Lt. Nicholas J. Quartemont,

First, thank you for trying Monaco/MAVRIC.

Geometry error reporting in KENO and MAVRIC is not real good (it is old), so here are some tips. When you look at the output file, you get some messages like:

```
  ***** error ***** sggp message number k6-089 follows:
  volume has been multiply defined.
   generation = 0   neutron = 0   unit =1

  particle at position  x= 6.00803E-01   y=-5.27310E+00   z=
2.76269E+01

  is located inside the following regions in the unit:
     9 T
       10 T
```

This isn't helpful unless you know that internally, the KENO geometry numbers the media, hole, and array objects sequentially from the beginning of the input file. With the numbering in your comments, perhaps you already knew this. In your case, the error message means that the media records

```
' Al Foil 2
       zCylinder 513 2.004 21.1405 21.13794
' HEU Foil
       zCylinder 514 2.004 21.1456 21.14048
  …
' 9 Al Foil
       media 6 1 513
' 10 HEU Foil
       media 9 1 514
```

overlap (just by a hair!). So, you need to either adjust the boundaries in the zcylinder descriptions or subtract one body away from the other, like this:

```
' 9 Al Foil
       media 6 1 513
' 10 HEU Foil
       media 9 1 514   -513
```

Of course, you will have to correct these overlaps in a way that makes physical sense. Also note that your numbering gets off after media 50.

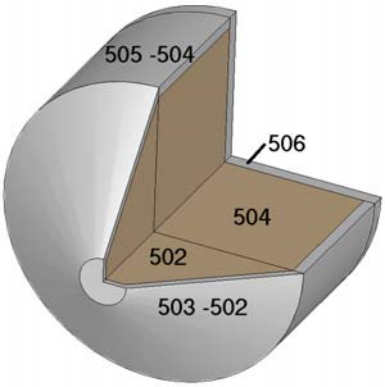
As to your comments and questions:

*1.Media records not intuitive* – Well, this is standard CSG (combinatorial solid geometry). Think of the spheres, cylinders and cuboids as 3-D shapes. You then define which material goes into what shape, or into the intersection of several shapes. There are lots of examples in the KENO-VI and CSAS-6 sections of the manual.

*2. Each surface needs a boundary in each direction* – not sure what you mean. "Media" cards fill an intersection of a given number of shapes with a material. A 'unit' has a boundary. Units can hold other units. Only in the outer most unit does the boundary act as a particle killer.

Just using the outer portions of your geometry, you have:

```
cone      502  13.00 15.52   1.81 6.5      Inner Cone
cone      503  14.00 15.52   2.19 6.0      Outer Cone
zCylinder 504  13.00   28.82 15.52         Inner Cylinder
zCylinder 505  14.00   28.82 15.52         Outer Cylinder
zCylinder 506  14.00   30.02 28.82         Cover
sphere    544  63.75                       Kill Radius

media 16 1  502                           Bottom Cone
media 16 1  504                           External Cylinder
media 1 1  503 -502                       Front Cone
media 1 1  505 -504                       Main Body
media 1 1  506                            Back Cover
media 0 1  544 -503 -505 -506             Chamber Fill
```




The outer cone is 503 -502, which in English is “inside 503 and outside 502” or “in 503 not in 502”. Looking at your input, it seems like you have the gist of it. Note that the inside and outside is reverse of what MCNP uses. Blame MCNP – KENO is older!

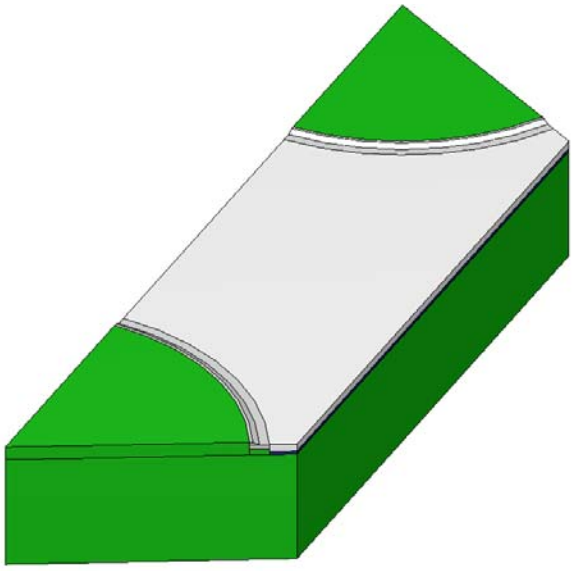
As you define new things, you have to subtract them away from what surrounds them.

Some tips:
1. No need to run csas-mg and paste its results into a Monaco input. You can use MAVRIC and do it in one shot.

```
=mavric
ETA Experiment
v7-27n19g
read compositions
    wtptAl6061  1 2.65 28 12024 7.7949e-01 …  1 300 end
    …
    Nitrogen      16 den=1.38 1 300 7014 99.61   7015  0.38982 end
end composition

read geometry
    global unit  1
        …
    boundary 544
end geometry

read definitions
        …
end definitions

read sources
        …
end sources

read tallies
        …
end tallies

read parameters
        …
end parameters

end data
end
```

2. You don't need to group the basic shapes (spheres, cylinders and cuboids) together and the group all the media cards together (unless you want to mimic MNCP). If it helps you construct the geometry, you can list a few of the basic shapes and then combine together and fill them with materials with media cards. Here is an example of a piece of roadway (with air above made invisible):

```
unit 812
   cylinder 1   746.76   431.8 384.81   origin x=-2484.12 y=1356.36
   cylinder 2   807.72   431.8 421.64   origin x=-2484.12 y=1356.36
   cylinder 3   807.72   421.64 406.4   origin x=-2484.12 y=1356.36
   cylinder 4   807.72   431.8 384.81   origin x=-2484.12 y=1356.36

   cone 5   746.76 436.88   787.4 416.56   origin x=-2484.12 y=1356.36

   media 10 1   1
   media 9 1   2 -1 5
   media 17 1   2 -1 -5
   media 9 1   3 -1
   media 10 1   4 -1 -2 -3

   cylinder 11   746.76   431.8 384.81   origin x=-2484.12 y=-1356.36
   cylinder 12   807.72   431.8 421.64   origin x=-2484.12 y=-1356.36
   cylinder 13   807.72   421.64 406.4   origin x=-2484.12 y=-1356.36
   cylinder 14   807.72   431.8 384.81   origin x=-2484.12 y=-1356.36

   cone 15   746.76 436.88   787.4 416.56   origin x=-2484.12 y=-1356.36

   media 10 1   11
   media 9 1   12 -11 15
   media 17 1   12 -11 -15
   media 9 1   13 -11
   media 10 1   14 -11 -12 -13

   cuboid 21   -2484.12 -1701.8   1356.36 -1356.36   2032.0 0.00
   cuboid 22   -2484.12 -1701.8   1356.36 -1356.36   421.64 0.00
   cuboid 23   -2484.12 -1701.8   1356.36 -1356.36   396.24 0.00
   cuboid 24   -2484.12 -1701.8   1356.36 -1356.36   384.81 0.00

   media 17 1   21 -22 -4 -14   -2 -12
   media 7 1   22 -23 -4 -14
   media 22 1   23 -24 -4 -14
   media 10 1   24  -4 -14

   plane 31   xpl=-1356.36 ypl=-2484.12 con=0
   plane 32   xpl=-1356.36 ypl=2484.12 con=0
boundary 21  31 32
```



The first part (blue) is the thin curved piece of soil and the curb at the top right. The second part (red) is the other curb. The green part is the main piece of road, the gravel under it and the large piece of soil. The boundary is the biggest cuboid and two planes to cut the angled portions. Grouping things helps me build stuff up easier.

Hopefully some of this helps.
Douglas