9.75	0.9304	0.00220	9.55	0.9332	0.00250	9.35	0.9318	0.00200
9.8	0.9336	0.00220	9.6	0.9393	0.00280	9.4	0.9353	0.00220
9.85	0.9391	0.00280	9.65	0.9378	0.00220	9.45	0.9379	0.00270
9.9	0.9389	0.00280	9.7	0.9479	0.00210	9.5	0.9479	0.00230
9.95	0.9401	0.00210	9.75	0.9500	0.00260	9.55	0.9485	0.00230
10	0.9478	0.00180	9.8	0.9535	0.00230	9.6	0.9547	0.00220
10.05	0.9534	0.00270	9.85	0.9555	0.00210	9.65	0.9574	0.00270
10.1	0.9598	0.00210	9.9	0.9554	0.00240	9.7	0.9628	0.00210
10.15	0.9599	0.00210	9.95	0.9620	0.00230	9.75	0.9695	0.00210
10.2	0.9671	0.00220	10	0.9707	0.00220	9.8	0.9733	0.00220
10.25	0.9667	0.00250	10.05	0.9745	0.00280	9.85	0.9724	0.00240
10.3	0.9749	0.00310	10.1	0.9800	0.00240	9.9	0.9764	0.00220
10.35	0.9732	0.00240	10.15	0.9792	0.00210	9.95	0.9839	0.00250
10.4	0.9794	0.00200	10.2	0.9769	0.00210	10	0.9840	0.00220
10.45	0.9847	0.00250	10.25	0.9875	0.00300	10.05	0.9908	0.00230
10.5	0.9883	0.00230	10.3	0.9926	0.00300	10.1	0.9927	0.00230
10.55	0.9924	0.00230	10.35	0.9953	0.00240	10.15	0.9991	0.00230
10.6	0.9955	0.00210	10.4	0.9965	0.00260	10.2	0.9974	0.00260
10.65	0.9995	0.00200	10.45	1.0032	0.00220	10.25	1.0051	0.00280
10.7	0.9992	0.00210	10.5	1.0082	0.00210	10.3	1.0083	0.00210
10.75	1.0046	0.00240	10.55	1.0108	0.00280	10.35	1.0112	0.00200
10.8	1.0052	0.00250	10.6	1.0127	0.00240	10.4	1.0175	0.00200
10.85	1.0175	0.00200	10.65	1.0169	0.00230	10.45	1.0235	0.00200
10.9	1.0177	0.00220	10.7	1.0177	0.00280	10.5	1.0229	0.00230
10.95	1.0200	0.00220						
11	1.0236	0.00200						

0.05			0.075			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.00	0.9121	0.00210	8.60	0.9174	0.00240	8.40	0.9242	0.00270
9.05	0.9189	0.00250	8.65	0.9229	0.00270	8.45	0.9248	0.00240
9.1	0.9217	0.00320	8.7	0.9240	0.00260	8.5	0.9288	0.00240
9.15	0.9275	0.00250	8.75	0.9336	0.00250	8.55	0.9370	0.00240
9.2	0.9316	0.00240	8.8	0.9401	0.00220	8.6	0.9401	0.00250
9.25	0.9327	0.00210	8.85	0.9445	0.00210	8.65	0.9447	0.00230
9.3	0.9405	0.00190	8.9	0.9493	0.00210	8.7	0.9524	0.00270
9.35	0.9488	0.00210	8.95	0.9540	0.00210	8.75	0.9547	0.00280
9.4	0.9471	0.00230	9	0.9580	0.00220	8.8	0.9624	0.00230
9.45	0.9558	0.00230	9.05	0.9661	0.00240	8.85	0.9666	0.00240
9.5	0.9576	0.00260	9.1	0.9692	0.00260	8.9	0.9690	0.00260
9.55	0.9614	0.00230	9.15	0.9710	0.00230	8.95	0.9747	0.00230
9.6	0.9660	0.00260	9.2	0.9789	0.00240	9	0.9768	0.00220
9.65	0.9731	0.00240	9.25	0.9806	0.00230	9.05	0.9840	0.00270
9.7	0.9737	0.00220	9.3	0.9831	0.00220	9.1	0.9918	0.00250
9.75	0.9798	0.00210	9.35	0.9901	0.00260	9.15	0.9936	0.00230
9.8	0.9868	0.00270	9.4	0.9976	0.00220	9.2	1.0018	0.00240
9.85	0.9905	0.00240	9.45	0.9980	0.00250	9.25	1.0046	0.00270
9.9	0.9946	0.00220	9.5	1.0033	0.00240	9.3	1.0146	0.00190
9.95	0.9957	0.00230	9.55	1.0065	0.00230	9.35	1.0081	0.00260
10	1.0002	0.00200	9.6	1.0120	0.00270	9.4	1.0184	0.00240
10.05	1.0022	0.00310	9.65	1.0143	0.00280	9.45	1.0219	0.00290
10.1	1.0080	0.00240	9.7	1.0233	0.00330	9.5	1.0233	0.00250
10.15	1.0121	0.00230						
10.2	1.0163	0.00220						
10.25	1.0222	0.00190						
10.3	1.0243	0.00220						

0.15			0.2			0.35		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.20	0.9175	0.00260	8.10	0.9183	0.00250	7.90	0.9201	0.00200
8.25	0.9264	0.00220	8.15	0.9275	0.00220	7.95	0.9265	0.00280
8.3	0.9314	0.00250	8.2	0.9343	0.00290	8	0.9299	0.00240
8.35	0.9354	0.00240	8.25	0.9385	0.00220	8.05	0.9343	0.00320
8.4	0.9443	0.00220	8.3	0.9421	0.00240	8.1	0.9402	0.00220
8.45	0.9471	0.00250	8.35	0.9442	0.00230	8.15	0.9446	0.00230
8.5	0.9463	0.00250	8.4	0.9594	0.00260	8.2	0.9519	0.00220
8.55	0.9549	0.00300	8.45	0.9592	0.00260	8.25	0.9574	0.00230
8.6	0.9631	0.00250	8.5	0.9622	0.00220	8.3	0.9615	0.00240
8.65	0.9690	0.00230	8.55	0.9651	0.00220	8.35	0.9666	0.00220
8.7	0.9707	0.00310	8.6	0.9733	0.00220	8.4	0.9726	0.00290
8.75	0.9772	0.00220	8.65	0.9789	0.00260	8.45	0.9808	0.00240
8.8	0.9835	0.00240	8.7	0.9847	0.00230	8.5	0.9833	0.00220
8.85	0.9889	0.00230	8.75	0.9832	0.00250	8.55	0.9908	0.00250
8.9	0.9915	0.00270	8.8	0.9894	0.00280	8.6	0.9965	0.00220
8.95	0.9916	0.00230	8.85	0.9976	0.00260	8.65	0.9990	0.00230
9	1.0033	0.00230	8.9	1.0056	0.00230	8.7	1.0014	0.00320
9.05	1.0066	0.00250	8.95	1.0045	0.00230	8.75	1.0106	0.00240
9.1	1.0104	0.00320	9	1.0129	0.00260	8.8	1.0132	0.00270
9.15	1.0140	0.00250	9.05	1.0209	0.00200	8.85	1.0150	0.00250
9.2	1.0202	0.00280	9.1	1.0186	0.00270	8.9	1.0241	0.00230
9.25	1.0261	0.00210				8.95	1.0283	0.00270
9.3	1.0311	0.00300				9	1.0343	0.00230

0.5			0.75			1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.70	0.9122	0.00220	7.50	0.9188	0.00260	7.30	0.9168	0.00220
7.75	0.9174	0.00230	7.55	0.9204	0.00200	7.35	0.9235	0.00280
7.8	0.9253	0.00210	7.6	0.9227	0.00240	7.4	0.9287	0.00230
7.85	0.9313	0.00260	7.65	0.9297	0.00220	7.45	0.9314	0.00200
7.9	0.9322	0.00230	7.7	0.9404	0.00220	7.5	0.9367	0.00220
7.95	0.9403	0.00220	7.75	0.9445	0.00230	7.55	0.9496	0.00200
8	0.9426	0.00190	7.8	0.9494	0.00260	7.6	0.9520	0.00210
8.05	0.9542	0.00210	7.85	0.9535	0.00250	7.65	0.9544	0.00220
8.1	0.9558	0.00240	7.9	0.9631	0.00250	7.7	0.9612	0.00270
8.15	0.9600	0.00230	7.95	0.9619	0.00290	7.75	0.9660	0.00260
8.2	0.9692	0.00260	8	0.9727	0.00250	7.8	0.9726	0.00220
8.25	0.9722	0.00220	8.05	0.9764	0.00210	7.85	0.9791	0.00220
8.3	0.9744	0.00250	8.1	0.9808	0.00250	7.9	0.9844	0.00210
8.35	0.9832	0.00200	8.15	0.9873	0.00220	7.95	0.9947	0.00330
8.4	0.9849	0.00220	8.2	0.9903	0.00210	8	0.9909	0.00270
8.45	0.9908	0.00230	8.25	0.9944	0.00260	8.05	0.9951	0.00250
8.5	0.9961	0.00210	8.3	1.0032	0.00210	8.1	1.0059	0.00220
8.55	1.0010	0.00270	8.35	1.0049	0.00250	8.15	1.0054	0.00210
8.6	1.0067	0.00230	8.4	1.0105	0.00250	8.2	1.0134	0.00200
8.65	1.0154	0.00240	8.45	1.0252	0.00270	8.25	1.0177	0.00200
8.7	1.0101	0.00250	8.5	1.0247	0.00280	8.3	1.0236	0.00230
8.75	1.0250	0.00240	8.55	1.0233	0.00250			
8.8	1.0255	0.00240	8.6	1.0326	0.00220			

1.5			2			2.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.00	0.9212	0.00210	6.70	0.9193	0.00230	6.40	0.9160	0.00270
7.05	0.9275	0.00220	6.75	0.9314	0.00230	6.45	0.9254	0.00230
7.1	0.9344	0.00210	6.8	0.9357	0.00200	6.5	0.9364	0.00260
7.15	0.9415	0.00200	6.85	0.9415	0.00250	6.55	0.9385	0.00240
7.2	0.9496	0.00230	6.9	0.9459	0.00210	6.6	0.9497	0.00210
7.25	0.9543	0.00220	6.95	0.9552	0.00210	6.65	0.9533	0.00210
7.3	0.9571	0.00240	7	0.9619	0.00190	6.7	0.9604	0.00250
7.35	0.9655	0.00250	7.05	0.9665	0.00200	6.75	0.9636	0.00240
7.4	0.9684	0.00190	7.1	0.9772	0.00300	6.8	0.9739	0.00250
7.45	0.9807	0.00210	7.15	0.9793	0.00240	6.85	0.9800	0.00210
7.5	0.9795	0.00270	7.2	0.9884	0.00200	6.9	0.9875	0.00290
7.55	0.9859	0.00220	7.25	0.9920	0.00200	6.95	0.9909	0.00220
7.6	0.9928	0.00220	7.3	1.0014	0.00190	7	0.9994	0.00220
7.65	1.0009	0.00290	7.35	1.0055	0.00200	7.05	1.0075	0.00260
7.7	1.0066	0.00290	7.4	1.0110	0.00230	7.1	1.0101	0.00240
7.75	1.0098	0.00240	7.45	1.0174	0.00220	7.15	1.0179	0.00200
7.8	1.0178	0.00210	7.5	1.0194	0.00200	7.2	1.0205	0.00260
7.85	1.0189	0.00200						
7.9	1.0216	0.00210						

3			4			5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.10	0.9075	0.00200	5.70	0.9149	0.00260	5.30	0.9098	0.00180
6.15	0.9195	0.00230	5.75	0.9233	0.00280	5.35	0.9162	0.00200
6.2	0.9261	0.00190	5.8	0.9333	0.00250	5.4	0.9310	0.00200
6.25	0.9322	0.00190	5.85	0.9403	0.00190	5.45	0.9329	0.00200
6.3	0.9401	0.00230	5.9	0.9463	0.00210	5.5	0.9397	0.00190
6.35	0.9456	0.00220	5.95	0.9556	0.00220	5.55	0.9459	0.00230
6.4	0.9536	0.00180	6	0.9599	0.00210	5.6	0.9582	0.00230
6.45	0.9607	0.00260	6.05	0.9653	0.00180	5.65	0.9658	0.00190
6.5	0.9667	0.00220	6.1	0.9765	0.00210	5.7	0.9766	0.00200
6.55	0.9760	0.00240	6.15	0.9819	0.00190	5.75	0.9804	0.00190
6.6	0.9805	0.00250	6.2	0.9963	0.00220	5.8	0.9897	0.00210
6.65	0.9902	0.00250	6.25	0.9986	0.00220	5.85	0.9994	0.00170
6.7	0.9908	0.00230	6.3	1.0027	0.00220	5.9	1.0049	0.00220
6.75	1.0066	0.00270	6.35	1.0125	0.00240	5.95	1.0141	0.00270
6.8	1.0093	0.00190	6.4	1.0214	0.00190	6	1.0163	0.00220
6.85	1.0156	0.00210	6.45	1.0272	0.00190	6.05	1.0280	0.00200
6.9	1.0178	0.00240	6.5	1.0316	0.00230	6.1	1.0322	0.00230
6.95	1.0281	0.00240						
7	1.0333	0.00190						

6			7			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.00	0.9122	0.00210	4.70	0.9145	0.00260	4.60	0.9206	0.00210
5.05	0.9248	0.00200	4.75	0.9252	0.00200	4.65	0.9257	0.00210
5.1	0.9295	0.00180	4.8	0.9332	0.00220	4.7	0.9388	0.00230
5.15	0.9403	0.00210	4.85	0.9444	0.00180	4.75	0.9487	0.00180
5.2	0.9533	0.00210	4.9	0.9462	0.00250	4.8	0.9524	0.00180
5.25	0.9572	0.00250	4.95	0.9578	0.00200	4.85	0.9645	0.00220
5.3	0.9603	0.00200	5	0.9685	0.00210	4.9	0.9703	0.00180
5.35	0.9710	0.00220	5.05	0.9752	0.00250	4.95	0.9843	0.00190
5.4	0.9869	0.00200	5.1	0.9834	0.00190	5	0.9930	0.00210
5.45	0.9904	0.00180	5.15	0.9927	0.00230	5.05	1.0024	0.00210
5.5	0.9992	0.00200	5.2	0.9992	0.00210	5.1	1.0109	0.00190
5.55	1.0076	0.00200	5.25	1.0091	0.00200	5.15	1.0199	0.00210
5.6	1.0151	0.00220	5.3	1.0209	0.00180	5.2	1.0246	0.00220
5.65	1.0258	0.00190	5.35	1.0309	0.00240			
5.7	1.0309	0.00200	5.4	1.0373	0.00180			

8			9			10		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.40	0.9064	0.00220	4.20	0.9154	0.00240	4.00	0.9208	0.00200
4.45	0.9158	0.00200	4.25	0.9223	0.00170	4.05	0.9300	0.00210
4.5	0.9254	0.00200	4.3	0.9372	0.00270	4.1	0.9439	0.00200
4.55	0.9379	0.00220	4.35	0.9475	0.00210	4.15	0.9513	0.00180
4.6	0.9473	0.00230	4.4	0.9540	0.00180	4.2	0.9633	0.00200
4.65	0.9535	0.00230	4.45	0.9660	0.00190	4.25	0.9711	0.00220
4.7	0.9624	0.00220	4.5	0.9770	0.00220	4.3	0.9833	0.00220
4.75	0.9715	0.00200	4.55	0.9836	0.00210	4.35	0.9931	0.00210
4.8	0.9816	0.00220	4.6	0.9912	0.00190	4.4	1.0002	0.00190
4.85	0.9912	0.00270	4.65	1.0074	0.00300	4.45	1.0125	0.00200
4.9	1.0017	0.00180	4.7	1.0140	0.00230	4.5	1.0229	0.00180
4.95	1.0121	0.00220	4.75	1.0187	0.00190	4.55	1.0335	0.00280
5	1.0156	0.00190	4.8	1.0303	0.00210	4.6	1.0427	0.00230
5.05	1.0263	0.00200						
5.1	1.0391	0.00210						

15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.00	0.9077	0.00200	2.40	0.9089	0.00200
3.02	0.9091	0.00220	2.42	0.9191	0.00180
3.04	0.9144	0.00200	2.44	0.9237	0.00200
3.06	0.9198	0.00150	2.46	0.9294	0.00220
3.08	0.9244	0.00180	2.48	0.9334	0.00180
3.1	0.9292	0.00220	2.5	0.9411	0.00210
3.12	0.9374	0.00190	2.52	0.9475	0.00190
3.14	0.9434	0.00200	2.54	0.9564	0.00200
3.16	0.9515	0.00230	2.56	0.9549	0.00210
3.18	0.9494	0.00180	2.58	0.9676	0.00170
3.2	0.9544	0.00180	2.6	0.9725	0.00190
3.22	0.9593	0.00180	2.62	0.9769	0.00190
3.24	0.9704	0.00190	2.64	0.9858	0.00200
3.26	0.9703	0.00190	2.66	0.9899	0.00210
3.28	0.9746	0.00170	2.68	0.9977	0.00230
3.3	0.9806	0.00210	2.7	1.0045	0.00190
3.32	0.9847	0.00200	2.72	1.0100	0.00210
3.34	0.9908	0.00220	2.74	1.0163	0.00200
3.36	0.9927	0.00190	2.76	1.0213	0.00220
3.38	0.9990	0.00280	2.78	1.0261	0.00210
3.4	1.0063	0.00170	2.8	1.0287	0.00180
3.42	1.0112	0.00220			
3.44	1.0160	0.00220			
3.46	1.0226	0.00190			
3.48	1.0247	0.00210			
3.5	1.0326	0.00210			

Case ID: pu_cyl_100_01ref

Material: Plutonium

Geometry: Infinite Cylinder

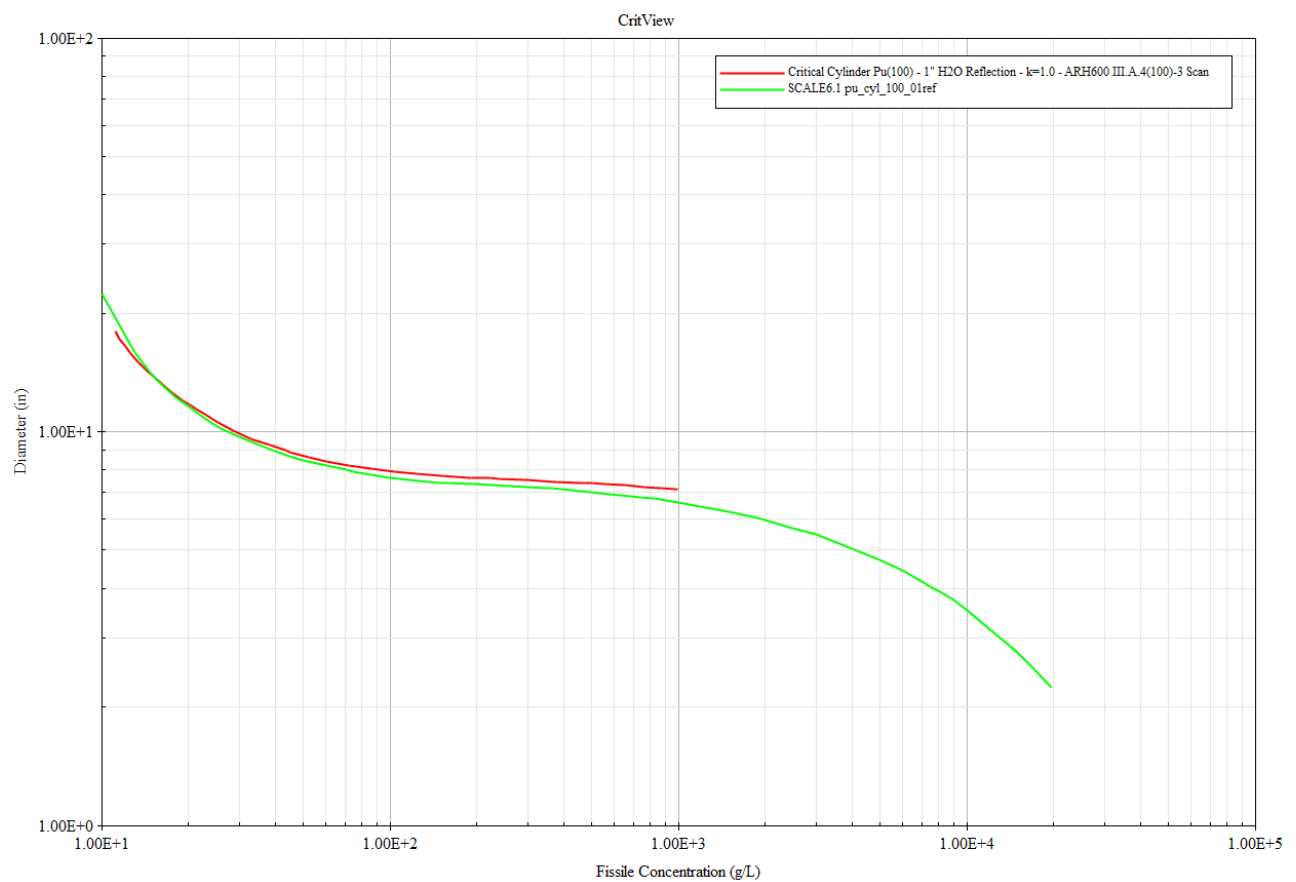
Isotopics: 100% ^{239}Pu

Reflector: 1" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	17.200	23.600	0.300	22.3281
0.013	13.200	16.400	0.100	15.8425
0.015	11.800	14.000	0.100	13.9286
0.018	10.600	12.800	0.100	12.2836
0.020	10.100	11.900	0.100	11.6222
0.022	9.600	11.000	0.050	10.9918
0.024	9.300	10.900	0.050	10.5837
0.025	9.100	10.400	0.050	10.3926
0.026	9.000	10.400	0.050	10.2026
0.028	8.700	10.200	0.050	9.9355
0.030	8.500	10.000	0.050	9.7102
0.032	8.400	9.700	0.050	9.5150
0.036	8.100	9.500	0.050	9.1809
0.040	7.900	9.100	0.100	8.9103
0.045	7.700	8.900	0.050	8.6538
0.050	7.500	8.700	0.050	8.4567
0.075	7.100	8.100	0.050	7.9059
0.100	6.800	7.900	0.050	7.6495
0.150	6.700	7.700	0.050	7.4281
0.200	6.600	7.600	0.050	7.3630
0.350	6.450	7.400	0.050	7.1698
0.500	6.300	7.400	0.050	7.0264
0.750	6.100	7.000	0.050	6.8043
1.000	5.900	6.900	0.050	6.5920
1.500	5.600	6.500	0.050	6.2685
2.000	5.300	6.200	0.050	5.9655
2.500	5.100	5.900	0.050	5.6840
3.000	4.900	5.700	0.050	5.4765
4.000	4.500	5.300	0.050	5.0513
5.000	4.200	4.900	0.050	4.7194
6.000	3.900	4.600	0.050	4.4549
7.000	3.700	4.300	0.050	4.1625
7.500	3.600	4.200	0.050	4.0383
8.000	3.500	4.100	0.050	3.9325
9.000	3.300	3.900	0.050	3.7250
10.000	3.100	3.700	0.050	3.5243
15.000	2.400	2.900	0.020	2.7508
19.600	2.000	2.400	0.020	2.2414

WORM and SCALE Input File

```

'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.1.2.1.2-1. Critical Dimensions for 100% 239Pu Cylinder - 1 Inch of Water Reflection
,
#index number = <index = 1:38:1>
,
#Concentration = <@conc =
0.01,0.013,0.015,0.018,0.02,0.022,0.024,0.025,0.026,0.028,0.03,0.032,0.036,0.04,0.045,0.05,0.075,
0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4,5,6,7,7.5,8,9,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)> g/cc
,
#Starting Diameter = <@startdia =
17.2,13.2,11.8,10.6,10.1,9.6,9.3,9.1,9.8,7,8.5,8.4,8.1,7.9,7.7,7.5,7.1,6.8,6.7,6.6,6.45,6.3,6.1,5
.9,5.6,5.3,5.1,4.9,4.5,4.2,3.9,3.7,3.6,3.5,3.3,3.1,2.4,2> in
#Ending Diameter = <@enddia =
23.6,16.4,14,12.8,11.9,11,10.9,10.4,10.4,10.2,10,9.7,9.5,9.1,8.9,8.7,8.1,7.9,7.7,7.6,7.4,7.4,7,6.
9,6.5,6.2,5.9,5.7,5.3,4.9,4.6,4.3,4.2,4.1,3.9,3.7,2.9,2.4> in
#Delta = <@delta =
0.3,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.0
5,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02,0.02> in
,
'Reflector Thickness {{refthick = 1}}
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
Template
v7-238
read composition
  pu-239          1 den=<critconc> 1 300
                  94239 100
                  94240 0   end
<&ZEROCHECK(wconc)\11>h2o          1 den=<wconc> 1 300   end
  h2o             2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Cylinder"
  cylinder 1      {{(diameter*in)/2}}      10      -10
  cylinder 2      {{(refdia*in)/2}}        10      -10
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
read bnds
  body=2
    surface(1)=vacuum
    surface(2)=mirror
    surface(3)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_cyl_100_01ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infcyl
modmat: H2O
critmat: plutonium
isomat: Pu239 1.0
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 22.3281
0.013 15.8425
0.015 13.9286
0.018 12.2836
0.020 11.6222
0.022 10.9918
0.024 10.5837
0.025 10.3926
0.026 10.2026
0.028 9.9355
0.030 9.7102
0.032 9.5150
0.036 9.1809
0.040 8.9103
0.045 8.6538
0.050 8.4567
0.075 7.9059
0.100 7.6495
0.150 7.4281
0.200 7.3630
0.350 7.1698
0.500 7.0264
0.750 6.8043
1.000 6.5920
1.500 6.2685
2.000 5.9655
2.500 5.6840
3.000 5.4765
4.000 5.0513
5.000 4.7194
6.000 4.4549
7.000 4.1625
7.500 4.0383
8.000 3.9325
9.000 3.7250
10.000 3.5243
15.000 2.7508
19.600 2.2414
```

0.01			0.013			0.015		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.20	0.9262	0.00130	13.20	0.9226	0.00190	11.80	0.9174	0.00170
17.5	0.9318	0.00130	13.3	0.9303	0.00170	11.9	0.9252	0.00170
17.8	0.9383	0.00160	13.4	0.9303	0.00150	12	0.9306	0.00170
18.1	0.9366	0.00160	13.5	0.9327	0.00210	12.1	0.9296	0.00190
18.4	0.9448	0.00160	13.6	0.9335	0.00150	12.2	0.9370	0.00150
18.7	0.9538	0.00130	13.7	0.9391	0.00200	12.3	0.9425	0.00210
19	0.9580	0.00150	13.8	0.9436	0.00170	12.4	0.9445	0.00160
19.3	0.9611	0.00160	13.9	0.9490	0.00150	12.5	0.9468	0.00170
19.6	0.9651	0.00160	14	0.9500	0.00130	12.6	0.9516	0.00190
19.9	0.9713	0.00130	14.1	0.9516	0.00140	12.7	0.9560	0.00160
20.2	0.9756	0.00140	14.2	0.9577	0.00140	12.8	0.9618	0.00160
20.5	0.9798	0.00160	14.3	0.9575	0.00130	12.9	0.9663	0.00170
20.8	0.9839	0.00110	14.4	0.9624	0.00160	13	0.9676	0.00140
21.1	0.9854	0.00130	14.5	0.9647	0.00170	13.1	0.9680	0.00200
21.4	0.9903	0.00130	14.6	0.9662	0.00160	13.2	0.9758	0.00160
21.7	0.9952	0.00120	14.7	0.9699	0.00160	13.3	0.9792	0.00150
22	0.9941	0.00150	14.8	0.9722	0.00180	13.4	0.9821	0.00140
22.3	0.9994	0.00160	14.9	0.9785	0.00180	13.5	0.9837	0.00180
22.6	1.0058	0.00120	15	0.9785	0.00130	13.6	0.9894	0.00170
22.9	1.0060	0.00110	15.1	0.9803	0.00150	13.7	0.9904	0.00160
23.2	1.0100	0.00120	15.2	0.9836	0.00190	13.8	0.9921	0.00150
23.5	1.0099	0.00160	15.3	0.9872	0.00200	13.9	0.9982	0.00170
23.6	1.0146	0.00160	15.4	0.9901	0.00150	14	1.0045	0.00190
			15.5	0.9913	0.00140			
			15.6	0.9952	0.00140			
			15.7	0.9978	0.00160			
			15.8	0.9983	0.00170			
			15.9	1.0023	0.00160			
			16	1.0051	0.00170			
			16.1	1.0054	0.00180			
			16.2	1.0073	0.00150			
			16.3	1.0099	0.00180			
			16.4	1.0120	0.00180			

0.018			0.02			0.022		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.60	0.9192	0.00170	10.10	0.9214	0.00190	9.60	0.9178	0.00190
10.7	0.9268	0.00160	10.2	0.9249	0.00190	9.65	0.9185	0.00190
10.8	0.9292	0.00180	10.3	0.9353	0.00190	9.7	0.9232	0.00200
10.9	0.9364	0.00180	10.4	0.9399	0.00200	9.75	0.9272	0.00180
11	0.9393	0.00170	10.5	0.9424	0.00190	9.8	0.9276	0.00220
11.1	0.9423	0.00190	10.6	0.9520	0.00200	9.85	0.9340	0.00170
11.2	0.9481	0.00180	10.7	0.9530	0.00170	9.9	0.9322	0.00180
11.3	0.9562	0.00190	10.8	0.9637	0.00190	9.95	0.9404	0.00180
11.4	0.9570	0.00240	10.9	0.9652	0.00180	10	0.9422	0.00200
11.5	0.9612	0.00160	11	0.9731	0.00180	10.05	0.9465	0.00170
11.6	0.9684	0.00170	11.1	0.9762	0.00170	10.1	0.9494	0.00220
11.7	0.9736	0.00240	11.2	0.9820	0.00160	10.15	0.9529	0.00180
11.8	0.9807	0.00170	11.3	0.9885	0.00220	10.2	0.9587	0.00180
11.9	0.9860	0.00180	11.4	0.9955	0.00240	10.25	0.9566	0.00160
12	0.9899	0.00160	11.5	0.9973	0.00160	10.3	0.9573	0.00170
12.1	0.9915	0.00170	11.6	0.9982	0.00190	10.35	0.9616	0.00190
12.2	0.9949	0.00170	11.7	1.0063	0.00150	10.4	0.9682	0.00180
12.3	1.0010	0.00140	11.8	1.0072	0.00200	10.45	0.9674	0.00180
12.4	1.0016	0.00220	11.9	1.0147	0.00190	10.5	0.9738	0.00200
12.5	1.0106	0.00170				10.55	0.9735	0.00190
12.6	1.0119	0.00190				10.6	0.9758	0.00180
12.7	1.0152	0.00180				10.65	0.9759	0.00170
12.8	1.0169	0.00180				10.7	0.9812	0.00190
						10.75	0.9865	0.00200
						10.8	0.9894	0.00220
						10.85	0.9905	0.00170
						10.9	0.9932	0.00180
						10.95	0.9954	0.00160
						11	1.0009	0.00190
						11.05	0.9976	0.00190
						11.1	1.0035	0.00190
						11.15	1.0048	0.00180
						11.2	1.0101	0.00180

0.024			0.025			0.026		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.30	0.9203	0.00230	9.10	0.9200	0.00170	9.00	0.9185	0.00190
9.35	0.9238	0.00200	9.15	0.9165	0.00160	9.05	0.9196	0.00170
9.4	0.9265	0.00200	9.2	0.9229	0.00170	9.1	0.9246	0.00190
9.45	0.9302	0.00250	9.25	0.9267	0.00190	9.15	0.9284	0.00190
9.5	0.9348	0.00190	9.3	0.9310	0.00210	9.2	0.9333	0.00210
9.55	0.9352	0.00200	9.35	0.9298	0.00210	9.25	0.9365	0.00220
9.6	0.9446	0.00200	9.4	0.9375	0.00200	9.3	0.9356	0.00200
9.65	0.9436	0.00180	9.45	0.9408	0.00200	9.35	0.9408	0.00210
9.7	0.9494	0.00200	9.5	0.9470	0.00270	9.4	0.9448	0.00200
9.75	0.9476	0.00190	9.55	0.9464	0.00220	9.45	0.9482	0.00220
9.8	0.9524	0.00200	9.6	0.9488	0.00200	9.5	0.9541	0.00190
9.85	0.9528	0.00200	9.65	0.9538	0.00180	9.55	0.9554	0.00200
9.9	0.9549	0.00170	9.7	0.9582	0.00170	9.6	0.9618	0.00190
9.95	0.9644	0.00210	9.75	0.9556	0.00180	9.65	0.9634	0.00180
10	0.9641	0.00190	9.8	0.9617	0.00210	9.7	0.9701	0.00220
10.05	0.9681	0.00200	9.85	0.9644	0.00210	9.75	0.9724	0.00200
10.1	0.9710	0.00270	9.9	0.9712	0.00220	9.8	0.9728	0.00210
10.15	0.9736	0.00170	9.95	0.9731	0.00210	9.85	0.9767	0.00230
10.2	0.9774	0.00210	10	0.9737	0.00220	9.9	0.9789	0.00260
10.25	0.9812	0.00190	10.05	0.9788	0.00270	9.95	0.9852	0.00190
10.3	0.9866	0.00210	10.1	0.9801	0.00200	10	0.9883	0.00200
10.35	0.9800	0.00200	10.15	0.9844	0.00200	10.05	0.9895	0.00180
10.4	0.9896	0.00230	10.2	0.9888	0.00190	10.1	0.9911	0.00190
10.45	0.9906	0.00210	10.25	0.9924	0.00170	10.15	0.9947	0.00180
10.5	0.9982	0.00200	10.3	0.9926	0.00180	10.2	0.9999	0.00150
10.55	0.9965	0.00200	10.35	0.9960	0.00180	10.25	1.0018	0.00200
10.6	1.0017	0.00170	10.4	1.0007	0.00200	10.3	1.0062	0.00210
10.65	1.0050	0.00190	10.45	1.0028	0.00200	10.35	1.0093	0.00260
10.7	1.0038	0.00210	10.5	1.0080	0.00240	10.4	1.0107	0.00190
10.75	1.0081	0.00200						
10.8	1.0121	0.00220						
10.85	1.0136	0.00200						
10.9	1.0225	0.00210						

0.028			0.03			0.032		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.70	0.9132	0.00190	8.50	0.9132	0.00230	8.40	0.9179	0.00200
8.75	0.9152	0.00200	8.55	0.9176	0.00200	8.45	0.9208	0.00230
8.8	0.9188	0.00220	8.6	0.9231	0.00190	8.5	0.9257	0.00190
8.85	0.9268	0.00220	8.65	0.9247	0.00350	8.55	0.9294	0.00180
8.9	0.9301	0.00220	8.7	0.9281	0.00220	8.6	0.9319	0.00190
8.95	0.9319	0.00200	8.75	0.9315	0.00180	8.65	0.9337	0.00240
9	0.9370	0.00190	8.8	0.9348	0.00240	8.7	0.9397	0.00230
9.05	0.9402	0.00240	8.85	0.9416	0.00180	8.75	0.9426	0.00190
9.1	0.9451	0.00270	8.9	0.9400	0.00260	8.8	0.9503	0.00180
9.15	0.9452	0.00230	8.95	0.9463	0.00230	8.85	0.9546	0.00210
9.2	0.9487	0.00250	9	0.9541	0.00210	8.9	0.9593	0.00220
9.25	0.9513	0.00210	9.05	0.9547	0.00240	8.95	0.9611	0.00250
9.3	0.9604	0.00190	9.1	0.9598	0.00190	9	0.9621	0.00260
9.35	0.9637	0.00230	9.15	0.9619	0.00190	9.05	0.9688	0.00250
9.4	0.9644	0.00200	9.2	0.9652	0.00230	9.1	0.9733	0.00230
9.45	0.9670	0.00180	9.25	0.9681	0.00200	9.15	0.9751	0.00200
9.5	0.9692	0.00190	9.3	0.9757	0.00200	9.2	0.9791	0.00180
9.55	0.9722	0.00230	9.35	0.9785	0.00240	9.25	0.9833	0.00180
9.6	0.9785	0.00190	9.4	0.9792	0.00180	9.3	0.9846	0.00190
9.65	0.9834	0.00230	9.45	0.9808	0.00190	9.35	0.9894	0.00250
9.7	0.9810	0.00200	9.5	0.9796	0.00190	9.4	0.9915	0.00170
9.75	0.9874	0.00190	9.55	0.9916	0.00270	9.45	0.9935	0.00210
9.8	0.9936	0.00180	9.6	0.9924	0.00190	9.5	0.9966	0.00250
9.85	0.9960	0.00190	9.65	0.9938	0.00190	9.55	1.0079	0.00220
9.9	0.9946	0.00200	9.7	0.9987	0.00220	9.6	1.0041	0.00190
9.95	1.0022	0.00210	9.75	1.0051	0.00200	9.65	1.0086	0.00210
10	1.0019	0.00260	9.8	1.0041	0.00190	9.7	1.0191	0.00210
10.05	1.0105	0.00210	9.85	1.0100	0.00220			
10.1	1.0123	0.00170	9.9	1.0116	0.00200			
10.15	1.0097	0.00210	9.95	1.0185	0.00200			
10.2	1.0124	0.00190	10	1.0187	0.00180			

0.036			0.04			0.045		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.10	0.9149	0.00190	7.90	0.9204	0.00200	7.70	0.9180	0.00230
8.15	0.9198	0.00190	8	0.9261	0.00170	7.75	0.9219	0.00210
8.2	0.9231	0.00240	8.1	0.9345	0.00210	7.8	0.9241	0.00270
8.25	0.9301	0.00220	8.2	0.9454	0.00220	7.85	0.9327	0.00190
8.3	0.9314	0.00220	8.3	0.9515	0.00190	7.9	0.9314	0.00220
8.35	0.9387	0.00200	8.4	0.9620	0.00190	7.95	0.9405	0.00200
8.4	0.9393	0.00200	8.5	0.9653	0.00210	8	0.9484	0.00230
8.45	0.9453	0.00200	8.6	0.9734	0.00210	8.05	0.9492	0.00200
8.5	0.9490	0.00210	8.7	0.9858	0.00170	8.1	0.9552	0.00200
8.55	0.9559	0.00260	8.8	0.9909	0.00250	8.15	0.9536	0.00200
8.6	0.9584	0.00200	8.9	0.9988	0.00200	8.2	0.9633	0.00200
8.65	0.9587	0.00250	9	1.0104	0.00240	8.25	0.9694	0.00190
8.7	0.9653	0.00220	9.1	1.0157	0.00200	8.3	0.9713	0.00210
8.75	0.9707	0.00220				8.35	0.9735	0.00270
8.8	0.9726	0.00190				8.4	0.9758	0.00250
8.85	0.9811	0.00240				8.45	0.9845	0.00250
8.9	0.9832	0.00220				8.5	0.9898	0.00220
8.95	0.9894	0.00220				8.55	0.9913	0.00280
9	0.9858	0.00180				8.6	0.9951	0.00200
9.05	0.9928	0.00220				8.65	0.9995	0.00230
9.1	0.9970	0.00230				8.7	1.0060	0.00270
9.15	0.9950	0.00190				8.75	1.0069	0.00220
9.2	1.0031	0.00190				8.8	1.0137	0.00200
9.25	1.0040	0.00270				8.85	1.0108	0.00220
9.3	1.0082	0.00190				8.9	1.0188	0.00230
9.35	1.0121	0.00200						
9.4	1.0197	0.00180						
9.45	1.0214	0.00210						
9.5	1.0241	0.00180						

0.05			0.075			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.50	0.9151	0.00330	7.10	0.9209	0.00230	6.80	0.9111	0.00250
7.55	0.9236	0.00200	7.15	0.9270	0.00240	6.85	0.9170	0.00240
7.6	0.9224	0.00230	7.2	0.9305	0.00250	6.9	0.9210	0.00210
7.65	0.9275	0.00220	7.25	0.9363	0.00230	6.95	0.9245	0.00310
7.7	0.9333	0.00190	7.3	0.9418	0.00200	7	0.9316	0.00250
7.75	0.9371	0.00220	7.35	0.9457	0.00230	7.05	0.9372	0.00270
7.8	0.9433	0.00230	7.4	0.9480	0.00200	7.1	0.9435	0.00250
7.85	0.9452	0.00240	7.45	0.9574	0.00230	7.15	0.9501	0.00240
7.9	0.9517	0.00220	7.5	0.9655	0.00250	7.2	0.9518	0.00220
7.95	0.9582	0.00230	7.55	0.9639	0.00270	7.25	0.9611	0.00240
8	0.9621	0.00240	7.6	0.9695	0.00220	7.3	0.9599	0.00230
8.05	0.9658	0.00220	7.65	0.9726	0.00190	7.35	0.9700	0.00260
8.1	0.9629	0.00200	7.7	0.9789	0.00240	7.4	0.9732	0.00190
8.15	0.9697	0.00190	7.75	0.9802	0.00210	7.45	0.9852	0.00220
8.2	0.9806	0.00210	7.8	0.9889	0.00240	7.5	0.9833	0.00220
8.25	0.9814	0.00240	7.85	0.9938	0.00190	7.55	0.9858	0.00230
8.3	0.9879	0.00220	7.9	0.9998	0.00230	7.6	0.9905	0.00220
8.35	0.9920	0.00190	7.95	1.0015	0.00220	7.65	1.0001	0.00230
8.4	0.9919	0.00230	8	1.0094	0.00230	7.7	1.0025	0.00230
8.45	0.9998	0.00220	8.05	1.0098	0.00220	7.75	1.0085	0.00230
8.5	1.0013	0.00250	8.1	1.0177	0.00260	7.8	1.0086	0.00230
8.55	1.0071	0.00250				7.85	1.0176	0.00260
8.6	1.0047	0.00230				7.9	1.0193	0.00240
8.65	1.0167	0.00210						
8.7	1.0154	0.00220						

0.15			0.2			0.35		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.70	0.9232	0.00200	6.60	0.9284	0.00230	6.45	0.9243	0.00220
6.75	0.9275	0.00210	6.65	0.9279	0.00240	6.5	0.9315	0.00220
6.8	0.9328	0.00210	6.7	0.9323	0.00220	6.55	0.9388	0.00230
6.85	0.9380	0.00220	6.75	0.9411	0.00240	6.6	0.9422	0.00210
6.9	0.9439	0.00230	6.8	0.9461	0.00250	6.65	0.9514	0.00230
6.95	0.9494	0.00230	6.85	0.9544	0.00220	6.7	0.9515	0.00260
7	0.9540	0.00240	6.9	0.9524	0.00230	6.75	0.9534	0.00240
7.05	0.9598	0.00230	6.95	0.9548	0.00230	6.8	0.9642	0.00230
7.1	0.9629	0.00290	7	0.9672	0.00270	6.85	0.9736	0.00210
7.15	0.9724	0.00240	7.05	0.9698	0.00250	6.9	0.9718	0.00210
7.2	0.9764	0.00210	7.1	0.9717	0.00210	6.95	0.9816	0.00210
7.25	0.9768	0.00220	7.15	0.9806	0.00240	7	0.9884	0.00230
7.3	0.9865	0.00270	7.2	0.9827	0.00210	7.05	0.9879	0.00240
7.35	0.9910	0.00260	7.25	0.9860	0.00280	7.1	0.9903	0.00230
7.4	0.9973	0.00230	7.3	0.9961	0.00330	7.15	0.9981	0.00220
7.45	1.0021	0.00230	7.35	0.9980	0.00240	7.2	1.0029	0.00270
7.5	1.0024	0.00230	7.4	1.0057	0.00230	7.25	1.0093	0.00240
7.55	1.0093	0.00220	7.45	1.0060	0.00250	7.3	1.0151	0.00230
7.6	1.0145	0.00260	7.5	1.0165	0.00330	7.35	1.0201	0.00250
7.65	1.0212	0.00220	7.55	1.0173	0.00230	7.4	1.0228	0.00270
7.7	1.0223	0.00280	7.6	1.0234	0.00190			

0.5			0.75			1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.30	0.9234	0.00220	6.10	0.9257	0.00250	5.90	0.9193	0.00230
6.35	0.9267	0.00200	6.15	0.9292	0.00260	5.95	0.9254	0.00210
6.4	0.9365	0.00220	6.2	0.9346	0.00250	6	0.9292	0.00220
6.45	0.9433	0.00290	6.25	0.9397	0.00230	6.05	0.9390	0.00210
6.5	0.9479	0.00200	6.3	0.9471	0.00210	6.1	0.9435	0.00200
6.55	0.9516	0.00250	6.35	0.9545	0.00230	6.15	0.9505	0.00220
6.6	0.9569	0.00240	6.4	0.9526	0.00240	6.2	0.9541	0.00250
6.65	0.9595	0.00220	6.45	0.9613	0.00220	6.25	0.9619	0.00210
6.7	0.9670	0.00200	6.5	0.9663	0.00290	6.3	0.9670	0.00240
6.75	0.9719	0.00220	6.55	0.9733	0.00240	6.35	0.9718	0.00290
6.8	0.9779	0.00230	6.6	0.9753	0.00210	6.4	0.9750	0.00240
6.85	0.9809	0.00250	6.65	0.9835	0.00250	6.45	0.9846	0.00250
6.9	0.9860	0.00290	6.7	0.9898	0.00230	6.5	0.9873	0.00230
6.95	0.9926	0.00220	6.75	0.9932	0.00250	6.55	0.9932	0.00250
7	0.9936	0.00230	6.8	0.9994	0.00250	6.6	1.0013	0.00280
7.05	1.0057	0.00200	6.85	1.0064	0.00240	6.65	1.0044	0.00240
7.1	1.0106	0.00220	6.9	1.0094	0.00210	6.7	1.0094	0.00240
7.15	1.0130	0.00270	6.95	1.0142	0.00230	6.75	1.0147	0.00230
7.2	1.0172	0.00260	7	1.0200	0.00220	6.8	1.0160	0.00210
7.25	1.0253	0.00230				6.85	1.0264	0.00270
7.3	1.0253	0.00230				6.9	1.0308	0.00250
7.35	1.0337	0.00210						
7.4	1.0374	0.00250						

1.5			2			2.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.60	0.9206	0.00270	5.30	0.9138	0.00220	5.10	0.9134	0.00210
5.65	0.9240	0.00190	5.35	0.9176	0.00240	5.15	0.9276	0.00220
5.7	0.9346	0.00240	5.4	0.9262	0.00210	5.2	0.9344	0.00220
5.75	0.9409	0.00190	5.45	0.9356	0.00210	5.25	0.9363	0.00210
5.8	0.9418	0.00250	5.5	0.9389	0.00220	5.3	0.9457	0.00210
5.85	0.9533	0.00220	5.55	0.9467	0.00210	5.35	0.9550	0.00260
5.9	0.9589	0.00240	5.6	0.9547	0.00230	5.4	0.9602	0.00230
5.95	0.9595	0.00270	5.65	0.9631	0.00210	5.45	0.9687	0.00230
6	0.9674	0.00220	5.7	0.9715	0.00240	5.5	0.9758	0.00200
6.05	0.9738	0.00240	5.75	0.9775	0.00230	5.55	0.9822	0.00200
6.1	0.9824	0.00250	5.8	0.9777	0.00190	5.6	0.9885	0.00200
6.15	0.9866	0.00220	5.85	0.9853	0.00220	5.65	0.9949	0.00210
6.2	0.9964	0.00190	5.9	0.9931	0.00210	5.7	1.0024	0.00190
6.25	0.9953	0.00210	5.95	0.9966	0.00220	5.75	1.0063	0.00210
6.3	1.0080	0.00210	6	1.0076	0.00200	5.8	1.0149	0.00230
6.35	1.0102	0.00200	6.05	1.0097	0.00200	5.85	1.0188	0.00250
6.4	1.0148	0.00210	6.1	1.0174	0.00250	5.9	1.0242	0.00210
6.45	1.0183	0.00230	6.15	1.0190	0.00210			
6.5	1.0239	0.00210	6.2	1.0337	0.00240			

3			4			5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.90	0.9201	0.00230	4.50	0.9145	0.00210	4.20	0.9127	0.00200
4.95	0.9278	0.00210	4.55	0.9227	0.00200	4.25	0.9194	0.00200
5	0.9345	0.00190	4.6	0.9267	0.00210	4.3	0.9284	0.00210
5.05	0.9453	0.00220	4.65	0.9375	0.00210	4.35	0.9390	0.00230
5.1	0.9433	0.00210	4.7	0.9443	0.00210	4.4	0.9460	0.00230
5.15	0.9551	0.00260	4.75	0.9473	0.00270	4.45	0.9594	0.00210
5.2	0.9613	0.00190	4.8	0.9630	0.00200	4.5	0.9633	0.00220
5.25	0.9688	0.00200	4.85	0.9688	0.00190	4.55	0.9688	0.00220
5.3	0.9789	0.00210	4.9	0.9775	0.00200	4.6	0.9811	0.00210
5.35	0.9864	0.00200	4.95	0.9806	0.00270	4.65	0.9874	0.00220
5.4	0.9892	0.00240	5	0.9887	0.00220	4.7	0.9967	0.00210
5.45	0.9982	0.00210	5.05	0.9998	0.00220	4.75	1.0052	0.00180
5.5	1.0016	0.00280	5.1	1.0075	0.00210	4.8	1.0128	0.00210
5.55	1.0114	0.00260	5.15	1.0117	0.00220	4.85	1.0207	0.00210
5.6	1.0194	0.00230	5.2	1.0212	0.00240	4.9	1.0289	0.00200
5.65	1.0243	0.00200	5.25	1.0250	0.00210			
5.7	1.0323	0.00230	5.3	1.0330	0.00190			

6			7			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.90	0.9100	0.00220	3.70	0.9144	0.00200	3.60	0.9140	0.00210
3.95	0.9127	0.00200	3.75	0.9204	0.00180	3.65	0.9230	0.00200
4	0.9247	0.00210	3.8	0.9312	0.00200	3.7	0.9322	0.00210
4.05	0.9327	0.00250	3.85	0.9421	0.00210	3.75	0.9430	0.00210
4.1	0.9422	0.00230	3.9	0.9489	0.00220	3.8	0.9526	0.00200
4.15	0.9519	0.00250	3.95	0.9607	0.00200	3.85	0.9608	0.00200
4.2	0.9592	0.00210	4	0.9668	0.00240	3.9	0.9717	0.00220
4.25	0.9684	0.00240	4.05	0.9802	0.00250	3.95	0.9825	0.00180
4.3	0.9815	0.00240	4.1	0.9852	0.00210	4	0.9899	0.00200
4.35	0.9860	0.00180	4.15	0.9978	0.00250	4.05	1.0031	0.00210
4.4	0.9969	0.00220	4.2	1.0066	0.00230	4.1	1.0079	0.00240
4.45	0.9986	0.00220	4.25	1.0144	0.00230	4.15	1.0242	0.00220
4.5	1.0130	0.00200	4.3	1.0259	0.00220	4.2	1.0249	0.00180
4.55	1.0177	0.00190						
4.6	1.0249	0.00200						

8			9			10		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.50	0.9144	0.00210	3.30	0.9097	0.00200	3.10	0.9043	0.00180
3.55	0.9224	0.00200	3.35	0.9212	0.00180	3.15	0.9173	0.00190
3.6	0.9332	0.00200	3.4	0.9302	0.00230	3.2	0.9288	0.00180
3.65	0.9495	0.00210	3.45	0.9446	0.00180	3.25	0.9363	0.00200
3.7	0.9561	0.00190	3.5	0.9527	0.00230	3.3	0.9492	0.00210
3.75	0.9645	0.00200	3.55	0.9617	0.00210	3.35	0.9632	0.00220
3.8	0.9745	0.00200	3.6	0.9741	0.00200	3.4	0.9732	0.00180
3.85	0.9814	0.00230	3.65	0.9850	0.00220	3.45	0.9829	0.00220
3.9	0.9920	0.00210	3.7	0.9923	0.00200	3.5	0.9950	0.00240
3.95	1.0043	0.00200	3.75	1.0077	0.00220	3.55	1.0053	0.00290
4	1.0094	0.00210	3.8	1.0153	0.00210	3.6	1.0156	0.00230
4.05	1.0202	0.00200	3.85	1.0225	0.00180	3.65	1.0282	0.00190
4.1	1.0309	0.00230	3.9	1.0346	0.00240	3.7	1.0375	0.00210

15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.40	0.9054	0.00240	2.00	0.9173	0.00190
2.42	0.9103	0.00210	2.02	0.9274	0.00250
2.44	0.9137	0.00190	2.04	0.9308	0.00230
2.46	0.9155	0.00200	2.06	0.9373	0.00210
2.48	0.9256	0.00200	2.08	0.9431	0.00210
2.5	0.9317	0.00230	2.1	0.9512	0.00220
2.52	0.9373	0.00180	2.12	0.9598	0.00170
2.54	0.9434	0.00190	2.14	0.9647	0.00200
2.56	0.9445	0.00190	2.16	0.9681	0.00200
2.58	0.9534	0.00240	2.18	0.9753	0.00230
2.6	0.9597	0.00200	2.2	0.9857	0.00220
2.62	0.9651	0.00230	2.22	0.9930	0.00180
2.64	0.9737	0.00200	2.24	0.9995	0.00210
2.66	0.9742	0.00220	2.26	1.0067	0.00210
2.68	0.9837	0.00200	2.28	1.0131	0.00210
2.7	0.9858	0.00190	2.3	1.0184	0.00180
2.72	0.9924	0.00220	2.32	1.0253	0.00200
2.74	0.9979	0.00180	2.34	1.0298	0.00210
2.76	1.0018	0.00220	2.36	1.0391	0.00270
2.78	1.0119	0.00170	2.38	1.0457	0.00230
2.8	1.0153	0.00200	2.4	1.0490	0.00210
2.82	1.0223	0.00190			
2.84	1.0260	0.00200			
2.86	1.0310	0.00210			
2.88	1.0383	0.00220			
2.9	1.0444	0.00230			

Case ID: pu_cyl_100_10ref

Material: Plutonium

Geometry: Infinite Cylinder

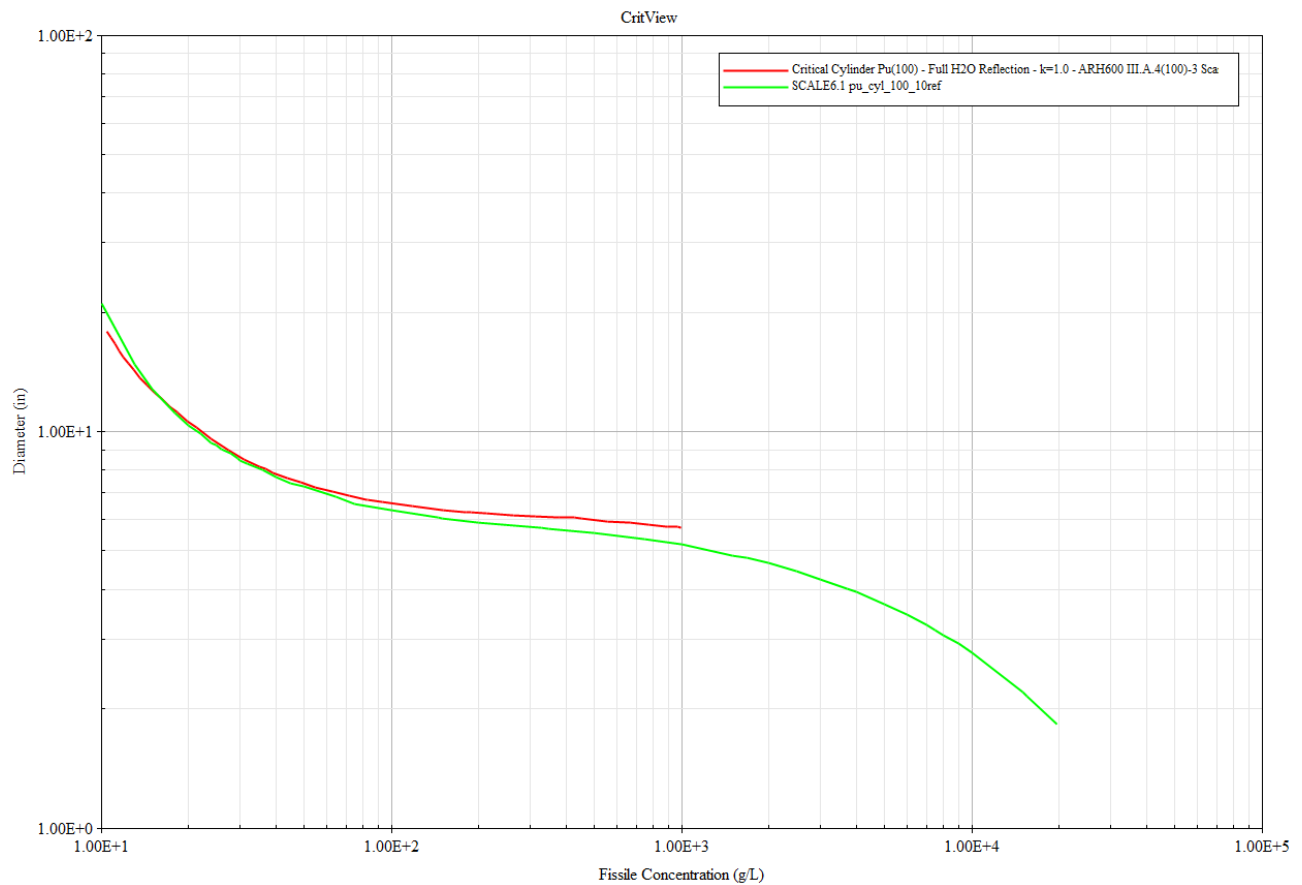
Isotopics: 100% ^{239}Pu

Reflector: 10" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	16.100	22.300	0.300	21.1143
0.013	12.100	15.300	0.100	14.7363
0.015	10.800	13.300	0.100	12.8255
0.018	9.500	11.600	0.100	11.1403
0.020	9.000	10.800	0.100	10.3901
0.022	8.500	10.200	0.050	9.8917
0.024	8.200	9.800	0.050	9.3728
0.025	8.000	9.600	0.050	9.2378
0.026	7.900	9.400	0.050	9.0500
0.028	7.600	9.100	0.050	8.7962
0.030	7.400	8.800	0.050	8.4716
0.032	7.200	8.600	0.050	8.2783
0.036	7.000	8.200	0.050	7.9842
0.040	6.700	8.000	0.050	7.6747
0.045	6.500	7.700	0.050	7.4278
0.050	6.300	7.500	0.050	7.2714
0.075	5.800	6.900	0.050	6.5807
0.100	5.600	6.600	0.050	6.3333
0.150	5.300	6.300	0.050	6.0397
0.200	5.200	6.200	0.050	5.9066
0.350	5.000	6.000	0.050	5.6978
0.500	4.900	5.800	0.050	5.5445
0.750	4.700	5.600	0.050	5.3556
1.000	4.500	5.400	0.050	5.2086
1.500	4.300	5.100	0.050	4.8730
2.000	4.100	4.900	0.050	4.6606
2.500	3.900	4.700	0.050	4.4521
3.000	3.700	4.500	0.050	4.2417
4.000	3.500	4.100	0.050	3.9539
5.000	3.200	3.900	0.050	3.6617
6.000	3.000	3.600	0.050	3.4596
7.000	2.800	3.400	0.050	3.2564
7.500	2.800	3.300	0.020	3.1572
8.000	2.700	3.200	0.020	3.0663
9.000	2.500	3.100	0.050	2.9156
10.000	2.400	2.900	0.020	2.7612
15.000	1.900	2.300	0.020	2.1968
19.600	1.600	1.900	0.020	1.8278

CritView compatible data file

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reset:
title: SCALE6.1 pu_cyl_100_10ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infcyl
modmat: H2O
critmat: plutonium
isomat: Pu239 1.0
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 21.1143
0.013 14.7363
0.015 12.8255
0.018 11.1403
0.020 10.3901
0.022 9.8917
0.024 9.3728
0.025 9.2378
0.026 9.0500
0.028 8.7962
0.030 8.4716
0.032 8.2783
0.036 7.9842
0.040 7.6747
0.045 7.4278
0.050 7.2714
0.075 6.5807
0.100 6.3333
0.150 6.0397
0.200 5.9066
0.350 5.6978
0.500 5.5445
0.750 5.3556
1.000 5.2086
1.500 4.8730
2.000 4.6606
2.500 4.4521
3.000 4.2417
4.000 3.9539
5.000 3.6617
6.000 3.4596
7.000 3.2564
7.500 3.1572
8.000 3.0663
9.000 2.9156
10.000 2.7612
15.000 2.1968
19.600 1.8278
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0.01			0.013			0.015		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
16.10	0.9243	0.00110	12.10	0.9231	0.00140	10.80	0.9274	0.00150
16.4	0.9298	0.00140	12.2	0.9307	0.00160	10.9	0.9262	0.00150
16.7	0.9370	0.00120	12.3	0.9304	0.00150	11	0.9318	0.00180
17	0.9423	0.00110	12.4	0.9336	0.00150	11.1	0.9351	0.00160
17.3	0.9479	0.00130	12.5	0.9352	0.00170	11.2	0.9415	0.00180
17.6	0.9513	0.00120	12.6	0.9385	0.00140	11.3	0.9421	0.00160
17.9	0.9587	0.00100	12.7	0.9432	0.00140	11.4	0.9484	0.00160
18.2	0.9639	0.00120	12.8	0.9488	0.00190	11.5	0.9536	0.00200
18.5	0.9655	0.00130	12.9	0.9472	0.00180	11.6	0.9566	0.00170
18.8	0.9707	0.00110	13	0.9531	0.00160	11.7	0.9591	0.00150
19.1	0.9747	0.00150	13.1	0.9566	0.00170	11.8	0.9650	0.00180
19.4	0.9796	0.00150	13.2	0.9622	0.00150	11.9	0.9689	0.00150
19.7	0.9842	0.00120	13.3	0.9628	0.00150	12	0.9730	0.00180
20	0.9876	0.00170	13.4	0.9651	0.00160	12.1	0.9754	0.00170
20.3	0.9899	0.00130	13.5	0.9702	0.00180	12.2	0.9770	0.00140
20.6	0.9915	0.00120	13.6	0.9740	0.00170	12.3	0.9821	0.00150
20.9	0.9955	0.00120	13.7	0.9760	0.00190	12.4	0.9871	0.00150
21.2	1.0018	0.00120	13.8	0.9768	0.00140	12.5	0.9911	0.00140
21.5	1.0035	0.00110	13.9	0.9779	0.00140	12.6	0.9930	0.00200
21.8	1.0053	0.00120	14	0.9818	0.00150	12.7	0.9936	0.00150
22.1	1.0104	0.00160	14.1	0.9853	0.00150	12.8	0.9987	0.00220
22.3	1.0137	0.00140	14.2	0.9873	0.00170	12.9	1.0038	0.00130
			14.3	0.9917	0.00160	13	1.0050	0.00180
			14.4	0.9927	0.00170	13.1	1.0097	0.00150
			14.5	0.9963	0.00140	13.2	1.0108	0.00170
			14.6	0.9957	0.00160	13.3	1.0160	0.00130
			14.7	0.9967	0.00150			
			14.8	1.0058	0.00130			
			14.9	1.0059	0.00150			
			15	1.0080	0.00160			
			15.1	1.0100	0.00150			
			15.2	1.0099	0.00170			
			15.3	1.0164	0.00150			

0.018			0.02			0.022		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.50	0.9210	0.00180	9.00	0.9276	0.00200	8.50	0.9199	0.00160
9.6	0.9268	0.00160	9.1	0.9302	0.00180	8.55	0.9248	0.00150
9.7	0.9323	0.00160	9.2	0.9339	0.00170	8.6	0.9237	0.00160
9.8	0.9392	0.00170	9.3	0.9444	0.00190	8.65	0.9298	0.00190
9.9	0.9436	0.00160	9.4	0.9459	0.00150	8.7	0.9335	0.00210
10	0.9475	0.00190	9.5	0.9536	0.00180	8.75	0.9361	0.00200
10.1	0.9497	0.00220	9.6	0.9595	0.00160	8.8	0.9384	0.00190
10.2	0.9599	0.00180	9.7	0.9653	0.00170	8.85	0.9422	0.00180
10.3	0.9582	0.00210	9.8	0.9696	0.00150	8.9	0.9469	0.00190
10.4	0.9663	0.00180	9.9	0.9750	0.00170	8.95	0.9491	0.00170
10.5	0.9722	0.00180	10	0.9777	0.00180	9	0.9520	0.00180
10.6	0.9759	0.00190	10.1	0.9882	0.00180	9.05	0.9567	0.00170
10.7	0.9830	0.00160	10.2	0.9915	0.00190	9.1	0.9588	0.00170
10.8	0.9884	0.00190	10.3	0.9927	0.00200	9.15	0.9584	0.00190
10.9	0.9909	0.00160	10.4	1.0008	0.00190	9.2	0.9636	0.00200
11	0.9955	0.00150	10.5	1.0042	0.00170	9.25	0.9672	0.00160
11.1	0.9973	0.00150	10.6	1.0080	0.00190	9.3	0.9730	0.00180
11.2	1.0040	0.00240	10.7	1.0158	0.00150	9.35	0.9741	0.00160
11.3	1.0082	0.00170	10.8	1.0174	0.00180	9.4	0.9790	0.00170
11.4	1.0103	0.00160				9.45	0.9786	0.00170
11.5	1.0149	0.00160				9.5	0.9807	0.00170
11.6	1.0218	0.00160				9.55	0.9841	0.00170
						9.6	0.9824	0.00190
						9.65	0.9868	0.00160
						9.7	0.9942	0.00180
						9.75	0.9944	0.00160
						9.8	0.9938	0.00170
						9.85	1.0005	0.00170
						9.9	0.9999	0.00180
						9.95	1.0027	0.00190
						10	1.0065	0.00180
						10.05	1.0076	0.00200
						10.1	1.0115	0.00160
						10.15	1.0159	0.00210
						10.2	1.0191	0.00160

0.024			0.025			0.026		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.20	0.9266	0.00170	8.00	0.9203	0.00160	7.90	0.9197	0.00190
8.25	0.9279	0.00180	8.05	0.9244	0.00170	7.95	0.9271	0.00180
8.3	0.9277	0.00170	8.1	0.9272	0.00160	8	0.9319	0.00190
8.35	0.9353	0.00170	8.15	0.9331	0.00180	8.05	0.9349	0.00180
8.4	0.9371	0.00170	8.2	0.9325	0.00230	8.1	0.9388	0.00230
8.45	0.9398	0.00190	8.25	0.9372	0.00180	8.15	0.9425	0.00200
8.5	0.9434	0.00160	8.3	0.9392	0.00170	8.2	0.9470	0.00210
8.55	0.9476	0.00160	8.35	0.9430	0.00220	8.25	0.9467	0.00170
8.6	0.9497	0.00180	8.4	0.9474	0.00180	8.3	0.9473	0.00200
8.65	0.9507	0.00260	8.45	0.9531	0.00170	8.35	0.9539	0.00190
8.7	0.9563	0.00190	8.5	0.9534	0.00180	8.4	0.9573	0.00170
8.75	0.9581	0.00200	8.55	0.9585	0.00170	8.45	0.9605	0.00180
8.8	0.9637	0.00180	8.6	0.9611	0.00170	8.5	0.9641	0.00220
8.85	0.9666	0.00170	8.65	0.9655	0.00190	8.55	0.9673	0.00170
8.9	0.9694	0.00170	8.7	0.9693	0.00220	8.6	0.9739	0.00190
8.95	0.9726	0.00210	8.75	0.9662	0.00210	8.65	0.9718	0.00180
9	0.9777	0.00180	8.8	0.9742	0.00180	8.7	0.9773	0.00160
9.05	0.9791	0.00220	8.85	0.9778	0.00180	8.75	0.9815	0.00200
9.1	0.9815	0.00200	8.9	0.9789	0.00180	8.8	0.9839	0.00180
9.15	0.9844	0.00200	8.95	0.9850	0.00200	8.85	0.9864	0.00220
9.2	0.9885	0.00200	9	0.9859	0.00210	8.9	0.9906	0.00170
9.25	0.9896	0.00210	9.05	0.9866	0.00160	8.95	0.9970	0.00160
9.3	0.9952	0.00170	9.1	0.9943	0.00210	9	0.9978	0.00160
9.35	0.9979	0.00200	9.15	0.9960	0.00180	9.05	1.0000	0.00180
9.4	1.0025	0.00160	9.2	0.9972	0.00190	9.1	1.0025	0.00190
9.45	1.0022	0.00190	9.25	1.0009	0.00230	9.15	1.0075	0.00170
9.5	1.0051	0.00210	9.3	1.0002	0.00270	9.2	1.0111	0.00150
9.55	1.0060	0.00220	9.35	1.0062	0.00220	9.25	1.0101	0.00180
9.6	1.0116	0.00200	9.4	1.0069	0.00190	9.3	1.0148	0.00170
9.65	1.0148	0.00210	9.45	1.0106	0.00180	9.35	1.0190	0.00180
9.7	1.0178	0.00200	9.5	1.0186	0.00180	9.4	1.0175	0.00170
9.75	1.0217	0.00240	9.55	1.0203	0.00260			
9.8	1.0216	0.00210	9.6	1.0232	0.00180			

0.028			0.03			0.032		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.60	0.9160	0.00220	7.40	0.9217	0.00200	7.20	0.9155	0.00200
7.65	0.9268	0.00170	7.45	0.9218	0.00220	7.25	0.9209	0.00180
7.7	0.9289	0.00180	7.5	0.9293	0.00190	7.3	0.9207	0.00200
7.75	0.9290	0.00210	7.55	0.9346	0.00190	7.35	0.9256	0.00160
7.8	0.9334	0.00190	7.6	0.9335	0.00180	7.4	0.9340	0.00170
7.85	0.9367	0.00200	7.65	0.9408	0.00180	7.45	0.9360	0.00170
7.9	0.9406	0.00220	7.7	0.9426	0.00180	7.5	0.9412	0.00190
7.95	0.9441	0.00180	7.75	0.9458	0.00190	7.55	0.9464	0.00190
8	0.9496	0.00200	7.8	0.9506	0.00220	7.6	0.9473	0.00190
8.05	0.9506	0.00220	7.85	0.9558	0.00200	7.65	0.9534	0.00190
8.1	0.9537	0.00180	7.9	0.9567	0.00210	7.7	0.9527	0.00210
8.15	0.9579	0.00220	7.95	0.9580	0.00230	7.75	0.9571	0.00190
8.2	0.9656	0.00210	8	0.9642	0.00220	7.8	0.9643	0.00230
8.25	0.9659	0.00190	8.05	0.9667	0.00220	7.85	0.9677	0.00230
8.3	0.9706	0.00190	8.1	0.9691	0.00190	7.9	0.9707	0.00200
8.35	0.9763	0.00210	8.15	0.9743	0.00260	7.95	0.9750	0.00160
8.4	0.9789	0.00240	8.2	0.9781	0.00210	8	0.9766	0.00210
8.45	0.9798	0.00180	8.25	0.9807	0.00180	8.05	0.9830	0.00210
8.5	0.9829	0.00210	8.3	0.9863	0.00180	8.1	0.9866	0.00200
8.55	0.9859	0.00180	8.35	0.9897	0.00220	8.15	0.9924	0.00190
8.6	0.9903	0.00200	8.4	0.9917	0.00270	8.2	0.9959	0.00210
8.65	0.9897	0.00220	8.45	0.9981	0.00180	8.25	0.9957	0.00230
8.7	0.9914	0.00190	8.5	1.0025	0.00180	8.3	1.0033	0.00240
8.75	0.9988	0.00200	8.55	1.0030	0.00280	8.35	1.0034	0.00170
8.8	1.0001	0.00160	8.6	1.0073	0.00210	8.4	1.0082	0.00220
8.85	1.0051	0.00160	8.65	1.0120	0.00180	8.45	1.0115	0.00190
8.9	1.0105	0.00160	8.7	1.0092	0.00190	8.5	1.0122	0.00200
8.95	1.0147	0.00200	8.75	1.0146	0.00170	8.55	1.0165	0.00190
9	1.0150	0.00200	8.8	1.0169	0.00180	8.6	1.0200	0.00200
9.05	1.0174	0.00170						
9.1	1.0211	0.00210						

0.036			0.04			0.045		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.00	0.9201	0.00270	6.70	0.9168	0.00200	6.50	0.9187	0.00220
7.05	0.9313	0.00210	6.75	0.9220	0.00210	6.55	0.9274	0.00220
7.1	0.9319	0.00190	6.8	0.9264	0.00170	6.6	0.9250	0.00190
7.15	0.9361	0.00210	6.85	0.9325	0.00180	6.65	0.9333	0.00190
7.2	0.9430	0.00240	6.9	0.9311	0.00200	6.7	0.9402	0.00180
7.25	0.9457	0.00210	6.95	0.9401	0.00230	6.75	0.9386	0.00200
7.3	0.9485	0.00190	7	0.9431	0.00220	6.8	0.9483	0.00220
7.35	0.9515	0.00320	7.05	0.9506	0.00200	6.85	0.9532	0.00190
7.4	0.9558	0.00180	7.1	0.9508	0.00220	6.9	0.9568	0.00210
7.45	0.9644	0.00230	7.15	0.9568	0.00200	6.95	0.9587	0.00190
7.5	0.9670	0.00190	7.2	0.9617	0.00220	7	0.9632	0.00220
7.55	0.9727	0.00180	7.25	0.9639	0.00180	7.05	0.9680	0.00210
7.6	0.9735	0.00180	7.3	0.9681	0.00170	7.1	0.9715	0.00220
7.65	0.9762	0.00220	7.35	0.9700	0.00190	7.15	0.9760	0.00190
7.7	0.9831	0.00190	7.4	0.9749	0.00180	7.2	0.9823	0.00270
7.75	0.9849	0.00190	7.45	0.9835	0.00200	7.25	0.9830	0.00230
7.8	0.9891	0.00230	7.5	0.9866	0.00220	7.3	0.9900	0.00180
7.85	0.9904	0.00170	7.55	0.9882	0.00260	7.35	0.9946	0.00300
7.9	0.9944	0.00200	7.6	0.9938	0.00210	7.4	0.9950	0.00180
7.95	0.9974	0.00170	7.65	0.9954	0.00200	7.45	1.0040	0.00200
8	1.0012	0.00190	7.7	1.0047	0.00210	7.5	1.0054	0.00190
8.05	1.0060	0.00200	7.75	1.0069	0.00210	7.55	1.0147	0.00230
8.1	1.0087	0.00180	7.8	1.0045	0.00200	7.6	1.0153	0.00210
8.15	1.0127	0.00240	7.85	1.0092	0.00190	7.65	1.0178	0.00200
8.2	1.0198	0.00200	7.9	1.0170	0.00190	7.7	1.0252	0.00190
			7.95	1.0174	0.00180			
			8	1.0271	0.00220			

0.05			0.075			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.30	0.9206	0.00200	5.80	0.9196	0.00240	5.60	0.9224	0.00220
6.35	0.9208	0.00240	5.85	0.9248	0.00200	5.65	0.9262	0.00230
6.4	0.9233	0.00210	5.9	0.9301	0.00220	5.7	0.9372	0.00220
6.45	0.9306	0.00180	5.95	0.9292	0.00230	5.75	0.9387	0.00330
6.5	0.9359	0.00240	6	0.9408	0.00230	5.8	0.9452	0.00200
6.55	0.9377	0.00190	6.05	0.9428	0.00210	5.85	0.9520	0.00230
6.6	0.9443	0.00180	6.1	0.9482	0.00250	5.9	0.9548	0.00190
6.65	0.9483	0.00190	6.15	0.9535	0.00220	5.95	0.9625	0.00260
6.7	0.9565	0.00210	6.2	0.9610	0.00200	6	0.9659	0.00220
6.75	0.9578	0.00180	6.25	0.9611	0.00250	6.05	0.9695	0.00210
6.8	0.9621	0.00240	6.3	0.9663	0.00240	6.1	0.9768	0.00230
6.85	0.9667	0.00230	6.35	0.9721	0.00210	6.15	0.9791	0.00270
6.9	0.9739	0.00190	6.4	0.9761	0.00200	6.2	0.9859	0.00260
6.95	0.9794	0.00180	6.45	0.9830	0.00220	6.25	0.9887	0.00230
7	0.9796	0.00190	6.5	0.9874	0.00240	6.3	0.9982	0.00200
7.05	0.9842	0.00270	6.55	0.9925	0.00180	6.35	1.0009	0.00240
7.1	0.9877	0.00230	6.6	1.0047	0.00190	6.4	1.0039	0.00200
7.15	0.9932	0.00200	6.65	1.0055	0.00240	6.45	1.0170	0.00230
7.2	0.9981	0.00200	6.7	1.0069	0.00240	6.5	1.0177	0.00200
7.25	0.9959	0.00200	6.75	1.0127	0.00200	6.55	1.0230	0.00200
7.3	1.0055	0.00180	6.8	1.0138	0.00190	6.6	1.0204	0.00200
7.35	1.0117	0.00240	6.85	1.0206	0.00210			
7.4	1.0139	0.00260	6.9	1.0286	0.00220			
7.45	1.0163	0.00250						
7.5	1.0272	0.00180						

0.15			0.2			0.35		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.30	0.9171	0.00280	5.20	0.9257	0.00210	5.00	0.9265	0.00210
5.35	0.9245	0.00290	5.25	0.9304	0.00260	5.05	0.9252	0.00210
5.4	0.9287	0.00220	5.3	0.9354	0.00270	5.1	0.9359	0.00210
5.45	0.9383	0.00250	5.35	0.9396	0.00220	5.15	0.9400	0.00220
5.5	0.9419	0.00250	5.4	0.9463	0.00230	5.2	0.9497	0.00190
5.55	0.9463	0.00230	5.45	0.9490	0.00240	5.25	0.9529	0.00220
5.6	0.9534	0.00250	5.5	0.9544	0.00220	5.3	0.9549	0.00200
5.65	0.9582	0.00190	5.55	0.9615	0.00210	5.35	0.9628	0.00230
5.7	0.9623	0.00210	5.6	0.9695	0.00220	5.4	0.9724	0.00250
5.75	0.9656	0.00210	5.65	0.9690	0.00210	5.45	0.9769	0.00270
5.8	0.9731	0.00180	5.7	0.9780	0.00230	5.5	0.9802	0.00200
5.85	0.9743	0.00230	5.75	0.9881	0.00310	5.55	0.9842	0.00190
5.9	0.9786	0.00210	5.8	0.9873	0.00220	5.6	0.9924	0.00240
5.95	0.9884	0.00220	5.85	0.9926	0.00220	5.65	0.9934	0.00200
6	0.9942	0.00310	5.9	0.9995	0.00220	5.7	1.0003	0.00210
6.05	1.0015	0.00220	5.95	1.0033	0.00260	5.75	1.0091	0.00210
6.1	1.0005	0.00240	6	1.0064	0.00290	5.8	1.0124	0.00240
6.15	1.0067	0.00220	6.05	1.0115	0.00220	5.85	1.0138	0.00250
6.2	1.0144	0.00200	6.1	1.0184	0.00210	5.9	1.0222	0.00240
6.25	1.0189	0.00220	6.15	1.0238	0.00210	5.95	1.0266	0.00220
6.3	1.0205	0.00200	6.2	1.0316	0.00230	6	1.0287	0.00220

0.5			0.75			1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.90	0.9261	0.00210	4.70	0.9207	0.00230	4.50	0.9173	0.00240
4.95	0.9369	0.00200	4.75	0.9315	0.00180	4.55	0.9250	0.00210
5	0.9397	0.00210	4.8	0.9372	0.00250	4.6	0.9320	0.00180
5.05	0.9449	0.00210	4.85	0.9423	0.00230	4.65	0.9360	0.00190
5.1	0.9502	0.00180	4.9	0.9469	0.00200	4.7	0.9413	0.00210
5.15	0.9580	0.00210	4.95	0.9496	0.00190	4.75	0.9522	0.00210
5.2	0.9655	0.00240	5	0.9584	0.00220	4.8	0.9513	0.00200
5.25	0.9668	0.00300	5.05	0.9665	0.00240	4.85	0.9632	0.00230
5.3	0.9737	0.00190	5.1	0.9729	0.00200	4.9	0.9697	0.00230
5.35	0.9762	0.00220	5.15	0.9726	0.00230	4.95	0.9687	0.00200
5.4	0.9848	0.00190	5.2	0.9848	0.00220	5	0.9726	0.00240
5.45	0.9901	0.00200	5.25	0.9918	0.00230	5.05	0.9831	0.00270
5.5	0.9943	0.00250	5.3	0.9909	0.00200	5.1	0.9888	0.00220
5.55	1.0007	0.00260	5.35	0.9995	0.00200	5.15	0.9972	0.00210
5.6	1.0063	0.00250	5.4	1.0040	0.00210	5.2	0.9986	0.00220
5.65	1.0081	0.00190	5.45	1.0063	0.00250	5.25	1.0067	0.00270
5.7	1.0125	0.00240	5.5	1.0145	0.00210	5.3	1.0114	0.00180
5.75	1.0216	0.00210	5.55	1.0168	0.00210	5.35	1.0212	0.00190
5.8	1.0266	0.00200	5.6	1.0298	0.00210	5.4	1.0273	0.00250

1.5			2			2.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.30	0.9257	0.00220	4.10	0.9267	0.00220	3.90	0.9231	0.00220
4.35	0.9310	0.00220	4.15	0.9349	0.00200	3.95	0.9293	0.00200
4.4	0.9380	0.00210	4.2	0.9412	0.00200	4	0.9391	0.00220
4.45	0.9424	0.00190	4.25	0.9442	0.00230	4.05	0.9447	0.00170
4.5	0.9523	0.00200	4.3	0.9530	0.00220	4.1	0.9524	0.00230
4.55	0.9570	0.00220	4.35	0.9597	0.00260	4.15	0.9570	0.00190
4.6	0.9600	0.00240	4.4	0.9650	0.00210	4.2	0.9673	0.00230
4.65	0.9665	0.00230	4.45	0.9737	0.00190	4.25	0.9723	0.00190
4.7	0.9759	0.00180	4.5	0.9810	0.00220	4.3	0.9797	0.00220
4.75	0.9828	0.00200	4.55	0.9848	0.00260	4.35	0.9871	0.00210
4.8	0.9880	0.00220	4.6	0.9921	0.00190	4.4	0.9933	0.00190
4.85	0.9948	0.00200	4.65	0.9981	0.00240	4.45	0.9995	0.00230
4.9	1.0061	0.00240	4.7	1.0071	0.00270	4.5	1.0113	0.00190
4.95	1.0085	0.00200	4.75	1.0082	0.00210	4.55	1.0140	0.00210
5	1.0119	0.00230	4.8	1.0168	0.00190	4.6	1.0240	0.00210
5.05	1.0181	0.00220	4.85	1.0239	0.00200	4.65	1.0291	0.00220
5.1	1.0250	0.00210	4.9	1.0315	0.00210	4.7	1.0341	0.00280

3			4			5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.70	0.9156	0.00210	3.50	0.9255	0.00200	3.20	0.9145	0.00210
3.75	0.9262	0.00200	3.55	0.9370	0.00200	3.25	0.9254	0.00200
3.8	0.9286	0.00200	3.6	0.9438	0.00180	3.3	0.9366	0.00190
3.85	0.9412	0.00190	3.65	0.9547	0.00200	3.35	0.9457	0.00190
3.9	0.9494	0.00210	3.7	0.9644	0.00220	3.4	0.9534	0.00190
3.95	0.9508	0.00230	3.75	0.9675	0.00190	3.45	0.9627	0.00210
4	0.9591	0.00200	3.8	0.9780	0.00280	3.5	0.9702	0.00220
4.05	0.9703	0.00200	3.85	0.9856	0.00190	3.55	0.9819	0.00180
4.1	0.9783	0.00190	3.9	0.9944	0.00240	3.6	0.9854	0.00210
4.15	0.9835	0.00260	3.95	0.9994	0.00190	3.65	0.9978	0.00240
4.2	0.9930	0.00230	4	1.0070	0.00260	3.7	1.0072	0.00210
4.25	1.0014	0.00220	4.05	1.0212	0.00220	3.75	1.0153	0.00190
4.3	1.0107	0.00240	4.1	1.0248	0.00190	3.8	1.0208	0.00200
4.35	1.0131	0.00270				3.85	1.0298	0.00190
4.4	1.0201	0.00190				3.9	1.0378	0.00270
4.45	1.0250	0.00220						
4.5	1.0338	0.00210						

6			7			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.00	0.9133	0.00260	2.80	0.9094	0.00190	2.80	0.9268	0.00170
3.05	0.9233	0.00190	2.85	0.9171	0.00200	2.82	0.9332	0.00190
3.1	0.9339	0.00230	2.9	0.9289	0.00230	2.84	0.9331	0.00210
3.15	0.9445	0.00200	2.95	0.9407	0.00180	2.86	0.9393	0.00210
3.2	0.9566	0.00200	3	0.9518	0.00200	2.88	0.9408	0.00220
3.25	0.9634	0.00200	3.05	0.9607	0.00180	2.9	0.9503	0.00180
3.3	0.9724	0.00190	3.1	0.9682	0.00230	2.92	0.9513	0.00200
3.35	0.9829	0.00250	3.15	0.9806	0.00210	2.94	0.9555	0.00240
3.4	0.9884	0.00240	3.2	0.9887	0.00210	2.96	0.9590	0.00170
3.45	0.9981	0.00190	3.25	0.9984	0.00240	2.98	0.9664	0.00180
3.5	1.0080	0.00190	3.3	1.0109	0.00180	3	0.9692	0.00200
3.55	1.0132	0.00230	3.35	1.0168	0.00230	3.02	0.9706	0.00190
3.6	1.0284	0.00250	3.4	1.0299	0.00200	3.04	0.9750	0.00240
						3.06	0.9794	0.00220
						3.08	0.9834	0.00210
						3.1	0.9865	0.00190
						3.12	0.9912	0.00280
						3.14	0.9963	0.00220
						3.16	1.0006	0.00210
						3.18	1.0031	0.00270
						3.2	1.0058	0.00240
						3.22	1.0144	0.00240
						3.24	1.0161	0.00180
						3.26	1.0240	0.00200
						3.28	1.0259	0.00230
						3.3	1.0276	0.00240

8			9			10		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.70	0.9237	0.00190	2.50	0.9058	0.00180	2.40	0.9165	0.00190
2.72	0.9256	0.00180	2.55	0.9221	0.00210	2.42	0.9182	0.00200
2.74	0.9277	0.00240	2.6	0.9297	0.00200	2.44	0.9226	0.00190
2.76	0.9335	0.00200	2.65	0.9413	0.00180	2.46	0.9343	0.00160
2.78	0.9342	0.00190	2.7	0.9543	0.00190	2.48	0.9334	0.00190
2.8	0.9429	0.00210	2.75	0.9668	0.00190	2.5	0.9390	0.00210
2.82	0.9480	0.00210	2.8	0.9737	0.00220	2.52	0.9422	0.00190
2.84	0.9506	0.00230	2.85	0.9852	0.00190	2.54	0.9488	0.00220
2.86	0.9538	0.00200	2.9	0.9972	0.00210	2.56	0.9541	0.00220
2.88	0.9606	0.00200	2.95	1.0062	0.00190	2.58	0.9579	0.00180
2.9	0.9662	0.00200	3	1.0188	0.00200	2.6	0.9592	0.00190
2.92	0.9714	0.00220	3.05	1.0294	0.00210	2.62	0.9642	0.00180
2.94	0.9712	0.00190	3.1	1.0391	0.00220	2.64	0.9703	0.00190
2.96	0.9775	0.00220				2.66	0.9744	0.00200
2.98	0.9810	0.00230				2.68	0.9813	0.00190
3	0.9848	0.00200				2.7	0.9826	0.00190
3.02	0.9889	0.00190				2.72	0.9893	0.00210
3.04	0.9953	0.00190				2.74	0.9983	0.00170
3.06	0.9971	0.00210				2.76	0.9998	0.00190
3.08	1.0063	0.00200				2.78	1.0031	0.00220
3.1	1.0079	0.00200				2.8	1.0110	0.00220
3.12	1.0104	0.00200				2.82	1.0123	0.00170
3.14	1.0170	0.00230				2.84	1.0194	0.00220
3.16	1.0203	0.00180				2.86	1.0252	0.00190
3.18	1.0206	0.00200				2.88	1.0278	0.00190
3.2	1.0240	0.00200				2.9	1.0374	0.00230

15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
1.90	0.9087	0.00260	1.60	0.9143	0.00230
1.92	0.9144	0.00190	1.62	0.9251	0.00200
1.94	0.9261	0.00200	1.64	0.9321	0.00210
1.96	0.9293	0.00180	1.66	0.9383	0.00200
1.98	0.9378	0.00210	1.68	0.9419	0.00230
2	0.9379	0.00230	1.7	0.9533	0.00210
2.02	0.9489	0.00180	1.72	0.9593	0.00190
2.04	0.9539	0.00170	1.74	0.9731	0.00200
2.06	0.9616	0.00220	1.76	0.9759	0.00260
2.08	0.9666	0.00200	1.78	0.9897	0.00230
2.1	0.9751	0.00210	1.8	0.9928	0.00250
2.12	0.9748	0.00190	1.82	0.9979	0.00210
2.14	0.9850	0.00220	1.84	1.0033	0.00190
2.16	0.9927	0.00220	1.86	1.0132	0.00190
2.18	0.9947	0.00190	1.88	1.0193	0.00200
2.2	1.0010	0.00240	1.9	1.0296	0.00200
2.22	1.0109	0.00190			
2.24	1.0153	0.00190			
2.26	1.0258	0.00170			
2.28	1.0295	0.00230			
2.3	1.0348	0.00200			

Pu-cyl-97 (Cases with 0", 1", 10" Reflector)

Case ID: pu_cyl_097_00ref

Material: Plutonium

Geometry: Infinite Cylinder

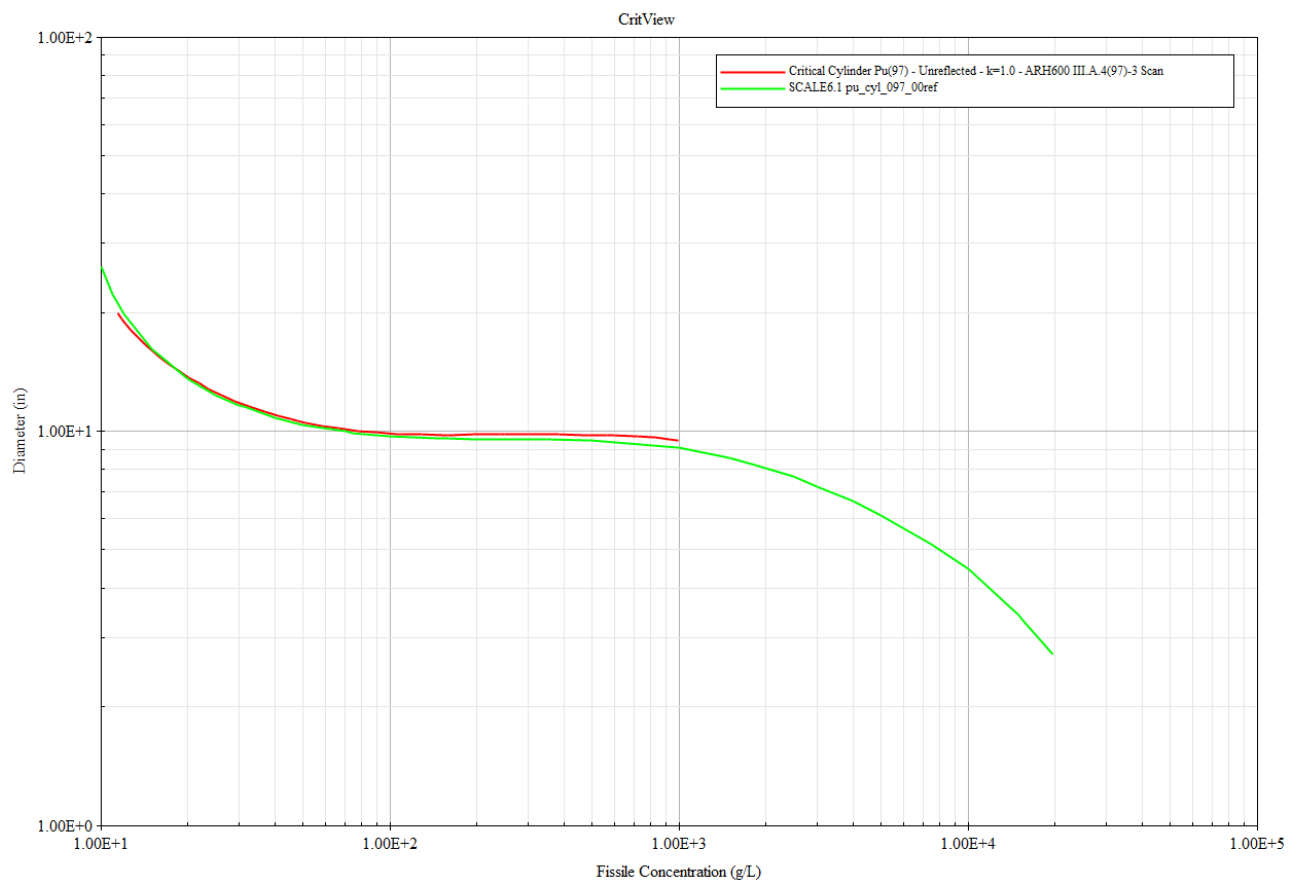
Isotopics: 97% ^{239}Pu 3% ^{240}Pu

Reflector: Unreflected

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	20.000	27.500	0.300	26.0600
0.011	17.900	23.300	0.200	22.2567
0.012	16.400	20.700	0.200	19.8486
0.015	13.800	16.700	0.100	16.1867
0.020	11.900	14.000	0.100	13.5976
0.025	11.000	12.700	0.050	12.3318
0.030	10.400	11.900	0.050	11.6245
0.040	9.700	11.100	0.050	10.8065
0.050	9.300	10.700	0.050	10.3435
0.075	8.900	10.200	0.050	9.8882
0.100	8.700	10.000	0.050	9.7158
0.150	8.700	9.900	0.050	9.5720
0.200	8.600	9.900	0.050	9.5381
0.350	8.600	9.800	0.050	9.5233
0.500	8.500	9.800	0.050	9.4856
0.750	8.400	9.600	0.050	9.2725
1.000	8.100	9.400	0.050	9.0601
1.500	7.700	8.800	0.050	8.5486
2.000	7.300	8.400	0.050	8.0591
2.500	6.900	7.900	0.050	7.6636
3.000	6.600	7.500	0.050	7.2462
4.000	6.000	6.900	0.050	6.6324
5.000	5.600	6.300	0.050	6.1247
7.500	4.700	5.400	0.050	5.1690
10.000	4.000	4.600	0.050	4.4612
15.000	3.100	3.500	0.020	3.4117
19.600	2.400	2.800	0.020	2.7161

WORM and SCALE Input File

```

'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.1.2.2.1-1. Critical Dimensions for Plutonium Cylinder (97% 239Pu) - 0 Inches of Water
Reflection
'
#index number = <index = 1:27:1>
'
#Concentration = <@conc =
0.01,0.011,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
'Table B.1.2.2.1-1. Critical Dimensions for Plutonium Cylinder (97% 239Pu) - 0 Inches of Water
Reflection
'
#Starting Diameter = <@startdia =
20,17.9,16.4,13.8,11.9,11,10.4,9.7,9.3,8.9,8.7,8.7,8.6,8.6,8.5,8.4,8.1,7.7,7.3,6.9,6.6,6,5.6,4.7,
4,3.1,2.4> in
#Ending Diameter = <@enddia =
27.5,23.3,20.7,16.7,14,12.7,11.9,11.1,10.7,10.2,10,9.9,9.9,9.8,9.8,9.6,9.4,8.8,8.4,7.9,7.5,6.9,6.
3,5.4,4.6,3.5,2.8> in
#Delta = <@delta =
0.3,0.2,0.2,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.
05,0.05,0.05,0.05,0.05,0.02,0.02> in
'
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'
'
=csas6
template
v7-238
read composition
  pu          1 den=<critconc> 1 300
                94239 97
                94240 3   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Cylinder"
  cylinder 1      {{(diameter*in)/2}}      10      -10
  media 1 1 1
  boundary 1
end geometry
read bnds
  body=1
    surface(1)=vacuum
    surface(2)=mirror
    surface(3)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```


CritView compatible data file

```
reset:
title: SCALE6.1 pu_cyl_097_00ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infcyl
modmat: H2O
critmat: plutonium
isomat: Pu239 0.97 Pu240 0.03
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 26.0600
0.011 22.2567
0.012 19.8486
0.015 16.1867
0.020 13.5976
0.025 12.3318
0.030 11.6245
0.040 10.8065
0.050 10.3435
0.075 9.8882
0.100 9.7158
0.150 9.5720
0.200 9.5381
0.350 9.5233
0.500 9.4856
0.750 9.2725
1.000 9.0601
1.500 8.5486
2.000 8.0591
2.500 7.6636
3.000 7.2462
4.000 6.6324
5.000 6.1247
7.500 5.1690
10.000 4.4612
15.000 3.4117
19.600 2.7161
```

0.01			0.011			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
20.00	0.9272	0.00160	17.90	0.9257	0.00150	16.40	0.9234	0.00170
20.3	0.9328	0.00140	18.1	0.9315	0.00150	16.6	0.9290	0.00130
20.6	0.9372	0.00160	18.3	0.9326	0.00130	16.8	0.9318	0.00150
20.9	0.9424	0.00140	18.5	0.9402	0.00150	17	0.9429	0.00160
21.2	0.9493	0.00160	18.7	0.9405	0.00130	17.2	0.9455	0.00140
21.5	0.9487	0.00120	18.9	0.9493	0.00140	17.4	0.9501	0.00130
21.8	0.9540	0.00170	19.1	0.9519	0.00150	17.6	0.9508	0.00150
22.1	0.9573	0.00130	19.3	0.9528	0.00140	17.8	0.9579	0.00200
22.4	0.9617	0.00110	19.5	0.9560	0.00150	18	0.9646	0.00160
22.7	0.9682	0.00150	19.7	0.9611	0.00140	18.2	0.9662	0.00170
23	0.9677	0.00140	19.9	0.9647	0.00120	18.4	0.9684	0.00140
23.3	0.9737	0.00130	20.1	0.9665	0.00160	18.6	0.9754	0.00150
23.6	0.9753	0.00150	20.3	0.9712	0.00130	18.8	0.9812	0.00150
23.9	0.9805	0.00140	20.5	0.9753	0.00140	19	0.9828	0.00180
24.2	0.9831	0.00150	20.7	0.9777	0.00140	19.2	0.9868	0.00170
24.5	0.9858	0.00130	20.9	0.9805	0.00160	19.4	0.9903	0.00170
24.8	0.9870	0.00120	21.1	0.9859	0.00170	19.6	0.9924	0.00190
25.1	0.9912	0.00130	21.3	0.9855	0.00180	19.8	0.9991	0.00150
25.4	0.9929	0.00130	21.5	0.9912	0.00180	20	1.0028	0.00160
25.7	0.9986	0.00130	21.7	0.9911	0.00140	20.2	1.0061	0.00140
26	0.9993	0.00190	21.9	0.9962	0.00160	20.4	1.0118	0.00150
26.3	1.0028	0.00140	22.1	0.9953	0.00120	20.6	1.0094	0.00160
26.6	1.0102	0.00140	22.3	1.0013	0.00120	20.7	1.0145	0.00190
26.9	1.0099	0.00120	22.5	1.0039	0.00160			
27.2	1.0081	0.00120	22.7	1.0067	0.00150			
27.5	1.0124	0.00120	22.9	1.0086	0.00180			
			23.1	1.0094	0.00130			
			23.3	1.0130	0.00130			

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.80	0.9169	0.00170	11.90	0.9222	0.00170	11.00	0.9205	0.00170
13.9	0.9216	0.00160	12	0.9219	0.00190	11.05	0.9247	0.00190
14	0.9246	0.00170	12.1	0.9269	0.00170	11.1	0.9270	0.00240
14.1	0.9280	0.00180	12.2	0.9320	0.00180	11.15	0.9310	0.00200
14.2	0.9339	0.00150	12.3	0.9383	0.00190	11.2	0.9314	0.00250
14.3	0.9395	0.00160	12.4	0.9440	0.00210	11.25	0.9315	0.00270
14.4	0.9410	0.00200	12.5	0.9483	0.00250	11.3	0.9408	0.00200
14.5	0.9456	0.00190	12.6	0.9545	0.00180	11.35	0.9424	0.00240
14.6	0.9512	0.00170	12.7	0.9603	0.00190	11.4	0.9473	0.00180
14.7	0.9500	0.00160	12.8	0.9622	0.00190	11.45	0.9472	0.00170
14.8	0.9568	0.00170	12.9	0.9694	0.00170	11.5	0.9530	0.00250
14.9	0.9556	0.00220	13	0.9714	0.00200	11.55	0.9569	0.00190
15	0.9625	0.00150	13.1	0.9774	0.00180	11.6	0.9597	0.00210
15.1	0.9667	0.00170	13.2	0.9851	0.00220	11.65	0.9632	0.00190
15.2	0.9715	0.00180	13.3	0.9835	0.00170	11.7	0.9596	0.00210
15.3	0.9727	0.00150	13.4	0.9923	0.00230	11.75	0.9673	0.00200
15.4	0.9762	0.00170	13.5	0.9960	0.00200	11.8	0.9678	0.00230
15.5	0.9800	0.00160	13.6	1.0001	0.00170	11.85	0.9730	0.00200
15.6	0.9826	0.00200	13.7	1.0064	0.00200	11.9	0.9731	0.00210
15.7	0.9861	0.00180	13.8	1.0109	0.00180	11.95	0.9777	0.00190
15.8	0.9887	0.00170	13.9	1.0107	0.00200	12	0.9818	0.00250
15.9	0.9940	0.00160	14	1.0133	0.00190	12.05	0.9809	0.00210
16	0.9944	0.00160				12.1	0.9842	0.00170
16.1	0.9974	0.00180				12.15	0.9872	0.00220
16.2	1.0004	0.00160				12.2	0.9929	0.00210
16.3	1.0014	0.00170				12.25	0.9928	0.00210
16.4	1.0021	0.00200				12.3	0.9965	0.00170
16.5	1.0083	0.00150				12.35	1.0020	0.00210
16.6	1.0110	0.00150				12.4	1.0011	0.00270
16.7	1.0149	0.00190				12.45	1.0050	0.00220
						12.5	1.0086	0.00180
						12.55	1.0105	0.00220
						12.6	1.0170	0.00230
						12.65	1.0146	0.00180
						12.7	1.0186	0.00260

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.40	0.9196	0.00200	9.70	0.9157	0.00190	9.30	0.9100	0.00210
10.45	0.9245	0.00180	9.75	0.9194	0.00200	9.35	0.9181	0.00260
10.5	0.9265	0.00210	9.8	0.9263	0.00200	9.4	0.9225	0.00190
10.55	0.9269	0.00190	9.85	0.9246	0.00250	9.45	0.9266	0.00260
10.6	0.9301	0.00210	9.9	0.9341	0.00220	9.5	0.9286	0.00220
10.65	0.9353	0.00200	9.95	0.9389	0.00210	9.55	0.9377	0.00220
10.7	0.9396	0.00230	10	0.9422	0.00240	9.6	0.9398	0.00270
10.75	0.9452	0.00180	10.05	0.9413	0.00240	9.65	0.9404	0.00260
10.8	0.9514	0.00200	10.1	0.9505	0.00210	9.7	0.9472	0.00210
10.85	0.9517	0.00200	10.15	0.9529	0.00210	9.75	0.9515	0.00210
10.9	0.9503	0.00260	10.2	0.9588	0.00250	9.8	0.9544	0.00210
10.95	0.9609	0.00170	10.25	0.9588	0.00270	9.85	0.9613	0.00220
11	0.9596	0.00220	10.3	0.9651	0.00200	9.9	0.9670	0.00250
11.05	0.9598	0.00190	10.35	0.9666	0.00200	9.95	0.9650	0.00210
11.1	0.9675	0.00210	10.4	0.9705	0.00250	10	0.9713	0.00270
11.15	0.9748	0.00210	10.45	0.9753	0.00190	10.05	0.9760	0.00210
11.2	0.9775	0.00260	10.5	0.9768	0.00190	10.1	0.9804	0.00200
11.25	0.9805	0.00230	10.55	0.9840	0.00210	10.15	0.9852	0.00270
11.3	0.9797	0.00220	10.6	0.9861	0.00230	10.2	0.9841	0.00270
11.35	0.9861	0.00180	10.65	0.9891	0.00200	10.25	0.9907	0.00230
11.4	0.9887	0.00240	10.7	0.9937	0.00240	10.3	0.9973	0.00210
11.45	0.9906	0.00190	10.75	0.9972	0.00230	10.35	1.0004	0.00220
11.5	0.9939	0.00200	10.8	0.9993	0.00210	10.4	1.0032	0.00210
11.55	0.9956	0.00200	10.85	1.0047	0.00200	10.45	1.0089	0.00230
11.6	0.9976	0.00200	10.9	1.0081	0.00260	10.5	1.0071	0.00220
11.65	1.0025	0.00210	10.95	1.0116	0.00200	10.55	1.0187	0.00250
11.7	1.0042	0.00190	11	1.0179	0.00210	10.6	1.0193	0.00250
11.75	1.0062	0.00200	11.05	1.0158	0.00210	10.65	1.0236	0.00220
11.8	1.0121	0.00190	11.1	1.0184	0.00260	10.7	1.0237	0.00210
11.85	1.0140	0.00190						
11.9	1.0179	0.00200						

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.90	0.9166	0.00210	8.70	0.9109	0.00290	8.70	0.9243	0.00210
8.95	0.9204	0.00210	8.75	0.9165	0.00260	8.75	0.9280	0.00210
9	0.9252	0.00210	8.8	0.9189	0.00210	8.8	0.9302	0.00250
9.05	0.9305	0.00210	8.85	0.9281	0.00200	8.85	0.9377	0.00270
9.1	0.9365	0.00230	8.9	0.9289	0.00250	8.9	0.9454	0.00210
9.15	0.9344	0.00220	8.95	0.9362	0.00200	8.95	0.9449	0.00270
9.2	0.9440	0.00250	9	0.9412	0.00210	9	0.9478	0.00240
9.25	0.9457	0.00260	9.05	0.9482	0.00240	9.05	0.9547	0.00240
9.3	0.9499	0.00210	9.1	0.9496	0.00210	9.1	0.9629	0.00210
9.35	0.9548	0.00230	9.15	0.9504	0.00210	9.15	0.9682	0.00230
9.4	0.9586	0.00240	9.2	0.9521	0.00280	9.2	0.9668	0.00250
9.45	0.9623	0.00200	9.25	0.9638	0.00220	9.25	0.9681	0.00210
9.5	0.9702	0.00260	9.3	0.9685	0.00220	9.3	0.9769	0.00220
9.55	0.9740	0.00240	9.35	0.9726	0.00230	9.35	0.9799	0.00230
9.6	0.9752	0.00230	9.4	0.9798	0.00220	9.4	0.9894	0.00230
9.65	0.9836	0.00210	9.45	0.9831	0.00250	9.45	0.9888	0.00240
9.7	0.9869	0.00200	9.5	0.9860	0.00240	9.5	0.9984	0.00260
9.75	0.9889	0.00240	9.55	0.9883	0.00230	9.55	0.9971	0.00230
9.8	0.9943	0.00250	9.6	0.9888	0.00260	9.6	1.0037	0.00240
9.85	0.9974	0.00220	9.65	0.9964	0.00230	9.65	1.0103	0.00290
9.9	1.0008	0.00230	9.7	0.9976	0.00250	9.7	1.0072	0.00270
9.95	1.0078	0.00270	9.75	1.0052	0.00210	9.75	1.0166	0.00260
10	1.0123	0.00240	9.8	1.0113	0.00260	9.8	1.0218	0.00280
10.05	1.0088	0.00240	9.85	1.0158	0.00210	9.85	1.0237	0.00260
10.1	1.0175	0.00280	9.9	1.0194	0.00190	9.9	1.0266	0.00230
10.15	1.0208	0.00230	9.95	1.0233	0.00260			
10.2	1.0241	0.00280	10	1.0262	0.00240			

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.60	0.9180	0.00230	8.60	0.9198	0.00250	8.50	0.9165	0.00220
8.65	0.9261	0.00250	8.65	0.9238	0.00240	8.55	0.9233	0.00230
8.7	0.9292	0.00270	8.7	0.9295	0.00220	8.6	0.9293	0.00240
8.75	0.9334	0.00230	8.75	0.9346	0.00230	8.65	0.9369	0.00190
8.8	0.9353	0.00220	8.8	0.9375	0.00270	8.7	0.9379	0.00240
8.85	0.9442	0.00230	8.85	0.9461	0.00200	8.75	0.9391	0.00190
8.9	0.9453	0.00200	8.9	0.9508	0.00280	8.8	0.9470	0.00200
8.95	0.9508	0.00220	8.95	0.9527	0.00270	8.85	0.9509	0.00200
9	0.9518	0.00230	9	0.9560	0.00230	8.9	0.9539	0.00200
9.05	0.9614	0.00260	9.05	0.9622	0.00210	8.95	0.9573	0.00200
9.1	0.9630	0.00240	9.1	0.9672	0.00290	9	0.9609	0.00190
9.15	0.9685	0.00230	9.15	0.9727	0.00240	9.05	0.9661	0.00190
9.2	0.9742	0.00300	9.2	0.9735	0.00250	9.1	0.9702	0.00210
9.25	0.9769	0.00260	9.25	0.9799	0.00240	9.15	0.9739	0.00240
9.3	0.9766	0.00220	9.3	0.9816	0.00240	9.2	0.9808	0.00190
9.35	0.9836	0.00220	9.35	0.9866	0.00250	9.25	0.9841	0.00240
9.4	0.9860	0.00220	9.4	0.9920	0.00190	9.3	0.9867	0.00260
9.45	0.9904	0.00220	9.45	0.9943	0.00220	9.35	0.9886	0.00200
9.5	0.9933	0.00260	9.5	0.9972	0.00210	9.4	0.9968	0.00210
9.55	1.0021	0.00230	9.55	1.0032	0.00250	9.45	0.9953	0.00260
9.6	1.0019	0.00310	9.6	1.0037	0.00230	9.5	1.0019	0.00210
9.65	1.0089	0.00250	9.65	1.0122	0.00190	9.55	1.0085	0.00270
9.7	1.0169	0.00200	9.7	1.0137	0.00210	9.6	1.0084	0.00210
9.75	1.0141	0.00230	9.75	1.0193	0.00260	9.65	1.0156	0.00210
9.8	1.0186	0.00220	9.8	1.0234	0.00210	9.7	1.0159	0.00190
9.85	1.0266	0.00220				9.75	1.0246	0.00220
9.9	1.0284	0.00320				9.8	1.0258	0.00210

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.40	0.9208	0.00190	8.10	0.9145	0.00240	7.70	0.9201	0.00220
8.45	0.9263	0.00200	8.15	0.9201	0.00190	7.75	0.9235	0.00220
8.5	0.9358	0.00220	8.2	0.9250	0.00200	7.8	0.9295	0.00220
8.55	0.9359	0.00210	8.25	0.9343	0.00210	7.85	0.9342	0.00190
8.6	0.9447	0.00310	8.3	0.9364	0.00220	7.9	0.9401	0.00190
8.65	0.9484	0.00280	8.35	0.9392	0.00220	7.95	0.9465	0.00190
8.7	0.9523	0.00210	8.4	0.9442	0.00200	8	0.9499	0.00190
8.75	0.9530	0.00220	8.45	0.9496	0.00200	8.05	0.9568	0.00270
8.8	0.9592	0.00220	8.5	0.9518	0.00220	8.1	0.9608	0.00210
8.85	0.9629	0.00190	8.55	0.9554	0.00200	8.15	0.9661	0.00240
8.9	0.9706	0.00270	8.6	0.9647	0.00200	8.2	0.9718	0.00200
8.95	0.9761	0.00210	8.65	0.9628	0.00220	8.25	0.9736	0.00210
9	0.9778	0.00200	8.7	0.9683	0.00200	8.3	0.9796	0.00170
9.05	0.9824	0.00230	8.75	0.9793	0.00230	8.35	0.9836	0.00250
9.1	0.9876	0.00270	8.8	0.9825	0.00220	8.4	0.9910	0.00250
9.15	0.9886	0.00260	8.85	0.9836	0.00230	8.45	0.9925	0.00250
9.2	0.9948	0.00240	8.9	0.9891	0.00260	8.5	0.9933	0.00240
9.25	0.9991	0.00210	8.95	0.9961	0.00200	8.55	1.0002	0.00220
9.3	1.0011	0.00210	9	0.9943	0.00270	8.6	1.0055	0.00310
9.35	1.0073	0.00250	9.05	0.9980	0.00240	8.65	1.0112	0.00210
9.4	1.0104	0.00220	9.1	1.0079	0.00280	8.7	1.0143	0.00210
9.45	1.0156	0.00180	9.15	1.0080	0.00250	8.75	1.0229	0.00200
9.5	1.0208	0.00230	9.2	1.0154	0.00210	8.8	1.0230	0.00220
9.55	1.0218	0.00190	9.25	1.0148	0.00220			
9.6	1.0239	0.00250	9.3	1.0248	0.00250			
			9.35	1.0241	0.00280			
			9.4	1.0301	0.00200			

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.30	0.9208	0.00210	6.90	0.9190	0.00200	6.60	0.9204	0.00200
7.35	0.9249	0.00210	6.95	0.9191	0.00230	6.65	0.9283	0.00220
7.4	0.9317	0.00200	7	0.9302	0.00210	6.7	0.9344	0.00260
7.45	0.9394	0.00240	7.05	0.9352	0.00210	6.75	0.9402	0.00200
7.5	0.9418	0.00190	7.1	0.9367	0.00220	6.8	0.9433	0.00180
7.55	0.9479	0.00190	7.15	0.9437	0.00210	6.85	0.9502	0.00240
7.6	0.9580	0.00200	7.2	0.9489	0.00190	6.9	0.9580	0.00210
7.65	0.9589	0.00210	7.25	0.9565	0.00180	6.95	0.9593	0.00190
7.7	0.9654	0.00210	7.3	0.9622	0.00310	7	0.9702	0.00220
7.75	0.9660	0.00190	7.35	0.9672	0.00220	7.05	0.9703	0.00240
7.8	0.9731	0.00190	7.4	0.9764	0.00210	7.1	0.9830	0.00190
7.85	0.9737	0.00200	7.45	0.9836	0.00180	7.15	0.9863	0.00190
7.9	0.9835	0.00240	7.5	0.9829	0.00220	7.2	0.9878	0.00220
7.95	0.9862	0.00190	7.55	0.9890	0.00220	7.25	1.0010	0.00230
8	0.9950	0.00190	7.6	0.9926	0.00180	7.3	1.0035	0.00200
8.05	0.9994	0.00190	7.65	0.9985	0.00210	7.35	1.0045	0.00200
8.1	1.0027	0.00240	7.7	1.0040	0.00210	7.4	1.0099	0.00210
8.15	1.0129	0.00270	7.75	1.0105	0.00230	7.45	1.0189	0.00220
8.2	1.0065	0.00210	7.8	1.0113	0.00240	7.5	1.0275	0.00200
8.25	1.0152	0.00210	7.85	1.0206	0.00200			
8.3	1.0235	0.00200	7.9	1.0284	0.00260			
8.35	1.0254	0.00170						
8.4	1.0313	0.00200						

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.00	0.9139	0.00180	5.60	0.9213	0.00170	4.70	0.9190	0.00190
6.05	0.9208	0.00230	5.65	0.9312	0.00230	4.75	0.9325	0.00170
6.1	0.9274	0.00200	5.7	0.9383	0.00220	4.8	0.9358	0.00260
6.15	0.9342	0.00180	5.75	0.9428	0.00180	4.85	0.9453	0.00180
6.2	0.9416	0.00210	5.8	0.9511	0.00190	4.9	0.9508	0.00210
6.25	0.9518	0.00190	5.85	0.9591	0.00260	4.95	0.9614	0.00190
6.3	0.9538	0.00210	5.9	0.9667	0.00180	5	0.9695	0.00200
6.35	0.9596	0.00200	5.95	0.9749	0.00260	5.05	0.9808	0.00220
6.4	0.9667	0.00220	6	0.9811	0.00180	5.1	0.9832	0.00170
6.45	0.9695	0.00180	6.05	0.9904	0.00180	5.15	0.9954	0.00220
6.5	0.9812	0.00240	6.1	0.9961	0.00230	5.2	1.0075	0.00180
6.55	0.9858	0.00230	6.15	1.0040	0.00220	5.25	1.0127	0.00190
6.6	0.9952	0.00210	6.2	1.0073	0.00200	5.3	1.0222	0.00190
6.65	1.0026	0.00210	6.25	1.0167	0.00210	5.35	1.0298	0.00270
6.7	1.0082	0.00230	6.3	1.0204	0.00180	5.4	1.0386	0.00200
6.75	1.0124	0.00190						
6.8	1.0183	0.00250						
6.85	1.0258	0.00210						
6.9	1.0344	0.00200						

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.00	0.9074	0.00170	3.10	0.9252	0.00200	2.40	0.9042	0.00210
4.05	0.9186	0.00170	3.12	0.9279	0.00180	2.42	0.9095	0.00260
4.1	0.9285	0.00220	3.14	0.9334	0.00210	2.44	0.9157	0.00190
4.15	0.9398	0.00160	3.16	0.9396	0.00190	2.46	0.9221	0.00210
4.2	0.9482	0.00210	3.18	0.9463	0.00160	2.48	0.9303	0.00200
4.25	0.9602	0.00200	3.2	0.9496	0.00190	2.5	0.9358	0.00220
4.3	0.9694	0.00220	3.22	0.9540	0.00190	2.52	0.9386	0.00230
4.35	0.9770	0.00250	3.24	0.9591	0.00190	2.54	0.9470	0.00200
4.4	0.9854	0.00200	3.26	0.9637	0.00190	2.56	0.9530	0.00190
4.45	0.9977	0.00180	3.28	0.9690	0.00180	2.58	0.9584	0.00200
4.5	1.0080	0.00180	3.3	0.9736	0.00210	2.6	0.9678	0.00240
4.55	1.0195	0.00200	3.32	0.9808	0.00220	2.62	0.9721	0.00180
4.6	1.0304	0.00220	3.34	0.9835	0.00200	2.64	0.9753	0.00270
			3.36	0.9851	0.00200	2.66	0.9820	0.00190
			3.38	0.9930	0.00180	2.68	0.9876	0.00200
			3.4	0.9956	0.00200	2.7	0.9934	0.00200
			3.42	1.0031	0.00200	2.72	1.0016	0.00250
			3.44	1.0052	0.00230	2.74	1.0077	0.00240
			3.46	1.0104	0.00180	2.76	1.0116	0.00200
			3.48	1.0160	0.00190	2.78	1.0164	0.00250
			3.5	1.0258	0.00190	2.8	1.0257	0.00220

Case ID: pu_cyl_097_01ref

Material: Plutonium

Geometry: Infinite Cylinder

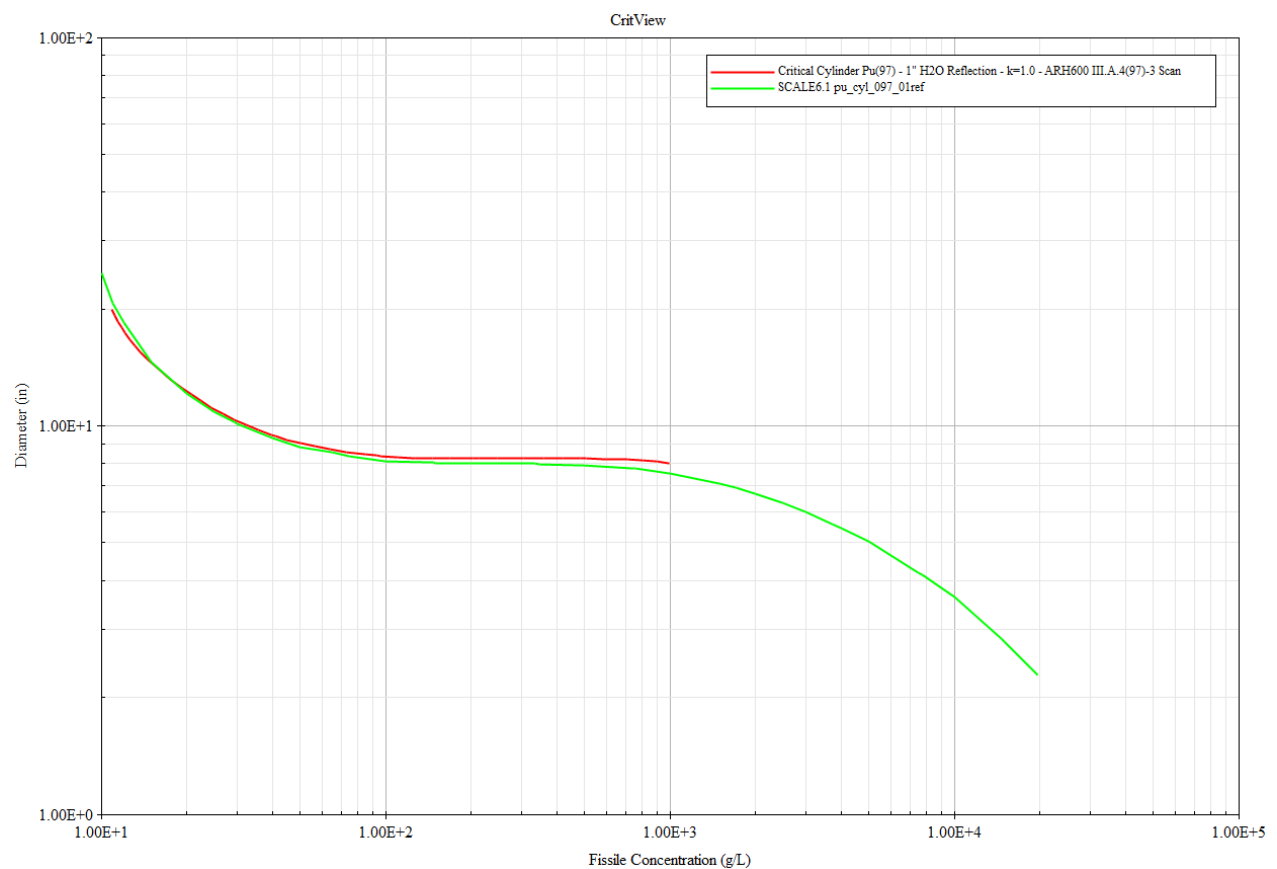
Isotopics: 97% ^{239}Pu 3% ^{240}Pu

Reflector: 1" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	18.700	26.200	0.300	24.7100
0.011	16.700	22.000	0.200	20.6617
0.012	15.000	19.400	0.200	18.4231
0.015	12.400	15.200	0.100	14.6000
0.020	10.400	12.500	0.100	12.1045
0.025	9.500	11.200	0.050	10.8558
0.030	8.900	10.400	0.050	10.1164
0.040	8.200	9.600	0.050	9.2930
0.050	7.800	9.100	0.050	8.7912
0.075	7.400	8.600	0.050	8.3340
0.100	7.200	8.400	0.050	8.1233
0.150	7.100	8.300	0.050	8.0223
0.200	7.100	8.200	0.050	8.0042
0.350	7.000	8.300	0.050	7.9412
0.500	7.000	8.200	0.050	7.9226
0.750	6.900	8.100	0.050	7.7705
1.000	6.700	7.900	0.050	7.5583
1.500	6.300	7.400	0.050	7.0986
2.000	5.900	7.000	0.050	6.6938
2.500	5.600	6.600	0.050	6.3300
3.000	5.300	6.200	0.050	6.0160
4.000	4.900	5.700	0.050	5.4500
5.000	4.500	5.200	0.050	5.0298
7.500	3.700	4.400	0.050	4.1899
10.000	3.200	3.800	0.050	3.6198
15.000	2.500	2.900	0.020	2.7905
19.600	2.000	2.400	0.020	2.2813

WORM and SCALE Input File

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'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.1.2.2.2-1. Critical Dimensions for Plutonium Cylinder (97% 239Pu) - 1 Inch of Water
Reflection
,
#index number = <index = 1:27:1>
,
#Concentration = <@conc =
0.01,0.011,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)> g/cc
,
#Starting Diameter = <@startdia =
18.7,16.7,15,12.4,10.4,9.5,8.9,8.2,7.8,7.4,7.2,7.1,7.1,7,7,6.9,6.7,6.3,5.9,5.6,5.3,4.9,4.5,3.7,3.
2,2.5,2> in
#Ending Diameter = <@enddia =
26.2,22,19.4,15.2,12.5,11.2,10.4,9.6,9.1,8.6,8.4,8.3,8.2,8.3,8.2,8.1,7.9,7.4,7,6.6,6.2,5.7,5.2,4.
4,3.8,2.9,2.4> in
#Delta = <@delta =
0.3,0.2,0.2,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.
05,0.05,0.05,0.05,0.05,0.02,0.02> in
,
'Reflector Thickness {{refthick = 1}}
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
Template
v7-238
read composition
  pu          1 den=<critconc> 1 300
                                94239 97
                                94240 3   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Cylinder"
  cylinder 1      {{(diameter*in)/2}}      10      -10
  cylinder 2      {{(refdia*in)/2}}      10      -10
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
read bnds
  body=2
    surface(1)=vacuum
    surface(2)=mirror
    surface(3)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}

```

</perl>

CritView compatible data file

```
reset:
title: SCALE6.1 pu_cyl_097_01ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infcyl
modmat: H2O
critmat: plutonium
isomat: Pu239 0.97 Pu240 0.03
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 24.7100
0.011 20.6617
0.012 18.4231
0.015 14.6000
0.020 12.1045
0.025 10.8558
0.030 10.1164
0.040 9.2930
0.050 8.7912
0.075 8.3340
0.100 8.1233
0.150 8.0223
0.200 8.0042
0.350 7.9412
0.500 7.9226
0.750 7.7705
1.000 7.5583
1.500 7.0986
2.000 6.6938
2.500 6.3300
3.000 6.0160
4.000 5.4500
5.000 5.0298
7.500 4.1899
10.000 3.6198
15.000 2.7905
19.600 2.2813
```

0.01			0.011			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
18.70	0.9314	0.00120	16.70	0.9311	0.00130	15.00	0.9246	0.00150
19	0.9374	0.00140	16.9	0.9353	0.00160	15.2	0.9306	0.00160
19.3	0.9407	0.00140	17.1	0.9410	0.00110	15.4	0.9354	0.00190
19.6	0.9451	0.00160	17.3	0.9426	0.00130	15.6	0.9407	0.00180
19.9	0.9471	0.00120	17.5	0.9474	0.00160	15.8	0.9484	0.00180
20.2	0.9514	0.00150	17.7	0.9536	0.00140	16	0.9533	0.00150
20.5	0.9563	0.00120	17.9	0.9558	0.00140	16.2	0.9546	0.00140
20.8	0.9621	0.00110	18.1	0.9614	0.00160	16.4	0.9606	0.00190
21.1	0.9652	0.00160	18.3	0.9639	0.00120	16.6	0.9652	0.00160
21.4	0.9695	0.00120	18.5	0.9668	0.00150	16.8	0.9688	0.00170
21.7	0.9728	0.00130	18.7	0.9705	0.00130	17	0.9749	0.00150
22	0.9720	0.00110	18.9	0.9761	0.00140	17.2	0.9775	0.00170
22.3	0.9761	0.00150	19.1	0.9767	0.00140	17.4	0.9807	0.00170
22.6	0.9788	0.00100	19.3	0.9799	0.00130	17.6	0.9858	0.00130
22.9	0.9868	0.00120	19.5	0.9829	0.00180	17.8	0.9901	0.00140
23.2	0.9886	0.00120	19.7	0.9869	0.00140	18	0.9941	0.00150
23.5	0.9938	0.00120	19.9	0.9901	0.00110	18.2	0.9968	0.00140
23.8	0.9960	0.00130	20.1	0.9916	0.00150	18.4	0.9994	0.00120
24.1	0.9949	0.00120	20.3	0.9950	0.00120	18.6	1.0046	0.00160
24.4	0.9985	0.00120	20.5	0.9962	0.00150	18.8	1.0073	0.00150
24.7	0.9999	0.00140	20.7	1.0009	0.00140	19	1.0125	0.00140
25	1.0029	0.00160	20.9	1.0055	0.00140	19.2	1.0129	0.00190
25.3	1.0058	0.00130	21.1	1.0062	0.00130	19.4	1.0125	0.00150
25.6	1.0085	0.00190	21.3	1.0056	0.00130			
25.9	1.0113	0.00110	21.5	1.0105	0.00130			
26.2	1.0141	0.00120	21.7	1.0111	0.00140			
			21.9	1.0141	0.00200			
			22	1.0156	0.00140			

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.40	0.9246	0.00150	10.40	0.9167	0.00160	9.50	0.9245	0.00200
12.5	0.9283	0.00190	10.5	0.9238	0.00220	9.55	0.9269	0.00250
12.6	0.9310	0.00160	10.6	0.9267	0.00190	9.6	0.9268	0.00180
12.7	0.9336	0.00170	10.7	0.9341	0.00150	9.65	0.9331	0.00220
12.8	0.9353	0.00180	10.8	0.9396	0.00180	9.7	0.9349	0.00160
12.9	0.9396	0.00190	10.9	0.9478	0.00200	9.75	0.9389	0.00170
13	0.9475	0.00190	11	0.9479	0.00160	9.8	0.9376	0.00220
13.1	0.9477	0.00160	11.1	0.9547	0.00200	9.85	0.9459	0.00170
13.2	0.9539	0.00150	11.2	0.9605	0.00210	9.9	0.9477	0.00190
13.3	0.9574	0.00190	11.3	0.9601	0.00200	9.95	0.9513	0.00160
13.4	0.9590	0.00170	11.4	0.9711	0.00180	10	0.9546	0.00180
13.5	0.9641	0.00170	11.5	0.9736	0.00180	10.05	0.9563	0.00180
13.6	0.9675	0.00180	11.6	0.9811	0.00170	10.1	0.9615	0.00190
13.7	0.9715	0.00140	11.7	0.9904	0.00180	10.15	0.9603	0.00190
13.8	0.9767	0.00190	11.8	0.9874	0.00220	10.2	0.9648	0.00180
13.9	0.9778	0.00170	11.9	0.9932	0.00190	10.25	0.9655	0.00200
14	0.9792	0.00200	12	0.9968	0.00170	10.3	0.9712	0.00160
14.1	0.9833	0.00160	12.1	0.9997	0.00170	10.35	0.9730	0.00190
14.2	0.9859	0.00150	12.2	1.0063	0.00170	10.4	0.9755	0.00210
14.3	0.9881	0.00160	12.3	1.0067	0.00220	10.45	0.9805	0.00170
14.4	0.9899	0.00160	12.4	1.0133	0.00180	10.5	0.9840	0.00170
14.5	0.9947	0.00180	12.5	1.0180	0.00160	10.55	0.9846	0.00190
14.6	1.0000	0.00170				10.6	0.9860	0.00200
14.7	1.0032	0.00140				10.65	0.9895	0.00170
14.8	1.0003	0.00160				10.7	0.9967	0.00210
14.9	1.0089	0.00180				10.75	0.9986	0.00200
15	1.0084	0.00170				10.8	0.9996	0.00200
15.1	1.0115	0.00140				10.85	0.9995	0.00250
15.2	1.0139	0.00210				10.9	1.0038	0.00210
						10.95	1.0095	0.00260
						11	1.0064	0.00180
						11.05	1.0144	0.00200
						11.1	1.0112	0.00180
						11.15	1.0189	0.00210
						11.2	1.0213	0.00180

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.90	0.9184	0.00220	8.20	0.9193	0.00240	7.80	0.9149	0.00200
8.95	0.9243	0.00210	8.25	0.9207	0.00180	7.85	0.9207	0.00200
9	0.9234	0.00240	8.3	0.9225	0.00210	7.9	0.9252	0.00200
9.05	0.9340	0.00190	8.35	0.9299	0.00200	7.95	0.9271	0.00220
9.1	0.9290	0.00290	8.4	0.9333	0.00210	8	0.9296	0.00230
9.15	0.9414	0.00200	8.45	0.9385	0.00280	8.05	0.9340	0.00210
9.2	0.9419	0.00220	8.5	0.9437	0.00210	8.1	0.9423	0.00220
9.25	0.9461	0.00200	8.55	0.9459	0.00190	8.15	0.9449	0.00240
9.3	0.9478	0.00190	8.6	0.9476	0.00190	8.2	0.9505	0.00210
9.35	0.9523	0.00180	8.65	0.9535	0.00200	8.25	0.9573	0.00190
9.4	0.9575	0.00200	8.7	0.9594	0.00200	8.3	0.9560	0.00230
9.45	0.9588	0.00190	8.75	0.9592	0.00240	8.35	0.9642	0.00230
9.5	0.9641	0.00230	8.8	0.9648	0.00220	8.4	0.9632	0.00270
9.55	0.9665	0.00210	8.85	0.9705	0.00230	8.45	0.9702	0.00220
9.6	0.9648	0.00200	8.9	0.9741	0.00220	8.5	0.9704	0.00220
9.65	0.9732	0.00250	8.95	0.9748	0.00190	8.55	0.9783	0.00230
9.7	0.9752	0.00240	9	0.9799	0.00210	8.6	0.9818	0.00270
9.75	0.9794	0.00250	9.05	0.9842	0.00230	8.65	0.9865	0.00240
9.8	0.9814	0.00170	9.1	0.9850	0.00250	8.7	0.9899	0.00220
9.85	0.9856	0.00230	9.15	0.9918	0.00200	8.75	0.9930	0.00230
9.9	0.9849	0.00220	9.2	0.9930	0.00230	8.8	1.0015	0.00220
9.95	0.9923	0.00250	9.25	0.9926	0.00220	8.85	1.0018	0.00200
10	0.9953	0.00190	9.3	1.0012	0.00260	8.9	1.0053	0.00230
10.05	0.9998	0.00240	9.35	1.0070	0.00200	8.95	1.0028	0.00210
10.1	0.9975	0.00190	9.4	1.0047	0.00200	9	1.0127	0.00260
10.15	1.0051	0.00230	9.45	1.0100	0.00230	9.05	1.0191	0.00210
10.2	1.0070	0.00190	9.5	1.0159	0.00210	9.1	1.0223	0.00260
10.25	1.0091	0.00180	9.55	1.0199	0.00220			
10.3	1.0097	0.00180	9.6	1.0219	0.00180			
10.35	1.0164	0.00220						
10.4	1.0182	0.00180						

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.40	0.9190	0.00200	7.20	0.9143	0.00210	7.10	0.9238	0.00200
7.45	0.9211	0.00220	7.25	0.9191	0.00250	7.15	0.9260	0.00280
7.5	0.9251	0.00200	7.3	0.9272	0.00220	7.2	0.9282	0.00220
7.55	0.9323	0.00210	7.35	0.9295	0.00230	7.25	0.9355	0.00220
7.6	0.9311	0.00200	7.4	0.9357	0.00240	7.3	0.9392	0.00230
7.65	0.9401	0.00220	7.45	0.9359	0.00210	7.35	0.9442	0.00240
7.7	0.9459	0.00250	7.5	0.9450	0.00220	7.4	0.9503	0.00240
7.75	0.9503	0.00200	7.55	0.9474	0.00220	7.45	0.9493	0.00230
7.8	0.9536	0.00240	7.6	0.9552	0.00210	7.5	0.9569	0.00240
7.85	0.9605	0.00200	7.65	0.9576	0.00270	7.55	0.9645	0.00270
7.9	0.9626	0.00200	7.7	0.9639	0.00240	7.6	0.9641	0.00210
7.95	0.9689	0.00230	7.75	0.9655	0.00220	7.65	0.9660	0.00240
8	0.9728	0.00230	7.8	0.9741	0.00210	7.7	0.9746	0.00240
8.05	0.9758	0.00210	7.85	0.9762	0.00220	7.75	0.9835	0.00250
8.1	0.9762	0.00240	7.9	0.9816	0.00220	7.8	0.9821	0.00260
8.15	0.9832	0.00250	7.95	0.9864	0.00220	7.85	0.9879	0.00240
8.2	0.9918	0.00240	8	0.9878	0.00230	7.9	0.9890	0.00220
8.25	0.9977	0.00190	8.05	0.9931	0.00270	7.95	0.9961	0.00240
8.3	0.9934	0.00200	8.1	0.9986	0.00230	8	0.9955	0.00230
8.35	1.0031	0.00230	8.15	1.0016	0.00200	8.05	1.0056	0.00250
8.4	1.0064	0.00250	8.2	1.0015	0.00290	8.1	1.0058	0.00220
8.45	1.0099	0.00210	8.25	1.0089	0.00200	8.15	1.0147	0.00340
8.5	1.0157	0.00270	8.3	1.0164	0.00230	8.2	1.0161	0.00190
8.55	1.0156	0.00200	8.35	1.0142	0.00260	8.25	1.0209	0.00210
8.6	1.0229	0.00240	8.4	1.0202	0.00200	8.3	1.0240	0.00220

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.10	0.9232	0.00240	7.00	0.9230	0.00210	7.00	0.9233	0.00200
7.15	0.9271	0.00250	7.05	0.9201	0.00210	7.05	0.9289	0.00220
7.2	0.9286	0.00230	7.1	0.9272	0.00240	7.1	0.9320	0.00200
7.25	0.9346	0.00250	7.15	0.9351	0.00200	7.15	0.9321	0.00190
7.3	0.9395	0.00240	7.2	0.9335	0.00250	7.2	0.9371	0.00230
7.35	0.9444	0.00230	7.25	0.9362	0.00200	7.25	0.9422	0.00240
7.4	0.9518	0.00220	7.3	0.9443	0.00230	7.3	0.9502	0.00280
7.45	0.9587	0.00220	7.35	0.9497	0.00210	7.35	0.9522	0.00190
7.5	0.9591	0.00220	7.4	0.9576	0.00260	7.4	0.9589	0.00190
7.55	0.9647	0.00270	7.45	0.9576	0.00240	7.45	0.9639	0.00280
7.6	0.9670	0.00220	7.5	0.9599	0.00230	7.5	0.9669	0.00200
7.65	0.9663	0.00240	7.55	0.9648	0.00210	7.55	0.9704	0.00210
7.7	0.9756	0.00190	7.6	0.9721	0.00220	7.6	0.9756	0.00210
7.75	0.9819	0.00210	7.65	0.9723	0.00230	7.65	0.9790	0.00200
7.8	0.9868	0.00260	7.7	0.9764	0.00270	7.7	0.9821	0.00190
7.85	0.9911	0.00210	7.75	0.9828	0.00210	7.75	0.9877	0.00220
7.9	0.9892	0.00210	7.8	0.9835	0.00190	7.8	0.9911	0.00240
7.95	0.9960	0.00250	7.85	0.9936	0.00230	7.85	0.9958	0.00250
8	0.9992	0.00230	7.9	0.9920	0.00220	7.9	0.9986	0.00200
8.05	1.0087	0.00200	7.95	1.0017	0.00200	7.95	1.0017	0.00200
8.1	1.0112	0.00250	8	1.0041	0.00210	8	1.0059	0.00210
8.15	1.0149	0.00240	8.05	1.0073	0.00220	8.05	1.0128	0.00240
8.2	1.0169	0.00230	8.1	1.0145	0.00200	8.1	1.0198	0.00230
			8.15	1.0145	0.00200	8.15	1.0175	0.00220
			8.2	1.0186	0.00200	8.2	1.0224	0.00220
			8.25	1.0191	0.00220			
			8.3	1.0253	0.00240			

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.90	0.9239	0.00200	6.70	0.9265	0.00190	6.30	0.9206	0.00270
6.95	0.9314	0.00220	6.75	0.9284	0.00210	6.35	0.9258	0.00210
7	0.9389	0.00200	6.8	0.9346	0.00210	6.4	0.9303	0.00200
7.05	0.9406	0.00220	6.85	0.9390	0.00210	6.45	0.9372	0.00230
7.1	0.9476	0.00200	6.9	0.9427	0.00190	6.5	0.9416	0.00210
7.15	0.9492	0.00180	6.95	0.9482	0.00200	6.55	0.9459	0.00220
7.2	0.9550	0.00210	7	0.9526	0.00190	6.6	0.9494	0.00200
7.25	0.9604	0.00270	7.05	0.9582	0.00250	6.65	0.9550	0.00210
7.3	0.9562	0.00190	7.1	0.9582	0.00200	6.7	0.9638	0.00200
7.35	0.9680	0.00220	7.15	0.9685	0.00210	6.75	0.9676	0.00200
7.4	0.9736	0.00220	7.2	0.9695	0.00260	6.8	0.9728	0.00210
7.45	0.9727	0.00220	7.25	0.9759	0.00190	6.85	0.9758	0.00200
7.5	0.9785	0.00230	7.3	0.9822	0.00230	6.9	0.9784	0.00210
7.55	0.9839	0.00250	7.35	0.9828	0.00200	6.95	0.9899	0.00200
7.6	0.9843	0.00190	7.4	0.9886	0.00210	7	0.9871	0.00200
7.65	0.9914	0.00180	7.45	0.9904	0.00210	7.05	0.9964	0.00170
7.7	0.9946	0.00210	7.5	0.9966	0.00200	7.1	1.0001	0.00190
7.75	0.9977	0.00190	7.55	1.0002	0.00230	7.15	1.0067	0.00190
7.8	1.0033	0.00260	7.6	0.9990	0.00240	7.2	1.0060	0.00190
7.85	1.0084	0.00220	7.65	1.0097	0.00240	7.25	1.0108	0.00200
7.9	1.0101	0.00190	7.7	1.0088	0.00280	7.3	1.0193	0.00220
7.95	1.0108	0.00220	7.75	1.0174	0.00220	7.35	1.0226	0.00240
8	1.0224	0.00250	7.8	1.0150	0.00200	7.4	1.0279	0.00200
8.05	1.0257	0.00260	7.85	1.0258	0.00200			
8.1	1.0264	0.00230	7.9	1.0257	0.00200			

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.90	0.9145	0.00230	5.60	0.9146	0.00250	5.30	0.9129	0.00250
5.95	0.9206	0.00210	5.65	0.9225	0.00230	5.35	0.9208	0.00260
6	0.9266	0.00190	5.7	0.9308	0.00210	5.4	0.9269	0.00200
6.05	0.9342	0.00190	5.75	0.9340	0.00210	5.45	0.9319	0.00210
6.1	0.9402	0.00190	5.8	0.9402	0.00220	5.5	0.9388	0.00220
6.15	0.9420	0.00200	5.85	0.9419	0.00180	5.55	0.9458	0.00230
6.2	0.9479	0.00210	5.9	0.9545	0.00220	5.6	0.9525	0.00200
6.25	0.9517	0.00210	5.95	0.9563	0.00200	5.65	0.9579	0.00220
6.3	0.9603	0.00190	6	0.9595	0.00230	5.7	0.9607	0.00180
6.35	0.9653	0.00230	6.05	0.9705	0.00210	5.75	0.9670	0.00240
6.4	0.9668	0.00190	6.1	0.9756	0.00200	5.8	0.9729	0.00190
6.45	0.9766	0.00210	6.15	0.9824	0.00190	5.85	0.9803	0.00220
6.5	0.9803	0.00200	6.2	0.9852	0.00260	5.9	0.9862	0.00210
6.55	0.9823	0.00230	6.25	0.9930	0.00240	5.95	0.9883	0.00260
6.6	0.9895	0.00200	6.3	0.9943	0.00190	6	0.9976	0.00210
6.65	0.9936	0.00190	6.35	1.0038	0.00210	6.05	1.0051	0.00190
6.7	1.0009	0.00180	6.4	1.0049	0.00170	6.1	1.0071	0.00200
6.75	1.0078	0.00220	6.45	1.0119	0.00190	6.15	1.0129	0.00210
6.8	1.0097	0.00180	6.5	1.0156	0.00230	6.2	1.0215	0.00210
6.85	1.0165	0.00210	6.55	1.0206	0.00210			
6.9	1.0213	0.00220	6.6	1.0305	0.00210			
6.95	1.0244	0.00220						
7	1.0308	0.00200						

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.90	0.9253	0.00200	4.50	0.9203	0.00200	3.70	0.9063	0.00180
4.95	0.9320	0.00170	4.55	0.9292	0.00190	3.75	0.9157	0.00180
5	0.9339	0.00170	4.6	0.9376	0.00190	3.8	0.9263	0.00210
5.05	0.9431	0.00170	4.65	0.9441	0.00190	3.85	0.9320	0.00200
5.1	0.9543	0.00170	4.7	0.9536	0.00180	3.9	0.9441	0.00200
5.15	0.9556	0.00200	4.75	0.9557	0.00240	3.95	0.9563	0.00190
5.2	0.9645	0.00190	4.8	0.9702	0.00170	4	0.9655	0.00210
5.25	0.9704	0.00270	4.85	0.9762	0.00190	4.05	0.9735	0.00220
5.3	0.9782	0.00200	4.9	0.9829	0.00190	4.1	0.9787	0.00200
5.35	0.9858	0.00190	4.95	0.9907	0.00190	4.15	0.9933	0.00200
5.4	0.9899	0.00260	5	0.9944	0.00190	4.2	1.0017	0.00200
5.45	1.0000	0.00200	5.05	1.0038	0.00190	4.25	1.0075	0.00190
5.5	1.0049	0.00200	5.1	1.0109	0.00200	4.3	1.0175	0.00230
5.55	1.0093	0.00230	5.15	1.0179	0.00190	4.35	1.0274	0.00200
5.6	1.0136	0.00210	5.2	1.0216	0.00200	4.4	1.0348	0.00200
5.65	1.0245	0.00180						
5.7	1.0325	0.00190						

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.20	0.9054	0.00190	2.50	0.9199	0.00180	2.00	0.9074	0.00220
3.25	0.9225	0.00220	2.52	0.9247	0.00190	2.02	0.9146	0.00200
3.3	0.9309	0.00190	2.54	0.9345	0.00220	2.04	0.9198	0.00210
3.35	0.9437	0.00200	2.56	0.9366	0.00210	2.06	0.9296	0.00240
3.4	0.9555	0.00170	2.58	0.9469	0.00210	2.08	0.9369	0.00180
3.45	0.9645	0.00180	2.6	0.9463	0.00190	2.1	0.9388	0.00170
3.5	0.9740	0.00200	2.62	0.9562	0.00190	2.12	0.9483	0.00220
3.55	0.9836	0.00170	2.64	0.9545	0.00230	2.14	0.9536	0.00240
3.6	0.9951	0.00180	2.66	0.9622	0.00220	2.16	0.9651	0.00190
3.65	1.0075	0.00200	2.68	0.9689	0.00220	2.18	0.9724	0.00250
3.7	1.0180	0.00220	2.7	0.9697	0.00200	2.2	0.9802	0.00190
3.75	1.0263	0.00230	2.72	0.9809	0.00180	2.22	0.9824	0.00200
3.8	1.0393	0.00220	2.74	0.9857	0.00200	2.24	0.9905	0.00210
			2.76	0.9938	0.00210	2.26	0.9968	0.00220
			2.78	0.9980	0.00190	2.28	0.9994	0.00230
			2.8	1.0018	0.00240	2.3	1.0086	0.00190
			2.82	1.0083	0.00200	2.32	1.0167	0.00220
			2.84	1.0123	0.00220	2.34	1.0217	0.00260
			2.86	1.0218	0.00280	2.36	1.0299	0.00200
			2.88	1.0216	0.00180	2.38	1.0342	0.00190
			2.9	1.0294	0.00230	2.4	1.0429	0.00250

Case ID: pu_cyl_097_10ref

Material: Plutonium

Geometry: Infinite Cylinder

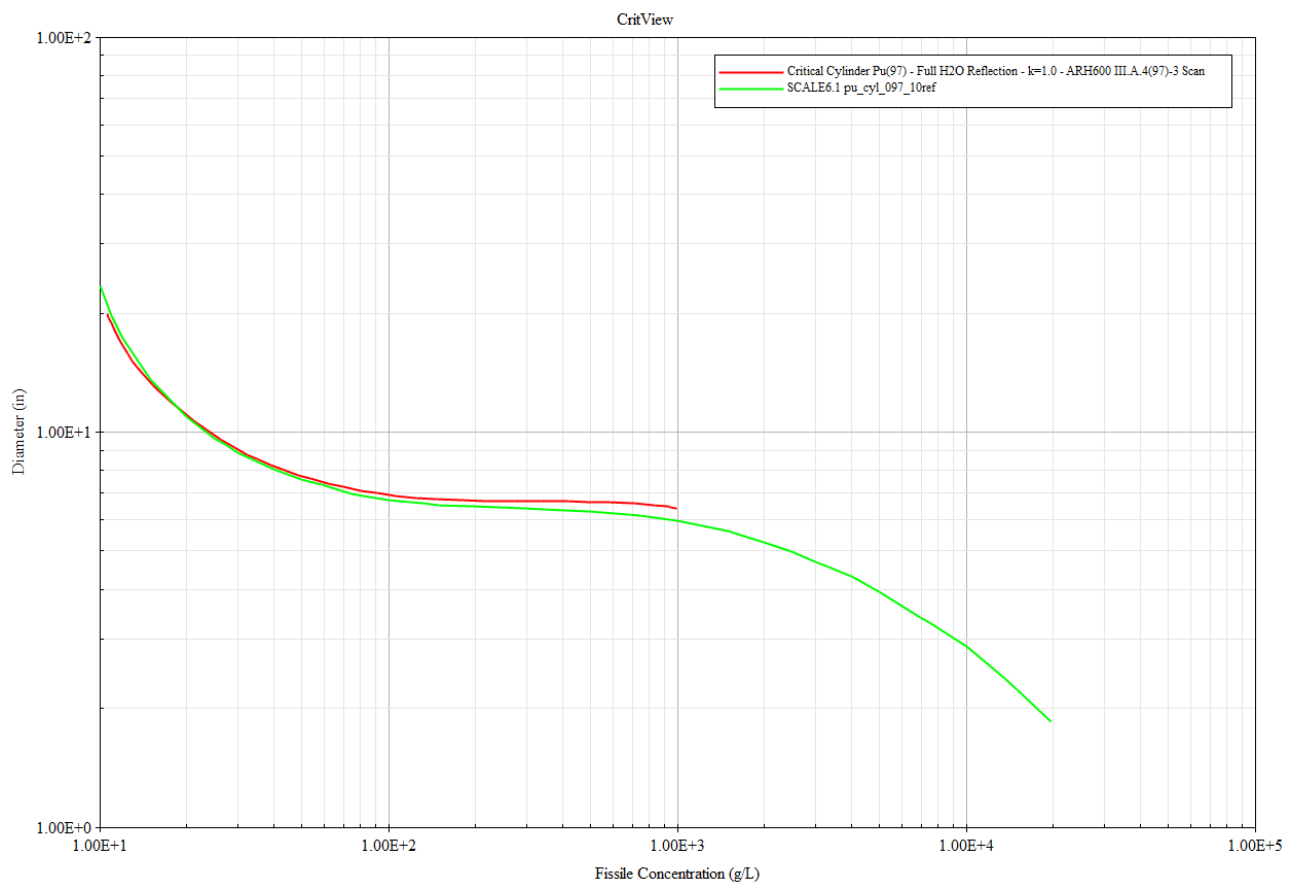
Isotopics: 97% ^{239}Pu 3% ^{240}Pu

Reflector: 10" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	17.400	24.900	0.300	23.4191
0.011	15.300	20.700	0.200	19.6619
0.012	13.800	18.100	0.200	17.2511
0.015	11.200	14.100	0.100	13.5667
0.020	9.300	11.300	0.100	10.9415
0.025	8.400	10.000	0.050	9.6368
0.030	7.800	9.200	0.050	8.8658
0.040	7.000	8.300	0.050	8.0339
0.050	6.500	7.900	0.050	7.5824
0.075	6.100	7.300	0.100	6.9643
0.100	5.700	7.000	0.050	6.7250
0.150	5.800	6.800	0.050	6.5228
0.200	5.600	6.700	0.050	6.4722
0.350	5.500	6.700	0.050	6.3614
0.500	5.500	6.600	0.050	6.2963
0.750	5.300	6.500	0.050	6.1588
1.000	5.200	6.300	0.050	5.9590
1.500	4.900	5.900	0.050	5.6200
2.000	4.600	5.500	0.050	5.2487
2.500	4.300	5.200	0.050	4.9784
3.000	4.100	5.000	0.050	4.7044
4.000	3.800	4.500	0.050	4.3050
5.000	3.500	4.200	0.050	3.9455
7.500	2.900	3.500	0.050	3.2968
10.000	2.500	3.000	0.020	2.8659
15.000	2.000	2.400	0.020	2.2352
19.600	1.600	2.000	0.020	1.8544

WORM and SCALE Input File

```

'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.1.2.2.3-1. Critical Dimensions for Plutonium Cylinder (97% 239Pu) - 10 Inches of
Reflection
'
#index number = <index = 1:27:1>
'
#Concentration = <@conc =
0.01,0.011,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)> g/cc
'
#Starting Diameter = <@startdia =
17.4,15.3,13.8,11.2,9.3,8.4,7.8,7,6.5,6.1,5.7,5.8,5.6,5.5,5.5,5.3,5.2,4.9,4.6,4.3,4.1,3.8,3.5,2.9
,2.5,2,1.6> in
#Ending Diameter = <@enddia =
24.9,20.7,18.1,14.1,11.3,10,9.2,8.3,7.9,7.3,7,6.8,6.7,6.7,6.6,6.5,6.3,5.9,5.5,5.2,5,4.5,4.2,3.5,3
,2.4,2> in
#Delta = <@delta =
0.3,0.2,0.2,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.0
5,0.05,0.05,0.05,0.02,0.02,0.02> in
'
'Reflector Thickness {{refthick = 10}}
'
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
'
=csas6
Template
v7-238
read composition
  pu          1 den=<critconc> 1 300
                94239 97
                94240 3   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Cylinder"
cylinder 1      {{(diameter*in)/2}}      10      -10
cylinder 2      {{(refdia*in)/2}}      10      -10
media 1 1 1
media 2 1 2 -1
boundary 2
end geometry
read bnds
  body=2
    surface(1)=vacuum
    surface(2)=mirror
    surface(3)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_cyl_097_10ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infcyl
modmat: H2O
critmat: plutonium
isomat: Pu239 0.97 Pu240 0.03
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 23.4191
0.011 19.6619
0.012 17.2511
0.015 13.5667
0.020 10.9415
0.025 9.6368
0.030 8.8658
0.040 8.0339
0.050 7.5824
0.075 6.9643
0.100 6.7250
0.150 6.5228
0.200 6.4722
0.350 6.3614
0.500 6.2963
0.750 6.1588
1.000 5.9590
1.500 5.6200
2.000 5.2487
2.500 4.9784
3.000 4.7044
4.000 4.3050
5.000 3.9455
7.500 3.2968
10.000 2.8659
15.000 2.2352
19.600 1.8544
```

0.01			0.011			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.40	0.9263	0.00110	15.30	0.9270	0.00130	13.80	0.9256	0.00160
17.7	0.9328	0.00130	15.5	0.9329	0.00180	14	0.9297	0.00160
18	0.9378	0.00170	15.7	0.9381	0.00160	14.2	0.9358	0.00150
18.3	0.9410	0.00140	15.9	0.9394	0.00170	14.4	0.9407	0.00140
18.6	0.9440	0.00130	16.1	0.9441	0.00160	14.6	0.9453	0.00140
18.9	0.9511	0.00130	16.3	0.9472	0.00140	14.8	0.9515	0.00140
19.2	0.9515	0.00110	16.5	0.9498	0.00130	15	0.9547	0.00150
19.5	0.9597	0.00140	16.7	0.9556	0.00200	15.2	0.9582	0.00140
19.8	0.9633	0.00140	16.9	0.9599	0.00140	15.4	0.9632	0.00150
20.1	0.9672	0.00190	17.1	0.9604	0.00120	15.6	0.9675	0.00140
20.4	0.9694	0.00130	17.3	0.9661	0.00160	15.8	0.9731	0.00140
20.7	0.9731	0.00120	17.5	0.9696	0.00160	16	0.9745	0.00140
21	0.9777	0.00140	17.7	0.9726	0.00120	16.2	0.9780	0.00150
21.3	0.9809	0.00150	17.9	0.9711	0.00120	16.4	0.9814	0.00170
21.6	0.9810	0.00150	18.1	0.9803	0.00150	16.6	0.9919	0.00140
21.9	0.9863	0.00120	18.3	0.9844	0.00130	16.8	0.9892	0.00130
22.2	0.9870	0.00130	18.5	0.9831	0.00130	17	0.9955	0.00130
22.5	0.9909	0.00130	18.7	0.9880	0.00140	17.2	0.9988	0.00120
22.8	0.9959	0.00110	18.9	0.9923	0.00160	17.4	1.0035	0.00150
23.1	0.9966	0.00140	19.1	0.9946	0.00140	17.6	1.0078	0.00110
23.4	0.9997	0.00140	19.3	0.9962	0.00170	17.8	1.0086	0.00150
23.7	1.0044	0.00210	19.5	0.9983	0.00110	18	1.0104	0.00120
24	1.0055	0.00120	19.7	1.0004	0.00130	18.1	1.0129	0.00120
24.3	1.0075	0.00180	19.9	1.0035	0.00150			
24.6	1.0067	0.00120	20.1	1.0067	0.00140			
24.9	1.0128	0.00120	20.3	1.0093	0.00130			
			20.5	1.0116	0.00110			
			20.7	1.0153	0.00160			

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.20	0.9186	0.00180	9.30	0.9271	0.00150	8.40	0.9275	0.00250
11.3	0.9236	0.00160	9.4	0.9268	0.00180	8.45	0.9240	0.00220
11.4	0.9296	0.00150	9.5	0.9301	0.00180	8.5	0.9306	0.00210
11.5	0.9335	0.00140	9.6	0.9348	0.00190	8.55	0.9366	0.00150
11.6	0.9333	0.00130	9.7	0.9434	0.00180	8.6	0.9378	0.00190
11.7	0.9415	0.00150	9.8	0.9490	0.00160	8.65	0.9415	0.00160
11.8	0.9420	0.00150	9.9	0.9556	0.00190	8.7	0.9454	0.00160
11.9	0.9440	0.00130	10	0.9584	0.00170	8.75	0.9482	0.00170
12	0.9504	0.00170	10.1	0.9641	0.00150	8.8	0.9521	0.00160
12.1	0.9529	0.00170	10.2	0.9652	0.00220	8.85	0.9528	0.00180
12.2	0.9585	0.00170	10.3	0.9727	0.00170	8.9	0.9593	0.00160
12.3	0.9606	0.00140	10.4	0.9775	0.00170	8.95	0.9627	0.00200
12.4	0.9641	0.00140	10.5	0.9816	0.00190	9	0.9658	0.00170
12.5	0.9680	0.00150	10.6	0.9880	0.00170	9.05	0.9689	0.00180
12.6	0.9709	0.00160	10.7	0.9922	0.00160	9.1	0.9675	0.00180
12.7	0.9768	0.00190	10.8	0.9920	0.00200	9.15	0.9705	0.00170
12.8	0.9796	0.00140	10.9	0.9978	0.00180	9.2	0.9766	0.00170
12.9	0.9808	0.00150	11	1.0031	0.00160	9.25	0.9787	0.00160
13	0.9854	0.00140	11.1	1.0081	0.00160	9.3	0.9829	0.00210
13.1	0.9875	0.00150	11.2	1.0107	0.00200	9.35	0.9815	0.00190
13.2	0.9913	0.00170	11.3	1.0154	0.00190	9.4	0.9840	0.00220
13.3	0.9944	0.00140				9.45	0.9877	0.00160
13.4	0.9994	0.00150				9.5	0.9887	0.00190
13.5	1.0008	0.00130				9.55	0.9979	0.00170
13.6	0.9996	0.00150				9.6	0.9975	0.00200
13.7	1.0071	0.00140				9.65	1.0009	0.00190
13.8	1.0112	0.00140				9.7	1.0010	0.00170
13.9	1.0094	0.00130				9.75	1.0038	0.00200
14	1.0112	0.00190				9.8	1.0072	0.00250
14.1	1.0159	0.00160				9.85	1.0127	0.00170
						9.9	1.0146	0.00190
						9.95	1.0138	0.00210
						10	1.0159	0.00200

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.80	0.9311	0.00190	7.00	0.9176	0.00170	6.50	0.9084	0.00190
7.85	0.9341	0.00180	7.05	0.9270	0.00250	6.55	0.9122	0.00210
7.9	0.9387	0.00170	7.1	0.9280	0.00200	6.6	0.9209	0.00190
7.95	0.9409	0.00180	7.15	0.9329	0.00200	6.65	0.9234	0.00200
8	0.9414	0.00180	7.2	0.9388	0.00170	6.7	0.9275	0.00230
8.05	0.9480	0.00220	7.25	0.9433	0.00180	6.75	0.9337	0.00240
8.1	0.9495	0.00160	7.3	0.9444	0.00220	6.8	0.9369	0.00200
8.15	0.9512	0.00180	7.35	0.9466	0.00190	6.85	0.9416	0.00190
8.2	0.9529	0.00190	7.4	0.9552	0.00210	6.9	0.9457	0.00190
8.25	0.9577	0.00220	7.45	0.9566	0.00190	6.95	0.9483	0.00220
8.3	0.9616	0.00170	7.5	0.9608	0.00240	7	0.9531	0.00240
8.35	0.9680	0.00170	7.55	0.9658	0.00200	7.05	0.9561	0.00180
8.4	0.9674	0.00200	7.6	0.9661	0.00180	7.1	0.9644	0.00190
8.45	0.9744	0.00170	7.65	0.9700	0.00190	7.15	0.9672	0.00220
8.5	0.9714	0.00200	7.7	0.9781	0.00210	7.2	0.9704	0.00240
8.55	0.9836	0.00220	7.75	0.9783	0.00170	7.25	0.9743	0.00190
8.6	0.9857	0.00180	7.8	0.9835	0.00180	7.3	0.9806	0.00230
8.65	0.9867	0.00220	7.85	0.9910	0.00170	7.35	0.9880	0.00230
8.7	0.9863	0.00180	7.9	0.9924	0.00230	7.4	0.9865	0.00190
8.75	0.9935	0.00190	7.95	0.9954	0.00220	7.45	0.9931	0.00180
8.8	0.9929	0.00190	8	0.9979	0.00260	7.5	0.9956	0.00220
8.85	0.9988	0.00160	8.05	1.0010	0.00180	7.55	0.9967	0.00190
8.9	1.0026	0.00220	8.1	1.0078	0.00200	7.6	1.0018	0.00240
8.95	1.0034	0.00200	8.15	1.0066	0.00200	7.65	1.0069	0.00170
9	1.0061	0.00220	8.2	1.0152	0.00190	7.7	1.0079	0.00180
9.05	1.0107	0.00220	8.25	1.0131	0.00230	7.75	1.0176	0.00200
9.1	1.0102	0.00180	8.3	1.0189	0.00250	7.8	1.0162	0.00170
9.15	1.0179	0.00190				7.85	1.0237	0.00240
9.2	1.0188	0.00260				7.9	1.0302	0.00330

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.10	0.9183	0.00190	5.70	0.9055	0.00190	5.80	0.9258	0.00210
6.2	0.9271	0.00240	5.75	0.9050	0.00190	5.85	0.9414	0.00220
6.3	0.9378	0.00220	5.8	0.9100	0.00210	5.9	0.9419	0.00210
6.4	0.9516	0.00230	5.85	0.9145	0.00220	5.95	0.9525	0.00220
6.5	0.9564	0.00210	5.9	0.9207	0.00220	6	0.9552	0.00230
6.6	0.9650	0.00210	5.95	0.9268	0.00200	6.05	0.9508	0.00230
6.7	0.9777	0.00240	6	0.9313	0.00190	6.1	0.9600	0.00210
6.8	0.9852	0.00210	6.05	0.9366	0.00220	6.15	0.9666	0.00200
6.9	0.9973	0.00190	6.1	0.9429	0.00190	6.2	0.9710	0.00230
7	1.0015	0.00220	6.15	0.9446	0.00200	6.25	0.9752	0.00230
7.1	1.0076	0.00230	6.2	0.9494	0.00220	6.3	0.9826	0.00220
7.2	1.0156	0.00200	6.25	0.9581	0.00220	6.35	0.9866	0.00210
7.3	1.0245	0.00180	6.3	0.9551	0.00230	6.4	0.9915	0.00190
			6.35	0.9632	0.00180	6.45	0.9940	0.00180
			6.4	0.9708	0.00190	6.5	0.9974	0.00260
			6.45	0.9756	0.00290	6.55	1.0031	0.00260
			6.5	0.9815	0.00230	6.6	1.0019	0.00250
			6.55	0.9804	0.00220	6.65	1.0067	0.00240
			6.6	0.9864	0.00190	6.7	1.0173	0.00220
			6.65	0.9954	0.00220	6.75	1.0192	0.00210
			6.7	0.9978	0.00250	6.8	1.0210	0.00190
			6.75	1.0022	0.00210			
			6.8	1.0029	0.00230			
			6.85	1.0133	0.00190			
			6.9	1.0139	0.00260			
			6.95	1.0167	0.00210			
			7	1.0228	0.00200			

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.60	0.9207	0.00210	5.50	0.9226	0.00210	5.50	0.9307	0.00220
5.65	0.9256	0.00250	5.55	0.9262	0.00190	5.55	0.9370	0.00210
5.7	0.9339	0.00200	5.6	0.9301	0.00210	5.6	0.9375	0.00190
5.75	0.9345	0.00220	5.65	0.9328	0.00220	5.65	0.9438	0.00190
5.8	0.9405	0.00230	5.7	0.9416	0.00220	5.7	0.9508	0.00200
5.85	0.9485	0.00190	5.75	0.9454	0.00200	5.75	0.9554	0.00210
5.9	0.9537	0.00350	5.8	0.9519	0.00240	5.8	0.9616	0.00220
5.95	0.9584	0.00250	5.85	0.9559	0.00240	5.85	0.9633	0.00200
6	0.9601	0.00230	5.9	0.9611	0.00250	5.9	0.9654	0.00200
6.05	0.9630	0.00220	5.95	0.9657	0.00200	5.95	0.9724	0.00190
6.1	0.9725	0.00190	6	0.9720	0.00300	6	0.9738	0.00190
6.15	0.9715	0.00240	6.05	0.9728	0.00200	6.05	0.9792	0.00200
6.2	0.9755	0.00240	6.1	0.9753	0.00190	6.1	0.9866	0.00230
6.25	0.9822	0.00200	6.15	0.9845	0.00210	6.15	0.9880	0.00190
6.3	0.9861	0.00190	6.2	0.9859	0.00220	6.2	0.9943	0.00210
6.35	0.9914	0.00260	6.25	0.9893	0.00340	6.25	0.9962	0.00230
6.4	0.9945	0.00250	6.3	0.9973	0.00210	6.3	1.0003	0.00250
6.45	1.0004	0.00210	6.35	0.9987	0.00200	6.35	1.0036	0.00220
6.5	0.9995	0.00220	6.4	1.0044	0.00210	6.4	1.0082	0.00210
6.55	1.0123	0.00230	6.45	1.0062	0.00210	6.45	1.0149	0.00210
6.6	1.0181	0.00210	6.5	1.0126	0.00230	6.5	1.0182	0.00210
6.65	1.0209	0.00220	6.55	1.0186	0.00200	6.55	1.0207	0.00200
6.7	1.0205	0.00250	6.6	1.0184	0.00230	6.6	1.0292	0.00210
			6.65	1.0239	0.00210			
			6.7	1.0293	0.00210			

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.30	0.9278	0.00210	5.20	0.9263	0.00190	4.90	0.9316	0.00190
5.35	0.9281	0.00190	5.25	0.9350	0.00200	4.95	0.9313	0.00210
5.4	0.9347	0.00230	5.3	0.9390	0.00230	5	0.9408	0.00180
5.45	0.9398	0.00220	5.35	0.9452	0.00210	5.05	0.9431	0.00190
5.5	0.9467	0.00200	5.4	0.9503	0.00180	5.1	0.9493	0.00210
5.55	0.9510	0.00220	5.45	0.9519	0.00240	5.15	0.9576	0.00200
5.6	0.9528	0.00220	5.5	0.9576	0.00220	5.2	0.9601	0.00210
5.65	0.9556	0.00190	5.55	0.9610	0.00200	5.25	0.9688	0.00230
5.7	0.9617	0.00210	5.6	0.9687	0.00190	5.3	0.9691	0.00190
5.75	0.9654	0.00200	5.65	0.9725	0.00200	5.35	0.9747	0.00170
5.8	0.9733	0.00220	5.7	0.9756	0.00200	5.4	0.9834	0.00190
5.85	0.9742	0.00250	5.75	0.9804	0.00190	5.45	0.9859	0.00190
5.9	0.9820	0.00210	5.8	0.9870	0.00220	5.5	0.9912	0.00190
5.95	0.9853	0.00210	5.85	0.9906	0.00200	5.55	0.9957	0.00210
6	0.9958	0.00250	5.9	0.9966	0.00240	5.6	0.9970	0.00210
6.05	0.9931	0.00220	5.95	0.9985	0.00190	5.65	1.0045	0.00210
6.1	0.9959	0.00170	6	1.0068	0.00210	5.7	1.0078	0.00230
6.15	0.9979	0.00190	6.05	1.0089	0.00210	5.75	1.0124	0.00180
6.2	1.0098	0.00220	6.1	1.0146	0.00200	5.8	1.0178	0.00200
6.25	1.0095	0.00190	6.15	1.0146	0.00190	5.85	1.0240	0.00200
6.3	1.0118	0.00200	6.2	1.0163	0.00190	5.9	1.0259	0.00180
6.35	1.0171	0.00240	6.25	1.0284	0.00210			
6.4	1.0173	0.00210	6.3	1.0203	0.00240			
6.45	1.0270	0.00220						
6.5	1.0324	0.00210						

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.60	0.9278	0.00190	4.30	0.9199	0.00190	4.10	0.9219	0.00200
4.65	0.9303	0.00200	4.35	0.9300	0.00210	4.15	0.9287	0.00200
4.7	0.9360	0.00200	4.4	0.9301	0.00210	4.2	0.9340	0.00190
4.75	0.9444	0.00200	4.45	0.9324	0.00190	4.25	0.9410	0.00210
4.8	0.9476	0.00220	4.5	0.9422	0.00190	4.3	0.9453	0.00190
4.85	0.9534	0.00210	4.55	0.9501	0.00200	4.35	0.9536	0.00200
4.9	0.9642	0.00290	4.6	0.9544	0.00200	4.4	0.9556	0.00190
4.95	0.9608	0.00200	4.65	0.9655	0.00190	4.45	0.9670	0.00220
5	0.9670	0.00170	4.7	0.9637	0.00220	4.5	0.9727	0.00220
5.05	0.9786	0.00200	4.75	0.9727	0.00200	4.55	0.9820	0.00180
5.1	0.9836	0.00210	4.8	0.9801	0.00200	4.6	0.9837	0.00210
5.15	0.9863	0.00190	4.85	0.9873	0.00210	4.65	0.9929	0.00210
5.2	0.9924	0.00200	4.9	0.9885	0.00180	4.7	0.9996	0.00180
5.25	1.0002	0.00230	4.95	0.9962	0.00180	4.75	1.0041	0.00210
5.3	1.0048	0.00200	5	1.0029	0.00200	4.8	1.0114	0.00200
5.35	1.0091	0.00190	5.05	1.0105	0.00200	4.85	1.0134	0.00250
5.4	1.0114	0.00200	5.1	1.0131	0.00190	4.9	1.0186	0.00200
5.45	1.0169	0.00250	5.15	1.0184	0.00210	4.95	1.0250	0.00200
5.5	1.0251	0.00270	5.2	1.0257	0.00230	5	1.0321	0.00210

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.80	0.9287	0.00190	3.50	0.9285	0.00210	2.90	0.9195	0.00190
3.85	0.9354	0.00230	3.55	0.9329	0.00180	2.95	0.9278	0.00200
3.9	0.9403	0.00170	3.6	0.9434	0.00190	3	0.9374	0.00190
3.95	0.9490	0.00190	3.65	0.9530	0.00190	3.05	0.9501	0.00190
4	0.9569	0.00190	3.7	0.9629	0.00170	3.1	0.9589	0.00200
4.05	0.9680	0.00190	3.75	0.9675	0.00200	3.15	0.9682	0.00220
4.1	0.9739	0.00210	3.8	0.9778	0.00180	3.2	0.9771	0.00200
4.15	0.9810	0.00210	3.85	0.9823	0.00200	3.25	0.9825	0.00190
4.2	0.9881	0.00190	3.9	0.9899	0.00260	3.3	1.0012	0.00250
4.25	0.9919	0.00180	3.95	1.0010	0.00190	3.35	1.0054	0.00200
4.3	0.9991	0.00230	4	1.0034	0.00230	3.4	1.0152	0.00190
4.35	1.0081	0.00190	4.05	1.0127	0.00190	3.45	1.0261	0.00180
4.4	1.0159	0.00190	4.1	1.0230	0.00200	3.5	1.0345	0.00200
4.45	1.0189	0.00180	4.15	1.0303	0.00190			
4.5	1.0269	0.00210	4.2	1.0368	0.00200			

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.50	0.9136	0.00180	2.00	0.9236	0.00240	1.60	0.9030	0.00190
2.52	0.9197	0.00190	2.02	0.9343	0.00210	1.62	0.9089	0.00190
2.54	0.9205	0.00200	2.04	0.9392	0.00220	1.64	0.9196	0.00200
2.56	0.9306	0.00190	2.06	0.9469	0.00170	1.66	0.9235	0.00190
2.58	0.9340	0.00180	2.08	0.9500	0.00180	1.68	0.9277	0.00200
2.6	0.9379	0.00220	2.1	0.9589	0.00220	1.7	0.9451	0.00220
2.62	0.9415	0.00210	2.12	0.9645	0.00210	1.72	0.9477	0.00200
2.64	0.9489	0.00190	2.14	0.9711	0.00240	1.74	0.9589	0.00210
2.66	0.9505	0.00200	2.16	0.9765	0.00220	1.76	0.9665	0.00190
2.68	0.9615	0.00190	2.18	0.9833	0.00200	1.78	0.9707	0.00230
2.7	0.9632	0.00190	2.2	0.9914	0.00180	1.8	0.9743	0.00190
2.72	0.9688	0.00200	2.22	0.9962	0.00220	1.82	0.9873	0.00230
2.74	0.9725	0.00170	2.24	1.0012	0.00190	1.84	0.9930	0.00190
2.76	0.9775	0.00220	2.26	1.0053	0.00190	1.86	1.0027	0.00190
2.78	0.9813	0.00180	2.28	1.0162	0.00210	1.88	1.0075	0.00220
2.8	0.9857	0.00180	2.3	1.0188	0.00210	1.9	1.0191	0.00200
2.82	0.9926	0.00190	2.32	1.0229	0.00260	1.92	1.0199	0.00200
2.84	0.9946	0.00200	2.34	1.0312	0.00200	1.94	1.0290	0.00220
2.86	0.9978	0.00240	2.36	1.0378	0.00190	1.96	1.0382	0.00230
2.88	1.0053	0.00180	2.38	1.0403	0.00190	1.98	1.0489	0.00230
2.9	1.0072	0.00220	2.4	1.0441	0.00190	2	1.0500	0.00220
2.92	1.0116	0.00210						
2.94	1.0154	0.00210						
2.96	1.0225	0.00200						
2.98	1.0265	0.00210						
3	1.0294	0.00190						

Pu-cyl-95 (Cases with 0", 1", 10" Reflector)

Case ID: pu_cyl_095_00ref

Material: Plutonium

Geometry: Infinite Cylinder

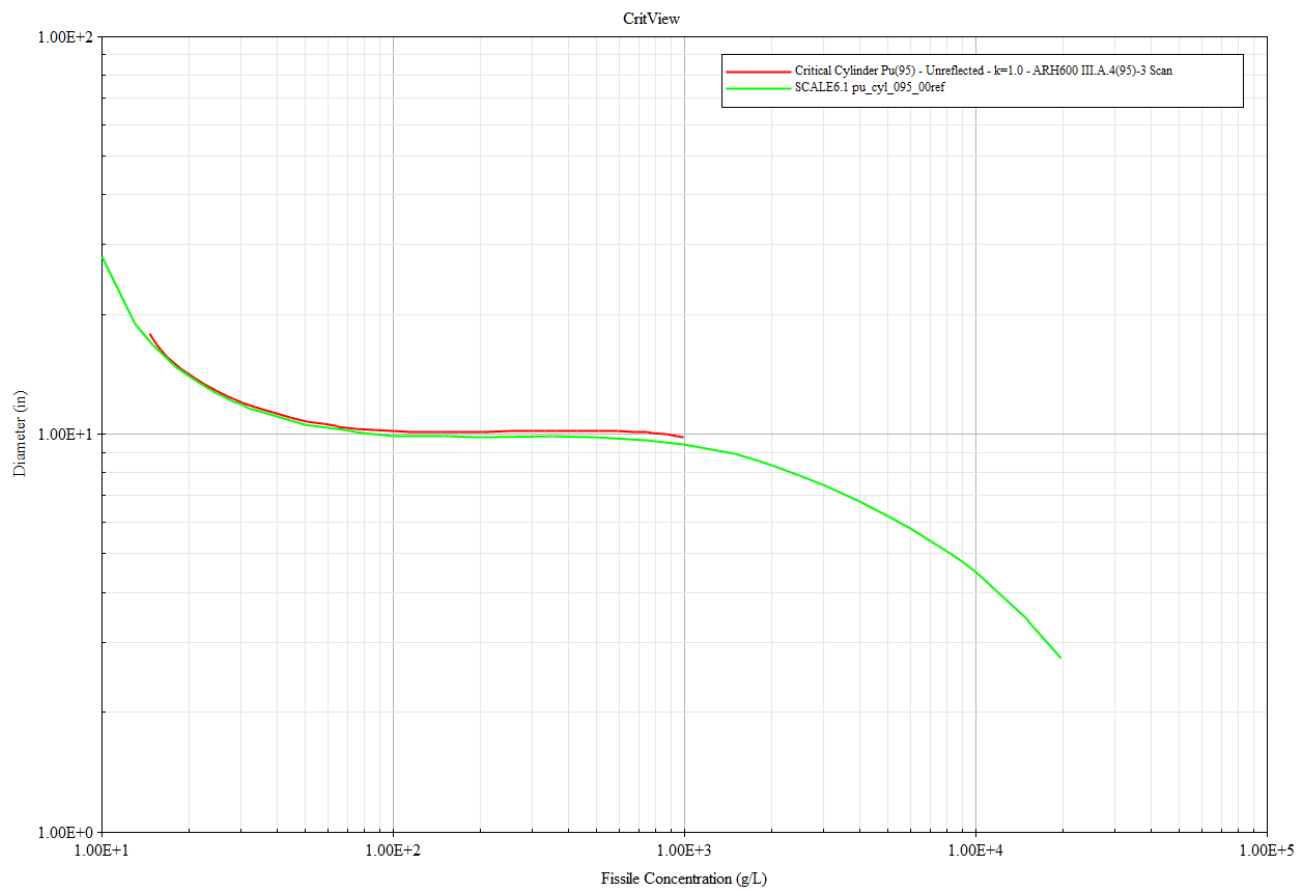
Isotopics: 95% ^{239}Pu 5% ^{240}Pu

Reflector: Unreflected

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	20.800	30.200	0.400	27.9111
0.013	15.800	19.800	0.200	18.8833
0.015	14.300	17.400	0.100	16.7636
0.018	12.800	15.300	0.100	14.7782
0.020	12.200	14.500	0.100	13.9600
0.022	11.700	13.700	0.100	13.3260
0.024	11.300	13.200	0.100	12.8556
0.025	11.200	13.000	0.100	12.6534
0.026	11.100	12.900	0.100	12.4766
0.028	10.800	12.500	0.050	12.1231
0.030	10.600	12.300	0.050	11.9092
0.032	10.400	12.000	0.050	11.6427
0.036	10.100	11.600	0.050	11.3139
0.040	9.900	11.400	0.050	11.0929
0.045	9.700	11.100	0.050	10.8182
0.050	9.500	10.900	0.050	10.5688
0.075	9.100	10.400	0.050	10.1043
0.100	9.000	10.300	0.050	9.9034
0.150	8.900	10.200	0.050	9.8669
0.200	8.900	10.200	0.050	9.8333
0.350	8.900	10.200	0.050	9.8694
0.500	8.800	10.200	0.050	9.8433
0.750	8.700	10.000	0.050	9.6472
1.000	8.400	9.800	0.050	9.4403
1.500	8.000	9.200	0.050	8.9065
2.000	7.500	9.100	0.050	8.3414
2.500	7.100	8.200	0.050	7.8685
3.000	6.700	7.700	0.050	7.4725
4.000	6.200	7.000	0.050	6.7739
5.000	5.700	6.500	0.050	6.2153
6.000	5.200	6.000	0.050	5.7775
7.000	4.900	5.600	0.050	5.3773
7.500	4.700	5.400	0.050	5.2233
8.000	4.600	5.200	0.050	5.0655
9.000	4.300	4.900	0.050	4.7694
10.000	4.100	4.700	0.050	4.5068
15.000	3.100	3.600	0.020	3.4286
19.600	2.400	2.900	0.020	2.7333

CritView compatible data file

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reset:
title: SCALE6.1 pu_cyl_095_00ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infcyl
modmat: H2O
critmat: plutonium
isomat: Pu239 0.95 Pu240 0.05
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 27.9111
0.013 18.8833
0.015 16.7636
0.018 14.7782
0.020 13.9600
0.022 13.3260
0.024 12.8556
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0.045 10.8182
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0.075 10.1043
0.100 9.9034
0.150 9.8669
0.200 9.8333
0.350 9.8694
0.500 9.8433
0.750 9.6472
1.000 9.4403
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2.000 8.3414
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4.000 6.7739
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7.000 5.3773
7.500 5.2233
8.000 5.0655
9.000 4.7694
10.000 4.5068
15.000 3.4286
19.600 2.7333
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0.01			0.013			0.015		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
20.80	0.9270	0.00110	15.80	0.9226	0.00140	14.30	0.9239	0.00150
21.2	0.9338	0.00150	16	0.9273	0.00180	14.4	0.9248	0.00170
21.6	0.9368	0.00110	16.2	0.9345	0.00150	14.5	0.9332	0.00180
22	0.9434	0.00150	16.4	0.9402	0.00150	14.6	0.9324	0.00190
22.4	0.9481	0.00120	16.6	0.9452	0.00130	14.7	0.9381	0.00150
22.8	0.9530	0.00240	16.8	0.9493	0.00170	14.8	0.9417	0.00240
23.2	0.9565	0.00110	17	0.9555	0.00150	14.9	0.9463	0.00140
23.6	0.9630	0.00120	17.2	0.9592	0.00140	15	0.9435	0.00150
24	0.9641	0.00130	17.4	0.9644	0.00160	15.1	0.9507	0.00180
24.4	0.9707	0.00150	17.6	0.9688	0.00160	15.2	0.9527	0.00150
24.8	0.9717	0.00120	17.8	0.9737	0.00150	15.3	0.9590	0.00200
25.2	0.9775	0.00120	18	0.9798	0.00160	15.4	0.9578	0.00180
25.6	0.9821	0.00100	18.2	0.9805	0.00130	15.5	0.9644	0.00200
26	0.9828	0.00180	18.4	0.9874	0.00170	15.6	0.9677	0.00160
26.4	0.9866	0.00110	18.6	0.9900	0.00180	15.7	0.9727	0.00190
26.8	0.9900	0.00130	18.8	0.9980	0.00150	15.8	0.9747	0.00180
27.2	0.9950	0.00140	19	1.0028	0.00140	15.9	0.9753	0.00150
27.6	0.9979	0.00110	19.2	1.0032	0.00120	16	0.9763	0.00160
28	1.0006	0.00120	19.4	1.0067	0.00160	16.1	0.9787	0.00150
28.4	1.0065	0.00150	19.6	1.0113	0.00150	16.2	0.9864	0.00200
28.8	1.0111	0.00130	19.8	1.0177	0.00140	16.3	0.9857	0.00160
29.2	1.0107	0.00110				16.4	0.9907	0.00150
29.6	1.0128	0.00110				16.5	0.9929	0.00180
30	1.0153	0.00120				16.6	0.9956	0.00140
30.2	1.0149	0.00130				16.7	0.9986	0.00170
						16.8	1.0008	0.00150
						16.9	1.0066	0.00140
						17	1.0057	0.00140
						17.1	1.0137	0.00150
						17.2	1.0083	0.00150
						17.3	1.0155	0.00160
						17.4	1.0150	0.00190

0.018			0.02			0.022		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.80	0.9172	0.00170	12.20	0.9190	0.00190	11.70	0.9124	0.00180
12.9	0.9203	0.00230	12.3	0.9293	0.00170	11.8	0.9224	0.00190
13	0.9283	0.00210	12.4	0.9332	0.00180	11.9	0.9288	0.00170
13.1	0.9363	0.00200	12.5	0.9333	0.00180	12	0.9325	0.00180
13.2	0.9379	0.00220	12.6	0.9407	0.00190	12.1	0.9384	0.00210
13.3	0.9396	0.00150	12.7	0.9460	0.00190	12.2	0.9437	0.00190
13.4	0.9462	0.00190	12.8	0.9499	0.00220	12.3	0.9506	0.00180
13.5	0.9525	0.00180	12.9	0.9534	0.00180	12.4	0.9550	0.00180
13.6	0.9548	0.00230	13	0.9550	0.00170	12.5	0.9595	0.00190
13.7	0.9601	0.00220	13.1	0.9601	0.00170	12.6	0.9652	0.00220
13.8	0.9652	0.00190	13.2	0.9675	0.00200	12.7	0.9723	0.00180
13.9	0.9671	0.00170	13.3	0.9725	0.00230	12.8	0.9734	0.00210
14	0.9692	0.00160	13.4	0.9792	0.00180	12.9	0.9775	0.00180
14.1	0.9744	0.00180	13.5	0.9840	0.00160	13	0.9846	0.00180
14.2	0.9770	0.00200	13.6	0.9849	0.00150	13.1	0.9906	0.00190
14.3	0.9828	0.00170	13.7	0.9886	0.00180	13.2	0.9866	0.00200
14.4	0.9898	0.00190	13.8	0.9956	0.00180	13.3	0.9987	0.00180
14.5	0.9911	0.00170	13.9	0.9988	0.00160	13.4	1.0037	0.00180
14.6	0.9931	0.00180	14	1.0008	0.00200	13.5	1.0048	0.00180
14.7	0.9957	0.00190	14.1	1.0033	0.00200	13.6	1.0128	0.00170
14.8	1.0012	0.00180	14.2	1.0118	0.00210	13.7	1.0164	0.00200
14.9	1.0024	0.00190	14.3	1.0151	0.00200			
15	1.0033	0.00160	14.4	1.0168	0.00150			
15.1	1.0108	0.00230	14.5	1.0240	0.00160			
15.2	1.0181	0.00160						
15.3	1.0193	0.00220						

0.024			0.025			0.026		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.30	0.9176	0.00180	11.20	0.9206	0.00210	11.10	0.9220	0.00200
11.4	0.9203	0.00170	11.3	0.9299	0.00170	11.2	0.9264	0.00190
11.5	0.9263	0.00190	11.4	0.9291	0.00180	11.3	0.9317	0.00220
11.6	0.9338	0.00200	11.5	0.9424	0.00190	11.4	0.9394	0.00210
11.7	0.9404	0.00190	11.6	0.9450	0.00220	11.5	0.9471	0.00200
11.8	0.9465	0.00190	11.7	0.9505	0.00210	11.6	0.9514	0.00290
11.9	0.9472	0.00190	11.8	0.9550	0.00190	11.7	0.9574	0.00180
12	0.9558	0.00190	11.9	0.9611	0.00180	11.8	0.9664	0.00200
12.1	0.9611	0.00190	12	0.9648	0.00250	11.9	0.9697	0.00180
12.2	0.9634	0.00230	12.1	0.9663	0.00190	12	0.9745	0.00210
12.3	0.9694	0.00190	12.2	0.9797	0.00220	12.1	0.9728	0.00210
12.4	0.9784	0.00190	12.3	0.9821	0.00220	12.2	0.9865	0.00180
12.5	0.9826	0.00240	12.4	0.9870	0.00200	12.3	0.9915	0.00170
12.6	0.9825	0.00200	12.5	0.9928	0.00200	12.4	0.9964	0.00190
12.7	0.9900	0.00190	12.6	0.9961	0.00180	12.5	1.0011	0.00170
12.8	0.9945	0.00180	12.7	1.0034	0.00180	12.6	1.0097	0.00220
12.9	1.0044	0.00210	12.8	1.0084	0.00180	12.7	1.0099	0.00180
13	1.0057	0.00240	12.9	1.0107	0.00190	12.8	1.0161	0.00250
13.1	1.0111	0.00280	13	1.0167	0.00210	12.9	1.0202	0.00190
13.2	1.0156	0.00180						

0.028			0.03			0.032		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.80	0.9240	0.00240	10.60	0.9155	0.00190	10.40	0.9177	0.00190
10.85	0.9250	0.00220	10.65	0.9226	0.00210	10.45	0.9226	0.00200
10.9	0.9245	0.00190	10.7	0.9259	0.00260	10.5	0.9271	0.00190
10.95	0.9310	0.00270	10.75	0.9255	0.00240	10.55	0.9336	0.00200
11	0.9370	0.00240	10.8	0.9251	0.00240	10.6	0.9360	0.00210
11.05	0.9311	0.00200	10.85	0.9369	0.00210	10.65	0.9358	0.00200
11.1	0.9393	0.00180	10.9	0.9348	0.00200	10.7	0.9397	0.00240
11.15	0.9442	0.00190	10.95	0.9419	0.00210	10.75	0.9431	0.00190
11.2	0.9467	0.00240	11	0.9469	0.00200	10.8	0.9453	0.00230
11.25	0.9485	0.00180	11.05	0.9489	0.00210	10.85	0.9521	0.00190
11.3	0.9521	0.00190	11.1	0.9559	0.00190	10.9	0.9505	0.00210
11.35	0.9519	0.00230	11.15	0.9583	0.00180	10.95	0.9559	0.00190
11.4	0.9570	0.00190	11.2	0.9549	0.00200	11	0.9601	0.00190
11.45	0.9590	0.00240	11.25	0.9654	0.00190	11.05	0.9607	0.00230
11.5	0.9637	0.00180	11.3	0.9630	0.00220	11.1	0.9657	0.00230
11.55	0.9650	0.00190	11.35	0.9670	0.00250	11.15	0.9694	0.00180
11.6	0.9696	0.00190	11.4	0.9731	0.00200	11.2	0.9710	0.00220
11.65	0.9679	0.00240	11.45	0.9740	0.00230	11.25	0.9746	0.00220
11.7	0.9739	0.00260	11.5	0.9782	0.00200	11.3	0.9747	0.00210
11.75	0.9793	0.00180	11.55	0.9774	0.00200	11.35	0.9784	0.00190
11.8	0.9813	0.00190	11.6	0.9853	0.00270	11.4	0.9843	0.00210
11.85	0.9846	0.00210	11.65	0.9862	0.00180	11.45	0.9861	0.00220
11.9	0.9872	0.00200	11.7	0.9874	0.00220	11.5	0.9907	0.00210
11.95	0.9886	0.00200	11.75	0.9911	0.00170	11.55	0.9954	0.00220
12	0.9892	0.00210	11.8	0.9921	0.00190	11.6	0.9901	0.00210
12.05	0.9986	0.00200	11.85	0.9957	0.00190	11.65	1.0017	0.00200
12.1	0.9963	0.00270	11.9	0.9991	0.00200	11.7	1.0006	0.00180
12.15	1.0043	0.00240	11.95	1.0040	0.00250	11.75	1.0098	0.00190
12.2	1.0031	0.00190	12	1.0083	0.00240	11.8	1.0063	0.00200
12.25	1.0050	0.00210	12.05	1.0087	0.00200	11.85	1.0066	0.00240
12.3	1.0087	0.00200	12.1	1.0122	0.00230	11.9	1.0159	0.00200
12.35	1.0111	0.00200	12.15	1.0164	0.00210	11.95	1.0173	0.00240
12.4	1.0130	0.00220	12.2	1.0169	0.00230	12	1.0210	0.00180
12.45	1.0163	0.00210	12.25	1.0217	0.00250			
12.5	1.0184	0.00260	12.3	1.0230	0.00240			

0.036			0.04			0.045		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.10	0.9163	0.00230	9.90	0.9192	0.00190	9.70	0.9194	0.00210
10.15	0.9157	0.00280	9.95	0.9203	0.00230	9.75	0.9237	0.00220
10.2	0.9245	0.00200	10	0.9242	0.00220	9.8	0.9238	0.00200
10.25	0.9309	0.00230	10.05	0.9314	0.00230	9.85	0.9314	0.00270
10.3	0.9344	0.00230	10.1	0.9330	0.00200	9.9	0.9350	0.00210
10.35	0.9359	0.00190	10.15	0.9390	0.00300	9.95	0.9380	0.00260
10.4	0.9389	0.00200	10.2	0.9362	0.00220	10	0.9403	0.00210
10.45	0.9423	0.00250	10.25	0.9451	0.00260	10.05	0.9461	0.00180
10.5	0.9449	0.00200	10.3	0.9496	0.00220	10.1	0.9478	0.00260
10.55	0.9506	0.00220	10.35	0.9569	0.00200	10.15	0.9537	0.00240
10.6	0.9564	0.00250	10.4	0.9553	0.00250	10.2	0.9568	0.00280
10.65	0.9589	0.00210	10.45	0.9579	0.00260	10.25	0.9590	0.00260
10.7	0.9612	0.00210	10.5	0.9640	0.00200	10.3	0.9677	0.00250
10.75	0.9630	0.00240	10.55	0.9682	0.00200	10.35	0.9700	0.00250
10.8	0.9671	0.00230	10.6	0.9728	0.00250	10.4	0.9729	0.00220
10.85	0.9675	0.00200	10.65	0.9710	0.00210	10.45	0.9748	0.00210
10.9	0.9728	0.00200	10.7	0.9778	0.00260	10.5	0.9765	0.00210
10.95	0.9786	0.00220	10.75	0.9825	0.00230	10.55	0.9865	0.00210
11	0.9785	0.00210	10.8	0.9841	0.00260	10.6	0.9892	0.00190
11.05	0.9867	0.00230	10.85	0.9869	0.00240	10.65	0.9928	0.00250
11.1	0.9858	0.00210	10.9	0.9937	0.00210	10.7	0.9897	0.00240
11.15	0.9895	0.00210	10.95	0.9916	0.00210	10.75	0.9963	0.00250
11.2	0.9936	0.00210	11	0.9996	0.00230	10.8	0.9973	0.00200
11.25	0.9976	0.00230	11.05	1.0012	0.00220	10.85	1.0047	0.00220
11.3	0.9990	0.00230	11.1	0.9998	0.00210	10.9	1.0068	0.00180
11.35	1.0026	0.00250	11.15	1.0100	0.00210	10.95	1.0133	0.00210
11.4	1.0055	0.00220	11.2	1.0123	0.00230	11	1.0157	0.00220
11.45	1.0063	0.00200	11.25	1.0182	0.00210	11.05	1.0128	0.00230
11.5	1.0138	0.00280	11.3	1.0205	0.00240	11.1	1.0196	0.00220
11.55	1.0150	0.00230	11.35	1.0196	0.00220			
11.6	1.0221	0.00220	11.4	1.0257	0.00220			

0.05			0.075			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.50	0.9142	0.00230	9.10	0.9161	0.00220	9.00	0.9190	0.00220
9.55	0.9173	0.00210	9.15	0.9180	0.00290	9.05	0.9275	0.00280
9.6	0.9227	0.00240	9.2	0.9285	0.00210	9.1	0.9303	0.00200
9.65	0.9257	0.00210	9.25	0.9297	0.00210	9.15	0.9331	0.00240
9.7	0.9357	0.00260	9.3	0.9325	0.00220	9.2	0.9343	0.00210
9.75	0.9362	0.00220	9.35	0.9377	0.00280	9.25	0.9436	0.00230
9.8	0.9391	0.00250	9.4	0.9437	0.00260	9.3	0.9507	0.00250
9.85	0.9423	0.00230	9.45	0.9464	0.00210	9.35	0.9536	0.00230
9.9	0.9450	0.00200	9.5	0.9494	0.00240	9.4	0.9581	0.00260
9.95	0.9510	0.00230	9.55	0.9577	0.00230	9.45	0.9585	0.00230
10	0.9566	0.00240	9.6	0.9544	0.00230	9.5	0.9610	0.00250
10.05	0.9547	0.00230	9.65	0.9640	0.00240	9.55	0.9675	0.00240
10.1	0.9616	0.00240	9.7	0.9639	0.00320	9.6	0.9713	0.00240
10.15	0.9682	0.00230	9.75	0.9692	0.00210	9.65	0.9773	0.00210
10.2	0.9735	0.00210	9.8	0.9746	0.00230	9.7	0.9827	0.00220
10.25	0.9729	0.00220	9.85	0.9776	0.00240	9.75	0.9873	0.00260
10.3	0.9777	0.00260	9.9	0.9808	0.00200	9.8	0.9885	0.00210
10.35	0.9820	0.00220	9.95	0.9864	0.00240	9.85	0.9889	0.00220
10.4	0.9858	0.00220	10	0.9896	0.00230	9.9	0.9998	0.00270
10.45	0.9898	0.00210	10.05	0.9912	0.00240	9.95	1.0027	0.00230
10.5	0.9951	0.00230	10.1	0.9998	0.00220	10	1.0030	0.00240
10.55	0.9997	0.00200	10.15	1.0021	0.00210	10.05	1.0101	0.00240
10.6	1.0005	0.00230	10.2	1.0086	0.00220	10.1	1.0107	0.00260
10.65	1.0039	0.00250	10.25	1.0097	0.00210	10.15	1.0165	0.00230
10.7	1.0111	0.00260	10.3	1.0145	0.00220	10.2	1.0166	0.00240
10.75	1.0083	0.00200	10.35	1.0212	0.00230	10.25	1.0300	0.00260
10.8	1.0132	0.00220	10.4	1.0200	0.00210	10.3	1.0267	0.00250
10.85	1.0163	0.00280						
10.9	1.0186	0.00200						

0.15			0.2			0.35		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.90	0.9183	0.00230	8.90	0.9234	0.00240	8.90	0.9242	0.00220
8.95	0.9249	0.00250	8.95	0.9283	0.00190	8.95	0.9283	0.00210
9	0.9301	0.00240	9	0.9233	0.00220	9	0.9313	0.00240
9.05	0.9318	0.00220	9.05	0.9329	0.00220	9.05	0.9356	0.00240
9.1	0.9328	0.00240	9.1	0.9394	0.00210	9.1	0.9405	0.00220
9.15	0.9453	0.00250	9.15	0.9447	0.00220	9.15	0.9474	0.00210
9.2	0.9493	0.00270	9.2	0.9474	0.00250	9.2	0.9445	0.00230
9.25	0.9517	0.00210	9.25	0.9540	0.00220	9.25	0.9505	0.00260
9.3	0.9544	0.00210	9.3	0.9585	0.00250	9.3	0.9517	0.00220
9.35	0.9626	0.00230	9.35	0.9639	0.00210	9.35	0.9563	0.00250
9.4	0.9650	0.00240	9.4	0.9635	0.00260	9.4	0.9644	0.00260
9.45	0.9665	0.00270	9.45	0.9652	0.00210	9.45	0.9617	0.00230
9.5	0.9708	0.00280	9.5	0.9700	0.00220	9.5	0.9729	0.00210
9.55	0.9784	0.00220	9.55	0.9756	0.00200	9.55	0.9758	0.00220
9.6	0.9776	0.00210	9.6	0.9788	0.00220	9.6	0.9800	0.00210
9.65	0.9828	0.00220	9.65	0.9841	0.00270	9.65	0.9783	0.00240
9.7	0.9833	0.00230	9.7	0.9884	0.00230	9.7	0.9892	0.00210
9.75	0.9914	0.00230	9.75	0.9921	0.00210	9.75	0.9910	0.00310
9.8	0.9978	0.00230	9.8	0.9984	0.00230	9.8	0.9943	0.00230
9.85	0.9977	0.00260	9.85	1.0008	0.00240	9.85	0.9979	0.00230
9.9	1.0045	0.00230	9.9	1.0054	0.00190	9.9	1.0033	0.00250
9.95	1.0058	0.00330	9.95	1.0101	0.00220	9.95	1.0080	0.00240
10	1.0087	0.00230	10	1.0138	0.00210	10	1.0081	0.00230
10.05	1.0162	0.00240	10.05	1.0150	0.00250	10.05	1.0142	0.00210
10.1	1.0184	0.00250	10.1	1.0187	0.00260	10.1	1.0186	0.00220
10.15	1.0259	0.00240	10.15	1.0223	0.00240	10.15	1.0190	0.00220
10.2	1.0276	0.00250	10.2	1.0315	0.00290	10.2	1.0196	0.00200

0.5			0.75			1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.80	0.9175	0.00200	8.70	0.9291	0.00220	8.40	0.9145	0.00220
8.85	0.9218	0.00220	8.75	0.9280	0.00200	8.45	0.9239	0.00290
8.9	0.9273	0.00200	8.8	0.9353	0.00220	8.5	0.9238	0.00210
8.95	0.9305	0.00260	8.85	0.9388	0.00200	8.55	0.9309	0.00220
9	0.9347	0.00230	8.9	0.9401	0.00200	8.6	0.9322	0.00190
9.05	0.9373	0.00220	8.95	0.9465	0.00200	8.65	0.9399	0.00220
9.1	0.9400	0.00190	9	0.9486	0.00250	8.7	0.9408	0.00190
9.15	0.9439	0.00280	9.05	0.9585	0.00240	8.75	0.9461	0.00190
9.2	0.9493	0.00220	9.1	0.9539	0.00250	8.8	0.9519	0.00190
9.25	0.9566	0.00240	9.15	0.9599	0.00210	8.85	0.9557	0.00190
9.3	0.9594	0.00240	9.2	0.9688	0.00210	8.9	0.9623	0.00190
9.35	0.9613	0.00190	9.25	0.9665	0.00250	8.95	0.9615	0.00260
9.4	0.9637	0.00200	9.3	0.9752	0.00230	9	0.9739	0.00200
9.45	0.9721	0.00210	9.35	0.9798	0.00190	9.05	0.9696	0.00230
9.5	0.9757	0.00220	9.4	0.9763	0.00210	9.1	0.9769	0.00190
9.55	0.9771	0.00210	9.45	0.9845	0.00190	9.15	0.9801	0.00200
9.6	0.9783	0.00200	9.5	0.9927	0.00200	9.2	0.9818	0.00230
9.65	0.9837	0.00210	9.55	0.9907	0.00210	9.25	0.9860	0.00250
9.7	0.9935	0.00230	9.6	0.9966	0.00230	9.3	0.9921	0.00190
9.75	0.9908	0.00250	9.65	1.0002	0.00250	9.35	0.9933	0.00200
9.8	0.9974	0.00210	9.7	1.0018	0.00210	9.4	0.9971	0.00200
9.85	1.0004	0.00220	9.75	1.0026	0.00250	9.45	1.0007	0.00220
9.9	1.0063	0.00200	9.8	1.0072	0.00200	9.5	1.0075	0.00220
9.95	1.0085	0.00190	9.85	1.0125	0.00230	9.55	1.0087	0.00190
10	1.0125	0.00240	9.9	1.0157	0.00190	9.6	1.0150	0.00190
10.05	1.0131	0.00260	9.95	1.0241	0.00210	9.65	1.0206	0.00220
10.1	1.0162	0.00210	10	1.0277	0.00200	9.7	1.0210	0.00180
10.15	1.0183	0.00270				9.75	1.0239	0.00220
10.2	1.0268	0.00210				9.8	1.0299	0.00250

1.5			2			2.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.00	0.9272	0.00190	7.50	0.9201	0.00180	7.10	0.9184	0.00230
8.05	0.9305	0.00190	7.55	0.9178	0.00180	7.15	0.9260	0.00190
8.1	0.9329	0.00190	7.6	0.9285	0.00310	7.2	0.9309	0.00230
8.15	0.9400	0.00190	7.65	0.9350	0.00230	7.25	0.9370	0.00200
8.2	0.9437	0.00230	7.7	0.9390	0.00180	7.3	0.9397	0.00210
8.25	0.9451	0.00200	7.75	0.9440	0.00220	7.35	0.9434	0.00200
8.3	0.9504	0.00260	7.8	0.9499	0.00200	7.4	0.9476	0.00200
8.35	0.9553	0.00190	7.85	0.9544	0.00260	7.45	0.9573	0.00220
8.4	0.9601	0.00200	7.9	0.9588	0.00180	7.5	0.9629	0.00240
8.45	0.9667	0.00210	7.95	0.9653	0.00190	7.55	0.9651	0.00200
8.5	0.9690	0.00250	8	0.9686	0.00280	7.6	0.9712	0.00200
8.55	0.9746	0.00180	8.05	0.9774	0.00180	7.65	0.9784	0.00200
8.6	0.9755	0.00200	8.1	0.9788	0.00180	7.7	0.9818	0.00200
8.65	0.9801	0.00240	8.15	0.9818	0.00190	7.75	0.9849	0.00190
8.7	0.9869	0.00240	8.2	0.9877	0.00270	7.8	0.9943	0.00210
8.75	0.9909	0.00200	8.25	0.9930	0.00250	7.85	0.9983	0.00230
8.8	0.9968	0.00220	8.3	0.9952	0.00210	7.9	1.0029	0.00190
8.85	0.9926	0.00220	8.35	1.0010	0.00210	7.95	1.0091	0.00240
8.9	0.9994	0.00210	8.4	1.0064	0.00190	8	1.0160	0.00180
8.95	1.0040	0.00210	8.45	1.0098	0.00210	8.05	1.0154	0.00190
9	1.0109	0.00250	8.5	1.0136	0.00200	8.1	1.0202	0.00220
9.05	1.0123	0.00200	8.55	1.0178	0.00210	8.15	1.0233	0.00230
9.1	1.0208	0.00210	8.6	1.0231	0.00170	8.2	1.0300	0.00190
9.15	1.0224	0.00200	8.65	1.0242	0.00210			
9.2	1.0259	0.00190	8.7	1.0328	0.00220			
			8.75	1.0353	0.00190			
			8.8	1.0390	0.00250			
			8.85	1.0470	0.00280			
			8.9	1.0496	0.00180			
			8.95	1.0532	0.00290			
			9	1.0600	0.00220			
			9.05	1.0604	0.00190			
			9.1	1.0602	0.00220			

3			4			5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.70	0.9115	0.00210	6.20	0.9242	0.00190	5.70	0.9276	0.00190
6.75	0.9190	0.00170	6.25	0.9324	0.00200	5.75	0.9299	0.00210
6.8	0.9258	0.00180	6.3	0.9421	0.00240	5.8	0.9387	0.00180
6.85	0.9341	0.00180	6.35	0.9474	0.00220	5.85	0.9430	0.00200
6.9	0.9394	0.00200	6.4	0.9518	0.00190	5.9	0.9536	0.00170
6.95	0.9443	0.00190	6.45	0.9626	0.00190	5.95	0.9613	0.00170
7	0.9494	0.00200	6.5	0.9672	0.00210	6	0.9684	0.00220
7.05	0.9529	0.00190	6.55	0.9735	0.00200	6.05	0.9759	0.00220
7.1	0.9584	0.00300	6.6	0.9759	0.00200	6.1	0.9827	0.00260
7.15	0.9638	0.00210	6.65	0.9825	0.00190	6.15	0.9885	0.00250
7.2	0.9738	0.00190	6.7	0.9920	0.00210	6.2	0.9977	0.00190
7.25	0.9807	0.00220	6.75	0.9958	0.00210	6.25	1.0052	0.00250
7.3	0.9856	0.00190	6.8	1.0046	0.00180	6.3	1.0078	0.00230
7.35	0.9893	0.00180	6.85	1.0080	0.00220	6.35	1.0139	0.00210
7.4	0.9929	0.00210	6.9	1.0108	0.00190	6.4	1.0207	0.00200
7.45	0.9982	0.00210	6.95	1.0201	0.00180	6.45	1.0311	0.00210
7.5	1.0022	0.00210	7	1.0236	0.00190	6.5	1.0347	0.00200
7.55	1.0067	0.00190						
7.6	1.0146	0.00170						
7.65	1.0172	0.00190						
7.7	1.0211	0.00190						

6			7			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.20	0.9098	0.00220	4.90	0.9158	0.00190	4.70	0.9126	0.00180
5.25	0.9192	0.00190	4.95	0.9196	0.00250	4.75	0.9206	0.00230
5.3	0.9231	0.00240	5	0.9345	0.00220	4.8	0.9300	0.00180
5.35	0.9316	0.00180	5.05	0.9422	0.00340	4.85	0.9319	0.00180
5.4	0.9365	0.00240	5.1	0.9477	0.00180	4.9	0.9432	0.00220
5.45	0.9502	0.00200	5.15	0.9606	0.00210	4.95	0.9535	0.00220
5.5	0.9558	0.00240	5.2	0.9702	0.00180	5	0.9646	0.00220
5.55	0.9661	0.00210	5.25	0.9760	0.00210	5.05	0.9695	0.00180
5.6	0.9750	0.00190	5.3	0.9860	0.00220	5.1	0.9772	0.00240
5.65	0.9784	0.00190	5.35	0.9965	0.00170	5.15	0.9855	0.00230
5.7	0.9863	0.00200	5.4	1.0029	0.00230	5.2	0.9973	0.00190
5.75	0.9922	0.00200	5.45	1.0130	0.00220	5.25	1.0031	0.00190
5.8	1.0064	0.00240	5.5	1.0140	0.00260	5.3	1.0127	0.00210
5.85	1.0109	0.00180	5.55	1.0272	0.00250	5.35	1.0218	0.00190
5.9	1.0166	0.00190	5.6	1.0344	0.00210	5.4	1.0321	0.00230
5.95	1.0287	0.00230						
6	1.0318	0.00220						

8			9			10		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.60	0.9191	0.00170	4.30	0.9160	0.00190	4.10	0.9232	0.00200
4.65	0.9281	0.00260	4.35	0.9232	0.00180	4.15	0.9343	0.00190
4.7	0.9410	0.00190	4.4	0.9278	0.00190	4.2	0.9439	0.00170
4.75	0.9459	0.00180	4.45	0.9410	0.00200	4.25	0.9499	0.00170
4.8	0.9539	0.00170	4.5	0.9523	0.00190	4.3	0.9662	0.00220
4.85	0.9618	0.00180	4.55	0.9597	0.00220	4.35	0.9725	0.00170
4.9	0.9756	0.00180	4.6	0.9693	0.00190	4.4	0.9864	0.00170
4.95	0.9834	0.00190	4.65	0.9800	0.00170	4.45	0.9923	0.00200
5	0.9891	0.00230	4.7	0.9893	0.00210	4.5	0.9982	0.00210
5.05	0.9970	0.00190	4.75	0.9986	0.00210	4.55	1.0115	0.00180
5.1	1.0067	0.00200	4.8	1.0022	0.00220	4.6	1.0215	0.00190
5.15	1.0160	0.00210	4.85	1.0151	0.00180	4.65	1.0306	0.00240
5.2	1.0224	0.00190	4.9	1.0265	0.00170	4.7	1.0435	0.00220

15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.10	0.9195	0.00170	2.40	0.8979	0.00180
3.12	0.9231	0.00170	2.42	0.9085	0.00190
3.14	0.9329	0.00230	2.44	0.9108	0.00190
3.16	0.9318	0.00190	2.46	0.9166	0.00200
3.18	0.9408	0.00190	2.48	0.9229	0.00200
3.2	0.9475	0.00210	2.5	0.9308	0.00200
3.22	0.9478	0.00220	2.52	0.9380	0.00190
3.24	0.9530	0.00190	2.54	0.9426	0.00220
3.26	0.9624	0.00180	2.56	0.9475	0.00200
3.28	0.9613	0.00180	2.58	0.9563	0.00200
3.3	0.9711	0.00220	2.6	0.9604	0.00270
3.32	0.9709	0.00190	2.62	0.9675	0.00200
3.34	0.9766	0.00210	2.64	0.9726	0.00190
3.36	0.9845	0.00220	2.66	0.9762	0.00210
3.38	0.9866	0.00210	2.68	0.9822	0.00250
3.4	0.9951	0.00190	2.7	0.9907	0.00180
3.42	0.9988	0.00180	2.72	0.9952	0.00190
3.44	1.0016	0.00170	2.74	1.0024	0.00260
3.46	1.0096	0.00190	2.76	1.0050	0.00220
3.48	1.0147	0.00210	2.78	1.0160	0.00200
3.5	1.0185	0.00200	2.8	1.0184	0.00200
3.52	1.0193	0.00200	2.82	1.0275	0.00200
3.54	1.0241	0.00210	2.84	1.0320	0.00220
3.56	1.0312	0.00210	2.86	1.0404	0.00210
3.58	1.0369	0.00210	2.88	1.0455	0.00210
3.6	1.0426	0.00220	2.9	1.0455	0.00180

Case ID: pu_cyl_095_01ref

Material: Plutonium

Geometry: Infinite Cylinder

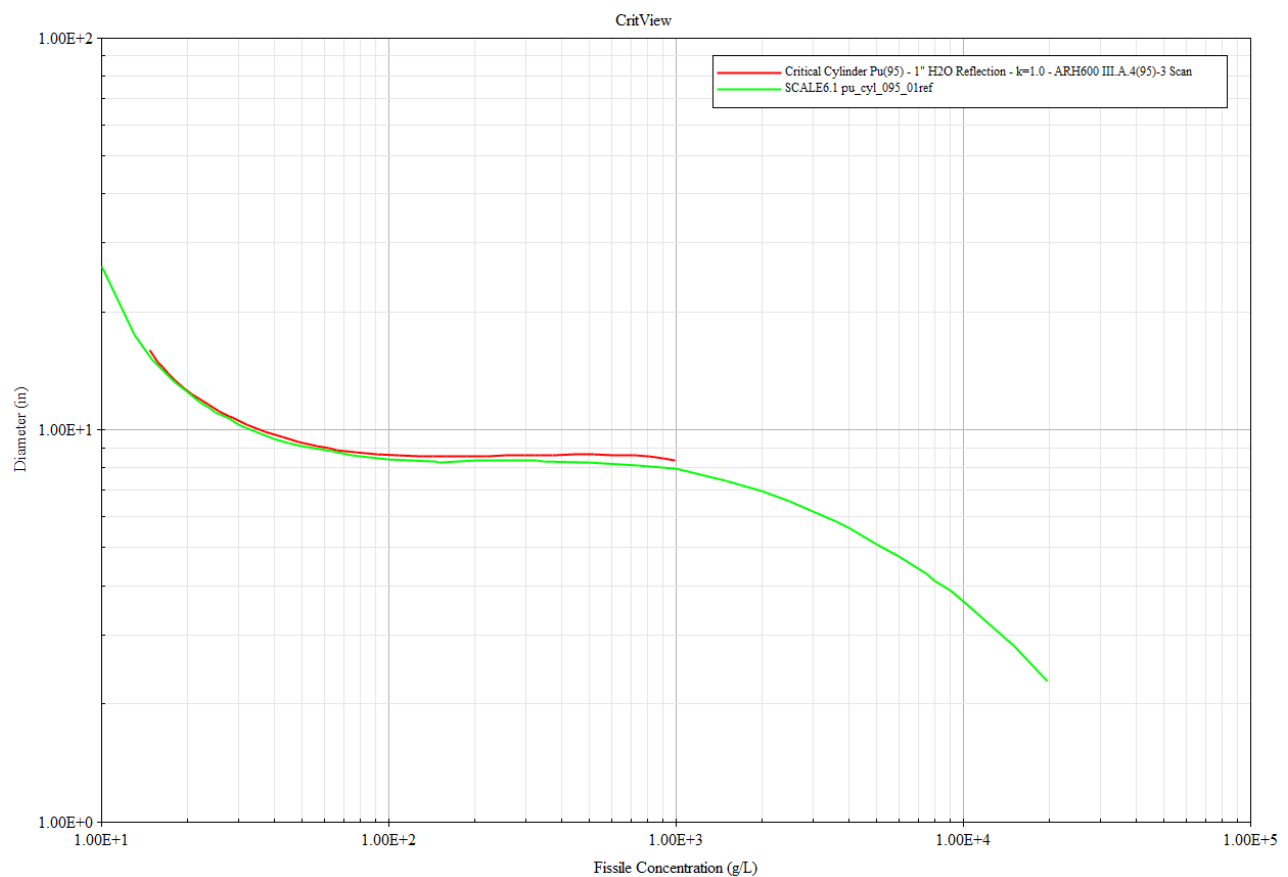
Isotopics: 95% ^{239}Pu 5% ^{240}Pu

Reflector: 1" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	19.400	28.100	0.400	26.2000
0.013	14.300	18.200	0.200	17.4949
0.015	12.800	15.800	0.100	15.1596
0.018	11.400	13.700	0.100	13.2609
0.020	10.700	12.800	0.100	12.4725
0.022	10.200	12.200	0.100	11.7738
0.024	9.900	11.600	0.050	11.3667
0.025	9.700	11.500	0.100	11.1000
0.026	9.600	11.300	0.050	10.9693
0.028	9.300	11.000	0.050	10.6545
0.030	9.100	10.700	0.050	10.3146
0.032	8.900	10.500	0.050	10.1191
0.036	8.600	10.200	0.050	9.7796
0.040	8.400	9.900	0.050	9.4929
0.045	8.200	9.500	0.050	9.2664
0.050	8.000	9.400	0.050	9.0597
0.075	7.600	8.900	0.050	8.5991
0.100	7.400	8.800	0.050	8.4123
0.150	7.300	8.600	0.050	8.2478
0.200	7.300	8.600	0.050	8.3354
0.350	7.300	8.600	0.050	8.3048
0.500	7.300	8.600	0.050	8.2611
0.750	7.200	8.400	0.050	8.1121
1.000	7.000	8.200	0.050	7.9477
1.500	6.500	7.700	0.050	7.4158
2.000	6.200	7.200	0.050	6.9760
2.500	5.800	6.800	0.050	6.5493
3.000	5.500	6.400	0.050	6.1934
4.000	5.000	5.800	0.050	5.6113
5.000	4.600	5.300	0.050	5.0990
6.000	4.200	4.900	0.050	4.7405
7.000	3.900	4.600	0.050	4.4114
7.500	3.800	4.400	0.050	4.2768
8.000	3.700	4.300	0.050	4.1138
9.000	3.400	4.000	0.050	3.8911
10.000	3.200	3.800	0.050	3.6564
15.000	2.500	2.900	0.020	2.8241
19.600	2.000	2.400	0.020	2.2883

[illegible]

CritView compatible data file

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reset:
title: SCALE6.1 pu_cyl_095_01ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infcyl
modmat: H2O
critmat: plutonium
isomat: Pu239 0.95 Pu240 0.05
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 26.2000
0.013 17.4949
0.015 15.1596
0.018 13.2609
0.020 12.4725
0.022 11.7738
0.024 11.3667
0.025 11.1000
0.026 10.9693
0.028 10.6545
0.030 10.3146
0.032 10.1191
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0.150 8.2478
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1.000 7.9477
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2.000 6.9760
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8.000 4.1138
9.000 3.8911
10.000 3.6564
15.000 2.8241
19.600 2.2883
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0.01			0.013			0.015		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
19.40	0.9283	0.00140	14.30	0.9231	0.00150	12.80	0.9275	0.00180
19.8	0.9336	0.00130	14.5	0.9334	0.00150	12.9	0.9282	0.00160
20.2	0.9367	0.00110	14.7	0.9367	0.00160	13	0.9318	0.00170
20.6	0.9465	0.00130	14.9	0.9404	0.00200	13.1	0.9332	0.00160
21	0.9502	0.00120	15.1	0.9440	0.00170	13.2	0.9359	0.00130
21.4	0.9542	0.00120	15.3	0.9528	0.00140	13.3	0.9418	0.00180
21.8	0.9569	0.00130	15.5	0.9591	0.00160	13.4	0.9455	0.00160
22.2	0.9607	0.00110	15.7	0.9603	0.00140	13.5	0.9484	0.00190
22.6	0.9664	0.00130	15.9	0.9659	0.00160	13.6	0.9524	0.00170
23	0.9697	0.00130	16.1	0.9699	0.00150	13.7	0.9578	0.00170
23.4	0.9768	0.00120	16.3	0.9748	0.00180	13.8	0.9576	0.00150
23.8	0.9773	0.00140	16.5	0.9780	0.00150	13.9	0.9609	0.00170
24.2	0.9834	0.00150	16.7	0.9828	0.00130	14	0.9627	0.00190
24.6	0.9861	0.00120	16.9	0.9896	0.00180	14.1	0.9669	0.00150
25	0.9899	0.00100	17.1	0.9940	0.00160	14.2	0.9679	0.00140
25.4	0.9921	0.00110	17.3	0.9962	0.00150	14.3	0.9747	0.00170
25.8	0.9977	0.00110	17.5	1.0001	0.00150	14.4	0.9776	0.00190
26.2	1.0000	0.00180	17.7	1.0039	0.00160	14.5	0.9773	0.00160
26.6	1.0018	0.00130	17.9	1.0087	0.00160	14.6	0.9807	0.00190
27	1.0027	0.00140	18.1	1.0096	0.00190	14.7	0.9842	0.00160
27.4	1.0082	0.00130	18.2	1.0120	0.00140	14.8	0.9891	0.00120
27.8	1.0109	0.00110				14.9	0.9908	0.00180
28.1	1.0132	0.00120				15	0.9949	0.00170
						15.1	0.9969	0.00140
						15.2	1.0021	0.00140
						15.3	1.0042	0.00150
						15.4	1.0044	0.00160
						15.5	1.0088	0.00140
						15.6	1.0092	0.00130
						15.7	1.0131	0.00170
						15.8	1.0160	0.00190

0.018			0.02			0.022		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.40	0.9238	0.00170	10.70	0.9194	0.00180	10.20	0.9146	0.00170
11.5	0.9276	0.00160	10.8	0.9255	0.00180	10.3	0.9244	0.00210
11.6	0.9332	0.00170	10.9	0.9301	0.00150	10.4	0.9297	0.00300
11.7	0.9358	0.00180	11	0.9348	0.00210	10.5	0.9373	0.00190
11.8	0.9427	0.00160	11.1	0.9391	0.00190	10.6	0.9425	0.00170
11.9	0.9436	0.00170	11.2	0.9417	0.00170	10.7	0.9441	0.00180
12	0.9499	0.00170	11.3	0.9484	0.00200	10.8	0.9528	0.00170
12.1	0.9528	0.00180	11.4	0.9533	0.00190	10.9	0.9504	0.00190
12.2	0.9595	0.00210	11.5	0.9616	0.00180	11	0.9558	0.00180
12.3	0.9627	0.00180	11.6	0.9652	0.00170	11.1	0.9658	0.00170
12.4	0.9673	0.00170	11.7	0.9684	0.00160	11.2	0.9691	0.00230
12.5	0.9707	0.00170	11.8	0.9730	0.00210	11.3	0.9727	0.00190
12.6	0.9729	0.00170	11.9	0.9750	0.00170	11.4	0.9800	0.00180
12.7	0.9763	0.00180	12	0.9811	0.00160	11.5	0.9848	0.00170
12.8	0.9809	0.00150	12.1	0.9833	0.00160	11.6	0.9883	0.00180
12.9	0.9870	0.00210	12.2	0.9895	0.00180	11.7	0.9941	0.00180
13	0.9906	0.00180	12.3	0.9937	0.00160	11.8	1.0021	0.00190
13.1	0.9952	0.00190	12.4	0.9963	0.00190	11.9	1.0046	0.00210
13.2	0.9972	0.00180	12.5	1.0014	0.00230	12	1.0070	0.00180
13.3	1.0018	0.00160	12.6	1.0049	0.00170	12.1	1.0127	0.00170
13.4	1.0032	0.00160	12.7	1.0130	0.00180	12.2	1.0196	0.00210
13.5	1.0089	0.00190	12.8	1.0186	0.00200			
13.6	1.0128	0.00190						
13.7	1.0129	0.00140						

0.024			0.025			0.026		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.90	0.9190	0.00170	9.70	0.9190	0.00200	9.60	0.9193	0.00200
9.95	0.9232	0.00200	9.8	0.9246	0.00200	9.65	0.9275	0.00200
10	0.9269	0.00190	9.9	0.9328	0.00190	9.7	0.9324	0.00230
10.05	0.9310	0.00200	10	0.9386	0.00200	9.75	0.9318	0.00190
10.1	0.9363	0.00250	10.1	0.9446	0.00190	9.8	0.9342	0.00190
10.15	0.9363	0.00150	10.2	0.9493	0.00200	9.85	0.9375	0.00240
10.2	0.9402	0.00200	10.3	0.9553	0.00220	9.9	0.9393	0.00170
10.25	0.9415	0.00160	10.4	0.9592	0.00240	9.95	0.9443	0.00170
10.3	0.9450	0.00180	10.5	0.9674	0.00210	10	0.9464	0.00180
10.35	0.9510	0.00200	10.6	0.9724	0.00180	10.05	0.9520	0.00200
10.4	0.9495	0.00190	10.7	0.9767	0.00200	10.1	0.9533	0.00180
10.45	0.9531	0.00190	10.8	0.9841	0.00230	10.15	0.9520	0.00170
10.5	0.9561	0.00170	10.9	0.9868	0.00190	10.2	0.9605	0.00190
10.55	0.9610	0.00180	11	0.9914	0.00190	10.25	0.9659	0.00250
10.6	0.9598	0.00170	11.1	1.0000	0.00220	10.3	0.9618	0.00230
10.65	0.9661	0.00180	11.2	1.0015	0.00210	10.35	0.9652	0.00190
10.7	0.9668	0.00240	11.3	1.0084	0.00190	10.4	0.9656	0.00200
10.75	0.9699	0.00190	11.4	1.0124	0.00190	10.45	0.9686	0.00170
10.8	0.9734	0.00180	11.5	1.0168	0.00190	10.5	0.9792	0.00240
10.85	0.9715	0.00210				10.55	0.9753	0.00190
10.9	0.9772	0.00180				10.6	0.9814	0.00200
10.95	0.9766	0.00200				10.65	0.9840	0.00200
11	0.9839	0.00170				10.7	0.9860	0.00190
11.05	0.9861	0.00170				10.75	0.9883	0.00200
11.1	0.9883	0.00200				10.8	0.9924	0.00180
11.15	0.9890	0.00240				10.85	0.9970	0.00210
11.2	0.9922	0.00190				10.9	0.9974	0.00190
11.25	0.9948	0.00210				10.95	0.9973	0.00190
11.3	0.9998	0.00180				11	1.0043	0.00190
11.35	0.9987	0.00170				11.05	1.0064	0.00230
11.4	1.0026	0.00190				11.1	1.0078	0.00190
11.45	1.0077	0.00240				11.15	1.0161	0.00170
11.5	1.0083	0.00200				11.2	1.0108	0.00190
11.55	1.0096	0.00180				11.25	1.0143	0.00180
11.6	1.0130	0.00180				11.3	1.0145	0.00180

0.028			0.03			0.032		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.30	0.9180	0.00210	9.10	0.9203	0.00220	8.90	0.9145	0.00190
9.35	0.9248	0.00180	9.15	0.9235	0.00200	8.95	0.9182	0.00220
9.4	0.9268	0.00190	9.2	0.9280	0.00170	9	0.9254	0.00180
9.45	0.9308	0.00200	9.25	0.9303	0.00180	9.05	0.9316	0.00220
9.5	0.9358	0.00210	9.3	0.9282	0.00220	9.1	0.9345	0.00200
9.55	0.9322	0.00180	9.35	0.9387	0.00200	9.15	0.9369	0.00200
9.6	0.9426	0.00190	9.4	0.9393	0.00220	9.2	0.9394	0.00200
9.65	0.9385	0.00170	9.45	0.9441	0.00160	9.25	0.9417	0.00230
9.7	0.9476	0.00180	9.5	0.9431	0.00190	9.3	0.9469	0.00210
9.75	0.9482	0.00190	9.55	0.9510	0.00220	9.35	0.9528	0.00190
9.8	0.9509	0.00210	9.6	0.9561	0.00180	9.4	0.9549	0.00210
9.85	0.9551	0.00180	9.65	0.9551	0.00190	9.45	0.9606	0.00240
9.9	0.9584	0.00220	9.7	0.9595	0.00210	9.5	0.9603	0.00180
9.95	0.9615	0.00270	9.75	0.9625	0.00220	9.55	0.9633	0.00180
10	0.9654	0.00200	9.8	0.9651	0.00190	9.6	0.9682	0.00200
10.05	0.9648	0.00180	9.85	0.9666	0.00200	9.65	0.9696	0.00180
10.1	0.9671	0.00170	9.9	0.9728	0.00200	9.7	0.9748	0.00240
10.15	0.9721	0.00190	9.95	0.9765	0.00170	9.75	0.9774	0.00240
10.2	0.9774	0.00220	10	0.9763	0.00270	9.8	0.9766	0.00180
10.25	0.9798	0.00180	10.05	0.9790	0.00190	9.85	0.9813	0.00220
10.3	0.9827	0.00180	10.1	0.9831	0.00180	9.9	0.9884	0.00220
10.35	0.9875	0.00200	10.15	0.9865	0.00210	9.95	0.9873	0.00230
10.4	0.9876	0.00180	10.2	0.9904	0.00210	10	0.9942	0.00190
10.45	0.9925	0.00170	10.25	0.9917	0.00170	10.05	0.9940	0.00220
10.5	0.9888	0.00220	10.3	0.9981	0.00180	10.1	0.9979	0.00210
10.55	0.9949	0.00210	10.35	1.0046	0.00230	10.15	1.0034	0.00190
10.6	0.9990	0.00170	10.4	1.0005	0.00260	10.2	1.0026	0.00200
10.65	0.9994	0.00220	10.45	1.0042	0.00170	10.25	1.0068	0.00190
10.7	1.0060	0.00170	10.5	1.0106	0.00180	10.3	1.0096	0.00200
10.75	1.0095	0.00200	10.55	1.0115	0.00210	10.35	1.0134	0.00200
10.8	1.0059	0.00210	10.6	1.0121	0.00180	10.4	1.0148	0.00210
10.85	1.0137	0.00180	10.65	1.0141	0.00210	10.45	1.0185	0.00220
10.9	1.0160	0.00180	10.7	1.0195	0.00190	10.5	1.0251	0.00220
10.95	1.0157	0.00180						
11	1.0221	0.00220						

0.036			0.04			0.045		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.60	0.9188	0.00230	8.40	0.9153	0.00240	8.20	0.9173	0.00190
8.65	0.9203	0.00230	8.45	0.9248	0.00190	8.25	0.9238	0.00200
8.7	0.9262	0.00220	8.5	0.9255	0.00180	8.3	0.9252	0.00200
8.75	0.9278	0.00240	8.55	0.9336	0.00220	8.35	0.9323	0.00190
8.8	0.9334	0.00220	8.6	0.9325	0.00190	8.4	0.9333	0.00200
8.85	0.9325	0.00220	8.65	0.9393	0.00240	8.45	0.9417	0.00210
8.9	0.9407	0.00190	8.7	0.9427	0.00220	8.5	0.9469	0.00240
8.95	0.9408	0.00210	8.75	0.9440	0.00200	8.55	0.9448	0.00210
9	0.9490	0.00210	8.8	0.9493	0.00230	8.6	0.9516	0.00220
9.05	0.9482	0.00260	8.85	0.9581	0.00210	8.65	0.9582	0.00220
9.1	0.9564	0.00190	8.9	0.9570	0.00240	8.7	0.9586	0.00230
9.15	0.9603	0.00230	8.95	0.9595	0.00200	8.75	0.9590	0.00200
9.2	0.9609	0.00200	9	0.9673	0.00210	8.8	0.9692	0.00180
9.25	0.9630	0.00220	9.05	0.9677	0.00250	8.85	0.9690	0.00220
9.3	0.9676	0.00200	9.1	0.9714	0.00220	8.9	0.9722	0.00200
9.35	0.9742	0.00210	9.15	0.9794	0.00240	8.95	0.9778	0.00210
9.4	0.9760	0.00200	9.2	0.9817	0.00200	9	0.9813	0.00200
9.45	0.9792	0.00230	9.25	0.9815	0.00220	9.05	0.9853	0.00190
9.5	0.9822	0.00160	9.3	0.9857	0.00200	9.1	0.9878	0.00180
9.55	0.9844	0.00230	9.35	0.9906	0.00190	9.15	0.9917	0.00240
9.6	0.9888	0.00210	9.4	0.9923	0.00210	9.2	0.9932	0.00200
9.65	0.9959	0.00240	9.45	0.9988	0.00200	9.25	0.9979	0.00250
9.7	0.9970	0.00180	9.5	1.0002	0.00220	9.3	1.0043	0.00200
9.75	0.9971	0.00220	9.55	1.0010	0.00190	9.35	1.0045	0.00210
9.8	1.0020	0.00190	9.6	1.0037	0.00210	9.4	1.0110	0.00200
9.85	1.0003	0.00190	9.65	1.0111	0.00170	9.45	1.0134	0.00220
9.9	1.0061	0.00210	9.7	1.0137	0.00200	9.5	1.0173	0.00240
9.95	1.0086	0.00180	9.75	1.0168	0.00180			
10	1.0127	0.00210	9.8	1.0196	0.00250			
10.05	1.0140	0.00200	9.85	1.0206	0.00240			
10.1	1.0157	0.00250	9.9	1.0234	0.00180			
10.15	1.0235	0.00230						
10.2	1.0253	0.00180						

0.05			0.075			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.00	0.9173	0.00210	7.60	0.9126	0.00210	7.40	0.9167	0.00220
8.05	0.9211	0.00190	7.65	0.9211	0.00210	7.45	0.9223	0.00190
8.1	0.9250	0.00230	7.7	0.9252	0.00250	7.5	0.9244	0.00240
8.15	0.9336	0.00220	7.75	0.9308	0.00230	7.55	0.9309	0.00210
8.2	0.9357	0.00230	7.8	0.9350	0.00220	7.6	0.9325	0.00220
8.25	0.9389	0.00250	7.85	0.9422	0.00210	7.65	0.9409	0.00230
8.3	0.9390	0.00200	7.9	0.9409	0.00200	7.7	0.9428	0.00220
8.35	0.9429	0.00220	7.95	0.9521	0.00210	7.75	0.9419	0.00200
8.4	0.9507	0.00200	8	0.9553	0.00210	7.8	0.9522	0.00200
8.45	0.9544	0.00240	8.05	0.9609	0.00210	7.85	0.9597	0.00230
8.5	0.9597	0.00240	8.1	0.9643	0.00250	7.9	0.9604	0.00240
8.55	0.9622	0.00210	8.15	0.9658	0.00200	7.95	0.9643	0.00200
8.6	0.9627	0.00200	8.2	0.9711	0.00220	8	0.9696	0.00230
8.65	0.9635	0.00210	8.25	0.9758	0.00210	8.05	0.9740	0.00210
8.7	0.9742	0.00240	8.3	0.9791	0.00210	8.1	0.9779	0.00180
8.75	0.9812	0.00230	8.35	0.9788	0.00270	8.15	0.9785	0.00270
8.8	0.9825	0.00260	8.4	0.9883	0.00210	8.2	0.9834	0.00310
8.85	0.9817	0.00240	8.45	0.9884	0.00230	8.25	0.9895	0.00260
8.9	0.9891	0.00190	8.5	0.9938	0.00260	8.3	0.9976	0.00220
8.95	0.9931	0.00200	8.55	0.9948	0.00230	8.35	0.9952	0.00270
9	0.9914	0.00220	8.6	1.0001	0.00220	8.4	0.9985	0.00220
9.05	0.9993	0.00210	8.65	1.0047	0.00230	8.45	1.0046	0.00230
9.1	1.0029	0.00200	8.7	1.0086	0.00210	8.5	1.0096	0.00220
9.15	1.0052	0.00230	8.75	1.0118	0.00200	8.55	1.0160	0.00230
9.2	1.0094	0.00300	8.8	1.0175	0.00290	8.6	1.0162	0.00220
9.25	1.0142	0.00210	8.85	1.0230	0.00220	8.65	1.0214	0.00270
9.3	1.0162	0.00210	8.9	1.0258	0.00230	8.7	1.0251	0.00200
9.35	1.0212	0.00210				8.75	1.0318	0.00230
9.4	1.0195	0.00220				8.8	1.0320	0.00240

0.15			0.2			0.35		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.30	0.9178	0.00280	7.30	0.9155	0.00250	7.30	0.9184	0.00220
7.35	0.9221	0.00240	7.35	0.9219	0.00220	7.35	0.9212	0.00200
7.4	0.9253	0.00220	7.4	0.9298	0.00240	7.4	0.9306	0.00210
7.45	0.9294	0.00250	7.45	0.9352	0.00220	7.45	0.9355	0.00230
7.5	0.9324	0.00220	7.5	0.9356	0.00220	7.5	0.9340	0.00210
7.55	0.9375	0.00270	7.55	0.9410	0.00230	7.55	0.9417	0.00240
7.6	0.9419	0.00250	7.6	0.9457	0.00190	7.6	0.9458	0.00230
7.65	0.9507	0.00200	7.65	0.9441	0.00230	7.65	0.9487	0.00250
7.7	0.9505	0.00220	7.7	0.9484	0.00210	7.7	0.9574	0.00220
7.75	0.9538	0.00210	7.75	0.9586	0.00230	7.75	0.9603	0.00230
7.8	0.9621	0.00230	7.8	0.9591	0.00220	7.8	0.9610	0.00240
7.85	0.9648	0.00250	7.85	0.9628	0.00210	7.85	0.9629	0.00240
7.9	0.9710	0.00210	7.9	0.9658	0.00220	7.9	0.9716	0.00250
7.95	0.9741	0.00210	7.95	0.9710	0.00240	7.95	0.9693	0.00190
8	0.9788	0.00230	8	0.9787	0.00230	8	0.9764	0.00200
8.05	0.9842	0.00220	8.05	0.9783	0.00190	8.05	0.9811	0.00220
8.1	0.9810	0.00230	8.1	0.9820	0.00210	8.1	0.9827	0.00230
8.15	0.9912	0.00220	8.15	0.9937	0.00230	8.15	0.9882	0.00200
8.2	0.9934	0.00220	8.2	0.9913	0.00290	8.2	0.9908	0.00200
8.25	1.0003	0.00200	8.25	0.9994	0.00200	8.25	0.9959	0.00240
8.3	1.0014	0.00240	8.3	1.0017	0.00340	8.3	0.9996	0.00190
8.35	1.0044	0.00260	8.35	0.9993	0.00200	8.35	1.0038	0.00230
8.4	1.0089	0.00240	8.4	1.0092	0.00200	8.4	1.0041	0.00220
8.45	1.0123	0.00210	8.45	1.0125	0.00210	8.45	1.0084	0.00200
8.5	1.0146	0.00180	8.5	1.0170	0.00250	8.5	1.0113	0.00210
8.55	1.0186	0.00250	8.55	1.0183	0.00240	8.55	1.0155	0.00230
8.6	1.0268	0.00210	8.6	1.0243	0.00270	8.6	1.0210	0.00260

0.5			0.75			1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.30	0.9206	0.00190	7.20	0.9287	0.00190	7.00	0.9257	0.00190
7.35	0.9250	0.00210	7.25	0.9298	0.00190	7.05	0.9285	0.00210
7.4	0.9326	0.00200	7.3	0.9337	0.00190	7.1	0.9338	0.00210
7.45	0.9347	0.00190	7.35	0.9373	0.00210	7.15	0.9369	0.00220
7.5	0.9375	0.00190	7.4	0.9429	0.00220	7.2	0.9446	0.00240
7.55	0.9450	0.00220	7.45	0.9461	0.00370	7.25	0.9469	0.00180
7.6	0.9463	0.00230	7.5	0.9517	0.00270	7.3	0.9518	0.00190
7.65	0.9513	0.00210	7.55	0.9583	0.00290	7.35	0.9551	0.00250
7.7	0.9582	0.00200	7.6	0.9593	0.00190	7.4	0.9613	0.00190
7.75	0.9598	0.00210	7.65	0.9626	0.00190	7.45	0.9689	0.00210
7.8	0.9651	0.00280	7.7	0.9682	0.00220	7.5	0.9673	0.00180
7.85	0.9686	0.00240	7.75	0.9694	0.00200	7.55	0.9716	0.00240
7.9	0.9695	0.00250	7.8	0.9776	0.00230	7.6	0.9762	0.00200
7.95	0.9803	0.00250	7.85	0.9814	0.00220	7.65	0.9794	0.00190
8	0.9769	0.00230	7.9	0.9830	0.00190	7.7	0.9863	0.00220
8.05	0.9816	0.00260	7.95	0.9844	0.00190	7.75	0.9869	0.00190
8.1	0.9849	0.00210	8	0.9883	0.00230	7.8	0.9965	0.00190
8.15	0.9921	0.00210	8.05	0.9942	0.00220	7.85	0.9946	0.00190
8.2	0.9922	0.00200	8.1	0.9993	0.00230	7.9	0.9959	0.00210
8.25	1.0004	0.00200	8.15	1.0022	0.00230	7.95	1.0002	0.00180
8.3	0.9986	0.00210	8.2	1.0030	0.00200	8	1.0046	0.00200
8.35	1.0060	0.00240	8.25	1.0154	0.00190	8.05	1.0107	0.00200
8.4	1.0060	0.00220	8.3	1.0133	0.00250	8.1	1.0120	0.00190
8.45	1.0110	0.00210	8.35	1.0133	0.00260	8.15	1.0223	0.00190
8.5	1.0128	0.00220	8.4	1.0189	0.00200	8.2	1.0231	0.00190
8.55	1.0224	0.00240						
8.6	1.0242	0.00200						

1.5			2			2.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.50	0.9141	0.00200	6.20	0.9249	0.00200	5.80	0.9187	0.00200
6.55	0.9206	0.00180	6.25	0.9286	0.00200	5.85	0.9282	0.00190
6.6	0.9284	0.00260	6.3	0.9344	0.00180	5.9	0.9237	0.00230
6.65	0.9305	0.00200	6.35	0.9443	0.00180	5.95	0.9385	0.00190
6.7	0.9361	0.00190	6.4	0.9439	0.00190	6	0.9447	0.00180
6.75	0.9439	0.00250	6.45	0.9509	0.00200	6.05	0.9486	0.00210
6.8	0.9450	0.00240	6.5	0.9559	0.00190	6.1	0.9533	0.00190
6.85	0.9514	0.00210	6.55	0.9573	0.00170	6.15	0.9533	0.00250
6.9	0.9541	0.00200	6.6	0.9643	0.00200	6.2	0.9620	0.00190
6.95	0.9597	0.00210	6.65	0.9710	0.00180	6.25	0.9661	0.00190
7	0.9649	0.00210	6.7	0.9757	0.00190	6.3	0.9758	0.00180
7.05	0.9673	0.00190	6.75	0.9788	0.00170	6.35	0.9758	0.00190
7.1	0.9729	0.00200	6.8	0.9819	0.00210	6.4	0.9869	0.00180
7.15	0.9762	0.00220	6.85	0.9868	0.00200	6.45	0.9897	0.00210
7.2	0.9785	0.00180	6.9	0.9942	0.00240	6.5	0.9932	0.00200
7.25	0.9823	0.00210	6.95	0.9974	0.00220	6.55	1.0001	0.00220
7.3	0.9901	0.00200	7	1.0024	0.00220	6.6	1.0065	0.00200
7.35	0.9967	0.00200	7.05	1.0068	0.00190	6.65	1.0105	0.00190
7.4	0.9981	0.00200	7.1	1.0101	0.00200	6.7	1.0163	0.00190
7.45	1.0041	0.00180	7.15	1.0136	0.00210	6.75	1.0185	0.00170
7.5	1.0077	0.00200	7.2	1.0166	0.00200	6.8	1.0259	0.00200
7.55	1.0081	0.00230						
7.6	1.0131	0.00200						
7.65	1.0176	0.00170						
7.7	1.0191	0.00250						

3			4			5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.50	0.9202	0.00190	5.00	0.9200	0.00190	4.60	0.9273	0.00210
5.55	0.9240	0.00180	5.05	0.9272	0.00200	4.65	0.9315	0.00190
5.6	0.9342	0.00200	5.1	0.9346	0.00190	4.7	0.9386	0.00190
5.65	0.9363	0.00200	5.15	0.9418	0.00200	4.75	0.9519	0.00240
5.7	0.9439	0.00200	5.2	0.9468	0.00190	4.8	0.9561	0.00200
5.75	0.9462	0.00180	5.25	0.9567	0.00220	4.85	0.9605	0.00210
5.8	0.9532	0.00210	5.3	0.9609	0.00200	4.9	0.9672	0.00210
5.85	0.9606	0.00180	5.35	0.9676	0.00230	4.95	0.9776	0.00190
5.9	0.9646	0.00200	5.4	0.9746	0.00210	5	0.9818	0.00190
5.95	0.9712	0.00180	5.45	0.9814	0.00200	5.05	0.9898	0.00200
6	0.9786	0.00220	5.5	0.9843	0.00230	5.1	1.0002	0.00230
6.05	0.9847	0.00200	5.55	0.9944	0.00200	5.15	1.0066	0.00210
6.1	0.9888	0.00190	5.6	0.9979	0.00220	5.2	1.0091	0.00230
6.15	0.9908	0.00220	5.65	1.0072	0.00210	5.25	1.0163	0.00210
6.2	1.0014	0.00180	5.7	1.0131	0.00200	5.3	1.0241	0.00220
6.25	1.0071	0.00250	5.75	1.0148	0.00190			
6.3	1.0077	0.00260	5.8	1.0250	0.00210			
6.35	1.0135	0.00190						
6.4	1.0215	0.00190						

6			7			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.20	0.9148	0.00200	3.90	0.9078	0.00180	3.80	0.9156	0.00210
4.25	0.9209	0.00210	3.95	0.9177	0.00210	3.85	0.9250	0.00220
4.3	0.9312	0.00190	4	0.9258	0.00190	3.9	0.9372	0.00220
4.35	0.9389	0.00200	4.05	0.9377	0.00180	3.95	0.9422	0.00180
4.4	0.9476	0.00180	4.1	0.9473	0.00230	4	0.9557	0.00190
4.45	0.9556	0.00200	4.15	0.9516	0.00180	4.05	0.9636	0.00220
4.5	0.9638	0.00190	4.2	0.9662	0.00200	4.1	0.9711	0.00180
4.55	0.9760	0.00200	4.25	0.9707	0.00180	4.15	0.9819	0.00190
4.6	0.9778	0.00200	4.3	0.9800	0.00170	4.2	0.9911	0.00220
4.65	0.9860	0.00190	4.35	0.9885	0.00190	4.25	0.9949	0.00200
4.7	0.9936	0.00190	4.4	0.9982	0.00220	4.3	1.0044	0.00230
4.75	1.0015	0.00200	4.45	1.0061	0.00230	4.35	1.0118	0.00190
4.8	1.0086	0.00210	4.5	1.0158	0.00200	4.4	1.0250	0.00190
4.85	1.0203	0.00200	4.55	1.0243	0.00200			
4.9	1.0236	0.00200	4.6	1.0349	0.00210			

8			9			10		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.70	0.9199	0.00210	3.40	0.9063	0.00190	3.20	0.8989	0.00290
3.75	0.9301	0.00190	3.45	0.9167	0.00180	3.25	0.9180	0.00190
3.8	0.9402	0.00210	3.5	0.9225	0.00190	3.3	0.9241	0.00220
3.85	0.9475	0.00200	3.55	0.9362	0.00200	3.35	0.9346	0.00230
3.9	0.9577	0.00240	3.6	0.9442	0.00180	3.4	0.9454	0.00240
3.95	0.9674	0.00200	3.65	0.9568	0.00190	3.45	0.9551	0.00190
4	0.9790	0.00240	3.7	0.9646	0.00190	3.5	0.9689	0.00230
4.05	0.9890	0.00230	3.75	0.9720	0.00180	3.55	0.9775	0.00250
4.1	0.9974	0.00190	3.8	0.9862	0.00200	3.6	0.9891	0.00190
4.15	1.0068	0.00190	3.85	0.9963	0.00190	3.65	0.9987	0.00190
4.2	1.0152	0.00230	3.9	1.0008	0.00190	3.7	1.0089	0.00180
4.25	1.0207	0.00200	3.95	1.0171	0.00180	3.75	1.0187	0.00200
4.3	1.0310	0.00200	4	1.0249	0.00210	3.8	1.0236	0.00200

15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.50	0.9148	0.00200	2.00	0.8984	0.00200
2.52	0.9168	0.00250	2.02	0.9099	0.00180
2.54	0.9229	0.00190	2.04	0.9151	0.00200
2.56	0.9314	0.00170	2.06	0.9264	0.00200
2.58	0.9357	0.00170	2.08	0.9346	0.00210
2.6	0.9417	0.00180	2.1	0.9364	0.00260
2.62	0.9499	0.00210	2.12	0.9456	0.00220
2.64	0.9533	0.00200	2.14	0.9503	0.00200
2.66	0.9556	0.00190	2.16	0.9573	0.00230
2.68	0.9617	0.00180	2.18	0.9610	0.00220
2.7	0.9698	0.00200	2.2	0.9673	0.00190
2.72	0.9746	0.00200	2.22	0.9736	0.00220
2.74	0.9802	0.00210	2.24	0.9858	0.00190
2.76	0.9852	0.00230	2.26	0.9921	0.00250
2.78	0.9900	0.00200	2.28	0.9985	0.00210
2.8	0.9938	0.00200	2.3	1.0021	0.00200
2.82	0.9983	0.00190	2.32	1.0101	0.00220
2.84	1.0066	0.00180	2.34	1.0151	0.00250
2.86	1.0088	0.00220	2.36	1.0262	0.00230
2.88	1.0167	0.00210	2.38	1.0316	0.00220
2.9	1.0234	0.00220	2.4	1.0352	0.00220

Case ID: pu_cyl_095_10ref

Material: Plutonium

Geometry: Infinite Cylinder

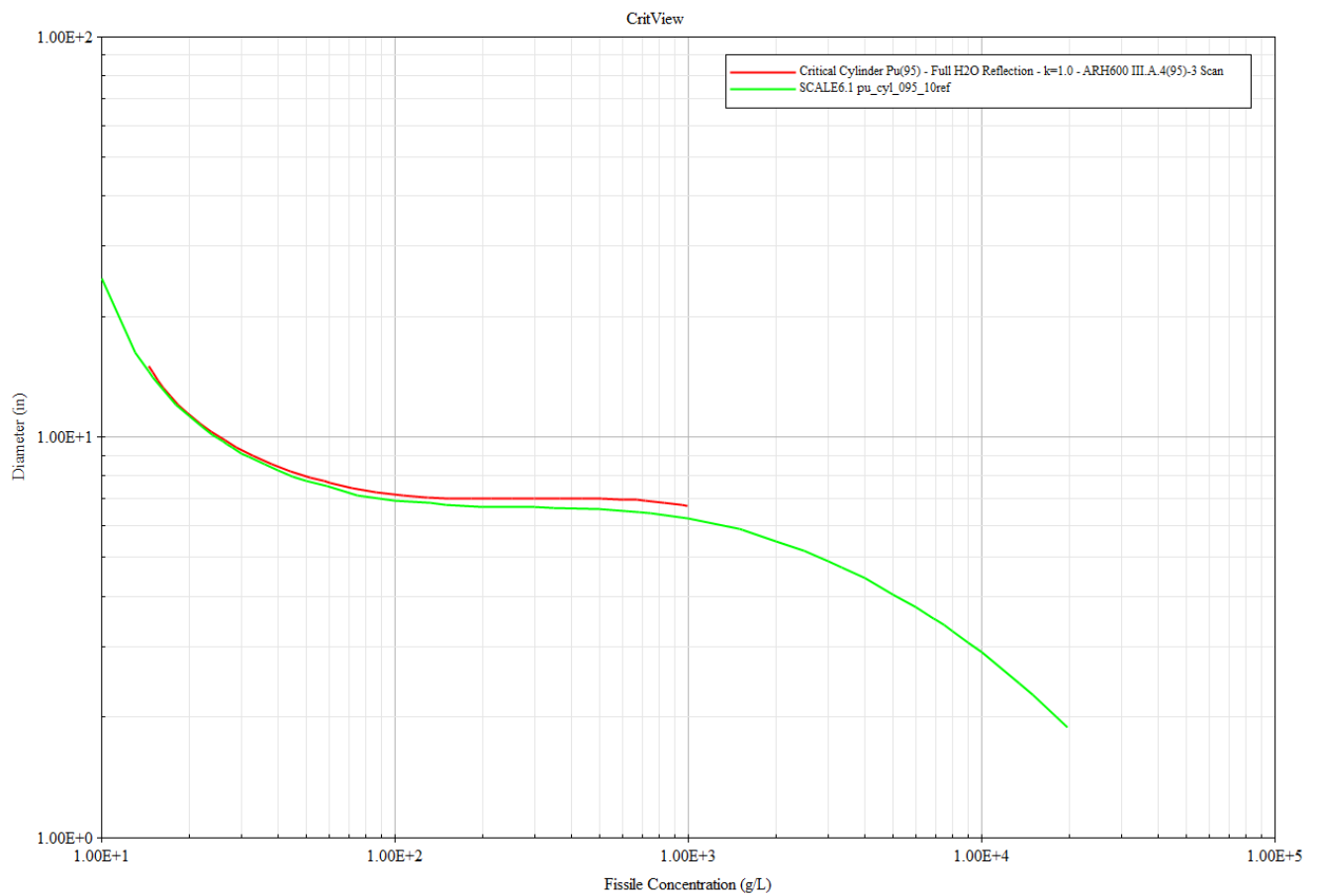
Isotopics: 95% ^{239}Pu 5% ^{240}Pu

Reflector: 10" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	18.200	27.200	0.400	24.9000
0.013	13.200	17.200	0.200	16.2966
0.015	11.700	14.700	0.100	14.0463
0.018	10.200	12.600	0.100	12.0476
0.020	9.600	11.700	0.100	11.2593
0.022	9.100	11.000	0.100	10.6200
0.024	8.700	10.500	0.100	10.1326
0.025	8.600	10.200	0.050	9.9304
0.026	8.400	10.100	0.050	9.7429
0.028	8.200	9.800	0.050	9.4429
0.030	7.900	9.600	0.050	9.0882
0.032	7.700	9.200	0.050	8.9167
0.036	7.500	8.900	0.050	8.5460
0.040	7.200	8.600	0.050	8.2294
0.045	7.000	8.300	0.050	7.9455
0.050	6.800	8.100	0.050	7.7862
0.075	6.300	7.500	0.050	7.1592
0.100	6.100	7.300	0.050	6.9231
0.150	5.900	7.100	0.050	6.7714
0.200	5.900	7.000	0.050	6.6815
0.350	5.800	7.000	0.050	6.6438
0.500	5.700	6.900	0.050	6.6067
0.750	5.600	6.800	0.050	6.4491
1.000	5.400	6.600	0.050	6.2750
1.500	5.100	6.200	0.050	5.9051
2.000	4.800	5.800	0.050	5.4893
2.500	4.500	5.400	0.050	5.1842
3.000	4.200	5.100	0.050	4.8891
4.000	3.900	4.700	0.050	4.4333
5.000	3.500	4.200	0.050	4.0399
6.000	3.300	3.900	0.050	3.7476
7.000	3.100	3.700	0.050	3.4961
7.500	3.000	3.500	0.020	3.3860
8.000	2.900	3.400	0.020	3.2689
9.000	2.700	3.200	0.020	3.0644
10.000	2.500	3.100	0.050	2.9000
15.000	2.000	2.400	0.020	2.2643
19.600	1.600	2.000	0.020	1.8846

[illegible]

CritView compatible data file

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reset:
title: SCALE6.1 pu_cyl_095_10ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infcyl
modmat: H2O
critmat: plutonium
isomat: Pu239 0.95 Pu240 0.05
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 24.9000
0.013 16.2966
0.015 14.0463
0.018 12.0476
0.020 11.2593
0.022 10.6200
0.024 10.1326
0.025 9.9304
0.026 9.7429
0.028 9.4429
0.030 9.0882
0.032 8.9167
0.036 8.5460
0.040 8.2294
0.045 7.9455
0.050 7.7862
0.075 7.1592
0.100 6.9231
0.150 6.7714
0.200 6.6815
0.350 6.6438
0.500 6.6067
0.750 6.4491
1.000 6.2750
1.500 5.9051
2.000 5.4893
2.500 5.1842
3.000 4.8891
4.000 4.4333
5.000 4.0399
6.000 3.7476
7.000 3.4961
7.500 3.3860
8.000 3.2689
9.000 3.0644
10.000 2.9000
15.000 2.2643
19.600 1.8846
```

0.01			0.013			0.015		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
18.20	0.9257	0.00130	13.20	0.9259	0.00140	11.70	0.9239	0.00170
18.6	0.9315	0.00130	13.4	0.9332	0.00150	11.8	0.9282	0.00150
19	0.9355	0.00120	13.6	0.9343	0.00190	11.9	0.9324	0.00170
19.4	0.9387	0.00100	13.8	0.9409	0.00160	12	0.9378	0.00180
19.8	0.9471	0.00110	14	0.9442	0.00130	12.1	0.9390	0.00140
20.2	0.9491	0.00120	14.2	0.9510	0.00150	12.2	0.9422	0.00160
20.6	0.9563	0.00150	14.4	0.9567	0.00130	12.3	0.9486	0.00130
21	0.9626	0.00120	14.6	0.9622	0.00120	12.4	0.9491	0.00160
21.4	0.9647	0.00150	14.8	0.9667	0.00160	12.5	0.9536	0.00140
21.8	0.9700	0.00140	15	0.9701	0.00190	12.6	0.9555	0.00180
22.2	0.9726	0.00120	15.2	0.9747	0.00130	12.7	0.9644	0.00170
22.6	0.9798	0.00110	15.4	0.9806	0.00140	12.8	0.9644	0.00190
23	0.9801	0.00130	15.6	0.9842	0.00190	12.9	0.9667	0.00150
23.4	0.9874	0.00100	15.8	0.9870	0.00150	13	0.9669	0.00180
23.8	0.9867	0.00120	16	0.9934	0.00150	13.1	0.9732	0.00160
24.2	0.9926	0.00130	16.2	0.9972	0.00130	13.2	0.9755	0.00180
24.6	0.9964	0.00140	16.4	1.0030	0.00160	13.3	0.9803	0.00160
25	1.0012	0.00190	16.6	1.0049	0.00170	13.4	0.9823	0.00160
25.4	1.0017	0.00110	16.8	1.0083	0.00130	13.5	0.9850	0.00150
25.8	1.0058	0.00140	17	1.0167	0.00170	13.6	0.9875	0.00160
26.2	1.0059	0.00140	17.2	1.0166	0.00120	13.7	0.9908	0.00180
26.6	1.0121	0.00180				13.8	0.9937	0.00130
27	1.0126	0.00110				13.9	0.9925	0.00160
27.2	1.0151	0.00150				14	0.9981	0.00150
						14.1	1.0022	0.00180
						14.2	1.0019	0.00130
						14.3	1.0075	0.00150
						14.4	1.0100	0.00140
						14.5	1.0104	0.00160
						14.6	1.0121	0.00150
						14.7	1.0161	0.00150

0.018			0.02			0.022		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.20	0.9206	0.00170	9.60	0.9217	0.00190	9.10	0.9229	0.00170
10.3	0.9265	0.00170	9.7	0.9306	0.00160	9.2	0.9288	0.00220
10.4	0.9286	0.00170	9.8	0.9347	0.00200	9.3	0.9321	0.00180
10.5	0.9346	0.00160	9.9	0.9384	0.00190	9.4	0.9388	0.00200
10.6	0.9415	0.00160	10	0.9424	0.00170	9.5	0.9435	0.00170
10.7	0.9465	0.00160	10.1	0.9497	0.00230	9.6	0.9510	0.00160
10.8	0.9468	0.00180	10.2	0.9516	0.00150	9.7	0.9547	0.00180
10.9	0.9537	0.00180	10.3	0.9528	0.00170	9.8	0.9572	0.00180
11	0.9569	0.00150	10.4	0.9600	0.00170	9.9	0.9638	0.00220
11.1	0.9614	0.00170	10.5	0.9657	0.00180	10	0.9684	0.00170
11.2	0.9649	0.00140	10.6	0.9756	0.00180	10.1	0.9754	0.00200
11.3	0.9690	0.00160	10.7	0.9744	0.00150	10.2	0.9793	0.00200
11.4	0.9754	0.00160	10.8	0.9820	0.00170	10.3	0.9860	0.00180
11.5	0.9785	0.00200	10.9	0.9856	0.00190	10.4	0.9904	0.00160
11.6	0.9834	0.00150	11	0.9892	0.00170	10.5	0.9955	0.00180
11.7	0.9858	0.00130	11.1	0.9905	0.00170	10.6	0.9994	0.00180
11.8	0.9883	0.00150	11.2	0.9984	0.00180	10.7	1.0024	0.00190
11.9	0.9904	0.00170	11.3	1.0011	0.00210	10.8	1.0080	0.00170
12	0.9990	0.00190	11.4	1.0038	0.00190	10.9	1.0101	0.00170
12.1	1.0011	0.00140	11.5	1.0104	0.00160	11	1.0166	0.00180
12.2	1.0024	0.00180	11.6	1.0149	0.00180			
12.3	1.0065	0.00140	11.7	1.0135	0.00170			
12.4	1.0135	0.00220						
12.5	1.0133	0.00180						
12.6	1.0158	0.00160						

0.024			0.025			0.026		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.70	0.9193	0.00200	8.60	0.9241	0.00180	8.40	0.9221	0.00160
8.8	0.9256	0.00180	8.65	0.9253	0.00180	8.45	0.9221	0.00180
8.9	0.9334	0.00170	8.7	0.9324	0.00210	8.5	0.9248	0.00200
9	0.9376	0.00190	8.75	0.9328	0.00180	8.55	0.9287	0.00170
9.1	0.9481	0.00210	8.8	0.9360	0.00180	8.6	0.9342	0.00160
9.2	0.9491	0.00150	8.85	0.9371	0.00170	8.65	0.9351	0.00170
9.3	0.9551	0.00160	8.9	0.9434	0.00200	8.7	0.9411	0.00200
9.4	0.9601	0.00190	8.95	0.9454	0.00170	8.75	0.9425	0.00160
9.5	0.9671	0.00160	9	0.9501	0.00180	8.8	0.9465	0.00200
9.6	0.9751	0.00170	9.05	0.9518	0.00170	8.85	0.9503	0.00180
9.7	0.9729	0.00150	9.1	0.9539	0.00180	8.9	0.9542	0.00150
9.8	0.9846	0.00160	9.15	0.9593	0.00150	8.95	0.9569	0.00190
9.9	0.9854	0.00200	9.2	0.9589	0.00190	9	0.9579	0.00170
10	0.9930	0.00170	9.25	0.9635	0.00200	9.05	0.9598	0.00240
10.1	0.9970	0.00190	9.3	0.9651	0.00180	9.1	0.9682	0.00190
10.2	1.0062	0.00160	9.35	0.9672	0.00210	9.15	0.9665	0.00160
10.3	1.0080	0.00170	9.4	0.9684	0.00220	9.2	0.9683	0.00200
10.4	1.0125	0.00180	9.45	0.9751	0.00150	9.25	0.9701	0.00170
10.5	1.0171	0.00190	9.5	0.9784	0.00150	9.3	0.9724	0.00200
			9.55	0.9787	0.00190	9.35	0.9772	0.00240
			9.6	0.9833	0.00180	9.4	0.9837	0.00180
			9.65	0.9861	0.00180	9.45	0.9814	0.00210
			9.7	0.9899	0.00170	9.5	0.9884	0.00200
			9.75	0.9908	0.00170	9.55	0.9914	0.00230
			9.8	0.9920	0.00180	9.6	0.9918	0.00200
			9.85	0.9964	0.00200	9.65	0.9924	0.00170
			9.9	0.9983	0.00160	9.7	0.9994	0.00170
			9.95	1.0011	0.00170	9.75	1.0001	0.00170
			10	1.0067	0.00170	9.8	1.0065	0.00180
			10.05	1.0060	0.00170	9.85	1.0083	0.00190
			10.1	1.0092	0.00160	9.9	1.0104	0.00170
			10.15	1.0105	0.00160	9.95	1.0112	0.00160
			10.2	1.0145	0.00170	10	1.0124	0.00170
						10.05	1.0155	0.00170
						10.1	1.0201	0.00180

0.028			0.03			0.032		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.20	0.9279	0.00180	7.90	0.9171	0.00170	7.70	0.9193	0.00160
8.25	0.9262	0.00190	7.95	0.9225	0.00180	7.75	0.9213	0.00200
8.3	0.9315	0.00210	8	0.9269	0.00190	7.8	0.9249	0.00240
8.35	0.9376	0.00190	8.05	0.9283	0.00160	7.85	0.9288	0.00190
8.4	0.9402	0.00200	8.1	0.9287	0.00190	7.9	0.9327	0.00210
8.45	0.9444	0.00210	8.15	0.9354	0.00230	7.95	0.9390	0.00190
8.5	0.9448	0.00180	8.2	0.9374	0.00200	8	0.9441	0.00190
8.55	0.9490	0.00180	8.25	0.9425	0.00210	8.05	0.9416	0.00190
8.6	0.9527	0.00180	8.3	0.9453	0.00180	8.1	0.9473	0.00220
8.65	0.9519	0.00170	8.35	0.9516	0.00220	8.15	0.9505	0.00170
8.7	0.9579	0.00190	8.4	0.9526	0.00180	8.2	0.9558	0.00250
8.75	0.9623	0.00160	8.45	0.9574	0.00180	8.25	0.9563	0.00160
8.8	0.9653	0.00180	8.5	0.9600	0.00170	8.3	0.9632	0.00200
8.85	0.9633	0.00180	8.55	0.9627	0.00220	8.35	0.9668	0.00190
8.9	0.9705	0.00230	8.6	0.9668	0.00200	8.4	0.9641	0.00180
8.95	0.9704	0.00190	8.65	0.9665	0.00190	8.45	0.9718	0.00160
9	0.9771	0.00180	8.7	0.9758	0.00210	8.5	0.9731	0.00180
9.05	0.9840	0.00200	8.75	0.9750	0.00180	8.55	0.9780	0.00180
9.1	0.9795	0.00210	8.8	0.9790	0.00240	8.6	0.9809	0.00170
9.15	0.9850	0.00200	8.85	0.9836	0.00220	8.65	0.9867	0.00190
9.2	0.9850	0.00220	8.9	0.9828	0.00210	8.7	0.9877	0.00220
9.25	0.9943	0.00200	8.95	0.9899	0.00180	8.75	0.9895	0.00200
9.3	0.9932	0.00170	9	0.9959	0.00190	8.8	0.9929	0.00170
9.35	0.9986	0.00180	9.05	0.9974	0.00180	8.85	0.9975	0.00210
9.4	0.9988	0.00170	9.1	1.0008	0.00210	8.9	0.9994	0.00210
9.45	1.0002	0.00170	9.15	1.0009	0.00180	8.95	1.0012	0.00160
9.5	1.0032	0.00170	9.2	1.0047	0.00180	9	1.0085	0.00170
9.55	1.0099	0.00180	9.25	1.0077	0.00230	9.05	1.0074	0.00180
9.6	1.0108	0.00180	9.3	1.0112	0.00200	9.1	1.0143	0.00190
9.65	1.0134	0.00180	9.35	1.0120	0.00210	9.15	1.0125	0.00190
9.7	1.0132	0.00190	9.4	1.0142	0.00200	9.2	1.0182	0.00190
9.75	1.0174	0.00170	9.45	1.0183	0.00200			
9.8	1.0249	0.00270	9.5	1.0198	0.00190			
			9.55	1.0223	0.00190			
			9.6	1.0259	0.00190			

0.036			0.04			0.045		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.50	0.9308	0.00180	7.20	0.9208	0.00220	7.00	0.9236	0.00180
7.55	0.9320	0.00240	7.25	0.9258	0.00200	7.05	0.9267	0.00190
7.6	0.9337	0.00200	7.3	0.9315	0.00180	7.1	0.9340	0.00210
7.65	0.9381	0.00170	7.35	0.9330	0.00190	7.15	0.9328	0.00210
7.7	0.9407	0.00160	7.4	0.9356	0.00190	7.2	0.9387	0.00180
7.75	0.9471	0.00190	7.45	0.9398	0.00170	7.25	0.9428	0.00190
7.8	0.9508	0.00210	7.5	0.9485	0.00250	7.3	0.9497	0.00210
7.85	0.9496	0.00190	7.55	0.9516	0.00190	7.35	0.9557	0.00190
7.9	0.9550	0.00160	7.6	0.9505	0.00180	7.4	0.9530	0.00210
7.95	0.9583	0.00180	7.65	0.9561	0.00200	7.45	0.9587	0.00190
8	0.9633	0.00190	7.7	0.9593	0.00170	7.5	0.9642	0.00190
8.05	0.9657	0.00190	7.75	0.9656	0.00200	7.55	0.9695	0.00200
8.1	0.9705	0.00180	7.8	0.9674	0.00200	7.6	0.9692	0.00200
8.15	0.9744	0.00210	7.85	0.9724	0.00180	7.65	0.9831	0.00240
8.2	0.9736	0.00220	7.9	0.9794	0.00210	7.7	0.9800	0.00190
8.25	0.9822	0.00210	7.95	0.9796	0.00220	7.75	0.9813	0.00190
8.3	0.9823	0.00220	8	0.9836	0.00190	7.8	0.9892	0.00230
8.35	0.9863	0.00200	8.05	0.9851	0.00190	7.85	0.9903	0.00180
8.4	0.9909	0.00190	8.1	0.9863	0.00170	7.9	0.9920	0.00200
8.45	0.9921	0.00190	8.15	0.9906	0.00220	7.95	1.0008	0.00180
8.5	0.9977	0.00180	8.2	0.9990	0.00210	8	1.0047	0.00180
8.55	1.0002	0.00220	8.25	1.0007	0.00200	8.05	1.0059	0.00230
8.6	1.0038	0.00180	8.3	1.0021	0.00240	8.1	1.0073	0.00170
8.65	1.0054	0.00200	8.35	1.0048	0.00190	8.15	1.0129	0.00190
8.7	1.0122	0.00200	8.4	1.0084	0.00240	8.2	1.0182	0.00210
8.75	1.0127	0.00170	8.45	1.0106	0.00160	8.25	1.0187	0.00190
8.8	1.0154	0.00180	8.5	1.0181	0.00180	8.3	1.0252	0.00230
8.85	1.0197	0.00160	8.55	1.0157	0.00200			
8.9	1.0228	0.00210	8.6	1.0251	0.00200			

0.05			0.075			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.80	0.9204	0.00200	6.30	0.9226	0.00200	6.10	0.9232	0.00200
6.85	0.9276	0.00210	6.35	0.9279	0.00250	6.15	0.9304	0.00170
6.9	0.9288	0.00200	6.4	0.9326	0.00210	6.2	0.9320	0.00200
6.95	0.9320	0.00190	6.45	0.9337	0.00240	6.25	0.9349	0.00230
7	0.9390	0.00190	6.5	0.9425	0.00250	6.3	0.9396	0.00250
7.05	0.9474	0.00240	6.55	0.9439	0.00210	6.35	0.9485	0.00230
7.1	0.9456	0.00190	6.6	0.9460	0.00210	6.4	0.9536	0.00230
7.15	0.9559	0.00180	6.65	0.9504	0.00200	6.45	0.9573	0.00190
7.2	0.9579	0.00170	6.7	0.9607	0.00190	6.5	0.9563	0.00250
7.25	0.9606	0.00180	6.75	0.9632	0.00170	6.55	0.9659	0.00190
7.3	0.9632	0.00200	6.8	0.9642	0.00190	6.6	0.9699	0.00200
7.35	0.9671	0.00230	6.85	0.9731	0.00210	6.65	0.9761	0.00190
7.4	0.9733	0.00200	6.9	0.9742	0.00190	6.7	0.9752	0.00210
7.45	0.9752	0.00240	6.95	0.9802	0.00190	6.75	0.9820	0.00180
7.5	0.9818	0.00200	7	0.9826	0.00180	6.8	0.9878	0.00230
7.55	0.9830	0.00200	7.05	0.9854	0.00190	6.85	0.9895	0.00230
7.6	0.9871	0.00270	7.1	0.9937	0.00200	6.9	0.9982	0.00180
7.65	0.9894	0.00210	7.15	0.9993	0.00220	6.95	1.0021	0.00240
7.7	0.9934	0.00190	7.2	1.0031	0.00220	7	1.0064	0.00210
7.75	0.9966	0.00190	7.25	1.0042	0.00220	7.05	1.0049	0.00180
7.8	1.0013	0.00190	7.3	1.0086	0.00180	7.1	1.0113	0.00190
7.85	1.0070	0.00240	7.35	1.0110	0.00220	7.15	1.0148	0.00200
7.9	1.0100	0.00220	7.4	1.0142	0.00290	7.2	1.0167	0.00190
7.95	1.0153	0.00200	7.45	1.0186	0.00200	7.25	1.0241	0.00210
8	1.0180	0.00210	7.5	1.0214	0.00200	7.3	1.0299	0.00210
8.05	1.0171	0.00190						
8.1	1.0228	0.00220						

0.15			0.2			0.35		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.90	0.9237	0.00270	5.90	0.9296	0.00220	5.80	0.9299	0.00230
5.95	0.9273	0.00200	5.95	0.9346	0.00230	5.85	0.9328	0.00230
6	0.9337	0.00210	6	0.9413	0.00210	5.9	0.9356	0.00190
6.05	0.9383	0.00210	6.05	0.9443	0.00190	5.95	0.9396	0.00230
6.1	0.9380	0.00210	6.1	0.9490	0.00250	6	0.9453	0.00250
6.15	0.9439	0.00200	6.15	0.9507	0.00190	6.05	0.9494	0.00220
6.2	0.9521	0.00230	6.2	0.9602	0.00190	6.1	0.9535	0.00220
6.25	0.9530	0.00220	6.25	0.9606	0.00230	6.15	0.9606	0.00200
6.3	0.9625	0.00200	6.3	0.9656	0.00190	6.2	0.9627	0.00220
6.35	0.9625	0.00250	6.35	0.9700	0.00180	6.25	0.9666	0.00210
6.4	0.9650	0.00180	6.4	0.9745	0.00190	6.3	0.9716	0.00230
6.45	0.9733	0.00190	6.45	0.9804	0.00190	6.35	0.9759	0.00220
6.5	0.9736	0.00200	6.5	0.9796	0.00210	6.4	0.9811	0.00210
6.55	0.9781	0.00210	6.55	0.9841	0.00240	6.45	0.9813	0.00200
6.6	0.9801	0.00210	6.6	0.9902	0.00240	6.5	0.9885	0.00190
6.65	0.9898	0.00250	6.65	0.9966	0.00240	6.55	0.9934	0.00190
6.7	0.9906	0.00190	6.7	1.0020	0.00240	6.6	0.9943	0.00260
6.75	0.9976	0.00200	6.75	1.0004	0.00230	6.65	1.0008	0.00220
6.8	1.0032	0.00200	6.8	1.0068	0.00220	6.7	1.0021	0.00240
6.85	1.0064	0.00200	6.85	1.0128	0.00220	6.75	1.0070	0.00200
6.9	1.0077	0.00180	6.9	1.0125	0.00190	6.8	1.0142	0.00230
6.95	1.0133	0.00190	6.95	1.0180	0.00190	6.85	1.0172	0.00210
7	1.0175	0.00210	7	1.0219	0.00240	6.9	1.0205	0.00260
7.05	1.0242	0.00190				6.95	1.0214	0.00190
7.1	1.0265	0.00240				7	1.0245	0.00200

0.5			0.75			1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.70	0.9250	0.00190	5.60	0.9352	0.00180	5.40	0.9259	0.00190
5.75	0.9341	0.00180	5.65	0.9339	0.00220	5.45	0.9311	0.00210
5.8	0.9343	0.00200	5.7	0.9409	0.00190	5.5	0.9331	0.00230
5.85	0.9377	0.00230	5.75	0.9407	0.00210	5.55	0.9467	0.00230
5.9	0.9433	0.00180	5.8	0.9448	0.00220	5.6	0.9427	0.00190
5.95	0.9464	0.00180	5.85	0.9512	0.00210	5.65	0.9508	0.00220
6	0.9539	0.00240	5.9	0.9542	0.00210	5.7	0.9525	0.00200
6.05	0.9550	0.00210	5.95	0.9641	0.00200	5.75	0.9584	0.00200
6.1	0.9623	0.00190	6	0.9618	0.00200	5.8	0.9600	0.00190
6.15	0.9611	0.00200	6.05	0.9667	0.00220	5.85	0.9652	0.00210
6.2	0.9696	0.00200	6.1	0.9705	0.00250	5.9	0.9718	0.00180
6.25	0.9703	0.00200	6.15	0.9754	0.00180	5.95	0.9763	0.00200
6.3	0.9808	0.00190	6.2	0.9783	0.00190	6	0.9754	0.00230
6.35	0.9802	0.00230	6.25	0.9868	0.00180	6.05	0.9791	0.00200
6.4	0.9826	0.00220	6.3	0.9894	0.00250	6.1	0.9868	0.00200
6.45	0.9890	0.00190	6.35	0.9931	0.00200	6.15	0.9857	0.00190
6.5	0.9913	0.00220	6.4	0.9945	0.00210	6.2	0.9951	0.00230
6.55	0.9953	0.00220	6.45	1.0001	0.00260	6.25	0.9991	0.00210
6.6	0.9996	0.00230	6.5	1.0051	0.00220	6.3	1.0009	0.00240
6.65	1.0026	0.00260	6.55	1.0079	0.00200	6.35	1.0079	0.00180
6.7	1.0082	0.00170	6.6	1.0100	0.00190	6.4	1.0118	0.00200
6.75	1.0086	0.00200	6.65	1.0154	0.00200	6.45	1.0148	0.00190
6.8	1.0166	0.00190	6.7	1.0172	0.00180	6.5	1.0217	0.00170
6.85	1.0161	0.00190	6.75	1.0248	0.00230	6.55	1.0226	0.00240
6.9	1.0195	0.00210	6.8	1.0234	0.00200	6.6	1.0259	0.00190

1.5			2			2.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.10	0.9298	0.00190	4.80	0.9278	0.00180	4.50	0.9256	0.00180
5.15	0.9324	0.00190	4.85	0.9352	0.00240	4.55	0.9349	0.00190
5.2	0.9397	0.00180	4.9	0.9425	0.00240	4.6	0.9401	0.00190
5.25	0.9402	0.00210	4.95	0.9468	0.00200	4.65	0.9467	0.00210
5.3	0.9461	0.00190	5	0.9493	0.00200	4.7	0.9496	0.00220
5.35	0.9501	0.00190	5.05	0.9554	0.00220	4.75	0.9555	0.00220
5.4	0.9581	0.00230	5.1	0.9624	0.00200	4.8	0.9584	0.00190
5.45	0.9616	0.00210	5.15	0.9680	0.00210	4.85	0.9672	0.00240
5.5	0.9706	0.00190	5.2	0.9689	0.00230	4.9	0.9727	0.00200
5.55	0.9746	0.00210	5.25	0.9773	0.00170	4.95	0.9784	0.00200
5.6	0.9790	0.00210	5.3	0.9799	0.00180	5	0.9808	0.00210
5.65	0.9839	0.00190	5.35	0.9879	0.00200	5.05	0.9851	0.00180
5.7	0.9865	0.00170	5.4	0.9852	0.00190	5.1	0.9909	0.00180
5.75	0.9920	0.00210	5.45	0.9934	0.00190	5.15	0.9948	0.00170
5.8	0.9921	0.00190	5.5	1.0018	0.00170	5.2	1.0024	0.00210
5.85	0.9968	0.00180	5.55	1.0053	0.00200	5.25	1.0076	0.00190
5.9	0.9989	0.00170	5.6	1.0106	0.00170	5.3	1.0135	0.00180
5.95	1.0096	0.00190	5.65	1.0123	0.00190	5.35	1.0211	0.00220
6	1.0140	0.00200	5.7	1.0196	0.00210	5.4	1.0258	0.00200
6.05	1.0140	0.00210	5.75	1.0217	0.00200			
6.1	1.0209	0.00200	5.8	1.0281	0.00220			
6.15	1.0259	0.00200						
6.2	1.0257	0.00180						

3			4			5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.20	0.9171	0.00200	3.90	0.9285	0.00170	3.50	0.9155	0.00200
4.25	0.9227	0.00210	3.95	0.9386	0.00210	3.55	0.9209	0.00190
4.3	0.9307	0.00180	4	0.9447	0.00190	3.6	0.9290	0.00190
4.35	0.9350	0.00190	4.05	0.9466	0.00200	3.65	0.9395	0.00190
4.4	0.9408	0.00170	4.1	0.9573	0.00190	3.7	0.9436	0.00170
4.45	0.9464	0.00190	4.15	0.9652	0.00220	3.75	0.9547	0.00220
4.5	0.9553	0.00190	4.2	0.9706	0.00250	3.8	0.9627	0.00210
4.55	0.9584	0.00190	4.25	0.9758	0.00180	3.85	0.9731	0.00170
4.6	0.9694	0.00200	4.3	0.9839	0.00230	3.9	0.9790	0.00190
4.65	0.9727	0.00200	4.35	0.9886	0.00190	3.95	0.9845	0.00190
4.7	0.9779	0.00190	4.4	0.9952	0.00260	4	0.9941	0.00240
4.75	0.9852	0.00170	4.45	1.0024	0.00190	4.05	1.0015	0.00180
4.8	0.9883	0.00220	4.5	1.0137	0.00190	4.1	1.0064	0.00200
4.85	0.9950	0.00180	4.55	1.0171	0.00200	4.15	1.0157	0.00180
4.9	1.0014	0.00200	4.6	1.0249	0.00190	4.2	1.0177	0.00220
4.95	1.0068	0.00180	4.65	1.0318	0.00180			
5	1.0107	0.00220	4.7	1.0346	0.00210			
5.05	1.0175	0.00220						
5.1	1.0227	0.00190						

6			7			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.30	0.9232	0.00170	3.10	0.9231	0.00210	3.00	0.9265	0.00200
3.35	0.9327	0.00220	3.15	0.9372	0.00180	3.02	0.9299	0.00190
3.4	0.9391	0.00180	3.2	0.9473	0.00200	3.04	0.9331	0.00190
3.45	0.9537	0.00180	3.25	0.9554	0.00190	3.06	0.9404	0.00200
3.5	0.9587	0.00210	3.3	0.9664	0.00190	3.08	0.9466	0.00180
3.55	0.9686	0.00210	3.35	0.9757	0.00210	3.1	0.9491	0.00190
3.6	0.9774	0.00200	3.4	0.9841	0.00180	3.12	0.9491	0.00200
3.65	0.9851	0.00230	3.45	0.9930	0.00210	3.14	0.9575	0.00170
3.7	0.9901	0.00200	3.5	1.0006	0.00190	3.16	0.9592	0.00210
3.75	1.0005	0.00220	3.55	1.0102	0.00220	3.18	0.9653	0.00200
3.8	1.0073	0.00190	3.6	1.0207	0.00170	3.2	0.9667	0.00190
3.85	1.0172	0.00190	3.65	1.0305	0.00220	3.22	0.9746	0.00170
3.9	1.0251	0.00180	3.7	1.0385	0.00190	3.24	0.9753	0.00200
						3.26	0.9765	0.00200
						3.28	0.9847	0.00250
						3.3	0.9874	0.00190
						3.32	0.9887	0.00180
						3.34	0.9921	0.00180
						3.36	0.9979	0.00220
						3.38	0.9985	0.00210
						3.4	1.0035	0.00220
						3.42	1.0102	0.00200
						3.44	1.0114	0.00210
						3.46	1.0118	0.00180
						3.48	1.0174	0.00200
						3.5	1.0234	0.00240

8			9			10		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.90	0.9277	0.00200	2.70	0.9186	0.00210	2.50	0.9068	0.00180
2.92	0.9342	0.00180	2.72	0.9232	0.00190	2.55	0.9186	0.00220
2.94	0.9348	0.00200	2.74	0.9269	0.00180	2.6	0.9291	0.00190
2.96	0.9370	0.00190	2.76	0.9327	0.00180	2.65	0.9417	0.00200
2.98	0.9446	0.00190	2.78	0.9391	0.00250	2.7	0.9511	0.00190
3	0.9477	0.00200	2.8	0.9425	0.00180	2.75	0.9664	0.00160
3.02	0.9488	0.00210	2.82	0.9495	0.00180	2.8	0.9813	0.00270
3.04	0.9553	0.00180	2.84	0.9483	0.00200	2.85	0.9866	0.00180
3.06	0.9591	0.00200	2.86	0.9520	0.00190	2.9	1.0000	0.00180
3.08	0.9619	0.00190	2.88	0.9594	0.00190	2.95	1.0076	0.00200
3.1	0.9645	0.00170	2.9	0.9609	0.00200	3	1.0188	0.00200
3.12	0.9684	0.00190	2.92	0.9696	0.00180	3.05	1.0275	0.00290
3.14	0.9765	0.00200	2.94	0.9717	0.00210	3.1	1.0403	0.00200
3.16	0.9817	0.00230	2.96	0.9753	0.00240			
3.18	0.9818	0.00220	2.98	0.9799	0.00210			
3.2	0.9863	0.00200	3	0.9840	0.00190			
3.22	0.9891	0.00200	3.02	0.9922	0.00190			
3.24	0.9956	0.00250	3.04	0.9935	0.00180			
3.26	0.9979	0.00210	3.06	0.9993	0.00200			
3.28	1.0026	0.00210	3.08	1.0025	0.00200			
3.3	1.0084	0.00230	3.1	1.0036	0.00200			
3.32	1.0114	0.00190	3.12	1.0070	0.00190			
3.34	1.0131	0.00190	3.14	1.0117	0.00200			
3.36	1.0139	0.00210	3.16	1.0118	0.00190			
3.38	1.0194	0.00200	3.18	1.0200	0.00220			
3.4	1.0219	0.00210	3.2	1.0249	0.00180			

15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.00	0.9218	0.00230	1.60	0.8927	0.00180
2.02	0.9249	0.00210	1.62	0.9024	0.00190
2.04	0.9329	0.00190	1.64	0.9127	0.00200
2.06	0.9365	0.00220	1.66	0.9225	0.00190
2.08	0.9440	0.00230	1.68	0.9294	0.00220
2.1	0.9490	0.00190	1.7	0.9363	0.00170
2.12	0.9556	0.00190	1.72	0.9459	0.00210
2.14	0.9598	0.00210	1.74	0.9528	0.00250
2.16	0.9637	0.00200	1.76	0.9555	0.00170
2.18	0.9767	0.00200	1.78	0.9688	0.00190
2.2	0.9816	0.00180	1.8	0.9731	0.00210
2.22	0.9879	0.00180	1.82	0.9832	0.00210
2.24	0.9954	0.00190	1.84	0.9838	0.00230
2.26	0.9989	0.00190	1.86	0.9941	0.00190
2.28	1.0040	0.00220	1.88	0.9966	0.00220
2.3	1.0086	0.00180	1.9	1.0114	0.00230
2.32	1.0156	0.00200	1.92	1.0162	0.00200
2.34	1.0228	0.00190	1.94	1.0279	0.00190
2.36	1.0265	0.00180	1.96	1.0296	0.00220
2.38	1.0345	0.00210	1.98	1.0391	0.00210
2.4	1.0348	0.00190	2	1.0478	0.00250

Pu-slab-100 (Cases with 0", 1", 10" Reflector)

Case ID: pu_slab_100_00ref

Material: Plutonium

Geometry: Infinite Plane

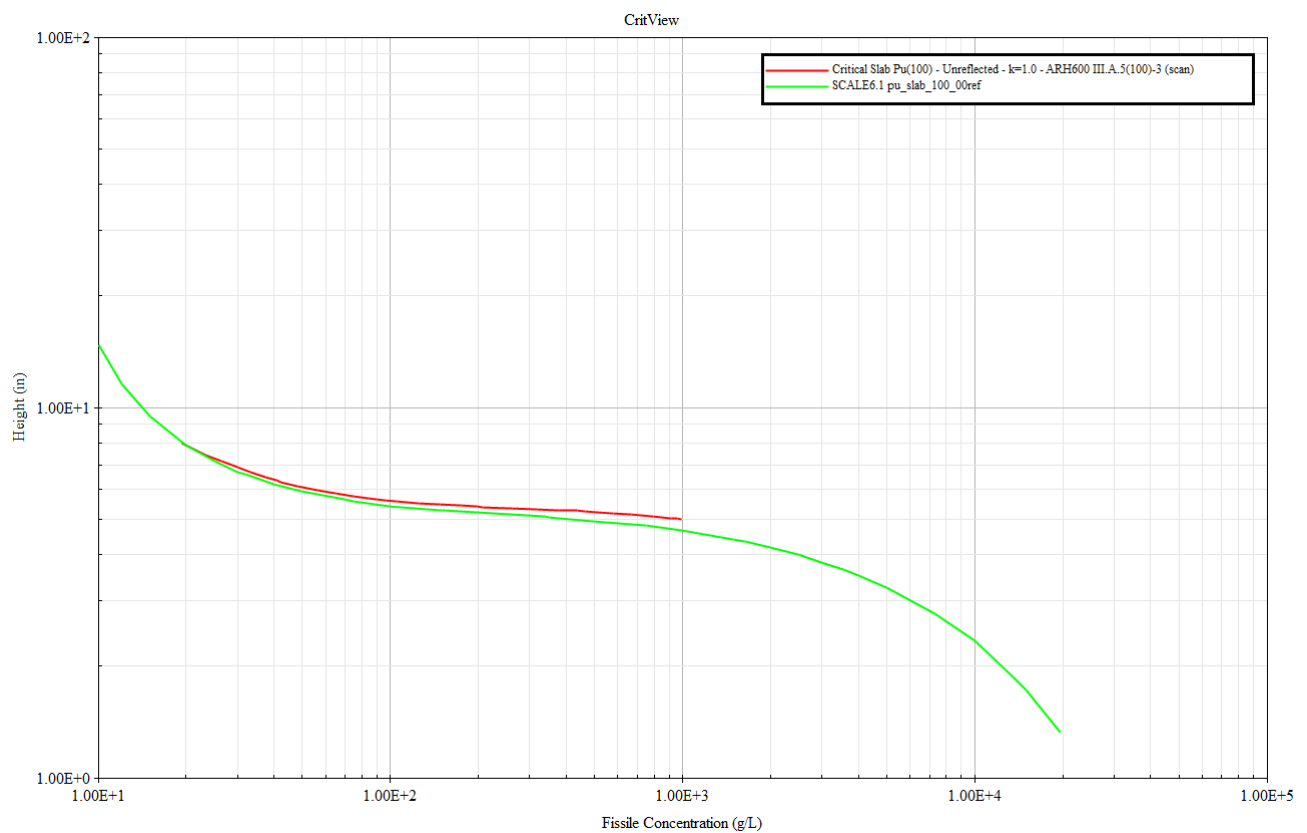
Isotopics: 100% ^{239}Pu

Reflector: Unreflected

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.007	20.000	100.000	5.000	N/A
0.010	11.600	15.600	0.200	14.8000
0.012	9.500	12.400	0.100	11.5724
0.015	8.100	9.800	0.050	9.4875
0.020	6.900	8.200	0.050	7.9255
0.025	6.400	7.400	0.050	7.1721
0.030	6.000	6.900	0.050	6.6976
0.040	5.600	6.400	0.050	6.2158
0.050	5.300	6.100	0.050	5.9239
0.075	5.000	5.800	0.050	5.5952
0.100	4.900	5.600	0.050	5.3984
0.150	4.700	5.500	0.050	5.2680
0.200	4.700	5.400	0.050	5.2071
0.350	4.600	5.300	0.050	5.0564
0.500	4.500	5.200	0.050	4.9375
0.750	4.300	5.000	0.050	4.8050
1.000	4.200	4.900	0.050	4.6476
1.500	4.000	4.600	0.050	4.4035
2.000	3.800	4.400	0.050	4.1829
2.500	3.600	4.200	0.050	3.9965
3.000	3.400	4.000	0.050	3.8087
4.000	3.200	3.700	0.020	3.5238
5.000	2.900	3.400	0.020	3.2595
7.500	2.500	2.900	0.020	2.7463
10.000	2.100	2.500	0.020	2.3370
15.000	1.500	1.800	0.020	1.7283
19.600	1.100	1.400	0.020	1.3264

WORM and SCALE Input File

```
'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'In this case, Diameter is thickness of slab
'Table B.1.3.1.1-1. Critical Dimensions for Plutonium Slab (100% 239Pu) - 0 Inches of Water
,
#index number = <index = 1:27:1>
,
#Concentration = <@conc =
0.007,0.01,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
20,11.6,9.5,8.1,6.9,6.4,6,5.6,5.3,5,4.9,4.7,4.7,4.6,4.5,4.3,4.2,4,3.8,3.6,3.4,3.2,2.9,2.5,2.1,1.5
,1.1> in
```

```

#Ending Diameter = <@enddia =
100,15.6,12.4,9.8,8.2,7.4,6.9,6.4,6.1,5.8,5.6,5.5,5.4,5.3,5.2,5,4.9,4.6,4.4,4.2,4,3.7,3.4,2.9,2.5
,1.8,1.4> in
#Delta = <@delta =
5,0.2,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.
05,0.02,0.02,0.02,0.02,0.02,0.02,0.02> in
,
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
slab no ref
v7-238
read composition
  pu          1 den=<critconc> 1 300
                94239 100
                94240 0   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Slab"
cuboid 1      {{{(diameter*in)/2}}}      {{{(-1*diameter*in)/2}}}      10      -10      10      -
10
media 1 1 1
boundary 1
end geometry
read bnds
  body=1
    surface(1)=vacuum
    surface(2)=vacuum
    surface(3)=mirror
    surface(4)=mirror
    surface(5)=mirror
    surface(6)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_slab_100_00ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infplane
modmat: H2O
critmat: plutonium
isomat: Pu239 1.0
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 14.8000
0.012 11.5724
0.015 9.4875
0.020 7.9255
0.025 7.1721
0.030 6.6976
0.040 6.2158
0.050 5.9239
0.075 5.5952
0.100 5.3984
0.150 5.2680
0.200 5.2071
0.350 5.0564
0.500 4.9375
0.750 4.8050
1.000 4.6476
1.500 4.4035
2.000 4.1829
2.500 3.9965
3.000 3.8087
4.000 3.5238
5.000 3.2595
7.500 2.7463
10.000 2.3370
15.000 1.7283
19.600 1.3264
```

0.007			0.01			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
20.00	0.8956	0.00110	11.60	0.9233	0.00120	9.50	0.9205	0.00160
25	0.9232	0.00100	11.8	0.9319	0.00160	9.6	0.9231	0.00160
30	0.9398	0.00130	12	0.9375	0.00110	9.7	0.9318	0.00130
35	0.9505	0.00100	12.2	0.9415	0.00180	9.8	0.9311	0.00170
40	0.9578	0.00068	12.4	0.9472	0.00130	9.9	0.9378	0.00170
45	0.9630	0.00085	12.6	0.9511	0.00130	10	0.9373	0.00140
50	0.9668	0.00084	12.8	0.9590	0.00120	10.1	0.9469	0.00160
55	0.9692	0.00073	13	0.9626	0.00130	10.2	0.9498	0.00160
60	0.9736	0.00076	13.2	0.9688	0.00110	10.3	0.9513	0.00150
65	0.9732	0.00085	13.4	0.9736	0.00120	10.4	0.9583	0.00200
70	0.9736	0.00068	13.6	0.9771	0.00130	10.5	0.9597	0.00140
75	0.9782	0.00100	13.8	0.9820	0.00120	10.6	0.9632	0.00160
80	0.9783	0.00099	14	0.9850	0.00130	10.7	0.9687	0.00150
85	0.9779	0.00094	14.2	0.9884	0.00120	10.8	0.9738	0.00120
90	0.9790	0.00080	14.4	0.9924	0.00130	10.9	0.9736	0.00140
95	0.9788	0.00071	14.6	0.9960	0.00110	11	0.9800	0.00140
100	0.9777	0.00076	14.8	1.0000	0.00120	11.1	0.9832	0.00150
			15	1.0037	0.00130	11.2	0.9895	0.00140
			15.2	1.0085	0.00150	11.3	0.9898	0.00140
			15.4	1.0105	0.00110	11.4	0.9913	0.00160
			15.6	1.0131	0.00150	11.5	0.9979	0.00170
						11.6	1.0008	0.00210
						11.7	1.0026	0.00160
						11.8	1.0050	0.00130
						11.9	1.0128	0.00120
						12	1.0115	0.00150
						12.1	1.0167	0.00170
						12.2	1.0199	0.00130
						12.3	1.0185	0.00160
						12.4	1.0262	0.00140

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.10	0.9209	0.00190	6.90	0.9149	0.00230	6.40	0.9237	0.00200
8.15	0.9246	0.00190	6.95	0.9154	0.00170	6.45	0.9279	0.00200
8.2	0.9252	0.00150	7	0.9225	0.00190	6.5	0.9329	0.00180
8.25	0.9281	0.00160	7.05	0.9269	0.00170	6.55	0.9374	0.00190
8.3	0.9353	0.00130	7.1	0.9296	0.00170	6.6	0.9442	0.00190
8.35	0.9338	0.00150	7.15	0.9371	0.00260	6.65	0.9472	0.00180
8.4	0.9390	0.00180	7.2	0.9408	0.00160	6.7	0.9551	0.00180
8.45	0.9427	0.00170	7.25	0.9460	0.00200	6.75	0.9598	0.00190
8.5	0.9449	0.00170	7.3	0.9501	0.00190	6.8	0.9656	0.00220
8.55	0.9533	0.00140	7.35	0.9540	0.00180	6.85	0.9694	0.00200
8.6	0.9504	0.00180	7.4	0.9573	0.00190	6.9	0.9731	0.00180
8.65	0.9571	0.00150	7.45	0.9614	0.00190	6.95	0.9785	0.00210
8.7	0.9564	0.00130	7.5	0.9663	0.00190	7	0.9847	0.00180
8.75	0.9602	0.00160	7.55	0.9703	0.00160	7.05	0.9877	0.00180
8.8	0.9653	0.00140	7.6	0.9743	0.00170	7.1	0.9919	0.00230
8.85	0.9661	0.00150	7.65	0.9780	0.00220	7.15	0.9973	0.00170
8.9	0.9707	0.00140	7.7	0.9826	0.00200	7.2	1.0034	0.00180
8.95	0.9726	0.00180	7.75	0.9837	0.00180	7.25	1.0057	0.00200
9	0.9769	0.00150	7.8	0.9879	0.00180	7.3	1.0089	0.00170
9.05	0.9767	0.00150	7.85	0.9966	0.00160	7.35	1.0164	0.00160
9.1	0.9790	0.00150	7.9	0.9974	0.00180	7.4	1.0221	0.00180
9.15	0.9826	0.00170	7.95	1.0025	0.00190			
9.2	0.9883	0.00170	8	1.0029	0.00170			
9.25	0.9909	0.00190	8.05	1.0073	0.00160			
9.3	0.9909	0.00150	8.1	1.0113	0.00170			
9.35	0.9919	0.00170	8.15	1.0158	0.00180			
9.4	0.9986	0.00160	8.2	1.0186	0.00190			
9.45	0.9988	0.00170						
9.5	1.0004	0.00170						
9.55	1.0018	0.00150						
9.6	1.0044	0.00150						
9.65	1.0087	0.00150						
9.7	1.0093	0.00150						
9.75	1.0113	0.00140						
9.8	1.0163	0.00140						

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.00	0.9190	0.00220	5.60	0.9208	0.00220	5.30	0.9109	0.00220
6.05	0.9226	0.00210	5.65	0.9306	0.00210	5.35	0.9196	0.00210
6.1	0.9281	0.00200	5.7	0.9352	0.00200	5.4	0.9290	0.00190
6.15	0.9364	0.00210	5.75	0.9413	0.00220	5.45	0.9323	0.00190
6.2	0.9429	0.00180	5.8	0.9477	0.00230	5.5	0.9409	0.00220
6.25	0.9469	0.00200	5.85	0.9508	0.00220	5.55	0.9515	0.00230
6.3	0.9529	0.00180	5.9	0.9592	0.00200	5.6	0.9552	0.00200
6.35	0.9574	0.00240	5.95	0.9678	0.00210	5.65	0.9634	0.00220
6.4	0.9639	0.00220	6	0.9726	0.00200	5.7	0.9670	0.00260
6.45	0.9716	0.00190	6.05	0.9810	0.00220	5.75	0.9741	0.00210
6.5	0.9720	0.00170	6.1	0.9870	0.00240	5.8	0.9804	0.00260
6.55	0.9781	0.00190	6.15	0.9942	0.00230	5.85	0.9870	0.00210
6.6	0.9878	0.00190	6.2	0.9982	0.00220	5.9	0.9957	0.00210
6.65	0.9920	0.00200	6.25	1.0039	0.00200	5.95	1.0047	0.00250
6.7	1.0004	0.00270	6.3	1.0111	0.00220	6	1.0048	0.00230
6.75	1.0006	0.00180	6.35	1.0148	0.00210	6.05	1.0177	0.00220
6.8	1.0068	0.00210	6.4	1.0221	0.00320	6.1	1.0242	0.00190
6.85	1.0111	0.00210						
6.9	1.0203	0.00210						

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.00	0.9119	0.00220	4.90	0.9209	0.00250	4.70	0.9056	0.00230
5.05	0.9204	0.00260	4.95	0.9265	0.00230	4.75	0.9106	0.00250
5.1	0.9281	0.00250	5	0.9355	0.00220	4.8	0.9269	0.00250
5.15	0.9324	0.00220	5.05	0.9380	0.00240	4.85	0.9335	0.00260
5.2	0.9429	0.00240	5.1	0.9516	0.00210	4.9	0.9411	0.00220
5.25	0.9545	0.00350	5.15	0.9559	0.00290	4.95	0.9457	0.00270
5.3	0.9592	0.00240	5.2	0.9623	0.00230	5	0.9558	0.00220
5.35	0.9675	0.00220	5.25	0.9749	0.00220	5.05	0.9695	0.00210
5.4	0.9741	0.00230	5.3	0.9781	0.00200	5.1	0.9743	0.00220
5.45	0.9846	0.00240	5.35	0.9876	0.00210	5.15	0.9788	0.00260
5.5	0.9916	0.00220	5.4	1.0004	0.00250	5.2	0.9950	0.00200
5.55	0.9924	0.00240	5.45	1.0065	0.00240	5.25	0.9973	0.00230
5.6	1.0008	0.00220	5.5	1.0131	0.00210	5.3	1.0048	0.00220
5.65	1.0080	0.00230	5.55	1.0214	0.00240	5.35	1.0142	0.00220
5.7	1.0161	0.00260	5.6	1.0293	0.00220	5.4	1.0180	0.00210
5.75	1.0282	0.00230				5.45	1.0250	0.00300
5.8	1.0289	0.00260				5.5	1.0353	0.00230

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.70	0.9191	0.00210	4.60	0.9210	0.00210	4.50	0.9184	0.00230
4.75	0.9283	0.00240	4.65	0.9350	0.00200	4.55	0.9341	0.00220
4.8	0.9329	0.00210	4.7	0.9416	0.00230	4.6	0.9384	0.00250
4.85	0.9419	0.00210	4.75	0.9476	0.00260	4.65	0.9503	0.00270
4.9	0.9545	0.00240	4.8	0.9538	0.00210	4.7	0.9555	0.00230
4.95	0.9602	0.00210	4.85	0.9662	0.00220	4.75	0.9646	0.00250
5	0.9678	0.00230	4.9	0.9737	0.00230	4.8	0.9740	0.00230
5.05	0.9748	0.00250	4.95	0.9851	0.00230	4.85	0.9802	0.00240
5.1	0.9846	0.00280	5	0.9908	0.00210	4.9	0.9940	0.00280
5.15	0.9917	0.00220	5.05	0.9988	0.00210	4.95	1.0020	0.00210
5.2	0.9984	0.00260	5.1	1.0082	0.00270	5	1.0072	0.00230
5.25	1.0097	0.00240	5.15	1.0131	0.00220	5.05	1.0172	0.00230
5.3	1.0133	0.00330	5.2	1.0230	0.00260	5.1	1.0228	0.00220
5.35	1.0280	0.00230	5.25	1.0325	0.00230	5.15	1.0323	0.00260
5.4	1.0305	0.00300	5.3	1.0372	0.00230	5.2	1.0400	0.00220

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.30	0.9113	0.00240	4.20	0.9214	0.00240	4.00	0.9220	0.00240
4.35	0.9187	0.00220	4.25	0.9293	0.00240	4.05	0.9336	0.00210
4.4	0.9294	0.00210	4.3	0.9415	0.00240	4.1	0.9440	0.00200
4.45	0.9419	0.00210	4.35	0.9435	0.00200	4.15	0.9486	0.00270
4.5	0.9477	0.00210	4.4	0.9565	0.00220	4.2	0.9623	0.00190
4.55	0.9560	0.00220	4.45	0.9627	0.00210	4.25	0.9724	0.00200
4.6	0.9659	0.00220	4.5	0.9697	0.00230	4.3	0.9829	0.00230
4.65	0.9733	0.00230	4.55	0.9824	0.00230	4.35	0.9871	0.00240
4.7	0.9782	0.00230	4.6	0.9883	0.00240	4.4	0.9995	0.00200
4.75	0.9881	0.00200	4.65	1.0006	0.00230	4.45	1.0066	0.00180
4.8	0.9993	0.00240	4.7	1.0075	0.00310	4.5	1.0189	0.00260
4.85	1.0063	0.00270	4.75	1.0125	0.00240	4.55	1.0306	0.00220
4.9	1.0200	0.00260	4.8	1.0235	0.00200	4.6	1.0365	0.00230
4.95	1.0213	0.00260	4.85	1.0351	0.00200			
5	1.0302	0.00210	4.9	1.0404	0.00220			

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.80	0.9230	0.00230	3.60	0.9197	0.00220	3.40	0.9092	0.00210
3.85	0.9345	0.00240	3.65	0.9276	0.00210	3.45	0.9179	0.00210
3.9	0.9468	0.00190	3.7	0.9403	0.00230	3.5	0.9288	0.00240
3.95	0.9576	0.00230	3.75	0.9534	0.00190	3.55	0.9433	0.00220
4	0.9636	0.00200	3.8	0.9586	0.00200	3.6	0.9526	0.00190
4.05	0.9754	0.00250	3.85	0.9750	0.00220	3.65	0.9621	0.00220
4.1	0.9809	0.00210	3.9	0.9806	0.00190	3.7	0.9777	0.00190
4.15	0.9973	0.00190	3.95	0.9893	0.00180	3.75	0.9865	0.00200
4.2	1.0014	0.00220	4	1.0008	0.00190	3.8	0.9983	0.00200
4.25	1.0140	0.00200	4.05	1.0139	0.00280	3.85	1.0081	0.00320
4.3	1.0196	0.00200	4.1	1.0248	0.00200	3.9	1.0197	0.00220
4.35	1.0299	0.00210	4.15	1.0351	0.00250	3.95	1.0272	0.00200
4.4	1.0398	0.00220	4.2	1.0431	0.00210	4	1.0386	0.00180

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.20	0.9228	0.00190	2.90	0.9045	0.00220	2.50	0.9270	0.00200
3.22	0.9282	0.00190	2.92	0.9096	0.00190	2.52	0.9342	0.00230
3.24	0.9328	0.00200	2.94	0.9157	0.00240	2.54	0.9398	0.00190
3.26	0.9367	0.00370	2.96	0.9202	0.00260	2.56	0.9422	0.00190
3.28	0.9478	0.00200	2.98	0.9276	0.00170	2.58	0.9515	0.00220
3.3	0.9472	0.00230	3	0.9359	0.00280	2.6	0.9557	0.00200
3.32	0.9499	0.00210	3.02	0.9406	0.00210	2.62	0.9612	0.00220
3.34	0.9606	0.00230	3.04	0.9422	0.00220	2.64	0.9684	0.00170
3.36	0.9658	0.00240	3.06	0.9493	0.00190	2.66	0.9710	0.00200
3.38	0.9658	0.00230	3.08	0.9531	0.00210	2.68	0.9807	0.00190
3.4	0.9741	0.00220	3.1	0.9577	0.00240	2.7	0.9828	0.00200
3.42	0.9736	0.00320	3.12	0.9646	0.00180	2.72	0.9937	0.00190
3.44	0.9802	0.00190	3.14	0.9700	0.00190	2.74	0.9982	0.00180
3.46	0.9886	0.00220	3.16	0.9768	0.00240	2.76	1.0039	0.00180
3.48	0.9903	0.00250	3.18	0.9814	0.00200	2.78	1.0102	0.00200
3.5	0.9977	0.00210	3.2	0.9839	0.00220	2.8	1.0126	0.00220
3.52	0.9983	0.00200	3.22	0.9894	0.00190	2.82	1.0215	0.00230
3.54	1.0072	0.00190	3.24	0.9917	0.00200	2.84	1.0260	0.00230
3.56	1.0105	0.00200	3.26	1.0002	0.00180	2.86	1.0285	0.00220
3.58	1.0142	0.00210	3.28	1.0030	0.00200	2.88	1.0342	0.00240
3.6	1.0216	0.00190	3.3	1.0124	0.00190	2.9	1.0418	0.00180
3.62	1.0240	0.00260	3.32	1.0147	0.00230			
3.64	1.0302	0.00190	3.34	1.0187	0.00200			
3.66	1.0323	0.00190	3.36	1.0241	0.00220			
3.68	1.0365	0.00210	3.38	1.0254	0.00210			
3.7	1.0442	0.00220	3.4	1.0359	0.00240			

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.10	0.9166	0.00200	1.50	0.9038	0.00210	1.10	0.8792	0.00230
2.12	0.9237	0.00180	1.52	0.9146	0.00180	1.12	0.8876	0.00200
2.14	0.9318	0.00180	1.54	0.9225	0.00220	1.14	0.8968	0.00190
2.16	0.9398	0.00230	1.56	0.9317	0.00180	1.16	0.9122	0.00190
2.18	0.9488	0.00180	1.58	0.9363	0.00200	1.18	0.9197	0.00210
2.2	0.9497	0.00180	1.6	0.9480	0.00200	1.2	0.9329	0.00190
2.22	0.9553	0.00170	1.62	0.9578	0.00190	1.22	0.9454	0.00270
2.24	0.9653	0.00190	1.64	0.9635	0.00180	1.24	0.9538	0.00210
2.26	0.9748	0.00230	1.66	0.9738	0.00200	1.26	0.9659	0.00190
2.28	0.9800	0.00190	1.68	0.9834	0.00210	1.28	0.9791	0.00210
2.3	0.9859	0.00220	1.7	0.9864	0.00190	1.3	0.9873	0.00210
2.32	0.9886	0.00190	1.72	0.9964	0.00180	1.32	0.9958	0.00200
2.34	1.0020	0.00270	1.74	1.0051	0.00180	1.34	1.0090	0.00210
2.36	1.0086	0.00180	1.76	1.0182	0.00210	1.36	1.0188	0.00190
2.38	1.0138	0.00180	1.78	1.0247	0.00230	1.38	1.0267	0.00190
2.4	1.0176	0.00180	1.8	1.0328	0.00230	1.4	1.0377	0.00280
2.42	1.0232	0.00210						
2.44	1.0302	0.00220						
2.46	1.0393	0.00190						
2.48	1.0454	0.00170						
2.5	1.0530	0.00220						

Case ID: pu_slab_100_01ref

Material: Plutonium

Geometry: Infinite Plane

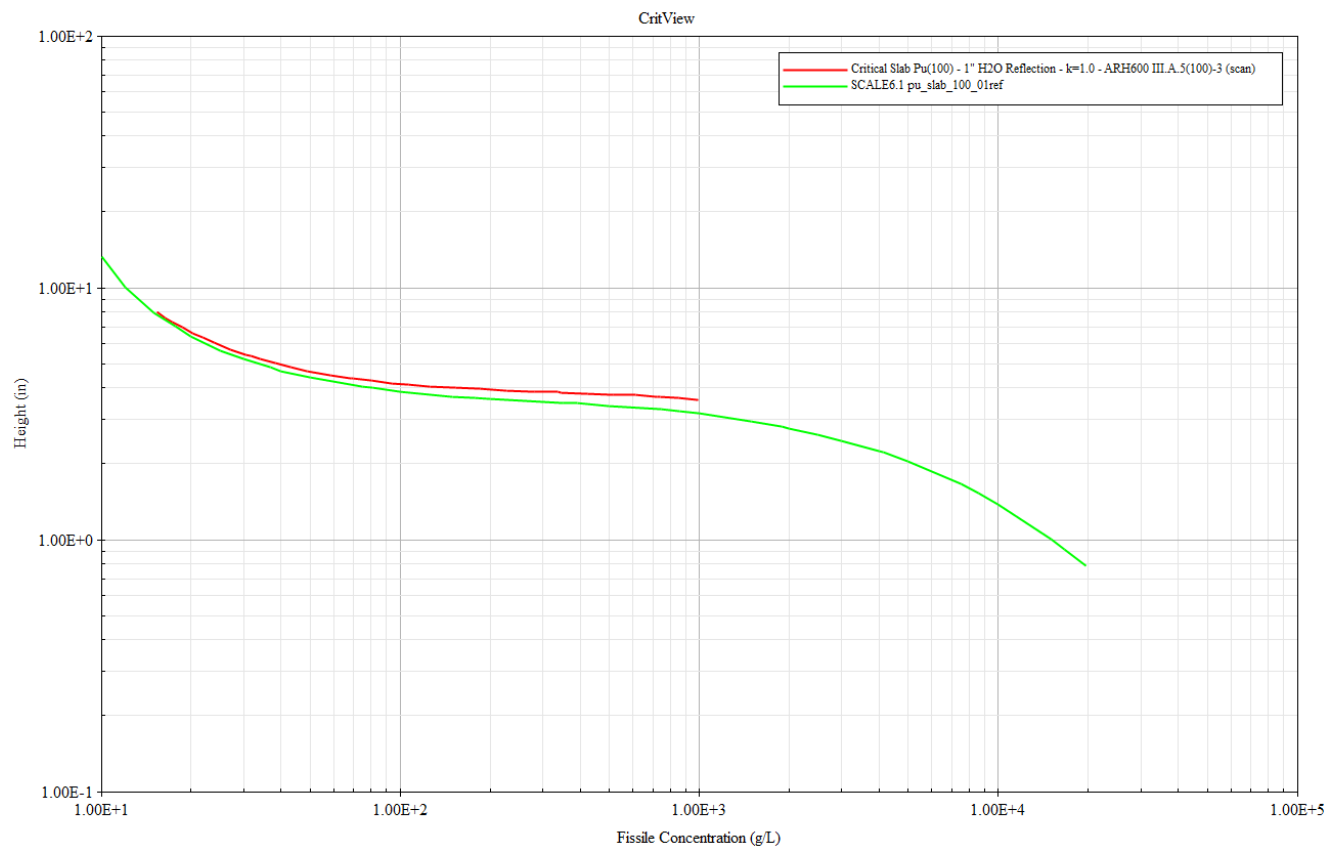
Isotopics: 100% ^{239}Pu

Reflector: 1" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.007	20.000	100.000	5.000	N/A
0.010	10.000	14.100	0.200	13.2577
0.012	8.100	10.500	0.100	10.0647
0.015	6.600	8.300	0.050	7.9661
0.020	5.400	6.700	0.050	6.3838
0.025	4.800	5.900	0.050	5.6413
0.030	4.500	5.400	0.050	5.2060
0.040	4.000	4.900	0.050	4.6816
0.050	3.800	4.600	0.050	4.4120
0.075	3.500	4.200	0.050	4.0388
0.100	3.300	4.000	0.050	3.8564
0.150	3.200	3.900	0.050	3.6970
0.200	3.100	3.800	0.050	3.6344
0.350	3.000	3.700	0.050	3.4957
0.500	2.900	3.600	0.050	3.3886
0.750	2.800	3.400	0.050	3.2843
1.000	2.700	3.300	0.050	3.1653
1.500	2.500	3.100	0.050	2.9518
2.000	2.400	2.900	0.020	2.7621
2.500	2.200	2.800	0.050	2.6160
3.000	2.100	2.600	0.020	2.4717
4.000	1.900	2.400	0.020	2.2446
5.000	1.700	2.200	0.020	2.0475
7.500	1.400	1.800	0.020	1.6673
10.000	1.100	1.500	0.020	1.3821
15.000	0.800	1.100	0.020	1.0087
19.600	0.600	0.900	0.020	0.7850

WORM and SCALE Input File

```
'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'In this case, Diameter is thickness of slab
'Table B.1.3.1.2-1. Critical Dimensions for Plutonium Slab (100% 239Pu) - 1 Inch of Water
Reflection
,
#index number = <index = 1:27:1>
,
#Concentration = <@conc =
0.007,0.01,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
20,10,8.1,6.6,5.4,4.8,4.5,4,3.8,3.5,3.3,3.2,3.1,3,2.9,2.8,2.7,2.5,2.4,2.2,2.1,1.9,1.7,1.4,1.1,0.8
,0.6> in
```

```

#Ending Diameter = <@enddia =
100,14.1,10.5,8.3,6.7,5.9,5.4,4.9,4.6,4.2,4,3.9,3.8,3.7,3.6,3.4,3.3,3.1,2.9,2.8,2.6,2.4,2.2,1.8,1
.5,1.1,0.9> in
#Delta = <@delta =
5,0.2,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02,0.05,0.
02,0.02,0.02,0.02,0.02,0.02,0.02> in
,
'Reflector Thickness {{refthick = 1}}
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
template
v7-238
read composition
  pu          1 den=<critconc> 1 300
                                94239 100
                                94240 0   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Slab"
  cuboid 1      {{(diameter*in)/2}}      {{(-1*diameter*in)/2}}      10      -10      10      -10
  cuboid 2      {{(refdia*in)/2}}      {{(-1*refdia*in)/2}}      10      -10      10      -10
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
read bnds
  body=2
    surface(1)=vacuum
    surface(2)=vacuum
    surface(3)=mirror
    surface(4)=mirror
    surface(5)=mirror
    surface(6)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```


CritView compatible data file

```
reset:
title: SCALE6.1 pu_slab_100_01ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infplane
modmat: H2O
critmat: plutonium
isomat: Pu239 1.0
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 13.2577
0.012 10.0647
0.015 7.9661
0.020 6.3838
0.025 5.6413
0.030 5.2060
0.040 4.6816
0.050 4.4120
0.075 4.0388
0.100 3.8564
0.150 3.6970
0.200 3.6344
0.350 3.4957
0.500 3.3886
0.750 3.2843
1.000 3.1653
1.500 2.9518
2.000 2.7621
2.500 2.6160
3.000 2.4717
4.000 2.2446
5.000 2.0475
7.500 1.6673
10.000 1.3821
15.000 1.0087
19.600 0.7850
```

0.007			0.01			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
20.00	0.9050	0.00110	10.00	0.9235	0.00120	8.10	0.9254	0.00130
25	0.9281	0.00110	10.2	0.9279	0.00150	8.2	0.9301	0.00130
30	0.9454	0.00079	10.4	0.9353	0.00130	8.3	0.9368	0.00170
35	0.9534	0.00094	10.6	0.9404	0.00120	8.4	0.9374	0.00160
40	0.9603	0.00077	10.8	0.9435	0.00110	8.5	0.9429	0.00150
45	0.9644	0.00091	11	0.9502	0.00130	8.6	0.9492	0.00140
50	0.9686	0.00085	11.2	0.9549	0.00130	8.7	0.9505	0.00130
55	0.9700	0.00080	11.4	0.9601	0.00120	8.8	0.9526	0.00120
60	0.9716	0.00083	11.6	0.9682	0.00130	8.9	0.9580	0.00140
65	0.9730	0.00092	11.8	0.9705	0.00120	9	0.9617	0.00130
70	0.9760	0.00080	12	0.9716	0.00120	9.1	0.9674	0.00190
75	0.9764	0.00080	12.2	0.9794	0.00120	9.2	0.9698	0.00120
80	0.9765	0.00067	12.4	0.9827	0.00110	9.3	0.9738	0.00150
85	0.9793	0.00089	12.6	0.9859	0.00140	9.4	0.9765	0.00140
90	0.9794	0.00074	12.8	0.9915	0.00120	9.5	0.9806	0.00140
95	0.9793	0.00070	13	0.9978	0.00120	9.6	0.9836	0.00180
100	0.9781	0.00077	13.2	0.9985	0.00110	9.7	0.9889	0.00120
			13.4	1.0037	0.00110	9.8	0.9935	0.00120
			13.6	1.0065	0.00110	9.9	0.9955	0.00140
			13.8	1.0087	0.00130	10	0.9989	0.00140
			14	1.0118	0.00110	10.1	1.0006	0.00170
			14.1	1.0123	0.00120	10.2	1.0047	0.00150
						10.3	1.0081	0.00170
						10.4	1.0082	0.00140
						10.5	1.0124	0.00130

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.60	0.9193	0.00160	5.40	0.9122	0.00170	4.80	0.9158	0.00190
6.65	0.9244	0.00160	5.45	0.9195	0.00190	4.85	0.9189	0.00180
6.7	0.9268	0.00150	5.5	0.9216	0.00180	4.9	0.9217	0.00220
6.75	0.9322	0.00190	5.55	0.9284	0.00160	4.95	0.9297	0.00170
6.8	0.9349	0.00170	5.6	0.9318	0.00170	5	0.9349	0.00230
6.85	0.9346	0.00150	5.65	0.9356	0.00170	5.05	0.9387	0.00200
6.9	0.9421	0.00150	5.7	0.9392	0.00170	5.1	0.9443	0.00200
6.95	0.9414	0.00170	5.75	0.9475	0.00170	5.15	0.9504	0.00190
7	0.9457	0.00180	5.8	0.9506	0.00190	5.2	0.9571	0.00210
7.05	0.9518	0.00150	5.85	0.9541	0.00200	5.25	0.9616	0.00180
7.1	0.9548	0.00160	5.9	0.9592	0.00150	5.3	0.9653	0.00190
7.15	0.9535	0.00150	5.95	0.9623	0.00170	5.35	0.9685	0.00190
7.2	0.9584	0.00180	6	0.9696	0.00160	5.4	0.9785	0.00200
7.25	0.9619	0.00150	6.05	0.9701	0.00150	5.45	0.9799	0.00180
7.3	0.9630	0.00140	6.1	0.9759	0.00170	5.5	0.9872	0.00190
7.35	0.9693	0.00140	6.15	0.9848	0.00210	5.55	0.9889	0.00170
7.4	0.9690	0.00150	6.2	0.9842	0.00230	5.6	0.9934	0.00170
7.45	0.9730	0.00180	6.25	0.9838	0.00160	5.65	1.0014	0.00180
7.5	0.9737	0.00160	6.3	0.9910	0.00220	5.7	1.0023	0.00180
7.55	0.9777	0.00160	6.35	0.9956	0.00170	5.75	1.0056	0.00230
7.6	0.9821	0.00150	6.4	1.0021	0.00170	5.8	1.0132	0.00190
7.65	0.9844	0.00150	6.45	1.0037	0.00170	5.85	1.0157	0.00190
7.7	0.9861	0.00170	6.5	1.0047	0.00170	5.9	1.0240	0.00200
7.75	0.9882	0.00130	6.55	1.0116	0.00180			
7.8	0.9918	0.00170	6.6	1.0138	0.00180			
7.85	0.9971	0.00150	6.65	1.0143	0.00170			
7.9	0.9962	0.00140	6.7	1.0233	0.00150			
7.95	0.9964	0.00160						
8	1.0076	0.00180						
8.05	1.0063	0.00160						
8.1	1.0108	0.00160						
8.15	1.0092	0.00190						
8.2	1.0118	0.00150						
8.25	1.0179	0.00160						
8.3	1.0156	0.00160						

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.50	0.9239	0.00180	4.00	0.9125	0.00190	3.80	0.9171	0.00220
4.55	0.9244	0.00190	4.05	0.9180	0.00200	3.85	0.9231	0.00180
4.6	0.9324	0.00200	4.1	0.9211	0.00200	3.9	0.9336	0.00220
4.65	0.9384	0.00200	4.15	0.9338	0.00210	3.95	0.9360	0.00200
4.7	0.9446	0.00190	4.2	0.9368	0.00190	4	0.9454	0.00190
4.75	0.9507	0.00210	4.25	0.9485	0.00240	4.05	0.9554	0.00200
4.8	0.9549	0.00200	4.3	0.9518	0.00190	4.1	0.9578	0.00190
4.85	0.9611	0.00190	4.35	0.9594	0.00210	4.15	0.9681	0.00180
4.9	0.9687	0.00220	4.4	0.9585	0.00200	4.2	0.9738	0.00190
4.95	0.9697	0.00200	4.45	0.9724	0.00240	4.25	0.9812	0.00210
5	0.9835	0.00240	4.5	0.9762	0.00190	4.3	0.9886	0.00290
5.05	0.9835	0.00200	4.55	0.9847	0.00220	4.35	0.9961	0.00230
5.1	0.9909	0.00240	4.6	0.9879	0.00200	4.4	0.9976	0.00210
5.15	0.9940	0.00200	4.65	0.9952	0.00210	4.45	1.0076	0.00200
5.2	0.9992	0.00180	4.7	1.0028	0.00210	4.5	1.0118	0.00200
5.25	1.0059	0.00200	4.75	1.0082	0.00200	4.55	1.0226	0.00200
5.3	1.0116	0.00170	4.8	1.0142	0.00210	4.6	1.0281	0.00190
5.35	1.0140	0.00190	4.85	1.0162	0.00200			
5.4	1.0209	0.00180	4.9	1.0255	0.00220			

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.50	0.9129	0.00210	3.30	0.9102	0.00230	3.20	0.9135	0.00230
3.55	0.9265	0.00210	3.35	0.9182	0.00260	3.25	0.9216	0.00220
3.6	0.9337	0.00260	3.4	0.9248	0.00200	3.3	0.9335	0.00250
3.65	0.9427	0.00230	3.45	0.9331	0.00200	3.35	0.9370	0.00210
3.7	0.9558	0.00200	3.5	0.9413	0.00220	3.4	0.9502	0.00250
3.75	0.9574	0.00250	3.55	0.9506	0.00220	3.45	0.9566	0.00230
3.8	0.9615	0.00200	3.6	0.9581	0.00240	3.5	0.9665	0.00220
3.85	0.9782	0.00200	3.65	0.9664	0.00250	3.55	0.9743	0.00230
3.9	0.9846	0.00220	3.7	0.9756	0.00240	3.6	0.9837	0.00230
3.95	0.9885	0.00250	3.75	0.9833	0.00240	3.65	0.9923	0.00240
4	0.9920	0.00230	3.8	0.9906	0.00210	3.7	1.0005	0.00250
4.05	1.0023	0.00190	3.85	0.9993	0.00210	3.75	1.0038	0.00210
4.1	1.0100	0.00210	3.9	1.0048	0.00210	3.8	1.0138	0.00290
4.15	1.0157	0.00210	3.95	1.0116	0.00220	3.85	1.0214	0.00220
4.2	1.0201	0.00210	4	1.0207	0.00220	3.9	1.0311	0.00210

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.10	0.9143	0.00220	3.00	0.9165	0.00210	2.90	0.9118	0.00200
3.15	0.9181	0.00220	3.05	0.9273	0.00220	2.95	0.9181	0.00250
3.2	0.9287	0.00260	3.1	0.9350	0.00230	3	0.9321	0.00240
3.25	0.9363	0.00250	3.15	0.9381	0.00220	3.05	0.9376	0.00230
3.3	0.9438	0.00220	3.2	0.9512	0.00200	3.1	0.9483	0.00230
3.35	0.9540	0.00210	3.25	0.9582	0.00230	3.15	0.9547	0.00200
3.4	0.9652	0.00230	3.3	0.9660	0.00210	3.2	0.9667	0.00220
3.45	0.9660	0.00210	3.35	0.9763	0.00190	3.25	0.9768	0.00230
3.5	0.9816	0.00240	3.4	0.9836	0.00250	3.3	0.9822	0.00200
3.55	0.9864	0.00210	3.45	0.9937	0.00210	3.35	0.9922	0.00210
3.6	0.9899	0.00200	3.5	1.0006	0.00230	3.4	1.0023	0.00220
3.65	1.0046	0.00220	3.55	1.0077	0.00210	3.45	1.0046	0.00240
3.7	1.0089	0.00220	3.6	1.0124	0.00190	3.5	1.0132	0.00230
3.75	1.0202	0.00220	3.65	1.0206	0.00210	3.55	1.0215	0.00250
3.8	1.0257	0.00230	3.7	1.0298	0.00230	3.6	1.0266	0.00230

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.80	0.9137	0.00260	2.70	0.9124	0.00250	2.50	0.9141	0.00240
2.85	0.9216	0.00210	2.75	0.9261	0.00200	2.55	0.9231	0.00220
2.9	0.9317	0.00250	2.8	0.9344	0.00210	2.6	0.9322	0.00200
2.95	0.9405	0.00220	2.85	0.9430	0.00220	2.65	0.9418	0.00220
3	0.9504	0.00270	2.9	0.9552	0.00220	2.7	0.9495	0.00270
3.05	0.9629	0.00240	2.95	0.9650	0.00230	2.75	0.9608	0.00250
3.1	0.9686	0.00220	3	0.9719	0.00280	2.8	0.9742	0.00200
3.15	0.9845	0.00210	3.05	0.9832	0.00220	2.85	0.9827	0.00220
3.2	0.9907	0.00250	3.1	0.9917	0.00210	2.9	0.9945	0.00200
3.25	0.9943	0.00200	3.15	0.9981	0.00200	2.95	0.9996	0.00230
3.3	1.0026	0.00240	3.2	1.0043	0.00200	3	1.0106	0.00200
3.35	1.0133	0.00210	3.25	1.0147	0.00220	3.05	1.0199	0.00200
3.4	1.0201	0.00270	3.3	1.0234	0.00200	3.1	1.0265	0.00220

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.40	0.9241	0.00210	2.20	0.9049	0.00240	2.10	0.9109	0.00200
2.42	0.9266	0.00210	2.25	0.9217	0.00200	2.12	0.9153	0.00190
2.44	0.9334	0.00260	2.3	0.9331	0.00230	2.14	0.9201	0.00230
2.46	0.9356	0.00230	2.35	0.9461	0.00220	2.16	0.9276	0.00220
2.48	0.9358	0.00210	2.4	0.9562	0.00210	2.18	0.9312	0.00200
2.5	0.9486	0.00200	2.45	0.9666	0.00210	2.2	0.9383	0.00180
2.52	0.9478	0.00210	2.5	0.9738	0.00240	2.22	0.9408	0.00200
2.54	0.9528	0.00210	2.55	0.9902	0.00200	2.24	0.9455	0.00200
2.56	0.9557	0.00200	2.6	0.9958	0.00210	2.26	0.9487	0.00210
2.58	0.9621	0.00220	2.65	1.0089	0.00210	2.28	0.9577	0.00240
2.6	0.9622	0.00210	2.7	1.0178	0.00230	2.3	0.9589	0.00220
2.62	0.9697	0.00200	2.75	1.0285	0.00220	2.32	0.9659	0.00200
2.64	0.9770	0.00190	2.8	1.0416	0.00220	2.34	0.9726	0.00210
2.66	0.9783	0.00270				2.36	0.9743	0.00200
2.68	0.9849	0.00230				2.38	0.9794	0.00200
2.7	0.9873	0.00250				2.4	0.9841	0.00220
2.72	0.9905	0.00210				2.42	0.9885	0.00220
2.74	0.9945	0.00240				2.44	0.9968	0.00200
2.76	0.9996	0.00230				2.46	0.9973	0.00240
2.78	1.0034	0.00210				2.48	1.0019	0.00240
2.8	1.0064	0.00230				2.5	1.0044	0.00200
2.82	1.0122	0.00200				2.52	1.0119	0.00220
2.84	1.0131	0.00210				2.54	1.0157	0.00230
2.86	1.0185	0.00240				2.56	1.0179	0.00210
2.88	1.0254	0.00190				2.58	1.0242	0.00200
2.9	1.0259	0.00210				2.6	1.0271	0.00230

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
1.90	0.9151	0.00190	1.70	0.9017	0.00220	1.40	0.9112	0.00190
1.92	0.9170	0.00200	1.72	0.9086	0.00200	1.42	0.9237	0.00200
1.94	0.9188	0.00250	1.74	0.9135	0.00220	1.44	0.9244	0.00190
1.96	0.9316	0.00210	1.76	0.9237	0.00210	1.46	0.9365	0.00230
1.98	0.9340	0.00210	1.78	0.9276	0.00190	1.48	0.9367	0.00240
2	0.9361	0.00230	1.8	0.9328	0.00190	1.5	0.9490	0.00190
2.02	0.9445	0.00190	1.82	0.9379	0.00190	1.52	0.9510	0.00210
2.04	0.9524	0.00200	1.84	0.9432	0.00200	1.54	0.9573	0.00290
2.06	0.9574	0.00250	1.86	0.9529	0.00220	1.56	0.9680	0.00180
2.08	0.9616	0.00200	1.88	0.9573	0.00300	1.58	0.9743	0.00230
2.1	0.9601	0.00220	1.9	0.9595	0.00210	1.6	0.9788	0.00280
2.12	0.9708	0.00200	1.92	0.9644	0.00200	1.62	0.9839	0.00170
2.14	0.9728	0.00220	1.94	0.9726	0.00210	1.64	0.9943	0.00220
2.16	0.9789	0.00220	1.96	0.9785	0.00190	1.66	0.9980	0.00180
2.18	0.9864	0.00190	1.98	0.9823	0.00230	1.68	1.0035	0.00190
2.2	0.9907	0.00290	2	0.9879	0.00190	1.7	1.0063	0.00320
2.22	0.9980	0.00260	2.02	0.9944	0.00210	1.72	1.0149	0.00220
2.24	0.9978	0.00200	2.04	0.9956	0.00200	1.74	1.0239	0.00200
2.26	1.0073	0.00210	2.06	1.0074	0.00260	1.76	1.0256	0.00180
2.28	1.0125	0.00200	2.08	1.0068	0.00190	1.78	1.0303	0.00230
2.3	1.0130	0.00230	2.1	1.0162	0.00200	1.8	1.0398	0.00220
2.32	1.0183	0.00220	2.12	1.0206	0.00220			
2.34	1.0269	0.00210	2.14	1.0219	0.00220			
2.36	1.0272	0.00210	2.16	1.0317	0.00200			
2.38	1.0335	0.00220	2.18	1.0335	0.00240			
2.4	1.0370	0.00180	2.2	1.0402	0.00230			

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
1.10	0.8856	0.00200	0.80	0.8899	0.00200	0.60	0.8738	0.00200
1.12	0.8959	0.00180	0.82	0.8995	0.00190	0.62	0.8846	0.00210
1.14	0.9073	0.00220	0.84	0.9128	0.00180	0.64	0.8996	0.00190
1.16	0.9075	0.00200	0.86	0.9243	0.00200	0.66	0.9149	0.00210
1.18	0.9147	0.00210	0.88	0.9338	0.00190	0.68	0.9291	0.00210
1.2	0.9272	0.00200	0.9	0.9474	0.00210	0.7	0.9446	0.00200
1.22	0.9380	0.00200	0.92	0.9579	0.00200	0.72	0.9558	0.00220
1.24	0.9442	0.00200	0.94	0.9687	0.00190	0.74	0.9712	0.00220
1.26	0.9533	0.00280	0.96	0.9771	0.00200	0.76	0.9851	0.00220
1.28	0.9577	0.00230	0.98	0.9881	0.00200	0.78	0.9961	0.00210
1.3	0.9661	0.00210	1	0.9947	0.00230	0.8	1.0116	0.00220
1.32	0.9760	0.00190	1.02	1.0069	0.00190	0.82	1.0241	0.00210
1.34	0.9857	0.00180	1.04	1.0189	0.00210	0.84	1.0318	0.00210
1.36	0.9865	0.00200	1.06	1.0240	0.00230	0.86	1.0424	0.00210
1.38	0.9995	0.00180	1.08	1.0358	0.00240	0.88	1.0619	0.00220
1.4	1.0043	0.00210	1.1	1.0465	0.00200	0.9	1.0663	0.00210
1.42	1.0106	0.00260						
1.44	1.0173	0.00200						
1.46	1.0243	0.00200						
1.48	1.0319	0.00210						
1.5	1.0368	0.00230						

Case ID: pu_slab_100_10ref

Material: Plutonium

Geometry: Infinite Plane

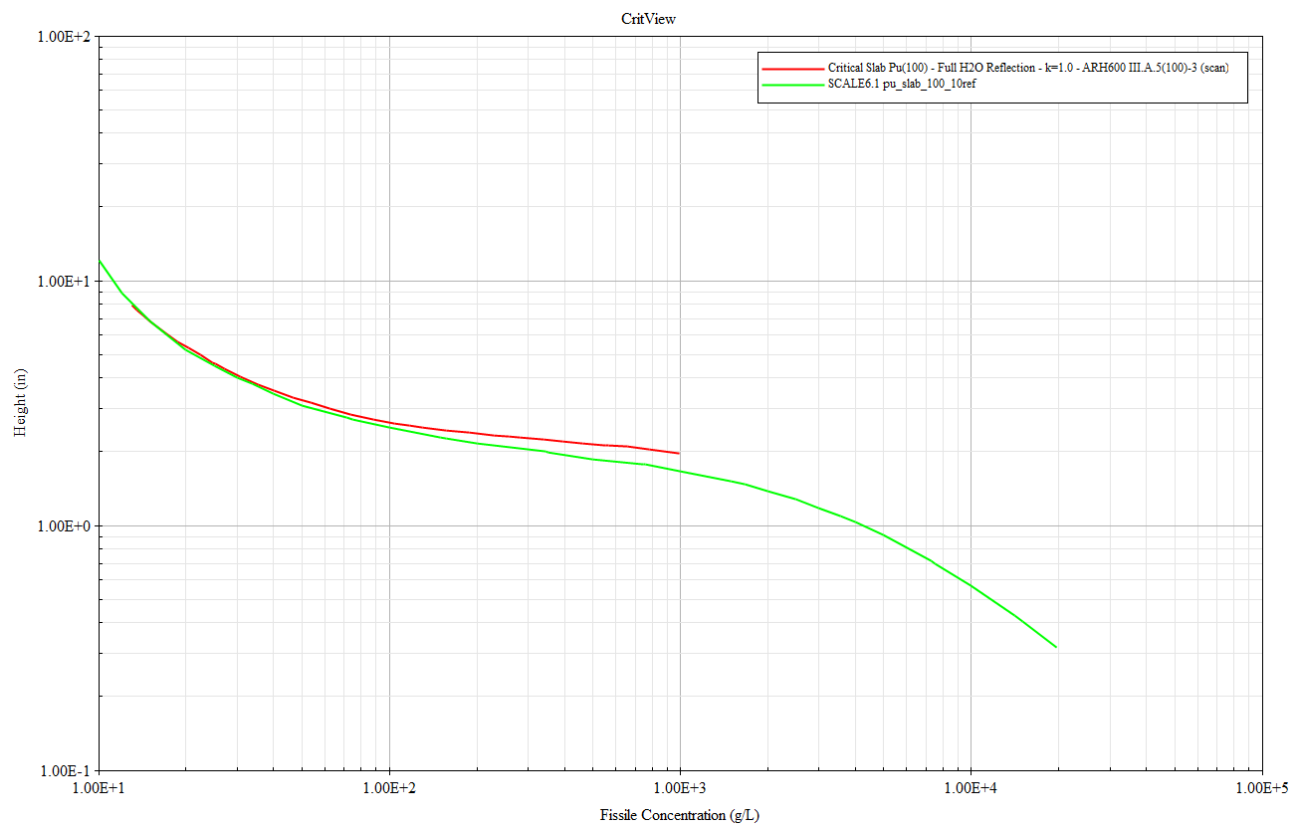
Isotopics: 100% ^{239}Pu

Reflector: 10" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.007	20.000	100.000	5.000	N/A
0.010	9.000	15.000	0.200	12.1472
0.012	7.000	10.000	0.100	8.9204
0.015	5.500	7.100	0.050	6.8131
0.020	4.400	5.500	0.050	5.2350
0.025	3.600	4.700	0.050	4.4833
0.030	3.400	4.200	0.050	3.9970
0.040	2.850	3.650	0.050	3.4419
0.050	2.550	3.350	0.050	3.1009
0.075	2.100	2.900	0.050	2.7115
0.100	1.900	2.700	0.050	2.5025
0.150	1.800	2.500	0.050	2.2899
0.200	1.800	2.400	0.050	2.1563
0.350	1.500	2.200	0.050	1.9861
0.500	1.500	2.100	0.050	1.8687
0.750	1.400	1.900	0.020	1.7713
1.000	1.300	1.900	0.050	1.6641
1.500	1.100	1.700	0.050	1.5198
2.000	1.000	1.500	0.020	1.3842
2.500	1.000	1.400	0.020	1.2807
3.000	0.900	1.300	0.020	1.1805
4.000	0.800	1.200	0.020	1.0359
5.000	0.700	1.000	0.020	0.9109
7.500	0.500	1.000	0.020	0.6968
10.000	0.400	0.700	0.020	0.5656
15.000	0.300	0.500	0.020	0.4055
19.600	0.240	0.380	0.010	0.3175

WORM and SCALE Input File

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'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'In this case, Diameter is thickness of slab
'Table B.1.3.1.3-1. Critical Dimensions for Plutonium Slab (100% 239Pu) - 10 Inch of Water
Reflection
,
#index number = <index = 1:27:1>
,
#Concentration = <@conc =
0.007,0.01,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
20,9,7,5.5,4.4,3.6,3.4,2.85,2.55,2.1,1.9,1.8,1.8,1.5,1.5,1.4,1.3,1.1,1,1,0.9,0.8,0.7,0.5,0.4,0.3,
0.24> in
```

```

#Ending Diameter = <@enddia =
100,15,10,7.1,5.5,4.7,4.2,3.65,3.35,2.9,2.7,2.5,2.4,2.2,2.1,1.9,1.9,1.7,1.5,1.4,1.3,1.2,1,1,0.7,0
.5,0.38> in
#Delta = <@delta =
5,0.2,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02,0.05,0.05,0.02,0.02,0.
02,0.02,0.02,0.02,0.02,0.02,0.01> in
,
'Reflector Thickness {{refthick = 10}}
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
template
v7-238
read composition
  pu          1 den=<critconc> 1 300
                                94239 100
                                94240 0   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Slab"
  cuboid 1      {{(diameter*in)/2}}      {{(-1*diameter*in)/2}}      10      -10      10      -10
  cuboid 2      {{(refdia*in)/2}}      {{(-1*refdia*in)/2}}      10      -10      10      -10
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
read bnds
  body=2
    surface(1)=vacuum
    surface(2)=vacuum
    surface(3)=mirror
    surface(4)=mirror
    surface(5)=mirror
    surface(6)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_slab_100_10ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infplane
modmat: H2O
critmat: plutonium
isomat: Pu239 1.0
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 12.1472
0.012 8.9204
0.015 6.8131
0.020 5.2350
0.025 4.4833
0.030 3.9970
0.040 3.4419
0.050 3.1009
0.075 2.7115
0.100 2.5025
0.150 2.2899
0.200 2.1563
0.350 1.9861
0.500 1.8687
0.750 1.7713
1.000 1.6641
1.500 1.5198
2.000 1.3842
2.500 1.2807
3.000 1.1805
4.000 1.0359
5.000 0.9109
7.500 0.6968
10.000 0.5656
15.000 0.4055
19.600 0.3175
```

0.007			0.01			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
20.00	0.9130	0.00100	9.00	0.9285	0.00130	7.00	0.9241	0.00130
25	0.9335	0.00097	9.2	0.9347	0.00110	7.1	0.9312	0.00150
30	0.9457	0.00083	9.4	0.9373	0.00120	7.2	0.9329	0.00130
35	0.9546	0.00082	9.6	0.9434	0.00160	7.3	0.9393	0.00150
40	0.9602	0.00078	9.8	0.9502	0.00120	7.4	0.9431	0.00150
45	0.9676	0.00099	10	0.9536	0.00120	7.5	0.9491	0.00120
50	0.9693	0.00100	10.2	0.9590	0.00110	7.6	0.9484	0.00150
55	0.9697	0.00100	10.4	0.9635	0.00120	7.7	0.9548	0.00150
60	0.9744	0.00079	10.6	0.9683	0.00120	7.8	0.9603	0.00130
65	0.9749	0.00077	10.8	0.9728	0.00110	7.9	0.9634	0.00120
70	0.9740	0.00068	11	0.9798	0.00110	8	0.9709	0.00110
75	0.9773	0.00074	11.2	0.9831	0.00120	8.1	0.9706	0.00140
80	0.9770	0.00070	11.4	0.9876	0.00120	8.2	0.9749	0.00140
85	0.9780	0.00068	11.6	0.9886	0.00098	8.3	0.9800	0.00120
90	0.9796	0.00062	11.8	0.9949	0.00130	8.4	0.9805	0.00130
95	0.9797	0.00074	12	0.9961	0.00110	8.5	0.9848	0.00130
0	0.9788	0.00065	12.2	1.0014	0.00110	8.6	0.9898	0.00140
			12.4	1.0053	0.00160	8.7	0.9932	0.00130
			12.6	1.0088	0.00120	8.8	0.9972	0.00130
			12.8	1.0096	0.00110	8.9	0.9990	0.00110
			13	1.0134	0.00120	9	1.0039	0.00110
			13.2	1.0157	0.00130	9.1	1.0075	0.00120
			13.4	1.0183	0.00130	9.2	1.0110	0.00130
			13.6	1.0231	0.00110	9.3	1.0129	0.00130
			13.8	1.0246	0.00120	9.4	1.0151	0.00130
			14	1.0278	0.00098	9.5	1.0193	0.00140
			14.2	1.0308	0.00120	9.6	1.0203	0.00120
			14.4	1.0346	0.00110	9.7	1.0219	0.00130
			14.6	1.0364	0.00110	9.8	1.0265	0.00130
			14.8	1.0374	0.00150	9.9	1.0292	0.00130
			15	1.0423	0.00100	10	1.0323	0.00110

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.50	0.9252	0.00140	4.40	0.9296	0.00230	3.60	0.9097	0.00160
5.55	0.9250	0.00140	4.45	0.9365	0.00140	3.65	0.9148	0.00150
5.6	0.9314	0.00150	4.5	0.9397	0.00130	3.7	0.9157	0.00160
5.65	0.9343	0.00170	4.55	0.9440	0.00160	3.75	0.9249	0.00200
5.7	0.9369	0.00170	4.6	0.9496	0.00150	3.8	0.9302	0.00150
5.75	0.9401	0.00170	4.65	0.9483	0.00180	3.85	0.9358	0.00170
5.8	0.9404	0.00190	4.7	0.9520	0.00180	3.9	0.9427	0.00170
5.85	0.9482	0.00160	4.75	0.9615	0.00150	3.95	0.9486	0.00200
5.9	0.9505	0.00180	4.8	0.9641	0.00150	4	0.9534	0.00200
5.95	0.9519	0.00140	4.85	0.9688	0.00170	4.05	0.9571	0.00200
6	0.9549	0.00150	4.9	0.9726	0.00150	4.1	0.9637	0.00170
6.05	0.9544	0.00180	4.95	0.9764	0.00200	4.15	0.9662	0.00180
6.1	0.9610	0.00220	5	0.9831	0.00170	4.2	0.9781	0.00160
6.15	0.9626	0.00160	5.05	0.9848	0.00150	4.25	0.9817	0.00190
6.2	0.9675	0.00150	5.1	0.9884	0.00160	4.3	0.9866	0.00170
6.25	0.9716	0.00130	5.15	0.9933	0.00160	4.35	0.9897	0.00200
6.3	0.9732	0.00150	5.2	0.9986	0.00150	4.4	0.9936	0.00170
6.35	0.9752	0.00160	5.25	1.0006	0.00170	4.45	0.9974	0.00170
6.4	0.9778	0.00140	5.3	1.0026	0.00170	4.5	1.0013	0.00170
6.45	0.9827	0.00130	5.35	1.0047	0.00150	4.55	1.0065	0.00150
6.5	0.9839	0.00180	5.4	1.0126	0.00190	4.6	1.0138	0.00270
6.55	0.9853	0.00160	5.45	1.0150	0.00170	4.65	1.0194	0.00200
6.6	0.9892	0.00140	5.5	1.0202	0.00150	4.7	1.0221	0.00160
6.65	0.9891	0.00140						
6.7	0.9966	0.00130						
6.75	0.9956	0.00160						
6.8	0.9978	0.00150						
6.85	1.0062	0.00150						
6.9	1.0073	0.00170						
6.95	1.0099	0.00180						
7	1.0093	0.00140						
7.05	1.0147	0.00140						
7.1	1.0185	0.00130						

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.40	0.9276	0.00170	2.85	0.9176	0.00180	2.55	0.9156	0.00170
3.45	0.9400	0.00180	2.9	0.9268	0.00200	2.6	0.9259	0.00210
3.5	0.9433	0.00180	2.95	0.9367	0.00180	2.65	0.9349	0.00190
3.55	0.9520	0.00170	3	0.9409	0.00170	2.7	0.9435	0.00190
3.6	0.9577	0.00200	3.05	0.9477	0.00190	2.75	0.9462	0.00180
3.65	0.9621	0.00180	3.1	0.9554	0.00180	2.8	0.9577	0.00210
3.7	0.9677	0.00170	3.15	0.9597	0.00190	2.85	0.9595	0.00210
3.75	0.9716	0.00180	3.2	0.9701	0.00170	2.9	0.9685	0.00180
3.8	0.9810	0.00180	3.25	0.9760	0.00190	2.95	0.9769	0.00220
3.85	0.9831	0.00170	3.3	0.9861	0.00180	3	0.9866	0.00190
3.9	0.9901	0.00250	3.35	0.9854	0.00210	3.05	0.9886	0.00200
3.95	0.9937	0.00180	3.4	0.9922	0.00170	3.1	0.9999	0.00190
4	1.0004	0.00180	3.45	1.0015	0.00220	3.15	1.0056	0.00190
4.05	1.0079	0.00180	3.5	1.0082	0.00190	3.2	1.0118	0.00180
4.1	1.0122	0.00170	3.55	1.0140	0.00220	3.25	1.0152	0.00190
4.15	1.0174	0.00190	3.6	1.0221	0.00190	3.3	1.0238	0.00180
4.2	1.0249	0.00190	3.65	1.0267	0.00170	3.35	1.0292	0.00190

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.10	0.9016	0.00220	1.90	0.8951	0.00180	1.80	0.9170	0.00200
2.15	0.9088	0.00240	1.95	0.9036	0.00190	1.85	0.9243	0.00260
2.2	0.9160	0.00200	2	0.9122	0.00240	1.9	0.9318	0.00200
2.25	0.9254	0.00220	2.05	0.9248	0.00190	1.95	0.9415	0.00270
2.3	0.9345	0.00180	2.1	0.9302	0.00190	2	0.9512	0.00180
2.35	0.9407	0.00180	2.15	0.9444	0.00190	2.05	0.9549	0.00200
2.4	0.9504	0.00200	2.2	0.9515	0.00220	2.1	0.9715	0.00200
2.45	0.9651	0.00200	2.25	0.9607	0.00200	2.15	0.9775	0.00230
2.5	0.9666	0.00190	2.3	0.9653	0.00220	2.2	0.9858	0.00230
2.55	0.9769	0.00200	2.35	0.9794	0.00230	2.25	0.9945	0.00220
2.6	0.9889	0.00240	2.4	0.9863	0.00240	2.3	1.0014	0.00320
2.65	0.9933	0.00180	2.45	0.9919	0.00240	2.35	1.0075	0.00190
2.7	0.9971	0.00220	2.5	0.9995	0.00190	2.4	1.0139	0.00240
2.75	1.0097	0.00230	2.55	1.0097	0.00210	2.45	1.0275	0.00200
2.8	1.0097	0.00200	2.6	1.0164	0.00210	2.5	1.0370	0.00220
2.85	1.0228	0.00180	2.65	1.0258	0.00220			
2.9	1.0280	0.00200	2.7	1.0365	0.00210			

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
1.80	0.9354	0.00200	1.50	0.9123	0.00240	1.50	0.9231	0.00220
1.85	0.9437	0.00220	1.55	0.9198	0.00190	1.55	0.9339	0.00190
1.9	0.9550	0.00200	1.6	0.9281	0.00220	1.6	0.9478	0.00190
1.95	0.9648	0.00210	1.65	0.9356	0.00210	1.65	0.9569	0.00220
2	0.9670	0.00200	1.7	0.9523	0.00200	1.7	0.9649	0.00210
2.05	0.9813	0.00270	1.75	0.9560	0.00240	1.75	0.9731	0.00180
2.1	0.9852	0.00200	1.8	0.9638	0.00220	1.8	0.9839	0.00220
2.15	0.9991	0.00220	1.85	0.9759	0.00240	1.85	0.9966	0.00210
2.2	1.0062	0.00220	1.9	0.9810	0.00220	1.9	1.0057	0.00200
2.25	1.0140	0.00210	1.95	0.9943	0.00200	1.95	1.0116	0.00220
2.3	1.0207	0.00220	2	1.0022	0.00230	2	1.0167	0.00220
2.35	1.0301	0.00200	2.05	1.0088	0.00260	2.05	1.0305	0.00210
2.4	1.0407	0.00310	2.1	1.0178	0.00210	2.1	1.0363	0.00200
			2.15	1.0243	0.00190			
			2.2	1.0309	0.00230			

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
1.40	0.9278	0.00220	1.30	0.9281	0.00210	1.10	0.9149	0.00250
1.42	0.9339	0.00260	1.35	0.9379	0.00210	1.15	0.9191	0.00190
1.44	0.9405	0.00180	1.4	0.9502	0.00220	1.2	0.9334	0.00200
1.46	0.9405	0.00200	1.45	0.9557	0.00230	1.25	0.9501	0.00220
1.48	0.9472	0.00190	1.5	0.9659	0.00230	1.3	0.9570	0.00190
1.5	0.9533	0.00210	1.55	0.9768	0.00190	1.35	0.9679	0.00220
1.52	0.9518	0.00230	1.6	0.9870	0.00230	1.4	0.9792	0.00260
1.54	0.9567	0.00240	1.65	0.9980	0.00190	1.45	0.9885	0.00200
1.56	0.9623	0.00200	1.7	1.0051	0.00180	1.5	0.9949	0.00200
1.58	0.9674	0.00240	1.75	1.0161	0.00240	1.55	1.0078	0.00270
1.6	0.9705	0.00200	1.8	1.0212	0.00210	1.6	1.0175	0.00190
1.62	0.9762	0.00230	1.85	1.0311	0.00200	1.65	1.0300	0.00230
1.64	0.9755	0.00210	1.9	1.0388	0.00220	1.7	1.0381	0.00200
1.66	0.9820	0.00210						
1.68	0.9830	0.00190						
1.7	0.9886	0.00220						
1.72	0.9928	0.00220						
1.74	0.9927	0.00210						
1.76	0.9946	0.00210						
1.78	1.0042	0.00270						
1.8	1.0071	0.00210						
1.82	1.0100	0.00210						
1.84	1.0122	0.00230						
1.86	1.0187	0.00230						
1.88	1.0193	0.00200						
1.9	1.0244	0.00210						

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
1.00	0.9152	0.00240	1.00	0.9350	0.00190	0.90	0.9253	0.00200
1.02	0.9190	0.00210	1.02	0.9386	0.00210	0.92	0.9333	0.00210
1.04	0.9214	0.00190	1.04	0.9466	0.00210	0.94	0.9353	0.00210
1.06	0.9275	0.00190	1.06	0.9496	0.00230	0.96	0.9441	0.00200
1.08	0.9332	0.00210	1.08	0.9530	0.00190	0.98	0.9502	0.00210
1.1	0.9327	0.00210	1.1	0.9610	0.00230	1	0.9536	0.00170
1.12	0.9381	0.00190	1.12	0.9631	0.00220	1.02	0.9648	0.00210
1.14	0.9442	0.00170	1.14	0.9661	0.00200	1.04	0.9645	0.00190
1.16	0.9508	0.00200	1.16	0.9728	0.00250	1.06	0.9654	0.00210
1.18	0.9534	0.00200	1.18	0.9795	0.00190	1.08	0.9780	0.00190
1.2	0.9644	0.00200	1.2	0.9844	0.00190	1.1	0.9758	0.00200
1.22	0.9668	0.00200	1.22	0.9879	0.00190	1.12	0.9842	0.00200
1.24	0.9694	0.00180	1.24	0.9928	0.00240	1.14	0.9882	0.00210
1.26	0.9771	0.00230	1.26	0.9997	0.00200	1.16	0.9948	0.00230
1.28	0.9788	0.00260	1.28	0.9998	0.00210	1.18	0.9999	0.00190
1.3	0.9812	0.00190	1.3	1.0057	0.00190	1.2	1.0039	0.00200
1.32	0.9885	0.00200	1.32	1.0089	0.00200	1.22	1.0077	0.00240
1.34	0.9897	0.00180	1.34	1.0161	0.00210	1.24	1.0140	0.00170
1.36	0.9994	0.00200	1.36	1.0195	0.00190	1.26	1.0188	0.00170
1.38	0.9981	0.00180	1.38	1.0274	0.00220	1.28	1.0257	0.00210
1.4	1.0072	0.00210	1.4	1.0252	0.00190	1.3	1.0291	0.00220
1.42	1.0095	0.00180						
1.44	1.0129	0.00190						
1.46	1.0199	0.00220						
1.48	1.0179	0.00240						
1.5	1.0341	0.00230						

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
0.80	0.9338	0.00200	0.70	0.9303	0.00190	0.50	0.9148	0.00180
0.82	0.9414	0.00200	0.72	0.9381	0.00210	0.52	0.9214	0.00200
0.84	0.9422	0.00190	0.74	0.9425	0.00240	0.54	0.9310	0.00200
0.86	0.9484	0.00190	0.76	0.9500	0.00190	0.56	0.9392	0.00180
0.88	0.9527	0.00330	0.78	0.9582	0.00210	0.58	0.9479	0.00180
0.9	0.9645	0.00200	0.8	0.9628	0.00190	0.6	0.9566	0.00180
0.92	0.9654	0.00200	0.82	0.9686	0.00200	0.62	0.9656	0.00240
0.94	0.9732	0.00200	0.84	0.9763	0.00190	0.64	0.9765	0.00200
0.96	0.9790	0.00180	0.86	0.9806	0.00210	0.66	0.9796	0.00180
0.98	0.9884	0.00210	0.88	0.9864	0.00220	0.68	0.9886	0.00190
1	0.9937	0.00200	0.9	0.9965	0.00200	0.7	1.0022	0.00250
1.02	0.9950	0.00240	0.92	1.0029	0.00190	0.72	1.0041	0.00200
1.04	1.0013	0.00180	0.94	1.0111	0.00200	0.74	1.0161	0.00200
1.06	1.0062	0.00200	0.96	1.0138	0.00220	0.76	1.0190	0.00210
1.08	1.0143	0.00180	0.98	1.0159	0.00250	0.78	1.0242	0.00180
1.1	1.0194	0.00180	1	1.0245	0.00200	0.8	1.0349	0.00200
1.12	1.0230	0.00180				0.82	1.0431	0.00200
1.14	1.0274	0.00200				0.84	1.0454	0.00230
1.16	1.0333	0.00190				0.86	1.0553	0.00230
1.18	1.0353	0.00190				0.88	1.0616	0.00210
1.2	1.0432	0.00200				0.9	1.0727	0.00190
						0.92	1.0747	0.00200
						0.94	1.0839	0.00190
						0.96	1.0889	0.00200
						0.98	1.0945	0.00200
						1	1.1018	0.00190

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
0.40	0.9150	0.00190	0.30	0.9256	0.00200	0.24	0.9292	0.00270
0.42	0.9238	0.00180	0.32	0.9384	0.00180	0.25	0.9376	0.00190
0.44	0.9303	0.00190	0.34	0.9522	0.00210	0.26	0.9466	0.00210
0.46	0.9443	0.00190	0.36	0.9689	0.00180	0.27	0.9598	0.00180
0.48	0.9545	0.00210	0.38	0.9818	0.00250	0.28	0.9698	0.00200
0.5	0.9681	0.00180	0.4	0.9954	0.00230	0.29	0.9788	0.00180
0.52	0.9759	0.00200	0.42	1.0122	0.00200	0.3	0.9858	0.00280
0.54	0.9844	0.00220	0.44	1.0238	0.00210	0.31	0.9918	0.00190
0.56	0.9981	0.00200	0.46	1.0388	0.00200	0.32	1.0028	0.00220
0.58	1.0049	0.00200	0.48	1.0450	0.00170	0.33	1.0099	0.00200
0.6	1.0149	0.00190	0.5	1.0609	0.00190	0.34	1.0165	0.00210
0.62	1.0214	0.00190				0.35	1.0280	0.00190
0.64	1.0348	0.00210				0.36	1.0365	0.00200
0.66	1.0403	0.00200				0.37	1.0418	0.00270
0.68	1.0501	0.00220				0.38	1.0496	0.00210
0.7	1.0569	0.00200						

Pu-slab-97 (Cases with 0", 1", 10" Reflector)

Case ID: pu_slab_097_00ref

Material: Plutonium

Geometry: Infinite Plane

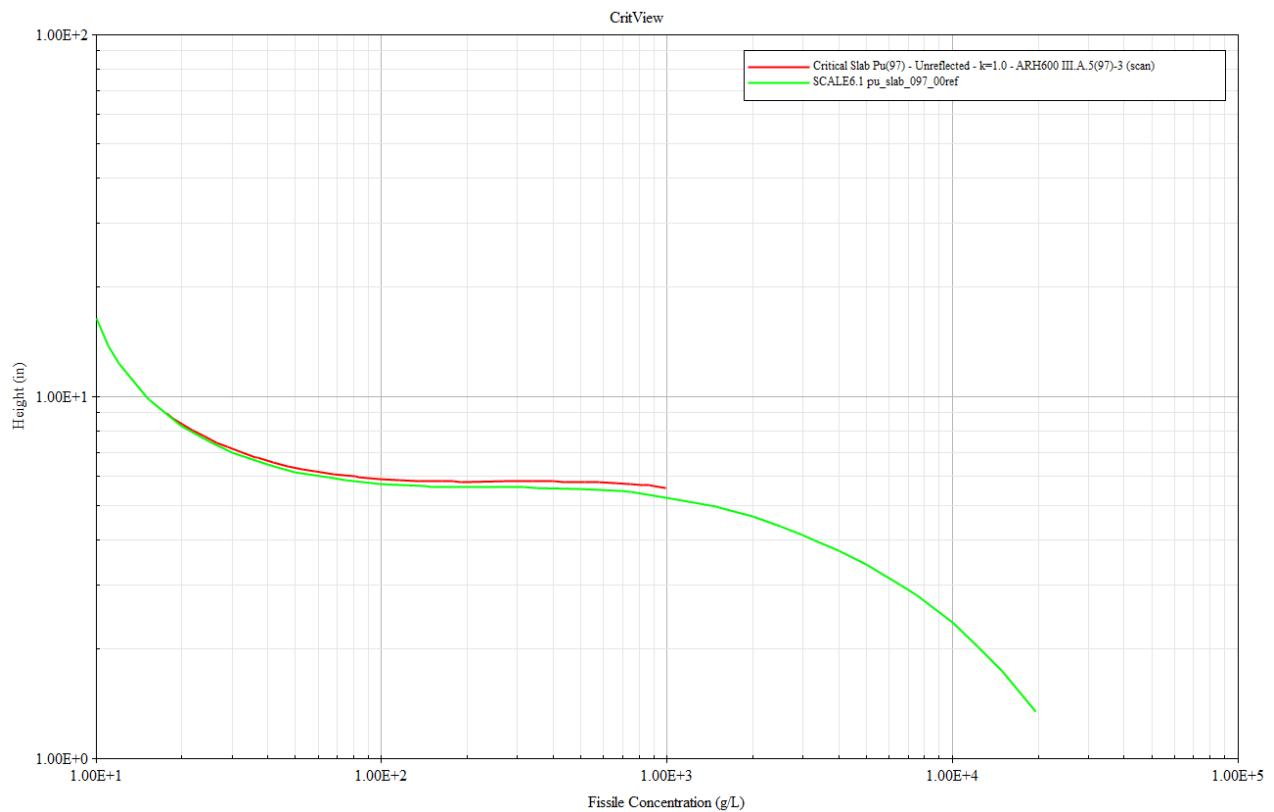
Isotopics: 97% ^{239}Pu 3% ^{240}Pu

Reflector: Unreflected

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	12.300	17.300	0.200	16.4000
0.011	11.000	14.600	0.100	13.8000
0.012	10.100	12.900	0.100	12.3438
0.015	8.400	10.300	0.100	9.9418
0.020	7.200	8.500	0.050	8.2747
0.025	6.600	7.700	0.050	7.4755
0.030	6.200	7.200	0.050	6.9788
0.040	5.700	6.700	0.050	6.4625
0.050	5.500	6.400	0.050	6.1809
0.075	5.200	6.000	0.050	5.8582
0.100	5.100	5.900	0.050	5.7250
0.150	5.000	5.800	0.050	5.6242
0.200	5.000	5.800	0.050	5.6077
0.350	5.000	5.800	0.050	5.5787
0.500	4.900	5.800	0.050	5.5590
0.750	4.800	5.600	0.050	5.4267
1.000	4.700	5.500	0.050	5.2524
1.500	4.400	5.100	0.050	4.9410
2.000	4.100	4.800	0.050	4.6515
2.500	3.900	4.600	0.050	4.3694
3.000	3.700	4.300	0.050	4.1379
4.000	3.300	3.900	0.050	3.7494
5.000	3.100	3.600	0.020	3.4305
7.500	2.500	3.000	0.020	2.8229
10.000	2.100	2.500	0.020	2.3797
15.000	1.500	1.800	0.020	1.7419
19.600	1.100	1.400	0.020	1.3418

WORM and SCALE Input File

```
'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep 6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'In this case, Diameter is thickness of slab
'Table B.1.3.2.1-1. Critical Dimensions for Plutonium Slab (97% 239Pu) - 0 Inches of Water
,
#index number = <index = 1:27:1>
,
#Concentration = <@conc =
0.01,0.011,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
12.3,11,10.1,8.4,7.2,6.6,6.2,5.7,5.5,5.2,5.1,5,5,4.9,4.8,4.7,4.4,4.1,3.9,3.7,3.3,3.1,2.5,2.1,1.
5,1.1> in
```

```

#Ending Diameter = <@enddia =
17.3,14.6,12.9,10.3,8.5,7.7,7.2,6.7,6.4,6,5.9,5.8,5.8,5.8,5.8,5.6,5.5,5.1,4.8,4.6,4.3,3.9,3.6,3,2
.5,1.8,1.4> in
#Delta = <@delta =
0.2,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0
.05,0.05,0.02,0.02,0.02,0.02,0.02> in
,
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
slab no ref
v7-238
read composition
  pu          1 den=<critconc> 1 300
                94239 97
                94240 3   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Slab"
cuboid 1      {{{(diameter*in)/2}}}      {{{(-1*diameter*in)/2}}}      10      -10      10      -
10
media 1 1 1
boundary 1
end geometry
read bnds
  body=1
    surface(1)=vacuum
    surface(2)=vacuum
    surface(3)=mirror
    surface(4)=mirror
    surface(5)=mirror
    surface(6)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_slab_097_00ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infplane
modmat: H2O
critmat: plutonium
isomat: Pu239 0.97 Pu240 0.03
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 16.4000
0.011 13.8000
0.012 12.3438
0.015 9.9418
0.020 8.2747
0.025 7.4755
0.030 6.9788
0.040 6.4625
0.050 6.1809
0.075 5.8582
0.100 5.7250
0.150 5.6242
0.200 5.6077
0.350 5.5787
0.500 5.5590
0.750 5.4267
1.000 5.2524
1.500 4.9410
2.000 4.6515
2.500 4.3694
3.000 4.1379
4.000 3.7494
5.000 3.4305
7.500 2.8229
10.000 2.3797
15.000 1.7419
19.600 1.3418
```

0.01			0.011			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.30	0.9230	0.00130	11.00	0.9224	0.00170	10.10	0.9258	0.00130
12.5	0.9322	0.00140	11.1	0.9260	0.00150	10.2	0.9278	0.00150
12.7	0.9346	0.00130	11.2	0.9304	0.00130	10.3	0.9326	0.00130
12.9	0.9395	0.00120	11.3	0.9336	0.00110	10.4	0.9372	0.00130
13.1	0.9453	0.00130	11.4	0.9379	0.00140	10.5	0.9422	0.00160
13.3	0.9501	0.00150	11.5	0.9391	0.00140	10.6	0.9455	0.00120
13.5	0.9543	0.00120	11.6	0.9463	0.00130	10.7	0.9493	0.00130
13.7	0.9560	0.00120	11.7	0.9467	0.00140	10.8	0.9531	0.00150
13.9	0.9603	0.00130	11.8	0.9493	0.00160	10.9	0.9546	0.00140
14.1	0.9646	0.00110	11.9	0.9492	0.00160	11	0.9558	0.00150
14.3	0.9671	0.00110	12	0.9556	0.00110	11.1	0.9628	0.00130
14.5	0.9727	0.00120	12.1	0.9582	0.00140	11.2	0.9636	0.00150
14.7	0.9741	0.00130	12.2	0.9597	0.00170	11.3	0.9665	0.00170
14.9	0.9774	0.00140	12.3	0.9631	0.00120	11.4	0.9708	0.00170
15.1	0.9841	0.00140	12.4	0.9635	0.00150	11.5	0.9762	0.00130
15.3	0.9853	0.00120	12.5	0.9685	0.00140	11.6	0.9759	0.00150
15.5	0.9859	0.00110	12.6	0.9750	0.00170	11.7	0.9819	0.00130
15.7	0.9929	0.00100	12.7	0.9757	0.00160	11.8	0.9853	0.00150
15.9	0.9944	0.00100	12.8	0.9746	0.00130	11.9	0.9871	0.00140
16.1	0.9972	0.00130	12.9	0.9775	0.00120	12	0.9885	0.00130
16.3	0.9979	0.00170	13	0.9808	0.00140	12.1	0.9937	0.00170
16.5	1.0021	0.00110	13.1	0.9852	0.00110	12.2	0.9959	0.00160
16.7	1.0028	0.00110	13.2	0.9856	0.00120	12.3	0.9993	0.00140
16.9	1.0095	0.00100	13.3	0.9879	0.00120	12.4	1.0009	0.00140
17.1	1.0092	0.00110	13.4	0.9908	0.00130	12.5	1.0028	0.00140
17.3	1.0112	0.00110	13.5	0.9914	0.00130	12.6	1.0065	0.00130
			13.6	0.9929	0.00120	12.7	1.0108	0.00140
			13.7	0.9982	0.00140	12.8	1.0121	0.00120
			13.8	1.0000	0.00140	12.9	1.0155	0.00160
			13.9	1.0003	0.00140			
			14	1.0016	0.00120			
			14.1	1.0057	0.00100			
			14.2	1.0063	0.00120			
			14.3	1.0076	0.00120			
			14.4	1.0132	0.00130			
			14.5	1.0099	0.00110			
			14.6	1.0140	0.00130			

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.40	0.9215	0.00170	7.20	0.9177	0.00160	6.60	0.9172	0.00190
8.5	0.9253	0.00150	7.25	0.9253	0.00160	6.65	0.9256	0.00180
8.6	0.9304	0.00180	7.3	0.9302	0.00170	6.7	0.9293	0.00220
8.7	0.9352	0.00170	7.35	0.9323	0.00160	6.75	0.9366	0.00190
8.8	0.9414	0.00170	7.4	0.9361	0.00180	6.8	0.9415	0.00180
8.9	0.9456	0.00170	7.45	0.9385	0.00180	6.85	0.9464	0.00170
9	0.9532	0.00170	7.5	0.9421	0.00210	6.9	0.9516	0.00200
9.1	0.9599	0.00170	7.55	0.9468	0.00190	6.95	0.9544	0.00160
9.2	0.9638	0.00170	7.6	0.9501	0.00190	7	0.9621	0.00220
9.3	0.9695	0.00140	7.65	0.9563	0.00170	7.05	0.9659	0.00180
9.4	0.9754	0.00140	7.7	0.9635	0.00160	7.1	0.9666	0.00180
9.5	0.9777	0.00170	7.75	0.9602	0.00250	7.15	0.9725	0.00200
9.6	0.9853	0.00160	7.8	0.9691	0.00190	7.2	0.9772	0.00160
9.7	0.9893	0.00210	7.85	0.9710	0.00190	7.25	0.9811	0.00220
9.8	0.9967	0.00160	7.9	0.9745	0.00170	7.3	0.9849	0.00180
9.9	0.9972	0.00140	7.95	0.9803	0.00190	7.35	0.9906	0.00180
10	1.0039	0.00140	8	0.9835	0.00160	7.4	0.9935	0.00200
10.1	1.0074	0.00140	8.05	0.9860	0.00160	7.45	0.9976	0.00200
10.2	1.0097	0.00160	8.1	0.9883	0.00190	7.5	1.0023	0.00200
10.3	1.0170	0.00130	8.15	0.9920	0.00160	7.55	1.0079	0.00210
			8.2	0.9993	0.00180	7.6	1.0121	0.00180
			8.25	0.9956	0.00220	7.65	1.0193	0.00170
			8.3	1.0045	0.00160	7.7	1.0208	0.00190
			8.35	1.0073	0.00210			
			8.4	1.0061	0.00160			
			8.45	1.0113	0.00180			
			8.5	1.0186	0.00200			

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.20	0.9185	0.00280	5.70	0.9079	0.00220	5.50	0.9136	0.00200
6.25	0.9234	0.00180	5.75	0.9164	0.00260	5.55	0.9198	0.00220
6.3	0.9305	0.00180	5.8	0.9232	0.00210	5.6	0.9248	0.00220
6.35	0.9366	0.00260	5.85	0.9311	0.00190	5.65	0.9373	0.00220
6.4	0.9408	0.00190	5.9	0.9351	0.00210	5.7	0.9414	0.00200
6.45	0.9434	0.00210	5.95	0.9393	0.00180	5.75	0.9470	0.00210
6.5	0.9492	0.00200	6	0.9494	0.00310	5.8	0.9491	0.00200
6.55	0.9552	0.00200	6.05	0.9578	0.00210	5.85	0.9612	0.00250
6.6	0.9645	0.00210	6.1	0.9597	0.00230	5.9	0.9662	0.00230
6.65	0.9681	0.00190	6.15	0.9653	0.00230	5.95	0.9731	0.00200
6.7	0.9716	0.00230	6.2	0.9727	0.00230	6	0.9790	0.00280
6.75	0.9778	0.00180	6.25	0.9724	0.00220	6.05	0.9869	0.00190
6.8	0.9805	0.00180	6.3	0.9825	0.00170	6.1	0.9895	0.00240
6.85	0.9842	0.00170	6.35	0.9861	0.00200	6.15	0.9916	0.00230
6.9	0.9920	0.00210	6.4	0.9967	0.00190	6.2	1.0052	0.00230
6.95	0.9977	0.00200	6.45	0.9982	0.00190	6.25	1.0125	0.00200
7	1.0017	0.00180	6.5	1.0054	0.00200	6.3	1.0154	0.00200
7.05	1.0054	0.00190	6.55	1.0133	0.00200	6.35	1.0211	0.00210
7.1	1.0077	0.00190	6.6	1.0129	0.00210	6.4	1.0289	0.00220
7.15	1.0162	0.00190	6.65	1.0211	0.00220			
7.2	1.0183	0.00180	6.7	1.0245	0.00200			

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.20	0.9074	0.00200	5.10	0.9043	0.00300	5.00	0.9068	0.00220
5.25	0.9213	0.00200	5.15	0.9177	0.00240	5.05	0.9177	0.00200
5.3	0.9259	0.00230	5.2	0.9283	0.00200	5.1	0.9248	0.00230
5.35	0.9331	0.00220	5.25	0.9394	0.00300	5.15	0.9334	0.00220
5.4	0.9392	0.00200	5.3	0.9446	0.00230	5.2	0.9393	0.00300
5.45	0.9453	0.00280	5.35	0.9491	0.00260	5.25	0.9441	0.00270
5.5	0.9570	0.00200	5.4	0.9562	0.00240	5.3	0.9559	0.00250
5.55	0.9586	0.00220	5.45	0.9617	0.00270	5.35	0.9576	0.00240
5.6	0.9692	0.00200	5.5	0.9723	0.00220	5.4	0.9701	0.00210
5.65	0.9746	0.00220	5.55	0.9760	0.00260	5.45	0.9761	0.00240
5.7	0.9855	0.00250	5.6	0.9875	0.00250	5.5	0.9822	0.00230
5.75	0.9916	0.00280	5.65	0.9911	0.00240	5.55	0.9913	0.00210
5.8	0.9943	0.00210	5.7	0.9980	0.00240	5.6	0.9970	0.00230
5.85	0.9982	0.00210	5.75	1.0020	0.00240	5.65	1.0032	0.00220
5.9	1.0092	0.00210	5.8	1.0103	0.00220	5.7	1.0134	0.00220
5.95	1.0114	0.00250	5.85	1.0215	0.00270	5.75	1.0161	0.00210
6	1.0165	0.00220	5.9	1.0279	0.00200	5.8	1.0231	0.00240

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.00	0.9136	0.00220	5.00	0.9198	0.00240	4.90	0.9117	0.00210
5.05	0.9213	0.00230	5.05	0.9248	0.00210	4.95	0.9191	0.00190
5.1	0.9333	0.00230	5.1	0.9346	0.00240	5	0.9268	0.00190
5.15	0.9329	0.00270	5.15	0.9441	0.00230	5.05	0.9327	0.00240
5.2	0.9446	0.00240	5.2	0.9457	0.00210	5.1	0.9396	0.00210
5.25	0.9536	0.00190	5.25	0.9525	0.00220	5.15	0.9527	0.00210
5.3	0.9579	0.00220	5.3	0.9600	0.00240	5.2	0.9553	0.00220
5.35	0.9630	0.00190	5.35	0.9684	0.00240	5.25	0.9628	0.00200
5.4	0.9749	0.00210	5.4	0.9769	0.00200	5.3	0.9714	0.00200
5.45	0.9784	0.00220	5.45	0.9837	0.00240	5.35	0.9775	0.00270
5.5	0.9869	0.00200	5.5	0.9863	0.00200	5.4	0.9782	0.00190
5.55	0.9961	0.00280	5.55	0.9969	0.00210	5.45	0.9931	0.00220
5.6	0.9985	0.00210	5.6	1.0023	0.00260	5.5	0.9940	0.00230
5.65	1.0083	0.00240	5.65	1.0103	0.00230	5.55	0.9993	0.00210
5.7	1.0142	0.00240	5.7	1.0113	0.00200	5.6	1.0032	0.00280
5.75	1.0192	0.00190	5.75	1.0220	0.00280	5.65	1.0147	0.00220
5.8	1.0276	0.00290	5.8	1.0241	0.00250	5.7	1.0230	0.00230
						5.75	1.0252	0.00210
						5.8	1.0329	0.00200

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.80	0.9126	0.00220	4.70	0.9237	0.00220	4.40	0.9176	0.00180
4.85	0.9227	0.00220	4.75	0.9281	0.00250	4.45	0.9263	0.00220
4.9	0.9271	0.00200	4.8	0.9371	0.00200	4.5	0.9338	0.00210
4.95	0.9361	0.00200	4.85	0.9416	0.00190	4.55	0.9430	0.00190
5	0.9422	0.00220	4.9	0.9511	0.00210	4.6	0.9457	0.00220
5.05	0.9526	0.00180	4.95	0.9540	0.00190	4.65	0.9554	0.00220
5.1	0.9610	0.00210	5	0.9650	0.00280	4.7	0.9643	0.00210
5.15	0.9658	0.00220	5.05	0.9690	0.00240	4.75	0.9683	0.00260
5.2	0.9729	0.00190	5.1	0.9793	0.00210	4.8	0.9807	0.00190
5.25	0.9761	0.00210	5.15	0.9821	0.00200	4.85	0.9872	0.00210
5.3	0.9843	0.00250	5.2	0.9926	0.00220	4.9	0.9950	0.00250
5.35	0.9906	0.00190	5.25	0.9997	0.00210	4.95	1.0011	0.00200
5.4	0.9984	0.00190	5.3	1.0060	0.00210	5	1.0093	0.00180
5.45	1.0014	0.00270	5.35	1.0115	0.00200	5.05	1.0155	0.00310
5.5	1.0100	0.00190	5.4	1.0185	0.00240	5.1	1.0227	0.00200
5.55	1.0195	0.00250	5.45	1.0236	0.00210			
5.6	1.0218	0.00190	5.5	1.0306	0.00210			

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.10	0.9069	0.00200	3.90	0.9163	0.00190	3.70	0.9137	0.00210
4.15	0.9169	0.00190	3.95	0.9241	0.00230	3.75	0.9255	0.00200
4.2	0.9303	0.00180	4	0.9324	0.00200	3.8	0.9353	0.00180
4.25	0.9369	0.00190	4.05	0.9424	0.00190	3.85	0.9434	0.00250
4.3	0.9445	0.00190	4.1	0.9500	0.00180	3.9	0.9536	0.00180
4.35	0.9530	0.00210	4.15	0.9604	0.00190	3.95	0.9658	0.00190
4.4	0.9635	0.00170	4.2	0.9715	0.00210	4	0.9706	0.00180
4.45	0.9711	0.00190	4.25	0.9818	0.00220	4.05	0.9817	0.00200
4.5	0.9754	0.00220	4.3	0.9863	0.00180	4.1	0.9906	0.00190
4.55	0.9856	0.00200	4.35	0.9960	0.00200	4.15	1.0030	0.00190
4.6	0.9944	0.00190	4.4	1.0063	0.00170	4.2	1.0096	0.00240
4.65	0.9998	0.00210	4.45	1.0111	0.00190	4.25	1.0211	0.00230
4.7	1.0066	0.00200	4.5	1.0207	0.00200	4.3	1.0278	0.00220
4.75	1.0191	0.00180	4.55	1.0294	0.00210			
4.8	1.0230	0.00190	4.6	1.0370	0.00180			

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.30	0.9021	0.00180	3.10	0.9243	0.00230	2.50	0.9091	0.00170
3.35	0.9170	0.00190	3.12	0.9279	0.00170	2.52	0.9138	0.00170
3.4	0.9273	0.00210	3.14	0.9342	0.00170	2.54	0.9185	0.00220
3.45	0.9381	0.00220	3.16	0.9395	0.00170	2.56	0.9238	0.00190
3.5	0.9458	0.00210	3.18	0.9445	0.00190	2.58	0.9313	0.00160
3.55	0.9574	0.00210	3.2	0.9483	0.00200	2.6	0.9351	0.00160
3.6	0.9713	0.00180	3.22	0.9519	0.00180	2.62	0.9422	0.00190
3.65	0.9816	0.00220	3.24	0.9578	0.00200	2.64	0.9489	0.00220
3.7	0.9915	0.00210	3.26	0.9608	0.00210	2.66	0.9547	0.00160
3.75	1.0001	0.00180	3.28	0.9670	0.00190	2.68	0.9535	0.00170
3.8	1.0114	0.00220	3.3	0.9730	0.00200	2.7	0.9650	0.00190
3.85	1.0221	0.00180	3.32	0.9741	0.00210	2.72	0.9747	0.00200
3.9	1.0320	0.00180	3.34	0.9800	0.00190	2.74	0.9790	0.00190
			3.36	0.9822	0.00230	2.76	0.9831	0.00210
			3.38	0.9849	0.00270	2.78	0.9870	0.00190
			3.4	0.9927	0.00230	2.8	0.9933	0.00170
			3.42	0.9980	0.00190	2.82	0.9992	0.00210
			3.44	1.0018	0.00240	2.84	1.0048	0.00200
			3.46	1.0088	0.00190	2.86	1.0153	0.00190
			3.48	1.0088	0.00230	2.88	1.0173	0.00170
			3.5	1.0176	0.00190	2.9	1.0214	0.00170
			3.52	1.0227	0.00190	2.92	1.0253	0.00200
			3.54	1.0269	0.00190	2.94	1.0349	0.00200
			3.56	1.0281	0.00190	2.96	1.0398	0.00200
			3.58	1.0341	0.00240	2.98	1.0409	0.00180
			3.6	1.0376	0.00230	3	1.0470	0.00180

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.10	0.9045	0.00180	1.50	0.8959	0.00170	1.10	0.8745	0.00190
2.12	0.9121	0.00190	1.52	0.9074	0.00190	1.12	0.8824	0.00190
2.14	0.9209	0.00200	1.54	0.9188	0.00180	1.14	0.8952	0.00230
2.16	0.9240	0.00190	1.56	0.9246	0.00190	1.16	0.9038	0.00200
2.18	0.9343	0.00250	1.58	0.9331	0.00180	1.18	0.9163	0.00200
2.2	0.9379	0.00180	1.6	0.9378	0.00180	1.2	0.9238	0.00240
2.22	0.9488	0.00160	1.62	0.9490	0.00180	1.22	0.9396	0.00200
2.24	0.9526	0.00180	1.64	0.9592	0.00200	1.24	0.9451	0.00220
2.26	0.9630	0.00230	1.66	0.9688	0.00190	1.26	0.9555	0.00210
2.28	0.9591	0.00180	1.68	0.9722	0.00190	1.28	0.9736	0.00220
2.3	0.9795	0.00210	1.7	0.9854	0.00250	1.3	0.9811	0.00210
2.32	0.9800	0.00170	1.72	0.9892	0.00180	1.32	0.9933	0.00190
2.34	0.9869	0.00190	1.74	0.9989	0.00200	1.34	0.9991	0.00200
2.36	0.9924	0.00180	1.76	1.0103	0.00190	1.36	1.0091	0.00220
2.38	1.0001	0.00190	1.78	1.0162	0.00230	1.38	1.0227	0.00200
2.4	1.0087	0.00190	1.8	1.0258	0.00200	1.4	1.0306	0.00200
2.42	1.0120	0.00180						
2.44	1.0191	0.00210						
2.46	1.0250	0.00240						
2.48	1.0326	0.00170						
2.5	1.0372	0.00200						

Case ID: pu_slab_097_01ref

Material: Plutonium

Geometry: Infinite Plane

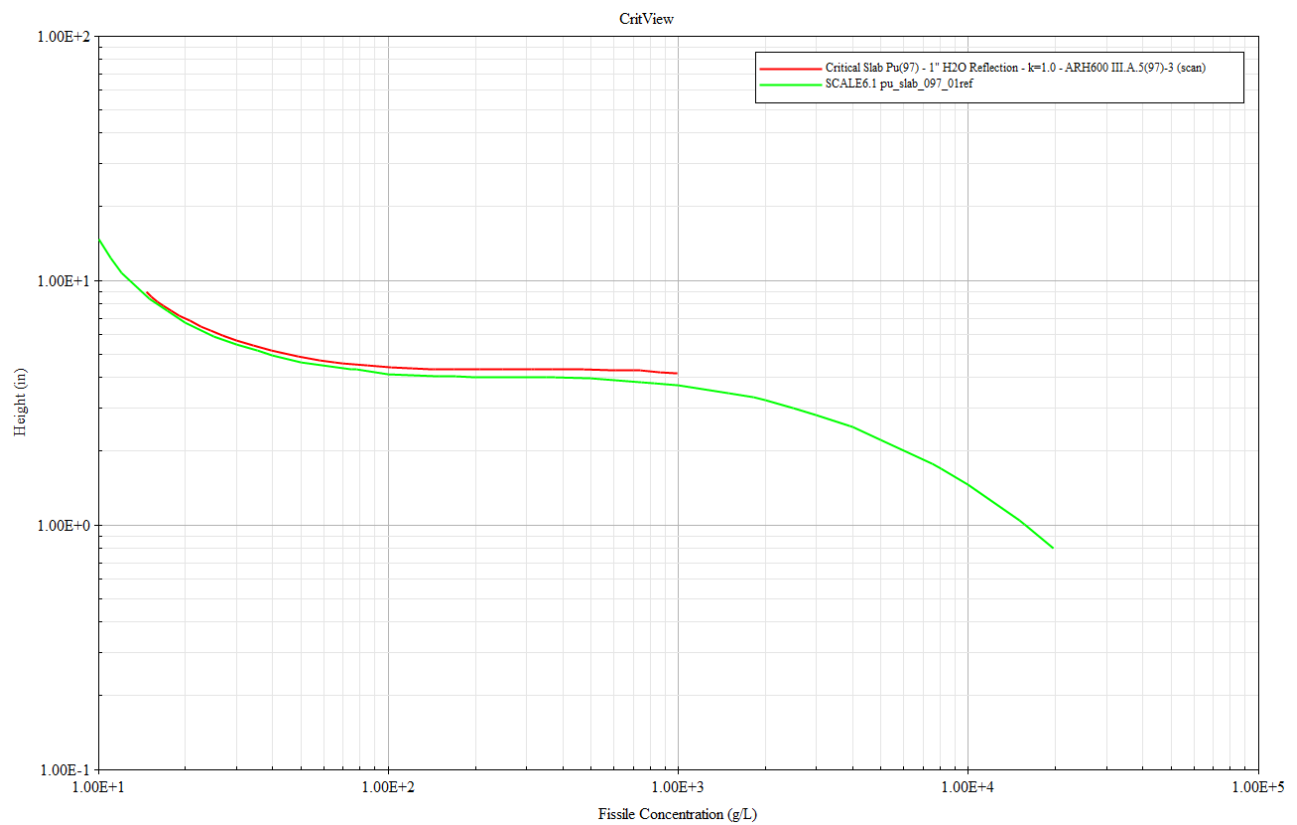
Isotopics: 97% ^{239}Pu 3% ^{240}Pu

Reflector: 1" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	10.800	15.600	0.200	14.7818
0.011	9.600	13.000	0.100	12.3346
0.012	8.300	11.300	0.100	10.7625
0.015	6.900	8.800	0.100	8.4385
0.020	5.700	7.000	0.050	6.7217
0.025	5.000	6.200	0.050	5.9167
0.030	4.700	5.700	0.050	5.4436
0.040	4.200	5.100	0.050	4.9191
0.050	4.000	4.800	0.050	4.6320
0.075	3.700	4.500	0.050	4.3082
0.100	3.600	4.300	0.050	4.1375
0.150	3.500	4.200	0.050	4.0559
0.200	3.400	4.200	0.050	4.0189
0.350	3.400	4.200	0.050	4.0000
0.500	3.400	4.200	0.050	3.9681
0.750	3.300	4.100	0.050	3.8491
1.000	3.200	3.900	0.050	3.7423
1.500	2.900	3.700	0.050	3.4580
2.000	2.700	3.400	0.050	3.2422
2.500	2.500	3.200	0.050	3.0114
3.000	2.400	3.000	0.050	2.8144
4.000	2.100	2.600	0.020	2.5073
5.000	1.900	2.400	0.020	2.2307
7.500	1.500	1.900	0.020	1.7792
10.000	1.200	1.600	0.020	1.4622
15.000	0.800	1.100	0.020	1.0462
19.600	0.600	0.900	0.020	0.8044

WORM and SCALE Input File

```
'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'In this case, Diameter is thickness of slab
'Table B.1.3.2.2-1. Critical Dimensions for Plutonium Slab (97% 239Pu) - 1 Inch of Water
Reflection
,
#index number = <index = 1:27:1>
,
#Concentration = <@conc =
0.01,0.011,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
10.8,9.6,8.3,6.9,5.7,5,4.7,4.2,4,3.7,3.6,3.5,3.4,3.4,3.4,3.3,3.2,2.9,2.7,2.5,2.4,2.1,1.9,1.5,1.2,
0.8,0.6> in
```

```

#Ending Diameter = <@enddia =
15.6,13,11.3,8.8,7,6.2,5.7,5.1,4.8,4.5,4.3,4.2,4.2,4.2,4.2,4.1,3.9,3.7,3.4,3.2,3,2.6,2.4,1.9,1.6,
1.1,0.9> in
#Delta = <@delta =
0.2,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0
.05,0.02,0.02,0.02,0.02,0.02,0.02> in
,
'Reflector Thickness {{refthick = 1}}
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
template
v7-238
read composition
  pu          1 den=<critconc> 1 300
                                94239 97
                                94240 3   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Slab"
  cuboid 1      {{(diameter*in)/2}}      {{(-1*diameter*in)/2}}      10      -10      10      -10
  cuboid 2      {{(refdia*in)/2}}      {{(-1*refdia*in)/2}}      10      -10      10      -10
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
read bnds
  body=2
    surface(1)=vacuum
    surface(2)=vacuum
    surface(3)=mirror
    surface(4)=mirror
    surface(5)=mirror
    surface(6)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_slab_097_01ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infplane
modmat: H2O
critmat: plutonium
isomat: Pu239 0.97 Pu240 0.03
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 14.7818
0.011 12.3346
0.012 10.7625
0.015 8.4385
0.020 6.7217
0.025 5.9167
0.030 5.4436
0.040 4.9191
0.050 4.6320
0.075 4.3082
0.100 4.1375
0.150 4.0559
0.200 4.0189
0.350 4.0000
0.500 3.9681
0.750 3.8491
1.000 3.7423
1.500 3.4580
2.000 3.2422
2.500 3.0114
3.000 2.8144
4.000 2.5073
5.000 2.2307
7.500 1.7792
10.000 1.4622
15.000 1.0462
19.600 0.8044
```


0.01			0.011			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.80	0.9256	0.00130	9.60	0.9278	0.00150	8.30	0.9140	0.00150
11	0.9280	0.00120	9.7	0.9295	0.00140	8.4	0.9198	0.00120
11.2	0.9361	0.00130	9.8	0.9360	0.00120	8.5	0.9225	0.00130
11.4	0.9401	0.00130	9.9	0.9381	0.00130	8.6	0.9238	0.00150
11.6	0.9441	0.00130	10	0.9397	0.00110	8.7	0.9322	0.00160
11.8	0.9498	0.00140	10.1	0.9468	0.00120	8.8	0.9330	0.00140
12	0.9525	0.00120	10.2	0.9470	0.00140	8.9	0.9369	0.00130
12.2	0.9593	0.00100	10.3	0.9508	0.00170	9	0.9396	0.00130
12.4	0.9608	0.00170	10.4	0.9535	0.00130	9.1	0.9443	0.00180
12.6	0.9664	0.00100	10.5	0.9567	0.00150	9.2	0.9496	0.00140
12.8	0.9700	0.00120	10.6	0.9582	0.00140	9.3	0.9509	0.00140
13	0.9724	0.00130	10.7	0.9625	0.00140	9.4	0.9552	0.00160
13.2	0.9771	0.00120	10.8	0.9653	0.00160	9.5	0.9597	0.00170
13.4	0.9790	0.00120	10.9	0.9682	0.00140	9.6	0.9640	0.00120
13.6	0.9832	0.00140	11	0.9700	0.00110	9.7	0.9643	0.00140
13.8	0.9869	0.00100	11.1	0.9700	0.00140	9.8	0.9694	0.00160
14	0.9895	0.00170	11.2	0.9767	0.00130	9.9	0.9724	0.00130
14.2	0.9914	0.00140	11.3	0.9762	0.00110	10	0.9741	0.00140
14.4	0.9954	0.00190	11.4	0.9780	0.00120	10.1	0.9787	0.00140
14.6	0.9980	0.00110	11.5	0.9820	0.00130	10.2	0.9816	0.00130
14.8	1.0002	0.00140	11.6	0.9858	0.00110	10.3	0.9831	0.00140
15	1.0036	0.00120	11.7	0.9879	0.00130	10.4	0.9878	0.00120
15.2	1.0063	0.00120	11.8	0.9886	0.00140	10.5	0.9915	0.00140
15.4	1.0089	0.00110	11.9	0.9899	0.00120	10.6	0.9942	0.00130
15.6	1.0121	0.00110	12	0.9945	0.00130	10.7	0.9990	0.00140
			12.1	0.9969	0.00120	10.8	1.0006	0.00120
			12.2	0.9984	0.00140	10.9	1.0010	0.00140
			12.3	0.9982	0.00130	11	1.0038	0.00140
			12.4	1.0034	0.00120	11.1	1.0086	0.00150
			12.5	1.0050	0.00170	11.2	1.0098	0.00130
			12.6	1.0054	0.00140	11.3	1.0129	0.00130
			12.7	1.0056	0.00140			
			12.8	1.0101	0.00120			
			12.9	1.0107	0.00110			
			13	1.0112	0.00120			

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.90	0.9197	0.00140	5.70	0.9217	0.00160	5.00	0.9110	0.00170
7	0.9213	0.00160	5.75	0.9227	0.00150	5.05	0.9183	0.00190
7.1	0.9327	0.00140	5.8	0.9297	0.00150	5.1	0.9248	0.00180
7.2	0.9363	0.00140	5.85	0.9341	0.00180	5.15	0.9274	0.00170
7.3	0.9414	0.00150	5.9	0.9382	0.00160	5.2	0.9310	0.00180
7.4	0.9486	0.00130	5.95	0.9382	0.00200	5.25	0.9420	0.00180
7.5	0.9550	0.00130	6	0.9463	0.00170	5.3	0.9430	0.00170
7.6	0.9594	0.00170	6.05	0.9504	0.00160	5.35	0.9525	0.00280
7.7	0.9655	0.00130	6.1	0.9528	0.00170	5.4	0.9504	0.00190
7.8	0.9670	0.00170	6.15	0.9579	0.00190	5.45	0.9590	0.00190
7.9	0.9755	0.00160	6.2	0.9613	0.00200	5.5	0.9648	0.00190
8	0.9786	0.00190	6.25	0.9647	0.00190	5.55	0.9691	0.00170
8.1	0.9834	0.00150	6.3	0.9702	0.00180	5.6	0.9708	0.00160
8.2	0.9878	0.00200	6.35	0.9731	0.00170	5.65	0.9734	0.00180
8.3	0.9970	0.00130	6.4	0.9744	0.00170	5.7	0.9806	0.00160
8.4	0.9985	0.00130	6.45	0.9771	0.00190	5.75	0.9866	0.00180
8.5	1.0024	0.00130	6.5	0.9862	0.00180	5.8	0.9865	0.00190
8.6	1.0066	0.00140	6.55	0.9871	0.00160	5.85	0.9929	0.00180
8.7	1.0114	0.00140	6.6	0.9892	0.00150	5.9	0.9989	0.00170
8.8	1.0162	0.00160	6.65	0.9966	0.00170	5.95	1.0022	0.00180
			6.7	0.9961	0.00160	6	1.0032	0.00160
			6.75	1.0051	0.00160	6.05	1.0131	0.00170
			6.8	1.0039	0.00170	6.1	1.0135	0.00200
			6.85	1.0077	0.00180	6.15	1.0166	0.00200
			6.9	1.0105	0.00170	6.2	1.0212	0.00160
			6.95	1.0143	0.00210			
			7	1.0143	0.00170			

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.70	0.9210	0.00190	4.20	0.9164	0.00180	4.00	0.9199	0.00210
4.75	0.9271	0.00180	4.25	0.9195	0.00200	4.05	0.9275	0.00220
4.8	0.9340	0.00180	4.3	0.9322	0.00200	4.1	0.9330	0.00190
4.85	0.9328	0.00180	4.35	0.9354	0.00180	4.15	0.9400	0.00200
4.9	0.9398	0.00190	4.4	0.9372	0.00200	4.2	0.9435	0.00220
4.95	0.9458	0.00190	4.45	0.9453	0.00190	4.25	0.9552	0.00180
5	0.9537	0.00170	4.5	0.9504	0.00210	4.3	0.9609	0.00200
5.05	0.9631	0.00170	4.55	0.9543	0.00220	4.35	0.9645	0.00210
5.1	0.9636	0.00170	4.6	0.9592	0.00190	4.4	0.9723	0.00190
5.15	0.9711	0.00170	4.65	0.9659	0.00200	4.45	0.9757	0.00210
5.2	0.9733	0.00170	4.7	0.9791	0.00230	4.5	0.9823	0.00190
5.25	0.9821	0.00200	4.75	0.9767	0.00200	4.55	0.9938	0.00190
5.3	0.9851	0.00180	4.8	0.9857	0.00230	4.6	0.9952	0.00200
5.35	0.9925	0.00210	4.85	0.9962	0.00260	4.65	1.0027	0.00200
5.4	0.9932	0.00220	4.9	0.9971	0.00190	4.7	1.0079	0.00220
5.45	1.0010	0.00170	4.95	1.0047	0.00180	4.75	1.0178	0.00200
5.5	1.0025	0.00180	5	1.0077	0.00200	4.8	1.0198	0.00210
5.55	1.0060	0.00180	5.05	1.0179	0.00210			
5.6	1.0160	0.00210	5.1	1.0176	0.00190			
5.65	1.0196	0.00180						
5.7	1.0237	0.00190						

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.70	0.9188	0.00200	3.60	0.9201	0.00200	3.50	0.9234	0.00210
3.75	0.9256	0.00210	3.65	0.9291	0.00260	3.55	0.9308	0.00190
3.8	0.9275	0.00250	3.7	0.9360	0.00230	3.6	0.9368	0.00230
3.85	0.9391	0.00220	3.75	0.9466	0.00250	3.65	0.9432	0.00250
3.9	0.9487	0.00220	3.8	0.9511	0.00240	3.7	0.9496	0.00190
3.95	0.9540	0.00220	3.85	0.9576	0.00200	3.75	0.9582	0.00200
4	0.9575	0.00310	3.9	0.9634	0.00220	3.8	0.9626	0.00220
4.05	0.9710	0.00240	3.95	0.9751	0.00200	3.85	0.9758	0.00210
4.1	0.9739	0.00220	4	0.9815	0.00220	3.9	0.9799	0.00250
4.15	0.9843	0.00220	4.05	0.9828	0.00210	3.95	0.9881	0.00300
4.2	0.9975	0.00320	4.1	0.9937	0.00270	4	0.9958	0.00220
4.25	0.9963	0.00230	4.15	1.0021	0.00230	4.05	0.9988	0.00280
4.3	0.9977	0.00220	4.2	1.0079	0.00260	4.1	1.0090	0.00220
4.35	1.0117	0.00270	4.25	1.0151	0.00220	4.15	1.0158	0.00240
4.4	1.0156	0.00250	4.3	1.0207	0.00200	4.2	1.0194	0.00240
4.45	1.0210	0.00200						
4.5	1.0268	0.00210						

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.40	0.9137	0.00190	3.40	0.9189	0.00210	3.40	0.9246	0.00200
3.45	0.9191	0.00230	3.45	0.9211	0.00240	3.45	0.9320	0.00210
3.5	0.9297	0.00220	3.5	0.9309	0.00210	3.5	0.9374	0.00190
3.55	0.9349	0.00210	3.55	0.9383	0.00210	3.55	0.9464	0.00230
3.6	0.9431	0.00180	3.6	0.9479	0.00200	3.6	0.9553	0.00210
3.65	0.9488	0.00210	3.65	0.9562	0.00260	3.65	0.9574	0.00180
3.7	0.9572	0.00200	3.7	0.9623	0.00200	3.7	0.9678	0.00210
3.75	0.9644	0.00230	3.75	0.9656	0.00250	3.75	0.9737	0.00220
3.8	0.9712	0.00240	3.8	0.9769	0.00240	3.8	0.9826	0.00230
3.85	0.9791	0.00210	3.85	0.9793	0.00210	3.85	0.9847	0.00200
3.9	0.9860	0.00210	3.9	0.9848	0.00180	3.9	0.9918	0.00190
3.95	0.9887	0.00210	3.95	0.9987	0.00210	3.95	0.9955	0.00230
4	0.9975	0.00190	4	1.0000	0.00210	4	1.0079	0.00220
4.05	1.0041	0.00200	4.05	1.0099	0.00250	4.05	1.0123	0.00190
4.1	1.0092	0.00230	4.1	1.0155	0.00250	4.1	1.0205	0.00200
4.15	1.0192	0.00210	4.15	1.0226	0.00220	4.15	1.0245	0.00210
4.2	1.0231	0.00220	4.2	1.0265	0.00320	4.2	1.0322	0.00190

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.30	0.9216	0.00210	3.20	0.9236	0.00230	2.90	0.9114	0.00200
3.35	0.9313	0.00220	3.25	0.9336	0.00190	2.95	0.9189	0.00220
3.4	0.9387	0.00210	3.3	0.9394	0.00210	3	0.9242	0.00210
3.45	0.9453	0.00200	3.35	0.9462	0.00210	3.05	0.9375	0.00210
3.5	0.9500	0.00200	3.4	0.9546	0.00180	3.1	0.9426	0.00200
3.55	0.9624	0.00210	3.45	0.9568	0.00210	3.15	0.9511	0.00190
3.6	0.9640	0.00190	3.5	0.9685	0.00200	3.2	0.9622	0.00200
3.65	0.9726	0.00220	3.55	0.9696	0.00210	3.25	0.9676	0.00180
3.7	0.9812	0.00200	3.6	0.9827	0.00190	3.3	0.9780	0.00220
3.75	0.9858	0.00230	3.65	0.9889	0.00210	3.35	0.9793	0.00190
3.8	0.9887	0.00210	3.7	0.9956	0.00190	3.4	0.9891	0.00220
3.85	1.0002	0.00240	3.75	1.0008	0.00190	3.45	0.9992	0.00190
3.9	1.0053	0.00230	3.8	1.0122	0.00230	3.5	1.0042	0.00200
3.95	1.0112	0.00200	3.85	1.0168	0.00210	3.55	1.0124	0.00190
4	1.0196	0.00190	3.9	1.0206	0.00230	3.6	1.0194	0.00180
4.05	1.0251	0.00220				3.65	1.0256	0.00210
4.1	1.0311	0.00230				3.7	1.0338	0.00220

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.70	0.9118	0.00220	2.50	0.9087	0.00170	2.40	0.9200	0.00190
2.75	0.9217	0.00250	2.55	0.9237	0.00240	2.45	0.9290	0.00200
2.8	0.9336	0.00210	2.6	0.9277	0.00190	2.5	0.9400	0.00180
2.85	0.9388	0.00210	2.65	0.9389	0.00200	2.55	0.9468	0.00200
2.9	0.9448	0.00190	2.7	0.9462	0.00210	2.6	0.9625	0.00240
2.95	0.9565	0.00190	2.75	0.9556	0.00190	2.65	0.9716	0.00200
3	0.9621	0.00190	2.8	0.9665	0.00190	2.7	0.9807	0.00190
3.05	0.9723	0.00220	2.85	0.9693	0.00190	2.75	0.9876	0.00190
3.1	0.9814	0.00230	2.9	0.9837	0.00180	2.8	0.9981	0.00230
3.15	0.9863	0.00170	2.95	0.9896	0.00190	2.85	1.0047	0.00200
3.2	0.9973	0.00210	3	0.9981	0.00200	2.9	1.0175	0.00190
3.25	1.0005	0.00210	3.05	1.0064	0.00220	2.95	1.0262	0.00220
3.3	1.0117	0.00190	3.1	1.0150	0.00180	3	1.0332	0.00230
3.35	1.0208	0.00200	3.15	1.0226	0.00200			
3.4	1.0284	0.00210	3.2	1.0339	0.00200			

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.10	0.9121	0.00200	1.90	0.9181	0.00180	1.50	0.9150	0.00210
2.12	0.9172	0.00180	1.92	0.9252	0.00190	1.52	0.9180	0.00190
2.14	0.9214	0.00180	1.94	0.9248	0.00210	1.54	0.9293	0.00190
2.16	0.9216	0.00230	1.96	0.9326	0.00220	1.56	0.9333	0.00210
2.18	0.9323	0.00190	1.98	0.9360	0.00190	1.58	0.9421	0.00240
2.2	0.9343	0.00190	2	0.9416	0.00170	1.6	0.9460	0.00190
2.22	0.9400	0.00180	2.02	0.9476	0.00210	1.62	0.9508	0.00190
2.24	0.9453	0.00180	2.04	0.9502	0.00200	1.64	0.9576	0.00180
2.26	0.9504	0.00180	2.06	0.9568	0.00190	1.66	0.9675	0.00200
2.28	0.9516	0.00200	2.08	0.9643	0.00210	1.68	0.9687	0.00200
2.3	0.9587	0.00200	2.1	0.9649	0.00170	1.7	0.9781	0.00190
2.32	0.9633	0.00230	2.12	0.9715	0.00220	1.72	0.9824	0.00190
2.34	0.9691	0.00290	2.14	0.9782	0.00200	1.74	0.9871	0.00180
2.36	0.9740	0.00190	2.16	0.9785	0.00200	1.76	0.9954	0.00190
2.38	0.9785	0.00210	2.18	0.9854	0.00190	1.78	1.0002	0.00200
2.4	0.9788	0.00190	2.2	0.9977	0.00170	1.8	1.0077	0.00190
2.42	0.9849	0.00210	2.22	0.9961	0.00210	1.82	1.0136	0.00200
2.44	0.9926	0.00180	2.24	1.0034	0.00180	1.84	1.0191	0.00230
2.46	0.9925	0.00190	2.26	1.0068	0.00200	1.86	1.0220	0.00170
2.48	0.9973	0.00170	2.28	1.0100	0.00210	1.88	1.0336	0.00200
2.5	0.9967	0.00190	2.3	1.0154	0.00190	1.9	1.0308	0.00210
2.52	1.0058	0.00200	2.32	1.0202	0.00200			
2.54	1.0131	0.00190	2.34	1.0241	0.00170			
2.56	1.0124	0.00200	2.36	1.0276	0.00200			
2.58	1.0169	0.00210	2.38	1.0349	0.00200			
2.6	1.0223	0.00270	2.4	1.0385	0.00190			

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
1.20	0.9044	0.00180	0.80	0.8738	0.00170	0.60	0.8587	0.00210
1.22	0.9120	0.00200	0.82	0.8848	0.00180	0.62	0.8729	0.00220
1.24	0.9225	0.00180	0.84	0.8940	0.00190	0.64	0.8871	0.00230
1.26	0.9266	0.00180	0.86	0.9100	0.00230	0.66	0.8989	0.00190
1.28	0.9340	0.00180	0.88	0.9215	0.00200	0.68	0.9172	0.00200
1.3	0.9437	0.00200	0.9	0.9300	0.00210	0.7	0.9306	0.00190
1.32	0.9523	0.00180	0.92	0.9360	0.00230	0.72	0.9413	0.00200
1.34	0.9597	0.00190	0.94	0.9438	0.00190	0.74	0.9569	0.00210
1.36	0.9627	0.00200	0.96	0.9617	0.00210	0.76	0.9697	0.00220
1.38	0.9727	0.00200	0.98	0.9712	0.00220	0.78	0.9832	0.00200
1.4	0.9798	0.00210	1	0.9814	0.00240	0.8	0.9974	0.00210
1.42	0.9870	0.00190	1.02	0.9895	0.00200	0.82	1.0091	0.00210
1.44	0.9941	0.00180	1.04	0.9950	0.00220	0.84	1.0207	0.00210
1.46	0.9991	0.00230	1.06	1.0112	0.00200	0.86	1.0336	0.00260
1.48	1.0073	0.00230	1.08	1.0169	0.00210	0.88	1.0465	0.00220
1.5	1.0142	0.00200	1.1	1.0300	0.00190	0.9	1.0546	0.00190
1.52	1.0197	0.00220						
1.54	1.0301	0.00220						
1.56	1.0354	0.00190						
1.58	1.0381	0.00210						
1.6	1.0533	0.00180						

Case ID: pu_slab_097_10ref

Material: Plutonium

Geometry: Infinite Plane

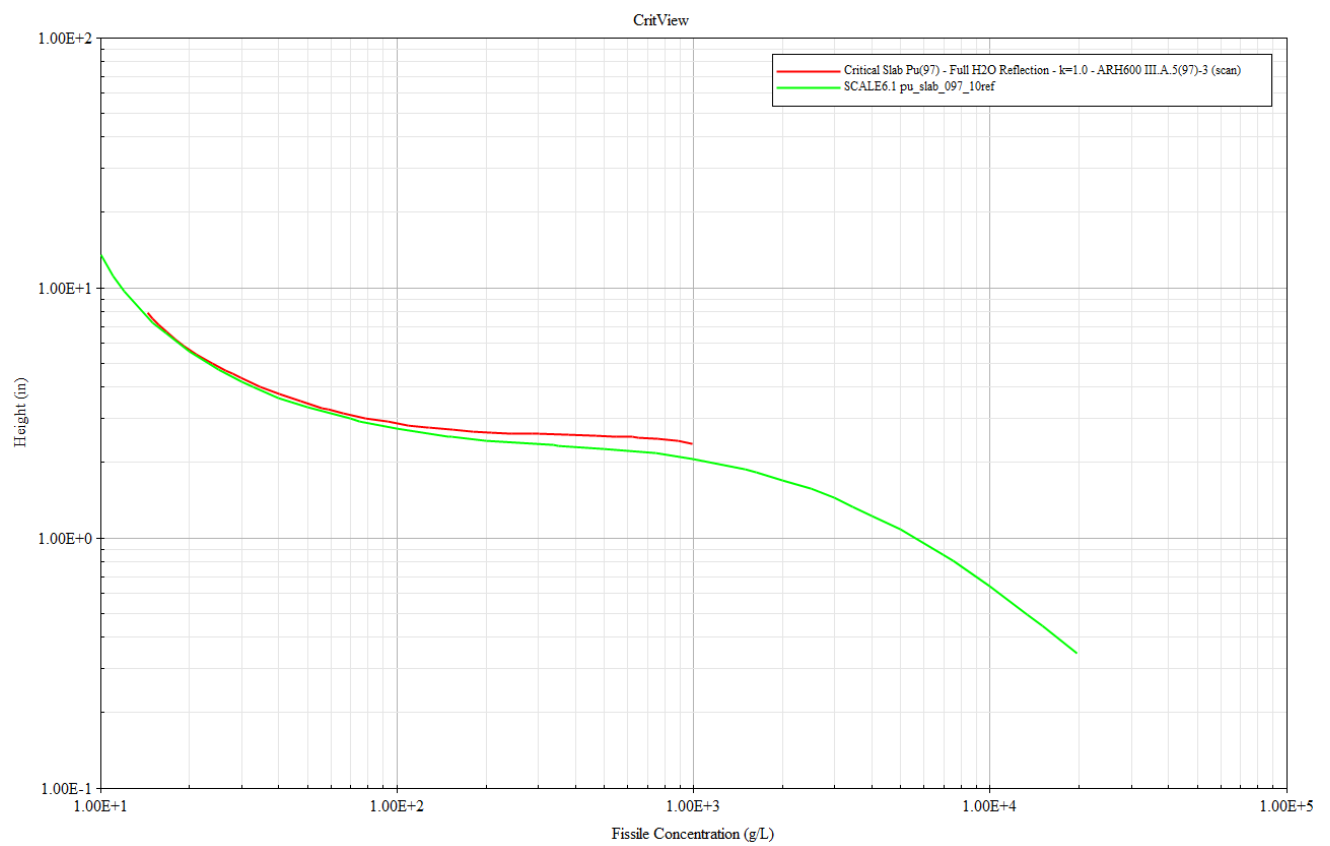
Isotopics: 97% ^{239}Pu 3% ^{240}Pu

Reflector: 10" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	9.800	14.600	0.200	13.6035
0.011	8.400	11.900	0.100	11.1674
0.012	7.600	10.200	0.100	9.6640
0.015	5.800	7.600	0.100	7.2176
0.020	4.600	5.800	0.050	5.5579
0.025	3.900	5.000	0.050	4.7192
0.030	3.500	4.500	0.050	4.2263
0.040	3.000	3.900	0.050	3.6358
0.050	2.800	3.500	0.050	3.3240
0.075	2.400	3.100	0.050	2.9248
0.100	2.200	2.900	0.050	2.7290
0.150	2.100	2.800	0.050	2.5342
0.200	2.000	2.700	0.050	2.4508
0.350	1.900	2.600	0.050	2.3308
0.500	1.800	2.500	0.050	2.2712
0.750	1.700	2.400	0.050	2.1904
1.000	1.600	2.300	0.050	2.0692
1.500	1.400	2.100	0.050	1.8800
2.000	1.300	1.900	0.050	1.6977
2.500	1.200	1.700	0.020	1.5808
3.000	1.100	1.600	0.020	1.4465
4.000	0.900	1.400	0.020	1.2200
5.000	0.800	1.200	0.020	1.0867
7.500	0.600	0.900	0.020	0.8104
10.000	0.500	0.800	0.020	0.6403
15.000	0.300	0.500	0.020	0.4453
19.600	0.200	0.400	0.020	0.3465

WORM and SCALE Input File

```
'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'In this case, Diameter is thickness of slab
'Table B.1.3.2.3-1. Critical Dimensions for Plutonium Slab (97% 239Pu) - 10 Inches of Water
Reflection
'
#index number = <index = 1:27:1>
'
#Concentration = <@conc =
0.01,0.011,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
'
#Starting Diameter = <@startdia =
9.8,8.4,7.6,5.8,4.6,3.9,3.5,3.2,2.4,2.2,2.1,2,1.9,1.8,1.7,1.6,1.4,1.3,1.2,1.1,0.9,0.8,0.6,0.5,0
.3,0.2> in
```

```

#Ending Diameter = <@enddia =
14.6,11.9,10.2,7.6,5.8,5,4.5,3.9,3.5,3.1,2.9,2.8,2.7,2.6,2.5,2.4,2.3,2.1,1.9,1.7,1.6,1.4,1.2,0.9,
0.8,0.5,0.4> in
#Delta = <@delta =
0.2,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02,0
.02,0.02,0.02,0.02,0.02,0.02> in
,
'Reflector Thickness {{refthick = 10}}
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
template
v7-238
read composition
  pu          1 den=<critconc> 1 300
                                94239 97
                                94240 3   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Slab"
  cuboid 1      {{(diameter*in)/2}}      {{(-1*diameter*in)/2}}      10      -10      10      -10
  cuboid 2      {{(refdia*in)/2}}      {{(-1*refdia*in)/2}}      10      -10      10      -10
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
read bnds
  body=2
    surface(1)=vacuum
    surface(2)=vacuum
    surface(3)=mirror
    surface(4)=mirror
    surface(5)=mirror
    surface(6)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_slab_097_10ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infplane
modmat: H2O
critmat: plutonium
isomat: Pu239 0.97 Pu240 0.03
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 13.6035
0.011 11.1674
0.012 9.6640
0.015 7.2176
0.020 5.5579
0.025 4.7192
0.030 4.2263
0.040 3.6358
0.050 3.3240
0.075 2.9248
0.100 2.7290
0.150 2.5342
0.200 2.4508
0.350 2.3308
0.500 2.2712
0.750 2.1904
1.000 2.0692
1.500 1.8800
2.000 1.6977
2.500 1.5808
3.000 1.4465
4.000 1.2200
5.000 1.0867
7.500 0.8104
10.000 0.6403
15.000 0.4453
19.600 0.3465
```

0.01			0.011			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.80	0.9250	0.00110	8.40	0.9265	0.00140	7.60	0.9298	0.00130
10	0.9332	0.00140	8.5	0.9296	0.00140	7.7	0.9361	0.00140
10.2	0.9384	0.00140	8.6	0.9308	0.00150	7.8	0.9410	0.00140
10.4	0.9409	0.00170	8.7	0.9377	0.00120	7.9	0.9423	0.00150
10.6	0.9486	0.00110	8.8	0.9386	0.00150	8	0.9488	0.00130
10.8	0.9510	0.00110	8.9	0.9434	0.00120	8.1	0.9509	0.00120
11	0.9550	0.00150	9	0.9449	0.00120	8.2	0.9556	0.00140
11.2	0.9602	0.00110	9.1	0.9488	0.00140	8.3	0.9583	0.00150
11.4	0.9617	0.00140	9.2	0.9511	0.00120	8.4	0.9637	0.00150
11.6	0.9659	0.00130	9.3	0.9563	0.00130	8.5	0.9644	0.00110
11.8	0.9701	0.00120	9.4	0.9578	0.00110	8.6	0.9675	0.00110
12	0.9757	0.00110	9.5	0.9594	0.00150	8.7	0.9711	0.00110
12.2	0.9783	0.00110	9.6	0.9646	0.00120	8.8	0.9751	0.00140
12.4	0.9841	0.00110	9.7	0.9668	0.00120	8.9	0.9794	0.00130
12.6	0.9850	0.00110	9.8	0.9668	0.00160	9	0.9812	0.00120
12.8	0.9908	0.00097	9.9	0.9697	0.00170	9.1	0.9847	0.00150
13	0.9921	0.00100	10	0.9731	0.00100	9.2	0.9829	0.00120
13.2	0.9946	0.00110	10.1	0.9778	0.00150	9.3	0.9932	0.00140
13.4	0.9977	0.00140	10.2	0.9788	0.00120	9.4	0.9912	0.00140
13.6	0.9999	0.00110	10.3	0.9786	0.00140	9.5	0.9948	0.00110
13.8	1.0056	0.00098	10.4	0.9849	0.00110	9.6	0.9968	0.00130
14	1.0042	0.00130	10.5	0.9850	0.00140	9.7	1.0018	0.00110
14.2	1.0075	0.00140	10.6	0.9882	0.00120	9.8	1.0024	0.00120
14.4	1.0118	0.00100	10.7	0.9897	0.00150	9.9	1.0085	0.00140
14.6	1.0123	0.00110	10.8	0.9912	0.00130	10	1.0129	0.00120
			10.9	0.9947	0.00110	10.1	1.0116	0.00160
			11	0.9957	0.00110	10.2	1.0163	0.00120
			11.1	0.9971	0.00110			
			11.2	1.0014	0.00120			
			11.3	1.0032	0.00120			
			11.4	1.0058	0.00140			
			11.5	1.0072	0.00120			
			11.6	1.0091	0.00140			
			11.7	1.0068	0.00120			
			11.8	1.0134	0.00130			
			11.9	1.0140	0.00110			

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.80	0.9225	0.00160	4.60	0.9249	0.00180	3.90	0.9181	0.00170
5.9	0.9278	0.00150	4.65	0.9289	0.00160	3.95	0.9274	0.00180
6	0.9342	0.00160	4.7	0.9330	0.00150	4	0.9324	0.00150
6.1	0.9402	0.00180	4.75	0.9390	0.00190	4.05	0.9352	0.00160
6.2	0.9469	0.00160	4.8	0.9449	0.00140	4.1	0.9388	0.00160
6.3	0.9497	0.00140	4.85	0.9485	0.00160	4.15	0.9475	0.00170
6.4	0.9589	0.00160	4.9	0.9517	0.00170	4.2	0.9499	0.00170
6.5	0.9645	0.00130	4.95	0.9585	0.00180	4.25	0.9526	0.00180
6.6	0.9685	0.00150	5	0.9616	0.00160	4.3	0.9614	0.00190
6.7	0.9732	0.00150	5.05	0.9629	0.00160	4.35	0.9687	0.00170
6.8	0.9801	0.00170	5.1	0.9644	0.00160	4.4	0.9692	0.00150
6.9	0.9853	0.00160	5.15	0.9717	0.00170	4.45	0.9744	0.00170
7	0.9869	0.00120	5.2	0.9738	0.00140	4.5	0.9806	0.00310
7.1	0.9930	0.00130	5.25	0.9799	0.00160	4.55	0.9846	0.00150
7.2	0.9991	0.00130	5.3	0.9771	0.00150	4.6	0.9911	0.00170
7.3	1.0042	0.00150	5.35	0.9849	0.00150	4.65	0.9908	0.00170
7.4	1.0062	0.00160	5.4	0.9906	0.00160	4.7	0.9977	0.00180
7.5	1.0115	0.00140	5.45	0.9938	0.00140	4.75	1.0037	0.00160
7.6	1.0156	0.00130	5.5	0.9954	0.00140	4.8	1.0073	0.00170
			5.55	0.9991	0.00140	4.85	1.0141	0.00200
			5.6	1.0048	0.00160	4.9	1.0157	0.00160
			5.65	1.0060	0.00150	4.95	1.0193	0.00180
			5.7	1.0084	0.00160	5	1.0232	0.00210
			5.75	1.0119	0.00150			
			5.8	1.0213	0.00150			

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.50	0.9217	0.00150	3.00	0.9174	0.00170	2.80	0.9284	0.00250
3.55	0.9264	0.00200	3.05	0.9248	0.00190	2.85	0.9349	0.00190
3.6	0.9367	0.00160	3.1	0.9310	0.00230	2.9	0.9427	0.00230
3.65	0.9365	0.00200	3.15	0.9392	0.00160	2.95	0.9517	0.00190
3.7	0.9425	0.00220	3.2	0.9435	0.00190	3	0.9572	0.00200
3.75	0.9476	0.00200	3.25	0.9498	0.00180	3.05	0.9649	0.00230
3.8	0.9547	0.00180	3.3	0.9585	0.00190	3.1	0.9697	0.00210
3.85	0.9581	0.00210	3.35	0.9678	0.00210	3.15	0.9792	0.00180
3.9	0.9673	0.00180	3.4	0.9691	0.00230	3.2	0.9834	0.00210
3.95	0.9678	0.00160	3.45	0.9770	0.00230	3.25	0.9937	0.00220
4	0.9780	0.00160	3.5	0.9802	0.00260	3.3	0.9976	0.00190
4.05	0.9799	0.00180	3.55	0.9879	0.00180	3.35	1.0026	0.00210
4.1	0.9863	0.00160	3.6	0.9932	0.00170	3.4	1.0114	0.00190
4.15	0.9933	0.00190	3.65	1.0027	0.00160	3.45	1.0169	0.00180
4.2	0.9970	0.00200	3.7	1.0046	0.00180	3.5	1.0204	0.00170
4.25	1.0027	0.00150	3.75	1.0135	0.00240			
4.3	1.0063	0.00180	3.8	1.0177	0.00180			
4.35	1.0113	0.00170	3.85	1.0246	0.00190			
4.4	1.0200	0.00200	3.9	1.0294	0.00190			
4.45	1.0234	0.00210						
4.5	1.0275	0.00160						

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.40	0.9263	0.00190	2.20	0.9203	0.00190	2.10	0.9343	0.00200
2.45	0.9341	0.00190	2.25	0.9304	0.00220	2.15	0.9370	0.00200
2.5	0.9375	0.00210	2.3	0.9346	0.00190	2.2	0.9488	0.00190
2.55	0.9492	0.00200	2.35	0.9453	0.00190	2.25	0.9579	0.00200
2.6	0.9549	0.00180	2.4	0.9517	0.00200	2.3	0.9624	0.00210
2.65	0.9622	0.00190	2.45	0.9607	0.00210	2.35	0.9777	0.00210
2.7	0.9706	0.00220	2.5	0.9648	0.00200	2.4	0.9801	0.00200
2.75	0.9766	0.00220	2.55	0.9758	0.00200	2.45	0.9885	0.00210
2.8	0.9841	0.00170	2.6	0.9837	0.00190	2.5	0.9920	0.00220
2.85	0.9940	0.00190	2.65	0.9910	0.00170	2.55	1.0037	0.00230
2.9	0.9949	0.00200	2.7	0.9939	0.00180	2.6	1.0116	0.00190
2.95	1.0052	0.00200	2.75	1.0044	0.00190	2.65	1.0177	0.00190
3	1.0103	0.00200	2.8	1.0083	0.00190	2.7	1.0223	0.00210
3.05	1.0204	0.00210	2.85	1.0152	0.00190	2.75	1.0300	0.00200
3.1	1.0235	0.00210	2.9	1.0213	0.00220	2.8	1.0372	0.00220

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.00	0.9317	0.00240	1.90	0.9360	0.00200	1.80	0.9303	0.00180
2.05	0.9390	0.00210	1.95	0.9458	0.00190	1.85	0.9363	0.00240
2.1	0.9470	0.00260	2	0.9468	0.00230	1.9	0.9499	0.00200
2.15	0.9578	0.00190	2.05	0.9572	0.00200	1.95	0.9532	0.00210
2.2	0.9618	0.00200	2.1	0.9665	0.00190	2	0.9608	0.00200
2.25	0.9699	0.00220	2.15	0.9735	0.00200	2.05	0.9654	0.00220
2.3	0.9750	0.00230	2.2	0.9824	0.00200	2.1	0.9792	0.00200
2.35	0.9843	0.00230	2.25	0.9865	0.00180	2.15	0.9837	0.00210
2.4	0.9938	0.00220	2.3	0.9936	0.00200	2.2	0.9950	0.00220
2.45	0.9999	0.00250	2.35	1.0040	0.00210	2.25	0.9952	0.00210
2.5	1.0063	0.00210	2.4	1.0081	0.00220	2.3	1.0065	0.00200
2.55	1.0192	0.00230	2.45	1.0118	0.00220	2.35	1.0104	0.00210
2.6	1.0252	0.00230	2.5	1.0224	0.00250	2.4	1.0217	0.00180
2.65	1.0288	0.00230	2.55	1.0288	0.00190	2.45	1.0226	0.00190
2.7	1.0345	0.00210	2.6	1.0328	0.00240	2.5	1.0346	0.00180

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
1.70	0.9299	0.00210	1.60	0.9270	0.00200	1.40	0.9223	0.00180
1.75	0.9377	0.00190	1.65	0.9372	0.00210	1.45	0.9321	0.00220
1.8	0.9470	0.00220	1.7	0.9459	0.00190	1.5	0.9403	0.00190
1.85	0.9515	0.00220	1.75	0.9567	0.00210	1.55	0.9481	0.00270
1.9	0.9600	0.00210	1.8	0.9555	0.00180	1.6	0.9532	0.00190
1.95	0.9671	0.00230	1.85	0.9686	0.00170	1.65	0.9653	0.00170
2	0.9732	0.00190	1.9	0.9732	0.00170	1.7	0.9730	0.00190
2.05	0.9803	0.00180	1.95	0.9790	0.00190	1.75	0.9805	0.00190
2.1	0.9912	0.00220	2	0.9892	0.00210	1.8	0.9854	0.00190
2.15	0.9945	0.00200	2.05	0.9957	0.00190	1.85	0.9949	0.00190
2.2	1.0013	0.00230	2.1	1.0069	0.00170	1.9	1.0034	0.00220
2.25	1.0122	0.00250	2.15	1.0148	0.00190	1.95	1.0143	0.00230
2.3	1.0206	0.00180	2.2	1.0199	0.00190	2	1.0197	0.00210
2.35	1.0239	0.00190	2.25	1.0266	0.00220	2.05	1.0273	0.00180
2.4	1.0282	0.00210	2.3	1.0322	0.00250	2.1	1.0327	0.00180

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
1.30	0.9271	0.00180	1.20	0.9290	0.00210	1.10	0.9232	0.00200
1.35	0.9366	0.00200	1.22	0.9290	0.00200	1.12	0.9293	0.00190
1.4	0.9447	0.00160	1.24	0.9369	0.00190	1.14	0.9362	0.00200
1.45	0.9546	0.00240	1.26	0.9428	0.00160	1.16	0.9406	0.00190
1.5	0.9619	0.00240	1.28	0.9487	0.00190	1.18	0.9423	0.00190
1.55	0.9732	0.00210	1.3	0.9477	0.00230	1.2	0.9505	0.00250
1.6	0.9812	0.00200	1.32	0.9531	0.00260	1.22	0.9547	0.00200
1.65	0.9916	0.00180	1.34	0.9567	0.00180	1.24	0.9616	0.00180
1.7	1.0004	0.00180	1.36	0.9598	0.00210	1.26	0.9630	0.00190
1.75	1.0107	0.00190	1.38	0.9652	0.00190	1.28	0.9698	0.00190
1.8	1.0149	0.00180	1.4	0.9749	0.00190	1.3	0.9717	0.00190
1.85	1.0263	0.00180	1.42	0.9700	0.00230	1.32	0.9749	0.00200
1.9	1.0299	0.00180	1.44	0.9755	0.00200	1.34	0.9790	0.00180
			1.46	0.9771	0.00260	1.36	0.9821	0.00200
			1.48	0.9845	0.00180	1.38	0.9894	0.00190
			1.5	0.9903	0.00220	1.4	0.9915	0.00200
			1.52	0.9936	0.00200	1.42	0.9985	0.00190
			1.54	0.9967	0.00220	1.44	0.9967	0.00230
			1.56	0.9995	0.00180	1.46	1.0069	0.00180
			1.58	0.9997	0.00200	1.48	1.0070	0.00210
			1.6	1.0071	0.00180	1.5	1.0129	0.00240
			1.62	1.0133	0.00240	1.52	1.0226	0.00180
			1.64	1.0110	0.00180	1.54	1.0203	0.00170
			1.66	1.0170	0.00180	1.56	1.0263	0.00250
			1.68	1.0196	0.00170	1.58	1.0272	0.00240
			1.7	1.0281	0.00170	1.6	1.0345	0.00180

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
0.90	0.9180	0.00210	0.80	0.9201	0.00190	0.60	0.9234	0.00220
0.92	0.9241	0.00210	0.82	0.9259	0.00170	0.62	0.9272	0.00200
0.94	0.9264	0.00190	0.84	0.9323	0.00180	0.64	0.9364	0.00230
0.96	0.9336	0.00170	0.86	0.9383	0.00200	0.66	0.9479	0.00180
0.98	0.9364	0.00200	0.88	0.9440	0.00180	0.68	0.9529	0.00270
1	0.9399	0.00170	0.9	0.9515	0.00200	0.7	0.9610	0.00200
1.02	0.9479	0.00190	0.92	0.9569	0.00190	0.72	0.9693	0.00190
1.04	0.9515	0.00220	0.94	0.9636	0.00190	0.74	0.9751	0.00190
1.06	0.9574	0.00190	0.96	0.9689	0.00170	0.76	0.9809	0.00210
1.08	0.9631	0.00190	0.98	0.9743	0.00170	0.78	0.9908	0.00210
1.1	0.9654	0.00200	1	0.9756	0.00230	0.8	0.9956	0.00210
1.12	0.9715	0.00180	1.02	0.9856	0.00200	0.82	1.0041	0.00210
1.14	0.9778	0.00220	1.04	0.9881	0.00170	0.84	1.0097	0.00180
1.16	0.9813	0.00200	1.06	0.9932	0.00180	0.86	1.0135	0.00230
1.18	0.9862	0.00180	1.08	0.9985	0.00200	0.88	1.0253	0.00210
1.2	0.9913	0.00180	1.1	1.0030	0.00190	0.9	1.0269	0.00190
1.22	1.0000	0.00190	1.12	1.0122	0.00180			
1.24	1.0026	0.00170	1.14	1.0148	0.00180			
1.26	1.0013	0.00190	1.16	1.0218	0.00200			
1.28	1.0097	0.00200	1.18	1.0273	0.00190			
1.3	1.0140	0.00160	1.2	1.0317	0.00210			
1.32	1.0184	0.00180						
1.34	1.0232	0.00190						
1.36	1.0290	0.00190						
1.38	1.0352	0.00230						
1.4	1.0364	0.00220						

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
0.50	0.9350	0.00220	0.30	0.9020	0.00170	0.20	0.8643	0.00190
0.52	0.9460	0.00180	0.32	0.9126	0.00170	0.22	0.8875	0.00210
0.54	0.9521	0.00180	0.34	0.9313	0.00170	0.24	0.9045	0.00190
0.56	0.9649	0.00210	0.36	0.9431	0.00220	0.26	0.9255	0.00170
0.58	0.9709	0.00210	0.38	0.9551	0.00180	0.28	0.9427	0.00190
0.6	0.9830	0.00180	0.4	0.9733	0.00180	0.3	0.9614	0.00220
0.62	0.9865	0.00200	0.42	0.9827	0.00180	0.32	0.9755	0.00180
0.64	0.9999	0.00180	0.44	0.9959	0.00230	0.34	0.9955	0.00210
0.66	1.0071	0.00200	0.46	1.0113	0.00190	0.36	1.0094	0.00210
0.68	1.0150	0.00180	0.48	1.0197	0.00200	0.38	1.0284	0.00210
0.7	1.0248	0.00190	0.5	1.0328	0.00240	0.4	1.0467	0.00210
0.72	1.0331	0.00160						
0.74	1.0430	0.00170						
0.76	1.0462	0.00190						
0.78	1.0567	0.00230						
0.8	1.0647	0.00190						

Pu-slab-95 (Cases with 0", 1", 10" Reflector)

Case ID: pu_slab_095_00ref

Material: Plutonium

Geometry: Infinite Plane

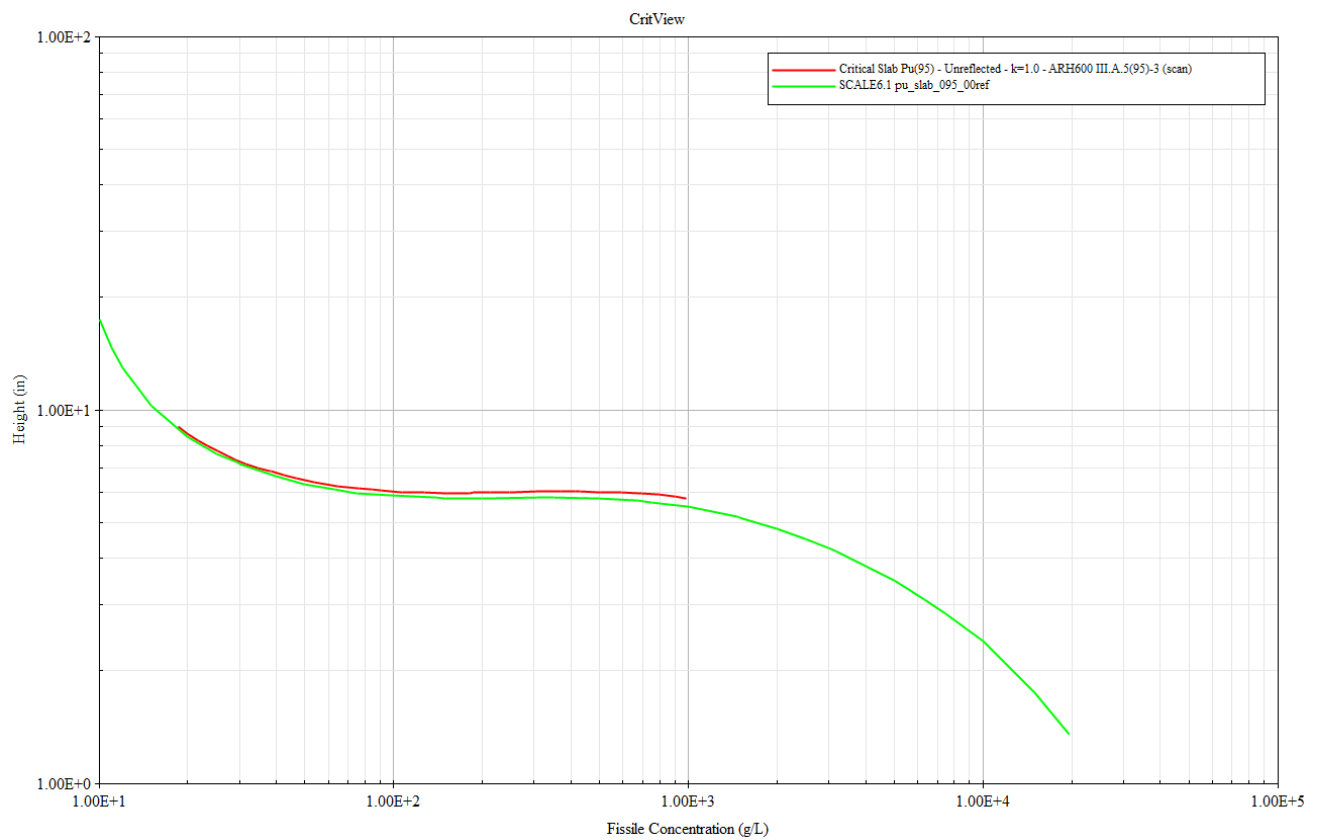
Isotopics: 95% ^{239}Pu 5% ^{240}Pu

Reflector: Unreflected

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	12.900	18.400	0.200	17.4622
0.011	11.400	15.000	0.100	14.6692
0.012	10.400	13.600	0.100	12.9161
0.015	8.700	10.900	0.100	10.2855
0.020	7.300	8.700	0.050	8.4643
0.025	6.700	7.900	0.050	7.6218
0.030	6.300	7.400	0.050	7.1563
0.040	5.900	6.800	0.050	6.6324
0.050	5.600	6.600	0.050	6.3233
0.075	5.400	6.300	0.050	5.9920
0.100	5.200	6.200	0.050	5.8946
0.150	5.200	6.000	0.050	5.8051
0.200	5.200	6.100	0.050	5.7987
0.350	5.200	6.300	0.050	5.8138
0.500	5.100	6.000	0.050	5.7905
0.750	5.000	7.500	0.100	5.6488
1.000	4.900	5.800	0.050	5.4939
1.500	4.600	5.300	0.050	5.1313
2.000	4.300	5.000	0.050	4.8154
2.500	4.000	4.700	0.050	4.5127
3.000	3.800	4.400	0.050	4.2645
4.000	3.400	4.000	0.050	3.8189
5.000	3.100	3.600	0.020	3.4856
7.500	2.500	3.000	0.020	2.8498
10.000	2.100	2.500	0.020	2.3991
15.000	1.500	1.900	0.020	1.7519
19.600	1.200	1.400	0.020	1.3495

WORM and SCALE Input File

```
'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'In this case, Diameter is thickness of slab
'Table B.1.3.3.1-1. Critical Dimensions for Plutonium Slab (95% 239Pu) - 0 Inches of Water
Reflection
,
#index number = <index = 1:27:1>
,
#Concentration = <@conc =
0.01,0.011,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
12.9,11.4,10.4,8.7,7.3,6.7,6.3,5.9,5.6,5.4,5.2,5.2,5.2,5.2,5.1,5,4.9,4.6,4.3,4,3.8,3.4,3.1,2.5,2.
1,1.5,1.2> in
```



```

#Ending Diameter = <@enddia =
18.4,15,13.6,10.9,8.7,7.9,7.4,6.8,6.6,6.3,6.2,6,6.1,6.3,6,7.5,5.8,5.3,5,4.7,4.4,4,3.6,3,2.5,1.9,1
.4> in
#Delta = <@delta =
0.2,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.1,0.05,0.05,0.05,0.05,0.
05,0.05,0.02,0.02,0.02,0.02,0.02> in
,
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
slab no ref
v7-238
read composition
  pu          1 den=<critconc> 1 300
                94239 95
                94240 5   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Slab"
cuboid 1      {{{(diameter*in)/2}}}      {{{(-1*diameter*in)/2}}}      10      -10      10      -
10
media 1 1 1
boundary 1
end geometry
read bnds
  body=1
    surface(1)=vacuum
    surface(2)=vacuum
    surface(3)=mirror
    surface(4)=mirror
    surface(5)=mirror
    surface(6)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_slab_095_00ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infplane
modmat: H2O
critmat: plutonium
isomat: Pu239 0.95 Pu240 0.05
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 17.4622
0.011 14.6692
0.012 12.9161
0.015 10.2855
0.020 8.4643
0.025 7.6218
0.030 7.1563
0.040 6.6324
0.050 6.3233
0.075 5.9920
0.100 5.8946
0.150 5.8051
0.200 5.7987
0.350 5.8138
0.500 5.7905
0.750 5.6488
1.000 5.4939
1.500 5.1313
2.000 4.8154
2.500 4.5127
3.000 4.2645
4.000 3.8189
5.000 3.4856
7.500 2.8498
10.000 2.3991
15.000 1.7519
19.600 1.3495
```

0.01			0.011			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.90	0.9221	0.00120	11.40	0.9239	0.00120	10.40	0.9234	0.00170
13.1	0.9294	0.00130	11.5	0.9273	0.00130	10.5	0.9253	0.00150
13.3	0.9333	0.00130	11.6	0.9298	0.00140	10.6	0.9299	0.00130
13.5	0.9367	0.00130	11.7	0.9329	0.00140	10.7	0.9331	0.00130
13.7	0.9434	0.00110	11.8	0.9349	0.00140	10.8	0.9391	0.00130
13.9	0.9489	0.00110	11.9	0.9368	0.00170	10.9	0.9425	0.00140
14.1	0.9513	0.00110	12	0.9404	0.00120	11	0.9435	0.00110
14.3	0.9585	0.00130	12.1	0.9438	0.00120	11.1	0.9494	0.00140
14.5	0.9582	0.00130	12.2	0.9461	0.00130	11.2	0.9495	0.00120
14.7	0.9605	0.00130	12.3	0.9516	0.00110	11.3	0.9564	0.00150
14.9	0.9637	0.00120	12.4	0.9528	0.00130	11.4	0.9573	0.00160
15.1	0.9678	0.00120	12.5	0.9507	0.00130	11.5	0.9578	0.00150
15.3	0.9718	0.00120	12.6	0.9569	0.00130	11.6	0.9637	0.00180
15.5	0.9733	0.00110	12.7	0.9590	0.00140	11.7	0.9658	0.00110
15.7	0.9774	0.00100	12.8	0.9617	0.00130	11.8	0.9692	0.00130
15.9	0.9808	0.00110	12.9	0.9649	0.00140	11.9	0.9717	0.00190
16.1	0.9843	0.00130	13	0.9664	0.00120	12	0.9755	0.00110
16.3	0.9868	0.00110	13.1	0.9698	0.00110	12.1	0.9810	0.00140
16.5	0.9856	0.00110	13.2	0.9729	0.00140	12.2	0.9813	0.00140
16.7	0.9926	0.00110	13.3	0.9756	0.00140	12.3	0.9859	0.00190
16.9	0.9919	0.00110	13.4	0.9767	0.00120	12.4	0.9878	0.00160
17.1	0.9960	0.00110	13.5	0.9778	0.00150	12.5	0.9900	0.00130
17.3	0.9970	0.00110	13.6	0.9796	0.00160	12.6	0.9906	0.00130
17.5	1.0007	0.00110	13.7	0.9811	0.00120	12.7	0.9930	0.00140
17.7	1.0016	0.00130	13.8	0.9850	0.00140	12.8	0.9995	0.00120
17.9	1.0050	0.00120	13.9	0.9844	0.00110	12.9	0.9995	0.00140
18.1	1.0077	0.00110	14	0.9872	0.00120	13	1.0026	0.00140
18.3	1.0095	0.00098	14.1	0.9890	0.00100	13.1	1.0040	0.00180
18.4	1.0085	0.00120	14.2	0.9935	0.00140	13.2	1.0079	0.00120
			14.3	0.9964	0.00110	13.3	1.0103	0.00130
			14.4	0.9954	0.00130	13.4	1.0122	0.00150
			14.5	0.9977	0.00170	13.5	1.0151	0.00130
			14.6	0.9982	0.00130	13.6	1.0183	0.00110
			14.7	1.0008	0.00150			
			14.8	1.0035	0.00110			
			14.9	1.0019	0.00110			
			15	1.0092	0.00100			

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.70	0.9199	0.00160	7.30	0.9152	0.00190	6.70	0.9162	0.00200
8.8	0.9271	0.00140	7.35	0.9162	0.00170	6.75	0.9244	0.00180
8.9	0.9355	0.00170	7.4	0.9211	0.00190	6.8	0.9263	0.00180
9	0.9398	0.00130	7.45	0.9255	0.00160	6.85	0.9321	0.00190
9.1	0.9433	0.00170	7.5	0.9314	0.00140	6.9	0.9339	0.00210
9.2	0.9496	0.00160	7.55	0.9345	0.00190	6.95	0.9418	0.00180
9.3	0.9551	0.00150	7.6	0.9363	0.00150	7	0.9453	0.00190
9.4	0.9605	0.00150	7.65	0.9425	0.00180	7.05	0.9491	0.00180
9.5	0.9656	0.00160	7.7	0.9454	0.00190	7.1	0.9544	0.00190
9.6	0.9669	0.00150	7.75	0.9457	0.00160	7.15	0.9581	0.00200
9.7	0.9736	0.00160	7.8	0.9540	0.00170	7.2	0.9621	0.00210
9.8	0.9778	0.00170	7.85	0.9575	0.00180	7.25	0.9675	0.00180
9.9	0.9845	0.00170	7.9	0.9628	0.00160	7.3	0.9734	0.00220
10	0.9874	0.00150	7.95	0.9663	0.00170	7.35	0.9744	0.00210
10.1	0.9909	0.00150	8	0.9657	0.00160	7.4	0.9782	0.00240
10.2	0.9953	0.00140	8.05	0.9730	0.00170	7.45	0.9836	0.00230
10.3	1.0008	0.00140	8.1	0.9763	0.00190	7.5	0.9898	0.00180
10.4	1.0036	0.00150	8.15	0.9803	0.00150	7.55	0.9915	0.00180
10.5	1.0109	0.00180	8.2	0.9814	0.00150	7.6	0.9983	0.00180
10.6	1.0126	0.00120	8.25	0.9852	0.00190	7.65	1.0022	0.00170
10.7	1.0165	0.00130	8.3	0.9873	0.00150	7.7	1.0070	0.00170
10.8	1.0188	0.00140	8.35	0.9877	0.00200	7.75	1.0064	0.00170
10.9	1.0221	0.00170	8.4	0.9965	0.00190	7.8	1.0129	0.00180
			8.45	1.0001	0.00160	7.85	1.0179	0.00190
			8.5	0.9983	0.00190	7.9	1.0216	0.00190
			8.55	0.9994	0.00180			
			8.6	1.0057	0.00170			
			8.65	1.0130	0.00160			
			8.7	1.0112	0.00170			

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.30	0.9175	0.00230	5.90	0.9219	0.00200	5.60	0.9093	0.00280
6.35	0.9203	0.00190	5.95	0.9238	0.00240	5.65	0.9192	0.00210
6.4	0.9263	0.00230	6	0.9328	0.00190	5.7	0.9170	0.00240
6.45	0.9341	0.00190	6.05	0.9383	0.00200	5.75	0.9308	0.00210
6.5	0.9326	0.00200	6.1	0.9443	0.00200	5.8	0.9387	0.00170
6.55	0.9415	0.00190	6.15	0.9509	0.00220	5.85	0.9440	0.00230
6.6	0.9451	0.00190	6.2	0.9542	0.00180	5.9	0.9516	0.00200
6.65	0.9498	0.00240	6.25	0.9641	0.00190	5.95	0.9536	0.00200
6.7	0.9553	0.00190	6.3	0.9685	0.00190	6	0.9601	0.00210
6.75	0.9609	0.00200	6.35	0.9740	0.00170	6.05	0.9660	0.00210
6.8	0.9684	0.00200	6.4	0.9803	0.00200	6.1	0.9749	0.00220
6.85	0.9721	0.00210	6.45	0.9881	0.00190	6.15	0.9797	0.00220
6.9	0.9766	0.00190	6.5	0.9881	0.00190	6.2	0.9886	0.00210
6.95	0.9818	0.00210	6.55	0.9945	0.00210	6.25	0.9934	0.00220
7	0.9856	0.00210	6.6	0.9976	0.00230	6.3	0.9952	0.00220
7.05	0.9941	0.00190	6.65	1.0013	0.00200	6.35	1.0055	0.00220
7.1	0.9952	0.00190	6.7	1.0114	0.00210	6.4	1.0063	0.00200
7.15	0.9998	0.00220	6.75	1.0145	0.00190	6.45	1.0147	0.00190
7.2	1.0014	0.00180	6.8	1.0166	0.00190	6.5	1.0217	0.00200
7.25	1.0117	0.00190				6.55	1.0241	0.00210
7.3	1.0142	0.00180				6.6	1.0298	0.00180
7.35	1.0180	0.00170						
7.4	1.0238	0.00180						

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.40	0.9206	0.00210	5.20	0.9114	0.00220	5.20	0.9194	0.00220
5.45	0.9307	0.00190	5.25	0.9123	0.00250	5.25	0.9198	0.00220
5.5	0.9365	0.00200	5.3	0.9225	0.00210	5.3	0.9306	0.00240
5.55	0.9456	0.00190	5.35	0.9290	0.00220	5.35	0.9426	0.00230
5.6	0.9489	0.00200	5.4	0.9391	0.00220	5.4	0.9459	0.00240
5.65	0.9542	0.00230	5.45	0.9456	0.00260	5.45	0.9512	0.00210
5.7	0.9640	0.00240	5.5	0.9505	0.00210	5.5	0.9614	0.00210
5.75	0.9655	0.00190	5.55	0.9550	0.00280	5.55	0.9662	0.00260
5.8	0.9757	0.00210	5.6	0.9651	0.00290	5.6	0.9729	0.00240
5.85	0.9791	0.00210	5.65	0.9696	0.00220	5.65	0.9824	0.00220
5.9	0.9835	0.00260	5.7	0.9783	0.00190	5.7	0.9848	0.00240
5.95	0.9942	0.00250	5.75	0.9832	0.00240	5.75	0.9942	0.00240
6	1.0011	0.00280	5.8	0.9877	0.00230	5.8	0.9990	0.00200
6.05	1.0057	0.00240	5.85	0.9950	0.00210	5.85	1.0089	0.00200
6.1	1.0116	0.00190	5.9	1.0006	0.00290	5.9	1.0124	0.00200
6.15	1.0209	0.00250	5.95	1.0085	0.00220	5.95	1.0207	0.00280
6.2	1.0234	0.00230	6	1.0137	0.00210	6	1.0257	0.00240
6.25	1.0308	0.00230	6.05	1.0210	0.00210			
6.3	1.0346	0.00210	6.1	1.0294	0.00240			
			6.15	1.0359	0.00200			
			6.2	1.0357	0.00200			

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.20	0.9223	0.00180	5.20	0.9267	0.00210	5.10	0.9147	0.00210
5.25	0.9266	0.00220	5.25	0.9315	0.00230	5.15	0.9221	0.00200
5.3	0.9390	0.00220	5.3	0.9342	0.00200	5.2	0.9313	0.00210
5.35	0.9418	0.00210	5.35	0.9454	0.00210	5.25	0.9382	0.00190
5.4	0.9457	0.00310	5.4	0.9495	0.00220	5.3	0.9413	0.00210
5.45	0.9558	0.00230	5.45	0.9587	0.00210	5.35	0.9487	0.00220
5.5	0.9612	0.00230	5.5	0.9612	0.00200	5.4	0.9538	0.00210
5.55	0.9714	0.00220	5.55	0.9663	0.00220	5.45	0.9592	0.00240
5.6	0.9730	0.00230	5.6	0.9727	0.00210	5.5	0.9652	0.00210
5.65	0.9845	0.00250	5.65	0.9789	0.00190	5.55	0.9758	0.00210
5.7	0.9849	0.00290	5.7	0.9870	0.00260	5.6	0.9770	0.00230
5.75	0.9925	0.00270	5.75	0.9884	0.00200	5.65	0.9894	0.00220
5.8	1.0002	0.00210	5.8	0.9969	0.00210	5.7	0.9902	0.00220
5.85	1.0055	0.00210	5.85	1.0081	0.00220	5.75	0.9966	0.00230
5.9	1.0110	0.00240	5.9	1.0060	0.00210	5.8	1.0008	0.00180
5.95	1.0204	0.00220	5.95	1.0158	0.00200	5.85	1.0054	0.00200
6	1.0270	0.00220	6	1.0231	0.00260	5.9	1.0132	0.00200
6.05	1.0277	0.00210	6.05	1.0249	0.00210	5.95	1.0181	0.00240
6.1	1.0359	0.00230	6.1	1.0353	0.00210	6	1.0237	0.00190
			6.15	1.0404	0.00190			
			6.2	1.0402	0.00230			
			6.25	1.0490	0.00240			
			6.3	1.0523	0.00250			

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.00	0.9163	0.00230	4.90	0.9202	0.00270	4.60	0.9276	0.00180
5.1	0.9291	0.00210	4.95	0.9314	0.00220	4.65	0.9316	0.00210
5.2	0.9416	0.00220	5	0.9364	0.00200	4.7	0.9379	0.00260
5.3	0.9554	0.00240	5.05	0.9441	0.00210	4.75	0.9452	0.00210
5.4	0.9686	0.00190	5.1	0.9511	0.00190	4.8	0.9504	0.00210
5.5	0.9791	0.00240	5.15	0.9536	0.00230	4.85	0.9582	0.00180
5.6	0.9941	0.00190	5.2	0.9627	0.00230	4.9	0.9683	0.00190
5.7	1.0062	0.00230	5.25	0.9711	0.00220	4.95	0.9774	0.00200
5.8	1.0189	0.00210	5.3	0.9773	0.00230	5	0.9836	0.00210
5.9	1.0269	0.00190	5.35	0.9816	0.00180	5.05	0.9872	0.00240
6	1.0359	0.00220	5.4	0.9905	0.00220	5.1	0.9943	0.00210
6.1	1.0499	0.00200	5.45	0.9935	0.00210	5.15	1.0034	0.00190
6.2	1.0602	0.00200	5.5	1.0009	0.00210	5.2	1.0088	0.00170
6.3	1.0666	0.00220	5.55	1.0084	0.00270	5.25	1.0148	0.00210
6.4	1.0833	0.00220	5.6	1.0113	0.00210	5.3	1.0205	0.00170
6.5	1.0825	0.00220	5.65	1.0232	0.00250			
6.6	1.0978	0.00180	5.7	1.0238	0.00190			
6.7	1.1077	0.00240	5.75	1.0306	0.00200			
6.8	1.1164	0.00210	5.8	1.0348	0.00230			
6.9	1.1249	0.00190						
7	1.1330	0.00200						
7.1	1.1423	0.00170						
7.2	1.1483	0.00180						
7.3	1.1575	0.00190						
7.4	1.1678	0.00190						
7.5	1.1757	0.00220						

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.30	0.9206	0.00220	4.00	0.9079	0.00210	3.80	0.9180	0.00200
4.35	0.9297	0.00180	4.05	0.9202	0.00190	3.85	0.9292	0.00200
4.4	0.9410	0.00200	4.1	0.9289	0.00190	3.9	0.9366	0.00220
4.45	0.9480	0.00200	4.15	0.9322	0.00260	3.95	0.9465	0.00160
4.5	0.9524	0.00170	4.2	0.9495	0.00200	4	0.9564	0.00210
4.55	0.9619	0.00220	4.25	0.9567	0.00180	4.05	0.9623	0.00190
4.6	0.9694	0.00230	4.3	0.9631	0.00190	4.1	0.9740	0.00200
4.65	0.9767	0.00240	4.35	0.9754	0.00170	4.15	0.9823	0.00200
4.7	0.9839	0.00230	4.4	0.9820	0.00270	4.2	0.9895	0.00180
4.75	0.9889	0.00190	4.45	0.9922	0.00180	4.25	0.9973	0.00240
4.8	0.9976	0.00190	4.5	0.9985	0.00210	4.3	1.0066	0.00190
4.85	1.0054	0.00200	4.55	1.0044	0.00200	4.35	1.0160	0.00200
4.9	1.0074	0.00200	4.6	1.0130	0.00210	4.4	1.0204	0.00210
4.95	1.0201	0.00210	4.65	1.0185	0.00240			
5	1.0262	0.00190	4.7	1.0274	0.00180			

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.40	0.9133	0.00180	3.10	0.9140	0.00190	2.50	0.9001	0.00200
3.45	0.9216	0.00200	3.12	0.9183	0.00180	2.52	0.9079	0.00170
3.5	0.9316	0.00180	3.14	0.9193	0.00200	2.54	0.9129	0.00170
3.55	0.9437	0.00190	3.16	0.9261	0.00180	2.56	0.9191	0.00160
3.6	0.9534	0.00180	3.18	0.9286	0.00190	2.58	0.9255	0.00220
3.65	0.9642	0.00190	3.2	0.9389	0.00190	2.6	0.9308	0.00220
3.7	0.9715	0.00200	3.22	0.9404	0.00200	2.62	0.9366	0.00220
3.75	0.9819	0.00180	3.24	0.9462	0.00190	2.64	0.9400	0.00190
3.8	0.9975	0.00200	3.26	0.9510	0.00200	2.66	0.9472	0.00200
3.85	1.0041	0.00190	3.28	0.9539	0.00190	2.68	0.9513	0.00170
3.9	1.0131	0.00190	3.3	0.9609	0.00170	2.7	0.9556	0.00200
3.95	1.0219	0.00230	3.32	0.9638	0.00210	2.72	0.9644	0.00180
4	1.0324	0.00180	3.34	0.9648	0.00170	2.74	0.9716	0.00200
			3.36	0.9751	0.00210	2.76	0.9751	0.00200
			3.38	0.9753	0.00200	2.78	0.9792	0.00190
			3.4	0.9834	0.00210	2.8	0.9848	0.00150
			3.42	0.9850	0.00200	2.82	0.9919	0.00200
			3.44	0.9866	0.00190	2.84	0.9978	0.00190
			3.46	0.9960	0.00190	2.86	1.0023	0.00220
			3.48	0.9988	0.00250	2.88	1.0084	0.00210
			3.5	1.0031	0.00180	2.9	1.0113	0.00170
			3.52	1.0109	0.00200	2.92	1.0167	0.00180
			3.54	1.0109	0.00210	2.94	1.0242	0.00240
			3.56	1.0186	0.00190	2.96	1.0284	0.00190
			3.58	1.0194	0.00240	2.98	1.0357	0.00200
			3.6	1.0262	0.00210	3	1.0394	0.00220

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.10	0.9007	0.00210	1.50	0.8919	0.00170	1.20	0.9199	0.00180
2.12	0.9061	0.00220	1.52	0.9039	0.00180	1.22	0.9338	0.00180
2.14	0.9137	0.00230	1.54	0.9118	0.00180	1.24	0.9404	0.00200
2.16	0.9215	0.00170	1.56	0.9178	0.00190	1.26	0.9574	0.00200
2.18	0.9277	0.00200	1.58	0.9251	0.00180	1.28	0.9645	0.00260
2.2	0.9367	0.00230	1.6	0.9392	0.00220	1.3	0.9736	0.00200
2.22	0.9427	0.00220	1.62	0.9446	0.00170	1.32	0.9869	0.00210
2.24	0.9511	0.00200	1.64	0.9489	0.00190	1.34	0.9936	0.00190
2.26	0.9558	0.00190	1.66	0.9640	0.00180	1.36	1.0071	0.00210
2.28	0.9602	0.00180	1.68	0.9688	0.00190	1.38	1.0143	0.00210
2.3	0.9672	0.00190	1.7	0.9745	0.00190	1.4	1.0246	0.00200
2.32	0.9757	0.00180	1.72	0.9854	0.00190			
2.34	0.9802	0.00200	1.74	0.9944	0.00190			
2.36	0.9855	0.00180	1.76	1.0038	0.00200			
2.38	0.9911	0.00200	1.78	1.0120	0.00210			
2.4	1.0004	0.00170	1.8	1.0191	0.00190			
2.42	1.0027	0.00220	1.82	1.0244	0.00210			
2.44	1.0147	0.00250	1.84	1.0336	0.00200			
2.46	1.0195	0.00170	1.86	1.0426	0.00200			
2.48	1.0262	0.00190	1.88	1.0492	0.00180			
2.5	1.0300	0.00200	1.9	1.0567	0.00220			

Case ID: pu_slab_095_01ref

Material: Plutonium

Geometry: Infinite Plane

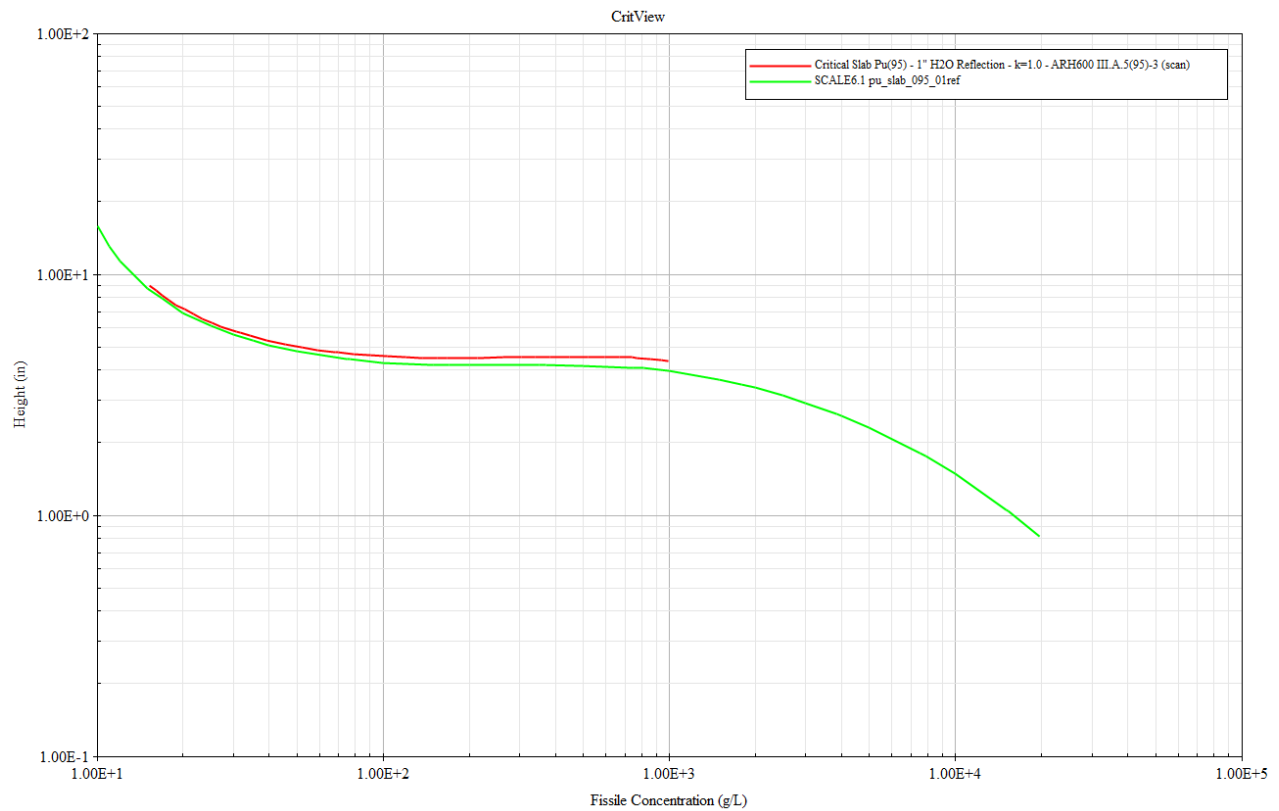
Isotopics: 95% ^{239}Pu 5% ^{240}Pu

Reflector: 1" Reflected

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	11.500	16.500	0.200	15.9000
0.011	9.900	13.800	0.200	13.0707
0.012	8.900	12.100	0.100	11.3619
0.015	7.200	9.100	0.100	8.7375
0.020	5.900	7.200	0.050	6.9415
0.025	5.200	6.300	0.050	6.1042
0.030	4.800	5.800	0.050	5.6155
0.040	4.300	5.300	0.050	5.0553
0.050	4.100	4.900	0.050	4.7858
0.075	3.800	4.700	0.050	4.4344
0.100	3.700	4.500	0.050	4.2892
0.150	3.600	4.400	0.050	4.2167
0.200	3.600	4.400	0.050	4.2228
0.350	3.600	4.400	0.050	4.1982
0.500	3.600	4.400	0.050	4.1758
0.750	3.500	4.300	0.050	4.0930
1.000	3.300	4.200	0.050	3.9625
1.500	3.100	3.800	0.050	3.6550
2.000	2.900	4.100	0.050	3.4013
2.500	2.700	3.300	0.050	3.1534
3.000	2.500	3.100	0.050	2.9258
4.000	2.200	2.700	0.020	2.5783
5.000	1.900	2.400	0.020	2.3200
7.500	1.500	1.900	0.020	1.8185
10.000	1.200	1.600	0.020	1.4834
15.000	0.900	1.100	0.020	1.0575
19.600	0.700	0.900	0.020	0.8200

WORM and SCALE Input File

```
'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'In this case, Diameter is thickness of slab
'Table B.1.3.3.2-1. Critical Dimensions for Plutonium Slab (95% 239Pu) - 1 Inches of Water
Reflection
,
#index number = <index = 1:27:1>
,
#Concentration = <@conc =
0.01,0.011,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
11.5,9.9,8.9,7.2,5.9,5.2,4.8,4.3,4.1,3.8,3.7,3.6,3.6,3.6,3.6,3.5,3.3,3.1,2.9,2.7,2.5,2.2,1.9,1.5,
1.2,0.9,0.7> in
```

```

#Ending Diameter = <@enddia =
16.5,13.8,12.1,9.1,7.2,6.3,5.8,5.3,4.9,4.7,4.5,4.4,4.4,4.4,4.4,4.3,4.2,3.8,4.1,3.3,3.1,2.7,2.4,1.
9,1.6,1.1,0.9> in
#Delta = <@delta =
0.2,0.2,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0
.05,0.02,0.02,0.02,0.02,0.02,0.02> in
,
'Reflector Thickness {{refthick = 1}}
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
template
v7-238
read composition
  pu          1 den=<critconc> 1 300
                                94239 95
                                94240 5   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Slab"
  cuboid 1      {{(diameter*in)/2}}      {{(-1*diameter*in)/2}}      10      -10      10      -10
  cuboid 2      {{(refdia*in)/2}}      {{(-1*refdia*in)/2}}      10      -10      10      -10
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
read bnds
  body=2
    surface(1)=vacuum
    surface(2)=vacuum
    surface(3)=mirror
    surface(4)=mirror
    surface(5)=mirror
    surface(6)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_slab_095_01ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infplane
modmat: H2O
critmat: plutonium
isomat: Pu239 0.95 Pu240 0.05
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 15.9000
0.011 13.0707
0.012 11.3619
0.015 8.7375
0.020 6.9415
0.025 6.1042
0.030 5.6155
0.040 5.0553
0.050 4.7858
0.075 4.4344
0.100 4.2892
0.150 4.2167
0.200 4.2228
0.350 4.1982
0.500 4.1758
0.750 4.0930
1.000 3.9625
1.500 3.6550
2.000 3.4013
2.500 3.1534
3.000 2.9258
4.000 2.5783
5.000 2.3200
7.500 1.8185
10.000 1.4834
15.000 1.0575
19.600 0.8200
```

0.01			0.011			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.50	0.9293	0.00110	9.90	0.9256	0.00130	8.90	0.9235	0.00180
11.7	0.9304	0.00120	10.1	0.9302	0.00130	9	0.9277	0.00130
11.9	0.9379	0.00100	10.3	0.9356	0.00160	9.1	0.9333	0.00130
12.1	0.9395	0.00100	10.5	0.9422	0.00130	9.2	0.9352	0.00150
12.3	0.9468	0.00120	10.7	0.9493	0.00120	9.3	0.9392	0.00130
12.5	0.9485	0.00097	10.9	0.9554	0.00120	9.4	0.9425	0.00160
12.7	0.9521	0.00130	11.1	0.9550	0.00130	9.5	0.9439	0.00140
12.9	0.9567	0.00110	11.3	0.9633	0.00110	9.6	0.9486	0.00120
13.1	0.9602	0.00120	11.5	0.9679	0.00130	9.7	0.9545	0.00130
13.3	0.9620	0.00140	11.7	0.9732	0.00110	9.8	0.9556	0.00120
13.5	0.9647	0.00110	11.9	0.9729	0.00130	9.9	0.9565	0.00160
13.7	0.9678	0.00140	12.1	0.9811	0.00120	10	0.9615	0.00120
13.9	0.9707	0.00130	12.3	0.9846	0.00120	10.1	0.9651	0.00120
14.1	0.9751	0.00130	12.5	0.9904	0.00110	10.2	0.9654	0.00130
14.3	0.9784	0.00170	12.7	0.9918	0.00110	10.3	0.9697	0.00120
14.5	0.9831	0.00140	12.9	0.9965	0.00110	10.4	0.9745	0.00130
14.7	0.9850	0.00150	13.1	1.0006	0.00100	10.5	0.9767	0.00120
14.9	0.9843	0.00120	13.3	1.0042	0.00120	10.6	0.9795	0.00160
15.1	0.9899	0.00140	13.5	1.0072	0.00110	10.7	0.9827	0.00130
15.3	0.9932	0.00100	13.7	1.0125	0.00130	10.8	0.9869	0.00140
15.5	0.9958	0.00120	13.8	1.0126	0.00130	10.9	0.9870	0.00130
15.7	0.9957	0.00110				11	0.9911	0.00150
15.9	1.0000	0.00100				11.1	0.9947	0.00130
16.1	1.0014	0.00150				11.2	0.9930	0.00130
16.3	1.0046	0.00110				11.3	0.9961	0.00140
16.5	1.0065	0.00110				11.4	1.0024	0.00150
						11.5	1.0015	0.00110
						11.6	1.0065	0.00120
						11.7	1.0091	0.00170
						11.8	1.0076	0.00140
						11.9	1.0100	0.00130
						12	1.0136	0.00120
						12.1	1.0158	0.00140

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.20	0.9234	0.00150	5.90	0.9243	0.00180	5.20	0.9176	0.00180
7.3	0.9287	0.00160	5.95	0.9244	0.00160	5.25	0.9297	0.00250
7.4	0.9337	0.00170	6	0.9280	0.00180	5.3	0.9240	0.00180
7.5	0.9411	0.00160	6.05	0.9324	0.00170	5.35	0.9354	0.00200
7.6	0.9456	0.00150	6.1	0.9380	0.00220	5.4	0.9384	0.00190
7.7	0.9513	0.00130	6.15	0.9455	0.00160	5.45	0.9440	0.00180
7.8	0.9558	0.00210	6.2	0.9498	0.00170	5.5	0.9479	0.00200
7.9	0.9625	0.00160	6.25	0.9498	0.00160	5.55	0.9498	0.00180
8	0.9642	0.00140	6.3	0.9559	0.00160	5.6	0.9544	0.00190
8.1	0.9722	0.00140	6.35	0.9614	0.00180	5.65	0.9621	0.00170
8.2	0.9771	0.00160	6.4	0.9617	0.00170	5.7	0.9670	0.00180
8.3	0.9788	0.00140	6.45	0.9627	0.00200	5.75	0.9692	0.00180
8.4	0.9838	0.00140	6.5	0.9701	0.00160	5.8	0.9754	0.00230
8.5	0.9879	0.00160	6.55	0.9727	0.00210	5.85	0.9796	0.00260
8.6	0.9944	0.00200	6.6	0.9783	0.00140	5.9	0.9833	0.00170
8.7	0.9982	0.00130	6.65	0.9779	0.00160	5.95	0.9874	0.00170
8.8	1.0030	0.00130	6.7	0.9813	0.00160	6	0.9914	0.00200
8.9	1.0051	0.00140	6.75	0.9877	0.00160	6.05	0.9939	0.00190
9	1.0117	0.00150	6.8	0.9881	0.00160	6.1	0.9997	0.00170
9.1	1.0162	0.00170	6.85	0.9911	0.00180	6.15	1.0033	0.00170
			6.9	0.9966	0.00170	6.2	1.0099	0.00170
			6.95	1.0007	0.00190	6.25	1.0114	0.00160
			7	1.0027	0.00160	6.3	1.0115	0.00190
			7.05	1.0042	0.00170			
			7.1	1.0067	0.00150			
			7.15	1.0136	0.00170			
			7.2	1.0121	0.00170			

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.80	0.9201	0.00190	4.30	0.9116	0.00180	4.10	0.9181	0.00190
4.85	0.9240	0.00180	4.35	0.9157	0.00170	4.15	0.9214	0.00200
4.9	0.9296	0.00170	4.4	0.9211	0.00210	4.2	0.9307	0.00170
4.95	0.9350	0.00220	4.45	0.9291	0.00180	4.25	0.9366	0.00200
5	0.9363	0.00180	4.5	0.9349	0.00170	4.3	0.9438	0.00230
5.05	0.9445	0.00190	4.55	0.9419	0.00190	4.35	0.9486	0.00220
5.1	0.9510	0.00220	4.6	0.9442	0.00200	4.4	0.9542	0.00210
5.15	0.9565	0.00270	4.65	0.9541	0.00190	4.45	0.9591	0.00210
5.2	0.9569	0.00210	4.7	0.9602	0.00260	4.5	0.9654	0.00220
5.25	0.9643	0.00190	4.75	0.9664	0.00190	4.55	0.9730	0.00250
5.3	0.9710	0.00190	4.8	0.9716	0.00190	4.6	0.9817	0.00200
5.35	0.9739	0.00250	4.85	0.9730	0.00200	4.65	0.9866	0.00190
5.4	0.9783	0.00200	4.9	0.9827	0.00200	4.7	0.9908	0.00200
5.45	0.9850	0.00190	4.95	0.9914	0.00210	4.75	0.9952	0.00190
5.5	0.9895	0.00170	5	0.9942	0.00210	4.8	1.0019	0.00190
5.55	0.9965	0.00190	5.05	0.9992	0.00200	4.85	1.0090	0.00210
5.6	0.9983	0.00190	5.1	1.0068	0.00180	4.9	1.0161	0.00210
5.65	1.0038	0.00190	5.15	1.0132	0.00240			
5.7	1.0115	0.00210	5.2	1.0117	0.00190			
5.75	1.0136	0.00210	5.25	1.0222	0.00210			
5.8	1.0167	0.00150	5.3	1.0240	0.00190			

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.80	0.9165	0.00200	3.70	0.9179	0.00210	3.60	0.9161	0.00230
3.85	0.9179	0.00220	3.75	0.9234	0.00200	3.65	0.9274	0.00220
3.9	0.9302	0.00230	3.8	0.9338	0.00210	3.7	0.9269	0.00200
3.95	0.9349	0.00200	3.85	0.9392	0.00210	3.75	0.9344	0.00190
4	0.9436	0.00250	3.9	0.9445	0.00220	3.8	0.9444	0.00200
4.05	0.9494	0.00240	3.95	0.9530	0.00210	3.85	0.9502	0.00200
4.1	0.9585	0.00190	4	0.9596	0.00220	3.9	0.9571	0.00290
4.15	0.9644	0.00230	4.05	0.9693	0.00200	3.95	0.9623	0.00190
4.2	0.9728	0.00220	4.1	0.9749	0.00190	4	0.9703	0.00230
4.25	0.9768	0.00220	4.15	0.9811	0.00200	4.05	0.9774	0.00230
4.3	0.9874	0.00250	4.2	0.9880	0.00220	4.1	0.9879	0.00230
4.35	0.9880	0.00190	4.25	0.9913	0.00240	4.15	0.9911	0.00200
4.4	0.9967	0.00230	4.3	1.0024	0.00250	4.2	0.9981	0.00210
4.45	1.0015	0.00210	4.35	1.0017	0.00250	4.25	1.0038	0.00180
4.5	1.0082	0.00210	4.4	1.0132	0.00240	4.3	1.0128	0.00220
4.55	1.0158	0.00210	4.45	1.0164	0.00180	4.35	1.0174	0.00210
4.6	1.0208	0.00210	4.5	1.0191	0.00230	4.4	1.0206	0.00220
4.65	1.0290	0.00210						
4.7	1.0356	0.00210						

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.60	0.9208	0.00290	3.60	0.9214	0.00210	3.60	0.9277	0.00220
3.65	0.9317	0.00200	3.65	0.9305	0.00210	3.65	0.9310	0.00220
3.7	0.9348	0.00230	3.7	0.9340	0.00230	3.7	0.9422	0.00210
3.75	0.9399	0.00220	3.75	0.9442	0.00200	3.75	0.9500	0.00220
3.8	0.9489	0.00210	3.8	0.9504	0.00220	3.8	0.9564	0.00210
3.85	0.9549	0.00240	3.85	0.9532	0.00190	3.85	0.9579	0.00220
3.9	0.9594	0.00300	3.9	0.9619	0.00200	3.9	0.9660	0.00200
3.95	0.9692	0.00210	3.95	0.9680	0.00300	3.95	0.9725	0.00210
4	0.9748	0.00240	4	0.9736	0.00200	4	0.9806	0.00200
4.05	0.9842	0.00200	4.05	0.9814	0.00210	4.05	0.9820	0.00240
4.1	0.9874	0.00220	4.1	0.9877	0.00210	4.1	0.9878	0.00200
4.15	0.9895	0.00210	4.15	0.9921	0.00190	4.15	0.9953	0.00220
4.2	0.9953	0.00200	4.2	1.0003	0.00210	4.2	1.0044	0.00220
4.25	1.0056	0.00200	4.25	1.0066	0.00200	4.25	1.0094	0.00180
4.3	1.0138	0.00220	4.3	1.0071	0.00210	4.3	1.0102	0.00190
4.35	1.0174	0.00220	4.35	1.0134	0.00240	4.35	1.0189	0.00260
4.4	1.0190	0.00220	4.4	1.0208	0.00220	4.4	1.0238	0.00200

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.50	0.9273	0.00210	3.30	0.9143	0.00210	3.10	0.9193	0.00200
3.55	0.9322	0.00200	3.35	0.9223	0.00210	3.15	0.9268	0.00200
3.6	0.9387	0.00210	3.4	0.9299	0.00220	3.2	0.9353	0.00230
3.65	0.9480	0.00200	3.45	0.9365	0.00180	3.25	0.9405	0.00220
3.7	0.9502	0.00250	3.5	0.9410	0.00240	3.3	0.9506	0.00200
3.75	0.9594	0.00210	3.55	0.9505	0.00200	3.35	0.9540	0.00200
3.8	0.9623	0.00190	3.6	0.9560	0.00210	3.4	0.9681	0.00210
3.85	0.9712	0.00240	3.65	0.9633	0.00230	3.45	0.9718	0.00180
3.9	0.9773	0.00210	3.7	0.9662	0.00200	3.5	0.9788	0.00210
3.95	0.9805	0.00210	3.75	0.9728	0.00190	3.55	0.9875	0.00230
4	0.9913	0.00200	3.8	0.9835	0.00260	3.6	0.9903	0.00210
4.05	0.9914	0.00220	3.85	0.9891	0.00200	3.65	0.9993	0.00200
4.1	1.0014	0.00190	3.9	0.9897	0.00210	3.7	1.0063	0.00190
4.15	1.0086	0.00200	3.95	0.9987	0.00210	3.75	1.0085	0.00200
4.2	1.0174	0.00200	4	1.0039	0.00210	3.8	1.0183	0.00200
4.25	1.0177	0.00190	4.05	1.0093	0.00200			
4.3	1.0236	0.00200	4.1	1.0185	0.00180			
			4.15	1.0205	0.00210			
			4.2	1.0286	0.00200			

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.90	0.9224	0.00190	2.70	0.9242	0.00220	2.50	0.9176	0.00220
2.95	0.9303	0.00190	2.75	0.9303	0.00240	2.55	0.9311	0.00220
3	0.9414	0.00200	2.8	0.9428	0.00190	2.6	0.9402	0.00180
3.05	0.9470	0.00180	2.85	0.9494	0.00220	2.65	0.9506	0.00200
3.1	0.9554	0.00240	2.9	0.9594	0.00210	2.7	0.9593	0.00210
3.15	0.9665	0.00230	2.95	0.9702	0.00180	2.75	0.9663	0.00190
3.2	0.9724	0.00200	3	0.9782	0.00230	2.8	0.9746	0.00220
3.25	0.9823	0.00180	3.05	0.9850	0.00240	2.85	0.9859	0.00190
3.3	0.9891	0.00200	3.1	0.9967	0.00180	2.9	0.9949	0.00180
3.35	0.9944	0.00190	3.15	0.9994	0.00190	2.95	1.0048	0.00230
3.4	0.9998	0.00230	3.2	1.0083	0.00190	3	1.0105	0.00180
3.45	1.0074	0.00190	3.25	1.0186	0.00190	3.05	1.0192	0.00240
3.5	1.0130	0.00200	3.3	1.0249	0.00190	3.1	1.0292	0.00180
3.55	1.0236	0.00190						
3.6	1.0308	0.00220						
3.65	1.0386	0.00210						
3.7	1.0413	0.00200						
3.75	1.0524	0.00180						
3.8	1.0559	0.00180						
3.85	1.0598	0.00210						
3.9	1.0727	0.00200						
3.95	1.0774	0.00200						
4	1.0817	0.00190						
4.05	1.0892	0.00190						
4.1	1.0944	0.00200						

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.20	0.9209	0.00200	1.90	0.9038	0.00230	1.50	0.9064	0.00180
2.22	0.9230	0.00180	1.92	0.9068	0.00200	1.52	0.9087	0.00180
2.24	0.9287	0.00180	1.94	0.9157	0.00180	1.54	0.9180	0.00200
2.26	0.9311	0.00220	1.96	0.9205	0.00200	1.56	0.9236	0.00220
2.28	0.9369	0.00180	1.98	0.9270	0.00200	1.58	0.9314	0.00190
2.3	0.9415	0.00200	2	0.9293	0.00220	1.6	0.9379	0.00200
2.32	0.9462	0.00190	2.02	0.9336	0.00180	1.62	0.9432	0.00200
2.34	0.9483	0.00190	2.04	0.9403	0.00190	1.64	0.9507	0.00190
2.36	0.9512	0.00200	2.06	0.9418	0.00170	1.66	0.9570	0.00180
2.38	0.9594	0.00210	2.08	0.9419	0.00210	1.68	0.9613	0.00210
2.4	0.9620	0.00200	2.1	0.9493	0.00200	1.7	0.9685	0.00200
2.42	0.9694	0.00180	2.12	0.9573	0.00220	1.72	0.9723	0.00260
2.44	0.9730	0.00200	2.14	0.9609	0.00190	1.74	0.9763	0.00240
2.46	0.9783	0.00190	2.16	0.9666	0.00230	1.76	0.9856	0.00260
2.48	0.9827	0.00200	2.18	0.9689	0.00220	1.78	0.9894	0.00190
2.5	0.9829	0.00190	2.2	0.9741	0.00180	1.8	0.9964	0.00190
2.52	0.9879	0.00250	2.22	0.9783	0.00180	1.82	1.0003	0.00180
2.54	0.9902	0.00270	2.24	0.9863	0.00230	1.84	1.0055	0.00200
2.56	0.9978	0.00240	2.26	0.9874	0.00190	1.86	1.0129	0.00190
2.58	1.0002	0.00180	2.28	0.9934	0.00190	1.88	1.0176	0.00200
2.6	1.0037	0.00200	2.3	0.9967	0.00220	1.9	1.0220	0.00200
2.62	1.0071	0.00220	2.32	1.0000	0.00260			
2.64	1.0084	0.00190	2.34	1.0063	0.00200			
2.66	1.0150	0.00230	2.36	1.0125	0.00200			
2.68	1.0187	0.00220	2.38	1.0158	0.00200			
2.7	1.0256	0.00240	2.4	1.0250	0.00200			

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
1.20	0.8940	0.00210	0.90	0.9223	0.00230	0.70	0.9237	0.00190
1.22	0.9011	0.00200	0.92	0.9323	0.00190	0.72	0.9432	0.00180
1.24	0.9126	0.00190	0.94	0.9419	0.00220	0.74	0.9465	0.00220
1.26	0.9198	0.00180	0.96	0.9520	0.00190	0.76	0.9623	0.00230
1.28	0.9265	0.00220	0.98	0.9598	0.00190	0.78	0.9760	0.00200
1.3	0.9343	0.00230	1	0.9749	0.00220	0.8	0.9870	0.00210
1.32	0.9424	0.00190	1.02	0.9809	0.00190	0.82	1.0000	0.00240
1.34	0.9486	0.00180	1.04	0.9923	0.00190	0.84	1.0156	0.00230
1.36	0.9577	0.00180	1.06	1.0011	0.00210	0.86	1.0261	0.00200
1.38	0.9611	0.00200	1.08	1.0105	0.00180	0.88	1.0411	0.00190
1.4	0.9729	0.00210	1.1	1.0224	0.00190	0.9	1.0476	0.00200
1.42	0.9754	0.00220						
1.44	0.9869	0.00190						
1.46	0.9917	0.00210						
1.48	0.9984	0.00190						
1.5	1.0079	0.00190						
1.52	1.0132	0.00250						
1.54	1.0189	0.00190						
1.56	1.0262	0.00250						
1.58	1.0329	0.00190						
1.6	1.0415	0.00180						

Case ID: pu_slab_095_10ref

Material: Plutonium

Geometry: Infinite Plane

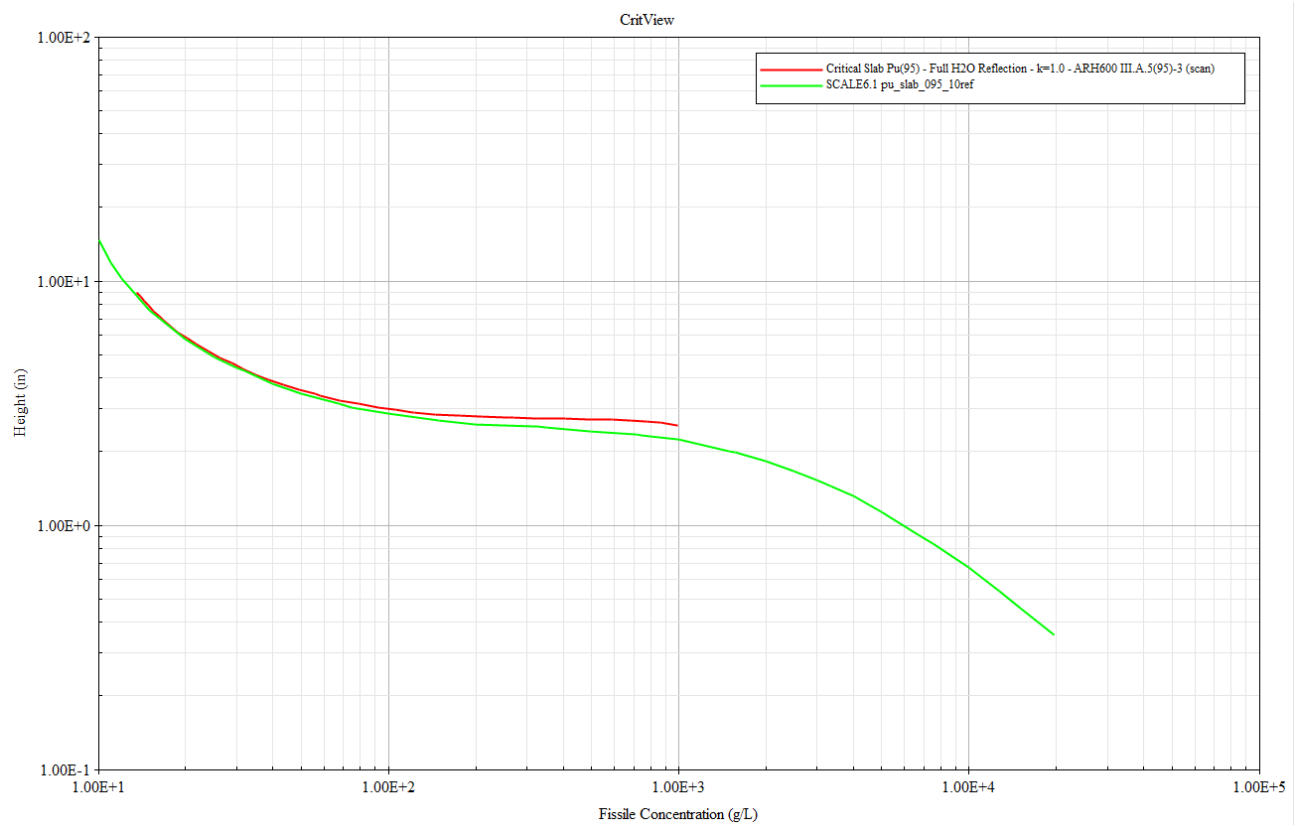
Isotopics: 95% ^{239}Pu 5% ^{240}Pu

Reflector: 10" Reflected

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.010	10.300	15.600	4.524	14.7645
0.011	8.900	12.800	3.106	11.9267
0.012	7.800	11.000	2.474	10.2541
0.015	6.100	8.000	1.510	7.5739
0.020	4.700	6.000	1.090	5.8083
0.025	4.100	5.100	0.823	4.8859
0.030	3.600	4.600	0.806	4.4133
0.040	3.100	4.000	0.715	3.7845
0.050	2.900	3.700	0.586	3.4468
0.075	2.500	3.400	0.590	3.0271
0.100	2.300	3.000	0.594	2.8633
0.150	2.200	2.900	0.529	2.6922
0.200	2.100	2.800	0.556	2.5833
0.350	2.000	2.650	0.572	2.5230
0.500	1.900	2.700	0.612	2.4288
0.750	1.800	2.500	0.598	2.3432
1.000	1.700	2.500	0.594	2.2398
1.500	1.500	2.300	0.578	2.0067
2.000	1.400	2.000	0.481	1.8231
2.500	1.300	1.800	0.416	1.6689
3.000	1.200	1.700	0.374	1.5296
4.000	1.000	1.500	0.347	1.3133
5.000	0.800	1.300	0.369	1.1400
7.500	0.600	1.000	0.274	0.8449
10.000	0.500	0.800	0.189	0.6695
15.000	0.300	0.600	0.174	0.4590
19.600	0.200	0.400	0.164	0.3561

WORM and SCALE Input File

```
'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'In this case, Diameter is thickness of slab
'Table B.1.3.3.3-1. Critical Dimensions for Plutonium Slab (95% 239Pu) - 10 Inches of Water
Reflection
,
#index number = <index = 1:27:1>
,
#Concentration = <@conc =
0.01,0.011,0.012,0.015,0.02,0.025,0.03,0.04,0.05,0.075,0.1,0.15,0.2,0.35,0.5,0.75,1,1.5,2,2.5,3,4
,5,7.5,10,15,19.6> g/cc
'Critical Density = <critdens = 19.6 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
10.3,8.9,7.8,6.1,4.7,4.1,3.6,3.1,2.9,2.5,2.3,2.2,2.1,2,1.9,1.8,1.7,1.5,1.4,1.3,1.2,1,0.8,0.6,0.5,
0.3,0.2> in
```

```

#Ending Diameter = <@enddia =
15.6,12.8,11,8,6,5.1,4.6,4,3.7,3.4,3,2.9,2.8,2.65,2.7,2.5,2.5,2.3,2,1.8,1.7,1.5,1.3,1,0.8,0.6,0.4
> in
#Delta = <@delta =
4.5236,3.1063,2.4741,1.5095,1.09,0.8234,0.806,0.7151,0.5863,0.5895,0.5938,0.5294,0.5564,0.5724,0.
6119,0.5983,0.5938,0.5782,0.4811,0.4155,0.374,0.3474,0.369,0.2735,0.1889,0.1737,0.1635> in
,
'Reflector Thickness {{refthick = 10}}
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
template
v7-238
read composition
  pu          1 den=<critconc> 1 300
                                94239 95
                                94240 5   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Slab"
  cuboid 1      {{(diameter*in)/2}}      {{(-1*diameter*in)/2}}      10      -10      10      -10
  cuboid 2      {{(refdia*in)/2}}      {{(-1*refdia*in)/2}}      10      -10      10      -10
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
read bnds
  body=2
    surface(1)=vacuum
    surface(2)=vacuum
    surface(3)=mirror
    surface(4)=mirror
    surface(5)=mirror
    surface(6)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 pu_slab_095_10ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: infplane
modmat: H2O
critmat: plutonium
isomat: Pu239 0.95 Pu240 0.05
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.010 14.7645
0.011 11.9267
0.012 10.2541
0.015 7.5739
0.020 5.8083
0.025 4.8859
0.030 4.4133
0.040 3.7845
0.050 3.4468
0.075 3.0271
0.100 2.8633
0.150 2.6922
0.200 2.5833
0.350 2.5230
0.500 2.4288
0.750 2.3432
1.000 2.2398
1.500 2.0067
2.000 1.8231
2.500 1.6689
3.000 1.5296
4.000 1.3133
5.000 1.1400
7.500 0.8449
10.000 0.6695
15.000 0.4590
19.600 0.3561
```

0.01			0.011			0.012		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.30	0.9248	0.00100	8.90	0.9289	0.00130	7.80	0.9239	0.00120
10.5	0.9309	0.00110	9.1	0.9324	0.00120	7.9	0.9264	0.00120
10.7	0.9339	0.00110	9.3	0.9390	0.00120	8	0.9319	0.00120
10.9	0.9382	0.00130	9.5	0.9450	0.00130	8.1	0.9372	0.00120
11.1	0.9443	0.00100	9.7	0.9505	0.00170	8.2	0.9415	0.00130
11.3	0.9471	0.00130	9.9	0.9573	0.00120	8.3	0.9423	0.00130
11.5	0.9509	0.00120	10.1	0.9609	0.00120	8.4	0.9455	0.00170
11.7	0.9541	0.00120	10.3	0.9652	0.00110	8.5	0.9504	0.00130
11.9	0.9591	0.00140	10.5	0.9722	0.00130	8.6	0.9526	0.00120
12.1	0.9615	0.00110	10.7	0.9757	0.00140	8.7	0.9588	0.00140
12.3	0.9653	0.00120	10.9	0.9788	0.00120	8.8	0.9607	0.00100
12.5	0.9661	0.00110	11.1	0.9851	0.00110	8.9	0.9617	0.00140
12.7	0.9734	0.00100	11.3	0.9863	0.00120	9	0.9649	0.00110
12.9	0.9743	0.00100	11.5	0.9921	0.00100	9.1	0.9694	0.00110
13.1	0.9778	0.00110	11.7	0.9968	0.00130	9.2	0.9741	0.00120
13.3	0.9808	0.00120	11.9	0.9994	0.00120	9.3	0.9756	0.00150
13.5	0.9825	0.00100	12.1	1.0039	0.00110	9.4	0.9818	0.00150
13.7	0.9862	0.00090	12.3	1.0048	0.00130	9.5	0.9809	0.00110
13.9	0.9888	0.00100	12.5	1.0057	0.00120	9.6	0.9816	0.00130
14.1	0.9925	0.00100	12.7	1.0144	0.00110	9.7	0.9850	0.00140
14.3	0.9933	0.00098	12.8	1.0147	0.00120	9.8	0.9885	0.00160
14.5	0.9990	0.00130				9.9	0.9924	0.00150
14.7	0.9989	0.00100				10	0.9946	0.00130
14.9	1.0023	0.00096				10.1	0.9947	0.00110
15.1	1.0032	0.00120				10.2	0.9967	0.00110
15.3	1.0062	0.00095				10.3	1.0028	0.00130
15.5	1.0082	0.00110				10.4	1.0030	0.00180
15.6	1.0110	0.00100				10.5	1.0070	0.00130
						10.6	1.0107	0.00140
						10.7	1.0119	0.00110
						10.8	1.0145	0.00150
						10.9	1.0164	0.00170
						11	1.0189	0.00120

0.015			0.02			0.025		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.10	0.9252	0.00150	4.70	0.9225	0.00160	4.10	0.9302	0.00150
6.2	0.9309	0.00150	4.75	0.9226	0.00140	4.15	0.9342	0.00190
6.3	0.9364	0.00170	4.8	0.9315	0.00150	4.2	0.9384	0.00150
6.4	0.9434	0.00130	4.85	0.9330	0.00160	4.25	0.9438	0.00180
6.5	0.9482	0.00140	4.9	0.9385	0.00160	4.3	0.9474	0.00190
6.6	0.9513	0.00150	4.95	0.9371	0.00170	4.35	0.9537	0.00230
6.7	0.9597	0.00140	5	0.9447	0.00150	4.4	0.9579	0.00180
6.8	0.9634	0.00190	5.05	0.9493	0.00150	4.45	0.9609	0.00190
6.9	0.9704	0.00150	5.1	0.9564	0.00210	4.5	0.9662	0.00160
7	0.9739	0.00130	5.15	0.9575	0.00170	4.55	0.9716	0.00170
7.1	0.9778	0.00130	5.2	0.9604	0.00160	4.6	0.9755	0.00170
7.2	0.9818	0.00140	5.25	0.9645	0.00140	4.65	0.9791	0.00170
7.3	0.9865	0.00180	5.3	0.9674	0.00140	4.7	0.9814	0.00150
7.4	0.9894	0.00140	5.35	0.9721	0.00140	4.75	0.9863	0.00170
7.5	0.9983	0.00140	5.4	0.9750	0.00170	4.8	0.9948	0.00150
7.6	1.0006	0.00150	5.45	0.9790	0.00170	4.85	0.9967	0.00170
7.7	1.0052	0.00160	5.5	0.9818	0.00140	4.9	1.0013	0.00200
7.8	1.0075	0.00130	5.55	0.9869	0.00150	4.95	1.0051	0.00170
7.9	1.0123	0.00130	5.6	0.9875	0.00140	5	1.0095	0.00160
8	1.0183	0.00130	5.65	0.9912	0.00140	5.05	1.0105	0.00170
			5.7	0.9964	0.00160	5.1	1.0153	0.00190
			5.75	0.9976	0.00150			
			5.8	0.9991	0.00140			
			5.85	1.0045	0.00150			
			5.9	1.0058	0.00170			
			5.95	1.0126	0.00160			
			6	1.0170	0.00190			

0.03			0.04			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.60	0.9192	0.00160	3.10	0.9167	0.00170	2.90	0.9287	0.00180
3.65	0.9245	0.00200	3.15	0.9228	0.00180	2.95	0.9321	0.00200
3.7	0.9309	0.00160	3.2	0.9309	0.00190	3	0.9453	0.00170
3.75	0.9343	0.00220	3.25	0.9363	0.00180	3.05	0.9474	0.00200
3.8	0.9420	0.00170	3.3	0.9409	0.00180	3.1	0.9579	0.00230
3.85	0.9449	0.00180	3.35	0.9483	0.00190	3.15	0.9589	0.00180
3.9	0.9556	0.00180	3.4	0.9573	0.00170	3.2	0.9682	0.00180
3.95	0.9569	0.00190	3.45	0.9623	0.00180	3.25	0.9718	0.00190
4	0.9596	0.00170	3.5	0.9692	0.00190	3.3	0.9792	0.00180
4.05	0.9657	0.00170	3.55	0.9727	0.00180	3.35	0.9898	0.00200
4.1	0.9709	0.00170	3.6	0.9809	0.00170	3.4	0.9928	0.00180
4.15	0.9787	0.00150	3.65	0.9833	0.00190	3.45	1.0005	0.00200
4.2	0.9801	0.00170	3.7	0.9884	0.00170	3.5	1.0093	0.00200
4.25	0.9910	0.00160	3.75	0.9960	0.00190	3.55	1.0097	0.00190
4.3	0.9932	0.00170	3.8	1.0018	0.00200	3.6	1.0194	0.00190
4.35	0.9941	0.00200	3.85	1.0055	0.00200	3.65	1.0240	0.00200
4.4	0.9992	0.00150	3.9	1.0095	0.00210	3.7	1.0282	0.00210
4.45	1.0022	0.00170	3.95	1.0196	0.00180			
4.5	1.0128	0.00180	4	1.0218	0.00180			
4.55	1.0169	0.00190						
4.6	1.0229	0.00160						

0.075			0.1			0.15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.50	0.9249	0.00180	2.30	0.9218	0.00180	2.20	0.9329	0.00190
2.55	0.9310	0.00200	2.35	0.9319	0.00200	2.25	0.9401	0.00210
2.6	0.9336	0.00200	2.4	0.9355	0.00180	2.3	0.9478	0.00230
2.65	0.9470	0.00190	2.45	0.9463	0.00220	2.35	0.9571	0.00210
2.7	0.9543	0.00200	2.5	0.9490	0.00250	2.4	0.9616	0.00190
2.75	0.9633	0.00190	2.55	0.9599	0.00220	2.45	0.9693	0.00210
2.8	0.9657	0.00180	2.6	0.9668	0.00200	2.5	0.9779	0.00180
2.85	0.9758	0.00220	2.65	0.9715	0.00280	2.55	0.9807	0.00240
2.9	0.9793	0.00230	2.7	0.9834	0.00210	2.6	0.9908	0.00210
2.95	0.9873	0.00210	2.75	0.9884	0.00260	2.65	0.9962	0.00200
3	0.9949	0.00210	2.8	0.9929	0.00180	2.7	1.0007	0.00180
3.05	1.0043	0.00170	2.85	0.9974	0.00190	2.75	1.0099	0.00250
3.1	1.0089	0.00210	2.9	1.0072	0.00210	2.8	1.0189	0.00200
3.15	1.0139	0.00190	2.95	1.0159	0.00210	2.85	1.0251	0.00220
3.2	1.0217	0.00180	3	1.0212	0.00190	2.9	1.0287	0.00230
3.25	1.0255	0.00180						
3.3	1.0350	0.00200						
3.35	1.0392	0.00200						
3.4	1.0431	0.00190						

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
2.10	0.9284	0.00210	2.00	0.9296	0.00200	1.90	0.9288	0.00220
2.15	0.9371	0.00210	2.05	0.9386	0.00230	1.95	0.9346	0.00230
2.2	0.9448	0.00190	2.1	0.9463	0.00180	2	0.9452	0.00210
2.25	0.9510	0.00210	2.15	0.9553	0.00200	2.05	0.9488	0.00190
2.3	0.9588	0.00210	2.2	0.9551	0.00190	2.1	0.9510	0.00190
2.35	0.9678	0.00200	2.25	0.9655	0.00190	2.15	0.9671	0.00190
2.4	0.9751	0.00190	2.3	0.9745	0.00180	2.2	0.9689	0.00190
2.45	0.9825	0.00290	2.35	0.9780	0.00210	2.25	0.9751	0.00220
2.5	0.9903	0.00200	2.4	0.9867	0.00220	2.3	0.9792	0.00200
2.55	0.9932	0.00230	2.45	0.9926	0.00210	2.35	0.9869	0.00180
2.6	1.0034	0.00200	2.5	0.9966	0.00190	2.4	0.9955	0.00180
2.65	1.0085	0.00180	2.55	1.0040	0.00220	2.45	1.0033	0.00180
2.7	1.0155	0.00200	2.6	1.0111	0.00210	2.5	1.0091	0.00190
2.75	1.0217	0.00200	2.65	1.0177	0.00220	2.55	1.0140	0.00190
2.8	1.0272	0.00230				2.6	1.0201	0.00230
						2.65	1.0247	0.00200
						2.7	1.0336	0.00190

0.75			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
1.80	0.9280	0.00190	1.70	0.9255	0.00180	1.50	0.9197	0.00170
1.85	0.9335	0.00190	1.75	0.9312	0.00230	1.55	0.9287	0.00200
1.9	0.9426	0.00190	1.8	0.9399	0.00220	1.6	0.9364	0.00190
1.95	0.9488	0.00180	1.85	0.9531	0.00190	1.65	0.9412	0.00180
2	0.9592	0.00230	1.9	0.9539	0.00240	1.7	0.9512	0.00220
2.05	0.9622	0.00240	1.95	0.9600	0.00220	1.75	0.9608	0.00220
2.1	0.9719	0.00210	2	0.9725	0.00200	1.8	0.9704	0.00180
2.15	0.9735	0.00200	2.05	0.9744	0.00170	1.85	0.9785	0.00220
2.2	0.9813	0.00230	2.1	0.9811	0.00190	1.9	0.9858	0.00200
2.25	0.9886	0.00170	2.15	0.9869	0.00190	1.95	0.9921	0.00200
2.3	0.9943	0.00190	2.2	0.9903	0.00190	2	0.9994	0.00170
2.35	1.0009	0.00220	2.25	1.0025	0.00180	2.05	1.0039	0.00180
2.4	1.0116	0.00180	2.3	1.0111	0.00200	2.1	1.0106	0.00180
2.45	1.0170	0.00210	2.35	1.0173	0.00180	2.15	1.0171	0.00190
2.5	1.0204	0.00230	2.4	1.0239	0.00190	2.2	1.0260	0.00180
			2.45	1.0273	0.00250	2.25	1.0319	0.00190
			2.5	1.0316	0.00200	2.3	1.0391	0.00180

2			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
1.40	0.9271	0.00190	1.30	0.9328	0.00200	1.20	0.9346	0.00180
1.45	0.9383	0.00170	1.32	0.9328	0.00200	1.22	0.9384	0.00220
1.5	0.9454	0.00170	1.34	0.9419	0.00190	1.24	0.9427	0.00190
1.55	0.9509	0.00190	1.36	0.9433	0.00180	1.26	0.9489	0.00200
1.6	0.9634	0.00170	1.38	0.9455	0.00180	1.28	0.9539	0.00190
1.65	0.9668	0.00170	1.4	0.9518	0.00220	1.3	0.9603	0.00200
1.7	0.9791	0.00250	1.42	0.9547	0.00190	1.32	0.9588	0.00180
1.75	0.9892	0.00180	1.44	0.9569	0.00180	1.34	0.9610	0.00200
1.8	0.9970	0.00210	1.46	0.9644	0.00200	1.36	0.9675	0.00170
1.85	1.0035	0.00210	1.48	0.9647	0.00180	1.38	0.9701	0.00230
1.9	1.0076	0.00190	1.5	0.9735	0.00190	1.4	0.9749	0.00250
1.95	1.0194	0.00190	1.52	0.9737	0.00200	1.42	0.9775	0.00310
2	1.0249	0.00210	1.54	0.9739	0.00210	1.44	0.9815	0.00190
			1.56	0.9778	0.00190	1.46	0.9853	0.00160
			1.58	0.9830	0.00190	1.48	0.9912	0.00200
			1.6	0.9859	0.00180	1.5	0.9941	0.00220
			1.62	0.9922	0.00180	1.52	1.0011	0.00220
			1.64	0.9969	0.00160	1.54	0.9988	0.00200
			1.66	0.9973	0.00170	1.56	1.0053	0.00180
			1.68	1.0034	0.00190	1.58	1.0110	0.00170
			1.7	1.0061	0.00190	1.6	1.0132	0.00160
			1.72	1.0117	0.00200	1.62	1.0174	0.00200
			1.74	1.0140	0.00190	1.64	1.0194	0.00190
			1.76	1.0140	0.00170	1.66	1.0250	0.00180
			1.78	1.0228	0.00180	1.68	1.0257	0.00280
			1.8	1.0221	0.00220	1.7	1.0278	0.00170

4			5			7.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
1.00	0.9290	0.00210	0.80	0.9090	0.00180	0.60	0.9095	0.00200
1.02	0.9335	0.00220	0.82	0.9111	0.00180	0.62	0.9163	0.00210
1.04	0.9396	0.00190	0.84	0.9191	0.00210	0.64	0.9239	0.00170
1.06	0.9458	0.00230	0.86	0.9254	0.00170	0.66	0.9316	0.00190
1.08	0.9482	0.00200	0.88	0.9323	0.00180	0.68	0.9414	0.00190
1.1	0.9536	0.00180	0.9	0.9370	0.00190	0.7	0.9458	0.00160
1.12	0.9569	0.00170	0.92	0.9406	0.00200	0.72	0.9553	0.00180
1.14	0.9613	0.00180	0.94	0.9475	0.00170	0.74	0.9603	0.00180
1.16	0.9670	0.00220	0.96	0.9545	0.00190	0.76	0.9686	0.00240
1.18	0.9721	0.00230	0.98	0.9587	0.00190	0.78	0.9780	0.00190
1.2	0.9768	0.00170	1	0.9649	0.00210	0.8	0.9829	0.00190
1.22	0.9818	0.00200	1.02	0.9703	0.00180	0.82	0.9922	0.00190
1.24	0.9861	0.00200	1.04	0.9764	0.00230	0.84	0.9987	0.00220
1.26	0.9861	0.00230	1.06	0.9784	0.00240	0.86	1.0040	0.00180
1.28	0.9954	0.00170	1.08	0.9869	0.00200	0.88	1.0101	0.00220
1.3	0.9964	0.00180	1.1	0.9898	0.00170	0.9	1.0198	0.00190
1.32	1.0018	0.00190	1.12	0.9945	0.00170	0.92	1.0252	0.00210
1.34	1.0070	0.00180	1.14	1.0000	0.00190	0.94	1.0299	0.00190
1.36	1.0125	0.00250	1.16	1.0082	0.00180	0.96	1.0395	0.00210
1.38	1.0165	0.00190	1.18	1.0072	0.00180	0.98	1.0425	0.00220
1.4	1.0193	0.00180	1.2	1.0166	0.00180	1	1.0496	0.00220
1.42	1.0244	0.00190	1.22	1.0224	0.00160			
1.44	1.0285	0.00180	1.24	1.0257	0.00190			
1.46	1.0328	0.00190	1.26	1.0329	0.00180			
1.48	1.0369	0.00220	1.28	1.0334	0.00170			
1.5	1.0373	0.00180	1.3	1.0412	0.00190			

10			15			19.6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
0.50	0.9267	0.00250	0.30	0.8915	0.00190	0.20	0.8564	0.00210
0.52	0.9293	0.00180	0.32	0.9047	0.00210	0.22	0.8784	0.00180
0.54	0.9415	0.00190	0.34	0.9159	0.00160	0.24	0.8976	0.00210
0.56	0.9529	0.00200	0.36	0.9325	0.00200	0.26	0.9206	0.00200
0.58	0.9597	0.00190	0.38	0.9452	0.00190	0.28	0.9382	0.00180
0.6	0.9686	0.00200	0.4	0.9604	0.00180	0.3	0.9525	0.00170
0.62	0.9786	0.00190	0.42	0.9792	0.00180	0.32	0.9709	0.00210
0.64	0.9899	0.00220	0.44	0.9865	0.00180	0.34	0.9869	0.00210
0.66	0.9945	0.00200	0.46	1.0007	0.00190	0.36	1.0032	0.00180
0.68	1.0061	0.00230	0.48	1.0088	0.00190	0.38	1.0166	0.00190
0.7	1.0136	0.00200	0.5	1.0255	0.00230	0.4	1.0359	0.00200
0.72	1.0206	0.00180	0.52	1.0334	0.00180			
0.74	1.0312	0.00180	0.54	1.0440	0.00170			
0.76	1.0374	0.00180	0.56	1.0583	0.00190			
0.78	1.0457	0.00230	0.58	1.0666	0.00240			
0.8	1.0545	0.00230	0.6	1.0842	0.00200			

U-sph-100 (Cases with 0", 1", 10" Reflector)

Case ID: u_sph_100_00ref

Material: Uranium

Geometry: Sphere

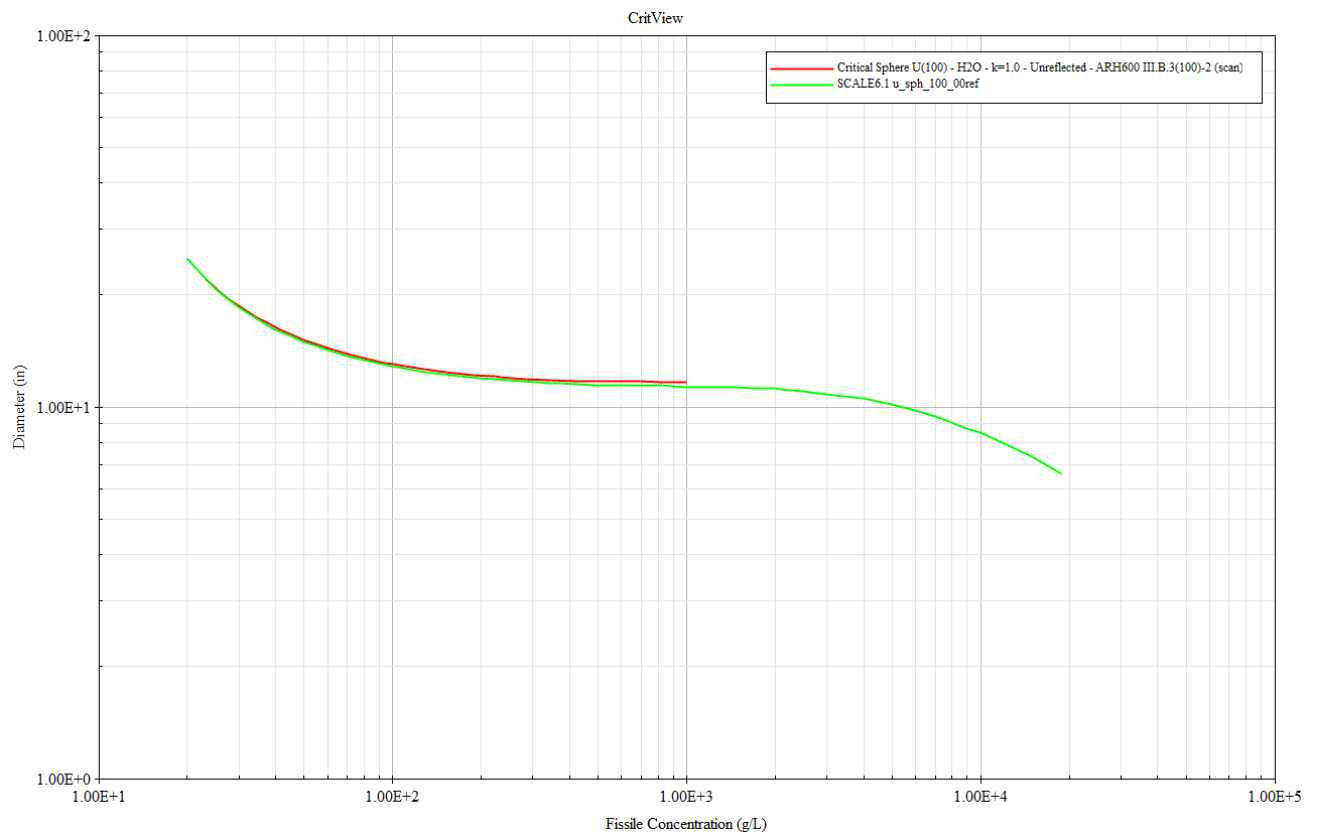
Isotopics: 100% ^{235}U

Reflector: Unreflected

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.020	20.900	26.000	0.200	25.1000
0.025	17.900	21.300	0.100	20.7353
0.030	16.200	19.000	0.100	18.4864
0.040	14.500	16.600	0.100	16.1473
0.045	13.900	15.900	0.100	15.5160
0.050	13.500	15.300	0.100	14.9614
0.055	13.200	14.900	0.050	14.6104
0.060	12.900	14.600	0.050	14.2313
0.065	12.600	14.300	0.050	13.9750
0.070	12.500	14.100	0.050	13.7092
0.080	12.100	13.700	0.050	13.3538
0.100	11.700	13.200	0.050	12.8633
0.130	11.300	12.700	0.050	12.4202
0.150	11.200	12.500	0.050	12.2250
0.170	11.000	12.400	0.050	12.0777
0.200	10.900	12.200	0.050	11.9429
0.350	10.600	11.900	0.050	11.5975
0.500	10.500	11.800	0.050	11.4480
0.800	10.400	11.700	0.050	11.4132
1.000	10.300	11.700	0.050	11.3257
1.500	10.300	11.600	0.050	11.2992
1.700	10.200	11.600	0.050	11.2327
1.900	10.200	11.500	0.050	11.2112
2.000	10.100	11.500	0.050	11.1974
2.100	10.100	11.500	0.050	11.1697
2.500	10.000	11.400	0.050	11.0175
3.000	9.800	11.200	0.050	10.8413
4.000	9.500	10.900	0.050	10.5220
5.000	9.200	10.500	0.050	10.1442
6.000	8.900	10.100	0.050	9.8055
7.000	8.600	9.700	0.050	9.3971
7.500	8.400	9.600	0.050	9.2558
8.000	8.300	9.400	0.050	9.0903
9.000	8.000	9.100	0.050	8.7500
10.000	7.800	8.800	0.050	8.5180
15.000	6.700	7.600	0.050	7.3596
18.900	6.000	6.800	0.050	6.5886

WORM and SCALE Input File

```

'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.2.1.1.1-1. Critical Dimensions for 100% 235U Sphere - 0 Inches of Water Reflection
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
0.02,0.025,0.03,0.04,0.045,0.05,0.055,0.06,0.065,0.07,0.08,0.1,0.13,0.15,0.17,0.2,0.35,0.5,0.8,1,
1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Critical Density = <critdens = 18.9 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
20.9,17.9,16.2,14.5,13.9,13.5,13.2,12.9,12.6,12.5,12.1,11.7,11.3,11.2,11,10.9,10.6,10.5,10.4,10.3
,10.3,10.2,10.2,10.1,10.1,10,9.8,9.5,9.2,8.9,8.6,8.4,8.3,8,7.8,6.7,6> in
#Ending Diameter = <@enddia =
26,21.3,19,16.6,15.9,15.3,14.9,14.6,14.3,14.1,13.7,13.2,12.7,12.5,12.4,12.2,11.9,11.8,11.7,11.7,1
1.6,11.6,11.5,11.5,11.5,11.4,11.2,10.9,10.5,10.1,9.7,9.6,9.4,9.1,8.8,7.6,6.8> in
#Delta = <@delta =
0.2,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.0
5,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05> in
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
,
=csas6
template
v7-238
read composition
  u          1 den=<critconc> 1 300
                                92235 100
                                92238 0   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
  sphere 1      {{{(diameter*in)/2}}}
  media 1 1 1
  boundary 1
end geometry
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```


CritView compatible data file

```
reset:
title: SCALE6.1 u_sph_100_00ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: sphere
modmat: H2O
critmat: uranium
isomat: U235 1.0
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.020 25.1000
0.025 20.7353
0.030 18.4864
0.040 16.1473
0.045 15.5160
0.050 14.9614
0.055 14.6104
0.060 14.2313
0.065 13.9750
0.070 13.7092
0.080 13.3538
0.100 12.8633
0.130 12.4202
0.150 12.2250
0.170 12.0777
0.200 11.9429
0.350 11.5975
0.500 11.4480
0.800 11.4132
1.000 11.3257
1.500 11.2992
1.700 11.2327
1.900 11.2112
2.000 11.1974
2.100 11.1697
2.500 11.0175
3.000 10.8413
4.000 10.5220
5.000 10.1442
6.000 9.8055
7.000 9.3971
7.500 9.2558
8.000 9.0903
9.000 8.7500
10.000 8.5180
15.000 7.3596
18.900 6.5886
```

0.02			0.025			0.03		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
20.90	0.9228	0.00190	17.90	0.9228	0.00190	16.20	0.9148	0.00190
21.1	0.9281	0.00150	18	0.9247	0.00170	16.3	0.9221	0.00170
21.3	0.9311	0.00160	18.1	0.9285	0.00190	16.4	0.9262	0.00180
21.5	0.9383	0.00190	18.2	0.9350	0.00180	16.5	0.9280	0.00290
21.7	0.9372	0.00180	18.3	0.9381	0.00190	16.6	0.9328	0.00210
21.9	0.9451	0.00170	18.4	0.9342	0.00160	16.7	0.9326	0.00190
22.1	0.9500	0.00160	18.5	0.9418	0.00180	16.8	0.9374	0.00220
22.3	0.9508	0.00200	18.6	0.9456	0.00190	16.9	0.9427	0.00190
22.5	0.9570	0.00150	18.7	0.9447	0.00180	17	0.9476	0.00220
22.7	0.9581	0.00150	18.8	0.9488	0.00220	17.1	0.9546	0.00180
22.9	0.9627	0.00180	18.9	0.9487	0.00190	17.2	0.9556	0.00180
23.1	0.9669	0.00200	19	0.9507	0.00200	17.3	0.9566	0.00260
23.3	0.9679	0.00160	19.1	0.9532	0.00170	17.4	0.9630	0.00220
23.5	0.9717	0.00210	19.2	0.9589	0.00170	17.5	0.9711	0.00230
23.7	0.9774	0.00180	19.3	0.9612	0.00170	17.6	0.9696	0.00190
23.9	0.9797	0.00140	19.4	0.9656	0.00260	17.7	0.9755	0.00190
24.1	0.9778	0.00220	19.5	0.9682	0.00190	17.8	0.9768	0.00200
24.3	0.9906	0.00180	19.6	0.9700	0.00190	17.9	0.9792	0.00250
24.5	0.9893	0.00170	19.7	0.9735	0.00180	18	0.9860	0.00190
24.7	0.9941	0.00180	19.8	0.9771	0.00170	18.1	0.9869	0.00220
24.9	0.9957	0.00170	19.9	0.9783	0.00210	18.2	0.9915	0.00180
25.1	1.0000	0.00190	20	0.9829	0.00190	18.3	0.9926	0.00180
25.3	1.0006	0.00170	20.1	0.9858	0.00200	18.4	0.9949	0.00220
25.5	1.0066	0.00180	20.2	0.9847	0.00200	18.5	1.0008	0.00240
25.7	1.0097	0.00170	20.3	0.9917	0.00170	18.6	1.0049	0.00200
25.9	1.0163	0.00210	20.4	0.9884	0.00230	18.7	1.0047	0.00200
26	1.0122	0.00150	20.5	0.9989	0.00250	18.8	1.0082	0.00230
			20.6	0.9983	0.00170	18.9	1.0130	0.00180
			20.7	0.9988	0.00170	19	1.0186	0.00230
			20.8	1.0022	0.00190			
			20.9	1.0027	0.00180			
			21	1.0060	0.00190			
			21.1	1.0105	0.00170			
			21.2	1.0124	0.00220			
			21.3	1.0141	0.00240			

0.04			0.045			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.50	0.9153	0.00230	13.90	0.9159	0.00220	13.50	0.9107	0.00220
14.6	0.9270	0.00230	14	0.9206	0.00240	13.6	0.9275	0.00220
14.7	0.9297	0.00200	14.1	0.9301	0.00260	13.7	0.9280	0.00240
14.8	0.9343	0.00220	14.2	0.9328	0.00250	13.8	0.9320	0.00200
14.9	0.9446	0.00200	14.3	0.9392	0.00180	13.9	0.9405	0.00230
15	0.9449	0.00240	14.4	0.9438	0.00240	14	0.9471	0.00240
15.1	0.9494	0.00230	14.5	0.9477	0.00190	14.1	0.9512	0.00240
15.2	0.9555	0.00240	14.6	0.9538	0.00240	14.2	0.9575	0.00230
15.3	0.9607	0.00220	14.7	0.9647	0.00240	14.3	0.9640	0.00240
15.4	0.9631	0.00230	14.8	0.9684	0.00210	14.4	0.9684	0.00200
15.5	0.9701	0.00200	14.9	0.9684	0.00240	14.5	0.9767	0.00220
15.6	0.9800	0.00240	15	0.9727	0.00280	14.6	0.9776	0.00230
15.7	0.9767	0.00240	15.1	0.9774	0.00210	14.7	0.9855	0.00250
15.8	0.9832	0.00270	15.2	0.9834	0.00230	14.8	0.9922	0.00220
15.9	0.9876	0.00180	15.3	0.9882	0.00220	14.9	0.9957	0.00220
16	0.9928	0.00200	15.4	0.9936	0.00200	15	1.0027	0.00240
16.1	0.9965	0.00220	15.5	0.9988	0.00200	15.1	1.0080	0.00230
16.2	1.0039	0.00230	15.6	1.0063	0.00210	15.2	1.0092	0.00240
16.3	1.0039	0.00220	15.7	1.0069	0.00220	15.3	1.0141	0.00190
16.4	1.0074	0.00200	15.8	1.0122	0.00210			
16.5	1.0100	0.00210	15.9	1.0144	0.00250			
16.6	1.0155	0.00220						

0.055			0.06			0.065		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.20	0.9202	0.00210	12.90	0.9158	0.00190	12.60	0.9123	0.00230
13.25	0.9222	0.00220	12.95	0.9170	0.00280	12.65	0.9166	0.00230
13.3	0.9249	0.00220	13	0.9257	0.00230	12.7	0.9187	0.00210
13.35	0.9286	0.00250	13.05	0.9261	0.00240	12.75	0.9226	0.00260
13.4	0.9309	0.00200	13.1	0.9336	0.00210	12.8	0.9274	0.00250
13.45	0.9342	0.00240	13.15	0.9330	0.00230	12.85	0.9319	0.00190
13.5	0.9370	0.00280	13.2	0.9322	0.00250	12.9	0.9313	0.00200
13.55	0.9367	0.00230	13.25	0.9392	0.00230	12.95	0.9356	0.00210
13.6	0.9430	0.00190	13.3	0.9407	0.00200	13	0.9396	0.00210
13.65	0.9462	0.00230	13.35	0.9437	0.00250	13.05	0.9434	0.00300
13.7	0.9493	0.00240	13.4	0.9520	0.00240	13.1	0.9453	0.00260
13.75	0.9505	0.00200	13.45	0.9552	0.00260	13.15	0.9492	0.00230
13.8	0.9515	0.00270	13.5	0.9552	0.00250	13.2	0.9509	0.00260
13.85	0.9598	0.00210	13.55	0.9574	0.00200	13.25	0.9520	0.00220
13.9	0.9605	0.00250	13.6	0.9623	0.00220	13.3	0.9574	0.00250
13.95	0.9653	0.00200	13.65	0.9626	0.00230	13.35	0.9579	0.00220
14	0.9663	0.00240	13.7	0.9689	0.00240	13.4	0.9649	0.00230
14.05	0.9699	0.00200	13.75	0.9651	0.00220	13.45	0.9663	0.00250
14.1	0.9788	0.00250	13.8	0.9695	0.00230	13.5	0.9702	0.00310
14.15	0.9782	0.00220	13.85	0.9767	0.00240	13.55	0.9763	0.00210
14.2	0.9786	0.00230	13.9	0.9760	0.00190	13.6	0.9777	0.00220
14.25	0.9787	0.00210	13.95	0.9814	0.00220	13.65	0.9782	0.00270
14.3	0.9842	0.00210	14	0.9882	0.00250	13.7	0.9865	0.00270
14.35	0.9872	0.00240	14.05	0.9885	0.00280	13.75	0.9834	0.00210
14.4	0.9917	0.00210	14.1	0.9929	0.00240	13.8	0.9907	0.00220
14.45	0.9905	0.00230	14.15	0.9931	0.00200	13.85	0.9914	0.00240
14.5	0.9935	0.00200	14.2	0.9975	0.00200	13.9	0.9936	0.00300
14.55	0.9953	0.00260	14.25	1.0015	0.00220	13.95	0.9951	0.00220
14.6	0.9990	0.00240	14.3	1.0005	0.00230	14	1.0049	0.00220
14.65	1.0038	0.00180	14.35	1.0047	0.00210	14.05	1.0021	0.00220
14.7	1.0084	0.00260	14.4	1.0095	0.00210	14.1	1.0062	0.00240
14.75	1.0121	0.00250	14.45	1.0137	0.00310	14.15	1.0081	0.00210
14.8	1.0097	0.00210	14.5	1.0134	0.00220	14.2	1.0177	0.00260
14.85	1.0139	0.00230	14.55	1.0189	0.00210	14.25	1.0086	0.00290
14.9	1.0147	0.00210	14.6	1.0236	0.00230	14.3	1.0157	0.00220

0.07			0.08			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.50	0.9178	0.00280	12.10	0.9127	0.00250	11.70	0.9118	0.00300
12.55	0.9212	0.00300	12.15	0.9145	0.00210	11.75	0.9174	0.00240
12.6	0.9230	0.00210	12.2	0.9206	0.00210	11.8	0.9222	0.00260
12.65	0.9259	0.00230	12.25	0.9191	0.00270	11.85	0.9235	0.00220
12.7	0.9326	0.00230	12.3	0.9295	0.00200	11.9	0.9304	0.00320
12.75	0.9373	0.00220	12.35	0.9280	0.00250	11.95	0.9322	0.00230
12.8	0.9439	0.00220	12.4	0.9302	0.00220	12	0.9372	0.00210
12.85	0.9440	0.00290	12.45	0.9386	0.00240	12.05	0.9373	0.00210
12.9	0.9477	0.00240	12.5	0.9396	0.00220	12.1	0.9434	0.00220
12.95	0.9491	0.00210	12.55	0.9418	0.00230	12.15	0.9490	0.00230
13	0.9539	0.00210	12.6	0.9486	0.00250	12.2	0.9561	0.00250
13.05	0.9525	0.00260	12.65	0.9499	0.00240	12.25	0.9571	0.00250
13.1	0.9598	0.00250	12.7	0.9533	0.00280	12.3	0.9587	0.00240
13.15	0.9638	0.00250	12.75	0.9585	0.00240	12.35	0.9599	0.00240
13.2	0.9662	0.00270	12.8	0.9607	0.00200	12.4	0.9690	0.00240
13.25	0.9702	0.00250	12.85	0.9650	0.00230	12.45	0.9654	0.00270
13.3	0.9694	0.00200	12.9	0.9684	0.00280	12.5	0.9730	0.00240
13.35	0.9747	0.00270	12.95	0.9716	0.00250	12.55	0.9758	0.00210
13.4	0.9768	0.00260	13	0.9752	0.00220	12.6	0.9812	0.00220
13.45	0.9820	0.00250	13.05	0.9778	0.00260	12.65	0.9848	0.00250
13.5	0.9835	0.00220	13.1	0.9797	0.00230	12.7	0.9876	0.00250
13.55	0.9891	0.00210	13.15	0.9839	0.00240	12.75	0.9895	0.00220
13.6	0.9900	0.00210	13.2	0.9898	0.00230	12.8	0.9930	0.00270
13.65	0.9934	0.00300	13.25	0.9918	0.00220	12.85	0.9983	0.00220
13.7	0.9989	0.00230	13.3	0.9977	0.00200	12.9	1.0047	0.00240
13.75	1.0049	0.00250	13.35	0.9997	0.00210	12.95	1.0011	0.00260
13.8	1.0018	0.00220	13.4	1.0036	0.00220	13	1.0081	0.00200
13.85	1.0073	0.00230	13.45	1.0136	0.00210	13.05	1.0147	0.00230
13.9	1.0066	0.00240	13.5	1.0061	0.00250	13.1	1.0180	0.00230
13.95	1.0165	0.00240	13.55	1.0133	0.00250	13.15	1.0190	0.00330
14	1.0177	0.00230	13.6	1.0150	0.00270	13.2	1.0205	0.00200
14.05	1.0184	0.00290	13.65	1.0165	0.00210			
14.1	1.0271	0.00290	13.7	1.0182	0.00220			

0.13			0.15			0.17		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.30	0.9079	0.00250	11.20	0.9158	0.00260	11.00	0.9100	0.00240
11.35	0.9190	0.00240	11.25	0.9211	0.00230	11.05	0.9128	0.00230
11.4	0.9215	0.00220	11.3	0.9250	0.00230	11.1	0.9201	0.00340
11.45	0.9268	0.00240	11.35	0.9313	0.00230	11.15	0.9259	0.00210
11.5	0.9298	0.00300	11.4	0.9334	0.00240	11.2	0.9274	0.00330
11.55	0.9363	0.00290	11.45	0.9365	0.00270	11.25	0.9315	0.00230
11.6	0.9388	0.00270	11.5	0.9404	0.00350	11.3	0.9355	0.00270
11.65	0.9407	0.00260	11.55	0.9456	0.00260	11.35	0.9415	0.00260
11.7	0.9443	0.00320	11.6	0.9531	0.00230	11.4	0.9493	0.00270
11.75	0.9489	0.00260	11.65	0.9638	0.00260	11.45	0.9515	0.00240
11.8	0.9482	0.00260	11.7	0.9589	0.00230	11.5	0.9527	0.00260
11.85	0.9556	0.00270	11.75	0.9641	0.00280	11.55	0.9526	0.00250
11.9	0.9644	0.00260	11.8	0.9633	0.00290	11.6	0.9606	0.00290
11.95	0.9677	0.00220	11.85	0.9717	0.00230	11.65	0.9614	0.00230
12	0.9654	0.00210	11.9	0.9718	0.00290	11.7	0.9676	0.00280
12.05	0.9721	0.00290	11.95	0.9771	0.00310	11.75	0.9745	0.00260
12.1	0.9779	0.00230	12	0.9848	0.00280	11.8	0.9747	0.00230
12.15	0.9795	0.00300	12.05	0.9841	0.00280	11.85	0.9798	0.00230
12.2	0.9768	0.00240	12.1	0.9902	0.00210	11.9	0.9868	0.00260
12.25	0.9867	0.00240	12.15	0.9914	0.00250	11.95	0.9879	0.00240
12.3	0.9926	0.00240	12.2	1.0002	0.00200	12	0.9913	0.00280
12.35	0.9924	0.00300	12.25	0.9998	0.00260	12.05	0.9964	0.00270
12.4	0.9981	0.00250	12.3	1.0062	0.00210	12.1	1.0029	0.00290
12.45	1.0028	0.00250	12.35	1.0144	0.00290	12.15	1.0048	0.00240
12.5	1.0036	0.00230	12.4	1.0090	0.00260	12.2	1.0084	0.00270
12.55	1.0060	0.00230	12.45	1.0160	0.00300	12.25	1.0158	0.00230
12.6	1.0124	0.00210	12.5	1.0227	0.00260	12.3	1.0172	0.00240
12.65	1.0140	0.00260				12.35	1.0190	0.00280
12.7	1.0189	0.00310				12.4	1.0212	0.00280

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.90	0.9133	0.00240	10.60	0.9202	0.00240	10.50	0.9183	0.00270
10.95	0.9179	0.00230	10.65	0.9249	0.00220	10.55	0.9182	0.00250
11	0.9224	0.00250	10.7	0.9333	0.00320	10.6	0.9267	0.00310
11.05	0.9236	0.00290	10.75	0.9319	0.00290	10.65	0.9311	0.00250
11.1	0.9334	0.00270	10.8	0.9320	0.00290	10.7	0.9372	0.00280
11.15	0.9318	0.00290	10.85	0.9408	0.00230	10.75	0.9416	0.00250
11.2	0.9395	0.00260	10.9	0.9443	0.00230	10.8	0.9452	0.00310
11.25	0.9424	0.00260	10.95	0.9477	0.00260	10.85	0.9494	0.00290
11.3	0.9526	0.00280	11	0.9490	0.00240	10.9	0.9494	0.00280
11.35	0.9560	0.00240	11.05	0.9592	0.00230	10.95	0.9564	0.00250
11.4	0.9563	0.00320	11.1	0.9574	0.00270	11	0.9625	0.00270
11.45	0.9607	0.00250	11.15	0.9634	0.00270	11.05	0.9669	0.00280
11.5	0.9642	0.00240	11.2	0.9674	0.00280	11.1	0.9697	0.00260
11.55	0.9717	0.00260	11.25	0.9743	0.00260	11.15	0.9741	0.00270
11.6	0.9728	0.00290	11.3	0.9766	0.00300	11.2	0.9816	0.00230
11.65	0.9773	0.00250	11.35	0.9874	0.00270	11.25	0.9846	0.00230
11.7	0.9838	0.00210	11.4	0.9856	0.00240	11.3	0.9931	0.00270
11.75	0.9837	0.00230	11.45	0.9888	0.00220	11.35	0.9905	0.00290
11.8	0.9858	0.00280	11.5	0.9880	0.00260	11.4	0.9929	0.00300
11.85	0.9924	0.00240	11.55	0.9962	0.00260	11.45	1.0003	0.00260
11.9	1.0042	0.00330	11.6	1.0002	0.00280	11.5	1.0027	0.00230
11.95	0.9993	0.00260	11.65	1.0009	0.00290	11.55	1.0069	0.00250
12	1.0004	0.00270	11.7	1.0136	0.00240	11.6	1.0122	0.00230
12.05	1.0063	0.00250	11.75	1.0122	0.00270	11.65	1.0142	0.00260
12.1	1.0155	0.00290	11.8	1.0170	0.00260	11.7	1.0154	0.00230
12.15	1.0152	0.00210	11.85	1.0189	0.00310	11.75	1.0231	0.00250
12.2	1.0213	0.00260	11.9	1.0256	0.00280	11.8	1.0296	0.00310

0.8			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.40	0.9207	0.00270	10.30	0.9170	0.00320	10.30	0.9215	0.00270
10.45	0.9260	0.00260	10.35	0.9182	0.00280	10.35	0.9288	0.00270
10.50	0.9251	0.00260	10.40	0.9192	0.00300	10.40	0.9313	0.00220
10.55	0.9322	0.00280	10.45	0.9268	0.00260	10.45	0.9328	0.00210
10.60	0.9357	0.00240	10.50	0.9319	0.00200	10.50	0.9366	0.00210
10.65	0.9444	0.00240	10.55	0.9354	0.00230	10.55	0.9415	0.00250
10.70	0.9462	0.00270	10.60	0.9410	0.00350	10.60	0.9498	0.00220
10.75	0.9525	0.00230	10.65	0.9419	0.00230	10.65	0.9533	0.00230
10.80	0.9478	0.00320	10.70	0.9483	0.00250	10.70	0.9514	0.00220
10.85	0.9523	0.00300	10.75	0.9528	0.00220	10.75	0.9572	0.00240
10.90	0.9638	0.00230	10.80	0.9584	0.00260	10.80	0.9613	0.00240
10.95	0.9606	0.00290	10.85	0.9636	0.00250	10.85	0.9648	0.00230
11.00	0.9674	0.00230	10.90	0.9665	0.00260	10.90	0.9711	0.00290
11.05	0.9771	0.00310	10.95	0.9707	0.00220	10.95	0.9745	0.00220
11.10	0.9728	0.00320	11.00	0.9758	0.00240	11.00	0.9804	0.00280
11.15	0.9830	0.00240	11.05	0.9785	0.00210	11.05	0.9802	0.00260
11.20	0.9823	0.00260	11.10	0.9835	0.00250	11.10	0.9872	0.00230
11.25	0.9910	0.00270	11.15	0.9865	0.00240	11.15	0.9919	0.00240
11.30	0.9902	0.00250	11.20	0.9887	0.00250	11.20	0.9920	0.00220
11.35	0.9994	0.00220	11.25	0.9976	0.00250	11.25	0.9939	0.00230
11.40	0.9976	0.00250	11.30	0.9963	0.00310	11.30	1.0001	0.00230
11.45	1.0067	0.00290	11.35	1.0035	0.00240	11.35	1.0036	0.00230
11.50	1.0079	0.00260	11.40	1.0019	0.00250	11.40	1.0100	0.00240
11.55	1.0151	0.00260	11.45	1.0058	0.00330	11.45	1.0179	0.00190
11.60	1.0171	0.00240	11.50	1.0097	0.00220	11.50	1.0146	0.00220
11.65	1.0170	0.00250	11.55	1.0175	0.00250	11.55	1.0204	0.00210
11.70	1.0219	0.00270	11.60	1.0154	0.00250	11.60	1.0189	0.00220
			11.65	1.0246	0.00220			
			11.70	1.0276	0.00250			

1.7			1.9			2		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.20	0.9229	0.00240	10.20	0.9216	0.00270	10.10	0.9146	0.00240
10.25	0.9249	0.00210	10.25	0.9264	0.00200	10.15	0.9168	0.00230
10.30	0.9271	0.00260	10.3	0.9333	0.00220	10.2	0.9266	0.00260
10.35	0.9309	0.00210	10.35	0.9346	0.00220	10.25	0.9272	0.00230
10.40	0.9318	0.00200	10.4	0.9359	0.00250	10.3	0.9321	0.00240
10.45	0.9360	0.00260	10.45	0.9446	0.00300	10.35	0.9357	0.00270
10.50	0.9403	0.00280	10.5	0.9478	0.00230	10.4	0.9442	0.00230
10.55	0.9469	0.00250	10.55	0.9522	0.00230	10.45	0.9444	0.00240
10.60	0.9510	0.00210	10.6	0.9524	0.00190	10.5	0.9498	0.00240
10.65	0.9508	0.00210	10.65	0.9569	0.00210	10.55	0.9541	0.00230
10.70	0.9530	0.00270	10.7	0.9640	0.00230	10.6	0.9571	0.00290
10.75	0.9605	0.00250	10.75	0.9619	0.00250	10.65	0.9555	0.00200
10.80	0.9625	0.00220	10.8	0.9687	0.00230	10.7	0.9646	0.00290
10.85	0.9677	0.00230	10.85	0.9718	0.00230	10.75	0.9663	0.00240
10.90	0.9734	0.00210	10.9	0.9729	0.00250	10.8	0.9714	0.00310
10.95	0.9752	0.00220	10.95	0.9804	0.00220	10.85	0.9751	0.00270
11.00	0.9825	0.00210	11	0.9842	0.00310	10.9	0.9811	0.00260
11.05	0.9819	0.00250	11.05	0.9896	0.00270	10.95	0.9874	0.00240
11.10	0.9869	0.00230	11.1	0.9869	0.00260	11	0.9875	0.00250
11.15	0.9894	0.00210	11.15	0.9909	0.00260	11.05	0.9865	0.00270
11.20	0.9945	0.00240	11.2	0.9974	0.00250	11.1	0.9944	0.00240
11.25	1.0029	0.00260	11.25	1.0090	0.00260	11.15	0.9928	0.00230
11.30	1.0051	0.00230	11.3	1.0073	0.00260	11.2	1.0004	0.00200
11.35	1.0067	0.00220	11.35	1.0115	0.00270	11.25	1.0043	0.00270
11.40	1.0114	0.00260	11.4	1.0135	0.00210	11.3	1.0114	0.00240
11.45	1.0158	0.00300	11.45	1.0167	0.00220	11.35	1.0124	0.00280
11.50	1.0173	0.00220	11.5	1.0223	0.00290	11.4	1.0173	0.00220
11.55	1.0203	0.00250				11.45	1.0187	0.00250
11.60	1.0249	0.00230				11.5	1.0272	0.00240

2.1			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.10	0.9196	0.00230	10.00	0.9222	0.00220	9.80	0.9167	0.00220
10.15	0.9234	0.00240	10.05	0.9189	0.00250	9.85	0.9195	0.00190
10.2	0.9310	0.00210	10.1	0.9262	0.00210	9.9	0.9231	0.00190
10.25	0.9288	0.00250	10.15	0.9348	0.00220	9.95	0.9274	0.00230
10.3	0.9384	0.00290	10.2	0.9360	0.00240	10	0.9342	0.00230
10.35	0.9335	0.00220	10.25	0.9384	0.00260	10.05	0.9350	0.00280
10.4	0.9418	0.00250	10.3	0.9431	0.00240	10.1	0.9439	0.00210
10.45	0.9464	0.00230	10.35	0.9484	0.00290	10.15	0.9460	0.00270
10.5	0.9495	0.00250	10.4	0.9561	0.00280	10.2	0.9494	0.00270
10.55	0.9539	0.00250	10.45	0.9571	0.00260	10.25	0.9526	0.00200
10.6	0.9586	0.00230	10.5	0.9598	0.00230	10.3	0.9575	0.00270
10.65	0.9584	0.00260	10.55	0.9629	0.00220	10.35	0.9607	0.00220
10.7	0.9689	0.00240	10.6	0.9676	0.00270	10.4	0.9654	0.00210
10.75	0.9705	0.00310	10.65	0.9698	0.00230	10.45	0.9667	0.00210
10.8	0.9735	0.00240	10.7	0.9762	0.00250	10.5	0.9672	0.00220
10.85	0.9765	0.00210	10.75	0.9753	0.00220	10.55	0.9771	0.00230
10.9	0.9790	0.00220	10.8	0.9858	0.00220	10.6	0.9792	0.00220
10.95	0.9847	0.00280	10.85	0.9901	0.00220	10.65	0.9875	0.00260
11	0.9868	0.00250	10.9	0.9861	0.00260	10.7	0.9862	0.00210
11.05	0.9893	0.00250	10.95	0.9958	0.00280	10.75	0.9896	0.00250
11.1	0.9967	0.00220	11	0.9993	0.00270	10.8	0.9938	0.00280
11.15	0.9963	0.00230	11.05	1.0013	0.00220	10.85	1.0013	0.00210
11.2	1.0057	0.00270	11.1	1.0072	0.00210	10.9	1.0028	0.00270
11.25	1.0051	0.00240	11.15	1.0060	0.00250	10.95	1.0014	0.00260
11.3	1.0105	0.00200	11.2	1.0190	0.00220	11	1.0101	0.00190
11.35	1.0154	0.00240	11.25	1.0144	0.00280	11.05	1.0154	0.00200
11.4	1.0217	0.00260	11.3	1.0171	0.00220	11.1	1.0180	0.00210
11.45	1.0225	0.00220	11.35	1.0226	0.00250	11.15	1.0216	0.00230
11.5	1.0288	0.00230	11.4	1.0234	0.00250	11.2	1.0213	0.00260

4			5			6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.50	0.9166	0.00230	9.20	0.9199	0.00200	8.90	0.9224	0.00200
9.55	0.9219	0.00190	9.25	0.9262	0.00230	8.95	0.9305	0.00210
9.6	0.9243	0.00240	9.3	0.9322	0.00220	9	0.9301	0.00180
9.65	0.9288	0.00250	9.35	0.9320	0.00240	9.05	0.9393	0.00190
9.7	0.9352	0.00190	9.4	0.9397	0.00220	9.1	0.9393	0.00200
9.75	0.9390	0.00220	9.45	0.9427	0.00240	9.15	0.9473	0.00230
9.8	0.9428	0.00290	9.5	0.9469	0.00210	9.2	0.9501	0.00230
9.85	0.9460	0.00220	9.55	0.9538	0.00210	9.25	0.9554	0.00200
9.9	0.9531	0.00280	9.6	0.9543	0.00260	9.3	0.9560	0.00200
9.95	0.9545	0.00290	9.65	0.9626	0.00190	9.35	0.9600	0.00180
10	0.9592	0.00210	9.7	0.9647	0.00260	9.4	0.9720	0.00210
10.05	0.9652	0.00240	9.75	0.9696	0.00190	9.45	0.9752	0.00230
10.1	0.9674	0.00170	9.8	0.9737	0.00210	9.5	0.9803	0.00190
10.15	0.9720	0.00270	9.85	0.9703	0.00200	9.55	0.9792	0.00180
10.2	0.9780	0.00200	9.9	0.9805	0.00240	9.6	0.9869	0.00190
10.25	0.9804	0.00240	9.95	0.9817	0.00180	9.65	0.9862	0.00200
10.3	0.9820	0.00220	10	0.9844	0.00200	9.7	0.9931	0.00220
10.35	0.9903	0.00220	10.05	0.9874	0.00260	9.75	0.9976	0.00250
10.4	0.9922	0.00230	10.1	0.9962	0.00250	9.8	0.9988	0.00280
10.45	0.9873	0.00270	10.15	1.0005	0.00230	9.85	1.0097	0.00180
10.5	0.9974	0.00190	10.2	1.0043	0.00220	9.9	1.0133	0.00190
10.55	1.0033	0.00240	10.25	1.0075	0.00220	9.95	1.0158	0.00180
10.6	1.0070	0.00260	10.3	1.0134	0.00190	10	1.0184	0.00200
10.65	1.0110	0.00180	10.35	1.0150	0.00210	10.05	1.0223	0.00200
10.7	1.0138	0.00210	10.4	1.0187	0.00260	10.1	1.0253	0.00220
10.75	1.0136	0.00200	10.45	1.0236	0.00250			
10.8	1.0256	0.00240	10.5	1.0248	0.00230			
10.85	1.0177	0.00210						
10.9	1.0311	0.00230						

7			7.5			8		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.60	0.9227	0.00200	8.40	0.9199	0.00190	8.30	0.9267	0.00190
8.65	0.9302	0.00240	8.45	0.9238	0.00190	8.35	0.9290	0.00200
8.7	0.9377	0.00210	8.5	0.9279	0.00190	8.4	0.9306	0.00230
8.75	0.9415	0.00220	8.55	0.9347	0.00210	8.45	0.9362	0.00230
8.8	0.9436	0.00200	8.6	0.9443	0.00210	8.5	0.9428	0.00210
8.85	0.9468	0.00170	8.65	0.9376	0.00190	8.55	0.9479	0.00200
8.9	0.9542	0.00210	8.7	0.9441	0.00210	8.6	0.9561	0.00180
8.95	0.9580	0.00230	8.75	0.9558	0.00190	8.65	0.9601	0.00200
9	0.9603	0.00230	8.8	0.9554	0.00170	8.7	0.9627	0.00200
9.05	0.9659	0.00230	8.85	0.9650	0.00190	8.75	0.9647	0.00220
9.1	0.9723	0.00180	8.9	0.9641	0.00220	8.8	0.9716	0.00200
9.15	0.9727	0.00240	8.95	0.9690	0.00230	8.85	0.9752	0.00180
9.2	0.9809	0.00230	9	0.9750	0.00200	8.9	0.9789	0.00200
9.25	0.9834	0.00210	9.05	0.9816	0.00190	8.95	0.9809	0.00200
9.3	0.9866	0.00220	9.1	0.9884	0.00170	9	0.9883	0.00230
9.35	0.9934	0.00180	9.15	0.9919	0.00210	9.05	0.9946	0.00210
9.4	1.0004	0.00280	9.2	0.9965	0.00220	9.1	1.0013	0.00210
9.45	1.0023	0.00230	9.25	0.9997	0.00180	9.15	1.0032	0.00180
9.5	1.0054	0.00210	9.3	1.0023	0.00210	9.2	1.0117	0.00190
9.55	1.0136	0.00230	9.35	1.0066	0.00230	9.25	1.0130	0.00200
9.6	1.0142	0.00230	9.4	1.0102	0.00170	9.3	1.0197	0.00220
9.65	1.0199	0.00220	9.45	1.0174	0.00210	9.35	1.0220	0.00190
9.7	1.0243	0.00180	9.5	1.0213	0.00240	9.4	1.0296	0.00180
			9.55	1.0249	0.00220			
			9.6	1.0356	0.00260			

9			10			15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.00	0.9194	0.00190	7.80	0.9250	0.00190	6.70	0.9245	0.00210
8.05	0.9265	0.00190	7.85	0.9311	0.00220	6.75	0.9284	0.00180
8.1	0.9312	0.00230	7.9	0.9392	0.00190	6.8	0.9332	0.00170
8.15	0.9375	0.00200	7.95	0.9423	0.00190	6.85	0.9425	0.00160
8.2	0.9393	0.00220	8	0.9437	0.00170	6.9	0.9432	0.00230
8.25	0.9458	0.00210	8.05	0.9591	0.00190	6.95	0.9527	0.00190
8.3	0.9508	0.00210	8.1	0.9551	0.00220	7	0.9604	0.00190
8.35	0.9555	0.00220	8.15	0.9674	0.00230	7.05	0.9624	0.00200
8.4	0.9609	0.00260	8.2	0.9692	0.00200	7.1	0.9721	0.00180
8.45	0.9668	0.00190	8.25	0.9743	0.00180	7.15	0.9757	0.00200
8.5	0.9667	0.00160	8.3	0.9752	0.00200	7.2	0.9838	0.00210
8.55	0.9760	0.00200	8.35	0.9818	0.00260	7.25	0.9899	0.00170
8.6	0.9818	0.00180	8.4	0.9885	0.00180	7.3	0.9947	0.00220
8.65	0.9856	0.00220	8.45	0.9932	0.00220	7.35	0.9991	0.00180
8.7	0.9897	0.00180	8.5	0.9969	0.00200	7.4	1.0038	0.00220
8.75	1.0000	0.00180	8.55	1.0055	0.00360	7.45	1.0104	0.00220
8.8	0.9952	0.00230	8.6	1.0087	0.00200	7.5	1.0144	0.00200
8.85	1.0088	0.00290	8.65	1.0136	0.00190	7.55	1.0209	0.00210
8.9	1.0093	0.00200	8.7	1.0194	0.00170	7.6	1.0294	0.00170
8.95	1.0167	0.00190	8.75	1.0219	0.00190			
9	1.0157	0.00200	8.8	1.0245	0.00240			
9.05	1.0229	0.00180						
9.1	1.0253	0.00190						

18.9		
Diameter (Inches)	K _{eff}	Sigma
6.00	0.9207	0.00150
6.05	0.9275	0.00150
6.1	0.9353	0.00210
6.15	0.9459	0.00190
6.2	0.9448	0.00170
6.25	0.9541	0.00220
6.3	0.9616	0.00220
6.35	0.9710	0.00200
6.4	0.9707	0.00190
6.45	0.9810	0.00180
6.5	0.9860	0.00180
6.55	0.9966	0.00170
6.6	1.0010	0.00210
6.65	1.0079	0.00210
6.7	1.0083	0.00180
6.75	1.0189	0.00200
6.8	1.0220	0.00170

Case ID: u_sph_100_01ref

Material: Uranium

Geometry: Sphere

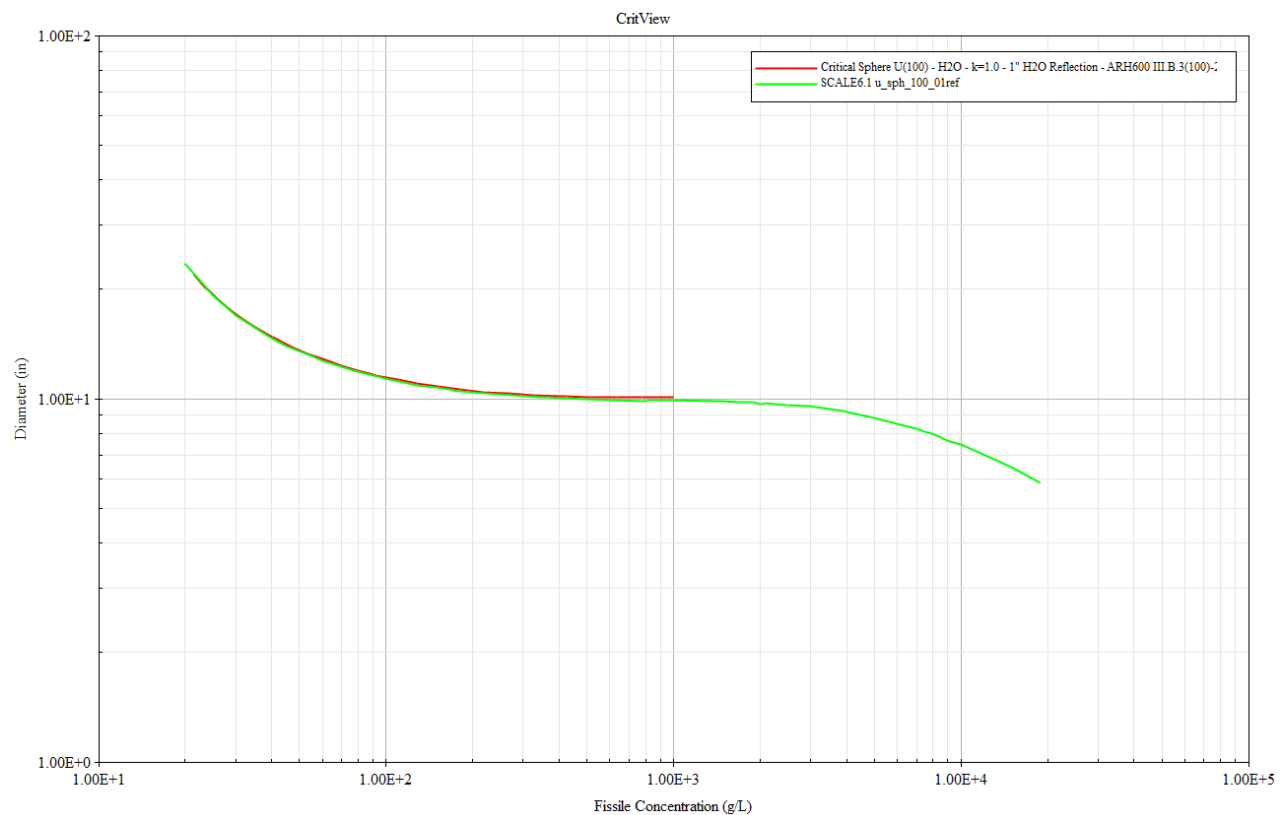
Isotopics: 100% ^{235}U

Reflector: 1" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.020	19.400	24.400	0.200	23.5681
0.025	16.400	19.800	0.100	19.1600
0.030	14.700	17.400	0.100	16.9871
0.040	13.000	15.100	0.100	14.6915
0.045	12.400	14.400	0.100	13.9961
0.050	12.000	13.800	0.100	13.5429
0.055	11.700	13.400	0.050	13.1136
0.060	11.400	13.100	0.050	12.6980
0.065	11.100	12.800	0.050	12.4473
0.070	11.000	12.500	0.050	12.2528
0.080	10.700	12.100	0.050	11.8843
0.100	10.200	11.700	0.050	11.3662
0.130	9.800	11.200	0.050	10.8708
0.150	9.700	11.000	0.050	10.7565
0.170	9.500	10.900	0.050	10.5746
0.200	9.400	10.700	0.050	10.4263
0.350	9.100	10.300	0.050	10.0681
0.500	9.000	10.200	0.050	9.9657
0.800	8.900	10.200	0.050	9.8458
1.000	8.900	10.200	0.050	9.8868
1.500	8.800	10.100	0.050	9.8462
1.700	8.800	10.100	0.050	9.7785
1.900	8.700	10.100	0.050	9.7845
2.000	8.700	10.000	0.050	9.6888
2.100	8.700	10.000	0.050	9.7464
2.500	8.600	10.000	0.050	9.6263
3.000	8.500	9.800	0.050	9.5326
4.000	8.200	9.500	0.050	9.2181
5.000	8.000	9.200	0.050	8.8760
6.000	7.700	8.900	0.050	8.5333
7.000	7.400	8.600	0.050	8.2674
7.500	7.300	8.400	0.050	8.1360
8.000	7.200	8.300	0.050	7.9989
9.000	6.900	8.000	0.050	7.6844
10.000	6.700	7.800	0.050	7.4690
15.000	5.800	6.700	0.050	6.4800
18.900	5.200	6.100	0.050	5.8505

WORM and SCALE Input File

```

'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.2.1.1.2-1. Critical Dimensions for 100% 235U Sphere - 1 Inch of Water Reflection
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
0.02,0.025,0.03,0.04,0.045,0.05,0.055,0.06,0.065,0.07,0.08,0.1,0.13,0.15,0.17,0.2,0.35,0.5,0.8,1,
1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Critical Density = <critdens = 18.9 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
19.4,16.4,14.7,13,12.4,12,11.7,11.4,11.1,11,10.7,10.2,9.8,9.7,9.5,9.4,9.1,9,8.9,8.9,8.8,8.8,8.7,8
.7,8.7,8.6,8.5,8.2,8,7.7,7.4,7.3,7.2,6.9,6.7,5.8,5.2> in
#Ending Diameter = <@enddia =
24.4,19.8,17.4,15.1,14.4,13.8,13.4,13.1,12.8,12.5,12.1,11.7,11.2,11,10.9,10.7,10.3,10.2,10.2,10.2
10.1,10.1,10.1,10,10,10,9.8,9.5,9.2,8.9,8.6,8.4,8.3,8,7.8,6.7,6.1> in
#Delta = <@delta =
0.2,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.0
5,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05> in
,
'Reflector Thickness {{refthick = 1}}
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
template
v7-238
read composition
  u          1 den=<critconc> 1 300
                                92235 100
                                92238 0   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Global Unit 1"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(refdia*in)/2}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
  return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 u_sph_100_01ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: sphere
modmat: H2O
critmat: uranium
isomat: U235 1.0
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.020 23.5681
0.025 19.1600
0.030 16.9871
0.040 14.6915
0.045 13.9961
0.050 13.5429
0.055 13.1136
0.060 12.6980
0.065 12.4473
0.070 12.2528
0.080 11.8843
0.100 11.3662
0.130 10.8708
0.150 10.7565
0.170 10.5746
0.200 10.4263
0.350 10.0681
0.500 9.9657
0.800 9.8458
1.000 9.8868
1.500 9.8462
1.700 9.7785
1.900 9.7845
2.000 9.6888
2.100 9.7464
2.500 9.6263
3.000 9.5326
4.000 9.2181
5.000 8.8760
6.000 8.5333
7.000 8.2674
7.500 8.1360
8.000 7.9989
9.000 7.6844
10.000 7.4690
15.000 6.4800
18.900 5.8505
```

0.02			0.025			0.03		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
19.40	0.9225	0.00180	16.40	0.9191	0.00170	14.70	0.9161	0.00190
19.6	0.9265	0.00190	16.5	0.9226	0.00190	14.8	0.9201	0.00180
19.8	0.9285	0.00150	16.6	0.9247	0.00170	14.9	0.9252	0.00160
20	0.9354	0.00180	16.7	0.9263	0.00190	15	0.9264	0.00240
20.2	0.9402	0.00160	16.8	0.9324	0.00200	15.1	0.9321	0.00240
20.4	0.9430	0.00150	16.9	0.9344	0.00170	15.2	0.9344	0.00200
20.6	0.9464	0.00210	17	0.9406	0.00180	15.3	0.9394	0.00160
20.8	0.9548	0.00180	17.1	0.9425	0.00190	15.4	0.9436	0.00190
21	0.9560	0.00190	17.2	0.9448	0.00160	15.5	0.9498	0.00190
21.2	0.9590	0.00210	17.3	0.9477	0.00210	15.6	0.9486	0.00190
21.4	0.9621	0.00160	17.4	0.9523	0.00190	15.7	0.9572	0.00190
21.6	0.9684	0.00170	17.5	0.9544	0.00190	15.8	0.9588	0.00240
21.8	0.9707	0.00180	17.6	0.9598	0.00210	15.9	0.9660	0.00180
22	0.9730	0.00190	17.7	0.9588	0.00170	16	0.9669	0.00190
22.2	0.9774	0.00180	17.8	0.9638	0.00150	16.1	0.9710	0.00170
22.4	0.9832	0.00140	17.9	0.9682	0.00190	16.2	0.9719	0.00190
22.6	0.9850	0.00150	18	0.9653	0.00160	16.3	0.9803	0.00230
22.8	0.9913	0.00170	18.1	0.9701	0.00190	16.4	0.9811	0.00180
23	0.9923	0.00160	18.2	0.9772	0.00180	16.5	0.9825	0.00210
23.2	0.9950	0.00170	18.3	0.9778	0.00160	16.6	0.9881	0.00160
23.4	0.9942	0.00120	18.4	0.9823	0.00170	16.7	0.9908	0.00210
23.6	1.0011	0.00140	18.5	0.9824	0.00150	16.8	0.9980	0.00190
23.8	1.0052	0.00190	18.6	0.9858	0.00160	16.9	0.9946	0.00190
24	1.0030	0.00130	18.7	0.9887	0.00220	17	1.0008	0.00170
24.2	1.0119	0.00190	18.8	0.9914	0.00190	17.1	1.0074	0.00160
24.4	1.0136	0.00210	18.9	0.9930	0.00170	17.2	1.0079	0.00170
			19	0.9950	0.00150	17.3	1.0095	0.00200
			19.1	0.9982	0.00170	17.4	1.0146	0.00170
			19.2	1.0012	0.00170			
			19.3	1.0033	0.00180			
			19.4	1.0050	0.00160			
			19.5	1.0093	0.00200			
			19.6	1.0095	0.00200			
			19.7	1.0119	0.00170			
			19.8	1.0161	0.00190			

0.04			0.045			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.00	0.9202	0.00200	12.40	0.9154	0.00240	12.00	0.9174	0.00250
13.1	0.9294	0.00220	12.5	0.9191	0.00190	12.1	0.9255	0.00210
13.2	0.9306	0.00200	12.6	0.9259	0.00230	12.2	0.9312	0.00190
13.3	0.9372	0.00180	12.7	0.9327	0.00170	12.3	0.9349	0.00240
13.4	0.9390	0.00190	12.8	0.9397	0.00220	12.4	0.9401	0.00250
13.5	0.9434	0.00190	12.9	0.9471	0.00210	12.5	0.9460	0.00190
13.6	0.9459	0.00230	13	0.9491	0.00230	12.6	0.9535	0.00220
13.7	0.9541	0.00240	13.1	0.9554	0.00200	12.7	0.9575	0.00230
13.8	0.9596	0.00180	13.2	0.9596	0.00210	12.8	0.9629	0.00230
13.9	0.9611	0.00200	13.3	0.9631	0.00200	12.9	0.9705	0.00240
14	0.9657	0.00190	13.4	0.9708	0.00200	13	0.9736	0.00240
14.1	0.9733	0.00190	13.5	0.9754	0.00230	13.1	0.9806	0.00220
14.2	0.9804	0.00190	13.6	0.9785	0.00260	13.2	0.9856	0.00220
14.3	0.9830	0.00220	13.7	0.9873	0.00240	13.3	0.9920	0.00300
14.4	0.9888	0.00240	13.8	0.9933	0.00210	13.4	0.9939	0.00240
14.5	0.9882	0.00270	13.9	0.9901	0.00210	13.5	0.9979	0.00210
14.6	0.9935	0.00210	14	1.0004	0.00210	13.6	1.0028	0.00230
14.7	1.0006	0.00230	14.1	1.0046	0.00190	13.7	1.0047	0.00210
14.8	1.0022	0.00200	14.2	1.0076	0.00170	13.8	1.0170	0.00230
14.9	1.0075	0.00200	14.3	1.0156	0.00280			
15	1.0123	0.00200	14.4	1.0183	0.00230			
15.1	1.0201	0.00240						

0.055			0.06			0.065		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.70	0.9188	0.00210	11.40	0.9188	0.00220	11.10	0.9153	0.00240
11.75	0.9207	0.00180	11.45	0.9201	0.00240	11.15	0.9158	0.00250
11.8	0.9242	0.00210	11.5	0.9252	0.00250	11.2	0.9139	0.00220
11.85	0.9308	0.00210	11.55	0.9284	0.00230	11.25	0.9246	0.00210
11.9	0.9300	0.00230	11.6	0.9287	0.00210	11.3	0.9262	0.00210
11.95	0.9413	0.00290	11.65	0.9360	0.00200	11.35	0.9295	0.00190
12	0.9352	0.00230	11.7	0.9355	0.00250	11.4	0.9421	0.00220
12.05	0.9428	0.00190	11.75	0.9388	0.00220	11.45	0.9386	0.00220
12.1	0.9405	0.00190	11.8	0.9407	0.00210	11.5	0.9400	0.00190
12.15	0.9469	0.00220	11.85	0.9474	0.00220	11.55	0.9446	0.00270
12.2	0.9511	0.00200	11.9	0.9504	0.00250	11.6	0.9433	0.00220
12.25	0.9545	0.00200	11.95	0.9506	0.00210	11.65	0.9514	0.00210
12.3	0.9556	0.00180	12	0.9584	0.00250	11.7	0.9559	0.00250
12.35	0.9605	0.00310	12.05	0.9575	0.00220	11.75	0.9556	0.00220
12.4	0.9647	0.00190	12.1	0.9634	0.00240	11.8	0.9620	0.00210
12.45	0.9626	0.00210	12.15	0.9634	0.00210	11.85	0.9651	0.00230
12.5	0.9689	0.00230	12.2	0.9702	0.00220	11.9	0.9659	0.00260
12.55	0.9692	0.00210	12.25	0.9730	0.00250	11.95	0.9667	0.00250
12.6	0.9743	0.00200	12.3	0.9704	0.00210	12	0.9694	0.00240
12.65	0.9746	0.00260	12.35	0.9768	0.00240	12.05	0.9776	0.00220
12.7	0.9772	0.00240	12.4	0.9822	0.00210	12.1	0.9786	0.00210
12.75	0.9844	0.00200	12.45	0.9853	0.00200	12.15	0.9827	0.00210
12.8	0.9859	0.00220	12.5	0.9865	0.00190	12.2	0.9872	0.00260
12.85	0.9901	0.00190	12.55	0.9902	0.00260	12.25	0.9897	0.00190
12.9	0.9865	0.00210	12.6	0.9899	0.00260	12.3	0.9910	0.00260
12.95	0.9917	0.00210	12.65	1.0008	0.00220	12.35	0.9943	0.00270
13	0.9934	0.00250	12.7	0.9950	0.00230	12.4	0.9965	0.00190
13.05	0.9959	0.00240	12.75	1.0021	0.00240	12.45	1.0002	0.00220
13.1	0.9965	0.00220	12.8	0.9983	0.00270	12.5	1.0024	0.00230
13.15	1.0094	0.00250	12.85	1.0059	0.00260	12.55	1.0049	0.00240
13.2	1.0097	0.00200	12.9	1.0106	0.00270	12.6	1.0082	0.00220
13.25	1.0095	0.00210	12.95	1.0134	0.00230	12.65	1.0152	0.00250
13.3	1.0127	0.00250	13	1.0163	0.00200	12.7	1.0117	0.00250
13.35	1.0113	0.00230	13.05	1.0176	0.00210	12.75	1.0156	0.00270
13.4	1.0181	0.00200	13.1	1.0203	0.00210	12.8	1.0187	0.00210

0.07			0.08			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.00	0.9190	0.00210	10.70	0.9206	0.00210	10.20	0.9141	0.00270
11.05	0.9249	0.00260	10.75	0.9253	0.00260	10.25	0.9157	0.00270
11.1	0.9264	0.00200	10.8	0.9263	0.00230	10.3	0.9237	0.00240
11.15	0.9299	0.00250	10.85	0.9279	0.00280	10.35	0.9258	0.00220
11.2	0.9322	0.00200	10.9	0.9345	0.00230	10.4	0.9299	0.00220
11.25	0.9351	0.00230	10.95	0.9337	0.00200	10.45	0.9367	0.00230
11.3	0.9412	0.00210	11	0.9447	0.00210	10.5	0.9350	0.00230
11.35	0.9458	0.00240	11.05	0.9432	0.00230	10.55	0.9391	0.00250
11.4	0.9483	0.00210	11.1	0.9475	0.00250	10.6	0.9494	0.00220
11.45	0.9506	0.00200	11.15	0.9509	0.00230	10.65	0.9467	0.00240
11.5	0.9555	0.00240	11.2	0.9570	0.00220	10.7	0.9522	0.00240
11.55	0.9539	0.00210	11.25	0.9598	0.00200	10.75	0.9558	0.00260
11.6	0.9620	0.00250	11.3	0.9579	0.00240	10.8	0.9596	0.00210
11.65	0.9577	0.00290	11.35	0.9668	0.00220	10.85	0.9642	0.00280
11.7	0.9670	0.00200	11.4	0.9716	0.00250	10.9	0.9711	0.00220
11.75	0.9678	0.00220	11.45	0.9715	0.00300	10.95	0.9687	0.00260
11.8	0.9778	0.00240	11.5	0.9781	0.00220	11	0.9737	0.00240
11.85	0.9742	0.00250	11.55	0.9780	0.00260	11.05	0.9733	0.00230
11.9	0.9786	0.00220	11.6	0.9807	0.00210	11.1	0.9767	0.00210
11.95	0.9786	0.00230	11.65	0.9795	0.00200	11.15	0.9864	0.00220
12	0.9896	0.00210	11.7	0.9888	0.00260	11.2	0.9903	0.00230
12.05	0.9878	0.00220	11.75	0.9946	0.00220	11.25	0.9930	0.00240
12.1	0.9911	0.00230	11.8	0.9957	0.00240	11.3	0.9963	0.00280
12.15	0.9925	0.00200	11.85	1.0035	0.00220	11.35	0.9964	0.00240
12.2	0.9987	0.00270	11.9	0.9984	0.00260	11.4	1.0075	0.00340
12.25	0.9996	0.00230	11.95	1.0047	0.00220	11.45	1.0062	0.00220
12.3	1.0067	0.00240	12	1.0109	0.00320	11.5	1.0097	0.00280
12.35	1.0086	0.00270	12.05	1.0122	0.00240	11.55	1.0164	0.00230
12.4	1.0107	0.00240	12.1	1.0147	0.00250	11.6	1.0180	0.00240
12.45	1.0144	0.00240				11.65	1.0264	0.00210
12.5	1.0133	0.00280				11.7	1.0185	0.00220

0.13			0.15			0.17		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.80	0.9152	0.00240	9.70	0.9175	0.00220	9.50	0.9140	0.00240
9.85	0.9196	0.00230	9.75	0.9211	0.00190	9.55	0.9168	0.00330
9.9	0.9206	0.00260	9.8	0.9243	0.00210	9.6	0.9224	0.00270
9.95	0.9241	0.00220	9.85	0.9311	0.00250	9.65	0.9238	0.00300
10	0.9304	0.00300	9.9	0.9378	0.00210	9.7	0.9321	0.00240
10.05	0.9337	0.00350	9.95	0.9382	0.00280	9.75	0.9326	0.00300
10.1	0.9359	0.00290	10	0.9428	0.00240	9.8	0.9352	0.00390
10.15	0.9386	0.00230	10.05	0.9471	0.00220	9.85	0.9448	0.00250
10.2	0.9462	0.00260	10.1	0.9511	0.00250	9.9	0.9415	0.00240
10.25	0.9516	0.00240	10.15	0.9557	0.00260	9.95	0.9506	0.00280
10.3	0.9555	0.00260	10.2	0.9587	0.00290	10	0.9555	0.00230
10.35	0.9548	0.00220	10.25	0.9643	0.00230	10.05	0.9588	0.00210
10.4	0.9588	0.00240	10.3	0.9669	0.00240	10.1	0.9630	0.00230
10.45	0.9627	0.00260	10.35	0.9731	0.00230	10.15	0.9644	0.00330
10.5	0.9692	0.00260	10.4	0.9777	0.00240	10.2	0.9724	0.00230
10.55	0.9747	0.00200	10.45	0.9809	0.00250	10.25	0.9783	0.00240
10.6	0.9787	0.00230	10.5	0.9837	0.00220	10.3	0.9804	0.00280
10.65	0.9793	0.00230	10.55	0.9887	0.00260	10.35	0.9838	0.00290
10.7	0.9871	0.00280	10.6	0.9918	0.00270	10.4	0.9900	0.00270
10.75	0.9907	0.00230	10.65	0.9934	0.00340	10.45	0.9910	0.00240
10.8	0.9887	0.00260	10.7	0.9968	0.00240	10.5	0.9944	0.00220
10.85	0.9975	0.00230	10.75	0.9994	0.00240	10.55	0.9968	0.00230
10.9	1.0035	0.00270	10.8	1.0040	0.00250	10.6	1.0033	0.00240
10.95	1.0012	0.00230	10.85	1.0080	0.00250	10.65	1.0034	0.00230
11	1.0102	0.00240	10.9	1.0127	0.00220	10.7	1.0074	0.00220
11.05	1.0095	0.00250	10.95	1.0207	0.00220	10.75	1.0127	0.00270
11.1	1.0129	0.00250	11	1.0193	0.00230	10.8	1.0138	0.00270
11.15	1.0171	0.00250				10.85	1.0210	0.00250
11.2	1.0191	0.00190				10.9	1.0266	0.00230

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.40	0.9155	0.00260	9.10	0.9163	0.00240	9.00	0.9193	0.00210
9.45	0.9198	0.00280	9.15	0.9231	0.00230	9.05	0.9247	0.00350
9.5	0.9219	0.00230	9.2	0.9283	0.00240	9.1	0.9272	0.00250
9.55	0.9317	0.00210	9.25	0.9322	0.00260	9.15	0.9339	0.00230
9.6	0.9323	0.00250	9.3	0.9318	0.00260	9.2	0.9378	0.00240
9.65	0.9387	0.00230	9.35	0.9456	0.00260	9.25	0.9419	0.00280
9.7	0.9418	0.00240	9.4	0.9435	0.00250	9.3	0.9484	0.00300
9.75	0.9452	0.00260	9.45	0.9492	0.00280	9.35	0.9468	0.00350
9.8	0.9515	0.00270	9.5	0.9545	0.00240	9.4	0.9577	0.00260
9.85	0.9526	0.00250	9.55	0.9549	0.00240	9.45	0.9600	0.00290
9.9	0.9548	0.00250	9.6	0.9620	0.00280	9.5	0.9625	0.00350
9.95	0.9639	0.00290	9.65	0.9641	0.00280	9.55	0.9709	0.00220
10	0.9688	0.00240	9.7	0.9651	0.00240	9.6	0.9710	0.00260
10.05	0.9707	0.00220	9.75	0.9736	0.00230	9.65	0.9734	0.00250
10.1	0.9721	0.00230	9.8	0.9800	0.00250	9.7	0.9780	0.00240
10.15	0.9779	0.00270	9.85	0.9807	0.00290	9.75	0.9820	0.00230
10.2	0.9821	0.00230	9.9	0.9857	0.00280	9.8	0.9842	0.00240
10.25	0.9920	0.00260	9.95	0.9946	0.00260	9.85	0.9947	0.00310
10.3	0.9928	0.00240	10	0.9903	0.00220	9.9	0.9962	0.00250
10.35	0.9948	0.00250	10.05	0.9970	0.00250	9.95	0.9978	0.00320
10.4	0.9969	0.00280	10.1	1.0053	0.00260	10	1.0048	0.00220
10.45	1.0028	0.00260	10.15	1.0093	0.00280	10.05	1.0059	0.00260
10.5	1.0043	0.00270	10.2	1.0069	0.00250	10.1	1.0144	0.00230
10.55	1.0114	0.00250	10.25	1.0169	0.00230	10.15	1.0136	0.00270
10.6	1.0138	0.00250	10.3	1.0189	0.00300	10.2	1.0168	0.00240
10.65	1.0220	0.00260						
10.7	1.0200	0.00220						

0.8			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.90	0.9204	0.00280	8.90	0.9192	0.00240	8.80	0.9199	0.00250
8.95	0.9242	0.00290	8.95	0.9217	0.00210	8.85	0.9222	0.00220
9.00	0.9251	0.00280	9.00	0.9310	0.00260	8.9	0.9249	0.00250
9.05	0.9329	0.00210	9.05	0.9333	0.00260	8.95	0.9314	0.00220
9.10	0.9382	0.00270	9.10	0.9370	0.00270	9	0.9361	0.00270
9.15	0.9388	0.00230	9.15	0.9412	0.00220	9.05	0.9405	0.00220
9.20	0.9400	0.00270	9.20	0.9475	0.00270	9.1	0.9431	0.00320
9.25	0.9516	0.00230	9.25	0.9510	0.00220	9.15	0.9479	0.00270
9.30	0.9509	0.00270	9.30	0.9507	0.00280	9.2	0.9518	0.00250
9.35	0.9600	0.00260	9.35	0.9615	0.00240	9.25	0.9553	0.00220
9.40	0.9647	0.00240	9.40	0.9625	0.00240	9.3	0.9600	0.00220
9.45	0.9644	0.00280	9.45	0.9709	0.00240	9.35	0.9629	0.00230
9.50	0.9735	0.00230	9.50	0.9733	0.00240	9.4	0.9646	0.00250
9.55	0.9738	0.00270	9.55	0.9764	0.00250	9.45	0.9723	0.00230
9.60	0.9786	0.00210	9.60	0.9835	0.00270	9.5	0.9802	0.00210
9.65	0.9769	0.00260	9.65	0.9842	0.00220	9.55	0.9787	0.00280
9.70	0.9838	0.00250	9.70	0.9849	0.00220	9.6	0.9839	0.00220
9.75	0.9898	0.00230	9.75	0.9930	0.00220	9.65	0.9880	0.00210
9.80	0.9924	0.00260	9.80	0.9978	0.00280	9.7	0.9916	0.00210
9.85	1.0007	0.00270	9.85	0.9961	0.00230	9.75	0.9953	0.00270
9.90	1.0024	0.00250	9.90	1.0014	0.00210	9.8	0.9988	0.00210
9.95	1.0075	0.00240	9.95	1.0044	0.00270	9.85	1.0001	0.00250
10.00	1.0090	0.00220	10.00	1.0063	0.00350	9.9	1.0080	0.00240
10.05	1.0134	0.00250	10.05	1.0155	0.00250	9.95	1.0138	0.00230
10.10	1.0138	0.00410	10.10	1.0177	0.00270	10	1.0097	0.00220
10.15	1.0321	0.00300	10.15	1.0231	0.00260	10.05	1.0165	0.00240
10.20	1.0291	0.00230	10.20	1.0257	0.00230	10.1	1.0195	0.00240

1.7			1.9			2		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.80	0.9197	0.00240	8.70	0.9174	0.00200	8.70	0.9162	0.00220
8.85	0.9257	0.00260	8.75	0.9171	0.00220	8.75	0.9258	0.00220
8.90	0.9289	0.00220	8.80	0.9237	0.00220	8.8	0.9243	0.00200
8.95	0.9303	0.00200	8.85	0.9281	0.00220	8.85	0.9298	0.00260
9.00	0.9349	0.00260	8.90	0.9335	0.00220	8.9	0.9363	0.00220
9.05	0.9408	0.00230	8.95	0.9388	0.00240	8.95	0.9385	0.00210
9.10	0.9428	0.00290	9.00	0.9417	0.00240	9	0.9429	0.00280
9.15	0.9501	0.00230	9.05	0.9441	0.00270	9.05	0.9533	0.00260
9.20	0.9518	0.00210	9.10	0.9470	0.00200	9.1	0.9525	0.00220
9.25	0.9569	0.00250	9.15	0.9456	0.00280	9.15	0.9516	0.00200
9.30	0.9602	0.00200	9.20	0.9606	0.00210	9.2	0.9587	0.00240
9.35	0.9658	0.00220	9.25	0.9594	0.00260	9.25	0.9574	0.00210
9.40	0.9672	0.00250	9.30	0.9632	0.00260	9.3	0.9672	0.00200
9.45	0.9739	0.00230	9.35	0.9681	0.00190	9.35	0.9725	0.00210
9.50	0.9752	0.00260	9.40	0.9715	0.00250	9.4	0.9723	0.00220
9.55	0.9785	0.00250	9.45	0.9777	0.00210	9.45	0.9810	0.00260
9.60	0.9883	0.00220	9.50	0.9799	0.00220	9.5	0.9791	0.00220
9.65	0.9847	0.00270	9.55	0.9849	0.00230	9.55	0.9875	0.00260
9.70	0.9937	0.00290	9.60	0.9863	0.00190	9.6	0.9855	0.00230
9.75	0.9935	0.00210	9.65	0.9940	0.00210	9.65	0.9969	0.00240
9.80	1.0049	0.00240	9.70	0.9945	0.00250	9.7	1.0009	0.00250
9.85	1.0072	0.00230	9.75	0.9960	0.00220	9.75	1.0006	0.00210
9.90	1.0106	0.00220	9.80	1.0018	0.00200	9.8	1.0046	0.00200
9.95	1.0142	0.00220	9.85	1.0060	0.00240	9.85	1.0099	0.00240
10.00	1.0135	0.00240	9.90	1.0179	0.00270	9.9	1.0106	0.00220
10.05	1.0156	0.00220	9.95	1.0153	0.00230	9.95	1.0130	0.00270
10.10	1.0204	0.00220	10.00	1.0207	0.00230	10	1.0200	0.00230
			10.05	1.0198	0.00220			

2.1			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.70	0.9218	0.00210	8.60	0.9165	0.00260	8.50	0.9244	0.00210
8.75	0.9222	0.00260	8.65	0.9205	0.00240	8.55	0.9268	0.00200
8.8	0.9312	0.00230	8.7	0.9271	0.00230	8.6	0.9254	0.00200
8.85	0.9329	0.00210	8.75	0.9322	0.00220	8.65	0.9356	0.00300
8.9	0.9350	0.00240	8.8	0.9342	0.00220	8.7	0.9378	0.00200
8.95	0.9398	0.00200	8.85	0.9401	0.00220	8.75	0.9436	0.00250
9	0.9436	0.00240	8.9	0.9454	0.00230	8.8	0.9469	0.00240
9.05	0.9441	0.00220	8.95	0.9474	0.00270	8.85	0.9520	0.00260
9.1	0.9512	0.00180	9	0.9510	0.00280	8.9	0.9563	0.00200
9.15	0.9570	0.00270	9.05	0.9523	0.00210	8.95	0.9625	0.00240
9.2	0.9593	0.00230	9.1	0.9563	0.00230	9	0.9622	0.00240
9.25	0.9640	0.00220	9.15	0.9645	0.00220	9.05	0.9661	0.00190
9.3	0.9632	0.00200	9.2	0.9675	0.00210	9.1	0.9722	0.00200
9.35	0.9704	0.00240	9.25	0.9680	0.00220	9.15	0.9692	0.00220
9.4	0.9764	0.00280	9.3	0.9721	0.00280	9.2	0.9763	0.00200
9.45	0.9812	0.00210	9.35	0.9773	0.00230	9.25	0.9790	0.00240
9.5	0.9820	0.00300	9.4	0.9818	0.00210	9.3	0.9844	0.00230
9.55	0.9868	0.00260	9.45	0.9867	0.00200	9.35	0.9920	0.00230
9.6	0.9891	0.00230	9.5	0.9915	0.00230	9.4	0.9931	0.00230
9.65	0.9923	0.00310	9.55	0.9902	0.00280	9.45	0.9960	0.00250
9.7	0.9974	0.00220	9.6	0.9958	0.00210	9.5	1.0015	0.00270
9.75	1.0002	0.00280	9.65	1.0038	0.00220	9.55	0.9992	0.00260
9.8	1.0097	0.00190	9.7	1.0086	0.00210	9.6	1.0060	0.00220
9.85	1.0095	0.00240	9.75	1.0101	0.00210	9.65	1.0127	0.00220
9.9	1.0104	0.00250	9.8	1.0127	0.00220	9.7	1.0138	0.00250
9.95	1.0158	0.00230	9.85	1.0151	0.00240	9.75	1.0206	0.00250
10	1.0199	0.00250	9.9	1.0202	0.00190	9.8	1.0195	0.00230
			9.95	1.0277	0.00280			
			10	1.0222	0.00240			

4			5			6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.20	0.9172	0.00210	8.00	0.9227	0.00200	7.70	0.9196	0.00210
8.25	0.9205	0.00220	8.05	0.9300	0.00180	7.75	0.9254	0.00190
8.3	0.9243	0.00190	8.1	0.9334	0.00200	7.8	0.9271	0.00180
8.35	0.9326	0.00280	8.15	0.9381	0.00240	7.85	0.9370	0.00260
8.4	0.9376	0.00200	8.2	0.9454	0.00200	7.9	0.9426	0.00220
8.45	0.9364	0.00220	8.25	0.9480	0.00230	7.95	0.9465	0.00190
8.5	0.9473	0.00200	8.3	0.9529	0.00240	8	0.9495	0.00220
8.55	0.9469	0.00200	8.35	0.9557	0.00190	8.05	0.9548	0.00170
8.6	0.9472	0.00230	8.4	0.9553	0.00200	8.1	0.9601	0.00190
8.65	0.9586	0.00200	8.45	0.9614	0.00200	8.15	0.9647	0.00190
8.7	0.9592	0.00210	8.5	0.9703	0.00220	8.2	0.9697	0.00200
8.75	0.9661	0.00220	8.55	0.9728	0.00240	8.25	0.9742	0.00190
8.8	0.9715	0.00200	8.6	0.9781	0.00220	8.3	0.9776	0.00220
8.85	0.9739	0.00200	8.65	0.9783	0.00210	8.35	0.9830	0.00210
8.9	0.9762	0.00200	8.7	0.9874	0.00190	8.4	0.9851	0.00190
8.95	0.9762	0.00200	8.75	0.9907	0.00190	8.45	0.9903	0.00210
9	0.9808	0.00220	8.8	0.9944	0.00230	8.5	0.9974	0.00200
9.05	0.9849	0.00230	8.85	0.9973	0.00210	8.55	1.0013	0.00180
9.1	0.9967	0.00200	8.9	1.0025	0.00220	8.6	1.0024	0.00230
9.15	0.9980	0.00240	8.95	1.0058	0.00210	8.65	1.0085	0.00280
9.2	0.9987	0.00350	9	1.0088	0.00260	8.7	1.0097	0.00220
9.25	1.0023	0.00250	9.05	1.0118	0.00250	8.75	1.0138	0.00200
9.3	1.0041	0.00250	9.1	1.0182	0.00230	8.8	1.0161	0.00280
9.35	1.0117	0.00210	9.15	1.0235	0.00200	8.85	1.0221	0.00210
9.4	1.0160	0.00190	9.2	1.0248	0.00190	8.9	1.0307	0.00210
9.45	1.0208	0.00220						
9.5	1.0251	0.00180						

7			7.5			8		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.40	0.9147	0.00200	7.30	0.9219	0.00180	7.20	0.9266	0.00180
7.45	0.9221	0.00220	7.35	0.9247	0.00190	7.25	0.9275	0.00190
7.5	0.9308	0.00200	7.4	0.9310	0.00210	7.3	0.9348	0.00230
7.55	0.9364	0.00190	7.45	0.9388	0.00180	7.35	0.9351	0.00180
7.6	0.9376	0.00250	7.5	0.9411	0.00190	7.4	0.9464	0.00200
7.65	0.9454	0.00190	7.55	0.9432	0.00220	7.45	0.9506	0.00170
7.7	0.9477	0.00170	7.6	0.9536	0.00200	7.5	0.9524	0.00260
7.75	0.9501	0.00190	7.65	0.9538	0.00200	7.55	0.9610	0.00210
7.8	0.9655	0.00280	7.7	0.9606	0.00190	7.6	0.9630	0.00220
7.85	0.9632	0.00200	7.75	0.9630	0.00180	7.65	0.9664	0.00170
7.9	0.9634	0.00200	7.8	0.9730	0.00220	7.7	0.9787	0.00180
7.95	0.9724	0.00210	7.85	0.9765	0.00190	7.75	0.9754	0.00190
8	0.9722	0.00190	7.9	0.9798	0.00170	7.8	0.9849	0.00270
8.05	0.9813	0.00190	7.95	0.9823	0.00200	7.85	0.9852	0.00220
8.1	0.9853	0.00210	8	0.9893	0.00230	7.9	0.9917	0.00210
8.15	0.9879	0.00220	8.05	0.9911	0.00190	7.95	0.9957	0.00190
8.2	0.9899	0.00210	8.1	1.0018	0.00200	8	1.0001	0.00210
8.25	0.9953	0.00250	8.15	0.9993	0.00200	8.05	1.0070	0.00200
8.3	1.0088	0.00220	8.2	1.0087	0.00180	8.1	1.0113	0.00190
8.35	1.0080	0.00240	8.25	1.0087	0.00210	8.15	1.0173	0.00180
8.4	1.0119	0.00210	8.3	1.0129	0.00200	8.2	1.0211	0.00230
8.45	1.0155	0.00220	8.35	1.0178	0.00210	8.25	1.0210	0.00200
8.5	1.0166	0.00190	8.4	1.0249	0.00200	8.3	1.0255	0.00190
8.55	1.0255	0.00170						
8.6	1.0287	0.00220						

9			10			15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.90	0.9150	0.00180	6.70	0.9162	0.00210	5.80	0.9160	0.00200
6.95	0.9229	0.00200	6.75	0.9231	0.00190	5.85	0.9224	0.00240
7	0.9265	0.00220	6.8	0.9284	0.00190	5.9	0.9262	0.00190
7.05	0.9345	0.00220	6.85	0.9357	0.00230	5.95	0.9326	0.00230
7.1	0.9385	0.00240	6.9	0.9350	0.00190	6	0.9420	0.00180
7.15	0.9421	0.00190	6.95	0.9432	0.00280	6.05	0.9483	0.00190
7.2	0.9428	0.00190	7	0.9478	0.00180	6.1	0.9529	0.00220
7.25	0.9551	0.00180	7.05	0.9563	0.00210	6.15	0.9582	0.00170
7.3	0.9590	0.00200	7.1	0.9592	0.00250	6.2	0.9690	0.00180
7.35	0.9620	0.00170	7.15	0.9667	0.00190	6.25	0.9741	0.00190
7.4	0.9672	0.00210	7.2	0.9711	0.00180	6.3	0.9797	0.00250
7.45	0.9721	0.00170	7.25	0.9726	0.00180	6.35	0.9834	0.00210
7.5	0.9790	0.00190	7.3	0.9824	0.00180	6.4	0.9882	0.00200
7.55	0.9787	0.00210	7.35	0.9884	0.00190	6.45	0.9934	0.00170
7.6	0.9849	0.00190	7.4	0.9899	0.00170	6.5	1.0044	0.00230
7.65	0.9969	0.00200	7.45	0.9989	0.00210	6.55	1.0051	0.00240
7.7	1.0014	0.00260	7.5	1.0018	0.00230	6.6	1.0137	0.00190
7.75	1.0035	0.00210	7.55	1.0062	0.00230	6.65	1.0183	0.00210
7.8	1.0068	0.00220	7.6	1.0126	0.00240	6.7	1.0274	0.00170
7.85	1.0106	0.00190	7.65	1.0188	0.00200			
7.9	1.0138	0.00200	7.7	1.0224	0.00180			
7.95	1.0189	0.00180	7.75	1.0284	0.00200			
8	1.0300	0.00190	7.8	1.0329	0.00190			

18.9		
Diameter (Inches)	K _{eff}	Sigma
5.20	0.9124	0.00150
5.25	0.9186	0.00210
5.3	0.9276	0.00190
5.35	0.9313	0.00160
5.4	0.9413	0.00180
5.45	0.9472	0.00160
5.5	0.9557	0.00200
5.55	0.9618	0.00240
5.6	0.9671	0.00180
5.65	0.9710	0.00200
5.7	0.9788	0.00200
5.75	0.9885	0.00200
5.8	0.9957	0.00180
5.85	0.9999	0.00200
5.9	1.0096	0.00190
5.95	1.0155	0.00170
6	1.0233	0.00170
6.05	1.0245	0.00160
6.1	1.0311	0.00210

Case ID: u_sph_100_10ref

Material: Uranium

Geometry: Sphere

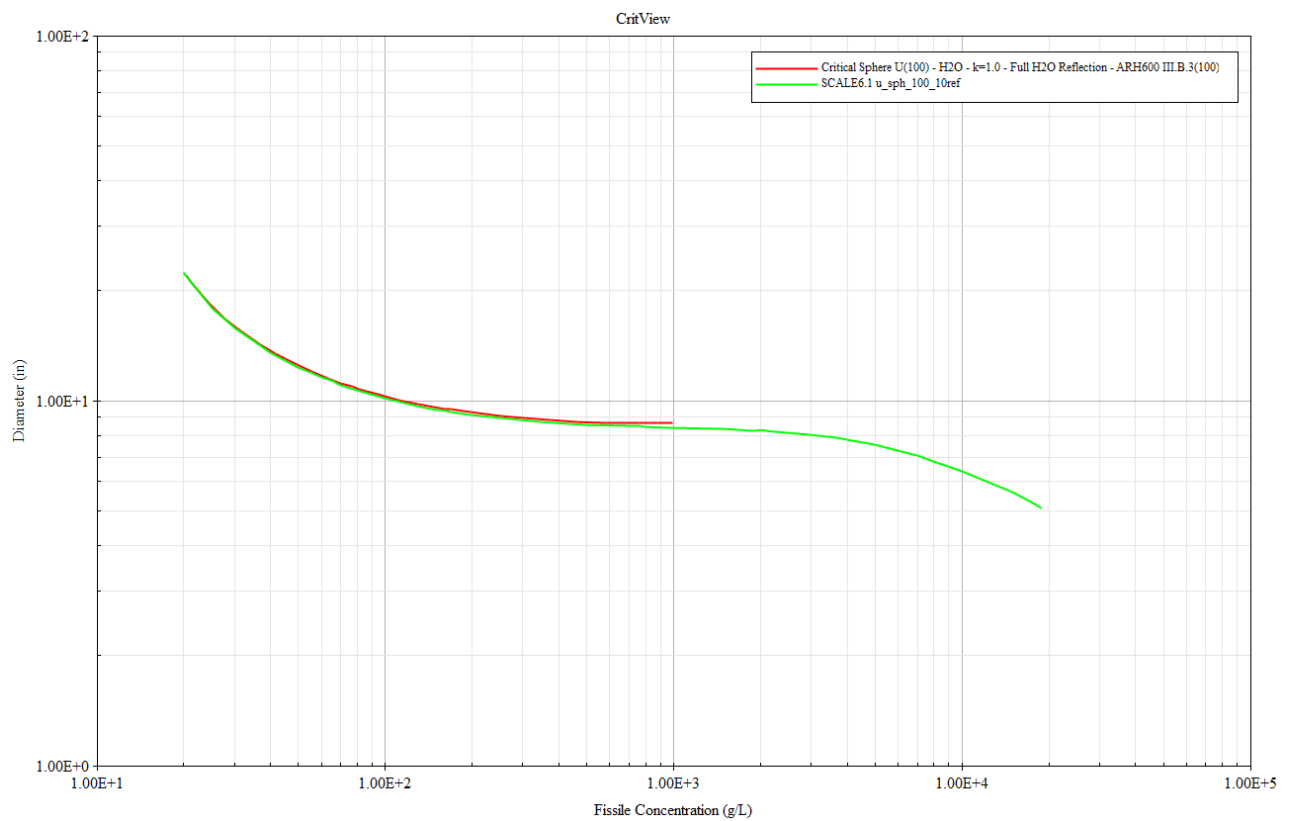
Isotopics: 100% ^{235}U

Reflector: 10" Water

Code: SCALE 6.1

Analyst: Alex

Date: 7/2021



Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.020	18.400	23.300	0.200	22.4400
0.025	15.300	18.700	0.100	17.9661
0.030	13.700	16.300	0.100	15.8304
0.040	11.900	13.900	0.100	13.5000
0.045	11.300	13.200	0.100	12.8403
0.050	10.900	12.700	0.100	12.3452
0.055	10.500	12.300	0.100	11.9314
0.060	10.300	11.900	0.050	11.5958
0.065	10.000	11.600	0.050	11.3500
0.070	9.800	11.400	0.050	11.0307
0.080	9.500	11.000	0.050	10.6836
0.100	9.100	10.400	0.050	10.1707
0.130	8.700	10.000	0.050	9.6619
0.150	8.500	9.800	0.050	9.4458
0.170	8.300	9.600	0.050	9.3132
0.200	8.200	9.400	0.050	9.1065
0.350	7.800	9.000	0.050	8.7229
0.500	7.700	8.900	0.050	8.5625
0.800	7.500	8.800	0.050	8.4717
1.000	7.500	8.700	0.050	8.4442
1.500	7.400	8.700	0.050	8.3816
1.700	7.400	8.600	0.050	8.3361
1.900	7.400	8.600	0.050	8.2821
2.000	7.300	8.600	0.050	8.2970
2.100	7.300	8.600	0.050	8.2886
2.500	7.200	8.500	0.050	8.1483
3.000	7.100	8.400	0.050	8.0669
4.000	6.900	8.100	0.050	7.8111
5.000	6.700	7.900	0.050	7.5571
6.000	6.500	7.600	0.050	7.2888
7.000	6.300	7.300	0.050	7.0684
7.500	6.200	7.200	0.050	6.9614
8.000	6.100	7.100	0.050	6.8161
9.000	5.900	6.900	0.050	6.6116
10.000	5.700	6.700	0.050	6.4150
15.000	5.000	5.800	0.050	5.6125
18.900	4.500	5.300	0.050	5.0847

WORM and SCALE Input File

```

'Input generated by GeeWiz SCALE 6.1 Compiled on Tue Sep  6 15:23:32 2011
'WORM file written by Alex on 6/28/21
'Table B.2.1.1.3-1. Critical Dimensions for 100% 235U Sphere - 10 Inches of Water Reflection
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
0.02,0.025,0.03,0.04,0.045,0.05,0.055,0.06,0.065,0.07,0.08,0.1,0.13,0.15,0.17,0.2,0.35,0.5,0.8,1,
1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Critical Density = <critdens = 18.9 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
18.4,15.3,13.7,11.9,11.3,10.9,10.5,10.3,10,9.8,9.5,9.1,8.7,8.5,8.3,8.2,7.8,7.7,7.5,7.5,7.4,7.4,7.
4,7.3,7.3,7.2,7.1,6.9,6.7,6.5,6.3,6.2,6.1,5.9,5.7,5.4,5.3> in
#Ending Diameter = <@enddia =
23.3,18.7,16.3,13.9,13.2,12.7,12.3,11.9,11.6,11.4,11,10.4,10,9.8,9.6,9.4,9,8.9,8.8,8.7,8.7,8.6,8.
6,8.6,8.6,8.5,8.4,8.1,7.9,7.6,7.3,7.2,7.1,6.9,6.7,5.8,5.3> in
#Delta = <@delta =
0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,
0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05> in
,
'Reflector Thickness {{refthick = 10}}
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
template
v7-238
read composition
  u          1 den=<critconc> 1 300
                                92235 100
                                92238 0   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Global Unit 1"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(refdia*in)/2}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
  return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: SCALE6.1 u_sph_100_10ref
set: SCALE6.1 set
source: SCALE6.1 primary
created: Thur 7/22/21
geometry: sphere
modmat: H2O
critmat: uranium
isomat: U235 1.0
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.020 22.4400
0.025 17.9661
0.030 15.8304
0.040 13.5000
0.045 12.8403
0.050 12.3452
0.055 11.9314
0.060 11.5958
0.065 11.3500
0.070 11.0307
0.080 10.6836
0.100 10.1707
0.130 9.6619
0.150 9.4458
0.170 9.3132
0.200 9.1065
0.350 8.7229
0.500 8.5625
0.800 8.4717
1.000 8.4442
1.500 8.3816
1.700 8.3361
1.900 8.2821
2.000 8.2970
2.100 8.2886
2.500 8.1483
3.000 8.0669
4.000 7.8111
5.000 7.5571
6.000 7.2888
7.000 7.0684
7.500 6.9614
8.000 6.8161
9.000 6.6116
10.000 6.4150
15.000 5.6125
18.900 5.0847
```

0.02			0.025			0.03		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
18.40	0.9214	0.00160	15.30	0.9200	0.00160	13.70	0.9221	0.00180
18.6	0.9297	0.00200	15.4	0.9238	0.00160	13.8	0.9256	0.00160
18.8	0.9324	0.00160	15.5	0.9267	0.00190	13.9	0.9262	0.00160
19	0.9361	0.00130	15.6	0.9293	0.00170	14	0.9341	0.00160
19.2	0.9424	0.00170	15.7	0.9316	0.00190	14.1	0.9358	0.00160
19.4	0.9453	0.00140	15.8	0.9377	0.00160	14.2	0.9406	0.00250
19.6	0.9504	0.00150	15.9	0.9370	0.00180	14.3	0.9465	0.00240
19.8	0.9551	0.00180	16	0.9428	0.00200	14.4	0.9494	0.00180
20	0.9542	0.00200	16.1	0.9471	0.00170	14.5	0.9508	0.00220
20.2	0.9592	0.00130	16.2	0.9487	0.00200	14.6	0.9546	0.00200
20.4	0.9634	0.00160	16.3	0.9502	0.00180	14.7	0.9613	0.00190
20.6	0.9716	0.00160	16.4	0.9512	0.00200	14.8	0.9670	0.00170
20.8	0.9740	0.00140	16.5	0.9579	0.00140	14.9	0.9687	0.00210
21	0.9756	0.00120	16.6	0.9620	0.00170	15	0.9686	0.00210
21.2	0.9804	0.00170	16.7	0.9673	0.00160	15.1	0.9763	0.00170
21.4	0.9848	0.00180	16.8	0.9659	0.00130	15.2	0.9779	0.00170
21.6	0.9885	0.00180	16.9	0.9709	0.00180	15.3	0.9799	0.00260
21.8	0.9880	0.00130	17	0.9739	0.00190	15.4	0.9871	0.00230
22	0.9938	0.00140	17.1	0.9785	0.00160	15.5	0.9896	0.00210
22.2	0.9945	0.00140	17.2	0.9785	0.00190	15.6	0.9919	0.00180
22.4	0.9992	0.00140	17.3	0.9793	0.00210	15.7	0.9950	0.00210
22.6	1.0032	0.00150	17.4	0.9813	0.00160	15.8	0.9993	0.00200
22.8	1.0042	0.00160	17.5	0.9894	0.00220	15.9	1.0016	0.00220
23	1.0050	0.00160	17.6	0.9888	0.00180	16	1.0048	0.00160
23.2	1.0139	0.00160	17.7	0.9906	0.00210	16.1	1.0101	0.00170
23.3	1.0111	0.00130	17.8	0.9952	0.00220	16.2	1.0091	0.00160
			17.9	0.9963	0.00220	16.3	1.0181	0.00210
			18	1.0019	0.00160			
			18.1	1.0015	0.00150			
			18.2	1.0038	0.00180			
			18.3	1.0066	0.00140			
			18.4	1.0086	0.00170			
			18.5	1.0105	0.00160			
			18.6	1.0143	0.00180			
			18.7	1.0163	0.00150			

0.04			0.045			0.05		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.90	0.9258	0.00180	11.30	0.9189	0.00230	10.90	0.9193	0.00240
12	0.9263	0.00160	11.4	0.9262	0.00190	11	0.9265	0.00230
12.1	0.9318	0.00260	11.5	0.9323	0.00180	11.1	0.9322	0.00200
12.2	0.9349	0.00200	11.6	0.9334	0.00190	11.2	0.9376	0.00210
12.3	0.9438	0.00200	11.7	0.9396	0.00240	11.3	0.9396	0.00180
12.4	0.9497	0.00200	11.8	0.9479	0.00190	11.4	0.9527	0.00200
12.5	0.9512	0.00260	11.9	0.9542	0.00220	11.5	0.9535	0.00180
12.6	0.9547	0.00170	12	0.9548	0.00170	11.6	0.9616	0.00220
12.7	0.9589	0.00220	12.1	0.9602	0.00200	11.7	0.9643	0.00210
12.8	0.9649	0.00210	12.2	0.9660	0.00160	11.8	0.9718	0.00200
12.9	0.9697	0.00210	12.3	0.9760	0.00200	11.9	0.9762	0.00190
13	0.9747	0.00180	12.4	0.9739	0.00230	12	0.9830	0.00220
13.1	0.9790	0.00210	12.5	0.9814	0.00210	12.1	0.9838	0.00230
13.2	0.9817	0.00230	12.6	0.9872	0.00190	12.2	0.9910	0.00200
13.3	0.9898	0.00160	12.7	0.9918	0.00200	12.3	0.9972	0.00180
13.4	0.9927	0.00230	12.8	0.9973	0.00170	12.4	1.0034	0.00210
13.5	1.0000	0.00200	12.9	1.0040	0.00180	12.5	1.0075	0.00210
13.6	1.0031	0.00180	13	1.0070	0.00260	12.6	1.0140	0.00200
13.7	1.0082	0.00240	13.1	1.0127	0.00230	12.7	1.0218	0.00240
13.8	1.0153	0.00190	13.2	1.0140	0.00210			
13.9	1.0149	0.00230						

0.055			0.06			0.065		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.50	0.9153	0.00210	10.30	0.9224	0.00200	10.00	0.9139	0.00270
10.6	0.9217	0.00270	10.35	0.9266	0.00190	10.05	0.9176	0.00210
10.7	0.9287	0.00250	10.4	0.9263	0.00250	10.1	0.9268	0.00210
10.8	0.9315	0.00200	10.45	0.9290	0.00200	10.15	0.9266	0.00210
10.9	0.9418	0.00260	10.5	0.9337	0.00230	10.2	0.9304	0.00200
11	0.9477	0.00180	10.55	0.9392	0.00220	10.25	0.9334	0.00200
11.1	0.9524	0.00230	10.6	0.9413	0.00240	10.3	0.9362	0.00190
11.2	0.9573	0.00200	10.65	0.9425	0.00210	10.35	0.9388	0.00210
11.3	0.9667	0.00220	10.7	0.9511	0.00210	10.4	0.9461	0.00180
11.4	0.9719	0.00210	10.75	0.9476	0.00250	10.45	0.9471	0.00200
11.5	0.9752	0.00210	10.8	0.9479	0.00210	10.5	0.9474	0.00220
11.6	0.9874	0.00260	10.85	0.9562	0.00240	10.55	0.9522	0.00200
11.7	0.9897	0.00200	10.9	0.9589	0.00200	10.6	0.9611	0.00270
11.8	0.9951	0.00210	10.95	0.9604	0.00190	10.65	0.9562	0.00240
11.9	0.9968	0.00210	11	0.9658	0.00260	10.7	0.9623	0.00210
12	1.0070	0.00240	11.05	0.9675	0.00180	10.75	0.9688	0.00280
12.1	1.0117	0.00200	11.1	0.9760	0.00210	10.8	0.9677	0.00210
12.2	1.0153	0.00240	11.15	0.9769	0.00230	10.85	0.9706	0.00230
12.3	1.0187	0.00220	11.2	0.9772	0.00230	10.9	0.9768	0.00200
			11.25	0.9775	0.00220	10.95	0.9825	0.00230
			11.3	0.9858	0.00210	11	0.9809	0.00260
			11.35	0.9874	0.00260	11.05	0.9879	0.00180
			11.4	0.9897	0.00190	11.1	0.9858	0.00220
			11.45	0.9927	0.00200	11.15	0.9932	0.00320
			11.5	0.9954	0.00200	11.2	0.9942	0.00190
			11.55	1.0011	0.00210	11.25	1.0004	0.00290
			11.6	0.9999	0.00190	11.3	1.0017	0.00270
			11.65	1.0069	0.00200	11.35	1.0000	0.00230
			11.7	1.0052	0.00210	11.4	1.0095	0.00220
			11.75	1.0126	0.00290	11.45	1.0116	0.00210
			11.8	1.0140	0.00220	11.5	1.0098	0.00210
			11.85	1.0218	0.00270	11.55	1.0123	0.00190
			11.9	1.0236	0.00210	11.6	1.0199	0.00200

0.07			0.08			0.1		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.80	0.9206	0.00250	9.50	0.9151	0.00240	9.10	0.9229	0.00230
9.85	0.9215	0.00230	9.55	0.9192	0.00230	9.15	0.9286	0.00260
9.9	0.9210	0.00230	9.6	0.9284	0.00230	9.2	0.9301	0.00200
9.95	0.9256	0.00220	9.65	0.9270	0.00240	9.25	0.9320	0.00260
10	0.9301	0.00230	9.7	0.9350	0.00230	9.3	0.9388	0.00240
10.05	0.9341	0.00210	9.75	0.9358	0.00240	9.35	0.9395	0.00250
10.1	0.9392	0.00220	9.8	0.9409	0.00250	9.4	0.9446	0.00230
10.15	0.9368	0.00280	9.85	0.9447	0.00230	9.45	0.9531	0.00220
10.2	0.9415	0.00200	9.9	0.9466	0.00230	9.5	0.9526	0.00200
10.25	0.9470	0.00240	9.95	0.9513	0.00220	9.55	0.9562	0.00230
10.3	0.9499	0.00210	10	0.9520	0.00180	9.6	0.9595	0.00290
10.35	0.9522	0.00230	10.05	0.9554	0.00200	9.65	0.9643	0.00230
10.4	0.9558	0.00250	10.1	0.9584	0.00210	9.7	0.9667	0.00220
10.45	0.9614	0.00200	10.15	0.9671	0.00250	9.75	0.9721	0.00320
10.5	0.9685	0.00200	10.2	0.9694	0.00210	9.8	0.9741	0.00220
10.55	0.9698	0.00210	10.25	0.9681	0.00190	9.85	0.9755	0.00210
10.6	0.9662	0.00220	10.3	0.9774	0.00260	9.9	0.9811	0.00210
10.65	0.9745	0.00250	10.35	0.9808	0.00210	9.95	0.9870	0.00270
10.7	0.9810	0.00220	10.4	0.9807	0.00210	10	0.9880	0.00230
10.75	0.9808	0.00220	10.45	0.9876	0.00250	10.05	0.9982	0.00240
10.8	0.9845	0.00240	10.5	0.9883	0.00210	10.1	0.9988	0.00180
10.85	0.9903	0.00210	10.55	0.9924	0.00220	10.15	0.9988	0.00220
10.9	0.9888	0.00210	10.6	0.9980	0.00270	10.2	1.0017	0.00200
10.95	0.9921	0.00230	10.65	0.9963	0.00230	10.25	1.0052	0.00200
11	0.9965	0.00190	10.7	1.0018	0.00210	10.3	1.0077	0.00260
11.05	1.0022	0.00200	10.75	1.0069	0.00220	10.35	1.0129	0.00190
11.1	1.0080	0.00180	10.8	1.0059	0.00220	10.4	1.0171	0.00230
11.15	1.0049	0.00210	10.85	1.0165	0.00250			
11.2	1.0096	0.00200	10.9	1.0140	0.00210			
11.25	1.0115	0.00210	10.95	1.0177	0.00220			
11.3	1.0148	0.00210	11	1.0177	0.00200			
11.35	1.0190	0.00200						
11.4	1.0205	0.00200						

0.13			0.15			0.17		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.70	0.9254	0.00220	8.50	0.9195	0.00240	8.30	0.9139	0.00200
8.75	0.9246	0.00240	8.55	0.9276	0.00200	8.35	0.9183	0.00220
8.8	0.9324	0.00220	8.6	0.9254	0.00260	8.4	0.9221	0.00190
8.85	0.9344	0.00210	8.65	0.9355	0.00280	8.45	0.9254	0.00190
8.9	0.9400	0.00210	8.7	0.9392	0.00240	8.5	0.9333	0.00220
8.95	0.9451	0.00250	8.75	0.9418	0.00230	8.55	0.9389	0.00230
9	0.9444	0.00220	8.8	0.9454	0.00220	8.6	0.9417	0.00220
9.05	0.9512	0.00250	8.85	0.9522	0.00230	8.65	0.9456	0.00270
9.1	0.9555	0.00190	8.9	0.9540	0.00220	8.7	0.9539	0.00250
9.15	0.9575	0.00220	8.95	0.9563	0.00240	8.75	0.9511	0.00230
9.2	0.9673	0.00250	9	0.9605	0.00310	8.8	0.9579	0.00230
9.25	0.9654	0.00210	9.05	0.9616	0.00200	8.85	0.9642	0.00210
9.3	0.9687	0.00210	9.1	0.9682	0.00200	8.9	0.9694	0.00240
9.35	0.9761	0.00200	9.15	0.9740	0.00210	8.95	0.9709	0.00220
9.4	0.9756	0.00200	9.2	0.9781	0.00250	9	0.9726	0.00250
9.45	0.9823	0.00210	9.25	0.9828	0.00200	9.05	0.9791	0.00250
9.5	0.9878	0.00210	9.3	0.9882	0.00210	9.1	0.9804	0.00250
9.55	0.9923	0.00250	9.35	0.9923	0.00220	9.15	0.9831	0.00230
9.6	0.9940	0.00240	9.4	0.9934	0.00270	9.2	0.9913	0.00240
9.65	0.9985	0.00210	9.45	1.0006	0.00200	9.25	0.9954	0.00290
9.7	1.0048	0.00220	9.5	1.0040	0.00190	9.3	0.9990	0.00260
9.75	1.0014	0.00250	9.55	1.0063	0.00230	9.35	1.0028	0.00250
9.8	1.0097	0.00210	9.6	1.0115	0.00220	9.4	1.0088	0.00290
9.85	1.0153	0.00300	9.65	1.0158	0.00240	9.45	1.0069	0.00230
9.9	1.0175	0.00240	9.7	1.0185	0.00260	9.5	1.0152	0.00210
9.95	1.0164	0.00280	9.75	1.0263	0.00190	9.55	1.0184	0.00230
10	1.0262	0.00220	9.8	1.0293	0.00230	9.6	1.0241	0.00210

0.2			0.35			0.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.20	0.9235	0.00220	7.80	0.9171	0.00250	7.70	0.9219	0.00250
8.25	0.9209	0.00230	7.85	0.9243	0.00230	7.75	0.9261	0.00220
8.3	0.9294	0.00240	7.9	0.9282	0.00220	7.8	0.9304	0.00250
8.35	0.9327	0.00240	7.95	0.9316	0.00230	7.85	0.9332	0.00260
8.4	0.9347	0.00250	8	0.9343	0.00230	7.9	0.9426	0.00220
8.45	0.9404	0.00240	8.05	0.9393	0.00220	7.95	0.9457	0.00230
8.5	0.9447	0.00240	8.1	0.9455	0.00220	8	0.9529	0.00210
8.55	0.9528	0.00230	8.15	0.9468	0.00270	8.05	0.9532	0.00260
8.6	0.9556	0.00270	8.2	0.9531	0.00240	8.1	0.9581	0.00280
8.65	0.9558	0.00220	8.25	0.9577	0.00210	8.15	0.9638	0.00200
8.7	0.9659	0.00320	8.3	0.9608	0.00210	8.2	0.9691	0.00230
8.75	0.9659	0.00250	8.35	0.9629	0.00240	8.25	0.9724	0.00210
8.8	0.9705	0.00300	8.4	0.9753	0.00250	8.3	0.9758	0.00230
8.85	0.9764	0.00210	8.45	0.9780	0.00220	8.35	0.9813	0.00220
8.9	0.9826	0.00230	8.5	0.9794	0.00220	8.4	0.9852	0.00210
8.95	0.9836	0.00230	8.55	0.9829	0.00180	8.45	0.9877	0.00250
9	0.9880	0.00220	8.6	0.9863	0.00260	8.5	0.9931	0.00320
9.05	0.9946	0.00250	8.65	0.9955	0.00200	8.55	1.0003	0.00270
9.1	0.9997	0.00220	8.7	0.9989	0.00250	8.6	0.9991	0.00210
9.15	1.0020	0.00220	8.75	1.0013	0.00210	8.65	1.0064	0.00240
9.2	1.0035	0.00230	8.8	1.0062	0.00230	8.7	1.0100	0.00250
9.25	1.0075	0.00210	8.85	1.0136	0.00290	8.75	1.0152	0.00240
9.3	1.0195	0.00310	8.9	1.0178	0.00210	8.8	1.0228	0.00220
9.35	1.0222	0.00250	8.95	1.0245	0.00230	8.85	1.0213	0.00230
9.4	1.0205	0.00230	9	1.0213	0.00220	8.9	1.0279	0.00210

0.8			1			1.5		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.50	0.9166	0.00200	7.50	0.9202	0.00270	7.40	0.9185	0.00210
7.55	0.9177	0.00230	7.55	0.9254	0.00220	7.45	0.9235	0.00210
7.6	0.9267	0.00200	7.6	0.9239	0.00250	7.5	0.9241	0.00210
7.65	0.9284	0.00240	7.65	0.9380	0.00240	7.55	0.9338	0.00250
7.7	0.9341	0.00250	7.7	0.9397	0.00200	7.6	0.9361	0.00220
7.75	0.9390	0.00270	7.75	0.9442	0.00230	7.65	0.9425	0.00230
7.8	0.9463	0.00280	7.8	0.9475	0.00200	7.7	0.9465	0.00210
7.85	0.9502	0.00240	7.85	0.9520	0.00240	7.75	0.9519	0.00220
7.9	0.9523	0.00280	7.9	0.9576	0.00210	7.8	0.9560	0.00200
7.95	0.9553	0.00270	7.95	0.9570	0.00270	7.85	0.9587	0.00230
8	0.9600	0.00290	8	0.9648	0.00220	7.9	0.9584	0.00220
8.05	0.9643	0.00240	8.05	0.9703	0.00230	7.95	0.9652	0.00210
8.1	0.9680	0.00240	8.1	0.9759	0.00220	8	0.9748	0.00240
8.15	0.9761	0.00290	8.15	0.9759	0.00210	8.05	0.9739	0.00250
8.2	0.9761	0.00250	8.2	0.9843	0.00220	8.1	0.9822	0.00240
8.25	0.9807	0.00280	8.25	0.9829	0.00200	8.15	0.9825	0.00220
8.3	0.9853	0.00270	8.3	0.9894	0.00250	8.2	0.9884	0.00250
8.35	0.9898	0.00290	8.35	0.9926	0.00200	8.25	0.9928	0.00220
8.4	0.9936	0.00240	8.4	0.9977	0.00230	8.3	0.9936	0.00230
8.45	0.9961	0.00270	8.45	1.0003	0.00240	8.35	0.9988	0.00240
8.5	1.0051	0.00200	8.5	1.0063	0.00230	8.4	1.0007	0.00220
8.55	1.0083	0.00280	8.55	1.0083	0.00260	8.45	1.0085	0.00200
8.6	1.0108	0.00260	8.6	1.0152	0.00210	8.5	1.0140	0.00250
8.65	1.0188	0.00240	8.65	1.0172	0.00200	8.55	1.0192	0.00250
8.7	1.0213	0.00240	8.7	1.0227	0.00220	8.6	1.0186	0.00220
8.75	1.0264	0.00240				8.65	1.0257	0.00230
8.8	1.0251	0.00200				8.7	1.0311	0.00240

1.7			1.9			2		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.40	0.9189	0.00250	7.40	0.9238	0.00220	7.30	0.9190	0.00210
7.45	0.9280	0.00240	7.45	0.9295	0.00210	7.35	0.9181	0.00220
7.5	0.9280	0.00220	7.5	0.9367	0.00220	7.4	0.9276	0.00230
7.55	0.9392	0.00220	7.55	0.9348	0.00200	7.45	0.9306	0.00230
7.6	0.9382	0.00200	7.6	0.9445	0.00200	7.5	0.9399	0.00270
7.65	0.9460	0.00200	7.65	0.9495	0.00190	7.55	0.9396	0.00220
7.7	0.9513	0.00200	7.7	0.9544	0.00200	7.6	0.9411	0.00250
7.75	0.9524	0.00250	7.75	0.9531	0.00200	7.65	0.9458	0.00290
7.8	0.9575	0.00240	7.8	0.9591	0.00260	7.7	0.9544	0.00180
7.85	0.9589	0.00200	7.85	0.9637	0.00210	7.75	0.9569	0.00190
7.9	0.9645	0.00210	7.9	0.9659	0.00210	7.8	0.9586	0.00230
7.95	0.9721	0.00210	7.95	0.9729	0.00240	7.85	0.9644	0.00220
8	0.9748	0.00230	8	0.9752	0.00190	7.9	0.9692	0.00230
8.05	0.9754	0.00200	8.05	0.9774	0.00200	7.95	0.9719	0.00220
8.1	0.9771	0.00230	8.1	0.9845	0.00220	8	0.9782	0.00220
8.15	0.9870	0.00200	8.15	0.9856	0.00210	8.05	0.9785	0.00260
8.2	0.9928	0.00190	8.2	0.9908	0.00200	8.1	0.9844	0.00200
8.25	0.9929	0.00260	8.25	0.9966	0.00290	8.15	0.9918	0.00220
8.3	0.9943	0.00240	8.3	1.0019	0.00230	8.2	0.9905	0.00200
8.35	1.0022	0.00240	8.35	1.0055	0.00210	8.25	0.9969	0.00220
8.4	1.0068	0.00220	8.4	1.0080	0.00200	8.3	1.0002	0.00190
8.45	1.0083	0.00210	8.45	1.0111	0.00200	8.35	1.0085	0.00230
8.5	1.0156	0.00210	8.5	1.0152	0.00220	8.4	1.0108	0.00220
8.55	1.0150	0.00220	8.55	1.0177	0.00200	8.45	1.0111	0.00180
8.6	1.0214	0.00210	8.6	1.0221	0.00200	8.5	1.0154	0.00240
						8.55	1.0177	0.00300
						8.6	1.0200	0.00220

2.1			2.5			3		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.30	0.9221	0.00210	7.20	0.9164	0.00200	7.10	0.9168	0.00230
7.35	0.9228	0.00250	7.25	0.9238	0.00210	7.15	0.9224	0.00190
7.4	0.9275	0.00200	7.3	0.9256	0.00200	7.2	0.9267	0.00200
7.45	0.9336	0.00230	7.35	0.9302	0.00210	7.25	0.9327	0.00210
7.5	0.9364	0.00200	7.4	0.9376	0.00180	7.3	0.9364	0.00190
7.55	0.9397	0.00210	7.45	0.9407	0.00210	7.35	0.9412	0.00200
7.6	0.9494	0.00210	7.5	0.9443	0.00260	7.4	0.9454	0.00210
7.65	0.9508	0.00190	7.55	0.9491	0.00200	7.45	0.9467	0.00210
7.7	0.9558	0.00250	7.6	0.9534	0.00210	7.5	0.9522	0.00210
7.75	0.9599	0.00210	7.65	0.9550	0.00210	7.55	0.9577	0.00210
7.8	0.9621	0.00240	7.7	0.9621	0.00250	7.6	0.9622	0.00230
7.85	0.9670	0.00210	7.75	0.9629	0.00210	7.65	0.9654	0.00180
7.9	0.9724	0.00210	7.8	0.9686	0.00240	7.7	0.9707	0.00230
7.95	0.9780	0.00220	7.85	0.9748	0.00210	7.75	0.9715	0.00220
8	0.9844	0.00190	7.9	0.9763	0.00230	7.8	0.9796	0.00190
8.05	0.9829	0.00210	7.95	0.9804	0.00250	7.85	0.9784	0.00210
8.1	0.9861	0.00240	8	0.9923	0.00240	7.9	0.9866	0.00200
8.15	0.9909	0.00190	8.05	0.9876	0.00220	7.95	0.9855	0.00210
8.2	0.9920	0.00200	8.1	0.9972	0.00240	8	0.9960	0.00190
8.25	0.9966	0.00240	8.15	1.0001	0.00190	8.05	0.9977	0.00230
8.3	1.0010	0.00210	8.2	1.0016	0.00220	8.1	1.0045	0.00230
8.35	1.0025	0.00290	8.25	1.0051	0.00200	8.15	1.0052	0.00250
8.4	1.0091	0.00220	8.3	1.0074	0.00270	8.2	1.0120	0.00230
8.45	1.0153	0.00210	8.35	1.0162	0.00190	8.25	1.0123	0.00200
8.5	1.0191	0.00260	8.4	1.0168	0.00240	8.3	1.0179	0.00290
8.55	1.0229	0.00200	8.45	1.0259	0.00200	8.35	1.0212	0.00200
8.6	1.0270	0.00220	8.5	1.0278	0.00200	8.4	1.0294	0.00240

4			5			6		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.90	0.9200	0.00250	6.70	0.9219	0.00210	6.50	0.9232	0.00220
6.95	0.9249	0.00190	6.75	0.9270	0.00240	6.55	0.9283	0.00250
7	0.9316	0.00250	6.8	0.9344	0.00190	6.6	0.9338	0.00190
7.05	0.9321	0.00220	6.85	0.9336	0.00200	6.65	0.9354	0.00180
7.1	0.9383	0.00230	6.9	0.9429	0.00210	6.7	0.9430	0.00210
7.15	0.9437	0.00210	6.95	0.9426	0.00220	6.75	0.9501	0.00200
7.2	0.9490	0.00170	7	0.9516	0.00180	6.8	0.9506	0.00190
7.25	0.9516	0.00220	7.05	0.9548	0.00250	6.85	0.9573	0.00240
7.3	0.9568	0.00190	7.1	0.9590	0.00200	6.9	0.9623	0.00200
7.35	0.9571	0.00200	7.15	0.9662	0.00220	6.95	0.9662	0.00200
7.4	0.9631	0.00180	7.2	0.9673	0.00230	7	0.9736	0.00250
7.45	0.9669	0.00190	7.25	0.9714	0.00230	7.05	0.9775	0.00200
7.5	0.9732	0.00210	7.3	0.9749	0.00180	7.1	0.9832	0.00210
7.55	0.9770	0.00190	7.35	0.9829	0.00190	7.15	0.9870	0.00210
7.6	0.9807	0.00200	7.4	0.9879	0.00190	7.2	0.9894	0.00200
7.65	0.9875	0.00190	7.45	0.9915	0.00210	7.25	0.9969	0.00190
7.7	0.9891	0.00210	7.5	0.9952	0.00220	7.3	1.0009	0.00190
7.75	0.9948	0.00210	7.55	0.9994	0.00250	7.35	1.0046	0.00200
7.8	0.9990	0.00240	7.6	1.0036	0.00190	7.4	1.0093	0.00280
7.85	1.0035	0.00180	7.65	1.0089	0.00210	7.45	1.0093	0.00200
7.9	1.0053	0.00210	7.7	1.0111	0.00220	7.5	1.0196	0.00220
7.95	1.0098	0.00220	7.75	1.0140	0.00180	7.55	1.0240	0.00200
8	1.0151	0.00190	7.8	1.0195	0.00170	7.6	1.0288	0.00200
8.05	1.0200	0.00190	7.85	1.0298	0.00220			
8.1	1.0224	0.00200	7.9	1.0267	0.00210			

7			7.5			8		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.30	0.9251	0.00210	6.20	0.9246	0.00190	6.10	0.9206	0.00210
6.35	0.9315	0.00230	6.25	0.9319	0.00200	6.15	0.9295	0.00170
6.4	0.9345	0.00180	6.3	0.9391	0.00200	6.2	0.9349	0.00220
6.45	0.9411	0.00190	6.35	0.9430	0.00230	6.25	0.9377	0.00180
6.5	0.9472	0.00180	6.4	0.9453	0.00190	6.3	0.9483	0.00190
6.55	0.9481	0.00200	6.45	0.9548	0.00170	6.35	0.9513	0.00210
6.6	0.9547	0.00190	6.5	0.9565	0.00200	6.4	0.9580	0.00210
6.65	0.9577	0.00210	6.55	0.9634	0.00210	6.45	0.9582	0.00230
6.7	0.9652	0.00210	6.6	0.9669	0.00190	6.5	0.9650	0.00220
6.75	0.9703	0.00200	6.65	0.9721	0.00230	6.55	0.9707	0.00180
6.8	0.9762	0.00210	6.7	0.9766	0.00210	6.6	0.9799	0.00270
6.85	0.9750	0.00210	6.75	0.9787	0.00230	6.65	0.9804	0.00180
6.9	0.9853	0.00190	6.8	0.9873	0.00230	6.7	0.9864	0.00180
6.95	0.9889	0.00220	6.85	0.9901	0.00210	6.75	0.9882	0.00210
7	0.9938	0.00200	6.9	0.9930	0.00180	6.8	0.9981	0.00190
7.05	0.9986	0.00210	6.95	0.9984	0.00180	6.85	1.0040	0.00190
7.1	1.0024	0.00180	7	1.0054	0.00220	6.9	1.0042	0.00180
7.15	1.0074	0.00210	7.05	1.0095	0.00190	6.95	1.0108	0.00170
7.2	1.0117	0.00210	7.1	1.0151	0.00190	7	1.0134	0.00230
7.25	1.0148	0.00190	7.15	1.0187	0.00210	7.05	1.0188	0.00230
7.3	1.0175	0.00200	7.2	1.0239	0.00190	7.1	1.0239	0.00210

9			10			15		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.90	0.9205	0.00170	5.70	0.9184	0.00180	5.00	0.9222	0.00190
5.95	0.9294	0.00190	5.75	0.9269	0.00160	5.05	0.9268	0.00180
6	0.9329	0.00230	5.8	0.9283	0.00220	5.1	0.9330	0.00240
6.05	0.9416	0.00210	5.85	0.9358	0.00240	5.15	0.9448	0.00220
6.1	0.9454	0.00190	5.9	0.9402	0.00170	5.2	0.9488	0.00180
6.15	0.9481	0.00180	5.95	0.9464	0.00180	5.25	0.9542	0.00170
6.2	0.9559	0.00220	6	0.9518	0.00180	5.3	0.9617	0.00160
6.25	0.9610	0.00250	6.05	0.9536	0.00210	5.35	0.9719	0.00180
6.3	0.9674	0.00180	6.1	0.9642	0.00200	5.4	0.9742	0.00170
6.35	0.9739	0.00240	6.15	0.9717	0.00190	5.45	0.9809	0.00160
6.4	0.9805	0.00180	6.2	0.9739	0.00190	5.5	0.9866	0.00170
6.45	0.9837	0.00220	6.25	0.9799	0.00170	5.55	0.9946	0.00190
6.5	0.9853	0.00210	6.3	0.9857	0.00220	5.6	0.9973	0.00180
6.55	0.9929	0.00170	6.35	0.9916	0.00200	5.65	1.0081	0.00180
6.6	0.9984	0.00170	6.4	0.9976	0.00200	5.7	1.0095	0.00190
6.65	1.0053	0.00230	6.45	1.0056	0.00190	5.75	1.0156	0.00170
6.7	1.0066	0.00190	6.5	1.0067	0.00200	5.8	1.0264	0.00190
6.75	1.0142	0.00180	6.55	1.0167	0.00180			
6.8	1.0185	0.00190	6.6	1.0162	0.00250			
6.85	1.0212	0.00170	6.65	1.0258	0.00190			
6.9	1.0272	0.00180	6.7	1.0307	0.00190			

18.9		
Diameter (Inches)	K _{eff}	Sigma
4.50	0.9132	0.00170
4.55	0.9242	0.00170
4.6	0.9287	0.00190
4.65	0.9357	0.00250
4.7	0.9446	0.00180
4.75	0.9501	0.00180
4.8	0.9583	0.00170
4.85	0.9671	0.00190
4.9	0.9723	0.00190
4.95	0.9801	0.00180
5	0.9871	0.00190
5.05	0.9930	0.00170
5.1	1.0031	0.00170
5.15	1.0085	0.00260
5.2	1.0176	0.00180
5.25	1.0235	0.00180
5.3	1.0284	0.00180

U-sphere-93.5 (Cases with 0", 1", 10" Reflector)

Case ID: U_sphere_093.5_00ref

Material: Uranium metal in water

Geometry: Sphere

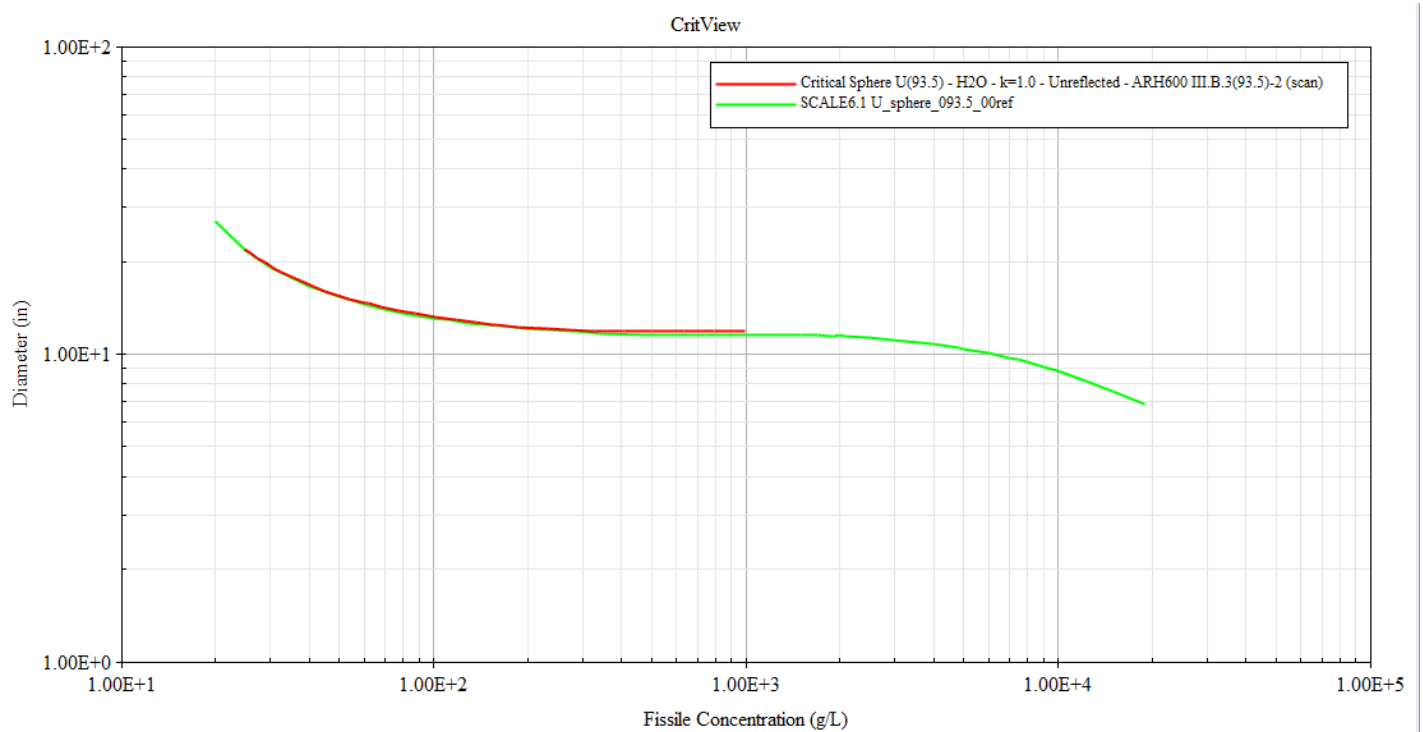
Isotopics: 93.5% ^{235}U 6.5% ^{238}U

Reflector: Unreflected

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



93.5% ²³⁵ U Sphere-0 Inches of Water Reflection				
Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.020	22.300	28.100	0.300	27.1532
0.025	18.700	22.500	0.200	21.8176
0.030	16.800	19.800	0.100	19.1781
0.040	14.800	17.100	0.100	16.6625
0.045	14.200	16.300	0.100	15.9882
0.050	13.800	15.700	0.100	15.3472
0.055	13.400	15.200	0.100	14.9084
0.060	13.100	14.900	0.100	14.5445
0.065	12.900	14.600	0.050	14.1993
0.070	12.700	14.400	0.050	13.9847
0.080	12.300	13.900	0.050	13.6145
0.100	11.900	13.400	0.050	13.0991
0.130	11.400	12.900	0.050	12.5313
0.150	11.300	12.700	0.050	12.4153
0.170	11.100	12.500	0.050	12.2940
0.200	11.000	12.400	0.050	12.0724
0.350	10.700	12.000	0.050	11.6858
0.500	10.600	11.900	0.050	11.5830
0.800	10.500	11.900	0.050	11.5414
1.000	10.500	11.900	0.050	11.5361
1.500	10.500	11.900	0.050	11.5417
1.700	10.400	11.900	0.050	11.5276
1.900	10.400	11.800	0.050	11.4693
2.000	10.400	11.800	0.050	11.4982
2.100	10.400	11.800	0.050	11.4583
2.500	10.300	11.700	0.050	11.3188
3.000	10.100	11.500	0.050	11.1279
4.000	9.800	11.200	0.050	10.7962
5.000	9.500	10.800	0.050	10.4155
6.000	9.100	10.400	0.050	10.0821
7.000	8.800	10.100	0.050	9.7221
7.500	8.700	9.900	0.050	9.5922
8.000	8.500	9.700	0.050	9.4052
9.000	8.300	9.400	0.050	9.0589
10.000	8.000	9.100	0.050	8.8007
15.000	6.900	7.900	0.050	7.5973
18.900	6.200	7.100	0.050	6.8881

WORM and SCALE Input File

```

'Worm generated by Natalie 6/24/21
'Recreating data from PRC-NS-00009 B-536 (pdf pg554)
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
0.02,0.025,0.03,0.04,0.045,0.05,0.055,0.06,0.065,0.07,0.08,0.1,0.13,0.15,0.17,0.2,0.35,0.5,0.8,1,
1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/18.9)>
,
#Starting Diameter = <@startdia =
22.3,18.7,16.8,14.8,14.2,13.8,13.4,13.1,12.9,12.7,12.3,11.9,11.4,11.3,11.1,11,10.7,10.6,10.5,10.5
,10.5,10.4,10.4,10.4,10.4,10.3,10.1,9.8,9.5,9.1,8.8,8.7,8.5,8.3,8,6.9,6.2> in
#Ending Diameter = <@enddia =
28.1,22.5,19.8,17.1,16.3,15.7,15.2,14.9,14.6,14.4,13.9,13.4,12.9,12.7,12.5,12.4,12,11.9,11.9,11.9
,11.9,11.9,11.8,11.8,11.8,11.7,11.5,11.2,10.8,10.4,10.1,9.9,9.7,9.4,9.1,7.9,7.1> in
#Delta = <@delta =
0.3,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,
0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05> in
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Unreflected Uranium Sphere
v7-238
read composition
  u          1 den=<critconc> 1 300
                        92235 93.5
                        92238 6.5  end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300  end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Unreflected Sphere"
  sphere 1      {{(diameter*in)/2}}
  media 1 1 1
  boundary 1
end geometry
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; U; Unreflected; 93.5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 0.935 U238 0.065
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.020 27.1532
0.025 21.8176
0.030 19.1781
0.040 16.6625
0.045 15.9882
0.050 15.3472
0.055 14.9084
0.060 14.5445
0.065 14.1993
0.070 13.9847
0.080 13.6145
0.100 13.0991
0.130 12.5313
0.150 12.4153
0.170 12.2940
0.200 12.0724
0.350 11.6858
0.500 11.5830
0.800 11.5414
1.000 11.5361
1.500 11.5417
1.700 11.5276
1.900 11.4693
2.000 11.4982
2.100 11.4583
2.500 11.3188
3.000 11.1279
4.000 10.7962
5.000 10.4155
6.000 10.0821
7.000 9.7221
7.500 9.5922
8.000 9.4052
9.000 9.0589
10.000 8.8007
15.000 7.5973
18.900 6.8881
```

20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
22.30	0.9238	0.00160	18.70	0.9231	0.00170	16.80	0.9157	0.00160
22.60	0.9268	0.00170	18.90	0.9277	0.00190	16.90	0.9221	0.00170
22.90	0.9355	0.00200	19.10	0.9310	0.00210	17.00	0.9264	0.00180
23.20	0.9414	0.00230	19.30	0.9396	0.00190	17.10	0.9300	0.00210
23.50	0.9478	0.00170	19.50	0.9440	0.00160	17.20	0.9360	0.00240
23.80	0.9542	0.00130	19.70	0.9479	0.00190	17.30	0.9409	0.00190
24.10	0.9557	0.00170	19.90	0.9526	0.00240	17.40	0.9394	0.00150
24.40	0.9612	0.00140	20.10	0.9551	0.00210	17.50	0.9436	0.00180
24.70	0.9643	0.00190	20.30	0.9671	0.00150	17.60	0.9482	0.00170
25.00	0.9726	0.00150	20.50	0.9708	0.00190	17.70	0.9527	0.00200
25.30	0.9772	0.00210	20.70	0.9763	0.00170	17.80	0.9541	0.00170
25.60	0.9798	0.00150	20.90	0.9798	0.00190	17.90	0.9608	0.00170
25.90	0.9788	0.00150	21.10	0.9859	0.00180	18.00	0.9594	0.00200
26.20	0.9849	0.00220	21.30	0.9880	0.00230	18.10	0.9613	0.00240
26.50	0.9907	0.00160	21.50	0.9929	0.00200	18.20	0.9653	0.00190
26.80	0.9961	0.00130	21.70	0.9970	0.00160	18.30	0.9732	0.00170
27.10	0.9989	0.00180	21.90	1.0021	0.00160	18.40	0.9743	0.00160
27.40	1.0051	0.00130	22.10	1.0051	0.00200	18.50	0.9753	0.00220
27.70	1.0075	0.00200	22.30	1.0102	0.00180	18.60	0.9784	0.00170
28.00	1.0109	0.00150	22.50	1.0126	0.00150	18.70	0.9824	0.00200
28.10	1.0119	0.00160				18.80	0.9874	0.00180
						18.90	0.9926	0.00190
						19.00	0.9956	0.00190
						19.10	0.9950	0.00200
						19.20	1.0014	0.00200
						19.30	1.0024	0.00190
						19.40	1.0059	0.00270
						19.50	1.0047	0.00210
						19.60	1.0114	0.00210
						19.70	1.0111	0.00220
						19.80	1.0118	0.00220

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
14.80	0.9133	0.00180	14.20	0.9136	0.00210	13.80	0.9169	0.00180
14.90	0.9207	0.00200	14.30	0.9212	0.00270	13.90	0.9255	0.00220
15.00	0.9321	0.00220	14.40	0.9287	0.00220	14.00	0.9304	0.00220
15.10	0.9316	0.00220	14.50	0.9286	0.00250	14.10	0.9340	0.00280
15.20	0.9350	0.00200	14.60	0.9359	0.00210	14.20	0.9424	0.00210
15.30	0.9386	0.00230	14.70	0.9371	0.00220	14.30	0.9480	0.00210
15.40	0.9456	0.00200	14.80	0.9459	0.00230	14.40	0.9526	0.00210
15.50	0.9518	0.00280	14.90	0.9480	0.00200	14.50	0.9547	0.00240
15.60	0.9542	0.00210	15.00	0.9562	0.00210	14.60	0.9617	0.00220
15.70	0.9578	0.00200	15.10	0.9628	0.00260	14.70	0.9680	0.00230
15.80	0.9636	0.00180	15.20	0.9677	0.00190	14.80	0.9758	0.00260
15.90	0.9667	0.00270	15.30	0.9686	0.00210	14.90	0.9738	0.00230
16.00	0.9711	0.00220	15.40	0.9709	0.00220	15.00	0.9849	0.00200
16.10	0.9740	0.00270	15.50	0.9812	0.00230	15.10	0.9879	0.00270
16.20	0.9753	0.00200	15.60	0.9853	0.00200	15.20	0.9879	0.00240
16.30	0.9875	0.00210	15.70	0.9876	0.00240	15.30	0.9949	0.00270
16.40	0.9912	0.00200	15.80	0.9969	0.00220	15.40	1.0057	0.00260
16.50	0.9917	0.00220	15.90	0.9985	0.00210	15.50	1.0028	0.00240
16.60	0.9960	0.00210	16.00	1.0002	0.00230	15.60	1.0145	0.00230
16.70	1.0024	0.00240	16.10	1.0052	0.00200	15.70	1.0146	0.00200
16.80	1.0009	0.00180	16.20	1.0084	0.00250			
16.90	1.0099	0.00220	16.30	1.0177	0.00200			
17.00	1.0140	0.00220						
17.10	1.0171	0.00220						

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
13.40	0.9175	0.00230	13.10	0.9144	0.00270	12.90	0.9177	0.00270
13.50	0.9212	0.00200	13.20	0.9230	0.00240	12.95	0.9189	0.00270
13.60	0.9285	0.00250	13.30	0.9296	0.00230	13.00	0.9274	0.00210
13.70	0.9362	0.00240	13.40	0.9368	0.00270	13.05	0.9267	0.00250
13.80	0.9374	0.00310	13.50	0.9425	0.00230	13.10	0.9289	0.00210
13.90	0.9465	0.00230	13.60	0.9468	0.00230	13.15	0.9364	0.00230
14.00	0.9542	0.00290	13.70	0.9519	0.00250	13.20	0.9425	0.00210
14.10	0.9590	0.00240	13.80	0.9593	0.00210	13.25	0.9411	0.00210
14.20	0.9639	0.00200	13.90	0.9652	0.00250	13.30	0.9424	0.00270
14.30	0.9700	0.00270	14.00	0.9710	0.00190	13.35	0.9472	0.00220
14.40	0.9723	0.00180	14.10	0.9738	0.00210	13.40	0.9498	0.00240
14.50	0.9782	0.00250	14.20	0.9745	0.00230	13.45	0.9534	0.00250
14.60	0.9823	0.00240	14.30	0.9820	0.00300	13.50	0.9560	0.00200
14.70	0.9895	0.00290	14.40	0.9955	0.00250	13.55	0.9587	0.00240
14.80	0.9937	0.00220	14.50	0.9943	0.00240	13.60	0.9637	0.00240
14.90	0.9990	0.00250	14.60	1.0071	0.00230	13.65	0.9642	0.00230
15.00	1.0109	0.00200	14.70	1.0069	0.00270	13.70	0.9699	0.00200
15.10	1.0130	0.00230	14.80	1.0130	0.00200	13.75	0.9718	0.00240
15.20	1.0147	0.00240	14.90	1.0187	0.00260	13.80	0.9774	0.00260
						13.85	0.9739	0.00210
						13.90	0.9777	0.00230
						13.95	0.9804	0.00230
						14.00	0.9881	0.00280
						14.05	0.9913	0.00200
						14.10	0.9961	0.00220
						14.15	0.9925	0.00220
						14.20	1.0001	0.00280
						14.25	1.0002	0.00220
						14.30	1.0018	0.00220
						14.35	1.0059	0.00190
						14.40	1.0054	0.00230
						14.45	1.0117	0.00250
						14.50	1.0161	0.00290
						14.55	1.0172	0.00210
						14.60	1.0192	0.00210

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
12.70	0.9176	0.00220	12.30	0.9151	0.00210	11.90	0.9181	0.00290
12.75	0.9236	0.00350	12.35	0.9183	0.00260	11.95	0.9212	0.00260
12.80	0.9277	0.00220	12.40	0.9245	0.00250	12.00	0.9267	0.00250
12.85	0.9272	0.00230	12.45	0.9227	0.00240	12.05	0.9305	0.00230
12.90	0.9351	0.00240	12.50	0.9294	0.00280	12.10	0.9298	0.00200
12.95	0.9363	0.00260	12.55	0.9292	0.00250	12.15	0.9404	0.00210
13.00	0.9367	0.00240	12.60	0.9328	0.00260	12.20	0.9392	0.00250
13.05	0.9423	0.00290	12.65	0.9388	0.00270	12.25	0.9428	0.00210
13.10	0.9449	0.00270	12.70	0.9448	0.00240	12.30	0.9471	0.00210
13.15	0.9510	0.00260	12.75	0.9429	0.00260	12.35	0.9465	0.00210
13.20	0.9505	0.00210	12.80	0.9457	0.00310	12.40	0.9532	0.00240
13.25	0.9540	0.00190	12.85	0.9533	0.00200	12.45	0.9574	0.00260
13.30	0.9562	0.00210	12.90	0.9561	0.00200	12.50	0.9606	0.00210
13.35	0.9617	0.00230	12.95	0.9570	0.00240	12.55	0.9655	0.00260
13.40	0.9626	0.00280	13.00	0.9598	0.00260	12.60	0.9719	0.00210
13.45	0.9664	0.00250	13.05	0.9622	0.00220	12.65	0.9694	0.00250
13.50	0.9717	0.00270	13.10	0.9693	0.00220	12.70	0.9783	0.00250
13.55	0.9742	0.00260	13.15	0.9696	0.00240	12.75	0.9800	0.00280
13.60	0.9752	0.00210	13.20	0.9757	0.00210	12.80	0.9825	0.00230
13.65	0.9750	0.00230	13.25	0.9733	0.00290	12.85	0.9858	0.00300
13.70	0.9845	0.00270	13.30	0.9791	0.00290	12.90	0.9867	0.00300
13.75	0.9868	0.00270	13.35	0.9833	0.00260	12.95	0.9942	0.00200
13.80	0.9893	0.00260	13.40	0.9876	0.00220	13.00	0.9958	0.00290
13.85	0.9921	0.00250	13.45	0.9923	0.00260	13.05	0.9945	0.00230
13.90	0.9964	0.00250	13.50	0.9975	0.00250	13.10	1.0001	0.00250
13.95	0.9918	0.00320	13.55	0.9966	0.00210	13.15	1.0086	0.00250
14.00	1.0036	0.00220	13.60	0.9984	0.00240	13.20	1.0097	0.00260
14.05	1.0035	0.00210	13.65	1.0039	0.00280	13.25	1.0143	0.00230
14.10	1.0051	0.00220	13.70	1.0023	0.00220	13.30	1.0145	0.00240
14.15	1.0067	0.00250	13.75	1.0097	0.00270	13.35	1.0155	0.00240
14.20	1.0152	0.00200	13.80	1.0147	0.00250	13.40	1.0235	0.00350
14.25	1.0129	0.00260	13.85	1.0149	0.00190			
14.30	1.0159	0.00260	13.90	1.0189	0.00270			
14.35	1.0135	0.00230						
14.40	1.0233	0.00270						

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.40	0.9084	0.00300	11.30	0.9135	0.00230	11.10	0.9099	0.00260
11.45	0.9131	0.00360	11.35	0.9193	0.00260	11.15	0.9121	0.00300
11.50	0.9215	0.00290	11.40	0.9218	0.00230	11.20	0.9158	0.00250
11.55	0.9234	0.00210	11.45	0.9299	0.00230	11.25	0.9255	0.00230
11.60	0.9277	0.00250	11.50	0.9256	0.00200	11.30	0.9239	0.00310
11.65	0.9260	0.00270	11.55	0.9365	0.00340	11.35	0.9301	0.00280
11.70	0.9324	0.00210	11.60	0.9389	0.00230	11.40	0.9364	0.00290
11.75	0.9406	0.00220	11.65	0.9415	0.00230	11.45	0.9381	0.00270
11.80	0.9413	0.00240	11.70	0.9473	0.00330	11.50	0.9454	0.00270
11.85	0.9417	0.00300	11.75	0.9510	0.00280	11.55	0.9427	0.00300
11.90	0.9454	0.00240	11.80	0.9524	0.00220	11.60	0.9505	0.00240
11.95	0.9492	0.00280	11.85	0.9552	0.00290	11.65	0.9480	0.00290
12.00	0.9574	0.00240	11.90	0.9635	0.00230	11.70	0.9581	0.00250
12.05	0.9609	0.00290	11.95	0.9693	0.00240	11.75	0.9678	0.00270
12.10	0.9649	0.00300	12.00	0.9718	0.00270	11.80	0.9697	0.00280
12.15	0.9683	0.00260	12.05	0.9744	0.00210	11.85	0.9722	0.00250
12.20	0.9752	0.00290	12.10	0.9785	0.00280	11.90	0.9721	0.00260
12.25	0.9712	0.00250	12.15	0.9810	0.00270	11.95	0.9737	0.00230
12.30	0.9764	0.00310	12.20	0.9842	0.00220	12.00	0.9840	0.00220
12.35	0.9842	0.00260	12.25	0.9893	0.00230	12.05	0.9828	0.00240
12.40	0.9835	0.00220	12.30	0.9968	0.00270	12.10	0.9894	0.00290
12.45	0.9926	0.00230	12.35	0.9990	0.00240	12.15	0.9945	0.00260
12.50	0.9930	0.00260	12.40	0.9981	0.00240	12.20	0.9948	0.00250
12.55	1.0042	0.00220	12.45	1.0043	0.00290	12.25	0.9956	0.00260
12.60	1.0017	0.00230	12.50	1.0065	0.00250	12.30	1.0006	0.00240
12.65	1.0048	0.00290	12.55	1.0103	0.00240	12.35	1.0080	0.00280
12.70	1.0074	0.00230	12.60	1.0133	0.00290	12.40	1.0153	0.00260
12.75	1.0071	0.00280	12.65	1.0179	0.00240	12.45	1.0147	0.00290
12.80	1.0165	0.00300	12.70	1.0239	0.00290	12.50	1.0188	0.00280
12.85	1.0138	0.00240						
12.90	1.0218	0.00230						

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.00	0.9123	0.00280	10.70	0.9129	0.00270	10.60	0.9177	0.00220
11.05	0.9164	0.00280	10.75	0.9203	0.00270	10.65	0.9298	0.00280
11.10	0.9229	0.00250	10.80	0.9228	0.00280	10.70	0.9266	0.00300
11.15	0.9248	0.00290	10.85	0.9265	0.00260	10.75	0.9266	0.00260
11.20	0.9301	0.00260	10.90	0.9306	0.00230	10.80	0.9322	0.00230
11.25	0.9359	0.00240	10.95	0.9406	0.00250	10.85	0.9421	0.00250
11.30	0.9362	0.00240	11.00	0.9404	0.00290	10.90	0.9435	0.00230
11.35	0.9440	0.00240	11.05	0.9473	0.00250	10.95	0.9475	0.00280
11.40	0.9492	0.00250	11.10	0.9504	0.00360	11.00	0.9483	0.00280
11.45	0.9522	0.00260	11.15	0.9558	0.00270	11.05	0.9519	0.00260
11.50	0.9587	0.00240	11.20	0.9582	0.00260	11.10	0.9592	0.00240
11.55	0.9548	0.00350	11.25	0.9636	0.00280	11.15	0.9628	0.00260
11.60	0.9640	0.00250	11.30	0.9655	0.00280	11.20	0.9689	0.00310
11.65	0.9684	0.00270	11.35	0.9750	0.00240	11.25	0.9701	0.00230
11.70	0.9697	0.00240	11.40	0.9764	0.00220	11.30	0.9732	0.00270
11.75	0.9709	0.00250	11.45	0.9757	0.00260	11.35	0.9767	0.00250
11.80	0.9790	0.00240	11.50	0.9868	0.00270	11.40	0.9828	0.00250
11.85	0.9820	0.00230	11.55	0.9867	0.00300	11.45	0.9881	0.00280
11.90	0.9855	0.00260	11.60	0.9890	0.00230	11.50	0.9907	0.00230
11.95	0.9893	0.00230	11.65	0.9927	0.00240	11.55	0.9926	0.00280
12.00	0.9944	0.00250	11.70	1.0029	0.00270	11.60	1.0038	0.00230
12.05	0.9987	0.00250	11.75	1.0028	0.00300	11.65	1.0085	0.00240
12.10	1.0016	0.00260	11.80	1.0037	0.00260	11.70	1.0105	0.00260
12.15	1.0063	0.00220	11.85	1.0113	0.00240	11.75	1.0086	0.00250
12.20	1.0085	0.00240	11.90	1.0206	0.00250	11.80	1.0108	0.00260
12.25	1.0141	0.00230	11.95	1.0192	0.00260	11.85	1.0230	0.00260
12.30	1.0148	0.00260	12.00	1.0220	0.00290	11.90	1.0207	0.00290
12.35	1.0254	0.00250						
12.40	1.0255	0.00280						

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.50	0.9167	0.00250	10.50	0.9177	0.00240	10.50	0.9240	0.00290
10.55	0.9180	0.00240	10.55	0.9221	0.00250	10.55	0.9251	0.00230
10.60	0.9199	0.00210	10.60	0.9219	0.00280	10.60	0.9270	0.00250
10.65	0.9279	0.00260	10.65	0.9303	0.00280	10.65	0.9334	0.00240
10.70	0.9344	0.00190	10.70	0.9332	0.00210	10.70	0.9319	0.00250
10.75	0.9337	0.00280	10.75	0.9374	0.00230	10.75	0.9385	0.00260
10.80	0.9427	0.00230	10.80	0.9373	0.00240	10.80	0.9458	0.00290
10.85	0.9451	0.00230	10.85	0.9435	0.00220	10.85	0.9502	0.00230
10.90	0.9493	0.00240	10.90	0.9481	0.00260	10.90	0.9564	0.00230
10.95	0.9514	0.00220	10.95	0.9520	0.00300	10.95	0.9558	0.00230
11.00	0.9563	0.00240	11.00	0.9581	0.00230	11.00	0.9603	0.00240
11.05	0.9590	0.00280	11.05	0.9608	0.00230	11.05	0.9708	0.00250
11.10	0.9625	0.00220	11.10	0.9666	0.00290	11.10	0.9684	0.00270
11.15	0.9695	0.00220	11.15	0.9709	0.00260	11.15	0.9718	0.00260
11.20	0.9637	0.00260	11.20	0.9714	0.00250	11.20	0.9719	0.00200
11.25	0.9760	0.00240	11.25	0.9726	0.00240	11.25	0.9795	0.00270
11.30	0.9772	0.00240	11.30	0.9795	0.00240	11.30	0.9817	0.00250
11.35	0.9811	0.00220	11.35	0.9869	0.00250	11.35	0.9868	0.00220
11.40	0.9886	0.00250	11.40	0.9918	0.00230	11.40	0.9914	0.00240
11.45	0.9911	0.00220	11.45	0.9879	0.00280	11.45	0.9923	0.00230
11.50	0.9976	0.00290	11.50	1.0039	0.00300	11.50	0.9965	0.00220
11.55	1.0005	0.00220	11.55	0.9985	0.00260	11.55	1.0007	0.00230
11.60	1.0003	0.00260	11.60	1.0053	0.00220	11.60	1.0051	0.00240
11.65	1.0090	0.00220	11.65	1.0038	0.00240	11.65	1.0096	0.00220
11.70	1.0126	0.00240	11.70	1.0139	0.00300	11.70	1.0146	0.00340
11.75	1.0167	0.00270	11.75	1.0140	0.00250	11.75	1.0188	0.00290
11.80	1.0174	0.00240	11.80	1.0176	0.00250	11.80	1.0196	0.00240
11.85	1.0205	0.00290	11.85	1.0235	0.00300	11.85	1.0229	0.00240
11.90	1.0202	0.00240	11.90	1.0286	0.00260	11.90	1.0297	0.00230

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.40	0.9160	0.00240	10.40	0.9210	0.00250	10.40	0.9193	0.00220
10.45	0.9184	0.00230	10.45	0.9273	0.00250	10.45	0.9280	0.00200
10.50	0.9245	0.00260	10.50	0.9303	0.00220	10.50	0.9275	0.00220
10.55	0.9305	0.00280	10.55	0.9311	0.00250	10.55	0.9354	0.00300
10.60	0.9285	0.00190	10.60	0.9362	0.00210	10.60	0.9344	0.00220
10.65	0.9343	0.00270	10.65	0.9400	0.00210	10.65	0.9386	0.00280
10.70	0.9405	0.00180	10.70	0.9448	0.00270	10.70	0.9437	0.00280
10.75	0.9462	0.00220	10.75	0.9487	0.00260	10.75	0.9439	0.00200
10.80	0.9499	0.00250	10.80	0.9503	0.00220	10.80	0.9482	0.00240
10.85	0.9554	0.00230	10.85	0.9572	0.00220	10.85	0.9562	0.00230
10.90	0.9531	0.00260	10.90	0.9559	0.00270	10.90	0.9594	0.00190
10.95	0.9582	0.00240	10.95	0.9608	0.00260	10.95	0.9605	0.00290
11.00	0.9636	0.00280	11.00	0.9680	0.00230	11.00	0.9665	0.00210
11.05	0.9691	0.00200	11.05	0.9719	0.00220	11.05	0.9661	0.00210
11.10	0.9683	0.00240	11.10	0.9719	0.00260	11.10	0.9764	0.00220
11.15	0.9735	0.00250	11.15	0.9754	0.00200	11.15	0.9732	0.00240
11.20	0.9825	0.00230	11.20	0.9784	0.00230	11.20	0.9799	0.00260
11.25	0.9802	0.00220	11.25	0.9815	0.00300	11.25	0.9839	0.00220
11.30	0.9885	0.00250	11.30	0.9891	0.00220	11.30	0.9889	0.00210
11.35	0.9888	0.00190	11.35	0.9894	0.00220	11.35	0.9960	0.00250
11.40	0.9892	0.00240	11.40	0.9968	0.00250	11.40	0.9955	0.00220
11.45	0.9961	0.00230	11.45	0.9966	0.00230	11.45	0.9946	0.00290
11.50	0.9952	0.00230	11.50	1.0054	0.00220	11.50	1.0002	0.00240
11.55	1.0039	0.00280	11.55	1.0065	0.00250	11.55	1.0072	0.00270
11.60	1.0079	0.00240	11.60	1.0089	0.00230	11.60	1.0088	0.00230
11.65	1.0099	0.00220	11.65	1.0128	0.00220	11.65	1.0105	0.00240
11.70	1.0160	0.00250	11.70	1.0149	0.00220	11.70	1.0173	0.00200
11.75	1.0135	0.00230	11.75	1.0216	0.00260	11.75	1.0205	0.00200
11.80	1.0207	0.00220	11.80	1.0278	0.00230	11.80	1.0228	0.00270
11.85	1.0216	0.00210						
11.90	1.0305	0.00260						

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.40	0.9250	0.00230	10.30	0.9229	0.00250	10.10	0.9175	0.00260
10.45	0.9267	0.00270	10.35	0.9286	0.00240	10.15	0.9210	0.00230
10.50	0.9302	0.00200	10.40	0.9285	0.00240	10.20	0.9265	0.00300
10.55	0.9342	0.00200	10.45	0.9338	0.00220	10.25	0.9345	0.00230
10.60	0.9358	0.00210	10.50	0.9364	0.00210	10.30	0.9385	0.00190
10.65	0.9414	0.00270	10.55	0.9400	0.00220	10.35	0.9364	0.00320
10.70	0.9488	0.00230	10.60	0.9508	0.00230	10.40	0.9442	0.00200
10.75	0.9466	0.00200	10.65	0.9496	0.00220	10.45	0.9442	0.00260
10.80	0.9570	0.00220	10.70	0.9550	0.00250	10.50	0.9509	0.00250
10.85	0.9565	0.00230	10.75	0.9519	0.00200	10.55	0.9573	0.00220
10.90	0.9623	0.00370	10.80	0.9611	0.00200	10.60	0.9621	0.00240
10.95	0.9638	0.00240	10.85	0.9650	0.00210	10.65	0.9636	0.00230
11.00	0.9656	0.00290	10.90	0.9683	0.00240	10.70	0.9673	0.00250
11.05	0.9726	0.00210	10.95	0.9755	0.00220	10.75	0.9685	0.00250
11.10	0.9758	0.00260	11.00	0.9799	0.00240	10.80	0.9734	0.00220
11.15	0.9822	0.00190	11.05	0.9770	0.00210	10.85	0.9755	0.00250
11.20	0.9834	0.00250	11.10	0.9781	0.00300	10.90	0.9800	0.00200
11.25	0.9816	0.00240	11.15	0.9850	0.00250	10.95	0.9810	0.00240
11.30	0.9923	0.00220	11.20	0.9907	0.00230	11.00	0.9907	0.00210
11.35	0.9932	0.00260	11.25	0.9966	0.00230	11.05	0.9937	0.00230
11.40	0.9986	0.00310	11.30	0.9967	0.00280	11.10	0.9981	0.00270
11.45	0.9992	0.00210	11.35	1.0055	0.00210	11.15	1.0015	0.00260
11.50	1.0040	0.00210	11.40	1.0019	0.00250	11.20	1.0059	0.00200
11.55	1.0057	0.00260	11.45	1.0063	0.00230	11.25	1.0047	0.00260
11.60	1.0119	0.00210	11.50	1.0095	0.00280	11.30	1.0060	0.00230
11.65	1.0148	0.00220	11.55	1.0134	0.00190	11.35	1.0077	0.00210
11.70	1.0163	0.00260	11.60	1.0180	0.00250	11.40	1.0144	0.00230
11.75	1.0208	0.00220	11.65	1.0205	0.00220	11.45	1.0159	0.00260
11.80	1.0289	0.00240	11.70	1.0259	0.00220	11.50	1.0216	0.00220

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.80	0.9219	0.00210	9.50	0.9261	0.00190	9.10	0.9211	0.00200
9.85	0.9216	0.00240	9.55	0.9300	0.00190	9.15	0.9233	0.00210
9.90	0.9281	0.00220	9.60	0.9331	0.00230	9.20	0.9251	0.00200
9.95	0.9352	0.00220	9.65	0.9409	0.00200	9.25	0.9347	0.00220
10.00	0.9408	0.00220	9.70	0.9399	0.00210	9.30	0.9349	0.00210
10.05	0.9404	0.00260	9.75	0.9477	0.00210	9.35	0.9383	0.00230
10.10	0.9453	0.00250	9.80	0.9502	0.00200	9.40	0.9446	0.00170
10.15	0.9493	0.00210	9.85	0.9517	0.00230	9.45	0.9472	0.00210
10.20	0.9560	0.00210	9.90	0.9557	0.00210	9.50	0.9509	0.00250
10.25	0.9591	0.00200	9.95	0.9613	0.00240	9.55	0.9626	0.00260
10.30	0.9625	0.00250	10.00	0.9648	0.00260	9.60	0.9631	0.00210
10.35	0.9639	0.00220	10.05	0.9698	0.00210	9.65	0.9678	0.00190
10.40	0.9695	0.00180	10.10	0.9751	0.00230	9.70	0.9717	0.00260
10.45	0.9732	0.00220	10.15	0.9728	0.00190	9.75	0.9760	0.00220
10.50	0.9743	0.00190	10.20	0.9777	0.00220	9.80	0.9798	0.00200
10.55	0.9745	0.00210	10.25	0.9881	0.00250	9.85	0.9787	0.00180
10.60	0.9818	0.00300	10.30	0.9867	0.00210	9.90	0.9844	0.00200
10.65	0.9923	0.00250	10.35	0.9934	0.00260	9.95	0.9920	0.00210
10.70	0.9877	0.00210	10.40	0.9970	0.00240	10.00	0.9916	0.00230
10.75	0.9903	0.00180	10.45	1.0067	0.00240	10.05	0.9955	0.00210
10.80	1.0008	0.00190	10.50	1.0011	0.00290	10.10	1.0025	0.00230
10.85	1.0032	0.00180	10.55	1.0071	0.00220	10.15	1.0025	0.00200
10.90	1.0042	0.00200	10.60	1.0104	0.00200	10.20	1.0122	0.00190
10.95	1.0129	0.00200	10.65	1.0158	0.00220	10.25	1.0185	0.00220
11.00	1.0151	0.00220	10.70	1.0188	0.00280	10.30	1.0203	0.00220
11.05	1.0161	0.00200	10.75	1.0229	0.00210	10.35	1.0198	0.00180
11.10	1.0215	0.00190	10.80	1.0272	0.00280	10.40	1.0284	0.00190
11.15	1.0212	0.00200						
11.20	1.0304	0.00190						

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.80	0.9207	0.00260	8.70	0.9258	0.00180	8.50	0.9184	0.00260
8.85	0.9245	0.00270	8.75	0.9304	0.00220	8.55	0.9287	0.00200
8.90	0.9283	0.00190	8.80	0.9340	0.00190	8.60	0.9297	0.00190
8.95	0.9348	0.00180	8.85	0.9449	0.00200	8.65	0.9339	0.00180
9.00	0.9360	0.00180	8.90	0.9437	0.00180	8.70	0.9403	0.00220
9.05	0.9396	0.00210	8.95	0.9481	0.00180	8.75	0.9448	0.00180
9.10	0.9409	0.00240	9.00	0.9515	0.00200	8.80	0.9434	0.00180
9.15	0.9518	0.00190	9.05	0.9554	0.00220	8.85	0.9520	0.00220
9.20	0.9531	0.00200	9.10	0.9648	0.00280	8.90	0.9555	0.00170
9.25	0.9592	0.00210	9.15	0.9674	0.00170	8.95	0.9614	0.00220
9.30	0.9659	0.00270	9.20	0.9691	0.00230	9.00	0.9672	0.00170
9.35	0.9688	0.00200	9.25	0.9789	0.00190	9.05	0.9695	0.00220
9.40	0.9711	0.00230	9.30	0.9794	0.00230	9.10	0.9728	0.00220
9.45	0.9753	0.00180	9.35	0.9859	0.00210	9.15	0.9822	0.00190
9.50	0.9822	0.00260	9.40	0.9876	0.00210	9.20	0.9815	0.00210
9.55	0.9851	0.00190	9.45	0.9927	0.00250	9.25	0.9906	0.00230
9.60	0.9883	0.00240	9.50	0.9978	0.00210	9.30	0.9970	0.00200
9.65	0.9957	0.00230	9.55	1.0027	0.00190	9.35	0.9967	0.00190
9.70	0.9977	0.00210	9.60	0.9995	0.00180	9.40	0.9994	0.00170
9.75	1.0029	0.00190	9.65	1.0092	0.00190	9.45	1.0052	0.00200
9.80	1.0100	0.00180	9.70	1.0176	0.00210	9.50	1.0117	0.00180
9.85	1.0149	0.00190	9.75	1.0169	0.00260	9.55	1.0176	0.00190
9.90	1.0182	0.00260	9.80	1.0198	0.00230	9.60	1.0191	0.00230
9.95	1.0208	0.00210	9.85	1.0269	0.00230	9.65	1.0228	0.00200
10.00	1.0253	0.00230	9.90	1.0313	0.00220	9.70	1.0263	0.00250
10.05	1.0297	0.00240						
10.10	1.0335	0.00230						

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.30	0.9278	0.00230	8.00	0.9183	0.00170	6.90	0.9201	0.00150
8.35	0.9297	0.00230	8.05	0.9273	0.00250	6.95	0.9245	0.00160
8.40	0.9380	0.00240	8.10	0.9344	0.00190	7.00	0.9304	0.00160
8.45	0.9414	0.00190	8.15	0.9376	0.00210	7.05	0.9364	0.00180
8.50	0.9486	0.00230	8.20	0.9402	0.00200	7.10	0.9396	0.00180
8.55	0.9516	0.00220	8.25	0.9474	0.00210	7.15	0.9473	0.00180
8.60	0.9602	0.00180	8.30	0.9554	0.00180	7.20	0.9562	0.00250
8.65	0.9608	0.00240	8.35	0.9583	0.00170	7.25	0.9660	0.00250
8.70	0.9654	0.00200	8.40	0.9644	0.00200	7.30	0.9622	0.00200
8.75	0.9717	0.00230	8.45	0.9675	0.00170	7.35	0.9738	0.00200
8.80	0.9760	0.00190	8.50	0.9746	0.00200	7.40	0.9751	0.00170
8.85	0.9834	0.00200	8.55	0.9793	0.00200	7.45	0.9831	0.00170
8.90	0.9871	0.00190	8.60	0.9855	0.00230	7.50	0.9844	0.00180
8.95	0.9918	0.00190	8.65	0.9884	0.00230	7.55	0.9911	0.00220
9.00	0.9936	0.00210	8.70	0.9931	0.00170	7.60	1.0005	0.00160
9.05	0.9992	0.00180	8.75	0.9953	0.00220	7.65	1.0068	0.00250
9.10	1.0037	0.00210	8.80	0.9999	0.00210	7.70	1.0139	0.00220
9.15	1.0078	0.00200	8.85	1.0071	0.00200	7.75	1.0145	0.00220
9.20	1.0110	0.00200	8.90	1.0153	0.00240	7.80	1.0190	0.00210
9.25	1.0177	0.00190	8.95	1.0179	0.00190	7.85	1.0247	0.00210
9.30	1.0185	0.00230	9.00	1.0193	0.00210	7.90	1.0330	0.00180
9.35	1.0258	0.00160	9.05	1.0265	0.00190			
9.40	1.0260	0.00220	9.10	1.0291	0.00220			

18900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma
6.20	0.9178	0.00160
6.25	0.9247	0.00150
6.30	0.9295	0.00190
6.35	0.9363	0.00210
6.40	0.9451	0.00170
6.45	0.9466	0.00160
6.50	0.9552	0.00210
6.55	0.9617	0.00220
6.60	0.9679	0.00230
6.65	0.9748	0.00200
6.70	0.9805	0.00150
6.75	0.9862	0.00240
6.80	0.9897	0.00150
6.85	0.9984	0.00180
6.90	1.0005	0.00210
6.95	1.0084	0.00260
7.00	1.0173	0.00170
7.05	1.0239	0.00180
7.10	1.0315	0.00170

Case ID: U_sphere_093.5_01ref

Material: Uranium metal in water

Geometry: Sphere

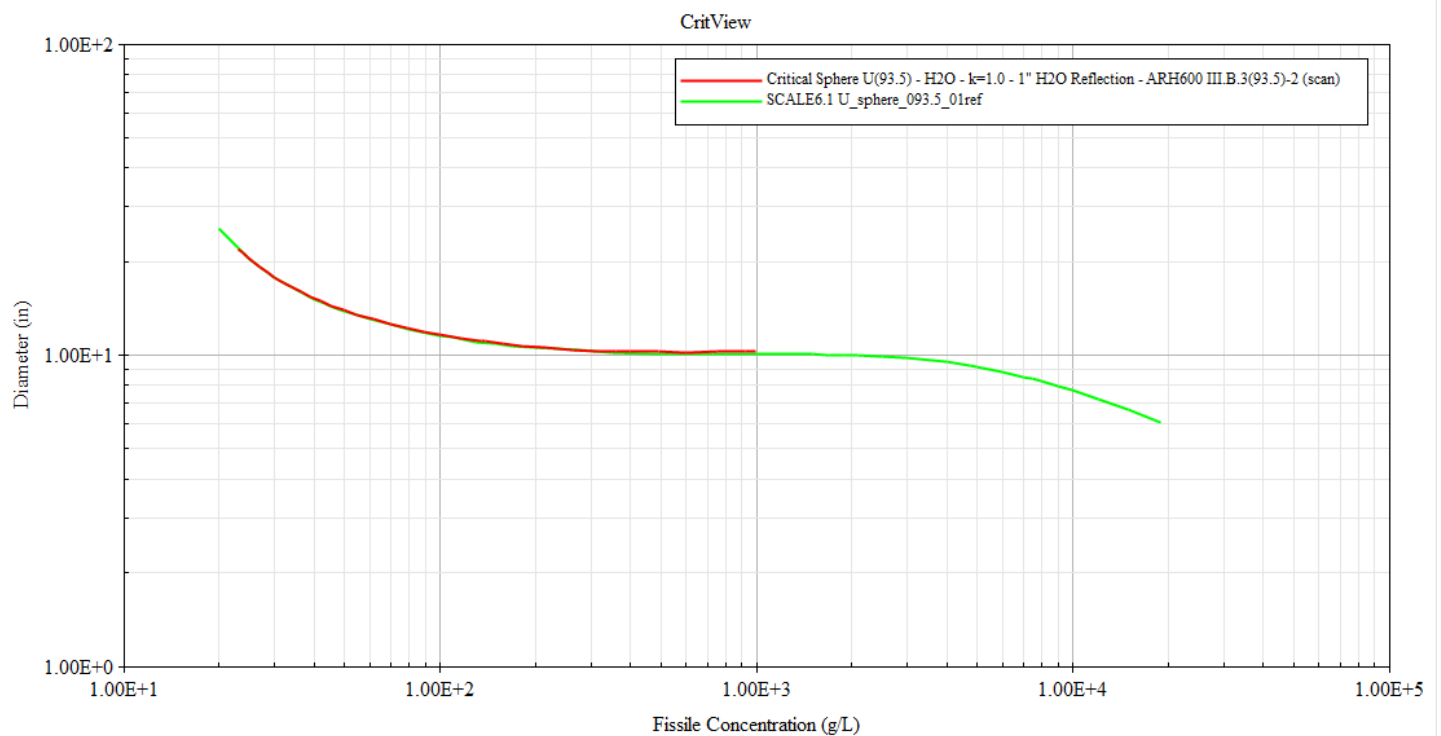
Isotopics: 93.5% ^{235}U 6.5% ^{238}U

Reflector: 1" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



93.5% ²³⁵ U Sphere- 1 Inch of Water Reflection				
Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.020	20.700	27.200	0.300	25.5907
0.025	17.200	20.900	0.100	20.2244
0.030	15.300	18.200	0.100	17.7593
0.040	13.300	15.500	0.100	15.1172
0.045	12.800	14.700	0.100	14.4387
0.050	12.300	14.100	0.100	13.8340
0.055	12.000	13.800	0.100	13.4122
0.060	11.600	13.400	0.100	13.0818
0.065	11.400	13.000	0.050	12.7971
0.070	11.200	12.800	0.050	12.5274
0.080	10.800	12.400	0.050	12.1286
0.100	10.400	11.900	0.050	11.4927
0.130	10.000	11.400	0.050	11.0385
0.150	9.800	11.200	0.050	10.8682
0.170	9.700	11.000	0.050	10.6814
0.200	9.500	10.800	0.050	10.5506
0.350	9.200	10.500	0.050	10.1826
0.500	9.100	10.400	0.050	10.0643
0.800	9.000	10.300	0.050	10.0679
1.000	9.000	10.300	0.050	10.0588
1.500	9.000	10.400	0.050	10.0556
1.700	9.000	10.300	0.050	10.0359
1.900	9.000	10.400	0.050	10.0226
2.000	8.900	10.300	0.050	10.0167
2.100	8.900	10.300	0.050	9.9899
2.500	8.900	10.200	0.050	9.9319
3.000	8.800	10.100	0.050	9.7821
4.000	8.500	9.800	0.050	9.4988
5.000	8.200	9.500	0.050	9.1426
6.000	7.900	9.200	0.050	8.8432
7.000	7.700	8.900	0.050	8.5281
7.500	7.500	8.700	0.050	8.3848
8.000	7.400	8.500	0.050	8.2477
9.000	7.200	8.300	0.050	7.9755
10.000	6.900	8.000	0.050	7.7284
15.000	6.100	7.000	0.050	6.7136
18.900	5.500	6.300	0.050	6.0773

WORM and SCALE Input File

```

'Worm generated by Natalie 6/24/21
'Recreating data from PRC-NS-00009 B-556 (pdf pg574)
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
0.02,0.025,0.03,0.04,0.045,0.05,0.055,0.06,0.065,0.07,0.08,0.1,0.13,0.15,0.17,0.2,0.35,0.5,0.8,1,
1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/18.9)>
,
#Starting Diameter = <@startdia =
20.7,17.2,15.3,13.3,12.8,12.3,12,11.6,11.4,11.2,10.8,10.4,10,9.8,9.7,9.5,9.2,9.1,9,9,9,9,8.9,8.
9,8.9,8.8,8.5,8.2,7.9,7.7,7.5,7.4,7.2,6.9,6.1,5.5> in
#Ending Diameter = <@enddia =
27.2,20.9,18.2,15.5,14.7,14.1,13.8,13.4,13,12.8,12.4,11.9,11.4,11.2,11,10.8,10.5,10.4,10.3,10.3,1
0.4,10.3,10.4,10.3,10.3,10.2,10.1,9.8,9.5,9.2,8.9,8.7,8.5,8.3,8,7,6.3> in
#Delta = <@delta =
0.3,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,
0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05> in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected Uranium Sphere
v7-238
read composition
  u          1 den=<critconc> 1 300
                        92235 93.5
                        92238 6.5   end
<&ZEROCHECK(wconc)\1>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere With Water Reflector"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(diameter*in)/2+(1*in)}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; U; 1" Water Reflector; 93.5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 0.935 U238 0.065
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.020 25.5907
0.025 20.2244
0.030 17.7593
0.040 15.1172
0.045 14.4387
0.050 13.8340
0.055 13.4122
0.060 13.0818
0.065 12.7971
0.070 12.5274
0.080 12.1286
0.100 11.4927
0.130 11.0385
0.150 10.8682
0.170 10.6814
0.200 10.5506
0.350 10.1826
0.500 10.0643
0.800 10.0679
1.000 10.0588
1.500 10.0556
1.700 10.0359
1.900 10.0226
2.000 10.0167
2.100 9.9899
2.500 9.9319
3.000 9.7821
4.000 9.4988
5.000 9.1426
6.000 8.8432
7.000 8.5281
7.500 8.3848
8.000 8.2477
9.000 7.9755
10.000 7.7284
15.000 6.7136
18.900 6.0773
```

20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
20.70	0.9246	0.00170	17.20	0.9199	0.00160	15.30	0.9241	0.00180
21.00	0.9300	0.00170	17.30	0.9261	0.00210	15.40	0.9210	0.00190
21.30	0.9339	0.00180	17.40	0.9291	0.00150	15.50	0.9252	0.00190
21.60	0.9391	0.00140	17.50	0.9286	0.00160	15.60	0.9295	0.00170
21.90	0.9439	0.00180	17.60	0.9312	0.00160	15.70	0.9327	0.00190
22.20	0.9543	0.00190	17.70	0.9364	0.00210	15.80	0.9375	0.00220
22.50	0.9531	0.00150	17.80	0.9379	0.00170	15.90	0.9420	0.00200
22.80	0.9590	0.00180	17.90	0.9408	0.00170	16.00	0.9429	0.00200
23.10	0.9641	0.00140	18.00	0.9443	0.00180	16.10	0.9491	0.00170
23.40	0.9697	0.00230	18.10	0.9491	0.00250	16.20	0.9524	0.00180
23.70	0.9733	0.00140	18.20	0.9468	0.00190	16.30	0.9544	0.00210
24.00	0.9766	0.00200	18.30	0.9514	0.00180	16.40	0.9578	0.00190
24.30	0.9819	0.00150	18.40	0.9542	0.00150	16.50	0.9599	0.00250
24.60	0.9862	0.00200	18.50	0.9562	0.00160	16.60	0.9654	0.00200
24.90	0.9904	0.00170	18.60	0.9589	0.00170	16.70	0.9665	0.00190
25.20	0.9932	0.00170	18.70	0.9604	0.00180	16.80	0.9714	0.00230
25.50	0.9987	0.00130	18.80	0.9641	0.00190	16.90	0.9759	0.00220
25.80	1.0030	0.00160	18.90	0.9672	0.00160	17.00	0.9797	0.00210
26.10	1.0101	0.00180	19.00	0.9726	0.00190	17.10	0.9821	0.00160
26.40	1.0096	0.00180	19.10	0.9717	0.00160	17.20	0.9855	0.00160
26.70	1.0110	0.00200	19.20	0.9740	0.00180	17.30	0.9890	0.00210
27.00	1.0150	0.00180	19.30	0.9806	0.00190	17.40	0.9869	0.00160
27.20	1.0258	0.00170	19.40	0.9835	0.00170	17.50	0.9930	0.00240
			19.50	0.9835	0.00180	17.60	0.9934	0.00160
			19.60	0.9853	0.00170	17.70	0.9984	0.00190
			19.70	0.9844	0.00130	17.80	1.0011	0.00200
			19.80	0.9896	0.00200	17.90	1.0016	0.00180
			19.90	0.9917	0.00160	18.00	1.0073	0.00180
			20.00	0.9922	0.00160	18.10	1.0112	0.00230
			20.10	0.9962	0.00170	18.20	1.0114	0.00170
			20.20	0.9989	0.00230			
			20.30	1.0034	0.00210			
			20.40	1.0040	0.00190			
			20.50	1.0058	0.00160			
			20.60	1.0063	0.00140			
			20.70	1.0058	0.00150			
			20.80	1.0099	0.00180			
			20.90	1.0176	0.00170			

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
13.30	0.9186	0.00180	12.80	0.9183	0.00210	12.30	0.9189	0.00240
13.40	0.9210	0.00250	12.90	0.9272	0.00190	12.40	0.9230	0.00230
13.50	0.9249	0.00180	13.00	0.9295	0.00210	12.50	0.9277	0.00200
13.60	0.9306	0.00230	13.10	0.9365	0.00250	12.60	0.9365	0.00200
13.70	0.9353	0.00190	13.20	0.9426	0.00220	12.70	0.9447	0.00220
13.80	0.9411	0.00240	13.30	0.9457	0.00200	12.80	0.9444	0.00190
13.90	0.9437	0.00190	13.40	0.9517	0.00220	12.90	0.9567	0.00220
14.00	0.9496	0.00190	13.50	0.9535	0.00190	13.00	0.9575	0.00190
14.10	0.9506	0.00170	13.60	0.9644	0.00230	13.10	0.9611	0.00200
14.20	0.9573	0.00220	13.70	0.9689	0.00240	13.20	0.9638	0.00240
14.30	0.9600	0.00240	13.80	0.9723	0.00210	13.30	0.9730	0.00180
14.40	0.9714	0.00210	13.90	0.9785	0.00190	13.40	0.9800	0.00180
14.50	0.9698	0.00180	14.00	0.9820	0.00220	13.50	0.9866	0.00220
14.60	0.9786	0.00240	14.10	0.9858	0.00250	13.60	0.9874	0.00260
14.70	0.9768	0.00290	14.20	0.9904	0.00190	13.70	0.9940	0.00240
14.80	0.9857	0.00210	14.30	0.9986	0.00230	13.80	0.9983	0.00240
14.90	0.9876	0.00200	14.40	0.9988	0.00190	13.90	1.0033	0.00250
15.00	0.9959	0.00240	14.50	1.0019	0.00190	14.00	1.0075	0.00210
15.10	0.9995	0.00190	14.60	1.0097	0.00170	14.10	1.0155	0.00270
15.20	1.0024	0.00220	14.70	1.0143	0.00190			
15.30	1.0042	0.00180						
15.40	1.0106	0.00190						
15.50	1.0171	0.00170						

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
12.00	0.9225	0.00210	11.60	0.9150	0.00200	11.40	0.9194	0.00210
12.10	0.9242	0.00190	11.70	0.9239	0.00270	11.45	0.9224	0.00250
12.20	0.9313	0.00200	11.80	0.9305	0.00230	11.50	0.9239	0.00270
12.30	0.9415	0.00180	11.90	0.9339	0.00290	11.55	0.9280	0.00240
12.40	0.9476	0.00220	12.00	0.9387	0.00240	11.60	0.9329	0.00260
12.50	0.9519	0.00240	12.10	0.9457	0.00220	11.65	0.9340	0.00220
12.60	0.9563	0.00220	12.20	0.9534	0.00270	11.70	0.9359	0.00190
12.70	0.9616	0.00210	12.30	0.9564	0.00190	11.75	0.9462	0.00200
12.80	0.9695	0.00230	12.40	0.9631	0.00200	11.80	0.9439	0.00220
12.90	0.9706	0.00220	12.50	0.9718	0.00270	11.85	0.9459	0.00250
13.00	0.9782	0.00220	12.60	0.9799	0.00240	11.90	0.9487	0.00210
13.10	0.9885	0.00240	12.70	0.9829	0.00190	11.95	0.9545	0.00260
13.20	0.9874	0.00220	12.80	0.9841	0.00230	12.00	0.9561	0.00210
13.30	0.9956	0.00180	12.90	0.9942	0.00230	12.05	0.9626	0.00230
13.40	0.9994	0.00210	13.00	0.9991	0.00220	12.10	0.9666	0.00220
13.50	1.0043	0.00180	13.10	1.0002	0.00210	12.15	0.9631	0.00200
13.60	1.0090	0.00240	13.20	1.0086	0.00240	12.20	0.9663	0.00200
13.70	1.0154	0.00220	13.30	1.0139	0.00220	12.25	0.9702	0.00230
13.80	1.0198	0.00210	13.40	1.0188	0.00250	12.30	0.9742	0.00220
						12.35	0.9723	0.00240
						12.40	0.9803	0.00210
						12.45	0.9799	0.00200
						12.50	0.9841	0.00200
						12.55	0.9910	0.00240
						12.60	0.9962	0.00200
						12.65	0.9942	0.00210
						12.70	0.9978	0.00200
						12.75	1.0032	0.00260
						12.80	0.9998	0.00220
						12.85	1.0068	0.00270
						12.90	1.0093	0.00310
						12.95	1.0157	0.00250
						13.00	1.0133	0.00240

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
11.20	0.9178	0.00240	10.80	0.9109	0.00210	10.40	0.9171	0.00210
11.25	0.9251	0.00230	10.85	0.9164	0.00210	10.45	0.9238	0.00230
11.30	0.9232	0.00270	10.90	0.9274	0.00210	10.50	0.9244	0.00220
11.35	0.9274	0.00200	10.95	0.9248	0.00230	10.55	0.9246	0.00290
11.40	0.9279	0.00200	11.00	0.9273	0.00220	10.60	0.9354	0.00230
11.45	0.9281	0.00200	11.05	0.9302	0.00230	10.65	0.9363	0.00250
11.50	0.9431	0.00190	11.10	0.9353	0.00210	10.70	0.9393	0.00200
11.55	0.9380	0.00260	11.15	0.9396	0.00260	10.75	0.9448	0.00230
11.60	0.9456	0.00190	11.20	0.9456	0.00280	10.80	0.9499	0.00230
11.65	0.9462	0.00230	11.25	0.9502	0.00200	10.85	0.9518	0.00210
11.70	0.9519	0.00220	11.30	0.9491	0.00230	10.90	0.9545	0.00290
11.75	0.9563	0.00240	11.35	0.9507	0.00230	10.95	0.9587	0.00240
11.80	0.9572	0.00200	11.40	0.9540	0.00210	11.00	0.9635	0.00290
11.85	0.9550	0.00250	11.45	0.9613	0.00220	11.05	0.9618	0.00240
11.90	0.9653	0.00220	11.50	0.9655	0.00220	11.10	0.9644	0.00240
11.95	0.9636	0.00230	11.55	0.9614	0.00230	11.15	0.9713	0.00220
12.00	0.9729	0.00280	11.60	0.9711	0.00220	11.20	0.9789	0.00260
12.05	0.9750	0.00240	11.65	0.9712	0.00220	11.25	0.9816	0.00250
12.10	0.9772	0.00220	11.70	0.9798	0.00210	11.30	0.9833	0.00260
12.15	0.9826	0.00260	11.75	0.9808	0.00240	11.35	0.9865	0.00250
12.20	0.9824	0.00210	11.80	0.9876	0.00200	11.40	0.9942	0.00230
12.25	0.9850	0.00290	11.85	0.9840	0.00250	11.45	0.9936	0.00280
12.30	0.9895	0.00220	11.90	0.9877	0.00200	11.50	1.0011	0.00210
12.35	0.9957	0.00210	11.95	0.9933	0.00220	11.55	1.0006	0.00250
12.40	0.9938	0.00220	12.00	0.9987	0.00280	11.60	1.0026	0.00250
12.45	0.9961	0.00210	12.05	0.9951	0.00210	11.65	1.0111	0.00240
12.50	0.9983	0.00220	12.10	0.9964	0.00260	11.70	1.0084	0.00220
12.55	1.0014	0.00190	12.15	1.0027	0.00240	11.75	1.0150	0.00230
12.60	1.0087	0.00220	12.20	1.0100	0.00270	11.80	1.0157	0.00240
12.65	1.0085	0.00200	12.25	1.0155	0.00230	11.85	1.0214	0.00230
12.70	1.0175	0.00270	12.30	1.0118	0.00240	11.90	1.0237	0.00210
12.75	1.0175	0.00240	12.35	1.0137	0.00210			
12.80	1.0240	0.00240	12.40	1.0175	0.00240			

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
10.00	0.9133	0.00320	9.80	0.9173	0.00260	9.70	0.9199	0.00270
10.05	0.9181	0.00250	9.85	0.9231	0.00270	9.75	0.9252	0.00250
10.10	0.9268	0.00250	9.90	0.9282	0.00200	9.80	0.9272	0.00220
10.15	0.9301	0.00230	9.95	0.9254	0.00290	9.85	0.9308	0.00240
10.20	0.9340	0.00270	10.00	0.9314	0.00240	9.90	0.9340	0.00220
10.25	0.9440	0.00240	10.05	0.9407	0.00230	9.95	0.9387	0.00260
10.30	0.9423	0.00240	10.10	0.9447	0.00230	10.00	0.9459	0.00190
10.35	0.9466	0.00210	10.15	0.9476	0.00240	10.05	0.9536	0.00240
10.40	0.9537	0.00270	10.20	0.9491	0.00220	10.10	0.9525	0.00230
10.45	0.9530	0.00230	10.25	0.9493	0.00250	10.15	0.9530	0.00270
10.50	0.9559	0.00270	10.30	0.9555	0.00230	10.20	0.9601	0.00240
10.55	0.9600	0.00330	10.35	0.9562	0.00270	10.25	0.9573	0.00270
10.60	0.9631	0.00280	10.40	0.9593	0.00290	10.30	0.9681	0.00230
10.65	0.9708	0.00240	10.45	0.9680	0.00210	10.35	0.9754	0.00230
10.70	0.9714	0.00240	10.50	0.9732	0.00260	10.40	0.9721	0.00330
10.75	0.9778	0.00220	10.55	0.9784	0.00280	10.45	0.9776	0.00220
10.80	0.9799	0.00220	10.60	0.9831	0.00230	10.50	0.9870	0.00260
10.85	0.9826	0.00260	10.65	0.9857	0.00260	10.55	0.9904	0.00310
10.90	0.9878	0.00230	10.70	0.9892	0.00260	10.60	0.9930	0.00330
10.95	0.9949	0.00250	10.75	0.9869	0.00240	10.65	0.9963	0.00240
11.00	0.9963	0.00220	10.80	0.9988	0.00230	10.70	1.0022	0.00240
11.05	1.0011	0.00260	10.85	0.9984	0.00250	10.75	1.0040	0.00250
11.10	1.0023	0.00230	10.90	1.0028	0.00250	10.80	1.0090	0.00210
11.15	1.0044	0.00210	10.95	1.0061	0.00280	10.85	1.0142	0.00250
11.20	1.0129	0.00280	11.00	1.0065	0.00260	10.90	1.0126	0.00230
11.25	1.0120	0.00240	11.05	1.0184	0.00260	10.95	1.0179	0.00230
11.30	1.0155	0.00270	11.10	1.0179	0.00240	11.00	1.0191	0.00270
11.35	1.0200	0.00250	11.15	1.0237	0.00250			
11.40	1.0245	0.00230	11.20	1.0264	0.00240			

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
9.50	0.9134	0.00230	9.20	0.9212	0.00250	9.10	0.9184	0.00280
9.55	0.9173	0.00260	9.25	0.9223	0.00250	9.15	0.9193	0.00290
9.60	0.9190	0.00260	9.30	0.9268	0.00270	9.20	0.9305	0.00220
9.65	0.9262	0.00250	9.35	0.9304	0.00240	9.25	0.9323	0.00220
9.70	0.9318	0.00250	9.40	0.9361	0.00250	9.30	0.9346	0.00240
9.75	0.9286	0.00300	9.45	0.9374	0.00260	9.35	0.9375	0.00270
9.80	0.9390	0.00260	9.50	0.9385	0.00230	9.40	0.9424	0.00220
9.85	0.9413	0.00250	9.55	0.9462	0.00240	9.45	0.9470	0.00210
9.90	0.9497	0.00230	9.60	0.9537	0.00290	9.50	0.9545	0.00220
9.95	0.9575	0.00270	9.65	0.9561	0.00260	9.55	0.9579	0.00230
10.00	0.9584	0.00280	9.70	0.9617	0.00320	9.60	0.9616	0.00270
10.05	0.9591	0.00220	9.75	0.9627	0.00260	9.65	0.9647	0.00280
10.10	0.9626	0.00300	9.80	0.9712	0.00270	9.70	0.9682	0.00260
10.15	0.9705	0.00260	9.85	0.9676	0.00290	9.75	0.9700	0.00250
10.20	0.9751	0.00220	9.90	0.9759	0.00260	9.80	0.9755	0.00270
10.25	0.9723	0.00200	9.95	0.9827	0.00250	9.85	0.9775	0.00220
10.30	0.9805	0.00240	10.00	0.9850	0.00260	9.90	0.9837	0.00230
10.35	0.9820	0.00260	10.05	0.9919	0.00260	9.95	0.9917	0.00260
10.40	0.9911	0.00220	10.10	0.9875	0.00240	10.00	0.9940	0.00240
10.45	0.9930	0.00230	10.15	0.9972	0.00210	10.05	0.9984	0.00240
10.50	0.9986	0.00250	10.20	1.0015	0.00290	10.10	1.0040	0.00260
10.55	0.9999	0.00240	10.25	1.0057	0.00270	10.15	1.0079	0.00240
10.60	1.0081	0.00310	10.30	1.0096	0.00240	10.20	1.0095	0.00260
10.65	1.0075	0.00250	10.35	1.0107	0.00270	10.25	1.0141	0.00230
10.70	1.0142	0.00260	10.40	1.0186	0.00280	10.30	1.0154	0.00250
10.75	1.0204	0.00270	10.45	1.0234	0.00230	10.35	1.0252	0.00240
10.80	1.0178	0.00220	10.50	1.0205	0.00230	10.40	1.0286	0.00250

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
9.00	0.9156	0.00250	9.00	0.9154	0.00280	9.00	0.9162	0.00220
9.05	0.9197	0.00240	9.05	0.9172	0.00300	9.05	0.9250	0.00220
9.10	0.9250	0.00290	9.10	0.9234	0.00290	9.10	0.9259	0.00280
9.15	0.9293	0.00220	9.15	0.9247	0.00210	9.15	0.9313	0.00230
9.20	0.9291	0.00220	9.20	0.9296	0.00260	9.20	0.9343	0.00220
9.25	0.9346	0.00240	9.25	0.9324	0.00310	9.25	0.9379	0.00230
9.30	0.9430	0.00270	9.30	0.9414	0.00300	9.30	0.9443	0.00230
9.35	0.9429	0.00240	9.35	0.9460	0.00280	9.35	0.9501	0.00210
9.40	0.9503	0.00250	9.40	0.9497	0.00290	9.40	0.9522	0.00210
9.45	0.9481	0.00220	9.45	0.9512	0.00210	9.45	0.9572	0.00240
9.50	0.9593	0.00240	9.50	0.9577	0.00270	9.50	0.9579	0.00210
9.55	0.9588	0.00210	9.55	0.9591	0.00270	9.55	0.9606	0.00210
9.60	0.9628	0.00240	9.60	0.9637	0.00280	9.60	0.9681	0.00190
9.65	0.9663	0.00190	9.65	0.9660	0.00250	9.65	0.9713	0.00250
9.70	0.9731	0.00230	9.70	0.9737	0.00260	9.70	0.9745	0.00220
9.75	0.9763	0.00240	9.75	0.9769	0.00250	9.75	0.9791	0.00240
9.80	0.9796	0.00290	9.80	0.9783	0.00220	9.80	0.9837	0.00290
9.85	0.9816	0.00210	9.85	0.9848	0.00240	9.85	0.9858	0.00250
9.90	0.9874	0.00280	9.90	0.9862	0.00210	9.90	0.9904	0.00240
9.95	0.9912	0.00250	9.95	0.9896	0.00270	9.95	0.9909	0.00230
10.00	0.9986	0.00220	10.00	0.9966	0.00240	10.00	0.9941	0.00250
10.05	1.0015	0.00240	10.05	0.9994	0.00250	10.05	0.9993	0.00220
10.10	0.9973	0.00260	10.10	1.0028	0.00260	10.10	1.0055	0.00250
10.15	1.0077	0.00220	10.15	1.0079	0.00240	10.15	1.0101	0.00240
10.20	1.0100	0.00250	10.20	1.0100	0.00230	10.20	1.0061	0.00230
10.25	1.0181	0.00330	10.25	1.0129	0.00210	10.25	1.0145	0.00200
10.30	1.0186	0.00270	10.30	1.0173	0.00230	10.30	1.0188	0.00210
						10.35	1.0216	0.00240
						10.40	1.0275	0.00180

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
9.00	0.9193	0.00210	9.00	0.9223	0.00260	8.90	0.9189	0.00270
9.05	0.9206	0.00200	9.05	0.9290	0.00220	8.95	0.9201	0.00210
9.10	0.9300	0.00210	9.10	0.9307	0.00210	9.00	0.9255	0.00260
9.15	0.9280	0.00240	9.15	0.9392	0.00190	9.05	0.9336	0.00230
9.20	0.9366	0.00230	9.20	0.9407	0.00220	9.10	0.9315	0.00240
9.25	0.9427	0.00310	9.25	0.9456	0.00280	9.15	0.9386	0.00210
9.30	0.9459	0.00250	9.30	0.9466	0.00260	9.20	0.9388	0.00220
9.35	0.9474	0.00250	9.35	0.9502	0.00250	9.25	0.9447	0.00190
9.40	0.9542	0.00210	9.40	0.9543	0.00210	9.30	0.9506	0.00210
9.45	0.9593	0.00260	9.45	0.9595	0.00260	9.35	0.9549	0.00240
9.50	0.9587	0.00270	9.50	0.9638	0.00240	9.40	0.9559	0.00240
9.55	0.9616	0.00260	9.55	0.9664	0.00300	9.45	0.9596	0.00220
9.60	0.9723	0.00240	9.60	0.9694	0.00210	9.50	0.9620	0.00260
9.65	0.9735	0.00230	9.65	0.9739	0.00220	9.55	0.9676	0.00220
9.70	0.9748	0.00240	9.70	0.9746	0.00220	9.60	0.9714	0.00210
9.75	0.9801	0.00230	9.75	0.9798	0.00270	9.65	0.9714	0.00220
9.80	0.9857	0.00280	9.80	0.9802	0.00220	9.70	0.9784	0.00240
9.85	0.9864	0.00240	9.85	0.9896	0.00220	9.75	0.9803	0.00290
9.90	0.9897	0.00270	9.90	0.9891	0.00240	9.80	0.9864	0.00200
9.95	0.9920	0.00270	9.95	0.9967	0.00280	9.85	0.9882	0.00230
10.00	0.9954	0.00230	10.00	0.9986	0.00230	9.90	0.9959	0.00220
10.05	1.0018	0.00200	10.05	1.0017	0.00260	9.95	0.9951	0.00200
10.10	1.0046	0.00230	10.10	1.0033	0.00200	10.00	0.9974	0.00250
10.15	1.0113	0.00230	10.15	1.0088	0.00240	10.05	1.0052	0.00190
10.20	1.0101	0.00240	10.20	1.0159	0.00220	10.10	1.0107	0.00280
10.25	1.0169	0.00220	10.25	1.0147	0.00200	10.15	1.0087	0.00220
10.30	1.0185	0.00280	10.30	1.0188	0.00260	10.20	1.0147	0.00230
			10.35	1.0256	0.00240	10.25	1.0164	0.00260
			10.40	1.0241	0.00250	10.30	1.0194	0.00200

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
8.90	0.9194	0.00230	8.90	0.9242	0.00200	8.80	0.9235	0.00210
8.95	0.9208	0.00230	8.95	0.9301	0.00210	8.85	0.9296	0.00200
9.00	0.9257	0.00210	9.00	0.9317	0.00290	8.90	0.9326	0.00240
9.05	0.9294	0.00220	9.05	0.9390	0.00200	8.95	0.9348	0.00220
9.10	0.9331	0.00230	9.10	0.9397	0.00210	9.00	0.9420	0.00200
9.15	0.9388	0.00250	9.15	0.9470	0.00200	9.05	0.9415	0.00230
9.20	0.9413	0.00200	9.20	0.9478	0.00200	9.10	0.9503	0.00190
9.25	0.9452	0.00220	9.25	0.9507	0.00210	9.15	0.9525	0.00210
9.30	0.9470	0.00210	9.30	0.9543	0.00220	9.20	0.9551	0.00190
9.35	0.9551	0.00270	9.35	0.9582	0.00220	9.25	0.9598	0.00220
9.40	0.9558	0.00250	9.40	0.9637	0.00220	9.30	0.9603	0.00220
9.45	0.9590	0.00220	9.45	0.9692	0.00250	9.35	0.9684	0.00210
9.50	0.9671	0.00210	9.50	0.9700	0.00200	9.40	0.9707	0.00210
9.55	0.9697	0.00240	9.55	0.9702	0.00200	9.45	0.9734	0.00210
9.60	0.9693	0.00250	9.60	0.9770	0.00270	9.50	0.9768	0.00230
9.65	0.9739	0.00210	9.65	0.9824	0.00200	9.55	0.9889	0.00200
9.70	0.9791	0.00220	9.70	0.9834	0.00240	9.60	0.9859	0.00280
9.75	0.9861	0.00200	9.75	0.9909	0.00290	9.65	0.9868	0.00240
9.80	0.9840	0.00190	9.80	0.9940	0.00300	9.70	0.9922	0.00210
9.85	0.9907	0.00210	9.85	0.9963	0.00220	9.75	0.9982	0.00230
9.90	0.9932	0.00290	9.90	1.0030	0.00180	9.80	1.0010	0.00200
9.95	0.9925	0.00230	9.95	0.9983	0.00190	9.85	1.0066	0.00220
10.00	1.0019	0.00220	10.00	1.0063	0.00220	9.90	1.0100	0.00200
10.05	1.0038	0.00200	10.05	1.0107	0.00210	9.95	1.0114	0.00230
10.10	1.0050	0.00210	10.10	1.0124	0.00250	10.00	1.0128	0.00240
10.15	1.0102	0.00220	10.15	1.0180	0.00230	10.05	1.0175	0.00200
10.20	1.0130	0.00230	10.20	1.0187	0.00220	10.10	1.0225	0.00310
10.25	1.0215	0.00240						
10.30	1.0219	0.00290						

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
8.50	0.9244	0.00200	8.20	0.9206	0.00190	7.90	0.9206	0.00250
8.55	0.9265	0.00230	8.25	0.9251	0.00250	7.95	0.9224	0.00210
8.60	0.9321	0.00220	8.30	0.9310	0.00180	8.00	0.9296	0.00180
8.65	0.9354	0.00190	8.35	0.9369	0.00230	8.05	0.9327	0.00190
8.70	0.9374	0.00180	8.40	0.9356	0.00200	8.10	0.9393	0.00190
8.75	0.9443	0.00210	8.45	0.9443	0.00270	8.15	0.9380	0.00230
8.80	0.9460	0.00230	8.50	0.9477	0.00200	8.20	0.9466	0.00180
8.85	0.9524	0.00200	8.55	0.9505	0.00230	8.25	0.9538	0.00200
8.90	0.9564	0.00230	8.60	0.9558	0.00210	8.30	0.9527	0.00200
8.95	0.9586	0.00200	8.65	0.9590	0.00220	8.35	0.9570	0.00230
9.00	0.9660	0.00240	8.70	0.9640	0.00210	8.40	0.9651	0.00200
9.05	0.9683	0.00210	8.75	0.9639	0.00210	8.45	0.9670	0.00230
9.10	0.9684	0.00240	8.80	0.9720	0.00200	8.50	0.9706	0.00240
9.15	0.9731	0.00220	8.85	0.9789	0.00200	8.55	0.9743	0.00210
9.20	0.9764	0.00200	8.90	0.9798	0.00240	8.60	0.9786	0.00190
9.25	0.9815	0.00190	8.95	0.9816	0.00220	8.65	0.9841	0.00200
9.30	0.9878	0.00200	9.00	0.9890	0.00200	8.70	0.9907	0.00200
9.35	0.9948	0.00190	9.05	0.9910	0.00190	8.75	0.9948	0.00190
9.40	0.9926	0.00200	9.10	0.9931	0.00210	8.80	0.9968	0.00210
9.45	0.9960	0.00220	9.15	1.0012	0.00220	8.85	1.0005	0.00280
9.50	1.0001	0.00240	9.20	1.0038	0.00260	8.90	1.0083	0.00190
9.55	1.0044	0.00250	9.25	1.0068	0.00210	8.95	1.0105	0.00200
9.60	1.0095	0.00240	9.30	1.0129	0.00200	9.00	1.0124	0.00190
9.65	1.0130	0.00220	9.35	1.0129	0.00220	9.05	1.0196	0.00200
9.70	1.0179	0.00210	9.40	1.0161	0.00190	9.10	1.0191	0.00230
9.75	1.0188	0.00200	9.45	1.0252	0.00210	9.15	1.0211	0.00200
9.80	1.0211	0.00220	9.50	1.0251	0.00210	9.20	1.0301	0.00210

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
7.70	0.9217	0.00220	7.50	0.9191	0.00200	7.40	0.9192	0.00190
7.75	0.9312	0.00180	7.55	0.9227	0.00190	7.45	0.9266	0.00190
7.80	0.9394	0.00220	7.60	0.9281	0.00190	7.50	0.9318	0.00210
7.85	0.9411	0.00220	7.65	0.9337	0.00190	7.55	0.9373	0.00190
7.90	0.9395	0.00200	7.70	0.9377	0.00170	7.60	0.9384	0.00210
7.95	0.9504	0.00170	7.75	0.9437	0.00220	7.65	0.9449	0.00200
8.00	0.9511	0.00230	7.80	0.9437	0.00190	7.70	0.9472	0.00190
8.05	0.9592	0.00220	7.85	0.9521	0.00200	7.75	0.9532	0.00210
8.10	0.9628	0.00200	7.90	0.9559	0.00170	7.80	0.9597	0.00250
8.15	0.9627	0.00210	7.95	0.9643	0.00180	7.85	0.9654	0.00190
8.20	0.9736	0.00260	8.00	0.9645	0.00200	7.90	0.9704	0.00210
8.25	0.9748	0.00200	8.05	0.9648	0.00260	7.95	0.9746	0.00230
8.30	0.9797	0.00190	8.10	0.9776	0.00230	8.00	0.9766	0.00210
8.35	0.9858	0.00250	8.15	0.9761	0.00190	8.05	0.9835	0.00190
8.40	0.9903	0.00310	8.20	0.9858	0.00200	8.10	0.9888	0.00200
8.45	0.9933	0.00230	8.25	0.9877	0.00190	8.15	0.9914	0.00270
8.50	0.9968	0.00210	8.30	0.9899	0.00180	8.20	0.9979	0.00210
8.55	1.0025	0.00260	8.35	0.9929	0.00210	8.25	1.0001	0.00180
8.60	1.0063	0.00200	8.40	1.0031	0.00200	8.30	1.0006	0.00190
8.65	1.0121	0.00240	8.45	1.0063	0.00190	8.35	1.0063	0.00190
8.70	1.0105	0.00210	8.50	1.0082	0.00190	8.40	1.0137	0.00190
8.75	1.0184	0.00260	8.55	1.0140	0.00240	8.45	1.0198	0.00220
8.80	1.0226	0.00220	8.60	1.0168	0.00220	8.50	1.0229	0.00190
8.85	1.0259	0.00220	8.65	1.0212	0.00180			
8.90	1.0282	0.00210	8.70	1.0274	0.00240			

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
7.20	0.9262	0.00210	6.90	0.9166	0.00220	6.10	0.9278	0.00170
7.25	0.9281	0.00210	6.95	0.9204	0.00180	6.15	0.9359	0.00190
7.30	0.9363	0.00220	7.00	0.9301	0.00200	6.20	0.9372	0.00180
7.35	0.9382	0.00190	7.05	0.9310	0.00200	6.25	0.9453	0.00200
7.40	0.9444	0.00170	7.10	0.9331	0.00190	6.30	0.9525	0.00210
7.45	0.9510	0.00190	7.15	0.9424	0.00190	6.35	0.9565	0.00220
7.50	0.9548	0.00180	7.20	0.9442	0.00200	6.40	0.9640	0.00180
7.55	0.9568	0.00240	7.25	0.9522	0.00190	6.45	0.9705	0.00160
7.60	0.9640	0.00230	7.30	0.9549	0.00210	6.50	0.9792	0.00230
7.65	0.9699	0.00200	7.35	0.9619	0.00250	6.55	0.9821	0.00220
7.70	0.9746	0.00220	7.40	0.9621	0.00200	6.60	0.9891	0.00200
7.75	0.9786	0.00180	7.45	0.9712	0.00200	6.65	0.9942	0.00210
7.80	0.9807	0.00230	7.50	0.9785	0.00200	6.70	0.9978	0.00220
7.85	0.9895	0.00250	7.55	0.9825	0.00190	6.75	1.0059	0.00190
7.90	0.9969	0.00190	7.60	0.9857	0.00190	6.80	1.0115	0.00190
7.95	0.9944	0.00200	7.65	0.9932	0.00210	6.85	1.0172	0.00180
8.00	1.0054	0.00180	7.70	0.9929	0.00200	6.90	1.0237	0.00220
8.05	1.0071	0.00190	7.75	1.0054	0.00180	6.95	1.0258	0.00180
8.10	1.0110	0.00190	7.80	1.0050	0.00200	7.00	1.0332	0.00180
8.15	1.0182	0.00220	7.85	1.0118	0.00190			
8.20	1.0204	0.00200	7.90	1.0170	0.00190			
8.25	1.0257	0.00190	7.95	1.0202	0.00230			
8.30	1.0297	0.00210	8.00	1.0243	0.00230			

18900 milli-g/cc		
Diameter (Inches)	Keff	Sigma
5.50	0.9234	0.00160
5.55	0.9311	0.00160
5.60	0.9352	0.00170
5.65	0.9431	0.00170
5.70	0.9527	0.00170
5.75	0.9571	0.00190
5.80	0.9668	0.00180
5.85	0.9745	0.00200
5.90	0.9778	0.00190
5.95	0.9847	0.00200
6.00	0.9905	0.00210
6.05	0.9958	0.00190
6.10	1.0035	0.00190
6.15	1.0120	0.00210
6.20	1.0136	0.00190
6.25	1.0227	0.00190
6.30	1.0256	0.00180

Case ID: U_sphere_093.5_10ref

Material: Uranium metal in water

Geometry: Sphere

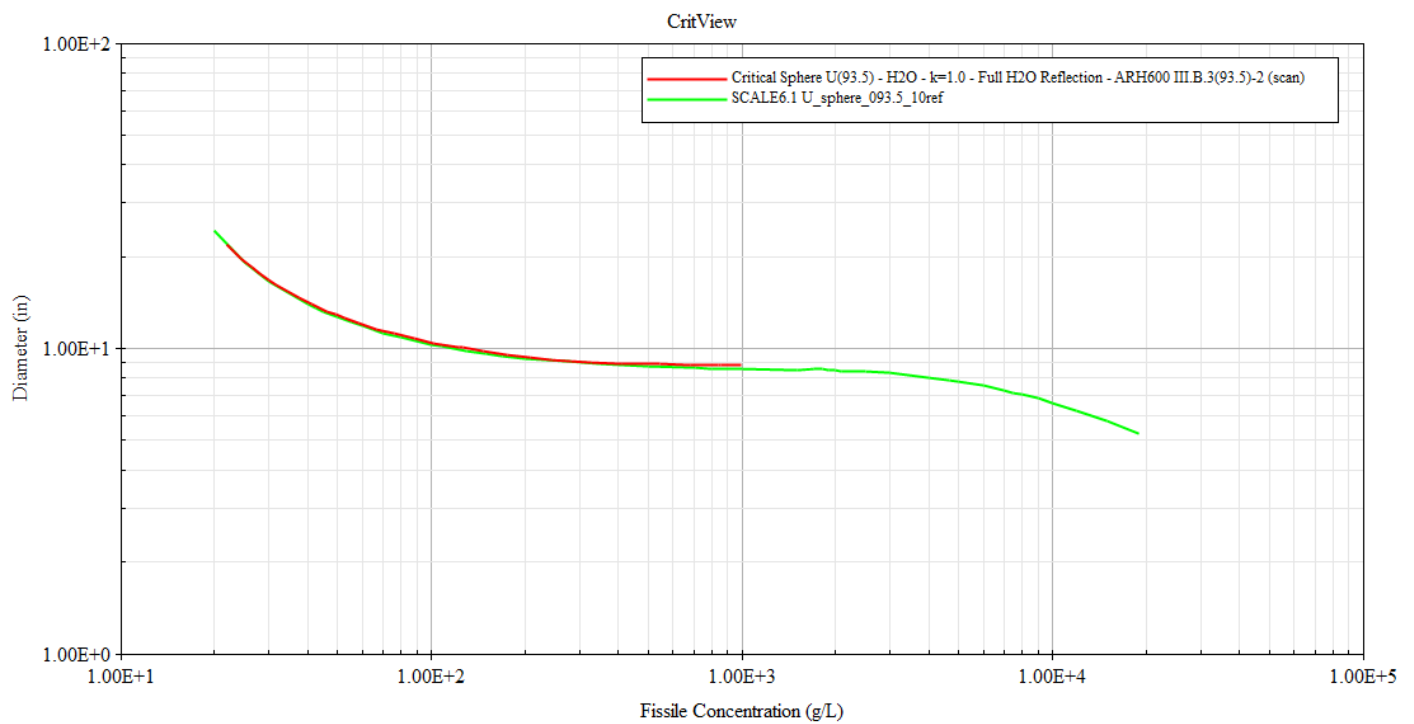
Isotopics: 93.5% ^{235}U 6.5% ^{238}U

Reflector: 10" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



93.5% ²³⁵ U Sphere- 10 Inches of Water Reflection				
Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.020	19.600	25.300	0.200	24.4688
0.025	16.100	19.800	0.100	19.1619
0.030	14.300	17.300	0.100	16.6157
0.040	12.300	14.400	0.100	14.0410
0.045	11.600	13.600	0.100	13.2185
0.050	11.200	13.100	0.100	12.6509
0.055	10.800	12.600	0.100	12.2239
0.060	10.500	12.200	0.050	11.8723
0.065	10.300	11.900	0.050	11.5900
0.070	10.000	11.700	0.050	11.2708
0.080	9.700	11.200	0.050	10.8617
0.100	9.200	10.700	0.050	10.3333
0.130	8.800	10.100	0.050	9.8333
0.150	8.600	9.900	0.050	9.6545
0.170	8.400	9.700	0.050	9.4586
0.200	8.300	9.500	0.050	9.2741
0.350	7.900	9.100	0.050	8.8767
0.500	7.800	9.000	0.050	8.7140
0.800	7.600	8.900	0.050	8.6194
1.000	7.700	8.900	0.050	8.6196
1.500	7.600	8.900	0.050	8.5222
1.700	7.600	8.900	0.050	8.5462
1.900	7.500	8.900	0.050	8.4943
2.000	7.500	8.800	0.050	8.4948
2.100	7.500	8.800	0.050	8.4565
2.500	7.400	8.800	0.050	8.4085
3.000	7.400	8.600	0.050	8.3139
4.000	7.100	8.400	0.050	8.0550
5.000	6.900	8.100	0.050	7.8033
6.000	6.700	7.800	0.050	7.5582
7.000	6.500	7.500	0.050	7.2770
7.500	6.400	7.500	0.050	7.1781
8.000	6.200	7.300	0.050	7.0593
9.000	6.100	7.100	0.050	6.8548
10.000	5.900	6.900	0.050	6.6552
15.000	5.200	6.100	0.050	5.7940
18.900	4.700	5.500	0.050	5.2841

```

# Worm generated by Natalie 6/24/21
'Recreating data from PRC-NS-00009 B-576 (pdf pg594)
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
0.02,0.025,0.03,0.04,0.045,0.05,0.055,0.06,0.065,0.07,0.08,0.1,0.13,0.15,0.17,0.2,0.35,0.5,0.8,1,
1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/18.9)>
,
#Starting Diameter = <@startdia =
19.6,16.1,14.3,12.3,11.6,11.2,10.8,10.5,10.3,10,9.7,9.2,8.8,8.6,8.4,8.3,7.9,7.8,7.6,7.7,7.6,7.6,7.
5,7.5,7.5,7.4,7.4,7.1,6.9,6.7,6.5,6.4,6.2,6.1,5.9,5.2,4.7> in
#Ending Diameter = <@enddia =
25.3,19.8,17.3,14.4,13.6,13.1,12.6,12.2,11.9,11.7,11.2,10.7,10.1,9.9,9.7,9.5,9.1,9,8.9,8.9,8.9,8.
9,8.9,8.8,8.8,8.8,8.6,8.4,8.1,7.8,7.5,7.5,7.3,7.1,6.9,6.1,5.5> in
#Delta = <@delta =
0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05
,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05> in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>)}} in
,
=csas6
Reflected Uranium Sphere Template
v7-238
read composition
u          1 den=<critconc> 1 300
          92235 93.5
          92238 6.5   end
<&ZEROCHECK(wconc)\ll>h2o          1 den=<wconc> 1 300   end
h2o        2 1 300   end
end composition
read parameter
htm=yes
end parameter
read geometry
global unit 1
com="Sphere With Water Reflector"
sphere 1    {{{(diameter*in)/2}}}
sphere 2    {{{(diameter*in)/2+(10*in)}}}
media 1 1 1
media 2 1 2 -1
boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; U; 10" Water Reflector; 93.5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 0.935 U238 0.065
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.020 24.4688
0.025 19.1619
0.030 16.6157
0.040 14.0410
0.045 13.2185
0.050 12.6509
0.055 12.2239
0.060 11.8723
0.065 11.5900
0.070 11.2708
0.080 10.8617
0.100 10.3333
0.130 9.8333
0.150 9.6545
0.170 9.4586
0.200 9.2741
0.350 8.8767
0.500 8.7140
0.800 8.6194
1.000 8.6196
1.500 8.5222
1.700 8.5462
1.900 8.4943
2.000 8.4948
2.100 8.4565
2.500 8.4085
3.000 8.3139
4.000 8.0550
5.000 7.8033
6.000 7.5582
7.000 7.2770
7.500 7.1781
8.000 7.0593
9.000 6.8548
10.000 6.6552
15.000 5.7940
18.900 5.2841
```

20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
19.60	0.9221	0.00120	16.10	0.9221	0.00170	14.30	0.9222	0.00140
19.80	0.9249	0.00150	16.20	0.9261	0.00160	14.40	0.9267	0.00180
20.00	0.9281	0.00180	16.30	0.9248	0.00170	14.50	0.9279	0.00190
20.20	0.9339	0.00140	16.40	0.9283	0.00150	14.60	0.9329	0.00170
20.40	0.9395	0.00190	16.50	0.9326	0.00170	14.70	0.9385	0.00200
20.60	0.9409	0.00170	16.60	0.9371	0.00200	14.80	0.9395	0.00170
20.80	0.9438	0.00140	16.70	0.9395	0.00190	14.90	0.9483	0.00210
21.00	0.9495	0.00140	16.80	0.9427	0.00170	15.00	0.9444	0.00210
21.20	0.9520	0.00150	16.90	0.9440	0.00200	15.10	0.9489	0.00190
21.40	0.9579	0.00140	17.00	0.9469	0.00140	15.20	0.9578	0.00150
21.60	0.9579	0.00180	17.10	0.9455	0.00140	15.30	0.9594	0.00150
21.80	0.9645	0.00130	17.20	0.9538	0.00160	15.40	0.9606	0.00180
22.00	0.9654	0.00130	17.30	0.9578	0.00190	15.50	0.9642	0.00180
22.20	0.9668	0.00190	17.40	0.9620	0.00160	15.60	0.9719	0.00150
22.40	0.9688	0.00170	17.50	0.9622	0.00220	15.70	0.9721	0.00180
22.60	0.9715	0.00140	17.60	0.9660	0.00180	15.80	0.9778	0.00170
22.80	0.9759	0.00140	17.70	0.9664	0.00190	15.90	0.9791	0.00170
23.00	0.9794	0.00140	17.80	0.9646	0.00180	16.00	0.9819	0.00160
23.20	0.9834	0.00140	17.90	0.9688	0.00150	16.10	0.9864	0.00150
23.40	0.9848	0.00120	18.00	0.9713	0.00160	16.20	0.9870	0.00170
23.60	0.9880	0.00160	18.10	0.9778	0.00190	16.30	0.9922	0.00180
23.80	0.9922	0.00170	18.20	0.9781	0.00170	16.40	0.9938	0.00190
24.00	0.9960	0.00140	18.30	0.9786	0.00160	16.50	0.9972	0.00240
24.20	0.9950	0.00160	18.40	0.9860	0.00150	16.60	0.9989	0.00200
24.40	0.9989	0.00160	18.50	0.9843	0.00140	16.70	1.0059	0.00180
24.60	1.0021	0.00120	18.60	0.9863	0.00200	16.80	1.0040	0.00170
24.80	1.0041	0.00210	18.70	0.9888	0.00140	16.90	1.0115	0.00200
25.00	1.0060	0.00130	18.80	0.9923	0.00160	17.00	1.0112	0.00170
25.20	1.0088	0.00130	18.90	0.9969	0.00150	17.10	1.0106	0.00160
25.30	1.0075	0.00160	19.00	0.9980	0.00160	17.20	1.0187	0.00180
			19.10	0.9961	0.00190	17.30	1.0193	0.00180
			19.20	1.0024	0.00160			
			19.30	1.0048	0.00170			
			19.40	1.0044	0.00140			
			19.50	1.0082	0.00180			
			19.60	1.0077	0.00200			
			19.70	1.0062	0.00190			
			19.80	1.0132	0.00150			

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
12.30	0.9215	0.00180	11.60	0.9160	0.00200	11.20	0.9220	0.00240
12.40	0.9262	0.00200	11.70	0.9206	0.00220	11.30	0.9256	0.00180
12.50	0.9305	0.00240	11.80	0.9266	0.00230	11.40	0.9305	0.00210
12.60	0.9379	0.00180	11.90	0.9361	0.00180	11.50	0.9358	0.00210
12.70	0.9414	0.00230	12.00	0.9381	0.00210	11.60	0.9437	0.00180
12.80	0.9467	0.00170	12.10	0.9424	0.00210	11.70	0.9468	0.00220
12.90	0.9524	0.00210	12.20	0.9440	0.00180	11.80	0.9558	0.00220
13.00	0.9598	0.00190	12.30	0.9520	0.00180	11.90	0.9583	0.00230
13.10	0.9641	0.00170	12.40	0.9547	0.00230	12.00	0.9651	0.00180
13.20	0.9609	0.00250	12.50	0.9615	0.00230	12.10	0.9660	0.00220
13.30	0.9647	0.00170	12.60	0.9658	0.00210	12.20	0.9759	0.00210
13.40	0.9747	0.00190	12.70	0.9744	0.00180	12.30	0.9788	0.00200
13.50	0.9737	0.00180	12.80	0.9796	0.00190	12.40	0.9868	0.00220
13.60	0.9831	0.00150	12.90	0.9795	0.00180	12.50	0.9904	0.00200
13.70	0.9873	0.00230	13.00	0.9867	0.00250	12.60	0.9944	0.00200
13.80	0.9914	0.00180	13.10	0.9935	0.00240	12.70	1.0054	0.00300
13.90	0.9939	0.00190	13.20	0.9990	0.00220	12.80	1.0065	0.00190
14.00	0.9984	0.00180	13.30	1.0044	0.00180	12.90	1.0114	0.00220
14.10	1.0023	0.00180	13.40	1.0067	0.00220	13.00	1.0105	0.00220
14.20	1.0068	0.00200	13.50	1.0108	0.00180	13.10	1.0149	0.00200
14.30	1.0128	0.00190	13.60	1.0172	0.00230			
14.40	1.0103	0.00230						

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
10.80	0.9153	0.00200	10.50	0.9144	0.00220	10.30	0.9207	0.00180
10.90	0.9220	0.00220	10.55	0.9201	0.00230	10.35	0.9267	0.00190
11.00	0.9324	0.00190	10.60	0.9203	0.00200	10.40	0.9254	0.00210
11.10	0.9351	0.00280	10.65	0.9282	0.00200	10.45	0.9284	0.00210
11.20	0.9446	0.00230	10.70	0.9281	0.00220	10.50	0.9324	0.00240
11.30	0.9499	0.00190	10.75	0.9316	0.00200	10.55	0.9400	0.00200
11.40	0.9541	0.00260	10.80	0.9375	0.00230	10.60	0.9429	0.00230
11.50	0.9577	0.00200	10.85	0.9384	0.00240	10.65	0.9454	0.00220
11.60	0.9635	0.00190	10.90	0.9462	0.00210	10.70	0.9505	0.00210
11.70	0.9683	0.00210	10.95	0.9461	0.00190	10.75	0.9499	0.00210
11.80	0.9737	0.00210	11.00	0.9486	0.00190	10.80	0.9511	0.00180
11.90	0.9809	0.00210	11.05	0.9547	0.00220	10.85	0.9576	0.00190
12.00	0.9894	0.00220	11.10	0.9530	0.00220	10.90	0.9598	0.00210
12.10	0.9934	0.00190	11.15	0.9535	0.00190	10.95	0.9587	0.00260
12.20	0.9989	0.00180	11.20	0.9580	0.00210	11.00	0.9642	0.00210
12.30	1.0035	0.00200	11.25	0.9708	0.00210	11.05	0.9703	0.00240
12.40	1.0103	0.00300	11.30	0.9660	0.00210	11.10	0.9714	0.00230
12.50	1.0111	0.00190	11.35	0.9722	0.00190	11.15	0.9769	0.00240
12.60	1.0191	0.00200	11.40	0.9713	0.00240	11.20	0.9802	0.00220
			11.45	0.9787	0.00230	11.25	0.9839	0.00220
			11.50	0.9817	0.00210	11.30	0.9853	0.00230
			11.55	0.9809	0.00200	11.35	0.9902	0.00200
			11.60	0.9813	0.00190	11.40	0.9905	0.00220
			11.65	0.9845	0.00240	11.45	0.9917	0.00200
			11.70	0.9899	0.00250	11.50	0.9964	0.00200
			11.75	0.9946	0.00170	11.55	1.0020	0.00200
			11.80	0.9959	0.00190	11.60	0.9995	0.00240
			11.85	0.9975	0.00190	11.65	1.0049	0.00240
			11.90	1.0031	0.00190	11.70	1.0113	0.00200
			11.95	1.0016	0.00190	11.75	1.0089	0.00210
			12.00	1.0082	0.00250	11.80	1.0172	0.00250
			12.05	1.0101	0.00190	11.85	1.0228	0.00210
			12.10	1.0154	0.00210	11.90	1.0238	0.00210
			12.15	1.0113	0.00220			
			12.20	1.0189	0.00220			

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
10.00	0.9177	0.00200	9.70	0.9154	0.00210	9.20	0.9147	0.00200
10.05	0.9180	0.00220	9.75	0.9215	0.00190	9.25	0.9195	0.00230
10.10	0.9219	0.00180	9.80	0.9251	0.00190	9.30	0.9260	0.00260
10.15	0.9270	0.00240	9.85	0.9273	0.00210	9.35	0.9280	0.00250
10.20	0.9252	0.00270	9.90	0.9328	0.00210	9.40	0.9360	0.00230
10.25	0.9293	0.00220	9.95	0.9376	0.00240	9.45	0.9424	0.00280
10.30	0.9360	0.00190	10.00	0.9396	0.00210	9.50	0.9379	0.00200
10.35	0.9406	0.00190	10.05	0.9468	0.00240	9.55	0.9435	0.00240
10.40	0.9434	0.00250	10.10	0.9488	0.00240	9.60	0.9502	0.00230
10.45	0.9424	0.00230	10.15	0.9516	0.00210	9.65	0.9519	0.00200
10.50	0.9498	0.00230	10.20	0.9549	0.00250	9.70	0.9550	0.00220
10.55	0.9550	0.00280	10.25	0.9585	0.00200	9.75	0.9597	0.00210
10.60	0.9594	0.00270	10.30	0.9615	0.00190	9.80	0.9649	0.00200
10.65	0.9585	0.00220	10.35	0.9676	0.00200	9.85	0.9712	0.00240
10.70	0.9647	0.00190	10.40	0.9703	0.00200	9.90	0.9690	0.00260
10.75	0.9677	0.00180	10.45	0.9721	0.00230	9.95	0.9737	0.00230
10.80	0.9737	0.00240	10.50	0.9735	0.00220	10.00	0.9772	0.00200
10.85	0.9713	0.00200	10.55	0.9782	0.00280	10.05	0.9813	0.00230
10.90	0.9721	0.00230	10.60	0.9831	0.00240	10.10	0.9846	0.00240
10.95	0.9773	0.00210	10.65	0.9843	0.00260	10.15	0.9895	0.00220
11.00	0.9813	0.00240	10.70	0.9893	0.00200	10.20	0.9925	0.00190
11.05	0.9849	0.00220	10.75	0.9906	0.00190	10.25	0.9952	0.00210
11.10	0.9836	0.00200	10.80	0.9925	0.00240	10.30	0.9992	0.00230
11.15	0.9891	0.00190	10.85	1.0007	0.00200	10.35	1.0004	0.00210
11.20	0.9913	0.00260	10.90	0.9977	0.00270	10.40	1.0023	0.00190
11.25	0.9995	0.00220	10.95	1.0030	0.00200	10.45	1.0079	0.00200
11.30	1.0007	0.00220	11.00	1.0050	0.00230	10.50	1.0098	0.00240
11.35	1.0043	0.00210	11.05	1.0104	0.00240	10.55	1.0136	0.00220
11.40	1.0036	0.00260	11.10	1.0135	0.00190	10.60	1.0157	0.00230
11.45	1.0106	0.00240	11.15	1.0161	0.00270	10.65	1.0219	0.00210
11.50	1.0125	0.00260	11.20	1.0192	0.00250	10.70	1.0286	0.00260
11.55	1.0120	0.00230						
11.60	1.0178	0.00200						
11.65	1.0201	0.00220						
11.70	1.0204	0.00220						

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
8.80	0.9157	0.00230	8.60	0.9189	0.00210	8.40	0.9054	0.00220
8.85	0.9244	0.00220	8.65	0.9295	0.00250	8.45	0.9178	0.00210
8.90	0.9273	0.00210	8.70	0.9269	0.00180	8.50	0.9206	0.00260
8.95	0.9341	0.00280	8.75	0.9309	0.00220	8.55	0.9262	0.00230
9.00	0.9311	0.00190	8.80	0.9321	0.00230	8.60	0.9315	0.00230
9.05	0.9394	0.00250	8.85	0.9406	0.00250	8.65	0.9346	0.00220
9.10	0.9456	0.00200	8.90	0.9476	0.00250	8.70	0.9380	0.00220
9.15	0.9478	0.00210	8.95	0.9494	0.00210	8.75	0.9466	0.00290
9.20	0.9503	0.00210	9.00	0.9509	0.00240	8.80	0.9488	0.00250
9.25	0.9537	0.00210	9.05	0.9554	0.00240	8.85	0.9517	0.00200
9.30	0.9611	0.00260	9.10	0.9587	0.00250	8.90	0.9557	0.00200
9.35	0.9656	0.00220	9.15	0.9630	0.00260	8.95	0.9627	0.00210
9.40	0.9677	0.00200	9.20	0.9679	0.00230	9.00	0.9592	0.00250
9.45	0.9723	0.00260	9.25	0.9725	0.00230	9.05	0.9717	0.00250
9.50	0.9739	0.00220	9.30	0.9755	0.00290	9.10	0.9666	0.00290
9.55	0.9783	0.00230	9.35	0.9764	0.00230	9.15	0.9795	0.00210
9.60	0.9830	0.00220	9.40	0.9851	0.00240	9.20	0.9780	0.00250
9.65	0.9884	0.00230	9.45	0.9881	0.00280	9.25	0.9853	0.00210
9.70	0.9912	0.00210	9.50	0.9945	0.00270	9.30	0.9911	0.00230
9.75	0.9934	0.00220	9.55	0.9942	0.00240	9.35	0.9913	0.00240
9.80	0.9944	0.00240	9.60	0.9967	0.00200	9.40	0.9991	0.00320
9.85	1.0028	0.00200	9.65	0.9991	0.00220	9.45	0.9990	0.00240
9.90	1.0061	0.00200	9.70	1.0090	0.00260	9.50	1.0048	0.00220
9.95	1.0085	0.00260	9.75	1.0133	0.00240	9.55	1.0088	0.00240
10.00	1.0132	0.00200	9.80	1.0130	0.00250	9.60	1.0136	0.00260
10.05	1.0122	0.00310	9.85	1.0162	0.00230	9.65	1.0156	0.00280
10.10	1.0156	0.00240	9.90	1.0235	0.00250	9.70	1.0176	0.00250

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
8.30	0.9190	0.00220	7.90	0.9194	0.00280	7.80	0.9197	0.00280
8.35	0.9231	0.00220	7.95	0.9199	0.00200	7.85	0.9224	0.00220
8.40	0.9268	0.00230	8.00	0.9264	0.00250	7.90	0.9301	0.00270
8.45	0.9353	0.00220	8.05	0.9287	0.00220	7.95	0.9310	0.00250
8.50	0.9358	0.00270	8.10	0.9389	0.00230	8.00	0.9386	0.00240
8.55	0.9432	0.00260	8.15	0.9426	0.00220	8.05	0.9409	0.00240
8.60	0.9492	0.00220	8.20	0.9453	0.00210	8.10	0.9493	0.00220
8.65	0.9497	0.00230	8.25	0.9528	0.00240	8.15	0.9520	0.00230
8.70	0.9544	0.00330	8.30	0.9547	0.00240	8.20	0.9593	0.00290
8.75	0.9575	0.00200	8.35	0.9587	0.00220	8.25	0.9668	0.00200
8.80	0.9610	0.00250	8.40	0.9592	0.00230	8.30	0.9676	0.00250
8.85	0.9638	0.00260	8.45	0.9670	0.00240	8.35	0.9686	0.00240
8.90	0.9709	0.00220	8.50	0.9679	0.00270	8.40	0.9720	0.00290
8.95	0.9740	0.00270	8.55	0.9768	0.00200	8.45	0.9764	0.00220
9.00	0.9746	0.00250	8.60	0.9763	0.00240	8.50	0.9797	0.00220
9.05	0.9797	0.00220	8.65	0.9802	0.00240	8.55	0.9865	0.00220
9.10	0.9882	0.00260	8.70	0.9918	0.00210	8.60	0.9931	0.00290
9.15	0.9946	0.00240	8.75	0.9961	0.00270	8.65	0.9955	0.00220
9.20	0.9950	0.00230	8.80	0.9954	0.00230	8.70	0.9984	0.00240
9.25	0.9974	0.00190	8.85	0.9968	0.00250	8.75	1.0041	0.00210
9.30	1.0028	0.00220	8.90	1.0028	0.00230	8.80	1.0069	0.00200
9.35	1.0069	0.00250	8.95	1.0107	0.00220	8.85	1.0147	0.00280
9.40	1.0096	0.00230	9.00	1.0162	0.00210	8.90	1.0161	0.00270
9.45	1.0141	0.00210	9.05	1.0181	0.00240	8.95	1.0167	0.00290
9.50	1.0198	0.00220	9.10	1.0203	0.00240	9.00	1.0220	0.00200

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
7.60	0.9124	0.00260	7.70	0.9236	0.00210	7.60	0.9237	0.00200
7.65	0.9188	0.00200	7.75	0.9332	0.00230	7.65	0.9290	0.00230
7.70	0.9191	0.00240	7.80	0.9383	0.00210	7.70	0.9305	0.00220
7.75	0.9287	0.00250	7.85	0.9354	0.00260	7.75	0.9346	0.00180
7.80	0.9335	0.00260	7.90	0.9447	0.00300	7.80	0.9370	0.00190
7.85	0.9347	0.00200	7.95	0.9480	0.00270	7.85	0.9441	0.00200
7.90	0.9359	0.00250	8.00	0.9523	0.00250	7.90	0.9470	0.00250
7.95	0.9416	0.00200	8.05	0.9530	0.00220	7.95	0.9504	0.00200
8.00	0.9468	0.00230	8.10	0.9581	0.00220	8.00	0.9560	0.00230
8.05	0.9512	0.00230	8.15	0.9630	0.00250	8.05	0.9581	0.00210
8.10	0.9572	0.00280	8.20	0.9662	0.00270	8.10	0.9655	0.00210
8.15	0.9608	0.00210	8.25	0.9749	0.00230	8.15	0.9719	0.00210
8.20	0.9683	0.00250	8.30	0.9751	0.00210	8.20	0.9730	0.00240
8.25	0.9701	0.00210	8.35	0.9815	0.00240	8.25	0.9768	0.00220
8.30	0.9768	0.00220	8.40	0.9838	0.00190	8.30	0.9766	0.00210
8.35	0.9827	0.00200	8.45	0.9893	0.00230	8.35	0.9833	0.00220
8.40	0.9830	0.00250	8.50	0.9969	0.00200	8.40	0.9892	0.00200
8.45	0.9859	0.00220	8.55	0.9954	0.00310	8.45	0.9870	0.00260
8.50	0.9910	0.00220	8.60	0.9971	0.00220	8.50	0.9976	0.00270
8.55	0.9936	0.00230	8.65	1.0045	0.00260	8.55	1.0030	0.00290
8.60	0.9988	0.00280	8.70	1.0080	0.00240	8.60	1.0025	0.00210
8.65	1.0019	0.00200	8.75	1.0091	0.00260	8.65	1.0023	0.00210
8.70	1.0059	0.00220	8.80	1.0162	0.00220	8.70	1.0117	0.00240
8.75	1.0136	0.00300	8.85	1.0177	0.00210	8.75	1.0167	0.00220
8.80	1.0153	0.00210	8.90	1.0245	0.00300	8.80	1.0196	0.00240
8.85	1.0210	0.00220				8.85	1.0232	0.00240
8.90	1.0223	0.00210				8.90	1.0289	0.00210

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
7.60	0.9219	0.00180	7.50	0.9201	0.00200	7.50	0.9203	0.00200
7.65	0.9285	0.00230	7.55	0.9236	0.00240	7.55	0.9246	0.00260
7.70	0.9342	0.00220	7.60	0.9303	0.00230	7.60	0.9280	0.00230
7.75	0.9409	0.00240	7.65	0.9321	0.00250	7.65	0.9346	0.00230
7.80	0.9447	0.00220	7.70	0.9382	0.00260	7.70	0.9354	0.00220
7.85	0.9453	0.00230	7.75	0.9383	0.00240	7.75	0.9403	0.00230
7.90	0.9513	0.00220	7.80	0.9441	0.00200	7.80	0.9418	0.00210
7.95	0.9569	0.00220	7.85	0.9449	0.00190	7.85	0.9506	0.00210
8.00	0.9571	0.00230	7.90	0.9563	0.00220	7.90	0.9560	0.00240
8.05	0.9594	0.00190	7.95	0.9535	0.00200	7.95	0.9531	0.00200
8.10	0.9669	0.00280	8.00	0.9576	0.00220	8.00	0.9637	0.00220
8.15	0.9671	0.00210	8.05	0.9618	0.00200	8.05	0.9606	0.00200
8.20	0.9752	0.00190	8.10	0.9655	0.00200	8.10	0.9700	0.00220
8.25	0.9796	0.00210	8.15	0.9699	0.00240	8.15	0.9763	0.00200
8.30	0.9844	0.00200	8.20	0.9779	0.00220	8.20	0.9784	0.00250
8.35	0.9843	0.00280	8.25	0.9748	0.00240	8.25	0.9823	0.00250
8.40	0.9891	0.00220	8.30	0.9834	0.00210	8.30	0.9833	0.00240
8.45	0.9925	0.00230	8.35	0.9822	0.00210	8.35	0.9896	0.00190
8.50	0.9964	0.00240	8.40	0.9930	0.00210	8.40	0.9916	0.00210
8.55	1.0003	0.00220	8.45	0.9922	0.00200	8.45	0.9948	0.00210
8.60	1.0052	0.00270	8.50	1.0010	0.00220	8.50	1.0006	0.00220
8.65	1.0109	0.00200	8.55	1.0015	0.00200	8.55	1.0077	0.00200
8.70	1.0070	0.00210	8.60	1.0059	0.00200	8.60	1.0069	0.00210
8.75	1.0163	0.00200	8.65	1.0095	0.00200	8.65	1.0121	0.00200
8.80	1.0192	0.00210	8.70	1.0181	0.00210	8.70	1.0152	0.00190
8.85	1.0233	0.00190	8.75	1.0191	0.00200	8.75	1.0161	0.00210
8.90	1.0302	0.00240	8.80	1.0214	0.00220	8.80	1.0236	0.00220
			8.85	1.0230	0.00220			
			8.90	1.0266	0.00220			

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
7.50	0.9196	0.00220	7.40	0.9186	0.00210	7.40	0.9258	0.00230
7.55	0.9244	0.00220	7.45	0.9236	0.00210	7.45	0.9333	0.00210
7.60	0.9295	0.00200	7.50	0.9283	0.00210	7.50	0.9376	0.00200
7.65	0.9307	0.00210	7.55	0.9281	0.00220	7.55	0.9429	0.00240
7.70	0.9366	0.00200	7.60	0.9328	0.00220	7.60	0.9433	0.00180
7.75	0.9457	0.00210	7.65	0.9378	0.00260	7.65	0.9498	0.00200
7.80	0.9469	0.00220	7.70	0.9460	0.00260	7.70	0.9545	0.00210
7.85	0.9495	0.00250	7.75	0.9474	0.00200	7.75	0.9540	0.00180
7.90	0.9506	0.00250	7.80	0.9492	0.00200	7.80	0.9570	0.00190
7.95	0.9560	0.00250	7.85	0.9551	0.00200	7.85	0.9636	0.00200
8.00	0.9622	0.00210	7.90	0.9577	0.00190	7.90	0.9692	0.00200
8.05	0.9698	0.00270	7.95	0.9611	0.00210	7.95	0.9727	0.00260
8.10	0.9694	0.00250	8.00	0.9689	0.00240	8.00	0.9744	0.00260
8.15	0.9771	0.00250	8.05	0.9675	0.00220	8.05	0.9794	0.00180
8.20	0.9816	0.00280	8.10	0.9783	0.00220	8.10	0.9808	0.00220
8.25	0.9863	0.00210	8.15	0.9802	0.00190	8.15	0.9873	0.00200
8.30	0.9866	0.00200	8.20	0.9851	0.00200	8.20	0.9895	0.00190
8.35	0.9870	0.00220	8.25	0.9905	0.00200	8.25	0.9970	0.00190
8.40	0.9908	0.00220	8.30	0.9942	0.00230	8.30	0.9975	0.00230
8.45	0.9997	0.00260	8.35	0.9960	0.00210	8.35	1.0065	0.00210
8.50	1.0020	0.00250	8.40	0.9993	0.00200	8.40	1.0075	0.00250
8.55	1.0082	0.00200	8.45	1.0034	0.00200	8.45	1.0101	0.00200
8.60	1.0104	0.00220	8.50	1.0042	0.00210	8.50	1.0162	0.00190
8.65	1.0161	0.00180	8.55	1.0084	0.00220	8.55	1.0162	0.00230
8.70	1.0146	0.00200	8.60	1.0165	0.00220	8.60	1.0193	0.00220
8.75	1.0224	0.00240	8.65	1.0153	0.00210			
8.80	1.0235	0.00220	8.70	1.0186	0.00200			
			8.75	1.0211	0.00210			
			8.80	1.0317	0.00210			

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
7.10	0.9205	0.00180	6.90	0.9224	0.00210	6.70	0.9264	0.00210
7.15	0.9225	0.00180	6.95	0.9304	0.00190	6.75	0.9256	0.00180
7.20	0.9247	0.00190	7.00	0.9323	0.00190	6.80	0.9343	0.00180
7.25	0.9335	0.00210	7.05	0.9342	0.00190	6.85	0.9387	0.00190
7.30	0.9384	0.00240	7.10	0.9402	0.00200	6.90	0.9450	0.00180
7.35	0.9396	0.00210	7.15	0.9501	0.00210	6.95	0.9452	0.00200
7.40	0.9476	0.00180	7.20	0.9475	0.00170	7.00	0.9538	0.00210
7.45	0.9487	0.00210	7.25	0.9538	0.00190	7.05	0.9579	0.00210
7.50	0.9542	0.00240	7.30	0.9603	0.00200	7.10	0.9642	0.00180
7.55	0.9568	0.00220	7.35	0.9602	0.00190	7.15	0.9676	0.00220
7.60	0.9637	0.00240	7.40	0.9650	0.00240	7.20	0.9703	0.00240
7.65	0.9705	0.00190	7.45	0.9696	0.00230	7.25	0.9743	0.00220
7.70	0.9709	0.00210	7.50	0.9772	0.00210	7.30	0.9802	0.00170
7.75	0.9787	0.00200	7.55	0.9794	0.00200	7.35	0.9838	0.00220
7.80	0.9796	0.00220	7.60	0.9796	0.00200	7.40	0.9870	0.00250
7.85	0.9826	0.00180	7.65	0.9868	0.00220	7.45	0.9923	0.00220
7.90	0.9880	0.00180	7.70	0.9919	0.00190	7.50	0.9990	0.00220
7.95	0.9944	0.00190	7.75	0.9984	0.00190	7.55	0.9988	0.00290
8.00	0.9949	0.00180	7.80	0.9997	0.00200	7.60	1.0061	0.00190
8.05	0.9998	0.00180	7.85	1.0043	0.00190	7.65	1.0151	0.00210
8.10	1.0018	0.00200	7.90	1.0095	0.00210	7.70	1.0116	0.00200
8.15	1.0058	0.00250	7.95	1.0084	0.00220	7.75	1.0172	0.00190
8.20	1.0067	0.00220	8.00	1.0142	0.00200	7.80	1.0208	0.00240
8.25	1.0108	0.00220	8.05	1.0219	0.00210			
8.30	1.0216	0.00210	8.10	1.0220	0.00230			
8.35	1.0221	0.00200						
8.40	1.0256	0.00240						

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
6.50	0.9264	0.00220	6.40	0.9244	0.00180	6.20	0.9179	0.00180
6.55	0.9281	0.00210	6.45	0.9294	0.00170	6.25	0.9181	0.00210
6.60	0.9372	0.00240	6.50	0.9364	0.00200	6.30	0.9278	0.00180
6.65	0.9396	0.00190	6.55	0.9437	0.00190	6.35	0.9318	0.00170
6.70	0.9449	0.00190	6.60	0.9471	0.00170	6.40	0.9329	0.00200
6.75	0.9505	0.00190	6.65	0.9503	0.00170	6.45	0.9392	0.00190
6.80	0.9574	0.00200	6.70	0.9571	0.00210	6.50	0.9489	0.00180
6.85	0.9591	0.00220	6.75	0.9586	0.00170	6.55	0.9499	0.00200
6.90	0.9665	0.00240	6.80	0.9621	0.00210	6.60	0.9568	0.00190
6.95	0.9677	0.00240	6.85	0.9733	0.00200	6.65	0.9627	0.00210
7.00	0.9755	0.00200	6.90	0.9770	0.00170	6.70	0.9667	0.00210
7.05	0.9799	0.00200	6.95	0.9835	0.00210	6.75	0.9722	0.00200
7.10	0.9816	0.00190	7.00	0.9821	0.00210	6.80	0.9748	0.00210
7.15	0.9896	0.00190	7.05	0.9870	0.00240	6.85	0.9818	0.00210
7.20	0.9895	0.00240	7.10	0.9927	0.00180	6.90	0.9871	0.00210
7.25	0.9953	0.00210	7.15	0.9982	0.00190	6.95	0.9921	0.00170
7.30	1.0040	0.00200	7.20	1.0014	0.00180	7.00	0.9956	0.00200
7.35	1.0054	0.00220	7.25	1.0071	0.00210	7.05	0.9989	0.00210
7.40	1.0123	0.00170	7.30	1.0119	0.00220	7.10	1.0048	0.00180
7.45	1.0133	0.00200	7.35	1.0159	0.00180	7.15	1.0090	0.00220
7.50	1.0157	0.00180	7.40	1.0219	0.00220	7.20	1.0145	0.00200
			7.45	1.0280	0.00200	7.25	1.0183	0.00190
			7.50	1.0291	0.00200	7.30	1.0214	0.00200

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma	Diameter (Inches)	Keff	Sigma
6.10	0.9284	0.00200	5.90	0.9232	0.00220	5.20	0.9256	0.00170
6.15	0.9309	0.00200	5.95	0.9288	0.00190	5.25	0.9308	0.00190
6.20	0.9348	0.00170	6.00	0.9360	0.00170	5.30	0.9369	0.00180
6.25	0.9388	0.00210	6.05	0.9391	0.00190	5.35	0.9424	0.00220
6.30	0.9461	0.00170	6.10	0.9453	0.00190	5.40	0.9474	0.00180
6.35	0.9518	0.00190	6.15	0.9528	0.00210	5.45	0.9572	0.00180
6.40	0.9551	0.00180	6.20	0.9520	0.00190	5.50	0.9639	0.00190
6.45	0.9657	0.00190	6.25	0.9598	0.00200	5.55	0.9716	0.00160
6.50	0.9668	0.00200	6.30	0.9659	0.00210	5.60	0.9784	0.00210
6.55	0.9701	0.00180	6.35	0.9699	0.00220	5.65	0.9837	0.00210
6.60	0.9800	0.00190	6.40	0.9739	0.00200	5.70	0.9892	0.00210
6.65	0.9803	0.00210	6.45	0.9797	0.00210	5.75	0.9941	0.00230
6.70	0.9839	0.00180	6.50	0.9870	0.00230	5.80	1.0008	0.00190
6.75	0.9887	0.00170	6.55	0.9904	0.00190	5.85	1.0072	0.00220
6.80	0.9962	0.00190	6.60	0.9983	0.00190	5.90	1.0085	0.00170
6.85	0.9993	0.00190	6.65	0.9989	0.00190	5.95	1.0195	0.00210
6.90	1.0066	0.00220	6.70	1.0095	0.00190	6.00	1.0239	0.00180
6.95	1.0112	0.00190	6.75	1.0133	0.00210	6.05	1.0278	0.00170
7.00	1.0158	0.00180	6.80	1.0168	0.00180	6.10	1.0358	0.00210
7.05	1.0225	0.00190	6.85	1.0225	0.00190			
7.10	1.0230	0.00210	6.90	1.0270	0.00210			

18900 milli-g/cc		
Diameter (Inches)	Keff	Sigma
4.70	0.9182	0.00210
4.75	0.9262	0.00160
4.80	0.9323	0.00190
4.85	0.9421	0.00190
4.90	0.9505	0.00220
4.95	0.9545	0.00170
5.00	0.9621	0.00160
5.05	0.9663	0.00170
5.10	0.9763	0.00170
5.15	0.9795	0.00190
5.20	0.9885	0.00180
5.25	0.9970	0.00200
5.30	1.0014	0.00180
5.35	1.0105	0.00200
5.40	1.0177	0.00210
5.45	1.0183	0.00190
5.50	1.0312	0.00200

U-cyl-100 (Cases with 0", 1", 10" Reflector)

Case ID: U_cyl_100_00ref

Material: Uranium metal in water

Geometry: Infinite cylinder

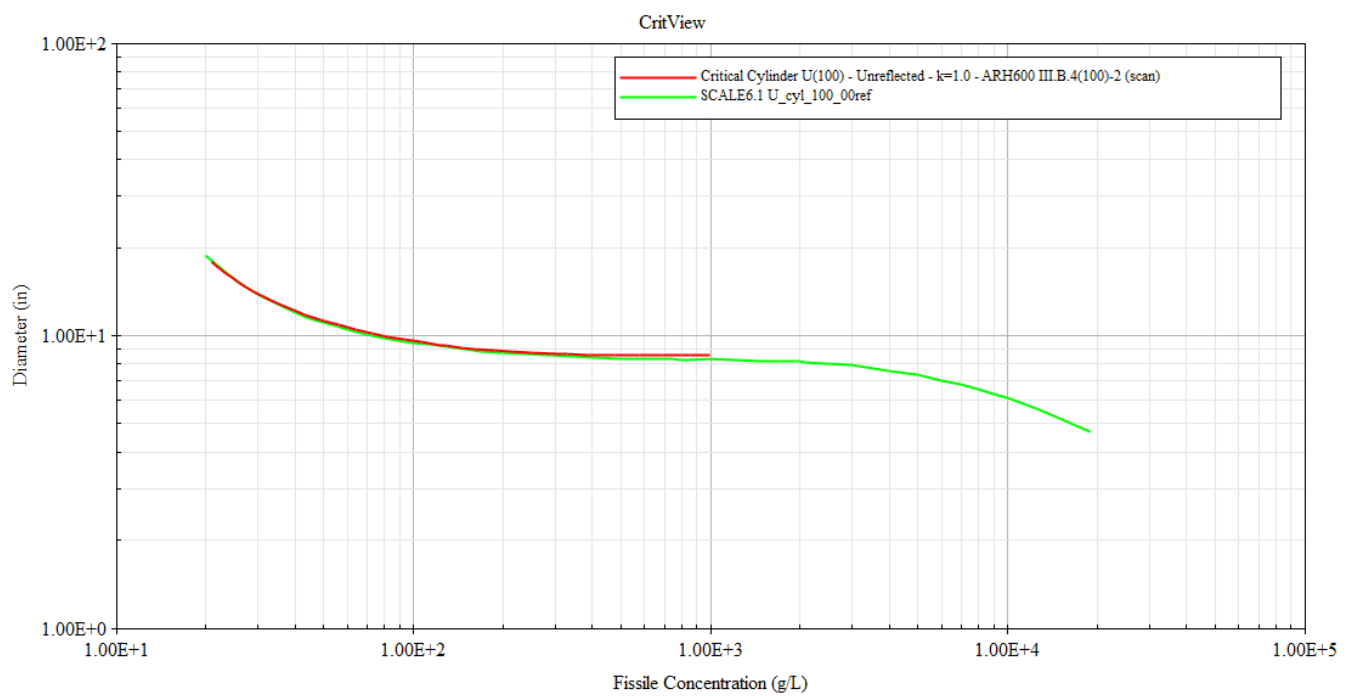
Isotopics: 100% ^{235}U

Reflector: Unreflected

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Cylinder (100% ²³⁵ U)- 0 Inches of Water Reflection				
Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.020	15.600	19.400	0.200	18.7571
0.025	13.300	15.900	0.100	15.5270
0.030	12.000	14.100	0.100	13.8014
0.040	10.600	12.300	0.050	12.0026
0.045	10.200	11.800	0.050	11.4804
0.050	10.000	11.300	0.050	11.0684
0.055	9.700	11.000	0.050	10.7659
0.060	9.500	10.800	0.050	10.5028
0.065	9.300	10.600	0.050	10.3114
0.070	8.800	10.400	0.050	10.1074
0.080	8.900	10.100	0.050	9.8383
0.100	8.400	9.700	0.050	9.4756
0.130	8.300	9.400	0.050	9.1351
0.150	8.200	9.200	0.050	9.0050
0.170	8.000	9.100	0.050	8.8717
0.200	8.100	9.000	0.050	8.7579
0.350	7.700	8.700	0.050	8.4891
0.500	7.500	8.600	0.050	8.3677
0.800	7.600	8.500	0.050	8.2873
1.000	7.400	8.500	0.050	8.3047
1.500	7.400	8.500	0.050	8.2017
1.700	7.500	8.400	0.050	8.2093
1.900	7.400	8.400	0.050	8.1417
2.000	7.200	8.400	0.050	8.1611
2.100	7.300	8.400	0.050	8.1096
2.500	7.300	8.300	0.050	8.0056
3.000	7.200	8.200	0.050	7.9149
4.000	6.800	7.900	0.050	7.5954
5.000	6.600	7.600	0.050	7.3275
6.000	6.400	7.300	0.050	7.0371
7.000	6.100	7.100	0.050	6.7941
7.500	6.000	6.900	0.050	6.6760
8.000	5.900	6.800	0.050	6.5459
9.000	5.700	6.600	0.050	6.3244
10.000	5.500	6.300	0.050	6.1093
15.000	4.700	5.500	0.050	5.2381
18.900	4.200	4.900	0.050	4.6758

WORM and SCALE Input File

```

'Worm generated by Natalie 6/28/21
'Recreating data from PRC-NS-00009 B-596 (pdf pg614)
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
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1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/18.9)>
,
#Starting Diameter = <@startdia =
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.3,7.3,7.2,6.8,6.6,6.4,6.1,6,5.9,5.7,5.5,4.7,4.2> in
#Ending Diameter = <@enddia =
19.4,15.9,14.1,12.3,11.8,11.3,11,10.8,10.6,10.4,10.1,9.7,9.4,9.2,9.1,9,8.7,8.6,8.5,8.5,8.5,8.4,8.
4,8.4,8.4,8.3,8.2,7.9,7.6,7.3,7.1,6.9,6.8,6.6,6.3,5.5,4.9> in
#Delta = <@delta =
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0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05> in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Unreflected Uranium Cylinder Template
v7-238
read composition
  u          1 den=<critconc> 1 300
              92235 100    end
<&ZEROCHECK(wconc)\11>h2o          1 den=<wconc> 1 300    end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Unreflected Cylinder Template"
  cylinder 1      {{(diameter*in)/2}}      5      -5
  media 1 1 1
  boundary 1
end geometry
read bnds
  body=1
    surface(1)=vacuum
    surface(2)=mirror
    surface(3)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
  return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Cylinder; U; Unreflected; 100% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: infcyl
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 1.0
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.020 18.7571
0.025 15.5270
0.030 13.8014
0.040 12.0026
0.045 11.4804
0.050 11.0684
0.055 10.7659
0.060 10.5028
0.065 10.3114
0.070 10.1074
0.080 9.8383
0.100 9.4756
0.130 9.1351
0.150 9.0050
0.170 8.8717
0.200 8.7579
0.350 8.4891
0.500 8.3677
0.800 8.2873
1.000 8.3047
1.500 8.2017
1.700 8.2093
1.900 8.1417
2.000 8.1611
2.100 8.1096
2.500 8.0056
3.000 7.9149
4.000 7.5954
5.000 7.3275
6.000 7.0371
7.000 6.7941
7.500 6.6760
8.000 6.5459
9.000 6.3244
10.000 6.1093
15.000 5.2381
18.900 4.6758
```

20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
15.60	0.9219	0.00170	13.30	0.9194	0.00170	12.00	0.9182	0.00220
15.80	0.9296	0.00170	13.40	0.9220	0.00200	12.10	0.9228	0.00210
16.00	0.9365	0.00160	13.50	0.9250	0.00180	12.20	0.9271	0.00180
16.20	0.9371	0.00190	13.60	0.9323	0.00180	12.30	0.9323	0.00170
16.40	0.9456	0.00140	13.70	0.9360	0.00180	12.40	0.9354	0.00190
16.60	0.9493	0.00150	13.80	0.9402	0.00170	12.50	0.9417	0.00150
16.80	0.9560	0.00150	13.90	0.9465	0.00160	12.60	0.9507	0.00180
17.00	0.9576	0.00130	14.00	0.9464	0.00210	12.70	0.9515	0.00160
17.20	0.9639	0.00170	14.10	0.9491	0.00180	12.80	0.9594	0.00160
17.40	0.9692	0.00140	14.20	0.9555	0.00180	12.90	0.9618	0.00220
17.60	0.9753	0.00140	14.30	0.9618	0.00170	13.00	0.9712	0.00210
17.80	0.9806	0.00170	14.40	0.9625	0.00200	13.10	0.9675	0.00160
18.00	0.9859	0.00150	14.50	0.9690	0.00140	13.20	0.9782	0.00180
18.20	0.9878	0.00180	14.60	0.9750	0.00150	13.30	0.9799	0.00200
18.40	0.9928	0.00130	14.70	0.9727	0.00150	13.40	0.9848	0.00190
18.60	0.9956	0.00170	14.80	0.9786	0.00160	13.50	0.9899	0.00140
18.80	1.0012	0.00160	14.90	0.9849	0.00190	13.60	0.9942	0.00160
19.00	1.0052	0.00250	15.00	0.9858	0.00150	13.70	0.9992	0.00160
19.20	1.0112	0.00170	15.10	0.9910	0.00160	13.80	0.9999	0.00180
19.40	1.0123	0.00160	15.20	0.9891	0.00190	13.90	1.0068	0.00230
			15.30	0.9956	0.00160	14.00	1.0128	0.00170
			15.40	0.9985	0.00220	14.10	1.0149	0.00170
			15.50	0.9973	0.00190			
			15.60	1.0073	0.00200			
			15.70	1.0062	0.00250			
			15.80	1.0104	0.00170			
			15.90	1.0176	0.00170			

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
10.60	0.9127	0.00180	10.20	0.9133	0.00240	10.00	0.9234	0.00220
10.65	0.9156	0.00200	10.25	0.9148	0.00220	10.05	0.9230	0.00200
10.70	0.9209	0.00200	10.30	0.9163	0.00250	10.10	0.9292	0.00230
10.75	0.9256	0.00200	10.35	0.9232	0.00230	10.15	0.9350	0.00220
10.80	0.9233	0.00240	10.40	0.9283	0.00210	10.20	0.9375	0.00210
10.85	0.9289	0.00170	10.45	0.9316	0.00200	10.25	0.9415	0.00210
10.90	0.9304	0.00180	10.50	0.9350	0.00220	10.30	0.9407	0.00200
10.95	0.9375	0.00270	10.55	0.9372	0.00220	10.35	0.9484	0.00230
11.00	0.9383	0.00220	10.60	0.9430	0.00200	10.40	0.9528	0.00250
11.05	0.9426	0.00200	10.65	0.9471	0.00250	10.45	0.9560	0.00210
11.10	0.9472	0.00200	10.70	0.9503	0.00220	10.50	0.9598	0.00200
11.15	0.9530	0.00330	10.75	0.9556	0.00220	10.55	0.9632	0.00190
11.20	0.9529	0.00200	10.80	0.9580	0.00200	10.60	0.9693	0.00220
11.25	0.9562	0.00210	10.85	0.9595	0.00190	10.65	0.9693	0.00240
11.30	0.9592	0.00190	10.90	0.9622	0.00200	10.70	0.9737	0.00220
11.35	0.9608	0.00200	10.95	0.9664	0.00230	10.75	0.9777	0.00210
11.40	0.9695	0.00220	11.00	0.9695	0.00230	10.80	0.9839	0.00210
11.45	0.9663	0.00210	11.05	0.9751	0.00190	10.85	0.9862	0.00210
11.50	0.9688	0.00220	11.10	0.9759	0.00220	10.90	0.9843	0.00210
11.55	0.9734	0.00270	11.15	0.9810	0.00210	10.95	0.9922	0.00200
11.60	0.9757	0.00190	11.20	0.9818	0.00190	11.00	0.9937	0.00210
11.65	0.9818	0.00220	11.25	0.9871	0.00230	11.05	0.9986	0.00200
11.70	0.9823	0.00230	11.30	0.9876	0.00190	11.10	1.0024	0.00250
11.75	0.9840	0.00260	11.35	0.9912	0.00220	11.15	1.0050	0.00230
11.80	0.9844	0.00190	11.40	0.9991	0.00210	11.20	1.0099	0.00210
11.85	0.9940	0.00190	11.45	0.9969	0.00210	11.25	1.0110	0.00200
11.90	0.9959	0.00200	11.50	1.0020	0.00190	11.30	1.0123	0.00190
11.95	0.9958	0.00170	11.55	1.0041	0.00190			
12.00	0.9998	0.00190	11.60	1.0062	0.00210			
12.05	1.0036	0.00190	11.65	1.0124	0.00180			
12.10	1.0056	0.00160	11.70	1.0183	0.00190			
12.15	1.0093	0.00170	11.75	1.0160	0.00250			
12.20	1.0134	0.00200	11.80	1.0211	0.00200			
12.25	1.0191	0.00180						
12.30	1.0187	0.00170						

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.70	0.9173	0.00190	9.50	0.9172	0.00200	9.30	0.9113	0.00300
9.75	0.9230	0.00230	9.55	0.9249	0.00220	9.35	0.9167	0.00270
9.80	0.9291	0.00240	9.60	0.9275	0.00200	9.40	0.9234	0.00200
9.85	0.9348	0.00220	9.65	0.9320	0.00200	9.45	0.9283	0.00210
9.90	0.9370	0.00180	9.70	0.9374	0.00240	9.50	0.9321	0.00200
9.95	0.9406	0.00190	9.75	0.9369	0.00220	9.55	0.9380	0.00240
10.00	0.9413	0.00200	9.80	0.9450	0.00210	9.60	0.9429	0.00240
10.05	0.9457	0.00220	9.85	0.9476	0.00190	9.65	0.9480	0.00210
10.10	0.9509	0.00240	9.90	0.9536	0.00230	9.70	0.9489	0.00210
10.15	0.9581	0.00200	9.95	0.9589	0.00200	9.75	0.9574	0.00250
10.20	0.9559	0.00180	10.00	0.9607	0.00250	9.80	0.9581	0.00270
10.25	0.9594	0.00210	10.05	0.9637	0.00230	9.85	0.9657	0.00240
10.30	0.9645	0.00250	10.10	0.9705	0.00240	9.90	0.9676	0.00200
10.35	0.9686	0.00230	10.15	0.9742	0.00210	9.95	0.9723	0.00270
10.40	0.9728	0.00190	10.20	0.9765	0.00210	10.00	0.9756	0.00210
10.45	0.9733	0.00240	10.25	0.9841	0.00200	10.05	0.9833	0.00240
10.50	0.9775	0.00200	10.30	0.9850	0.00210	10.10	0.9835	0.00220
10.55	0.9827	0.00260	10.35	0.9842	0.00200	10.15	0.9919	0.00220
10.60	0.9872	0.00190	10.40	0.9955	0.00210	10.20	0.9910	0.00220
10.65	0.9877	0.00190	10.45	0.9957	0.00230	10.25	0.9929	0.00230
10.70	0.9980	0.00210	10.50	0.9997	0.00220	10.30	0.9985	0.00230
10.75	0.9980	0.00220	10.55	1.0050	0.00200	10.35	1.0051	0.00250
10.80	1.0043	0.00260	10.60	1.0088	0.00240	10.40	1.0076	0.00210
10.85	1.0074	0.00230	10.65	1.0130	0.00230	10.45	1.0091	0.00200
10.90	1.0090	0.00220	10.70	1.0140	0.00190	10.50	1.0163	0.00190
10.95	1.0157	0.00180	10.75	1.0172	0.00230	10.55	1.0180	0.00240
11.00	1.0149	0.00210	10.80	1.0220	0.00220	10.60	1.0215	0.00260

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.80	0.8809	0.00240	8.90	0.9165	0.00220	8.40	0.9022	0.00240
8.85	0.8878	0.00200	8.95	0.9197	0.00300	8.45	0.9045	0.00230
8.90	0.8975	0.00200	9.00	0.9254	0.00230	8.50	0.9049	0.00270
8.95	0.8957	0.00240	9.05	0.9307	0.00220	8.55	0.9109	0.00250
9.00	0.9019	0.00200	9.10	0.9291	0.00250	8.60	0.9187	0.00200
9.05	0.9089	0.00220	9.15	0.9386	0.00300	8.65	0.9206	0.00230
9.10	0.9097	0.00200	9.20	0.9426	0.00240	8.70	0.9293	0.00230
9.15	0.9160	0.00210	9.25	0.9453	0.00260	8.75	0.9324	0.00220
9.20	0.9196	0.00240	9.30	0.9475	0.00210	8.80	0.9363	0.00210
9.25	0.9273	0.00230	9.35	0.9528	0.00240	8.85	0.9453	0.00240
9.30	0.9312	0.00220	9.40	0.9601	0.00210	8.90	0.9457	0.00270
9.35	0.9326	0.00210	9.45	0.9674	0.00230	8.95	0.9506	0.00240
9.40	0.9397	0.00200	9.50	0.9686	0.00240	9.00	0.9593	0.00230
9.45	0.9471	0.00230	9.55	0.9718	0.00230	9.05	0.9589	0.00250
9.50	0.9486	0.00210	9.60	0.9801	0.00230	9.10	0.9682	0.00220
9.55	0.9511	0.00200	9.65	0.9806	0.00260	9.15	0.9727	0.00230
9.60	0.9543	0.00220	9.70	0.9884	0.00230	9.20	0.9733	0.00230
9.65	0.9597	0.00220	9.75	0.9911	0.00230	9.25	0.9768	0.00250
9.70	0.9649	0.00240	9.80	0.9941	0.00210	9.30	0.9869	0.00220
9.75	0.9692	0.00230	9.85	1.0018	0.00230	9.35	0.9919	0.00270
9.80	0.9720	0.00250	9.90	1.0050	0.00210	9.40	0.9924	0.00240
9.85	0.9766	0.00210	9.95	1.0091	0.00230	9.45	0.9958	0.00250
9.90	0.9830	0.00210	10.00	1.0142	0.00230	9.50	1.0040	0.00240
9.95	0.9881	0.00210	10.05	1.0135	0.00240	9.55	1.0103	0.00210
10.00	0.9913	0.00200	10.10	1.0174	0.00230	9.60	1.0104	0.00370
10.05	0.9937	0.00250				9.65	1.0186	0.00220
10.10	0.9996	0.00250				9.70	1.0236	0.00230
10.15	1.0023	0.00240						
10.20	1.0059	0.00240						
10.25	1.0105	0.00220						
10.30	1.0116	0.00200						
10.35	1.0199	0.00240						
10.40	1.0245	0.00220						

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.30	0.9181	0.00280	8.20	0.9211	0.00240	8.00	0.9078	0.00260
8.35	0.9206	0.00220	8.25	0.9237	0.00240	8.05	0.9074	0.00210
8.40	0.9273	0.00230	8.30	0.9276	0.00320	8.10	0.9200	0.00250
8.45	0.9322	0.00230	8.35	0.9365	0.00240	8.15	0.9263	0.00230
8.50	0.9379	0.00230	8.40	0.9408	0.00230	8.20	0.9250	0.00300
8.55	0.9431	0.00270	8.45	0.9423	0.00300	8.25	0.9369	0.00240
8.60	0.9457	0.00220	8.50	0.9535	0.00270	8.30	0.9392	0.00270
8.65	0.9558	0.00240	8.55	0.9552	0.00210	8.35	0.9412	0.00210
8.70	0.9559	0.00220	8.60	0.9613	0.00240	8.40	0.9498	0.00250
8.75	0.9649	0.00250	8.65	0.9670	0.00250	8.45	0.9612	0.00260
8.80	0.9726	0.00230	8.70	0.9689	0.00220	8.50	0.9603	0.00230
8.85	0.9752	0.00240	8.75	0.9765	0.00270	8.55	0.9710	0.00280
8.90	0.9803	0.00250	8.80	0.9839	0.00220	8.60	0.9739	0.00260
8.95	0.9859	0.00240	8.85	0.9866	0.00270	8.65	0.9776	0.00280
9.00	0.9894	0.00260	8.90	0.9892	0.00270	8.70	0.9811	0.00240
9.05	0.9921	0.00210	8.95	0.9991	0.00230	8.75	0.9886	0.00270
9.10	0.9974	0.00250	9.00	0.9987	0.00220	8.80	0.9927	0.00260
9.15	1.0011	0.00260	9.05	1.0116	0.00230	8.85	0.9974	0.00260
9.20	1.0118	0.00220	9.10	1.0119	0.00260	8.90	1.0034	0.00220
9.25	1.0109	0.00230	9.15	1.0164	0.00230	8.95	1.0093	0.00280
9.30	1.0175	0.00270	9.20	1.0236	0.00220	9.00	1.0108	0.00230
9.35	1.0224	0.00230				9.05	1.0217	0.00250
9.40	1.0297	0.00230				9.10	1.0260	0.00270

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.10	0.9300	0.00240	7.70	0.9147	0.00300	7.50	0.9036	0.00210
8.15	0.9362	0.00230	7.75	0.9238	0.00230	7.55	0.9111	0.00260
8.20	0.9440	0.00230	7.80	0.9250	0.00270	7.60	0.9128	0.00260
8.25	0.9502	0.00220	7.85	0.9308	0.00280	7.65	0.9216	0.00210
8.30	0.9547	0.00240	7.90	0.9406	0.00320	7.70	0.9219	0.00250
8.35	0.9569	0.00250	7.95	0.9391	0.00220	7.75	0.9368	0.00240
8.40	0.9619	0.00230	8.00	0.9536	0.00260	7.80	0.9376	0.00240
8.45	0.9724	0.00250	8.05	0.9588	0.00250	7.85	0.9427	0.00250
8.50	0.9779	0.00220	8.10	0.9612	0.00240	7.90	0.9445	0.00230
8.55	0.9829	0.00260	8.15	0.9694	0.00240	7.95	0.9586	0.00250
8.60	0.9838	0.00230	8.20	0.9728	0.00260	8.00	0.9582	0.00240
8.65	0.9940	0.00240	8.25	0.9816	0.00280	8.05	0.9663	0.00230
8.70	0.9996	0.00250	8.30	0.9810	0.00230	8.10	0.9741	0.00260
8.75	0.9981	0.00230	8.35	0.9917	0.00230	8.15	0.9717	0.00290
8.80	1.0102	0.00270	8.40	0.9947	0.00230	8.20	0.9843	0.00260
8.85	1.0143	0.00230	8.45	0.9975	0.00230	8.25	0.9878	0.00280
8.90	1.0220	0.00290	8.50	1.0007	0.00270	8.30	0.9889	0.00290
8.95	1.0232	0.00310	8.55	1.0121	0.00210	8.35	0.9965	0.00230
9.00	1.0290	0.00280	8.60	1.0178	0.00250	8.40	1.0064	0.00220
			8.65	1.0174	0.00240	8.45	1.0064	0.00230
			8.70	1.0284	0.00240	8.50	1.0144	0.00270
						8.55	1.0183	0.00290
						8.60	1.0239	0.00210

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.60	0.9285	0.00250	7.40	0.9042	0.00200	7.40	0.9145	0.00220
7.65	0.9283	0.00250	7.45	0.9128	0.00210	7.45	0.9153	0.00290
7.70	0.9347	0.00290	7.50	0.9169	0.00230	7.50	0.9250	0.00250
7.75	0.9432	0.00280	7.55	0.9249	0.00230	7.55	0.9323	0.00210
7.80	0.9474	0.00270	7.60	0.9296	0.00210	7.60	0.9402	0.00250
7.85	0.9504	0.00240	7.65	0.9310	0.00250	7.65	0.9361	0.00240
7.90	0.9607	0.00210	7.70	0.9399	0.00210	7.70	0.9492	0.00290
7.95	0.9641	0.00300	7.75	0.9421	0.00250	7.75	0.9528	0.00250
8.00	0.9700	0.00220	7.80	0.9549	0.00260	7.80	0.9590	0.00270
8.05	0.9768	0.00280	7.85	0.9546	0.00230	7.85	0.9616	0.00240
8.10	0.9812	0.00210	7.90	0.9617	0.00270	7.90	0.9707	0.00280
8.15	0.9897	0.00240	7.95	0.9661	0.00240	7.95	0.9725	0.00250
8.20	0.9875	0.00250	8.00	0.9716	0.00220	8.00	0.9809	0.00220
8.25	0.9950	0.00220	8.05	0.9786	0.00220	8.05	0.9796	0.00240
8.30	1.0017	0.00290	8.10	0.9807	0.00230	8.10	0.9921	0.00200
8.35	1.0055	0.00240	8.15	0.9853	0.00250	8.15	0.9947	0.00240
8.40	1.0131	0.00240	8.20	0.9955	0.00220	8.20	0.9998	0.00270
8.45	1.0118	0.00260	8.25	0.9956	0.00220	8.25	1.0056	0.00230
8.50	1.0219	0.00230	8.30	0.9992	0.00240	8.30	1.0055	0.00230
			8.35	1.0078	0.00230	8.35	1.0136	0.00230
			8.40	1.0123	0.00280	8.40	1.0158	0.00270
			8.45	1.0182	0.00220	8.45	1.0222	0.00290
			8.50	1.0239	0.00270	8.50	1.0273	0.00210

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.50	0.9291	0.00210	7.40	0.9210	0.00250	7.20	0.9036	0.00210
7.55	0.9332	0.00230	7.45	0.9290	0.00240	7.25	0.9097	0.00190
7.60	0.9413	0.00280	7.50	0.9347	0.00230	7.30	0.9121	0.00190
7.65	0.9448	0.00190	7.55	0.9388	0.00230	7.35	0.9159	0.00270
7.70	0.9533	0.00300	7.60	0.9434	0.00260	7.40	0.9239	0.00230
7.75	0.9566	0.00260	7.65	0.9485	0.00210	7.45	0.9297	0.00210
7.80	0.9610	0.00210	7.70	0.9570	0.00230	7.50	0.9367	0.00220
7.85	0.9690	0.00270	7.75	0.9586	0.00230	7.55	0.9433	0.00210
7.90	0.9717	0.00220	7.80	0.9658	0.00210	7.60	0.9460	0.00290
7.95	0.9752	0.00270	7.85	0.9678	0.00260	7.65	0.9517	0.00260
8.00	0.9755	0.00260	7.90	0.9732	0.00240	7.70	0.9564	0.00210
8.05	0.9882	0.00250	7.95	0.9803	0.00230	7.75	0.9606	0.00200
8.10	0.9909	0.00230	8.00	0.9847	0.00220	7.80	0.9672	0.00270
8.15	0.9974	0.00200	8.05	0.9892	0.00240	7.85	0.9736	0.00210
8.20	0.9987	0.00230	8.10	0.9889	0.00230	7.90	0.9763	0.00220
8.25	1.0057	0.00250	8.15	1.0022	0.00230	7.95	0.9852	0.00200
8.30	1.0102	0.00240	8.20	1.0072	0.00230	8.00	0.9856	0.00210
8.35	1.0195	0.00220	8.25	1.0074	0.00220	8.05	0.9957	0.00210
8.40	1.0255	0.00310	8.30	1.0171	0.00250	8.10	0.9963	0.00230
			8.35	1.0217	0.00260	8.15	0.9982	0.00250
			8.40	1.0247	0.00230	8.20	1.0063	0.00220
						8.25	1.0163	0.00220
						8.30	1.0194	0.00230
						8.35	1.0213	0.00210
						8.40	1.0282	0.00210

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.30	0.9169	0.00210	7.30	0.9296	0.00200	7.20	0.9243	0.00200
7.35	0.9220	0.00240	7.35	0.9280	0.00240	7.25	0.9333	0.00230
7.40	0.9284	0.00250	7.40	0.9385	0.00230	7.30	0.9408	0.00220
7.45	0.9305	0.00230	7.45	0.9412	0.00220	7.35	0.9446	0.00180
7.50	0.9386	0.00200	7.50	0.9460	0.00190	7.40	0.9494	0.00210
7.55	0.9435	0.00220	7.55	0.9547	0.00200	7.45	0.9568	0.00220
7.60	0.9477	0.00230	7.60	0.9608	0.00200	7.50	0.9607	0.00230
7.65	0.9569	0.00300	7.65	0.9640	0.00230	7.55	0.9666	0.00250
7.70	0.9629	0.00210	7.70	0.9670	0.00210	7.60	0.9732	0.00200
7.75	0.9679	0.00200	7.75	0.9737	0.00210	7.65	0.9767	0.00230
7.80	0.9705	0.00230	7.80	0.9813	0.00210	7.70	0.9777	0.00200
7.85	0.9749	0.00250	7.85	0.9827	0.00220	7.75	0.9838	0.00230
7.90	0.9829	0.00300	7.90	0.9910	0.00210	7.80	0.9919	0.00190
7.95	0.9841	0.00240	7.95	0.9939	0.00200	7.85	0.9960	0.00230
8.00	0.9920	0.00250	8.00	0.9998	0.00190	7.90	0.9971	0.00190
8.05	0.9916	0.00210	8.05	1.0016	0.00210	7.95	1.0068	0.00200
8.10	0.9985	0.00210	8.10	1.0082	0.00240	8.00	1.0098	0.00210
8.15	1.0063	0.00210	8.15	1.0110	0.00200	8.05	1.0127	0.00190
8.20	1.0058	0.00210	8.20	1.0184	0.00200	8.10	1.0200	0.00250
8.25	1.0176	0.00190	8.25	1.0225	0.00230	8.15	1.0266	0.00220
8.30	1.0140	0.00210	8.30	1.0254	0.00260	8.20	1.0299	0.00220
8.35	1.0255	0.00220						
8.40	1.0310	0.00210						

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.80	0.9128	0.00230	6.60	0.9192	0.00200	6.40	0.9197	0.00180
6.85	0.9212	0.00200	6.65	0.9232	0.00220	6.45	0.9287	0.00210
6.90	0.9211	0.00190	6.70	0.9289	0.00180	6.50	0.9361	0.00210
6.95	0.9307	0.00210	6.75	0.9370	0.00210	6.55	0.9371	0.00200
7.00	0.9348	0.00190	6.80	0.9365	0.00180	6.60	0.9485	0.00200
7.05	0.9430	0.00210	6.85	0.9440	0.00190	6.65	0.9541	0.00200
7.10	0.9422	0.00220	6.90	0.9503	0.00210	6.70	0.9587	0.00200
7.15	0.9504	0.00210	6.95	0.9597	0.00220	6.75	0.9624	0.00200
7.20	0.9569	0.00250	7.00	0.9595	0.00290	6.80	0.9704	0.00210
7.25	0.9625	0.00180	7.05	0.9671	0.00240	6.85	0.9765	0.00240
7.30	0.9700	0.00240	7.10	0.9724	0.00180	6.90	0.9837	0.00210
7.35	0.9678	0.00250	7.15	0.9818	0.00210	6.95	0.9928	0.00190
7.40	0.9763	0.00220	7.20	0.9861	0.00220	7.00	0.9951	0.00200
7.45	0.9824	0.00190	7.25	0.9898	0.00190	7.05	1.0017	0.00190
7.50	0.9877	0.00180	7.30	0.9944	0.00200	7.10	1.0047	0.00230
7.55	0.9921	0.00180	7.35	1.0046	0.00260	7.15	1.0132	0.00170
7.60	1.0008	0.00200	7.40	1.0075	0.00180	7.20	1.0169	0.00250
7.65	1.0049	0.00190	7.45	1.0111	0.00200	7.25	1.0197	0.00200
7.70	1.0081	0.00190	7.50	1.0170	0.00220	7.30	1.0290	0.00190
7.75	1.0120	0.00230	7.55	1.0225	0.00200			
7.80	1.0200	0.00230	7.60	1.0305	0.00180			
7.85	1.0183	0.00230						
7.90	1.0275	0.00190						

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.10	0.9115	0.00180	6.00	0.9147	0.00190	5.90	0.9169	0.00190
6.15	0.9166	0.00190	6.05	0.9229	0.00230	5.95	0.9232	0.00190
6.20	0.9269	0.00210	6.10	0.9253	0.00180	6.00	0.9314	0.00210
6.25	0.9335	0.00200	6.15	0.9322	0.00200	6.05	0.9350	0.00180
6.30	0.9395	0.00190	6.20	0.9430	0.00180	6.10	0.9413	0.00180
6.35	0.9469	0.00200	6.25	0.9483	0.00220	6.15	0.9504	0.00160
6.40	0.9532	0.00200	6.30	0.9553	0.00190	6.20	0.9570	0.00210
6.45	0.9577	0.00210	6.35	0.9599	0.00170	6.25	0.9606	0.00210
6.50	0.9626	0.00190	6.40	0.9646	0.00210	6.30	0.9739	0.00190
6.55	0.9679	0.00200	6.45	0.9721	0.00170	6.35	0.9733	0.00230
6.60	0.9763	0.00210	6.50	0.9787	0.00190	6.40	0.9804	0.00160
6.65	0.9823	0.00180	6.55	0.9838	0.00180	6.45	0.9898	0.00270
6.70	0.9903	0.00210	6.60	0.9917	0.00210	6.50	0.9922	0.00200
6.75	0.9933	0.00200	6.65	0.9975	0.00190	6.55	1.0007	0.00220
6.80	1.0009	0.00190	6.70	1.0023	0.00200	6.60	1.0011	0.00220
6.85	1.0078	0.00230	6.75	1.0078	0.00210	6.65	1.0098	0.00230
6.90	1.0098	0.00210	6.80	1.0163	0.00220	6.70	1.0174	0.00160
6.95	1.0164	0.00210	6.85	1.0223	0.00200	6.75	1.0258	0.00210
7.00	1.0218	0.00200	6.90	1.0265	0.00180	6.80	1.0292	0.00190
7.05	1.0260	0.00230						
7.10	1.0385	0.00220						

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.70	0.9152	0.00180	5.50	0.9135	0.00160	4.70	0.9119	0.00220
5.75	0.9248	0.00190	5.55	0.9203	0.00230	4.75	0.9223	0.00170
5.80	0.9296	0.00190	5.60	0.9278	0.00220	4.80	0.9304	0.00190
5.85	0.9390	0.00210	5.65	0.9390	0.00200	4.85	0.9355	0.00210
5.90	0.9465	0.00220	5.70	0.9451	0.00180	4.90	0.9470	0.00170
5.95	0.9520	0.00220	5.75	0.9487	0.00180	4.95	0.9544	0.00150
6.00	0.9575	0.00240	5.80	0.9550	0.00180	5.00	0.9639	0.00190
6.05	0.9659	0.00170	5.85	0.9629	0.00200	5.05	0.9730	0.00200
6.10	0.9716	0.00230	5.90	0.9658	0.00190	5.10	0.9788	0.00180
6.15	0.9778	0.00210	5.95	0.9747	0.00180	5.15	0.9858	0.00160
6.20	0.9866	0.00200	6.00	0.9848	0.00230	5.20	0.9952	0.00170
6.25	0.9919	0.00210	6.05	0.9938	0.00180	5.25	1.0015	0.00190
6.30	0.9979	0.00190	6.10	0.9990	0.00190	5.30	1.0038	0.00150
6.35	1.0022	0.00290	6.15	1.0044	0.00220	5.35	1.0124	0.00170
6.40	1.0110	0.00190	6.20	1.0136	0.00180	5.40	1.0213	0.00160
6.45	1.0134	0.00170	6.25	1.0164	0.00170	5.45	1.0315	0.00180
6.50	1.0193	0.00230	6.30	1.0203	0.00170	5.50	1.0394	0.00190
6.55	1.0267	0.00200						
6.60	1.0339	0.00170						

18900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma
4.20	0.9198	0.00170
4.25	0.9263	0.00240
4.30	0.9356	0.00190
4.35	0.9462	0.00150
4.40	0.9560	0.00200
4.45	0.9598	0.00170
4.50	0.9728	0.00180
4.55	0.9805	0.00200
4.60	0.9875	0.00160
4.65	0.9954	0.00180
4.70	1.0043	0.00170
4.75	1.0148	0.00180
4.80	1.0220	0.00230
4.85	1.0289	0.00210
4.90	1.0366	0.00180

Case ID: U_cyl_100_01ref

Material: Uranium metal in water

Geometry: Infinite cylinder

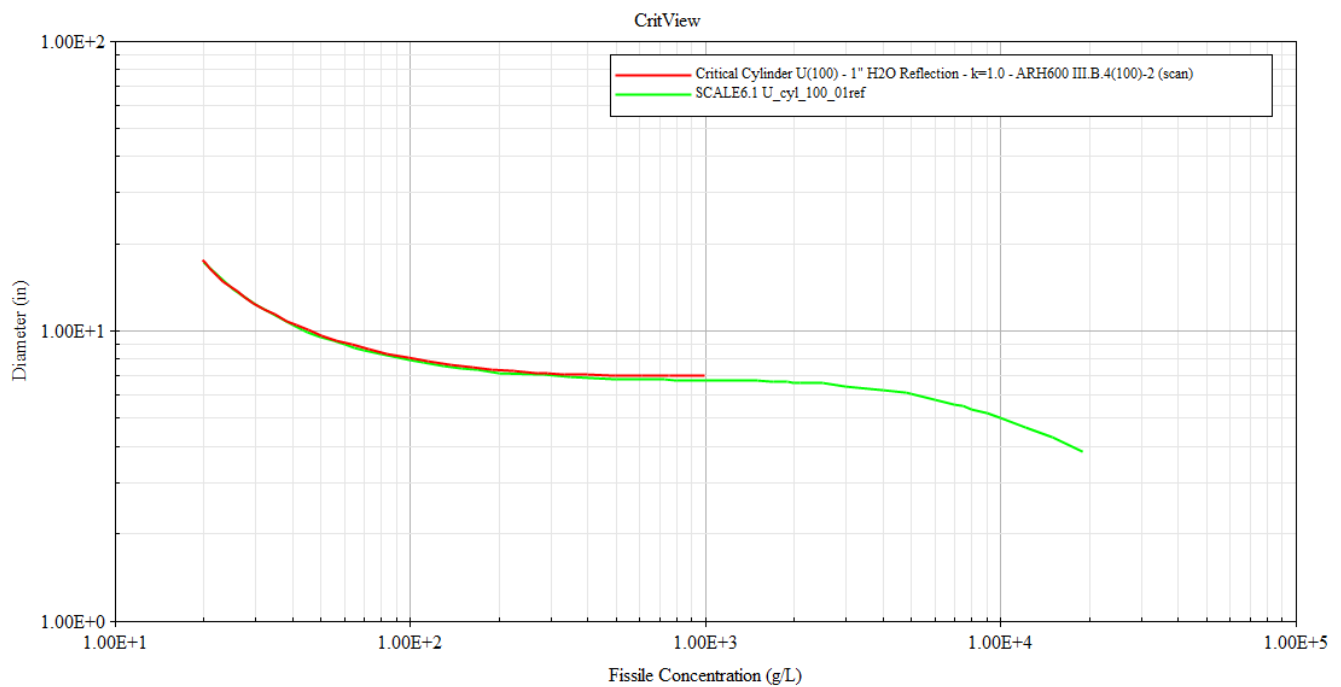
Isotopics: 100% ^{235}U

Reflector: 1" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Cylinder (100% ²³⁵ U) – 1 Inch of Water Reflection				
Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.020	14.100	17.900	0.200	17.2519
0.025	11.800	14.300	0.100	13.9560
0.030	10.500	12.600	0.100	12.2897
0.040	8.800	10.800	0.100	10.4632
0.045	8.700	10.200	0.050	9.9279
0.050	8.400	9.800	0.050	9.5278
0.055	8.100	9.500	0.050	9.2442
0.060	8.000	9.200	0.050	8.9900
0.065	7.500	9.000	0.050	8.7620
0.070	7.200	8.800	0.050	8.6107
0.080	7.500	8.500	0.050	8.3250
0.100	7.100	8.200	0.050	7.9360
0.130	6.800	7.800	0.050	7.5868
0.150	6.600	7.700	0.050	7.4140
0.170	6.600	7.500	0.050	7.3261
0.200	6.400	7.400	0.050	7.1781
0.350	6.200	7.100	0.050	6.9256
0.500	6.100	7.000	0.050	6.8206
0.800	6.000	7.000	0.050	6.7833
1.000	6.000	7.000	0.050	6.7473
1.500	5.900	7.000	0.050	6.7235
1.700	5.900	6.900	0.050	6.6920
1.900	5.900	6.900	0.050	6.6781
2.000	5.900	6.900	0.050	6.6565
2.100	5.900	6.900	0.050	6.6425
2.500	5.800	6.800	0.050	6.6174
3.000	5.700	6.700	0.050	6.4667
4.000	5.500	6.500	0.050	6.2732
5.000	5.300	6.300	0.050	6.0607
6.000	5.100	6.000	0.050	5.7992
7.000	5.000	5.800	0.050	5.5948
7.500	4.900	5.700	0.050	5.5129
8.000	4.800	5.600	0.050	5.3910
9.000	4.600	5.400	0.050	5.2193
10.000	4.500	5.200	0.050	5.0254
15.000	3.800	4.500	0.050	4.2897
18.900	3.200	4.000	0.050	3.8441

WORM and SCALE Input File

```

'Worm generated by Natalie 6/28/21
'Recreating data from PRC-NS-00009 B-616 (pdf pg634)
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
0.02,0.025,0.03,0.04,0.045,0.05,0.055,0.06,0.065,0.07,0.08,0.1,0.13,0.15,0.17,0.2,0.35,0.5,0.8,1,
1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/18.9)>
,
#Starting Diameter = <@startdia =
14.1,11.8,10.5,8.8,8.7,8.4,8.1,8,7.5,7.2,7.5,7.1,6.8,6.6,6.6,6.4,6.2,6.1,6,6,5.9,5.9,5.9,5.9,5.9,
5.8,5.7,5.5,5.3,5.1,5,4.9,4.8,4.6,4.5,3.8,3.2> in
#Ending Diameter = <@enddia =
17.9,14.3,12.6,10.8,10.2,9.8,9.5,9.2,9,8.8,8.5,8.2,7.8,7.7,7.5,7.4,7.1,7,7,7,6.9,6.9,6.9,6.9,6.
8,6.7,6.5,6.3,6,5.8,5.7,5.6,5.4,5.2,4.5,4> in
#Delta = <@delta =
0.2,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0
.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05> in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected Cylinder Template
v7-238
read composition
  u          1 den=<critconc> 1 300
              92235 100    end
<&ZEROCHECK(wconc)\11>h2o          1 den=<wconc> 1 300    end
  h2o          2 1 300    end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Reflected Cylinder Template"
  cylinder 1      {{(diameter*in)/2}}          5          -5
  cylinder 2      {{(diameter*in)/2+(1*in)}}      5          -5
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
read bnds
  body=1
    surface(1)=vacuum
    surface(2)=mirror
    surface(3)=mirror
  body=2
    surface(1)=vacuum
    surface(2)=mirror
    surface(3)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Cylinder; U; 1" Water Reflector; 100% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: infcyl
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 1.0
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.020 17.2519
0.025 13.9560
0.030 12.2897
0.040 10.4632
0.045 9.9279
0.050 9.5278
0.055 9.2442
0.060 8.9900
0.065 8.7620
0.070 8.6107
0.080 8.3250
0.100 7.9360
0.130 7.5868
0.150 7.4140
0.170 7.3261
0.200 7.1781
0.350 6.9256
0.500 6.8206
0.800 6.7833
1.000 6.7473
1.500 6.7235
1.700 6.6920
1.900 6.6781
2.000 6.6565
2.100 6.6425
2.500 6.6174
3.000 6.4667
4.000 6.2732
5.000 6.0607
6.000 5.7992
7.000 5.5948
7.500 5.5129
8.000 5.3910
9.000 5.2193
10.000 5.0254
15.000 4.2897
18.900 3.8441
```


20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.10	0.9212	0.00150	11.80	0.9238	0.00170	10.50	0.9156	0.00180
14.30	0.9262	0.00150	11.90	0.9232	0.00190	10.60	0.9239	0.00170
14.50	0.9339	0.00140	12.00	0.9296	0.00150	10.70	0.9284	0.00200
14.70	0.9391	0.00160	12.10	0.9328	0.00170	10.80	0.9319	0.00190
14.90	0.9433	0.00170	12.20	0.9390	0.00160	10.90	0.9413	0.00170
15.10	0.9517	0.00140	12.30	0.9439	0.00170	11.00	0.9455	0.00170
15.30	0.9565	0.00140	12.40	0.9449	0.00150	11.10	0.9503	0.00230
15.50	0.9611	0.00140	12.50	0.9490	0.00210	11.20	0.9546	0.00190
15.70	0.9652	0.00170	12.60	0.9509	0.00220	11.30	0.9563	0.00240
15.90	0.9674	0.00170	12.70	0.9571	0.00160	11.40	0.9657	0.00170
16.10	0.9747	0.00160	12.80	0.9618	0.00150	11.50	0.9648	0.00190
16.30	0.9794	0.00160	12.90	0.9658	0.00160	11.60	0.9717	0.00190
16.50	0.9855	0.00150	13.00	0.9664	0.00220	11.70	0.9734	0.00190
16.70	0.9887	0.00160	13.10	0.9731	0.00150	11.80	0.9822	0.00210
16.90	0.9933	0.00150	13.20	0.9748	0.00180	11.90	0.9866	0.00220
17.10	0.9959	0.00140	13.30	0.9808	0.00190	12.00	0.9894	0.00160
17.30	1.0013	0.00180	13.40	0.9816	0.00160	12.10	0.9935	0.00220
17.50	1.0023	0.00160	13.50	0.9833	0.00150	12.20	1.0026	0.00230
17.70	1.0098	0.00240	13.60	0.9906	0.00160	12.30	0.9997	0.00210
17.90	1.0136	0.00160	13.70	0.9969	0.00210	12.40	1.0087	0.00180
			13.80	0.9968	0.00160	12.50	1.0122	0.00180
			13.90	0.9986	0.00140	12.60	1.0118	0.00200
			14.00	1.0011	0.00180			
			14.10	1.0068	0.00190			
			14.20	1.0089	0.00150			
			14.30	1.0096	0.00150			

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.80	0.8932	0.00180	8.70	0.9158	0.00210	8.40	0.9127	0.00220
8.90	0.8969	0.00190	8.75	0.9173	0.00220	8.45	0.9179	0.00210
9.00	0.9111	0.00200	8.80	0.9191	0.00220	8.50	0.9236	0.00170
9.10	0.9132	0.00180	8.85	0.9224	0.00170	8.55	0.9261	0.00230
9.20	0.9218	0.00250	8.90	0.9286	0.00220	8.60	0.9327	0.00190
9.30	0.9257	0.00190	8.95	0.9319	0.00220	8.65	0.9326	0.00190
9.40	0.9316	0.00160	9.00	0.9380	0.00190	8.70	0.9371	0.00220
9.50	0.9369	0.00210	9.05	0.9409	0.00190	8.75	0.9421	0.00190
9.60	0.9472	0.00200	9.10	0.9431	0.00190	8.80	0.9466	0.00270
9.70	0.9525	0.00240	9.15	0.9451	0.00200	8.85	0.9501	0.00200
9.80	0.9578	0.00210	9.20	0.9494	0.00200	8.90	0.9547	0.00230
9.90	0.9626	0.00200	9.25	0.9555	0.00200	8.95	0.9550	0.00210
10.00	0.9722	0.00180	9.30	0.9561	0.00190	9.00	0.9595	0.00190
10.10	0.9791	0.00210	9.35	0.9583	0.00210	9.05	0.9649	0.00200
10.20	0.9894	0.00190	9.40	0.9637	0.00190	9.10	0.9652	0.00180
10.30	0.9861	0.00200	9.45	0.9673	0.00230	9.15	0.9735	0.00210
10.40	0.9976	0.00180	9.50	0.9760	0.00220	9.20	0.9747	0.00210
10.50	1.0014	0.00330	9.55	0.9741	0.00210	9.25	0.9779	0.00220
10.60	1.0082	0.00240	9.60	0.9785	0.00330	9.30	0.9858	0.00210
10.70	1.0131	0.00180	9.65	0.9809	0.00190	9.35	0.9864	0.00240
10.80	1.0199	0.00210	9.70	0.9832	0.00190	9.40	0.9890	0.00210
			9.75	0.9829	0.00180	9.45	0.9905	0.00250
			9.80	0.9884	0.00190	9.50	0.9990	0.00190
			9.85	0.9944	0.00220	9.55	1.0008	0.00210
			9.90	0.9942	0.00190	9.60	1.0012	0.00170
			9.95	1.0046	0.00210	9.65	1.0087	0.00210
			10.00	1.0026	0.00240	9.70	1.0072	0.00190
			10.05	1.0078	0.00200	9.75	1.0133	0.00210
			10.10	1.0117	0.00210	9.80	1.0147	0.00190
			10.15	1.0116	0.00200			
			10.20	1.0148	0.00190			

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.10	0.9074	0.00240	8.00	0.9182	0.00210	7.50	0.8888	0.00190
8.15	0.9133	0.00210	8.05	0.9229	0.00220	7.55	0.8961	0.00250
8.20	0.9205	0.00180	8.10	0.9284	0.00230	7.60	0.8993	0.00200
8.25	0.9255	0.00220	8.15	0.9337	0.00210	7.65	0.9046	0.00260
8.30	0.9212	0.00220	8.20	0.9375	0.00220	7.70	0.9088	0.00210
8.35	0.9302	0.00180	8.25	0.9420	0.00200	7.75	0.9139	0.00220
8.40	0.9333	0.00210	8.30	0.9447	0.00210	7.80	0.9140	0.00190
8.45	0.9419	0.00210	8.35	0.9492	0.00190	7.85	0.9227	0.00210
8.50	0.9414	0.00200	8.40	0.9485	0.00220	7.90	0.9229	0.00240
8.55	0.9488	0.00190	8.45	0.9545	0.00220	7.95	0.9308	0.00210
8.60	0.9520	0.00210	8.50	0.9645	0.00270	8.00	0.9328	0.00210
8.65	0.9579	0.00190	8.55	0.9673	0.00200	8.05	0.9396	0.00220
8.70	0.9592	0.00200	8.60	0.9679	0.00240	8.10	0.9422	0.00200
8.75	0.9629	0.00190	8.65	0.9726	0.00250	8.15	0.9486	0.00190
8.80	0.9721	0.00220	8.70	0.9783	0.00250	8.20	0.9527	0.00240
8.85	0.9744	0.00230	8.75	0.9805	0.00230	8.25	0.9547	0.00200
8.90	0.9748	0.00210	8.80	0.9834	0.00190	8.30	0.9626	0.00230
8.95	0.9776	0.00210	8.85	0.9902	0.00210	8.35	0.9648	0.00220
9.00	0.9837	0.00200	8.90	0.9946	0.00180	8.40	0.9704	0.00270
9.05	0.9825	0.00200	8.95	0.9956	0.00230	8.45	0.9721	0.00230
9.10	0.9899	0.00230	9.00	1.0011	0.00210	8.50	0.9814	0.00250
9.15	0.9913	0.00200	9.05	1.0034	0.00260	8.55	0.9853	0.00210
9.20	0.9947	0.00210	9.10	1.0077	0.00240	8.60	0.9878	0.00200
9.25	1.0007	0.00210	9.15	1.0133	0.00190	8.65	0.9924	0.00210
9.30	1.0028	0.00210	9.20	1.0147	0.00270	8.70	0.9918	0.00190
9.35	1.0122	0.00210				8.75	0.9994	0.00210
9.40	1.0114	0.00230				8.80	1.0019	0.00240
9.45	1.0155	0.00210				8.85	1.0036	0.00340
9.50	1.0184	0.00200				8.90	1.0079	0.00240
						8.95	1.0146	0.00240
						9.00	1.0150	0.00190

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.20	0.8706	0.00180	7.50	0.9216	0.00190	7.10	0.9185	0.00220
7.25	0.8782	0.00250	7.55	0.9308	0.00220	7.15	0.9240	0.00230
7.30	0.8834	0.00210	7.60	0.9331	0.00210	7.20	0.9280	0.00240
7.35	0.8860	0.00210	7.65	0.9423	0.00210	7.25	0.9325	0.00230
7.40	0.8891	0.00210	7.70	0.9484	0.00260	7.30	0.9403	0.00260
7.45	0.9000	0.00220	7.75	0.9484	0.00240	7.35	0.9415	0.00230
7.50	0.9029	0.00200	7.80	0.9548	0.00250	7.40	0.9487	0.00210
7.55	0.9063	0.00220	7.85	0.9563	0.00190	7.45	0.9583	0.00200
7.60	0.9151	0.00210	7.90	0.9649	0.00240	7.50	0.9603	0.00260
7.65	0.9204	0.00200	7.95	0.9626	0.00210	7.55	0.9638	0.00230
7.70	0.9189	0.00200	8.00	0.9728	0.00240	7.60	0.9717	0.00240
7.75	0.9224	0.00200	8.05	0.9796	0.00250	7.65	0.9740	0.00270
7.80	0.9297	0.00220	8.10	0.9809	0.00220	7.70	0.9778	0.00250
7.85	0.9329	0.00230	8.15	0.9837	0.00250	7.75	0.9841	0.00230
7.90	0.9391	0.00210	8.20	0.9911	0.00230	7.80	0.9866	0.00220
7.95	0.9471	0.00250	8.25	0.9906	0.00200	7.85	0.9866	0.00230
8.00	0.9493	0.00220	8.30	0.9988	0.00240	7.90	0.9969	0.00230
8.05	0.9547	0.00200	8.35	1.0012	0.00250	7.95	1.0012	0.00220
8.10	0.9598	0.00210	8.40	1.0099	0.00250	8.00	1.0045	0.00220
8.15	0.9617	0.00230	8.45	1.0116	0.00250	8.05	1.0086	0.00240
8.20	0.9637	0.00200	8.50	1.0185	0.00250	8.10	1.0160	0.00320
8.25	0.9694	0.00200				8.15	1.0188	0.00210
8.30	0.9752	0.00190				8.20	1.0251	0.00290
8.35	0.9809	0.00240						
8.40	0.9794	0.00220						
8.45	0.9891	0.00250						
8.50	0.9912	0.00220						
8.55	0.9930	0.00210						
8.60	0.9985	0.00210						
8.65	1.0055	0.00250						
8.70	1.0063	0.00220						
8.75	1.0105	0.00190						
8.80	1.0156	0.00210						

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.80	0.9174	0.00230	6.60	0.9141	0.00220	6.60	0.9206	0.00250
6.85	0.9223	0.00240	6.65	0.9168	0.00210	6.65	0.9232	0.00200
6.90	0.9302	0.00240	6.70	0.9181	0.00210	6.70	0.9291	0.00280
6.95	0.9332	0.00260	6.75	0.9275	0.00230	6.75	0.9353	0.00220
7.00	0.9407	0.00210	6.80	0.9363	0.00250	6.80	0.9441	0.00220
7.05	0.9412	0.00250	6.85	0.9392	0.00240	6.85	0.9503	0.00250
7.10	0.9511	0.00220	6.90	0.9417	0.00250	6.90	0.9557	0.00220
7.15	0.9551	0.00250	6.95	0.9476	0.00230	6.95	0.9633	0.00230
7.20	0.9617	0.00230	7.00	0.9550	0.00260	7.00	0.9711	0.00260
7.25	0.9670	0.00250	7.05	0.9604	0.00210	7.05	0.9690	0.00210
7.30	0.9732	0.00210	7.10	0.9651	0.00270	7.10	0.9715	0.00270
7.35	0.9742	0.00240	7.15	0.9725	0.00220	7.15	0.9849	0.00270
7.40	0.9778	0.00220	7.20	0.9703	0.00240	7.20	0.9890	0.00240
7.45	0.9842	0.00260	7.25	0.9829	0.00240	7.25	0.9894	0.00240
7.50	0.9919	0.00250	7.30	0.9855	0.00260	7.30	0.9963	0.00200
7.55	0.9975	0.00230	7.35	0.9930	0.00270	7.35	1.0034	0.00270
7.60	1.0009	0.00210	7.40	0.9977	0.00220	7.40	1.0076	0.00210
7.65	1.0038	0.00260	7.45	1.0059	0.00240	7.45	1.0143	0.00220
7.70	1.0117	0.00230	7.50	1.0058	0.00290	7.50	1.0175	0.00230
7.75	1.0147	0.00230	7.55	1.0142	0.00240			
7.80	1.0189	0.00230	7.60	1.0154	0.00260			
			7.65	1.0236	0.00240			
			7.70	1.0258	0.00240			

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.40	0.9096	0.00240	6.20	0.9148	0.00230	6.10	0.9186	0.00220
6.45	0.9188	0.00280	6.25	0.9200	0.00300	6.15	0.9201	0.00250
6.50	0.9183	0.00230	6.30	0.9304	0.00230	6.20	0.9241	0.00270
6.55	0.9324	0.00210	6.35	0.9311	0.00320	6.25	0.9313	0.00220
6.60	0.9338	0.00240	6.40	0.9393	0.00210	6.30	0.9415	0.00220
6.65	0.9408	0.00260	6.45	0.9468	0.00220	6.35	0.9466	0.00260
6.70	0.9452	0.00210	6.50	0.9517	0.00240	6.40	0.9473	0.00260
6.75	0.9489	0.00250	6.55	0.9600	0.00240	6.45	0.9588	0.00210
6.80	0.9604	0.00220	6.60	0.9644	0.00230	6.50	0.9625	0.00250
6.85	0.9641	0.00270	6.65	0.9706	0.00270	6.55	0.9715	0.00250
6.90	0.9695	0.00240	6.70	0.9710	0.00220	6.60	0.9724	0.00230
6.95	0.9716	0.00270	6.75	0.9865	0.00210	6.65	0.9775	0.00230
7.00	0.9812	0.00230	6.80	0.9877	0.00250	6.70	0.9857	0.00230
7.05	0.9843	0.00200	6.85	0.9911	0.00230	6.75	0.9918	0.00260
7.10	0.9926	0.00280	6.90	0.9978	0.00220	6.80	0.9960	0.00250
7.15	0.9945	0.00230	6.95	1.0021	0.00270	6.85	1.0057	0.00250
7.20	1.0043	0.00290	7.00	1.0064	0.00280	6.90	1.0118	0.00270
7.25	1.0082	0.00240	7.05	1.0129	0.00240	6.95	1.0090	0.00230
7.30	1.0113	0.00240	7.10	1.0163	0.00210	7.00	1.0190	0.00240
7.35	1.0174	0.00240						
7.40	1.0179	0.00260						

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.00	0.9159	0.00220	6.00	0.9140	0.00220	5.90	0.9144	0.00270
6.05	0.9210	0.00230	6.05	0.9240	0.00220	5.95	0.9176	0.00210
6.10	0.9251	0.00220	6.10	0.9301	0.00250	6.00	0.9223	0.00270
6.15	0.9319	0.00250	6.15	0.9339	0.00250	6.05	0.9292	0.00220
6.20	0.9377	0.00210	6.20	0.9359	0.00220	6.10	0.9344	0.00240
6.25	0.9389	0.00270	6.25	0.9469	0.00200	6.15	0.9419	0.00220
6.30	0.9506	0.00220	6.30	0.9465	0.00340	6.20	0.9441	0.00230
6.35	0.9526	0.00230	6.35	0.9545	0.00210	6.25	0.9494	0.00220
6.40	0.9593	0.00230	6.40	0.9632	0.00210	6.30	0.9546	0.00210
6.45	0.9609	0.00230	6.45	0.9653	0.00250	6.35	0.9580	0.00250
6.50	0.9690	0.00270	6.50	0.9756	0.00220	6.40	0.9641	0.00210
6.55	0.9753	0.00210	6.55	0.9770	0.00230	6.45	0.9730	0.00220
6.60	0.9848	0.00230	6.60	0.9821	0.00250	6.50	0.9763	0.00210
6.65	0.9854	0.00270	6.65	0.9902	0.00240	6.55	0.9806	0.00230
6.70	0.9928	0.00230	6.70	0.9930	0.00280	6.60	0.9896	0.00200
6.75	0.9976	0.00220	6.75	1.0004	0.00240	6.65	0.9927	0.00200
6.80	1.0012	0.00230	6.80	1.0028	0.00260	6.70	0.9939	0.00210
6.85	1.0150	0.00270	6.85	1.0097	0.00240	6.75	1.0069	0.00250
6.90	1.0100	0.00240	6.90	1.0182	0.00230	6.80	1.0075	0.00250
6.95	1.0146	0.00240	6.95	1.0187	0.00260	6.85	1.0110	0.00270
7.00	1.0236	0.00220	7.00	1.0217	0.00230	6.90	1.0164	0.00260
						6.95	1.0243	0.00280
						7.00	1.0288	0.00210

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.90	0.9157	0.00230	5.90	0.9163	0.00200	5.90	0.9208	0.00220
5.95	0.9187	0.00230	5.95	0.9217	0.00280	5.95	0.9258	0.00220
6.00	0.9256	0.00200	6.00	0.9294	0.00220	6.00	0.9300	0.00210
6.05	0.9310	0.00240	6.05	0.9349	0.00200	6.05	0.9367	0.00260
6.10	0.9329	0.00220	6.10	0.9405	0.00240	6.10	0.9430	0.00190
6.15	0.9400	0.00200	6.15	0.9459	0.00290	6.15	0.9435	0.00210
6.20	0.9446	0.00230	6.20	0.9500	0.00200	6.20	0.9489	0.00250
6.25	0.9488	0.00230	6.25	0.9567	0.00220	6.25	0.9575	0.00190
6.30	0.9602	0.00220	6.30	0.9650	0.00210	6.30	0.9618	0.00230
6.35	0.9625	0.00220	6.35	0.9640	0.00270	6.35	0.9673	0.00220
6.40	0.9707	0.00230	6.40	0.9725	0.00250	6.40	0.9757	0.00200
6.45	0.9762	0.00240	6.45	0.9767	0.00240	6.45	0.9782	0.00230
6.50	0.9806	0.00240	6.50	0.9827	0.00250	6.50	0.9837	0.00210
6.55	0.9873	0.00240	6.55	0.9876	0.00250	6.55	0.9883	0.00200
6.60	0.9896	0.00230	6.60	0.9919	0.00220	6.60	0.9961	0.00180
6.65	0.9953	0.00210	6.65	0.9982	0.00190	6.65	0.9991	0.00230
6.70	1.0009	0.00210	6.70	1.0014	0.00250	6.70	1.0060	0.00220
6.75	1.0038	0.00190	6.75	1.0139	0.00250	6.75	1.0094	0.00220
6.80	1.0147	0.00260	6.80	1.0131	0.00220	6.80	1.0109	0.00220
6.85	1.0145	0.00230	6.85	1.0124	0.00210	6.85	1.0203	0.00190
6.90	1.0193	0.00190	6.90	1.0209	0.00260	6.90	1.0283	0.00270

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.90	0.9243	0.00200	5.80	0.9159	0.00210	5.70	0.9163	0.00220
5.95	0.9278	0.00200	5.85	0.9247	0.00230	5.75	0.9196	0.00260
6.00	0.9271	0.00210	5.90	0.9245	0.00230	5.80	0.9247	0.00190
6.05	0.9344	0.00200	5.95	0.9317	0.00210	5.85	0.9335	0.00220
6.10	0.9441	0.00180	6.00	0.9349	0.00230	5.90	0.9407	0.00230
6.15	0.9480	0.00210	6.05	0.9439	0.00220	5.95	0.9467	0.00210
6.20	0.9536	0.00210	6.10	0.9525	0.00200	6.00	0.9495	0.00210
6.25	0.9584	0.00200	6.15	0.9557	0.00260	6.05	0.9527	0.00190
6.30	0.9612	0.00300	6.20	0.9599	0.00260	6.10	0.9625	0.00200
6.35	0.9696	0.00310	6.25	0.9677	0.00270	6.15	0.9693	0.00190
6.40	0.9732	0.00270	6.30	0.9700	0.00250	6.20	0.9737	0.00210
6.45	0.9839	0.00220	6.35	0.9743	0.00220	6.25	0.9750	0.00200
6.50	0.9851	0.00210	6.40	0.9817	0.00190	6.30	0.9833	0.00250
6.55	0.9886	0.00190	6.45	0.9879	0.00200	6.35	0.9871	0.00210
6.60	0.9955	0.00210	6.50	0.9949	0.00200	6.40	0.9908	0.00220
6.65	1.0008	0.00280	6.55	0.9960	0.00220	6.45	1.0002	0.00210
6.70	1.0063	0.00210	6.60	0.9962	0.00220	6.50	0.9996	0.00230
6.75	1.0097	0.00210	6.65	1.0071	0.00200	6.55	1.0074	0.00220
6.80	1.0141	0.00200	6.70	1.0173	0.00310	6.60	1.0112	0.00280
6.85	1.0213	0.00220	6.75	1.0149	0.00290	6.65	1.0183	0.00210
6.90	1.0276	0.00210	6.80	1.0213	0.00210	6.70	1.0207	0.00210

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.50	0.9181	0.00200	5.30	0.9131	0.00270	5.10	0.9144	0.00230
5.55	0.9240	0.00190	5.35	0.9183	0.00210	5.15	0.9193	0.00230
5.60	0.9297	0.00200	5.40	0.9220	0.00210	5.20	0.9285	0.00220
5.65	0.9348	0.00190	5.45	0.9300	0.00200	5.25	0.9341	0.00200
5.70	0.9378	0.00200	5.50	0.9385	0.00190	5.30	0.9414	0.00200
5.75	0.9429	0.00220	5.55	0.9449	0.00240	5.35	0.9456	0.00210
5.80	0.9510	0.00230	5.60	0.9512	0.00180	5.40	0.9542	0.00190
5.85	0.9557	0.00180	5.65	0.9595	0.00190	5.45	0.9598	0.00210
5.90	0.9584	0.00210	5.70	0.9643	0.00200	5.50	0.9626	0.00220
5.95	0.9615	0.00180	5.75	0.9649	0.00200	5.55	0.9686	0.00220
6.00	0.9702	0.00220	5.80	0.9750	0.00230	5.60	0.9733	0.00210
6.05	0.9708	0.00200	5.85	0.9761	0.00200	5.65	0.9776	0.00200
6.10	0.9840	0.00200	5.90	0.9834	0.00190	5.70	0.9862	0.00210
6.15	0.9892	0.00210	5.95	0.9903	0.00210	5.75	0.9874	0.00190
6.20	0.9921	0.00200	6.00	0.9947	0.00190	5.80	1.0002	0.00190
6.25	0.9974	0.00210	6.05	0.9976	0.00220	5.85	1.0029	0.00200
6.30	1.0030	0.00220	6.10	1.0088	0.00190	5.90	1.0114	0.00200
6.35	1.0095	0.00180	6.15	1.0123	0.00190	5.95	1.0177	0.00220
6.40	1.0128	0.00190	6.20	1.0209	0.00210	6.00	1.0209	0.00200
6.45	1.0196	0.00240	6.25	1.0247	0.00210			
6.50	1.0235	0.00190	6.30	1.0256	0.00180			

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.00	0.9281	0.00210	4.90	0.9241	0.00180	4.80	0.9205	0.00180
5.05	0.9335	0.00220	4.95	0.9302	0.00230	4.85	0.9292	0.00190
5.10	0.9423	0.00220	5.00	0.9371	0.00200	4.90	0.9363	0.00200
5.15	0.9427	0.00220	5.05	0.9436	0.00170	4.95	0.9424	0.00230
5.20	0.9570	0.00160	5.10	0.9523	0.00180	5.00	0.9498	0.00190
5.25	0.9557	0.00180	5.15	0.9607	0.00200	5.05	0.9588	0.00190
5.30	0.9628	0.00200	5.20	0.9638	0.00210	5.10	0.9577	0.00250
5.35	0.9681	0.00200	5.25	0.9698	0.00210	5.15	0.9724	0.00230
5.40	0.9783	0.00190	5.30	0.9739	0.00190	5.20	0.9741	0.00230
5.45	0.9830	0.00240	5.35	0.9818	0.00190	5.25	0.9813	0.00190
5.50	0.9891	0.00210	5.40	0.9874	0.00250	5.30	0.9901	0.00200
5.55	0.9923	0.00180	5.45	0.9922	0.00180	5.35	0.9927	0.00190
5.60	1.0009	0.00200	5.50	0.9984	0.00190	5.40	1.0016	0.00230
5.65	1.0098	0.00210	5.55	1.0046	0.00200	5.45	1.0046	0.00170
5.70	1.0162	0.00190	5.60	1.0104	0.00240	5.50	1.0157	0.00190
5.75	1.0172	0.00210	5.65	1.0185	0.00190	5.55	1.0197	0.00180
5.80	1.0242	0.00220	5.70	1.0236	0.00210	5.60	1.0217	0.00190

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.60	0.9179	0.00190	4.50	0.9238	0.00190	3.80	0.9154	0.00200
4.65	0.9234	0.00180	4.55	0.9324	0.00200	3.85	0.9238	0.00160
4.70	0.9336	0.00200	4.60	0.9409	0.00240	3.90	0.9314	0.00290
4.75	0.9395	0.00190	4.65	0.9492	0.00210	3.95	0.9392	0.00170
4.80	0.9490	0.00190	4.70	0.9560	0.00180	4.00	0.9502	0.00200
4.85	0.9523	0.00180	4.75	0.9587	0.00190	4.05	0.9631	0.00200
4.90	0.9605	0.00200	4.80	0.9698	0.00170	4.10	0.9652	0.00200
4.95	0.9694	0.00180	4.85	0.9744	0.00210	4.15	0.9758	0.00180
5.00	0.9765	0.00180	4.90	0.9818	0.00170	4.20	0.9827	0.00210
5.05	0.9788	0.00180	4.95	0.9883	0.00210	4.25	0.9915	0.00190
5.10	0.9821	0.00190	5.00	0.9966	0.00280	4.30	1.0022	0.00170
5.15	0.9919	0.00200	5.05	1.0033	0.00210	4.35	1.0047	0.00190
5.20	0.9973	0.00210	5.10	1.0082	0.00210	4.40	1.0148	0.00180
5.25	1.0043	0.00180	5.15	1.0157	0.00180	4.45	1.0226	0.00220
5.30	1.0124	0.00220	5.20	1.0227	0.00180	4.50	1.0298	0.00170
5.35	1.0176	0.00190						
5.40	1.0274	0.00210						

18900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma
3.20	0.8771	0.00170
3.25	0.8861	0.00160
3.30	0.8959	0.00180
3.35	0.9100	0.00210
3.40	0.9176	0.00180
3.45	0.9266	0.00160
3.50	0.9349	0.00160
3.55	0.9460	0.00160
3.60	0.9569	0.00170
3.65	0.9657	0.00170
3.70	0.9697	0.00170
3.75	0.9823	0.00180
3.80	0.9918	0.00170
3.85	1.0011	0.00230
3.90	1.0104	0.00190
3.95	1.0189	0.00170
4.00	1.0269	0.00180

Case ID: U_cyl_100_10ref

Material: Uranium metal in water

Geometry: Infinite cylinder

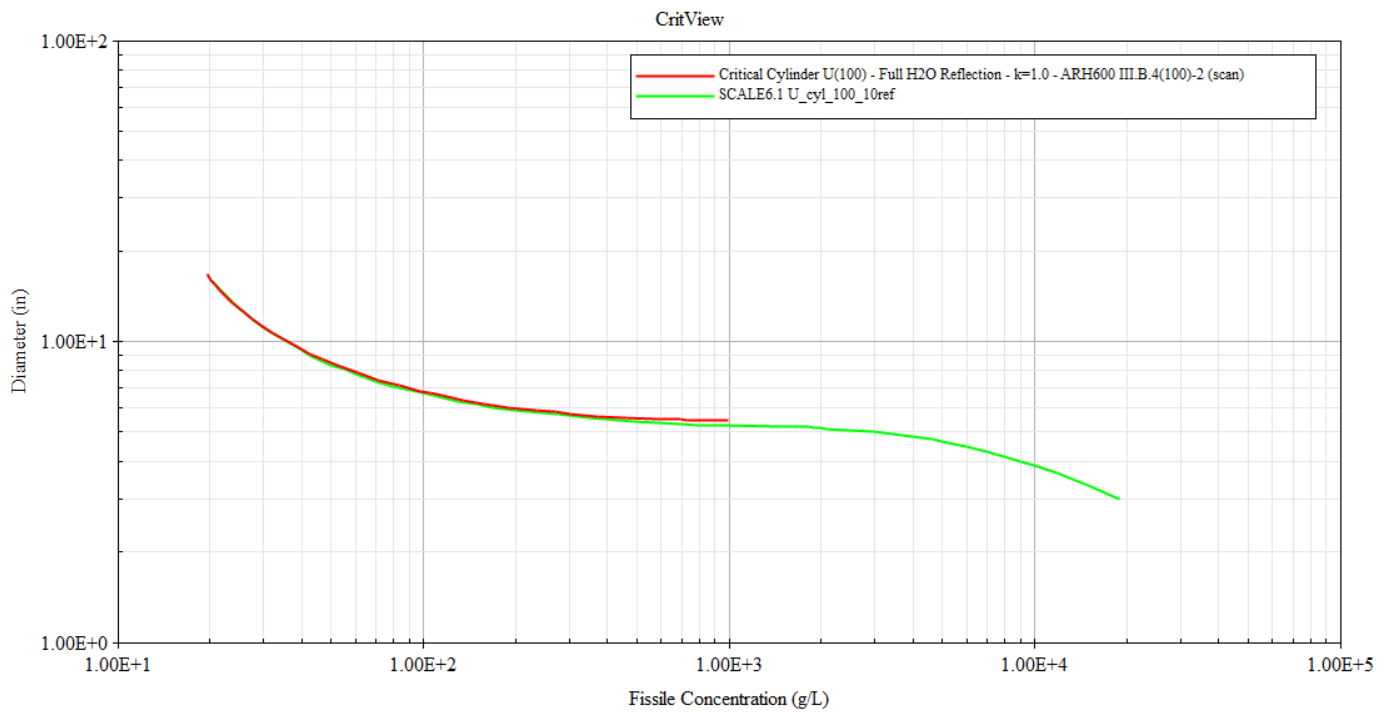
Isotopics: 100% ^{235}U

Reflector: 10" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Cylinder (100% ²³⁵ U)– 10 Inches of Water Reflection				
Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.020	13.100	16.800	0.100	16.0750
0.025	10.400	13.200	0.100	12.7742
0.030	9.400	11.400	0.100	11.0648
0.040	8.000	10.000	0.100	9.3345
0.045	7.800	9.100	0.050	8.7824
0.050	7.300	8.700	0.050	8.3438
0.055	7.100	8.300	0.050	8.0705
0.060	6.800	8.100	0.050	7.8039
0.065	6.600	7.800	0.050	7.5900
0.070	6.500	7.700	0.050	7.3843
0.080	6.300	7.400	0.050	7.0625
0.100	5.900	6.900	0.050	6.7262
0.130	5.600	6.600	0.050	6.2869
0.150	5.400	6.400	0.050	6.1809
0.170	5.300	6.300	0.050	6.0136
0.200	5.200	6.100	0.050	5.8789
0.350	4.700	5.800	0.050	5.5573
0.500	4.700	5.600	0.050	5.3956
0.800	4.600	5.600	0.050	5.2882
1.000	4.600	5.500	0.050	5.2612
1.500	4.400	5.500	0.050	5.2267
1.700	4.500	5.400	0.050	5.2128
1.900	4.500	5.400	0.050	5.1841
2.000	4.500	5.400	0.050	5.1449
2.100	4.400	5.400	0.050	5.1191
2.500	4.400	5.300	0.050	5.0500
3.000	4.200	5.200	0.050	5.0107
4.000	4.200	5.100	0.050	4.8192
5.000	4.100	4.900	0.050	4.6567
6.000	3.800	4.700	0.050	4.4613
7.000	3.500	4.500	0.050	4.2936
7.500	3.800	4.400	0.050	4.2370
8.000	3.600	4.400	0.050	4.1556
9.000	3.300	4.200	0.050	3.9866
10.000	3.300	4.100	0.050	3.8776
15.000	2.800	3.500	0.050	3.3238
18.900	2.500	3.200	0.050	2.9873

WORM and SCALE Input File

```

'Worm generated by Natalie 6/28/21
'Recreating data from PRC-NS-00009 B-636 (pdf pg654)
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
0.02,0.025,0.03,0.04,0.045,0.05,0.055,0.06,0.065,0.07,0.08,0.1,0.13,0.15,0.17,0.2,0.35,0.5,0.8,1,
1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/18.9)>
,
#Starting Diameter = <@startdia =
13.1,10.4,9.4,8,7.8,7.3,7.1,6.8,6.6,6.5,6.3,5.9,5.6,5.4,5.3,5.2,4.7,4.7,4.6,4.6,4.4,4.5,4.5,4
.4,4.4,4.2,4.2,4.1,3.8,3.5,3.8,3.6,3.3,3.3,2.8,2.5> in
#Ending Diameter = <@enddia =
16.8,13.2,11.4,10,9.1,8.7,8.3,8.1,7.8,7.7,7.4,6.9,6.6,6.4,6.3,6.1,5.8,5.6,5.6,5.5,5.5,5.4,5.4,5.4
,5.4,5.3,5.2,5.1,4.9,4.7,4.5,4.4,4.4,4.2,4.1,3.5,3.2> in
#Delta = <@delta =
0.1,0.1,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0
.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05> in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected Cylinder Template
v7-238
read composition
  u          1 den=<critconc> 1 300
              92235 100    end
<&ZEROCHECK(wconc)\11>h2o          1 den=<wconc> 1 300    end
  h2o          2 1 300    end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Reflected Cylinder Template"
  cylinder 1    {{(diameter*in)/2}}          5          -5
  cylinder 2    {{(diameter*in)/2+(10*in)}}    5          -5
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
read bnds
  body=1
    surface(1)=vacuum
    surface(2)=mirror
    surface(3)=mirror
  body=2
    surface(1)=vacuum
    surface(2)=mirror
    surface(3)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```


CritView compatible data file

```
reset:
title: Critical Cylinder; U; 10" Water Reflector; 100% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: infcyl
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 1.0
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.020 16.0750
0.025 12.7742
0.030 11.0648
0.040 9.3345
0.045 8.7824
0.050 8.3438
0.055 8.0705
0.060 7.8039
0.065 7.5900
0.070 7.3843
0.080 7.0625
0.100 6.7262
0.130 6.2869
0.150 6.1809
0.170 6.0136
0.200 5.8789
0.350 5.5573
0.500 5.3956
0.800 5.2882
1.000 5.2612
1.500 5.2267
1.700 5.2128
1.900 5.1841
2.000 5.1449
2.100 5.1191
2.500 5.0500
3.000 5.0107
4.000 4.8192
5.000 4.6567
6.000 4.4613
7.000 4.2936
7.500 4.2370
8.000 4.1556
9.000 3.9866
10.000 3.8776
15.000 3.3238
18.900 2.9873
```

20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.10	0.9261	0.00180	10.40	0.9081	0.00190	9.40	0.9168	0.00210
13.20	0.9269	0.00140	10.50	0.9126	0.00160	9.50	0.9251	0.00190
13.30	0.9314	0.00150	10.60	0.9190	0.00180	9.60	0.9272	0.00160
13.40	0.9332	0.00140	10.70	0.9200	0.00170	9.70	0.9342	0.00220
13.50	0.9360	0.00200	10.80	0.9257	0.00200	9.80	0.9411	0.00180
13.60	0.9408	0.00130	10.90	0.9307	0.00150	9.90	0.9451	0.00180
13.70	0.9418	0.00150	11.00	0.9317	0.00170	10.00	0.9528	0.00170
13.80	0.9472	0.00130	11.10	0.9401	0.00160	10.10	0.9565	0.00160
13.90	0.9470	0.00140	11.20	0.9433	0.00170	10.20	0.9613	0.00180
14.00	0.9498	0.00140	11.30	0.9480	0.00190	10.30	0.9686	0.00180
14.10	0.9538	0.00190	11.40	0.9521	0.00140	10.40	0.9709	0.00160
14.20	0.9557	0.00160	11.50	0.9556	0.00160	10.50	0.9725	0.00180
14.30	0.9589	0.00140	11.60	0.9572	0.00160	10.60	0.9800	0.00150
14.40	0.9607	0.00140	11.70	0.9615	0.00200	10.70	0.9816	0.00220
14.50	0.9641	0.00150	11.80	0.9652	0.00170	10.80	0.9866	0.00190
14.60	0.9677	0.00140	11.90	0.9702	0.00170	10.90	0.9936	0.00180
14.70	0.9731	0.00140	12.00	0.9732	0.00140	11.00	0.9954	0.00180
14.80	0.9713	0.00130	12.10	0.9757	0.00150	11.10	1.0025	0.00140
14.90	0.9721	0.00140	12.20	0.9801	0.00160	11.20	1.0048	0.00200
15.00	0.9767	0.00140	12.30	0.9850	0.00210	11.30	1.0103	0.00180
15.10	0.9785	0.00160	12.40	0.9883	0.00180	11.40	1.0155	0.00180
15.20	0.9808	0.00180	12.50	0.9945	0.00160			
15.30	0.9825	0.00150	12.60	0.9942	0.00190			
15.40	0.9838	0.00170	12.70	0.9977	0.00170			
15.50	0.9848	0.00130	12.80	1.0008	0.00160			
15.60	0.9878	0.00150	12.90	1.0011	0.00190			
15.70	0.9923	0.00160	13.00	1.0072	0.00200			
15.80	0.9947	0.00110	13.10	1.0073	0.00150			
15.90	0.9933	0.00140	13.20	1.0151	0.00190			
16.00	0.9991	0.00120						
16.10	1.0003	0.00140						
16.20	1.0007	0.00120						
16.30	1.0034	0.00120						
16.40	1.0073	0.00130						
16.50	1.0064	0.00150						
16.60	1.0135	0.00140						
16.70	1.0116	0.00130						
16.80	1.0165	0.00190						

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.00	0.9140	0.00170	7.80	0.9313	0.00200	7.30	0.9190	0.00200
8.10	0.9204	0.00190	7.85	0.9394	0.00200	7.35	0.9229	0.00200
8.20	0.9272	0.00160	7.90	0.9400	0.00220	7.40	0.9320	0.00190
8.30	0.9349	0.00200	7.95	0.9407	0.00190	7.45	0.9293	0.00190
8.40	0.9386	0.00160	8.00	0.9443	0.00220	7.50	0.9336	0.00180
8.50	0.9525	0.00160	8.05	0.9524	0.00180	7.55	0.9396	0.00210
8.60	0.9518	0.00200	8.10	0.9574	0.00250	7.60	0.9428	0.00160
8.70	0.9627	0.00200	8.15	0.9575	0.00180	7.65	0.9485	0.00220
8.80	0.9697	0.00220	8.20	0.9609	0.00200	7.70	0.9506	0.00180
8.90	0.9734	0.00200	8.25	0.9616	0.00180	7.75	0.9541	0.00180
9.00	0.9832	0.00160	8.30	0.9700	0.00200	7.80	0.9585	0.00230
9.10	0.9886	0.00190	8.35	0.9714	0.00160	7.85	0.9613	0.00210
9.20	0.9942	0.00190	8.40	0.9741	0.00210	7.90	0.9653	0.00200
9.30	0.9980	0.00220	8.45	0.9769	0.00190	7.95	0.9710	0.00170
9.40	1.0038	0.00190	8.50	0.9841	0.00160	8.00	0.9748	0.00190
9.50	1.0123	0.00220	8.55	0.9849	0.00180	8.05	0.9755	0.00170
9.60	1.0175	0.00170	8.60	0.9899	0.00190	8.10	0.9831	0.00180
9.70	1.0223	0.00160	8.65	0.9939	0.00200	8.15	0.9830	0.00170
9.80	1.0279	0.00190	8.70	0.9923	0.00180	8.20	0.9891	0.00170
9.90	1.0336	0.00170	8.75	0.9978	0.00240	8.25	0.9928	0.00170
10.00	1.0375	0.00180	8.80	1.0012	0.00210	8.30	0.9972	0.00210
			8.85	1.0048	0.00150	8.35	1.0004	0.00200
			8.90	1.0079	0.00190	8.40	1.0034	0.00210
			8.95	1.0110	0.00170	8.45	1.0033	0.00220
			9.00	1.0150	0.00240	8.50	1.0093	0.00190
			9.05	1.0186	0.00180	8.55	1.0094	0.00230
			9.10	1.0216	0.00200	8.60	1.0140	0.00190
						8.65	1.0216	0.00210
						8.70	1.0207	0.00250

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.10	0.9226	0.00200	6.80	0.9185	0.00220	6.60	0.9183	0.00180
7.15	0.9300	0.00260	6.85	0.9227	0.00210	6.65	0.9192	0.00250
7.20	0.9330	0.00210	6.90	0.9273	0.00190	6.70	0.9255	0.00220
7.25	0.9390	0.00200	6.95	0.9321	0.00200	6.75	0.9260	0.00190
7.30	0.9379	0.00200	7.00	0.9372	0.00190	6.80	0.9340	0.00190
7.35	0.9447	0.00260	7.05	0.9380	0.00170	6.85	0.9343	0.00190
7.40	0.9503	0.00170	7.10	0.9444	0.00180	6.90	0.9437	0.00250
7.45	0.9553	0.00220	7.15	0.9485	0.00220	6.95	0.9497	0.00210
7.50	0.9588	0.00180	7.20	0.9529	0.00200	7.00	0.9488	0.00240
7.55	0.9583	0.00170	7.25	0.9580	0.00190	7.05	0.9561	0.00200
7.60	0.9635	0.00260	7.30	0.9640	0.00190	7.10	0.9614	0.00210
7.65	0.9678	0.00240	7.35	0.9649	0.00180	7.15	0.9646	0.00220
7.70	0.9741	0.00200	7.40	0.9699	0.00230	7.20	0.9677	0.00230
7.75	0.9785	0.00230	7.45	0.9692	0.00210	7.25	0.9733	0.00190
7.80	0.9832	0.00230	7.50	0.9759	0.00250	7.30	0.9790	0.00190
7.85	0.9856	0.00200	7.55	0.9853	0.00190	7.35	0.9817	0.00220
7.90	0.9877	0.00200	7.60	0.9892	0.00180	7.40	0.9842	0.00200
7.95	0.9918	0.00170	7.65	0.9879	0.00190	7.45	0.9889	0.00230
8.00	0.9934	0.00190	7.70	0.9907	0.00190	7.50	0.9961	0.00190
8.05	0.9975	0.00240	7.75	0.9980	0.00210	7.55	0.9996	0.00190
8.10	1.0036	0.00170	7.80	0.9997	0.00170	7.60	1.0001	0.00170
8.15	1.0088	0.00210	7.85	1.0035	0.00200	7.65	1.0099	0.00180
8.20	1.0083	0.00170	7.90	1.0051	0.00190	7.70	1.0111	0.00220
8.25	1.0140	0.00180	7.95	1.0130	0.00190	7.75	1.0129	0.00200
8.30	1.0160	0.00210	8.00	1.0169	0.00200	7.80	1.0181	0.00200
			8.05	1.0192	0.00220			
			8.10	1.0241	0.00190			

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.50	0.9178	0.00230	6.30	0.9263	0.00200	5.90	0.9221	0.00220
6.55	0.9263	0.00200	6.35	0.9279	0.00170	5.95	0.9238	0.00220
6.60	0.9281	0.00210	6.40	0.9349	0.00220	6.00	0.9315	0.00200
6.65	0.9355	0.00210	6.45	0.9414	0.00200	6.05	0.9343	0.00200
6.70	0.9375	0.00180	6.50	0.9432	0.00200	6.10	0.9427	0.00200
6.75	0.9441	0.00210	6.55	0.9522	0.00210	6.15	0.9462	0.00270
6.80	0.9453	0.00200	6.60	0.9575	0.00280	6.20	0.9514	0.00220
6.85	0.9518	0.00210	6.65	0.9603	0.00220	6.25	0.9573	0.00190
6.90	0.9561	0.00210	6.70	0.9632	0.00230	6.30	0.9611	0.00200
6.95	0.9634	0.00210	6.75	0.9704	0.00210	6.35	0.9677	0.00220
7.00	0.9676	0.00190	6.80	0.9758	0.00190	6.40	0.9718	0.00190
7.05	0.9722	0.00250	6.85	0.9780	0.00200	6.45	0.9774	0.00200
7.10	0.9770	0.00210	6.90	0.9828	0.00190	6.50	0.9778	0.00190
7.15	0.9793	0.00190	6.95	0.9801	0.00200	6.55	0.9828	0.00240
7.20	0.9852	0.00230	7.00	0.9908	0.00200	6.60	0.9962	0.00220
7.25	0.9868	0.00190	7.05	0.9996	0.00230	6.65	0.9946	0.00190
7.30	0.9958	0.00210	7.10	1.0012	0.00250	6.70	0.9944	0.00260
7.35	0.9965	0.00250	7.15	1.0075	0.00180	6.75	1.0051	0.00200
7.40	1.0016	0.00240	7.20	1.0114	0.00260	6.80	1.0126	0.00190
7.45	1.0061	0.00210	7.25	1.0128	0.00180	6.85	1.0160	0.00290
7.50	1.0085	0.00200	7.30	1.0195	0.00230	6.90	1.0179	0.00200
7.55	1.0141	0.00190	7.35	1.0215	0.00210			
7.60	1.0161	0.00210	7.40	1.0264	0.00210			
7.65	1.0228	0.00210						
7.70	1.0288	0.00200						

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.60	0.9203	0.00220	5.40	0.9148	0.00270	5.30	0.9209	0.00200
5.65	0.9288	0.00200	5.45	0.9175	0.00200	5.35	0.9254	0.00260
5.70	0.9331	0.00220	5.50	0.9252	0.00200	5.40	0.9323	0.00250
5.75	0.9410	0.00210	5.55	0.9320	0.00280	5.45	0.9354	0.00220
5.80	0.9480	0.00210	5.60	0.9400	0.00210	5.50	0.9391	0.00210
5.85	0.9497	0.00200	5.65	0.9483	0.00230	5.55	0.9454	0.00200
5.90	0.9580	0.00230	5.70	0.9527	0.00220	5.60	0.9515	0.00190
5.95	0.9572	0.00240	5.75	0.9539	0.00210	5.65	0.9610	0.00210
6.00	0.9659	0.00260	5.80	0.9614	0.00200	5.70	0.9673	0.00240
6.05	0.9694	0.00240	5.85	0.9686	0.00250	5.75	0.9654	0.00210
6.10	0.9752	0.00240	5.90	0.9753	0.00290	5.80	0.9745	0.00190
6.15	0.9803	0.00230	5.95	0.9782	0.00240	5.85	0.9796	0.00230
6.20	0.9885	0.00210	6.00	0.9835	0.00210	5.90	0.9819	0.00220
6.25	0.9921	0.00240	6.05	0.9874	0.00210	5.95	0.9925	0.00230
6.30	1.0028	0.00250	6.10	0.9964	0.00210	6.00	0.9975	0.00200
6.35	1.0020	0.00230	6.15	0.9958	0.00210	6.05	1.0067	0.00200
6.40	1.0083	0.00220	6.20	1.0026	0.00200	6.10	1.0130	0.00260
6.45	1.0155	0.00210	6.25	1.0083	0.00230	6.15	1.0112	0.00230
6.50	1.0179	0.00220	6.30	1.0143	0.00200	6.20	1.0186	0.00230
6.55	1.0249	0.00240	6.35	1.0198	0.00200	6.25	1.0262	0.00220
6.60	1.0293	0.00220	6.40	1.0240	0.00240	6.30	1.0256	0.00240

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.20	0.9203	0.00260	4.70	0.8975	0.00190	4.70	0.9131	0.00200
5.25	0.9240	0.00220	4.75	0.9027	0.00190	4.75	0.9201	0.00230
5.30	0.9335	0.00250	4.80	0.9094	0.00270	4.80	0.9261	0.00220
5.35	0.9392	0.00230	4.85	0.9181	0.00260	4.85	0.9312	0.00250
5.40	0.9434	0.00240	4.90	0.9206	0.00200	4.90	0.9382	0.00250
5.45	0.9507	0.00200	4.95	0.9262	0.00260	4.95	0.9457	0.00220
5.50	0.9560	0.00210	5.00	0.9332	0.00210	5.00	0.9473	0.00250
5.55	0.9657	0.00190	5.05	0.9391	0.00270	5.05	0.9565	0.00200
5.60	0.9679	0.00220	5.10	0.9458	0.00220	5.10	0.9618	0.00200
5.65	0.9711	0.00260	5.15	0.9574	0.00200	5.15	0.9707	0.00230
5.70	0.9791	0.00230	5.20	0.9558	0.00230	5.20	0.9788	0.00220
5.75	0.9837	0.00260	5.25	0.9681	0.00210	5.25	0.9791	0.00210
5.80	0.9892	0.00210	5.30	0.9705	0.00210	5.30	0.9866	0.00230
5.85	0.9959	0.00260	5.35	0.9816	0.00210	5.35	0.9877	0.00260
5.90	1.0030	0.00220	5.40	0.9799	0.00220	5.40	1.0012	0.00240
5.95	1.0046	0.00260	5.45	0.9877	0.00230	5.45	1.0019	0.00260
6.00	1.0122	0.00210	5.50	0.9961	0.00240	5.50	1.0127	0.00270
6.05	1.0154	0.00210	5.55	0.9992	0.00230	5.55	1.0138	0.00230
6.10	1.0200	0.00230	5.60	1.0047	0.00210	5.60	1.0216	0.00250
			5.65	1.0104	0.00220			
			5.70	1.0192	0.00250			
			5.75	1.0251	0.00210			
			5.80	1.0279	0.00280			

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.60	0.9154	0.00250	4.60	0.9228	0.00210	4.40	0.9027	0.00230
4.65	0.9212	0.00260	4.65	0.9298	0.00210	4.45	0.9142	0.00250
4.70	0.9296	0.00250	4.70	0.9372	0.00210	4.50	0.9226	0.00180
4.75	0.9301	0.00230	4.75	0.9404	0.00230	4.55	0.9256	0.00210
4.80	0.9415	0.00230	4.80	0.9441	0.00210	4.60	0.9341	0.00240
4.85	0.9444	0.00240	4.85	0.9519	0.00220	4.65	0.9368	0.00210
4.90	0.9518	0.00240	4.90	0.9550	0.00270	4.70	0.9403	0.00200
4.95	0.9563	0.00220	4.95	0.9623	0.00220	4.75	0.9536	0.00220
5.00	0.9643	0.00190	5.00	0.9685	0.00190	4.80	0.9553	0.00220
5.05	0.9693	0.00230	5.05	0.9760	0.00200	4.85	0.9594	0.00210
5.10	0.9774	0.00210	5.10	0.9835	0.00270	4.90	0.9646	0.00210
5.15	0.9818	0.00200	5.15	0.9834	0.00250	4.95	0.9729	0.00200
5.20	0.9867	0.00200	5.20	0.9903	0.00220	5.00	0.9719	0.00220
5.25	0.9942	0.00210	5.25	0.9981	0.00220	5.05	0.9805	0.00240
5.30	1.0018	0.00200	5.30	1.0066	0.00240	5.10	0.9879	0.00240
5.35	1.0028	0.00220	5.35	1.0088	0.00200	5.15	0.9998	0.00200
5.40	1.0102	0.00220	5.40	1.0121	0.00200	5.20	0.9968	0.00230
5.45	1.0114	0.00270	5.45	1.0192	0.00210	5.25	1.0028	0.00220
5.50	1.0173	0.00210	5.50	1.0280	0.00210	5.30	1.0085	0.00240
5.55	1.0225	0.00240				5.35	1.0174	0.00220
5.60	1.0314	0.00250				5.40	1.0191	0.00200
						5.45	1.0274	0.00230
						5.50	1.0313	0.00220

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.50	0.9227	0.00230	4.50	0.9249	0.00230	4.50	0.9305	0.00190
4.55	0.9317	0.00210	4.55	0.9307	0.00230	4.55	0.9347	0.00230
4.60	0.9321	0.00200	4.60	0.9360	0.00200	4.60	0.9368	0.00200
4.65	0.9430	0.00240	4.65	0.9457	0.00190	4.65	0.9453	0.00230
4.70	0.9433	0.00220	4.70	0.9502	0.00210	4.70	0.9506	0.00190
4.75	0.9566	0.00240	4.75	0.9531	0.00210	4.75	0.9563	0.00200
4.80	0.9579	0.00210	4.80	0.9618	0.00210	4.80	0.9616	0.00230
4.85	0.9631	0.00250	4.85	0.9691	0.00210	4.85	0.9688	0.00200
4.90	0.9659	0.00230	4.90	0.9725	0.00230	4.90	0.9723	0.00210
4.95	0.9736	0.00220	4.95	0.9761	0.00290	4.95	0.9789	0.00190
5.00	0.9827	0.00240	5.00	0.9804	0.00180	5.00	0.9860	0.00220
5.05	0.9887	0.00230	5.05	0.9897	0.00240	5.05	0.9907	0.00180
5.10	0.9926	0.00260	5.10	0.9905	0.00200	5.10	0.9938	0.00210
5.15	0.9943	0.00180	5.15	0.9985	0.00190	5.15	1.0007	0.00190
5.20	0.9969	0.00200	5.20	1.0007	0.00200	5.20	1.0068	0.00190
5.25	1.0090	0.00200	5.25	1.0122	0.00180	5.25	1.0121	0.00200
5.30	1.0118	0.00220	5.30	1.0142	0.00220	5.30	1.0187	0.00200
5.35	1.0203	0.00200	5.35	1.0226	0.00180	5.35	1.0221	0.00210
5.40	1.0223	0.00200	5.40	1.0249	0.00200	5.40	1.0281	0.00200

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.40	0.9187	0.00210	4.40	0.9262	0.00230	4.20	0.9068	0.00220
4.45	0.9235	0.00200	4.45	0.9300	0.00220	4.25	0.9150	0.00210
4.50	0.9272	0.00250	4.50	0.9346	0.00200	4.30	0.9176	0.00250
4.55	0.9337	0.00200	4.55	0.9460	0.00190	4.35	0.9263	0.00250
4.60	0.9419	0.00230	4.60	0.9476	0.00200	4.40	0.9324	0.00210
4.65	0.9463	0.00320	4.65	0.9540	0.00250	4.45	0.9390	0.00170
4.70	0.9525	0.00250	4.70	0.9608	0.00210	4.50	0.9473	0.00190
4.75	0.9594	0.00190	4.75	0.9671	0.00240	4.55	0.9487	0.00200
4.80	0.9653	0.00220	4.80	0.9684	0.00190	4.60	0.9561	0.00240
4.85	0.9666	0.00250	4.85	0.9762	0.00200	4.65	0.9612	0.00210
4.90	0.9770	0.00240	4.90	0.9805	0.00210	4.70	0.9646	0.00190
4.95	0.9793	0.00180	4.95	0.9866	0.00190	4.75	0.9761	0.00190
5.00	0.9879	0.00220	5.00	0.9890	0.00190	4.80	0.9761	0.00210
5.05	0.9938	0.00210	5.05	1.0000	0.00210	4.85	0.9842	0.00220
5.10	0.9979	0.00280	5.10	1.0038	0.00200	4.90	0.9898	0.00190
5.15	1.0034	0.00210	5.15	1.0104	0.00190	4.95	0.9969	0.00220
5.20	1.0060	0.00250	5.20	1.0129	0.00220	5.00	0.9978	0.00210
5.25	1.0126	0.00190	5.25	1.0192	0.00190	5.05	1.0081	0.00220
5.30	1.0176	0.00210	5.30	1.0241	0.00190	5.10	1.0118	0.00240
5.35	1.0212	0.00250				5.15	1.0165	0.00220
5.40	1.0268	0.00220				5.20	1.0231	0.00200

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.20	0.9239	0.00240	4.10	0.9322	0.00220	3.80	0.9154	0.00240
4.25	0.9347	0.00200	4.15	0.9404	0.00210	3.85	0.9220	0.00220
4.30	0.9394	0.00230	4.20	0.9467	0.00200	3.90	0.9263	0.00200
4.35	0.9477	0.00210	4.25	0.9525	0.00250	3.95	0.9318	0.00210
4.40	0.9499	0.00190	4.30	0.9620	0.00190	4.00	0.9417	0.00180
4.45	0.9569	0.00210	4.35	0.9640	0.00190	4.05	0.9446	0.00200
4.50	0.9617	0.00200	4.40	0.9699	0.00230	4.10	0.9528	0.00190
4.55	0.9724	0.00250	4.45	0.9798	0.00210	4.15	0.9608	0.00170
4.60	0.9747	0.00210	4.50	0.9831	0.00200	4.20	0.9688	0.00190
4.65	0.9809	0.00180	4.55	0.9945	0.00210	4.25	0.9706	0.00170
4.70	0.9851	0.00230	4.60	0.9919	0.00200	4.30	0.9849	0.00190
4.75	0.9944	0.00250	4.65	0.9984	0.00170	4.35	0.9876	0.00210
4.80	0.9975	0.00220	4.70	1.0103	0.00190	4.40	0.9924	0.00230
4.85	1.0040	0.00220	4.75	1.0109	0.00170	4.45	0.9984	0.00200
4.90	1.0083	0.00190	4.80	1.0184	0.00180	4.50	1.0055	0.00210
4.95	1.0164	0.00230	4.85	1.0243	0.00200	4.55	1.0120	0.00200
5.00	1.0210	0.00220	4.90	1.0269	0.00200	4.60	1.0184	0.00170
5.05	1.0246	0.00220				4.65	1.0204	0.00180
5.10	1.0281	0.00200				4.70	1.0316	0.00210

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.50	0.8909	0.00180	3.80	0.9429	0.00190	3.60	0.9215	0.00190
3.55	0.8966	0.00200	3.85	0.9483	0.00190	3.65	0.9291	0.00170
3.60	0.9026	0.00180	3.90	0.9571	0.00180	3.70	0.9361	0.00190
3.65	0.9120	0.00200	3.95	0.9681	0.00240	3.75	0.9452	0.00180
3.70	0.9212	0.00190	4.00	0.9705	0.00180	3.80	0.9514	0.00180
3.75	0.9292	0.00190	4.05	0.9718	0.00190	3.85	0.9589	0.00180
3.80	0.9319	0.00180	4.10	0.9838	0.00170	3.90	0.9662	0.00230
3.85	0.9421	0.00200	4.15	0.9894	0.00220	3.95	0.9723	0.00220
3.90	0.9468	0.00200	4.20	0.9949	0.00180	4.00	0.9799	0.00180
3.95	0.9549	0.00200	4.25	1.0018	0.00200	4.05	0.9885	0.00170
4.00	0.9629	0.00180	4.30	1.0081	0.00170	4.10	0.9923	0.00230
4.05	0.9677	0.00180	4.35	1.0184	0.00170	4.15	0.9993	0.00180
4.10	0.9725	0.00200	4.40	1.0236	0.00180	4.20	1.0056	0.00190
4.15	0.9827	0.00180				4.25	1.0108	0.00180
4.20	0.9901	0.00210				4.30	1.0150	0.00190
4.25	0.9918	0.00190				4.35	1.0240	0.00190
4.30	1.0012	0.00200				4.40	1.0319	0.00180
4.35	1.0037	0.00200						
4.40	1.0137	0.00210						
4.45	1.0152	0.00180						
4.50	1.0259	0.00210						

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.30	0.8972	0.00180	3.30	0.9129	0.00170	2.80	0.9039	0.00180
3.35	0.9036	0.00200	3.35	0.9206	0.00160	2.85	0.9144	0.00170
3.40	0.9128	0.00200	3.40	0.9271	0.00210	2.90	0.9201	0.00160
3.45	0.9190	0.00180	3.45	0.9354	0.00200	2.95	0.9332	0.00190
3.50	0.9269	0.00190	3.50	0.9401	0.00200	3.00	0.9384	0.00170
3.55	0.9341	0.00200	3.55	0.9525	0.00170	3.05	0.9509	0.00170
3.60	0.9410	0.00180	3.60	0.9609	0.00200	3.10	0.9620	0.00180
3.65	0.9497	0.00180	3.65	0.9639	0.00190	3.15	0.9660	0.00180
3.70	0.9542	0.00240	3.70	0.9714	0.00170	3.20	0.9774	0.00170
3.75	0.9631	0.00190	3.75	0.9807	0.00190	3.25	0.9853	0.00190
3.80	0.9702	0.00190	3.80	0.9895	0.00180	3.30	0.9952	0.00170
3.85	0.9754	0.00230	3.85	0.9963	0.00200	3.35	1.0053	0.00170
3.90	0.9840	0.00190	3.90	1.0030	0.00200	3.40	1.0119	0.00190
3.95	0.9932	0.00170	3.95	1.0101	0.00190	3.45	1.0189	0.00190
4.00	1.0025	0.00180	4.00	1.0168	0.00190	3.50	1.0319	0.00190
4.05	1.0049	0.00180	4.05	1.0225	0.00190			
4.10	1.0126	0.00190	4.10	1.0320	0.00190			
4.15	1.0165	0.00240						
4.20	1.0292	0.00190						

18900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma
2.50	0.8996	0.00150
2.55	0.9103	0.00170
2.60	0.9243	0.00220
2.65	0.9327	0.00180
2.70	0.9439	0.00160
2.75	0.9531	0.00170
2.80	0.9614	0.00180
2.85	0.9700	0.00210
2.90	0.9794	0.00200
2.95	0.9915	0.00180
3.00	1.0029	0.00190
3.05	1.0116	0.00160
3.10	1.0192	0.00190
3.15	1.0318	0.00180
3.20	1.0407	0.00200

U-cyl-93.5 (Cases with 0", 1", 10" Reflector)

Case ID: U_cyl_093.5_00ref

Material: Uranium metal in water

Geometry: Infinite cylinder

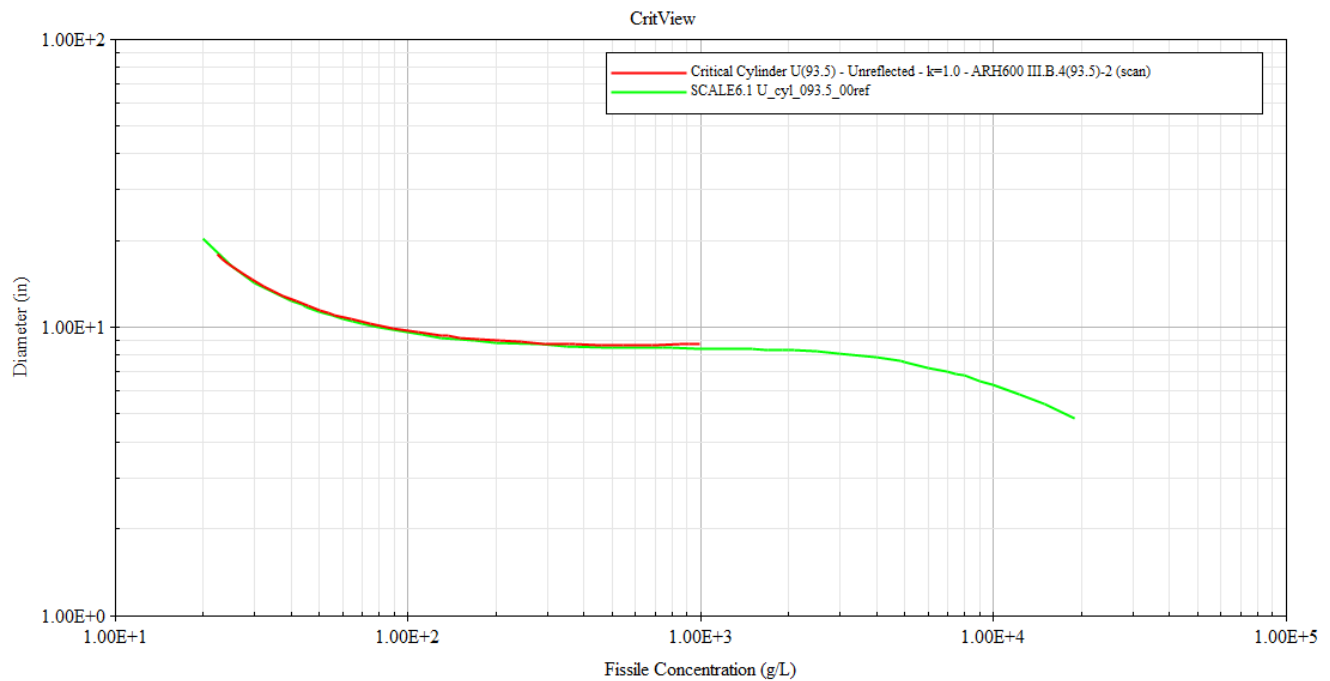
Isotopics: 93.5% ^{235}U 6.5% ^{238}U

Reflector: Unreflected

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Cylinder (93.5% ²³⁵ U) – 0 Inches of Water Reflection				
Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.020	16.600	21.200	0.200	20.3243
0.025	13.900	16.700	0.100	16.2580
0.030	12.500	14.700	0.100	14.3102
0.040	11.000	12.700	0.050	12.3667
0.045	10.500	12.100	0.050	11.8106
0.050	10.200	11.600	0.050	11.3229
0.055	9.900	11.300	0.050	10.9860
0.060	9.600	11.000	0.050	10.6969
0.065	9.500	10.700	0.050	10.5208
0.070	9.300	10.600	0.050	10.2843
0.080	9.000	10.300	0.050	9.9696
0.100	8.700	9.800	0.050	9.5844
0.130	8.400	9.500	0.050	9.2042
0.150	8.200	9.300	0.050	9.0978
0.170	8.100	9.200	0.050	8.9716
0.200	8.100	9.100	0.050	8.8278
0.350	7.800	8.800	0.050	8.5763
0.500	7.700	8.700	0.050	8.4659
0.800	7.700	8.700	0.050	8.4600
1.000	7.600	8.700	0.050	8.3989
1.500	7.600	8.700	0.050	8.4079
1.700	7.600	8.600	0.050	8.3556
1.900	7.500	8.600	0.050	8.3675
2.000	7.500	8.600	0.050	8.3038
2.100	7.500	8.600	0.050	8.3135
2.500	7.400	8.500	0.050	8.2407
3.000	7.300	8.400	0.050	8.0981
4.000	7.100	8.100	0.050	7.8528
5.000	6.800	7.800	0.050	7.5657
6.000	6.600	7.500	0.050	7.2469
7.000	6.300	7.300	0.050	7.0017
7.500	6.200	7.100	0.050	6.9028
8.000	6.100	7.000	0.050	6.7875
9.000	5.900	6.800	0.050	6.5275
10.000	5.700	6.600	0.050	6.3082
15.000	4.900	5.700	0.050	5.4192
18.900	4.400	5.100	0.050	4.8531

WORM and SCALE Input File

```

'Worm generated by Natalie 6/28/21
'Recreating data from PRC-NS-00009 B-656 (pdf pg674)
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
0.02,0.025,0.03,0.04,0.045,0.05,0.055,0.06,0.065,0.07,0.08,0.1,0.13,0.15,0.17,0.2,0.35,0.5,0.8,1,
1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/18.9)>
,
#Starting Diameter = <@startdia =
16.6,13.9,12.5,11,10.5,10.2,9.9,9.6,9.5,9.3,9,8.7,8.4,8.2,8.1,8.1,7.8,7.7,7.7,7.6,7.6,7.6,7.5,7.5
,7.5,7.4,7.3,7.1,6.8,6.6,6.3,6.2,6.1,5.9,5.7,4.9,4.4> in
#Ending Diameter = <@enddia =
21.2,16.7,14.7,12.7,12.1,11.6,11.3,11,10.7,10.6,10.3,9.8,9.5,9.3,9.2,9.1,8.8,8.7,8.7,8.7,8.7,8.6,
8.6,8.6,8.6,8.5,8.4,8.1,7.8,7.5,7.3,7.1,7,6.8,6.6,5.7,5.1> in
#Delta = <@delta =
0.2,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,
0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05> in
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Unreflected Uranium Cylinder Template
v7-238
read composition
  u          1 den=<critconc> 1 300
                        92235 93.5
                        92238 6.5   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Unreflected Cylinder Template"
  cylinder 1      {{(diameter*in)/2}}      5      -5
  media 1 1 1
  boundary 1
end geometry
read bnds
  body=1
    surface(1)=vacuum
    surface(2)=mirror
    surface(3)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Cylinder; U; Unreflected; 93.5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: infcyl
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 0.935 U238 0.065
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.020 20.3243
0.025 16.2580
0.030 14.3102
0.040 12.3667
0.045 11.8106
0.050 11.3229
0.055 10.9860
0.060 10.6969
0.065 10.5208
0.070 10.2843
0.080 9.9696
0.100 9.5844
0.130 9.2042
0.150 9.0978
0.170 8.9716
0.200 8.8278
0.350 8.5763
0.500 8.4659
0.800 8.4600
1.000 8.3989
1.500 8.4079
1.700 8.3556
1.900 8.3675
2.000 8.3038
2.100 8.3135
2.500 8.2407
3.000 8.0981
4.000 7.8528
5.000 7.5657
6.000 7.2469
7.000 7.0017
7.500 6.9028
8.000 6.7875
9.000 6.5275
10.000 6.3082
15.000 5.4192
18.900 4.8531
```

20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
16.60	0.9228	0.00140	13.90	0.9218	0.00160	12.50	0.9205	0.00200
16.80	0.9265	0.00160	14.00	0.9264	0.00190	12.60	0.9279	0.00180
17.00	0.9319	0.00160	14.10	0.9267	0.00180	12.70	0.9289	0.00160
17.20	0.9379	0.00130	14.20	0.9244	0.00280	12.80	0.9323	0.00170
17.40	0.9446	0.00150	14.30	0.9350	0.00220	12.90	0.9402	0.00170
17.60	0.9471	0.00130	14.40	0.9410	0.00210	13.00	0.9466	0.00190
17.80	0.9532	0.00120	14.50	0.9442	0.00180	13.10	0.9477	0.00160
18.00	0.9518	0.00160	14.60	0.9470	0.00180	13.20	0.9476	0.00220
18.20	0.9615	0.00190	14.70	0.9531	0.00180	13.30	0.9577	0.00160
18.40	0.9670	0.00180	14.80	0.9558	0.00160	13.40	0.9634	0.00230
18.60	0.9682	0.00140	14.90	0.9550	0.00200	13.50	0.9675	0.00200
18.80	0.9709	0.00170	15.00	0.9601	0.00140	13.60	0.9727	0.00170
19.00	0.9757	0.00170	15.10	0.9658	0.00190	13.70	0.9794	0.00190
19.20	0.9810	0.00140	15.20	0.9679	0.00180	13.80	0.9821	0.00170
19.40	0.9824	0.00120	15.30	0.9702	0.00170	13.90	0.9811	0.00160
19.60	0.9883	0.00170	15.40	0.9723	0.00160	14.00	0.9890	0.00170
19.80	0.9941	0.00150	15.50	0.9758	0.00200	14.10	0.9902	0.00200
20.00	0.9938	0.00190	15.60	0.9810	0.00170	14.20	0.9912	0.00180
20.20	0.9977	0.00160	15.70	0.9823	0.00180	14.30	0.9994	0.00210
20.40	1.0014	0.00140	15.80	0.9861	0.00160	14.40	1.0053	0.00180
20.60	1.0049	0.00150	15.90	0.9900	0.00130	14.50	1.0091	0.00180
20.80	1.0089	0.00150	16.00	0.9944	0.00140	14.60	1.0103	0.00170
21.00	1.0112	0.00140	16.10	0.9954	0.00160	14.70	1.0126	0.00250
21.20	1.0172	0.00150	16.20	0.9971	0.00150			
			16.30	1.0021	0.00230			
			16.40	1.0016	0.00140			
			16.50	1.0046	0.00150			
			16.60	1.0066	0.00180			
			16.70	1.0129	0.00140			

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
11.00	0.9224	0.00180	10.50	0.9156	0.00200	10.20	0.9212	0.00210
11.05	0.9213	0.00220	10.55	0.9223	0.00210	10.25	0.9276	0.00180
11.10	0.9268	0.00210	10.60	0.9239	0.00180	10.30	0.9285	0.00190
11.15	0.9305	0.00180	10.65	0.9257	0.00210	10.35	0.9296	0.00190
11.20	0.9328	0.00190	10.70	0.9263	0.00250	10.40	0.9352	0.00210
11.25	0.9333	0.00190	10.75	0.9294	0.00190	10.45	0.9388	0.00200
11.30	0.9354	0.00200	10.80	0.9361	0.00230	10.50	0.9436	0.00200
11.35	0.9423	0.00200	10.85	0.9455	0.00190	10.55	0.9453	0.00230
11.40	0.9466	0.00230	10.90	0.9440	0.00190	10.60	0.9469	0.00200
11.45	0.9503	0.00170	10.95	0.9437	0.00230	10.65	0.9540	0.00230
11.50	0.9495	0.00200	11.00	0.9503	0.00230	10.70	0.9583	0.00230
11.55	0.9539	0.00230	11.05	0.9516	0.00220	10.75	0.9615	0.00250
11.60	0.9597	0.00190	11.10	0.9547	0.00210	10.80	0.9618	0.00200
11.65	0.9593	0.00200	11.15	0.9566	0.00170	10.85	0.9663	0.00220
11.70	0.9614	0.00190	11.20	0.9637	0.00210	10.90	0.9694	0.00200
11.75	0.9653	0.00210	11.25	0.9710	0.00270	10.95	0.9736	0.00200
11.80	0.9701	0.00230	11.30	0.9720	0.00210	11.00	0.9763	0.00250
11.85	0.9722	0.00180	11.35	0.9720	0.00180	11.05	0.9829	0.00220
11.90	0.9781	0.00220	11.40	0.9759	0.00210	11.10	0.9851	0.00240
11.95	0.9751	0.00210	11.45	0.9806	0.00220	11.15	0.9868	0.00190
12.00	0.9833	0.00220	11.50	0.9845	0.00210	11.20	0.9900	0.00180
12.05	0.9823	0.00170	11.55	0.9879	0.00200	11.25	0.9943	0.00200
12.10	0.9880	0.00220	11.60	0.9937	0.00330	11.30	0.9989	0.00230
12.15	0.9881	0.00180	11.65	0.9914	0.00240	11.35	1.0013	0.00200
12.20	0.9919	0.00230	11.70	0.9914	0.00190	11.40	1.0055	0.00200
12.25	0.9917	0.00170	11.75	0.9938	0.00210	11.45	1.0120	0.00200
12.30	0.9992	0.00190	11.80	0.9989	0.00190	11.50	1.0088	0.00220
12.35	0.9996	0.00190	11.85	1.0041	0.00200	11.55	1.0139	0.00190
12.40	1.0008	0.00190	11.90	1.0097	0.00220	11.60	1.0112	0.00220
12.45	1.0036	0.00190	11.95	1.0073	0.00210			
12.50	1.0091	0.00220	12.00	1.0146	0.00220			
12.55	1.0122	0.00180	12.05	1.0155	0.00210			
12.60	1.0131	0.00200	12.10	1.0185	0.00220			
12.65	1.0164	0.00200						
12.70	1.0192	0.00200						

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.90	0.9167	0.00200	9.60	0.9130	0.00220	9.50	0.9153	0.00200
9.95	0.9252	0.00270	9.65	0.9174	0.00210	9.55	0.9247	0.00220
10.00	0.9304	0.00200	9.70	0.9193	0.00290	9.60	0.9255	0.00260
10.05	0.9316	0.00200	9.75	0.9248	0.00180	9.65	0.9310	0.00190
10.10	0.9339	0.00230	9.80	0.9299	0.00220	9.70	0.9386	0.00220
10.15	0.9393	0.00190	9.85	0.9296	0.00200	9.75	0.9426	0.00210
10.20	0.9450	0.00230	9.90	0.9347	0.00190	9.80	0.9474	0.00220
10.25	0.9470	0.00200	9.95	0.9362	0.00180	9.85	0.9485	0.00230
10.30	0.9496	0.00220	10.00	0.9463	0.00210	9.90	0.9513	0.00200
10.35	0.9527	0.00210	10.05	0.9483	0.00220	9.95	0.9510	0.00220
10.40	0.9570	0.00260	10.10	0.9513	0.00190	10.00	0.9606	0.00210
10.45	0.9563	0.00220	10.15	0.9533	0.00210	10.05	0.9652	0.00200
10.50	0.9661	0.00220	10.20	0.9607	0.00210	10.10	0.9684	0.00210
10.55	0.9697	0.00210	10.25	0.9631	0.00210	10.15	0.9716	0.00250
10.60	0.9732	0.00230	10.30	0.9657	0.00190	10.20	0.9704	0.00220
10.65	0.9777	0.00240	10.35	0.9723	0.00190	10.25	0.9826	0.00200
10.70	0.9776	0.00240	10.40	0.9771	0.00250	10.30	0.9835	0.00210
10.75	0.9844	0.00230	10.45	0.9814	0.00280	10.35	0.9895	0.00230
10.80	0.9887	0.00240	10.50	0.9804	0.00220	10.40	0.9934	0.00220
10.85	0.9880	0.00240	10.55	0.9866	0.00230	10.45	0.9961	0.00200
10.90	0.9950	0.00240	10.60	0.9932	0.00200	10.50	0.9990	0.00220
10.95	0.9951	0.00230	10.65	0.9893	0.00220	10.55	1.0014	0.00230
11.00	1.0019	0.00200	10.70	1.0007	0.00190	10.60	1.0072	0.00180
11.05	1.0035	0.00200	10.75	1.0019	0.00310	10.65	1.0109	0.00240
11.10	1.0068	0.00240	10.80	1.0072	0.00250	10.70	1.0156	0.00200
11.15	1.0126	0.00220	10.85	1.0040	0.00260			
11.20	1.0155	0.00230	10.90	1.0106	0.00230			
11.25	1.0171	0.00240	10.95	1.0174	0.00220			
11.30	1.0175	0.00210	11.00	1.0212	0.00260			

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.30	0.9166	0.00200	9.00	0.9133	0.00200	8.70	0.9152	0.00280
9.35	0.9184	0.00240	9.05	0.9110	0.00250	8.75	0.9228	0.00240
9.40	0.9243	0.00190	9.10	0.9209	0.00220	8.80	0.9225	0.00200
9.45	0.9244	0.00230	9.15	0.9229	0.00200	8.85	0.9275	0.00200
9.50	0.9331	0.00250	9.20	0.9292	0.00260	8.90	0.9420	0.00270
9.55	0.9359	0.00230	9.25	0.9373	0.00200	8.95	0.9369	0.00290
9.60	0.9413	0.00240	9.30	0.9379	0.00220	9.00	0.9454	0.00230
9.65	0.9460	0.00200	9.35	0.9424	0.00260	9.05	0.9486	0.00210
9.70	0.9476	0.00250	9.40	0.9449	0.00240	9.10	0.9554	0.00260
9.75	0.9531	0.00240	9.45	0.9540	0.00210	9.15	0.9549	0.00200
9.80	0.9616	0.00210	9.50	0.9560	0.00220	9.20	0.9644	0.00210
9.85	0.9642	0.00230	9.55	0.9623	0.00240	9.25	0.9652	0.00270
9.90	0.9650	0.00210	9.60	0.9656	0.00230	9.30	0.9717	0.00250
9.95	0.9693	0.00200	9.65	0.9694	0.00220	9.35	0.9795	0.00270
10.00	0.9770	0.00220	9.70	0.9752	0.00230	9.40	0.9847	0.00220
10.05	0.9766	0.00190	9.75	0.9817	0.00220	9.45	0.9903	0.00320
10.10	0.9830	0.00220	9.80	0.9851	0.00210	9.50	0.9905	0.00230
10.15	0.9879	0.00230	9.85	0.9837	0.00230	9.55	0.9923	0.00200
10.20	0.9931	0.00210	9.90	0.9918	0.00270	9.60	1.0035	0.00200
10.25	0.9963	0.00220	9.95	0.9971	0.00260	9.65	1.0041	0.00340
10.30	1.0017	0.00220	10.00	1.0045	0.00190	9.70	1.0096	0.00230
10.35	1.0047	0.00210	10.05	1.0028	0.00230	9.75	1.0194	0.00200
10.40	1.0078	0.00240	10.10	1.0073	0.00210	9.80	1.0179	0.00230
10.45	1.0103	0.00240	10.15	1.0113	0.00230			
10.50	1.0162	0.00250	10.20	1.0142	0.00240			
10.55	1.0130	0.00270	10.25	1.0225	0.00220			
10.60	1.0210	0.00230	10.30	1.0262	0.00220			

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.40	0.9194	0.00230	8.20	0.9105	0.00260	8.10	0.9107	0.00210
8.45	0.9197	0.00220	8.25	0.9162	0.00240	8.15	0.9136	0.00200
8.50	0.9257	0.00220	8.30	0.9171	0.00220	8.20	0.9174	0.00270
8.55	0.9318	0.00290	8.35	0.9193	0.00200	8.25	0.9235	0.00250
8.60	0.9333	0.00290	8.40	0.9292	0.00310	8.30	0.9280	0.00210
8.65	0.9442	0.00230	8.45	0.9386	0.00260	8.35	0.9348	0.00270
8.70	0.9460	0.00260	8.50	0.9444	0.00230	8.40	0.9409	0.00270
8.75	0.9527	0.00220	8.55	0.9536	0.00260	8.45	0.9439	0.00250
8.80	0.9506	0.00230	8.60	0.9538	0.00250	8.50	0.9530	0.00260
8.85	0.9642	0.00210	8.65	0.9541	0.00210	8.55	0.9601	0.00240
8.90	0.9695	0.00280	8.70	0.9644	0.00270	8.60	0.9651	0.00240
8.95	0.9699	0.00210	8.75	0.9673	0.00230	8.65	0.9682	0.00260
9.00	0.9778	0.00260	8.80	0.9749	0.00230	8.70	0.9701	0.00230
9.05	0.9831	0.00210	8.85	0.9759	0.00250	8.75	0.9738	0.00240
9.10	0.9901	0.00240	8.90	0.9792	0.00290	8.80	0.9835	0.00240
9.15	0.9914	0.00230	8.95	0.9924	0.00220	8.85	0.9880	0.00260
9.20	0.9994	0.00260	9.00	0.9934	0.00230	8.90	0.9920	0.00260
9.25	1.0066	0.00240	9.05	0.9956	0.00250	8.95	0.9984	0.00250
9.30	1.0061	0.00210	9.10	1.0002	0.00210	9.00	1.0021	0.00280
9.35	1.0078	0.00230	9.15	1.0054	0.00230	9.05	1.0070	0.00240
9.40	1.0113	0.00220	9.20	1.0113	0.00290	9.10	1.0170	0.00260
9.45	1.0211	0.00240	9.25	1.0149	0.00280	9.15	1.0196	0.00280
9.50	1.0284	0.00220	9.30	1.0172	0.00220	9.20	1.0253	0.00300

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.10	0.9194	0.00240	7.80	0.9109	0.00230	7.70	0.9153	0.00250
8.15	0.9255	0.00240	7.85	0.9215	0.00230	7.75	0.9190	0.00220
8.20	0.9339	0.00230	7.90	0.9303	0.00250	7.80	0.9250	0.00270
8.25	0.9396	0.00240	7.95	0.9343	0.00250	7.85	0.9345	0.00250
8.30	0.9434	0.00260	8.00	0.9350	0.00230	7.90	0.9395	0.00260
8.35	0.9493	0.00220	8.05	0.9466	0.00270	7.95	0.9425	0.00250
8.40	0.9508	0.00260	8.10	0.9481	0.00260	8.00	0.9511	0.00220
8.45	0.9624	0.00250	8.15	0.9569	0.00220	8.05	0.9555	0.00240
8.50	0.9643	0.00210	8.20	0.9600	0.00280	8.10	0.9587	0.00230
8.55	0.9739	0.00250	8.25	0.9674	0.00310	8.15	0.9660	0.00230
8.60	0.9777	0.00250	8.30	0.9690	0.00260	8.20	0.9714	0.00250
8.65	0.9774	0.00290	8.35	0.9771	0.00220	8.25	0.9732	0.00220
8.70	0.9881	0.00230	8.40	0.9834	0.00210	8.30	0.9766	0.00220
8.75	0.9939	0.00240	8.45	0.9895	0.00230	8.35	0.9878	0.00240
8.80	0.9970	0.00220	8.50	0.9931	0.00260	8.40	0.9956	0.00220
8.85	1.0024	0.00260	8.55	0.9959	0.00330	8.45	0.9979	0.00280
8.90	1.0056	0.00250	8.60	1.0037	0.00250	8.50	1.0045	0.00260
8.95	1.0112	0.00230	8.65	1.0088	0.00260	8.55	1.0057	0.00330
9.00	1.0145	0.00250	8.70	1.0148	0.00260	8.60	1.0088	0.00250
9.05	1.0202	0.00220	8.75	1.0197	0.00230	8.65	1.0176	0.00280
9.10	1.0278	0.00230	8.80	1.0238	0.00270	8.70	1.0253	0.00200

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.70	0.9237	0.00210	7.60	0.9143	0.00220	7.60	0.9160	0.00250
7.75	0.9275	0.00220	7.65	0.9196	0.00250	7.65	0.9228	0.00230
7.80	0.9337	0.00250	7.70	0.9210	0.00230	7.70	0.9267	0.00200
7.85	0.9398	0.00230	7.75	0.9279	0.00210	7.75	0.9409	0.00320
7.90	0.9408	0.00200	7.80	0.9335	0.00260	7.80	0.9382	0.00270
7.95	0.9490	0.00300	7.85	0.9381	0.00220	7.85	0.9465	0.00250
8.00	0.9520	0.00250	7.90	0.9453	0.00250	7.90	0.9495	0.00250
8.05	0.9617	0.00260	7.95	0.9487	0.00250	7.95	0.9553	0.00200
8.10	0.9596	0.00210	8.00	0.9501	0.00220	8.00	0.9583	0.00240
8.15	0.9694	0.00280	8.05	0.9648	0.00240	8.05	0.9648	0.00250
8.20	0.9723	0.00260	8.10	0.9651	0.00220	8.10	0.9684	0.00230
8.25	0.9837	0.00240	8.15	0.9725	0.00240	8.15	0.9785	0.00210
8.30	0.9860	0.00300	8.20	0.9771	0.00220	8.20	0.9809	0.00210
8.35	0.9924	0.00220	8.25	0.9810	0.00280	8.25	0.9875	0.00240
8.40	0.9958	0.00240	8.30	0.9871	0.00220	8.30	0.9872	0.00220
8.45	0.9987	0.00250	8.35	0.9912	0.00260	8.35	0.9943	0.00210
8.50	1.0052	0.00250	8.40	1.0002	0.00230	8.40	0.9997	0.00200
8.55	1.0111	0.00310	8.45	1.0035	0.00240	8.45	1.0016	0.00240
8.60	1.0175	0.00260	8.50	1.0085	0.00230	8.50	1.0077	0.00210
8.65	1.0219	0.00240	8.55	1.0140	0.00230	8.55	1.0140	0.00310
8.70	1.0227	0.00220	8.60	1.0183	0.00260	8.60	1.0209	0.00210
			8.65	1.0234	0.00220	8.65	1.0238	0.00260
			8.70	1.0245	0.00270	8.70	1.0281	0.00230

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.60	0.9198	0.00250	7.50	0.9135	0.00260	7.50	0.9188	0.00240
7.65	0.9282	0.00220	7.55	0.9190	0.00200	7.55	0.9202	0.00230
7.70	0.9314	0.00230	7.60	0.9261	0.00280	7.60	0.9308	0.00210
7.75	0.9408	0.00200	7.65	0.9320	0.00180	7.65	0.9320	0.00210
7.80	0.9410	0.00260	7.70	0.9360	0.00200	7.70	0.9377	0.00230
7.85	0.9492	0.00290	7.75	0.9393	0.00260	7.75	0.9458	0.00230
7.90	0.9529	0.00230	7.80	0.9457	0.00210	7.80	0.9462	0.00200
7.95	0.9585	0.00200	7.85	0.9528	0.00200	7.85	0.9497	0.00230
8.00	0.9655	0.00230	7.90	0.9546	0.00220	7.90	0.9601	0.00210
8.05	0.9711	0.00200	7.95	0.9640	0.00240	7.95	0.9606	0.00240
8.10	0.9719	0.00190	8.00	0.9642	0.00230	8.00	0.9661	0.00210
8.15	0.9793	0.00210	8.05	0.9706	0.00250	8.05	0.9724	0.00220
8.20	0.9853	0.00210	8.10	0.9749	0.00230	8.10	0.9802	0.00280
8.25	0.9943	0.00260	8.15	0.9813	0.00230	8.15	0.9804	0.00270
8.30	0.9920	0.00320	8.20	0.9866	0.00210	8.20	0.9907	0.00210
8.35	0.9995	0.00210	8.25	0.9925	0.00250	8.25	0.9951	0.00220
8.40	1.0040	0.00240	8.30	0.9990	0.00240	8.30	0.9996	0.00210
8.45	1.0086	0.00210	8.35	0.9965	0.00180	8.35	1.0048	0.00220
8.50	1.0146	0.00250	8.40	1.0065	0.00220	8.40	1.0048	0.00240
8.55	1.0179	0.00230	8.45	1.0070	0.00230	8.45	1.0115	0.00240
8.60	1.0240	0.00250	8.50	1.0162	0.00210	8.50	1.0149	0.00300
			8.55	1.0179	0.00210	8.55	1.0207	0.00200
			8.60	1.0200	0.00240	8.60	1.0269	0.00230

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.50	0.9205	0.00210	7.40	0.9179	0.00210	7.30	0.9188	0.00200
7.55	0.9236	0.00210	7.45	0.9201	0.00180	7.35	0.9218	0.00230
7.60	0.9291	0.00190	7.50	0.9280	0.00240	7.40	0.9315	0.00170
7.65	0.9331	0.00200	7.55	0.9350	0.00220	7.45	0.9315	0.00230
7.70	0.9417	0.00190	7.60	0.9376	0.00190	7.50	0.9390	0.00220
7.75	0.9457	0.00200	7.65	0.9417	0.00210	7.55	0.9418	0.00280
7.80	0.9462	0.00240	7.70	0.9476	0.00250	7.60	0.9506	0.00220
7.85	0.9539	0.00200	7.75	0.9513	0.00270	7.65	0.9547	0.00240
7.90	0.9573	0.00210	7.80	0.9548	0.00240	7.70	0.9604	0.00190
7.95	0.9659	0.00190	7.85	0.9628	0.00210	7.75	0.9652	0.00240
8.00	0.9709	0.00190	7.90	0.9657	0.00250	7.80	0.9681	0.00240
8.05	0.9763	0.00250	7.95	0.9776	0.00180	7.85	0.9752	0.00210
8.10	0.9800	0.00250	8.00	0.9761	0.00200	7.90	0.9839	0.00200
8.15	0.9809	0.00200	8.05	0.9815	0.00200	7.95	0.9812	0.00230
8.20	0.9871	0.00200	8.10	0.9869	0.00230	8.00	0.9875	0.00230
8.25	0.9925	0.00210	8.15	0.9901	0.00210	8.05	0.9923	0.00230
8.30	0.9986	0.00220	8.20	0.9956	0.00240	8.10	1.0003	0.00220
8.35	1.0038	0.00240	8.25	1.0010	0.00230	8.15	1.0011	0.00180
8.40	1.0094	0.00250	8.30	1.0045	0.00250	8.20	1.0040	0.00220
8.45	1.0135	0.00230	8.35	1.0094	0.00210	8.25	1.0116	0.00260
8.50	1.0170	0.00200	8.40	1.0168	0.00240	8.30	1.0203	0.00240
8.55	1.0265	0.00200	8.45	1.0237	0.00230	8.35	1.0206	0.00190
8.60	1.0279	0.00200	8.50	1.0248	0.00240	8.40	1.0222	0.00230

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.10	0.9277	0.00190	6.80	0.9184	0.00230	6.60	0.9253	0.00190
7.15	0.9299	0.00200	6.85	0.9250	0.00180	6.65	0.9258	0.00220
7.20	0.9332	0.00200	6.90	0.9308	0.00200	6.70	0.9341	0.00220
7.25	0.9372	0.00230	6.95	0.9335	0.00180	6.75	0.9410	0.00190
7.30	0.9484	0.00240	7.00	0.9395	0.00190	6.80	0.9432	0.00200
7.35	0.9537	0.00200	7.05	0.9454	0.00270	6.85	0.9515	0.00170
7.40	0.9563	0.00240	7.10	0.9511	0.00220	6.90	0.9593	0.00190
7.45	0.9559	0.00210	7.15	0.9606	0.00220	6.95	0.9668	0.00180
7.50	0.9616	0.00190	7.20	0.9588	0.00190	7.00	0.9712	0.00180
7.55	0.9714	0.00170	7.25	0.9666	0.00210	7.05	0.9780	0.00200
7.60	0.9745	0.00240	7.30	0.9750	0.00260	7.10	0.9829	0.00210
7.65	0.9827	0.00240	7.35	0.9786	0.00170	7.15	0.9846	0.00230
7.70	0.9846	0.00220	7.40	0.9845	0.00210	7.20	0.9940	0.00250
7.75	0.9885	0.00200	7.45	0.9913	0.00230	7.25	1.0004	0.00210
7.80	0.9981	0.00190	7.50	0.9939	0.00200	7.30	1.0024	0.00190
7.85	0.9996	0.00190	7.55	0.9984	0.00230	7.35	1.0088	0.00200
7.90	1.0067	0.00220	7.60	1.0035	0.00260	7.40	1.0125	0.00270
7.95	1.0087	0.00210	7.65	1.0096	0.00220	7.45	1.0198	0.00170
8.00	1.0167	0.00300	7.70	1.0166	0.00200	7.50	1.0249	0.00210
8.05	1.0241	0.00220	7.75	1.0156	0.00220			
8.10	1.0214	0.00270	7.80	1.0272	0.00220			

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.30	0.9177	0.00210	6.20	0.9166	0.00200	6.10	0.9215	0.00180
6.35	0.9191	0.00190	6.25	0.9274	0.00160	6.15	0.9230	0.00170
6.40	0.9269	0.00170	6.30	0.9327	0.00310	6.20	0.9310	0.00180
6.45	0.9370	0.00240	6.35	0.9391	0.00200	6.25	0.9377	0.00200
6.50	0.9411	0.00220	6.40	0.9436	0.00280	6.30	0.9446	0.00190
6.55	0.9502	0.00190	6.45	0.9496	0.00180	6.35	0.9474	0.00190
6.60	0.9560	0.00230	6.50	0.9554	0.00180	6.40	0.9570	0.00250
6.65	0.9606	0.00220	6.55	0.9609	0.00250	6.45	0.9609	0.00200
6.70	0.9657	0.00210	6.60	0.9692	0.00220	6.50	0.9697	0.00190
6.75	0.9699	0.00230	6.65	0.9737	0.00170	6.55	0.9721	0.00190
6.80	0.9753	0.00180	6.70	0.9792	0.00170	6.60	0.9818	0.00200
6.85	0.9802	0.00190	6.75	0.9838	0.00180	6.65	0.9869	0.00170
6.90	0.9850	0.00180	6.80	0.9896	0.00230	6.70	0.9981	0.00220
6.95	0.9941	0.00180	6.85	0.9960	0.00260	6.75	0.9997	0.00200
7.00	0.9998	0.00200	6.90	0.9995	0.00220	6.80	1.0001	0.00210
7.05	1.0057	0.00230	6.95	1.0084	0.00200	6.85	1.0106	0.00210
7.10	1.0086	0.00240	7.00	1.0153	0.00170	6.90	1.0163	0.00200
7.15	1.0146	0.00210	7.05	1.0163	0.00220	6.95	1.0215	0.00210
7.20	1.0231	0.00180	7.10	1.0211	0.00170	7.00	1.0283	0.00200
7.25	1.0248	0.00190						
7.30	1.0335	0.00190						

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.90	0.9204	0.00160	5.70	0.9155	0.00180	4.90	0.9163	0.00180
5.95	0.9275	0.00200	5.75	0.9256	0.00180	4.95	0.9239	0.00180
6.00	0.9324	0.00150	5.80	0.9331	0.00260	5.00	0.9325	0.00180
6.05	0.9409	0.00180	5.85	0.9389	0.00160	5.05	0.9402	0.00190
6.10	0.9440	0.00230	5.90	0.9455	0.00200	5.10	0.9493	0.00200
6.15	0.9487	0.00230	5.95	0.9550	0.00210	5.15	0.9571	0.00180
6.20	0.9554	0.00180	6.00	0.9590	0.00180	5.20	0.9618	0.00210
6.25	0.9646	0.00200	6.05	0.9659	0.00180	5.25	0.9768	0.00190
6.30	0.9716	0.00190	6.10	0.9714	0.00190	5.30	0.9774	0.00190
6.35	0.9782	0.00200	6.15	0.9808	0.00230	5.35	0.9859	0.00160
6.40	0.9858	0.00190	6.20	0.9850	0.00190	5.40	0.9980	0.00240
6.45	0.9920	0.00180	6.25	0.9938	0.00220	5.45	1.0032	0.00160
6.50	0.9972	0.00160	6.30	0.9987	0.00170	5.50	1.0104	0.00170
6.55	1.0023	0.00160	6.35	1.0066	0.00160	5.55	1.0167	0.00180
6.60	1.0062	0.00230	6.40	1.0102	0.00210	5.60	1.0224	0.00240
6.65	1.0162	0.00180	6.45	1.0175	0.00200	5.65	1.0321	0.00200
6.70	1.0216	0.00210	6.50	1.0213	0.00180	5.70	1.0377	0.00170
6.75	1.0260	0.00160	6.55	1.0285	0.00160			
6.80	1.0327	0.00180	6.60	1.0335	0.00200			

18900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma
4.40	0.9203	0.00180
4.45	0.9278	0.00160
4.50	0.9395	0.00140
4.55	0.9431	0.00180
4.60	0.9560	0.00170
4.65	0.9618	0.00150
4.70	0.9737	0.00160
4.75	0.9802	0.00170
4.80	0.9893	0.00180
4.85	0.9996	0.00170
4.90	1.0060	0.00170
4.95	1.0145	0.00190
5.00	1.0215	0.00180
5.05	1.0281	0.00160
5.10	1.0374	0.00170

Case ID: U_cyl_093.5_01ref

Material: Uranium metal in water

Geometry: Infinite cylinder

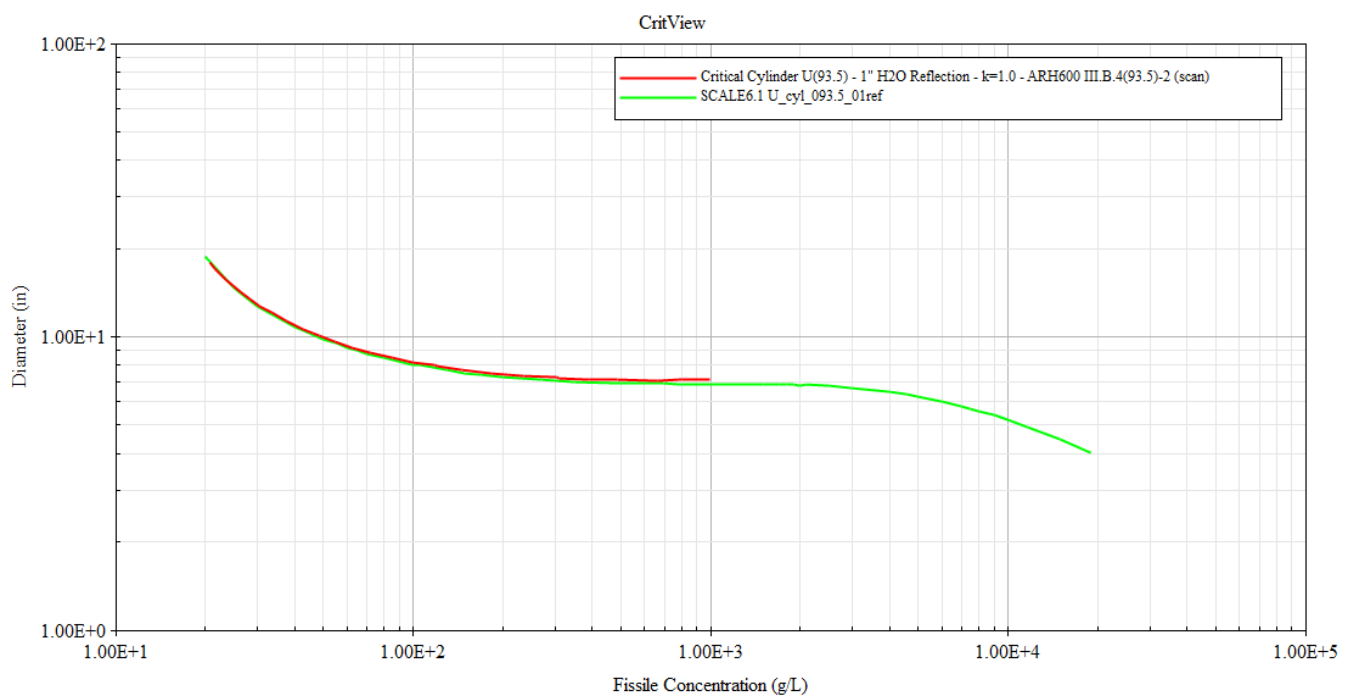
Isotopics: 93.5% ^{235}U 6.5% ^{238}U

Reflector: 1" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Cylinder (93.5% ²³⁵ U) - 1 Inch of Water Reflection				
Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.020	15.100	19.600	0.200	18.7750
0.025	12.400	15.200	0.100	14.6951
0.030	11.000	13.200	0.100	12.7567
0.040	9.500	11.100	0.050	10.8333
0.045	9.000	10.500	0.050	10.3059
0.050	8.600	10.100	0.050	9.8450
0.055	8.400	9.700	0.050	9.4937
0.060	8.100	9.500	0.050	9.1936
0.065	7.900	9.200	0.050	8.9798
0.070	7.800	9.100	0.050	8.7433
0.080	7.500	8.700	0.050	8.5035
0.100	7.200	8.300	0.050	8.0604
0.130	6.900	7.900	0.050	7.7215
0.150	6.700	7.800	0.050	7.5371
0.170	6.600	7.600	0.050	7.4112
0.200	6.500	7.500	0.050	7.2630
0.350	6.300	7.200	0.050	7.0233
0.500	6.200	7.200	0.050	6.9549
0.800	6.100	7.100	0.050	6.9092
1.000	6.100	7.100	0.050	6.9100
1.500	6.100	7.100	0.050	6.8660
1.700	6.100	7.200	0.050	6.9138
1.900	6.100	7.100	0.050	6.8706
2.000	6.100	7.100	0.050	6.8405
2.100	6.100	7.100	0.050	6.8708
2.500	6.000	7.000	0.050	6.7899
3.000	5.900	6.900	0.050	6.6701
4.000	5.700	6.700	0.050	6.5075
5.000	5.500	6.500	0.050	6.2438
6.000	5.300	6.300	0.050	5.9995
7.000	5.100	6.000	0.050	5.8043
7.500	5.000	5.900	0.050	5.6667
8.000	4.900	5.800	0.050	5.5752
9.000	4.800	5.600	0.050	5.4000
10.000	4.600	5.400	0.050	5.1958
15.000	4.000	4.700	0.050	4.4703
18.900	3.600	4.200	0.050	4.0200

```

Worm generated by Natalie 6/28/21
'Recreating data from PRC-NS-00009 B-676 (pdf pg694)
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
0.02,0.025,0.03,0.04,0.045,0.05,0.055,0.06,0.065,0.07,0.08,0.1,0.13,0.15,0.17,0.2,0.35,0.5,0.8,1,
1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/18.9)>
,
#Starting Diameter = <@startdia =
15.1,12.4,11,9.5,9,8.6,8.4,8.1,7.9,7.8,7.5,7.2,6.9,6.7,6.6,6.5,6.3,6.2,6.1,6.1,6.1,6.1,6.1,6.1,6.
1,6,5.9,5.7,5.5,5.3,5.1,5,4.9,4.8,4.6,4,3.6> in
#Ending Diameter = <@enddia =
19.6,15.2,13.2,11.1,10.5,10.1,9.7,9.5,9.2,9.1,8.7,8.3,7.9,7.8,7.6,7.5,7.2,7.2,7.1,7.1,7.1,7.2,7.1
,7.1,7.1,7,6.9,6.7,6.5,6.3,6,5.9,5.8,5.6,5.4,4.7,4.2> in
#Delta = <@delta =
0.2,0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,
0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05> in
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected Cylinder Template
v7-238
read composition
u          1 den=<critconc> 1 300
                                92235 93.5
                                92238 6.5   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
h2o          2 1 300   end
end composition
read parameter
htm=yes
end parameter
read geometry
global unit 1
com="Reflected Cylinder Template"
cylinder 1      {{{(diameter*in)/2}}}      5      -5
cylinder 2      {{{(diameter*in)/2+(1*in)}}}      5      -5
media 1 1 1
media 2 1 2 -1
boundary 2
end geometry
read bnds
body=1
surface(1)=vacuum
surface(2)=mirror
surface(3)=mirror
body=2
surface(1)=vacuum
surface(2)=mirror
surface(3)=mirror
end bnds
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Cylinder; U; 1" Water Reflector; 93.5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: infcyl
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 0.935 U238 0.065
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.020 18.7750
0.025 14.6951
0.030 12.7567
0.040 10.8333
0.045 10.3059
0.050 9.8450
0.055 9.4937
0.060 9.1936
0.065 8.9798
0.070 8.7433
0.080 8.5035
0.100 8.0604
0.130 7.7215
0.150 7.5371
0.170 7.4112
0.200 7.2630
0.350 7.0233
0.500 6.9549
0.800 6.9092
1.000 6.9100
1.500 6.8660
1.700 6.9138
1.900 6.8706
2.000 6.8405
2.100 6.8708
2.500 6.7899
3.000 6.6701
4.000 6.5075
5.000 6.2438
6.000 5.9995
7.000 5.8043
7.500 5.6667
8.000 5.5752
9.000 5.4000
10.000 5.1958
15.000 4.4703
18.900 4.0200
```

20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
15.10	0.9228	0.00140	12.40	0.9206	0.00190	11.00	0.9227	0.00260
15.30	0.9288	0.00160	12.50	0.9213	0.00160	11.10	0.9223	0.00180
15.50	0.9322	0.00160	12.60	0.9299	0.00170	11.20	0.9309	0.00190
15.70	0.9370	0.00170	12.70	0.9335	0.00200	11.30	0.9348	0.00180
15.90	0.9424	0.00180	12.80	0.9365	0.00160	11.40	0.9411	0.00160
16.10	0.9484	0.00150	12.90	0.9415	0.00190	11.50	0.9430	0.00190
16.30	0.9504	0.00150	13.00	0.9445	0.00160	11.60	0.9488	0.00190
16.50	0.9556	0.00140	13.10	0.9479	0.00150	11.70	0.9564	0.00210
16.70	0.9594	0.00150	13.20	0.9515	0.00190	11.80	0.9595	0.00190
16.90	0.9684	0.00180	13.30	0.9545	0.00150	11.90	0.9637	0.00200
17.10	0.9726	0.00130	13.40	0.9565	0.00190	12.00	0.9661	0.00190
17.30	0.9743	0.00160	13.50	0.9622	0.00170	12.10	0.9674	0.00170
17.50	0.9751	0.00160	13.60	0.9673	0.00160	12.20	0.9749	0.00170
17.70	0.9800	0.00130	13.70	0.9684	0.00170	12.30	0.9807	0.00200
17.90	0.9862	0.00150	13.80	0.9692	0.00160	12.40	0.9840	0.00190
18.10	0.9906	0.00150	13.90	0.9726	0.00160	12.50	0.9894	0.00160
18.30	0.9910	0.00130	14.00	0.9776	0.00140	12.60	0.9892	0.00200
18.50	0.9937	0.00180	14.10	0.9792	0.00160	12.70	0.9983	0.00170
18.70	0.9991	0.00150	14.20	0.9848	0.00140	12.80	1.0013	0.00190
18.90	1.0015	0.00140	14.30	0.9860	0.00190	12.90	1.0030	0.00200
19.10	1.0048	0.00200	14.40	0.9894	0.00170	13.00	1.0036	0.00150
19.30	1.0058	0.00150	14.50	0.9937	0.00170	13.10	1.0142	0.00180
19.50	1.0119	0.00170	14.60	0.9923	0.00180	13.20	1.0154	0.00200
19.60	1.0144	0.00160	14.70	1.0004	0.00160			
			14.80	1.0025	0.00140			
			14.90	1.0038	0.00180			
			15.00	1.0064	0.00200			
			15.10	1.0084	0.00160			
			15.20	1.0091	0.00190			

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
9.50	0.9198	0.00230	9.00	0.9180	0.00180	8.60	0.9138	0.00200
9.55	0.9262	0.00200	9.05	0.9232	0.00180	8.65	0.9190	0.00190
9.60	0.9262	0.00220	9.10	0.9248	0.00210	8.70	0.9226	0.00200
9.65	0.9343	0.00210	9.15	0.9296	0.00230	8.75	0.9268	0.00200
9.70	0.9323	0.00180	9.20	0.9309	0.00210	8.80	0.9293	0.00180
9.75	0.9373	0.00180	9.25	0.9312	0.00210	8.85	0.9306	0.00170
9.80	0.9375	0.00180	9.30	0.9377	0.00170	8.90	0.9378	0.00250
9.85	0.9431	0.00180	9.35	0.9437	0.00180	8.95	0.9388	0.00220
9.90	0.9454	0.00190	9.40	0.9459	0.00190	9.00	0.9376	0.00200
9.95	0.9457	0.00180	9.45	0.9482	0.00190	9.05	0.9429	0.00210
10.00	0.9521	0.00210	9.50	0.9481	0.00220	9.10	0.9509	0.00190
10.05	0.9570	0.00200	9.55	0.9551	0.00230	9.15	0.9449	0.00260
10.10	0.9569	0.00200	9.60	0.9583	0.00190	9.20	0.9569	0.00180
10.15	0.9601	0.00200	9.65	0.9602	0.00210	9.25	0.9606	0.00190
10.20	0.9633	0.00180	9.70	0.9653	0.00180	9.30	0.9658	0.00210
10.25	0.9661	0.00180	9.75	0.9647	0.00190	9.35	0.9676	0.00190
10.30	0.9722	0.00180	9.80	0.9716	0.00180	9.40	0.9743	0.00210
10.35	0.9713	0.00180	9.85	0.9746	0.00220	9.45	0.9725	0.00200
10.40	0.9752	0.00170	9.90	0.9788	0.00230	9.50	0.9758	0.00190
10.45	0.9778	0.00220	9.95	0.9822	0.00220	9.55	0.9762	0.00250
10.50	0.9827	0.00190	10.00	0.9864	0.00200	9.60	0.9858	0.00210
10.55	0.9870	0.00190	10.05	0.9860	0.00240	9.65	0.9904	0.00250
10.60	0.9871	0.00170	10.10	0.9915	0.00190	9.70	0.9922	0.00220
10.65	0.9899	0.00180	10.15	0.9917	0.00180	9.75	0.9938	0.00190
10.70	0.9917	0.00210	10.20	0.9967	0.00250	9.80	0.9964	0.00200
10.75	0.9923	0.00190	10.25	0.9996	0.00190	9.85	1.0004	0.00200
10.80	0.9976	0.00200	10.30	0.9989	0.00180	9.90	1.0030	0.00180
10.85	1.0012	0.00200	10.35	1.0083	0.00200	9.95	1.0049	0.00170
10.90	1.0043	0.00200	10.40	1.0068	0.00170	10.00	1.0108	0.00210
10.95	1.0054	0.00230	10.45	1.0086	0.00220	10.05	1.0126	0.00200
11.00	1.0052	0.00170	10.50	1.0159	0.00190	10.10	1.0144	0.00190
11.05	1.0125	0.00250						
11.10	1.0170	0.00200						

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.40	0.9214	0.00260	8.10	0.9136	0.00210	7.90	0.9099	0.00190
8.45	0.9186	0.00170	8.15	0.9173	0.00250	7.95	0.9132	0.00190
8.50	0.9279	0.00210	8.20	0.9182	0.00250	8.00	0.9191	0.00230
8.55	0.9357	0.00220	8.25	0.9226	0.00220	8.05	0.9217	0.00250
8.60	0.9351	0.00200	8.30	0.9309	0.00180	8.10	0.9266	0.00190
8.65	0.9426	0.00190	8.35	0.9353	0.00200	8.15	0.9326	0.00230
8.70	0.9393	0.00200	8.40	0.9397	0.00240	8.20	0.9406	0.00200
8.75	0.9492	0.00220	8.45	0.9405	0.00200	8.25	0.9421	0.00210
8.80	0.9483	0.00190	8.50	0.9443	0.00220	8.30	0.9487	0.00200
8.85	0.9547	0.00210	8.55	0.9506	0.00230	8.35	0.9511	0.00240
8.90	0.9597	0.00190	8.60	0.9534	0.00210	8.40	0.9542	0.00210
8.95	0.9604	0.00230	8.65	0.9613	0.00240	8.45	0.9607	0.00170
9.00	0.9640	0.00210	8.70	0.9633	0.00220	8.50	0.9608	0.00200
9.05	0.9693	0.00220	8.75	0.9649	0.00220	8.55	0.9641	0.00210
9.10	0.9708	0.00200	8.80	0.9665	0.00250	8.60	0.9704	0.00210
9.15	0.9761	0.00200	8.85	0.9757	0.00210	8.65	0.9764	0.00180
9.20	0.9763	0.00250	8.90	0.9776	0.00200	8.70	0.9758	0.00230
9.25	0.9827	0.00210	8.95	0.9775	0.00180	8.75	0.9809	0.00240
9.30	0.9863	0.00240	9.00	0.9831	0.00200	8.80	0.9857	0.00190
9.35	0.9888	0.00220	9.05	0.9879	0.00220	8.85	0.9921	0.00220
9.40	0.9972	0.00220	9.10	0.9905	0.00190	8.90	0.9949	0.00210
9.45	0.9945	0.00280	9.15	0.9966	0.00200	8.95	0.9972	0.00270
9.50	1.0008	0.00180	9.20	1.0005	0.00240	9.00	1.0019	0.00190
9.55	1.0036	0.00180	9.25	1.0060	0.00360	9.05	1.0061	0.00240
9.60	1.0101	0.00200	9.30	1.0077	0.00210	9.10	1.0086	0.00210
9.65	1.0124	0.00190	9.35	1.0122	0.00200	9.15	1.0134	0.00190
9.70	1.0140	0.00200	9.40	1.0129	0.00200	9.20	1.0146	0.00200
			9.45	1.0164	0.00200			
			9.50	1.0194	0.00190			

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.80	0.9138	0.00240	7.50	0.9121	0.00210	7.20	0.9134	0.00230
7.85	0.9209	0.00220	7.55	0.9199	0.00260	7.25	0.9218	0.00200
7.90	0.9267	0.00210	7.60	0.9211	0.00240	7.30	0.9254	0.00220
7.95	0.9315	0.00210	7.65	0.9243	0.00220	7.35	0.9349	0.00220
8.00	0.9334	0.00210	7.70	0.9295	0.00190	7.40	0.9379	0.00230
8.05	0.9412	0.00220	7.75	0.9327	0.00220	7.45	0.9403	0.00220
8.10	0.9420	0.00250	7.80	0.9422	0.00210	7.50	0.9479	0.00250
8.15	0.9467	0.00210	7.85	0.9440	0.00220	7.55	0.9494	0.00210
8.20	0.9554	0.00200	7.90	0.9493	0.00190	7.60	0.9545	0.00230
8.25	0.9573	0.00210	7.95	0.9565	0.00230	7.65	0.9656	0.00200
8.30	0.9633	0.00220	8.00	0.9622	0.00250	7.70	0.9640	0.00230
8.35	0.9614	0.00220	8.05	0.9646	0.00260	7.75	0.9692	0.00220
8.40	0.9713	0.00240	8.10	0.9688	0.00290	7.80	0.9736	0.00220
8.45	0.9690	0.00230	8.15	0.9715	0.00260	7.85	0.9779	0.00210
8.50	0.9753	0.00210	8.20	0.9722	0.00250	7.90	0.9884	0.00220
8.55	0.9815	0.00240	8.25	0.9835	0.00230	7.95	0.9874	0.00240
8.60	0.9829	0.00190	8.30	0.9845	0.00280	8.00	0.9948	0.00240
8.65	0.9905	0.00210	8.35	0.9893	0.00220	8.05	0.9989	0.00220
8.70	0.9961	0.00190	8.40	0.9917	0.00230	8.10	1.0042	0.00280
8.75	1.0006	0.00220	8.45	0.9928	0.00290	8.15	1.0075	0.00210
8.80	1.0041	0.00280	8.50	0.9994	0.00230	8.20	1.0121	0.00220
8.85	1.0029	0.00240	8.55	1.0080	0.00230	8.25	1.0143	0.00240
8.90	1.0091	0.00220	8.60	1.0133	0.00200	8.30	1.0225	0.00230
8.95	1.0086	0.00240	8.65	1.0135	0.00210			
9.00	1.0148	0.00220	8.70	1.0165	0.00260			
9.05	1.0195	0.00200						
9.10	1.0190	0.00280						

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.90	0.9170	0.00220	6.70	0.9083	0.00210	6.60	0.9101	0.00220
6.95	0.9266	0.00210	6.75	0.9177	0.00210	6.65	0.9173	0.00220
7.00	0.9301	0.00220	6.80	0.9221	0.00220	6.70	0.9253	0.00220
7.05	0.9336	0.00240	6.85	0.9287	0.00250	6.75	0.9278	0.00290
7.10	0.9414	0.00230	6.90	0.9334	0.00240	6.80	0.9270	0.00200
7.15	0.9444	0.00200	6.95	0.9378	0.00220	6.85	0.9389	0.00230
7.20	0.9451	0.00220	7.00	0.9434	0.00210	6.90	0.9435	0.00200
7.25	0.9572	0.00280	7.05	0.9501	0.00230	6.95	0.9536	0.00210
7.30	0.9585	0.00220	7.10	0.9563	0.00220	7.00	0.9580	0.00210
7.35	0.9652	0.00280	7.15	0.9568	0.00220	7.05	0.9627	0.00220
7.40	0.9735	0.00290	7.20	0.9667	0.00230	7.10	0.9668	0.00280
7.45	0.9762	0.00270	7.25	0.9718	0.00220	7.15	0.9715	0.00210
7.50	0.9789	0.00230	7.30	0.9770	0.00230	7.20	0.9800	0.00250
7.55	0.9815	0.00230	7.35	0.9814	0.00220	7.25	0.9788	0.00250
7.60	0.9903	0.00210	7.40	0.9933	0.00290	7.30	0.9839	0.00230
7.65	0.9931	0.00230	7.45	0.9874	0.00230	7.35	0.9971	0.00230
7.70	0.9972	0.00270	7.50	0.9934	0.00210	7.40	0.9985	0.00220
7.75	1.0037	0.00210	7.55	1.0023	0.00220	7.45	1.0052	0.00210
7.80	1.0088	0.00260	7.60	1.0065	0.00260	7.50	1.0031	0.00230
7.85	1.0093	0.00230	7.65	1.0092	0.00220	7.55	1.0123	0.00220
7.90	1.0184	0.00250	7.70	1.0152	0.00200	7.60	1.0180	0.00240
			7.75	1.0219	0.00270			
			7.80	1.0241	0.00270			

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.50	0.9135	0.00230	6.30	0.9228	0.00240	6.20	0.9205	0.00250
6.55	0.9195	0.00220	6.35	0.9260	0.00310	6.25	0.9219	0.00240
6.60	0.9234	0.00240	6.40	0.9318	0.00270	6.30	0.9328	0.00220
6.65	0.9293	0.00290	6.45	0.9373	0.00260	6.35	0.9338	0.00230
6.70	0.9366	0.00220	6.50	0.9439	0.00220	6.40	0.9454	0.00210
6.75	0.9392	0.00260	6.55	0.9482	0.00260	6.45	0.9481	0.00250
6.80	0.9476	0.00230	6.60	0.9538	0.00230	6.50	0.9558	0.00240
6.85	0.9523	0.00240	6.65	0.9602	0.00230	6.55	0.9602	0.00290
6.90	0.9573	0.00230	6.70	0.9658	0.00340	6.60	0.9655	0.00220
6.95	0.9631	0.00240	6.75	0.9726	0.00250	6.65	0.9692	0.00270
7.00	0.9662	0.00250	6.80	0.9783	0.00280	6.70	0.9739	0.00240
7.05	0.9749	0.00220	6.85	0.9846	0.00250	6.75	0.9838	0.00290
7.10	0.9808	0.00250	6.90	0.9851	0.00230	6.80	0.9885	0.00250
7.15	0.9820	0.00260	6.95	0.9891	0.00230	6.85	0.9914	0.00220
7.20	0.9827	0.00240	7.00	0.9966	0.00230	6.90	0.9988	0.00280
7.25	0.9964	0.00220	7.05	1.0039	0.00260	6.95	0.9993	0.00240
7.30	1.0102	0.00240	7.10	1.0098	0.00200	7.00	1.0064	0.00220
7.35	1.0044	0.00230	7.15	1.0137	0.00260	7.05	1.0146	0.00250
7.40	1.0137	0.00220	7.20	1.0160	0.00220	7.10	1.0205	0.00230
7.45	1.0120	0.00230				7.15	1.0245	0.00220
7.50	1.0214	0.00230				7.20	1.0273	0.00220

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.10	0.9168	0.00210	6.10	0.9112	0.00210	6.10	0.9153	0.00230
6.15	0.9254	0.00230	6.15	0.9166	0.00250	6.15	0.9228	0.00270
6.20	0.9243	0.00230	6.20	0.9206	0.00240	6.20	0.9296	0.00200
6.25	0.9312	0.00250	6.25	0.9318	0.00260	6.25	0.9360	0.00220
6.30	0.9362	0.00220	6.30	0.9362	0.00230	6.30	0.9395	0.00250
6.35	0.9410	0.00230	6.35	0.9416	0.00200	6.35	0.9448	0.00200
6.40	0.9485	0.00230	6.40	0.9513	0.00250	6.40	0.9475	0.00220
6.45	0.9489	0.00220	6.45	0.9582	0.00220	6.45	0.9533	0.00200
6.50	0.9556	0.00240	6.50	0.9553	0.00250	6.50	0.9635	0.00230
6.55	0.9606	0.00230	6.55	0.9628	0.00230	6.55	0.9629	0.00270
6.60	0.9717	0.00270	6.60	0.9643	0.00190	6.60	0.9716	0.00230
6.65	0.9728	0.00260	6.65	0.9735	0.00230	6.65	0.9766	0.00250
6.70	0.9733	0.00240	6.70	0.9749	0.00230	6.70	0.9796	0.00210
6.75	0.9758	0.00230	6.75	0.9838	0.00260	6.75	0.9840	0.00200
6.80	0.9858	0.00270	6.80	0.9888	0.00210	6.80	0.9877	0.00240
6.85	0.9934	0.00230	6.85	0.9941	0.00210	6.85	0.9992	0.00250
6.90	0.9989	0.00250	6.90	0.9981	0.00200	6.90	1.0017	0.00230
6.95	1.0049	0.00240	6.95	1.0076	0.00200	6.95	1.0056	0.00230
7.00	1.0099	0.00230	7.00	1.0066	0.00260	7.00	1.0094	0.00240
7.05	1.0148	0.00250	7.05	1.0176	0.00200	7.05	1.0152	0.00200
7.10	1.0189	0.00290	7.10	1.0213	0.00210	7.10	1.0178	0.00220

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.10	0.9228	0.00230	6.10	0.9218	0.00200	6.10	0.9228	0.00190
6.15	0.9290	0.00200	6.15	0.9267	0.00220	6.15	0.9292	0.00210
6.20	0.9332	0.00220	6.20	0.9358	0.00240	6.20	0.9368	0.00240
6.25	0.9355	0.00220	6.25	0.9395	0.00230	6.25	0.9369	0.00220
6.30	0.9433	0.00210	6.30	0.9413	0.00230	6.30	0.9437	0.00220
6.35	0.9483	0.00240	6.35	0.9468	0.00230	6.35	0.9490	0.00210
6.40	0.9521	0.00240	6.40	0.9549	0.00210	6.40	0.9564	0.00210
6.45	0.9585	0.00200	6.45	0.9573	0.00230	6.45	0.9565	0.00210
6.50	0.9617	0.00220	6.50	0.9593	0.00220	6.50	0.9652	0.00220
6.55	0.9654	0.00220	6.55	0.9674	0.00200	6.55	0.9730	0.00210
6.60	0.9709	0.00230	6.60	0.9750	0.00190	6.60	0.9733	0.00210
6.65	0.9794	0.00210	6.65	0.9820	0.00200	6.65	0.9768	0.00240
6.70	0.9819	0.00260	6.70	0.9876	0.00220	6.70	0.9856	0.00210
6.75	0.9853	0.00220	6.75	0.9892	0.00220	6.75	0.9899	0.00180
6.80	0.9878	0.00220	6.80	0.9960	0.00220	6.80	0.9949	0.00200
6.85	0.9938	0.00220	6.85	0.9979	0.00210	6.85	1.0012	0.00250
6.90	0.9973	0.00210	6.90	1.0030	0.00190	6.90	1.0002	0.00210
6.95	1.0071	0.00250	6.95	1.0090	0.00210	6.95	1.0117	0.00240
7.00	1.0142	0.00210	7.00	1.0136	0.00200	7.00	1.0148	0.00190
7.05	1.0164	0.00230	7.05	1.0169	0.00300	7.05	1.0161	0.00210
7.10	1.0219	0.00210	7.10	1.0254	0.00220	7.10	1.0226	0.00210
7.15	1.0260	0.00210						
7.20	1.0296	0.00200						

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.10	0.9241	0.00210	6.00	0.9214	0.00210	5.90	0.9167	0.00190
6.15	0.9308	0.00180	6.05	0.9254	0.00200	5.95	0.9232	0.00200
6.20	0.9358	0.00210	6.10	0.9329	0.00190	6.00	0.9274	0.00220
6.25	0.9430	0.00230	6.15	0.9350	0.00260	6.05	0.9349	0.00210
6.30	0.9448	0.00220	6.20	0.9434	0.00180	6.10	0.9388	0.00190
6.35	0.9470	0.00190	6.25	0.9467	0.00220	6.15	0.9472	0.00220
6.40	0.9561	0.00230	6.30	0.9544	0.00200	6.20	0.9520	0.00200
6.45	0.9627	0.00200	6.35	0.9531	0.00200	6.25	0.9580	0.00260
6.50	0.9650	0.00240	6.40	0.9635	0.00210	6.30	0.9594	0.00200
6.55	0.9733	0.00270	6.45	0.9674	0.00200	6.35	0.9638	0.00190
6.60	0.9752	0.00190	6.50	0.9697	0.00180	6.40	0.9698	0.00200
6.65	0.9821	0.00210	6.55	0.9738	0.00200	6.45	0.9738	0.00240
6.70	0.9873	0.00200	6.60	0.9829	0.00230	6.50	0.9838	0.00190
6.75	0.9931	0.00210	6.65	0.9836	0.00210	6.55	0.9885	0.00230
6.80	0.9922	0.00290	6.70	0.9902	0.00230	6.60	0.9903	0.00200
6.85	0.9990	0.00190	6.75	0.9945	0.00240	6.65	0.9963	0.00250
6.90	1.0014	0.00240	6.80	1.0014	0.00220	6.70	1.0055	0.00230
6.95	1.0079	0.00220	6.85	1.0035	0.00200	6.75	1.0072	0.00210
7.00	1.0142	0.00240	6.90	1.0107	0.00190	6.80	1.0092	0.00220
7.05	1.0178	0.00210	6.95	1.0152	0.00330	6.85	1.0128	0.00200
7.10	1.0216	0.00210	7.00	1.0211	0.00190	6.90	1.0178	0.00200

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.70	0.9185	0.00210	5.50	0.9170	0.00200	5.30	0.9208	0.00190
5.75	0.9231	0.00210	5.55	0.9248	0.00200	5.35	0.9256	0.00220
5.80	0.9245	0.00250	5.60	0.9294	0.00200	5.40	0.9341	0.00190
5.85	0.9360	0.00230	5.65	0.9312	0.00220	5.45	0.9388	0.00180
5.90	0.9379	0.00220	5.70	0.9407	0.00190	5.50	0.9416	0.00200
5.95	0.9453	0.00170	5.75	0.9483	0.00190	5.55	0.9483	0.00180
6.00	0.9517	0.00180	5.80	0.9517	0.00200	5.60	0.9529	0.00270
6.05	0.9555	0.00200	5.85	0.9542	0.00210	5.65	0.9588	0.00210
6.10	0.9605	0.00210	5.90	0.9665	0.00200	5.70	0.9649	0.00210
6.15	0.9638	0.00230	5.95	0.9649	0.00170	5.75	0.9712	0.00210
6.20	0.9696	0.00190	6.00	0.9773	0.00220	5.80	0.9805	0.00210
6.25	0.9757	0.00230	6.05	0.9745	0.00230	5.85	0.9825	0.00220
6.30	0.9830	0.00240	6.10	0.9884	0.00200	5.90	0.9870	0.00220
6.35	0.9865	0.00190	6.15	0.9927	0.00230	5.95	0.9910	0.00190
6.40	0.9901	0.00220	6.20	0.9943	0.00190	6.00	1.0001	0.00170
6.45	0.9992	0.00200	6.25	1.0008	0.00220	6.05	1.0065	0.00190
6.50	0.9984	0.00260	6.30	1.0042	0.00220	6.10	1.0077	0.00190
6.55	1.0090	0.00230	6.35	1.0128	0.00200	6.15	1.0158	0.00190
6.60	1.0110	0.00180	6.40	1.0127	0.00200	6.20	1.0235	0.00200
6.65	1.0139	0.00250	6.45	1.0185	0.00210	6.25	1.0264	0.00170
6.70	1.0223	0.00180	6.50	1.0234	0.00200	6.30	1.0313	0.00230

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.10	0.9209	0.00220	5.00	0.9162	0.00170	4.90	0.9128	0.00170
5.15	0.9240	0.00190	5.05	0.9207	0.00190	4.95	0.9225	0.00180
5.20	0.9306	0.00180	5.10	0.9303	0.00240	5.00	0.9288	0.00200
5.25	0.9359	0.00180	5.15	0.9349	0.00190	5.05	0.9356	0.00180
5.30	0.9401	0.00230	5.20	0.9406	0.00190	5.10	0.9422	0.00180
5.35	0.9457	0.00210	5.25	0.9462	0.00180	5.15	0.9471	0.00220
5.40	0.9538	0.00190	5.30	0.9564	0.00190	5.20	0.9533	0.00220
5.45	0.9596	0.00210	5.35	0.9607	0.00200	5.25	0.9572	0.00190
5.50	0.9716	0.00200	5.40	0.9660	0.00190	5.30	0.9630	0.00190
5.55	0.9747	0.00190	5.45	0.9730	0.00210	5.35	0.9701	0.00210
5.60	0.9768	0.00230	5.50	0.9802	0.00180	5.40	0.9758	0.00180
5.65	0.9829	0.00190	5.55	0.9862	0.00210	5.45	0.9907	0.00190
5.70	0.9915	0.00210	5.60	0.9888	0.00210	5.50	0.9908	0.00200
5.75	0.9971	0.00230	5.65	0.9993	0.00220	5.55	0.9944	0.00210
5.80	0.9990	0.00170	5.70	1.0014	0.00190	5.60	1.0055	0.00200
5.85	1.0106	0.00200	5.75	1.0088	0.00200	5.65	1.0083	0.00190
5.90	1.0096	0.00210	5.80	1.0147	0.00220	5.70	1.0156	0.00170
5.95	1.0192	0.00170	5.85	1.0199	0.00210	5.75	1.0191	0.00180
6.00	1.0209	0.00190	5.90	1.0211	0.00230	5.80	1.0269	0.00180

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.80	0.9252	0.00170	4.60	0.9192	0.00250	4.00	0.9209	0.00180
4.85	0.9316	0.00180	4.65	0.9218	0.00200	4.05	0.9332	0.00170
4.90	0.9360	0.00200	4.70	0.9326	0.00210	4.10	0.9390	0.00170
4.95	0.9391	0.00180	4.75	0.9402	0.00190	4.15	0.9477	0.00200
5.00	0.9510	0.00210	4.80	0.9399	0.00160	4.20	0.9547	0.00200
5.05	0.9538	0.00190	4.85	0.9548	0.00190	4.25	0.9632	0.00170
5.10	0.9650	0.00180	4.90	0.9591	0.00190	4.30	0.9711	0.00170
5.15	0.9675	0.00200	4.95	0.9673	0.00250	4.35	0.9804	0.00180
5.20	0.9776	0.00200	5.00	0.9704	0.00260	4.40	0.9880	0.00180
5.25	0.9826	0.00260	5.05	0.9814	0.00170	4.45	0.9957	0.00150
5.30	0.9887	0.00190	5.10	0.9846	0.00180	4.50	1.0063	0.00200
5.35	0.9931	0.00200	5.15	0.9935	0.00200	4.55	1.0101	0.00160
5.40	1.0000	0.00180	5.20	1.0006	0.00180	4.60	1.0175	0.00180
5.45	1.0070	0.00220	5.25	1.0095	0.00210	4.65	1.0263	0.00190
5.50	1.0146	0.00160	5.30	1.0103	0.00220	4.70	1.0305	0.00210
5.55	1.0234	0.00190	5.35	1.0189	0.00200			
5.60	1.0273	0.00190	5.40	1.0231	0.00210			

18900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma
3.60	0.9261	0.00170
3.65	0.9360	0.00200
3.70	0.9441	0.00210
3.75	0.9544	0.00210
3.80	0.9595	0.00170
3.85	0.9706	0.00170
3.90	0.9797	0.00160
3.95	0.9857	0.00170
4.00	0.9966	0.00180
4.05	1.0051	0.00180
4.10	1.0132	0.00170
4.15	1.0184	0.00170
4.20	1.0304	0.00210

Case ID: U_cyl_093.5_10ref

Material: Uranium metal in water

Geometry: Infinite cylinder

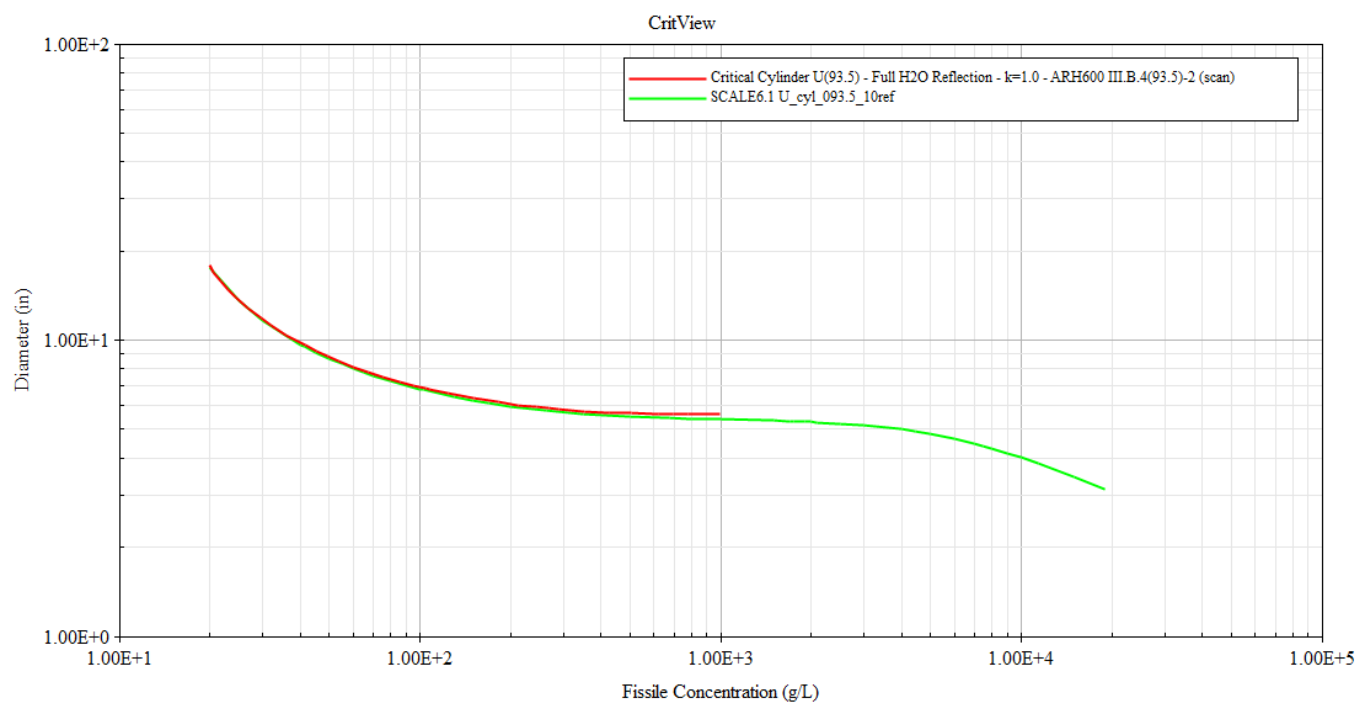
Isotopics: 93.5% ^{235}U 6.5% ^{238}U

Reflector: 10" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Cylinder (93.5% ²³⁵ U)- 10 Inches of Water Reflection				
Concentration (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.020	14.000	18.500	0.200	17.6703
0.025	11.300	14.300	0.100	13.5815
0.030	9.900	12.100	0.100	11.6500
0.040	8.300	10.000	0.050	9.6329
0.045	7.900	9.400	0.050	9.0897
0.050	7.500	8.900	0.050	8.6321
0.055	7.200	8.600	0.050	8.3505
0.060	7.000	8.300	0.050	8.0560
0.065	6.800	8.100	0.050	7.7780
0.070	6.700	7.900	0.050	7.5595
0.080	6.400	7.500	0.050	7.2704
0.100	6.000	7.100	0.050	6.8167
0.130	5.700	6.700	0.050	6.4328
0.150	5.500	6.500	0.050	6.2676
0.170	5.400	6.400	0.050	6.1379
0.200	5.300	6.200	0.050	5.9661
0.350	4.900	5.900	0.050	5.6454
0.500	4.800	5.700	0.050	5.5254
0.800	4.700	5.700	0.050	5.4247
1.000	4.700	5.600	0.050	5.4119
1.500	4.700	5.600	0.050	5.3492
1.700	4.600	5.600	0.050	5.3190
1.900	4.600	5.600	0.050	5.3065
2.000	4.600	5.600	0.050	5.3104
2.100	4.600	5.500	0.050	5.2830
2.500	4.500	5.500	0.050	5.2277
3.000	4.500	5.400	0.050	5.1707
4.000	4.300	5.200	0.050	4.9981
5.000	4.200	5.100	0.050	4.8215
6.000	4.000	4.900	0.050	4.6532
7.000	3.900	4.700	0.050	4.4677
7.500	3.800	4.600	0.050	4.3964
8.000	3.700	4.500	0.050	4.3056
9.000	3.600	4.400	0.050	4.1431
10.000	3.500	4.200	0.050	4.0189
15.000	3.000	3.700	0.050	3.4583
18.900	2.700	3.300	0.050	3.1275

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CritView compatible data file

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reset:
title: Critical Cylinder; U; 10" Water Reflector; 93.5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: infcyl
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 0.935 U238 0.065
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.020 17.6703
0.025 13.5815
0.030 11.6500
0.040 9.6329
0.045 9.0897
0.050 8.6321
0.055 8.3505
0.060 8.0560
0.065 7.7780
0.070 7.5595
0.080 7.2704
0.100 6.8167
0.130 6.4328
0.150 6.2676
0.170 6.1379
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7.500 4.3964
8.000 4.3056
9.000 4.1431
10.000 4.0189
15.000 3.4583
18.900 3.1275
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20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.00	0.9274	0.00150	11.30	0.9233	0.00170	9.90	0.9225	0.00170
14.20	0.9269	0.00170	11.40	0.9248	0.00140	10.00	0.9273	0.00160
14.40	0.9300	0.00170	11.50	0.9307	0.00150	10.10	0.9329	0.00170
14.60	0.9382	0.00150	11.60	0.9325	0.00150	10.20	0.9358	0.00140
14.80	0.9419	0.00130	11.70	0.9374	0.00160	10.30	0.9406	0.00210
15.00	0.9466	0.00120	11.80	0.9443	0.00150	10.40	0.9447	0.00140
15.20	0.9500	0.00130	11.90	0.9444	0.00150	10.50	0.9538	0.00170
15.40	0.9573	0.00140	12.00	0.9489	0.00150	10.60	0.9532	0.00190
15.60	0.9598	0.00180	12.10	0.9529	0.00160	10.70	0.9600	0.00170
15.80	0.9665	0.00140	12.20	0.9604	0.00210	10.80	0.9665	0.00150
16.00	0.9699	0.00150	12.30	0.9559	0.00170	10.90	0.9675	0.00180
16.20	0.9748	0.00140	12.40	0.9596	0.00190	11.00	0.9780	0.00200
16.40	0.9810	0.00180	12.50	0.9668	0.00140	11.10	0.9774	0.00170
16.60	0.9792	0.00140	12.60	0.9688	0.00190	11.20	0.9824	0.00160
16.80	0.9840	0.00160	12.70	0.9731	0.00130	11.30	0.9834	0.00170
17.00	0.9910	0.00150	12.80	0.9769	0.00160	11.40	0.9918	0.00160
17.20	0.9933	0.00150	12.90	0.9758	0.00140	11.50	0.9944	0.00180
17.40	0.9953	0.00140	13.00	0.9808	0.00140	11.60	0.9978	0.00180
17.60	0.9987	0.00150	13.10	0.9862	0.00130	11.70	1.0022	0.00220
17.80	1.0024	0.00130	13.20	0.9882	0.00180	11.80	1.0085	0.00190
18.00	1.0085	0.00140	13.30	0.9902	0.00200	11.90	1.0082	0.00170
18.20	1.0059	0.00120	13.40	0.9946	0.00150	12.00	1.0127	0.00150
18.40	1.0143	0.00130	13.50	0.9978	0.00160	12.10	1.0194	0.00150
18.50	1.0144	0.00150	13.60	1.0005	0.00130			
			13.70	1.0019	0.00140			
			13.80	1.0080	0.00150			
			13.90	1.0066	0.00160			
			14.00	1.0091	0.00200			
			14.10	1.0134	0.00160			
			14.20	1.0161	0.00150			
			14.30	1.0202	0.00130			

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
8.30	0.9165	0.00200	7.90	0.9184	0.00190	7.50	0.9183	0.00220
8.35	0.9242	0.00180	7.95	0.9253	0.00170	7.55	0.9188	0.00170
8.40	0.9248	0.00180	8.00	0.9259	0.00200	7.60	0.9223	0.00150
8.45	0.9263	0.00200	8.05	0.9337	0.00160	7.65	0.9304	0.00210
8.50	0.9315	0.00160	8.10	0.9339	0.00170	7.70	0.9318	0.00190
8.55	0.9348	0.00160	8.15	0.9401	0.00200	7.75	0.9386	0.00180
8.60	0.9336	0.00220	8.20	0.9431	0.00160	7.80	0.9421	0.00180
8.65	0.9394	0.00160	8.25	0.9480	0.00200	7.85	0.9438	0.00210
8.70	0.9467	0.00180	8.30	0.9509	0.00190	7.90	0.9468	0.00160
8.75	0.9515	0.00180	8.35	0.9545	0.00180	7.95	0.9519	0.00190
8.80	0.9500	0.00230	8.40	0.9547	0.00210	8.00	0.9570	0.00220
8.85	0.9514	0.00170	8.45	0.9619	0.00200	8.05	0.9587	0.00160
8.90	0.9550	0.00200	8.50	0.9629	0.00180	8.10	0.9633	0.00220
8.95	0.9601	0.00180	8.55	0.9619	0.00170	8.15	0.9637	0.00210
9.00	0.9603	0.00190	8.60	0.9671	0.00210	8.20	0.9690	0.00190
9.05	0.9616	0.00190	8.65	0.9742	0.00180	8.25	0.9722	0.00200
9.10	0.9651	0.00190	8.70	0.9796	0.00160	8.30	0.9742	0.00180
9.15	0.9698	0.00270	8.75	0.9816	0.00160	8.35	0.9780	0.00190
9.20	0.9766	0.00200	8.80	0.9814	0.00200	8.40	0.9840	0.00180
9.25	0.9754	0.00220	8.85	0.9838	0.00170	8.45	0.9844	0.00160
9.30	0.9794	0.00190	8.90	0.9907	0.00200	8.50	0.9891	0.00200
9.35	0.9844	0.00170	8.95	0.9919	0.00210	8.55	0.9940	0.00160
9.40	0.9845	0.00180	9.00	0.9957	0.00210	8.60	0.9973	0.00180
9.45	0.9937	0.00200	9.05	0.9973	0.00190	8.65	1.0015	0.00220
9.50	0.9900	0.00180	9.10	1.0007	0.00200	8.70	1.0036	0.00190
9.55	0.9896	0.00200	9.15	1.0043	0.00180	8.75	1.0038	0.00180
9.60	0.9975	0.00170	9.20	1.0067	0.00150	8.80	1.0118	0.00230
9.65	1.0013	0.00190	9.25	1.0094	0.00160	8.85	1.0155	0.00210
9.70	1.0013	0.00150	9.30	1.0128	0.00200	8.90	1.0168	0.00190
9.75	1.0033	0.00180	9.35	1.0177	0.00200			
9.80	1.0014	0.00180	9.40	1.0191	0.00200			
9.85	1.0125	0.00190						
9.90	1.0134	0.00270						
9.95	1.0177	0.00220						
10.00	1.0190	0.00200						

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
7.20	0.9165	0.00170	7.00	0.9172	0.00170	6.80	0.9157	0.00220
7.25	0.9192	0.00210	7.05	0.9220	0.00180	6.85	0.9201	0.00180
7.30	0.9246	0.00200	7.10	0.9267	0.00180	6.90	0.9264	0.00190
7.35	0.9268	0.00190	7.15	0.9334	0.00190	6.95	0.9300	0.00210
7.40	0.9305	0.00190	7.20	0.9364	0.00230	7.00	0.9339	0.00180
7.45	0.9381	0.00230	7.25	0.9391	0.00200	7.05	0.9429	0.00190
7.50	0.9393	0.00190	7.30	0.9427	0.00190	7.10	0.9500	0.00190
7.55	0.9442	0.00220	7.35	0.9482	0.00190	7.15	0.9522	0.00210
7.60	0.9516	0.00260	7.40	0.9498	0.00180	7.20	0.9490	0.00210
7.65	0.9501	0.00240	7.45	0.9518	0.00210	7.25	0.9573	0.00180
7.70	0.9526	0.00230	7.50	0.9581	0.00190	7.30	0.9613	0.00240
7.75	0.9620	0.00190	7.55	0.9644	0.00190	7.35	0.9677	0.00210
7.80	0.9663	0.00190	7.60	0.9665	0.00210	7.40	0.9731	0.00180
7.85	0.9704	0.00200	7.65	0.9736	0.00240	7.45	0.9737	0.00240
7.90	0.9705	0.00230	7.70	0.9755	0.00180	7.50	0.9765	0.00200
7.95	0.9757	0.00200	7.75	0.9818	0.00230	7.55	0.9825	0.00210
8.00	0.9781	0.00240	7.80	0.9860	0.00230	7.60	0.9833	0.00240
8.05	0.9841	0.00220	7.85	0.9880	0.00180	7.65	0.9879	0.00180
8.10	0.9837	0.00240	7.90	0.9917	0.00180	7.70	0.9945	0.00220
8.15	0.9906	0.00190	7.95	0.9948	0.00180	7.75	0.9977	0.00210
8.20	0.9929	0.00180	8.00	0.9993	0.00210	7.80	1.0018	0.00180
8.25	0.9960	0.00200	8.05	0.9992	0.00210	7.85	1.0059	0.00200
8.30	0.9961	0.00200	8.10	1.0059	0.00180	7.90	1.0044	0.00200
8.35	0.9999	0.00210	8.15	1.0085	0.00230	7.95	1.0131	0.00160
8.40	1.0098	0.00220	8.20	1.0130	0.00260	8.00	1.0153	0.00210
8.45	1.0117	0.00170	8.25	1.0183	0.00220	8.05	1.0211	0.00180
8.50	1.0148	0.00200	8.30	1.0200	0.00200	8.10	1.0209	0.00200
8.55	1.0180	0.00190						
8.60	1.0211	0.00180						

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
6.70	0.9231	0.00190	6.40	0.9195	0.00210	6.00	0.9188	0.00210
6.75	0.9289	0.00200	6.45	0.9294	0.00210	6.05	0.9218	0.00210
6.80	0.9314	0.00250	6.50	0.9295	0.00270	6.10	0.9285	0.00220
6.85	0.9389	0.00260	6.55	0.9375	0.00250	6.15	0.9327	0.00180
6.90	0.9438	0.00180	6.60	0.9426	0.00310	6.20	0.9352	0.00210
6.95	0.9461	0.00200	6.65	0.9443	0.00220	6.25	0.9459	0.00220
7.00	0.9532	0.00190	6.70	0.9498	0.00210	6.30	0.9507	0.00190
7.05	0.9588	0.00190	6.75	0.9548	0.00250	6.35	0.9512	0.00190
7.10	0.9632	0.00200	6.80	0.9590	0.00190	6.40	0.9559	0.00230
7.15	0.9676	0.00200	6.85	0.9645	0.00190	6.45	0.9618	0.00250
7.20	0.9688	0.00210	6.90	0.9705	0.00190	6.50	0.9659	0.00180
7.25	0.9718	0.00220	6.95	0.9703	0.00190	6.55	0.9725	0.00240
7.30	0.9754	0.00170	7.00	0.9770	0.00200	6.60	0.9794	0.00220
7.35	0.9784	0.00180	7.05	0.9804	0.00220	6.65	0.9825	0.00200
7.40	0.9876	0.00220	7.10	0.9841	0.00230	6.70	0.9892	0.00190
7.45	0.9905	0.00180	7.15	0.9892	0.00270	6.75	0.9965	0.00280
7.50	0.9906	0.00200	7.20	0.9961	0.00210	6.80	0.9985	0.00200
7.55	1.0004	0.00220	7.25	0.9978	0.00210	6.85	1.0030	0.00260
7.60	0.9983	0.00200	7.30	1.0032	0.00190	6.90	1.0047	0.00230
7.65	1.0051	0.00200	7.35	1.0108	0.00230	6.95	1.0114	0.00230
7.70	1.0109	0.00180	7.40	1.0134	0.00200	7.00	1.0153	0.00220
7.75	1.0181	0.00190	7.45	1.0184	0.00210	7.05	1.0219	0.00220
7.80	1.0143	0.00180	7.50	1.0190	0.00190	7.10	1.0246	0.00220
7.85	1.0200	0.00270						
7.90	1.0240	0.00270						

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.70	0.9217	0.00190	5.50	0.9166	0.00200	5.40	0.9180	0.00210
5.75	0.9292	0.00190	5.55	0.9231	0.00220	5.45	0.9236	0.00220
5.80	0.9318	0.00190	5.60	0.9278	0.00240	5.50	0.9298	0.00220
5.85	0.9425	0.00190	5.65	0.9290	0.00210	5.55	0.9399	0.00200
5.90	0.9443	0.00250	5.70	0.9375	0.00250	5.60	0.9406	0.00190
5.95	0.9511	0.00200	5.75	0.9430	0.00290	5.65	0.9470	0.00230
6.00	0.9550	0.00250	5.80	0.9512	0.00200	5.70	0.9559	0.00220
6.05	0.9620	0.00190	5.85	0.9595	0.00240	5.75	0.9552	0.00190
6.10	0.9635	0.00210	5.90	0.9607	0.00200	5.80	0.9618	0.00250
6.15	0.9684	0.00230	5.95	0.9656	0.00200	5.85	0.9700	0.00200
6.20	0.9834	0.00190	6.00	0.9693	0.00210	5.90	0.9758	0.00310
6.25	0.9775	0.00210	6.05	0.9781	0.00200	5.95	0.9804	0.00190
6.30	0.9889	0.00280	6.10	0.9823	0.00200	6.00	0.9911	0.00200
6.35	0.9900	0.00240	6.15	0.9859	0.00250	6.05	0.9881	0.00250
6.40	0.9956	0.00240	6.20	0.9934	0.00190	6.10	0.9978	0.00200
6.45	1.0023	0.00210	6.25	0.9964	0.00250	6.15	1.0007	0.00230
6.50	1.0082	0.00260	6.30	1.0066	0.00210	6.20	1.0061	0.00210
6.55	1.0104	0.00220	6.35	1.0064	0.00210	6.25	1.0116	0.00230
6.60	1.0162	0.00230	6.40	1.0146	0.00210	6.30	1.0175	0.00280
6.65	1.0186	0.00200	6.45	1.0188	0.00220	6.35	1.0261	0.00220
6.70	1.0254	0.00230	6.50	1.0201	0.00220	6.40	1.0290	0.00240

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
5.30	0.9225	0.00210	4.90	0.9146	0.00200	4.80	0.9185	0.00240
5.35	0.9292	0.00190	4.95	0.9173	0.00230	4.85	0.9226	0.00220
5.40	0.9350	0.00200	5.00	0.9275	0.00210	4.90	0.9287	0.00220
5.45	0.9428	0.00240	5.05	0.9295	0.00200	4.95	0.9340	0.00340
5.50	0.9461	0.00200	5.10	0.9383	0.00240	5.00	0.9436	0.00210
5.55	0.9496	0.00280	5.15	0.9473	0.00220	5.05	0.9454	0.00210
5.60	0.9595	0.00210	5.20	0.9550	0.00230	5.10	0.9490	0.00270
5.65	0.9619	0.00230	5.25	0.9523	0.00250	5.15	0.9592	0.00240
5.70	0.9697	0.00220	5.30	0.9590	0.00210	5.20	0.9608	0.00230
5.75	0.9760	0.00240	5.35	0.9672	0.00230	5.25	0.9677	0.00230
5.80	0.9778	0.00240	5.40	0.9754	0.00210	5.30	0.9792	0.00250
5.85	0.9879	0.00230	5.45	0.9778	0.00260	5.35	0.9812	0.00230
5.90	0.9901	0.00250	5.50	0.9807	0.00240	5.40	0.9839	0.00220
5.95	0.9952	0.00230	5.55	0.9900	0.00220	5.45	0.9937	0.00220
6.00	1.0101	0.00220	5.60	0.9951	0.00230	5.50	0.9964	0.00250
6.05	1.0080	0.00210	5.65	1.0005	0.00200	5.55	1.0035	0.00220
6.10	1.0120	0.00200	5.70	1.0061	0.00250	5.60	1.0114	0.00200
6.15	1.0197	0.00200	5.75	1.0172	0.00240	5.65	1.0150	0.00240
6.20	1.0235	0.00220	5.80	1.0202	0.00250	5.70	1.0202	0.00210
			5.85	1.0243	0.00200			
			5.90	1.0273	0.00230			

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.70	0.9191	0.00310	4.70	0.9232	0.00200	4.70	0.9260	0.00230
4.75	0.9231	0.00210	4.75	0.9262	0.00200	4.75	0.9345	0.00210
4.80	0.9316	0.00200	4.80	0.9336	0.00220	4.80	0.9448	0.00200
4.85	0.9364	0.00210	4.85	0.9402	0.00250	4.85	0.9491	0.00190
4.90	0.9434	0.00220	4.90	0.9464	0.00240	4.90	0.9539	0.00280
4.95	0.9493	0.00200	4.95	0.9470	0.00230	4.95	0.9548	0.00250
5.00	0.9567	0.00210	5.00	0.9572	0.00240	5.00	0.9649	0.00260
5.05	0.9553	0.00200	5.05	0.9639	0.00240	5.05	0.9655	0.00260
5.10	0.9693	0.00220	5.10	0.9669	0.00180	5.10	0.9749	0.00220
5.15	0.9664	0.00210	5.15	0.9747	0.00230	5.15	0.9791	0.00230
5.20	0.9795	0.00210	5.20	0.9762	0.00280	5.20	0.9831	0.00200
5.25	0.9792	0.00220	5.25	0.9854	0.00190	5.25	0.9896	0.00230
5.30	0.9862	0.00280	5.30	0.9895	0.00230	5.30	0.9937	0.00190
5.35	0.9924	0.00250	5.35	0.9978	0.00220	5.35	1.0001	0.00260
5.40	0.9957	0.00220	5.40	0.9986	0.00200	5.40	1.0035	0.00220
5.45	1.0044	0.00230	5.45	1.0045	0.00210	5.45	1.0107	0.00220
5.50	1.0085	0.00240	5.50	1.0172	0.00240	5.50	1.0177	0.00200
5.55	1.0119	0.00210	5.55	1.0180	0.00240	5.55	1.0211	0.00240
5.60	1.0176	0.00210	5.60	1.0176	0.00220	5.60	1.0239	0.00220
5.65	1.0245	0.00270						
5.70	1.0234	0.00230						

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.60	0.9231	0.00220	4.60	0.9220	0.00200	4.60	0.9224	0.00240
4.65	0.9246	0.00180	4.65	0.9272	0.00200	4.65	0.9287	0.00200
4.70	0.9354	0.00230	4.70	0.9325	0.00190	4.70	0.9355	0.00220
4.75	0.9397	0.00220	4.75	0.9370	0.00200	4.75	0.9404	0.00230
4.80	0.9432	0.00200	4.80	0.9464	0.00230	4.80	0.9430	0.00230
4.85	0.9511	0.00230	4.85	0.9527	0.00240	4.85	0.9536	0.00210
4.90	0.9543	0.00190	4.90	0.9544	0.00220	4.90	0.9588	0.00180
4.95	0.9557	0.00280	4.95	0.9661	0.00190	4.95	0.9631	0.00190
5.00	0.9698	0.00220	5.00	0.9679	0.00200	5.00	0.9710	0.00200
5.05	0.9707	0.00220	5.05	0.9724	0.00210	5.05	0.9745	0.00190
5.10	0.9718	0.00250	5.10	0.9809	0.00220	5.10	0.9808	0.00240
5.15	0.9823	0.00220	5.15	0.9854	0.00250	5.15	0.9855	0.00200
5.20	0.9900	0.00200	5.20	0.9845	0.00230	5.20	0.9880	0.00210
5.25	0.9888	0.00170	5.25	0.9946	0.00230	5.25	0.9956	0.00220
5.30	0.9981	0.00220	5.30	0.9994	0.00210	5.30	0.9975	0.00240
5.35	1.0031	0.00240	5.35	1.0040	0.00200	5.35	1.0095	0.00190
5.40	1.0070	0.00200	5.40	1.0083	0.00230	5.40	1.0115	0.00190
5.45	1.0105	0.00210	5.45	1.0131	0.00200	5.45	1.0136	0.00200
5.50	1.0180	0.00190	5.50	1.0206	0.00230	5.50	1.0161	0.00200
5.55	1.0212	0.00200	5.55	1.0250	0.00190	5.55	1.0221	0.00220
5.60	1.0265	0.00220	5.60	1.0309	0.00220	5.60	1.0300	0.00220

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.60	0.9256	0.00210	4.50	0.9225	0.00200	4.50	0.9311	0.00200
4.65	0.9282	0.00260	4.55	0.9242	0.00200	4.55	0.9353	0.00230
4.70	0.9325	0.00170	4.60	0.9330	0.00260	4.60	0.9434	0.00190
4.75	0.9404	0.00220	4.65	0.9384	0.00220	4.65	0.9433	0.00220
4.80	0.9474	0.00260	4.70	0.9424	0.00180	4.70	0.9531	0.00210
4.85	0.9541	0.00240	4.75	0.9517	0.00190	4.75	0.9573	0.00190
4.90	0.9608	0.00200	4.80	0.9523	0.00210	4.80	0.9613	0.00210
4.95	0.9673	0.00220	4.85	0.9623	0.00220	4.85	0.9652	0.00190
5.00	0.9726	0.00220	4.90	0.9645	0.00180	4.90	0.9729	0.00220
5.05	0.9763	0.00260	4.95	0.9695	0.00300	4.95	0.9768	0.00240
5.10	0.9811	0.00210	5.00	0.9785	0.00190	5.00	0.9846	0.00210
5.15	0.9859	0.00190	5.05	0.9801	0.00200	5.05	0.9885	0.00190
5.20	0.9917	0.00230	5.10	0.9869	0.00190	5.10	0.9993	0.00200
5.25	0.9969	0.00200	5.15	0.9894	0.00210	5.15	0.9969	0.00190
5.30	1.0016	0.00210	5.20	0.9944	0.00220	5.20	1.0044	0.00280
5.35	1.0052	0.00200	5.25	1.0045	0.00210	5.25	1.0112	0.00190
5.40	1.0126	0.00210	5.30	1.0059	0.00280	5.30	1.0137	0.00220
5.45	1.0158	0.00210	5.35	1.0119	0.00200	5.35	1.0202	0.00230
5.50	1.0159	0.00200	5.40	1.0190	0.00200	5.40	1.0255	0.00180
			5.45	1.0222	0.00200			
			5.50	1.0295	0.00190			

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
4.30	0.9235	0.00190	4.20	0.9296	0.00180	4.00	0.9225	0.00190
4.35	0.9282	0.00190	4.25	0.9370	0.00170	4.05	0.9290	0.00190
4.40	0.9337	0.00190	4.30	0.9433	0.00230	4.10	0.9383	0.00190
4.45	0.9404	0.00200	4.35	0.9474	0.00200	4.15	0.9460	0.00190
4.50	0.9484	0.00180	4.40	0.9566	0.00190	4.20	0.9500	0.00170
4.55	0.9573	0.00190	4.45	0.9612	0.00200	4.25	0.9553	0.00190
4.60	0.9566	0.00190	4.50	0.9631	0.00200	4.30	0.9616	0.00230
4.65	0.9679	0.00200	4.55	0.9709	0.00240	4.35	0.9692	0.00190
4.70	0.9700	0.00260	4.60	0.9790	0.00180	4.40	0.9758	0.00200
4.75	0.9764	0.00180	4.65	0.9856	0.00180	4.45	0.9762	0.00190
4.80	0.9802	0.00170	4.70	0.9870	0.00200	4.50	0.9857	0.00180
4.85	0.9851	0.00200	4.75	0.9950	0.00200	4.55	0.9916	0.00200
4.90	0.9918	0.00200	4.80	0.9972	0.00180	4.60	0.9944	0.00210
4.95	0.9974	0.00180	4.85	1.0037	0.00250	4.65	0.9993	0.00210
5.00	1.0001	0.00200	4.90	1.0100	0.00190	4.70	1.0103	0.00190
5.05	1.0047	0.00200	4.95	1.0174	0.00210	4.75	1.0165	0.00190
5.10	1.0133	0.00210	5.00	1.0218	0.00180	4.80	1.0180	0.00200
5.15	1.0175	0.00210	5.05	1.0257	0.00180	4.85	1.0215	0.00210
5.20	1.0203	0.00190	5.10	1.0365	0.00200	4.90	1.0302	0.00170

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.90	0.9274	0.00200	3.80	0.9231	0.00180	3.70	0.9197	0.00170
3.95	0.9357	0.00200	3.85	0.9338	0.00300	3.75	0.9239	0.00170
4.00	0.9433	0.00180	3.90	0.9358	0.00210	3.80	0.9347	0.00230
4.05	0.9477	0.00250	3.95	0.9440	0.00190	3.85	0.9420	0.00210
4.10	0.9572	0.00180	4.00	0.9499	0.00180	3.90	0.9487	0.00180
4.15	0.9605	0.00200	4.05	0.9585	0.00180	3.95	0.9522	0.00170
4.20	0.9678	0.00200	4.10	0.9628	0.00190	4.00	0.9589	0.00220
4.25	0.9765	0.00190	4.15	0.9693	0.00180	4.05	0.9647	0.00160
4.30	0.9802	0.00200	4.20	0.9775	0.00180	4.10	0.9728	0.00200
4.35	0.9876	0.00210	4.25	0.9883	0.00190	4.15	0.9823	0.00180
4.40	0.9941	0.00220	4.30	0.9887	0.00210	4.20	0.9865	0.00170
4.45	0.9978	0.00210	4.35	0.9974	0.00170	4.25	0.9904	0.00220
4.50	1.0040	0.00200	4.40	1.0002	0.00220	4.30	0.9993	0.00190
4.55	1.0081	0.00200	4.45	1.0073	0.00190	4.35	1.0055	0.00170
4.60	1.0143	0.00200	4.50	1.0168	0.00230	4.40	1.0112	0.00180
4.65	1.0263	0.00200	4.55	1.0234	0.00190	4.45	1.0219	0.00210
4.70	1.0280	0.00240	4.60	1.0256	0.00200	4.50	1.0220	0.00230

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
3.60	0.9210	0.00170	3.50	0.9261	0.00180	3.00	0.9222	0.00180
3.65	0.9278	0.00230	3.55	0.9338	0.00180	3.05	0.9297	0.00160
3.70	0.9354	0.00200	3.60	0.9387	0.00190	3.10	0.9368	0.00180
3.75	0.9433	0.00180	3.65	0.9488	0.00170	3.15	0.9460	0.00200
3.80	0.9483	0.00180	3.70	0.9560	0.00160	3.20	0.9529	0.00180
3.85	0.9622	0.00180	3.75	0.9607	0.00190	3.25	0.9644	0.00170
3.90	0.9663	0.00210	3.80	0.9683	0.00190	3.30	0.9731	0.00160
3.95	0.9725	0.00190	3.85	0.9776	0.00180	3.35	0.9791	0.00170
4.00	0.9761	0.00220	3.90	0.9841	0.00170	3.40	0.9919	0.00190
4.05	0.9877	0.00200	3.95	0.9900	0.00170	3.45	0.9987	0.00200
4.10	0.9907	0.00210	4.00	0.9975	0.00170	3.50	1.0065	0.00170
4.15	1.0015	0.00200	4.05	1.0041	0.00200	3.55	1.0166	0.00160
4.20	1.0075	0.00210	4.10	1.0080	0.00180	3.60	1.0238	0.00170
4.25	1.0123	0.00170	4.15	1.0143	0.00190	3.65	1.0282	0.00190
4.30	1.0196	0.00190	4.20	1.0251	0.00170	3.70	1.0372	0.00190
4.35	1.0246	0.00180						
4.40	1.0295	0.00180						

18900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma
2.70	0.9180	0.00170
2.75	0.9266	0.00180
2.80	0.9394	0.00170
2.85	0.9482	0.00190
2.90	0.9582	0.00170
2.95	0.9713	0.00180
3.00	0.9773	0.00200
3.05	0.9826	0.00180
3.10	0.9933	0.00180
3.15	1.0055	0.00180
3.20	1.0123	0.00170
3.25	1.0286	0.00250
3.30	1.0273	0.00170

U-slab-100 (Cases with 0", 1", 10" Reflector)

Case ID: U_slab_100_00ref

Material: Uranium metal in water

Geometry: Infinite plane

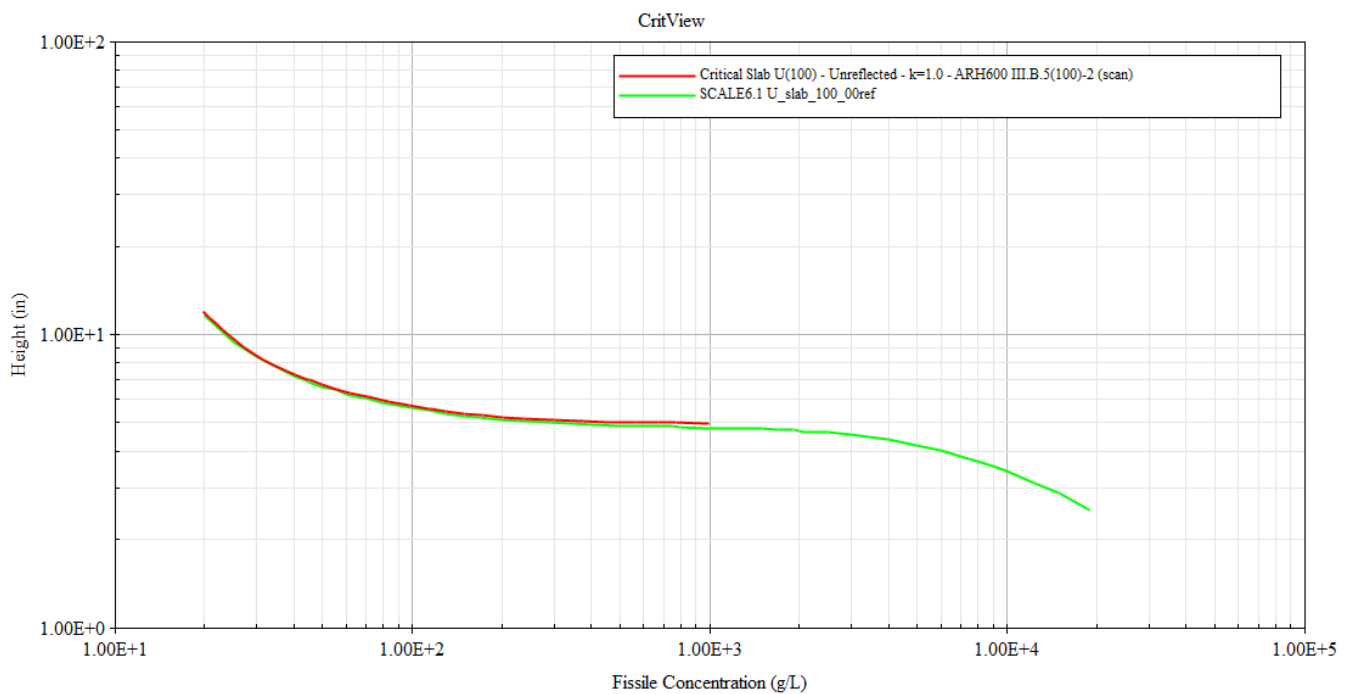
Isotopics: 100% ^{235}U

Reflector: Unreflected

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Slab (100% ²³⁵ U) – 0 Inches of Water Reflection				
Concentration (g/cc)	First Height (Inches)	Last Height (Inches)	Delta (Inches)	Critical Height (Inches)
0.020	9.600	12.100	0.100	11.6167
0.025	8.100	9.800	0.050	9.4490
0.030	7.300	8.600	0.050	8.3850
0.040	6.400	7.500	0.050	7.2516
0.045	6.100	7.100	0.050	6.8984
0.050	5.900	6.900	0.050	6.6489
0.055	5.800	6.700	0.050	6.4964
0.060	5.600	6.500	0.050	6.2740
0.065	5.500	6.300	0.050	6.1382
0.070	5.400	6.200	0.050	6.0625
0.080	5.300	6.000	0.050	5.8582
0.100	5.000	5.800	0.050	5.6173
0.130	4.900	5.600	0.050	5.3782
0.150	4.800	5.500	0.050	5.2831
0.170	4.700	5.400	0.050	5.2264
0.200	4.600	5.300	0.050	5.1326
0.350	4.500	5.100	0.050	4.9544
0.500	4.400	5.000	0.050	4.8722
0.800	4.300	5.000	0.050	4.8234
1.000	4.300	5.000	0.050	4.7994
1.500	4.300	4.900	0.050	4.7754
1.700	4.200	4.900	0.050	4.7452
1.900	4.200	4.900	0.050	4.7173
2.000	4.200	4.900	0.050	4.6973
2.100	4.200	4.900	0.050	4.6398
2.500	4.100	4.800	0.050	4.6355
3.000	4.100	4.700	0.050	4.5403
4.000	3.900	4.600	0.050	4.3831
5.000	3.700	4.400	0.050	4.1926
6.000	3.600	4.200	0.050	4.0079
7.000	3.400	4.000	0.050	3.8462
7.500	3.400	3.900	0.020	3.7592
8.000	3.300	3.900	0.050	3.7049
9.000	3.200	3.700	0.020	3.5605
10.000	3.000	3.600	0.050	3.4271
15.000	2.500	3.000	0.020	2.8773
18.900	2.200	2.700	0.020	2.5208

WORM and SCALE Input File

```

'Worm generated by Natalie 6/28/21
'Recreating data from PRC-NS-00009 B-716 (pdf pg734)
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
0.02,0.025,0.03,0.04,0.045,0.05,0.055,0.06,0.065,0.07,0.08,0.1,0.13,0.15,0.17,0.2,0.35,0.5,0.8,1,
1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/18.9)>
,
#Starting Diameter = <@startdia =
9.6,8.1,7.3,6.4,6.1,5.9,5.8,5.6,5.5,5.4,5.3,5,4.9,4.8,4.7,4.6,4.5,4.4,4.3,4.3,4.3,4.2,4.2,4.2,4.2
,4.1,4.1,3.9,3.7,3.6,3.4,3.4,3.3,3.2,3,2.5,2.2> in
#Ending Diameter = <@enddia =
12.1,9.8,8.6,7.5,7.1,6.9,6.7,6.5,6.3,6.2,6,5.8,5.6,5.5,5.4,5.3,5.1,5,5,5,4.9,4.9,4.9,4.9,4.8,
4.7,4.6,4.4,4.2,4,3.9,3.9,3.7,3.6,3,2.7> in
#Delta = <@delta =
0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.0
5,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02,0.05,0.02,0.05,0.02,0.02> in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Unreflected Slab Template
v7-238
read composition
  u          1 den=<critconc> 1 300
              92235 100    end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300    end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Unreflected Slab Template"
  cuboid 1      5      -5      5      -5      {{(diameter*in)/2}}      {{(-1*diameter*in)/2}}
  media 1 1 1
  boundary 1
end geometry
read bnds
  body=1
    surface(1)=mirror
    surface(2)=mirror
    surface(3)=mirror
    surface(4)=mirror
    surface(5)=vacuum
    surface(6)=vacuum
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Slab; U; Unreflected; 100% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: infplane
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 1.0
reflmat: None
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: height in
0.020 11.6167
0.025 9.4490
0.030 8.3850
0.040 7.2516
0.045 6.8984
0.050 6.6489
0.055 6.4964
0.060 6.2740
0.065 6.1382
0.070 6.0625
0.080 5.8582
0.100 5.6173
0.130 5.3782
0.150 5.2831
0.170 5.2264
0.200 5.1326
0.350 4.9544
0.500 4.8722
0.800 4.8234
1.000 4.7994
1.500 4.7754
1.700 4.7452
1.900 4.7173
2.000 4.6973
2.100 4.6398
2.500 4.6355
3.000 4.5403
4.000 4.3831
5.000 4.1926
6.000 4.0079
7.000 3.8462
7.500 3.7592
8.000 3.7049
9.000 3.5605
10.000 3.4271
15.000 2.8773
18.900 2.5208
```

20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
9.60	0.9239	0.00140	8.10	0.9206	0.00150	7.30	0.9231	0.00210
9.70	0.9263	0.00190	8.15	0.9246	0.00160	7.35	0.9223	0.00150
9.80	0.9329	0.00150	8.20	0.9266	0.00180	7.40	0.9271	0.00160
9.90	0.9379	0.00140	8.25	0.9280	0.00180	7.45	0.9325	0.00170
10.00	0.9398	0.00160	8.30	0.9354	0.00150	7.50	0.9370	0.00160
10.10	0.9413	0.00150	8.35	0.9365	0.00210	7.55	0.9403	0.00150
10.20	0.9500	0.00160	8.40	0.9408	0.00160	7.60	0.9420	0.00200
10.30	0.9533	0.00140	8.45	0.9398	0.00160	7.65	0.9507	0.00150
10.40	0.9557	0.00150	8.50	0.9447	0.00170	7.70	0.9522	0.00210
10.50	0.9580	0.00150	8.55	0.9467	0.00140	7.75	0.9561	0.00170
10.60	0.9654	0.00150	8.60	0.9523	0.00150	7.80	0.9570	0.00170
10.70	0.9666	0.00140	8.65	0.9545	0.00190	7.85	0.9663	0.00150
10.80	0.9719	0.00160	8.70	0.9619	0.00150	7.90	0.9697	0.00190
10.90	0.9751	0.00150	8.75	0.9588	0.00140	7.95	0.9693	0.00200
11.00	0.9819	0.00160	8.80	0.9635	0.00190	8.00	0.9776	0.00210
11.10	0.9823	0.00140	8.85	0.9669	0.00160	8.05	0.9761	0.00200
11.20	0.9872	0.00130	8.90	0.9674	0.00160	8.10	0.9792	0.00180
11.30	0.9895	0.00130	8.95	0.9704	0.00200	8.15	0.9839	0.00160
11.40	0.9949	0.00140	9.00	0.9730	0.00150	8.20	0.9866	0.00190
11.50	0.9966	0.00140	9.05	0.9806	0.00160	8.25	0.9908	0.00180
11.60	0.9997	0.00130	9.10	0.9783	0.00190	8.30	0.9925	0.00220
11.70	1.0015	0.00160	9.15	0.9829	0.00150	8.35	1.0007	0.00170
11.80	1.0063	0.00120	9.20	0.9849	0.00130	8.40	0.9997	0.00170
11.90	1.0082	0.00130	9.25	0.9885	0.00190	8.45	1.0025	0.00180
12.00	1.0123	0.00150	9.30	0.9876	0.00160	8.50	1.0107	0.00160
12.10	1.0163	0.00140	9.35	0.9938	0.00140	8.55	1.0066	0.00250
			9.40	0.9951	0.00180	8.60	1.0174	0.00190
			9.45	1.0001	0.00160			
			9.50	1.0017	0.00150			
			9.55	1.0052	0.00150			
			9.60	1.0028	0.00150			
			9.65	1.0115	0.00170			
			9.70	1.0115	0.00170			
			9.75	1.0131	0.00170			
			9.80	1.0170	0.00140			

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
6.40	0.9170	0.00190	6.10	0.9125	0.00180	5.90	0.9150	0.00210
6.45	0.9200	0.00200	6.15	0.9151	0.00190	5.95	0.9188	0.00200
6.50	0.9291	0.00210	6.20	0.9188	0.00200	6.00	0.9242	0.00200
6.55	0.9304	0.00160	6.25	0.9296	0.00180	6.05	0.9324	0.00210
6.60	0.9359	0.00200	6.30	0.9340	0.00180	6.10	0.9366	0.00210
6.65	0.9397	0.00330	6.35	0.9367	0.00220	6.15	0.9442	0.00180
6.70	0.9487	0.00180	6.40	0.9461	0.00190	6.20	0.9446	0.00180
6.75	0.9492	0.00260	6.45	0.9527	0.00210	6.25	0.9543	0.00190
6.80	0.9565	0.00170	6.50	0.9562	0.00180	6.30	0.9612	0.00180
6.85	0.9614	0.00170	6.55	0.9602	0.00210	6.35	0.9650	0.00200
6.90	0.9660	0.00190	6.60	0.9671	0.00210	6.40	0.9735	0.00250
6.95	0.9710	0.00200	6.65	0.9709	0.00200	6.45	0.9760	0.00210
7.00	0.9731	0.00190	6.70	0.9759	0.00180	6.50	0.9821	0.00180
7.05	0.9791	0.00170	6.75	0.9851	0.00190	6.55	0.9906	0.00210
7.10	0.9878	0.00190	6.80	0.9917	0.00220	6.60	0.9955	0.00210
7.15	0.9911	0.00190	6.85	0.9969	0.00220	6.65	1.0001	0.00200
7.20	0.9963	0.00200	6.90	1.0001	0.00230	6.70	1.0035	0.00220
7.25	0.9998	0.00180	6.95	1.0037	0.00180	6.75	1.0079	0.00190
7.30	1.0062	0.00210	7.00	1.0086	0.00230	6.80	1.0176	0.00230
7.35	1.0075	0.00210	7.05	1.0136	0.00220	6.85	1.0184	0.00190
7.40	1.0129	0.00190	7.10	1.0188	0.00200	6.90	1.0222	0.00230
7.45	1.0184	0.00210						
7.50	1.0221	0.00160						

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
5.80	0.9178	0.00210	5.60	0.9112	0.00210	5.50	0.9082	0.00200
5.85	0.9264	0.00230	5.65	0.9174	0.00220	5.55	0.9191	0.00180
5.90	0.9357	0.00190	5.70	0.9238	0.00200	5.60	0.9265	0.00260
5.95	0.9387	0.00200	5.75	0.9314	0.00200	5.65	0.9392	0.00190
6.00	0.9401	0.00220	5.80	0.9339	0.00230	5.70	0.9433	0.00280
6.05	0.9511	0.00210	5.85	0.9438	0.00230	5.75	0.9450	0.00260
6.10	0.9572	0.00210	5.90	0.9502	0.00240	5.80	0.9553	0.00200
6.15	0.9622	0.00190	5.95	0.9576	0.00210	5.85	0.9585	0.00210
6.20	0.9730	0.00180	6.00	0.9639	0.00210	5.90	0.9658	0.00220
6.25	0.9771	0.00200	6.05	0.9726	0.00240	5.95	0.9727	0.00180
6.30	0.9844	0.00240	6.10	0.9785	0.00240	6.00	0.9756	0.00200
6.35	0.9911	0.00210	6.15	0.9843	0.00200	6.05	0.9860	0.00220
6.40	0.9942	0.00210	6.20	0.9916	0.00190	6.10	0.9935	0.00190
6.45	0.9961	0.00220	6.25	0.9964	0.00290	6.15	1.0020	0.00240
6.50	1.0003	0.00200	6.30	1.0039	0.00210	6.20	1.0049	0.00220
6.55	1.0093	0.00290	6.35	1.0078	0.00240	6.25	1.0138	0.00260
6.60	1.0156	0.00240	6.40	1.0107	0.00200	6.30	1.0186	0.00180
6.65	1.0225	0.00200	6.45	1.0142	0.00240			
6.70	1.0249	0.00180	6.50	1.0239	0.00220			

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
5.40	0.9093	0.00210	5.30	0.9178	0.00200	5.00	0.9055	0.00200
5.45	0.9191	0.00200	5.35	0.9293	0.00220	5.05	0.9112	0.00210
5.50	0.9245	0.00210	5.40	0.9335	0.00260	5.10	0.9217	0.00290
5.55	0.9299	0.00210	5.45	0.9409	0.00260	5.15	0.9294	0.00210
5.60	0.9418	0.00230	5.50	0.9458	0.00220	5.20	0.9328	0.00300
5.65	0.9433	0.00210	5.55	0.9584	0.00240	5.25	0.9434	0.00230
5.70	0.9537	0.00240	5.60	0.9624	0.00240	5.30	0.9545	0.00200
5.75	0.9653	0.00190	5.65	0.9705	0.00230	5.35	0.9608	0.00210
5.80	0.9666	0.00220	5.70	0.9758	0.00210	5.40	0.9686	0.00210
5.85	0.9758	0.00240	5.75	0.9885	0.00230	5.45	0.9765	0.00270
5.90	0.9833	0.00200	5.80	0.9923	0.00240	5.50	0.9808	0.00220
5.95	0.9913	0.00280	5.85	0.9992	0.00230	5.55	0.9957	0.00200
6.00	0.9949	0.00240	5.90	1.0041	0.00220	5.60	0.9973	0.00220
6.05	0.9985	0.00240	5.95	1.0118	0.00200	5.65	1.0051	0.00240
6.10	1.0045	0.00250	6.00	1.0152	0.00210	5.70	1.0133	0.00240
6.15	1.0116	0.00200				5.75	1.0181	0.00260
6.20	1.0178	0.00210				5.80	1.0264	0.00260

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.90	0.9188	0.00290	4.80	0.9182	0.00210	4.70	0.9088	0.00220
4.95	0.9253	0.00210	4.85	0.9231	0.00220	4.75	0.9162	0.00260
5.00	0.9372	0.00230	4.90	0.9341	0.00290	4.80	0.9289	0.00210
5.05	0.9435	0.00240	4.95	0.9391	0.00210	4.85	0.9326	0.00270
5.10	0.9513	0.00230	5.00	0.9499	0.00230	4.90	0.9482	0.00240
5.15	0.9578	0.00220	5.05	0.9672	0.00230	4.95	0.9572	0.00260
5.20	0.9689	0.00210	5.10	0.9721	0.00210	5.00	0.9600	0.00210
5.25	0.9766	0.00230	5.15	0.9780	0.00240	5.05	0.9703	0.00230
5.30	0.9871	0.00230	5.20	0.9850	0.00220	5.10	0.9807	0.00250
5.35	0.9943	0.00220	5.25	0.9955	0.00220	5.15	0.9917	0.00240
5.40	1.0044	0.00220	5.30	1.0023	0.00210	5.20	0.9962	0.00230
5.45	1.0082	0.00270	5.35	1.0091	0.00240	5.25	1.0034	0.00230
5.50	1.0176	0.00240	5.40	1.0155	0.00220	5.30	1.0162	0.00200
5.55	1.0247	0.00200	5.45	1.0293	0.00220	5.35	1.0183	0.00220
5.60	1.0316	0.00220	5.50	1.0360	0.00250	5.40	1.0251	0.00280

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.60	0.9045	0.00250	4.50	0.9190	0.00260	4.40	0.9141	0.00250
4.65	0.9121	0.00220	4.55	0.9313	0.00210	4.45	0.9197	0.00210
4.70	0.9246	0.00220	4.60	0.9331	0.00210	4.50	0.9300	0.00280
4.75	0.9316	0.00260	4.65	0.9450	0.00230	4.55	0.9433	0.00220
4.80	0.9441	0.00250	4.70	0.9547	0.00220	4.60	0.9535	0.00250
4.85	0.9517	0.00230	4.75	0.9698	0.00270	4.65	0.9583	0.00240
4.90	0.9555	0.00270	4.80	0.9717	0.00230	4.70	0.9698	0.00260
4.95	0.9740	0.00230	4.85	0.9848	0.00230	4.75	0.9777	0.00260
5.00	0.9768	0.00270	4.90	0.9897	0.00220	4.80	0.9872	0.00340
5.05	0.9867	0.00240	4.95	0.9992	0.00320	4.85	0.9964	0.00250
5.10	0.9916	0.00260	5.00	1.0083	0.00260	4.90	1.0045	0.00210
5.15	1.0045	0.00220	5.05	1.0150	0.00350	4.95	1.0139	0.00270
5.20	1.0155	0.00250	5.10	1.0282	0.00240	5.00	1.0191	0.00260
5.25	1.0240	0.00250						
5.30	1.0263	0.00220						

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.30	0.9053	0.00250	4.30	0.9089	0.00260	4.30	0.9222	0.00250
4.35	0.9106	0.00220	4.35	0.9244	0.00200	4.35	0.9322	0.00220
4.40	0.9244	0.00230	4.40	0.9348	0.00250	4.40	0.9395	0.00240
4.45	0.9342	0.00230	4.45	0.9416	0.00270	4.45	0.9478	0.00210
4.50	0.9462	0.00200	4.50	0.9511	0.00210	4.50	0.9542	0.00210
4.55	0.9516	0.00230	4.55	0.9549	0.00200	4.55	0.9680	0.00220
4.60	0.9604	0.00200	4.60	0.9662	0.00220	4.60	0.9739	0.00230
4.65	0.9720	0.00200	4.65	0.9751	0.00250	4.65	0.9836	0.00190
4.70	0.9777	0.00260	4.70	0.9824	0.00190	4.70	0.9911	0.00250
4.75	0.9858	0.00290	4.75	0.9915	0.00250	4.75	0.9966	0.00260
4.80	0.9964	0.00230	4.80	1.0001	0.00220	4.80	1.0033	0.00230
4.85	1.0041	0.00210	4.85	1.0125	0.00220	4.85	1.0123	0.00210
4.90	1.0122	0.00200	4.90	1.0152	0.00230	4.90	1.0241	0.00250
4.95	1.0241	0.00220	4.95	1.0239	0.00230			
5.00	1.0279	0.00210	5.00	1.0285	0.00220			

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.20	0.9109	0.00240	4.20	0.9138	0.00200	4.20	0.9160	0.00200
4.25	0.9224	0.00210	4.25	0.9206	0.00200	4.25	0.9277	0.00270
4.30	0.9274	0.00230	4.30	0.9299	0.00190	4.30	0.9353	0.00190
4.35	0.9372	0.00250	4.35	0.9426	0.00200	4.35	0.9396	0.00180
4.40	0.9458	0.00250	4.40	0.9480	0.00210	4.40	0.9512	0.00270
4.45	0.9514	0.00230	4.45	0.9560	0.00210	4.45	0.9628	0.00200
4.50	0.9632	0.00290	4.50	0.9690	0.00190	4.50	0.9665	0.00250
4.55	0.9660	0.00190	4.55	0.9783	0.00240	4.55	0.9734	0.00220
4.60	0.9779	0.00220	4.60	0.9805	0.00210	4.60	0.9856	0.00210
4.65	0.9863	0.00230	4.65	0.9891	0.00210	4.65	0.9931	0.00210
4.70	0.9925	0.00180	4.70	0.9966	0.00210	4.70	1.0004	0.00200
4.75	1.0008	0.00230	4.75	1.0064	0.00200	4.75	1.0075	0.00250
4.80	1.0103	0.00190	4.80	1.0150	0.00210	4.80	1.0131	0.00250
4.85	1.0232	0.00210	4.85	1.0260	0.00270	4.85	1.0212	0.00230
4.90	1.0279	0.00220	4.90	1.0290	0.00190	4.90	1.0304	0.00210

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.20	0.9219	0.00220	4.10	0.9128	0.00230	4.10	0.9289	0.00170
4.25	0.9301	0.00260	4.15	0.9197	0.00210	4.15	0.9356	0.00280
4.30	0.9350	0.00180	4.20	0.9260	0.00190	4.20	0.9442	0.00180
4.35	0.9445	0.00190	4.25	0.9386	0.00200	4.25	0.9527	0.00180
4.40	0.9549	0.00200	4.30	0.9463	0.00200	4.30	0.9594	0.00190
4.45	0.9627	0.00210	4.35	0.9574	0.00230	4.35	0.9697	0.00200
4.50	0.9725	0.00210	4.40	0.9594	0.00200	4.40	0.9767	0.00270
4.55	0.9752	0.00250	4.45	0.9712	0.00220	4.45	0.9856	0.00230
4.60	0.9879	0.00240	4.50	0.9810	0.00240	4.50	0.9888	0.00190
4.65	1.0031	0.00240	4.55	0.9879	0.00210	4.55	1.0027	0.00210
4.70	1.0030	0.00220	4.60	0.9924	0.00200	4.60	1.0073	0.00200
4.75	1.0106	0.00210	4.65	1.0031	0.00220	4.65	1.0160	0.00210
4.80	1.0193	0.00200	4.70	1.0147	0.00210	4.70	1.0238	0.00200
4.85	1.0252	0.00210	4.75	1.0204	0.00220			
4.90	1.0303	0.00210	4.80	1.0272	0.00280			

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
3.90	0.9168	0.00180	3.70	0.9087	0.00220	3.60	0.9217	0.00180
3.95	0.9271	0.00190	3.75	0.9185	0.00200	3.65	0.9271	0.00220
4.00	0.9384	0.00190	3.80	0.9313	0.00170	3.70	0.9375	0.00200
4.05	0.9445	0.00180	3.85	0.9364	0.00190	3.75	0.9496	0.00170
4.10	0.9566	0.00190	3.90	0.9518	0.00180	3.80	0.9614	0.00210
4.15	0.9605	0.00220	3.95	0.9603	0.00190	3.85	0.9691	0.00210
4.20	0.9700	0.00180	4.00	0.9683	0.00170	3.90	0.9772	0.00280
4.25	0.9825	0.00230	4.05	0.9731	0.00230	3.95	0.9901	0.00170
4.30	0.9898	0.00190	4.10	0.9862	0.00190	4.00	0.9994	0.00230
4.35	0.9951	0.00190	4.15	0.9948	0.00180	4.05	1.0032	0.00200
4.40	1.0025	0.00200	4.20	1.0009	0.00190	4.10	1.0155	0.00210
4.45	1.0108	0.00190	4.25	1.0113	0.00170	4.15	1.0260	0.00200
4.50	1.0216	0.00230	4.30	1.0197	0.00230	4.20	1.0338	0.00180
4.55	1.0307	0.00220	4.35	1.0284	0.00190			
4.60	1.0374	0.00190	4.40	1.0346	0.00190			

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
3.40	0.9119	0.00210	3.40	0.9260	0.00210	3.30	0.9206	0.00170
3.45	0.9219	0.00190	3.42	0.9312	0.00170	3.35	0.9313	0.00220
3.50	0.9348	0.00210	3.44	0.9323	0.00200	3.40	0.9386	0.00200
3.55	0.9414	0.00180	3.46	0.9364	0.00170	3.45	0.9541	0.00170
3.60	0.9513	0.00180	3.48	0.9430	0.00200	3.50	0.9587	0.00180
3.65	0.9636	0.00170	3.50	0.9477	0.00180	3.55	0.9693	0.00220
3.70	0.9703	0.00170	3.52	0.9479	0.00170	3.60	0.9831	0.00170
3.75	0.9828	0.00190	3.54	0.9573	0.00170	3.65	0.9890	0.00180
3.80	0.9877	0.00170	3.56	0.9580	0.00190	3.70	0.9988	0.00190
3.85	1.0010	0.00180	3.58	0.9656	0.00250	3.75	1.0111	0.00200
3.90	1.0070	0.00170	3.60	0.9701	0.00190	3.80	1.0216	0.00180
3.95	1.0176	0.00240	3.62	0.9676	0.00220	3.85	1.0287	0.00230
4.00	1.0308	0.00200	3.64	0.9742	0.00160	3.90	1.0365	0.00190
			3.66	0.9783	0.00160			
			3.68	0.9778	0.00210			
			3.70	0.9829	0.00180			
			3.72	0.9893	0.00200			
			3.74	0.9906	0.00180			
			3.76	1.0004	0.00170			
			3.78	1.0044	0.00200			
			3.80	1.0057	0.00220			
			3.82	1.0089	0.00160			
			3.84	1.0143	0.00220			
			3.86	1.0176	0.00200			
			3.88	1.0187	0.00180			
			3.90	1.0213	0.00240			

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
3.20	0.9238	0.00200	3.00	0.9058	0.00200	2.50	0.9015	0.00160
3.22	0.9311	0.00200	3.05	0.9160	0.00170	2.52	0.9086	0.00140
3.24	0.9339	0.00200	3.10	0.9295	0.00180	2.54	0.9145	0.00210
3.26	0.9373	0.00170	3.15	0.9372	0.00200	2.56	0.9214	0.00140
3.28	0.9406	0.00170	3.20	0.9485	0.00180	2.58	0.9235	0.00200
3.30	0.9436	0.00210	3.25	0.9653	0.00190	2.60	0.9290	0.00160
3.32	0.9492	0.00180	3.30	0.9712	0.00160	2.62	0.9310	0.00230
3.34	0.9535	0.00180	3.35	0.9832	0.00200	2.64	0.9405	0.00210
3.36	0.9597	0.00240	3.40	0.9935	0.00190	2.66	0.9473	0.00170
3.38	0.9639	0.00180	3.45	1.0055	0.00160	2.68	0.9479	0.00180
3.40	0.9681	0.00180	3.50	1.0142	0.00180	2.70	0.9553	0.00160
3.42	0.9740	0.00210	3.55	1.0284	0.00220	2.72	0.9589	0.00170
3.44	0.9739	0.00240	3.60	1.0350	0.00170	2.74	0.9668	0.00210
3.46	0.9829	0.00170				2.76	0.9727	0.00170
3.48	0.9854	0.00210				2.78	0.9751	0.00160
3.50	0.9891	0.00160				2.80	0.9805	0.00170
3.52	0.9943	0.00200				2.82	0.9868	0.00160
3.54	0.9986	0.00180				2.84	0.9926	0.00160
3.56	0.9998	0.00170				2.86	0.9987	0.00170
3.58	1.0079	0.00160				2.88	1.0002	0.00180
3.60	1.0051	0.00180				2.90	1.0070	0.00210
3.62	1.0133	0.00180				2.92	1.0093	0.00170
3.64	1.0191	0.00190				2.94	1.0166	0.00170
3.66	1.0172	0.00250				2.96	1.0184	0.00160
3.68	1.0275	0.00200				2.98	1.0283	0.00150
3.70	1.0287	0.00180				3.00	1.0328	0.00190

18900 milli-g/cc		
Height (Inches)	K _{eff}	Sigma
2.20	0.9113	0.00150
2.22	0.9153	0.00190
2.24	0.9212	0.00160
2.26	0.9290	0.00150
2.28	0.9319	0.00160
2.30	0.9425	0.00200
2.32	0.9451	0.00180
2.34	0.9499	0.00180
2.36	0.9562	0.00200
2.38	0.9624	0.00160
2.40	0.9671	0.00160
2.42	0.9739	0.00160
2.44	0.9768	0.00190
2.46	0.9869	0.00170
2.48	0.9943	0.00190
2.50	0.9938	0.00160
2.52	0.9997	0.00160
2.54	1.0076	0.00170
2.56	1.0097	0.00170
2.58	1.0186	0.00170
2.60	1.0215	0.00190
2.62	1.0284	0.00160
2.64	1.0371	0.00170
2.66	1.0400	0.00190
2.68	1.0409	0.00160
2.70	1.0463	0.00170

Case ID: U_slab_100_01ref

Material: Uranium metal in water

Geometry: Infinite plane

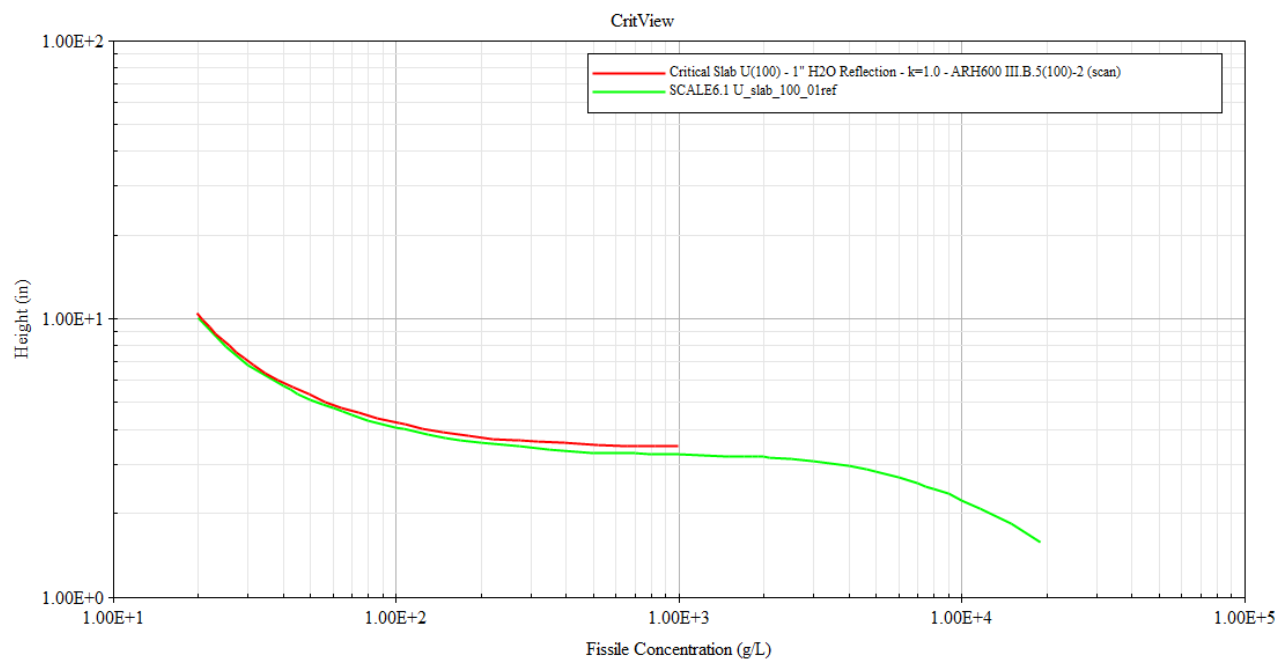
Isotopics: 100% ^{235}U

Reflector: 1" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Slab (100% ²³⁵ U) - 1 Inch of Water Reflection				
Concentration (g/cc)	First Height (Inches)	Last Height (Inches)	Delta (Inches)	Critical Height (Inches)
0.020	8.100	10.500	0.100	10.1068
0.025	6.600	8.200	0.050	7.9643
0.030	5.800	7.100	0.050	6.8291
0.040	4.900	5.900	0.050	5.7440
0.045	4.600	5.600	0.050	5.3778
0.050	4.400	5.300	0.050	5.1302
0.055	4.200	5.100	0.050	4.9136
0.060	4.100	4.900	0.050	4.7625
0.065	4.000	4.800	0.050	4.6322
0.070	3.900	4.700	0.050	4.5080
0.080	3.700	4.500	0.050	4.3212
0.100	3.500	4.200	0.050	4.0750
0.130	3.300	4.000	0.050	3.8346
0.150	3.200	3.900	0.050	3.7394
0.170	3.200	3.800	0.050	3.6640
0.200	3.100	3.700	0.050	3.5814
0.350	2.900	3.500	0.050	3.3759
0.500	2.900	3.500	0.050	3.3079
0.800	2.800	3.400	0.050	3.2650
1.000	2.800	3.400	0.050	3.2605
1.500	2.700	3.400	0.050	3.1993
1.700	2.700	3.400	0.050	3.1993
1.900	2.700	3.400	0.050	3.2099
2.000	2.700	3.300	0.050	3.1889
2.100	2.700	3.300	0.050	3.1772
2.500	2.700	3.300	0.050	3.1315
3.000	2.600	3.200	0.050	3.0800
4.000	2.500	3.100	0.050	2.9544
5.000	2.400	3.000	0.050	2.8172
6.000	2.300	2.800	0.020	2.6840
7.000	2.100	2.700	0.050	2.5609
7.500	2.100	2.700	0.050	2.5000
8.000	2.000	2.600	0.050	2.4390
9.000	2.000	2.500	0.020	2.3468
10.000	1.900	2.400	0.020	2.2329
15.000	1.500	2.000	0.020	1.8327
18.900	1.300	1.700	0.020	1.5829

WORM and SCALE Input File

```

'Worm generated by Natalie 6/28/21
'In this case, Diameter is thickness of slab
'Recreating data from PRC-NS-00009 B-736 (pdf pg754)
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
0.02,0.025,0.03,0.04,0.045,0.05,0.055,0.06,0.065,0.07,0.08,0.1,0.13,0.15,0.17,0.2,0.35,0.5,0.8,1,
1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Critical Density = <critdens = 18.9 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
8.1,6.6,5.8,4.9,4.6,4.4,4.2,4.1,4,3.9,3.7,3.5,3.3,3.2,3.2,3.1,2.9,2.9,2.8,2.8,2.7,2.7,2.7,2.7,2.7
,2.7,2.6,2.5,2.4,2.3,2.1,2.1,2,2,1.9,1.5,1.3> in
#Ending Diameter = <@enddia =
10.5,8.2,7.1,5.9,5.6,5.3,5.1,4.9,4.8,4.7,4.5,4.2,4,3.9,3.8,3.7,3.5,3.5,3.4,3.4,3.4,3.4,3.4,3.3,3.
3,3.3,3.2,3.1,3,2.8,2.7,2.6,2.5,2.4,2,1.7> in
#Delta = <@delta =
0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.0
5,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02,0.05,0.05,0.05,0.02,0.02,0.02,0.02> in
,
'Reflector Thickness {{refthick = 1}}
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
template
v7-238
read composition
  u          1 den=<critconc> 1 300
                                92235 100    end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300    end
  h2o        2 1 300    end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Slab"
  cuboid 1      {{(diameter*in)/2}}      {{(-1*diameter*in)/2}}      10      -10      10      -10
  cuboid 2      {{(refdia*in)/2}}      {{(-1*refdia*in)/2}}      10      -10      10      -10
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
read bnds
  body=2
    surface(1)=vacuum
    surface(2)=vacuum
    surface(3)=mirror
    surface(4)=mirror
    surface(5)=mirror
    surface(6)=mirror
  end bnds
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
  return '\';
}
}

```

```
}  
}  
</perl>
```

CritView compatible data file

```
reset:
title: Critical Slab; U; 1" Water Reflector; 100% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: infplane
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 1.0
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: height in
0.020 10.1068
0.025 7.9643
0.030 6.8291
0.040 5.7440
0.045 5.3778
0.050 5.1302
0.055 4.9136
0.060 4.7625
0.065 4.6322
0.070 4.5080
0.080 4.3212
0.100 4.0750
0.130 3.8346
0.150 3.7394
0.170 3.6640
0.200 3.5814
0.350 3.3759
0.500 3.3079
0.800 3.2650
1.000 3.2605
1.500 3.1993
1.700 3.1993
1.900 3.2099
2.000 3.1889
2.100 3.1772
2.500 3.1315
3.000 3.0800
4.000 2.9544
5.000 2.8172
6.000 2.6840
7.000 2.5609
7.500 2.5000
8.000 2.4390
9.000 2.3468
10.000 2.2329
15.000 1.8327
18.900 1.5829
```

20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
8.10	0.9255	0.00120	6.60	0.9204	0.00160	5.80	0.9210	0.00160
8.20	0.9278	0.00140	6.65	0.9252	0.00160	5.85	0.9237	0.00160
8.30	0.9321	0.00160	6.70	0.9278	0.00150	5.90	0.9332	0.00170
8.40	0.9386	0.00130	6.75	0.9314	0.00170	5.95	0.9372	0.00220
8.50	0.9409	0.00150	6.80	0.9335	0.00190	6.00	0.9388	0.00170
8.60	0.9461	0.00140	6.85	0.9360	0.00150	6.05	0.9438	0.00160
8.70	0.9513	0.00140	6.90	0.9382	0.00170	6.10	0.9454	0.00160
8.80	0.9558	0.00180	6.95	0.9430	0.00160	6.15	0.9515	0.00210
8.90	0.9573	0.00160	7.00	0.9438	0.00160	6.20	0.9552	0.00160
9.00	0.9614	0.00150	7.05	0.9479	0.00180	6.25	0.9612	0.00190
9.10	0.9647	0.00130	7.10	0.9534	0.00150	6.30	0.9597	0.00150
9.20	0.9692	0.00140	7.15	0.9520	0.00190	6.35	0.9659	0.00180
9.30	0.9723	0.00120	7.20	0.9593	0.00140	6.40	0.9675	0.00160
9.40	0.9752	0.00150	7.25	0.9611	0.00180	6.45	0.9747	0.00160
9.50	0.9809	0.00110	7.30	0.9669	0.00180	6.50	0.9770	0.00160
9.60	0.9852	0.00120	7.35	0.9657	0.00180	6.55	0.9802	0.00170
9.70	0.9886	0.00140	7.40	0.9732	0.00140	6.60	0.9841	0.00150
9.80	0.9896	0.00140	7.45	0.9722	0.00150	6.65	0.9856	0.00150
9.90	0.9919	0.00150	7.50	0.9776	0.00150	6.70	0.9884	0.00160
10.00	0.9956	0.00180	7.55	0.9784	0.00200	6.75	0.9922	0.00180
10.10	0.9997	0.00130	7.60	0.9834	0.00170	6.80	0.9975	0.00180
10.20	1.0041	0.00120	7.65	0.9854	0.00170	6.85	1.0018	0.00170
10.30	1.0066	0.00140	7.70	0.9869	0.00140	6.90	1.0054	0.00210
10.40	1.0099	0.00140	7.75	0.9888	0.00210	6.95	1.0079	0.00160
10.50	1.0116	0.00130	7.80	0.9939	0.00230	7.00	1.0107	0.00180
			7.85	0.9958	0.00150	7.05	1.0141	0.00160
			7.90	0.9985	0.00170	7.10	1.0139	0.00150
			7.95	0.9990	0.00150			
			8.00	1.0025	0.00180			
			8.05	1.0043	0.00140			
			8.10	1.0092	0.00140			
			8.15	1.0105	0.00170			
			8.20	1.0138	0.00160			

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.90	0.9231	0.00220	4.60	0.9141	0.00180	4.40	0.9175	0.00190
4.95	0.9267	0.00190	4.65	0.9173	0.00190	4.45	0.9208	0.00230
5.00	0.9250	0.00170	4.70	0.9275	0.00190	4.50	0.9293	0.00210
5.05	0.9348	0.00220	4.75	0.9279	0.00220	4.55	0.9322	0.00180
5.10	0.9368	0.00240	4.80	0.9384	0.00170	4.60	0.9367	0.00170
5.15	0.9447	0.00180	4.85	0.9418	0.00200	4.65	0.9431	0.00170
5.20	0.9513	0.00210	4.90	0.9468	0.00170	4.70	0.9492	0.00210
5.25	0.9559	0.00160	4.95	0.9551	0.00180	4.75	0.9579	0.00180
5.30	0.9595	0.00160	5.00	0.9581	0.00180	4.80	0.9637	0.00200
5.35	0.9613	0.00210	5.05	0.9643	0.00200	4.85	0.9694	0.00200
5.40	0.9721	0.00210	5.10	0.9702	0.00170	4.90	0.9717	0.00230
5.45	0.9724	0.00180	5.15	0.9759	0.00230	4.95	0.9792	0.00150
5.50	0.9775	0.00180	5.20	0.9815	0.00200	5.00	0.9893	0.00200
5.55	0.9828	0.00170	5.25	0.9855	0.00180	5.05	0.9921	0.00190
5.60	0.9887	0.00220	5.30	0.9900	0.00200	5.10	0.9933	0.00200
5.65	0.9942	0.00170	5.35	0.9950	0.00200	5.15	1.0044	0.00200
5.70	0.9963	0.00170	5.40	1.0040	0.00210	5.20	1.0070	0.00190
5.75	1.0005	0.00170	5.45	1.0098	0.00180	5.25	1.0142	0.00220
5.80	1.0066	0.00160	5.50	1.0133	0.00180	5.30	1.0168	0.00210
5.85	1.0105	0.00180	5.55	1.0170	0.00220			
5.90	1.0154	0.00170	5.60	1.0213	0.00190			

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.20	0.9065	0.00200	4.10	0.9141	0.00250	4.00	0.9157	0.00190
4.25	0.9152	0.00210	4.15	0.9204	0.00180	4.05	0.9266	0.00240
4.30	0.9211	0.00220	4.20	0.9257	0.00250	4.10	0.9322	0.00180
4.35	0.9266	0.00190	4.25	0.9346	0.00190	4.15	0.9377	0.00200
4.40	0.9382	0.00170	4.30	0.9420	0.00230	4.20	0.9452	0.00220
4.45	0.9448	0.00210	4.35	0.9486	0.00260	4.25	0.9522	0.00200
4.50	0.9486	0.00220	4.40	0.9569	0.00250	4.30	0.9574	0.00180
4.55	0.9544	0.00200	4.45	0.9641	0.00190	4.35	0.9680	0.00220
4.60	0.9627	0.00200	4.50	0.9657	0.00190	4.40	0.9709	0.00180
4.65	0.9683	0.00240	4.55	0.9737	0.00180	4.45	0.9768	0.00210
4.70	0.9770	0.00180	4.60	0.9817	0.00190	4.50	0.9818	0.00210
4.75	0.9793	0.00190	4.65	0.9899	0.00190	4.55	0.9915	0.00180
4.80	0.9850	0.00180	4.70	0.9931	0.00180	4.60	0.9944	0.00220
4.85	0.9909	0.00180	4.75	0.9981	0.00170	4.65	1.0031	0.00180
4.90	0.9981	0.00190	4.80	1.0057	0.00190	4.70	1.0098	0.00210
4.95	1.0051	0.00220	4.85	1.0131	0.00200	4.75	1.0145	0.00280
5.00	1.0112	0.00230	4.90	1.0117	0.00210	4.80	1.0205	0.00210
5.05	1.0149	0.00200						
5.10	1.0187	0.00220						

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
3.90	0.9208	0.00190	3.70	0.9036	0.00230	3.50	0.9101	0.00220
3.95	0.9246	0.00200	3.75	0.9150	0.00260	3.55	0.9198	0.00210
4.00	0.9291	0.00210	3.80	0.9245	0.00250	3.60	0.9294	0.00250
4.05	0.9372	0.00210	3.85	0.9302	0.00200	3.65	0.9360	0.00180
4.10	0.9423	0.00230	3.90	0.9376	0.00200	3.70	0.9435	0.00200
4.15	0.9510	0.00200	3.95	0.9425	0.00220	3.75	0.9514	0.00240
4.20	0.9611	0.00200	4.00	0.9564	0.00280	3.80	0.9606	0.00230
4.25	0.9661	0.00220	4.05	0.9645	0.00200	3.85	0.9638	0.00200
4.30	0.9693	0.00220	4.10	0.9647	0.00190	3.90	0.9747	0.00210
4.35	0.9778	0.00200	4.15	0.9782	0.00200	3.95	0.9837	0.00200
4.40	0.9855	0.00200	4.20	0.9828	0.00210	4.00	0.9886	0.00220
4.45	0.9919	0.00250	4.25	0.9894	0.00240	4.05	0.9970	0.00200
4.50	0.9991	0.00230	4.30	0.9944	0.00200	4.10	1.0030	0.00230
4.55	1.0047	0.00230	4.35	1.0076	0.00190	4.15	1.0102	0.00210
4.60	1.0115	0.00230	4.40	1.0110	0.00190	4.20	1.0188	0.00220
4.65	1.0184	0.00210	4.45	1.0187	0.00190			
4.70	1.0224	0.00190	4.50	1.0235	0.00220			

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
3.30	0.9096	0.00200	3.20	0.9065	0.00230	3.20	0.9211	0.00270
3.35	0.9186	0.00320	3.25	0.9174	0.00260	3.25	0.9265	0.00230
3.40	0.9279	0.00280	3.30	0.9229	0.00240	3.30	0.9367	0.00220
3.45	0.9370	0.00230	3.35	0.9358	0.00280	3.35	0.9474	0.00200
3.50	0.9446	0.00220	3.40	0.9417	0.00240	3.40	0.9544	0.00230
3.55	0.9548	0.00200	3.45	0.9552	0.00230	3.45	0.9641	0.00240
3.60	0.9620	0.00220	3.50	0.9630	0.00250	3.50	0.9708	0.00230
3.65	0.9663	0.00200	3.55	0.9699	0.00230	3.55	0.9808	0.00240
3.70	0.9798	0.00270	3.60	0.9760	0.00220	3.60	0.9893	0.00260
3.75	0.9880	0.00230	3.65	0.9845	0.00220	3.65	0.9967	0.00210
3.80	0.9953	0.00210	3.70	0.9944	0.00270	3.70	1.0085	0.00270
3.85	1.0021	0.00200	3.75	1.0015	0.00230	3.75	1.0157	0.00200
3.90	1.0082	0.00210	3.80	1.0104	0.00210	3.80	1.0173	0.00190
3.95	1.0204	0.00230	3.85	1.0178	0.00210			
4.00	1.0219	0.00220	3.90	1.0263	0.00200			

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
3.10	0.9140	0.00200	2.90	0.9087	0.00230	2.90	0.9227	0.00250
3.15	0.9181	0.00230	2.95	0.9176	0.00230	2.95	0.9314	0.00200
3.20	0.9323	0.00210	3.00	0.9269	0.00220	3.00	0.9425	0.00230
3.25	0.9406	0.00220	3.05	0.9373	0.00210	3.05	0.9557	0.00310
3.30	0.9515	0.00230	3.10	0.9521	0.00230	3.10	0.9599	0.00220
3.35	0.9573	0.00220	3.15	0.9620	0.00230	3.15	0.9708	0.00240
3.40	0.9681	0.00230	3.20	0.9665	0.00250	3.20	0.9780	0.00290
3.45	0.9808	0.00250	3.25	0.9786	0.00220	3.25	0.9902	0.00210
3.50	0.9821	0.00230	3.30	0.9850	0.00260	3.30	0.9983	0.00240
3.55	0.9963	0.00270	3.35	0.9930	0.00220	3.35	1.0090	0.00260
3.60	1.0022	0.00250	3.40	1.0065	0.00240	3.40	1.0123	0.00240
3.65	1.0095	0.00260	3.45	1.0084	0.00250	3.45	1.0204	0.00270
3.70	1.0192	0.00220	3.50	1.0160	0.00220	3.50	1.0327	0.00240

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.80	0.9136	0.00240	2.80	0.9209	0.00230	2.70	0.9125	0.00210
2.85	0.9235	0.00210	2.85	0.9337	0.00220	2.75	0.9146	0.00210
2.90	0.9337	0.00200	2.90	0.9384	0.00180	2.80	0.9327	0.00200
2.95	0.9455	0.00220	2.95	0.9459	0.00210	2.85	0.9392	0.00230
3.00	0.9522	0.00320	3.00	0.9550	0.00210	2.90	0.9467	0.00210
3.05	0.9648	0.00260	3.05	0.9640	0.00200	2.95	0.9566	0.00190
3.10	0.9689	0.00210	3.10	0.9735	0.00220	3.00	0.9641	0.00210
3.15	0.9814	0.00220	3.15	0.9829	0.00210	3.05	0.9704	0.00220
3.20	0.9907	0.00240	3.20	0.9916	0.00210	3.10	0.9810	0.00230
3.25	0.9973	0.00200	3.25	0.9974	0.00230	3.15	0.9865	0.00210
3.30	1.0063	0.00220	3.30	1.0098	0.00250	3.20	1.0002	0.00200
3.35	1.0136	0.00220	3.35	1.0142	0.00250	3.25	1.0051	0.00210
3.40	1.0271	0.00230	3.40	1.0254	0.00210	3.30	1.0167	0.00240
						3.35	1.0218	0.00210
						3.40	1.0298	0.00270

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.70	0.9072	0.00240	2.70	0.9183	0.00210	2.70	0.9194	0.00250
2.75	0.9226	0.00200	2.75	0.9222	0.00190	2.75	0.9228	0.00220
2.80	0.9310	0.00260	2.80	0.9321	0.00220	2.80	0.9332	0.00240
2.85	0.9419	0.00250	2.85	0.9433	0.00200	2.85	0.9476	0.00220
2.90	0.9469	0.00200	2.90	0.9510	0.00230	2.90	0.9514	0.00210
2.95	0.9593	0.00260	2.95	0.9584	0.00240	2.95	0.9577	0.00230
3.00	0.9652	0.00210	3.00	0.9674	0.00230	3.00	0.9725	0.00200
3.05	0.9737	0.00220	3.05	0.9790	0.00220	3.05	0.9801	0.00220
3.10	0.9782	0.00220	3.10	0.9809	0.00200	3.10	0.9877	0.00190
3.15	0.9932	0.00210	3.15	0.9941	0.00190	3.15	0.9926	0.00220
3.20	1.0001	0.00230	3.20	0.9979	0.00190	3.20	1.0021	0.00230
3.25	1.0044	0.00240	3.25	1.0085	0.00240	3.25	1.0099	0.00210
3.30	1.0108	0.00250	3.30	1.0194	0.00220	3.30	1.0186	0.00210
3.35	1.0217	0.00230	3.35	1.0227	0.00190			
3.40	1.0313	0.00210	3.40	1.0318	0.00230			

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.70	0.9229	0.00190	2.70	0.9239	0.00210	2.60	0.9203	0.00230
2.75	0.9252	0.00220	2.75	0.9344	0.00220	2.65	0.9261	0.00210
2.80	0.9404	0.00250	2.80	0.9443	0.00200	2.70	0.9388	0.00220
2.85	0.9439	0.00210	2.85	0.9555	0.00210	2.75	0.9439	0.00220
2.90	0.9537	0.00190	2.90	0.9647	0.00210	2.80	0.9496	0.00200
2.95	0.9607	0.00200	2.95	0.9723	0.00200	2.85	0.9598	0.00200
3.00	0.9729	0.00280	3.00	0.9785	0.00230	2.90	0.9705	0.00220
3.05	0.9799	0.00230	3.05	0.9879	0.00210	2.95	0.9808	0.00210
3.10	0.9857	0.00190	3.10	0.9913	0.00220	3.00	0.9876	0.00210
3.15	0.9951	0.00240	3.15	1.0051	0.00220	3.05	0.9967	0.00180
3.20	1.0041	0.00200	3.20	1.0087	0.00240	3.10	1.0022	0.00210
3.25	1.0147	0.00250	3.25	1.0188	0.00240	3.15	1.0101	0.00220
3.30	1.0218	0.00210	3.30	1.0228	0.00190	3.20	1.0198	0.00190

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.50	0.9193	0.00190	2.40	0.9249	0.00200	2.30	0.9250	0.00160
2.55	0.9291	0.00200	2.45	0.9330	0.00190	2.32	0.9291	0.00200
2.60	0.9408	0.00200	2.50	0.9460	0.00180	2.34	0.9349	0.00200
2.65	0.9467	0.00200	2.55	0.9512	0.00200	2.36	0.9390	0.00190
2.70	0.9590	0.00190	2.60	0.9590	0.00220	2.38	0.9430	0.00240
2.75	0.9629	0.00190	2.65	0.9714	0.00200	2.40	0.9461	0.00190
2.80	0.9749	0.00190	2.70	0.9784	0.00200	2.42	0.9494	0.00200
2.85	0.9825	0.00180	2.75	0.9894	0.00180	2.44	0.9552	0.00180
2.90	0.9920	0.00270	2.80	0.9960	0.00190	2.46	0.9592	0.00240
2.95	0.9989	0.00200	2.85	1.0076	0.00210	2.48	0.9604	0.00190
3.00	1.0113	0.00230	2.90	1.0155	0.00170	2.50	0.9646	0.00210
3.05	1.0165	0.00200	2.95	1.0220	0.00220	2.52	0.9722	0.00190
3.10	1.0250	0.00220	3.00	1.0340	0.00220	2.54	0.9723	0.00200
						2.56	0.9784	0.00220
						2.58	0.9799	0.00180
						2.60	0.9825	0.00180
						2.62	0.9851	0.00180
						2.64	0.9900	0.00190
						2.66	0.9943	0.00190
						2.68	0.9984	0.00190
						2.70	1.0064	0.00190
						2.72	1.0068	0.00190
						2.74	1.0081	0.00190
						2.76	1.0178	0.00180
						2.78	1.0179	0.00170
						2.80	1.0189	0.00200

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.10	0.9055	0.00180	2.10	0.9141	0.00170	2.00	0.9039	0.00180
2.15	0.9136	0.00190	2.15	0.9302	0.00230	2.05	0.9155	0.00190
2.20	0.9279	0.00230	2.20	0.9376	0.00180	2.10	0.9281	0.00190
2.25	0.9362	0.00200	2.25	0.9500	0.00180	2.15	0.9411	0.00200
2.30	0.9505	0.00220	2.30	0.9579	0.00170	2.20	0.9504	0.00190
2.35	0.9556	0.00200	2.35	0.9714	0.00180	2.25	0.9620	0.00190
2.40	0.9671	0.00190	2.40	0.9790	0.00180	2.30	0.9682	0.00200
2.45	0.9783	0.00200	2.45	0.9888	0.00200	2.35	0.9818	0.00190
2.50	0.9927	0.00180	2.50	1.0000	0.00180	2.40	0.9940	0.00210
2.55	0.9985	0.00190	2.55	1.0083	0.00180	2.45	1.0017	0.00180
2.60	1.0054	0.00210	2.60	1.0182	0.00220	2.50	1.0115	0.00190
2.65	1.0152	0.00190	2.65	1.0294	0.00190	2.55	1.0213	0.00190
2.70	1.0263	0.00180	2.70	1.0407	0.00180	2.60	1.0270	0.00200

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.00	0.9276	0.00200	1.90	0.9228	0.00210	1.50	0.9106	0.00190
2.02	0.9325	0.00210	1.92	0.9303	0.00200	1.52	0.9144	0.00160
2.04	0.9337	0.00200	1.94	0.9343	0.00190	1.54	0.9210	0.00230
2.06	0.9408	0.00180	1.96	0.9366	0.00160	1.56	0.9255	0.00170
2.08	0.9460	0.00230	1.98	0.9426	0.00210	1.58	0.9302	0.00170
2.10	0.9451	0.00190	2.00	0.9448	0.00180	1.60	0.9372	0.00200
2.12	0.9507	0.00190	2.02	0.9515	0.00180	1.62	0.9380	0.00240
2.14	0.9592	0.00190	2.04	0.9550	0.00210	1.64	0.9485	0.00190
2.16	0.9599	0.00220	2.06	0.9581	0.00160	1.66	0.9529	0.00160
2.18	0.9652	0.00170	2.08	0.9649	0.00230	1.68	0.9602	0.00240
2.20	0.9704	0.00200	2.10	0.9697	0.00190	1.70	0.9647	0.00180
2.22	0.9763	0.00180	2.12	0.9732	0.00190	1.72	0.9725	0.00170
2.24	0.9792	0.00180	2.14	0.9761	0.00180	1.74	0.9755	0.00250
2.26	0.9816	0.00240	2.16	0.9817	0.00190	1.76	0.9803	0.00190
2.28	0.9886	0.00180	2.18	0.9887	0.00170	1.78	0.9875	0.00190
2.30	0.9912	0.00190	2.20	0.9907	0.00210	1.80	0.9913	0.00180
2.32	0.9954	0.00180	2.22	0.9964	0.00180	1.82	0.9967	0.00190
2.34	0.9983	0.00190	2.24	1.0020	0.00190	1.84	1.0019	0.00180
2.36	1.0033	0.00200	2.26	1.0027	0.00200	1.86	1.0089	0.00220
2.38	1.0053	0.00180	2.28	1.0124	0.00190	1.88	1.0149	0.00220
2.40	1.0158	0.00190	2.30	1.0121	0.00200	1.90	1.0211	0.00190
2.42	1.0172	0.00200	2.32	1.0176	0.00190	1.92	1.0245	0.00190
2.44	1.0219	0.00190	2.34	1.0203	0.00220	1.94	1.0253	0.00170
2.46	1.0253	0.00170	2.36	1.0264	0.00220	1.96	1.0305	0.00190
2.48	1.0305	0.00230	2.38	1.0328	0.00190	1.98	1.0370	0.00200
2.50	1.0336	0.00190	2.40	1.0320	0.00190	2.00	1.0453	0.00170

18900 milli-g/cc		
Height (Inches)	K _{eff}	Sigma
1.30	0.9084	0.00160
1.32	0.9166	0.00170
1.34	0.9234	0.00170
1.36	0.9296	0.00160
1.38	0.9383	0.00170
1.40	0.9408	0.00180
1.42	0.9473	0.00200
1.44	0.9548	0.00170
1.46	0.9634	0.00170
1.48	0.9683	0.00160
1.50	0.9740	0.00210
1.52	0.9819	0.00210
1.54	0.9900	0.00170
1.56	0.9955	0.00190
1.58	0.9995	0.00200
1.60	1.0029	0.00230
1.62	1.0123	0.00170
1.64	1.0158	0.00210
1.66	1.0234	0.00200
1.68	1.0251	0.00180
1.70	1.0327	0.00210

Case ID: U_slab_100_10ref

Material: Uranium metal in water

Geometry: Infinite plane

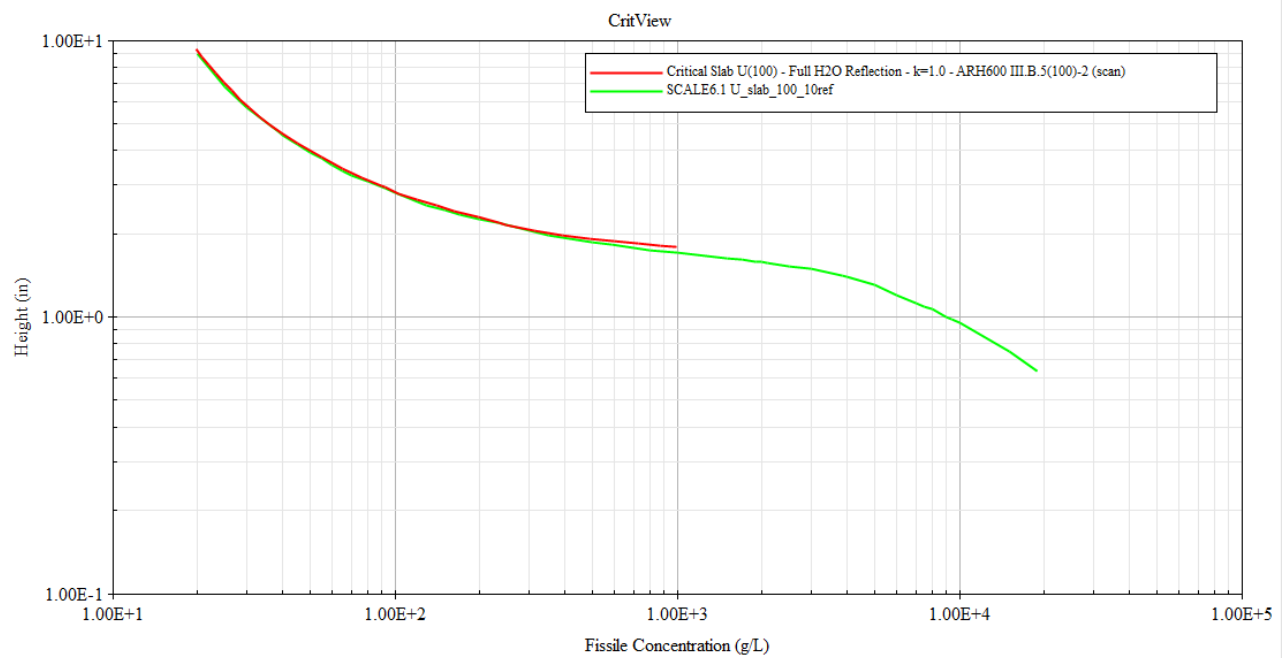
Isotopics: 100% ^{235}U

Reflector: 10" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Slab (100% ²³⁵ U)- 10 Inches of Water Reflection				
Concentration (g/cc)	First Height (Inches)	Last Height (Inches)	Delta (Inches)	Critical Height (Inches)
0.020	7.000	9.400	0.100	8.9541
0.025	5.500	7.100	0.050	6.8085
0.030	4.700	5.900	0.050	5.6875
0.040	3.800	4.800	0.050	4.5380
0.045	3.500	4.400	0.050	4.1848
0.050	3.300	4.100	0.050	3.9264
0.055	3.100	3.900	0.050	3.7302
0.060	3.000	3.700	0.050	3.5313
0.065	2.800	3.600	0.050	3.3778
0.070	2.700	3.500	0.050	3.2519
0.080	2.600	3.300	0.050	3.1073
0.100	2.300	3.000	0.050	2.8084
0.130	2.100	2.700	0.050	2.5393
0.150	2.000	2.600	0.050	2.4362
0.170	1.900	2.500	0.050	2.3383
0.200	1.800	2.400	0.050	2.2596
0.350	1.600	2.100	0.020	1.9706
0.500	1.500	2.000	0.020	1.8566
0.800	1.400	1.900	0.020	1.7463
1.000	1.300	1.900	0.050	1.7089
1.500	1.200	1.800	0.050	1.6232
1.700	1.300	1.800	0.020	1.6089
1.900	1.200	1.800	0.050	1.5844
2.000	1.200	1.800	0.050	1.5786
2.100	1.200	1.700	0.020	1.5633
2.500	1.100	1.700	0.050	1.5217
3.000	1.100	1.700	0.050	1.4890
4.000	1.000	1.600	0.050	1.3935
5.000	0.900	1.500	0.050	1.3113
6.000	0.900	1.400	0.020	1.2031
7.000	0.800	1.300	0.020	1.1218
7.500	0.800	1.300	0.020	1.0930
8.000	0.800	1.200	0.020	1.0674
9.000	0.700	1.200	0.020	0.9992
10.000	0.700	1.100	0.020	0.9525
15.000	0.500	0.900	0.020	0.7474
18.900	0.400	0.700	0.020	0.6389

WORM and SCALE Input File

```

'Worm generated by Natalie 6/28/21
'In this case, Diameter is thickness of slab
'Recreating data from PRC-NS-00009 B-756 (pdf pg774)
,
#index number = <index = 1:37:1>
,
#Concentration = <@conc =
0.02,0.025,0.03,0.04,0.045,0.05,0.055,0.06,0.065,0.07,0.08,0.1,0.13,0.15,0.17,0.2,0.35,0.5,0.8,1,
1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
'Critical Density = <critdens = 18.9 > g/cc
'Concentration = <critconc = conc[index]\n> g/cc
'Water Concentration = <wconc = 1-(critconc/critdens)>
,
#Starting Diameter = <@startdia =
7,5.5,4.7,3.8,3.5,3.3,3.1,3,2.8,2.7,2.6,2.3,2.1,2,1.9,1.8,1.6,1.5,1.4,1.3,1.2,1.3,1.2,1.2,1.2,1.1
,1.1,1,0.9,0.8,0.8,0.8,0.7,0.7,0.5,0.4> in
#Ending Diameter = <@enddia =
9.4,7.1,5.9,4.8,4.4,4.1,3.9,3.7,3.6,3.5,3.3,3,2.7,2.6,2.5,2.4,2.1,2,1.9,1.9,1.8,1.8,1.8,1.8,1.7,1
.7,1.7,1.6,1.5,1.4,1.3,1.3,1.2,1.2,1.1,0.9,0.7> in
#Delta = <@delta =
0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02,0.02,0.02,0.0
5,0.05,0.02,0.05,0.05,0.02,0.05,0.05,0.05,0.05,0.02,0.02,0.02,0.02,0.02,0.02,0.02> in
,
'Reflector Thickness {{refthick = 10}}
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
template
v7-238
read composition
  u          1 den=<critconc> 1 300
                                92235 100    end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300    end
  h2o        2 1 300    end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Slab"
  cuboid 1      {{(diameter*in)/2}}      {{(-1*diameter*in)/2}}      10      -10      10      -10
  cuboid 2      {{(refdia*in)/2}}      {{(-1*refdia*in)/2}}      10      -10      10      -10
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
read bnds
  body=2
  surface(1)=vacuum
  surface(2)=vacuum
  surface(3)=mirror
  surface(4)=mirror
  surface(5)=mirror
  surface(6)=mirror
end bnds
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
  return '\';
}

```

```
}  
}  
</perl>
```


CritView compatible data file

```
reset:
title: Critical Slab; U; 10" Water Reflector; 100% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: infplane
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 1.0
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: height in
0.020 8.9541
0.025 6.8085
0.030 5.6875
0.040 4.5380
0.045 4.1848
0.050 3.9264
0.055 3.7302
0.060 3.5313
0.065 3.3778
0.070 3.2519
0.080 3.1073
0.100 2.8084
0.130 2.5393
0.150 2.4362
0.170 2.3383
0.200 2.2596
0.350 1.9706
0.500 1.8566
0.800 1.7463
1.000 1.7089
1.500 1.6232
1.700 1.6089
1.900 1.5844
2.000 1.5786
2.100 1.5633
2.500 1.5217
3.000 1.4890
4.000 1.3935
5.000 1.3113
6.000 1.2031
7.000 1.1218
7.500 1.0930
8.000 1.0674
9.000 0.9992
10.000 0.9525
15.000 0.7474
18.900 0.6389
```

20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
7.00	0.9259	0.00120	5.50	0.9243	0.00150	4.70	0.9241	0.00160
7.10	0.9298	0.00130	5.55	0.9235	0.00140	4.75	0.9324	0.00150
7.20	0.9350	0.00140	5.60	0.9306	0.00170	4.80	0.9330	0.00150
7.30	0.9385	0.00160	5.65	0.9307	0.00180	4.85	0.9366	0.00180
7.40	0.9416	0.00190	5.70	0.9380	0.00150	4.90	0.9396	0.00200
7.50	0.9463	0.00120	5.75	0.9411	0.00140	4.95	0.9460	0.00200
7.60	0.9496	0.00140	5.80	0.9466	0.00150	5.00	0.9493	0.00160
7.70	0.9559	0.00140	5.85	0.9481	0.00150	5.05	0.9557	0.00150
7.80	0.9596	0.00130	5.90	0.9526	0.00140	5.10	0.9576	0.00150
7.90	0.9629	0.00130	5.95	0.9540	0.00150	5.15	0.9615	0.00190
8.00	0.9681	0.00130	6.00	0.9564	0.00160	5.20	0.9657	0.00180
8.10	0.9710	0.00150	6.05	0.9557	0.00130	5.25	0.9702	0.00170
8.20	0.9748	0.00150	6.10	0.9615	0.00160	5.30	0.9728	0.00160
8.30	0.9769	0.00170	6.15	0.9655	0.00140	5.35	0.9777	0.00140
8.40	0.9816	0.00130	6.20	0.9683	0.00160	5.40	0.9793	0.00150
8.50	0.9857	0.00140	6.25	0.9718	0.00160	5.45	0.9841	0.00170
8.60	0.9881	0.00160	6.30	0.9712	0.00140	5.50	0.9864	0.00190
8.70	0.9932	0.00120	6.35	0.9760	0.00160	5.55	0.9925	0.00150
8.80	0.9935	0.00140	6.40	0.9780	0.00140	5.60	0.9945	0.00160
8.90	0.9980	0.00130	6.45	0.9824	0.00140	5.65	0.9973	0.00160
9.00	1.0017	0.00120	6.50	0.9855	0.00140	5.70	1.0009	0.00140
9.10	1.0032	0.00140	6.55	0.9871	0.00140	5.75	1.0057	0.00160
9.20	1.0089	0.00120	6.60	0.9905	0.00130	5.80	1.0062	0.00180
9.30	1.0119	0.00140	6.65	0.9930	0.00180	5.85	1.0129	0.00150
9.40	1.0139	0.00160	6.70	0.9977	0.00150	5.90	1.0158	0.00150
			6.75	0.9982	0.00130			
			6.80	0.9991	0.00160			
			6.85	1.0044	0.00130			
			6.90	1.0067	0.00130			
			6.95	1.0084	0.00140			
			7.00	1.0134	0.00150			
			7.05	1.0127	0.00160			
			7.10	1.0165	0.00130			

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
3.80	0.9253	0.00160	3.50	0.9199	0.00170	3.30	0.9233	0.00170
3.85	0.9265	0.00170	3.55	0.9310	0.00170	3.35	0.9294	0.00170
3.90	0.9365	0.00160	3.60	0.9348	0.00150	3.40	0.9369	0.00150
3.95	0.9429	0.00190	3.65	0.9381	0.00160	3.45	0.9452	0.00170
4.00	0.9451	0.00210	3.70	0.9447	0.00150	3.50	0.9485	0.00150
4.05	0.9521	0.00170	3.75	0.9485	0.00190	3.55	0.9548	0.00230
4.10	0.9587	0.00170	3.80	0.9588	0.00170	3.60	0.9572	0.00160
4.15	0.9602	0.00180	3.85	0.9614	0.00170	3.65	0.9651	0.00230
4.20	0.9652	0.00210	3.90	0.9687	0.00190	3.70	0.9743	0.00170
4.25	0.9738	0.00190	3.95	0.9746	0.00210	3.75	0.9805	0.00170
4.30	0.9763	0.00210	4.00	0.9791	0.00190	3.80	0.9851	0.00170
4.35	0.9817	0.00160	4.05	0.9867	0.00180	3.85	0.9901	0.00170
4.40	0.9846	0.00180	4.10	0.9879	0.00180	3.90	0.9972	0.00170
4.45	0.9923	0.00170	4.15	0.9952	0.00170	3.95	1.0025	0.00220
4.50	0.9940	0.00170	4.20	1.0021	0.00180	4.00	1.0068	0.00200
4.55	1.0019	0.00150	4.25	1.0055	0.00160	4.05	1.0103	0.00160
4.60	1.0069	0.00190	4.30	1.0099	0.00190	4.10	1.0184	0.00170
4.65	1.0103	0.00180	4.35	1.0138	0.00160			
4.70	1.0139	0.00160	4.40	1.0228	0.00170			
4.75	1.0203	0.00190						
4.80	1.0257	0.00170						

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
3.10	0.9212	0.00240	3.00	0.9269	0.00220	2.80	0.9145	0.00170
3.15	0.9269	0.00180	3.05	0.9333	0.00190	2.85	0.9223	0.00200
3.20	0.9339	0.00180	3.10	0.9404	0.00220	2.90	0.9309	0.00180
3.25	0.9408	0.00180	3.15	0.9481	0.00190	2.95	0.9377	0.00190
3.30	0.9488	0.00170	3.20	0.9529	0.00170	3.00	0.9431	0.00240
3.35	0.9515	0.00240	3.25	0.9610	0.00220	3.05	0.9509	0.00170
3.40	0.9643	0.00180	3.30	0.9693	0.00170	3.10	0.9603	0.00170
3.45	0.9644	0.00180	3.35	0.9745	0.00180	3.15	0.9675	0.00210
3.50	0.9726	0.00170	3.40	0.9813	0.00200	3.20	0.9732	0.00170
3.55	0.9771	0.00170	3.45	0.9899	0.00160	3.25	0.9795	0.00170
3.60	0.9868	0.00220	3.50	0.9985	0.00220	3.30	0.9858	0.00180
3.65	0.9907	0.00210	3.55	1.0009	0.00190	3.35	0.9950	0.00180
3.70	0.9945	0.00230	3.60	1.0047	0.00160	3.40	1.0040	0.00230
3.75	1.0036	0.00200	3.65	1.0159	0.00190	3.45	1.0074	0.00200
3.80	1.0098	0.00170	3.70	1.0185	0.00170	3.50	1.0120	0.00190
3.85	1.0158	0.00170				3.55	1.0192	0.00190
3.90	1.0216	0.00190				3.60	1.0278	0.00170

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.70	0.9142	0.00230	2.60	0.9256	0.00190	2.30	0.9149	0.00200
2.75	0.9205	0.00200	2.65	0.9349	0.00200	2.35	0.9249	0.00200
2.80	0.9285	0.00180	2.70	0.9471	0.00200	2.40	0.9349	0.00270
2.85	0.9383	0.00220	2.75	0.9506	0.00210	2.45	0.9402	0.00210
2.90	0.9475	0.00200	2.80	0.9574	0.00170	2.50	0.9494	0.00200
2.95	0.9541	0.00190	2.85	0.9634	0.00230	2.55	0.9580	0.00190
3.00	0.9608	0.00160	2.90	0.9743	0.00220	2.60	0.9644	0.00210
3.05	0.9687	0.00200	2.95	0.9830	0.00180	2.65	0.9772	0.00210
3.10	0.9760	0.00190	3.00	0.9896	0.00190	2.70	0.9812	0.00210
3.15	0.9805	0.00200	3.05	0.9981	0.00180	2.75	0.9939	0.00180
3.20	0.9870	0.00220	3.10	0.9984	0.00210	2.80	0.9984	0.00200
3.25	0.9998	0.00190	3.15	1.0094	0.00170	2.85	1.0079	0.00200
3.30	1.0052	0.00200	3.20	1.0140	0.00210	2.90	1.0128	0.00190
3.35	1.0121	0.00190	3.25	1.0247	0.00200	2.95	1.0227	0.00200
3.40	1.0138	0.00210	3.30	1.0299	0.00220	3.00	1.0292	0.00200
3.45	1.0216	0.00210						
3.50	1.0287	0.00180						

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.10	0.9199	0.00190	2.00	0.9255	0.00190	1.90	0.9184	0.00220
2.15	0.9276	0.00210	2.05	0.9317	0.00210	1.95	0.9270	0.00190
2.20	0.9400	0.00200	2.10	0.9402	0.00190	2.00	0.9379	0.00180
2.25	0.9450	0.00180	2.15	0.9498	0.00210	2.05	0.9450	0.00190
2.30	0.9524	0.00200	2.20	0.9592	0.00210	2.10	0.9591	0.00210
2.35	0.9668	0.00220	2.25	0.9675	0.00200	2.15	0.9656	0.00200
2.40	0.9791	0.00180	2.30	0.9797	0.00220	2.20	0.9749	0.00180
2.45	0.9804	0.00200	2.35	0.9861	0.00190	2.25	0.9822	0.00210
2.50	0.9930	0.00200	2.40	0.9921	0.00230	2.30	0.9905	0.00200
2.55	1.0019	0.00210	2.45	1.0030	0.00200	2.35	1.0029	0.00280
2.60	1.0071	0.00190	2.50	1.0104	0.00230	2.40	1.0091	0.00210
2.65	1.0182	0.00190	2.55	1.0183	0.00240	2.45	1.0179	0.00210
2.70	1.0256	0.00210	2.60	1.0292	0.00210	2.50	1.0283	0.00210

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
1.80	0.9159	0.00290	1.60	0.9289	0.00230	1.50	0.9262	0.00200
1.85	0.9268	0.00230	1.62	0.9290	0.00220	1.52	0.9349	0.00210
1.90	0.9341	0.00200	1.64	0.9342	0.00250	1.54	0.9356	0.00200
1.95	0.9433	0.00210	1.66	0.9365	0.00220	1.56	0.9394	0.00220
2.00	0.9552	0.00190	1.68	0.9451	0.00240	1.58	0.9489	0.00270
2.05	0.9629	0.00190	1.70	0.9440	0.00210	1.60	0.9490	0.00200
2.10	0.9749	0.00220	1.72	0.9499	0.00220	1.62	0.9536	0.00250
2.15	0.9848	0.00230	1.74	0.9565	0.00200	1.64	0.9582	0.00230
2.20	0.9910	0.00230	1.76	0.9638	0.00200	1.66	0.9611	0.00200
2.25	0.9974	0.00230	1.78	0.9643	0.00200	1.68	0.9638	0.00220
2.30	1.0109	0.00220	1.80	0.9672	0.00210	1.70	0.9717	0.00220
2.35	1.0175	0.00240	1.82	0.9709	0.00200	1.72	0.9747	0.00230
2.40	1.0269	0.00210	1.84	0.9735	0.00220	1.74	0.9796	0.00220
			1.86	0.9751	0.00220	1.76	0.9823	0.00260
			1.88	0.9831	0.00230	1.78	0.9844	0.00220
			1.90	0.9851	0.00220	1.80	0.9892	0.00230
			1.92	0.9919	0.00210	1.82	0.9909	0.00200
			1.94	0.9930	0.00230	1.84	0.9912	0.00200
			1.96	0.9950	0.00200	1.86	1.0018	0.00230
			1.98	1.0044	0.00190	1.88	1.0044	0.00220
			2.00	1.0025	0.00200	1.90	1.0067	0.00250
			2.02	1.0062	0.00210	1.92	1.0103	0.00220
			2.04	1.0117	0.00200	1.94	1.0136	0.00320
			2.06	1.0197	0.00200	1.96	1.0187	0.00230
			2.08	1.0204	0.00180	1.98	1.0211	0.00190
			2.10	1.0218	0.00250	2.00	1.0233	0.00210

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
1.40	0.9287	0.00220	1.30	0.9201	0.00210	1.20	0.9159	0.00260
1.42	0.9363	0.00220	1.35	0.9338	0.00200	1.25	0.9276	0.00210
1.44	0.9399	0.00260	1.40	0.9464	0.00210	1.30	0.9375	0.00180
1.46	0.9485	0.00200	1.45	0.9531	0.00210	1.35	0.9496	0.00190
1.48	0.9475	0.00220	1.50	0.9584	0.00220	1.40	0.9536	0.00170
1.50	0.9522	0.00240	1.55	0.9712	0.00220	1.45	0.9695	0.00230
1.52	0.9561	0.00240	1.60	0.9798	0.00230	1.50	0.9753	0.00200
1.54	0.9599	0.00270	1.65	0.9878	0.00240	1.55	0.9862	0.00220
1.56	0.9647	0.00210	1.70	0.9982	0.00210	1.60	0.9956	0.00190
1.58	0.9717	0.00220	1.75	1.0083	0.00200	1.65	1.0051	0.00240
1.60	0.9734	0.00270	1.80	1.0164	0.00230	1.70	1.0109	0.00210
1.62	0.9788	0.00220	1.85	1.0232	0.00250	1.75	1.0209	0.00210
1.64	0.9786	0.00210	1.90	1.0361	0.00200	1.80	1.0274	0.00200
1.66	0.9846	0.00190						
1.68	0.9874	0.00200						
1.70	0.9931	0.00230						
1.72	0.9940	0.00210						
1.74	0.9979	0.00320						
1.76	1.0046	0.00210						
1.78	1.0041	0.00290						
1.80	1.0116	0.00240						
1.82	1.0155	0.00230						
1.84	1.0131	0.00220						
1.86	1.0196	0.00220						
1.88	1.0186	0.00220						
1.90	1.0282	0.00210						

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
1.30	0.9431	0.00260	1.20	0.9277	0.00230	1.20	0.9314	0.00200
1.32	0.9416	0.00200	1.25	0.9385	0.00200	1.25	0.9395	0.00210
1.34	0.9511	0.00180	1.30	0.9485	0.00210	1.30	0.9492	0.00190
1.36	0.9540	0.00220	1.35	0.9590	0.00200	1.35	0.9608	0.00190
1.38	0.9591	0.00240	1.40	0.9650	0.00240	1.40	0.9663	0.00210
1.40	0.9605	0.00210	1.45	0.9732	0.00240	1.45	0.9776	0.00220
1.42	0.9618	0.00210	1.50	0.9828	0.00200	1.50	0.9875	0.00210
1.44	0.9659	0.00200	1.55	0.9956	0.00200	1.55	0.9945	0.00220
1.46	0.9727	0.00230	1.60	1.0020	0.00220	1.60	1.0041	0.00200
1.48	0.9760	0.00230	1.65	1.0095	0.00200	1.65	1.0147	0.00180
1.50	0.9795	0.00200	1.70	1.0246	0.00220	1.70	1.0218	0.00220
1.52	0.9845	0.00190	1.75	1.0306	0.00210	1.75	1.0317	0.00200
1.54	0.9859	0.00260	1.80	1.0344	0.00210	1.80	1.0378	0.00250
1.56	0.9920	0.00180						
1.58	0.9943	0.00190						
1.60	0.9975	0.00210						
1.62	1.0031	0.00220						
1.64	1.0064	0.00190						
1.66	1.0131	0.00190						
1.68	1.0101	0.00240						
1.70	1.0180	0.00210						
1.72	1.0183	0.00220						
1.74	1.0240	0.00200						
1.76	1.0273	0.00200						
1.78	1.0294	0.00200						
1.80	1.0316	0.00200						

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
1.20	0.9341	0.00180	1.10	0.9175	0.00190	1.10	0.9285	0.00240
1.22	0.9349	0.00180	1.15	0.9317	0.00220	1.15	0.9368	0.00180
1.24	0.9369	0.00210	1.20	0.9421	0.00190	1.20	0.9486	0.00200
1.26	0.9413	0.00210	1.25	0.9473	0.00200	1.25	0.9575	0.00230
1.28	0.9483	0.00200	1.30	0.9586	0.00190	1.30	0.9722	0.00220
1.30	0.9511	0.00230	1.35	0.9678	0.00200	1.35	0.9759	0.00170
1.32	0.9568	0.00190	1.40	0.9779	0.00210	1.40	0.9897	0.00220
1.34	0.9610	0.00200	1.45	0.9886	0.00230	1.45	0.9947	0.00210
1.36	0.9675	0.00230	1.50	0.9954	0.00240	1.50	1.0015	0.00190
1.38	0.9670	0.00220	1.55	1.0060	0.00210	1.55	1.0106	0.00180
1.40	0.9706	0.00210	1.60	1.0141	0.00180	1.60	1.0231	0.00230
1.42	0.9746	0.00210	1.65	1.0197	0.00240	1.65	1.0322	0.00200
1.44	0.9787	0.00190	1.70	1.0297	0.00210	1.70	1.0374	0.00180
1.46	0.9831	0.00280						
1.48	0.9844	0.00190						
1.50	0.9915	0.00200						
1.52	0.9913	0.00200						
1.54	0.9962	0.00200						
1.56	0.9996	0.00220						
1.58	1.0020	0.00190						
1.60	1.0018	0.00220						
1.62	1.0102	0.00190						
1.64	1.0136	0.00220						
1.66	1.0210	0.00210						
1.68	1.0205	0.00250						
1.70	1.0255	0.00200						

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
1.00	0.9257	0.00180	0.90	0.9179	0.00180	0.90	0.9325	0.00200
1.05	0.9382	0.00220	0.95	0.9282	0.00200	0.92	0.9345	0.00190
1.10	0.9424	0.00200	1.00	0.9425	0.00190	0.94	0.9420	0.00230
1.15	0.9533	0.00200	1.05	0.9494	0.00180	0.96	0.9509	0.00210
1.20	0.9637	0.00210	1.10	0.9592	0.00200	0.98	0.9501	0.00180
1.25	0.9777	0.00190	1.15	0.9711	0.00220	1.00	0.9557	0.00230
1.30	0.9870	0.00180	1.20	0.9804	0.00170	1.02	0.9570	0.00220
1.35	0.9940	0.00250	1.25	0.9910	0.00200	1.04	0.9648	0.00190
1.40	1.0009	0.00210	1.30	0.9966	0.00190	1.06	0.9676	0.00180
1.45	1.0107	0.00210	1.35	1.0116	0.00190	1.08	0.9755	0.00210
1.50	1.0200	0.00180	1.40	1.0202	0.00220	1.10	0.9791	0.00180
1.55	1.0338	0.00230	1.45	1.0264	0.00180	1.12	0.9812	0.00190
1.60	1.0385	0.00170	1.50	1.0374	0.00190	1.14	0.9816	0.00180
						1.16	0.9904	0.00250
						1.18	0.9918	0.00180
						1.20	0.9996	0.00220
						1.22	1.0022	0.00200
						1.24	1.0066	0.00180
						1.26	1.0109	0.00180
						1.28	1.0109	0.00220
						1.30	1.0161	0.00200
						1.32	1.0193	0.00220
						1.34	1.0235	0.00230
						1.36	1.0317	0.00190
						1.38	1.0311	0.00220
						1.40	1.0350	0.00190

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
0.80	0.9243	0.00160	0.80	0.9281	0.00180	0.80	0.9348	0.00170
0.82	0.9267	0.00210	0.82	0.9347	0.00200	0.82	0.9418	0.00210
0.84	0.9274	0.00180	0.84	0.9343	0.00240	0.84	0.9488	0.00220
0.86	0.9350	0.00200	0.86	0.9416	0.00190	0.86	0.9477	0.00180
0.88	0.9398	0.00200	0.88	0.9512	0.00210	0.88	0.9529	0.00190
0.90	0.9459	0.00240	0.90	0.9562	0.00190	0.90	0.9593	0.00220
0.92	0.9540	0.00180	0.92	0.9568	0.00170	0.92	0.9640	0.00210
0.94	0.9544	0.00190	0.94	0.9598	0.00250	0.94	0.9710	0.00260
0.96	0.9581	0.00200	0.96	0.9683	0.00200	0.96	0.9700	0.00160
0.98	0.9654	0.00230	0.98	0.9698	0.00180	0.98	0.9791	0.00210
1.00	0.9652	0.00190	1.00	0.9763	0.00200	1.00	0.9844	0.00230
1.02	0.9714	0.00200	1.02	0.9802	0.00220	1.02	0.9909	0.00210
1.04	0.9777	0.00180	1.04	0.9862	0.00190	1.04	0.9911	0.00180
1.06	0.9815	0.00190	1.06	0.9893	0.00190	1.06	0.9987	0.00180
1.08	0.9859	0.00190	1.08	0.9959	0.00200	1.08	1.0022	0.00210
1.10	0.9879	0.00210	1.10	1.0022	0.00180	1.10	1.0044	0.00190
1.12	1.0002	0.00210	1.12	1.0044	0.00180	1.12	1.0087	0.00230
1.14	0.9980	0.00240	1.14	1.0114	0.00200	1.14	1.0146	0.00170
1.16	1.0052	0.00210	1.16	1.0107	0.00190	1.16	1.0198	0.00180
1.18	1.0104	0.00190	1.18	1.0191	0.00210	1.18	1.0235	0.00220
1.20	1.0120	0.00200	1.20	1.0229	0.00210	1.20	1.0301	0.00240
1.22	1.0140	0.00240	1.22	1.0222	0.00190			
1.24	1.0226	0.00180	1.24	1.0260	0.00220			
1.26	1.0242	0.00190	1.26	1.0310	0.00210			
1.28	1.0336	0.00180	1.28	1.0342	0.00190			
1.30	1.0330	0.00210	1.30	1.0415	0.00200			

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
0.70	0.9226	0.00200	0.70	0.9318	0.00190	0.50	0.9144	0.00210
0.72	0.9202	0.00200	0.72	0.9412	0.00180	0.52	0.9234	0.00190
0.74	0.9318	0.00170	0.74	0.9430	0.00190	0.54	0.9318	0.00180
0.76	0.9373	0.00190	0.76	0.9475	0.00180	0.56	0.9392	0.00200
0.78	0.9407	0.00180	0.78	0.9545	0.00180	0.58	0.9459	0.00200
0.80	0.9478	0.00180	0.80	0.9615	0.00170	0.60	0.9558	0.00190
0.82	0.9525	0.00180	0.82	0.9642	0.00170	0.62	0.9587	0.00170
0.84	0.9591	0.00230	0.84	0.9691	0.00190	0.64	0.9682	0.00180
0.86	0.9647	0.00170	0.86	0.9768	0.00190	0.66	0.9734	0.00190
0.88	0.9692	0.00180	0.88	0.9815	0.00180	0.68	0.9797	0.00210
0.90	0.9763	0.00190	0.90	0.9856	0.00180	0.70	0.9867	0.00160
0.92	0.9767	0.00190	0.92	0.9951	0.00190	0.72	0.9937	0.00180
0.94	0.9842	0.00190	0.94	0.9970	0.00190	0.74	0.9967	0.00180
0.96	0.9858	0.00170	0.96	1.0018	0.00200	0.76	1.0056	0.00180
0.98	0.9952	0.00170	0.98	1.0071	0.00200	0.78	1.0126	0.00180
1.00	1.0002	0.00180	1.00	1.0100	0.00180	0.80	1.0177	0.00210
1.02	1.0042	0.00190	1.02	1.0171	0.00180	0.82	1.0213	0.00160
1.04	1.0050	0.00180	1.04	1.0172	0.00170	0.84	1.0302	0.00210
1.06	1.0081	0.00220	1.06	1.0242	0.00190	0.86	1.0355	0.00170
1.08	1.0155	0.00170	1.08	1.0322	0.00200	0.88	1.0403	0.00180
1.10	1.0205	0.00190	1.10	1.0366	0.00200	0.90	1.0450	0.00190
1.12	1.0240	0.00170						
1.14	1.0300	0.00190						
1.16	1.0346	0.00200						
1.18	1.0388	0.00180						
1.20	1.0442	0.00180						

18900 milli-g/cc		
Height (Inches)	K _{eff}	Sigma
0.40	0.9052	0.00190
0.42	0.9126	0.00180
0.44	0.9249	0.00170
0.46	0.9328	0.00170
0.48	0.9436	0.00170
0.50	0.9487	0.00180
0.52	0.9558	0.00210
0.54	0.9664	0.00190
0.56	0.9676	0.00180
0.58	0.9844	0.00170
0.60	0.9881	0.00170
0.62	0.9948	0.00180
0.64	1.0003	0.00180
0.66	1.0130	0.00180
0.68	1.0156	0.00160
0.70	1.0263	0.00180

U-slab-93.5 (Cases with 0", 1", 10" Reflector)

Case ID: U_slab_093.5_00ref

Material: Uranium metal in water

Geometry: Infinite plane

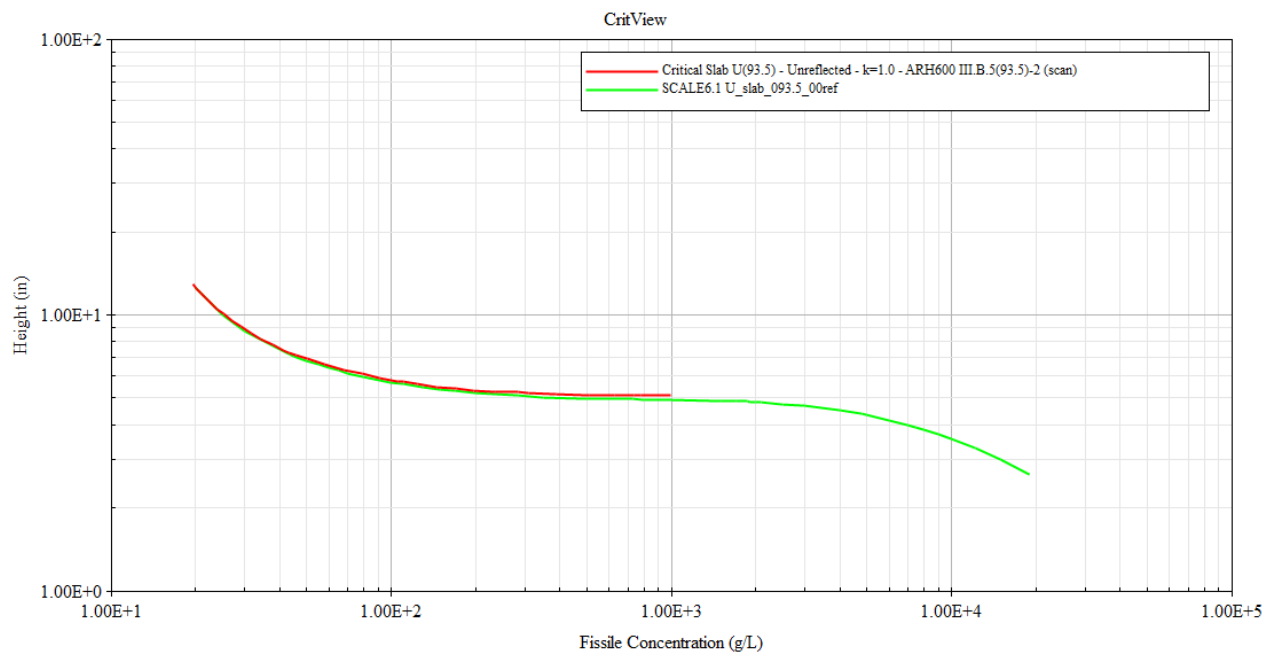
Isotopics: 93.5% ^{235}U 6.5% ^{238}U

Reflector: Unreflected

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



²³⁵ U Slab (93.5% ²³⁵ U) - 0 Inches of Water Reflection				
Concentration (g/cc)	First Height (Inches)	Last Height (Inches)	Delta (Inches)	Critical Height (Inches)
0.020	10.200	13.200	0.100	12.6105
0.025	8.500	10.300	0.100	10.0000
0.030	7.500	9.000	0.050	8.7344
0.040	6.600	7.700	0.050	7.4824
0.045	6.300	7.300	0.050	7.0831
0.050	6.100	7.000	0.050	6.8261
0.055	5.900	6.800	0.050	6.6189
0.060	5.700	6.600	0.050	6.4568
0.065	5.600	6.500	0.050	6.2878
0.070	5.500	6.400	0.050	6.1465
0.080	5.400	6.200	0.050	5.9573
0.100	5.100	5.900	0.050	5.6894
0.130	4.900	5.700	0.050	5.4461
0.150	4.800	5.500	0.050	5.3636
0.170	4.800	5.500	0.050	5.2979
0.200	4.700	5.400	0.050	5.2043
0.350	4.500	5.200	0.050	5.0033
0.500	4.500	5.100	0.050	4.9701
0.800	4.400	5.100	0.050	4.9224
1.000	4.400	5.100	0.050	4.9168
1.500	4.400	5.100	0.050	4.8725
1.700	4.300	5.100	0.050	4.8587
1.900	4.300	5.000	0.050	4.8435
2.000	4.300	5.000	0.050	4.8299
2.100	4.300	5.000	0.050	4.8122
2.500	4.200	5.000	0.050	4.7589
3.000	4.200	4.900	0.050	4.6913
4.000	4.000	4.700	0.050	4.5248
5.000	3.900	4.500	0.050	4.3319
6.000	3.700	4.300	0.050	4.1586
7.000	3.500	4.200	0.050	3.9833
7.500	3.500	4.100	0.050	3.8989
8.000	3.400	4.000	0.050	3.8383
9.000	3.300	3.900	0.050	3.6876
10.000	3.200	3.700	0.020	3.5575
15.000	2.700	3.100	0.020	2.9988
18.900	2.300	2.800	0.020	2.6457

[illegible]

CritView compatible data file

```
reset:
title: Critical Slab; U; Unreflected; 93.5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: infplane
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 0.935 U238 0.065
reflmat: none
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: height in
0.020 12.6105
0.025 10.0000
0.030 8.7344
0.040 7.4824
0.045 7.0831
0.050 6.8261
0.055 6.6189
0.060 6.4568
0.065 6.2878
0.070 6.1465
0.080 5.9573
0.100 5.6894
0.130 5.4461
0.150 5.3636
0.170 5.2979
0.200 5.2043
0.350 5.0033
0.500 4.9701
0.800 4.9224
1.000 4.9168
1.500 4.8725
1.700 4.8587
1.900 4.8435
2.000 4.8299
2.100 4.8122
2.500 4.7589
3.000 4.6913
4.000 4.5248
5.000 4.3319
6.000 4.1586
7.000 3.9833
7.500 3.8989
8.000 3.8383
9.000 3.6876
10.000 3.5575
15.000 2.9988
18.900 2.6457
```

20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
10.20	0.9195	0.00140	8.50	0.9229	0.00170	7.50	0.9159	0.00160
10.30	0.9265	0.00140	8.60	0.9272	0.00140	7.55	0.9168	0.00160
10.40	0.9291	0.00150	8.70	0.9312	0.00160	7.60	0.9204	0.00160
10.50	0.9318	0.00150	8.80	0.9418	0.00160	7.65	0.9271	0.00200
10.60	0.9369	0.00140	8.90	0.9452	0.00180	7.70	0.9271	0.00170
10.70	0.9426	0.00150	9.00	0.9506	0.00160	7.75	0.9306	0.00180
10.80	0.9447	0.00120	9.10	0.9598	0.00160	7.80	0.9405	0.00160
10.90	0.9483	0.00130	9.20	0.9653	0.00170	7.85	0.9420	0.00170
11.00	0.9512	0.00120	9.30	0.9647	0.00150	7.90	0.9445	0.00160
11.10	0.9544	0.00140	9.40	0.9705	0.00130	7.95	0.9493	0.00170
11.20	0.9578	0.00130	9.50	0.9765	0.00140	8.00	0.9515	0.00190
11.30	0.9621	0.00140	9.60	0.9824	0.00140	8.05	0.9540	0.00170
11.40	0.9641	0.00140	9.70	0.9829	0.00170	8.10	0.9586	0.00160
11.50	0.9673	0.00140	9.80	0.9894	0.00140	8.15	0.9608	0.00190
11.60	0.9729	0.00160	9.90	0.9948	0.00160	8.20	0.9631	0.00170
11.70	0.9753	0.00160	10.00	1.0000	0.00150	8.25	0.9663	0.00160
11.80	0.9768	0.00150	10.10	1.0022	0.00150	8.30	0.9719	0.00150
11.90	0.9788	0.00140	10.20	1.0087	0.00170	8.35	0.9750	0.00190
12.00	0.9821	0.00160	10.30	1.0132	0.00160	8.40	0.9779	0.00140
12.10	0.9863	0.00170				8.45	0.9769	0.00200
12.20	0.9872	0.00150				8.50	0.9855	0.00150
12.30	0.9911	0.00130				8.55	0.9831	0.00150
12.40	0.9952	0.00120				8.60	0.9898	0.00170
12.50	0.9950	0.00130				8.65	0.9935	0.00180
12.60	0.9998	0.00130				8.70	0.9969	0.00180
12.70	1.0017	0.00120				8.75	1.0014	0.00180
12.80	1.0032	0.00140				8.80	1.0021	0.00150
12.90	1.0070	0.00120				8.85	1.0075	0.00180
13.00	1.0082	0.00150				8.90	1.0085	0.00160
13.10	1.0144	0.00150				8.95	1.0117	0.00150
13.20	1.0145	0.00150				9.00	1.0157	0.00170

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
6.60	0.9138	0.00170	6.30	0.9167	0.00190	6.10	0.9194	0.00190
6.65	0.9216	0.00180	6.35	0.9229	0.00210	6.15	0.9234	0.00200
6.70	0.9307	0.00190	6.40	0.9286	0.00190	6.20	0.9286	0.00190
6.75	0.9358	0.00220	6.45	0.9342	0.00170	6.25	0.9318	0.00180
6.80	0.9408	0.00190	6.50	0.9423	0.00160	6.30	0.9438	0.00180
6.85	0.9407	0.00200	6.55	0.9431	0.00230	6.35	0.9490	0.00190
6.90	0.9455	0.00200	6.60	0.9481	0.00210	6.40	0.9537	0.00190
6.95	0.9499	0.00220	6.65	0.9559	0.00170	6.45	0.9617	0.00210
7.00	0.9551	0.00210	6.70	0.9603	0.00190	6.50	0.9603	0.00190
7.05	0.9612	0.00260	6.75	0.9637	0.00230	6.55	0.9687	0.00190
7.10	0.9649	0.00210	6.80	0.9702	0.00170	6.60	0.9752	0.00180
7.15	0.9727	0.00180	6.85	0.9735	0.00180	6.65	0.9783	0.00170
7.20	0.9741	0.00170	6.90	0.9811	0.00200	6.70	0.9850	0.00170
7.25	0.9800	0.00190	6.95	0.9852	0.00200	6.75	0.9882	0.00250
7.30	0.9835	0.00190	7.00	0.9914	0.00180	6.80	0.9954	0.00210
7.35	0.9932	0.00190	7.05	0.9955	0.00210	6.85	1.0042	0.00190
7.40	0.9899	0.00170	7.10	1.0023	0.00170	6.90	1.0072	0.00220
7.45	0.9978	0.00180	7.15	1.0058	0.00220	6.95	1.0112	0.00200
7.50	1.0012	0.00180	7.20	1.0095	0.00190	7.00	1.0185	0.00200
7.55	1.0020	0.00180	7.25	1.0138	0.00170			
7.60	1.0088	0.00200	7.30	1.0188	0.00180			
7.65	1.0130	0.00170						
7.70	1.0153	0.00160						

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
5.90	0.9168	0.00170	5.70	0.9094	0.00200	5.60	0.9115	0.00270
5.95	0.9245	0.00180	5.75	0.9146	0.00200	5.65	0.9193	0.00190
6.00	0.9292	0.00190	5.80	0.9213	0.00230	5.70	0.9245	0.00190
6.05	0.9343	0.00260	5.85	0.9292	0.00200	5.75	0.9360	0.00230
6.10	0.9396	0.00190	5.90	0.9340	0.00200	5.80	0.9393	0.00210
6.15	0.9444	0.00200	5.95	0.9432	0.00190	5.85	0.9482	0.00210
6.20	0.9526	0.00210	6.00	0.9491	0.00230	5.90	0.9537	0.00210
6.25	0.9630	0.00180	6.05	0.9494	0.00180	5.95	0.9565	0.00180
6.30	0.9645	0.00200	6.10	0.9626	0.00240	6.00	0.9624	0.00230
6.35	0.9687	0.00190	6.15	0.9673	0.00240	6.05	0.9699	0.00180
6.40	0.9802	0.00210	6.20	0.9750	0.00190	6.10	0.9773	0.00210
6.45	0.9817	0.00250	6.25	0.9759	0.00210	6.15	0.9820	0.00230
6.50	0.9877	0.00190	6.30	0.9823	0.00200	6.20	0.9870	0.00220
6.55	0.9938	0.00190	6.35	0.9927	0.00220	6.25	0.9932	0.00230
6.60	0.9986	0.00200	6.40	0.9946	0.00200	6.30	1.0022	0.00190
6.65	1.0023	0.00180	6.45	0.9988	0.00210	6.35	1.0090	0.00190
6.70	1.0112	0.00220	6.50	1.0076	0.00200	6.40	1.0137	0.00220
6.75	1.0125	0.00200	6.55	1.0096	0.00220	6.45	1.0184	0.00230
6.80	1.0237	0.00190	6.60	1.0171	0.00180	6.50	1.0268	0.00220

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
5.50	0.9105	0.00200	5.40	0.9209	0.00210	5.10	0.9093	0.00270
5.55	0.9166	0.00190	5.45	0.9233	0.00210	5.15	0.9159	0.00230
5.60	0.9240	0.00240	5.50	0.9320	0.00230	5.20	0.9266	0.00210
5.65	0.9327	0.00200	5.55	0.9416	0.00190	5.25	0.9296	0.00190
5.70	0.9386	0.00200	5.60	0.9494	0.00270	5.30	0.9479	0.00240
5.75	0.9438	0.00180	5.65	0.9540	0.00240	5.35	0.9484	0.00200
5.80	0.9525	0.00170	5.70	0.9619	0.00220	5.40	0.9566	0.00220
5.85	0.9594	0.00180	5.75	0.9700	0.00240	5.45	0.9611	0.00220
5.90	0.9677	0.00210	5.80	0.9805	0.00210	5.50	0.9673	0.00240
5.95	0.9721	0.00220	5.85	0.9827	0.00240	5.55	0.9768	0.00220
6.00	0.9775	0.00260	5.90	0.9889	0.00230	5.60	0.9820	0.00210
6.05	0.9828	0.00210	5.95	0.9986	0.00170	5.65	0.9929	0.00210
6.10	0.9934	0.00200	6.00	1.0082	0.00190	5.70	1.0019	0.00240
6.15	1.0005	0.00200	6.05	1.0090	0.00240	5.75	1.0062	0.00200
6.20	1.0030	0.00260	6.10	1.0186	0.00270	5.80	1.0151	0.00220
6.25	1.0099	0.00210	6.15	1.0209	0.00230	5.85	1.0221	0.00230
6.30	1.0177	0.00250	6.20	1.0261	0.00230	5.90	1.0309	0.00220
6.35	1.0190	0.00230						
6.40	1.0292	0.00220						

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.90	0.9106	0.00240	4.80	0.9039	0.00210	4.80	0.9187	0.00260
4.95	0.9198	0.00200	4.85	0.9162	0.00220	4.85	0.9280	0.00240
5.00	0.9247	0.00230	4.90	0.9245	0.00220	4.90	0.9337	0.00190
5.05	0.9361	0.00260	4.95	0.9299	0.00220	4.95	0.9447	0.00260
5.10	0.9437	0.00220	5.00	0.9368	0.00230	5.00	0.9553	0.00250
5.15	0.9463	0.00270	5.05	0.9468	0.00280	5.05	0.9625	0.00240
5.20	0.9589	0.00220	5.10	0.9588	0.00200	5.10	0.9709	0.00230
5.25	0.9683	0.00210	5.15	0.9680	0.00220	5.15	0.9810	0.00240
5.30	0.9727	0.00260	5.20	0.9732	0.00200	5.20	0.9838	0.00210
5.35	0.9861	0.00210	5.25	0.9862	0.00250	5.25	0.9930	0.00220
5.40	0.9905	0.00260	5.30	0.9904	0.00230	5.30	1.0003	0.00220
5.45	1.0008	0.00230	5.35	0.9975	0.00280	5.35	1.0137	0.00260
5.50	1.0049	0.00220	5.40	1.0067	0.00240	5.40	1.0256	0.00240
5.55	1.0100	0.00260	5.45	1.0092	0.00260	5.45	1.0262	0.00230
5.60	1.0203	0.00240	5.50	1.0144	0.00260	5.50	1.0362	0.00260
5.65	1.0287	0.00240						
5.70	1.0402	0.00250						

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.70	0.9104	0.00230	4.50	0.9116	0.00250	4.50	0.9223	0.00250
4.75	0.9198	0.00250	4.55	0.9195	0.00260	4.55	0.9288	0.00280
4.80	0.9323	0.00250	4.60	0.9278	0.00230	4.60	0.9333	0.00240
4.85	0.9373	0.00230	4.65	0.9351	0.00230	4.65	0.9508	0.00260
4.90	0.9478	0.00210	4.70	0.9459	0.00270	4.70	0.9585	0.00230
4.95	0.9544	0.00220	4.75	0.9559	0.00250	4.75	0.9595	0.00240
5.00	0.9675	0.00230	4.80	0.9615	0.00250	4.80	0.9734	0.00220
5.05	0.9767	0.00230	4.85	0.9725	0.00260	4.85	0.9805	0.00270
5.10	0.9848	0.00270	4.90	0.9802	0.00280	4.90	0.9934	0.00250
5.15	0.9885	0.00230	4.95	0.9895	0.00210	4.95	0.9931	0.00230
5.20	0.9992	0.00220	5.00	0.9997	0.00240	5.00	1.0103	0.00230
5.25	1.0086	0.00220	5.05	1.0043	0.00250	5.05	1.0186	0.00260
5.30	1.0154	0.00240	5.10	1.0191	0.00220	5.10	1.0236	0.00240
5.35	1.0229	0.00280	5.15	1.0207	0.00230			
5.40	1.0281	0.00250	5.20	1.0290	0.00270			

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.40	0.9080	0.00220	4.40	0.9126	0.00210	4.40	0.9200	0.00200
4.45	0.9197	0.00240	4.45	0.9228	0.00200	4.45	0.9289	0.00220
4.50	0.9273	0.00260	4.50	0.9296	0.00210	4.50	0.9410	0.00200
4.55	0.9373	0.00250	4.55	0.9406	0.00240	4.55	0.9461	0.00240
4.60	0.9427	0.00210	4.60	0.9502	0.00210	4.60	0.9564	0.00220
4.65	0.9560	0.00210	4.65	0.9575	0.00270	4.65	0.9653	0.00220
4.70	0.9665	0.00240	4.70	0.9683	0.00240	4.70	0.9719	0.00260
4.75	0.9713	0.00220	4.75	0.9730	0.00250	4.75	0.9825	0.00200
4.80	0.9791	0.00210	4.80	0.9812	0.00240	4.80	0.9915	0.00210
4.85	0.9894	0.00200	4.85	0.9907	0.00240	4.85	0.9969	0.00300
4.90	0.9965	0.00230	4.90	0.9966	0.00220	4.90	1.0038	0.00230
4.95	1.0043	0.00210	4.95	1.0067	0.00220	4.95	1.0118	0.00200
5.00	1.0088	0.00230	5.00	1.0172	0.00250	5.00	1.0185	0.00250
5.05	1.0206	0.00260	5.05	1.0200	0.00210	5.05	1.0252	0.00260
5.10	1.0297	0.00270	5.10	1.0292	0.00290	5.10	1.0303	0.00240

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.30	0.9092	0.00200	4.30	0.9141	0.00220	4.30	0.9130	0.00250
4.35	0.9134	0.00230	4.35	0.9247	0.00220	4.35	0.9234	0.00190
4.40	0.9267	0.00240	4.40	0.9283	0.00200	4.40	0.9343	0.00200
4.45	0.9328	0.00250	4.45	0.9406	0.00190	4.45	0.9397	0.00200
4.50	0.9435	0.00320	4.50	0.9454	0.00210	4.50	0.9484	0.00190
4.55	0.9512	0.00230	4.55	0.9546	0.00210	4.55	0.9538	0.00210
4.60	0.9583	0.00190	4.60	0.9595	0.00250	4.60	0.9612	0.00230
4.65	0.9686	0.00210	4.65	0.9699	0.00250	4.65	0.9735	0.00200
4.70	0.9730	0.00240	4.70	0.9794	0.00250	4.70	0.9789	0.00190
4.75	0.9850	0.00200	4.75	0.9879	0.00200	4.75	0.9876	0.00250
4.80	0.9906	0.00220	4.80	0.9879	0.00210	4.80	0.9957	0.00200
4.85	0.9992	0.00280	4.85	1.0018	0.00240	4.85	1.0029	0.00190
4.90	1.0038	0.00200	4.90	1.0122	0.00230	4.90	1.0099	0.00230
4.95	1.0124	0.00290	4.95	1.0210	0.00210	4.95	1.0160	0.00190
5.00	1.0204	0.00210	5.00	1.0239	0.00190	5.00	1.0226	0.00230
5.05	1.0277	0.00250						
5.10	1.0353	0.00240						

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.30	0.9163	0.00240	4.20	0.9123	0.00190	4.20	0.9229	0.00240
4.35	0.9267	0.00180	4.25	0.9171	0.00180	4.25	0.9297	0.00240
4.40	0.9332	0.00230	4.30	0.9279	0.00200	4.30	0.9385	0.00240
4.45	0.9434	0.00210	4.35	0.9379	0.00250	4.35	0.9463	0.00230
4.50	0.9492	0.00220	4.40	0.9433	0.00240	4.40	0.9563	0.00240
4.55	0.9582	0.00190	4.45	0.9528	0.00200	4.45	0.9644	0.00180
4.60	0.9654	0.00200	4.50	0.9567	0.00200	4.50	0.9719	0.00200
4.65	0.9773	0.00190	4.55	0.9688	0.00190	4.55	0.9796	0.00200
4.70	0.9766	0.00190	4.60	0.9735	0.00200	4.60	0.9889	0.00250
4.75	0.9869	0.00210	4.65	0.9814	0.00190	4.65	0.9957	0.00200
4.80	0.9970	0.00190	4.70	0.9893	0.00250	4.70	1.0009	0.00190
4.85	1.0093	0.00200	4.75	0.9987	0.00240	4.75	1.0107	0.00210
4.90	1.0117	0.00210	4.80	1.0060	0.00210	4.80	1.0147	0.00260
4.95	1.0190	0.00180	4.85	1.0105	0.00190	4.85	1.0275	0.00210
5.00	1.0265	0.00200	4.90	1.0208	0.00220	4.90	1.0315	0.00190
			4.95	1.0252	0.00210			
			5.00	1.0315	0.00190			

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.00	0.9124	0.00220	3.90	0.9263	0.00170	3.70	0.9187	0.00160
4.05	0.9256	0.00210	3.95	0.9347	0.00180	3.75	0.9281	0.00170
4.10	0.9298	0.00210	4.00	0.9435	0.00180	3.80	0.9395	0.00200
4.15	0.9397	0.00180	4.05	0.9504	0.00220	3.85	0.9471	0.00200
4.20	0.9474	0.00200	4.10	0.9612	0.00240	3.90	0.9573	0.00190
4.25	0.9594	0.00210	4.15	0.9743	0.00190	3.95	0.9658	0.00170
4.30	0.9669	0.00190	4.20	0.9751	0.00190	4.00	0.9738	0.00180
4.35	0.9739	0.00190	4.25	0.9837	0.00200	4.05	0.9822	0.00190
4.40	0.9828	0.00200	4.30	0.9942	0.00190	4.10	0.9894	0.00200
4.45	0.9892	0.00190	4.35	1.0033	0.00200	4.15	0.9981	0.00170
4.50	0.9945	0.00200	4.40	1.0076	0.00170	4.20	1.0092	0.00170
4.55	1.0056	0.00190	4.45	1.0182	0.00210	4.25	1.0136	0.00200
4.60	1.0146	0.00220	4.50	1.0262	0.00210	4.30	1.0235	0.00200
4.65	1.0218	0.00180						
4.70	1.0300	0.00220						

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
3.50	0.9068	0.00180	3.50	0.9215	0.00170	3.40	0.9182	0.00180
3.55	0.9159	0.00180	3.55	0.9328	0.00200	3.45	0.9282	0.00170
3.60	0.9290	0.00220	3.60	0.9375	0.00190	3.50	0.9355	0.00210
3.65	0.9398	0.00160	3.65	0.9509	0.00190	3.55	0.9448	0.00200
3.70	0.9446	0.00230	3.70	0.9603	0.00210	3.60	0.9553	0.00180
3.75	0.9568	0.00170	3.75	0.9725	0.00240	3.65	0.9648	0.00150
3.80	0.9623	0.00190	3.80	0.9769	0.00240	3.70	0.9748	0.00200
3.85	0.9714	0.00170	3.85	0.9915	0.00170	3.75	0.9874	0.00200
3.90	0.9848	0.00170	3.90	1.0002	0.00220	3.80	0.9931	0.00250
3.95	0.9948	0.00180	3.95	1.0114	0.00190	3.85	1.0021	0.00190
4.00	1.0026	0.00180	4.00	1.0170	0.00170	3.90	1.0118	0.00210
4.05	1.0126	0.00180	4.05	1.0256	0.00170	3.95	1.0189	0.00240
4.10	1.0164	0.00220	4.10	1.0330	0.00210	4.00	1.0313	0.00160
4.15	1.0290	0.00180						
4.20	1.0339	0.00170						

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
3.30	0.9189	0.00180	3.20	0.9236	0.00160	2.70	0.9246	0.00180
3.35	0.9313	0.00170	3.22	0.9294	0.00160	2.72	0.9320	0.00170
3.40	0.9441	0.00200	3.24	0.9347	0.00180	2.74	0.9353	0.00220
3.45	0.9537	0.00180	3.26	0.9366	0.00190	2.76	0.9421	0.00160
3.50	0.9618	0.00210	3.28	0.9413	0.00160	2.78	0.9492	0.00150
3.55	0.9733	0.00200	3.30	0.9501	0.00190	2.80	0.9481	0.00180
3.60	0.9824	0.00190	3.32	0.9502	0.00230	2.82	0.9583	0.00140
3.65	0.9906	0.00180	3.34	0.9565	0.00180	2.84	0.9594	0.00180
3.70	1.0031	0.00210	3.36	0.9586	0.00270	2.86	0.9639	0.00190
3.75	1.0120	0.00190	3.38	0.9634	0.00210	2.88	0.9709	0.00180
3.80	1.0213	0.00220	3.40	0.9672	0.00170	2.90	0.9743	0.00180
3.85	1.0338	0.00220	3.42	0.9764	0.00200	2.92	0.9798	0.00150
3.90	1.0399	0.00200	3.44	0.9774	0.00160	2.94	0.9860	0.00210
			3.46	0.9851	0.00180	2.96	0.9896	0.00180
			3.48	0.9870	0.00200	2.98	0.9954	0.00160
			3.50	0.9852	0.00270	3.00	1.0003	0.00160
			3.52	0.9926	0.00210	3.02	1.0059	0.00210
			3.54	0.9952	0.00170	3.04	1.0104	0.00180
			3.56	1.0007	0.00180	3.06	1.0142	0.00150
			3.58	1.0038	0.00220	3.08	1.0181	0.00180
			3.60	1.0104	0.00170	3.10	1.0190	0.00160
			3.62	1.0181	0.00190			
			3.64	1.0194	0.00210			
			3.66	1.0221	0.00170			
			3.68	1.0242	0.00160			
			3.70	1.0298	0.00150			

18900 milli-g/cc		
Height (Inches)	K _{eff}	Sigma
2.30	0.9058	0.00170
2.32	0.9136	0.00170
2.34	0.9225	0.00180
2.36	0.9222	0.00160
2.38	0.9278	0.00170
2.40	0.9333	0.00210
2.42	0.9399	0.00150
2.44	0.9485	0.00180
2.46	0.9508	0.00170
2.48	0.9557	0.00150
2.50	0.9620	0.00180
2.52	0.9697	0.00150
2.54	0.9732	0.00200
2.56	0.9802	0.00170
2.58	0.9837	0.00160
2.60	0.9908	0.00150
2.62	0.9943	0.00220
2.64	0.9974	0.00160
2.66	1.0066	0.00190
2.68	1.0078	0.00150
2.70	1.0178	0.00160
2.72	1.0197	0.00150
2.74	1.0292	0.00170
2.76	1.0309	0.00160
2.78	1.0392	0.00190
2.80	1.0425	0.00160

Case ID: U_slab_093.5_01ref

Material: Uranium metal in water

Geometry: Infinite plane

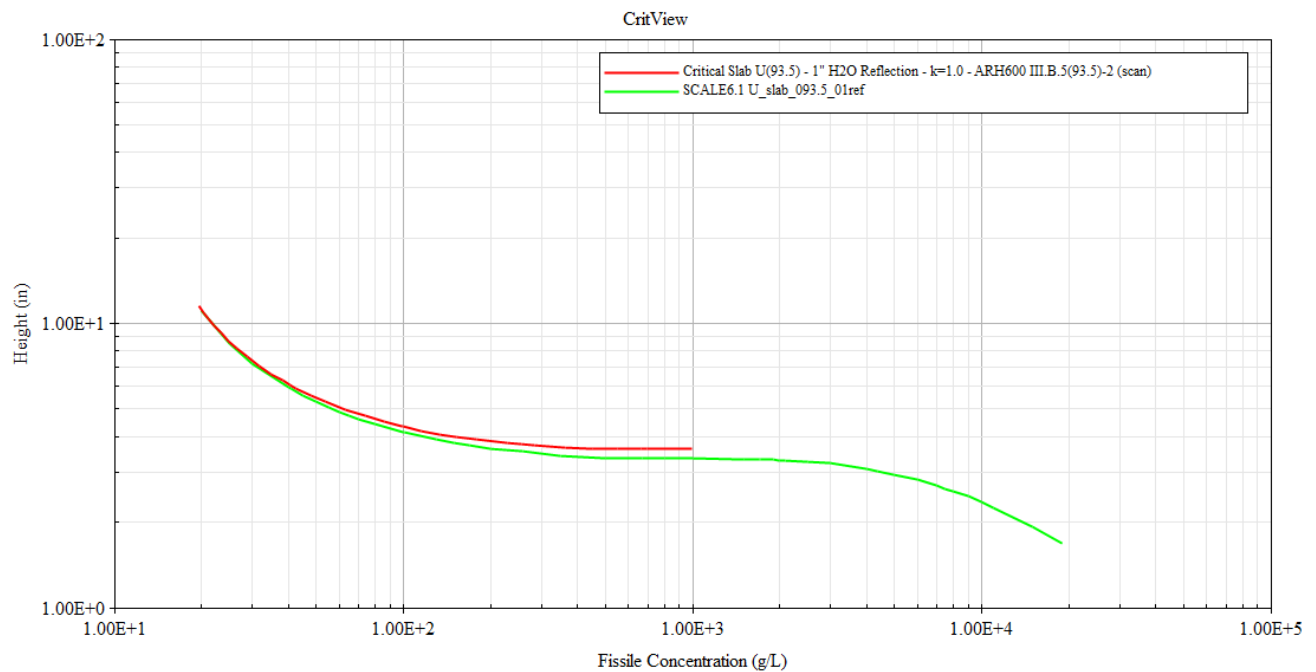
Isotopics: 93.5% ^{235}U 6.5% ^{238}U

Reflector: 1" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



²³⁵ U Slab (93.5% ²³⁵ U) - 1 Inch of Water Reflection				
Concentration (g/cc)	First Height (Inches)	Last Height (Inches)	Delta (Inches)	Critical Height (Inches)
0.020	8.700	11.600	0.100	11.1000
0.025	7.000	8.800	0.100	8.4636
0.030	6.000	7.500	0.050	7.2443
0.040	5.100	6.200	0.050	5.9477
0.045	4.800	5.800	0.050	5.5706
0.050	4.500	5.500	0.050	5.3160
0.055	4.400	5.300	0.050	5.0443
0.060	4.200	5.100	0.050	4.8872
0.065	4.100	4.900	0.050	4.7543
0.070	4.000	4.800	0.050	4.6037
0.080	3.800	4.600	0.050	4.4115
0.100	3.600	4.300	0.050	4.1579
0.130	3.400	4.100	0.050	3.9088
0.150	3.300	4.000	0.050	3.8064
0.170	3.200	3.900	0.050	3.7171
0.200	3.200	3.800	0.050	3.6396
0.350	3.000	3.600	0.050	3.4349
0.500	2.900	3.500	0.050	3.3719
0.800	2.900	3.500	0.050	3.3606
1.000	2.800	3.500	0.050	3.3476
1.500	2.800	3.500	0.050	3.3203
1.700	2.800	3.500	0.050	3.3266
1.900	2.800	3.500	0.050	3.3220
2.000	2.800	3.500	0.050	3.3043
2.100	2.800	3.500	0.050	3.2914
2.500	2.800	3.400	0.050	3.2597
3.000	2.700	3.400	0.050	3.2194
4.000	2.600	3.200	0.050	3.0767
5.000	2.500	3.100	0.050	2.9365
6.000	2.400	3.000	0.050	2.8230
7.000	2.300	2.800	0.020	2.6841
7.500	2.200	2.800	0.050	2.6120
8.000	2.100	2.700	0.050	2.5585
9.000	2.100	2.600	0.020	2.4611
10.000	2.000	2.500	0.020	2.3539
15.000	1.600	2.100	0.020	1.9331
18.900	1.400	1.800	0.020	1.6844

[illegible]

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CritView compatible data file

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created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: infplane
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 0.935 U238 0.065
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: height in
0.020 11.1000
0.025 8.4636
0.030 7.2443
0.040 5.9477
0.045 5.5706
0.050 5.3160
0.055 5.0443
0.060 4.8872
0.065 4.7543
0.070 4.6037
0.080 4.4115
0.100 4.1579
0.130 3.9088
0.150 3.8064
0.170 3.7171
0.200 3.6396
0.350 3.4349
0.500 3.3719
0.800 3.3606
1.000 3.3476
1.500 3.3203
1.700 3.3266
1.900 3.3220
2.000 3.3043
2.100 3.2914
2.500 3.2597
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7.000 2.6841
7.500 2.6120
8.000 2.5585
9.000 2.4611
10.000 2.3539
15.000 1.9331
18.900 1.6844
```

20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
8.70	0.9240	0.00150	7.00	0.9202	0.00160	6.00	0.9120	0.00150
8.80	0.9256	0.00150	7.10	0.9254	0.00150	6.05	0.9185	0.00160
8.90	0.9318	0.00160	7.20	0.9359	0.00140	6.10	0.9201	0.00180
9.00	0.9336	0.00140	7.30	0.9400	0.00150	6.15	0.9270	0.00180
9.10	0.9392	0.00170	7.40	0.9460	0.00160	6.20	0.9293	0.00150
9.20	0.9421	0.00140	7.50	0.9523	0.00140	6.25	0.9327	0.00150
9.30	0.9459	0.00140	7.60	0.9550	0.00150	6.30	0.9345	0.00160
9.40	0.9474	0.00130	7.70	0.9608	0.00140	6.35	0.9403	0.00170
9.50	0.9519	0.00140	7.80	0.9661	0.00160	6.40	0.9454	0.00180
9.60	0.9553	0.00130	7.90	0.9740	0.00150	6.45	0.9485	0.00160
9.70	0.9581	0.00130	8.00	0.9747	0.00250	6.50	0.9542	0.00150
9.80	0.9652	0.00130	8.10	0.9831	0.00180	6.55	0.9580	0.00150
9.90	0.9630	0.00140	8.20	0.9861	0.00160	6.60	0.9590	0.00170
10.00	0.9665	0.00150	8.30	0.9930	0.00140	6.65	0.9643	0.00180
10.10	0.9696	0.00130	8.40	0.9993	0.00160	6.70	0.9650	0.00150
10.20	0.9767	0.00130	8.50	1.0004	0.00180	6.75	0.9707	0.00180
10.30	0.9782	0.00130	8.60	1.0056	0.00140	6.80	0.9723	0.00160
10.40	0.9783	0.00170	8.70	1.0111	0.00170	6.85	0.9774	0.00160
10.50	0.9829	0.00150	8.80	1.0129	0.00160	6.90	0.9787	0.00160
10.60	0.9847	0.00140				6.95	0.9829	0.00220
10.70	0.9880	0.00130				7.00	0.9868	0.00160
10.80	0.9911	0.00150				7.05	0.9890	0.00170
10.90	0.9946	0.00140				7.10	0.9919	0.00180
11.00	1.0010	0.00150				7.15	0.9969	0.00180
11.10	1.0000	0.00150				7.20	0.9969	0.00200
11.20	1.0034	0.00120				7.25	1.0004	0.00180
11.30	1.0052	0.00130				7.30	1.0035	0.00150
11.40	1.0092	0.00110				7.35	1.0078	0.00160
11.50	1.0101	0.00130				7.40	1.0066	0.00160
11.60	1.0125	0.00140				7.45	1.0141	0.00180
						7.50	1.0162	0.00150

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
5.10	0.9217	0.00190	4.80	0.9168	0.00170	4.50	0.9102	0.00200
5.15	0.9239	0.00180	4.85	0.9214	0.00250	4.55	0.9158	0.00180
5.20	0.9283	0.00190	4.90	0.9281	0.00180	4.60	0.9197	0.00190
5.25	0.9352	0.00180	4.95	0.9350	0.00180	4.65	0.9278	0.00170
5.30	0.9387	0.00220	5.00	0.9429	0.00180	4.70	0.9303	0.00250
5.35	0.9455	0.00170	5.05	0.9452	0.00230	4.75	0.9434	0.00210
5.40	0.9492	0.00180	5.10	0.9545	0.00190	4.80	0.9441	0.00180
5.45	0.9567	0.00200	5.15	0.9573	0.00170	4.85	0.9487	0.00200
5.50	0.9598	0.00170	5.20	0.9615	0.00180	4.90	0.9576	0.00170
5.55	0.9674	0.00170	5.25	0.9679	0.00210	4.95	0.9603	0.00150
5.60	0.9662	0.00150	5.30	0.9745	0.00200	5.00	0.9685	0.00190
5.65	0.9747	0.00180	5.35	0.9779	0.00180	5.05	0.9711	0.00200
5.70	0.9757	0.00160	5.40	0.9817	0.00190	5.10	0.9763	0.00200
5.75	0.9855	0.00170	5.45	0.9879	0.00220	5.15	0.9825	0.00200
5.80	0.9856	0.00170	5.50	0.9942	0.00190	5.20	0.9910	0.00160
5.85	0.9913	0.00150	5.55	0.9986	0.00200	5.25	0.9953	0.00170
5.90	0.9937	0.00170	5.60	1.0020	0.00200	5.30	0.9968	0.00220
5.95	1.0003	0.00190	5.65	1.0013	0.00170	5.35	1.0068	0.00170
6.00	1.0052	0.00170	5.70	1.0143	0.00170	5.40	1.0095	0.00210
6.05	1.0062	0.00190	5.75	1.0141	0.00190	5.45	1.0131	0.00200
6.10	1.0101	0.00170	5.80	1.0189	0.00190	5.50	1.0181	0.00190
6.15	1.0154	0.00200						
6.20	1.0222	0.00190						

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.40	0.9203	0.00190	4.20	0.9162	0.00180	4.10	0.9153	0.00170
4.45	0.9295	0.00200	4.25	0.9227	0.00190	4.15	0.9190	0.00180
4.50	0.9305	0.00180	4.30	0.9245	0.00180	4.20	0.9288	0.00190
4.55	0.9376	0.00180	4.35	0.9335	0.00190	4.25	0.9368	0.00210
4.60	0.9447	0.00220	4.40	0.9405	0.00190	4.30	0.9417	0.00180
4.65	0.9489	0.00230	4.45	0.9463	0.00200	4.35	0.9502	0.00190
4.70	0.9578	0.00180	4.50	0.9505	0.00200	4.40	0.9578	0.00180
4.75	0.9614	0.00220	4.55	0.9575	0.00190	4.45	0.9637	0.00230
4.80	0.9656	0.00200	4.60	0.9645	0.00210	4.50	0.9658	0.00220
4.85	0.9734	0.00210	4.65	0.9699	0.00190	4.55	0.9731	0.00180
4.90	0.9795	0.00190	4.70	0.9815	0.00180	4.60	0.9790	0.00200
4.95	0.9864	0.00190	4.75	0.9780	0.00210	4.65	0.9889	0.00180
5.00	0.9914	0.00190	4.80	0.9874	0.00180	4.70	0.9917	0.00190
5.05	1.0011	0.00230	4.85	0.9968	0.00220	4.75	0.9992	0.00220
5.10	1.0032	0.00190	4.90	1.0011	0.00220	4.80	1.0085	0.00200
5.15	1.0073	0.00180	4.95	1.0009	0.00170	4.85	1.0129	0.00170
5.20	1.0122	0.00200	5.00	1.0155	0.00200	4.90	1.0156	0.00210
5.25	1.0195	0.00180	5.05	1.0215	0.00210			
5.30	1.0243	0.00200	5.10	1.0217	0.00190			

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.00	0.9159	0.00190	3.80	0.9096	0.00250	3.60	0.9183	0.00210
4.05	0.9198	0.00180	3.85	0.9200	0.00230	3.65	0.9239	0.00180
4.10	0.9322	0.00200	3.90	0.9232	0.00280	3.70	0.9283	0.00200
4.15	0.9336	0.00190	3.95	0.9313	0.00190	3.75	0.9371	0.00200
4.20	0.9389	0.00230	4.00	0.9400	0.00210	3.80	0.9456	0.00280
4.25	0.9517	0.00180	4.05	0.9475	0.00190	3.85	0.9532	0.00240
4.30	0.9549	0.00200	4.10	0.9587	0.00200	3.90	0.9597	0.00220
4.35	0.9651	0.00260	4.15	0.9593	0.00190	3.95	0.9665	0.00230
4.40	0.9691	0.00210	4.20	0.9706	0.00290	4.00	0.9779	0.00230
4.45	0.9778	0.00220	4.25	0.9753	0.00270	4.05	0.9807	0.00230
4.50	0.9843	0.00210	4.30	0.9884	0.00200	4.10	0.9933	0.00220
4.55	0.9918	0.00260	4.35	0.9906	0.00230	4.15	0.9988	0.00200
4.60	0.9998	0.00200	4.40	0.9988	0.00220	4.20	1.0064	0.00220
4.65	1.0025	0.00200	4.45	1.0040	0.00210	4.25	1.0156	0.00210
4.70	1.0082	0.00180	4.50	1.0081	0.00200	4.30	1.0197	0.00230
4.75	1.0124	0.00230	4.55	1.0199	0.00190			
4.80	1.0228	0.00190	4.60	1.0226	0.00210			

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
3.40	0.9157	0.00220	3.30	0.9139	0.00230	3.20	0.9055	0.00250
3.45	0.9209	0.00240	3.35	0.9226	0.00230	3.25	0.9171	0.00260
3.50	0.9359	0.00240	3.40	0.9292	0.00200	3.30	0.9255	0.00230
3.55	0.9437	0.00190	3.45	0.9409	0.00210	3.35	0.9342	0.00250
3.60	0.9478	0.00200	3.50	0.9498	0.00210	3.40	0.9463	0.00200
3.65	0.9556	0.00240	3.55	0.9573	0.00210	3.45	0.9531	0.00290
3.70	0.9685	0.00250	3.60	0.9694	0.00240	3.50	0.9639	0.00230
3.75	0.9748	0.00250	3.65	0.9748	0.00250	3.55	0.9670	0.00250
3.80	0.9809	0.00220	3.70	0.9849	0.00230	3.60	0.9775	0.00260
3.85	0.9915	0.00190	3.75	0.9888	0.00250	3.65	0.9850	0.00220
3.90	0.9988	0.00200	3.80	0.9985	0.00210	3.70	0.9961	0.00220
3.95	1.0056	0.00240	3.85	1.0103	0.00250	3.75	1.0075	0.00270
4.00	1.0116	0.00230	3.90	1.0131	0.00210	3.80	1.0095	0.00260
4.05	1.0221	0.00260	3.95	1.0192	0.00250	3.85	1.0185	0.00250
4.10	1.0312	0.00220	4.00	1.0306	0.00200	3.90	1.0273	0.00280

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
3.20	0.9209	0.00240	3.00	0.9217	0.00210	2.90	0.9132	0.00220
3.25	0.9330	0.00230	3.05	0.9301	0.00240	2.95	0.9241	0.00220
3.30	0.9406	0.00220	3.10	0.9363	0.00210	3.00	0.9354	0.00220
3.35	0.9484	0.00270	3.15	0.9472	0.00230	3.05	0.9385	0.00240
3.40	0.9661	0.00230	3.20	0.9593	0.00220	3.10	0.9490	0.00250
3.45	0.9653	0.00260	3.25	0.9663	0.00250	3.15	0.9594	0.00270
3.50	0.9769	0.00230	3.30	0.9759	0.00220	3.20	0.9670	0.00250
3.55	0.9859	0.00240	3.35	0.9812	0.00210	3.25	0.9769	0.00210
3.60	0.9962	0.00200	3.40	0.9894	0.00210	3.30	0.9839	0.00220
3.65	1.0010	0.00320	3.45	1.0046	0.00270	3.35	0.9941	0.00240
3.70	1.0099	0.00260	3.50	1.0055	0.00260	3.40	1.0076	0.00220
3.75	1.0191	0.00270	3.55	1.0184	0.00210	3.45	1.0066	0.00250
3.80	1.0298	0.00230	3.60	1.0246	0.00230	3.50	1.0205	0.00220

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.90	0.9200	0.00250	2.80	0.9090	0.00210	2.80	0.9132	0.00200
2.95	0.9304	0.00220	2.85	0.9195	0.00220	2.85	0.9205	0.00250
3.00	0.9407	0.00210	2.90	0.9247	0.00220	2.90	0.9275	0.00220
3.05	0.9533	0.00280	2.95	0.9318	0.00200	2.95	0.9392	0.00230
3.10	0.9572	0.00230	3.00	0.9398	0.00240	3.00	0.9465	0.00200
3.15	0.9648	0.00250	3.05	0.9528	0.00210	3.05	0.9520	0.00240
3.20	0.9792	0.00270	3.10	0.9587	0.00210	3.10	0.9641	0.00240
3.25	0.9875	0.00200	3.15	0.9599	0.00310	3.15	0.9680	0.00220
3.30	0.9910	0.00220	3.20	0.9781	0.00200	3.20	0.9746	0.00230
3.35	0.9983	0.00210	3.25	0.9855	0.00220	3.25	0.9860	0.00230
3.40	1.0063	0.00230	3.30	0.9902	0.00210	3.30	0.9970	0.00210
3.45	1.0186	0.00220	3.35	1.0005	0.00220	3.35	1.0044	0.00250
3.50	1.0271	0.00280	3.40	1.0085	0.00270	3.40	1.0067	0.00260
			3.45	1.0150	0.00220	3.45	1.0169	0.00190
			3.50	1.0224	0.00220	3.50	1.0267	0.00220

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.80	0.9113	0.00210	2.80	0.9156	0.00190	2.80	0.9179	0.00220
2.85	0.9242	0.00270	2.85	0.9264	0.00270	2.85	0.9254	0.00220
2.90	0.9336	0.00220	2.90	0.9337	0.00190	2.90	0.9342	0.00200
2.95	0.9377	0.00240	2.95	0.9416	0.00230	2.95	0.9418	0.00260
3.00	0.9486	0.00220	3.00	0.9544	0.00230	3.00	0.9480	0.00220
3.05	0.9568	0.00230	3.05	0.9576	0.00220	3.05	0.9631	0.00200
3.10	0.9660	0.00230	3.10	0.9700	0.00220	3.10	0.9691	0.00220
3.15	0.9714	0.00220	3.15	0.9801	0.00200	3.15	0.9754	0.00260
3.20	0.9838	0.00230	3.20	0.9840	0.00220	3.20	0.9837	0.00190
3.25	0.9892	0.00210	3.25	0.9927	0.00200	3.25	0.9942	0.00210
3.30	0.9943	0.00220	3.30	0.9964	0.00250	3.30	0.9993	0.00200
3.35	1.0050	0.00220	3.35	1.0046	0.00190	3.35	1.0075	0.00230
3.40	1.0125	0.00250	3.40	1.0128	0.00220	3.40	1.0104	0.00190
3.45	1.0199	0.00220	3.45	1.0206	0.00200	3.45	1.0193	0.00220
3.50	1.0280	0.00230	3.50	1.0313	0.00180	3.50	1.0310	0.00200

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.80	0.9193	0.00210	2.80	0.9224	0.00210	2.70	0.9170	0.00220
2.85	0.9284	0.00240	2.85	0.9375	0.00210	2.75	0.9236	0.00180
2.90	0.9355	0.00220	2.90	0.9436	0.00200	2.80	0.9362	0.00200
2.95	0.9444	0.00230	2.95	0.9516	0.00210	2.85	0.9449	0.00180
3.00	0.9511	0.00230	3.00	0.9607	0.00210	2.90	0.9502	0.00240
3.05	0.9618	0.00230	3.05	0.9673	0.00200	2.95	0.9611	0.00190
3.10	0.9687	0.00240	3.10	0.9766	0.00200	3.00	0.9681	0.00250
3.15	0.9745	0.00210	3.15	0.9862	0.00200	3.05	0.9770	0.00180
3.20	0.9842	0.00220	3.20	0.9892	0.00220	3.10	0.9833	0.00190
3.25	0.9894	0.00210	3.25	0.9977	0.00220	3.15	0.9929	0.00230
3.30	1.0022	0.00230	3.30	1.0096	0.00180	3.20	0.9948	0.00190
3.35	1.0071	0.00210	3.35	1.0110	0.00180	3.25	1.0082	0.00220
3.40	1.0172	0.00220	3.40	1.0229	0.00190	3.30	1.0139	0.00240
3.45	1.0268	0.00210				3.35	1.0213	0.00200
3.50	1.0312	0.00220				3.40	1.0337	0.00190

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.60	0.9196	0.00190	2.50	0.9265	0.00220	2.40	0.9264	0.00190
2.65	0.9301	0.00210	2.55	0.9329	0.00220	2.45	0.9325	0.00210
2.70	0.9365	0.00190	2.60	0.9435	0.00210	2.50	0.9432	0.00180
2.75	0.9438	0.00180	2.65	0.9502	0.00200	2.55	0.9560	0.00190
2.80	0.9519	0.00230	2.70	0.9574	0.00230	2.60	0.9602	0.00250
2.85	0.9631	0.00210	2.75	0.9659	0.00180	2.65	0.9710	0.00190
2.90	0.9708	0.00180	2.80	0.9747	0.00190	2.70	0.9774	0.00260
2.95	0.9830	0.00230	2.85	0.9827	0.00230	2.75	0.9917	0.00240
3.00	0.9900	0.00210	2.90	0.9927	0.00220	2.80	0.9955	0.00190
3.05	0.9944	0.00190	2.95	1.0027	0.00220	2.85	1.0053	0.00190
3.10	1.0049	0.00180	3.00	1.0126	0.00190	2.90	1.0158	0.00190
3.15	1.0130	0.00230	3.05	1.0145	0.00190	2.95	1.0195	0.00220
3.20	1.0197	0.00190	3.10	1.0219	0.00200	3.00	1.0296	0.00200

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.30	0.9254	0.00200	2.20	0.9159	0.00190	2.10	0.9046	0.00200
2.32	0.9300	0.00200	2.25	0.9281	0.00180	2.15	0.9199	0.00230
2.34	0.9325	0.00160	2.30	0.9394	0.00180	2.20	0.9272	0.00180
2.36	0.9406	0.00190	2.35	0.9461	0.00220	2.25	0.9411	0.00210
2.38	0.9454	0.00200	2.40	0.9590	0.00210	2.30	0.9480	0.00180
2.40	0.9447	0.00210	2.45	0.9671	0.00230	2.35	0.9579	0.00190
2.42	0.9510	0.00180	2.50	0.9760	0.00220	2.40	0.9699	0.00200
2.44	0.9518	0.00200	2.55	0.9873	0.00190	2.45	0.9777	0.00230
2.46	0.9630	0.00230	2.60	0.9980	0.00180	2.50	0.9879	0.00220
2.48	0.9622	0.00180	2.65	1.0063	0.00190	2.55	0.9982	0.00170
2.50	0.9675	0.00250	2.70	1.0154	0.00180	2.60	1.0088	0.00210
2.52	0.9685	0.00200	2.75	1.0234	0.00200	2.65	1.0140	0.00190
2.54	0.9710	0.00190	2.80	1.0324	0.00230	2.70	1.0286	0.00190
2.56	0.9795	0.00210						
2.58	0.9834	0.00180						
2.60	0.9862	0.00200						
2.62	0.9881	0.00200						
2.64	0.9945	0.00190						
2.66	0.9960	0.00210						
2.68	0.9990	0.00180						
2.70	1.0039	0.00180						
2.72	1.0070	0.00250						
2.74	1.0086	0.00190						
2.76	1.0151	0.00190						
2.78	1.0165	0.00190						
2.80	1.0223	0.00190						

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.10	0.9271	0.00190	2.00	0.9244	0.00190	1.60	0.9128	0.00190
2.12	0.9296	0.00180	2.02	0.9298	0.00180	1.62	0.9188	0.00170
2.14	0.9339	0.00190	2.04	0.9328	0.00190	1.64	0.9252	0.00180
2.16	0.9409	0.00170	2.06	0.9375	0.00210	1.66	0.9278	0.00180
2.18	0.9436	0.00200	2.08	0.9391	0.00220	1.68	0.9323	0.00180
2.20	0.9516	0.00180	2.10	0.9463	0.00180	1.70	0.9371	0.00210
2.22	0.9519	0.00190	2.12	0.9505	0.00190	1.72	0.9434	0.00200
2.24	0.9574	0.00160	2.14	0.9561	0.00190	1.74	0.9510	0.00180
2.26	0.9635	0.00190	2.16	0.9590	0.00190	1.76	0.9570	0.00160
2.28	0.9714	0.00210	2.18	0.9656	0.00190	1.78	0.9601	0.00190
2.30	0.9675	0.00210	2.20	0.9680	0.00170	1.80	0.9677	0.00160
2.32	0.9733	0.00180	2.22	0.9713	0.00220	1.82	0.9728	0.00180
2.34	0.9789	0.00180	2.24	0.9803	0.00190	1.84	0.9755	0.00190
2.36	0.9826	0.00220	2.26	0.9802	0.00190	1.86	0.9863	0.00190
2.38	0.9855	0.00180	2.28	0.9875	0.00190	1.88	0.9849	0.00180
2.40	0.9873	0.00190	2.30	0.9913	0.00170	1.90	0.9930	0.00210
2.42	0.9922	0.00200	2.32	0.9946	0.00180	1.92	0.9958	0.00170
2.44	0.9995	0.00190	2.34	0.9961	0.00180	1.94	1.0022	0.00200
2.46	0.9995	0.00190	2.36	1.0017	0.00190	1.96	1.0072	0.00190
2.48	1.0084	0.00310	2.38	1.0080	0.00210	1.98	1.0096	0.00190
2.50	1.0117	0.00200	2.40	1.0107	0.00200	2.00	1.0149	0.00210
2.52	1.0132	0.00190	2.42	1.0149	0.00180	2.02	1.0235	0.00180
2.54	1.0202	0.00190	2.44	1.0166	0.00190	2.04	1.0224	0.00180
2.56	1.0248	0.00180	2.46	1.0242	0.00220	2.06	1.0333	0.00180
2.58	1.0284	0.00190	2.48	1.0250	0.00190	2.08	1.0318	0.00180
2.60	1.0277	0.00190	2.50	1.0289	0.00200	2.10	1.0410	0.00170

18900 milli-g/cc		
Height (Inches)	K _{eff}	Sigma
1.40	0.9158	0.00170
1.42	0.9208	0.00190
1.44	0.9302	0.00200
1.46	0.9332	0.00220
1.48	0.9412	0.00190
1.50	0.9495	0.00190
1.52	0.9556	0.00200
1.54	0.9596	0.00210
1.56	0.9655	0.00170
1.58	0.9698	0.00170
1.60	0.9754	0.00190
1.62	0.9848	0.00170
1.64	0.9869	0.00180
1.66	0.9935	0.00180
1.68	0.9991	0.00210
1.70	1.0032	0.00190
1.72	1.0119	0.00180
1.74	1.0188	0.00180
1.76	1.0241	0.00170
1.78	1.0301	0.00200
1.80	1.0350	0.00170

Case ID: U_slab_093.5_10ref

Material: Uranium metal in water

Geometry: Infinite plane

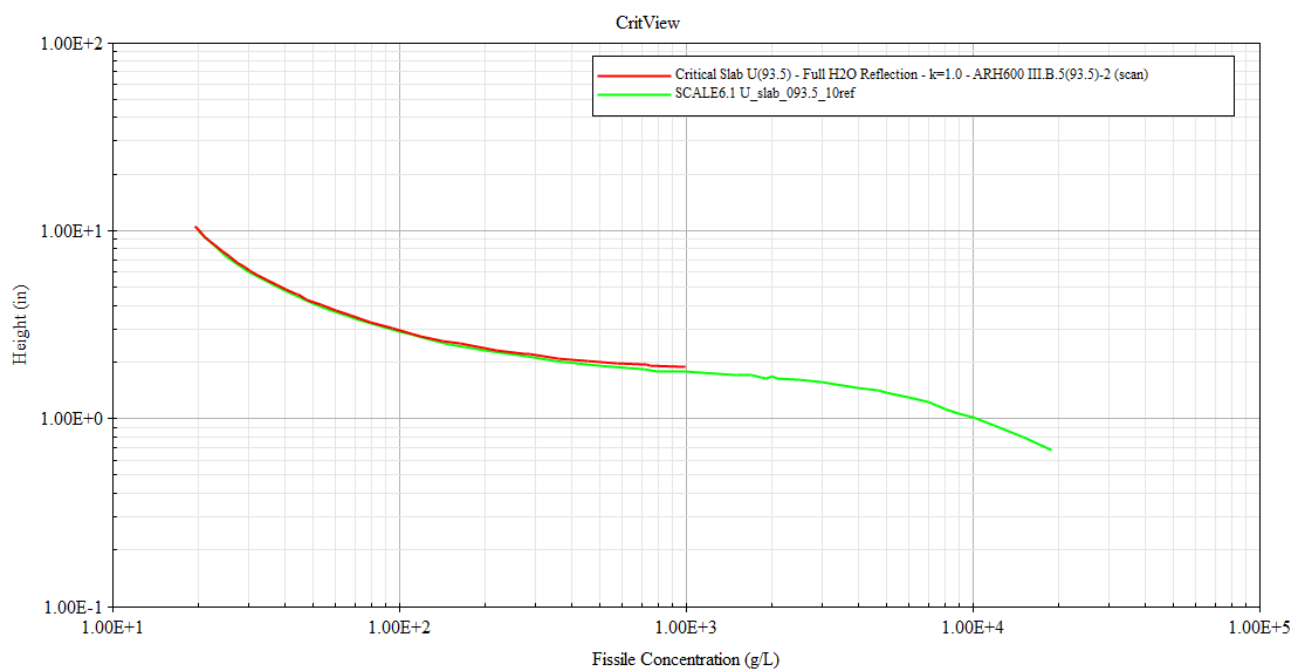
Isotopics: 93.5% ^{235}U 6.5% ^{238}U

Reflector: 10" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



²³⁵ U Slab (93.5% ²³⁵ U) - 10 Inches of Water Reflection				
Concentration (g/cc)	First Height (Inches)	Last Height (Inches)	Delta (Inches)	Critical Height (Inches)
0.020	7.600	10.500	0.100	9.9692
0.025	5.900	7.700	0.100	7.3113
0.030	5.000	6.300	0.050	6.0543
0.040	4.000	5.000	0.050	4.7750
0.045	3.700	4.600	0.050	4.3815
0.050	3.400	4.300	0.050	4.1161
0.055	3.200	4.100	0.050	3.8712
0.060	3.100	3.900	0.050	3.7065
0.065	2.900	3.700	0.050	3.5481
0.070	2.800	3.600	0.050	3.3877
0.080	2.700	3.400	0.050	3.2091
0.100	2.400	3.100	0.050	2.9011
0.130	2.200	2.800	0.050	2.6336
0.150	2.100	2.700	0.050	2.4862
0.170	2.000	2.600	0.050	2.4149
0.200	1.900	2.500	0.050	2.3011
0.350	1.600	2.200	0.050	2.0244
0.500	1.500	2.100	0.050	1.9156
0.800	1.400	2.000	0.050	1.7860
1.000	1.400	1.900	0.020	1.7806
1.500	1.300	1.900	0.050	1.6933
1.700	1.300	1.900	0.050	1.6985
1.900	1.300	1.900	0.050	1.6394
2.000	1.200	1.800	0.050	1.6697
2.100	1.200	1.800	0.050	1.6415
2.500	1.200	1.800	0.050	1.6036
3.000	1.200	1.700	0.020	1.5715
4.000	1.100	1.600	0.020	1.4638
5.000	1.000	1.600	0.050	1.3713
6.000	0.900	1.500	0.050	1.3025
7.000	0.900	1.400	0.020	1.2256
7.500	0.800	1.300	0.020	1.1700
8.000	0.800	1.300	0.020	1.1194
9.000	0.800	1.200	0.020	1.0676
10.000	0.700	1.200	0.020	1.0181
15.000	0.500	0.900	0.020	0.7953
18.900	0.500	0.800	0.020	0.6793

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Worm generated by Natalie 6/28/21
'In this case, Diameter is thickness of slab
'Recreating data from PRC-NS-00009 B-816 (pdf pg834)
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1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9,10,15,18.9> g/cc
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'Water Concentration = <wconc = 1-(critconc/critdens)>
,
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#Ending Diameter = <@enddia =
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#Delta = <@delta =
0.1,0.1,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.02,
0.05,0.05,0.05,0.05,0.05,0.05,0.02,0.02,0.05,0.05,0.02,0.02,0.02,0.02,0.02,0.02> in
,
'Reflector Thickness {{refthick = 10}}
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>)}} in
'Reflector Diameter = {{refdia = (diameter+2*refthick)}}
,
,
=csas6
template
v7-238
read composition
u          1 den=<critconc> 1 300
                                92235 93.5
                                92238 6.5   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
h2o          2 1 300   end
end composition
read parameter
htm=yes
end parameter
read geometry
global unit 1
com="Slab"
cuboid 1      {{(diameter*in)/2}}      {{(-1*diameter*in)/2}}      10      -10      10      -10
cuboid 2      {{(refdia*in)/2}}      {{(-1*refdia*in)/2}}      10      -10      10      -10
media 1 1 1
media 2 1 2 -1
boundary 2
end geometry
read bnds
body=2
surface(1)=vacuum
surface(2)=vacuum
surface(3)=mirror
surface(4)=mirror
surface(5)=mirror
surface(6)=mirror
end bnds
end data
end

<perl>
sub ZEROCHECK
{
if ($ [0] == 0){

```

```
        return '\';  
    }  
}  
</perl>
```

CritView compatible data file

```
reset:
title: Critical Slab; U; 10" Water Reflector; 93.5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: infplane
modmat: H2O
fiss-element: Uranium
fiss-form: Elemental
critmat: U (elemental)
isomat: U235 0.935 U238 0.065
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: height in
0.020 9.9692
0.025 7.3113
0.030 6.0543
0.040 4.7750
0.045 4.3815
0.050 4.1161
0.055 3.8712
0.060 3.7065
0.065 3.5481
0.070 3.3877
0.080 3.2091
0.100 2.9011
0.130 2.6336
0.150 2.4862
0.170 2.4149
0.200 2.3011
0.350 2.0244
0.500 1.9156
0.800 1.7860
1.000 1.7806
1.500 1.6933
1.700 1.6985
1.900 1.6394
2.000 1.6697
2.100 1.6415
2.500 1.6036
3.000 1.5715
4.000 1.4638
5.000 1.3713
6.000 1.3025
7.000 1.2256
7.500 1.1700
8.000 1.1194
9.000 1.0676
10.000 1.0181
15.000 0.7953
18.900 0.6793
```

20 milli-g/cc			25 milli-g/cc			30 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
7.60	0.9232	0.00120	5.90	0.9250	0.00140	5.00	0.9230	0.00160
7.70	0.9267	0.00140	6.00	0.9308	0.00190	5.05	0.9295	0.00150
7.80	0.9345	0.00170	6.10	0.9360	0.00140	5.10	0.9338	0.00140
7.90	0.9343	0.00130	6.20	0.9432	0.00140	5.15	0.9351	0.00150
8.00	0.9387	0.00140	6.30	0.9481	0.00150	5.20	0.9429	0.00140
8.10	0.9428	0.00130	6.40	0.9539	0.00160	5.25	0.9454	0.00150
8.20	0.9452	0.00110	6.50	0.9577	0.00160	5.30	0.9475	0.00150
8.30	0.9486	0.00130	6.60	0.9630	0.00140	5.35	0.9522	0.00150
8.40	0.9540	0.00170	6.70	0.9686	0.00130	5.40	0.9567	0.00170
8.50	0.9554	0.00130	6.80	0.9775	0.00130	5.45	0.9610	0.00160
8.60	0.9601	0.00110	6.90	0.9793	0.00130	5.50	0.9628	0.00160
8.70	0.9634	0.00120	7.00	0.9844	0.00130	5.55	0.9656	0.00150
8.80	0.9654	0.00110	7.10	0.9909	0.00150	5.60	0.9692	0.00130
8.90	0.9703	0.00120	7.20	0.9924	0.00140	5.65	0.9731	0.00140
9.00	0.9727	0.00130	7.30	0.9993	0.00140	5.70	0.9770	0.00180
9.10	0.9758	0.00120	7.40	1.0055	0.00130	5.75	0.9811	0.00140
9.20	0.9781	0.00140	7.50	1.0083	0.00130	5.80	0.9841	0.00160
9.30	0.9837	0.00130	7.60	1.0109	0.00160	5.85	0.9868	0.00150
9.40	0.9841	0.00130	7.70	1.0154	0.00140	5.90	0.9909	0.00180
9.50	0.9875	0.00140				5.95	0.9932	0.00190
9.60	0.9889	0.00130				6.00	0.9966	0.00150
9.70	0.9923	0.00130				6.05	0.9998	0.00150
9.80	0.9968	0.00140				6.10	1.0021	0.00150
9.90	0.9982	0.00110				6.15	1.0019	0.00200
10.00	1.0008	0.00110				6.20	1.0093	0.00150
10.10	1.0015	0.00130				6.25	1.0139	0.00150
10.20	1.0070	0.00130				6.30	1.0159	0.00180
10.30	1.0087	0.00120						
10.40	1.0115	0.00110						
10.50	1.0119	0.00140						

40 milli-g/cc			45 milli-g/cc			50 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
4.00	0.9259	0.00180	3.70	0.9256	0.00170	3.40	0.9175	0.00180
4.05	0.9336	0.00160	3.75	0.9276	0.00180	3.45	0.9220	0.00160
4.10	0.9350	0.00220	3.80	0.9380	0.00190	3.50	0.9308	0.00180
4.15	0.9398	0.00170	3.85	0.9410	0.00150	3.55	0.9361	0.00170
4.20	0.9452	0.00190	3.90	0.9482	0.00170	3.60	0.9441	0.00190
4.25	0.9527	0.00190	3.95	0.9522	0.00170	3.65	0.9493	0.00170
4.30	0.9530	0.00170	4.00	0.9587	0.00180	3.70	0.9519	0.00170
4.35	0.9634	0.00210	4.05	0.9669	0.00160	3.75	0.9608	0.00160
4.40	0.9645	0.00220	4.10	0.9690	0.00210	3.80	0.9689	0.00210
4.45	0.9701	0.00150	4.15	0.9730	0.00190	3.85	0.9709	0.00160
4.50	0.9746	0.00200	4.20	0.9818	0.00160	3.90	0.9769	0.00180
4.55	0.9820	0.00160	4.25	0.9861	0.00190	3.95	0.9826	0.00190
4.60	0.9837	0.00150	4.30	0.9883	0.00180	4.00	0.9913	0.00200
4.65	0.9888	0.00160	4.35	0.9949	0.00150	4.05	0.9913	0.00190
4.70	0.9951	0.00170	4.40	1.0030	0.00180	4.10	0.9973	0.00170
4.75	0.9965	0.00160	4.45	1.0043	0.00170	4.15	1.0057	0.00160
4.80	1.0035	0.00160	4.50	1.0058	0.00160	4.20	1.0063	0.00170
4.85	1.0050	0.00170	4.55	1.0125	0.00180	4.25	1.0152	0.00170
4.90	1.0119	0.00160	4.60	1.0183	0.00180	4.30	1.0182	0.00170
4.95	1.0155	0.00150						
5.00	1.0166	0.00160						

55 milli-g/cc			60 milli-g/cc			65 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
3.20	0.9168	0.00190	3.10	0.9216	0.00170	2.90	0.9096	0.00190
3.25	0.9230	0.00180	3.15	0.9312	0.00220	2.95	0.9198	0.00190
3.30	0.9310	0.00160	3.20	0.9361	0.00180	3.00	0.9297	0.00180
3.35	0.9333	0.00170	3.25	0.9451	0.00170	3.05	0.9344	0.00190
3.40	0.9437	0.00230	3.30	0.9502	0.00220	3.10	0.9425	0.00170
3.45	0.9449	0.00200	3.35	0.9583	0.00180	3.15	0.9502	0.00180
3.50	0.9585	0.00200	3.40	0.9629	0.00190	3.20	0.9606	0.00180
3.55	0.9601	0.00160	3.45	0.9720	0.00170	3.25	0.9650	0.00190
3.60	0.9669	0.00170	3.50	0.9751	0.00250	3.30	0.9687	0.00170
3.65	0.9738	0.00180	3.55	0.9777	0.00170	3.35	0.9761	0.00180
3.70	0.9802	0.00170	3.60	0.9865	0.00170	3.40	0.9812	0.00170
3.75	0.9848	0.00190	3.65	0.9963	0.00170	3.45	0.9873	0.00170
3.80	0.9928	0.00190	3.70	0.9993	0.00190	3.50	0.9949	0.00170
3.85	0.9978	0.00180	3.75	1.0047	0.00200	3.55	1.0002	0.00230
3.90	1.0030	0.00170	3.80	1.0120	0.00160	3.60	1.0106	0.00180
3.95	1.0058	0.00210	3.85	1.0200	0.00190	3.65	1.0130	0.00190
4.00	1.0103	0.00170	3.90	1.0191	0.00210	3.70	1.0215	0.00210
4.05	1.0181	0.00170						
4.10	1.0238	0.00170						

70 milli-g/cc			80 milli-g/cc			100 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.80	0.9143	0.00170	2.70	0.9237	0.00180	2.40	0.9175	0.00200
2.85	0.9227	0.00240	2.75	0.9340	0.00190	2.45	0.9269	0.00190
2.90	0.9297	0.00170	2.80	0.9416	0.00200	2.50	0.9377	0.00190
2.95	0.9337	0.00220	2.85	0.9510	0.00200	2.55	0.9453	0.00170
3.00	0.9422	0.00200	2.90	0.9585	0.00210	2.60	0.9548	0.00180
3.05	0.9525	0.00180	2.95	0.9659	0.00190	2.65	0.9649	0.00170
3.10	0.9587	0.00200	3.00	0.9715	0.00240	2.70	0.9703	0.00190
3.15	0.9650	0.00210	3.05	0.9802	0.00240	2.75	0.9770	0.00200
3.20	0.9727	0.00200	3.10	0.9872	0.00210	2.80	0.9850	0.00190
3.25	0.9788	0.00170	3.15	0.9957	0.00200	2.85	0.9942	0.00180
3.30	0.9893	0.00180	3.20	0.9985	0.00180	2.90	0.9999	0.00230
3.35	0.9960	0.00190	3.25	1.0067	0.00210	2.95	1.0044	0.00210
3.40	1.0013	0.00180	3.30	1.0123	0.00220	3.00	1.0136	0.00220
3.45	1.0045	0.00170	3.35	1.0223	0.00190	3.05	1.0218	0.00170
3.50	1.0068	0.00190	3.40	1.0258	0.00190	3.10	1.0286	0.00220
3.55	1.0137	0.00230						
3.60	1.0250	0.00220						

130 milli-g/cc			150 milli-g/cc			170 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
2.20	0.9271	0.00210	2.10	0.9302	0.00200	2.00	0.9278	0.00190
2.25	0.9375	0.00200	2.15	0.9381	0.00200	2.05	0.9374	0.00190
2.30	0.9476	0.00180	2.20	0.9461	0.00220	2.10	0.9456	0.00230
2.35	0.9568	0.00210	2.25	0.9571	0.00210	2.15	0.9542	0.00220
2.40	0.9613	0.00200	2.30	0.9703	0.00220	2.20	0.9642	0.00210
2.45	0.9721	0.00220	2.35	0.9740	0.00200	2.25	0.9734	0.00200
2.50	0.9803	0.00190	2.40	0.9853	0.00250	2.30	0.9826	0.00230
2.55	0.9893	0.00190	2.45	0.9892	0.00200	2.35	0.9891	0.00190
2.60	0.9955	0.00200	2.50	1.0041	0.00210	2.40	0.9975	0.00230
2.65	1.0022	0.00190	2.55	1.0072	0.00240	2.45	1.0059	0.00230
2.70	1.0113	0.00210	2.60	1.0179	0.00240	2.50	1.0159	0.00190
2.75	1.0175	0.00250	2.65	1.0236	0.00190	2.55	1.0251	0.00190
2.80	1.0305	0.00210	2.70	1.0311	0.00230	2.60	1.0325	0.00190

200 milli-g/cc			350 milli-g/cc			500 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
1.90	0.9255	0.00200	1.60	0.9157	0.00200	1.50	0.9199	0.00230
1.95	0.9340	0.00220	1.65	0.9266	0.00200	1.55	0.9287	0.00220
2.00	0.9445	0.00200	1.70	0.9356	0.00200	1.60	0.9402	0.00200
2.05	0.9534	0.00210	1.75	0.9483	0.00200	1.65	0.9507	0.00220
2.10	0.9623	0.00190	1.80	0.9598	0.00200	1.70	0.9611	0.00200
2.15	0.9721	0.00210	1.85	0.9646	0.00220	1.75	0.9707	0.00210
2.20	0.9798	0.00280	1.90	0.9777	0.00220	1.80	0.9763	0.00190
2.25	0.9926	0.00290	1.95	0.9864	0.00220	1.85	0.9885	0.00190
2.30	0.9998	0.00190	2.00	0.9960	0.00220	1.90	0.9967	0.00200
2.35	1.0085	0.00220	2.05	1.0042	0.00200	1.95	1.0073	0.00220
2.40	1.0170	0.00240	2.10	1.0104	0.00210	2.00	1.0189	0.00200
2.45	1.0268	0.00270	2.15	1.0199	0.00230	2.05	1.0247	0.00210
2.50	1.0316	0.00240	2.20	1.0332	0.00240	2.10	1.0326	0.00180

800 milli-g/cc			1000 milli-g/cc			1500 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
1.40	0.9209	0.00210	1.40	0.9326	0.00230	1.30	0.9257	0.00250
1.45	0.9359	0.00210	1.42	0.9345	0.00210	1.35	0.9359	0.00190
1.50	0.9432	0.00200	1.44	0.9386	0.00210	1.40	0.9425	0.00230
1.55	0.9486	0.00250	1.46	0.9450	0.00200	1.45	0.9543	0.00200
1.60	0.9659	0.00230	1.48	0.9461	0.00200	1.50	0.9665	0.00200
1.65	0.9715	0.00190	1.50	0.9484	0.00250	1.55	0.9704	0.00220
1.70	0.9808	0.00230	1.52	0.9568	0.00240	1.60	0.9815	0.00200
1.75	0.9905	0.00190	1.54	0.9577	0.00210	1.65	0.9910	0.00210
1.80	1.0037	0.00210	1.56	0.9619	0.00270	1.70	1.0014	0.00250
1.85	1.0077	0.00220	1.58	0.9669	0.00220	1.75	1.0071	0.00180
1.90	1.0152	0.00200	1.60	0.9717	0.00210	1.80	1.0156	0.00190
1.95	1.0260	0.00220	1.62	0.9716	0.00210	1.85	1.0208	0.00200
2.00	1.0324	0.00190	1.64	0.9759	0.00210	1.90	1.0300	0.00190
			1.66	0.9783	0.00210			
			1.68	0.9865	0.00200			
			1.70	0.9897	0.00240			
			1.72	0.9933	0.00190			
			1.74	0.9895	0.00200			
			1.76	0.9968	0.00230			
			1.78	0.9997	0.00200			
			1.80	1.0093	0.00220			
			1.82	1.0071	0.00210			
			1.84	1.0128	0.00200			
			1.86	1.0130	0.00200			
			1.88	1.0190	0.00220			
			1.90	1.0221	0.00200			

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
1.30	0.9266	0.00190	1.30	0.9366	0.00190	1.20	0.9209	0.00210
1.35	0.9418	0.00220	1.35	0.9427	0.00190	1.25	0.9255	0.00240
1.40	0.9519	0.00220	1.40	0.9543	0.00210	1.30	0.9378	0.00200
1.45	0.9615	0.00230	1.45	0.9621	0.00180	1.35	0.9444	0.00210
1.50	0.9667	0.00190	1.50	0.9742	0.00190	1.40	0.9561	0.00290
1.55	0.9792	0.00210	1.55	0.9803	0.00260	1.45	0.9647	0.00200
1.60	0.9855	0.00190	1.60	0.9903	0.00230	1.50	0.9743	0.00230
1.65	0.9937	0.00190	1.65	1.0026	0.00200	1.55	0.9827	0.00210
1.70	1.0002	0.00200	1.70	1.0053	0.00210	1.60	0.9895	0.00210
1.75	1.0139	0.00200	1.75	1.0145	0.00170	1.65	0.9961	0.00200
1.80	1.0163	0.00180	1.80	1.0224	0.00200	1.70	1.0060	0.00210
1.85	1.0274	0.00210	1.85	1.0296	0.00230	1.75	1.0157	0.00210
1.90	1.0350	0.00220	1.90	1.0375	0.00220	1.80	1.0274	0.00240

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
1.20	0.9210	0.00160	1.20	0.9258	0.00220	1.20	0.9373	0.00190
1.25	0.9294	0.00200	1.25	0.9388	0.00250	1.22	0.9397	0.00190
1.30	0.9403	0.00190	1.30	0.9454	0.00190	1.24	0.9414	0.00210
1.35	0.9468	0.00200	1.35	0.9531	0.00230	1.26	0.9475	0.00200
1.40	0.9581	0.00220	1.40	0.9637	0.00200	1.28	0.9512	0.00190
1.45	0.9683	0.00210	1.45	0.9705	0.00250	1.30	0.9520	0.00200
1.50	0.9749	0.00210	1.50	0.9792	0.00180	1.32	0.9570	0.00190
1.55	0.9860	0.00200	1.55	0.9927	0.00200	1.34	0.9629	0.00190
1.60	0.9903	0.00220	1.60	0.9995	0.00220	1.36	0.9665	0.00180
1.65	1.0020	0.00200	1.65	1.0064	0.00190	1.38	0.9720	0.00200
1.70	1.0105	0.00220	1.70	1.0165	0.00260	1.40	0.9731	0.00190
1.75	1.0196	0.00200	1.75	1.0232	0.00210	1.42	0.9730	0.00200
1.80	1.0243	0.00200	1.80	1.0318	0.00210	1.44	0.9803	0.00200
						1.46	0.9830	0.00210
						1.48	0.9868	0.00190
						1.50	0.9917	0.00200
						1.52	0.9926	0.00200
						1.54	0.9952	0.00200
						1.56	0.9954	0.00250
						1.58	1.0034	0.00180
						1.60	1.0083	0.00180
						1.62	1.0123	0.00200
						1.64	1.0153	0.00190
						1.66	1.0175	0.00190
						1.68	1.0198	0.00200
						1.70	1.0244	0.00180

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
1.10	0.9314	0.00200	1.00	0.9232	0.00200	0.90	0.9194	0.00220
1.12	0.9339	0.00190	1.05	0.9362	0.00200	0.95	0.9303	0.00200
1.14	0.9392	0.00190	1.10	0.9454	0.00230	1.00	0.9406	0.00200
1.16	0.9449	0.00210	1.15	0.9596	0.00260	1.05	0.9518	0.00190
1.18	0.9498	0.00180	1.20	0.9669	0.00180	1.10	0.9615	0.00190
1.20	0.9525	0.00200	1.25	0.9754	0.00180	1.15	0.9719	0.00170
1.22	0.9555	0.00230	1.30	0.9866	0.00190	1.20	0.9804	0.00200
1.24	0.9576	0.00210	1.35	0.9949	0.00170	1.25	0.9896	0.00200
1.26	0.9629	0.00190	1.40	1.0069	0.00180	1.30	0.9994	0.00180
1.28	0.9667	0.00170	1.45	1.0117	0.00180	1.35	1.0113	0.00190
1.30	0.9711	0.00190	1.50	1.0208	0.00180	1.40	1.0186	0.00210
1.32	0.9749	0.00180	1.55	1.0333	0.00180	1.45	1.0272	0.00190
1.34	0.9810	0.00210	1.60	1.0360	0.00230	1.50	1.0407	0.00200
1.36	0.9819	0.00210						
1.38	0.9803	0.00180						
1.40	0.9845	0.00220						
1.42	0.9909	0.00190						
1.44	0.9978	0.00190						
1.46	0.9995	0.00180						
1.48	1.0021	0.00200						
1.50	1.0070	0.00180						
1.52	1.0073	0.00200						
1.54	1.0140	0.00200						
1.56	1.0161	0.00210						
1.58	1.0185	0.00190						
1.60	1.0254	0.00200						

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
0.90	0.9306	0.00190	0.80	0.9148	0.00200	0.80	0.9195	0.00180
0.92	0.9362	0.00180	0.82	0.9194	0.00190	0.82	0.9266	0.00190
0.94	0.9415	0.00200	0.84	0.9230	0.00180	0.84	0.9296	0.00170
0.96	0.9430	0.00160	0.86	0.9323	0.00180	0.86	0.9347	0.00190
0.98	0.9499	0.00170	0.88	0.9361	0.00210	0.88	0.9406	0.00250
1.00	0.9568	0.00190	0.90	0.9388	0.00190	0.90	0.9452	0.00190
1.02	0.9635	0.00190	0.92	0.9439	0.00190	0.92	0.9535	0.00210
1.04	0.9668	0.00160	0.94	0.9462	0.00190	0.94	0.9541	0.00200
1.06	0.9689	0.00170	0.96	0.9499	0.00190	0.96	0.9576	0.00180
1.08	0.9702	0.00220	0.98	0.9543	0.00180	0.98	0.9662	0.00180
1.10	0.9743	0.00210	1.00	0.9603	0.00180	1.00	0.9709	0.00190
1.12	0.9793	0.00170	1.02	0.9671	0.00200	1.02	0.9727	0.00210
1.14	0.9804	0.00300	1.04	0.9700	0.00180	1.04	0.9742	0.00180
1.16	0.9924	0.00180	1.06	0.9731	0.00230	1.06	0.9838	0.00170
1.18	0.9920	0.00190	1.08	0.9797	0.00180	1.08	0.9871	0.00190
1.20	0.9962	0.00180	1.10	0.9813	0.00170	1.10	0.9896	0.00170
1.22	0.9976	0.00220	1.12	0.9911	0.00180	1.12	1.0003	0.00190
1.24	1.0062	0.00170	1.14	0.9949	0.00190	1.14	1.0020	0.00180
1.26	1.0057	0.00190	1.16	0.9988	0.00180	1.16	1.0032	0.00180
1.28	1.0131	0.00180	1.18	1.0012	0.00170	1.18	1.0024	0.00260
1.30	1.0128	0.00190	1.20	1.0061	0.00190	1.20	1.0105	0.00200
1.32	1.0182	0.00170	1.22	1.0078	0.00170	1.22	1.0135	0.00190
1.34	1.0257	0.00200	1.24	1.0133	0.00190	1.24	1.0208	0.00190
1.36	1.0257	0.00170	1.26	1.0182	0.00170	1.26	1.0230	0.00190
1.38	1.0301	0.00180	1.28	1.0256	0.00180	1.28	1.0283	0.00180
1.40	1.0339	0.00200	1.30	1.0222	0.00190	1.30	1.0338	0.00190

9000 milli-g/cc			10000 milli-g/cc			15000 milli-g/cc		
Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma	Height (Inches)	K _{eff}	Sigma
0.80	0.9309	0.00170	0.70	0.9167	0.00210	0.50	0.9019	0.00170
0.82	0.9417	0.00230	0.72	0.9260	0.00180	0.52	0.9066	0.00170
0.84	0.9434	0.00170	0.74	0.9280	0.00240	0.54	0.9155	0.00190
0.86	0.9509	0.00210	0.76	0.9354	0.00160	0.56	0.9229	0.00190
0.88	0.9513	0.00190	0.78	0.9404	0.00180	0.58	0.9297	0.00180
0.90	0.9555	0.00210	0.80	0.9475	0.00190	0.60	0.9394	0.00190
0.92	0.9622	0.00180	0.82	0.9484	0.00200	0.62	0.9434	0.00180
0.94	0.9653	0.00190	0.84	0.9538	0.00170	0.64	0.9486	0.00180
0.96	0.9688	0.00170	0.86	0.9582	0.00180	0.66	0.9572	0.00210
0.98	0.9756	0.00170	0.88	0.9664	0.00180	0.68	0.9655	0.00190
1.00	0.9822	0.00170	0.90	0.9693	0.00200	0.70	0.9719	0.00180
1.02	0.9888	0.00190	0.92	0.9740	0.00200	0.72	0.9745	0.00190
1.04	0.9922	0.00220	0.94	0.9795	0.00220	0.74	0.9799	0.00190
1.06	0.9963	0.00220	0.96	0.9834	0.00190	0.76	0.9873	0.00180
1.08	1.0060	0.00210	0.98	0.9906	0.00170	0.78	0.9955	0.00250
1.10	1.0061	0.00230	1.00	0.9934	0.00180	0.80	1.0014	0.00190
1.12	1.0076	0.00180	1.02	1.0007	0.00190	0.82	1.0090	0.00180
1.14	1.0122	0.00160	1.04	1.0023	0.00210	0.84	1.0084	0.00200
1.16	1.0164	0.00180	1.06	1.0090	0.00170	0.86	1.0190	0.00220
1.18	1.0235	0.00190	1.08	1.0149	0.00200	0.88	1.0237	0.00180
1.20	1.0224	0.00180	1.10	1.0176	0.00170	0.90	1.0290	0.00180
			1.12	1.0197	0.00200			
			1.14	1.0293	0.00170			
			1.16	1.0339	0.00200			
			1.18	1.0347	0.00190			
			1.20	1.0400	0.00200			

18900 milli-g/cc		
Height (Inches)	K _{eff}	Sigma
0.50	0.9311	0.00220
0.52	0.9406	0.00190
0.54	0.9488	0.00160
0.56	0.9566	0.00220
0.58	0.9643	0.00170
0.60	0.9724	0.00240
0.62	0.9763	0.00190
0.64	0.9864	0.00200
0.66	0.9914	0.00160
0.68	1.0003	0.00190
0.70	1.0058	0.00210
0.72	1.0155	0.00180
0.74	1.0153	0.00160
0.76	1.0278	0.00170
0.78	1.0320	0.00160
0.80	1.0400	0.00210

UO₂-sphere-6 (Cases with 0", 1", 10" Reflector)

Case ID: UO2_sphere_006_00ref

Material: Uranium dioxide in water

Weight Fraction U in UO₂: 0.88143

Geometry: Sphere

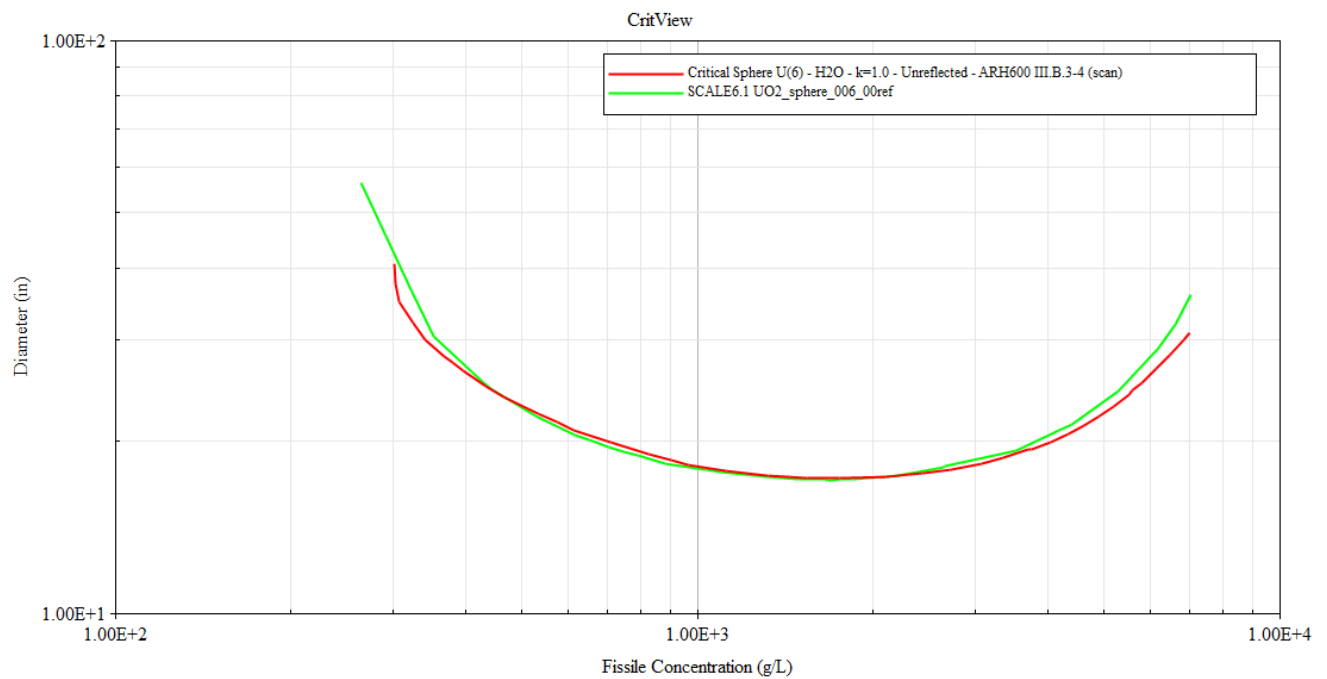
Isotopics: 6% ²³⁵U 94% ²³⁸U

Reflector: Unreflected

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere (6.0% ²³⁵ U) - 0 Inches of Water Reflection					
UO2 Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.300	0.26443	34.900	63.100	1.400	56.5255
0.400	0.35257	24.300	32.200	0.400	30.4194
0.500	0.44072	20.800	25.700	0.200	24.6408
0.600	0.52886	19.100	23.100	0.200	22.1132
0.700	0.61700	18.100	21.400	0.100	20.4673
0.800	0.70514	17.300	20.100	0.100	19.5049
0.850	0.74922	17.100	19.800	0.100	19.1313
0.900	0.79329	16.800	19.500	0.100	18.8571
1.000	0.88143	16.400	19.100	0.100	18.2677
1.250	1.10179	15.800	18.400	0.100	17.6000
1.500	1.32215	15.600	18.200	0.100	17.3092
1.700	1.49843	15.400	18.000	0.100	17.1514
1.900	1.67472	15.400	18.000	0.100	17.0404
2.000	1.76286	15.400	18.000	0.100	17.1288
2.100	1.85100	15.500	18.100	0.100	17.0952
2.500	2.20358	15.800	18.300	0.100	17.3821
3.000	2.64429	16.200	18.800	0.100	17.9981
4.000	3.52572	17.500	20.200	0.100	19.2139
5.000	4.40715	19.200	22.800	0.100	21.4067
6.000	5.28858	21.600	25.800	0.200	24.4073
7.000	6.17001	24.700	30.600	0.300	28.8744
7.500	6.61073	27.300	34.400	0.300	31.8629
8.000	7.05144	29.700	39.500	0.500	36.0462

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-836 (pdf pg854)
,
#index number = <index = 1:23:1>
,
#UO2 Concentration = <@conc =
0.3,0.4,0.5,0.6,0.7,0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
34.9,24.3,20.8,19.1,18.1,17.3,17.1,16.8,16.4,15.8,15.6,15.4,15.4,15.4,15.5,15.8,16.2,17.5,19.2,21
.6,24.7,27.3,29.7> in
#Ending Diameter = <@enddia =
63.1,32.2,25.7,23.1,21.4,20.1,19.8,19.5,19.1,18.4,18.2,18,18,18,18.1,18.3,18.8,20.2,22.8,25.8,30.
6,34.4,39.5> in
#Delta = <@delta =
1.4,0.4,0.2,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.2,0.3,0.3,0.5> in
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Unreflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                                92235 6
                                92238 94 end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300 end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Unreflected UO2 Sphere"
  sphere 1      {{(diameter*in)/2}}
  media 1 1 1
  boundary 1
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; Unreflected; 6% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.06 U238 0.94
reflmat: None
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.264 56.5255
0.353 30.4194
0.441 24.6408
0.529 22.1132
0.617 20.4673
0.705 19.5049
0.749 19.1313
0.793 18.8571
0.881 18.2677
1.102 17.6000
1.322 17.3092
1.498 17.1514
1.675 17.0404
1.763 17.1288
1.851 17.0952
2.204 17.3821
2.644 17.9981
3.526 19.2139
4.407 21.4067
5.289 24.4073
6.170 28.8744
6.611 31.8629
7.051 36.0462
```

300 milli-g/cc			400 milli-g/cc			500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
34.90	0.9294	0.00180	24.30	0.9254	0.00200	20.80	0.9265	0.00190
36.30	0.9367	0.00130	24.70	0.9337	0.00150	21.00	0.9262	0.00190
37.70	0.9467	0.00130	25.10	0.9358	0.00150	21.20	0.9346	0.00250
39.10	0.9510	0.00140	25.50	0.9473	0.00160	21.40	0.9399	0.00150
40.50	0.9560	0.00150	25.90	0.9496	0.00150	21.60	0.9424	0.00200
41.90	0.9642	0.00170	26.30	0.9544	0.00180	21.80	0.9490	0.00150
43.30	0.9696	0.00140	26.70	0.9563	0.00150	22.00	0.9544	0.00170
44.70	0.9745	0.00140	27.10	0.9655	0.00170	22.20	0.9574	0.00170
46.10	0.9805	0.00110	27.50	0.9715	0.00160	22.40	0.9627	0.00160
47.50	0.9820	0.00120	27.90	0.9749	0.00150	22.60	0.9643	0.00180
48.90	0.9857	0.00160	28.30	0.9767	0.00170	22.80	0.9686	0.00170
50.30	0.9872	0.00110	28.70	0.9831	0.00170	23.00	0.9703	0.00210
51.70	0.9933	0.00160	29.10	0.9845	0.00200	23.20	0.9754	0.00180
53.10	0.9936	0.00130	29.50	0.9939	0.00170	23.40	0.9775	0.00210
54.50	0.9972	0.00120	29.90	0.9973	0.00140	23.60	0.9810	0.00210
55.90	0.9979	0.00120	30.30	0.9980	0.00220	23.80	0.9851	0.00150
57.30	1.0026	0.00110	30.70	1.0047	0.00160	24.00	0.9904	0.00220
58.70	1.0042	0.00110	31.10	1.0053	0.00160	24.20	0.9930	0.00190
60.10	1.0095	0.00130	31.50	1.0062	0.00130	24.40	0.9957	0.00200
61.50	1.0112	0.00120	31.90	1.0132	0.00140	24.60	0.9980	0.00170
62.90	1.0117	0.00110	32.20	1.0198	0.00120	24.80	1.0078	0.00190
63.10	1.0117	0.00150				25.00	1.0047	0.00150
						25.20	1.0106	0.00180
						25.40	1.0090	0.00190
						25.60	1.0156	0.00160
						25.70	1.0141	0.00160

600 milli-g/cc			700 milli-g/cc			800 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
19.10	0.9285	0.00180	18.10	0.9330	0.00200	17.30	0.9268	0.00180
19.30	0.9354	0.00150	18.20	0.9352	0.00230	17.40	0.9338	0.00170
19.50	0.9378	0.00240	18.30	0.9391	0.00230	17.50	0.9371	0.00200
19.70	0.9461	0.00200	18.40	0.9427	0.00180	17.60	0.9411	0.00210
19.90	0.9504	0.00180	18.50	0.9441	0.00180	17.70	0.9446	0.00190
20.10	0.9528	0.00190	18.60	0.9510	0.00240	17.80	0.9505	0.00210
20.30	0.9581	0.00180	18.70	0.9547	0.00160	17.90	0.9544	0.00220
20.50	0.9700	0.00180	18.80	0.9551	0.00160	18.00	0.9567	0.00180
20.70	0.9707	0.00190	18.90	0.9568	0.00240	18.10	0.9627	0.00170
20.90	0.9765	0.00210	19.00	0.9607	0.00200	18.20	0.9612	0.00230
21.10	0.9814	0.00210	19.10	0.9622	0.00220	18.30	0.9611	0.00230
21.30	0.9833	0.00190	19.20	0.9613	0.00200	18.40	0.9698	0.00180
21.50	0.9932	0.00220	19.30	0.9703	0.00170	18.50	0.9713	0.00170
21.70	0.9912	0.00200	19.40	0.9726	0.00190	18.60	0.9740	0.00250
21.90	0.9992	0.00200	19.50	0.9731	0.00250	18.70	0.9797	0.00210
22.10	0.9995	0.00180	19.60	0.9783	0.00200	18.80	0.9801	0.00190
22.30	1.0071	0.00200	19.70	0.9782	0.00210	18.90	0.9811	0.00210
22.50	1.0105	0.00220	19.80	0.9825	0.00180	19.00	0.9834	0.00180
22.70	1.0136	0.00180	19.90	0.9842	0.00180	19.10	0.9903	0.00230
22.90	1.0177	0.00230	20.00	0.9895	0.00260	19.20	0.9927	0.00170
23.10	1.0206	0.00160	20.10	0.9919	0.00180	19.30	0.9977	0.00220
			20.20	0.9950	0.00240	19.40	0.9978	0.00190
			20.30	0.9959	0.00160	19.50	0.9996	0.00240
			20.40	0.9967	0.00170	19.60	1.0078	0.00170
			20.50	1.0016	0.00200	19.70	1.0066	0.00180
			20.60	1.0034	0.00220	19.80	1.0088	0.00210
			20.70	1.0021	0.00220	19.90	1.0125	0.00210
			20.80	1.0078	0.00190	20.00	1.0141	0.00210
			20.90	1.0114	0.00200	20.10	1.0205	0.00260
			21.00	1.0126	0.00170			
			21.10	1.0152	0.00170			
			21.20	1.0192	0.00190			
			21.30	1.0197	0.00220			
			21.40	1.0247	0.00170			

850 milli-g/cc			900 milli-g/cc			1000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.10	0.9354	0.00240	16.80	0.9308	0.00210	16.40	0.9318	0.00220
17.20	0.9386	0.00190	16.90	0.9359	0.00230	16.50	0.9355	0.00220
17.30	0.9417	0.00200	17.00	0.9420	0.00220	16.60	0.9441	0.00180
17.40	0.9472	0.00180	17.10	0.9422	0.00170	16.70	0.9454	0.00200
17.50	0.9486	0.00240	17.20	0.9479	0.00270	16.80	0.9483	0.00210
17.60	0.9501	0.00210	17.30	0.9488	0.00220	16.90	0.9515	0.00200
17.70	0.9612	0.00190	17.40	0.9531	0.00190	17.00	0.9551	0.00210
17.80	0.9597	0.00230	17.50	0.9566	0.00240	17.10	0.9595	0.00240
17.90	0.9613	0.00190	17.60	0.9601	0.00170	17.20	0.9653	0.00210
18.00	0.9672	0.00220	17.70	0.9673	0.00250	17.30	0.9693	0.00190
18.10	0.9705	0.00190	17.80	0.9699	0.00220	17.40	0.9676	0.00250
18.20	0.9739	0.00220	17.90	0.9722	0.00190	17.50	0.9716	0.00190
18.30	0.9780	0.00230	18.00	0.9746	0.00240	17.60	0.9748	0.00220
18.40	0.9771	0.00160	18.10	0.9787	0.00220	17.70	0.9802	0.00220
18.50	0.9801	0.00300	18.20	0.9807	0.00230	17.80	0.9883	0.00180
18.60	0.9908	0.00250	18.30	0.9887	0.00210	17.90	0.9906	0.00220
18.70	0.9887	0.00200	18.40	0.9914	0.00220	18.00	0.9920	0.00210
18.80	0.9957	0.00180	18.50	0.9945	0.00200	18.10	0.9909	0.00200
18.90	0.9949	0.00190	18.60	0.9944	0.00190	18.20	0.9958	0.00220
19.00	0.9975	0.00190	18.70	0.9936	0.00180	18.30	1.0020	0.00280
19.10	0.9980	0.00200	18.80	0.9980	0.00190	18.40	1.0046	0.00190
19.20	1.0044	0.00160	18.90	1.0015	0.00210	18.50	1.0035	0.00240
19.30	1.0070	0.00170	19.00	1.0050	0.00280	18.60	1.0079	0.00190
19.40	1.0112	0.00180	19.10	1.0089	0.00170	18.70	1.0129	0.00190
19.50	1.0144	0.00200	19.20	1.0131	0.00170	18.80	1.0135	0.00220
19.60	1.0122	0.00210	19.30	1.0124	0.00210	18.90	1.0192	0.00280
19.70	1.0161	0.00170	19.40	1.0216	0.00210	19.00	1.0219	0.00240
19.80	1.0217	0.00170	19.50	1.0222	0.00210	19.10	1.0268	0.00280

1250 milli-g/cc			1500 milli-g/cc			1700 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
15.80	0.9316	0.00220	15.60	0.9331	0.00260	15.40	0.9292	0.00230
15.90	0.9302	0.00230	15.70	0.9373	0.00200	15.50	0.9301	0.00190
16.00	0.9423	0.00200	15.80	0.9410	0.00190	15.60	0.9340	0.00200
16.10	0.9411	0.00220	15.90	0.9462	0.00180	15.70	0.9440	0.00220
16.20	0.9485	0.00180	16.00	0.9528	0.00270	15.80	0.9486	0.00240
16.30	0.9523	0.00190	16.10	0.9556	0.00210	15.90	0.9481	0.00220
16.40	0.9525	0.00210	16.20	0.9622	0.00200	16.00	0.9548	0.00210
16.50	0.9590	0.00250	16.30	0.9578	0.00180	16.10	0.9591	0.00200
16.60	0.9642	0.00210	16.40	0.9696	0.00210	16.20	0.9649	0.00230
16.70	0.9646	0.00190	16.50	0.9726	0.00220	16.30	0.9643	0.00220
16.80	0.9758	0.00210	16.60	0.9813	0.00220	16.40	0.9697	0.00220
16.90	0.9776	0.00180	16.70	0.9797	0.00270	16.50	0.9742	0.00210
17.00	0.9795	0.00200	16.80	0.9886	0.00200	16.60	0.9743	0.00270
17.10	0.9816	0.00220	16.90	0.9887	0.00230	16.70	0.9832	0.00240
17.20	0.9867	0.00180	17.00	0.9891	0.00190	16.80	0.9902	0.00230
17.30	0.9883	0.00260	17.10	0.9983	0.00220	16.90	0.9953	0.00220
17.40	0.9927	0.00180	17.20	0.9950	0.00190	17.00	0.9963	0.00200
17.50	0.9968	0.00230	17.30	0.9990	0.00220	17.10	0.9962	0.00240
17.60	1.0000	0.00220	17.40	1.0099	0.00190	17.20	1.0036	0.00220
17.70	1.0031	0.00230	17.50	1.0115	0.00230	17.30	1.0054	0.00240
17.80	1.0125	0.00240	17.60	1.0166	0.00210	17.40	1.0139	0.00220
17.90	1.0152	0.00230	17.70	1.0209	0.00200	17.50	1.0146	0.00210
18.00	1.0168	0.00230	17.80	1.0217	0.00240	17.60	1.0188	0.00270
18.10	1.0200	0.00230	17.90	1.0258	0.00190	17.70	1.0216	0.00230
18.20	1.0236	0.00220	18.00	1.0293	0.00200	17.80	1.0256	0.00210
18.30	1.0251	0.00200	18.10	1.0294	0.00190	17.90	1.0298	0.00220
18.40	1.0228	0.00240	18.20	1.0326	0.00190	18.00	1.0323	0.00260

1900 milli-g/cc			2000 milli-g/cc			2100 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
15.40	0.9292	0.00210	15.40	0.9325	0.00270	15.50	0.9307	0.00210
15.50	0.9341	0.00240	15.50	0.9299	0.00220	15.60	0.9330	0.00200
15.60	0.9338	0.00200	15.60	0.9393	0.00230	15.70	0.9397	0.00240
15.70	0.9449	0.00250	15.70	0.9430	0.00200	15.80	0.9473	0.00220
15.80	0.9447	0.00210	15.80	0.9464	0.00210	15.90	0.9498	0.00230
15.90	0.9487	0.00250	15.90	0.9521	0.00230	16.00	0.9545	0.00240
16.00	0.9558	0.00230	16.00	0.9518	0.00230	16.10	0.9610	0.00230
16.10	0.9593	0.00210	16.10	0.9592	0.00200	16.20	0.9600	0.00230
16.20	0.9649	0.00200	16.20	0.9622	0.00240	16.30	0.9698	0.00260
16.30	0.9716	0.00210	16.30	0.9674	0.00220	16.40	0.9715	0.00230
16.40	0.9718	0.00280	16.40	0.9712	0.00240	16.50	0.9719	0.00240
16.50	0.9769	0.00240	16.50	0.9772	0.00190	16.60	0.9794	0.00240
16.60	0.9804	0.00200	16.60	0.9817	0.00200	16.70	0.9838	0.00220
16.70	0.9859	0.00260	16.70	0.9867	0.00220	16.80	0.9865	0.00210
16.80	0.9852	0.00220	16.80	0.9870	0.00200	16.90	0.9881	0.00260
16.90	0.9925	0.00240	16.90	0.9935	0.00220	17.00	0.9941	0.00220
17.00	0.9981	0.00210	17.00	0.9960	0.00260	17.10	1.0003	0.00260
17.10	1.0028	0.00240	17.10	0.9977	0.00220	17.20	1.0005	0.00270
17.20	1.0008	0.00190	17.20	1.0057	0.00230	17.30	1.0044	0.00260
17.30	1.0057	0.00210	17.30	1.0094	0.00190	17.40	1.0108	0.00290
17.40	1.0062	0.00200	17.40	1.0081	0.00250	17.50	1.0118	0.00230
17.50	1.0159	0.00280	17.50	1.0152	0.00210	17.60	1.0187	0.00210
17.60	1.0180	0.00210	17.60	1.0159	0.00200	17.70	1.0160	0.00210
17.70	1.0171	0.00250	17.70	1.0242	0.00270	17.80	1.0249	0.00220
17.80	1.0276	0.00200	17.80	1.0280	0.00250	17.90	1.0285	0.00190
17.90	1.0304	0.00220	17.90	1.0308	0.00200	18.00	1.0338	0.00300
18.00	1.0339	0.00240	18.00	1.0355	0.00210	18.10	1.0340	0.00250

2500 milli-g/cc			3000 milli-g/cc			4000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
15.80	0.9346	0.00200	16.20	0.9366	0.00210	17.50	0.9390	0.00240
15.90	0.9427	0.00230	16.30	0.9454	0.00210	17.60	0.9417	0.00290
16.00	0.9437	0.00230	16.40	0.9463	0.00220	17.70	0.9468	0.00220
16.10	0.9544	0.00230	16.50	0.9467	0.00200	17.80	0.9523	0.00240
16.20	0.9565	0.00240	16.60	0.9506	0.00240	17.90	0.9545	0.00210
16.30	0.9583	0.00200	16.70	0.9590	0.00210	18.00	0.9600	0.00310
16.40	0.9642	0.00200	16.80	0.9589	0.00220	18.10	0.9652	0.00200
16.50	0.9676	0.00220	16.90	0.9639	0.00220	18.20	0.9687	0.00170
16.60	0.9717	0.00300	17.00	0.9704	0.00220	18.30	0.9674	0.00210
16.70	0.9733	0.00250	17.10	0.9709	0.00210	18.40	0.9728	0.00220
16.80	0.9803	0.00250	17.20	0.9796	0.00180	18.50	0.9736	0.00180
16.90	0.9772	0.00250	17.30	0.9783	0.00220	18.60	0.9758	0.00210
17.00	0.9831	0.00260	17.40	0.9799	0.00230	18.70	0.9783	0.00190
17.10	0.9848	0.00260	17.50	0.9848	0.00190	18.80	0.9842	0.00230
17.20	0.9924	0.00220	17.60	0.9883	0.00270	18.90	0.9888	0.00250
17.30	1.0046	0.00240	17.70	0.9915	0.00200	19.00	0.9944	0.00210
17.40	0.9990	0.00260	17.80	0.9974	0.00240	19.10	0.9927	0.00190
17.50	1.0012	0.00200	17.90	1.0053	0.00240	19.20	0.9995	0.00200
17.60	1.0050	0.00260	18.00	0.9999	0.00270	19.30	1.0031	0.00220
17.70	1.0161	0.00220	18.10	1.0074	0.00330	19.40	1.0039	0.00220
17.80	1.0181	0.00230	18.20	1.0122	0.00210	19.50	1.0061	0.00210
17.90	1.0212	0.00250	18.30	1.0128	0.00260	19.60	1.0113	0.00220
18.00	1.0250	0.00250	18.40	1.0191	0.00200	19.70	1.0126	0.00250
18.10	1.0246	0.00190	18.50	1.0232	0.00260	19.80	1.0151	0.00190
18.20	1.0309	0.00240	18.60	1.0222	0.00200	19.90	1.0149	0.00190
18.30	1.0322	0.00240	18.70	1.0305	0.00250	20.00	1.0205	0.00220
			18.80	1.0321	0.00250	20.10	1.0283	0.00210
						20.20	1.0259	0.00200

5000 milli-g/cc			6000 milli-g/cc			7000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
19.20	0.9388	0.00230	21.60	0.9370	0.00210	24.70	0.9373	0.00180
19.30	0.9385	0.00180	21.80	0.9447	0.00200	25.00	0.9406	0.00210
19.40	0.9470	0.00160	22.00	0.9491	0.00180	25.30	0.9437	0.00200
19.50	0.9487	0.00200	22.20	0.9545	0.00290	25.60	0.9546	0.00180
19.60	0.9544	0.00190	22.40	0.9608	0.00190	25.90	0.9568	0.00180
19.70	0.9565	0.00250	22.60	0.9638	0.00200	26.20	0.9613	0.00170
19.80	0.9564	0.00190	22.80	0.9677	0.00240	26.50	0.9695	0.00180
19.90	0.9586	0.00190	23.00	0.9701	0.00210	26.80	0.9684	0.00210
20.00	0.9625	0.00250	23.20	0.9798	0.00250	27.10	0.9764	0.00160
20.10	0.9637	0.00260	23.40	0.9799	0.00200	27.40	0.9802	0.00270
20.20	0.9687	0.00190	23.60	0.9849	0.00210	27.70	0.9828	0.00190
20.30	0.9683	0.00190	23.80	0.9859	0.00170	28.00	0.9889	0.00150
20.40	0.9751	0.00270	24.00	0.9932	0.00210	28.30	0.9901	0.00260
20.50	0.9735	0.00200	24.20	0.9961	0.00250	28.60	0.9925	0.00170
20.60	0.9779	0.00210	24.40	0.9998	0.00180	28.90	1.0007	0.00250
20.70	0.9835	0.00230	24.60	1.0053	0.00220	29.20	1.0063	0.00180
20.80	0.9850	0.00210	24.80	1.0069	0.00180	29.50	1.0103	0.00220
20.90	0.9843	0.00250	25.00	1.0092	0.00160	29.80	1.0105	0.00200
21.00	0.9922	0.00230	25.20	1.0180	0.00250	30.10	1.0165	0.00220
21.10	0.9927	0.00190	25.40	1.0223	0.00200	30.40	1.0192	0.00180
21.20	0.9942	0.00170	25.60	1.0222	0.00190	30.60	1.0258	0.00160
21.30	0.9967	0.00200	25.80	1.0271	0.00180			
21.40	0.9998	0.00210						
21.50	1.0028	0.00250						
21.60	1.0061	0.00210						
21.70	1.0050	0.00200						
21.80	1.0136	0.00220						
21.90	1.0121	0.00210						
22.00	1.0157	0.00250						
22.10	1.0163	0.00190						
22.20	1.0155	0.00210						
22.30	1.0223	0.00190						
22.40	1.0241	0.00210						
22.50	1.0249	0.00240						
22.60	1.0312	0.00240						
22.70	1.0281	0.00190						
22.80	1.0375	0.00190						

7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
27.30	0.9408	0.00210	29.70	0.9333	0.00160
27.60	0.9435	0.00150	30.20	0.9422	0.00140
27.90	0.9491	0.00140	30.70	0.9422	0.00150
28.20	0.9515	0.00190	31.20	0.9525	0.00190
28.50	0.9589	0.00210	31.70	0.9568	0.00210
28.80	0.9637	0.00180	32.20	0.9662	0.00190
29.10	0.9670	0.00260	32.70	0.9660	0.00200
29.40	0.9694	0.00220	33.20	0.9742	0.00210
29.70	0.9714	0.00160	33.70	0.9802	0.00190
30.00	0.9742	0.00190	34.20	0.9844	0.00190
30.30	0.9812	0.00200	34.70	0.9888	0.00160
30.60	0.9851	0.00160	35.20	0.9884	0.00160
30.90	0.9870	0.00200	35.70	0.9964	0.00150
31.20	0.9886	0.00190	36.20	1.0016	0.00190
31.50	0.9971	0.00170	36.70	1.0040	0.00150
31.80	0.9987	0.00220	37.20	1.0062	0.00190
32.10	1.0049	0.00140	37.70	1.0101	0.00180
32.40	1.0032	0.00180	38.20	1.0155	0.00170
32.70	1.0062	0.00160	38.70	1.0190	0.00160
33.00	1.0137	0.00190	39.20	1.0193	0.00170
33.30	1.0114	0.00170	39.50	1.0232	0.00190
33.60	1.0180	0.00180			
33.90	1.0140	0.00200			
34.20	1.0208	0.00170			
34.40	1.0249	0.00180			

Case ID: UO2_sphere_006_01ref

Material: Uranium dioxide in water

Weight Fraction U in UO2: 0.88143

Geometry: Sphere

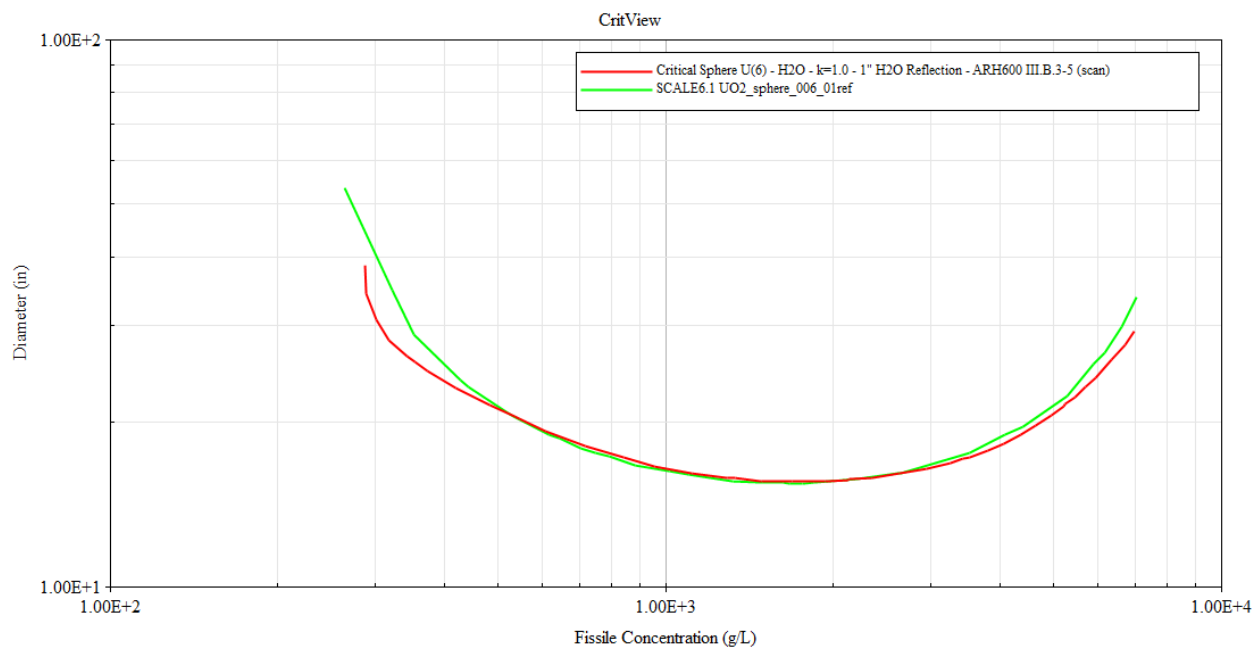
Isotopics: 6% ^{235}U 94% ^{238}U

Reflector: 1" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere(6.0% ²³⁵ U) – 1 Inch of Water Reflection					
UO2 Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.300	0.26443	33.300	61.400	1.400	53.5767
0.400	0.35257	23.000	30.300	0.300	28.8655
0.500	0.44072	19.300	24.200	0.200	23.1390
0.600	0.52886	17.600	21.300	0.100	20.5435
0.700	0.61700	16.400	19.700	0.100	18.9054
0.800	0.70514	15.600	18.800	0.100	17.8844
0.850	0.74922	15.200	18.500	0.100	17.5586
0.900	0.79329	14.900	18.000	0.100	17.2660
1.000	0.88143	14.600	17.500	0.100	16.6778
1.250	1.10179	14.100	16.700	0.100	16.0267
1.500	1.32215	13.900	16.300	0.100	15.5707
1.700	1.49843	13.800	16.200	0.100	15.4731
1.900	1.67472	13.900	16.200	0.100	15.4363
2.000	1.76286	13.900	16.200	0.100	15.4196
2.100	1.85100	13.900	16.300	0.100	15.5295
2.500	2.20358	14.100	16.600	0.100	15.7064
3.000	2.64429	14.400	17.100	0.100	16.1295
4.000	3.52572	15.500	18.600	0.100	17.5736
5.000	4.40715	17.400	20.700	0.100	19.5679
6.000	5.28858	19.400	24.000	0.200	22.3432
7.000	6.17001	22.900	29.100	0.300	26.6902
7.500	6.61073	25.100	32.500	0.300	29.8842
8.000	7.05144	27.700	37.100	0.400	33.7750

WORM and SCALE Input File

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'Recreating data from PRC-NS-00009 B-850 (pdf pg868)
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'Water Concentration = <wconc = 1-(critconc/11)>
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#Ending Diameter = <@enddia =
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9.1,32.5,37.1> in
#Delta = <@delta =
1.4,0.3,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.2,0.3,0.3,0.4> in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                                92235 6
                                92238 94   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere With Water Reflector"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(diameter*in)/2+(1*in)}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; 1" Water Reflector; 6% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.06 U238 0.94
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.264 53.5767
0.353 28.8655
0.441 23.1390
0.529 20.5435
0.617 18.9054
0.705 17.8844
0.749 17.5586
0.793 17.2660
0.881 16.6778
1.102 16.0267
1.322 15.5707
1.498 15.4731
1.675 15.4363
1.763 15.4196
1.851 15.5295
2.204 15.7064
2.644 16.1295
3.526 17.5736
4.407 19.5679
5.289 22.3432
6.170 26.6902
6.611 29.8842
7.051 33.7750
```

300 milli-g/cc			400 milli-g/cc			500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
33.30	0.9282	0.00150	23.00	0.9278	0.00200	19.30	0.9255	0.00130
34.70	0.9368	0.00130	23.30	0.9349	0.00150	19.50	0.9303	0.00180
36.10	0.9439	0.00120	23.60	0.9351	0.00140	19.70	0.9347	0.00160
37.50	0.9510	0.00140	23.90	0.9416	0.00140	19.90	0.9387	0.00180
38.90	0.9563	0.00120	24.20	0.9469	0.00190	20.10	0.9445	0.00150
40.30	0.9628	0.00140	24.50	0.9507	0.00180	20.30	0.9492	0.00170
41.70	0.9654	0.00110	24.80	0.9526	0.00140	20.50	0.9514	0.00170
43.10	0.9721	0.00130	25.10	0.9590	0.00150	20.70	0.9585	0.00170
44.50	0.9776	0.00140	25.40	0.9609	0.00160	20.90	0.9609	0.00180
45.90	0.9820	0.00130	25.70	0.9634	0.00170	21.10	0.9639	0.00170
47.30	0.9816	0.00120	26.00	0.9714	0.00130	21.30	0.9681	0.00210
48.70	0.9900	0.00100	26.30	0.9726	0.00170	21.50	0.9688	0.00160
50.10	0.9938	0.00130	26.60	0.9751	0.00140	21.70	0.9748	0.00220
51.50	0.9947	0.00120	26.90	0.9789	0.00170	21.90	0.9765	0.00180
52.90	0.9971	0.00130	27.20	0.9804	0.00130	22.10	0.9829	0.00150
54.30	1.0031	0.00120	27.50	0.9874	0.00140	22.30	0.9859	0.00210
55.70	1.0042	0.00120	27.80	0.9893	0.00200	22.50	0.9851	0.00200
57.10	1.0053	0.00090	28.10	0.9948	0.00200	22.70	0.9939	0.00180
58.50	1.0083	0.00100	28.40	0.9953	0.00190	22.90	0.9986	0.00150
59.90	1.0079	0.00100	28.70	0.9968	0.00160	23.10	0.9992	0.00160
61.30	1.0108	0.00140	29.00	1.0026	0.00180	23.30	1.0033	0.00180
61.40	1.0088	0.00100	29.30	1.0046	0.00210	23.50	1.0059	0.00150
			29.60	1.0060	0.00150	23.70	1.0090	0.00200
			29.90	1.0107	0.00150	23.90	1.0126	0.00190
			30.20	1.0101	0.00160	24.10	1.0167	0.00150
			30.30	1.0148	0.00150	24.20	1.0165	0.00140

600 milli-g/cc			700 milli-g/cc			800 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.60	0.9331	0.00200	16.40	0.9328	0.00200	15.60	0.9260	0.00190
17.70	0.9328	0.00190	16.50	0.9315	0.00180	15.70	0.9307	0.00210
17.80	0.9375	0.00200	16.60	0.9348	0.00160	15.80	0.9348	0.00190
17.90	0.9383	0.00180	16.70	0.9374	0.00140	15.90	0.9352	0.00170
18.00	0.9425	0.00170	16.80	0.9424	0.00220	16.00	0.9416	0.00220
18.10	0.9407	0.00220	16.90	0.9475	0.00170	16.10	0.9443	0.00230
18.20	0.9453	0.00160	17.00	0.9459	0.00220	16.20	0.9477	0.00220
18.30	0.9538	0.00170	17.10	0.9513	0.00160	16.30	0.9506	0.00190
18.40	0.9516	0.00210	17.20	0.9520	0.00230	16.40	0.9525	0.00200
18.50	0.9560	0.00210	17.30	0.9570	0.00210	16.50	0.9522	0.00260
18.60	0.9560	0.00170	17.40	0.9570	0.00180	16.60	0.9622	0.00170
18.70	0.9579	0.00190	17.50	0.9629	0.00230	16.70	0.9635	0.00200
18.80	0.9619	0.00160	17.60	0.9653	0.00190	16.80	0.9651	0.00210
18.90	0.9634	0.00170	17.70	0.9692	0.00200	16.90	0.9732	0.00200
19.00	0.9668	0.00180	17.80	0.9693	0.00160	17.00	0.9754	0.00200
19.10	0.9693	0.00150	17.90	0.9759	0.00170	17.10	0.9769	0.00190
19.20	0.9699	0.00180	18.00	0.9766	0.00190	17.20	0.9781	0.00200
19.30	0.9721	0.00170	18.10	0.9809	0.00210	17.30	0.9832	0.00180
19.40	0.9775	0.00180	18.20	0.9801	0.00160	17.40	0.9859	0.00220
19.50	0.9756	0.00210	18.30	0.9841	0.00170	17.50	0.9838	0.00190
19.60	0.9798	0.00190	18.40	0.9861	0.00160	17.60	0.9954	0.00180
19.70	0.9803	0.00170	18.50	0.9912	0.00170	17.70	0.9923	0.00200
19.80	0.9832	0.00190	18.60	0.9899	0.00180	17.80	0.9973	0.00170
19.90	0.9896	0.00190	18.70	0.9916	0.00180	17.90	1.0005	0.00220
20.00	0.9905	0.00210	18.80	0.9979	0.00170	18.00	1.0031	0.00230
20.10	0.9926	0.00160	18.90	0.9998	0.00210	18.10	1.0046	0.00170
20.20	0.9979	0.00180	19.00	1.0035	0.00200	18.20	1.0063	0.00200
20.30	0.9968	0.00190	19.10	1.0062	0.00190	18.30	1.0084	0.00190
20.40	0.9978	0.00200	19.20	1.0105	0.00190	18.40	1.0140	0.00190
20.50	0.9973	0.00170	19.30	1.0104	0.00190	18.50	1.0193	0.00230
20.60	1.0035	0.00220	19.40	1.0148	0.00190	18.60	1.0168	0.00180
20.70	1.0058	0.00160	19.50	1.0147	0.00160	18.70	1.0198	0.00190
20.80	1.0087	0.00190	19.60	1.0165	0.00180	18.80	1.0240	0.00190
20.90	1.0057	0.00180	19.70	1.0180	0.00170			
21.00	1.0127	0.00180						
21.10	1.0094	0.00190						
21.20	1.0130	0.00220						
21.30	1.0178	0.00160						

850 milli-g/cc			900 milli-g/cc			1000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
15.20	0.9204	0.00200	14.90	0.9201	0.00190	14.60	0.9278	0.00250
15.30	0.9276	0.00170	15.00	0.9269	0.00210	14.70	0.9274	0.00230
15.40	0.9299	0.00170	15.10	0.9284	0.00190	14.80	0.9319	0.00230
15.50	0.9333	0.00210	15.20	0.9315	0.00180	14.90	0.9345	0.00190
15.60	0.9447	0.00190	15.30	0.9387	0.00210	15.00	0.9423	0.00220
15.70	0.9423	0.00180	15.40	0.9415	0.00220	15.10	0.9450	0.00170
15.80	0.9424	0.00270	15.50	0.9454	0.00240	15.20	0.9482	0.00210
15.90	0.9487	0.00190	15.60	0.9471	0.00180	15.30	0.9530	0.00220
16.00	0.9466	0.00230	15.70	0.9478	0.00210	15.40	0.9597	0.00190
16.10	0.9520	0.00290	15.80	0.9531	0.00160	15.50	0.9614	0.00180
16.20	0.9616	0.00180	15.90	0.9550	0.00190	15.60	0.9601	0.00220
16.30	0.9606	0.00240	16.00	0.9623	0.00230	15.70	0.9670	0.00180
16.40	0.9660	0.00250	16.10	0.9649	0.00190	15.80	0.9703	0.00210
16.50	0.9716	0.00200	16.20	0.9709	0.00190	15.90	0.9674	0.00220
16.60	0.9736	0.00160	16.30	0.9741	0.00200	16.00	0.9746	0.00220
16.70	0.9756	0.00190	16.40	0.9764	0.00180	16.10	0.9746	0.00240
16.80	0.9779	0.00230	16.50	0.9783	0.00210	16.20	0.9835	0.00210
16.90	0.9795	0.00170	16.60	0.9815	0.00200	16.30	0.9880	0.00200
17.00	0.9844	0.00190	16.70	0.9863	0.00210	16.40	0.9888	0.00180
17.10	0.9847	0.00180	16.80	0.9896	0.00200	16.50	0.9957	0.00220
17.20	0.9879	0.00220	16.90	0.9914	0.00170	16.60	0.9972	0.00210
17.30	0.9958	0.00170	17.00	0.9925	0.00300	16.70	1.0008	0.00260
17.40	0.9991	0.00230	17.10	0.9955	0.00180	16.80	1.0026	0.00230
17.50	1.0017	0.00290	17.20	0.9969	0.00180	16.90	1.0069	0.00180
17.60	0.9988	0.00230	17.30	1.0016	0.00220	17.00	1.0136	0.00200
17.70	1.0085	0.00170	17.40	1.0060	0.00210	17.10	1.0125	0.00190
17.80	1.0117	0.00210	17.50	1.0112	0.00220	17.20	1.0152	0.00250
17.90	1.0111	0.00210	17.60	1.0148	0.00200	17.30	1.0193	0.00200
18.00	1.0139	0.00170	17.70	1.0156	0.00200	17.40	1.0252	0.00210
18.10	1.0178	0.00200	17.80	1.0170	0.00180	17.50	1.0291	0.00220
18.20	1.0183	0.00190	17.90	1.0193	0.00180			
18.30	1.0214	0.00220	18.00	1.0244	0.00200			
18.40	1.0282	0.00200						
18.50	1.0274	0.00180						

1250 milli-g/cc			1500 milli-g/cc			1700 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.10	0.9236	0.00190	13.90	0.9286	0.00190	13.80	0.9307	0.00190
14.20	0.9306	0.00180	14.00	0.9347	0.00230	13.90	0.9291	0.00220
14.30	0.9338	0.00220	14.10	0.9387	0.00200	14.00	0.9361	0.00210
14.40	0.9375	0.00180	14.20	0.9450	0.00210	14.10	0.9436	0.00200
14.50	0.9405	0.00210	14.30	0.9479	0.00180	14.20	0.9444	0.00190
14.60	0.9510	0.00230	14.40	0.9517	0.00200	14.30	0.9506	0.00250
14.70	0.9493	0.00220	14.50	0.9576	0.00210	14.40	0.9563	0.00250
14.80	0.9528	0.00190	14.60	0.9582	0.00280	14.50	0.9634	0.00230
14.90	0.9586	0.00230	14.70	0.9678	0.00190	14.60	0.9640	0.00190
15.00	0.9646	0.00190	14.80	0.9671	0.00200	14.70	0.9670	0.00220
15.10	0.9700	0.00240	14.90	0.9769	0.00200	14.80	0.9704	0.00190
15.20	0.9730	0.00230	15.00	0.9787	0.00230	14.90	0.9765	0.00230
15.30	0.9759	0.00200	15.10	0.9799	0.00190	15.00	0.9818	0.00210
15.40	0.9784	0.00180	15.20	0.9813	0.00210	15.10	0.9856	0.00170
15.50	0.9831	0.00190	15.30	0.9898	0.00240	15.20	0.9871	0.00220
15.60	0.9904	0.00300	15.40	0.9940	0.00200	15.30	0.9930	0.00270
15.70	0.9879	0.00210	15.50	0.9942	0.00180	15.40	0.9951	0.00180
15.80	0.9962	0.00190	15.60	1.0024	0.00200	15.50	1.0018	0.00260
15.90	0.9954	0.00170	15.70	1.0069	0.00240	15.60	1.0065	0.00180
16.00	0.9976	0.00200	15.80	1.0084	0.00220	15.70	1.0068	0.00200
16.10	1.0066	0.00200	15.90	1.0119	0.00190	15.80	1.0120	0.00200
16.20	1.0087	0.00220	16.00	1.0145	0.00220	15.90	1.0151	0.00260
16.30	1.0126	0.00210	16.10	1.0150	0.00250	16.00	1.0193	0.00200
16.40	1.0148	0.00200	16.20	1.0195	0.00190	16.10	1.0220	0.00250
16.50	1.0219	0.00230	16.30	1.0241	0.00220	16.20	1.0277	0.00190
16.60	1.0228	0.00240						
16.70	1.0258	0.00190						

1900 milli-g/cc			2000 milli-g/cc			2100 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.90	0.9358	0.00230	13.90	0.9356	0.00200	13.90	0.9355	0.00190
14.00	0.9414	0.00200	14.00	0.9368	0.00210	14.00	0.9398	0.00190
14.10	0.9430	0.00200	14.10	0.9434	0.00220	14.10	0.9450	0.00190
14.20	0.9509	0.00240	14.20	0.9493	0.00210	14.20	0.9466	0.00190
14.30	0.9521	0.00190	14.30	0.9523	0.00290	14.30	0.9517	0.00200
14.40	0.9573	0.00230	14.40	0.9572	0.00220	14.40	0.9554	0.00220
14.50	0.9619	0.00190	14.50	0.9627	0.00190	14.50	0.9632	0.00240
14.60	0.9700	0.00220	14.60	0.9639	0.00200	14.60	0.9669	0.00200
14.70	0.9704	0.00220	14.70	0.9735	0.00240	14.70	0.9709	0.00230
14.80	0.9761	0.00200	14.80	0.9743	0.00190	14.80	0.9729	0.00220
14.90	0.9837	0.00220	14.90	0.9769	0.00220	14.90	0.9808	0.00290
15.00	0.9830	0.00230	15.00	0.9821	0.00250	15.00	0.9832	0.00270
15.10	0.9856	0.00210	15.10	0.9851	0.00190	15.10	0.9875	0.00220
15.20	0.9919	0.00210	15.20	0.9894	0.00250	15.20	0.9880	0.00210
15.30	0.9914	0.00210	15.30	0.9920	0.00230	15.30	0.9913	0.00220
15.40	0.9967	0.00200	15.40	0.9990	0.00220	15.40	0.9956	0.00260
15.50	1.0058	0.00230	15.50	1.0041	0.00200	15.50	0.9987	0.00230
15.60	1.0078	0.00200	15.60	1.0097	0.00300	15.60	1.0031	0.00200
15.70	1.0105	0.00210	15.70	1.0044	0.00200	15.70	1.0081	0.00230
15.80	1.0135	0.00260	15.80	1.0107	0.00180	15.80	1.0145	0.00240
15.90	1.0197	0.00210	15.90	1.0159	0.00230	15.90	1.0183	0.00180
16.00	1.0208	0.00210	16.00	1.0215	0.00230	16.00	1.0190	0.00250
16.10	1.0248	0.00200	16.10	1.0251	0.00190	16.10	1.0232	0.00200
16.20	1.0261	0.00210	16.20	1.0258	0.00200	16.20	1.0302	0.00200
						16.30	1.0305	0.00200

2500 milli-g/cc			3000 milli-g/cc			4000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.10	0.9366	0.00210	14.40	0.9335	0.00220	15.50	0.9322	0.00180
14.20	0.9408	0.00190	14.50	0.9361	0.00220	15.60	0.9376	0.00230
14.30	0.9406	0.00220	14.60	0.9393	0.00200	15.70	0.9418	0.00210
14.40	0.9504	0.00210	14.70	0.9470	0.00190	15.80	0.9428	0.00210
14.50	0.9557	0.00200	14.80	0.9485	0.00210	15.90	0.9446	0.00190
14.60	0.9546	0.00280	14.90	0.9490	0.00210	16.00	0.9514	0.00220
14.70	0.9629	0.00210	15.00	0.9564	0.00240	16.10	0.9529	0.00230
14.80	0.9674	0.00210	15.10	0.9646	0.00240	16.20	0.9580	0.00220
14.90	0.9720	0.00220	15.20	0.9638	0.00320	16.30	0.9633	0.00240
15.00	0.9730	0.00210	15.30	0.9710	0.00290	16.40	0.9671	0.00200
15.10	0.9781	0.00190	15.40	0.9706	0.00230	16.50	0.9668	0.00190
15.20	0.9817	0.00230	15.50	0.9753	0.00220	16.60	0.9726	0.00200
15.30	0.9847	0.00200	15.60	0.9772	0.00220	16.70	0.9729	0.00190
15.40	0.9920	0.00240	15.70	0.9888	0.00200	16.80	0.9794	0.00240
15.50	0.9886	0.00210	15.80	0.9916	0.00190	16.90	0.9812	0.00220
15.60	0.9980	0.00210	15.90	0.9931	0.00250	17.00	0.9854	0.00220
15.70	0.9995	0.00220	16.00	0.9947	0.00240	17.10	0.9874	0.00210
15.80	1.0073	0.00270	16.10	0.9982	0.00190	17.20	0.9882	0.00210
15.90	1.0107	0.00220	16.20	1.0043	0.00270	17.30	0.9943	0.00250
16.00	1.0145	0.00180	16.30	1.0053	0.00260	17.40	0.9989	0.00190
16.10	1.0120	0.00200	16.40	1.0130	0.00250	17.50	0.9961	0.00190
16.20	1.0177	0.00200	16.50	1.0123	0.00210	17.60	1.0014	0.00210
16.30	1.0192	0.00260	16.60	1.0164	0.00230	17.70	1.0062	0.00240
16.40	1.0242	0.00200	16.70	1.0174	0.00220	17.80	1.0076	0.00250
16.50	1.0319	0.00250	16.80	1.0235	0.00200	17.90	1.0120	0.00210
16.60	1.0330	0.00200	16.90	1.0271	0.00220	18.00	1.0182	0.00220
			17.00	1.0290	0.00190	18.10	1.0212	0.00180
			17.10	1.0308	0.00250	18.20	1.0179	0.00200
						18.30	1.0239	0.00260
						18.40	1.0250	0.00210
						18.50	1.0282	0.00200
						18.60	1.0303	0.00210

5000 milli-g/cc			6000 milli-g/cc			7000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.40	0.9380	0.00200	19.40	0.9346	0.00170	22.90	0.9391	0.00180
17.50	0.9444	0.00190	19.60	0.9360	0.00170	23.20	0.9425	0.00160
17.60	0.9488	0.00220	19.80	0.9462	0.00190	23.50	0.9530	0.00190
17.70	0.9519	0.00230	20.00	0.9503	0.00180	23.80	0.9564	0.00180
17.80	0.9540	0.00200	20.20	0.9556	0.00220	24.10	0.9590	0.00200
17.90	0.9568	0.00230	20.40	0.9559	0.00190	24.40	0.9640	0.00200
18.00	0.9545	0.00190	20.60	0.9624	0.00200	24.70	0.9688	0.00190
18.10	0.9627	0.00180	20.80	0.9681	0.00190	25.00	0.9756	0.00180
18.20	0.9650	0.00200	21.00	0.9719	0.00180	25.30	0.9803	0.00190
18.30	0.9653	0.00180	21.20	0.9740	0.00170	25.60	0.9851	0.00180
18.40	0.9705	0.00190	21.40	0.9772	0.00280	25.90	0.9854	0.00190
18.50	0.9758	0.00190	21.60	0.9863	0.00220	26.20	0.9936	0.00180
18.60	0.9740	0.00210	21.80	0.9856	0.00170	26.50	0.9974	0.00160
18.70	0.9773	0.00210	22.00	0.9909	0.00180	26.80	1.0015	0.00160
18.80	0.9767	0.00230	22.20	0.9947	0.00180	27.10	1.0048	0.00170
18.90	0.9876	0.00220	22.40	1.0021	0.00220	27.40	1.0069	0.00280
19.00	0.9863	0.00210	22.60	1.0009	0.00190	27.70	1.0099	0.00200
19.10	0.9929	0.00230	22.80	1.0050	0.00210	28.00	1.0129	0.00180
19.20	0.9914	0.00200	23.00	1.0124	0.00200	28.30	1.0186	0.00240
19.30	0.9934	0.00180	23.20	1.0121	0.00210	28.60	1.0202	0.00180
19.40	0.9969	0.00190	23.40	1.0151	0.00200	28.90	1.0236	0.00200
19.50	0.9928	0.00210	23.60	1.0197	0.00180	29.10	1.0271	0.00220
19.60	1.0034	0.00190	23.80	1.0242	0.00220			
19.70	1.0035	0.00210	24.00	1.0302	0.00170			
19.80	1.0095	0.00170						
19.90	1.0099	0.00230						
20.00	1.0075	0.00190						
20.10	1.0134	0.00230						
20.20	1.0150	0.00180						
20.30	1.0205	0.00240						
20.40	1.0244	0.00230						
20.50	1.0236	0.00240						
20.60	1.0255	0.00180						
20.70	1.0294	0.00200						

7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
25.10	0.9386	0.00170	27.70	0.9379	0.00170
25.40	0.9438	0.00160	28.10	0.9374	0.00200
25.70	0.9478	0.00160	28.50	0.9483	0.00240
26.00	0.9517	0.00170	28.90	0.9502	0.00200
26.30	0.9567	0.00170	29.30	0.9568	0.00220
26.60	0.9610	0.00190	29.70	0.9599	0.00170
26.90	0.9646	0.00150	30.10	0.9628	0.00160
27.20	0.9705	0.00200	30.50	0.9681	0.00160
27.50	0.9720	0.00170	30.90	0.9731	0.00160
27.80	0.9766	0.00190	31.30	0.9767	0.00140
28.10	0.9783	0.00140	31.70	0.9793	0.00230
28.40	0.9822	0.00220	32.10	0.9800	0.00170
28.70	0.9850	0.00170	32.50	0.9867	0.00190
29.00	0.9877	0.00180	32.90	0.9903	0.00160
29.30	0.9895	0.00230	33.30	0.9902	0.00180
29.60	0.9982	0.00180	33.70	0.9994	0.00190
29.90	1.0001	0.00210	34.10	1.0026	0.00170
30.20	1.0029	0.00190	34.50	1.0043	0.00190
30.50	1.0039	0.00220	34.90	1.0063	0.00160
30.80	1.0119	0.00180	35.30	1.0059	0.00180
31.10	1.0117	0.00150	35.70	1.0113	0.00160
31.40	1.0159	0.00150	36.10	1.0155	0.00180
31.70	1.0164	0.00180	36.50	1.0181	0.00170
32.00	1.0185	0.00180	36.90	1.0190	0.00180
32.30	1.0224	0.00190	37.10	1.0207	0.00150
32.50	1.0246	0.00170			

Case ID: UO2_sphere_006_10ref

Material: Uranium dioxide in water

Weight Fraction U in UO2: 0.88143

Geometry: Sphere

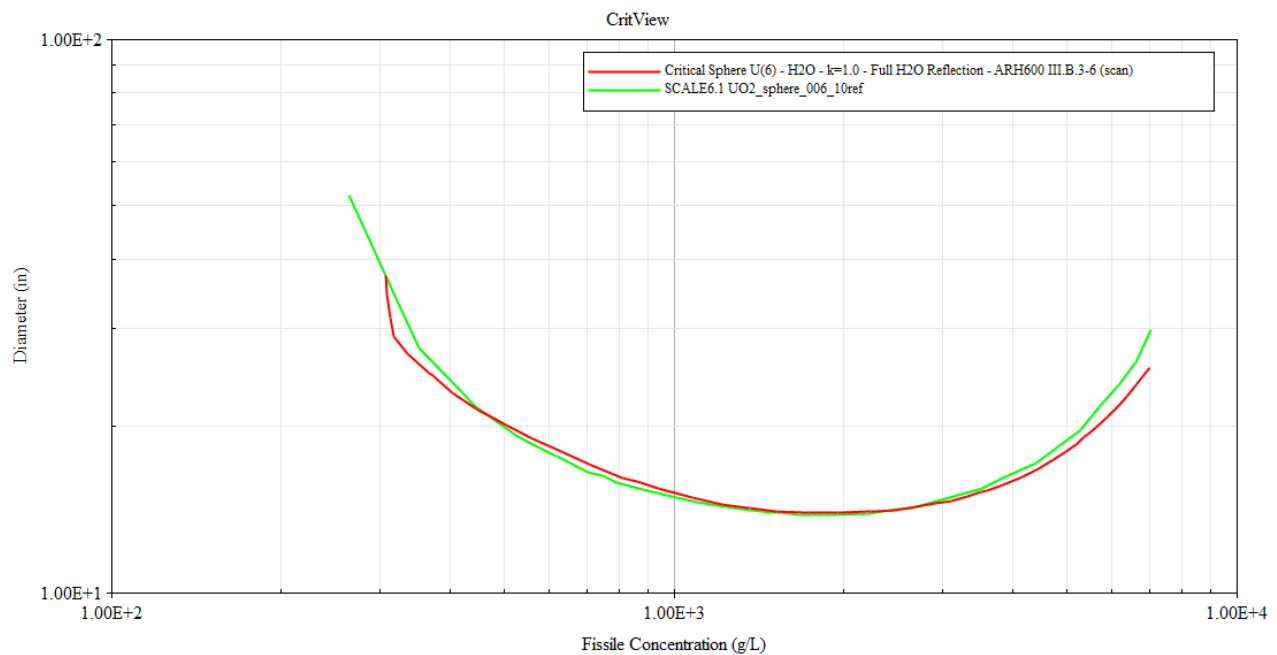
Isotopics: 6% ^{235}U 94% ^{238}U

Reflector: 10" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere(6.0% ²³⁵ U) - 10 Inches of Water Reflection					
UO2 Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.300	0.26443	32.300	62.000	1.400	52.2500
0.400	0.35257	21.800	29.300	0.300	27.6786
0.500	0.44072	18.200	23.100	0.200	21.7840
0.600	0.52886	16.400	20.000	0.100	19.1667
0.700	0.61700	15.000	18.500	0.100	17.6047
0.800	0.70514	14.300	17.500	0.100	16.5000
0.850	0.74922	14.100	17.100	0.100	16.2366
0.900	0.79329	13.900	16.700	0.100	15.8321
1.000	0.88143	13.500	16.000	0.100	15.3455
1.250	1.10179	13.000	15.100	0.100	14.5492
1.500	1.32215	12.700	14.800	0.100	14.1723
1.700	1.49843	12.500	14.700	0.100	13.9477
1.900	1.67472	12.500	14.600	0.100	13.8269
2.000	1.76286	12.500	14.600	0.100	13.8385
2.100	1.85100	12.500	14.600	0.100	13.8024
2.500	2.20358	12.600	14.800	0.100	13.8776
3.000	2.64429	12.800	15.000	0.100	14.2490
4.000	3.52572	13.600	16.400	0.100	15.4477
5.000	4.40715	14.800	18.600	0.200	17.1128
6.000	5.28858	17.000	21.100	0.200	19.7031
7.000	6.17001	19.400	25.500	0.300	23.7125
7.500	6.61073	21.500	28.900	0.300	26.0931
8.000	7.05144	23.900	33.300	0.400	29.8471

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-864 (pdf pg882)
,
#index number = <index = 1:23:1>
,
#UO2 Concentration = <@conc =
0.3,0.4,0.5,0.6,0.7,0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
32.3,21.8,18.2,16.4,15,14.3,14.1,13.9,13.5,13,12.7,12.5,12.5,12.5,12.5,12.6,12.8,13.6,14.8,17,19.
4,21.5,23.9> in
#Ending Diameter = <@enddia =
62,29.3,23.1,20,18.5,17.5,17.1,16.7,16,15.1,14.8,14.7,14.6,14.6,14.6,14.8,15,16.4,18.6,21.1,25.5,
28.9,33.3> in
#Delta = <@delta =
1.4,0.3,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.2,0.2,0.3,0.3,0.4> in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                                92235 6
                                92238 94  end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300  end
  h2o          2 1 300  end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere With Water Reflector"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(diameter*in)/2+(10*in)}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; 10" Water Reflector; 6% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.06 U238 0.94
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.264 52.2500
0.353 27.6786
0.441 21.7840
0.529 19.1667
0.617 17.6047
0.705 16.5000
0.749 16.2366
0.793 15.8321
0.881 15.3455
1.102 14.5492
1.322 14.1723
1.498 13.9477
1.675 13.8269
1.763 13.8385
1.851 13.8024
2.204 13.8776
2.644 14.2490
3.526 15.4477
4.407 17.1128
5.289 19.7031
6.170 23.7125
6.611 26.0931
7.051 29.8471
```

300 milli-g/cc			400 milli-g/cc			500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
32.30	0.9292	0.00130	21.80	0.9297	0.00140	18.20	0.9289	0.00180
33.70	0.9368	0.00150	22.10	0.9358	0.00150	18.40	0.9344	0.00180
35.10	0.9441	0.00110	22.40	0.9381	0.00180	18.60	0.9344	0.00150
36.50	0.9529	0.00140	22.70	0.9417	0.00120	18.80	0.9419	0.00150
37.90	0.9622	0.00100	23.00	0.9490	0.00170	19.00	0.9439	0.00200
39.30	0.9648	0.00140	23.30	0.9488	0.00150	19.20	0.9529	0.00210
40.70	0.9690	0.00140	23.60	0.9553	0.00320	19.40	0.9540	0.00160
42.10	0.9722	0.00140	23.90	0.9615	0.00160	19.60	0.9578	0.00160
43.50	0.9793	0.00120	24.20	0.9610	0.00170	19.80	0.9645	0.00160
44.90	0.9823	0.00110	24.50	0.9674	0.00150	20.00	0.9651	0.00160
46.30	0.9863	0.00160	24.80	0.9688	0.00130	20.20	0.9700	0.00170
47.70	0.9887	0.00120	25.10	0.9727	0.00130	20.40	0.9789	0.00170
49.10	0.9929	0.00110	25.40	0.9736	0.00120	20.60	0.9779	0.00140
50.50	0.9974	0.00160	25.70	0.9820	0.00130	20.80	0.9810	0.00160
51.90	0.9998	0.00190	26.00	0.9831	0.00170	21.00	0.9832	0.00150
53.30	1.0006	0.00120	26.30	0.9853	0.00140	21.20	0.9883	0.00170
54.70	1.0040	0.00093	26.60	0.9914	0.00110	21.40	0.9928	0.00160
56.10	1.0048	0.00170	26.90	0.9923	0.00140	21.60	0.9954	0.00150
57.50	1.0067	0.00100	27.20	0.9959	0.00170	21.80	1.0004	0.00180
58.90	1.0117	0.00140	27.50	0.9975	0.00200	22.00	1.0038	0.00180
60.30	1.0117	0.00100	27.80	1.0017	0.00140	22.20	1.0057	0.00150
61.70	1.0141	0.00120	28.10	1.0043	0.00180	22.40	1.0086	0.00170
62.00	1.0140	0.00110	28.40	1.0071	0.00130	22.60	1.0133	0.00170
			28.70	1.0102	0.00180	22.80	1.0143	0.00210
			29.00	1.0093	0.00150	23.00	1.0161	0.00190
			29.30	1.0144	0.00160	23.10	1.0154	0.00130

600 milli-g/cc			700 milli-g/cc			800 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
16.40	0.9299	0.00180	15.00	0.9238	0.00210	14.30	0.9298	0.00170
16.50	0.9341	0.00170	15.10	0.9297	0.00170	14.40	0.9319	0.00150
16.60	0.9405	0.00160	15.20	0.9295	0.00170	14.50	0.9322	0.00170
16.70	0.9406	0.00200	15.30	0.9325	0.00190	14.60	0.9406	0.00170
16.80	0.9420	0.00180	15.40	0.9378	0.00170	14.70	0.9449	0.00170
16.90	0.9446	0.00240	15.50	0.9420	0.00160	14.80	0.9456	0.00190
17.00	0.9509	0.00190	15.60	0.9416	0.00170	14.90	0.9492	0.00210
17.10	0.9488	0.00190	15.70	0.9503	0.00180	15.00	0.9535	0.00200
17.20	0.9539	0.00230	15.80	0.9506	0.00150	15.10	0.9533	0.00160
17.30	0.9547	0.00180	15.90	0.9518	0.00190	15.20	0.9580	0.00230
17.40	0.9586	0.00180	16.00	0.9518	0.00190	15.30	0.9638	0.00170
17.50	0.9657	0.00150	16.10	0.9606	0.00210	15.40	0.9617	0.00170
17.60	0.9615	0.00190	16.20	0.9633	0.00180	15.50	0.9658	0.00150
17.70	0.9641	0.00190	16.30	0.9681	0.00170	15.60	0.9693	0.00170
17.80	0.9693	0.00170	16.40	0.9644	0.00200	15.70	0.9759	0.00210
17.90	0.9703	0.00210	16.50	0.9702	0.00180	15.80	0.9763	0.00190
18.00	0.9734	0.00180	16.60	0.9699	0.00170	15.90	0.9760	0.00210
18.10	0.9780	0.00170	16.70	0.9746	0.00180	16.00	0.9836	0.00170
18.20	0.9794	0.00190	16.80	0.9798	0.00210	16.10	0.9893	0.00190
18.30	0.9803	0.00170	16.90	0.9833	0.00200	16.20	0.9926	0.00150
18.40	0.9837	0.00170	17.00	0.9833	0.00160	16.30	0.9893	0.00200
18.50	0.9855	0.00180	17.10	0.9863	0.00230	16.40	0.9943	0.00210
18.60	0.9896	0.00170	17.20	0.9935	0.00160	16.50	1.0000	0.00170
18.70	0.9908	0.00190	17.30	0.9935	0.00220	16.60	0.9980	0.00180
18.80	0.9917	0.00180	17.40	0.9960	0.00160	16.70	1.0013	0.00180
18.90	0.9952	0.00140	17.50	0.9994	0.00170	16.80	1.0045	0.00180
19.00	0.9975	0.00140	17.60	0.9998	0.00210	16.90	1.0071	0.00150
19.10	0.9986	0.00150	17.70	1.0041	0.00160	17.00	1.0135	0.00160
19.20	1.0007	0.00150	17.80	1.0078	0.00170	17.10	1.0131	0.00160
19.30	1.0022	0.00180	17.90	1.0105	0.00160	17.20	1.0192	0.00190
19.40	1.0013	0.00190	18.00	1.0088	0.00160	17.30	1.0200	0.00200
19.50	1.0060	0.00180	18.10	1.0138	0.00170	17.40	1.0213	0.00160
19.60	1.0079	0.00150	18.20	1.0161	0.00190	17.50	1.0247	0.00240
19.70	1.0082	0.00180	18.30	1.0186	0.00220			
19.80	1.0118	0.00240	18.40	1.0210	0.00220			
19.90	1.0150	0.00190	18.50	1.0249	0.00160			
20.00	1.0148	0.00170						

850 milli-g/cc			900 milli-g/cc			1000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.10	0.9318	0.00210	13.90	0.9345	0.00180	13.50	0.9357	0.00200
14.20	0.9353	0.00190	14.00	0.9345	0.00180	13.60	0.9366	0.00180
14.30	0.9394	0.00170	14.10	0.9432	0.00190	13.70	0.9451	0.00170
14.40	0.9383	0.00170	14.20	0.9435	0.00150	13.80	0.9466	0.00160
14.50	0.9437	0.00200	14.30	0.9508	0.00230	13.90	0.9503	0.00170
14.60	0.9485	0.00150	14.40	0.9510	0.00200	14.00	0.9500	0.00190
14.70	0.9508	0.00230	14.50	0.9586	0.00170	14.10	0.9554	0.00200
14.80	0.9569	0.00210	14.60	0.9590	0.00180	14.20	0.9583	0.00170
14.90	0.9581	0.00190	14.70	0.9588	0.00210	14.30	0.9640	0.00210
15.00	0.9607	0.00180	14.80	0.9654	0.00210	14.40	0.9701	0.00200
15.10	0.9668	0.00190	14.90	0.9705	0.00230	14.50	0.9701	0.00220
15.20	0.9675	0.00170	15.00	0.9700	0.00190	14.60	0.9767	0.00180
15.30	0.9776	0.00200	15.10	0.9750	0.00170	14.70	0.9771	0.00240
15.40	0.9762	0.00170	15.20	0.9780	0.00210	14.80	0.9856	0.00250
15.50	0.9778	0.00190	15.30	0.9844	0.00220	14.90	0.9857	0.00220
15.60	0.9843	0.00340	15.40	0.9870	0.00160	15.00	0.9893	0.00180
15.70	0.9829	0.00170	15.50	0.9898	0.00190	15.10	0.9948	0.00220
15.80	0.9853	0.00200	15.60	0.9937	0.00190	15.20	0.9927	0.00190
15.90	0.9970	0.00170	15.70	0.9967	0.00200	15.30	0.9985	0.00200
16.00	0.9942	0.00190	15.80	0.9991	0.00210	15.40	1.0018	0.00180
16.10	0.9964	0.00190	15.90	1.0019	0.00190	15.50	1.0037	0.00240
16.20	0.9970	0.00200	16.00	1.0082	0.00170	15.60	1.0088	0.00200
16.30	1.0052	0.00160	16.10	1.0088	0.00180	15.70	1.0114	0.00170
16.40	1.0039	0.00160	16.20	1.0088	0.00160	15.80	1.0175	0.00170
16.50	1.0093	0.00180	16.30	1.0155	0.00180	15.90	1.0185	0.00200
16.60	1.0139	0.00190	16.40	1.0178	0.00210	16.00	1.0226	0.00240
16.70	1.0167	0.00190	16.50	1.0163	0.00180			
16.80	1.0191	0.00150	16.60	1.0228	0.00220			
16.90	1.0226	0.00150	16.70	1.0281	0.00180			
17.00	1.0255	0.00170						
17.10	1.0265	0.00210						

1250 milli-g/cc			1500 milli-g/cc			1700 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.00	0.9386	0.00160	12.70	0.9407	0.00180	12.50	0.9417	0.00180
13.10	0.9468	0.00200	12.80	0.9441	0.00210	12.60	0.9418	0.00200
13.20	0.9483	0.00190	12.90	0.9490	0.00240	12.70	0.9490	0.00210
13.30	0.9503	0.00160	13.00	0.9560	0.00200	12.80	0.9535	0.00180
13.40	0.9558	0.00210	13.10	0.9589	0.00220	12.90	0.9593	0.00200
13.50	0.9617	0.00220	13.20	0.9660	0.00220	13.00	0.9591	0.00170
13.60	0.9676	0.00170	13.30	0.9703	0.00170	13.10	0.9654	0.00210
13.70	0.9685	0.00250	13.40	0.9726	0.00170	13.20	0.9734	0.00190
13.80	0.9764	0.00220	13.50	0.9744	0.00190	13.30	0.9756	0.00180
13.90	0.9755	0.00250	13.60	0.9770	0.00180	13.40	0.9757	0.00210
14.00	0.9809	0.00180	13.70	0.9873	0.00260	13.50	0.9808	0.00200
14.10	0.9842	0.00180	13.80	0.9873	0.00250	13.60	0.9827	0.00160
14.20	0.9908	0.00180	13.90	0.9903	0.00200	13.70	0.9918	0.00220
14.30	0.9893	0.00190	14.00	0.9984	0.00230	13.80	0.9910	0.00170
14.40	0.9963	0.00180	14.10	0.9953	0.00190	13.90	0.9969	0.00180
14.50	0.9971	0.00180	14.20	1.0018	0.00170	14.00	1.0034	0.00180
14.60	1.0030	0.00200	14.30	1.0064	0.00180	14.10	1.0041	0.00240
14.70	1.0062	0.00220	14.40	1.0099	0.00210	14.20	1.0103	0.00190
14.80	1.0073	0.00260	14.50	1.0153	0.00230	14.30	1.0102	0.00180
14.90	1.0139	0.00180	14.60	1.0189	0.00210	14.40	1.0179	0.00230
15.00	1.0196	0.00180	14.70	1.0228	0.00260	14.50	1.0232	0.00200
15.10	1.0166	0.00170	14.80	1.0266	0.00200	14.60	1.0242	0.00200
						14.70	1.0278	0.00230

1900 milli-g/cc			2000 milli-g/cc			2100 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.50	0.9449	0.00180	12.50	0.9445	0.00230	12.50	0.9430	0.00190
12.60	0.9498	0.00220	12.60	0.9450	0.00220	12.60	0.9482	0.00180
12.70	0.9532	0.00190	12.70	0.9524	0.00200	12.70	0.9483	0.00240
12.80	0.9570	0.00200	12.80	0.9558	0.00170	12.80	0.9562	0.00230
12.90	0.9630	0.00230	12.90	0.9628	0.00220	12.90	0.9616	0.00240
13.00	0.9652	0.00180	13.00	0.9666	0.00220	13.00	0.9651	0.00190
13.10	0.9684	0.00170	13.10	0.9660	0.00180	13.10	0.9720	0.00230
13.20	0.9726	0.00190	13.20	0.9734	0.00270	13.20	0.9741	0.00190
13.30	0.9733	0.00210	13.30	0.9791	0.00220	13.30	0.9798	0.00250
13.40	0.9793	0.00190	13.40	0.9818	0.00190	13.40	0.9809	0.00180
13.50	0.9850	0.00190	13.50	0.9832	0.00170	13.50	0.9882	0.00210
13.60	0.9865	0.00200	13.60	0.9874	0.00200	13.60	0.9896	0.00230
13.70	0.9980	0.00290	13.70	0.9946	0.00190	13.70	0.9947	0.00180
13.80	0.9986	0.00210	13.80	0.9975	0.00190	13.80	0.9998	0.00240
13.90	1.0038	0.00240	13.90	1.0040	0.00220	13.90	1.0080	0.00280
14.00	1.0043	0.00220	14.00	1.0070	0.00190	14.00	1.0052	0.00180
14.10	1.0123	0.00200	14.10	1.0093	0.00170	14.10	1.0096	0.00190
14.20	1.0129	0.00190	14.20	1.0144	0.00210	14.20	1.0164	0.00210
14.30	1.0190	0.00190	14.30	1.0193	0.00190	14.30	1.0212	0.00170
14.40	1.0196	0.00190	14.40	1.0221	0.00210	14.40	1.0141	0.00260
14.50	1.0243	0.00250	14.50	1.0228	0.00230	14.50	1.0230	0.00170
14.60	1.0253	0.00210	14.60	1.0268	0.00210	14.60	1.0287	0.00190

2500 milli-g/cc			3000 milli-g/cc			4000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.60	0.9430	0.00240	12.80	0.9431	0.00180	13.60	0.9387	0.00220
12.70	0.9512	0.00210	12.90	0.9444	0.00270	13.70	0.9438	0.00190
12.80	0.9514	0.00200	13.00	0.9507	0.00170	13.80	0.9468	0.00170
12.90	0.9586	0.00200	13.10	0.9560	0.00200	13.90	0.9510	0.00190
13.00	0.9637	0.00260	13.20	0.9581	0.00200	14.00	0.9552	0.00200
13.10	0.9675	0.00290	13.30	0.9668	0.00230	14.10	0.9580	0.00190
13.20	0.9695	0.00260	13.40	0.9647	0.00190	14.20	0.9645	0.00190
13.30	0.9733	0.00190	13.50	0.9766	0.00180	14.30	0.9651	0.00170
13.40	0.9796	0.00200	13.60	0.9742	0.00190	14.40	0.9670	0.00200
13.50	0.9813	0.00200	13.70	0.9812	0.00210	14.50	0.9683	0.00200
13.60	0.9839	0.00210	13.80	0.9839	0.00180	14.60	0.9727	0.00210
13.70	0.9940	0.00200	13.90	0.9891	0.00210	14.70	0.9781	0.00200
13.80	0.9934	0.00200	14.00	0.9915	0.00180	14.80	0.9799	0.00180
13.90	1.0019	0.00190	14.10	0.9912	0.00190	14.90	0.9856	0.00210
14.00	1.0053	0.00200	14.20	0.9976	0.00180	15.00	0.9885	0.00200
14.10	1.0065	0.00170	14.30	1.0025	0.00230	15.10	0.9919	0.00210
14.20	1.0072	0.00220	14.40	1.0055	0.00220	15.20	0.9930	0.00200
14.30	1.0136	0.00210	14.50	1.0102	0.00190	15.30	0.9970	0.00200
14.40	1.0166	0.00210	14.60	1.0056	0.00210	15.40	0.9969	0.00210
14.50	1.0203	0.00260	14.70	1.0183	0.00180	15.50	1.0034	0.00210
14.60	1.0229	0.00220	14.80	1.0176	0.00220	15.60	1.0051	0.00170
14.70	1.0241	0.00220	14.90	1.0201	0.00200	15.70	1.0098	0.00220
14.80	1.0274	0.00230	15.00	1.0247	0.00210	15.80	1.0129	0.00180
						15.90	1.0135	0.00250
						16.00	1.0224	0.00240
						16.10	1.0200	0.00190
						16.20	1.0251	0.00210
						16.30	1.0271	0.00220
						16.40	1.0283	0.00180

5000 milli-g/cc			6000 milli-g/cc			7000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.80	0.9366	0.00210	17.00	0.9459	0.00250	19.40	0.9344	0.00170
15.00	0.9386	0.00190	17.20	0.9498	0.00200	19.70	0.9428	0.00160
15.20	0.9460	0.00210	17.40	0.9524	0.00160	20.00	0.9484	0.00200
15.40	0.9524	0.00220	17.60	0.9559	0.00180	20.30	0.9502	0.00170
15.60	0.9585	0.00180	17.80	0.9590	0.00260	20.60	0.9549	0.00160
15.80	0.9652	0.00200	18.00	0.9715	0.00200	20.90	0.9622	0.00240
16.00	0.9677	0.00200	18.20	0.9694	0.00230	21.20	0.9634	0.00150
16.20	0.9738	0.00170	18.40	0.9744	0.00180	21.50	0.9715	0.00160
16.40	0.9820	0.00190	18.60	0.9813	0.00180	21.80	0.9748	0.00230
16.60	0.9872	0.00170	18.80	0.9822	0.00170	22.10	0.9815	0.00190
16.80	0.9930	0.00240	19.00	0.9872	0.00180	22.40	0.9807	0.00220
17.00	0.9978	0.00190	19.20	0.9952	0.00180	22.70	0.9898	0.00190
17.20	1.0017	0.00200	19.40	0.9941	0.00220	23.00	0.9913	0.00150
17.40	1.0067	0.00180	19.60	0.9950	0.00170	23.30	0.9985	0.00160
17.60	1.0111	0.00180	19.80	1.0047	0.00220	23.60	0.9970	0.00160
17.80	1.0166	0.00220	20.00	1.0066	0.00170	23.90	1.0050	0.00170
18.00	1.0187	0.00190	20.20	1.0081	0.00190	24.20	1.0082	0.00230
18.20	1.0259	0.00190	20.40	1.0129	0.00210	24.50	1.0100	0.00150
18.40	1.0294	0.00260	20.60	1.0144	0.00190	24.80	1.0166	0.00190
18.60	1.0308	0.00210	20.80	1.0197	0.00190	25.10	1.0201	0.00170
			21.00	1.0222	0.00190	25.40	1.0248	0.00210
			21.10	1.0244	0.00170	25.50	1.0229	0.00180

7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
21.50	0.9364	0.00150	23.90	0.9398	0.00160
21.80	0.9449	0.00180	24.30	0.9445	0.00150
22.10	0.9465	0.00160	24.70	0.9446	0.00210
22.40	0.9547	0.00170	25.10	0.9542	0.00170
22.70	0.9584	0.00190	25.50	0.9574	0.00170
23.00	0.9606	0.00150	25.90	0.9615	0.00140
23.30	0.9664	0.00190	26.30	0.9656	0.00150
23.60	0.9680	0.00180	26.70	0.9737	0.00170
23.90	0.9744	0.00190	27.10	0.9724	0.00150
24.20	0.9737	0.00190	27.50	0.9766	0.00150
24.50	0.9827	0.00200	27.90	0.9819	0.00180
24.80	0.9806	0.00160	28.30	0.9861	0.00150
25.10	0.9866	0.00150	28.70	0.9877	0.00220
25.40	0.9926	0.00220	29.10	0.9896	0.00150
25.70	0.9920	0.00180	29.50	0.9941	0.00170
26.00	1.0009	0.00210	29.90	1.0009	0.00170
26.30	0.9980	0.00140	30.30	1.0034	0.00150
26.60	1.0020	0.00170	30.70	1.0036	0.00190
26.90	1.0083	0.00170	31.10	1.0066	0.00180
27.20	1.0109	0.00180	31.50	1.0121	0.00170
27.50	1.0141	0.00150	31.90	1.0152	0.00150
27.80	1.0172	0.00160	32.30	1.0181	0.00170
28.10	1.0181	0.00180	32.70	1.0175	0.00210
28.40	1.0200	0.00180	33.10	1.0208	0.00180
28.70	1.0243	0.00180	33.30	1.0227	0.00170
28.90	1.0222	0.00220			

UO2-sphere-5 (Cases with 0", 1", 10" Reflector)

Case ID: UO2_sphere_005_00ref

Material: Uranium dioxide in water

Weight Fraction U in UO2: 0.88144

Geometry: Sphere

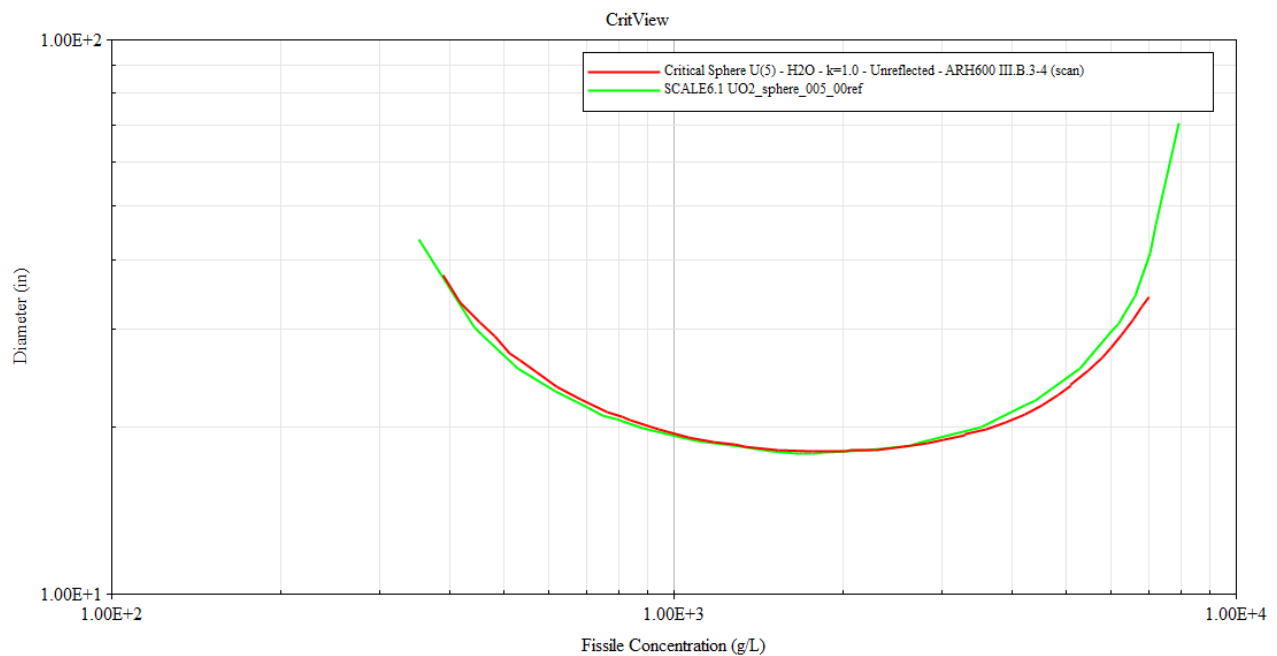
Isotopics: 5% ^{235}U 95% ^{238}U

Reflector: Unreflected

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere (5.0% ²³⁵ U) - 0 Inches of Water Reflection					
UO2 Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.400	0.35258	30.800	47.600	0.800	43.5149
0.500	0.44072	24.100	31.700	0.300	30.3178
0.600	0.52886	21.500	26.900	0.200	25.4854
0.700	0.61701	19.800	24.200	0.200	23.2107
0.800	0.70515	18.000	22.300	0.200	21.6358
0.850	0.74922	18.200	21.800	0.100	20.9909
0.900	0.79330	17.800	21.300	0.100	20.6407
1.000	0.88144	17.300	20.400	0.100	19.8542
1.250	1.10180	16.600	19.500	0.100	18.8333
1.500	1.32216	16.200	18.900	0.100	18.4174
1.700	1.49845	15.900	18.800	0.100	18.0304
1.900	1.67474	16.000	18.600	0.100	17.9310
2.000	1.76288	16.000	18.600	0.100	17.8904
2.100	1.85102	16.000	18.600	0.100	18.0021
2.500	2.20360	16.200	18.800	0.100	18.1707
3.000	2.64432	16.600	19.300	0.100	18.5269
4.000	3.52576	17.500	21.000	0.100	19.9762
5.000	4.40720	19.700	23.500	0.200	22.2447
6.000	5.28864	22.200	27.200	0.200	25.5143
7.000	6.17008	26.000	33.100	0.300	30.5818
7.500	6.61080	28.900	37.800	0.400	34.4683
8.000	7.05152	32.500	44.800	0.600	41.1687
9.000	7.93296	45.100	83.700	1.900	70.6143

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-878 (pdf pg896)
,
#index number = <index = 1:23:1>
,
#UO2 Concentration = <@conc =
0.4,0.5,0.6,0.7,0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
30.8,24.1,21.5,19.8,18,18.2,17.8,17.3,16.6,16.2,15.9,16,16,16,16.2,16.6,17.5,19.7,22.2,26,28.9,32
.5,45.1> in
#Ending Diameter = <@enddia =
47.6,31.7,26.9,24.2,22.3,21.8,21.3,20.4,19.5,18.9,18.8,18.6,18.6,18.6,18.8,19.3,21,23.5,27.2,33.1
,37.8,44.8,83.7> in
#Delta = <@delta =
0.8,0.3,0.2,0.2,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.2,0.2,0.3,0.4,0.6,1.9> in
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Unreflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                                92235 5
                                92238 95  end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300  end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Unreflected UO2 Sphere"
  sphere 1      {{(diameter*in)/2}}
  media 1 1 1
  boundary 1
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; Unreflected; 5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.05 U238 0.95
reflmat: None
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.353 43.5149
0.441 30.3178
0.529 25.4854
0.617 23.2107
0.705 21.6358
0.749 20.9909
0.793 20.6407
0.881 19.8542
1.102 18.8333
1.322 18.4174
1.498 18.0304
1.675 17.9310
1.763 17.8904
1.851 18.0021
2.204 18.1707
2.644 18.5269
3.526 19.9762
4.407 22.2447
5.289 25.5143
6.170 30.5818
6.611 34.4683
7.052 41.1687
7.933 70.6143
```

400 milli-g/cc			500 milli-g/cc			600 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
30.80	0.9287	0.00150	24.10	0.9220	0.00170	21.50	0.9265	0.00140
31.60	0.9335	0.00140	24.40	0.9275	0.00190	21.70	0.9344	0.00170
32.40	0.9401	0.00140	24.70	0.9350	0.00160	21.90	0.9356	0.00190
33.20	0.9487	0.00150	25.00	0.9363	0.00180	22.10	0.9401	0.00150
34.00	0.9523	0.00150	25.30	0.9420	0.00130	22.30	0.9475	0.00160
34.80	0.9580	0.00130	25.60	0.9450	0.00120	22.50	0.9494	0.00260
35.60	0.9622	0.00150	25.90	0.9520	0.00190	22.70	0.9495	0.00170
36.40	0.9658	0.00160	26.20	0.9545	0.00140	22.90	0.9524	0.00160
37.20	0.9705	0.00170	26.50	0.9588	0.00150	23.10	0.9600	0.00160
38.00	0.9748	0.00120	26.80	0.9626	0.00170	23.30	0.9665	0.00180
38.80	0.9817	0.00130	27.10	0.9683	0.00190	23.50	0.9684	0.00260
39.60	0.9807	0.00170	27.40	0.9703	0.00200	23.70	0.9660	0.00160
40.40	0.9872	0.00140	27.70	0.9707	0.00180	23.90	0.9701	0.00150
41.20	0.9883	0.00150	28.00	0.9727	0.00240	24.10	0.9747	0.00140
42.00	0.9941	0.00150	28.30	0.9775	0.00150	24.30	0.9809	0.00190
42.80	0.9958	0.00120	28.60	0.9842	0.00160	24.50	0.9845	0.00200
43.60	1.0005	0.00140	28.90	0.9859	0.00160	24.70	0.9845	0.00170
44.40	1.0003	0.00110	29.20	0.9876	0.00160	24.90	0.9915	0.00210
45.20	1.0052	0.00160	29.50	0.9953	0.00150	25.10	0.9944	0.00180
46.00	1.0097	0.00120	29.80	0.9980	0.00130	25.30	0.9962	0.00160
46.80	1.0105	0.00130	30.10	0.9947	0.00120	25.50	1.0003	0.00170
47.60	1.0116	0.00140	30.40	1.0020	0.00140	25.70	1.0027	0.00160
			30.70	1.0032	0.00130	25.90	1.0048	0.00140
			31.00	1.0085	0.00130	26.10	1.0073	0.00150
			31.30	1.0099	0.00170	26.30	1.0099	0.00180
			31.60	1.0133	0.00160	26.50	1.0134	0.00190
			31.70	1.0147	0.00160	26.70	1.0188	0.00140
						26.90	1.0200	0.00180

700 milli-g/cc			800 milli-g/cc			850 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
19.80	0.9273	0.00160	18.00	0.9026	0.00170	18.20	0.9206	0.00200
20.00	0.9305	0.00150	18.20	0.9107	0.00140	18.30	0.9265	0.00180
20.20	0.9350	0.00160	18.40	0.9182	0.00200	18.40	0.9295	0.00200
20.40	0.9427	0.00190	18.60	0.9217	0.00170	18.50	0.9344	0.00180
20.60	0.9476	0.00200	18.80	0.9310	0.00190	18.60	0.9323	0.00200
20.80	0.9528	0.00180	19.00	0.9385	0.00180	18.70	0.9386	0.00200
21.00	0.9609	0.00270	19.20	0.9421	0.00200	18.80	0.9425	0.00180
21.20	0.9570	0.00220	19.40	0.9464	0.00240	18.90	0.9427	0.00180
21.40	0.9643	0.00170	19.60	0.9493	0.00210	19.00	0.9480	0.00210
21.60	0.9664	0.00140	19.80	0.9588	0.00200	19.10	0.9470	0.00210
21.80	0.9690	0.00190	20.00	0.9639	0.00170	19.20	0.9532	0.00180
22.00	0.9787	0.00190	20.20	0.9677	0.00250	19.30	0.9554	0.00180
22.20	0.9808	0.00190	20.40	0.9731	0.00170	19.40	0.9576	0.00190
22.40	0.9866	0.00200	20.60	0.9773	0.00170	19.50	0.9612	0.00190
22.60	0.9877	0.00160	20.80	0.9772	0.00190	19.60	0.9660	0.00190
22.80	0.9914	0.00180	21.00	0.9887	0.00200	19.70	0.9672	0.00210
23.00	0.9974	0.00190	21.20	0.9909	0.00200	19.80	0.9695	0.00220
23.20	0.9996	0.00210	21.40	0.9930	0.00190	19.90	0.9725	0.00170
23.40	1.0071	0.00210	21.60	0.9988	0.00160	20.00	0.9744	0.00210
23.60	1.0099	0.00170	21.80	1.0055	0.00180	20.10	0.9762	0.00190
23.80	1.0147	0.00150	22.00	1.0136	0.00180	20.20	0.9802	0.00180
24.00	1.0133	0.00180	22.20	1.0160	0.00220	20.30	0.9797	0.00250
24.20	1.0179	0.00170	22.30	1.0122	0.00190	20.40	0.9846	0.00170
						20.50	0.9846	0.00160
						20.60	0.9875	0.00200
						20.70	0.9942	0.00220
						20.80	0.9951	0.00220
						20.90	0.9950	0.00210
						21.00	1.0005	0.00170
						21.10	1.0009	0.00160
						21.20	1.0047	0.00170
						21.30	1.0002	0.00210
						21.40	1.0116	0.00230
						21.50	1.0114	0.00210
						21.60	1.0159	0.00160
						21.70	1.0161	0.00210
						21.80	1.0189	0.00210

900 milli-g/cc			1000 milli-g/cc			1250 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.80	0.9181	0.00250	17.30	0.9242	0.00200	16.60	0.9229	0.00180
17.90	0.9241	0.00160	17.40	0.9236	0.00200	16.70	0.9296	0.00240
18.00	0.9289	0.00190	17.50	0.9274	0.00190	16.80	0.9302	0.00230
18.10	0.9312	0.00190	17.60	0.9324	0.00230	16.90	0.9391	0.00200
18.20	0.9380	0.00170	17.70	0.9340	0.00200	17.00	0.9353	0.00210
18.30	0.9353	0.00220	17.80	0.9398	0.00190	17.10	0.9400	0.00190
18.40	0.9408	0.00180	17.90	0.9397	0.00220	17.20	0.9427	0.00200
18.50	0.9460	0.00170	18.00	0.9433	0.00200	17.30	0.9492	0.00190
18.60	0.9471	0.00170	18.10	0.9479	0.00230	17.40	0.9545	0.00200
18.70	0.9467	0.00200	18.20	0.9509	0.00180	17.50	0.9578	0.00180
18.80	0.9450	0.00220	18.30	0.9559	0.00230	17.60	0.9610	0.00210
18.90	0.9536	0.00170	18.40	0.9566	0.00210	17.70	0.9660	0.00200
19.00	0.9564	0.00200	18.50	0.9605	0.00200	17.80	0.9694	0.00180
19.10	0.9596	0.00190	18.60	0.9620	0.00200	17.90	0.9695	0.00170
19.20	0.9617	0.00190	18.70	0.9653	0.00210	18.00	0.9743	0.00180
19.30	0.9643	0.00210	18.80	0.9690	0.00180	18.10	0.9798	0.00230
19.40	0.9654	0.00190	18.90	0.9739	0.00200	18.20	0.9802	0.00190
19.50	0.9694	0.00210	19.00	0.9764	0.00200	18.30	0.9821	0.00190
19.60	0.9748	0.00170	19.10	0.9840	0.00200	18.40	0.9857	0.00210
19.70	0.9760	0.00210	19.20	0.9802	0.00220	18.50	0.9888	0.00180
19.80	0.9789	0.00210	19.30	0.9849	0.00180	18.60	0.9928	0.00200
19.90	0.9855	0.00200	19.40	0.9833	0.00200	18.70	0.9966	0.00190
20.00	0.9866	0.00210	19.50	0.9910	0.00180	18.80	1.0004	0.00230
20.10	0.9848	0.00190	19.60	0.9951	0.00220	18.90	0.9992	0.00180
20.20	0.9892	0.00160	19.70	0.9971	0.00230	19.00	1.0106	0.00190
20.30	0.9914	0.00190	19.80	0.9974	0.00190	19.10	1.0110	0.00270
20.40	0.9938	0.00200	19.90	1.0022	0.00190	19.20	1.0107	0.00210
20.50	0.9991	0.00160	20.00	1.0032	0.00180	19.30	1.0156	0.00200
20.60	0.9989	0.00160	20.10	1.0051	0.00180	19.40	1.0213	0.00200
20.70	1.0016	0.00210	20.20	1.0122	0.00180	19.50	1.0235	0.00200
20.80	1.0082	0.00180	20.30	1.0121	0.00180			
20.90	1.0064	0.00190	20.40	1.0137	0.00190			
21.00	1.0087	0.00170						
21.10	1.0101	0.00200						
21.20	1.0143	0.00180						
21.30	1.0153	0.00180						

1500 milli-g/cc			1700 milli-g/cc			1900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
16.20	0.9246	0.00200	15.90	0.9216	0.00190	16.00	0.9287	0.00240
16.30	0.9276	0.00180	16.00	0.9210	0.00200	16.10	0.9272	0.00250
16.40	0.9297	0.00210	16.10	0.9261	0.00190	16.20	0.9338	0.00200
16.50	0.9353	0.00240	16.20	0.9346	0.00200	16.30	0.9343	0.00270
16.60	0.9403	0.00210	16.30	0.9328	0.00200	16.40	0.9406	0.00210
16.70	0.9444	0.00200	16.40	0.9416	0.00200	16.50	0.9433	0.00200
16.80	0.9523	0.00200	16.50	0.9396	0.00210	16.60	0.9502	0.00230
16.90	0.9509	0.00210	16.60	0.9441	0.00190	16.70	0.9529	0.00200
17.00	0.9527	0.00210	16.70	0.9506	0.00240	16.80	0.9590	0.00190
17.10	0.9584	0.00190	16.80	0.9523	0.00250	16.90	0.9584	0.00200
17.20	0.9629	0.00200	16.90	0.9571	0.00310	17.00	0.9672	0.00280
17.30	0.9679	0.00230	17.00	0.9626	0.00240	17.10	0.9699	0.00190
17.40	0.9718	0.00230	17.10	0.9648	0.00190	17.20	0.9729	0.00220
17.50	0.9709	0.00210	17.20	0.9696	0.00190	17.30	0.9763	0.00210
17.60	0.9794	0.00240	17.30	0.9738	0.00230	17.40	0.9819	0.00200
17.70	0.9807	0.00220	17.40	0.9821	0.00250	17.50	0.9812	0.00270
17.80	0.9835	0.00200	17.50	0.9792	0.00270	17.60	0.9918	0.00200
17.90	0.9888	0.00220	17.60	0.9861	0.00240	17.70	0.9851	0.00230
18.00	0.9894	0.00200	17.70	0.9890	0.00240	17.80	0.9933	0.00190
18.10	0.9962	0.00190	17.80	0.9928	0.00210	17.90	0.9982	0.00220
18.20	0.9980	0.00220	17.90	0.9940	0.00210	18.00	1.0040	0.00240
18.30	0.9984	0.00200	18.00	0.9986	0.00200	18.10	1.0027	0.00300
18.40	0.9984	0.00190	18.10	1.0032	0.00220	18.20	1.0072	0.00200
18.50	1.0076	0.00180	18.20	1.0069	0.00200	18.30	1.0112	0.00200
18.60	1.0145	0.00180	18.30	1.0072	0.00220	18.40	1.0174	0.00230
18.70	1.0163	0.00180	18.40	1.0099	0.00230	18.50	1.0160	0.00200
18.80	1.0210	0.00190	18.50	1.0168	0.00230	18.60	1.0222	0.00200
18.90	1.0203	0.00210	18.60	1.0165	0.00180			
			18.70	1.0214	0.00190			
			18.80	1.0225	0.00200			

2000 milli-g/cc			2100 milli-g/cc			2500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
16.00	0.9223	0.00200	16.00	0.9215	0.00240	16.20	0.9345	0.00240
16.10	0.9288	0.00250	16.10	0.9311	0.00190	16.30	0.9323	0.00230
16.20	0.9337	0.00230	16.20	0.9301	0.00190	16.40	0.9338	0.00220
16.30	0.9390	0.00210	16.30	0.9422	0.00200	16.50	0.9389	0.00270
16.40	0.9433	0.00280	16.40	0.9426	0.00180	16.60	0.9429	0.00250
16.50	0.9436	0.00220	16.50	0.9455	0.00190	16.70	0.9455	0.00220
16.60	0.9479	0.00220	16.60	0.9464	0.00260	16.80	0.9518	0.00240
16.70	0.9543	0.00270	16.70	0.9583	0.00230	16.90	0.9553	0.00190
16.80	0.9618	0.00220	16.80	0.9620	0.00220	17.00	0.9639	0.00230
16.90	0.9614	0.00250	16.90	0.9622	0.00250	17.10	0.9617	0.00210
17.00	0.9685	0.00230	17.00	0.9661	0.00200	17.20	0.9665	0.00240
17.10	0.9676	0.00220	17.10	0.9653	0.00200	17.30	0.9726	0.00210
17.20	0.9696	0.00200	17.20	0.9731	0.00230	17.40	0.9748	0.00220
17.30	0.9801	0.00200	17.30	0.9776	0.00190	17.50	0.9788	0.00220
17.40	0.9814	0.00210	17.40	0.9796	0.00210	17.60	0.9827	0.00230
17.50	0.9855	0.00230	17.50	0.9829	0.00190	17.70	0.9842	0.00260
17.60	0.9870	0.00180	17.60	0.9866	0.00210	17.80	0.9897	0.00220
17.70	0.9907	0.00220	17.70	0.9927	0.00200	17.90	0.9923	0.00210
17.80	0.9934	0.00240	17.80	0.9942	0.00200	18.00	0.9982	0.00260
17.90	1.0007	0.00220	17.90	0.9983	0.00220	18.10	0.9971	0.00220
18.00	1.0026	0.00240	18.00	0.9999	0.00260	18.20	1.0012	0.00310
18.10	1.0055	0.00190	18.10	1.0047	0.00270	18.30	1.0072	0.00200
18.20	1.0073	0.00220	18.20	1.0109	0.00190	18.40	1.0109	0.00210
18.30	1.0121	0.00210	18.30	1.0118	0.00210	18.50	1.0125	0.00210
18.40	1.0140	0.00220	18.40	1.0157	0.00230	18.60	1.0163	0.00230
18.50	1.0169	0.00190	18.50	1.0171	0.00210	18.70	1.0183	0.00200
18.60	1.0220	0.00230	18.60	1.0214	0.00240	18.80	1.0220	0.00200

3000 milli-g/cc			4000 milli-g/cc			5000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
16.60	0.9269	0.00230	17.50	0.9177	0.00200	19.70	0.9296	0.00210
16.70	0.9328	0.00270	17.60	0.9250	0.00180	19.90	0.9434	0.00180
16.80	0.9346	0.00210	17.70	0.9223	0.00230	20.10	0.9449	0.00240
16.90	0.9445	0.00220	17.80	0.9295	0.00210	20.30	0.9519	0.00250
17.00	0.9440	0.00250	17.90	0.9354	0.00260	20.50	0.9551	0.00180
17.10	0.9488	0.00220	18.00	0.9359	0.00210	20.70	0.9595	0.00220
17.20	0.9504	0.00260	18.10	0.9383	0.00200	20.90	0.9677	0.00170
17.30	0.9567	0.00190	18.20	0.9437	0.00260	21.10	0.9696	0.00220
17.40	0.9581	0.00240	18.30	0.9439	0.00190	21.30	0.9790	0.00230
17.50	0.9618	0.00200	18.40	0.9517	0.00190	21.50	0.9822	0.00240
17.60	0.9681	0.00200	18.50	0.9539	0.00240	21.70	0.9880	0.00180
17.70	0.9728	0.00230	18.60	0.9586	0.00210	21.90	0.9939	0.00280
17.80	0.9730	0.00250	18.70	0.9578	0.00210	22.10	0.9945	0.00210
17.90	0.9782	0.00270	18.80	0.9704	0.00170	22.30	1.0021	0.00310
18.00	0.9794	0.00280	18.90	0.9683	0.00220	22.50	1.0015	0.00220
18.10	0.9796	0.00220	19.00	0.9693	0.00220	22.70	1.0119	0.00200
18.20	0.9857	0.00270	19.10	0.9731	0.00190	22.90	1.0173	0.00210
18.30	0.9940	0.00260	19.20	0.9682	0.00250	23.10	1.0182	0.00260
18.40	0.9953	0.00250	19.30	0.9790	0.00200	23.30	1.0208	0.00170
18.50	1.0007	0.00190	19.40	0.9800	0.00220	23.50	1.0271	0.00210
18.60	0.9981	0.00200	19.50	0.9857	0.00250			
18.70	1.0021	0.00190	19.60	0.9850	0.00220			
18.80	1.0079	0.00230	19.70	0.9895	0.00190			
18.90	1.0088	0.00250	19.80	0.9922	0.00270			
19.00	1.0107	0.00240	19.90	0.9968	0.00250			
19.10	1.0142	0.00230	20.00	1.0010	0.00220			
19.20	1.0189	0.00220	20.10	1.0034	0.00200			
19.30	1.0212	0.00250	20.20	1.0066	0.00240			
			20.30	1.0101	0.00190			
			20.40	1.0106	0.00190			
			20.50	1.0131	0.00260			
			20.60	1.0166	0.00210			
			20.70	1.0176	0.00240			
			20.80	1.0166	0.00220			
			20.90	1.0231	0.00200			
			21.00	1.0253	0.00230			

6000 milli-g/cc			7000 milli-g/cc			7500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
22.20	0.9361	0.00190	26.00	0.9338	0.00150	28.90	0.9331	0.00180
22.40	0.9355	0.00190	26.30	0.9386	0.00200	29.30	0.9426	0.00180
22.60	0.9412	0.00180	26.60	0.9450	0.00230	29.70	0.9467	0.00160
22.80	0.9442	0.00170	26.90	0.9490	0.00190	30.10	0.9493	0.00170
23.00	0.9474	0.00200	27.20	0.9496	0.00160	30.50	0.9567	0.00160
23.20	0.9539	0.00210	27.50	0.9594	0.00190	30.90	0.9641	0.00200
23.40	0.9640	0.00170	27.80	0.9639	0.00220	31.30	0.9652	0.00180
23.60	0.9639	0.00190	28.10	0.9643	0.00210	31.70	0.9670	0.00150
23.80	0.9703	0.00230	28.40	0.9713	0.00210	32.10	0.9737	0.00170
24.00	0.9725	0.00210	28.70	0.9712	0.00170	32.50	0.9758	0.00190
24.20	0.9745	0.00210	29.00	0.9762	0.00230	32.90	0.9794	0.00170
24.40	0.9793	0.00180	29.30	0.9803	0.00180	33.30	0.9840	0.00160
24.60	0.9790	0.00180	29.60	0.9838	0.00240	33.70	0.9914	0.00170
24.80	0.9844	0.00170	29.90	0.9868	0.00210	34.10	0.9942	0.00160
25.00	0.9953	0.00200	30.20	0.9901	0.00170	34.50	1.0005	0.00190
25.20	0.9938	0.00230	30.50	0.9994	0.00250	34.90	1.0027	0.00150
25.40	1.0016	0.00200	30.80	1.0016	0.00190	35.30	1.0026	0.00170
25.60	0.9988	0.00150	31.10	1.0033	0.00190	35.70	1.0034	0.00180
25.80	1.0028	0.00290	31.40	1.0067	0.00220	36.10	1.0080	0.00200
26.00	1.0091	0.00200	31.70	1.0083	0.00200	36.50	1.0152	0.00180
26.20	1.0075	0.00180	32.00	1.0118	0.00180	36.90	1.0163	0.00260
26.40	1.0136	0.00220	32.30	1.0164	0.00150	37.30	1.0210	0.00180
26.60	1.0179	0.00180	32.60	1.0197	0.00190	37.70	1.0225	0.00170
26.80	1.0182	0.00190	32.90	1.0226	0.00160	37.80	1.0233	0.00230
27.00	1.0228	0.00350	33.10	1.0252	0.00190			
27.20	1.0276	0.00190						

8000 milli-g/cc			9000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
32.50	0.9356	0.00170	45.10	0.9338	0.00140
33.10	0.9412	0.00150	47.00	0.9401	0.00130
33.70	0.9460	0.00140	48.90	0.9494	0.00160
34.30	0.9491	0.00180	50.80	0.9565	0.00130
34.90	0.9564	0.00170	52.70	0.9614	0.00130
35.50	0.9627	0.00200	54.60	0.9676	0.00160
36.10	0.9664	0.00270	56.50	0.9750	0.00150
36.70	0.9731	0.00160	58.40	0.9784	0.00180
37.30	0.9753	0.00190	60.30	0.9835	0.00140
37.90	0.9814	0.00170	62.20	0.9837	0.00140
38.50	0.9889	0.00230	64.10	0.9910	0.00130
39.10	0.9889	0.00180	66.00	0.9923	0.00180
39.70	0.9920	0.00170	67.90	0.9965	0.00160
40.30	0.9973	0.00160	69.80	0.9976	0.00140
40.90	0.9970	0.00150	71.70	1.0032	0.00170
41.50	1.0037	0.00140	73.60	1.0038	0.00150
42.10	1.0063	0.00250	75.50	1.0072	0.00180
42.70	1.0127	0.00210	77.40	1.0112	0.00140
43.30	1.0135	0.00160	79.30	1.0069	0.00140
43.90	1.0159	0.00140	81.20	1.0097	0.00120
44.50	1.0207	0.00190	83.10	1.0173	0.00160
44.80	1.0207	0.00130	83.70	1.0178	0.00130

Case ID: UO2_sphere_005_01ref

Material: Uranium dioxide in water

Weight Fraction U in UO2: 0.88144

Geometry: Sphere

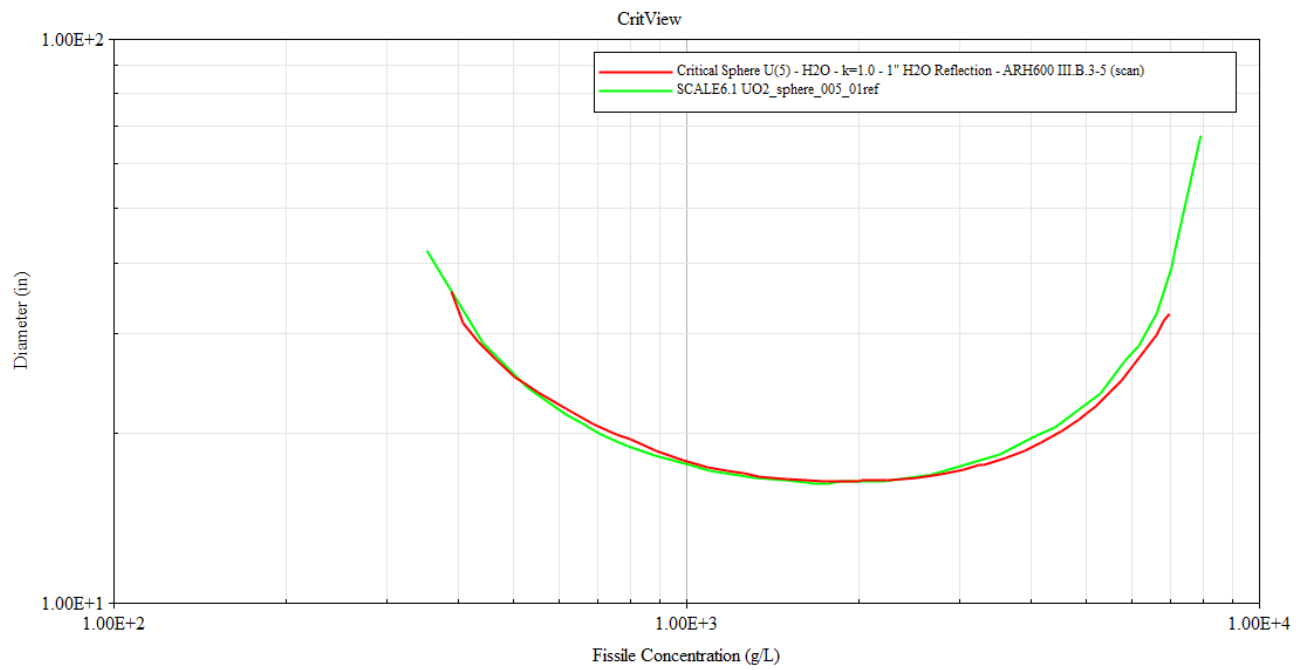
Isotopics: 5% ^{235}U 95% ^{238}U

Reflector: 1" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere(5.0% ²³⁵ U) – 1 Inch of Water Reflection					
UO2 Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.400	0.35258	29.100	45.600	0.800	42.0600
0.500	0.44072	22.700	30.200	0.300	28.8615
0.600	0.52886	19.900	25.200	0.200	24.0143
0.700	0.61701	18.400	22.600	0.200	21.5844
0.800	0.70515	17.000	20.700	0.100	19.9600
0.850	0.74922	16.600	20.200	0.100	19.4081
0.900	0.79330	16.400	19.600	0.100	18.9603
1.000	0.88144	15.800	19.000	0.100	18.2172
1.250	1.10180	15.000	17.800	0.100	17.1298
1.500	1.32216	14.600	17.300	0.100	16.6851
1.700	1.49845	14.100	17.000	0.100	16.4619
1.900	1.67474	14.400	17.000	0.100	16.2608
2.000	1.76288	14.300	16.900	0.100	16.2795
2.100	1.85102	14.400	16.900	0.100	16.3769
2.500	2.20360	14.500	17.100	0.100	16.3735
3.000	2.64432	14.900	17.600	0.100	16.8297
4.000	3.52576	16.000	19.100	0.100	18.3148
5.000	4.40720	17.900	21.500	0.100	20.4167
6.000	5.28864	20.400	25.100	0.200	23.5302
7.000	6.17008	24.000	30.900	0.300	28.5611
7.500	6.61080	26.800	35.500	0.400	32.5600
8.000	7.05152	30.300	42.900	0.600	39.4450
9.000	7.93296	43.000	80.500	1.800	67.3391

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-892 (pdf pg910)
,
#index number = <index = 1:23:1>
,
#UO2 Concentration = <@conc =
0.4,0.5,0.6,0.7,0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
29.1,22.7,19.9,18.4,17,16.6,16.4,15.8,15,14.6,14.1,14.4,14.3,14.4,14.5,14.9,16,17.9,20.4,24,26.8,
30.3,43> in
#Ending Diameter = <@enddia =
45.6,30.2,25.2,22.6,20.7,20.2,19.6,19,17.8,17.3,17,17,16.9,16.9,17.1,17.6,19.1,21.5,25.1,30.9,35.
5,42.9,80.5> in
#Delta = <@delta =
0.8,0.3,0.2,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.2,0.3,0.4,0.6,1.8> in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                                92235 5
                                92238 95  end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300  end
  h2o          2 1 300  end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere With Water Reflector"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(diameter*in)/2+(1*in)}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; 1" Water Reflector; 5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.05 U238 0.95
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.353 42.0600
0.441 28.8615
0.529 24.0143
0.617 21.5844
0.705 19.9600
0.749 19.4081
0.793 18.9603
0.881 18.2172
1.102 17.1298
1.322 16.6851
1.498 16.4619
1.675 16.2608
1.763 16.2795
1.851 16.3769
2.204 16.3735
2.644 16.8297
3.526 18.3148
4.407 20.4167
5.289 23.5302
6.170 28.5611
6.611 32.5600
7.052 39.4450
7.933 67.3391
```

400 milli-g/cc			500 milli-g/cc			600 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
29.10	0.9271	0.00140	22.70	0.9269	0.00140	19.90	0.9267	0.00210
29.90	0.9322	0.00120	23.00	0.9320	0.00160	20.10	0.9329	0.00180
30.70	0.9394	0.00150	23.30	0.9336	0.00160	20.30	0.9360	0.00170
31.50	0.9447	0.00170	23.60	0.9404	0.00190	20.50	0.9374	0.00180
32.30	0.9524	0.00140	23.90	0.9422	0.00180	20.70	0.9451	0.00170
33.10	0.9567	0.00160	24.20	0.9494	0.00200	20.90	0.9456	0.00140
33.90	0.9627	0.00130	24.50	0.9525	0.00170	21.10	0.9535	0.00160
34.70	0.9673	0.00200	24.80	0.9547	0.00160	21.30	0.9560	0.00190
35.50	0.9723	0.00150	25.10	0.9619	0.00160	21.50	0.9601	0.00160
36.30	0.9747	0.00210	25.40	0.9638	0.00190	21.70	0.9615	0.00170
37.10	0.9808	0.00130	25.70	0.9639	0.00170	21.90	0.9651	0.00150
37.90	0.9838	0.00140	26.00	0.9699	0.00200	22.10	0.9691	0.00140
38.70	0.9875	0.00210	26.30	0.9747	0.00140	22.30	0.9752	0.00130
39.50	0.9935	0.00150	26.60	0.9772	0.00170	22.50	0.9768	0.00160
40.30	0.9932	0.00150	26.90	0.9828	0.00110	22.70	0.9778	0.00150
41.10	0.9966	0.00170	27.20	0.9843	0.00160	22.90	0.9819	0.00150
41.90	0.9989	0.00140	27.50	0.9861	0.00160	23.10	0.9842	0.00150
42.70	1.0044	0.00150	27.80	0.9917	0.00180	23.30	0.9884	0.00230
43.50	1.0035	0.00170	28.10	0.9936	0.00140	23.50	0.9907	0.00160
44.30	1.0053	0.00130	28.40	0.9945	0.00150	23.70	0.9949	0.00160
45.10	1.0073	0.00140	28.70	0.9979	0.00170	23.90	1.0004	0.00180
45.60	1.0125	0.00110	29.00	1.0018	0.00160	24.10	0.9997	0.00170
			29.30	1.0085	0.00170	24.30	1.0042	0.00150
			29.60	1.0104	0.00210	24.50	1.0052	0.00180
			29.90	1.0132	0.00150	24.70	1.0102	0.00130
			30.20	1.0129	0.00120	24.90	1.0126	0.00180
						25.10	1.0144	0.00150
						25.20	1.0166	0.00180

700 milli-g/cc			800 milli-g/cc			850 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
18.40	0.9335	0.00210	17.00	0.9185	0.00180	16.60	0.9239	0.00170
18.60	0.9345	0.00170	17.10	0.9253	0.00170	16.70	0.9230	0.00170
18.80	0.9401	0.00200	17.20	0.9267	0.00190	16.80	0.9297	0.00200
19.00	0.9468	0.00180	17.30	0.9280	0.00190	16.90	0.9353	0.00190
19.20	0.9484	0.00180	17.40	0.9329	0.00200	17.00	0.9355	0.00180
19.40	0.9521	0.00150	17.50	0.9366	0.00200	17.10	0.9358	0.00190
19.60	0.9607	0.00180	17.60	0.9410	0.00200	17.20	0.9405	0.00190
19.80	0.9663	0.00160	17.70	0.9457	0.00180	17.30	0.9413	0.00190
20.00	0.9689	0.00170	17.80	0.9465	0.00180	17.40	0.9432	0.00200
20.20	0.9722	0.00180	17.90	0.9486	0.00180	17.50	0.9478	0.00150
20.40	0.9749	0.00190	18.00	0.9493	0.00190	17.60	0.9525	0.00160
20.60	0.9775	0.00220	18.10	0.9549	0.00160	17.70	0.9567	0.00170
20.80	0.9850	0.00170	18.20	0.9526	0.00240	17.80	0.9557	0.00190
21.00	0.9881	0.00170	18.30	0.9585	0.00150	17.90	0.9579	0.00190
21.20	0.9957	0.00210	18.40	0.9599	0.00160	18.00	0.9648	0.00190
21.40	0.9929	0.00180	18.50	0.9637	0.00180	18.10	0.9632	0.00200
21.60	1.0006	0.00170	18.60	0.9671	0.00190	18.20	0.9690	0.00220
21.80	1.0060	0.00200	18.70	0.9692	0.00190	18.30	0.9706	0.00170
22.00	1.0093	0.00200	18.80	0.9691	0.00230	18.40	0.9690	0.00190
22.20	1.0099	0.00240	18.90	0.9722	0.00170	18.50	0.9772	0.00210
22.40	1.0133	0.00170	19.00	0.9745	0.00240	18.60	0.9827	0.00180
22.60	1.0153	0.00170	19.10	0.9757	0.00170	18.70	0.9814	0.00230
			19.20	0.9789	0.00180	18.80	0.9845	0.00160
			19.30	0.9866	0.00170	18.90	0.9843	0.00190
			19.40	0.9847	0.00240	19.00	0.9875	0.00160
			19.50	0.9879	0.00160	19.10	0.9944	0.00200
			19.60	0.9883	0.00200	19.20	0.9945	0.00190
			19.70	0.9929	0.00160	19.30	0.9952	0.00170
			19.80	0.9931	0.00160	19.40	0.9997	0.00170
			19.90	1.0003	0.00180	19.50	1.0034	0.00180
			20.00	1.0007	0.00210	19.60	1.0033	0.00200
			20.10	0.9993	0.00200	19.70	1.0030	0.00150
			20.20	1.0021	0.00190	19.80	1.0102	0.00160
			20.30	1.0036	0.00170	19.90	1.0105	0.00170
			20.40	1.0062	0.00230	20.00	1.0110	0.00180
			20.50	1.0121	0.00180	20.10	1.0129	0.00170
			20.60	1.0115	0.00170	20.20	1.0150	0.00150
			20.70	1.0142	0.00190			

900 milli-g/cc			1000 milli-g/cc			1250 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
16.40	0.9245	0.00230	15.80	0.9249	0.00200	15.00	0.9232	0.00170
16.50	0.9294	0.00230	15.90	0.9253	0.00170	15.10	0.9269	0.00180
16.60	0.9290	0.00170	16.00	0.9304	0.00270	15.20	0.9331	0.00210
16.70	0.9386	0.00260	16.10	0.9395	0.00160	15.30	0.9378	0.00170
16.80	0.9353	0.00150	16.20	0.9355	0.00180	15.40	0.9414	0.00220
16.90	0.9416	0.00230	16.30	0.9429	0.00190	15.50	0.9415	0.00210
17.00	0.9448	0.00200	16.40	0.9443	0.00160	15.60	0.9467	0.00200
17.10	0.9474	0.00180	16.50	0.9480	0.00160	15.70	0.9510	0.00190
17.20	0.9509	0.00240	16.60	0.9537	0.00180	15.80	0.9547	0.00160
17.30	0.9545	0.00170	16.70	0.9535	0.00180	15.90	0.9564	0.00180
17.40	0.9583	0.00200	16.80	0.9580	0.00170	16.00	0.9608	0.00160
17.50	0.9609	0.00160	16.90	0.9609	0.00210	16.10	0.9650	0.00200
17.60	0.9646	0.00160	17.00	0.9642	0.00170	16.20	0.9696	0.00210
17.70	0.9655	0.00260	17.10	0.9667	0.00180	16.30	0.9724	0.00200
17.80	0.9645	0.00200	17.20	0.9684	0.00190	16.40	0.9748	0.00220
17.90	0.9762	0.00190	17.30	0.9747	0.00180	16.50	0.9773	0.00180
18.00	0.9685	0.00190	17.40	0.9733	0.00220	16.60	0.9822	0.00260
18.10	0.9776	0.00230	17.50	0.9799	0.00210	16.70	0.9886	0.00200
18.20	0.9781	0.00160	17.60	0.9816	0.00180	16.80	0.9896	0.00180
18.30	0.9844	0.00180	17.70	0.9810	0.00210	16.90	0.9901	0.00210
18.40	0.9827	0.00200	17.80	0.9884	0.00200	17.00	0.9959	0.00230
18.50	0.9908	0.00170	17.90	0.9881	0.00190	17.10	0.9986	0.00200
18.60	0.9897	0.00210	18.00	0.9932	0.00220	17.20	1.0033	0.00190
18.70	0.9938	0.00170	18.10	0.9979	0.00200	17.30	1.0031	0.00200
18.80	0.9949	0.00170	18.20	0.9995	0.00280	17.40	1.0072	0.00230
18.90	0.9959	0.00170	18.30	1.0024	0.00160	17.50	1.0074	0.00200
19.00	1.0027	0.00240	18.40	1.0049	0.00160	17.60	1.0091	0.00220
19.10	1.0074	0.00190	18.50	1.0058	0.00220	17.70	1.0174	0.00230
19.20	1.0048	0.00200	18.60	1.0081	0.00200	17.80	1.0176	0.00220
19.30	1.0021	0.00170	18.70	1.0137	0.00180			
19.40	1.0071	0.00180	18.80	1.0157	0.00180			
19.50	1.0098	0.00170	18.90	1.0187	0.00220			
19.60	1.0128	0.00230	19.00	1.0183	0.00170			

1500 milli-g/cc			1700 milli-g/cc			1900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.60	0.9289	0.00220	14.10	0.9093	0.00180	14.40	0.9225	0.00220
14.70	0.9293	0.00190	14.20	0.9148	0.00190	14.50	0.9316	0.00270
14.80	0.9340	0.00180	14.30	0.9212	0.00240	14.60	0.9354	0.00210
14.90	0.9349	0.00190	14.40	0.9220	0.00190	14.70	0.9414	0.00180
15.00	0.9396	0.00230	14.50	0.9271	0.00200	14.80	0.9420	0.00230
15.10	0.9473	0.00190	14.60	0.9357	0.00230	14.90	0.9517	0.00190
15.20	0.9500	0.00200	14.70	0.9357	0.00240	15.00	0.9502	0.00200
15.30	0.9512	0.00210	14.80	0.9428	0.00280	15.10	0.9557	0.00250
15.40	0.9603	0.00210	14.90	0.9475	0.00240	15.20	0.9599	0.00180
15.50	0.9590	0.00200	15.00	0.9526	0.00270	15.30	0.9649	0.00190
15.60	0.9636	0.00170	15.10	0.9543	0.00210	15.40	0.9700	0.00220
15.70	0.9659	0.00220	15.20	0.9601	0.00200	15.50	0.9737	0.00170
15.80	0.9655	0.00180	15.30	0.9624	0.00250	15.60	0.9742	0.00220
15.90	0.9744	0.00170	15.40	0.9637	0.00230	15.70	0.9778	0.00210
16.00	0.9769	0.00210	15.50	0.9635	0.00180	15.80	0.9836	0.00220
16.10	0.9828	0.00210	15.60	0.9741	0.00210	15.90	0.9863	0.00210
16.20	0.9876	0.00230	15.70	0.9720	0.00280	16.00	0.9897	0.00190
16.30	0.9856	0.00210	15.80	0.9779	0.00200	16.10	0.9899	0.00270
16.40	0.9886	0.00230	15.90	0.9813	0.00230	16.20	0.9969	0.00210
16.50	0.9970	0.00220	16.00	0.9879	0.00200	16.30	1.0020	0.00210
16.60	0.9937	0.00190	16.10	0.9875	0.00350	16.40	1.0042	0.00260
16.70	1.0011	0.00220	16.20	0.9919	0.00220	16.50	1.0091	0.00210
16.80	1.0059	0.00210	16.30	0.9965	0.00180	16.60	1.0095	0.00170
16.90	1.0058	0.00190	16.40	0.9987	0.00190	16.70	1.0106	0.00190
17.00	1.0094	0.00250	16.50	1.0008	0.00230	16.80	1.0166	0.00210
17.10	1.0164	0.00180	16.60	1.0063	0.00220	16.90	1.0205	0.00220
17.20	1.0178	0.00200	16.70	1.0106	0.00210	17.00	1.0224	0.00200
17.30	1.0210	0.00190	16.80	1.0115	0.00220			
			16.90	1.0149	0.00200			
			17.00	1.0134	0.00210			

2000 milli-g/cc			2100 milli-g/cc			2500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.30	0.9211	0.00200	14.40	0.9285	0.00220	14.50	0.9283	0.00220
14.40	0.9273	0.00200	14.50	0.9322	0.00260	14.60	0.9342	0.00190
14.50	0.9335	0.00200	14.60	0.9347	0.00200	14.70	0.9346	0.00190
14.60	0.9402	0.00250	14.70	0.9383	0.00220	14.80	0.9349	0.00240
14.70	0.9405	0.00230	14.80	0.9418	0.00220	14.90	0.9433	0.00300
14.80	0.9461	0.00240	14.90	0.9502	0.00210	15.00	0.9503	0.00240
14.90	0.9503	0.00190	15.00	0.9496	0.00180	15.10	0.9517	0.00230
15.00	0.9501	0.00190	15.10	0.9562	0.00190	15.20	0.9550	0.00210
15.10	0.9578	0.00200	15.20	0.9593	0.00220	15.30	0.9599	0.00200
15.20	0.9582	0.00200	15.30	0.9600	0.00240	15.40	0.9683	0.00230
15.30	0.9646	0.00210	15.40	0.9654	0.00220	15.50	0.9703	0.00230
15.40	0.9681	0.00200	15.50	0.9696	0.00170	15.60	0.9682	0.00230
15.50	0.9696	0.00220	15.60	0.9758	0.00220	15.70	0.9756	0.00280
15.60	0.9793	0.00200	15.70	0.9814	0.00190	15.80	0.9745	0.00200
15.70	0.9757	0.00240	15.80	0.9847	0.00200	15.90	0.9822	0.00210
15.80	0.9813	0.00200	15.90	0.9841	0.00190	16.00	0.9824	0.00220
15.90	0.9857	0.00210	16.00	0.9864	0.00180	16.10	0.9900	0.00200
16.00	0.9876	0.00200	16.10	0.9964	0.00190	16.20	0.9890	0.00250
16.10	0.9933	0.00220	16.20	0.9981	0.00200	16.30	0.9925	0.00230
16.20	0.9969	0.00190	16.30	0.9990	0.00240	16.40	1.0027	0.00200
16.30	1.0008	0.00230	16.40	1.0003	0.00210	16.50	1.0091	0.00260
16.40	1.0047	0.00220	16.50	1.0080	0.00270	16.60	1.0044	0.00230
16.50	1.0076	0.00260	16.60	1.0116	0.00200	16.70	1.0097	0.00240
16.60	1.0072	0.00180	16.70	1.0141	0.00190	16.80	1.0126	0.00220
16.70	1.0112	0.00240	16.80	1.0168	0.00190	16.90	1.0150	0.00190
16.80	1.0185	0.00230	16.90	1.0161	0.00200	17.00	1.0227	0.00250
16.90	1.0212	0.00190				17.10	1.0232	0.00260

3000 milli-g/cc			4000 milli-g/cc			5000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.90	0.9275	0.00190	16.00	0.9296	0.00190	17.90	0.9399	0.00190
15.00	0.9309	0.00190	16.10	0.9341	0.00210	18.00	0.9395	0.00210
15.10	0.9389	0.00250	16.20	0.9376	0.00230	18.10	0.9401	0.00190
15.20	0.9444	0.00210	16.30	0.9455	0.00210	18.20	0.9475	0.00220
15.30	0.9478	0.00200	16.40	0.9431	0.00210	18.30	0.9476	0.00200
15.40	0.9462	0.00200	16.50	0.9468	0.00220	18.40	0.9509	0.00210
15.50	0.9501	0.00220	16.60	0.9493	0.00220	18.50	0.9529	0.00180
15.60	0.9555	0.00230	16.70	0.9568	0.00210	18.60	0.9571	0.00220
15.70	0.9586	0.00160	16.80	0.9619	0.00260	18.70	0.9582	0.00200
15.80	0.9609	0.00200	16.90	0.9612	0.00230	18.80	0.9607	0.00170
15.90	0.9656	0.00200	17.00	0.9633	0.00240	18.90	0.9642	0.00210
16.00	0.9737	0.00190	17.10	0.9674	0.00250	19.00	0.9690	0.00180
16.10	0.9732	0.00280	17.20	0.9686	0.00200	19.10	0.9702	0.00220
16.20	0.9755	0.00220	17.30	0.9720	0.00250	19.20	0.9734	0.00290
16.30	0.9775	0.00200	17.40	0.9741	0.00190	19.30	0.9752	0.00220
16.40	0.9828	0.00230	17.50	0.9758	0.00230	19.40	0.9763	0.00160
16.50	0.9866	0.00260	17.60	0.9790	0.00220	19.50	0.9776	0.00200
16.60	0.9896	0.00200	17.70	0.9848	0.00220	19.60	0.9819	0.00190
16.70	0.9966	0.00250	17.80	0.9906	0.00260	19.70	0.9812	0.00180
16.80	0.9981	0.00180	17.90	0.9911	0.00240	19.80	0.9836	0.00200
16.90	1.0045	0.00210	18.00	0.9931	0.00240	19.90	0.9909	0.00190
17.00	1.0038	0.00230	18.10	0.9971	0.00200	20.00	0.9921	0.00270
17.10	1.0067	0.00180	18.20	0.9984	0.00240	20.10	0.9914	0.00200
17.20	1.0131	0.00220	18.30	0.9992	0.00240	20.20	0.9975	0.00170
17.30	1.0156	0.00200	18.40	1.0046	0.00190	20.30	0.9954	0.00210
17.40	1.0179	0.00210	18.50	1.0072	0.00200	20.40	0.9999	0.00180
17.50	1.0177	0.00210	18.60	1.0109	0.00190	20.50	1.0005	0.00230
17.60	1.0228	0.00230	18.70	1.0182	0.00210	20.60	1.0027	0.00190
			18.80	1.0161	0.00210	20.70	1.0069	0.00190
			18.90	1.0184	0.00230	20.80	1.0077	0.00190
			19.00	1.0208	0.00250	20.90	1.0086	0.00200
			19.10	1.0229	0.00250	21.00	1.0133	0.00250
						21.10	1.0163	0.00180
						21.20	1.0172	0.00220
						21.30	1.0196	0.00180
						21.40	1.0198	0.00240
						21.50	1.0255	0.00200

6000 milli-g/cc			7000 milli-g/cc			7500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
20.40	0.9391	0.00210	24.00	0.9361	0.00150	26.80	0.9414	0.00220
20.60	0.9431	0.00200	24.30	0.9394	0.00160	27.20	0.9430	0.00160
20.80	0.9452	0.00170	24.60	0.9444	0.00210	27.60	0.9459	0.00200
21.00	0.9487	0.00220	24.90	0.9523	0.00150	28.00	0.9525	0.00210
21.20	0.9555	0.00180	25.20	0.9524	0.00170	28.40	0.9566	0.00170
21.40	0.9582	0.00190	25.50	0.9573	0.00200	28.80	0.9586	0.00170
21.60	0.9607	0.00180	25.80	0.9633	0.00170	29.20	0.9678	0.00200
21.80	0.9636	0.00210	26.10	0.9705	0.00180	29.60	0.9696	0.00210
22.00	0.9678	0.00220	26.40	0.9727	0.00210	30.00	0.9738	0.00220
22.20	0.9748	0.00200	26.70	0.9713	0.00190	30.40	0.9804	0.00190
22.40	0.9766	0.00220	27.00	0.9789	0.00200	30.80	0.9808	0.00200
22.60	0.9817	0.00210	27.30	0.9795	0.00150	31.20	0.9831	0.00220
22.80	0.9881	0.00220	27.60	0.9833	0.00200	31.60	0.9901	0.00190
23.00	0.9863	0.00190	27.90	0.9928	0.00170	32.00	0.9949	0.00190
23.20	0.9921	0.00250	28.20	0.9908	0.00180	32.40	1.0002	0.00220
23.40	0.9972	0.00190	28.50	0.9989	0.00250	32.80	0.9997	0.00180
23.60	1.0015	0.00260	28.80	1.0043	0.00160	33.20	1.0013	0.00290
23.80	1.0017	0.00180	29.10	1.0028	0.00160	33.60	1.0048	0.00150
24.00	1.0058	0.00210	29.40	1.0077	0.00200	34.00	1.0123	0.00170
24.20	1.0103	0.00180	29.70	1.0085	0.00200	34.40	1.0116	0.00170
24.40	1.0101	0.00150	30.00	1.0113	0.00250	34.80	1.0161	0.00200
24.60	1.0165	0.00240	30.30	1.0160	0.00180	35.20	1.0183	0.00150
24.80	1.0136	0.00220	30.60	1.0225	0.00190	35.50	1.0203	0.00180
25.00	1.0167	0.00180	30.90	1.0239	0.00230			
25.10	1.0188	0.00220						

8000 milli-g/cc			9000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
30.30	0.9363	0.00180	43.00	0.9363	0.00140
30.90	0.9420	0.00180	44.80	0.9438	0.00190
31.50	0.9498	0.00170	46.60	0.9533	0.00170
32.10	0.9533	0.00170	48.40	0.9572	0.00160
32.70	0.9585	0.00170	50.20	0.9612	0.00170
33.30	0.9611	0.00200	52.00	0.9654	0.00190
33.90	0.9707	0.00160	53.80	0.9717	0.00150
34.50	0.9749	0.00150	55.60	0.9755	0.00180
35.10	0.9790	0.00150	57.40	0.9767	0.00140
35.70	0.9812	0.00170	59.20	0.9849	0.00130
36.30	0.9844	0.00170	61.00	0.9891	0.00160
36.90	0.9870	0.00210	62.80	0.9956	0.00140
37.50	0.9921	0.00190	64.60	0.9937	0.00200
38.10	0.9982	0.00170	66.40	0.9976	0.00120
38.70	0.9997	0.00160	68.20	1.0022	0.00140
39.30	0.9971	0.00190	70.00	1.0025	0.00160
39.90	1.0091	0.00150	71.80	1.0028	0.00130
40.50	1.0101	0.00190	73.60	1.0080	0.00160
41.10	1.0118	0.00170	75.40	1.0108	0.00120
41.70	1.0143	0.00210	77.20	1.0135	0.00150
42.30	1.0185	0.00140	79.00	1.0132	0.00140
42.90	1.0226	0.00170	80.50	1.0119	0.00130

Case ID: UO2_sphere_005_10ref

Material: Uranium dioxide in water

Weight Fraction U in UO₂: 0.88144

Geometry: Sphere

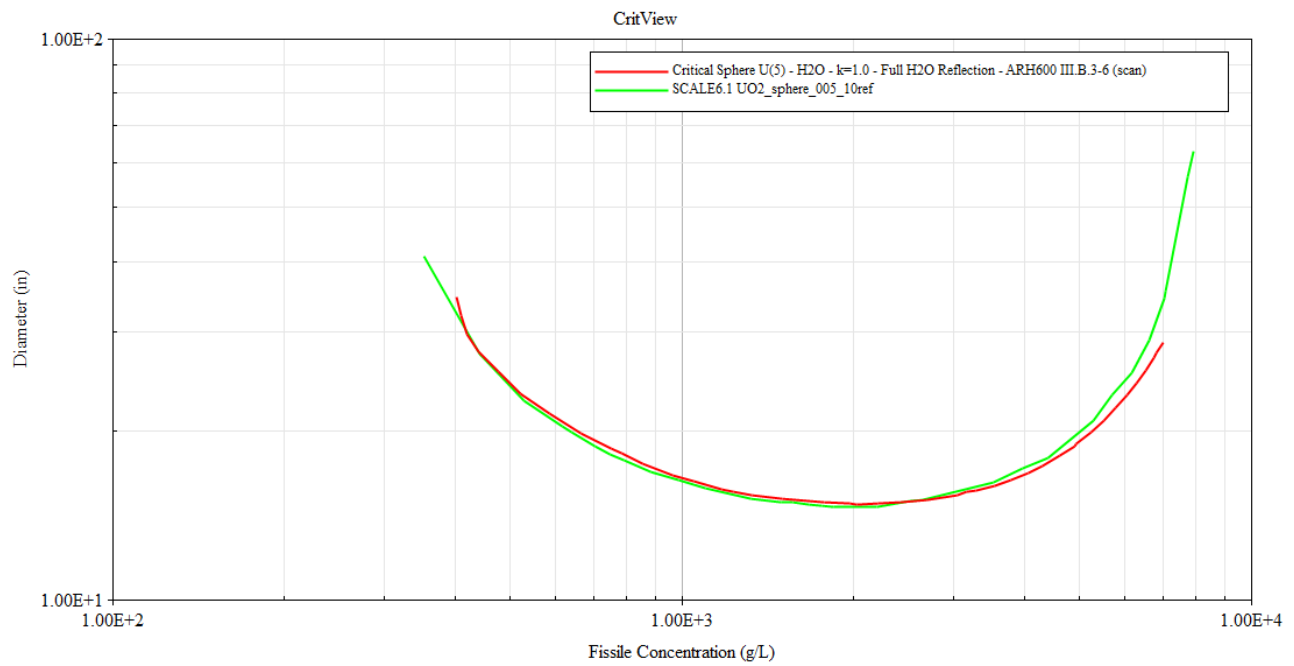
Isotopics: 5% ²³⁵U 95% ²³⁸U

Reflector: 10" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere(5.0% ²³⁵ U) - 10 Inches of Water Reflection					
UO2 Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.400	0.35258	28.000	44.800	0.800	40.9474
0.500	0.44072	21.500	28.900	0.300	27.3655
0.600	0.52886	18.800	24.100	0.200	22.6512
0.700	0.61701	17.200	21.100	0.200	20.3750
0.800	0.70515	15.800	19.500	0.100	18.7533
0.850	0.74922	15.400	18.900	0.100	18.1706
0.900	0.79330	15.000	18.400	0.100	17.7406
1.000	0.88144	14.500	17.600	0.100	16.9000
1.250	1.10180	13.600	16.400	0.100	15.8262
1.500	1.32216	13.200	15.800	0.100	15.1585
1.700	1.49845	12.900	15.500	0.100	14.9329
1.900	1.67474	12.800	15.400	0.100	14.7378
2.000	1.76288	12.600	15.400	0.100	14.6879
2.100	1.85102	12.600	15.300	0.100	14.6373
2.500	2.20360	12.900	15.400	0.100	14.6479
3.000	2.64432	13.100	15.800	0.100	15.0235
4.000	3.52576	13.900	17.100	0.100	16.2148
5.000	4.40720	15.500	19.100	0.100	17.8721
6.000	5.28864	17.400	22.400	0.200	20.8357
7.000	6.17008	20.800	27.800	0.300	25.3789
7.500	6.61080	23.200	32.100	0.400	29.0133
8.000	7.05152	26.300	38.900	0.600	34.5343
9.000	7.93296	37.200	76.300	1.900	63.0793

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-906 (pdf pg924)
,
#index number = <index = 1:23:1>
,
#UO2 Concentration = <@conc =
0.4,0.5,0.6,0.7,0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8,9> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
28,21.5,18.8,17.2,15.8,15.4,15,14.5,13.6,13.2,12.9,12.8,12.6,12.6,12.9,13.1,13.9,15.5,17.4,20.8,2
3.2,26.3,37.2> in
#Ending Diameter = <@enddia =
44.8,28.9,24.1,21.1,19.5,18.9,18.4,17.6,16.4,15.8,15.5,15.4,15.4,15.3,15.4,15.8,17.1,19.1,22.4,27
.8,32.1,38.9,76.3> in
#Delta = <@delta =
0.8,0.3,0.2,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.2,0.3,0.4,0.6,1.9> in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                                92235 5
                                92238 95  end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300  end
  h2o          2 1 300  end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere With Water Reflector"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(diameter*in)/2+(10*in)}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; 10" Water Reflector; 5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.05 U238 0.95
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.353 40.9474
0.441 27.3655
0.529 22.6512
0.617 20.3750
0.705 18.7533
0.749 18.1706
0.793 17.7406
0.881 16.9000
1.102 15.8262
1.322 15.1585
1.498 14.9329
1.675 14.7378
1.763 14.6879
1.851 14.6373
2.204 14.6479
2.644 15.0235
3.526 16.2148
4.407 17.8721
5.289 20.8357
6.170 25.3789
6.611 29.0133
7.052 34.5343
7.933 63.0793
```

400 milli-g/cc			500 milli-g/cc			600 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
28.00	0.9285	0.00140	21.50	0.9261	0.00140	18.80	0.9312	0.00180
28.80	0.9334	0.00160	21.80	0.9269	0.00140	19.00	0.9343	0.00150
29.60	0.9422	0.00140	22.10	0.9345	0.00140	19.20	0.9406	0.00150
30.40	0.9471	0.00110	22.40	0.9398	0.00170	19.40	0.9418	0.00150
31.20	0.9503	0.00130	22.70	0.9466	0.00170	19.60	0.9476	0.00160
32.00	0.9570	0.00170	23.00	0.9490	0.00180	19.80	0.9534	0.00190
32.80	0.9631	0.00150	23.30	0.9507	0.00210	20.00	0.9545	0.00230
33.60	0.9686	0.00120	23.60	0.9576	0.00130	20.20	0.9568	0.00160
34.40	0.9725	0.00150	23.90	0.9594	0.00140	20.40	0.9605	0.00190
35.20	0.9786	0.00160	24.20	0.9620	0.00150	20.60	0.9664	0.00140
36.00	0.9799	0.00120	24.50	0.9668	0.00160	20.80	0.9681	0.00140
36.80	0.9846	0.00110	24.80	0.9725	0.00170	21.00	0.9748	0.00190
37.60	0.9875	0.00110	25.10	0.9759	0.00130	21.20	0.9772	0.00150
38.40	0.9930	0.00110	25.40	0.9802	0.00140	21.40	0.9781	0.00130
39.20	0.9945	0.00150	25.70	0.9810	0.00170	21.60	0.9811	0.00170
40.00	0.9967	0.00150	26.00	0.9878	0.00150	21.80	0.9855	0.00150
40.80	0.9993	0.00130	26.30	0.9862	0.00160	22.00	0.9873	0.00170
41.60	1.0031	0.00150	26.60	0.9934	0.00140	22.20	0.9899	0.00160
42.40	1.0036	0.00099	26.90	0.9928	0.00150	22.40	0.9944	0.00180
43.20	1.0064	0.00130	27.20	0.9968	0.00180	22.60	0.9989	0.00220
44.00	1.0117	0.00100	27.50	1.0026	0.00160	22.80	1.0032	0.00170
44.80	1.0158	0.00190	27.80	1.0023	0.00210	23.00	1.0021	0.00170
			28.10	1.0045	0.00180	23.20	1.0045	0.00130
			28.40	1.0081	0.00180	23.40	1.0091	0.00180
			28.70	1.0156	0.00140	23.60	1.0109	0.00230
			28.90	1.0126	0.00140	23.80	1.0138	0.00150
						24.00	1.0175	0.00220
						24.10	1.0176	0.00170

700 milli-g/cc			800 milli-g/cc			850 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.20	0.9317	0.00160	15.80	0.9254	0.00170	15.40	0.9269	0.00150
17.40	0.9357	0.00160	15.90	0.9278	0.00150	15.50	0.9296	0.00270
17.60	0.9455	0.00150	16.00	0.9322	0.00170	15.60	0.9349	0.00180
17.80	0.9462	0.00170	16.10	0.9355	0.00200	15.70	0.9344	0.00190
18.00	0.9535	0.00180	16.20	0.9375	0.00140	15.80	0.9351	0.00160
18.20	0.9550	0.00140	16.30	0.9410	0.00180	15.90	0.9396	0.00180
18.40	0.9674	0.00190	16.40	0.9425	0.00150	16.00	0.9426	0.00200
18.60	0.9655	0.00150	16.50	0.9460	0.00180	16.10	0.9437	0.00150
18.80	0.9715	0.00150	16.60	0.9465	0.00150	16.20	0.9448	0.00190
19.00	0.9752	0.00190	16.70	0.9519	0.00220	16.30	0.9530	0.00170
19.20	0.9803	0.00150	16.80	0.9540	0.00190	16.40	0.9531	0.00220
19.40	0.9838	0.00150	16.90	0.9547	0.00170	16.50	0.9614	0.00160
19.60	0.9875	0.00190	17.00	0.9601	0.00190	16.60	0.9623	0.00160
19.80	0.9920	0.00190	17.10	0.9599	0.00210	16.70	0.9640	0.00190
20.00	0.9962	0.00160	17.20	0.9627	0.00210	16.80	0.9634	0.00200
20.20	0.9951	0.00240	17.30	0.9661	0.00170	16.90	0.9696	0.00210
20.40	1.0007	0.00170	17.40	0.9722	0.00180	17.00	0.9751	0.00160
20.60	1.0044	0.00170	17.50	0.9742	0.00170	17.10	0.9700	0.00210
20.80	1.0082	0.00170	17.60	0.9725	0.00150	17.20	0.9777	0.00190
21.00	1.0146	0.00170	17.70	0.9742	0.00180	17.30	0.9772	0.00220
21.10	1.0120	0.00150	17.80	0.9766	0.00160	17.40	0.9831	0.00180
			17.90	0.9803	0.00160	17.50	0.9855	0.00160
			18.00	0.9841	0.00230	17.60	0.9875	0.00160
			18.10	0.9858	0.00280	17.70	0.9881	0.00190
			18.20	0.9912	0.00190	17.80	0.9933	0.00170
			18.30	0.9927	0.00180	17.90	0.9950	0.00230
			18.40	0.9950	0.00190	18.00	0.9954	0.00200
			18.50	0.9951	0.00180	18.10	0.9964	0.00200
			18.60	0.9999	0.00190	18.20	1.0015	0.00190
			18.70	0.9960	0.00200	18.30	1.0043	0.00180
			18.80	1.0035	0.00160	18.40	1.0045	0.00160
			18.90	1.0040	0.00160	18.50	1.0086	0.00180
			19.00	1.0096	0.00170	18.60	1.0091	0.00190
			19.10	1.0060	0.00150	18.70	1.0158	0.00220
			19.20	1.0075	0.00150	18.80	1.0140	0.00150
			19.30	1.0134	0.00160	18.90	1.0193	0.00160
			19.40	1.0151	0.00150			
			19.50	1.0179	0.00180			

900 milli-g/cc			1000 milli-g/cc			1250 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
15.00	0.9264	0.00170	14.50	0.9254	0.00200	13.60	0.9257	0.00230
15.10	0.9270	0.00170	14.60	0.9294	0.00200	13.70	0.9306	0.00180
15.20	0.9293	0.00180	14.70	0.9325	0.00180	13.80	0.9258	0.00170
15.30	0.9369	0.00190	14.80	0.9368	0.00180	13.90	0.9346	0.00250
15.40	0.9334	0.00190	14.90	0.9414	0.00230	14.00	0.9401	0.00240
15.50	0.9396	0.00170	15.00	0.9407	0.00170	14.10	0.9421	0.00230
15.60	0.9419	0.00240	15.10	0.9452	0.00230	14.20	0.9436	0.00170
15.70	0.9429	0.00160	15.20	0.9511	0.00220	14.30	0.9499	0.00200
15.80	0.9484	0.00180	15.30	0.9512	0.00180	14.40	0.9546	0.00180
15.90	0.9506	0.00190	15.40	0.9551	0.00180	14.50	0.9597	0.00230
16.00	0.9564	0.00190	15.50	0.9588	0.00170	14.60	0.9604	0.00190
16.10	0.9568	0.00180	15.60	0.9584	0.00230	14.70	0.9645	0.00190
16.20	0.9612	0.00210	15.70	0.9628	0.00240	14.80	0.9694	0.00200
16.30	0.9607	0.00180	15.80	0.9656	0.00180	14.90	0.9743	0.00190
16.40	0.9683	0.00220	15.90	0.9705	0.00200	15.00	0.9773	0.00200
16.50	0.9699	0.00170	16.00	0.9745	0.00210	15.10	0.9762	0.00180
16.60	0.9719	0.00210	16.10	0.9769	0.00230	15.20	0.9852	0.00170
16.70	0.9750	0.00180	16.20	0.9781	0.00170	15.30	0.9868	0.00230
16.80	0.9781	0.00230	16.30	0.9805	0.00200	15.40	0.9823	0.00170
16.90	0.9806	0.00220	16.40	0.9868	0.00190	15.50	0.9901	0.00200
17.00	0.9828	0.00170	16.50	0.9874	0.00210	15.60	0.9892	0.00210
17.10	0.9854	0.00200	16.60	0.9932	0.00200	15.70	0.9984	0.00210
17.20	0.9904	0.00160	16.70	0.9970	0.00190	15.80	0.9989	0.00220
17.30	0.9899	0.00210	16.80	0.9965	0.00210	15.90	1.0031	0.00180
17.40	0.9981	0.00220	16.90	1.0000	0.00190	16.00	1.0092	0.00190
17.50	0.9944	0.00220	17.00	1.0000	0.00160	16.10	1.0062	0.00170
17.60	0.9943	0.00160	17.10	1.0052	0.00170	16.20	1.0153	0.00240
17.70	0.9987	0.00160	17.20	1.0042	0.00200	16.30	1.0161	0.00220
17.80	1.0019	0.00170	17.30	1.0091	0.00200	16.40	1.0161	0.00190
17.90	1.0059	0.00170	17.40	1.0117	0.00160			
18.00	1.0097	0.00150	17.50	1.0142	0.00150			
18.10	1.0146	0.00190	17.60	1.0149	0.00160			
18.20	1.0152	0.00180						
18.30	1.0162	0.00180						
18.40	1.0198	0.00160						

1500 milli-g/cc			1700 milli-g/cc			1900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.20	0.9282	0.00180	12.90	0.9239	0.00180	12.80	0.9264	0.00180
13.30	0.9349	0.00220	13.00	0.9273	0.00200	12.90	0.9314	0.00190
13.40	0.9363	0.00180	13.10	0.9314	0.00180	13.00	0.9346	0.00200
13.50	0.9434	0.00250	13.20	0.9336	0.00200	13.10	0.9407	0.00220
13.60	0.9447	0.00200	13.30	0.9431	0.00210	13.20	0.9369	0.00170
13.70	0.9507	0.00220	13.40	0.9446	0.00190	13.30	0.9468	0.00180
13.80	0.9524	0.00200	13.50	0.9493	0.00170	13.40	0.9497	0.00210
13.90	0.9546	0.00160	13.60	0.9503	0.00200	13.50	0.9548	0.00210
14.00	0.9594	0.00190	13.70	0.9539	0.00220	13.60	0.9563	0.00170
14.10	0.9611	0.00170	13.80	0.9614	0.00200	13.70	0.9615	0.00180
14.20	0.9634	0.00210	13.90	0.9678	0.00200	13.80	0.9669	0.00170
14.30	0.9703	0.00210	14.00	0.9666	0.00220	13.90	0.9672	0.00180
14.40	0.9744	0.00180	14.10	0.9730	0.00200	14.00	0.9720	0.00240
14.50	0.9771	0.00190	14.20	0.9766	0.00250	14.10	0.9767	0.00180
14.60	0.9851	0.00210	14.30	0.9790	0.00230	14.20	0.9813	0.00170
14.70	0.9874	0.00170	14.40	0.9857	0.00180	14.30	0.9824	0.00210
14.80	0.9852	0.00210	14.50	0.9875	0.00190	14.40	0.9895	0.00190
14.90	0.9881	0.00190	14.60	0.9903	0.00230	14.50	0.9947	0.00200
15.00	0.9920	0.00170	14.70	0.9972	0.00220	14.60	0.9931	0.00200
15.10	0.9945	0.00170	14.80	0.9979	0.00220	14.70	0.9986	0.00200
15.20	1.0039	0.00200	14.90	0.9973	0.00170	14.80	1.0023	0.00180
15.30	1.0042	0.00190	15.00	1.0055	0.00210	14.90	1.0047	0.00210
15.40	1.0040	0.00220	15.10	1.0083	0.00160	15.00	1.0085	0.00170
15.50	1.0111	0.00200	15.20	1.0109	0.00240	15.10	1.0134	0.00200
15.60	1.0110	0.00170	15.30	1.0123	0.00260	15.20	1.0177	0.00200
15.70	1.0166	0.00190	15.40	1.0187	0.00190	15.30	1.0179	0.00250
15.80	1.0202	0.00200	15.50	1.0227	0.00200	15.40	1.0213	0.00220

2000 milli-g/cc			2100 milli-g/cc			2500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
12.60	0.9178	0.00190	12.60	0.9176	0.00200	12.90	0.9336	0.00170
12.70	0.9220	0.00190	12.70	0.9240	0.00180	13.00	0.9364	0.00210
12.80	0.9257	0.00190	12.80	0.9265	0.00190	13.10	0.9387	0.00220
12.90	0.9280	0.00200	12.90	0.9320	0.00270	13.20	0.9454	0.00170
13.00	0.9349	0.00220	13.00	0.9374	0.00210	13.30	0.9480	0.00190
13.10	0.9406	0.00230	13.10	0.9371	0.00190	13.40	0.9524	0.00180
13.20	0.9430	0.00180	13.20	0.9410	0.00210	13.50	0.9567	0.00200
13.30	0.9521	0.00190	13.30	0.9425	0.00210	13.60	0.9595	0.00200
13.40	0.9501	0.00180	13.40	0.9526	0.00230	13.70	0.9642	0.00190
13.50	0.9559	0.00220	13.50	0.9561	0.00310	13.80	0.9640	0.00190
13.60	0.9572	0.00200	13.60	0.9609	0.00190	13.90	0.9720	0.00180
13.70	0.9617	0.00180	13.70	0.9657	0.00220	14.00	0.9757	0.00200
13.80	0.9667	0.00200	13.80	0.9660	0.00210	14.10	0.9763	0.00200
13.90	0.9692	0.00180	13.90	0.9730	0.00210	14.20	0.9807	0.00210
14.00	0.9783	0.00210	14.00	0.9721	0.00190	14.30	0.9855	0.00200
14.10	0.9784	0.00180	14.10	0.9808	0.00210	14.40	0.9918	0.00170
14.20	0.9795	0.00200	14.20	0.9793	0.00210	14.50	0.9908	0.00170
14.30	0.9856	0.00170	14.30	0.9853	0.00190	14.60	0.9977	0.00200
14.40	0.9859	0.00180	14.40	0.9919	0.00210	14.70	1.0025	0.00180
14.50	0.9971	0.00200	14.50	0.9943	0.00210	14.80	1.0046	0.00170
14.60	0.9920	0.00200	14.60	0.9978	0.00180	14.90	1.0063	0.00180
14.70	1.0011	0.00180	14.70	1.0037	0.00290	15.00	1.0101	0.00210
14.80	1.0013	0.00180	14.80	1.0042	0.00190	15.10	1.0144	0.00230
14.90	1.0082	0.00210	14.90	1.0054	0.00190	15.20	1.0156	0.00220
15.00	1.0097	0.00210	15.00	1.0054	0.00240	15.30	1.0191	0.00210
15.10	1.0159	0.00190	15.10	1.0148	0.00200	15.40	1.0224	0.00230
15.20	1.0193	0.00210	15.20	1.0195	0.00220			
15.30	1.0202	0.00210	15.30	1.0211	0.00210			
15.40	1.0195	0.00190						

3000 milli-g/cc			4000 milli-g/cc			5000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.10	0.9280	0.00190	13.90	0.9261	0.00230	15.50	0.9355	0.00180
13.20	0.9317	0.00220	14.00	0.9325	0.00190	15.60	0.9396	0.00230
13.30	0.9391	0.00210	14.10	0.9370	0.00180	15.70	0.9399	0.00180
13.40	0.9431	0.00200	14.20	0.9415	0.00190	15.80	0.9447	0.00190
13.50	0.9473	0.00280	14.30	0.9401	0.00200	15.90	0.9490	0.00190
13.60	0.9486	0.00220	14.40	0.9430	0.00190	16.00	0.9481	0.00240
13.70	0.9540	0.00210	14.50	0.9468	0.00210	16.10	0.9534	0.00170
13.80	0.9572	0.00180	14.60	0.9526	0.00200	16.20	0.9556	0.00180
13.90	0.9624	0.00200	14.70	0.9557	0.00220	16.30	0.9570	0.00170
14.00	0.9636	0.00170	14.80	0.9590	0.00170	16.40	0.9603	0.00220
14.10	0.9699	0.00220	14.90	0.9628	0.00220	16.50	0.9643	0.00210
14.20	0.9719	0.00230	15.00	0.9632	0.00220	16.60	0.9683	0.00190
14.30	0.9767	0.00180	15.10	0.9681	0.00230	16.70	0.9674	0.00200
14.40	0.9770	0.00200	15.20	0.9700	0.00190	16.80	0.9703	0.00200
14.50	0.9827	0.00190	15.30	0.9756	0.00190	16.90	0.9763	0.00160
14.60	0.9868	0.00190	15.40	0.9803	0.00200	17.00	0.9770	0.00180
14.70	0.9811	0.00240	15.50	0.9777	0.00230	17.10	0.9823	0.00210
14.80	0.9950	0.00180	15.60	0.9824	0.00200	17.20	0.9843	0.00210
14.90	0.9949	0.00180	15.70	0.9847	0.00210	17.30	0.9844	0.00210
15.00	0.9992	0.00180	15.80	0.9906	0.00210	17.40	0.9904	0.00160
15.10	1.0026	0.00240	15.90	0.9922	0.00220	17.50	0.9887	0.00190
15.20	1.0047	0.00240	16.00	0.9950	0.00220	17.60	0.9889	0.00210
15.30	1.0093	0.00190	16.10	0.9961	0.00190	17.70	0.9930	0.00210
15.40	1.0163	0.00200	16.20	0.9991	0.00300	17.80	0.9969	0.00250
15.50	1.0153	0.00180	16.30	1.0052	0.00240	17.90	1.0012	0.00170
15.60	1.0204	0.00190	16.40	1.0067	0.00200	18.00	1.0012	0.00170
15.70	1.0224	0.00240	16.50	1.0106	0.00220	18.10	1.0033	0.00170
15.80	1.0261	0.00190	16.60	1.0146	0.00250	18.20	1.0028	0.00170
			16.70	1.0156	0.00180	18.30	1.0038	0.00170
			16.80	1.0227	0.00200	18.40	1.0093	0.00180
			16.90	1.0218	0.00210	18.50	1.0134	0.00200
			17.00	1.0241	0.00170	18.60	1.0135	0.00210
			17.10	1.0227	0.00190	18.70	1.0155	0.00180
						18.80	1.0153	0.00240
						18.90	1.0162	0.00190
						19.00	1.0223	0.00180
						19.10	1.0245	0.00210

6000 milli-g/cc			7000 milli-g/cc			7500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.40	0.9314	0.00160	20.80	0.9368	0.00190	23.20	0.9375	0.00170
17.60	0.9395	0.00190	21.10	0.9400	0.00200	23.60	0.9398	0.00180
17.80	0.9405	0.00180	21.40	0.9431	0.00170	24.00	0.9488	0.00170
18.00	0.9448	0.00180	21.70	0.9492	0.00170	24.40	0.9522	0.00220
18.20	0.9509	0.00170	22.00	0.9554	0.00190	24.80	0.9589	0.00190
18.40	0.9551	0.00200	22.30	0.9600	0.00180	25.20	0.9606	0.00180
18.60	0.9580	0.00200	22.60	0.9634	0.00200	25.60	0.9679	0.00220
18.80	0.9641	0.00170	22.90	0.9685	0.00160	26.00	0.9718	0.00160
19.00	0.9690	0.00190	23.20	0.9706	0.00150	26.40	0.9756	0.00160
19.20	0.9694	0.00180	23.50	0.9733	0.00180	26.80	0.9754	0.00200
19.40	0.9748	0.00210	23.80	0.9766	0.00210	27.20	0.9827	0.00160
19.60	0.9770	0.00210	24.10	0.9833	0.00160	27.60	0.9862	0.00160
19.80	0.9839	0.00190	24.40	0.9867	0.00180	28.00	0.9903	0.00170
20.00	0.9855	0.00210	24.70	0.9925	0.00160	28.40	0.9878	0.00220
20.20	0.9946	0.00200	25.00	0.9945	0.00160	28.80	0.9984	0.00200
20.40	0.9911	0.00190	25.30	0.9990	0.00150	29.20	1.0014	0.00180
20.60	0.9932	0.00180	25.60	1.0028	0.00160	29.60	1.0045	0.00170
20.80	0.9995	0.00190	25.90	1.0035	0.00190	30.00	1.0067	0.00150
21.00	1.0023	0.00170	26.20	1.0138	0.00220	30.40	1.0116	0.00150
21.20	1.0037	0.00180	26.50	1.0091	0.00180	30.80	1.0149	0.00160
21.40	1.0099	0.00180	26.80	1.0137	0.00170	31.20	1.0134	0.00200
21.60	1.0143	0.00170	27.10	1.0148	0.00190	31.60	1.0196	0.00200
21.80	1.0145	0.00180	27.40	1.0189	0.00190	32.00	1.0229	0.00180
22.00	1.0191	0.00180	27.70	1.0258	0.00220	32.10	1.0221	0.00190
22.20	1.0211	0.00170	27.80	1.0205	0.00180			
22.40	1.0269	0.00180						

8000 milli-g/cc			9000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
26.30	0.9343	0.00160	37.20	0.9330	0.00150
26.90	0.9413	0.00150	39.10	0.9448	0.00160
27.50	0.9473	0.00130	41.00	0.9495	0.00160
28.10	0.9527	0.00160	42.90	0.9581	0.00130
28.70	0.9607	0.00150	44.80	0.9642	0.00140
29.30	0.9651	0.00150	46.70	0.9711	0.00170
29.90	0.9672	0.00150	48.60	0.9768	0.00150
30.50	0.9760	0.00160	50.50	0.9786	0.00140
31.10	0.9801	0.00170	52.40	0.9811	0.00150
31.70	0.9805	0.00190	54.30	0.9846	0.00130
32.30	0.9841	0.00170	56.20	0.9900	0.00130
32.90	0.9875	0.00160	58.10	0.9946	0.00120
33.50	0.9904	0.00210	60.00	0.9948	0.00180
34.10	0.9924	0.00170	61.90	0.9982	0.00160
34.70	1.0029	0.00240	63.80	1.0011	0.00140
35.30	1.0049	0.00160	65.70	1.0053	0.00150
35.90	1.0070	0.00160	67.60	1.0067	0.00150
36.50	1.0146	0.00190	69.50	1.0086	0.00130
37.10	1.0157	0.00230	71.40	1.0071	0.00190
37.70	1.0150	0.00160	73.30	1.0101	0.00130
38.30	1.0184	0.00180	75.20	1.0173	0.00170
38.90	1.0214	0.00150	76.30	1.0167	0.00210

UO2-sphere-4 (Cases with 0", 1", 10" Reflector)

Case ID: UO2_sphere_004_00ref

Material: Uranium dioxide in water

Weight Fraction U in UO2: 0.88145

Geometry: Sphere

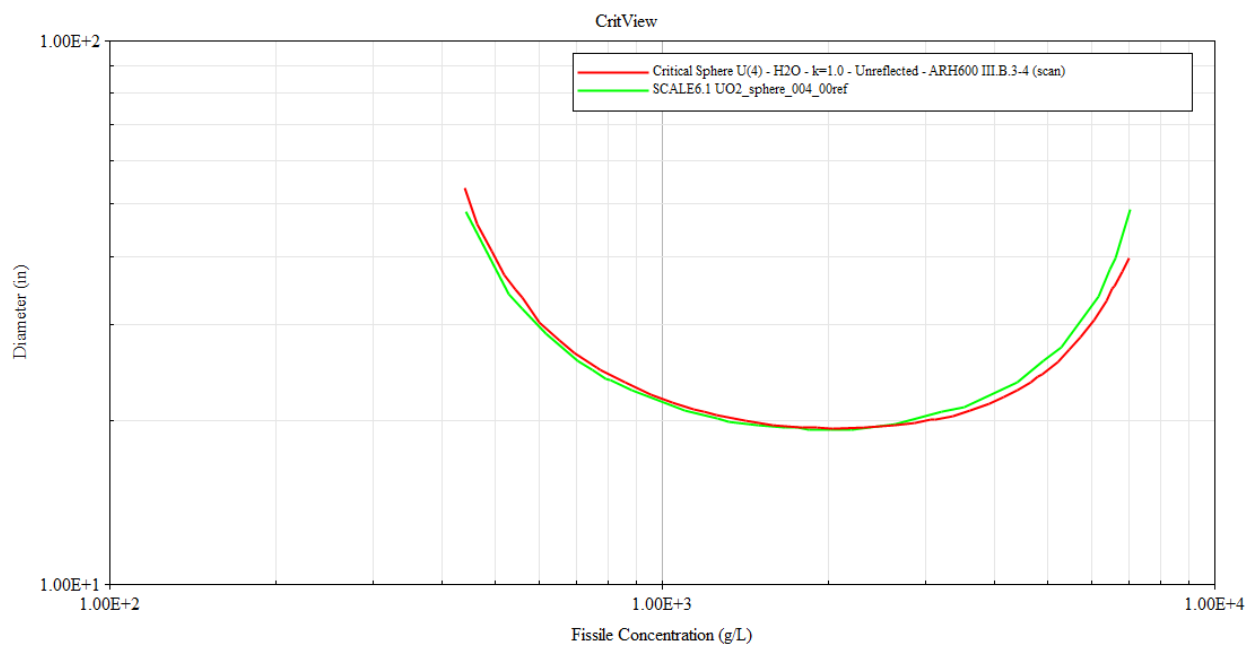
Isotopics: 4% ^{235}U 96% ^{238}U

Reflector: Unreflected

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere (4.0% ²³⁵ U) - 0 Inches of Water Reflection					
UO ₂ Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.500	0.44073	32.500	54.200	1.000	48.5000
0.600	0.52887	26.400	36.300	0.500	34.0733
0.700	0.61702	23.500	30.300	0.300	28.8300
0.800	0.70516	21.400	26.800	0.200	25.7143
0.850	0.74923	20.700	25.800	0.200	24.7822
0.900	0.79331	20.300	25.000	0.200	23.8343
1.000	0.88145	19.400	23.500	0.200	22.6950
1.250	1.10181	18.500	21.800	0.100	20.8939
1.500	1.32218	17.600	20.700	0.100	19.8738
1.700	1.49847	17.200	20.300	0.100	19.6200
1.900	1.67476	17.100	20.100	0.100	19.4250
2.000	1.76290	16.800	20.000	0.100	19.3609
2.100	1.85105	17.000	20.000	0.100	19.2528
2.500	2.20363	17.100	20.100	0.100	19.2645
3.000	2.64435	12.100	20.500	0.400	19.7052
4.000	3.52580	18.600	22.200	0.100	21.1938
5.000	4.40725	20.600	24.900	0.200	23.5275
6.000	5.28870	23.500	29.100	0.200	27.3000
7.000	6.17015	28.100	36.700	0.400	33.7870
7.500	6.61088	31.800	43.300	0.500	39.8069
8.000	7.05160	36.600	54.800	0.900	48.8276

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-920 (pdf pg938)
,
#index number = <index = 1:21:1>
,
#UO2 Concentration = <@conc =
0.5,0.6,0.7,0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
32.5,26.4,23.5,21.4,20.7,20.3,19.4,18.5,17.6,17.2,17.1,16.8,17,17.1,12.1,18.6,20.6,23.5,28.1,31.8
,36.6> in
#Ending Diameter = <@enddia =
54.2,36.3,30.3,26.8,25.8,25,23.5,21.8,20.7,20.3,20.1,20,20,20.1,20.5,22.2,24.9,29.1,36.7,43.3,54.
8> in
#Delta = <@delta =
1,0.5,0.3,0.2,0.2,0.2,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.4,0.1,0.2,0.2,0.4,0.5,0.9> in
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Unreflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                                92235 4
                                92238 96  end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300  end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Unreflected UO2 Sphere"
  sphere 1      {{(diameter*in)/2}}
  media 1 1 1
  boundary 1
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; Unreflected; 4% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.04 U238 0.96
reflmat: None
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.441 48.5000
0.529 34.0733
0.617 28.8300
0.705 25.7143
0.749 24.7822
0.793 23.8343
0.881 22.6950
1.102 20.8939
1.322 19.8738
1.498 19.6200
1.675 19.4250
1.763 19.3609
1.851 19.2528
2.204 19.2645
2.644 19.7052
3.526 21.1938
4.407 23.5275
5.289 27.3000
6.170 33.7870
6.611 39.8069
7.052 48.8276
```

500 milli-g/cc			600 milli-g/cc			700 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
32.50	0.9253	0.00130	26.40	0.9302	0.00120	23.50	0.9286	0.00160
33.50	0.9319	0.00120	26.90	0.9370	0.00140	23.80	0.9347	0.00220
34.50	0.9397	0.00140	27.40	0.9393	0.00150	24.10	0.9389	0.00170
35.50	0.9453	0.00140	27.90	0.9431	0.00160	24.40	0.9435	0.00190
36.50	0.9502	0.00130	28.40	0.9475	0.00120	24.70	0.9466	0.00180
37.50	0.9562	0.00180	28.90	0.9564	0.00170	25.00	0.9533	0.00180
38.50	0.9630	0.00130	29.40	0.9620	0.00130	25.30	0.9610	0.00180
39.50	0.9667	0.00150	29.90	0.9664	0.00140	25.60	0.9623	0.00170
40.50	0.9698	0.00150	30.40	0.9692	0.00160	25.90	0.9673	0.00160
41.50	0.9757	0.00130	30.90	0.9746	0.00250	26.20	0.9680	0.00150
42.50	0.9832	0.00120	31.40	0.9786	0.00180	26.50	0.9690	0.00160
43.50	0.9815	0.00130	31.90	0.9829	0.00200	26.80	0.9755	0.00180
44.50	0.9891	0.00140	32.40	0.9864	0.00150	27.10	0.9780	0.00240
45.50	0.9925	0.00100	32.90	0.9934	0.00160	27.40	0.9872	0.00170
46.50	0.9931	0.00100	33.40	0.9948	0.00160	27.70	0.9889	0.00170
47.50	0.9946	0.00140	33.90	0.9974	0.00170	28.00	0.9905	0.00210
48.50	1.0000	0.00150	34.40	1.0049	0.00160	28.30	0.9948	0.00140
49.50	1.0010	0.00110	34.90	1.0057	0.00170	28.60	0.9977	0.00170
50.50	1.0062	0.00100	35.40	1.0072	0.00170	28.90	1.0007	0.00200
51.50	1.0075	0.00130	35.90	1.0148	0.00200	29.20	1.0048	0.00170
52.50	1.0068	0.00150	36.30	1.0124	0.00120	29.50	1.0077	0.00140
53.50	1.0119	0.00100				29.80	1.0165	0.00180
54.20	1.0132	0.00130				30.10	1.0139	0.00180
						30.30	1.0150	0.00180

800 milli-g/cc			850 milli-g/cc			900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
21.40	0.9215	0.00160	20.70	0.9199	0.00200	20.30	0.9231	0.00160
21.60	0.9285	0.00180	20.90	0.9218	0.00200	20.50	0.9312	0.00150
21.80	0.9312	0.00190	21.10	0.9323	0.00170	20.70	0.9408	0.00150
22.00	0.9336	0.00150	21.30	0.9382	0.00150	20.90	0.9423	0.00180
22.20	0.9396	0.00150	21.50	0.9389	0.00180	21.10	0.9420	0.00210
22.40	0.9465	0.00170	21.70	0.9408	0.00260	21.30	0.9501	0.00170
22.60	0.9486	0.00170	21.90	0.9494	0.00170	21.50	0.9508	0.00160
22.80	0.9484	0.00200	22.10	0.9536	0.00200	21.70	0.9576	0.00180
23.00	0.9523	0.00160	22.30	0.9566	0.00160	21.90	0.9605	0.00180
23.20	0.9596	0.00180	22.50	0.9623	0.00210	22.10	0.9652	0.00160
23.40	0.9599	0.00170	22.70	0.9636	0.00180	22.30	0.9661	0.00160
23.60	0.9624	0.00220	22.90	0.9662	0.00180	22.50	0.9750	0.00170
23.80	0.9697	0.00230	23.10	0.9704	0.00310	22.70	0.9767	0.00190
24.00	0.9715	0.00170	23.30	0.9731	0.00180	22.90	0.9792	0.00180
24.20	0.9790	0.00200	23.50	0.9753	0.00180	23.10	0.9846	0.00150
24.40	0.9797	0.00180	23.70	0.9825	0.00230	23.30	0.9891	0.00160
24.60	0.9793	0.00190	23.90	0.9834	0.00140	23.50	0.9899	0.00210
24.80	0.9828	0.00200	24.10	0.9862	0.00200	23.70	0.9953	0.00210
25.00	0.9888	0.00190	24.30	0.9917	0.00190	23.90	1.0023	0.00210
25.20	0.9906	0.00190	24.50	0.9958	0.00200	24.10	1.0001	0.00180
25.40	0.9938	0.00170	24.70	0.9970	0.00130	24.30	1.0037	0.00200
25.60	1.0008	0.00140	24.90	1.0043	0.00150	24.50	1.0110	0.00170
25.80	0.9994	0.00160	25.10	1.0026	0.00170	24.70	1.0121	0.00160
26.00	1.0055	0.00170	25.30	1.0064	0.00170	24.90	1.0154	0.00220
26.20	1.0066	0.00190	25.50	1.0102	0.00170	25.00	1.0206	0.00170
26.40	1.0096	0.00190	25.70	1.0131	0.00200			
26.60	1.0096	0.00170	25.80	1.0157	0.00170			
26.80	1.0137	0.00150						

1000 milli-g/cc			1250 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
19.40	0.9268	0.00180	18.50	0.9326	0.00280	17.60	0.9284	0.00230
19.60	0.9288	0.00180	18.60	0.9357	0.00220	17.70	0.9282	0.00180
19.80	0.9290	0.00240	18.70	0.9399	0.00230	17.80	0.9349	0.00160
20.00	0.9397	0.00190	18.80	0.9460	0.00170	17.90	0.9383	0.00200
20.20	0.9443	0.00180	18.90	0.9468	0.00180	18.00	0.9420	0.00170
20.40	0.9486	0.00160	19.00	0.9484	0.00230	18.10	0.9447	0.00200
20.60	0.9534	0.00190	19.10	0.9506	0.00210	18.20	0.9475	0.00250
20.80	0.9588	0.00190	19.20	0.9565	0.00180	18.30	0.9514	0.00250
21.00	0.9615	0.00190	19.30	0.9597	0.00170	18.40	0.9493	0.00250
21.20	0.9656	0.00210	19.40	0.9613	0.00190	18.50	0.9558	0.00220
21.40	0.9750	0.00170	19.50	0.9600	0.00220	18.60	0.9603	0.00200
21.60	0.9758	0.00180	19.60	0.9663	0.00250	18.70	0.9646	0.00190
21.80	0.9827	0.00170	19.70	0.9694	0.00260	18.80	0.9678	0.00210
22.00	0.9861	0.00190	19.80	0.9741	0.00200	18.90	0.9676	0.00220
22.20	0.9890	0.00160	19.90	0.9768	0.00160	19.00	0.9684	0.00220
22.40	0.9934	0.00180	20.00	0.9789	0.00190	19.10	0.9743	0.00210
22.60	0.9981	0.00170	20.10	0.9763	0.00190	19.20	0.9775	0.00240
22.80	1.0021	0.00190	20.20	0.9818	0.00260	19.30	0.9802	0.00190
23.00	1.0072	0.00160	20.30	0.9815	0.00250	19.40	0.9851	0.00180
23.20	1.0127	0.00190	20.40	0.9886	0.00250	19.50	0.9884	0.00190
23.40	1.0137	0.00210	20.50	0.9904	0.00220	19.60	0.9919	0.00220
23.50	1.0165	0.00210	20.60	0.9936	0.00220	19.70	0.9911	0.00180
			20.70	0.9936	0.00260	19.80	0.9955	0.00200
			20.80	0.9954	0.00180	19.90	1.0016	0.00180
			20.90	1.0003	0.00160	20.00	1.0024	0.00170
			21.00	1.0018	0.00210	20.10	1.0049	0.00170
			21.10	1.0011	0.00210	20.20	1.0040	0.00210
			21.20	1.0064	0.00190	20.30	1.0120	0.00180
			21.30	1.0102	0.00210	20.40	1.0120	0.00300
			21.40	1.0126	0.00170	20.50	1.0123	0.00200
			21.50	1.0128	0.00250	20.60	1.0122	0.00200
			21.60	1.0144	0.00180	20.70	1.0159	0.00200
			21.70	1.0147	0.00220			
			21.80	1.0190	0.00200			

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.20	0.9265	0.00210	17.10	0.9245	0.00200	16.80	0.9160	0.00200
17.30	0.9258	0.00160	17.20	0.9309	0.00180	16.90	0.9232	0.00220
17.40	0.9298	0.00230	17.30	0.9361	0.00190	17.00	0.9222	0.00190
17.50	0.9329	0.00240	17.40	0.9389	0.00200	17.10	0.9308	0.00190
17.60	0.9370	0.00170	17.50	0.9368	0.00200	17.20	0.9312	0.00190
17.70	0.9399	0.00270	17.60	0.9424	0.00190	17.30	0.9346	0.00220
17.80	0.9437	0.00240	17.70	0.9482	0.00220	17.40	0.9386	0.00260
17.90	0.9461	0.00180	17.80	0.9528	0.00180	17.50	0.9407	0.00250
18.00	0.9489	0.00230	17.90	0.9531	0.00230	17.60	0.9437	0.00190
18.10	0.9522	0.00240	18.00	0.9596	0.00220	17.70	0.9500	0.00220
18.20	0.9588	0.00200	18.10	0.9588	0.00240	17.80	0.9533	0.00200
18.30	0.9606	0.00210	18.20	0.9629	0.00220	17.90	0.9572	0.00180
18.40	0.9652	0.00210	18.30	0.9677	0.00210	18.00	0.9572	0.00220
18.50	0.9700	0.00220	18.40	0.9712	0.00190	18.10	0.9586	0.00220
18.60	0.9705	0.00210	18.50	0.9719	0.00180	18.20	0.9676	0.00200
18.70	0.9735	0.00180	18.60	0.9771	0.00240	18.30	0.9703	0.00230
18.80	0.9722	0.00180	18.70	0.9791	0.00210	18.40	0.9712	0.00210
18.90	0.9756	0.00230	18.80	0.9813	0.00190	18.50	0.9757	0.00180
19.00	0.9858	0.00180	18.90	0.9857	0.00190	18.60	0.9797	0.00200
19.10	0.9855	0.00260	19.00	0.9892	0.00200	18.70	0.9800	0.00220
19.20	0.9876	0.00210	19.10	0.9952	0.00280	18.80	0.9801	0.00240
19.30	0.9933	0.00220	19.20	0.9944	0.00200	18.90	0.9868	0.00230
19.40	0.9941	0.00210	19.30	0.9950	0.00180	19.00	0.9915	0.00210
19.50	0.9978	0.00220	19.40	0.9991	0.00220	19.10	0.9907	0.00190
19.60	0.9993	0.00230	19.50	1.0027	0.00230	19.20	0.9987	0.00210
19.70	1.0028	0.00220	19.60	1.0070	0.00170	19.30	1.0014	0.00220
19.80	1.0101	0.00180	19.70	1.0095	0.00220	19.40	0.9991	0.00180
19.90	1.0069	0.00230	19.80	1.0133	0.00170	19.50	1.0023	0.00220
20.00	1.0132	0.00200	19.90	1.0127	0.00200	19.60	1.0055	0.00210
20.10	1.0157	0.00190	20.00	1.0146	0.00230	19.70	1.0129	0.00250
20.20	1.0175	0.00220	20.10	1.0208	0.00220	19.80	1.0115	0.00220
20.30	1.0182	0.00180				19.90	1.0190	0.00270
						20.00	1.0185	0.00230

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.00	0.9233	0.00180	17.10	0.9280	0.00210	12.10	0.6774	0.00160
17.10	0.9277	0.00230	17.20	0.9315	0.00290	12.50	0.6971	0.00170
17.20	0.9335	0.00240	17.30	0.9345	0.00190	12.90	0.7213	0.00180
17.30	0.9321	0.00180	17.40	0.9367	0.00200	13.30	0.7457	0.00210
17.40	0.9385	0.00220	17.50	0.9433	0.00200	13.70	0.7655	0.00180
17.50	0.9454	0.00200	17.60	0.9409	0.00190	14.10	0.7875	0.00200
17.60	0.9457	0.00220	17.70	0.9451	0.00220	14.50	0.8065	0.00200
17.70	0.9470	0.00200	17.80	0.9491	0.00210	14.90	0.8219	0.00170
17.80	0.9527	0.00320	17.90	0.9541	0.00220	15.30	0.8440	0.00200
17.90	0.9599	0.00190	18.00	0.9580	0.00210	15.70	0.8607	0.00220
18.00	0.9565	0.00240	18.10	0.9601	0.00220	16.10	0.8758	0.00200
18.10	0.9606	0.00190	18.20	0.9629	0.00190	16.50	0.8886	0.00190
18.20	0.9670	0.00170	18.30	0.9656	0.00220	16.90	0.9057	0.00260
18.30	0.9730	0.00230	18.40	0.9696	0.00210	17.30	0.9269	0.00210
18.40	0.9757	0.00220	18.50	0.9742	0.00190	17.70	0.9338	0.00230
18.50	0.9805	0.00180	18.60	0.9778	0.00210	18.10	0.9481	0.00280
18.60	0.9808	0.00190	18.70	0.9801	0.00270	18.50	0.9631	0.00190
18.70	0.9829	0.00250	18.80	0.9837	0.00210	18.90	0.9792	0.00230
18.80	0.9869	0.00270	18.90	0.9858	0.00230	19.30	0.9885	0.00190
18.90	0.9894	0.00290	19.00	0.9925	0.00210	19.70	0.9998	0.00210
19.00	0.9908	0.00230	19.10	0.9941	0.00200	20.10	1.0151	0.00230
19.10	0.9952	0.00250	19.20	0.9960	0.00230	20.50	1.0184	0.00230
19.20	0.9972	0.00180	19.30	1.0022	0.00200			
19.30	1.0025	0.00200	19.40	1.0012	0.00190			
19.40	1.0037	0.00220	19.50	1.0035	0.00200			
19.50	1.0087	0.00210	19.60	1.0121	0.00230			
19.60	1.0094	0.00300	19.70	1.0116	0.00190			
19.70	1.0140	0.00220	19.80	1.0119	0.00210			
19.80	1.0151	0.00200	19.90	1.0160	0.00220			
19.90	1.0142	0.00250	20.00	1.0217	0.00190			
20.00	1.0234	0.00180	20.10	1.0234	0.00200			

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
18.60	0.9263	0.00190	20.60	0.9304	0.00240	23.50	0.9347	0.00250
18.70	0.9306	0.00210	20.80	0.9359	0.00190	23.70	0.9395	0.00180
18.80	0.9353	0.00200	21.00	0.9449	0.00200	23.90	0.9397	0.00200
18.90	0.9356	0.00250	21.20	0.9467	0.00170	24.10	0.9523	0.00280
19.00	0.9421	0.00210	21.40	0.9517	0.00220	24.30	0.9460	0.00180
19.10	0.9437	0.00230	21.60	0.9579	0.00170	24.50	0.9533	0.00200
19.20	0.9404	0.00250	21.80	0.9591	0.00200	24.70	0.9543	0.00210
19.30	0.9519	0.00200	22.00	0.9650	0.00280	24.90	0.9601	0.00210
19.40	0.9538	0.00180	22.20	0.9731	0.00230	25.10	0.9626	0.00180
19.50	0.9542	0.00180	22.40	0.9783	0.00200	25.30	0.9689	0.00170
19.60	0.9593	0.00230	22.60	0.9788	0.00240	25.50	0.9705	0.00190
19.70	0.9636	0.00190	22.80	0.9848	0.00260	25.70	0.9709	0.00210
19.80	0.9645	0.00220	23.00	0.9903	0.00220	25.90	0.9765	0.00230
19.90	0.9687	0.00200	23.20	0.9925	0.00170	26.10	0.9841	0.00200
20.00	0.9714	0.00210	23.40	0.9949	0.00230	26.30	0.9827	0.00190
20.10	0.9725	0.00210	23.60	1.0029	0.00220	26.50	0.9860	0.00190
20.20	0.9732	0.00200	23.80	1.0008	0.00160	26.70	0.9941	0.00200
20.30	0.9804	0.00200	24.00	1.0039	0.00170	26.90	0.9940	0.00190
20.40	0.9772	0.00210	24.20	1.0132	0.00200	27.10	0.9989	0.00210
20.50	0.9839	0.00230	24.40	1.0162	0.00190	27.30	1.0000	0.00180
20.60	0.9873	0.00230	24.60	1.0231	0.00190	27.50	1.0008	0.00180
20.70	0.9890	0.00310	24.80	1.0246	0.00190	27.70	1.0067	0.00190
20.80	0.9922	0.00190	24.90	1.0220	0.00200	27.90	1.0074	0.00210
20.90	0.9903	0.00200				28.10	1.0098	0.00170
21.00	0.9977	0.00180				28.30	1.0104	0.00160
21.10	1.0045	0.00200				28.50	1.0151	0.00180
21.20	0.9997	0.00210				28.70	1.0170	0.00240
21.30	1.0052	0.00210				28.90	1.0207	0.00190
21.40	1.0063	0.00180				29.10	1.0289	0.00230
21.50	1.0078	0.00220						
21.60	1.0101	0.00240						
21.70	1.0162	0.00210						
21.80	1.0169	0.00230						
21.90	1.0174	0.00200						
22.00	1.0189	0.00270						
22.10	1.0276	0.00220						
22.20	1.0262	0.00220						

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
28.10	0.9326	0.00240	31.80	0.9366	0.00190	36.60	0.9319	0.00170
28.50	0.9393	0.00160	32.30	0.9433	0.00160	37.50	0.9412	0.00160
28.90	0.9442	0.00160	32.80	0.9468	0.00240	38.40	0.9539	0.00210
29.30	0.9490	0.00160	33.30	0.9524	0.00190	39.30	0.9545	0.00170
29.70	0.9562	0.00210	33.80	0.9553	0.00130	40.20	0.9592	0.00150
30.10	0.9610	0.00190	34.30	0.9630	0.00190	41.10	0.9650	0.00160
30.50	0.9634	0.00160	34.80	0.9643	0.00170	42.00	0.9712	0.00160
30.90	0.9691	0.00230	35.30	0.9704	0.00180	42.90	0.9715	0.00200
31.30	0.9698	0.00200	35.80	0.9761	0.00170	43.80	0.9795	0.00180
31.70	0.9780	0.00180	36.30	0.9786	0.00170	44.70	0.9831	0.00150
32.10	0.9833	0.00180	36.80	0.9834	0.00140	45.60	0.9879	0.00160
32.50	0.9838	0.00170	37.30	0.9823	0.00160	46.50	0.9898	0.00170
32.90	0.9901	0.00210	37.80	0.9870	0.00200	47.40	0.9922	0.00200
33.30	0.9935	0.00210	38.30	0.9931	0.00210	48.30	0.9983	0.00170
33.70	0.9990	0.00200	38.80	0.9941	0.00130	49.20	1.0012	0.00180
34.10	1.0036	0.00170	39.30	0.9982	0.00200	50.10	1.0032	0.00170
34.50	1.0027	0.00190	39.80	0.9999	0.00160	51.00	1.0080	0.00160
34.90	1.0071	0.00200	40.30	1.0071	0.00210	51.90	1.0078	0.00170
35.30	1.0116	0.00170	40.80	1.0056	0.00240	52.80	1.0123	0.00140
35.70	1.0132	0.00170	41.30	1.0129	0.00180	53.70	1.0155	0.00190
36.10	1.0188	0.00190	41.80	1.0117	0.00150	54.60	1.0148	0.00160
36.50	1.0234	0.00190	42.30	1.0151	0.00190	54.80	1.0157	0.00160
36.70	1.0188	0.00160	42.80	1.0142	0.00170			
			43.30	1.0195	0.00200			

Case ID: UO2_sphere_004_01ref

Material: Uranium dioxide in water

Weight Fraction U in UO2: 0.88145

Geometry: Sphere

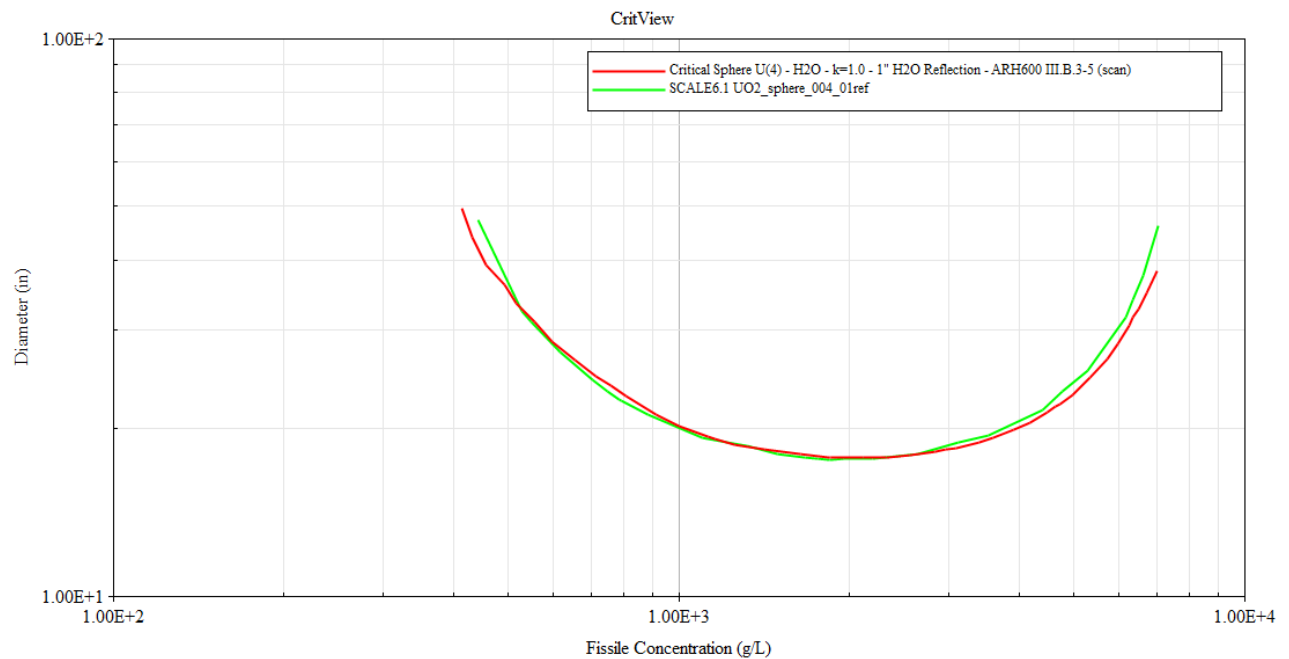
Isotopics: 4% ^{235}U 96% ^{238}U

Reflector: 1" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere(4.0% ²³⁵ U) - 1 Inch of Water Reflection					
UO2 Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.500	0.44073	31.000	52.300	1.000	47.3261
0.600	0.52887	25.000	34.700	0.400	32.4143
0.700	0.61702	21.900	28.700	0.300	27.3362
0.800	0.70516	19.700	25.300	0.200	24.4385
0.850	0.74923	19.500	24.500	0.200	23.3000
0.900	0.79331	19.000	23.600	0.200	22.4179
1.000	0.88145	17.800	21.900	0.200	21.1561
1.250	1.10181	16.800	20.300	0.100	19.1975
1.500	1.32218	15.900	19.000	0.100	18.5971
1.700	1.49847	15.600	18.600	0.100	17.9581
1.900	1.67476	15.500	18.400	0.100	17.7600
2.000	1.76290	15.400	18.400	0.100	17.6519
2.100	1.85105	15.400	18.300	0.100	17.5816
2.500	2.20363	15.500	18.400	0.100	17.6591
3.000	2.64435	15.700	18.700	0.100	17.9632
4.000	3.52580	16.900	20.400	0.100	19.4276
5.000	4.40725	18.700	23.000	0.200	21.5400
6.000	5.28870	21.600	27.200	0.200	25.3200
7.000	6.17015	26.200	34.700	0.400	31.6197
7.500	6.61088	29.400	41.000	0.500	37.5667
8.000	7.05160	34.500	56.300	1.100	46.0657

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-933 (pdf pg951)
,
#index number = <index = 1:21:1>
,
#UO2 Concentration = <@conc =
0.5,0.6,0.7,0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
31,25,21.9,19.7,19.5,19,17.8,16.8,15.9,15.6,15.5,15.4,15.4,15.5,15.7,16.9,18.7,21.6,26.2,29.4,34.
5> in
#Ending Diameter = <@enddia =
52.3,34.7,28.7,25.3,24.5,23.6,21.9,20.3,19,18.6,18.4,18.4,18.3,18.4,18.7,20.4,23,27.2,34.7,41,56.
3> in
#Delta = <@delta =
1,0.4,0.3,0.2,0.2,0.2,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.2,0.2,0.4,0.5,1.1> in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                                92235 4
                                92238 96   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere With Water Reflector"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(diameter*in)/2+(1*in)}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; 1" Water Reflector; 4% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.04 U238 0.96
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.441 47.3261
0.529 32.4143
0.617 27.3362
0.705 24.4385
0.749 23.3000
0.793 22.4179
0.881 21.1561
1.102 19.1975
1.322 18.5971
1.498 17.9581
1.675 17.7600
1.763 17.6519
1.851 17.5816
2.204 17.6591
2.644 17.9632
3.526 19.4276
4.407 21.5400
5.289 25.3200
6.170 31.6197
6.611 37.5667
7.052 46.0657
```

500 milli-g/cc			600 milli-g/cc			700 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
31.00	0.9291	0.00150	25.00	0.9310	0.00130	21.90	0.9276	0.00160
32.00	0.9369	0.00150	25.40	0.9361	0.00140	22.20	0.9339	0.00170
33.00	0.9411	0.00110	25.80	0.9393	0.00180	22.50	0.9379	0.00130
34.00	0.9462	0.00130	26.20	0.9417	0.00170	22.80	0.9422	0.00160
35.00	0.9543	0.00150	26.60	0.9455	0.00160	23.10	0.9494	0.00170
36.00	0.9566	0.00160	27.00	0.9479	0.00190	23.40	0.9535	0.00140
37.00	0.9621	0.00120	27.40	0.9580	0.00190	23.70	0.9561	0.00160
38.00	0.9676	0.00130	27.80	0.9622	0.00150	24.00	0.9638	0.00160
39.00	0.9714	0.00140	28.20	0.9650	0.00160	24.30	0.9626	0.00180
40.00	0.9766	0.00130	28.60	0.9672	0.00170	24.60	0.9686	0.00160
41.00	0.9794	0.00120	29.00	0.9717	0.00180	24.90	0.9745	0.00150
42.00	0.9836	0.00140	29.40	0.9781	0.00130	25.20	0.9747	0.00160
43.00	0.9888	0.00120	29.80	0.9783	0.00160	25.50	0.9851	0.00160
44.00	0.9931	0.00110	30.20	0.9814	0.00160	25.80	0.9828	0.00170
45.00	0.9944	0.00140	30.60	0.9859	0.00160	26.10	0.9895	0.00170
46.00	0.9970	0.00130	31.00	0.9885	0.00160	26.40	0.9939	0.00160
47.00	0.9985	0.00190	31.40	0.9908	0.00140	26.70	0.9952	0.00140
48.00	1.0031	0.00130	31.80	0.9961	0.00180	27.00	0.9976	0.00150
49.00	1.0038	0.00130	32.20	0.9970	0.00200	27.30	0.9993	0.00170
50.00	1.0053	0.00100	32.60	1.0026	0.00130	27.60	1.0051	0.00170
51.00	1.0089	0.00130	33.00	1.0047	0.00140	27.90	1.0102	0.00180
52.00	1.0092	0.00130	33.40	1.0054	0.00150	28.20	1.0089	0.00160
52.30	1.0112	0.00150	33.80	1.0045	0.00140	28.50	1.0118	0.00190
			34.20	1.0127	0.00140	28.70	1.0175	0.00170
			34.60	1.0127	0.00130			
			34.70	1.0158	0.00140			

800 milli-g/cc			850 milli-g/cc			900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
19.70	0.9215	0.00190	19.50	0.9288	0.00170	19.00	0.9314	0.00150
19.90	0.9261	0.00170	19.70	0.9349	0.00180	19.20	0.9373	0.00150
20.10	0.9307	0.00190	19.90	0.9411	0.00150	19.40	0.9416	0.00160
20.30	0.9343	0.00170	20.10	0.9440	0.00180	19.60	0.9450	0.00160
20.50	0.9367	0.00160	20.30	0.9477	0.00200	19.80	0.9498	0.00170
20.70	0.9407	0.00160	20.50	0.9515	0.00170	20.00	0.9554	0.00180
20.90	0.9447	0.00180	20.70	0.9564	0.00140	20.20	0.9583	0.00160
21.10	0.9523	0.00150	20.90	0.9611	0.00180	20.40	0.9653	0.00150
21.30	0.9523	0.00180	21.10	0.9609	0.00200	20.60	0.9679	0.00160
21.50	0.9595	0.00170	21.30	0.9665	0.00150	20.80	0.9688	0.00180
21.70	0.9560	0.00180	21.50	0.9731	0.00210	21.00	0.9774	0.00200
21.90	0.9626	0.00150	21.70	0.9712	0.00190	21.20	0.9804	0.00210
22.10	0.9694	0.00200	21.90	0.9807	0.00180	21.40	0.9852	0.00170
22.30	0.9688	0.00140	22.10	0.9810	0.00170	21.60	0.9865	0.00220
22.50	0.9759	0.00180	22.30	0.9872	0.00170	21.80	0.9919	0.00190
22.70	0.9769	0.00190	22.50	0.9893	0.00240	22.00	0.9949	0.00230
22.90	0.9803	0.00210	22.70	0.9928	0.00200	22.20	0.9966	0.00220
23.10	0.9836	0.00160	22.90	0.9951	0.00180	22.40	0.9995	0.00220
23.30	0.9867	0.00210	23.10	1.0035	0.00200	22.60	1.0051	0.00140
23.50	0.9917	0.00160	23.30	1.0000	0.00210	22.80	1.0120	0.00150
23.70	0.9977	0.00170	23.50	1.0021	0.00180	23.00	1.0115	0.00180
23.90	0.9974	0.00170	23.70	1.0096	0.00150	23.20	1.0159	0.00300
24.10	0.9990	0.00160	23.90	1.0084	0.00200	23.40	1.0168	0.00150
24.30	0.9964	0.00190	24.10	1.0144	0.00140	23.60	1.0188	0.00170
24.50	1.0016	0.00160	24.30	1.0179	0.00190			
24.70	1.0079	0.00140	24.50	1.0162	0.00150			
24.90	1.0075	0.00180						
25.10	1.0101	0.00190						
25.30	1.0160	0.00210						

1000 milli-g/cc			1250 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.80	0.9269	0.00170	16.80	0.9307	0.00210	15.90	0.9295	0.00190
18.00	0.9300	0.00220	16.90	0.9380	0.00200	16.00	0.9279	0.00190
18.20	0.9342	0.00170	17.00	0.9384	0.00190	16.10	0.9353	0.00190
18.40	0.9396	0.00220	17.10	0.9418	0.00220	16.20	0.9322	0.00220
18.60	0.9455	0.00200	17.20	0.9419	0.00210	16.30	0.9353	0.00200
18.80	0.9492	0.00170	17.30	0.9451	0.00210	16.40	0.9401	0.00230
19.00	0.9553	0.00220	17.40	0.9521	0.00200	16.50	0.9461	0.00240
19.20	0.9543	0.00170	17.50	0.9534	0.00180	16.60	0.9472	0.00250
19.40	0.9662	0.00170	17.60	0.9548	0.00210	16.70	0.9528	0.00260
19.60	0.9654	0.00200	17.70	0.9586	0.00200	16.80	0.9538	0.00150
19.80	0.9751	0.00150	17.80	0.9621	0.00180	16.90	0.9575	0.00180
20.00	0.9778	0.00180	17.90	0.9658	0.00210	17.00	0.9576	0.00200
20.20	0.9812	0.00170	18.00	0.9656	0.00180	17.10	0.9626	0.00210
20.40	0.9792	0.00180	18.10	0.9713	0.00160	17.20	0.9654	0.00200
20.60	0.9866	0.00180	18.20	0.9750	0.00200	17.30	0.9672	0.00190
20.80	0.9945	0.00170	18.30	0.9729	0.00190	17.40	0.9704	0.00210
21.00	0.9968	0.00200	18.40	0.9738	0.00170	17.50	0.9711	0.00180
21.20	1.0009	0.00190	18.50	0.9801	0.00180	17.60	0.9802	0.00200
21.40	1.0048	0.00200	18.60	0.9849	0.00200	17.70	0.9841	0.00180
21.60	1.0076	0.00190	18.70	0.9855	0.00200	17.80	0.9839	0.00230
21.80	1.0149	0.00180	18.80	0.9841	0.00170	17.90	0.9878	0.00200
21.90	1.0173	0.00190	18.90	0.9882	0.00210	18.00	0.9895	0.00170
			19.00	0.9935	0.00180	18.10	0.9953	0.00230
			19.10	0.9923	0.00210	18.20	0.9965	0.00200
			19.20	1.0002	0.00190	18.30	0.9931	0.00180
			19.30	1.0026	0.00180	18.40	0.9979	0.00190
			19.40	1.0022	0.00170	18.50	1.0034	0.00200
			19.50	1.0034	0.00220	18.60	0.9999	0.00260
			19.60	1.0080	0.00190	18.70	1.0099	0.00180
			19.70	1.0124	0.00190	18.80	1.0114	0.00170
			19.80	1.0119	0.00300	18.90	1.0140	0.00180
			19.90	1.0141	0.00190	19.00	1.0164	0.00180
			20.00	1.0162	0.00210			
			20.10	1.0184	0.00190			
			20.20	1.0172	0.00160			
			20.30	1.0279	0.00190			

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
15.60	0.9257	0.00230	15.50	0.9293	0.00320	15.40	0.9223	0.00190
15.70	0.9291	0.00210	15.60	0.9307	0.00180	15.50	0.9304	0.00230
15.80	0.9310	0.00270	15.70	0.9376	0.00290	15.60	0.9341	0.00200
15.90	0.9367	0.00200	15.80	0.9392	0.00200	15.70	0.9353	0.00240
16.00	0.9386	0.00200	15.90	0.9432	0.00200	15.80	0.9410	0.00170
16.10	0.9392	0.00190	16.00	0.9414	0.00210	15.90	0.9426	0.00220
16.20	0.9474	0.00260	16.10	0.9502	0.00230	16.00	0.9472	0.00180
16.30	0.9477	0.00190	16.20	0.9519	0.00180	16.10	0.9458	0.00240
16.40	0.9497	0.00240	16.30	0.9569	0.00210	16.20	0.9547	0.00230
16.50	0.9564	0.00180	16.40	0.9595	0.00200	16.30	0.9598	0.00200
16.60	0.9596	0.00210	16.50	0.9606	0.00200	16.40	0.9610	0.00240
16.70	0.9629	0.00180	16.60	0.9601	0.00200	16.50	0.9651	0.00200
16.80	0.9657	0.00210	16.70	0.9700	0.00180	16.60	0.9701	0.00190
16.90	0.9658	0.00220	16.80	0.9711	0.00190	16.70	0.9685	0.00270
17.00	0.9675	0.00230	16.90	0.9755	0.00200	16.80	0.9722	0.00200
17.10	0.9765	0.00170	17.00	0.9786	0.00180	16.90	0.9757	0.00190
17.20	0.9768	0.00180	17.10	0.9789	0.00180	17.00	0.9816	0.00200
17.30	0.9831	0.00180	17.20	0.9851	0.00180	17.10	0.9841	0.00180
17.40	0.9846	0.00210	17.30	0.9868	0.00190	17.20	0.9920	0.00180
17.50	0.9880	0.00360	17.40	0.9928	0.00200	17.30	0.9930	0.00230
17.60	0.9920	0.00200	17.50	0.9917	0.00190	17.40	0.9919	0.00210
17.70	0.9906	0.00180	17.60	0.9957	0.00200	17.50	0.9937	0.00180
17.80	0.9958	0.00240	17.70	0.9949	0.00240	17.60	1.0014	0.00180
17.90	0.9964	0.00210	17.80	1.0034	0.00220	17.70	0.9987	0.00200
18.00	1.0026	0.00280	17.90	1.0017	0.00180	17.80	1.0040	0.00230
18.10	1.0069	0.00170	18.00	1.0052	0.00200	17.90	1.0071	0.00180
18.20	1.0076	0.00210	18.10	1.0085	0.00230	18.00	1.0154	0.00220
18.30	1.0076	0.00170	18.20	1.0105	0.00170	18.10	1.0130	0.00190
18.40	1.0113	0.00210	18.30	1.0166	0.00180	18.20	1.0167	0.00190
18.50	1.0155	0.00200	18.40	1.0190	0.00190	18.30	1.0181	0.00170
18.60	1.0169	0.00150				18.40	1.0198	0.00180

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
15.40	0.9242	0.00220	15.50	0.9278	0.00180	15.70	0.9249	0.00220
15.50	0.9285	0.00240	15.60	0.9361	0.00210	15.80	0.9352	0.00210
15.60	0.9373	0.00210	15.70	0.9388	0.00220	15.90	0.9322	0.00180
15.70	0.9381	0.00240	15.80	0.9383	0.00210	16.00	0.9403	0.00180
15.80	0.9376	0.00260	15.90	0.9490	0.00220	16.10	0.9436	0.00180
15.90	0.9473	0.00190	16.00	0.9535	0.00190	16.20	0.9434	0.00210
16.00	0.9432	0.00230	16.10	0.9520	0.00210	16.30	0.9501	0.00240
16.10	0.9491	0.00200	16.20	0.9547	0.00190	16.40	0.9522	0.00240
16.20	0.9544	0.00210	16.30	0.9587	0.00200	16.50	0.9578	0.00200
16.30	0.9571	0.00230	16.40	0.9596	0.00190	16.60	0.9614	0.00230
16.40	0.9606	0.00210	16.50	0.9637	0.00200	16.70	0.9580	0.00240
16.50	0.9665	0.00180	16.60	0.9672	0.00200	16.80	0.9669	0.00220
16.60	0.9683	0.00230	16.70	0.9709	0.00210	16.90	0.9671	0.00210
16.70	0.9746	0.00220	16.80	0.9737	0.00260	17.00	0.9759	0.00270
16.80	0.9735	0.00220	16.90	0.9786	0.00210	17.10	0.9742	0.00240
16.90	0.9785	0.00230	17.00	0.9789	0.00200	17.20	0.9782	0.00210
17.00	0.9833	0.00210	17.10	0.9842	0.00240	17.30	0.9796	0.00180
17.10	0.9850	0.00200	17.20	0.9896	0.00200	17.40	0.9853	0.00230
17.20	0.9886	0.00220	17.30	0.9926	0.00230	17.50	0.9850	0.00240
17.30	0.9892	0.00190	17.40	0.9948	0.00270	17.60	0.9903	0.00220
17.40	0.9962	0.00190	17.50	0.9979	0.00230	17.70	0.9954	0.00190
17.50	0.9969	0.00210	17.60	0.9961	0.00220	17.80	0.9972	0.00200
17.60	1.0007	0.00190	17.70	1.0027	0.00250	17.90	0.9988	0.00230
17.70	1.0001	0.00190	17.80	1.0048	0.00200	18.00	1.0007	0.00190
17.80	1.0018	0.00190	17.90	1.0090	0.00170	18.10	1.0079	0.00200
17.90	1.0103	0.00230	18.00	1.0114	0.00190	18.20	1.0092	0.00240
18.00	1.0111	0.00220	18.10	1.0137	0.00200	18.30	1.0117	0.00200
18.10	1.0172	0.00210	18.20	1.0149	0.00220	18.40	1.0095	0.00270
18.20	1.0158	0.00240	18.30	1.0209	0.00220	18.50	1.0146	0.00210
18.30	1.0211	0.00200	18.40	1.0238	0.00200	18.60	1.0171	0.00220
						18.70	1.0223	0.00170

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
16.90	0.9319	0.00240	18.70	0.9298	0.00180	21.60	0.9349	0.00200
17.00	0.9353	0.00190	18.90	0.9340	0.00190	21.80	0.9394	0.00180
17.10	0.9347	0.00180	19.10	0.9413	0.00180	22.00	0.9409	0.00200
17.20	0.9393	0.00180	19.30	0.9456	0.00210	22.20	0.9462	0.00220
17.30	0.9430	0.00170	19.50	0.9519	0.00210	22.40	0.9479	0.00250
17.40	0.9490	0.00270	19.70	0.9597	0.00220	22.60	0.9568	0.00180
17.50	0.9496	0.00190	19.90	0.9586	0.00200	22.80	0.9576	0.00190
17.60	0.9525	0.00210	20.10	0.9665	0.00190	23.00	0.9586	0.00220
17.70	0.9547	0.00210	20.30	0.9713	0.00210	23.20	0.9646	0.00200
17.80	0.9576	0.00210	20.50	0.9756	0.00250	23.40	0.9667	0.00200
17.90	0.9635	0.00170	20.70	0.9810	0.00180	23.60	0.9729	0.00170
18.00	0.9609	0.00190	20.90	0.9837	0.00190	23.80	0.9743	0.00230
18.10	0.9676	0.00200	21.10	0.9907	0.00240	24.00	0.9784	0.00200
18.20	0.9691	0.00210	21.30	0.9910	0.00200	24.20	0.9823	0.00200
18.30	0.9716	0.00220	21.50	0.9998	0.00180	24.40	0.9824	0.00220
18.40	0.9748	0.00210	21.70	1.0008	0.00170	24.60	0.9852	0.00200
18.50	0.9762	0.00230	21.90	1.0065	0.00200	24.80	0.9954	0.00210
18.60	0.9801	0.00240	22.10	1.0077	0.00190	25.00	0.9957	0.00190
18.70	0.9834	0.00180	22.30	1.0139	0.00230	25.20	0.9964	0.00200
18.80	0.9849	0.00210	22.50	1.0164	0.00210	25.40	1.0024	0.00170
18.90	0.9900	0.00170	22.70	1.0210	0.00210	25.60	1.0035	0.00190
19.00	0.9881	0.00220	22.90	1.0297	0.00200	25.80	1.0065	0.00210
19.10	0.9958	0.00240	23.00	1.0277	0.00200	26.00	1.0087	0.00210
19.20	0.9944	0.00200				26.20	1.0116	0.00160
19.30	0.9990	0.00200				26.40	1.0156	0.00170
19.40	0.9984	0.00220				26.60	1.0142	0.00180
19.50	1.0042	0.00190				26.80	1.0205	0.00180
19.60	1.0030	0.00190				27.00	1.0242	0.00190
19.70	1.0086	0.00230				27.20	1.0239	0.00200
19.80	1.0109	0.00230						
19.90	1.0177	0.00200						
20.00	1.0151	0.00200						
20.10	1.0209	0.00230						
20.20	1.0196	0.00200						
20.30	1.0218	0.00160						
20.40	1.0233	0.00180						

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
26.20	0.9345	0.00210	29.40	0.9325	0.00230	34.50	0.9346	0.00140
26.60	0.9461	0.00180	29.90	0.9406	0.00200	35.60	0.9448	0.00190
27.00	0.9456	0.00230	30.40	0.9484	0.00190	36.70	0.9537	0.00190
27.40	0.9544	0.00170	30.90	0.9532	0.00160	37.80	0.9604	0.00190
27.80	0.9565	0.00240	31.40	0.9519	0.00200	38.90	0.9662	0.00150
28.20	0.9619	0.00170	31.90	0.9575	0.00200	40.00	0.9715	0.00160
28.60	0.9654	0.00200	32.40	0.9625	0.00180	41.10	0.9777	0.00150
29.00	0.9718	0.00160	32.90	0.9656	0.00170	42.20	0.9828	0.00170
29.40	0.9775	0.00220	33.40	0.9720	0.00170	43.30	0.9869	0.00230
29.80	0.9803	0.00230	33.90	0.9761	0.00220	44.40	0.9921	0.00140
30.20	0.9835	0.00160	34.40	0.9776	0.00190	45.50	0.9964	0.00210
30.60	0.9897	0.00200	34.90	0.9819	0.00190	46.60	1.0034	0.00140
31.00	0.9920	0.00220	35.40	0.9862	0.00160	47.70	1.0037	0.00160
31.40	0.9961	0.00160	35.90	0.9891	0.00160	48.80	1.0052	0.00150
31.80	1.0032	0.00180	36.40	0.9937	0.00190	49.90	1.0096	0.00160
32.20	1.0037	0.00230	36.90	0.9973	0.00140	51.00	1.0130	0.00210
32.60	1.0040	0.00200	37.40	0.9995	0.00170	52.10	1.0131	0.00190
33.00	1.0107	0.00170	37.90	1.0010	0.00210	53.20	1.0210	0.00220
33.40	1.0135	0.00190	38.40	1.0025	0.00170	54.30	1.0231	0.00150
33.80	1.0160	0.00220	38.90	1.0064	0.00160	55.40	1.0260	0.00210
34.20	1.0191	0.00170	39.40	1.0107	0.00160	56.30	1.0296	0.00180
34.60	1.0225	0.00210	39.90	1.0145	0.00170			
34.70	1.0193	0.00220	40.40	1.0132	0.00170			
			40.90	1.0173	0.00170			
			41.00	1.0208	0.00170			

Case ID: UO2_sphere_004_10ref

Material: Uranium dioxide in water

Weight Fraction U in UO₂: 0.88145

Geometry: Sphere

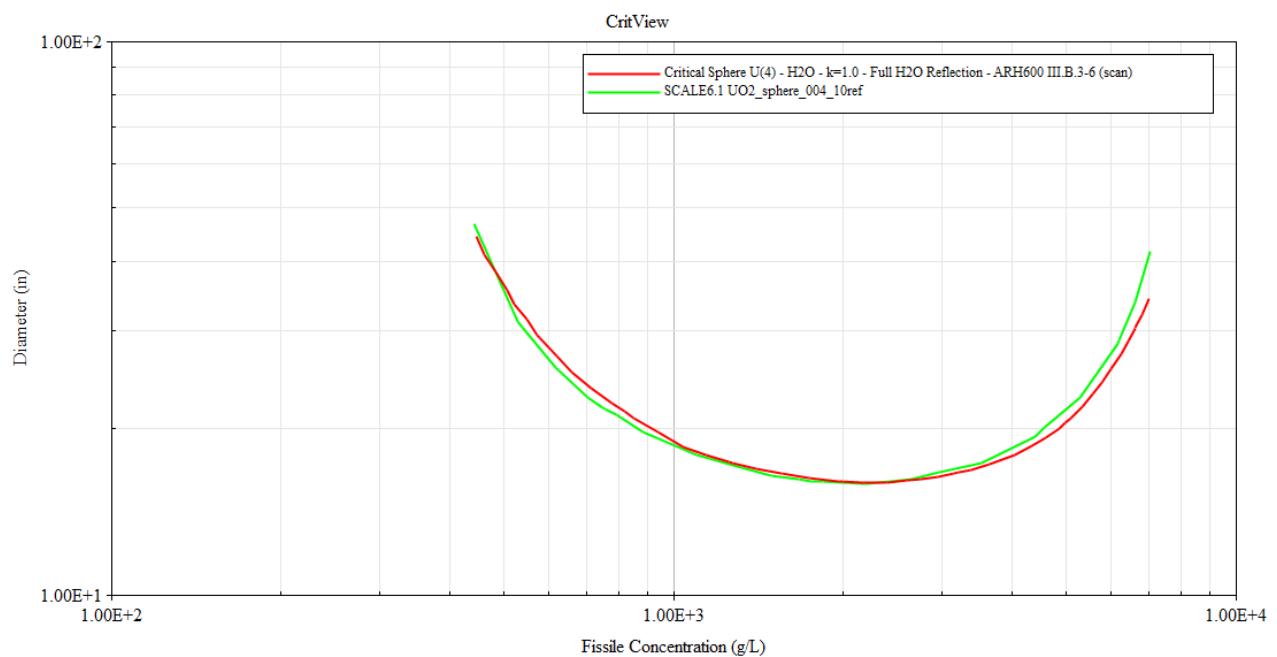
Isotopics: 4% ²³⁵U 96% ²³⁸U

Reflector: 10" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere(4.0% ²³⁵ U) - 10 Inches of Water Reflection					
UO2 Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.500	0.44073	30.000	51.600	1.000	46.9310
0.600	0.52887	23.900	33.200	0.400	31.1364
0.700	0.61702	20.500	27.300	0.300	25.7200
0.800	0.70516	18.700	24.000	0.200	22.7667
0.850	0.74923	18.300	23.100	0.200	21.8000
0.900	0.79331	17.700	22.200	0.200	21.1492
1.000	0.88145	16.500	20.600	0.200	19.6538
1.250	1.10181	15.400	19.000	0.100	17.8733
1.500	1.32218	14.500	17.700	0.100	17.0015
1.700	1.49847	14.200	17.200	0.100	16.4414
1.900	1.67476	13.900	16.900	0.100	16.1778
2.000	1.76290	14.000	16.700	0.100	16.0556
2.100	1.85105	13.900	16.700	0.100	16.0296
2.500	2.20363	13.800	16.700	0.100	15.8967
3.000	2.64435	14.000	17.000	0.100	16.1613
4.000	3.52580	14.900	18.300	0.100	17.3133
5.000	4.40725	16.400	20.600	0.200	19.2816
6.000	5.28870	18.900	24.500	0.200	22.7308
7.000	6.17015	22.800	31.300	0.400	28.4333
7.500	6.61088	25.900	37.800	0.600	33.7667
8.000	7.05160	30.300	48.800	0.900	41.6684

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-946 (pdf pg964)
,
#index number = <index = 1:21:1>
,
#UO2 Concentration = <@conc =
0.5,0.6,0.7,0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
30,23.9,20.5,18.7,18.3,17.7,16.5,15.4,14.5,14.2,13.9,14,13.9,13.8,14,14.9,16.4,18.9,22.8,25.9,30.
3> in
#Ending Diameter = <@enddia =
51.6,33.2,27.3,24,23.1,22.2,20.6,19,17.7,17.2,16.9,16.7,16.7,16.7,17,18.3,20.6,24.5,31.3,37.8,48.
8> in
#Delta = <@delta =
1,0.4,0.3,0.2,0.2,0.2,0.2,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.2,0.2,0.4,0.6,0.9> in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                                92235 4
                                92238 96   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere With Water Reflector"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(diameter*in)/2+(10*in)}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; 10" Water Reflector; 4% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.04 U238 0.96
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.441 46.9310
0.529 31.1364
0.617 25.7200
0.705 22.7667
0.749 21.8000
0.793 21.1492
0.881 19.6538
1.102 17.8733
1.322 17.0015
1.498 16.4414
1.675 16.1778
1.763 16.0556
1.851 16.0296
2.204 15.8967
2.644 16.1613
3.526 17.3133
4.407 19.2816
5.289 22.7308
6.170 28.4333
6.611 33.7667
7.052 41.6684
```

500 milli-g/cc			600 milli-g/cc			700 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
30.00	0.9317	0.00140	23.90	0.9316	0.00130	20.50	0.9271	0.00200
31.00	0.9372	0.00100	24.30	0.9342	0.00170	20.80	0.9292	0.00140
32.00	0.9411	0.00200	24.70	0.9391	0.00190	21.10	0.9388	0.00150
33.00	0.9495	0.00110	25.10	0.9442	0.00120	21.40	0.9441	0.00140
34.00	0.9550	0.00130	25.50	0.9505	0.00130	21.70	0.9459	0.00160
35.00	0.9604	0.00130	25.90	0.9552	0.00130	22.00	0.9477	0.00130
36.00	0.9634	0.00130	26.30	0.9586	0.00140	22.30	0.9529	0.00220
37.00	0.9701	0.00130	26.70	0.9611	0.00170	22.60	0.9579	0.00130
38.00	0.9749	0.00120	27.10	0.9662	0.00150	22.90	0.9644	0.00150
39.00	0.9734	0.00110	27.50	0.9712	0.00150	23.20	0.9670	0.00220
40.00	0.9832	0.00130	27.90	0.9716	0.00130	23.50	0.9731	0.00150
41.00	0.9878	0.00140	28.30	0.9780	0.00120	23.80	0.9761	0.00160
42.00	0.9883	0.00140	28.70	0.9798	0.00160	24.10	0.9788	0.00130
43.00	0.9928	0.00120	29.10	0.9841	0.00160	24.40	0.9824	0.00150
44.00	0.9919	0.00150	29.50	0.9869	0.00160	24.70	0.9906	0.00180
45.00	0.9976	0.00140	29.90	0.9880	0.00130	25.00	0.9911	0.00130
46.00	1.0027	0.00130	30.30	0.9961	0.00180	25.30	0.9938	0.00150
47.00	0.9998	0.00160	30.70	0.9955	0.00150	25.60	0.9992	0.00170
48.00	1.0050	0.00160	31.10	0.9998	0.00140	25.90	1.0012	0.00130
49.00	1.0109	0.00140	31.50	1.0020	0.00180	26.20	1.0035	0.00150
50.00	1.0099	0.00100	31.90	1.0028	0.00190	26.50	1.0051	0.00120
51.00	1.0130	0.00100	32.30	1.0040	0.00150	26.80	1.0120	0.00190
51.60	1.0127	0.00150	32.70	1.0122	0.00130	27.10	1.0143	0.00160
			33.10	1.0146	0.00160	27.30	1.0126	0.00160
			33.20	1.0091	0.00130			

800 milli-g/cc			850 milli-g/cc			900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
18.70	0.9282	0.00210	18.30	0.9329	0.00170	17.70	0.9313	0.00200
18.90	0.9307	0.00160	18.50	0.9381	0.00140	17.90	0.9371	0.00180
19.10	0.9369	0.00160	18.70	0.9408	0.00180	18.10	0.9419	0.00230
19.30	0.9406	0.00170	18.90	0.9472	0.00150	18.30	0.9463	0.00180
19.50	0.9405	0.00130	19.10	0.9495	0.00160	18.50	0.9517	0.00160
19.70	0.9467	0.00180	19.30	0.9587	0.00190	18.70	0.9571	0.00260
19.90	0.9496	0.00180	19.50	0.9574	0.00150	18.90	0.9594	0.00190
20.10	0.9533	0.00180	19.70	0.9595	0.00170	19.10	0.9650	0.00140
20.30	0.9617	0.00180	19.90	0.9706	0.00170	19.30	0.9690	0.00170
20.50	0.9617	0.00140	20.10	0.9685	0.00190	19.50	0.9724	0.00170
20.70	0.9646	0.00150	20.30	0.9727	0.00160	19.70	0.9753	0.00150
20.90	0.9703	0.00140	20.50	0.9758	0.00150	19.90	0.9800	0.00190
21.10	0.9738	0.00170	20.70	0.9833	0.00180	20.10	0.9815	0.00180
21.30	0.9803	0.00150	20.90	0.9848	0.00140	20.30	0.9867	0.00190
21.50	0.9780	0.00180	21.10	0.9879	0.00180	20.50	0.9916	0.00160
21.70	0.9803	0.00200	21.30	0.9936	0.00170	20.70	0.9918	0.00150
21.90	0.9840	0.00160	21.50	0.9946	0.00160	20.90	0.9979	0.00160
22.10	0.9880	0.00150	21.70	1.0001	0.00170	21.10	0.9985	0.00150
22.30	0.9922	0.00160	21.90	0.9999	0.00160	21.30	1.0046	0.00170
22.50	0.9997	0.00190	22.10	1.0049	0.00150	21.50	1.0076	0.00200
22.70	0.9971	0.00140	22.30	1.0048	0.00140	21.70	1.0131	0.00140
22.90	1.0058	0.00170	22.50	1.0100	0.00160	21.90	1.0152	0.00160
23.10	1.0049	0.00150	22.70	1.0145	0.00140	22.10	1.0188	0.00190
23.30	1.0065	0.00130	22.90	1.0168	0.00160	22.20	1.0233	0.00150
23.50	1.0043	0.00160	23.10	1.0179	0.00150			
23.70	1.0083	0.00160						
23.90	1.0127	0.00190						
24.00	1.0142	0.00150						

1000 milli-g/cc			1250 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
16.50	0.9243	0.00170	15.40	0.9304	0.00220	14.50	0.9261	0.00190
16.70	0.9291	0.00160	15.50	0.9322	0.00160	14.60	0.9321	0.00220
16.90	0.9315	0.00200	15.60	0.9415	0.00160	14.70	0.9339	0.00180
17.10	0.9378	0.00150	15.70	0.9379	0.00240	14.80	0.9354	0.00180
17.30	0.9452	0.00170	15.80	0.9454	0.00170	14.90	0.9390	0.00220
17.50	0.9524	0.00160	15.90	0.9456	0.00170	15.00	0.9400	0.00160
17.70	0.9571	0.00180	16.00	0.9510	0.00210	15.10	0.9429	0.00180
17.90	0.9583	0.00170	16.10	0.9532	0.00170	15.20	0.9463	0.00180
18.10	0.9654	0.00160	16.20	0.9515	0.00200	15.30	0.9552	0.00180
18.30	0.9683	0.00180	16.30	0.9565	0.00150	15.40	0.9577	0.00210
18.50	0.9749	0.00240	16.40	0.9632	0.00210	15.50	0.9603	0.00190
18.70	0.9775	0.00170	16.50	0.9670	0.00180	15.60	0.9635	0.00190
18.90	0.9810	0.00150	16.60	0.9645	0.00170	15.70	0.9657	0.00190
19.10	0.9873	0.00200	16.70	0.9696	0.00190	15.80	0.9707	0.00180
19.30	0.9906	0.00230	16.80	0.9747	0.00210	15.90	0.9729	0.00160
19.50	0.9950	0.00190	16.90	0.9750	0.00220	16.00	0.9755	0.00230
19.70	1.0015	0.00210	17.00	0.9753	0.00210	16.10	0.9777	0.00210
19.90	1.0012	0.00160	17.10	0.9814	0.00200	16.20	0.9784	0.00190
20.10	1.0061	0.00170	17.20	0.9803	0.00190	16.30	0.9854	0.00170
20.30	1.0106	0.00140	17.30	0.9883	0.00230	16.40	0.9847	0.00150
20.50	1.0147	0.00190	17.40	0.9881	0.00210	16.50	0.9894	0.00190
20.60	1.0164	0.00150	17.50	0.9897	0.00170	16.60	0.9918	0.00210
			17.60	0.9915	0.00150	16.70	0.9925	0.00190
			17.70	0.9972	0.00200	16.80	0.9966	0.00170
			17.80	0.9967	0.00170	16.90	0.9964	0.00160
			17.90	1.0012	0.00210	17.00	0.9999	0.00160
			18.00	1.0016	0.00200	17.10	1.0067	0.00180
			18.10	1.0029	0.00170	17.20	1.0098	0.00190
			18.20	1.0028	0.00150	17.30	1.0097	0.00280
			18.30	1.0130	0.00190	17.40	1.0133	0.00210
			18.40	1.0145	0.00160	17.50	1.0119	0.00220
			18.50	1.0146	0.00220	17.60	1.0184	0.00170
			18.60	1.0186	0.00180	17.70	1.0242	0.00220
			18.70	1.0178	0.00210			
			18.80	1.0234	0.00170			
			18.90	1.0207	0.00160			
			19.00	1.0234	0.00200			

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.20	0.9269	0.00160	13.90	0.9266	0.00180	14.00	0.9309	0.00180
14.30	0.9313	0.00190	14.00	0.9250	0.00220	14.10	0.9361	0.00190
14.40	0.9331	0.00170	14.10	0.9320	0.00200	14.20	0.9374	0.00190
14.50	0.9406	0.00200	14.20	0.9362	0.00150	14.30	0.9423	0.00210
14.60	0.9432	0.00160	14.30	0.9362	0.00170	14.40	0.9459	0.00200
14.70	0.9424	0.00210	14.40	0.9425	0.00210	14.50	0.9489	0.00170
14.80	0.9491	0.00190	14.50	0.9441	0.00180	14.60	0.9548	0.00170
14.90	0.9527	0.00170	14.60	0.9483	0.00190	14.70	0.9557	0.00170
15.00	0.9535	0.00200	14.70	0.9517	0.00230	14.80	0.9575	0.00210
15.10	0.9589	0.00260	14.80	0.9560	0.00190	14.90	0.9630	0.00220
15.20	0.9629	0.00230	14.90	0.9581	0.00170	15.00	0.9670	0.00190
15.30	0.9664	0.00220	15.00	0.9627	0.00230	15.10	0.9704	0.00190
15.40	0.9678	0.00170	15.10	0.9682	0.00230	15.20	0.9729	0.00200
15.50	0.9721	0.00230	15.20	0.9677	0.00190	15.30	0.9751	0.00170
15.60	0.9727	0.00200	15.30	0.9731	0.00170	15.40	0.9790	0.00170
15.70	0.9776	0.00180	15.40	0.9744	0.00230	15.50	0.9795	0.00190
15.80	0.9800	0.00200	15.50	0.9813	0.00250	15.60	0.9874	0.00170
15.90	0.9858	0.00170	15.60	0.9851	0.00160	15.70	0.9919	0.00210
16.00	0.9839	0.00190	15.70	0.9849	0.00200	15.80	0.9930	0.00190
16.10	0.9889	0.00220	15.80	0.9888	0.00170	15.90	0.9953	0.00190
16.20	0.9955	0.00180	15.90	0.9952	0.00220	16.00	0.9960	0.00190
16.30	0.9979	0.00180	16.00	0.9953	0.00190	16.10	1.0032	0.00180
16.40	0.9988	0.00160	16.10	0.9965	0.00150	16.20	1.0044	0.00140
16.50	1.0017	0.00190	16.20	1.0010	0.00180	16.30	1.0073	0.00230
16.60	1.0006	0.00180	16.30	1.0020	0.00180	16.40	1.0074	0.00200
16.70	1.0071	0.00200	16.40	1.0075	0.00220	16.50	1.0116	0.00170
16.80	1.0094	0.00200	16.50	1.0087	0.00160	16.60	1.0158	0.00220
16.90	1.0116	0.00210	16.60	1.0160	0.00210	16.70	1.0163	0.00190
17.00	1.0151	0.00190	16.70	1.0146	0.00190			
17.10	1.0184	0.00210	16.80	1.0207	0.00180			
17.20	1.0209	0.00180	16.90	1.0187	0.00260			

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
13.90	0.9291	0.00190	13.80	0.9274	0.00190	14.00	0.9259	0.00270
14.00	0.9295	0.00180	13.90	0.9352	0.00220	14.10	0.9325	0.00260
14.10	0.9365	0.00180	14.00	0.9401	0.00170	14.20	0.9394	0.00190
14.20	0.9383	0.00240	14.10	0.9374	0.00190	14.30	0.9419	0.00180
14.30	0.9448	0.00220	14.20	0.9458	0.00220	14.40	0.9472	0.00210
14.40	0.9501	0.00190	14.30	0.9483	0.00190	14.50	0.9424	0.00210
14.50	0.9511	0.00180	14.40	0.9512	0.00170	14.60	0.9493	0.00220
14.60	0.9550	0.00170	14.50	0.9541	0.00190	14.70	0.9591	0.00180
14.70	0.9564	0.00200	14.60	0.9550	0.00200	14.80	0.9566	0.00200
14.80	0.9616	0.00170	14.70	0.9590	0.00190	14.90	0.9583	0.00200
14.90	0.9650	0.00200	14.80	0.9646	0.00230	15.00	0.9640	0.00160
15.00	0.9685	0.00170	14.90	0.9698	0.00160	15.10	0.9681	0.00220
15.10	0.9700	0.00210	15.00	0.9714	0.00240	15.20	0.9707	0.00210
15.20	0.9790	0.00200	15.10	0.9711	0.00190	15.30	0.9758	0.00200
15.30	0.9802	0.00170	15.20	0.9764	0.00200	15.40	0.9774	0.00170
15.40	0.9849	0.00200	15.30	0.9795	0.00180	15.50	0.9819	0.00200
15.50	0.9829	0.00170	15.40	0.9800	0.00180	15.60	0.9866	0.00220
15.60	0.9863	0.00190	15.50	0.9833	0.00260	15.70	0.9877	0.00190
15.70	0.9959	0.00170	15.60	0.9914	0.00200	15.80	0.9880	0.00190
15.80	0.9955	0.00250	15.70	0.9915	0.00190	15.90	0.9910	0.00160
15.90	0.9965	0.00200	15.80	0.9942	0.00200	16.00	0.9954	0.00190
16.00	1.0021	0.00180	15.90	1.0002	0.00200	16.10	0.9981	0.00170
16.10	0.9950	0.00160	16.00	1.0010	0.00160	16.20	1.0012	0.00190
16.20	1.0035	0.00170	16.10	1.0005	0.00230	16.30	1.0055	0.00230
16.30	1.0090	0.00200	16.20	1.0074	0.00210	16.40	1.0098	0.00200
16.40	1.0089	0.00250	16.30	1.0122	0.00200	16.50	1.0110	0.00160
16.50	1.0144	0.00220	16.40	1.0107	0.00180	16.60	1.0167	0.00210
16.60	1.0159	0.00160	16.50	1.0136	0.00210	16.70	1.0151	0.00180
16.70	1.0196	0.00190	16.60	1.0195	0.00220	16.80	1.0178	0.00190
			16.70	1.0220	0.00170	16.90	1.0165	0.00170
						17.00	1.0241	0.00190

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
14.90	0.9310	0.00180	16.40	0.9331	0.00170	18.90	0.9389	0.00200
15.00	0.9369	0.00170	16.60	0.9411	0.00180	19.10	0.9388	0.00160
15.10	0.9390	0.00190	16.80	0.9455	0.00190	19.30	0.9444	0.00220
15.20	0.9454	0.00170	17.00	0.9498	0.00180	19.50	0.9510	0.00170
15.30	0.9448	0.00190	17.20	0.9516	0.00170	19.70	0.9527	0.00180
15.40	0.9475	0.00210	17.40	0.9591	0.00210	19.90	0.9546	0.00220
15.50	0.9494	0.00210	17.60	0.9585	0.00170	20.10	0.9573	0.00190
15.60	0.9538	0.00240	17.80	0.9703	0.00160	20.30	0.9620	0.00230
15.70	0.9581	0.00170	18.00	0.9711	0.00220	20.50	0.9660	0.00200
15.80	0.9620	0.00190	18.20	0.9768	0.00200	20.70	0.9720	0.00210
15.90	0.9628	0.00180	18.40	0.9809	0.00170	20.90	0.9746	0.00230
16.00	0.9630	0.00260	18.60	0.9837	0.00210	21.10	0.9768	0.00190
16.10	0.9707	0.00190	18.80	0.9936	0.00160	21.30	0.9798	0.00170
16.20	0.9747	0.00210	19.00	0.9948	0.00170	21.50	0.9858	0.00200
16.30	0.9726	0.00190	19.20	0.9980	0.00160	21.70	0.9851	0.00190
16.40	0.9773	0.00170	19.40	1.0029	0.00180	21.90	0.9915	0.00160
16.50	0.9805	0.00220	19.60	1.0075	0.00250	22.10	0.9932	0.00190
16.60	0.9826	0.00210	19.80	1.0067	0.00210	22.30	0.9959	0.00250
16.70	0.9881	0.00180	20.00	1.0159	0.00190	22.50	0.9948	0.00190
16.80	0.9852	0.00230	20.20	1.0190	0.00180	22.70	0.9990	0.00180
16.90	0.9894	0.00180	20.40	1.0235	0.00280	22.90	1.0055	0.00220
17.00	0.9933	0.00220	20.60	1.0245	0.00190	23.10	1.0061	0.00180
17.10	0.9979	0.00230				23.30	1.0087	0.00240
17.20	0.9961	0.00230				23.50	1.0118	0.00240
17.30	0.9998	0.00200				23.70	1.0217	0.00300
17.40	1.0013	0.00190				23.90	1.0170	0.00170
17.50	1.0041	0.00170				24.10	1.0190	0.00140
17.60	1.0075	0.00210				24.30	1.0220	0.00180
17.70	1.0111	0.00220				24.50	1.0242	0.00170
17.80	1.0152	0.00190						
17.90	1.0133	0.00250						
18.00	1.0149	0.00190						
18.10	1.0204	0.00200						
18.20	1.0206	0.00240						
18.30	1.0231	0.00210						

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
22.80	0.9370	0.00170	25.90	0.9386	0.00190	30.30	0.9389	0.00170
23.20	0.9423	0.00150	26.50	0.9417	0.00150	31.20	0.9463	0.00160
23.60	0.9471	0.00220	27.10	0.9491	0.00150	32.10	0.9509	0.00240
24.00	0.9530	0.00170	27.70	0.9578	0.00220	33.00	0.9557	0.00200
24.40	0.9576	0.00170	28.30	0.9617	0.00160	33.90	0.9612	0.00190
24.80	0.9602	0.00140	28.90	0.9664	0.00150	34.80	0.9659	0.00160
25.20	0.9663	0.00180	29.50	0.9715	0.00170	35.70	0.9681	0.00140
25.60	0.9697	0.00180	30.10	0.9756	0.00210	36.60	0.9801	0.00200
26.00	0.9782	0.00180	30.70	0.9785	0.00150	37.50	0.9836	0.00220
26.40	0.9768	0.00240	31.30	0.9837	0.00160	38.40	0.9861	0.00190
26.80	0.9874	0.00170	31.90	0.9865	0.00160	39.30	0.9876	0.00150
27.20	0.9859	0.00190	32.50	0.9899	0.00200	40.20	0.9944	0.00180
27.60	0.9907	0.00150	33.10	0.9965	0.00170	41.10	0.9964	0.00190
28.00	0.9965	0.00160	33.70	0.9994	0.00150	42.00	1.0021	0.00140
28.40	0.9996	0.00180	34.30	1.0048	0.00150	42.90	1.0025	0.00160
28.80	1.0044	0.00190	34.90	1.0073	0.00210	43.80	1.0057	0.00150
29.20	1.0054	0.00180	35.50	1.0115	0.00210	44.70	1.0098	0.00170
29.60	1.0091	0.00150	36.10	1.0132	0.00160	45.60	1.0109	0.00150
30.00	1.0130	0.00200	36.70	1.0146	0.00150	46.50	1.0118	0.00170
30.40	1.0161	0.00180	37.30	1.0206	0.00180	47.40	1.0159	0.00140
30.80	1.0204	0.00230	37.80	1.0192	0.00190	48.30	1.0183	0.00130
31.20	1.0240	0.00200				48.80	1.0176	0.00170
31.30	1.0195	0.00140						

UO₂-sphere-3 (Cases with 0", 1", 10" Reflector)

Case ID: UO2_sphere_003_00ref

Material: Uranium dioxide in water

Weight Fraction U in UO₂: 0.88147

Geometry: Sphere

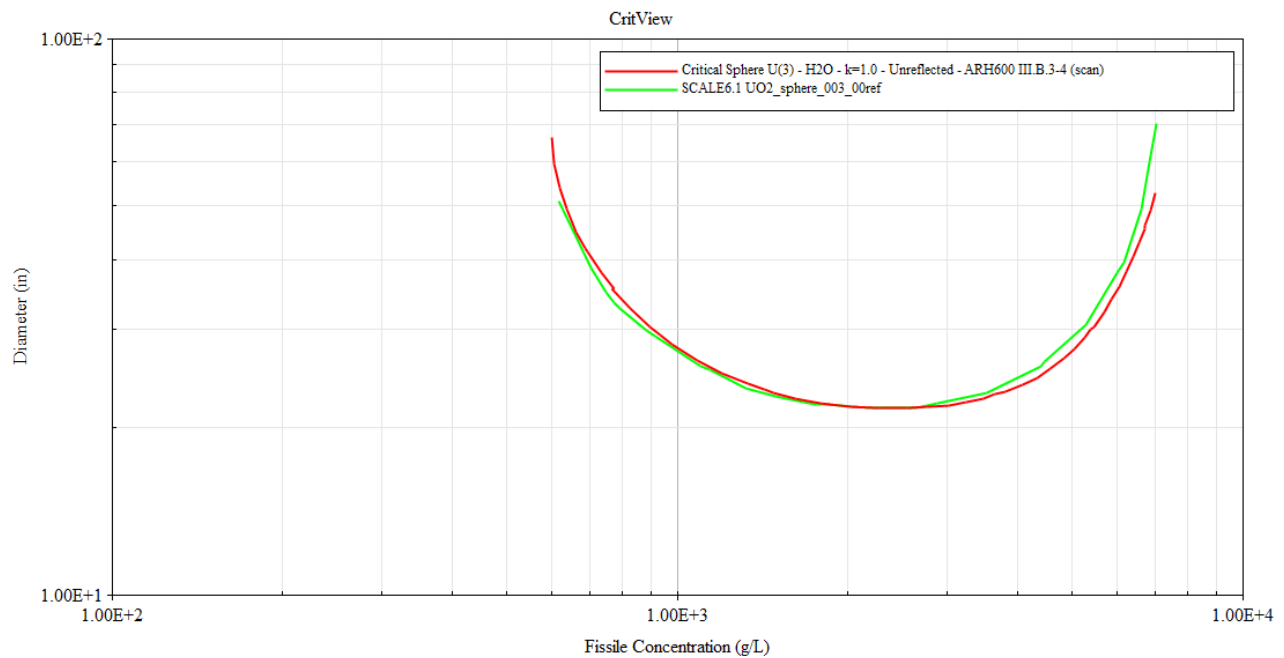
Isotopics: 3% ²³⁵U 97% ²³⁸U

Reflector: Unreflected

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere (3.0% ²³⁵ U) - 0 Inches of Water Reflection					
UO ₂ Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.700	0.61703	33.700	57.400	1.100	51.0381
0.800	0.70518	28.700	41.400	0.600	38.7186
0.850	0.74925	27.200	37.700	0.500	35.0077
0.900	0.79332	25.700	35.100	0.400	32.7553
1.000	0.88147	24.000	31.300	0.300	29.7973
1.250	1.10184	21.600	26.700	0.200	25.7292
1.500	1.32221	20.100	24.600	0.200	23.4733
1.700	1.49850	19.500	23.500	0.200	22.7167
1.900	1.67479	19.200	23.100	0.200	22.1750
2.000	1.76294	19.000	22.900	0.200	21.9871
2.100	1.85109	18.800	22.800	0.200	21.9321
2.500	2.20368	18.700	22.600	0.200	21.6273
3.000	2.64441	19.100	22.700	0.100	21.6792
4.000	3.52588	20.200	24.400	0.200	23.0696
5.000	4.40735	22.400	27.400	0.200	25.7667
6.000	5.28882	25.700	32.900	0.300	30.6146
7.000	6.17029	31.600	43.900	0.600	39.6426
7.500	6.61103	35.900	55.400	0.900	49.4321
8.000	7.05176	44.600	77.200	1.600	70.3524

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-959 (pdf pg977)
,
#index number = <index = 1:19:1>
,
#UO2 Concentration = <@conc = 0.7,0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
33.7,28.7,27.2,25.7,24,21.6,20.1,19.5,19.2,19,18.8,18.7,19.1,20.2,22.4,25.7,31.6,35.9,44.6> in
#Ending Diameter = <@enddia =
57.4,41.4,37.7,35.1,31.3,26.7,24.6,23.5,23.1,22.9,22.8,22.6,22.7,24.4,27.4,32.9,43.9,55.4,77.2>
in
#Delta = <@delta = 1.1,0.6,0.5,0.4,0.3,0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.1,0.2,0.2,0.3,0.6,0.9,1.6>
in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Unreflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                                92235 3
                                92238 97   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Unreflected UO2 Sphere"
  sphere 1      {{(diameter*in)/2}}
  media 1 1 1
  boundary 1
end geometry
end data
end

<perl>
sub ZEROCHECK
{
  if ($_[0] == 0) {
    return '\';
  }
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; Unreflected; 3% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.03 U238 0.97
reflmat: None
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.617 51.0381
0.705 38.7186
0.749 35.0077
0.793 32.7553
0.881 29.7973
1.102 25.7292
1.322 23.4733
1.499 22.7167
1.675 22.1750
1.763 21.9871
1.851 21.9321
2.204 21.6273
2.644 21.6792
3.526 23.0696
4.407 25.7667
5.289 30.6146
6.170 39.6426
6.611 49.4321
7.052 70.3524
```


700 milli-g/cc			800 milli-g/cc			850 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
33.70	0.9301	0.00160	28.70	0.9271	0.00140	27.20	0.9284	0.00180
34.80	0.9368	0.00100	29.30	0.9318	0.00140	27.70	0.9351	0.00160
35.90	0.9451	0.00200	29.90	0.9400	0.00120	28.20	0.9388	0.00170
37.00	0.9480	0.00160	30.50	0.9459	0.00190	28.70	0.9447	0.00130
38.10	0.9531	0.00140	31.10	0.9496	0.00140	29.20	0.9510	0.00140
39.20	0.9587	0.00150	31.70	0.9547	0.00130	29.70	0.9581	0.00140
40.30	0.9624	0.00210	32.30	0.9614	0.00150	30.20	0.9620	0.00160
41.40	0.9750	0.00170	32.90	0.9665	0.00180	30.70	0.9675	0.00150
42.50	0.9728	0.00170	33.50	0.9698	0.00130	31.20	0.9695	0.00140
43.60	0.9766	0.00140	34.10	0.9719	0.00180	31.70	0.9725	0.00130
44.70	0.9808	0.00110	34.70	0.9796	0.00160	32.20	0.9771	0.00130
45.80	0.9867	0.00140	35.30	0.9838	0.00160	32.70	0.9796	0.00170
46.90	0.9933	0.00120	35.90	0.9858	0.00120	33.20	0.9828	0.00150
48.00	0.9922	0.00140	36.50	0.9916	0.00130	33.70	0.9858	0.00130
49.10	0.9927	0.00120	37.10	0.9914	0.00180	34.20	0.9933	0.00160
50.20	0.9984	0.00120	37.70	0.9971	0.00140	34.70	0.9968	0.00170
51.30	1.0005	0.00110	38.30	0.9970	0.00150	35.20	1.0020	0.00120
52.40	1.0034	0.00110	38.90	1.0013	0.00140	35.70	1.0023	0.00170
53.50	1.0034	0.00140	39.50	1.0052	0.00160	36.20	1.0040	0.00140
54.60	1.0057	0.00190	40.10	1.0063	0.00130	36.70	1.0072	0.00150
55.70	1.0082	0.00110	40.70	1.0084	0.00170	37.20	1.0143	0.00130
56.80	1.0062	0.00150	41.30	1.0114	0.00110	37.70	1.0137	0.00140
57.40	1.0136	0.00140	41.40	1.0147	0.00120			

900 milli-g/cc			1000 milli-g/cc			1250 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
25.70	0.9254	0.00160	24.00	0.9248	0.00180	21.60	0.9285	0.00220
26.10	0.9282	0.00180	24.30	0.9305	0.00170	21.80	0.9344	0.00170
26.50	0.9361	0.00170	24.60	0.9368	0.00150	22.00	0.9406	0.00160
26.90	0.9391	0.00130	24.90	0.9404	0.00150	22.20	0.9443	0.00170
27.30	0.9479	0.00190	25.20	0.9443	0.00150	22.40	0.9447	0.00210
27.70	0.9521	0.00160	25.50	0.9489	0.00210	22.60	0.9505	0.00160
28.10	0.9543	0.00170	25.80	0.9554	0.00170	22.80	0.9549	0.00210
28.50	0.9585	0.00180	26.10	0.9559	0.00170	23.00	0.9563	0.00160
28.90	0.9620	0.00140	26.40	0.9625	0.00180	23.20	0.9636	0.00160
29.30	0.9677	0.00180	26.70	0.9642	0.00240	23.40	0.9635	0.00240
29.70	0.9729	0.00130	27.00	0.9676	0.00140	23.60	0.9678	0.00170
30.10	0.9738	0.00150	27.30	0.9730	0.00160	23.80	0.9753	0.00190
30.50	0.9799	0.00130	27.60	0.9785	0.00140	24.00	0.9795	0.00170
30.90	0.9813	0.00160	27.90	0.9805	0.00150	24.20	0.9779	0.00180
31.30	0.9869	0.00170	28.20	0.9831	0.00140	24.40	0.9827	0.00200
31.70	0.9911	0.00160	28.50	0.9882	0.00130	24.60	0.9832	0.00200
32.10	0.9953	0.00160	28.80	0.9945	0.00170	24.80	0.9863	0.00160
32.50	0.9970	0.00170	29.10	0.9947	0.00160	25.00	0.9918	0.00160
32.90	1.0017	0.00160	29.40	0.9991	0.00190	25.20	0.9939	0.00160
33.30	1.0029	0.00150	29.70	0.9988	0.00210	25.40	0.9992	0.00140
33.70	1.0070	0.00140	30.00	1.0025	0.00200	25.60	0.9969	0.00180
34.10	1.0080	0.00130	30.30	1.0033	0.00130	25.80	1.0017	0.00200
34.50	1.0088	0.00180	30.60	1.0088	0.00130	26.00	1.0054	0.00160
34.90	1.0184	0.00220	30.90	1.0113	0.00190	26.20	1.0097	0.00210
35.10	1.0158	0.00150	31.20	1.0145	0.00160	26.40	1.0113	0.00170
			31.30	1.0168	0.00190	26.60	1.0121	0.00160
						26.70	1.0147	0.00160

1500 milli-g/cc			1700 milli-g/cc			1900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
20.10	0.9249	0.00210	19.50	0.9299	0.00160	19.20	0.9295	0.00170
20.30	0.9283	0.00190	19.70	0.9298	0.00200	19.40	0.9317	0.00180
20.50	0.9357	0.00150	19.90	0.9395	0.00220	19.60	0.9385	0.00230
20.70	0.9385	0.00240	20.10	0.9385	0.00190	19.80	0.9445	0.00230
20.90	0.9427	0.00250	20.30	0.9489	0.00190	20.00	0.9502	0.00220
21.10	0.9491	0.00170	20.50	0.9481	0.00170	20.20	0.9531	0.00200
21.30	0.9555	0.00170	20.70	0.9532	0.00200	20.40	0.9580	0.00230
21.50	0.9595	0.00160	20.90	0.9626	0.00190	20.60	0.9600	0.00170
21.70	0.9648	0.00170	21.10	0.9646	0.00220	20.80	0.9693	0.00220
21.90	0.9682	0.00230	21.30	0.9709	0.00200	21.00	0.9712	0.00190
22.10	0.9691	0.00180	21.50	0.9745	0.00220	21.20	0.9756	0.00180
22.30	0.9731	0.00200	21.70	0.9775	0.00200	21.40	0.9824	0.00250
22.50	0.9783	0.00180	21.90	0.9820	0.00190	21.60	0.9854	0.00190
22.70	0.9832	0.00170	22.10	0.9865	0.00210	21.80	0.9920	0.00180
22.90	0.9835	0.00210	22.30	0.9891	0.00180	22.00	0.9972	0.00180
23.10	0.9908	0.00200	22.50	0.9950	0.00200	22.20	1.0004	0.00180
23.30	0.9935	0.00160	22.70	0.9998	0.00190	22.40	1.0033	0.00210
23.50	1.0010	0.00210	22.90	1.0022	0.00240	22.60	1.0089	0.00160
23.70	1.0062	0.00210	23.10	1.0069	0.00180	22.80	1.0100	0.00200
23.90	1.0043	0.00200	23.30	1.0103	0.00240	23.00	1.0141	0.00170
24.10	1.0098	0.00180	23.50	1.0121	0.00200	23.10	1.0188	0.00200
24.30	1.0084	0.00150						
24.50	1.0156	0.00210						
24.60	1.0161	0.00180						

2000 milli-g/cc			2100 milli-g/cc			2500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
19.00	0.9260	0.00180	18.80	0.9227	0.00190	18.70	0.9276	0.00250
19.20	0.9334	0.00200	19.00	0.9283	0.00200	18.90	0.9326	0.00170
19.40	0.9366	0.00200	19.20	0.9360	0.00180	19.10	0.9343	0.00180
19.60	0.9436	0.00170	19.40	0.9409	0.00200	19.30	0.9419	0.00170
19.80	0.9486	0.00170	19.60	0.9467	0.00190	19.50	0.9499	0.00210
20.00	0.9545	0.00180	19.80	0.9510	0.00180	19.70	0.9510	0.00220
20.20	0.9566	0.00190	20.00	0.9575	0.00180	19.90	0.9569	0.00190
20.40	0.9640	0.00180	20.20	0.9624	0.00180	20.10	0.9634	0.00210
20.60	0.9687	0.00180	20.40	0.9629	0.00200	20.30	0.9708	0.00220
20.80	0.9760	0.00200	20.60	0.9682	0.00200	20.50	0.9710	0.00220
21.00	0.9745	0.00180	20.80	0.9758	0.00190	20.70	0.9764	0.00200
21.20	0.9833	0.00230	21.00	0.9799	0.00190	20.90	0.9891	0.00170
21.40	0.9865	0.00240	21.20	0.9874	0.00190	21.10	0.9861	0.00210
21.60	0.9916	0.00180	21.40	0.9900	0.00170	21.30	0.9919	0.00210
21.80	0.9942	0.00190	21.60	0.9964	0.00170	21.50	0.9965	0.00230
22.00	1.0004	0.00200	21.80	0.9965	0.00200	21.70	1.0020	0.00220
22.20	1.0055	0.00200	22.00	1.0018	0.00170	21.90	1.0088	0.00190
22.40	1.0106	0.00230	22.20	1.0051	0.00200	22.10	1.0084	0.00230
22.60	1.0178	0.00190	22.40	1.0106	0.00200	22.30	1.0136	0.00170
22.80	1.0194	0.00180	22.60	1.0166	0.00200	22.50	1.0209	0.00160
22.90	1.0201	0.00210	22.80	1.0220	0.00170	22.60	1.0227	0.00200

3000 milli-g/cc			4000 milli-g/cc			5000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
19.10	0.9333	0.00200	20.20	0.9288	0.00170	22.40	0.9345	0.00200
19.20	0.9337	0.00220	20.40	0.9357	0.00200	22.60	0.9380	0.00180
19.30	0.9367	0.00180	20.60	0.9352	0.00200	22.80	0.9472	0.00230
19.40	0.9392	0.00240	20.80	0.9425	0.00200	23.00	0.9487	0.00210
19.50	0.9378	0.00200	21.00	0.9508	0.00200	23.20	0.9546	0.00240
19.60	0.9449	0.00210	21.20	0.9568	0.00210	23.40	0.9568	0.00230
19.70	0.9464	0.00250	21.40	0.9619	0.00180	23.60	0.9599	0.00200
19.80	0.9528	0.00200	21.60	0.9661	0.00210	23.80	0.9618	0.00200
19.90	0.9542	0.00240	21.80	0.9672	0.00190	24.00	0.9658	0.00200
20.00	0.9582	0.00210	22.00	0.9721	0.00190	24.20	0.9735	0.00240
20.10	0.9601	0.00180	22.20	0.9814	0.00180	24.40	0.9728	0.00160
20.20	0.9649	0.00220	22.40	0.9870	0.00200	24.60	0.9757	0.00230
20.30	0.9671	0.00180	22.60	0.9878	0.00210	24.80	0.9828	0.00220
20.40	0.9693	0.00200	22.80	0.9903	0.00180	25.00	0.9853	0.00230
20.50	0.9710	0.00190	23.00	1.0008	0.00210	25.20	0.9855	0.00160
20.60	0.9730	0.00230	23.20	0.9985	0.00210	25.40	0.9879	0.00180
20.70	0.9777	0.00190	23.40	1.0034	0.00190	25.60	0.9950	0.00170
20.80	0.9778	0.00220	23.60	1.0134	0.00170	25.80	1.0010	0.00230
20.90	0.9842	0.00180	23.80	1.0122	0.00220	26.00	1.0018	0.00240
21.00	0.9831	0.00180	24.00	1.0163	0.00180	26.20	1.0004	0.00180
21.10	0.9860	0.00210	24.20	1.0195	0.00190	26.40	1.0089	0.00200
21.20	0.9869	0.00210	24.40	1.0187	0.00250	26.60	1.0056	0.00180
21.30	0.9914	0.00190				26.80	1.0166	0.00230
21.40	0.9909	0.00220				27.00	1.0193	0.00190
21.50	0.9946	0.00230				27.20	1.0222	0.00190
21.60	0.9962	0.00230				27.40	1.0205	0.00220
21.70	1.0010	0.00230						
21.80	1.0008	0.00220						
21.90	1.0002	0.00220						
22.00	1.0049	0.00220						
22.10	1.0068	0.00210						
22.20	1.0110	0.00230						
22.30	1.0108	0.00390						
22.40	1.0188	0.00220						
22.50	1.0174	0.00200						
22.60	1.0186	0.00210						
22.70	1.0248	0.00260						

6000 milli-g/cc			7000 milli-g/cc			7500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
25.70	0.9336	0.00270	31.60	0.9323	0.00190	35.90	0.9359	0.00170
26.00	0.9412	0.00210	32.20	0.9406	0.00180	36.80	0.9332	0.00200
26.30	0.9455	0.00160	32.80	0.9443	0.00180	37.70	0.9452	0.00160
26.60	0.9500	0.00150	33.40	0.9504	0.00230	38.60	0.9489	0.00160
26.90	0.9520	0.00190	34.00	0.9543	0.00180	39.50	0.9546	0.00200
27.20	0.9545	0.00210	34.60	0.9650	0.00160	40.40	0.9604	0.00280
27.50	0.9640	0.00150	35.20	0.9670	0.00190	41.30	0.9634	0.00160
27.80	0.9660	0.00170	35.80	0.9724	0.00210	42.20	0.9720	0.00160
28.10	0.9702	0.00250	36.40	0.9800	0.00170	43.10	0.9745	0.00220
28.40	0.9709	0.00190	37.00	0.9796	0.00200	44.00	0.9796	0.00160
28.70	0.9763	0.00200	37.60	0.9874	0.00200	44.90	0.9826	0.00170
29.00	0.9792	0.00220	38.20	0.9899	0.00180	45.80	0.9854	0.00190
29.30	0.9885	0.00260	38.80	0.9958	0.00160	46.70	0.9900	0.00160
29.60	0.9892	0.00230	39.40	0.9981	0.00170	47.60	0.9954	0.00180
29.90	0.9919	0.00190	40.00	1.0028	0.00180	48.50	0.9962	0.00180
30.20	0.9972	0.00150	40.60	1.0021	0.00170	49.40	0.9999	0.00170
30.50	0.9966	0.00190	41.20	1.0064	0.00170	50.30	1.0027	0.00230
30.80	1.0055	0.00210	41.80	1.0081	0.00210	51.20	1.0100	0.00170
31.10	1.0056	0.00210	42.40	1.0134	0.00200	52.10	1.0108	0.00160
31.40	1.0109	0.00180	43.00	1.0217	0.00240	53.00	1.0122	0.00150
31.70	1.0118	0.00210	43.60	1.0185	0.00200	53.90	1.0139	0.00140
32.00	1.0179	0.00170	43.90	1.0230	0.00210	54.80	1.0147	0.00160
32.30	1.0198	0.00230				55.40	1.0133	0.00180
32.60	1.0217	0.00180						
32.90	1.0262	0.00160						

8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma
44.60	0.9322	0.00180
46.20	0.9413	0.00140
47.80	0.9471	0.00140
49.40	0.9542	0.00140
51.00	0.9597	0.00210
52.60	0.9686	0.00140
54.20	0.9664	0.00180
55.80	0.9753	0.00160
57.40	0.9743	0.00170
59.00	0.9775	0.00180
60.60	0.9826	0.00200
62.20	0.9842	0.00200
63.80	0.9884	0.00180
65.40	0.9908	0.00220
67.00	0.9938	0.00150
68.60	0.9959	0.00210
70.20	1.0002	0.00150
71.80	0.9991	0.00190
73.40	0.9960	0.00220
75.00	1.0049	0.00140
76.60	1.0024	0.00150
77.20	1.0108	0.00140

Case ID: UO2_sphere_003_01ref

Material: Uranium dioxide in water

Weight Fraction U in UO2: 0.88147

Geometry: Sphere

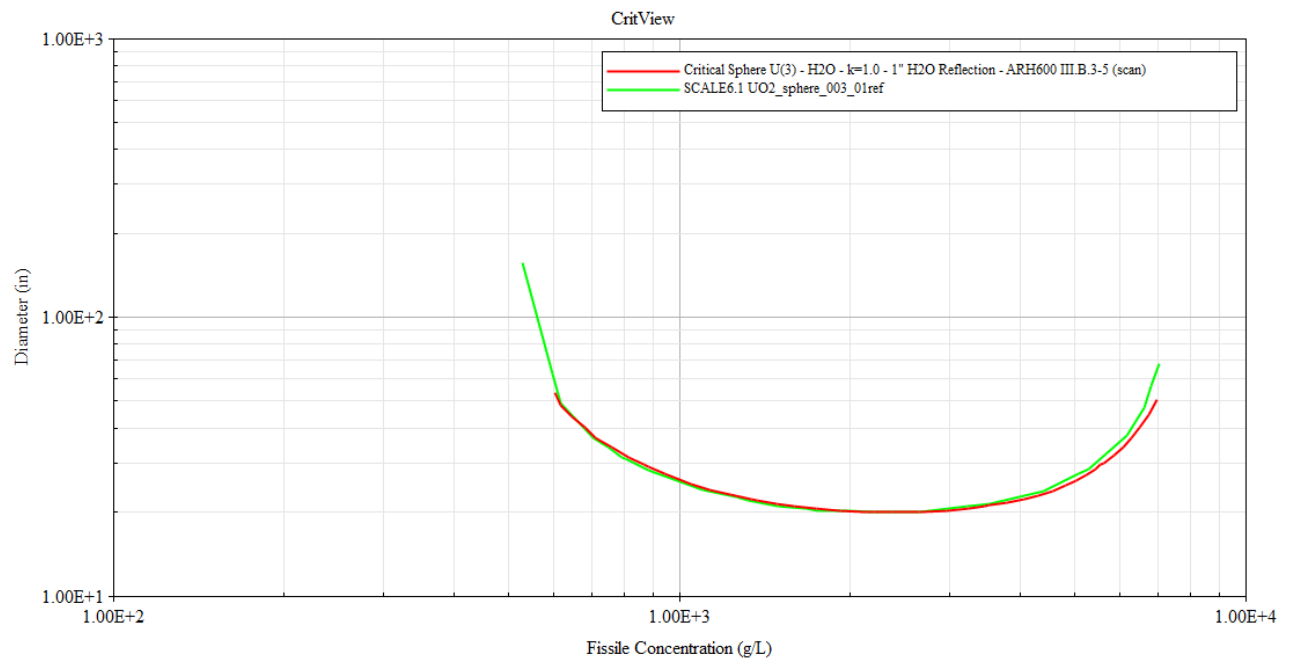
Isotopics: 3% ²³⁵U 97% ²³⁸U

Reflector: 1" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere(3.0% ²³⁵ U) - 1 Inch of Water Reflection					
UO2 Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.600	0.52888	44.000	572.000	26.400	157.0526
0.700	0.61703	32.100	56.100	1.200	49.4239
0.800	0.70518	27.000	39.800	0.600	37.0909
0.850	0.74925	25.500	36.000	0.500	34.0641
0.900	0.79332	24.400	33.500	0.400	31.5333
1.000	0.88147	22.300	29.700	0.300	28.2100
1.250	1.10184	20.000	25.300	0.200	23.9244
1.500	1.32221	18.400	22.900	0.200	22.0000
1.700	1.49850	17.200	22.000	0.200	21.0452
1.900	1.67479	17.500	21.500	0.200	20.5160
2.000	1.76294	17.400	21.300	0.200	20.2176
2.100	1.85109	17.300	21.100	0.200	20.1509
2.500	2.20368	17.100	20.800	0.100	19.9250
3.000	2.64441	17.200	21.000	0.200	20.0868
4.000	3.52588	18.000	22.500	0.200	21.3667
5.000	4.40735	20.400	25.600	0.200	23.8250
6.000	5.28882	23.100	30.800	0.300	28.5927
7.000	6.17029	29.500	41.800	0.600	37.8143
7.500	6.61103	34.500	54.100	0.900	47.1706
8.000	7.05176	42.900	76.000	1.600	68.1052

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-972 (pdf pg990)
,
#index number = <index = 1:20:1>
,
#UO2 Concentration = <@conc = 0.6,0.7,0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8>
g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
44,32.1,27,25.5,24.4,22.3,20,18.4,17.2,17.5,17.4,17.3,17.1,17.2,18,20.4,23.1,29.5,34.5,42.9> in
#Ending Diameter = <@enddia =
572,56.1,39.8,36,33.5,29.7,25.3,22.9,22,21.5,21.3,21.1,20.8,21,22.5,25.6,30.8,41.8,54.1,76> in
#Delta = <@delta =
26.4,1.2,0.6,0.5,0.4,0.3,0.2,0.2,0.2,0.2,0.2,0.2,0.1,0.2,0.2,0.2,0.3,0.6,0.9,1.6> in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                    92235 3
                    92238 97  end
<&ZEROCHECK(wconc)\11>h2o          1 den=<wconc> 1 300  end
  h2o          2 1 300  end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere With Water Reflector"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(diameter*in)/2+(1*in)}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
  return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; 1" Water Reflector; 3% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.03 U238 0.97
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.529 157.0526
0.617 49.4239
0.705 37.0909
0.749 34.0641
0.793 31.5333
0.881 28.2100
1.102 23.9244
1.322 22.0000
1.499 21.0452
1.675 20.5160
1.763 20.2176
1.851 20.1509
2.204 19.9250
2.644 20.0868
3.526 21.3667
4.407 23.8250
5.289 28.5927
6.170 37.8143
6.611 47.1706
7.052 68.1052
```

600 milli-g/cc			700 milli-g/cc			800 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
44.00	0.9308	0.00098	32.10	0.9303	0.00110	27.00	0.9281	0.00170
70.40	0.9722	0.00094	33.30	0.9317	0.00160	27.60	0.9370	0.00160
96.80	0.9861	0.00110	34.50	0.9446	0.00150	28.20	0.9426	0.00140
123.20	0.9939	0.00100	35.70	0.9510	0.00110	28.80	0.9453	0.00140
149.60	0.9994	0.00097	36.90	0.9576	0.00110	29.40	0.9494	0.00120
176.00	1.0015	0.00120	38.10	0.9605	0.00180	30.00	0.9590	0.00150
202.40	1.0032	0.00099	39.30	0.9713	0.00170	30.60	0.9589	0.00140
228.80	1.0027	0.00095	40.50	0.9738	0.00120	31.20	0.9643	0.00190
255.20	1.0017	0.00079	41.70	0.9767	0.00130	31.80	0.9693	0.00150
281.60	1.0017	0.00098	42.90	0.9788	0.00150	32.40	0.9723	0.00140
308.00	1.0045	0.00090	44.10	0.9837	0.00120	33.00	0.9775	0.00140
334.40	1.0035	0.00088	45.30	0.9879	0.00100	33.60	0.9821	0.00130
360.80	1.0055	0.00077	46.50	0.9913	0.00120	34.20	0.9822	0.00130
387.20	1.0046	0.00079	47.70	0.9976	0.00130	34.80	0.9874	0.00160
413.60	1.0049	0.00086	48.90	0.9969	0.00120	35.40	0.9930	0.00150
440.00	1.0058	0.00072	50.10	1.0040	0.00140	36.00	0.9948	0.00140
466.40	1.0065	0.00094	51.30	1.0022	0.00110	36.60	0.9973	0.00150
492.80	1.0072	0.00075	52.50	1.0069	0.00110	37.20	1.0006	0.00120
519.20	1.0052	0.00081	53.70	1.0082	0.00120	37.80	1.0049	0.00160
545.60	1.0072	0.00075	54.90	1.0071	0.00130	38.40	1.0091	0.00160
572.00	1.0049	0.00073	56.10	1.0155	0.00130	39.00	1.0112	0.00170
						39.60	1.0119	0.00250
						39.80	1.0100	0.00150

850 milli-g/cc			900 milli-g/cc			1000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
25.50	0.9253	0.00160	24.40	0.9301	0.00160	22.30	0.9256	0.00170
26.00	0.9326	0.00170	24.80	0.9320	0.00170	22.60	0.9303	0.00180
26.50	0.9374	0.00150	25.20	0.9425	0.00160	22.90	0.9352	0.00180
27.00	0.9459	0.00120	25.60	0.9437	0.00190	23.20	0.9427	0.00200
27.50	0.9525	0.00120	26.00	0.9513	0.00140	23.50	0.9453	0.00130
28.00	0.9545	0.00110	26.40	0.9541	0.00150	23.80	0.9485	0.00140
28.50	0.9589	0.00180	26.80	0.9574	0.00130	24.10	0.9544	0.00140
29.00	0.9626	0.00150	27.20	0.9593	0.00140	24.40	0.9540	0.00150
29.50	0.9658	0.00170	27.60	0.9681	0.00170	24.70	0.9583	0.00180
30.00	0.9725	0.00140	28.00	0.9697	0.00160	25.00	0.9635	0.00220
30.50	0.9781	0.00160	28.40	0.9748	0.00140	25.30	0.9693	0.00140
31.00	0.9833	0.00170	28.80	0.9789	0.00180	25.60	0.9756	0.00190
31.50	0.9857	0.00140	29.20	0.9812	0.00150	25.90	0.9778	0.00160
32.00	0.9892	0.00170	29.60	0.9857	0.00140	26.20	0.9780	0.00150
32.50	0.9912	0.00130	30.00	0.9899	0.00160	26.50	0.9821	0.00170
33.00	0.9954	0.00150	30.40	0.9941	0.00220	26.80	0.9870	0.00170
33.50	0.9994	0.00150	30.80	0.9965	0.00190	27.10	0.9893	0.00220
34.00	0.9990	0.00170	31.20	0.9970	0.00150	27.40	0.9912	0.00200
34.50	1.0068	0.00150	31.60	1.0006	0.00140	27.70	0.9924	0.00140
35.00	1.0076	0.00130	32.00	1.0067	0.00150	28.00	0.9979	0.00160
35.50	1.0094	0.00140	32.40	1.0104	0.00170	28.30	1.0009	0.00170
36.00	1.0154	0.00150	32.80	1.0109	0.00160	28.60	1.0057	0.00190
			33.20	1.0136	0.00180	28.90	1.0065	0.00190
			33.50	1.0160	0.00160	29.20	1.0100	0.00140
						29.50	1.0106	0.00150
						29.70	1.0154	0.00150

1250 milli-g/cc			1500 milli-g/cc			1700 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
20.00	0.9325	0.00180	18.40	0.9287	0.00180	17.20	0.9040	0.00170
20.20	0.9340	0.00150	18.60	0.9320	0.00160	17.40	0.9093	0.00190
20.40	0.9354	0.00150	18.80	0.9351	0.00160	17.60	0.9184	0.00190
20.60	0.9448	0.00190	19.00	0.9393	0.00270	17.80	0.9234	0.00200
20.80	0.9454	0.00170	19.20	0.9424	0.00200	18.00	0.9261	0.00180
21.00	0.9514	0.00180	19.40	0.9457	0.00160	18.20	0.9344	0.00160
21.20	0.9553	0.00170	19.60	0.9550	0.00150	18.40	0.9412	0.00230
21.40	0.9579	0.00170	19.80	0.9548	0.00190	18.60	0.9447	0.00160
21.60	0.9627	0.00190	20.00	0.9641	0.00170	18.80	0.9509	0.00180
21.80	0.9662	0.00160	20.20	0.9666	0.00190	19.00	0.9530	0.00190
22.00	0.9672	0.00170	20.40	0.9710	0.00180	19.20	0.9587	0.00170
22.20	0.9714	0.00160	20.60	0.9719	0.00150	19.40	0.9642	0.00190
22.40	0.9749	0.00220	20.80	0.9784	0.00250	19.60	0.9704	0.00190
22.60	0.9781	0.00130	21.00	0.9794	0.00160	19.80	0.9711	0.00220
22.80	0.9810	0.00160	21.20	0.9863	0.00180	20.00	0.9771	0.00190
23.00	0.9843	0.00200	21.40	0.9928	0.00200	20.20	0.9807	0.00200
23.20	0.9903	0.00170	21.60	0.9906	0.00180	20.40	0.9866	0.00220
23.40	0.9903	0.00170	21.80	0.9991	0.00180	20.60	0.9907	0.00180
23.60	0.9965	0.00210	22.00	1.0000	0.00160	20.80	0.9973	0.00160
23.80	0.9944	0.00200	22.20	1.0070	0.00190	21.00	0.9986	0.00170
24.00	1.0034	0.00170	22.40	1.0077	0.00160	21.20	1.0048	0.00170
24.20	1.0070	0.00190	22.60	1.0108	0.00170	21.40	1.0073	0.00170
24.40	1.0045	0.00170	22.80	1.0166	0.00200	21.60	1.0099	0.00180
24.60	1.0113	0.00170	22.90	1.0157	0.00200	21.80	1.0152	0.00180
24.80	1.0118	0.00210				22.00	1.0161	0.00170
25.00	1.0142	0.00170						
25.20	1.0147	0.00180						
25.30	1.0204	0.00160						

1900 milli-g/cc			2000 milli-g/cc			2100 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.50	0.9277	0.00150	17.40	0.9323	0.00190	17.30	0.9263	0.00200
17.70	0.9304	0.00200	17.60	0.9332	0.00230	17.50	0.9332	0.00170
17.90	0.9393	0.00210	17.80	0.9392	0.00160	17.70	0.9357	0.00200
18.10	0.9397	0.00170	18.00	0.9407	0.00170	17.90	0.9417	0.00230
18.30	0.9475	0.00180	18.20	0.9491	0.00180	18.10	0.9480	0.00210
18.50	0.9542	0.00200	18.40	0.9518	0.00200	18.30	0.9576	0.00220
18.70	0.9575	0.00180	18.60	0.9593	0.00160	18.50	0.9583	0.00160
18.90	0.9603	0.00200	18.80	0.9654	0.00170	18.70	0.9688	0.00220
19.10	0.9681	0.00160	19.00	0.9709	0.00190	18.90	0.9713	0.00170
19.30	0.9729	0.00200	19.20	0.9732	0.00210	19.10	0.9765	0.00200
19.50	0.9781	0.00160	19.40	0.9782	0.00200	19.30	0.9786	0.00210
19.70	0.9798	0.00230	19.60	0.9846	0.00190	19.50	0.9854	0.00170
19.90	0.9872	0.00190	19.80	0.9902	0.00210	19.70	0.9897	0.00210
20.10	0.9929	0.00210	20.00	0.9922	0.00180	19.90	0.9953	0.00180
20.30	0.9956	0.00190	20.20	0.9997	0.00230	20.10	0.9986	0.00170
20.50	0.9998	0.00200	20.40	1.0031	0.00210	20.30	1.0041	0.00330
20.70	1.0023	0.00200	20.60	1.0038	0.00210	20.50	1.0075	0.00190
20.90	1.0059	0.00170	20.80	1.0098	0.00200	20.70	1.0084	0.00230
21.10	1.0092	0.00180	21.00	1.0149	0.00200	20.90	1.0179	0.00180
21.30	1.0172	0.00210	21.20	1.0163	0.00200	21.10	1.0227	0.00260
21.50	1.0214	0.00200	21.30	1.0217	0.00170			

2500 milli-g/cc			3000 milli-g/cc			4000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.10	0.9254	0.00210	17.20	0.9284	0.00160	18.00	0.9180	0.00270
17.20	0.9287	0.00300	17.40	0.9364	0.00160	18.20	0.9259	0.00220
17.30	0.9327	0.00160	17.60	0.9369	0.00230	18.40	0.9351	0.00180
17.40	0.9359	0.00160	17.80	0.9415	0.00190	18.60	0.9350	0.00180
17.50	0.9407	0.00250	18.00	0.9484	0.00220	18.80	0.9391	0.00180
17.60	0.9412	0.00210	18.20	0.9527	0.00240	19.00	0.9430	0.00180
17.70	0.9433	0.00200	18.40	0.9619	0.00190	19.20	0.9514	0.00210
17.80	0.9477	0.00190	18.60	0.9649	0.00200	19.40	0.9566	0.00220
17.90	0.9496	0.00170	18.80	0.9733	0.00190	19.60	0.9636	0.00160
18.00	0.9516	0.00190	19.00	0.9736	0.00160	19.80	0.9650	0.00180
18.10	0.9553	0.00230	19.20	0.9804	0.00210	20.00	0.9721	0.00180
18.20	0.9592	0.00200	19.40	0.9806	0.00220	20.20	0.9784	0.00180
18.30	0.9641	0.00220	19.60	0.9910	0.00180	20.40	0.9819	0.00170
18.40	0.9611	0.00200	19.80	0.9913	0.00200	20.60	0.9841	0.00180
18.50	0.9653	0.00270	20.00	0.9967	0.00190	20.80	0.9857	0.00200
18.60	0.9678	0.00230	20.20	1.0043	0.00180	21.00	0.9954	0.00210
18.70	0.9715	0.00190	20.40	1.0064	0.00180	21.20	0.9980	0.00190
18.80	0.9708	0.00180	20.60	1.0153	0.00210	21.40	1.0004	0.00260
18.90	0.9761	0.00190	20.80	1.0154	0.00170	21.60	1.0023	0.00240
19.00	0.9784	0.00290	21.00	1.0196	0.00220	21.80	1.0080	0.00180
19.10	0.9804	0.00190				22.00	1.0098	0.00180
19.20	0.9849	0.00240				22.20	1.0155	0.00210
19.30	0.9842	0.00240				22.40	1.0212	0.00170
19.40	0.9908	0.00190				22.50	1.0241	0.00250
19.50	0.9940	0.00190						
19.60	0.9910	0.00190						
19.70	0.9938	0.00180						
19.80	0.9989	0.00200						
19.90	0.9982	0.00220						
20.00	1.0054	0.00180						
20.10	1.0036	0.00210						
20.20	1.0049	0.00190						
20.30	1.0097	0.00180						
20.40	1.0094	0.00230						
20.50	1.0136	0.00200						
20.60	1.0175	0.00190						
20.70	1.0195	0.00220						
20.80	1.0243	0.00180						

5000 milli-g/cc			6000 milli-g/cc			7000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
20.40	0.9309	0.00210	23.10	0.9227	0.00230	29.50	0.9348	0.00170
20.60	0.9353	0.00180	23.40	0.9321	0.00270	30.10	0.9429	0.00170
20.80	0.9441	0.00170	23.70	0.9353	0.00200	30.70	0.9460	0.00170
21.00	0.9470	0.00200	24.00	0.9387	0.00170	31.30	0.9544	0.00180
21.20	0.9458	0.00250	24.30	0.9422	0.00190	31.90	0.9599	0.00160
21.40	0.9532	0.00180	24.60	0.9484	0.00210	32.50	0.9668	0.00170
21.60	0.9592	0.00190	24.90	0.9567	0.00190	33.10	0.9671	0.00150
21.80	0.9589	0.00180	25.20	0.9570	0.00210	33.70	0.9740	0.00150
22.00	0.9623	0.00170	25.50	0.9620	0.00190	34.30	0.9719	0.00170
22.20	0.9675	0.00200	25.80	0.9644	0.00180	34.90	0.9816	0.00170
22.40	0.9714	0.00210	26.10	0.9663	0.00170	35.50	0.9877	0.00170
22.60	0.9810	0.00200	26.40	0.9754	0.00280	36.10	0.9885	0.00170
22.80	0.9815	0.00200	26.70	0.9772	0.00200	36.70	0.9934	0.00180
23.00	0.9842	0.00220	27.00	0.9822	0.00270	37.30	0.9946	0.00230
23.20	0.9949	0.00190	27.30	0.9857	0.00190	37.90	1.0009	0.00190
23.40	0.9912	0.00160	27.60	0.9893	0.00200	38.50	1.0039	0.00150
23.60	0.9933	0.00220	27.90	0.9940	0.00220	39.10	1.0097	0.00140
23.80	0.9999	0.00210	28.20	0.9972	0.00190	39.70	1.0103	0.00200
24.00	1.0007	0.00190	28.50	0.9983	0.00190	40.30	1.0150	0.00170
24.20	1.0020	0.00250	28.80	1.0038	0.00180	40.90	1.0161	0.00160
24.40	1.0049	0.00160	29.10	1.0075	0.00150	41.50	1.0211	0.00170
24.60	1.0032	0.00180	29.40	1.0084	0.00230	41.80	1.0235	0.00200
24.80	1.0102	0.00180	29.70	1.0087	0.00230			
25.00	1.0157	0.00170	30.00	1.0150	0.00170			
25.20	1.0203	0.00230	30.30	1.0169	0.00200			
25.40	1.0208	0.00170	30.60	1.0173	0.00240			
25.60	1.0241	0.00210	30.80	1.0261	0.00150			

7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
34.50	0.9372	0.00160	42.90	0.9381	0.00150
35.40	0.9461	0.00210	44.50	0.9406	0.00220
36.30	0.9510	0.00170	46.10	0.9513	0.00140
37.20	0.9544	0.00220	47.70	0.9573	0.00150
38.10	0.9602	0.00170	49.30	0.9634	0.00200
39.00	0.9645	0.00190	50.90	0.9664	0.00200
39.90	0.9719	0.00140	52.50	0.9701	0.00190
40.80	0.9832	0.00260	54.10	0.9739	0.00150
41.70	0.9782	0.00200	55.70	0.9802	0.00150
42.60	0.9831	0.00180	57.30	0.9843	0.00180
43.50	0.9863	0.00160	58.90	0.9876	0.00180
44.40	0.9914	0.00170	60.50	0.9877	0.00160
45.30	0.9924	0.00150	62.10	0.9905	0.00160
46.20	0.9999	0.00160	63.70	0.9936	0.00180
47.10	0.9996	0.00150	65.30	0.9936	0.00190
48.00	1.0047	0.00210	66.90	0.9942	0.00190
48.90	1.0065	0.00190	68.50	1.0019	0.00160
49.80	1.0098	0.00210	70.10	1.0025	0.00140
50.70	1.0134	0.00150	71.70	1.0046	0.00180
51.60	1.0120	0.00190	73.30	1.0070	0.00220
52.50	1.0161	0.00150	74.90	1.0052	0.00170
53.40	1.0189	0.00170	76.00	1.0057	0.00130
54.10	1.0213	0.00160			

Case ID: UO2_sphere_003_10ref

Material: Uranium dioxide in water

Weight Fraction U in UO₂: 0.88147

Geometry: Sphere

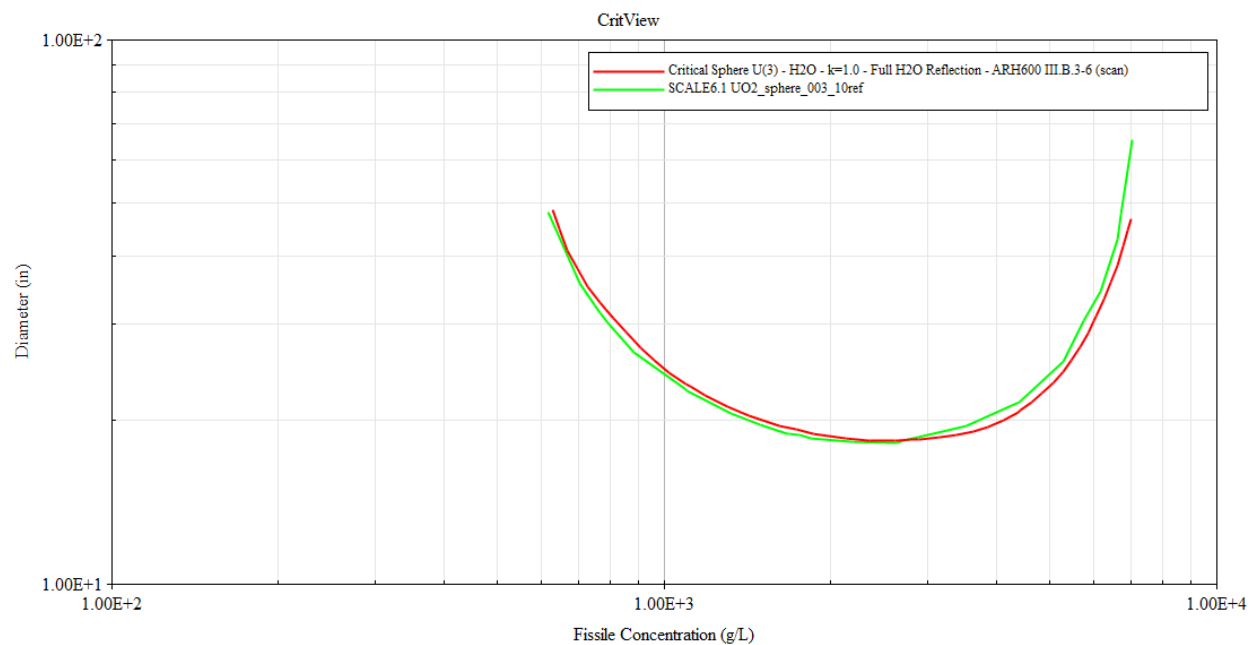
Isotopics: 3% ²³⁵U 97% ²³⁸U

Reflector: 10" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere(3.0% ²³⁵ U) - 10 Inches of Water Reflection					
UO2 Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.700	0.61703	30.800	55.500	1.200	48.1032
0.800	0.70518	25.800	38.700	0.600	35.6813
0.850	0.74925	24.400	34.800	0.500	32.5522
0.900	0.79332	23.200	32.100	0.400	30.1714
1.000	0.88147	21.100	28.400	0.300	26.6742
1.250	1.10184	18.800	24.000	0.200	22.5760
1.500	1.32221	17.200	21.500	0.200	20.5929
1.700	1.49850	16.500	20.500	0.200	19.6208
1.900	1.67479	16.000	20.000	0.200	18.9000
2.000	1.76294	15.900	19.700	0.200	18.7930
2.100	1.85109	15.800	19.500	0.100	18.5250
2.500	2.20368	15.500	19.100	0.100	18.1984
3.000	2.64441	15.600	19.300	0.100	18.1750
4.000	3.52588	16.500	20.600	0.200	19.4920
5.000	4.40735	18.300	23.300	0.200	21.6079
6.000	5.28882	21.100	28.100	0.300	25.6353
7.000	6.17029	26.400	38.600	0.600	34.5261
7.500	6.61103	30.800	50.100	0.900	43.0459
8.000	7.05176	38.400	82.100	2.100	65.4789

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-985 (pdf pg1003)
,
#index number = <index = 1:19:1>
,
#UO2 Concentration = <@conc = 0.7,0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
30.8,25.8,24.4,23.2,21.1,18.8,17.2,16.5,16,15.9,15.8,15.5,15.6,16.5,18.3,21.1,26.4,30.8,38.4> in
#Ending Diameter = <@enddia =
55.5,38.7,34.8,32.1,28.4,24,21.5,20.5,20,19.7,19.5,19.1,19.3,20.6,23.3,28.1,38.6,50.1,82.1> in
#Delta = <@delta = 1.2,0.6,0.5,0.4,0.3,0.2,0.2,0.2,0.2,0.2,0.1,0.1,0.1,0.2,0.2,0.3,0.6,0.9,2.1>
in
,
'Diameter being Tested = {{(diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                                92235 3
                                92238 97   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere With Water Reflector"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(diameter*in)/2+(10*in)}}
media 1 1 1
media 2 1 2 -1
boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; 10" Water Reflector; 3% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.03 U238 0.97
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.617 48.1032
0.705 35.6813
0.749 32.5522
0.793 30.1714
0.881 26.6742
1.102 22.5760
1.322 20.5929
1.499 19.6208
1.675 18.9000
1.763 18.7930
1.851 18.5250
2.204 18.1984
2.644 18.1750
3.526 19.4920
4.407 21.6079
5.289 25.6353
6.170 34.5261
6.611 43.0459
7.052 65.4789
```

700 milli-g/cc			800 milli-g/cc			850 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
30.80	0.9267	0.00140	25.80	0.9282	0.00150	24.40	0.9325	0.00150
32.00	0.9379	0.00160	26.40	0.9336	0.00140	24.90	0.9345	0.00180
33.20	0.9425	0.00190	27.00	0.9415	0.00160	25.40	0.9412	0.00190
34.40	0.9494	0.00130	27.60	0.9449	0.00150	25.90	0.9440	0.00170
35.60	0.9576	0.00130	28.20	0.9490	0.00160	26.40	0.9522	0.00130
36.80	0.9598	0.00190	28.80	0.9576	0.00140	26.90	0.9542	0.00170
38.00	0.9677	0.00170	29.40	0.9600	0.00140	27.40	0.9629	0.00160
39.20	0.9735	0.00150	30.00	0.9639	0.00180	27.90	0.9655	0.00140
40.40	0.9760	0.00150	30.60	0.9730	0.00110	28.40	0.9690	0.00150
41.60	0.9816	0.00130	31.20	0.9734	0.00110	28.90	0.9756	0.00130
42.80	0.9862	0.00130	31.80	0.9770	0.00120	29.40	0.9784	0.00150
44.00	0.9885	0.00150	32.40	0.9767	0.00150	29.90	0.9824	0.00170
45.20	0.9919	0.00130	33.00	0.9868	0.00160	30.40	0.9855	0.00130
46.40	0.9956	0.00140	33.60	0.9908	0.00110	30.90	0.9911	0.00150
47.60	0.9974	0.00170	34.20	0.9930	0.00120	31.40	0.9943	0.00240
48.80	1.0036	0.00180	34.80	0.9930	0.00130	31.90	0.9981	0.00140
50.00	1.0029	0.00150	35.40	0.9985	0.00140	32.40	0.9993	0.00140
51.20	1.0054	0.00110	36.00	1.0017	0.00140	32.90	1.0016	0.00130
52.40	1.0063	0.00110	36.60	1.0054	0.00150	33.40	1.0060	0.00120
53.60	1.0127	0.00170	37.20	1.0060	0.00160	33.90	1.0126	0.00130
54.80	1.0108	0.00140	37.80	1.0101	0.00110	34.40	1.0124	0.00140
55.50	1.0160	0.00140	38.40	1.0144	0.00130	34.80	1.0134	0.00140
			38.70	1.0125	0.00120			

900 milli-g/cc			1000 milli-g/cc			1250 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
23.20	0.9303	0.00150	21.10	0.9276	0.00130	18.80	0.9315	0.00260
23.60	0.9364	0.00130	21.40	0.9318	0.00190	19.00	0.9367	0.00150
24.00	0.9416	0.00150	21.70	0.9401	0.00140	19.20	0.9414	0.00200
24.40	0.9467	0.00150	22.00	0.9424	0.00110	19.40	0.9457	0.00170
24.80	0.9509	0.00170	22.30	0.9418	0.00190	19.60	0.9497	0.00170
25.20	0.9560	0.00170	22.60	0.9482	0.00140	19.80	0.9555	0.00140
25.60	0.9624	0.00170	22.90	0.9526	0.00170	20.00	0.9574	0.00190
26.00	0.9631	0.00150	23.20	0.9606	0.00140	20.20	0.9626	0.00160
26.40	0.9693	0.00130	23.50	0.9639	0.00150	20.40	0.9670	0.00160
26.80	0.9701	0.00180	23.80	0.9668	0.00150	20.60	0.9683	0.00180
27.20	0.9796	0.00150	24.10	0.9677	0.00180	20.80	0.9734	0.00190
27.60	0.9808	0.00140	24.40	0.9763	0.00170	21.00	0.9763	0.00190
28.00	0.9841	0.00140	24.70	0.9785	0.00200	21.20	0.9789	0.00160
28.40	0.9850	0.00150	25.00	0.9830	0.00170	21.40	0.9828	0.00180
28.80	0.9931	0.00160	25.30	0.9820	0.00160	21.60	0.9850	0.00160
29.20	0.9946	0.00240	25.60	0.9857	0.00160	21.80	0.9886	0.00160
29.60	0.9975	0.00120	25.90	0.9914	0.00150	22.00	0.9938	0.00200
30.00	0.9967	0.00110	26.20	0.9936	0.00140	22.20	0.9940	0.00140
30.40	1.0044	0.00150	26.50	0.9982	0.00160	22.40	0.9978	0.00140
30.80	1.0082	0.00130	26.80	1.0013	0.00180	22.60	1.0003	0.00160
31.20	1.0034	0.00130	27.10	1.0039	0.00150	22.80	1.0020	0.00180
31.60	1.0128	0.00150	27.40	1.0055	0.00160	23.00	1.0054	0.00140
32.00	1.0127	0.00140	27.70	1.0076	0.00150	23.20	1.0105	0.00210
32.10	1.0152	0.00160	28.00	1.0127	0.00140	23.40	1.0121	0.00180
			28.30	1.0186	0.00170	23.60	1.0121	0.00160
			28.40	1.0167	0.00140	23.80	1.0158	0.00150
						24.00	1.0204	0.00150

1500 milli-g/cc			1700 milli-g/cc			1900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.20	0.9273	0.00200	16.50	0.9272	0.00160	16.00	0.9270	0.00150
17.40	0.9355	0.00190	16.70	0.9347	0.00190	16.20	0.9285	0.00160
17.60	0.9377	0.00190	16.90	0.9390	0.00170	16.40	0.9391	0.00170
17.80	0.9463	0.00170	17.10	0.9453	0.00150	16.60	0.9428	0.00150
18.00	0.9494	0.00190	17.30	0.9470	0.00160	16.80	0.9458	0.00180
18.20	0.9512	0.00170	17.50	0.9516	0.00160	17.00	0.9516	0.00140
18.40	0.9600	0.00180	17.70	0.9590	0.00180	17.20	0.9557	0.00210
18.60	0.9605	0.00140	17.90	0.9629	0.00180	17.40	0.9637	0.00150
18.80	0.9661	0.00200	18.10	0.9681	0.00190	17.60	0.9691	0.00160
19.00	0.9683	0.00200	18.30	0.9763	0.00170	17.80	0.9713	0.00170
19.20	0.9744	0.00190	18.50	0.9763	0.00210	18.00	0.9786	0.00180
19.40	0.9759	0.00200	18.70	0.9816	0.00170	18.20	0.9788	0.00170
19.60	0.9841	0.00170	18.90	0.9835	0.00220	18.40	0.9872	0.00180
19.80	0.9871	0.00160	19.10	0.9899	0.00160	18.60	0.9936	0.00170
20.00	0.9904	0.00180	19.30	0.9919	0.00160	18.80	0.9989	0.00270
20.20	0.9939	0.00210	19.50	0.9968	0.00170	19.00	1.0011	0.00160
20.40	0.9973	0.00170	19.70	1.0021	0.00180	19.20	1.0038	0.00180
20.60	1.0001	0.00160	19.90	1.0102	0.00190	19.40	1.0074	0.00170
20.80	1.0068	0.00150	20.10	1.0166	0.00180	19.60	1.0132	0.00270
21.00	1.0084	0.00200	20.30	1.0160	0.00170	19.80	1.0157	0.00210
21.20	1.0126	0.00160	20.50	1.0171	0.00170	20.00	1.0242	0.00190
21.40	1.0177	0.00180						
21.50	1.0197	0.00180						

2000 milli-g/cc			2100 milli-g/cc			2500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
15.90	0.9279	0.00160	15.80	0.9266	0.00190	15.50	0.9285	0.00190
16.10	0.9345	0.00220	15.90	0.9281	0.00180	15.60	0.9330	0.00200
16.30	0.9362	0.00170	16.00	0.9334	0.00180	15.70	0.9340	0.00210
16.50	0.9446	0.00190	16.10	0.9342	0.00160	15.80	0.9375	0.00170
16.70	0.9506	0.00160	16.20	0.9368	0.00270	15.90	0.9394	0.00190
16.90	0.9527	0.00230	16.30	0.9431	0.00200	16.00	0.9409	0.00180
17.10	0.9622	0.00190	16.40	0.9428	0.00190	16.10	0.9426	0.00170
17.30	0.9645	0.00230	16.50	0.9484	0.00170	16.20	0.9484	0.00220
17.50	0.9704	0.00200	16.60	0.9517	0.00210	16.30	0.9532	0.00180
17.70	0.9753	0.00190	16.70	0.9526	0.00160	16.40	0.9552	0.00180
17.90	0.9809	0.00190	16.80	0.9565	0.00180	16.50	0.9567	0.00260
18.10	0.9869	0.00170	16.90	0.9608	0.00180	16.60	0.9608	0.00190
18.30	0.9889	0.00200	17.00	0.9620	0.00160	16.70	0.9607	0.00180
18.50	0.9929	0.00200	17.10	0.9635	0.00180	16.80	0.9649	0.00160
18.70	0.9960	0.00220	17.20	0.9654	0.00150	16.90	0.9667	0.00200
18.90	1.0046	0.00180	17.30	0.9653	0.00160	17.00	0.9678	0.00170
19.10	1.0051	0.00170	17.40	0.9706	0.00180	17.10	0.9741	0.00160
19.30	1.0118	0.00160	17.50	0.9757	0.00160	17.20	0.9736	0.00180
19.50	1.0131	0.00180	17.60	0.9752	0.00200	17.30	0.9783	0.00200
19.70	1.0224	0.00200	17.70	0.9791	0.00240	17.40	0.9805	0.00180
			17.80	0.9828	0.00160	17.50	0.9805	0.00170
			17.90	0.9836	0.00190	17.60	0.9837	0.00180
			18.00	0.9842	0.00200	17.70	0.9897	0.00220
			18.10	0.9866	0.00170	17.80	0.9922	0.00170
			18.20	0.9924	0.00180	17.90	0.9939	0.00180
			18.30	0.9930	0.00170	18.00	0.9974	0.00220
			18.40	0.9996	0.00180	18.10	0.9938	0.00170
			18.50	1.0006	0.00210	18.20	1.0001	0.00220
			18.60	0.9982	0.00150	18.30	1.0022	0.00200
			18.70	1.0024	0.00230	18.40	1.0054	0.00160
			18.80	1.0018	0.00160	18.50	1.0057	0.00190
			18.90	1.0075	0.00160	18.60	1.0090	0.00180
			19.00	1.0101	0.00180	18.70	1.0085	0.00170
			19.10	1.0123	0.00190	18.80	1.0119	0.00190
			19.20	1.0124	0.00180	18.90	1.0125	0.00170
			19.30	1.0115	0.00180	19.00	1.0194	0.00210
			19.40	1.0169	0.00160	19.10	1.0185	0.00190
			19.50	1.0163	0.00190			

3000 milli-g/cc			4000 milli-g/cc			5000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
15.60	0.9284	0.00150	16.50	0.9347	0.00190	18.30	0.9354	0.00200
15.70	0.9328	0.00180	16.70	0.9366	0.00230	18.50	0.9418	0.00170
15.80	0.9355	0.00230	16.90	0.9462	0.00180	18.70	0.9435	0.00160
15.90	0.9377	0.00170	17.10	0.9488	0.00180	18.90	0.9505	0.00190
16.00	0.9400	0.00240	17.30	0.9538	0.00190	19.10	0.9524	0.00170
16.10	0.9467	0.00170	17.50	0.9578	0.00200	19.30	0.9569	0.00170
16.20	0.9490	0.00160	17.70	0.9634	0.00180	19.50	0.9592	0.00200
16.30	0.9493	0.00180	17.90	0.9645	0.00160	19.70	0.9655	0.00150
16.40	0.9550	0.00180	18.10	0.9751	0.00180	19.90	0.9705	0.00180
16.50	0.9557	0.00180	18.30	0.9781	0.00230	20.10	0.9749	0.00190
16.60	0.9597	0.00240	18.50	0.9805	0.00160	20.30	0.9759	0.00190
16.70	0.9607	0.00170	18.70	0.9828	0.00160	20.50	0.9750	0.00190
16.80	0.9624	0.00150	18.90	0.9915	0.00170	20.70	0.9811	0.00180
16.90	0.9678	0.00210	19.10	0.9937	0.00170	20.90	0.9880	0.00210
17.00	0.9665	0.00150	19.30	0.9976	0.00200	21.10	0.9905	0.00270
17.10	0.9723	0.00230	19.50	1.0001	0.00180	21.30	0.9917	0.00200
17.20	0.9747	0.00210	19.70	1.0085	0.00170	21.50	0.9952	0.00180
17.30	0.9755	0.00180	19.90	1.0128	0.00170	21.70	1.0041	0.00200
17.40	0.9795	0.00170	20.10	1.0165	0.00240	21.90	1.0034	0.00190
17.50	0.9841	0.00180	20.30	1.0155	0.00180	22.10	1.0098	0.00170
17.60	0.9832	0.00210	20.50	1.0227	0.00170	22.30	1.0121	0.00170
17.70	0.9898	0.00190	20.60	1.0233	0.00180	22.50	1.0136	0.00200
17.80	0.9903	0.00200				22.70	1.0157	0.00160
17.90	0.9901	0.00170				22.90	1.0214	0.00190
18.00	0.9928	0.00200				23.10	1.0231	0.00170
18.10	0.9982	0.00190				23.30	1.0233	0.00200
18.20	1.0006	0.00190						
18.30	1.0021	0.00180						
18.40	1.0022	0.00180						
18.50	1.0042	0.00160						
18.60	1.0085	0.00170						
18.70	1.0078	0.00230						
18.80	1.0116	0.00180						
18.90	1.0133	0.00240						
19.00	1.0175	0.00200						
19.10	1.0193	0.00240						
19.20	1.0195	0.00170						
19.30	1.0218	0.00190						

6000 milli-g/cc			7000 milli-g/cc			7500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
21.10	0.9330	0.00180	26.40	0.9384	0.00180	30.80	0.9423	0.00240
21.40	0.9426	0.00170	27.00	0.9434	0.00180	31.70	0.9445	0.00170
21.70	0.9475	0.00160	27.60	0.9493	0.00190	32.60	0.9476	0.00160
22.00	0.9527	0.00190	28.20	0.9544	0.00190	33.50	0.9573	0.00160
22.30	0.9559	0.00200	28.80	0.9637	0.00160	34.40	0.9590	0.00250
22.60	0.9591	0.00180	29.40	0.9670	0.00220	35.30	0.9659	0.00160
22.90	0.9662	0.00180	30.00	0.9718	0.00200	36.20	0.9706	0.00180
23.20	0.9657	0.00180	30.60	0.9729	0.00260	37.10	0.9745	0.00160
23.50	0.9706	0.00180	31.20	0.9788	0.00150	38.00	0.9820	0.00160
23.80	0.9807	0.00190	31.80	0.9822	0.00160	38.90	0.9834	0.00160
24.10	0.9826	0.00220	32.40	0.9869	0.00230	39.80	0.9875	0.00150
24.40	0.9843	0.00190	33.00	0.9918	0.00170	40.70	0.9893	0.00150
24.70	0.9874	0.00150	33.60	0.9954	0.00200	41.60	0.9922	0.00170
25.00	0.9880	0.00180	34.20	0.9975	0.00190	42.50	0.9963	0.00200
25.30	0.9943	0.00180	34.80	1.0021	0.00170	43.40	1.0024	0.00150
25.60	0.9998	0.00190	35.40	1.0095	0.00160	44.30	1.0039	0.00150
25.90	1.0015	0.00170	36.00	1.0098	0.00160	45.20	1.0061	0.00150
26.20	1.0042	0.00160	36.60	1.0139	0.00150	46.10	1.0093	0.00200
26.50	1.0083	0.00190	37.20	1.0165	0.00170	47.00	1.0133	0.00150
26.80	1.0092	0.00200	37.80	1.0208	0.00160	47.90	1.0155	0.00150
27.10	1.0138	0.00160	38.40	1.0191	0.00200	48.80	1.0156	0.00150
27.40	1.0191	0.00170	38.60	1.0225	0.00170	49.70	1.0173	0.00240
27.70	1.0189	0.00200				50.10	1.0224	0.00140
28.00	1.0190	0.00150						
28.10	1.0191	0.00180						

8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma
38.40	0.9363	0.00180
40.50	0.9446	0.00150
42.60	0.9563	0.00150
44.70	0.9620	0.00150
46.80	0.9678	0.00150
48.90	0.9730	0.00150
51.00	0.9767	0.00180
53.10	0.9827	0.00190
55.20	0.9862	0.00180
57.30	0.9881	0.00130
59.40	0.9941	0.00170
61.50	0.9965	0.00170
63.60	1.0017	0.00190
65.70	0.9998	0.00130
67.80	1.0033	0.00150
69.90	1.0073	0.00140
72.00	1.0079	0.00150
74.10	1.0123	0.00150
76.20	1.0132	0.00140
78.30	1.0141	0.00130
80.40	1.0160	0.00170
82.10	1.0154	0.00150

UO₂-sphere-2.5 (Cases with 0", 1", 10" Reflector)

Case ID: UO2_sphere_002.5_00ref

Material: Uranium dioxide in water

Weight Fraction U in UO₂: 0.88147

Geometry: Sphere

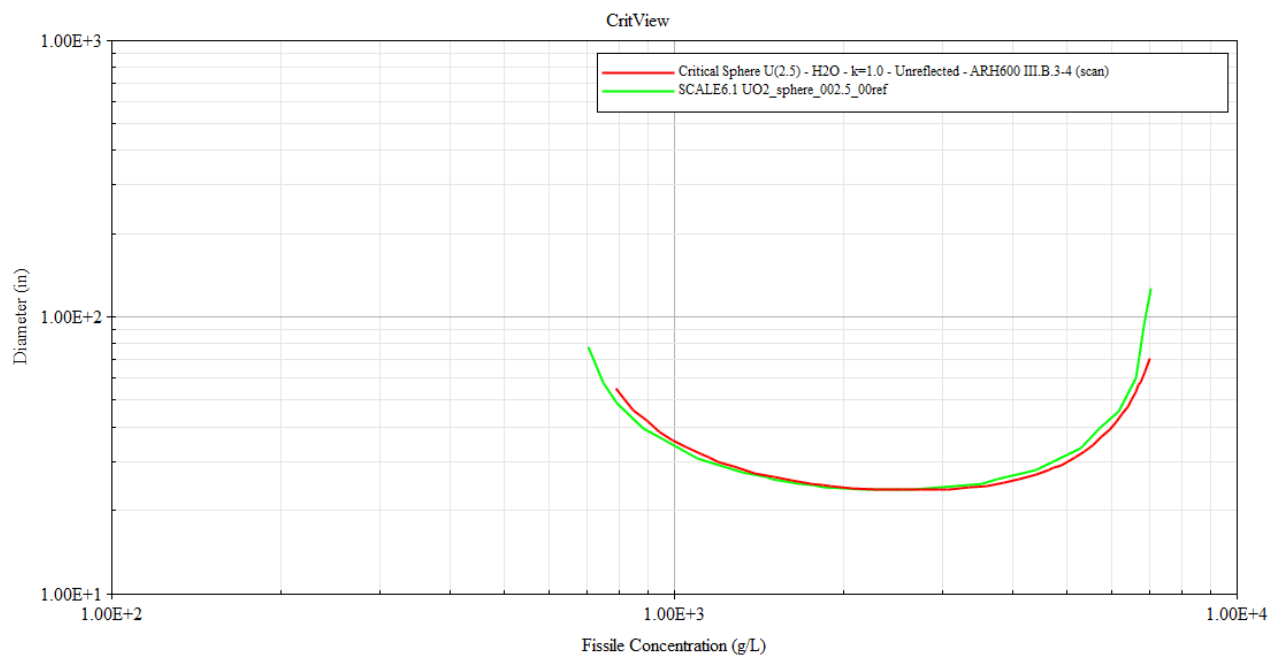
Isotopics: 2.5% ²³⁵U 97.5% ²³⁸U

Reflector: Unreflected

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere (2.5% ²³⁵ U) - 0 Inches of Water Reflection					
UO2 Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.800	0.70518	39.800	103.200	3.100	78.2400
0.850	0.74925	36.100	69.500	1.600	58.1746
0.900	0.79332	33.100	55.300	1.100	48.8667
1.000	0.88147	29.400	43.600	0.700	39.4613
1.250	1.10184	24.800	32.900	0.400	30.8563
1.500	1.32221	22.700	28.900	0.300	27.4147
1.700	1.49850	21.700	27.200	0.200	25.8574
1.900	1.67479	21.100	26.000	0.200	25.0041
2.000	1.76294	20.900	25.800	0.200	24.5977
2.100	1.85109	20.800	25.400	0.200	24.3319
2.500	2.20368	20.400	24.800	0.200	23.7625
3.000	2.64441	20.400	24.800	0.200	23.7077
4.000	3.52588	21.600	26.500	0.200	24.9660
5.000	4.40735	23.900	29.900	0.300	28.0543
6.000	5.28882	27.600	36.300	0.400	33.6698
7.000	6.17029	34.700	51.400	0.800	45.7531
7.500	6.61103	41.100	73.300	1.600	60.2492
8.000	7.05176	52.900	206.800	7.700	126.6000

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-998 (pdf pg1016)
,
#index number = <index = 1:18:1>
,
#UO2 Concentration = <@conc = 0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
39.8,36.1,33.1,29.4,24.8,22.7,21.7,21.1,20.9,20.8,20.4,20.4,21.6,23.9,27.6,34.7,41.1,52.9> in
#Ending Diameter = <@enddia =
103.2,69.5,55.3,43.6,32.9,28.9,27.2,26,25.8,25.4,24.8,24.8,26.5,29.9,36.3,51.4,73.3,206.8> in
#Delta = <@delta = 3.1,1.6,1.1,0.7,0.4,0.3,0.2,0.2,0.2,0.2,0.2,0.2,0.3,0.4,0.8,1.6,7.7> in
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Unreflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                    92235 2.5
                    92238 97.5   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Unreflected UO2 Sphere"
  sphere 1      {{(diameter*in)/2}}
  media 1 1 1
  boundary 1
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```


CritView compatible data file

```
reset:
title: Critical Sphere; UO2; Unreflected; 2.5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.025 U238 0.975
reflmat: None
reflthick: 0 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.705 78.2400
0.749 58.1746
0.793 48.8667
0.881 39.4613
1.102 30.8563
1.322 27.4147
1.499 25.8574
1.675 25.0041
1.763 24.5977
1.851 24.3319
2.204 23.7625
2.644 23.7077
3.526 24.9660
4.407 28.0543
5.289 33.6698
6.170 45.7531
6.611 60.2492
7.052 126.6000
```

800 milli-g/cc			850 milli-g/cc			900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
39.80	0.9301	0.00160	36.10	0.9301	0.00190	33.10	0.9265	0.00150
42.90	0.9430	0.00120	37.70	0.9390	0.00150	34.20	0.9373	0.00110
46.00	0.9528	0.00110	39.30	0.9434	0.00110	35.30	0.9428	0.00120
49.10	0.9582	0.00130	40.90	0.9570	0.00110	36.40	0.9475	0.00100
52.20	0.9692	0.00120	42.50	0.9606	0.00160	37.50	0.9543	0.00160
55.30	0.9760	0.00110	44.10	0.9656	0.00130	38.60	0.9619	0.00110
58.40	0.9815	0.00120	45.70	0.9695	0.00160	39.70	0.9649	0.00140
61.50	0.9858	0.00092	47.30	0.9786	0.00140	40.80	0.9701	0.00130
64.60	0.9868	0.00100	48.90	0.9805	0.00100	41.90	0.9795	0.00160
67.70	0.9914	0.00110	50.50	0.9820	0.00130	43.00	0.9815	0.00150
70.80	0.9962	0.00110	52.10	0.9901	0.00160	44.10	0.9854	0.00140
73.90	0.9974	0.00110	53.70	0.9916	0.00170	45.20	0.9853	0.00160
77.00	0.9986	0.00100	55.30	0.9961	0.00120	46.30	0.9854	0.00190
80.10	1.0021	0.00110	56.90	0.9953	0.00130	47.40	0.9928	0.00150
83.20	1.0014	0.00110	58.50	1.0012	0.00110	48.50	0.9994	0.00120
86.30	1.0063	0.00170	60.10	1.0036	0.00160	49.60	1.0012	0.00140
89.40	1.0056	0.00110	61.70	1.0030	0.00100	50.70	1.0025	0.00170
92.50	1.0105	0.00096	63.30	1.0064	0.00100	51.80	1.0078	0.00120
95.60	1.0090	0.00150	64.90	1.0081	0.00130	52.90	1.0090	0.00100
98.70	1.0119	0.00092	66.50	1.0117	0.00140	54.00	1.0131	0.00160
101.80	1.0095	0.00150	68.10	1.0090	0.00099	55.10	1.0095	0.00170
103.20	1.0145	0.00130	69.50	1.0138	0.00130	55.30	1.0109	0.00120

1000 milli-g/cc			1250 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
29.40	0.9278	0.00150	24.80	0.9280	0.00170	22.70	0.9291	0.00180
30.10	0.9333	0.00150	25.20	0.9320	0.00190	23.00	0.9314	0.00180
30.80	0.9424	0.00130	25.60	0.9402	0.00150	23.30	0.9391	0.00200
31.50	0.9461	0.00150	26.00	0.9467	0.00150	23.60	0.9414	0.00190
32.20	0.9499	0.00150	26.40	0.9507	0.00150	23.90	0.9487	0.00160
32.90	0.9586	0.00130	26.80	0.9554	0.00180	24.20	0.9539	0.00200
33.60	0.9621	0.00240	27.20	0.9567	0.00160	24.50	0.9552	0.00210
34.30	0.9664	0.00140	27.60	0.9669	0.00160	24.80	0.9655	0.00180
35.00	0.9724	0.00130	28.00	0.9715	0.00200	25.10	0.9689	0.00190
35.70	0.9759	0.00150	28.40	0.9701	0.00210	25.40	0.9758	0.00180
36.40	0.9834	0.00130	28.80	0.9806	0.00140	25.70	0.9779	0.00180
37.10	0.9844	0.00140	29.20	0.9829	0.00150	26.00	0.9819	0.00180
37.80	0.9900	0.00110	29.60	0.9869	0.00170	26.30	0.9853	0.00160
38.50	0.9926	0.00140	30.00	0.9894	0.00180	26.60	0.9847	0.00160
39.20	0.9972	0.00130	30.40	0.9902	0.00140	26.90	0.9914	0.00240
39.90	1.0047	0.00160	30.80	0.9991	0.00140	27.20	0.9927	0.00180
40.60	1.0033	0.00220	31.20	1.0055	0.00180	27.50	1.0029	0.00170
41.30	1.0047	0.00130	31.60	1.0065	0.00160	27.80	1.0062	0.00170
42.00	1.0082	0.00110	32.00	1.0097	0.00180	28.10	1.0081	0.00170
42.70	1.0100	0.00130	32.40	1.0106	0.00180	28.40	1.0112	0.00170
43.40	1.0164	0.00130	32.80	1.0152	0.00150	28.70	1.0157	0.00140
43.60	1.0143	0.00180	32.90	1.0125	0.00190	28.90	1.0158	0.00150

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
21.70	0.9248	0.00160	21.10	0.9262	0.00190	20.90	0.9237	0.00190
21.90	0.9301	0.00210	21.30	0.9333	0.00160	21.10	0.9277	0.00240
22.10	0.9329	0.00160	21.50	0.9365	0.00160	21.30	0.9366	0.00180
22.30	0.9406	0.00170	21.70	0.9383	0.00160	21.50	0.9406	0.00200
22.50	0.9415	0.00160	21.90	0.9429	0.00170	21.70	0.9449	0.00190
22.70	0.9473	0.00170	22.10	0.9479	0.00180	21.90	0.9490	0.00210
22.90	0.9519	0.00170	22.30	0.9535	0.00160	22.10	0.9526	0.00170
23.10	0.9555	0.00190	22.50	0.9573	0.00230	22.30	0.9568	0.00170
23.30	0.9581	0.00170	22.70	0.9583	0.00170	22.50	0.9624	0.00190
23.50	0.9600	0.00180	22.90	0.9637	0.00180	22.70	0.9645	0.00200
23.70	0.9664	0.00160	23.10	0.9690	0.00180	22.90	0.9662	0.00200
23.90	0.9680	0.00190	23.30	0.9745	0.00180	23.10	0.9716	0.00170
24.10	0.9717	0.00170	23.50	0.9742	0.00190	23.30	0.9775	0.00200
24.30	0.9734	0.00200	23.70	0.9747	0.00180	23.50	0.9796	0.00170
24.50	0.9788	0.00140	23.90	0.9821	0.00160	23.70	0.9836	0.00200
24.70	0.9797	0.00220	24.10	0.9858	0.00210	23.90	0.9897	0.00170
24.90	0.9873	0.00180	24.30	0.9904	0.00200	24.10	0.9942	0.00180
25.10	0.9910	0.00160	24.50	0.9894	0.00180	24.30	0.9927	0.00150
25.30	0.9918	0.00150	24.70	0.9935	0.00150	24.50	0.9979	0.00150
25.50	0.9920	0.00180	24.90	0.9962	0.00180	24.70	1.0022	0.00210
25.70	0.9963	0.00150	25.10	1.0035	0.00190	24.90	1.0069	0.00220
25.90	1.0010	0.00200	25.30	1.0046	0.00210	25.10	1.0112	0.00250
26.10	1.0018	0.00220	25.50	1.0105	0.00160	25.30	1.0092	0.00170
26.30	1.0024	0.00170	25.70	1.0121	0.00150	25.50	1.0134	0.00170
26.50	1.0067	0.00240	25.90	1.0167	0.00200	25.70	1.0146	0.00230
26.70	1.0138	0.00160	26.00	1.0142	0.00180	25.80	1.0150	0.00210
26.90	1.0101	0.00210						
27.10	1.0171	0.00150						
27.20	1.0207	0.00180						

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
20.80	0.9285	0.00180	20.40	0.9269	0.00250	20.40	0.9267	0.00180
21.00	0.9359	0.00180	20.60	0.9292	0.00220	20.60	0.9324	0.00220
21.20	0.9370	0.00210	20.80	0.9421	0.00180	20.80	0.9373	0.00170
21.40	0.9439	0.00180	21.00	0.9449	0.00200	21.00	0.9427	0.00180
21.60	0.9494	0.00210	21.20	0.9466	0.00160	21.20	0.9492	0.00210
21.80	0.9487	0.00190	21.40	0.9522	0.00240	21.40	0.9553	0.00230
22.00	0.9594	0.00170	21.60	0.9579	0.00190	21.60	0.9546	0.00180
22.20	0.9617	0.00180	21.80	0.9595	0.00160	21.80	0.9619	0.00190
22.40	0.9664	0.00250	22.00	0.9642	0.00220	22.00	0.9659	0.00180
22.60	0.9699	0.00170	22.20	0.9727	0.00180	22.20	0.9666	0.00220
22.80	0.9703	0.00200	22.40	0.9700	0.00180	22.40	0.9761	0.00310
23.00	0.9751	0.00180	22.60	0.9806	0.00190	22.60	0.9794	0.00200
23.20	0.9790	0.00200	22.80	0.9842	0.00210	22.80	0.9812	0.00200
23.40	0.9835	0.00190	23.00	0.9859	0.00200	23.00	0.9884	0.00190
23.60	0.9884	0.00200	23.20	0.9889	0.00230	23.20	0.9926	0.00210
23.80	0.9916	0.00200	23.40	0.9936	0.00240	23.40	0.9930	0.00220
24.00	0.9904	0.00170	23.60	0.9987	0.00170	23.60	0.9972	0.00160
24.20	0.9969	0.00170	23.80	1.0003	0.00190	23.80	1.0024	0.00230
24.40	1.0016	0.00190	24.00	1.0017	0.00220	24.00	1.0074	0.00190
24.60	1.0015	0.00160	24.20	1.0069	0.00190	24.20	1.0090	0.00210
24.80	1.0067	0.00170	24.40	1.0127	0.00250	24.40	1.0146	0.00190
25.00	1.0166	0.00190	24.60	1.0139	0.00190	24.60	1.0161	0.00200
25.20	1.0172	0.00150	24.80	1.0220	0.00200	24.80	1.0197	0.00180
25.40	1.0150	0.00200						

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
21.60	0.9333	0.00170	23.90	0.9361	0.00210	27.60	0.9371	0.00180
21.80	0.9395	0.00200	24.20	0.9437	0.00250	28.00	0.9381	0.00190
22.00	0.9464	0.00170	24.50	0.9443	0.00180	28.40	0.9434	0.00230
22.20	0.9472	0.00240	24.80	0.9470	0.00210	28.80	0.9506	0.00230
22.40	0.9523	0.00190	25.10	0.9593	0.00200	29.20	0.9562	0.00170
22.60	0.9529	0.00180	25.40	0.9609	0.00170	29.60	0.9603	0.00180
22.80	0.9589	0.00170	25.70	0.9691	0.00150	30.00	0.9667	0.00170
23.00	0.9596	0.00190	26.00	0.9678	0.00210	30.40	0.9691	0.00190
23.20	0.9691	0.00250	26.30	0.9756	0.00180	30.80	0.9761	0.00180
23.40	0.9690	0.00190	26.60	0.9823	0.00230	31.20	0.9782	0.00190
23.60	0.9722	0.00190	26.90	0.9854	0.00200	31.60	0.9814	0.00250
23.80	0.9793	0.00170	27.20	0.9910	0.00230	32.00	0.9880	0.00180
24.00	0.9804	0.00240	27.50	0.9915	0.00190	32.40	0.9890	0.00200
24.20	0.9852	0.00210	27.80	0.9961	0.00180	32.80	0.9957	0.00260
24.40	0.9908	0.00200	28.10	1.0007	0.00200	33.20	0.9941	0.00210
24.60	0.9907	0.00210	28.40	1.0019	0.00200	33.60	0.9978	0.00250
24.80	0.9956	0.00210	28.70	1.0100	0.00200	34.00	1.0104	0.00210
25.00	1.0009	0.00180	29.00	1.0133	0.00220	34.40	1.0084	0.00240
25.20	1.0045	0.00150	29.30	1.0148	0.00200	34.80	1.0131	0.00210
25.40	1.0059	0.00170	29.60	1.0209	0.00210	35.20	1.0157	0.00190
25.60	1.0093	0.00200	29.90	1.0219	0.00210	35.60	1.0177	0.00150
25.80	1.0106	0.00200				36.00	1.0196	0.00180
26.00	1.0140	0.00170				36.30	1.0227	0.00170
26.20	1.0201	0.00210						
26.40	1.0196	0.00160						
26.50	1.0227	0.00210						

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
34.70	0.9354	0.00170	41.10	0.9356	0.00140	52.90	0.9357	0.00150
35.50	0.9430	0.00200	42.70	0.9472	0.00190	60.60	0.9533	0.00130
36.30	0.9480	0.00160	44.30	0.9518	0.00180	68.30	0.9689	0.00200
37.10	0.9517	0.00250	45.90	0.9568	0.00150	76.00	0.9760	0.00170
37.90	0.9605	0.00210	47.50	0.9678	0.00230	83.70	0.9844	0.00150
38.70	0.9650	0.00200	49.10	0.9713	0.00190	91.40	0.9874	0.00180
39.50	0.9719	0.00170	50.70	0.9730	0.00190	99.10	0.9939	0.00160
40.30	0.9729	0.00200	52.30	0.9811	0.00210	106.80	0.9902	0.00140
41.10	0.9799	0.00160	53.90	0.9844	0.00150	114.50	0.9974	0.00150
41.90	0.9866	0.00160	55.50	0.9900	0.00210	122.20	0.9988	0.00150
42.70	0.9917	0.00160	57.10	0.9914	0.00170	129.90	1.0009	0.00180
43.50	0.9911	0.00230	58.70	0.9939	0.00230	137.60	1.0021	0.00130
44.30	0.9925	0.00180	60.30	1.0002	0.00130	145.30	1.0046	0.00120
45.10	0.9960	0.00190	61.90	1.0031	0.00160	153.00	1.0070	0.00180
45.90	1.0009	0.00180	63.50	1.0049	0.00190	160.70	1.0055	0.00150
46.70	1.0039	0.00200	65.10	1.0053	0.00150	168.40	1.0079	0.00210
47.50	1.0077	0.00250	66.70	1.0088	0.00190	176.10	1.0057	0.00160
48.30	1.0090	0.00190	68.30	1.0093	0.00190	183.80	1.0065	0.00140
49.10	1.0167	0.00160	69.90	1.0167	0.00220	191.50	1.0050	0.00130
49.90	1.0179	0.00150	71.50	1.0195	0.00160	199.20	1.0107	0.00130
50.70	1.0170	0.00170	73.10	1.0210	0.00160	206.80	1.0087	0.00130
51.40	1.0208	0.00190	73.30	1.0186	0.00210			

Case ID: UO2_sphere_002.5_01ref

Material: Uranium dioxide in water

Weight Fraction U in UO2: 0.88147

Geometry: Sphere

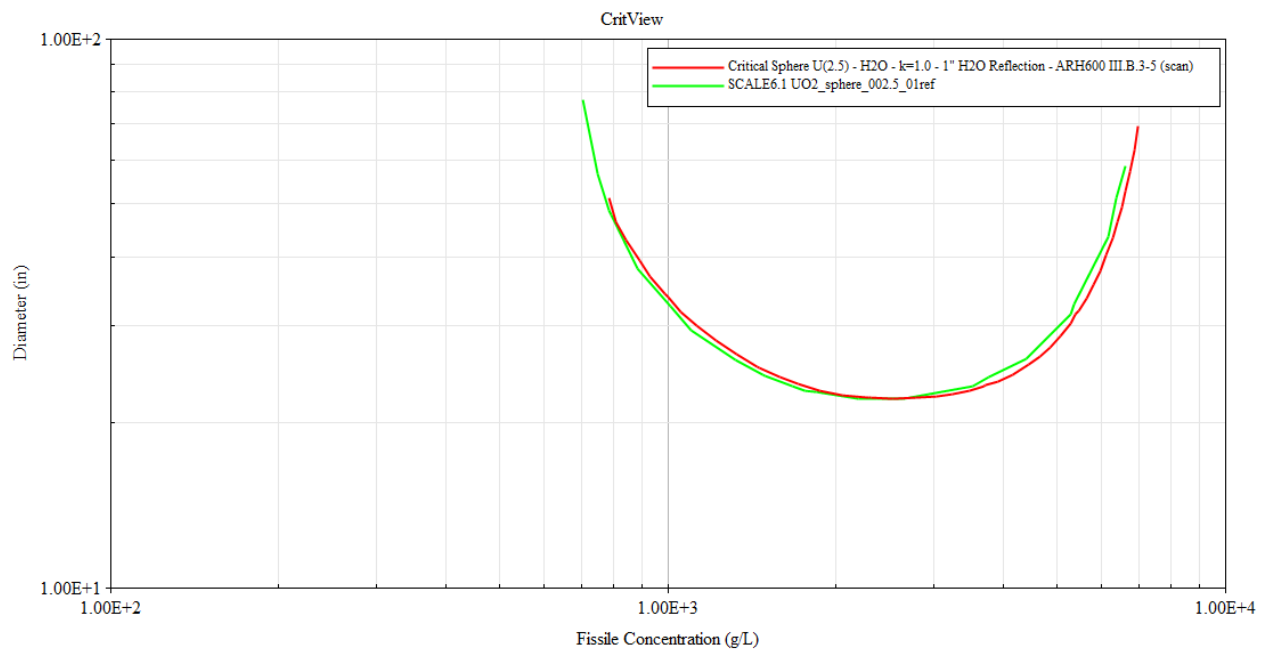
Isotopics: 2.5% ^{235}U 97.5% ^{238}U

Reflector: 1" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere(2.5% ²³⁵ U) – 1 Inch of Water Reflection					
UO ₂ Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.800	0.70518	38.500	101.900	3.100	77.3513
0.850	0.74925	34.400	67.700	1.600	56.6090
0.900	0.79332	31.700	54.500	1.100	47.7500
1.000	0.88147	28.000	41.500	0.600	38.1875
1.250	1.10184	23.300	31.300	0.400	29.4429
1.500	1.32221	21.000	27.100	0.300	25.9714
1.700	1.49850	20.100	25.600	0.200	24.3462
1.900	1.67479	19.500	24.400	0.200	23.2619
2.000	1.76294	19.300	24.200	0.200	22.8417
2.100	1.85109	19.000	23.700	0.200	22.7111
2.500	2.20368	18.700	23.200	0.200	22.1143
3.000	2.64441	18.700	23.100	0.200	22.1157
4.000	3.52588	19.700	24.700	0.200	23.2455
5.000	4.40735	22.000	28.000	0.300	26.1731
6.000	5.28882	25.700	34.300	0.400	31.4364
7.000	6.17029	32.800	49.400	0.800	43.5937
7.500	6.61103	39.200	77.300	1.900	58.6524

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-1010 (pdf pg1028)
,
#index number = <index = 1:17:1>
,
#UO2 Concentration = <@conc = 0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
38.5,34.4,31.7,28,23.3,21,20.1,19.5,19.3,19,18.7,18.7,19.7,22,25.7,32.8,39.2> in
#Ending Diameter = <@enddia =
101.9,67.7,54.5,41.5,31.3,27.1,25.6,24.4,24.2,23.7,23.2,23.1,24.7,28,34.3,49.4,77.3> in
#Delta = <@delta = 3.1,1.6,1.1,0.6,0.4,0.3,0.2,0.2,0.2,0.2,0.2,0.2,0.3,0.4,0.8,1.9> in
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                                92235 2.5
                                92238 97.5   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere With Water Reflector"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(diameter*in)/2+(1*in)}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; 1" Water Reflector; 2.5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.025 U238 0.975
reflmat: H2O
reflthick: 1 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.705 77.3513
0.749 56.6090
0.793 47.7500
0.881 38.1875
1.102 29.4429
1.322 25.9714
1.499 24.3462
1.675 23.2619
1.763 22.8417
1.851 22.7111
2.204 22.1143
2.644 22.1157
3.526 23.2455
4.407 26.1731
5.289 31.4364
6.170 43.5937
6.611 58.6524
```

800 milli-g/cc			850 milli-g/cc			900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
38.50	0.9302	0.00110	34.40	0.9319	0.00150	31.70	0.9314	0.00120
41.60	0.9453	0.00120	36.00	0.9390	0.00170	32.80	0.9373	0.00130
44.70	0.9503	0.00140	37.60	0.9484	0.00150	33.90	0.9439	0.00160
47.80	0.9639	0.00140	39.20	0.9528	0.00130	35.00	0.9493	0.00130
50.90	0.9678	0.00140	40.80	0.9576	0.00150	36.10	0.9561	0.00160
54.00	0.9742	0.00120	42.40	0.9655	0.00170	37.20	0.9631	0.00170
57.10	0.9776	0.00140	44.00	0.9719	0.00140	38.30	0.9683	0.00150
60.20	0.9846	0.00130	45.60	0.9754	0.00110	39.40	0.9769	0.00140
63.30	0.9870	0.00100	47.20	0.9832	0.00110	40.50	0.9775	0.00120
66.40	0.9922	0.00150	48.80	0.9837	0.00140	41.60	0.9821	0.00160
69.50	0.9996	0.00140	50.40	0.9899	0.00140	42.70	0.9839	0.00120
72.60	0.9933	0.00110	52.00	0.9928	0.00140	43.80	0.9895	0.00130
75.70	0.9978	0.00130	53.60	0.9937	0.00150	44.90	0.9917	0.00097
78.80	1.0019	0.00091	55.20	0.9941	0.00110	46.00	0.9943	0.00120
81.90	1.0018	0.00100	56.80	1.0008	0.00120	47.10	0.9974	0.00180
85.00	1.0062	0.00140	58.40	1.0007	0.00100	48.20	1.0018	0.00100
88.10	1.0070	0.00100	60.00	1.0039	0.00120	49.30	1.0060	0.00140
91.20	1.0085	0.00100	61.60	1.0061	0.00110	50.40	1.0047	0.00160
94.30	1.0099	0.00110	63.20	1.0112	0.00110	51.50	1.0100	0.00120
97.40	1.0121	0.00110	64.80	1.0094	0.00120	52.60	1.0105	0.00120
100.50	1.0114	0.00120	66.40	1.0114	0.00140	53.70	1.0151	0.00110
101.90	1.0138	0.00096	67.70	1.0146	0.00130	54.50	1.0125	0.00140

1000 milli-g/cc			1250 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
28.00	0.9314	0.00260	23.30	0.9283	0.00160	21.00	0.9255	0.00170
28.60	0.9365	0.00190	23.70	0.9338	0.00140	21.30	0.9305	0.00190
29.20	0.9431	0.00160	24.10	0.9403	0.00160	21.60	0.9368	0.00150
29.80	0.9477	0.00140	24.50	0.9463	0.00180	21.90	0.9403	0.00160
30.40	0.9499	0.00170	24.90	0.9500	0.00150	22.20	0.9460	0.00150
31.00	0.9561	0.00120	25.30	0.9556	0.00150	22.50	0.9545	0.00190
31.60	0.9591	0.00120	25.70	0.9603	0.00180	22.80	0.9579	0.00160
32.20	0.9635	0.00120	26.10	0.9644	0.00120	23.10	0.9584	0.00190
32.80	0.9689	0.00170	26.50	0.9700	0.00170	23.40	0.9655	0.00220
33.40	0.9713	0.00160	26.90	0.9741	0.00160	23.70	0.9700	0.00150
34.00	0.9767	0.00140	27.30	0.9808	0.00150	24.00	0.9746	0.00150
34.60	0.9798	0.00160	27.70	0.9837	0.00170	24.30	0.9794	0.00190
35.20	0.9846	0.00170	28.10	0.9888	0.00140	24.60	0.9852	0.00150
35.80	0.9880	0.00150	28.50	0.9886	0.00200	24.90	0.9897	0.00160
36.40	0.9894	0.00180	28.90	0.9958	0.00140	25.20	0.9938	0.00160
37.00	0.9925	0.00120	29.30	0.9990	0.00150	25.50	0.9968	0.00150
37.60	0.9953	0.00160	29.70	1.0018	0.00170	25.80	0.9988	0.00160
38.20	1.0001	0.00130	30.10	1.0051	0.00140	26.10	1.0009	0.00210
38.80	1.0003	0.00160	30.50	1.0096	0.00140	26.40	1.0079	0.00180
39.40	1.0053	0.00150	30.90	1.0106	0.00140	26.70	1.0078	0.00170
40.00	1.0054	0.00160	31.30	1.0139	0.00160	27.00	1.0150	0.00170
40.60	1.0102	0.00120				27.10	1.0137	0.00220
41.20	1.0105	0.00110						
41.50	1.0095	0.00150						

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
20.10	0.9308	0.00190	19.50	0.9287	0.00210	19.30	0.9270	0.00190
20.30	0.9329	0.00170	19.70	0.9344	0.00190	19.50	0.9321	0.00160
20.50	0.9364	0.00170	19.90	0.9348	0.00210	19.70	0.9392	0.00200
20.70	0.9403	0.00220	20.10	0.9399	0.00190	19.90	0.9382	0.00200
20.90	0.9447	0.00160	20.30	0.9415	0.00200	20.10	0.9480	0.00160
21.10	0.9455	0.00160	20.50	0.9522	0.00180	20.30	0.9504	0.00170
21.30	0.9537	0.00150	20.70	0.9532	0.00140	20.50	0.9546	0.00200
21.50	0.9514	0.00210	20.90	0.9593	0.00170	20.70	0.9587	0.00150
21.70	0.9580	0.00180	21.10	0.9614	0.00150	20.90	0.9658	0.00180
21.90	0.9618	0.00180	21.30	0.9662	0.00190	21.10	0.9660	0.00180
22.10	0.9656	0.00150	21.50	0.9702	0.00170	21.30	0.9714	0.00200
22.30	0.9701	0.00140	21.70	0.9744	0.00180	21.50	0.9742	0.00200
22.50	0.9713	0.00180	21.90	0.9763	0.00170	21.70	0.9777	0.00180
22.70	0.9749	0.00170	22.10	0.9818	0.00210	21.90	0.9819	0.00250
22.90	0.9766	0.00200	22.30	0.9825	0.00160	22.10	0.9878	0.00160
23.10	0.9832	0.00180	22.50	0.9875	0.00150	22.30	0.9902	0.00160
23.30	0.9833	0.00300	22.70	0.9944	0.00170	22.50	0.9927	0.00160
23.50	0.9881	0.00200	22.90	0.9952	0.00200	22.70	0.9966	0.00170
23.70	0.9895	0.00170	23.10	0.9949	0.00140	22.90	1.0014	0.00160
23.90	0.9936	0.00140	23.30	1.0012	0.00170	23.10	1.0020	0.00220
24.10	0.9970	0.00150	23.50	1.0053	0.00180	23.30	1.0074	0.00210
24.30	0.9997	0.00170	23.70	1.0097	0.00180	23.50	1.0093	0.00150
24.50	1.0010	0.00160	23.90	1.0113	0.00180	23.70	1.0102	0.00190
24.70	1.0063	0.00190	24.10	1.0139	0.00160	23.90	1.0151	0.00180
24.90	1.0072	0.00160	24.30	1.0170	0.00190	24.10	1.0194	0.00220
25.10	1.0103	0.00210	24.40	1.0131	0.00190	24.20	1.0154	0.00160
25.30	1.0137	0.00180						
25.50	1.0153	0.00150						
25.60	1.0188	0.00160						

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
19.00	0.9277	0.00180	18.70	0.9297	0.00200	18.70	0.9300	0.00190
19.20	0.9290	0.00180	18.90	0.9312	0.00180	18.90	0.9350	0.00210
19.40	0.9359	0.00240	19.10	0.9378	0.00240	19.10	0.9399	0.00200
19.60	0.9420	0.00170	19.30	0.9436	0.00160	19.30	0.9470	0.00170
19.80	0.9458	0.00180	19.50	0.9450	0.00190	19.50	0.9486	0.00210
20.00	0.9420	0.00200	19.70	0.9583	0.00170	19.70	0.9511	0.00160
20.20	0.9561	0.00180	19.90	0.9569	0.00170	19.90	0.9562	0.00160
20.40	0.9599	0.00240	20.10	0.9609	0.00180	20.10	0.9646	0.00170
20.60	0.9610	0.00220	20.30	0.9654	0.00190	20.30	0.9613	0.00240
20.80	0.9658	0.00180	20.50	0.9704	0.00210	20.50	0.9695	0.00170
21.00	0.9673	0.00210	20.70	0.9721	0.00180	20.70	0.9765	0.00180
21.20	0.9734	0.00160	20.90	0.9764	0.00200	20.90	0.9745	0.00170
21.40	0.9780	0.00190	21.10	0.9792	0.00220	21.10	0.9798	0.00260
21.60	0.9844	0.00170	21.30	0.9837	0.00210	21.30	0.9879	0.00200
21.80	0.9840	0.00200	21.50	0.9927	0.00220	21.50	0.9929	0.00180
22.00	0.9882	0.00180	21.70	0.9937	0.00160	21.70	0.9949	0.00160
22.20	0.9908	0.00170	21.90	0.9976	0.00200	21.90	0.9984	0.00170
22.40	0.9950	0.00180	22.10	0.9998	0.00170	22.10	0.9993	0.00160
22.60	0.9990	0.00190	22.30	1.0026	0.00160	22.30	1.0082	0.00170
22.80	1.0008	0.00170	22.50	1.0073	0.00160	22.50	1.0091	0.00210
23.00	1.0062	0.00170	22.70	1.0123	0.00170	22.70	1.0146	0.00230
23.20	1.0081	0.00170	22.90	1.0183	0.00230	22.90	1.0196	0.00170
23.40	1.0118	0.00230	23.10	1.0198	0.00170	23.10	1.0214	0.00170
23.60	1.0186	0.00170	23.20	1.0179	0.00200			
23.70	1.0175	0.00210						

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
19.70	0.9287	0.00190	22.00	0.9372	0.00220	25.70	0.9379	0.00200
19.90	0.9314	0.00200	22.30	0.9405	0.00260	26.10	0.9398	0.00190
20.10	0.9370	0.00200	22.60	0.9473	0.00180	26.50	0.9475	0.00200
20.30	0.9465	0.00190	22.90	0.9503	0.00200	26.90	0.9523	0.00230
20.50	0.9474	0.00230	23.20	0.9576	0.00190	27.30	0.9548	0.00180
20.70	0.9460	0.00200	23.50	0.9599	0.00190	27.70	0.9595	0.00170
20.90	0.9526	0.00210	23.80	0.9661	0.00250	28.10	0.9653	0.00190
21.10	0.9621	0.00180	24.10	0.9707	0.00180	28.50	0.9698	0.00170
21.30	0.9663	0.00190	24.40	0.9765	0.00200	28.90	0.9766	0.00150
21.50	0.9671	0.00230	24.70	0.9783	0.00190	29.30	0.9771	0.00190
21.70	0.9747	0.00180	25.00	0.9851	0.00180	29.70	0.9837	0.00190
21.90	0.9741	0.00210	25.30	0.9857	0.00230	30.10	0.9882	0.00190
22.10	0.9813	0.00170	25.60	0.9921	0.00210	30.50	0.9925	0.00160
22.30	0.9806	0.00190	25.90	0.9939	0.00170	30.90	0.9975	0.00160
22.50	0.9868	0.00170	26.20	1.0006	0.00210	31.30	0.9985	0.00160
22.70	0.9931	0.00210	26.50	1.0022	0.00170	31.70	1.0029	0.00210
22.90	0.9953	0.00170	26.80	1.0052	0.00170	32.10	1.0083	0.00180
23.10	0.9960	0.00180	27.10	1.0106	0.00180	32.50	1.0067	0.00160
23.30	1.0015	0.00170	27.40	1.0161	0.00190	32.90	1.0122	0.00170
23.50	1.0038	0.00180	27.70	1.0202	0.00180	33.30	1.0166	0.00170
23.70	1.0114	0.00170	28.00	1.0246	0.00160	33.70	1.0151	0.00160
23.90	1.0087	0.00200				34.10	1.0174	0.00170
24.10	1.0147	0.00210				34.30	1.0261	0.00200
24.30	1.0185	0.00220						
24.50	1.0198	0.00170						
24.70	1.0241	0.00220						

7000 milli-g/cc			7500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
32.80	0.9386	0.00180	39.20	0.9387	0.00140
33.60	0.9434	0.00190	41.10	0.9438	0.00190
34.40	0.9519	0.00160	43.00	0.9552	0.00170
35.20	0.9555	0.00190	44.90	0.9636	0.00170
36.00	0.9627	0.00150	46.80	0.9670	0.00160
36.80	0.9667	0.00180	48.70	0.9760	0.00160
37.60	0.9720	0.00160	50.60	0.9834	0.00140
38.40	0.9760	0.00190	52.50	0.9836	0.00210
39.20	0.9798	0.00150	54.40	0.9927	0.00170
40.00	0.9852	0.00150	56.30	0.9952	0.00170
40.80	0.9879	0.00200	58.20	0.9995	0.00180
41.60	0.9905	0.00140	60.10	1.0016	0.00160
42.40	0.9961	0.00160	62.00	1.0059	0.00160
43.20	0.9969	0.00160	63.90	1.0058	0.00130
44.00	1.0032	0.00170	65.80	1.0094	0.00150
44.80	1.0043	0.00190	67.70	1.0157	0.00150
45.60	1.0100	0.00170	69.60	1.0118	0.00170
46.40	1.0110	0.00180	71.50	1.0219	0.00130
47.20	1.0138	0.00210	73.40	1.0229	0.00240
48.00	1.0153	0.00210	75.30	1.0250	0.00140
48.80	1.0199	0.00180	77.20	1.0255	0.00170
49.40	1.0188	0.00170	77.30	1.0230	0.00170

Case ID: UO2_sphere_002.5_10ref

Material: Uranium dioxide in water

Weight Fraction U in UO2: 0.88147

Geometry: Sphere

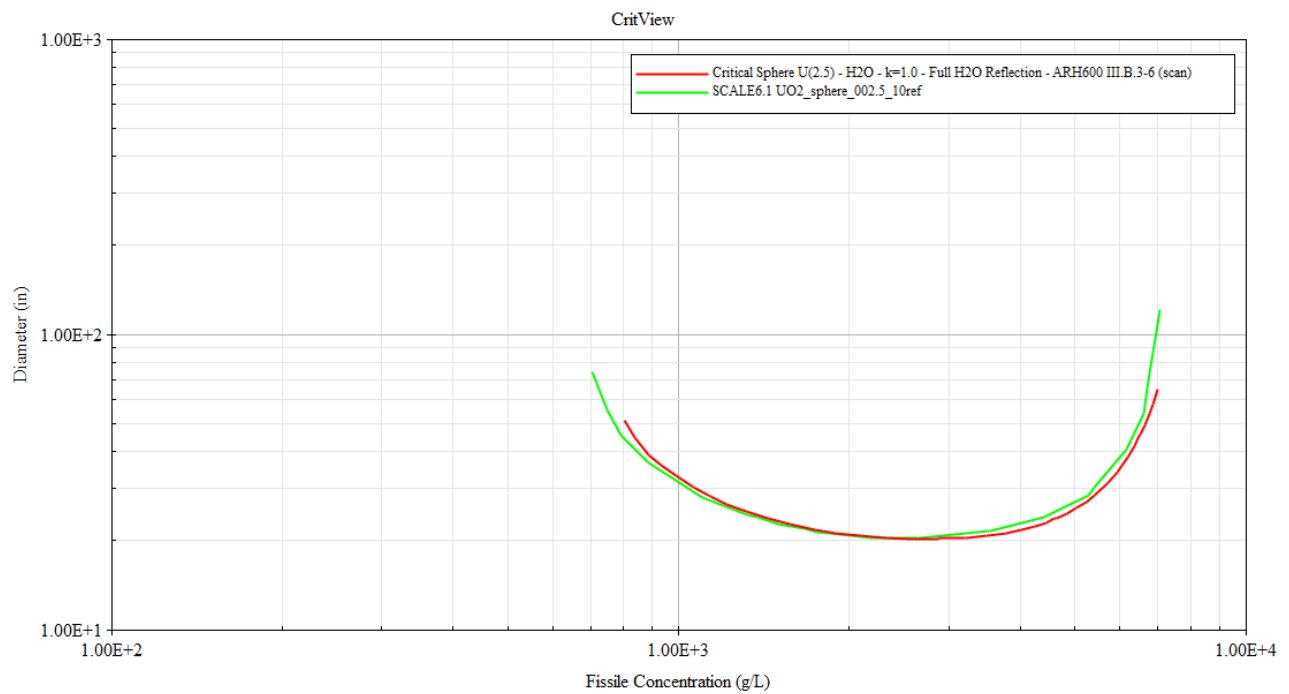
Isotopics: 2.5% ^{235}U 97.5% ^{238}U

Reflector: 10" water

Code: SCALE6.1

Analyst: Natalie Coon

Date: 7/2021



Uranium Dioxide Sphere(2.5% ²³⁵ U) - 10 Inches of Water Reflection					
UO2 Conc. (g/cc)	U Conc (g/cc)	First Diameter (Inches)	Last Diameter (Inches)	Delta (Inches)	Critical Diameter (Inches)
0.800	0.70518	36.400	111.100	3.700	74.6759
0.850	0.74925	33.300	66.900	1.600	55.5000
0.900	0.79332	30.200	53.100	1.100	45.5083
1.000	0.88147	26.500	40.500	0.700	36.9317
1.250	1.10184	22.100	30.000	0.400	28.0418
1.500	1.32221	19.700	25.700	0.300	24.4115
1.700	1.49850	18.600	24.100	0.200	22.7810
1.900	1.67479	18.100	23.000	0.200	21.9000
2.000	1.76294	17.900	22.500	0.200	21.2957
2.100	1.85109	17.600	22.300	0.200	21.2298
2.500	2.20368	17.200	21.600	0.200	20.4095
3.000	2.64441	17.000	21.400	0.200	20.3674
4.000	3.52588	17.800	22.600	0.200	21.6278
5.000	4.40735	19.700	25.600	0.300	23.9462
6.000	5.28882	23.200	31.500	0.400	28.5026
7.000	6.17029	29.400	46.400	0.800	40.7733
7.500	6.61103	35.600	67.200	1.500	54.0535
8.000	7.05176	47.300	182.900	6.700	121.0000

WORM and SCALE Input File

```

'Worm generated by Natalie 6/29/21
'Recreating data from PRC-NS-00009 B-1022 (pdf pg1040)
,
#index number = <index = 1:18:1>
,
#UO2 Concentration = <@conc = 0.8,0.85,0.9,1,1.25,1.5,1.7,1.9,2,2.1,2.5,3,4,5,6,7,7.5,8> g/cc
'Concentration = <critconc = conc[index]\n>
'Water Concentration = <wconc = 1-(critconc/11)>
,
#Starting Diameter = <@startdia =
36.4,33.3,30.2,26.5,22.1,19.7,18.6,18.1,17.9,17.6,17.2,17,17.8,19.7,23.2,29.4,35.6,47.3> in
#Ending Diameter = <@enddia =
111.1,66.9,53.1,40.5,30,25.7,24.1,23,22.5,22.3,21.6,21.4,22.6,25.6,31.5,46.4,67.2,182.9> in
#Delta = <@delta = 3.7,1.6,1.1,0.7,0.4,0.3,0.2,0.2,0.2,0.2,0.2,0.2,0.3,0.4,0.8,1.5,6.7> in
,
'Diameter being Tested = {{diameter = <startdia[index]>:<enddia[index]>:<delta[index]>}} in
,
=csas6
Reflected UO2 Sphere Template
v7-238
read composition
  uo2          1 den=<critconc> 1 300
                        92235 2.5
                        92238 97.5   end
<&ZEROCHECK(wconc)\11>h2o      1 den=<wconc> 1 300   end
  h2o          2 1 300   end
end composition
read parameter
  htm=yes
end parameter
read geometry
global unit 1
com="Sphere With Water Reflector"
  sphere 1      {{(diameter*in)/2}}
  sphere 2      {{(diameter*in)/2+(10*in)}}
  media 1 1 1
  media 2 1 2 -1
  boundary 2
end geometry
end data
end

<perl>
sub ZEROCHECK
{
if ($_[0] == 0) {
    return '\';
}
}
</perl>

```

CritView compatible data file

```
reset:
title: Critical Sphere; UO2; 10" Water Reflector; 2.5% U-235; SCALE6.1
created: 7/19/21
set: SCALE6.1 set
source: SCALE-NC
geometry: sphere
modmat: H2O
fiss-element: Uranium
fiss-form: Oxide
critmat: UO2
isomat: U235 0.025 U238 0.975
reflmat: H2O
reflthick: 10 in
keff: 1.0
var: critconc g/cc
var: diameter in
0.705 74.6759
0.749 55.5000
0.793 45.5083
0.881 36.9317
1.102 28.0418
1.322 24.4115
1.499 22.7810
1.675 21.9000
1.763 21.2957
1.851 21.2298
2.204 20.4095
2.644 20.3674
3.526 21.6278
4.407 23.9462
5.289 28.5026
6.170 40.7733
6.611 54.0535
7.052 121.0000
```

800 milli-g/cc			850 milli-g/cc			900 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
36.40	0.9275	0.00130	33.30	0.9303	0.00120	30.20	0.9284	0.00110
40.10	0.9422	0.00110	34.90	0.9405	0.00120	31.30	0.9368	0.00130
43.80	0.9540	0.00140	36.50	0.9483	0.00110	32.40	0.9446	0.00130
47.50	0.9633	0.00130	38.10	0.9540	0.00110	33.50	0.9483	0.00120
51.20	0.9705	0.00110	39.70	0.9579	0.00100	34.60	0.9559	0.00200
54.90	0.9730	0.00120	41.30	0.9667	0.00130	35.70	0.9638	0.00110
58.60	0.9817	0.00120	42.90	0.9700	0.00110	36.80	0.9664	0.00140
62.30	0.9867	0.00095	44.50	0.9765	0.00160	37.90	0.9709	0.00110
66.00	0.9919	0.00097	46.10	0.9807	0.00100	39.00	0.9774	0.00150
69.70	0.9947	0.00120	47.70	0.9818	0.00110	40.10	0.9803	0.00190
73.40	0.9980	0.00100	49.30	0.9905	0.00160	41.20	0.9839	0.00150
77.10	1.0038	0.00110	50.90	0.9905	0.00110	42.30	0.9850	0.00120
80.80	1.0032	0.00110	52.50	0.9932	0.00110	43.40	0.9915	0.00120
84.50	1.0077	0.00100	54.10	0.9993	0.00110	44.50	0.9934	0.00120
88.20	1.0076	0.00100	55.70	1.0001	0.00120	45.60	1.0006	0.00120
91.90	1.0120	0.00100	57.30	1.0016	0.00130	46.70	1.0031	0.00160
95.60	1.0109	0.00092	58.90	1.0073	0.00140	47.80	1.0045	0.00100
99.30	1.0092	0.00140	60.50	1.0070	0.00130	48.90	1.0041	0.00100
103.00	1.0106	0.00094	62.10	1.0094	0.00110	50.00	1.0075	0.00110
106.70	1.0153	0.00100	63.70	1.0104	0.00120	51.10	1.0093	0.00120
110.40	1.0117	0.00100	65.30	1.0125	0.00100	52.20	1.0136	0.00110
111.10	1.0161	0.00110	66.90	1.0149	0.00140	53.10	1.0111	0.00100

1000 milli-g/cc			1250 milli-g/cc			1500 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
26.50	0.9275	0.00160	22.10	0.9307	0.00150	19.70	0.9293	0.00160
27.20	0.9371	0.00140	22.50	0.9379	0.00120	20.00	0.9341	0.00140
27.90	0.9396	0.00130	22.90	0.9443	0.00150	20.30	0.9394	0.00170
28.60	0.9450	0.00180	23.30	0.9464	0.00200	20.60	0.9471	0.00160
29.30	0.9501	0.00130	23.70	0.9517	0.00150	20.90	0.9493	0.00170
30.00	0.9581	0.00150	24.10	0.9597	0.00210	21.20	0.9554	0.00160
30.70	0.9604	0.00140	24.50	0.9656	0.00170	21.50	0.9593	0.00160
31.40	0.9685	0.00140	24.90	0.9692	0.00120	21.80	0.9653	0.00200
32.10	0.9726	0.00160	25.30	0.9720	0.00220	22.10	0.9720	0.00200
32.80	0.9760	0.00120	25.70	0.9755	0.00180	22.40	0.9735	0.00200
33.50	0.9790	0.00150	26.10	0.9784	0.00120	22.70	0.9784	0.00140
34.20	0.9859	0.00140	26.50	0.9865	0.00150	23.00	0.9829	0.00240
34.90	0.9900	0.00140	26.90	0.9892	0.00170	23.30	0.9851	0.00160
35.60	0.9930	0.00110	27.30	0.9918	0.00260	23.60	0.9901	0.00140
36.30	0.9963	0.00140	27.70	0.9953	0.00170	23.90	0.9941	0.00160
37.00	1.0004	0.00150	28.10	1.0008	0.00160	24.20	0.9957	0.00250
37.70	1.0018	0.00140	28.50	1.0065	0.00140	24.50	1.0018	0.00160
38.40	1.0071	0.00160	28.90	1.0059	0.00130	24.80	1.0063	0.00190
39.10	1.0087	0.00140	29.30	1.0122	0.00160	25.10	1.0072	0.00180
39.80	1.0100	0.00130	29.70	1.0126	0.00140	25.40	1.0099	0.00150
40.50	1.0138	0.00120	30.00	1.0171	0.00170	25.70	1.0176	0.00160

1700 milli-g/cc			1900 milli-g/cc			2000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
18.60	0.9260	0.00170	18.10	0.9260	0.00190	17.90	0.9335	0.00190
18.80	0.9284	0.00220	18.30	0.9326	0.00150	18.10	0.9366	0.00150
19.00	0.9376	0.00170	18.50	0.9368	0.00180	18.30	0.9386	0.00240
19.20	0.9364	0.00170	18.70	0.9424	0.00200	18.50	0.9443	0.00160
19.40	0.9433	0.00170	18.90	0.9463	0.00190	18.70	0.9511	0.00180
19.60	0.9457	0.00160	19.10	0.9527	0.00210	18.90	0.9535	0.00180
19.80	0.9474	0.00200	19.30	0.9524	0.00200	19.10	0.9586	0.00170
20.00	0.9548	0.00180	19.50	0.9591	0.00180	19.30	0.9617	0.00210
20.20	0.9556	0.00140	19.70	0.9629	0.00190	19.50	0.9639	0.00160
20.40	0.9658	0.00180	19.90	0.9659	0.00160	19.70	0.9668	0.00220
20.60	0.9645	0.00160	20.10	0.9739	0.00240	19.90	0.9743	0.00170
20.80	0.9698	0.00180	20.30	0.9756	0.00230	20.10	0.9730	0.00160
21.00	0.9744	0.00180	20.50	0.9803	0.00210	20.30	0.9789	0.00160
21.20	0.9765	0.00210	20.70	0.9819	0.00170	20.50	0.9837	0.00170
21.40	0.9789	0.00170	20.90	0.9827	0.00140	20.70	0.9913	0.00210
21.60	0.9785	0.00160	21.10	0.9901	0.00140	20.90	0.9907	0.00170
21.80	0.9848	0.00210	21.30	0.9920	0.00170	21.10	0.9908	0.00160
22.00	0.9888	0.00140	21.50	0.9943	0.00140	21.30	1.0002	0.00210
22.20	0.9913	0.00140	21.70	0.9931	0.00190	21.50	1.0014	0.00190
22.40	0.9935	0.00140	21.90	1.0000	0.00220	21.70	1.0087	0.00170
22.60	0.9962	0.00200	22.10	1.0018	0.00180	21.90	1.0081	0.00160
22.80	1.0004	0.00230	22.30	1.0081	0.00180	22.10	1.0093	0.00200
23.00	1.0020	0.00160	22.50	1.0098	0.00150	22.30	1.0144	0.00170
23.20	1.0057	0.00160	22.70	1.0134	0.00230	22.50	1.0161	0.00160
23.40	1.0073	0.00150	22.90	1.0185	0.00220			
23.60	1.0101	0.00160	23.00	1.0130	0.00200			
23.80	1.0118	0.00320						
24.00	1.0179	0.00140						
24.10	1.0172	0.00140						

2100 milli-g/cc			2500 milli-g/cc			3000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.60	0.9300	0.00190	17.20	0.9315	0.00160	17.00	0.9301	0.00200
17.80	0.9322	0.00150	17.40	0.9342	0.00180	17.20	0.9355	0.00150
18.00	0.9391	0.00220	17.60	0.9411	0.00160	17.40	0.9398	0.00190
18.20	0.9417	0.00150	17.80	0.9486	0.00190	17.60	0.9458	0.00170
18.40	0.9433	0.00150	18.00	0.9502	0.00210	17.80	0.9488	0.00190
18.60	0.9509	0.00170	18.20	0.9536	0.00220	18.00	0.9525	0.00150
18.80	0.9526	0.00210	18.40	0.9625	0.00180	18.20	0.9586	0.00200
19.00	0.9593	0.00180	18.60	0.9655	0.00180	18.40	0.9620	0.00160
19.20	0.9698	0.00200	18.80	0.9670	0.00230	18.60	0.9685	0.00150
19.40	0.9676	0.00150	19.00	0.9742	0.00240	18.80	0.9714	0.00170
19.60	0.9714	0.00190	19.20	0.9798	0.00220	19.00	0.9749	0.00160
19.80	0.9746	0.00180	19.40	0.9829	0.00230	19.20	0.9818	0.00170
20.00	0.9806	0.00180	19.60	0.9872	0.00180	19.40	0.9848	0.00190
20.20	0.9793	0.00180	19.80	0.9882	0.00160	19.60	0.9877	0.00200
20.40	0.9868	0.00170	20.00	0.9941	0.00180	19.80	0.9919	0.00190
20.60	0.9883	0.00190	20.20	0.9962	0.00170	20.00	0.9952	0.00170
20.80	0.9899	0.00170	20.40	0.9999	0.00200	20.20	0.9964	0.00180
21.00	0.9994	0.00150	20.60	1.0020	0.00200	20.40	1.0007	0.00170
21.20	0.9993	0.00180	20.80	1.0068	0.00180	20.60	1.0056	0.00160
21.40	1.0040	0.00230	21.00	1.0102	0.00170	20.80	1.0081	0.00210
21.60	1.0069	0.00190	21.20	1.0129	0.00200	21.00	1.0110	0.00160
21.80	1.0113	0.00160	21.40	1.0187	0.00170	21.20	1.0178	0.00180
22.00	1.0141	0.00210	21.60	1.0262	0.00180	21.40	1.0205	0.00210
22.20	1.0174	0.00150						
22.30	1.0198	0.00220						

4000 milli-g/cc			5000 milli-g/cc			6000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
17.80	0.9332	0.00160	19.70	0.9339	0.00200	23.20	0.9387	0.00180
18.00	0.9345	0.00160	20.00	0.9375	0.00160	23.60	0.9454	0.00160
18.20	0.9422	0.00200	20.30	0.9458	0.00200	24.00	0.9492	0.00290
18.40	0.9459	0.00170	20.60	0.9517	0.00160	24.40	0.9530	0.00230
18.60	0.9514	0.00230	20.90	0.9548	0.00200	24.80	0.9596	0.00170
18.80	0.9542	0.00180	21.20	0.9618	0.00150	25.20	0.9646	0.00190
19.00	0.9593	0.00240	21.50	0.9666	0.00170	25.60	0.9678	0.00200
19.20	0.9625	0.00230	21.80	0.9674	0.00180	26.00	0.9717	0.00180
19.40	0.9648	0.00190	22.10	0.9728	0.00190	26.40	0.9777	0.00220
19.60	0.9695	0.00170	22.40	0.9808	0.00200	26.80	0.9775	0.00140
19.80	0.9747	0.00230	22.70	0.9847	0.00160	27.20	0.9880	0.00190
20.00	0.9813	0.00190	23.00	0.9880	0.00230	27.60	0.9854	0.00160
20.20	0.9850	0.00170	23.30	0.9916	0.00170	28.00	0.9897	0.00190
20.40	0.9860	0.00140	23.60	0.9961	0.00190	28.40	0.9990	0.00210
20.60	0.9855	0.00230	23.90	0.9988	0.00180	28.80	1.0029	0.00160
20.80	0.9912	0.00220	24.20	1.0066	0.00210	29.20	1.0034	0.00210
21.00	0.9962	0.00160	24.50	1.0118	0.00240	29.60	1.0043	0.00180
21.20	0.9981	0.00160	24.80	1.0170	0.00210	30.00	1.0145	0.00160
21.40	0.9999	0.00200	25.10	1.0112	0.00160	30.40	1.0111	0.00200
21.60	0.9985	0.00170	25.40	1.0200	0.00190	30.80	1.0181	0.00210
21.80	1.0093	0.00160	25.60	1.0224	0.00190	31.20	1.0226	0.00160
22.00	1.0116	0.00150				31.50	1.0219	0.00190
22.20	1.0149	0.00160						
22.40	1.0189	0.00190						
22.60	1.0233	0.00180						

7000 milli-g/cc			7500 milli-g/cc			8000 milli-g/cc		
Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma	Diameter (Inches)	K _{eff}	Sigma
29.40	0.9393	0.00160	35.60	0.9344	0.00180	47.30	0.9364	0.00150
30.20	0.9448	0.00210	37.10	0.9460	0.00150	54.00	0.9506	0.00150
31.00	0.9508	0.00170	38.60	0.9537	0.00180	60.70	0.9629	0.00140
31.80	0.9547	0.00180	40.10	0.9582	0.00150	67.40	0.9711	0.00150
32.60	0.9634	0.00190	41.60	0.9657	0.00140	74.10	0.9820	0.00140
33.40	0.9636	0.00150	43.10	0.9707	0.00170	80.80	0.9839	0.00170
34.20	0.9713	0.00170	44.60	0.9721	0.00210	87.50	0.9925	0.00160
35.00	0.9725	0.00230	46.10	0.9785	0.00210	94.20	0.9913	0.00140
35.80	0.9793	0.00150	47.60	0.9859	0.00160	100.90	0.9938	0.00150
36.60	0.9819	0.00200	49.10	0.9841	0.00150	107.60	0.9984	0.00130
37.40	0.9882	0.00130	50.60	0.9914	0.00180	114.30	0.9994	0.00170
38.20	0.9857	0.00180	52.10	0.9930	0.00210	121.00	1.0000	0.00290
39.00	0.9917	0.00160	53.60	0.9987	0.00140	127.70	1.0063	0.00140
39.80	0.9992	0.00150	55.10	1.0030	0.00160	134.40	1.0021	0.00150
40.60	0.9987	0.00220	56.60	1.0067	0.00170	141.10	1.0050	0.00160
41.40	1.0047	0.00150	58.10	1.0076	0.00160	147.80	1.0042	0.00160
42.20	1.0093	0.00190	59.60	1.0103	0.00150	154.50	1.0039	0.00140
43.00	1.0121	0.00180	61.10	1.0085	0.00160	161.20	1.0050	0.00220
43.80	1.0108	0.00190	62.60	1.0140	0.00160	167.90	1.0081	0.00140
44.60	1.0157	0.00140	64.10	1.0111	0.00150	174.60	1.0099	0.00160
45.40	1.0157	0.00160	65.60	1.0159	0.00160	181.30	1.0085	0.00140
46.20	1.0171	0.00150	67.10	1.0265	0.00200	182.90	1.0120	0.00140
46.40	1.0210	0.00170	67.20	1.0203	0.00220			