# E71_CEFR_main_72assy_250C_CR_0700mm.py

Overall notes:

- There are a number of commented lines. These should be removed so they don't confuse learners.
- I had to change the temperature settings in OpenMC to get the model to load by adding:

```python
settings_file.temperature = {'method': 'nearest',
                             'multipole': True,
                             'tolerance': 300}
```

Was a custom data library being used to generate the report data?
After making these changes I got a k-eff of 1.00021 +/- 112 pcm, which is statistically similar to the eigenvalue listed in the report.

- The flow of the file may be a little easier to follow if the surface definitions are closer to the cell definitions. I'd recommend placing the material definitions before the surfaces to remedy this.
- It looks like there are some redundant surfaces in the model. I would recommend either removing those in the code itself or by specifying `remove_surfs=True` when exporting the geometry to XML.

```python
cyl_CR_HCO_OU = openmc.ZCylinder(x0=0, y0=0, r=2.61076,
name='cyl_CR_HCO_OU') # Head connector outer radius
...
cyl_CR_LSH = openmc.ZCylinder(x0=0, y0=0, r=2.61076, name='cyl_CR_LSH') #
Lower shielding inner radius
```

- Just to shorten up some of the pincell definitions. The lines

```python
p_FU_LGP = openmc.Universe()
p_FU_LGP.add_cells([
c_FU_LGP1,
c_FU_LGP2,
c_FU_LGP3
])
```

could become

```
p_FU_LGP = openmc.Universe(cells=[
c_FU_LGP1,
c_FU_LGP2,
c_FU_LGP3
])
```

- There are a lot of numbers that might be more clear as variable names. The pincell hex lattice pitch being one of those values.

- The `HexLattice` universe definitions look really nice.

- Line comments:

  - L65: There are many commented lines in the section containing surface definitions. If they aren't being used and don't contain helpful information, I'd recommend that they be removed.
  - L410-417: For the mixture materials that are created using one other material, I'd suggest using the `openmc.Material.clone` method and updating the name after.
  - L467: Setting the `openmc.Materials.cross_sections` attribute to a hard-coded path is going to cause a problem. I'd suggest setting this attribute as if the cross sections are included in the same directory as the Python script and add a comment above that line on how to set the environment variable `OPENMC_CROSS_SECTIONS` in case the learner would prefer to do this instead.
  - L1975: Setting a `rotation` attribute on the hex lattice won't have any affect on the lattice's orientation. This can be set for a cell, but not a lattice.
  - L2824: It would be good to provide a comment on why these rotations are applied. Same in other areas of the code. If these rotations are being applied to correct the lattice orientation, I'd suggest simply changing the orientation when building the `HexLattice` object. (Docs [here](#)). This would make the code run more efficiently.
  - L4240: I'd recomment placing the comment on the group structure at the end of this array above this line for clarity.