Technical Tidbit
Shelter in Place

Sheltering in Place – does it work and when should it be used? A chemical spill has just occurred or is imminent. A toxic cloud results. Basically the idea of shelter in place is to go inside, close windows, doors and shut off any ventilation that exchanges outside air with the inside air before the toxic cloud reaches the shelter structure. If the toxic vapor cloud is relatively short in duration, the concentration an individual would be exposed to will be reduced over the period the toxic cloud passes past the shelter, i.e., the dose (concentration over time) is reduced. The individual(s) continue to breath the air confined or trapped in the shelter before the toxic cloud has reached the shelter while the toxic cloud passes. Taping the windows and door seams of an interior room where occupants remain until and all-clear signal is received can enhance the air tightness of the shelter.

The PEAC system provides the ability to calculate Protective Action Distances (PAD) using its built-in dispersion model or providing access to the US DOT Emergency Response Guidebook's (ERG2000) "green pages" information. Sometimes evacuation is not the best option because there may not be time to evacuate. In many cases Sheltering in Place will provide the best protective option to the public downwind or near a hazardous material spill that produces a toxic vapor cloud.

To answer the two questions above, first – does it work? ***YES***! It does work and there are numerous instances where it has been used and the action has saved many lives and preserved the health of even more people that would have been exposed. In some tests the concentration has been reduced inside a shelter to 1/30 and even 1/100 of the outside concentration.

To answer the second question – when should it be used? That is a more difficult question, and there are models that have been developed that try to answer that question in a very straightforward manner. The biggest problem is that there are some assumptions that have to be made (as with all models) and some of these assumptions can make significant differences in the outcome or prediction. Not all buildings have the same air exchange rate although testing has developed exchange rates for different types of structures. Another problem that can arise in an incident, are all the buildings in an area of the same type and do they have the same air exchange rate. If they are different, how do I decide which rate to use?

A article on the topic was developed by the **National Institute for Chemical Studies** and is titled ***Sheltering in Place as a Public Protective Action*** at the following Internet site: http://www.nicsinfo.org/SIP%20Center.htm. To quote from the article "The body of

evidence suggests that if there is insufficient time to complete an evacuation, or the chemical leak will be of limited duration, or conditions would make an evacuation more risky than staying in place, sheltering in place is a good way to protect the public during chemical emergencies." The discussion provides examples where the Shelter in Place action has been used and some of the results from previous testing conducted by different federal agencies. The article also provides (in Appendix A) a list of easy to follow instructions on how to Shelter in Place.