## Let's Take a PEAC at PEAC


An example using the PEAC tool: Hydrogen Chloride is a common chemical and is normally seen as an aqueous solution that is typically labeled as Hydrochloric Acid. The concentration can vary depending on the ultimate for which the agent will be used. As most mineral acids, it is very corrosive and should always be handled with care and proper CPC should be utilized if exposure to the Hydrochloric Acid is possible.

Hydrogen Chloride is also produced and shipped as a liquefied gas under its own vapor pressure. In this form, it is referred to as "Hydrogen Chloride, Anhydrous", the anhydrous means it is not in solution with water.

As a strong acid, it has a number of industrial purposes. An important use is the dissolving of certain metals, for this reason hydrochloric acid is used extensively in the industrial processing of metals and in the concentration of some ores. It is also used in the production of vinyl, cotton, and for etching semi-conductor crystals.

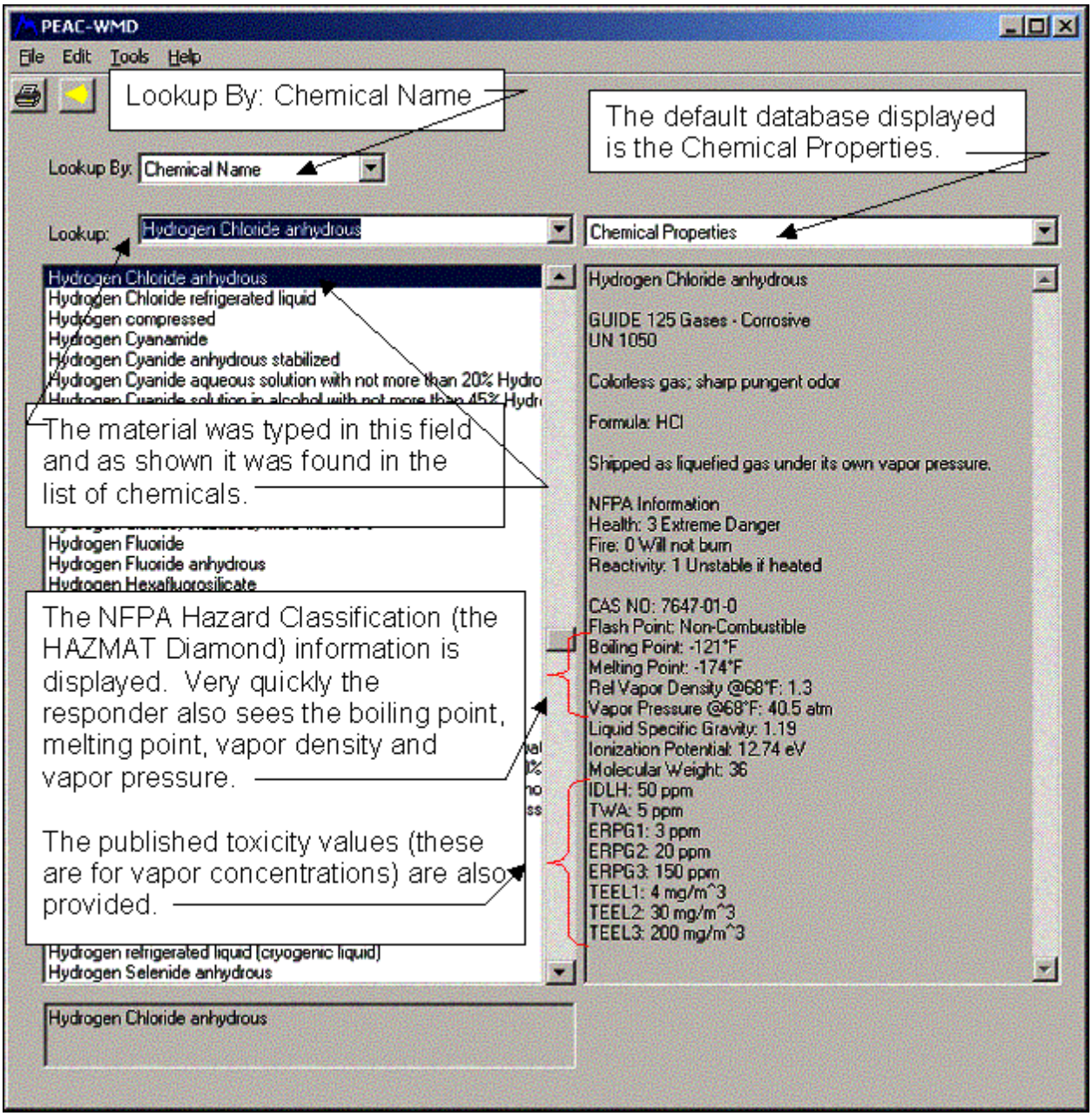
Anhydrous Hydrogen Chloride by itself is not corrosive, but it will react with any moisture present to form concentrated Hydrochloric Acid. Therefore, an individual exposed to Anhydrous Hydrogen Chloride must be properly protected, both to prevent inhalation and contact with the skin or eyes. In either situation, the moisture present on the skin or eyes will immediately form Hydrochloric Acid that will lead to severe burns and potentially long term effects. The inhalation will lead to reaction with moisture in the airways and , which can lead to long-term health effects or even death.

An interesting sidelight about Anhydrous Hydrogen Chloride is that it is controlled by the DEA (Drug Enforcement Administration) because of its potential use in the manufacturing of Methamphetamine. A domestic threshold of zero (0.0 kilograms) for anhydrous hydrogen chloride became effective September 1, 2000, by a Final Rule published on August 2, 2000 (65 FR 47309). Although the threshold for anhydrous hydrogen chloride is established at 0.0 kilogram, DEA has concluded that certain transactions in anhydrous hydrogen chloride are not sources for diversion. The Final Rule establishing a zero threshold for anhydrous hydrogen chloride also provided exemption, on an interim basis, from the record keeping and reporting requirements for: (1) domestic transactions involving pipeline distributions; and (2) domestic distributions of 12,000 pounds (net weight) or more in a single container.

For those not familiar with the PEAC application and its various features, the following is a brief description of how information can be displayed in the PEAC application. There are multiple methods to find a hazardous material, it can be searched for by: (1) name, (2)

UN#, (3) CAS#, or if it is known to be in a certain class of materials, it can be searched by selecting a Quick Filter. Once the material is found, there are multiple databases that can be displayed on the screen. The default database always displayed is the Chemical Properties information.

The following discussion provides screen captures from ***PEAC-WMD 2002 for Windows*** application while viewing some of the information available for Anhydrous Hydrogen Chloride.

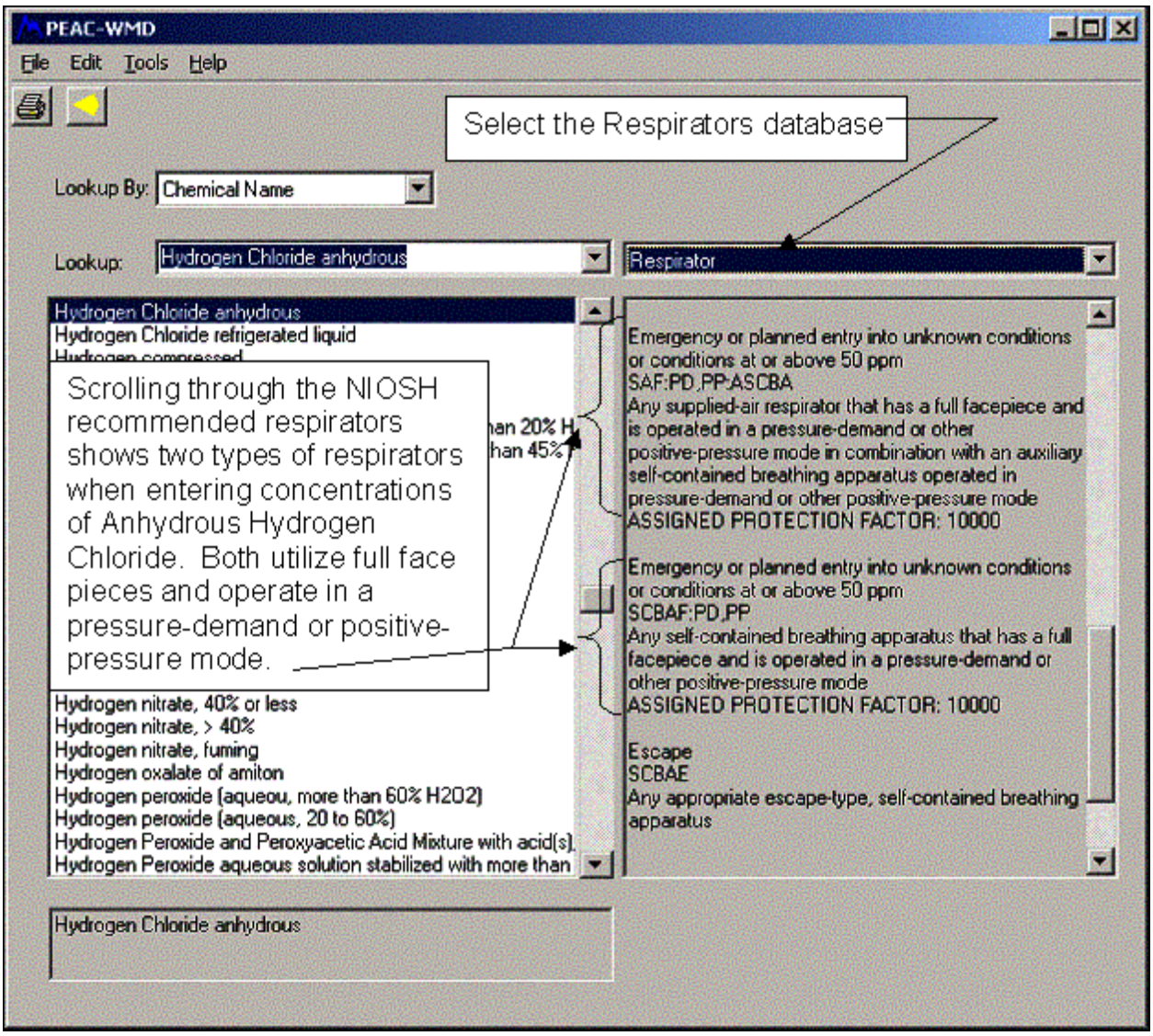



The Chemical Properties database screen provides the responder with the basic information required to start developing a plan of attack on the problems that may be encountered in dealing with Anhydrous Hydrogen Chloride. One concern is that the material is going to be released as a gas and form a vapor cloud.

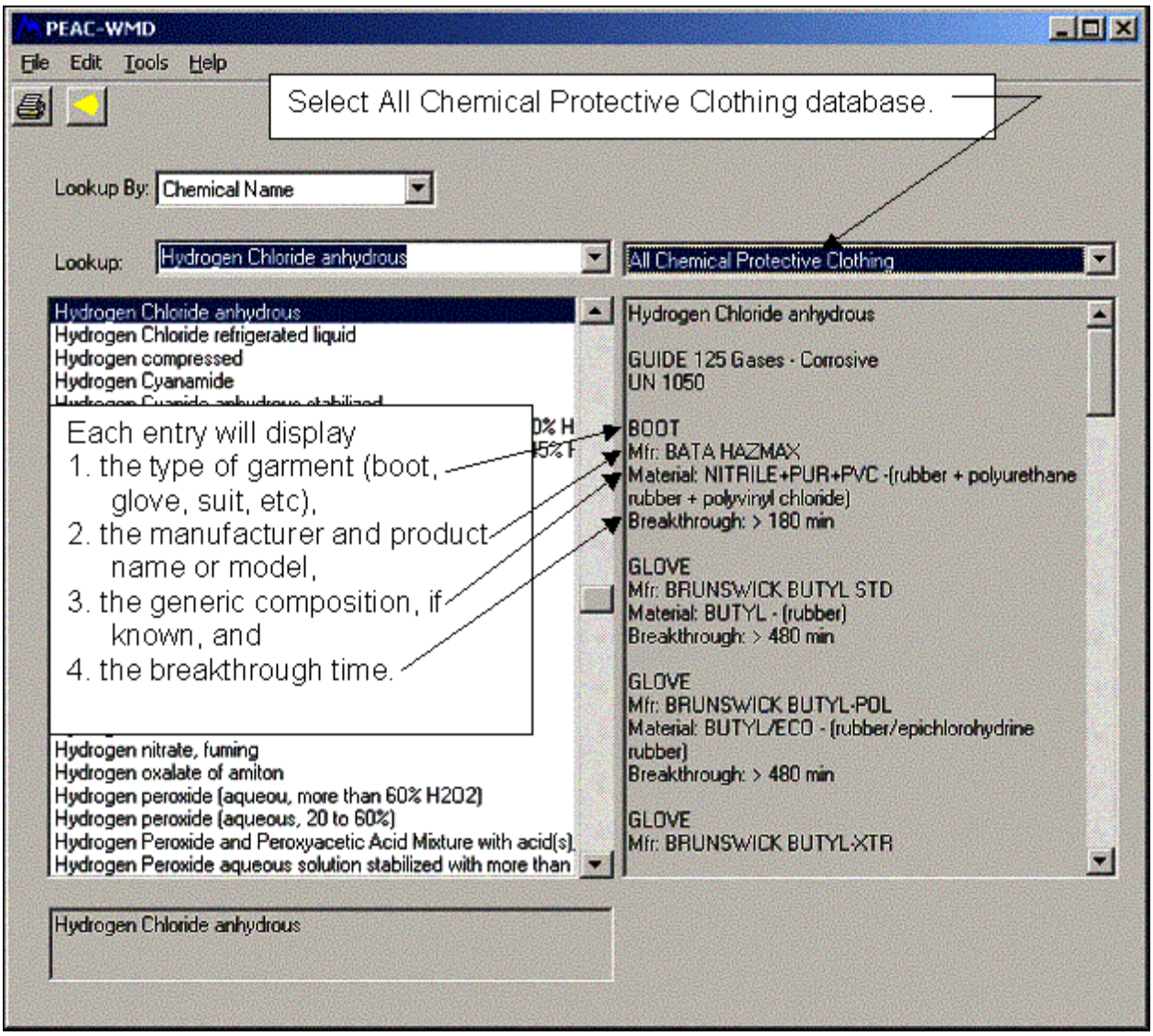
This is obvious from observing a couple of different pieces of information found on the above screen capture. First, the material is shipped as a liquefied gas under its own vapor pressure plus it has a vapor pressure of 40+ atmospheres at 68°F. In addition, the boiling point is –121°F so any material released is going to be released as a vapor or it will flash to a vapor very quickly if released as a liquid.
Secondly, the vapor cloud is going to behave as a dense-gas or heavier-than-air. This is should be evident for two reasons: (1) the relative vapor density is 1.3 since the molecular weight is 36 compared to air which is approximately 29, and (2) as we have already seen, the material has a very low boiling point (–121°F), therefore when the material is released from its container, particularly if released as a liquid, it will flash to a vapor, and cool the resulting vapor causing it to exhibit a dense-gas behavior.

Third, the material is toxic (with an IDLH of 50 ppm) therefore respiratory protection is mandatory. As discussed earlier, because of its reactivity with water or moisture, proper selection of CPC is also critical for protecting response personnel.

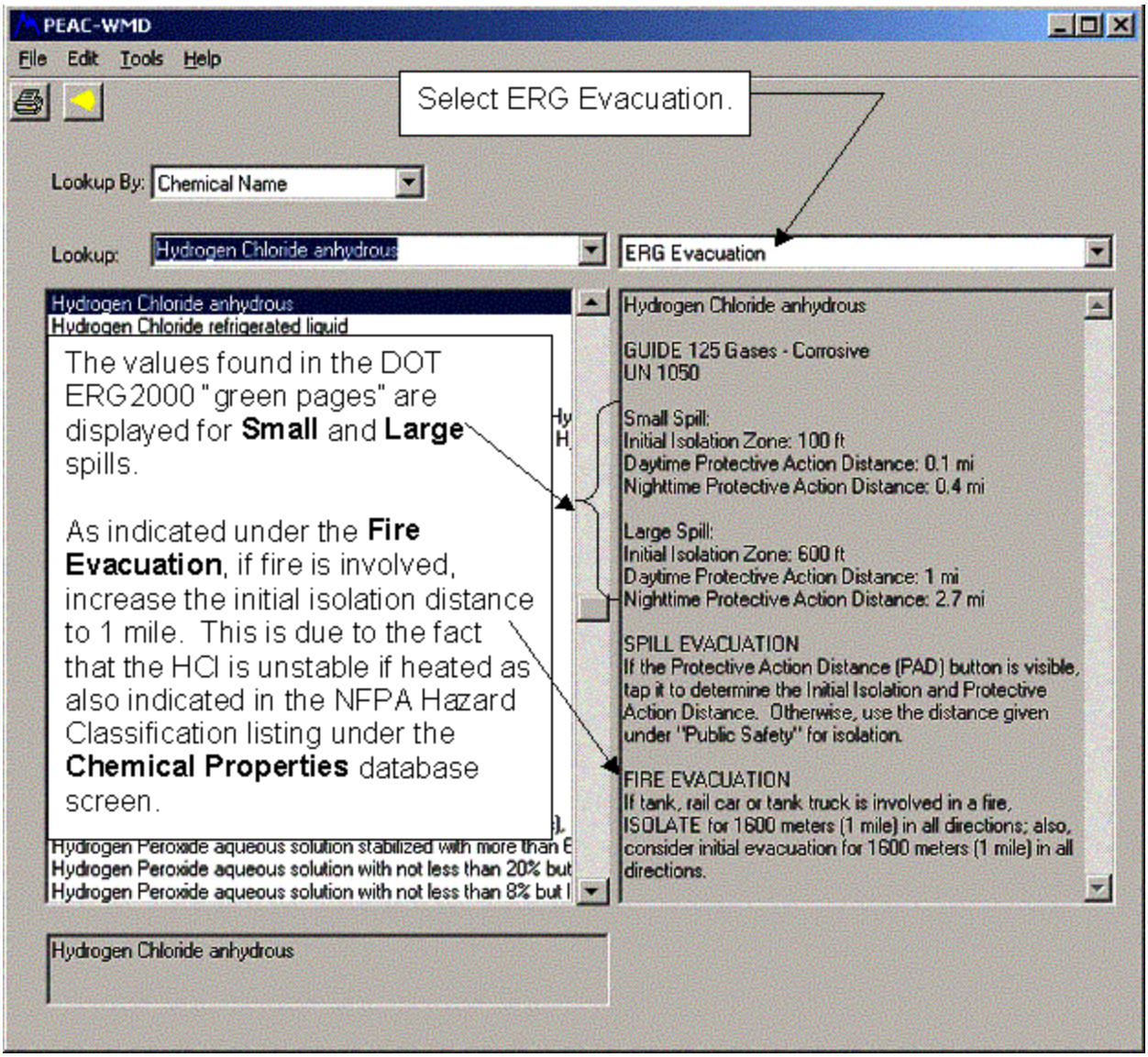
Finally, the material is not combustible; therefore elimination of ignition sources is not a critical factor.




By selecting the All Chemical Protective Clothing database, all the entries in the PEAC database for those products tested against Anhydrous Hydrogen Chloride are listed by type of garment and breakthrough times.

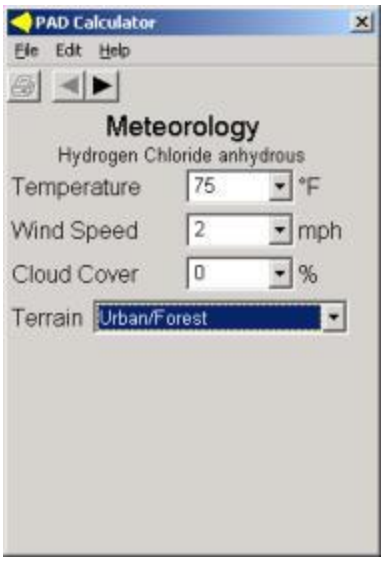


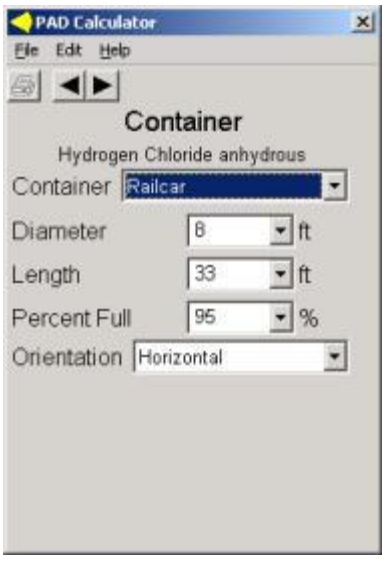

Depending on the incident and other factors involved, such as fire, access to the DOT ERG2000 "orange pages" may provide additional guidance. In the next screen capture are displayed the information for Evacuation. As shown, in addition to the generic procedures provided in the "orange pages", the PEAC system will also provide the evacuation distances found in the "green pages" of the ERG2000. This screen also indicates the increasing of isolation distance if fire is involved in the incident. The other DOT ERG2000 listings can also be displayed by selecting them in a similar manner.

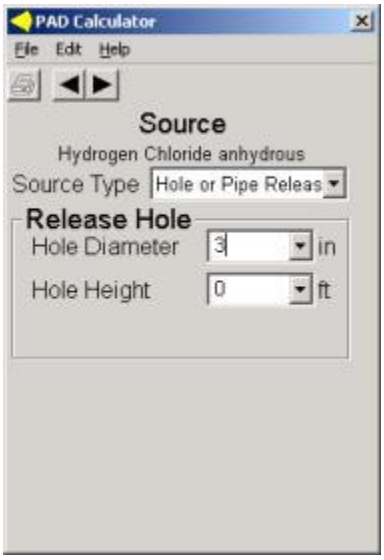



Since the PEAC tool displays the PAD icon at the top of the screen when Hydrogen Chloride, Anhydrous is selected, this means a PAD (Protective Action Distance) can be generated based on information provided by the user. To display the input screens to allow generation of a PAD, click on the yellow PAD icon at the top of the screen.

A hypothetical incident has been used to demonstrate the use of the PEAC PAD calculation. The incident involves a railcar that has derailed and struck the super structure of a bridge causing a hole to penetrate the car. The hole can't be seen but the portion of the bridge that pierced the tank is approximately 3" in diameter. Liquid is coming out the hole, but no liquid pool is forming because all the liquid is forming a vapor or fog cloud that is moving downwind. The surrounding area is mostly wooded with a residential area about 1 mile downwind. The time is about 2:00 PM, very light winds, outside temperature is in the mid 70's, and no cloud cover.




Meteorology The temperature is mid-70's or about 75, light wind is set for 2 mph, no cloud cover is 0%, and the terrain is wooded with residential farther downwind.

**Container We select a railcar from our list of containers and it fills in a default size of the container. 95% full assumes worst-case unless we know it is less, this also allows for head-space. We**

Source The exact size of the hole is not known but since it looks like the bridge structure element that made the hole is 3", we'll go with 3". We didn't say where the hole was but will assume it is close to the bottom, at least we know liquid is coming out, so it isn't at the top.

**have assumed the tank is horizontal.**


The PEAC built-in dispersion model makes a calculation using the IDLH of 50 ppm as the **Level of Concern**. This results in a downwind distance of 2.4 miles. With a residential area about a mile away from the incident, the call for evacuation is probably in order. If the loss of liquid was through a valve or some external line on the container that might have some potential of being capped or plugged, then perhaps an evacuation won't be required. In that case, perhaps only a "shelter in place" might be the most prudent recommendation. The thought being that the plugging or capping can be accomplished fairly quickly and allowing the public to close windows and shut off air-conditioners and ventilation for a relatively short time should provide enough protection. With the puncture scenario, the time required to off load the contents means that the vapor cloud is going to persist for quite some time until the problem is mitigated.