SNAP/RADTRAD Exercise 1:

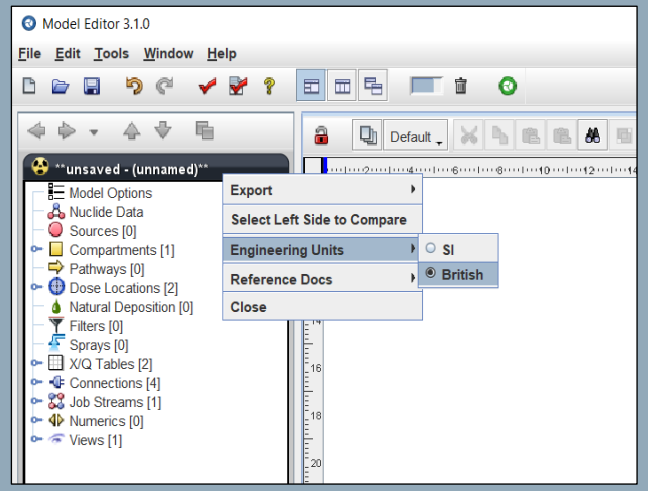
Building a Simple Fuel Handling Accident (FHA) Model

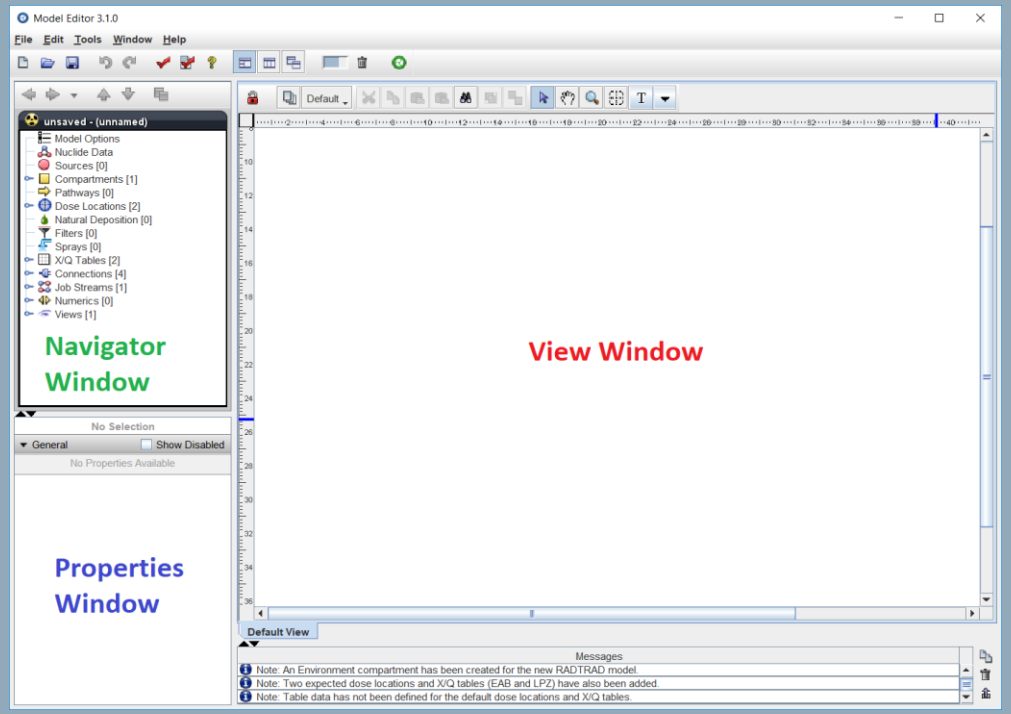
Fuel Handling Accident Overview

- A fuel assembly is assumed to be dropped and damaged
- No credit for containment isolation or pool filtration is taken
- A source from a representative PWR plant is used
- Simple model – a containment with a source, environment, and leakage pathway
- Doses examined at EAB and LPZ at end of accident

Step 1: Preliminary Setup

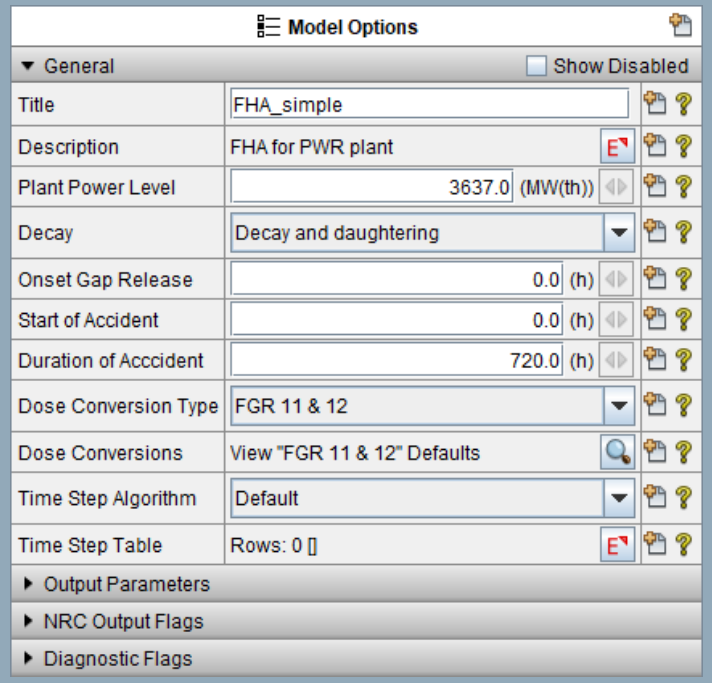
- Open the SNAP Model Editor:
- Select “Create a New Model” and choose RADTRAD
- Examine the SNAP interface and its three primary windows
- Verify that the model units are set to British by right clicking on the black title bar





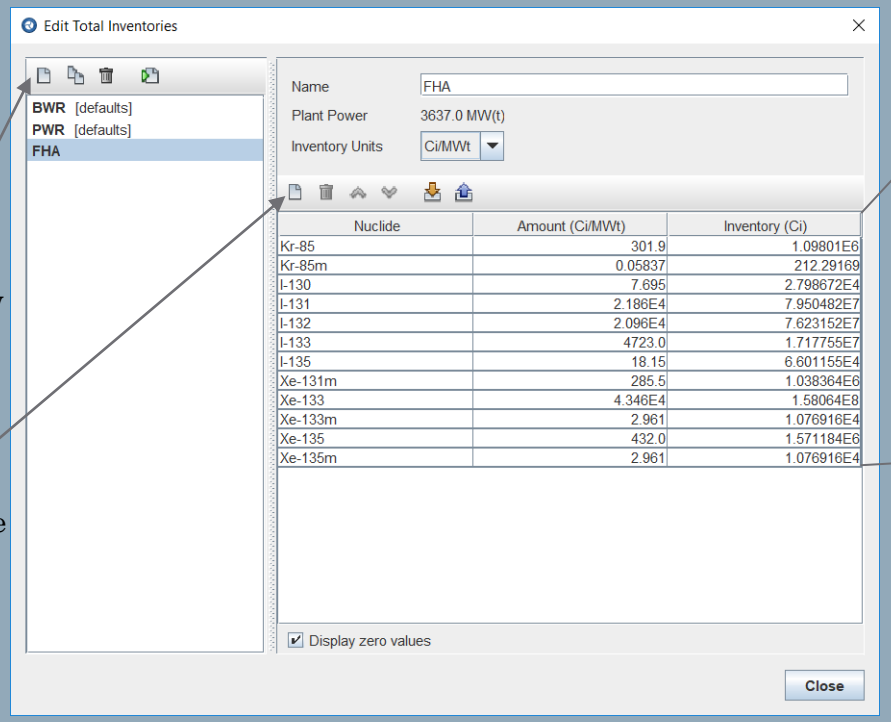
Step 2: Setting the Model Options

- Click “Model Options” in the Navigator Window
- Notice that the Properties Window now shows the “Model Options” input parameters
- Set the unknown values for the model as shown below:



Step 3: Setting the Nuclide Data

- Click “Nuclide Data” in the Navigator Window
- In the Properties Window, select the “Total Inventories” tab: 
- Create a new inventory and select the  icon to import the FHAInventory.icx file. If the file is not available, the nuclides and concentrations will need to be manually filled out.



create new inventory

add nuclide

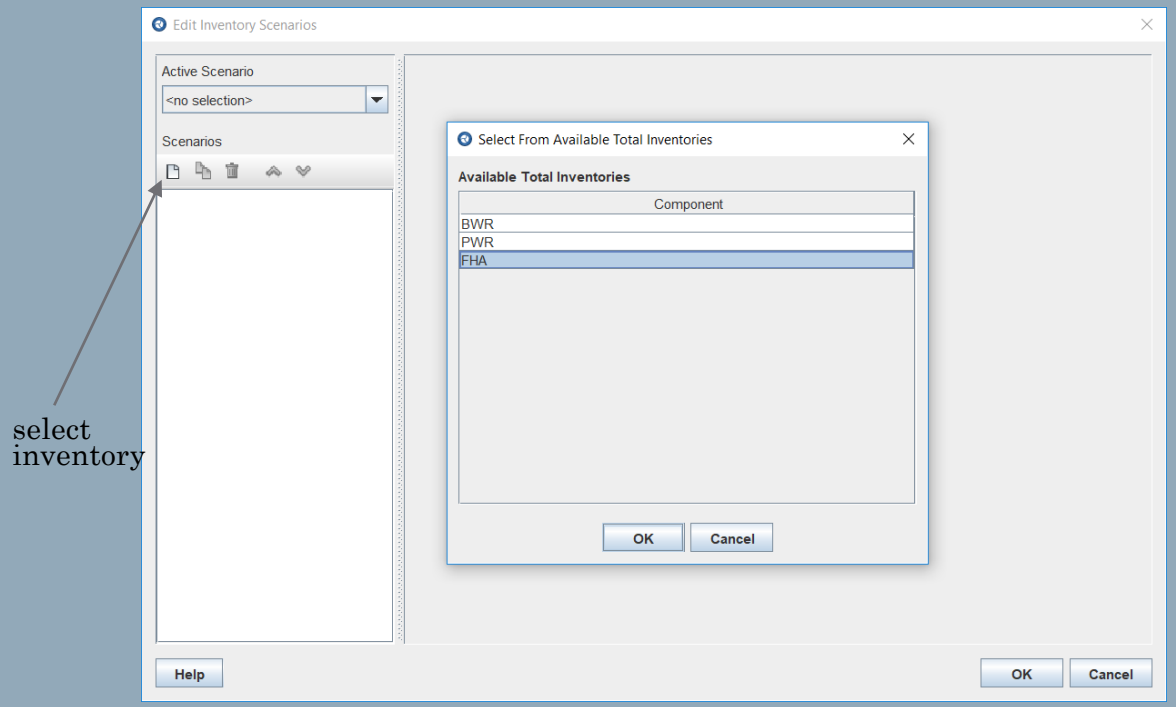
Nuclide	Amount (Ci/MWt)	Inventory (Ci)
I-130	7.695	2.798672E4
I-131	2.186E4	7.950482E7
I-132	2.096E4	7.623152E7
I-133	4723.0	1.717755E7
I-135	18.15	6.601155E4
Kr-85	301.9	1.09801E6
Kr-85m	0.05837	212.29169
Xe-131m	285.5	1.038364E6
Xe-133	4.346E4	1.58064E8
Xe-133m	2.961	1.076916E4
Xe-135	432.0	1.571184E6
Xe-135m	2.961	1.076916E4

Note: When adding nuclides, hold the ctrl key while clicking in order to select multiple at once.

Step 4: Setting the Source

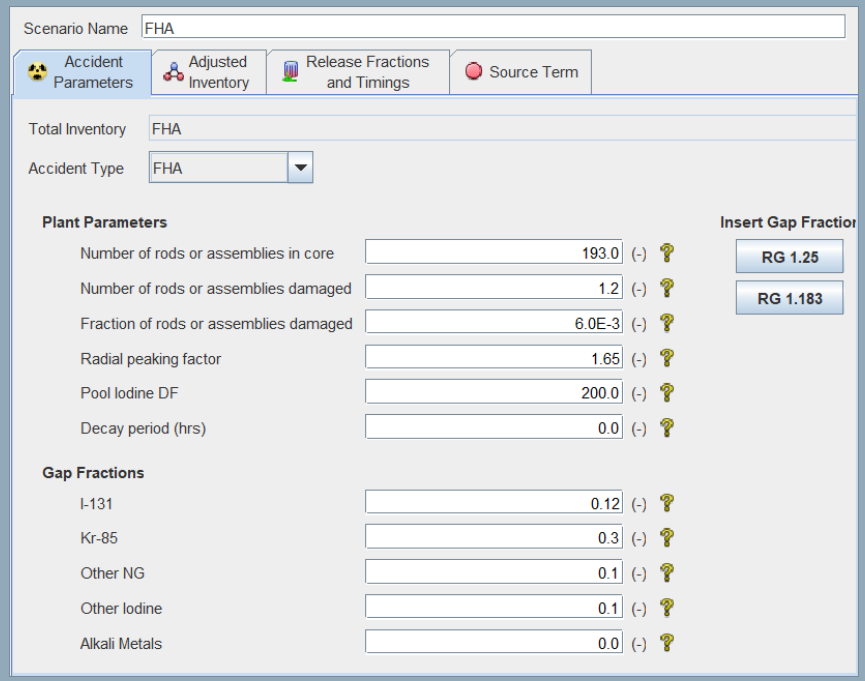
- Right click on “Sources [0]” in the Navigator Window and select “New”
- In the Properties Window, input the data to the right:
- Select the “Source Scenarios” tab ( ) and open the “FHA” inventory we created in the previous step.

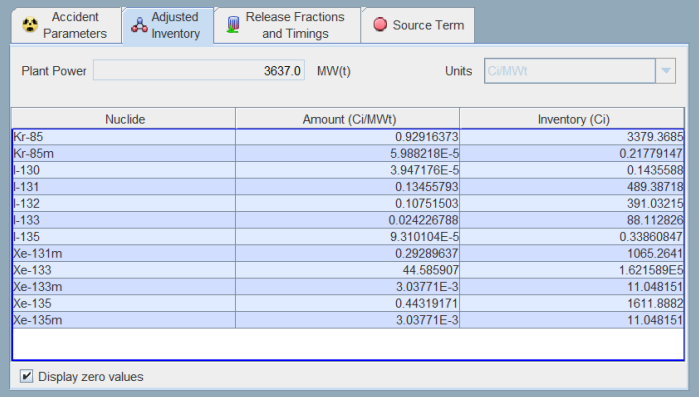
Source 1 (FHA source)	
General	Show Disabled
Name	FHA source
Component Number	1
Description	<none>
Source Scenarios	Invalid Values
Source Term Fraction	1.0 (-)
Iodine Physical Form	User Defined
Aerosol Fraction	0.0 (-)
Elemental Fraction	0.7 (-)
Organic Fraction	0.3 (-)
Compartments	

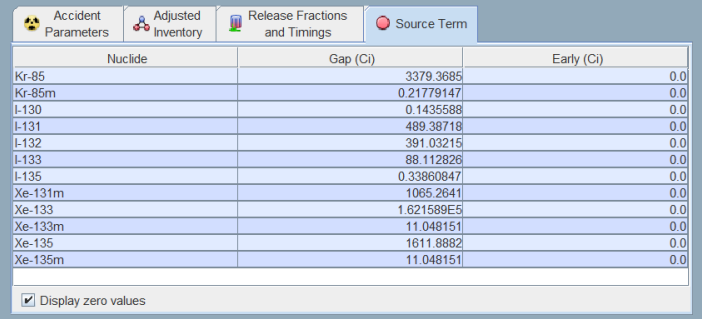


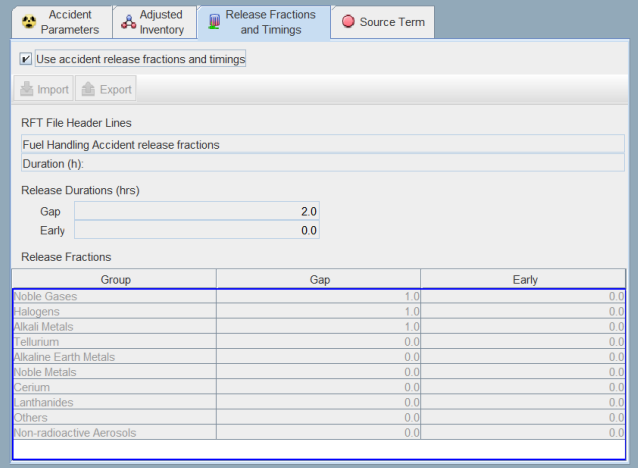
Step 5: Setting the Source (cont.)

- In the “Edit Inventory Scenarios” box, input the “Accident Parameters” data to the right:
- Also, verify that the other three tabs (Adjusted Inventory, Release Fractions and Timings, Source Term) contain the values shown below:



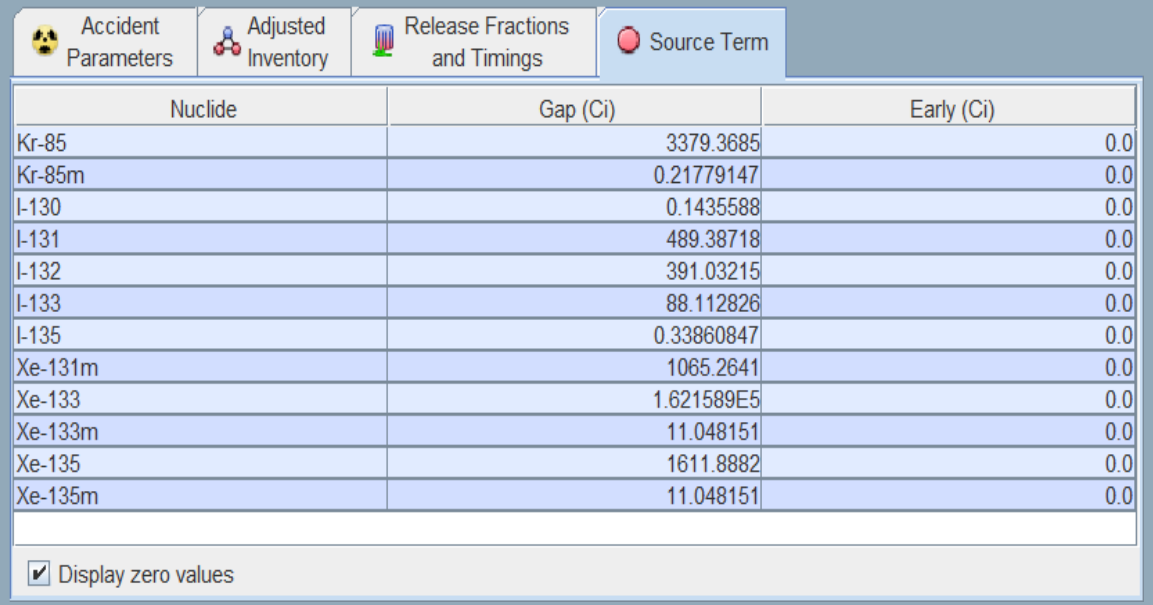


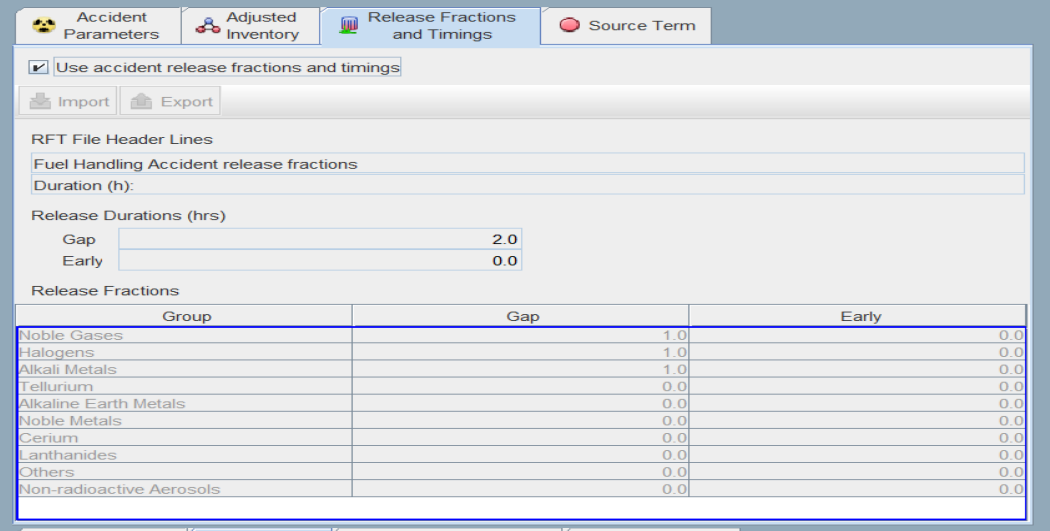


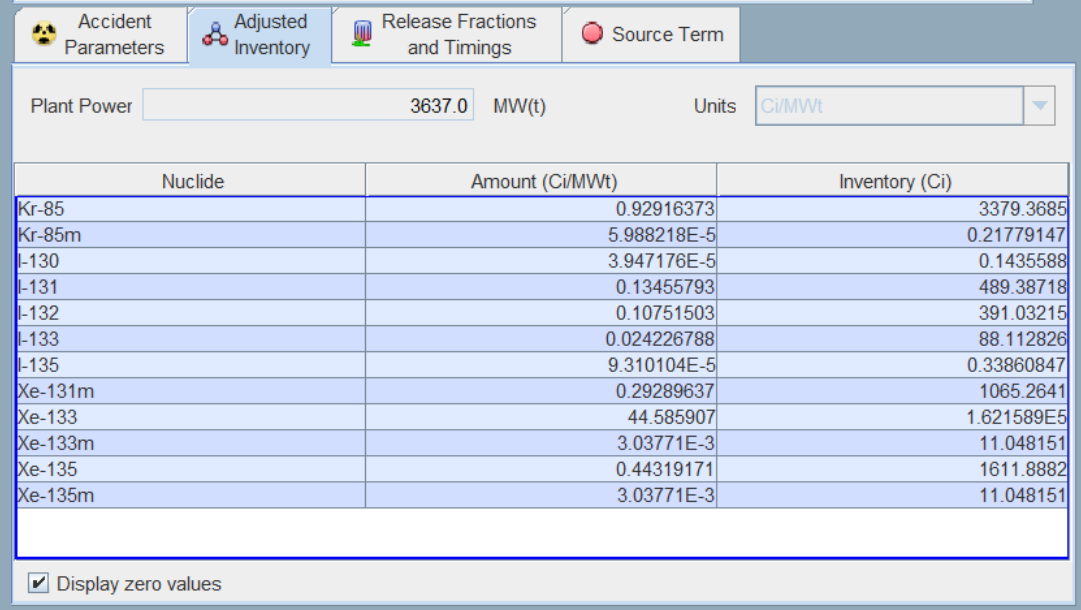


Step 5: Setting the Source (cont.)

- Also, verify that the other three tabs (Adjusted Inventory, Release Fractions and Timings, Source Term) contain the values shown:

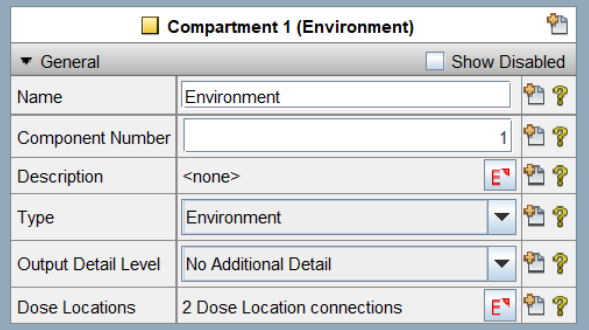


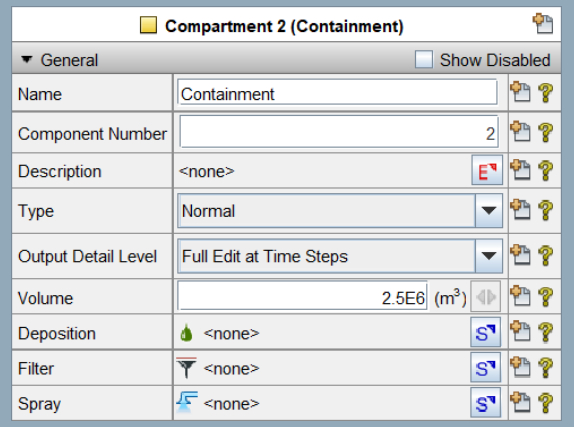


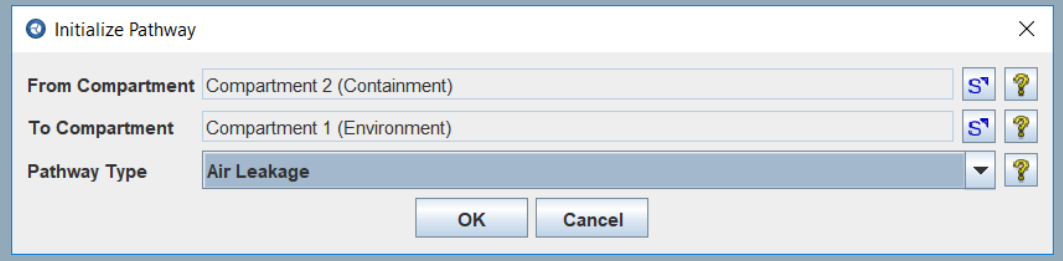


Step 6: Containment & Environment

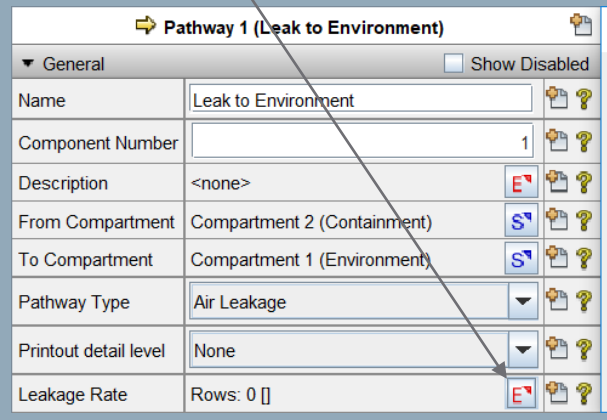
- Right click on “Compartments [1]” in the Navigator Window and select “New”. Note that there is already a compartment created for the environment.
- Set the “Containment” and “Environment” compartment as shown to the right:
- Create a new pathway in the Navigator Window in the same way you created a new compartment.
- Initialize the pathway as shown below, and set the inputs for the pathway as shown:

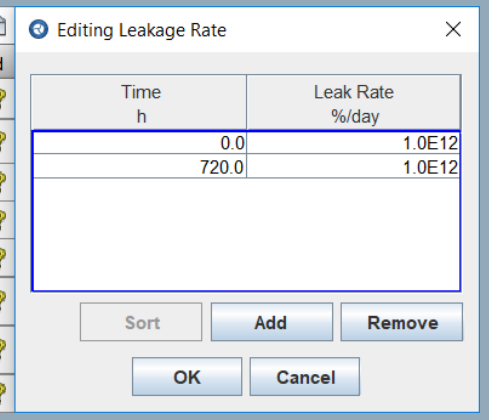






set leakage rates

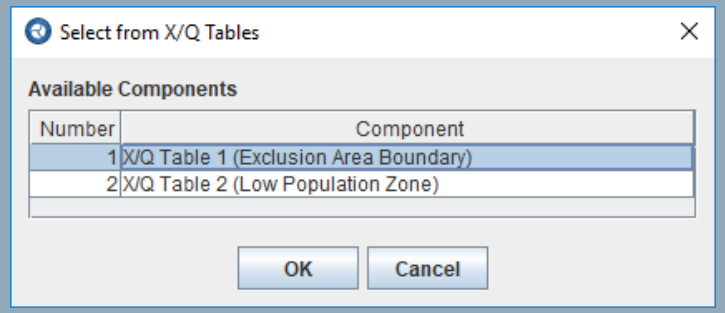




Step 7: Dose Locations

- Under “Dose Locations” in the Navigator Window, verify the breathing rates for the EAB and the LPZ to the right:
- Also, verify that each dose location points to the correct corresponding X/Q table.

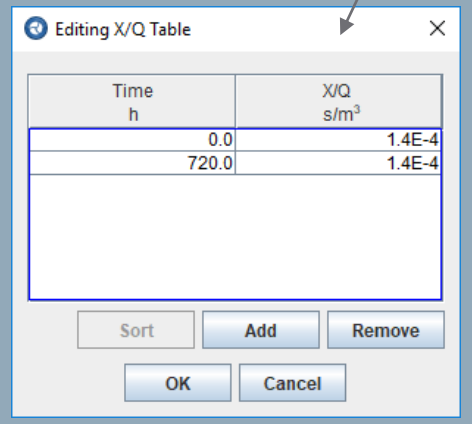
Time h	Breathing Rates ft^3/min
0.0	0.741608
8.0	0.3813984
24.0	0.4873424

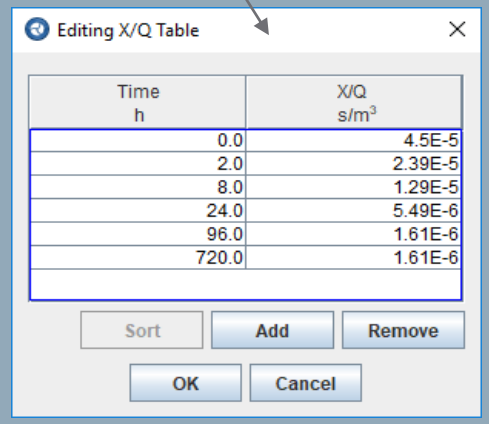


- The X/Q tables must be populated. Select these in the Navigator Window and set the following inputs:

EAB

LPZ

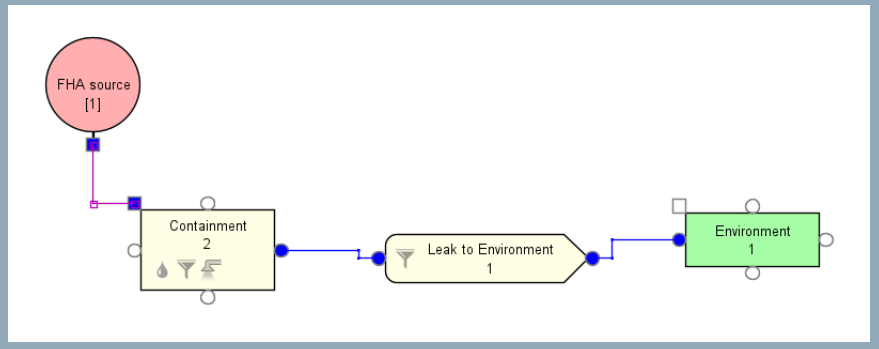




Step 8: Populating the View Window

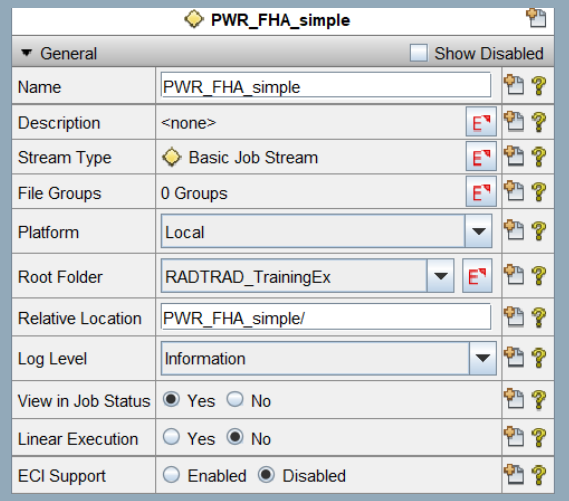
- So far, you have not been able to see your components in the View Window
- In the Navigator Window, right click on each of the components you created and click "Add to View" → "Default View"
- In the View Window, click and drag these components to your liking
- You will notice that the source is not connected to the containment. Connect these two components using the connection tool

- Left click the connection tool, and then left click on each square port – first the source and then the containment.
- Finally, your View Window should look as follows:



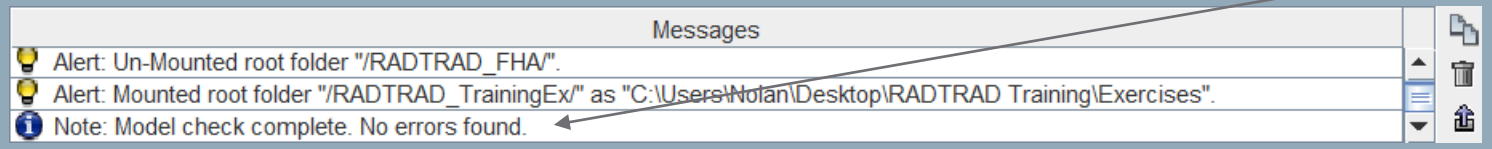
Step 9: Setting the Job Stream

- In the Navigator Window, under “Job Streams [1]”, select the “Simple_Stream”
- In the Properties Window, rename the “Simple_Stream” to “PWR_FHA_simple”
- Define the root and relative location on your machine, where the output files will be stored
  - Set the “Root Folder” to an accessible directory on your machine
  - The “Relative Location” will be a directory within the root directory
- The Properties Window for your job stream should look something like the image on the right:



- Run a model check by clicking the red check mark at the top of the model editor

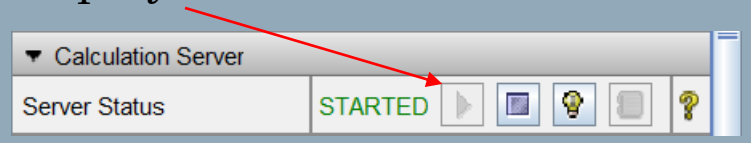
- If there are errors, a window will open listing deficiencies



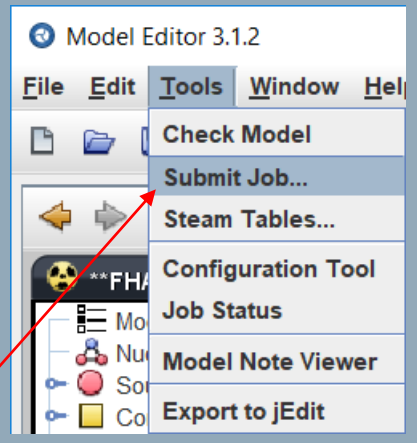
no errors found

Step 10: Running the Simulation

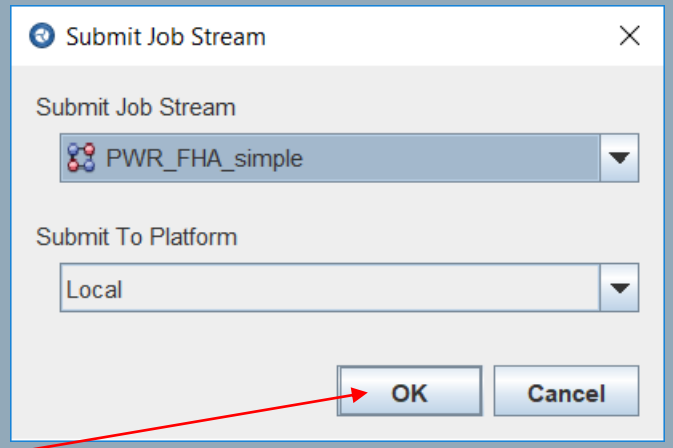
- Prior to running the exercise, be sure that the SNAP Configuration Tool is running
- Open the Configuration Tool:
- Click the play button on the “Server Status” tab and then close the Configuration Tool.



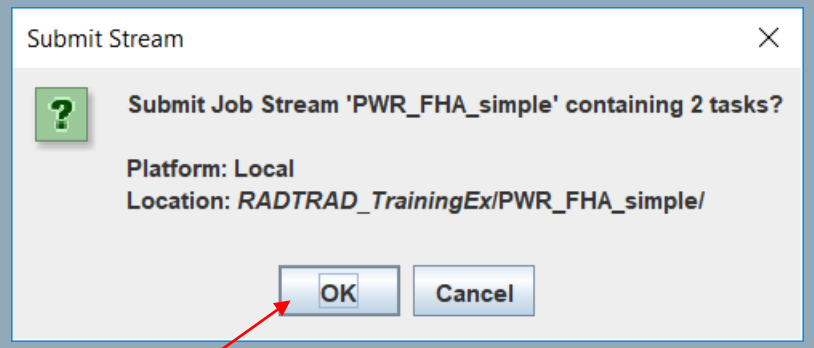
- In the Model Editor, submit the job by following the images below. A SNAP Job Status window will appear – wait and allow the case to complete.



submit job under “Tools”



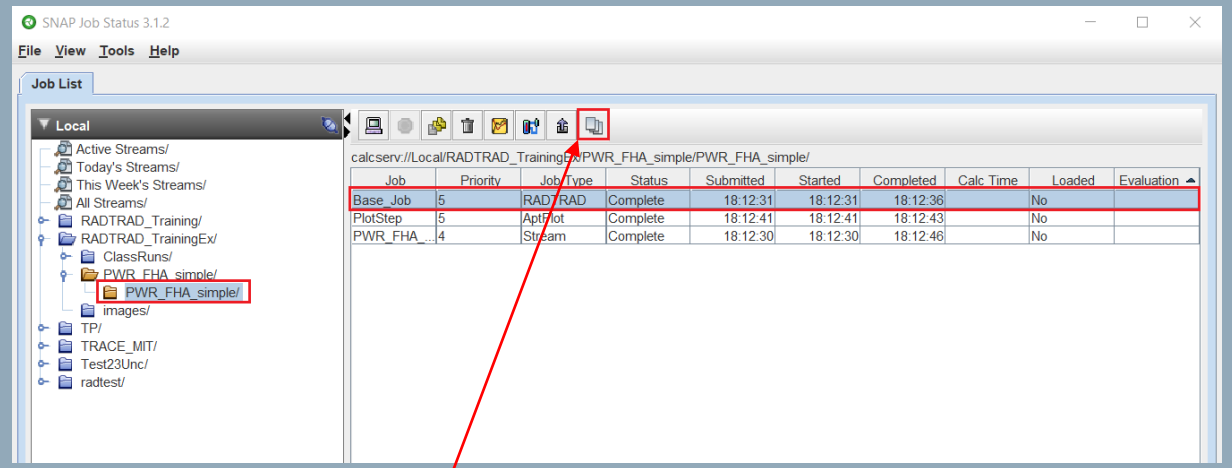
click okay



click okay

Step 11: Checking Results

- Check the results in the job status window



click to open
radtrad.out text file