

ASSESSMENT OF PHYSICAL PROTECTION SYSTEMS : EVA METHOD

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CEA's missions in various sectors of activity such as nuclear, defence, industrial contracts and the associated regulatory requirements make it necessary to develop a strategy in the field of physical protection. In particular, firms having nuclear materials are subject to the July 25, 1980 law n°80-572 on the protection and control of nuclear materials. A holding permit delivered by the regulatory authority is conditioned to the protection, by the operator, of the nuclear materials used. So in France, it is the nuclear operator who must demonstrate, in the form of a security study, that potential aggressors would be neutralised before they could escape with the material.

To meet these requirements, we have developed methods to assess the vulnerability of our facilities.

The EVA method, the French acronym for "Evaluation de la vulnérabilité des Accès" (Access vulnerability assessment) allows dealing with internal and external threats involving brutal actions. *In scenarios relating to external threat, the intruders get past the various barriers of our protection system, attempting to steal a large volume of material in one fell swoop and then escape. In the case of internal threat, the goal is the same. However, as the intruder usually has access to the material in the scope of his activities, the action begins at the level of the target. Our protection system is based on in-depth defence where the intruders are detected and then delayed in their advance towards their target to allow time for intervention forces to intercept them.*

To assess facility physical protection system, we start to make a crossing means model of the various protection barriers.

Then, the assessment after having found the various ways to reach the target, consists of the calculate of:

- the probability of intercepting intruders,
- the probability of detecting intruders,
- the margin or the delay of the intervention force,
- the critical detection point,
- the most vulnerable passage areas.

The critical detection point is the last detection point allowing to intercept intruders on their path.

Our Physical Protection Laboratory measures indispensable parameters for the use of our methods :

- penetration time of various obstacles that delay the intruders in their progress. This time depends particularly on the characteristics of the obstacle (structure, materials) and the intruders 's tools.
- intrusion detection probabilities corresponding to the various sensors in their conditions of use.

Today, we have realised more than 200 tests (fig. 1) with various obstacles (fences, walls, windows, doors, roof, ...) to know the penetration time using various tools kinds (thermal cutting torch, explosives, ...) and with various detectors (video motion detection, active infrared sensors, fence sensors, interior motion sensors, ...) to know the detection probabilities using various penetration means (cutting of a manhole, jumping, climbing, ...).

We have developed the EVA software associated with this method. It allows users to take advantage of the convenience of computer tools : processing of a large number of scenarios, rapid modification of parameters, simulation of situations like the protection strengthening effect with a view to optimise the cost-efficacy ratio or the protection deterioration effect and check the breakdown measure efficacy.

This software is very user-friendly. It operates under Windows on a simple office computer and its use is no more complicated than that of a simple calculator (fig. 2).

Our physical protection system assessment methods are tools :

- which allow an homogeneous treatment of facilities security,
- which reduce assessment subjective aspect,
- for help to take decision for conceivers, nuclear operators, analyst.

The EVA method is appreciated by the nuclear operators for its simplicity to use and its high teaching qualities. The tree aspect of the protection appear very clearly : detection, intruders penetration time and intervention force time.

So, its use facilitates the security various actors implication in the analysis process. That is essential to get good results and to acquire a security coherent culture.

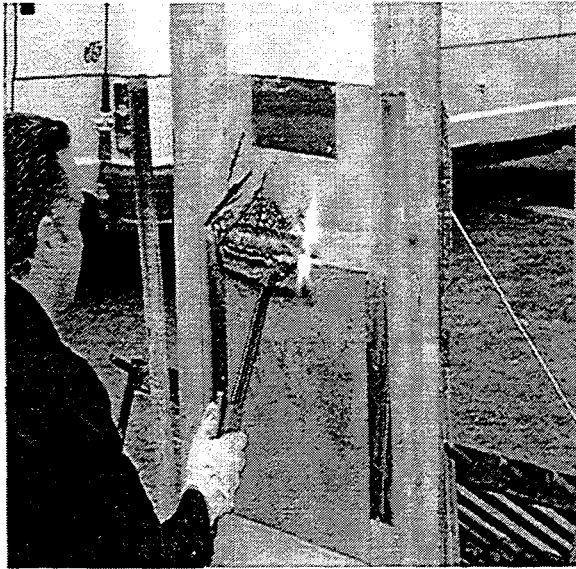


fig. 1 : Intrusion test :
 attacks on standard doors (2
 metal sheets - thickness : 3 mm)
 Adversary : one man
 Techniques : realisation of a
 manhole (40 cm x 40 cm)
 Tool : thermal cutting torch
 Result : penetration time

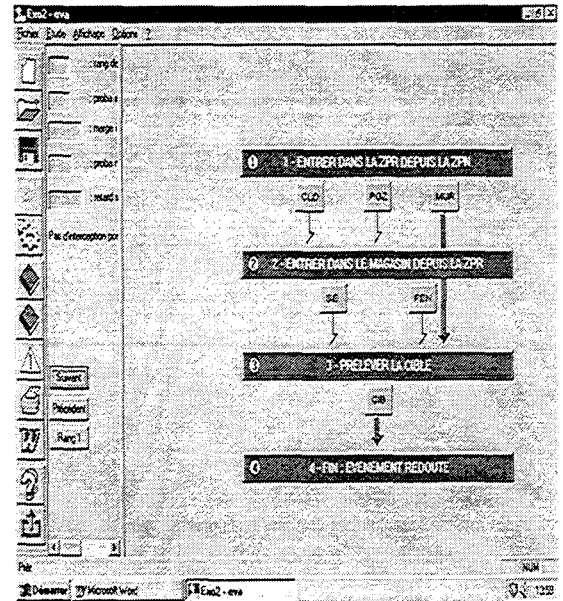


fig. 2 : EVA Software :
 Diagram of a hypothetical facility
 with
 various ways to reach the
 target, probability of detecting
 intruders, probability of
 intercepting intruders,
 margin or the delay of the
 intervention force, critical
 detection point, most vulnerable
 passage areas.