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Annex C: Data Libraries for IAEA Nuclear Security Assessment Methodologies (NUSAM)

D. Shull, M. Lane

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Annex C: Data Libraries (D.S. - T.M, P.L, A.I)

Section includes input from P. Lindahl and D. Greenhalgh

What are they?

Data Libraries are a collection of experimental data for PP elements based on specific defeat mechanisms. The data can be related to probability of detection, assessment, or barrier delay times. The data libraries can be a manually tabulated list or an electronic menu values embedded in a stand-alone database or in an assessment software program such as SAVI or EASI. Data library values are usually based on years of historical testing data for many forms of common and sometimes unique PPS systems. Most useful testing libraries include data from the most basic alarm sensors, doors, walls, and barriers to very sophisticated PP elements. Each PP element is tested using increasing levels of defeat techniques from hand tools, power tools, breaching tools, explosives, and vehicles, as applicable.

Why is it useful?

Once established, data libraries can be used as initial input to assessments with some confidence that similar PP element configurations will provide comparable detection, assessment or delay values for similar installations/configuration. This enables the analyst to base conclusions on documented evidence, rather than perform limited-scope performance testing throughout the security configuration.

What is its source?

There are numerous sources where experimental data is derived.

On-site Testing – Due to unique facility design or environmental conditions that may not match existing source data testing parameters, some sites perform PPS element testing to establish and/or validate assessment input values. This type of testing is usually performed at operating facilities that require detailed coordination with facility operations and security to ensure protection measures are maintained during the testing period.

On-site Maintenance—The maintenance program is a valuable source for system functionality and operability information and should not be ignored when documenting the expected performance of electronic detection and access control subsystems. For example, since probability of detection is based upon the lowest probability of a protection element, additional maintenance on specific configurations, equipment types, or locations may indicate lower probabilities of detection than tested outside of the normal system configuration. These data are gathered from prescriptive maintenance, repair requests, or compensatory measure call-outs.

Dedicated Test Field – Development of a state or site dedicated test field containing a wide variety of PPS systems installed in various configurations can be used for testing. The dedicated test field approach allows for PPS testing under more realistic defeat or destructive testing under controlled conditions without impacting facility operations or security. This type of test field is beneficial in determining and/or validating assessment input values over a wide range of conditions and adversary scenarios. Care must be taken, however, to document a variety of targets, approach methods, and field conditions such

as meteorological conditions, vegetation, and temperatures. Data gathered under ideal conditions may not be representative of all conditions under which the equipment (and personnel) will be expected to perform.

Open Source Data – Open source data comes from various historical test sources or generally accepted information. This information includes data used by other organizations such as law enforcement or emergency response organizations. Examples of such data includes ammunition ballistics performance data or general explosive blast effect characteristics. Other open source information can include manufacturer published or website data or independent certification organizations for PPS performance, usually under laboratory controlled conditions. Validation of open source information should be performed.

Military Data and Experience

One element of the physical protection system is the response force. Its existence may play a role to deter an adversary from an attack, and its function is to delay and neutralize the adversary should an attack occur.

To make an analytical assessment of the effectiveness of the response force, a model of the combat scenario need to be developed. Building this model, some data may be acquired directly from performance testing or other types of response force exercises. However, sometimes this information may be supplemented with generic data from e.g. military field handbooks. An example of such a handbook, that is openly available, is the Swedish “SoldF” [1]. This book contains basic knowledge for all soldiers, regardless if they belong to the army, the marines or the air force. It gives guidance on the soldier’s behavior, on and outside the battlefield. Specifically there are sections on rules of engagement, on weapon types - including general descriptions on their performance, on armor and on communications.

This type of data source, although it is quite general in nature, has the advantage that its quality has been assessed and found to be sufficient as guidance for military personnel. When the information provided is applicable, it may be therefore be expected to be quite realistic.

The use of military training, testing, and experiential field information may be integrated into data libraries provided they represent the conditions, assumptions, and systems used in the PP configuration. As with all data included in the libraries, it must be validated with an adequate number of trials and provide documentation on how the data was gathered and for which purpose.

Who should have access to it?

This information should be protected and limited in distribution to those personnel who have a need-to-know and have been vetted by the credential-issuing authority. Because the information is sensitive in nature, it may aid the adversary and insiders in all aspects of system defeat methods.

IAEA TECHNICAL REPORT

[1] SoldF – Soldaten i fält (SoldF - Soldier in the field)

(Will be a portion of the IAEA Nuclear Security Assessment Methodologies (NUSAM) document)