

CARVER+Shock Vulnerability Assessment Tool

As the Director of The US Army's Homeland Infrastructure Security Threats Office we developed a vulnerability assessment tool that was ubiquitous across all critical infrastructures known as the CARVER+Shock Vulnerability Assessment Tool. Over the past two years this methodology has been used to uncover previously unidentified weaknesses in multiple agriculture commodities, food, power, and transportation industries. Listed below is the history of the tool, an explanation of the process of implementing the tool, and why this tool is superior to many other tools of this sort.

CARVER was originally developed as a targeting tool for used by US Special Operations Forces to quickly and thoroughly analyze enemy critical infrastructure to identify a critical node against which a small well-trained force can launch an attack to disable or destroy that infrastructure. With this in mind, we selected the CARVER targeting tool and reversed engineered it as a vulnerability assessment tool. Let's see how the tool works.

CARVER is an acronym for:

- **CRITICALITY.**
- **ACCESSIBILITY.**
- **RECUPERABILITY.**
- **VULNERABILITY.**
- **EFFECT.**
- **RECOGNIZABILITY**
- **SHOCK**

Having discussed the basic architecture of the tool, the next step in the process is to begin the actual Vulnerability Assessment process to see how the tool is used.

As in most other effective VA tools, there are several key pieces of information that must be understood. To conduct an effective VA you must:

Know Yourself. This includes the entire infrastructure or facility to be assessed. Many other VA systems attempt to identify only critical systems to evaluate in the hopes of saving time and resources. This shortcut can overlook crucial vulnerabilities as proven time and again by users of this tool. Results show that significant vulnerability lies in areas that most experts never considered critical and may have overlooked.

Know The Threat

Actual, localize threat for a specific target system

Design basis threat for a higher-level assessment as used by the USDA and FDA.

We must understand Who the threat is, Why they want to attack, How they will attack you, and What is the desired effect.

Know Your Environment. This is information about the physical, political, and legal environment that effect the target system and the threat.

Know what your enemy knows about you. This is an additional component to this pre-assessment information sometimes called Red Teaming. It is not required to identify the actual vulnerabilities, it is used more to predict probability of attack.

Now that we know exactly what we want to assess and the threat posed against it, we have to evaluate the target components of the target system to determine the true vulnerability. We do this by placing the target system in a spreadsheet and listing in outline form the subordinate subsystems, complexes and components. Figure 1 below demonstrates this technique for a small portion of the milk target system.

Target Description	C	A	R	V	E	R	Shock	SUM
Production								0
Farm								
Feed Bins								
Barns								
Farm Hands								
Off Farm hands (Vets etc)								
Milking Machines								
Holding Tanks								

*Figure 1
Demonstrates how the Subsystem (Production) Complex (Farm) and Components (Feed, barn etc..) are broken out for assessment*

Ratings for each target component are issued a number from 1-10. Generic value tables can be used or specific definitions and value tables can be developed to for each assessment. Regardless of the level of detail, these value tables and definitions must be included with the assessment. An example of a value table and definition is provided below.

Recognizability

- If they can recognize the target under the conditions they must attack
- If they can recognize the target via more than one method
- Consider virtual assets

Criteria	Scale
The target is clearly recognizable under all conditions from a distance and requires little or no training for recognition	9 – 10
The target is easily recognizable requires a small amount of training for recognition	7 – 8
The target is difficult to recognize at night or in bad weather or might be confused with other targets or target components and requires some training for recognition	5 – 6
The target is difficult to recognize at night or in bad weather. It is easily confused with other targets or components and requires extensive training for recognition	3 – 4
The target cannot be recognized under any conditions, except by experts or insiders	1 – 2

In closing we see that the CARVER tool is a ubiquitous tool that can be used to thoroughly evaluate the vulnerability of any infrastructure or facility. In addition to these attributes we also see CARVER being:

- Easy to learn and use
- Easy to automate
- Industry neutral
- Effective in evaluating the entire target system and not just select pieces

POC is the undersigned. (816) 668-6630, edward.d.clark@executive-interface.com

Edward D. Clark
Founder, Executive Interface