TRANSPORTATION ACCIDENT

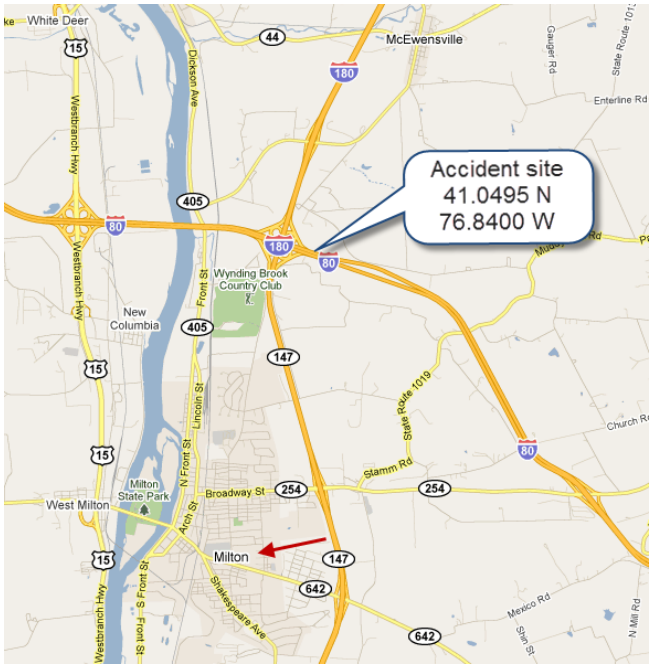
Part of the RASCAL Instructor-led Training

What do you do if the release is at a location that is not part of the RASCAL facility database?

Use the option on Event Location to Describe a Site not in the Database.

As a minimum you will need the latitude and longitude of the accident location.

TRANSPORTATION ACCIDENT - SCENARIO



At 02:00 a tractor trailer truck crashed in central Pennsylvania near the intersection of I-80 and I-180 when the driver lost control on the icy road.

Transportation Accident - Scenario

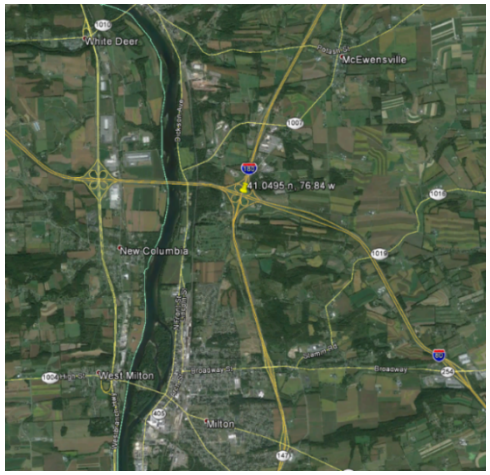
The truck manifest says it was carrying 5,000 TBq of tritium gas and was bound for the Safety Light facility in Bloomsburg, PA. State highway patrol reports that the trailer slid at high speed into a bridge support and split open.

Reports from the scene are that the weather is cold, but the precipitation had stopped and the winds are very light.

TRANSPORTATION ACCIDENT - SCENARIO

For this problem, assume that the following site information has been obtained:

Nearby population	Accident Location Information
City: Milton	Time Zone = Eastern
County: Northumberland	Latitude = 41.0495° (positive latitude is north)
State: Pennsylvania	Longitude = -76.8400° (negative longitude is west)
Country: United States	Elevation = 153 meters



Transportation Accident - Scenario

The licensee estimates that 10 percent of the containers may have ruptured and that most of their contents are likely to leak out within 10-20 minutes and would quickly volatilize and become airborne.

TRANSPORTATION ACCIDENT - SCENARIO

What are the doses (TED) to persons and the first responders in the immediate vicinity of the crash (0.16 and 0.32 km)?

What are the doses (TED) to nearby residents in the vicinity of the crash (0.8 and 1.6 km)?

Dose Type	Distance from Release (km)			
	0.16	0.32	0.8	1.6
TED (Sv)				

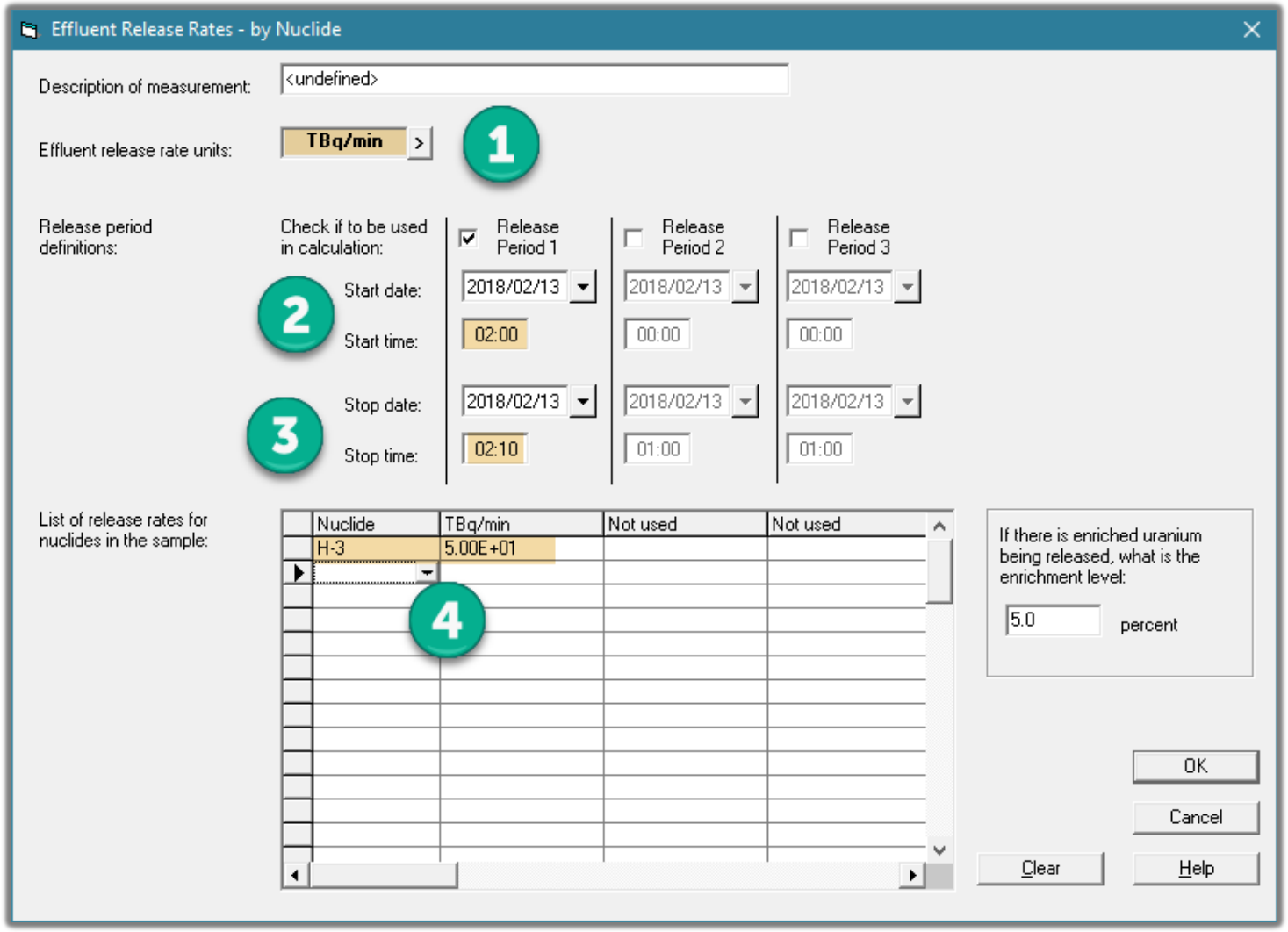
One way to work the problem is as follows:

- Event type
  - Not a nuclear power plant, spent fuel, or fuel cycle accident
  - That leaves Other Radioactive Material Releases
- Event location
  - Select the option for Define a Site not in the Material Database
  - Enter a name, city, state, time zone, latitude, longitude and elevation.

Next, figure out how to define the source term and release pathway.

- Recall the data you have been given about the release
  - Inventory = 5,000 TBq
  - 10% released in 10 minutes
- You have an amount and a time so we could define a rate.

Select and fill-in the option for Effluent Release Rates – by Nuclide



Details on filling in the Source Term screen

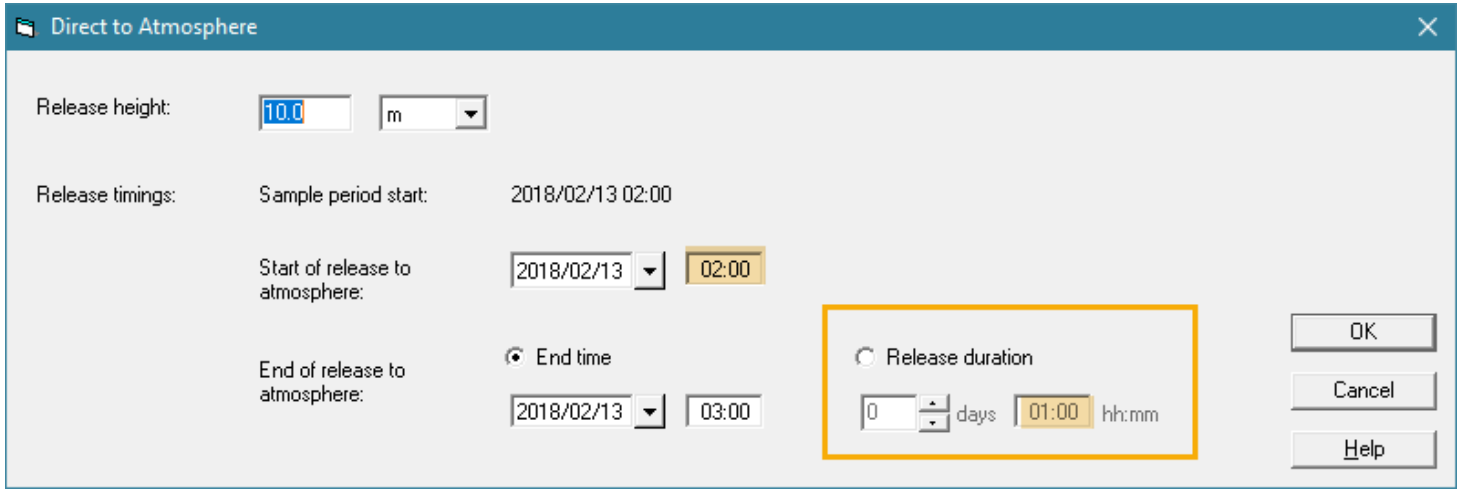
- The default release rate units are in µCi/s. Change it to TBq/min.
- Set the release start time to the time of the accident: 02:00
- Set the stop time to 02:10. That defines the release period duration to be 10 minutes.
- Finally, enter H-3 as the nuclide and set a TBq/min release rate value of 50. (That gets 10% of the 5000 out over the 10 minutes)

STILL NEED TO PROVIDE RELEASE PATHWAY INFORMATION

Leave release height at the default of 10 meters.

The start of release defaults to the source term start.

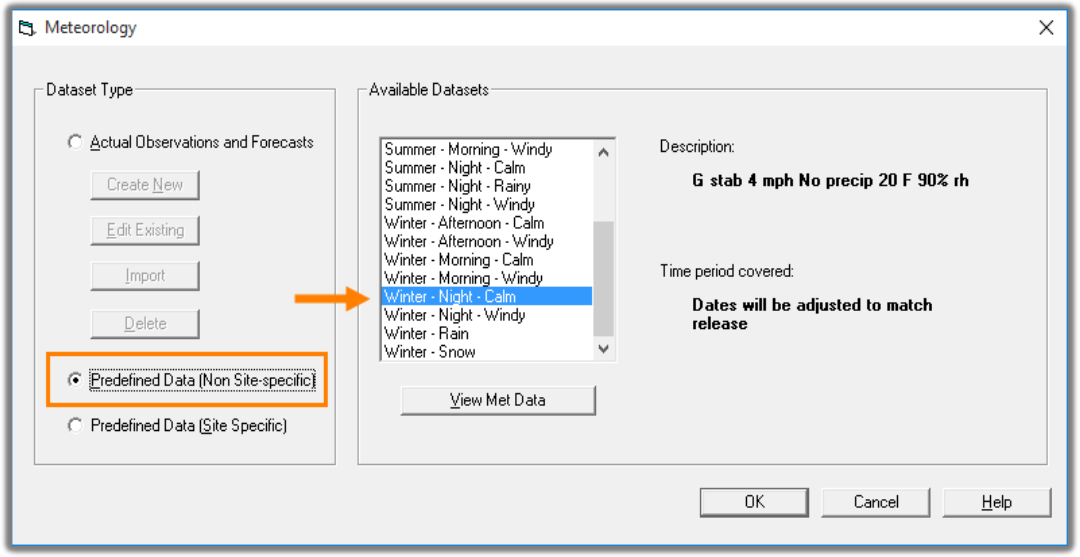
Set the release duration to match the 10 minutes of the single source term defined.



METEOROLOGICAL DATA

No wind speed or direction have been provided. For a quick assessment we can make use of the predefined meteorological datasets.

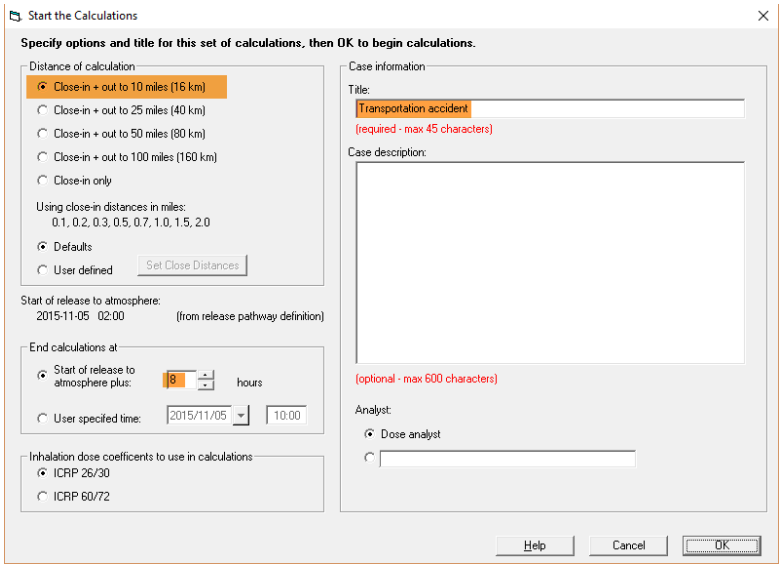
Winter – Night – Calm would be a logical choice



SET THE FINAL PARAMETERS AND START THE CALCULATIONS

Distance to 16 km is fine; we do not expect doses at long ranges.

The default 8h calculation duration is more than enough for this 10 minute release with 4 mph winds



PROBLEM CONCLUSION

From the source term summary screen, we can confirm that 5.0E+14 Bq (or 500 TBq) of tritium were released.

Then on the maximum dose values screen we see the following doses:

Dose Type	Distance from Release (km)			
	0.16	0.32	0.8	1.6
TED (Sv)	4.5E-04	2.2E-04	9.5E-05	5.5E-05

PROBLEM CONCLUSION

RASCAL has the flexibility to model these type accidents.

You just need to take what you know, make some assumptions, and find the best fit to define the release.