NEI 09-05 [Revision 0] Supplement

Guidance on the Protection of Unattended Openings that Intersect a Security Boundary, Supplement

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Nuclear Energy Institute

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November 2012

Nuclear Energy Institute, 1776 I Street N. W., Suite 400, Washington D.C. (202.739.8000)

ACKNOWLEDGMENTS

NEI 09-05, *Guidance on the Protection of Unattended Openings that Intersect a Security Boundary*, Revision 0, Supplement was developed in a joint effort by NEI and members of the Security Rulemaking Task Force who possess a broad range of experience in security and regulatory matters. NEI wishes to acknowledge the extensive review and comment by these industry members and personnel who shaped the final form of this document.

NOTICE

EXECUTIVE SUMMARY

This document addresses the regulatory expectations for protection of two-dimensional openings and three-dimensional pathways in security barriers at nuclear power reactor facilities, including environmental factors inside the opening or pathway, interior physical barriers to entry, and correction of vulnerabilities identified.

Definitions for the terms used in this document appear in section 2.

This document also serves as a guide to:(1) establish the basic criteria for identifying and defining exploitable openings and pathways that intersect security boundaries; (2) define the criteria associated with acceptable barrier types, barrier placement and acceptable monitoring and surveillance methodologies; and (3) provide guidance on actions to be taken to correct vulnerabilities in such barriers.

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GUIDANCE ON THE PROTECTION OF UNATTENDED OPENINGS THAT INTERSECT A SECURITY BOUNDARY, SUPPLEMENT

1 PURPOSE

The purpose of this document is to provide guidance on the regulatory expectations associated with the protection of openings and pathways that intersect a security boundary at nuclear power reactor facilities.

2 DEFINITIONS

Hospitable environment: openings and pathways that do not have continuous operational impediments such as continuous flushing, high pressure areas, or other activities that would prevent an adversary from navigating the opening or pathway and survivinglong enough to carry out assigned tasks.

Inhospitable environment: openings and pathways that have continuous operational impediments such as continuous flushing, high pressure areas, or other activities that would prevent an adversary from navigating the opening or pathway and surviving. Openings and pathways that have an inhospitable environment are not considered unattended openings within the meaning of 10 CFR 73.55(i)(5)(iii).

Opening: see Two-dimensional opening, below

Pathway: see Three-dimensional pathway, below

Person-sized: an opening that is greater than 96 square inches or a pathway that is greater than 144 square inches; this term will be used as shorthand with respect to each opening/pathway in discussions below, i.e., "person-sized" in a discussion of openings will mean greater than 96 square inches, etc., and in a discussion of pathways will mean greater than 144 square inches, etc.

Substantial interior physical barrier: a permanently installed, physical impediment inserted into a two-dimensional opening or three-dimensional pathway that is under direct continuous observation or subject to random patrols at a periodicity less than the task time to defeat the barrier, and which would deny penetration by the adversary within the surveillance frequency established by these patrols. Examples of substantial interior physical barriers include pipe bundles, grills, manifolds, and racks. Openings and pathways that have a substantial interior physical barrier are not considered unattended openings within the meaning of 10 CFR 73.55(i)(5)(iii).[1]

Three-dimensional pathway: a pathway of more than 12 inches in depth that has a cross section of at least 144 square inches where the smallest dimension is no less than 9 inches, and penetrates a security barrier; the beginning and ending of these pathways are subject to the definition for a two-dimensional opening (see figure 2)

Two-dimensional opening: an opening of 96 square inches or greater, where the smallest dimension is at least 6 inches, and the depth of the opening is no more than 12 inches, which penetrates a security barrier (see figure 2)

[1] Current NRC guidance in Information Notice 86-83 refers to these as "non-removable physical obstacles to attempted entry to, or exit from, the tunnel."

Unattended opening: a person-sized two-dimensional opening or a person-sized three-dimensional pathway that does not have a substantial interior physical barrier or an inhospitable environment that would preclude the passage of an adversary.

3 REGULATORY BASIS

10 CFR 73.55(e) describes the function of physical barriers in the security program. §73.55(e)(3) states that physical barriers must be designed and constructed to … "perform their required function in support of the licensee's physical protection program." §73.55(e)(4) states that, "consistent with the stated function to be performed, openings[2] in any barrier or barrier system …must be secured and monitored to prevent exploitation of the opening."

The regulatory intent is to require licensees to protect openings and pathways that could be exploited by an adversary to gain unauthorized access to a security area. Openings/pathways that are too small to allow exploitation or that have substantial interior physical barriers that reduce the size of the opening/pathway to less than person-sized, do not require additional action by the licensee. Openings/pathways that are at least person-sized and which do not have interior physical barriers to reduce the size of the opening/pathway to less than person-sized are considered unattended openings pursuant to 10 CFR 73.55(i)(5)(iii), discussed below.

10 CFR 73.55(i)(5)(iii) requires, in part, that unattended openings be "protected by a physical barrier and monitored by intrusion detection equipment or observed by security personnel at a frequency sufficient to detect exploitation."

NRC Information Notice 86-83, "Underground Pathways into Protected Areas, Vital Areas, Material Access Areas, and Controlled Access Areas" (September 19, 1986) notes that "[i]mproperly secured underground pathways…pose a potentially significant threat to site security… [t]he seriousness of the threat is determined by the physical characteristics of the pathway, which include the type of entry as well as impediments to entry." The NRC author of this document noted during preparation of this revision to NEI 09-05 that this sentence was included to indicate that NRC would tolerate openings that were too small, circuitous, inhospitable or otherwise undesirable as potential adversary access paths.

IN 86-83 specifically states that "the 96-square-inch standard applies only to two-dimensional openings and may not apply to large pipes and tunnels. Tunnels may be slightly larger than 96 square inches cross-section (11.04-inch diameter) and still preclude passage to a controlled area because its length and circuitous route may make it impossible for an intruder to move along the interior of the tunnel in such a small area."

[2] "Opening" is defined as "something that constitutes a beginning," which in this context suggests only the aperture at the beginning of a pathway. This guidance differentiates between two-dimensional openings, e.g., holes in walls, and three-dimensional pathways, e.g., tunnels and pipes. The original intent of "opening" in 10 CFR 73.55(e)(4) was consistent with the definition and with this distinction, but only uses the single word "opening." For conservatism, this document assumes that the regulatory requirement for opening also applies to pathways.

NRC Regulatory Issue Summary 2005-04, "Guidance on Protection of Unattended Openings That Intersect a Security Boundary or Area" (April 14, 2005), notes that "Information Notice No. 86-83…remains applicable to this topical area." RIS 2005-04 states that "[a]ny opening that is not monitored by an intrusion detection system should be observed by security force personnel at a frequency that allows for timely response upon detection of evidence of ingress, egress, or tampering."

RIS 2005-04 states that "as a means to meet physical barrier requirements, barriers or alarms should be installed for all unattended openings which are larger than 96 square inches in area and are larger than six inches in the smallest dimension." The RIS did not discuss pathways as distinct from openings.

4 IDENTIFYING OPENINGS AND PATHWAYS

Using site drawings, records of previous analyses, walk downs, and other available means, the licensee should identify all two-dimensional openings and three-dimensional pathways that penetrate a security boundary and which could provide unauthorized access to a security area.

The licensee should consider the following when assessing these openings and pathways:

- size of the opening or pathway
- length of the pathway
- construction of the opening or pathway
- physical features and barriers interior to the pathway
- survivability in the opening or pathway
- penetration time, including pathway travel time
- monitoring/surveillance options, including patrol frequency
- contingency response considerations

Table 1 (following page) provides a list of common examples and describes how each example is a pathway, an opening, or neither. The following steps should be used in applying this table to the identification of openings and pathways onsite:

Step 1: Apply minimum conditions for pathway and determine whether the area of concern fits.
Step 2: Apply minimum conditions for opening and determine whether the area of concern fits.
Step 3: If neither the minimum conditions for pathways or minimum conditions for openings fit, the area of concern is screened out.

UAO Decision Tree

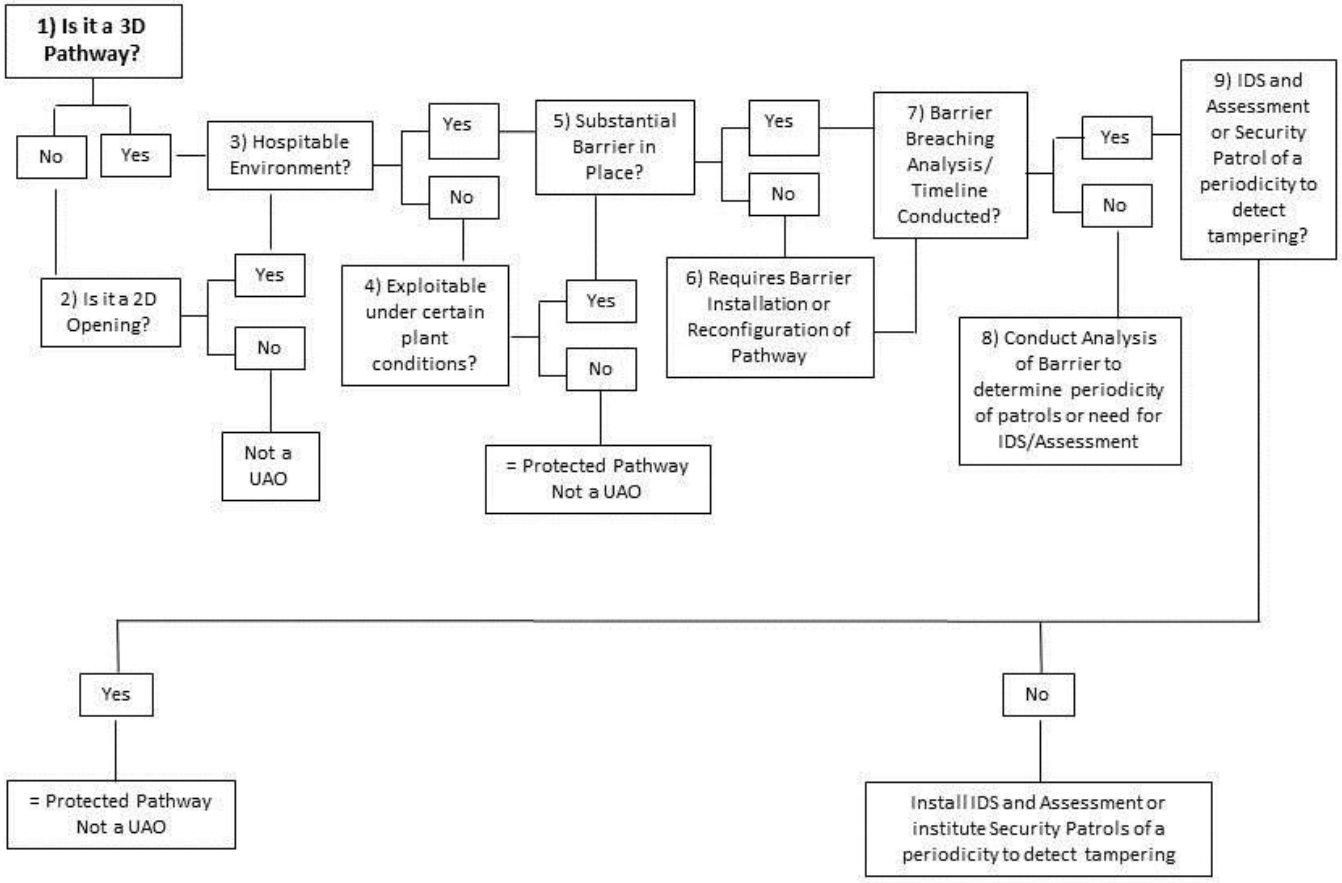

FIGURE 1

Examples	3-Dimensional Pathway	2-Dimensional Opening	Neither	Notes
	Minimum conditions			
length	> 12 inches	<= 12 inches		
cross section	>= 144 sq. inches	>= 96 sq. inches		
smallest dimension	=> 9 inches	=> 6 inches		
hole in a 12” thick wall with a cross section of 96 square inches, with the smallest dimension measuring 6”		X		Classic definition of “opening”
pipe that is more than 12” long with a cross-section of 144 square inches, with the smallest dimension measuring 9”	X			Classic definition of “pathway”
hole in a 13” thick wall with a cross section of 97 square inches, with the smallest dimension measuring 8”			X	Too long to be an “opening,” cross section too small to be a “pathway”
hole in a 10” thick wall with a cross section of 97 square inches, with the smallest dimension measuring 8”		X		
hole in a 6” thick wall with a cross section of 100 square inches, with the smallest dimension measuring 7”		X		
hole in a 10” thick wall with a cross section of 95 square inches, with the smallest dimension measuring 7”			X	Too short to be a “pathway,” cross section too small to be an “opening”
hole in a 11” thick wall with a cross section of 96 square inches, with the smallest dimension measuring 8”		X		
hole in a 10” thick wall with a cross section of 96 square inches with the smallest dimension of 5 inches			X	Too short to be a “pathway,” smallest dimension too small to be an “opening”
pipe that is 14” long with a cross-section of 113 square inches and smallest dimension of 10”			X	Too long to be an “opening,” cross section too small to be a “pathway”
pipe that is 14” long with a cross-section of 150 square inches and smallest dimension of 10”	X			
pipe that is 14’ long with a cross-section of 150 square inches and smallest dimension of 8”			X	Too long to be an “opening,” smallest dimension too small to be a “pathway”
pipe that is 10’ long with a cross-section of 150 square inches and smallest dimension of 10”	X			

5 ACCEPTABLE MONITORING AND SURVEILLANCE METHODOLOGIES

Monitoring by personnel can be at a fixed frequency or at a random frequency or a combination of both.

6 INHERENT PHYSICAL FEATURES OF PATHWAYS

Some pathways include bends, elbows, and vertical rises that would prevent the adversary from exploiting the pathway.

6.1 BENDS

Bends in the pathway that create a deviation in the path between 0° and 90° increase the difficulty of penetration by an adversary. Any bend that warrants an adjustment to the conclusions about the pathway's exploitability must be documented, and the adjustments to the conclusions about exploitability must be justified.

6.2 ELBOWS

Elbows in the pathway that create a deviation in the path greater than 90° substantially increase the difficulty of penetration by an adversary and are likely to alter the exploitability of the pathway. Elbows that add to the difficulty of penetration by an adversary should be considered and analyzed, and some pathways may be shown through such analysis to be screened out as potential entry points by the adversary.

6.3 VERTICAL RISES

A vertical rise or fall of at least 15 feet should be analyzed for exploitability. A security/tactical subject matter expert should conduct an exploitability analysis to determine if the vertical rise/fall can be negotiated with commercial off-the-shelf equipment allowable within the DBT.

7 CORRECTING VULNERABILITIES IN OPENINGS AND PATHWAYS

Vulnerabilities may be identified in an opening that penetrates a security barrier (therefore, an opening that is no deeper than 12 inches), at the inner and outer apertures to a pathway (less than or equal to 12 inches in depth and, therefore, categorized as "openings") that penetrate a security barrier, or in the pathway itself.

7.1 VULNERABILITIES ASSOCIATED WITH A TWO-DIMENSIONAL OPENING

If a two-dimensional opening exists or is created in a security barrier, it can be corrected by reducing the size of the opening to less than 96 square inches or the size of the smallest dimension to less than 6 inches, or increasing the depth of the opening to greater than 12 inches. Corrections carried out to repair this vulnerability and eliminate the aperture from the category of two-dimensional openings must be permanent and, if the correction can be defeated by an adversary with standard tools and strategies included in the design basis threat, the corrected vulnerability must be subject to surveillance on a schedule shorter than the task time for defeat of the barrier.

7.2 VULNERABILITIES ASSOCIATED WITH AN OUTER APERTURE TO A PATHWAY

In this discussion, "outer" refers to an aperture outside the security area that serves as the beginning of a pathway that traverses a security boundary. If an outer aperture to a pathway is at least as large as the definition for a two-dimensional opening (therefore, it would allow the adversary to penetrate the aperture and enter the pathway), it can be corrected by reducing the size of the aperture to less than 96 square inches or the size of the smallest dimension to less than 6 inches, or increasing the depth of the opening to greater than 12 inches. Corrections carried out to repair this vulnerability and eliminate the aperture from the category of two-dimensional openings must be permanent and, if the correction can be defeated by an adversary with standard tools and strategies included in the design basis threat, the corrected vulnerability must be subject to surveillance on a schedule shorter than the task time for defeat of the barrier.

Such correction also eliminates the inner aperture and the three-dimensional pathway as vulnerabilities.

7.3 VULNERABILITIES ASSOCIATED WITH AN INNER APERTURE TO A PATHWAY

In this discussion, "inner" refers to an aperture inside the security area that serves as the exit point from a pathway that traverses a security boundary. If an inner aperture to a pathway is at least as large as the definition for a two-dimensional opening (therefore, it would allow the adversary to penetrate the aperture and exit the pathway), it can be corrected by reducing the size of the aperture to less than 96 square inches or the size of the smallest dimension to less than 6 inches, or increasing the depth of the opening to greater than 12 inches. Corrections carried out to repair this vulnerability and eliminate the aperture from the category of two-dimensional openings must be permanent and, if

the correction can be defeated by an adversary with standard tools and strategies included in the design basis threat, the corrected vulnerability must be subject to surveillance on a schedule shorter than the task time for defeat of the barrier.

Such correction also eliminates the outer aperture and the three-dimensional pathway as vulnerabilities.

7.4 VULNERABILITIES ASSOCIATED WITH A THREE-DIMENSIONAL PATHWAY

If a three-dimensional pathway which traverses a security boundary is found to be more than 12 inches in depth and has a cross section of at least 144 square inches where the smallest dimension is no less than 9 inches, it can be corrected by inserting a substantial interior security barrier in the pathway.

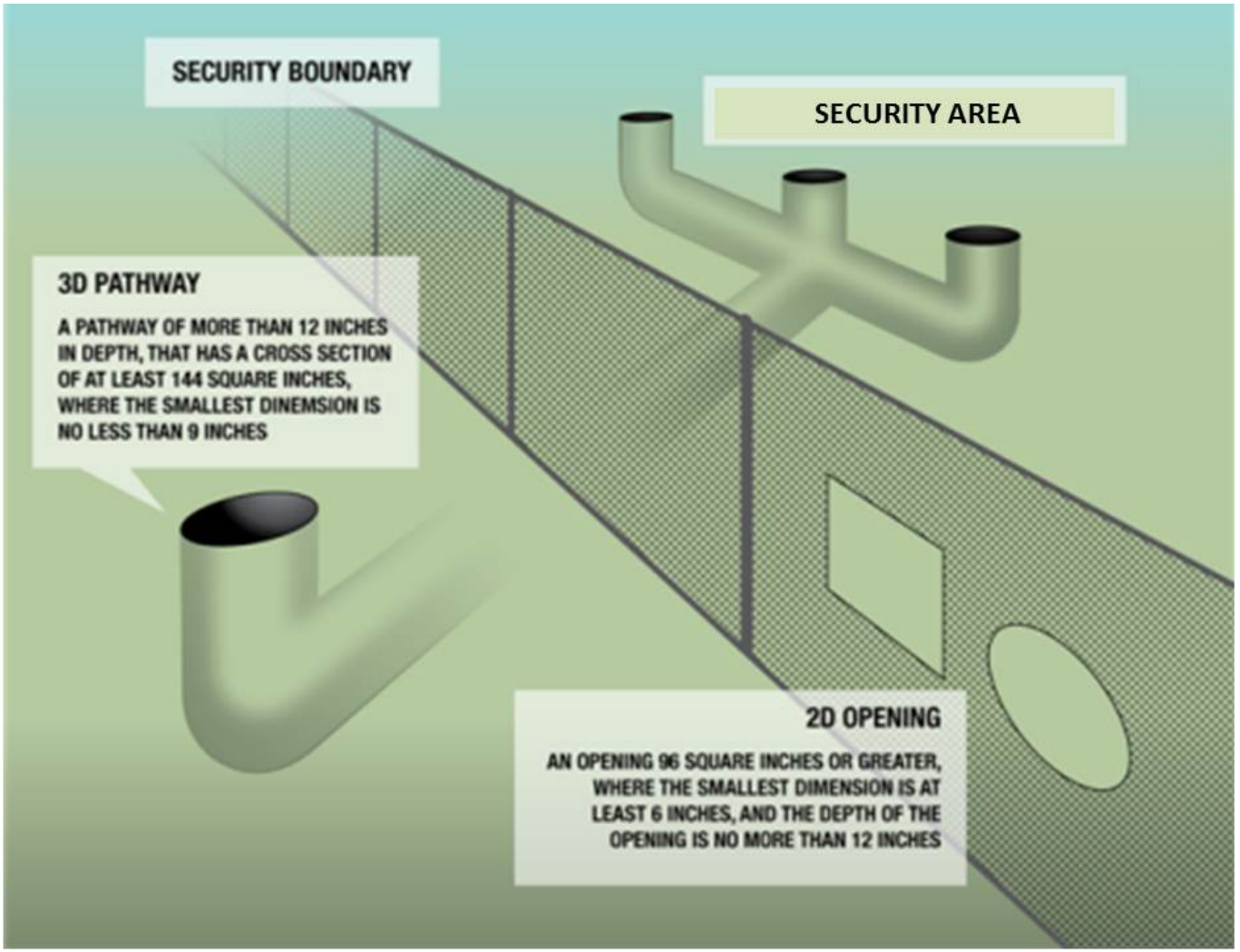
SECURITY BOUNDARY
SECURITY AREA
3D PATHWAY
A PATHWAY OF MORE THAN 12 INCHES IN DEPTH, THAT HAS A CROSS SECTION OF AT LEAST 144 SQUARE INCHES, WHERE THE SMALLEST DINEMSION IS NO LESS THAN 9 INCHES
2D OPENING
AN OPENING 96 SQUARE INCHES OR GREATER, WHERE THE SMALLEST DIMENSION IS AT LEAST 6 INCHES, AND THE DEPTH OF THE OPENING IS NO MORE THAN 12 INCHES

FIGURE 2

8 ENVIRONMENTAL CONDITIONS

Two-dimensional openings and three-dimensional pathways can have environmental conditions that prevent exploitation by an adversary. This is more likely with pathways than openings, because of the amount of time the adversary will have to spend in the pathway to penetrate it.

Environmental conditions considered inhospitable and, therefore, difficult to exploit include pipes, tunnels, etc., that have continuous operational impediments such as continuous flushing, high pressure areas, or other activities that would prevent an adversary from navigating the length of the pathway and surviving.

Openings and pathways that have such inhospitable environments require no additional action to secure them.

9 ASSESSMENT DOCUMENTATION/PROCEDURAL PROTOCOLS

Licensees must document the results of their evaluation of openings and pathways, as well as corrective measures taken when required. The licensee should identify in facility procedures the criteria for monitoring by intrusion detection and/or surveillance the openings and pathways that require this treatment.

Engineering evaluation and/or security professional judgment must be documented and based on credible source documents (e.g., Sandia Access Delay Manual) to determine what would be an adequate patrol frequency based on the task times associated with penetrating each opening or pathway. However, professional judgment by security subject matter experts based on real world experience and/or testing need not be based or rely on source documents such as Sandia Access Delay Manual. In any case, full-scale mock up testing should be conducted.