

Let's Take a PEEK at PEAC-WMD - by S. Bruce King

NBC Indicator Matrix in the PEAC-WMD application

This month we'll visit the NBC Indicator Matrix feature and how it is implemented in the PEAC-WMD application.

The original guide was developed by the US Department of Defense (DOD) that assesses the observed symptoms of a large number of victims to provide guidance as to the type of possible weapon of mass destruction (WMD) agent to which they have been exposed. The tool may or may not be useful in a real scenario and it is certainly not a substitute for appropriate sensor or detector systems or laboratory analysis that can positively identify a WMD agent that has affected victims.

IMPORTANT NOTE: Be careful when using this tool!

It should also be pointed out that if only a single victim or small numbers of victims out of many are demonstrating certain symptoms, the likelihood of a WMD incident is reduced.

WMD events typically involve a large number of victims where most are exhibiting the same or many of the same symptoms. The user should always keep in mind that these symptoms might be exhibited by other maladies, e.g., heart attack, food poisoning, or allergic reactions. Even if the incident does involve WMD agents, this tool does not attempt to identify a specific agent, only the type of agent.

The NBC (nuclear, biological and chemical) Indicator Matrix was developed by the US DOD in the early 1990s to provide visual cues for the First Responder to assist in determining the possible WMD agent used to incapacitate a number of victims. More than one WMD agent exhibits many of the symptoms described and the technique is not proof positive that the victims have been exposed to a specific type of agent. There are several factors that control or effect the exhibition of the described symptoms: (1) the amount of exposure, (2) the elapsed time since exposure, and (3) an individuals tolerance or sensitivity to the agent to which they have been exposed. Therefore, as time passes, symptoms may change, i.e., additional symptoms may appear or a victims behavior may worsen or improve as exposure is increased or decreased.

The original NBC Indicator Matrix was developed for a hardcopy system and consisted of two pages as shown in Figures 1 and 2.

INSTRUCTIONS FOR USING NBC INDICATOR MATRIX										
HOW TO USE										
1. Units arrive at scene where even at a distance multiple persons are affected.										
2. Units should "STOP – LOOK – LISTEN" and relay observations to Dispatch.										
3. On the MATRIX place a check mark in the "Indicator Present" column for each observed.										
4. For every row in which the Indicator Present column is checked place another check mark in all un-shaded boxes, including those with words inside the box.										
5. At the bottom of each page: add the total number of check marks for each column; record as page totals; and transfer the totals to page 2. The column with the highest # of indicators should be considered the agent material most likely present.										
APPEARANCE (at a distance, # of people)	IP	RTC	A	B	C	D	E	F	G	H
Prostration		1-1								
Involuntary twitching/jerking		1-2								
Convulsions		1-3								
Coma		1-4								
Confusion		1-5								
Bleeding from orifices (n,e,m,r)		1-6								
Coughing		1-7								
Sneezing, violent and persistent		1-8								
Vomiting		1-9		BLOOD						
SKIN										
Reddening of the lips and skin		2-1								
Blisters, painless (ask victim)		2-2								
Blisters, painful (ask victim)		2-3								
Grey area of dead skin does not blister		2-4								
Sunburn-like appearance (erythema)		2-5								
Pain, stinging/deep aching (ask victim)		2-6								
Clammy skin		2-7								
Skin, lesions, multiple pinpoint		2-8								
Hair loss, large quantities		2-9								
EYES										
Pinpointing of pupils		3-1								
Enlargement of pupils		3-2								
Lesions		3-3								
Involuntary closing		3-4								
Tears or tearing		3-5								
Eyes, immediate burning/gritty feeling		3-6								
Pain in/above, aggravated by bright light		3-7								
Dimness of vision (ask victim)		3-8								
RESPIRATORY										
Coughing-up of frothy sputum		3-9							BLOOD	
Severe and uncontrollable coughing		3-10								
Hoarseness (may progress to loss of voice)		3-11								
Runny nose-copious		4-1								
Breathing Rate decreased		4-2								
Breathing Rate increased		4-3								
Breathing Depth increased		4-4								
Breathing, difficult (observed/ask)		4-5								
Dry Throat (ask victim)		4-6								
Tightness in chest (ask victim)		4-7								

NBC Indicator Matrix – Page 1

Figure 1 - NBC Indicator Matrix (Page 1)

EXAMINATION (with protection if significant indicators above are found.)										
CARDIOVASCULAR	IP	RTC	A	B	C	D	E	F	G	H
Pulse Slow		4-8								
Blood pressure low		4-9								
Blood pressure high		5-1								
Heart action rapid and feeble		5-2								
Heart beat rapid		5-3								
Headache (ask victim)		5-4								
Headaches, FRONTAL (ask victim)		5-5								
Dizziness (ask victim)		5-6								
DIGESTIVE SYSTEM (GL, GU GLANDS)										
Diarhea		5-7		BLOOD						
Involuntary defecation and urination		5-8								
Nausea		5-9								
Localized Sweating		5-10								
Excessive Sweating		5-11								
TEMPERATURE										
Fever		6-1								
Temperature, subnormal		6-2								
HISTORY or ENVIRONMENTAL										
Odor-apple blossom		6-3								
Odor-pepper-like		6-4								
Odor-garlic		6-5								
Odor-horseradish		6-6								
Odor-bitter almonds (faint)		6-7								
Odor-sour fruit		6-8								
Odor-peach kernels (faint)		6-9								
Odor-new mown hay/fresh cut grass		6-10								
Odor-fruity to geranium like		7-1								
Unscheduled/unusual spray being dissem.		7-2								
Unusual Liquid Droplets, oily, no recent rain		7-3								
Abandoned spray devices		7-4								
Dead Animals, Birds, Fish		7-5								
Dead Weeds, Trees, Bushes, Lawns, etc.		7-6								
Illness assoc w/specific geo area, (victims have diff tx locations, work w/in same area)		7-7								
Immediate Fatalities, not assoc/trauma		7-8								
Lack of Insect Life		7-9								
Low Lying Clouds not explained by surround		7-10								
Reports of colleagues, med community, media, etc., w/similar unexplained illness		8-1								
TOTAL INDICATORS FROM PAGE 1										
TOTAL INDICATORS FROM PAGE 2										

A= NERVE AGENT
B= BLISTER AGENT
C= BLOOD AGENT
D= CHOKING AGENT
E= IRRITATING AGENT
F= INCAPACITATING AGENT
G= BIOLOGICAL AGENT
H= RADIOLOGICAL AGENT

- Put on Respiratory Protection
- Report all observations to dispatch
- Report wind conditions (speed/direction)
- Calm victims; HELP is on the way!!
- Direct walking wounded to safe refuge
- Touch nothing and no victim until in PPE
- REMAIN CALM
- TOTAL INDICATORS OF ALL PATIENTS


NBC Indicator Matrix – Page 2

Figure 2 NBC Indicator Matrix (Page 2)

The user of the system would proceed from the top of the list of symptoms by observing the victims for each of the listed items. If a symptom were observed, then the user would check any open boxes (not shaded) on that line. After all symptoms have been processed, the number of checks in each

column for both pages are summed and the column with the most checks is the most likely agent to which the victims have been exposed.

As shown at the bottom for Figure 2, there are eight (8) possible classes of WMD agents. The user is only given the class, not a specific agent within that class of WMD agents.

To access the PEAC-WMD **NBC Indicator Matrix** feature the user simply selects the pull down menu by clicking on **Tools** and then selects the **NBC Indicator Matrix** selection from the list of option as shown in Figure 3. The NBC Indicator Matrix can also be accessed via the  icon at the top of the screen. A screen similar to that shown in Figure 4 will be displayed.

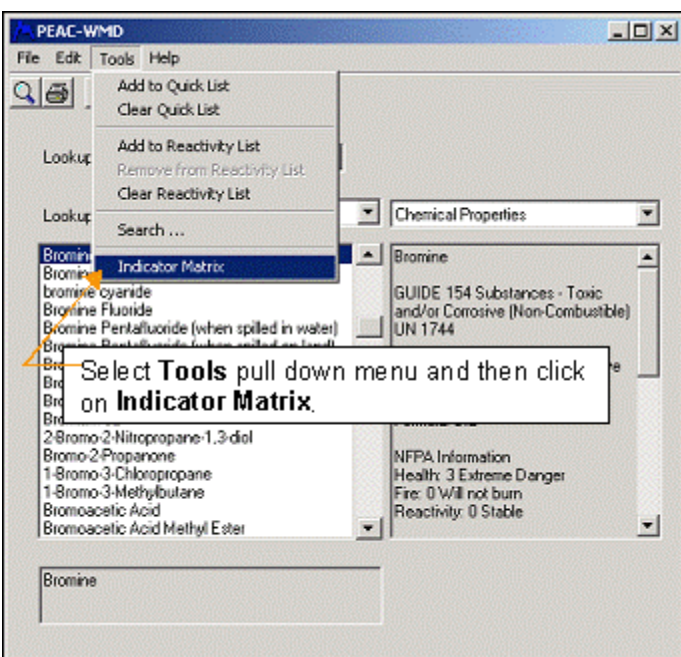


Figure 3 Accessing the NBC Indicator Matrix feature

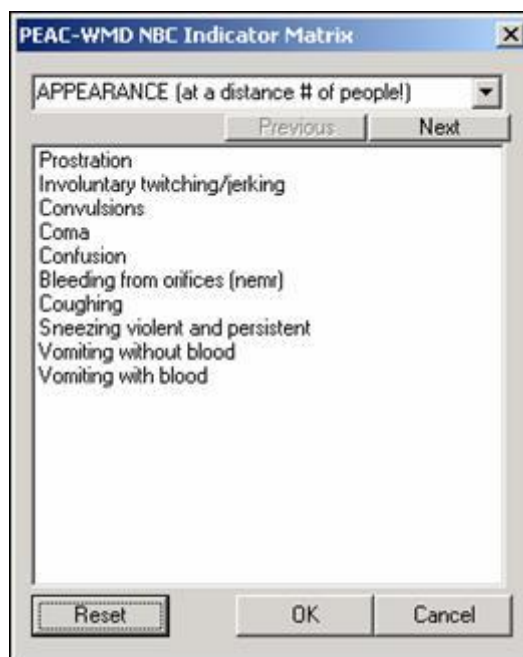


Figure 4 The NBC Indicator Matrix screen

The **NBC Indicator Matrix** screen is designed to replicate the list of symptoms as shown in Figures 1 and 2, by displaying one group of symptoms at a time. To check a symptom as being observed, the user simply clicks on the symptom, which will highlight it as shown in Figure 5.



Figure 5 Check a symptom by clicking to highlight the symptom



Figure 6 Click on a highlighted entry to uncheck and remove the highlight

To remove a check, click again and remove the highlight as shown in Figure 6.

Continue highlighting symptoms, there are several pages of symptoms. To go to the next page of symptoms, click on the **[Next]** button, as shown in Figure 7. After the last page of symptoms (HISTORY or ENVIRONMENTAL) are highlighted, see Figure 8, click on the **[OK]** button to display the WMD agent list from the PEAC-WMD application that matches the most likely WMD agent as per the **NBC Indicator Matrix** analysis. Click on the **[Cancel]** button to exit, or click on the **[Reset]** button to erase all highlighted symptoms and begin at the beginning of the list.

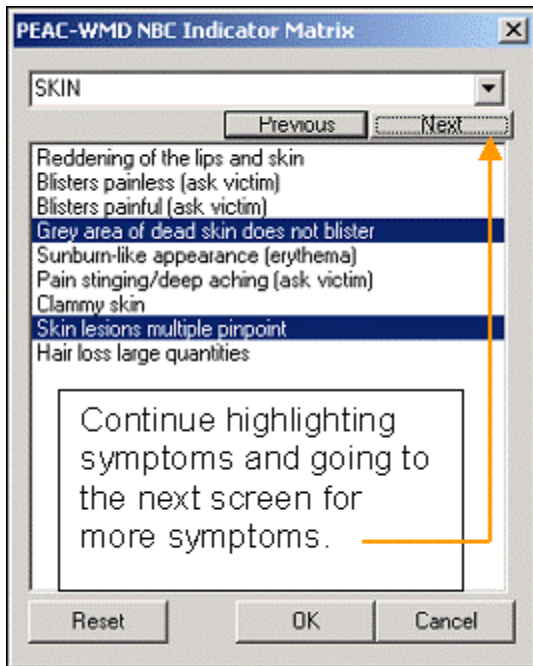


Figure 7 Continue to the next page of symptoms

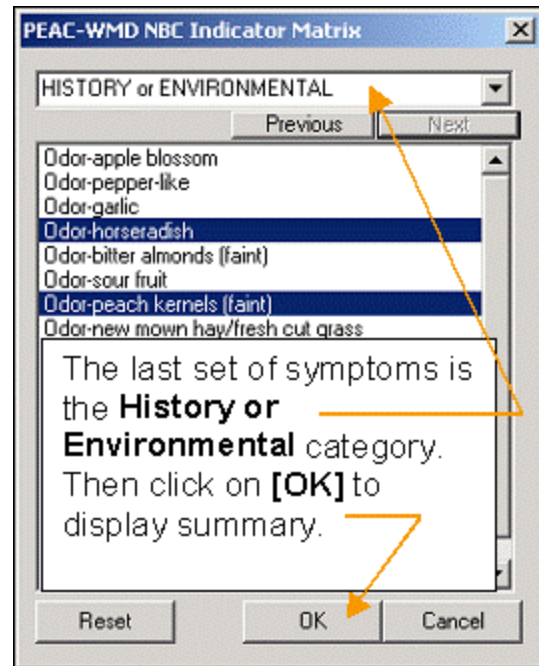


Figure 8 Click [OK] after the last page of symptoms is processed

The **NBC Indicator Matrix** is implemented in the PEAC-WMD application to accelerate and simplify the process of checking boxes. Rather than observe a symptom and then check all the open boxes and finally sum all the checks in each column, the PEAC-WMD application keeps track of each symptom the user has observed and does the sum internally as the user steps through the procedure. As indicated in Figures 7 and 8, the user should step through all symptom pages before clicking on **[OK]** to display the results.

This has some obvious advantages for the user. First, it relieves the user from having to carry a hardcopy of the **NBC Indicator Matrix** while observing victims and carrying a pen or pencil to make the check marks. Second, if the user decides to re-evaluate or re-assess the symptoms because of changes over time, the user can step back through the symptoms and modify which symptoms are highlighted (checked) or not. This eliminates the requirement for carrying multiple copies of the **NBC Indicator Matrix** hardcopy. Third, when the user has completed processing the symptoms and is given the most likely WMD agent responsible for the symptoms, the user can automatically access the PEAC-WMD list of agents associated with the indicated agent. This is done by clicking on **[OK]** button at the bottom of the window.

The PEAC-WMD application will automatically display a dynamic list of materials in the PEAC-WMD database that fall into the most likely WMD agent category determined by the **NBC Indicator Matrix**, see Figure 9.

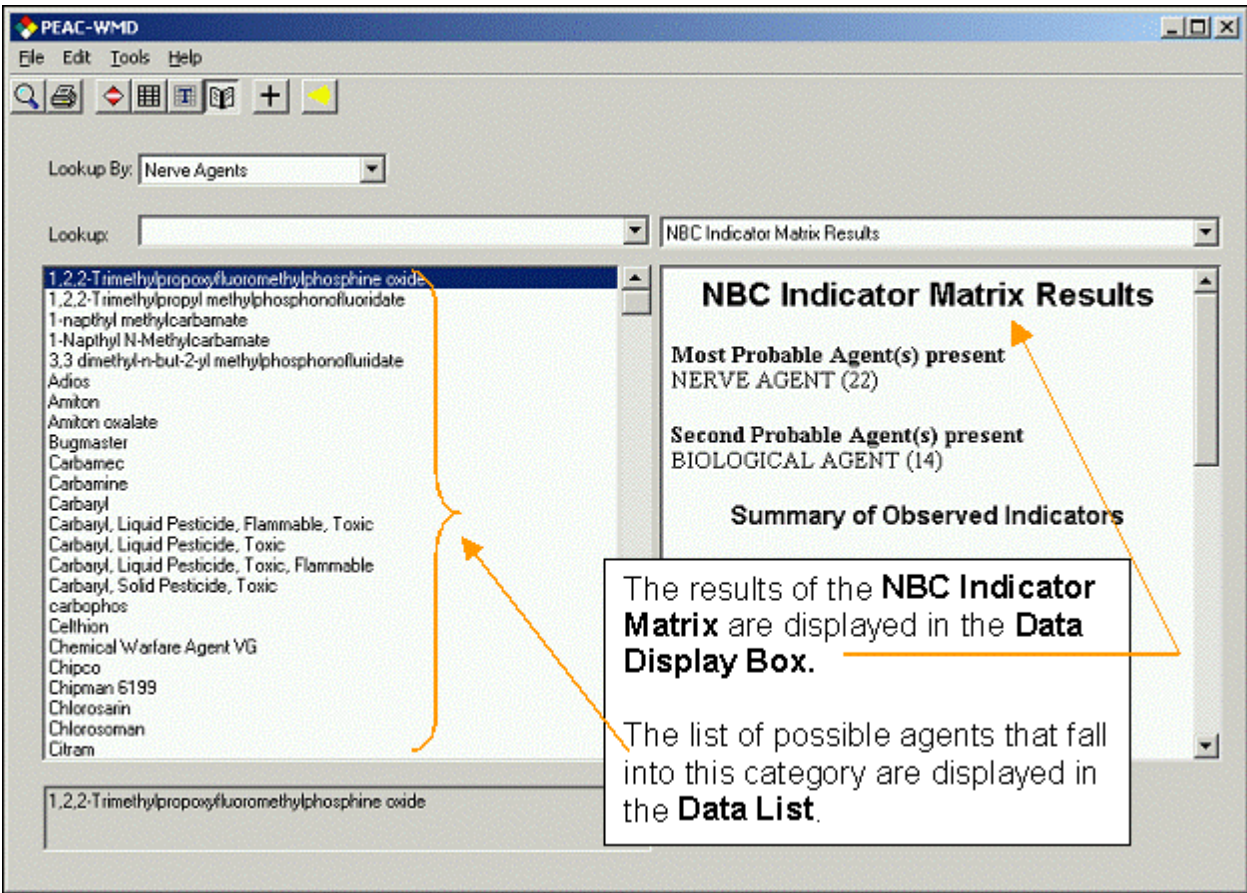


Figure 9 Display of results and possible WMD agents in the category

The **NBC Indicator Matrix Results** report (shown on the right side of the window example in Figure 9) is a summary of the symptoms the user has checked plus the most likely and second most likely class of agent the mass casualties have been exposed to. The list can be copied to the clipboard and then into another report or printed to the local printer.

As with the other assessment or calculation tools in the PEAC-WMD application, the application automatically saves a copy of the **NBC Indicator Matrix Results** report for later retrieval. By selecting the **Prior Results** option from the drop down menu, previous **NBC Indicator Matrix Results** reports can be found with the "NBCIM" string at the beginning of the file name and the date and time stamp making up the remainder of the name. A selected previous result can be viewed, copied to the clipboard for pasting into another document, or printed to a local printer.