Notes on Procedures for POWDERPUFS-V Calculations

1. Decide whether you are running an "instantaneous" or "reaction-rate-averaged" case, and whether it's a straight "burn" case, or a "burn + perturbation".

    Remember that "instantaneous" cases are appropriate to find the properties of one bundle, whereas "reaction-rate-averaged" cases are appropriate to find the average properties of the reactor.

2. Remember that the file name is of the form "xxxxxxx001.pin", where "xxxxxxx" is a 7-character label. Choose a file name which will remind you what calculation you are doing!

    My recommendation: start with a 5-character label which distinguishes the case uniquely, then make up the 6th and 7th characters as follows:

    "bi" for a "burn" case, "instantaneous" option
    "pi" for a "burn + perturbation" case, "instantaneous" option
    "br" for a "burn" case, "reaction-rate-averaged" option
    "pr" for a "burn + perturbation" case, "reaction-rate-averaged" option

    For example, if I were doing a case to **perturb** the fuel temperature to 900 ^{o}C, and I were interested in the **average reactor effect**, I would choose a file name such as ft900pr001.pin.

3. It's easiest to make up a new input file from a previous file. But be sure to give it a new name, and to change all the things that need to be changed.

4. Open and edit input files with Notepad, save the files with extension "pin" and as "all files" rather than as "text" files. All inputs must be aligned in 15-character-wide columns.

    Do not use "tab" to move from one column to another, use the space bar.

5. Open and edit the "pou" output file with WORD, remember to change the page setup to "Legal, Landscape", and resave the file as a WORD document (extension "doc").

6. To plot results:
    a) search for the page in the output file which has the multiplication constant k-infinity (search for character string "multip")
    b) highlight the table and copy it to an Excel file. Everything will be in one column (column 1). Change to multiple columns by choosing the options "Data", then "Text to Columns", then resize the columns to a good width.
    c) Open a new column and calculate "reactivity" from the "multiplication constant, at each irradiation.

d) Then you can plot reactivity against irradiation (exposure, fluence), if that's what you are asked to do.
e) Don't forget that in a perturbation run the output file will be twice as large, because it will have the "burn" results first, then the "perturbed" results. So you will find two pages when you search "multip".
f) If you need the burnup value, it is given [in MW.d/Mg(U)] in the 4th column of the page following the multiplication constant (this is the column with heading MWD/TONNE UMET).