# 1 An Introduction to Vital Area Identification

## *1.0 Course Goals and Objectives*

### 1.0.1 Goals

- Understand the definition of a vital area
- Understand the vital area identification (VAI) process steps
- Understand the application of a vital area identification process based on logic models

### 1.0.2 Learning Objectives

After completing this course, the participants will be able to:

- Describe what vital areas are and what a vital area set is
- Recognize the basic concepts of safety and physical protection important to vital area identification
- Identify prerequisites for vital area identification
- Explain a process for vital area identification
- Recognize resource commitments and expertise required for vital area identification

### 1.0.3 Description of Vital Area Identification

Nuclear facilities have layers of protection for nuclear material, equipment, and devices to prevent radiological sabotage or theft of nuclear material. Vital areas are those areas, rooms, buildings, or set of rooms or buildings that contain nuclear material or equipment that needs to be protected to prevent radiological sabotage. Vital area identification (VAI) is the structured, transparent approach described in this course for identifying the sets of vital areas that each contain a minimum complement of equipment, systems, and devices that, if any one of which is protected, will prevent the radiological sabotage of nuclear facilities. The results of this process are the identification of those sets of areas, rooms, or buildings that, if protected from insider or outsider malevolent acts, will prevent unacceptable radiological consequences. Facility management determines which vital area set or sets they will protect based on the cost of protection, operational considerations, and other factors important to the efficiency of facility operations. Information concerning vital area sets and their protective measures is sensitive since it would be useful to adversaries if they could determine how to subvert those protective measures.

The VAI method presented in this course builds upon the information developed in conducting the safety analyses generally required to support facility licensing. The method focuses on the development of sabotage fault trees that reflect sabotage scenarios that could cause unacceptable radiological consequences as established by the governing regulatory bodies. The sabotage actions represented in the fault trees are then linked to the locations or areas from which they can be accomplished. The resulting sabotage location tree is then transformed by negation into its dual—the sabotage protection tree—which represents locations that must be protected in order to prevent unacceptable radiological consequences. The solution—path sets—of this logic tree actually yields sets of areas, where each set contains a minimum complement of equipment, systems, or devices that, if protected, will prevent sabotage. A general discussion of some of the criteria (e.g., safety, security, operations, and cost impacts) that should be considered in the final vital area set selection is also provided.

# 1.1 VAI Overview

## 1.1.1 Section Objectives

After completing this section, the participants will be able to:

- Recognize the goal of the vital area identification process
- Recognize the steps of a vital area identification process
- Identify the specialists required for the vital area identification process
- Identify the output of the vital area identification process
- Recognize the definitions of the terms: *vital area identification, vital area set, vital area, candidate vital area sets, sabotage, competent authority, unacceptable radiological consequence, initiating event of malevolent origin (IEMO), and disablement*

## 1.1.2 Basic Concepts

Before embarking on a discussion of basic VAI concepts, it is necessary to establish definitions for several terms that have particular technical meanings in this context. Note: because of the specific application of these terms, the definitions may or may not correspond with their use in other contexts (e.g., although they are generally consistent with those in use by the International Atomic Energy Agency [IAEA]).

**Key definitions**

***Vital Area Identification (VAI).*** VAI is a process employed by safety and physical protection specialists to identify the areas containing nuclear material or the minimum complement of equipment, systems, or devices to be protected against sabotage (adapted from INFCIRC 225 Paragraph 7.1.5). This is the subject of the course.

***Vital Area Set.*** A vital area set is a set of areas the protection of which will ensure that unacceptable radiological consequences (herein, sabotage) will not occur. A vital area set contains a minimum complement of equipment, systems or devices, or nuclear material, that, if protected, will prevent sabotage (according to INFCIRC 225).

***Vital Area.*** A vital area is any area that is a member of the vital area set to be protected. It is possible to clarify the INFCIRC 225 definition to match this sense as: A vital area is an area inside a protected area containing [*some of the minimum complement of*] equipment, systems or devices, or nuclear material, the sabotage of which could directly or indirectly lead to unacceptable radiological consequences (adapted from INFCIRC 225 Paragraph 2.17).

***Candidate Vital Area Sets.*** The vital area identification process will identify candidate vital area sets, one of which must be selected for protection as vital as recommended in INFCIRC 225.

***Sabotage.*** Sabotage is any deliberate act directed against a nuclear facility (or nuclear material located therein) which could directly or indirectly endanger the health and safety of personnel, the public, and the environment by exposure to radiation or release of radioactive substances [*unacceptable radiological consequences]* (adapted from INFCIRC 225 Paragraph 2.1.2). Note: Sabotage in INFCIRC 225 considers additional modes of use and storage, such as transportation.

***Competent Authority.*** The State agency or agencies responsible for establishing and enforcing regulations, standards, or measures to ensure that appropriate levels of physical protection and safety are maintained within the State in accordance with international agreements and the requirements of the State (adapted from INFCIRC 254/Rev.6/ Appendix C, paragraph 5.)

***Unacceptable Radiological Consequence (URC).*** An unacceptable radiological consequence is a possible result of sabotage that is deemed, by the facility or competent authority, to represent a condition that would ending

er the health and safety of facility personnel, the public, or the environment. An unacceptable radiological consequence is defined by one or more quantitative measures of dose or radioactive material release that have been established as thresholds (limits). It may also be represented by a facility condition (e.g., reactor core damage) judged as sufficiently likely to cause dose or radioactive material release in excess of established thresholds such that it is also deemed to be an unacceptable radiological consequence. Unacceptable radiological consequences may also be referred to as *sabotage criteria*.

***Initiating Event of Malevolent Origin (IEMO).*** An IEMO is any deliberate, malevolent act against a nuclear facility (or nuclear material located therein) resulting in a plant upset condition that, if not mitigated, will lead to sabotage.

***Disablement.*** Disablement is any deliberate, malevolent act(s) that cause failure of equipment, systems, devices, or components, that would otherwise mitigate an IEMO.

With these basic definitions in hand, it is possible to begin discussing how one might set about identifying vital areas.

The VAI process described below and followed throughout this course is based on principles first developed in research studies sponsored by the United States (US) Nuclear Regulatory Commission (NRC) in the late 1970s.[1, 2] The objective of that early work was to develop systematic methods for identifying vital areas at nuclear power plants (NPP). Four key concepts emerged from those studies:

1. Using fault trees to determine the events that can cause sabotage
2. Replacing the events in the fault trees with the locations from which they can be accomplished
3. Solving the fault trees to generate the combinations of locations that must be visited to complete sabotage
4. Identifying the sets of locations that, if protected, will preclude all possible sabotage

These concepts were applied in identifying vital areas at all US NPPs.[3] A comprehensive methodology for modeling NPP systems (Modular Fault Tree Analysis) was developed to support efficient application of these VAI concepts.[4]

**This course focuses on radiological sabotage, not industrial sabotage**

VAI is the process of identifying the areas that must be protected to prevent sabotage. The scope of this course involves radiological sabotage, which involves dispersal of radioactive material. In order to disperse material, an adversary must cause some form of energy to be applied to the material. Conceivably an adversary might do this by directly applying energy from an external source brought into the facility (e.g., radioactive material dispersal by use

[1] Boozer, Drayton D., et. al., *Safeguards System Effectiveness Modeling*, SAND76-0428. Albuquerque, NM: Sandia National Laboratories, 1976.
[2] Varnado, G. Bruce, and Ortiz, Nestor R., *Fault Tree Analysis for Vital Area Identification*, NUREG/CR-0809, SAND79-0946. Albuquerque, NM: Sandia National Laboratories, 1979.
[3] Varnado, G. Bruce, and Haarman, Roy A., *Vital Area Analysis for Nuclear Power Plants*, SAND80-0553C. Albuquerque, NM: Sandia National Laboratories, 1980.
[4] Varnado, G. Bruce, et. al., *Modular Fault Tree Analysis Procedures Guide* (Volumes 1–4), NUREG/CR-3268, SAND83-0936. Albuquerque, NM: Sandia National Laboratories, 1983.

of an explosive or incendiary device) or indirectly by using the energy stored in the material or its related process systems to cause dispersal (e.g., melting caused by damage to a facility cooling system that prevents adequate removal of decay heat in irradiated material).

In this course, the term “sabotage scenario” refers to a particular, postulated combination of maliciously caused structure, system, and component failures that lead to sabotage.

**Types of sabotage scenarios**

Three types or classes of sabotage scenarios are addressed in the VAI process described herein:

I. Direct dispersal of radioactive material by explosive, incendiary, or other device (energy source) that the adversary brings into the facility

II. Disturbing facility operations in a manner more severe than the facility safety measures can respond to (i.e., beyond the safety design basis)

III. Disturbing facility operations and disabling the safety measures needed to adequately respond to the resulting system upset

**Direct dispersal of radioactive material**

In order to carry out the first type of sabotage scenario—direct dispersal of radioactive material—the adversary must gain access to the area in which the radioactive material is located and must have the capability (tools, explosives, or other resources) to disperse it. Therefore, the facility must designate as vital those areas containing radioactive material of sufficient inventory (quantity) that, if released by dispersal mechanisms, would cause unacceptable radiological consequences.

**Facility system disturbances that exceed the safety design basis**

In order to carry out the second type of sabotage scenario—facility system disturbances or upsets that exceed the safety design basis—the adversary must gain access to the area in which susceptible systems are located and must have the capability (tools, explosives, or other resources) to cause such extensive damage that plant systems are unable to respond in a manner that is sufficient to prevent release (e.g., massive breaches of cooling systems or destruction of passive components not expected to fail under design operating conditions). Therefore, the facility must designate as vital those areas from which maliciously caused structure, system, or component failures would directly or indirectly cause the sabotage limits to be exceeded.

**Disturbing operations and disabling the safety measures needed to respond to the disturbance**

In order to carry out sabotage scenarios of the third type—disturbing operations and disabling the safety measures needed to respond to the disturbance—the adversary must have the capability (tools, explosives, or other resources) to gain access to areas from which facility operations can be disturbed by causing an upset condition and areas from which the safety systems designed to mitigate the upset condition can be disabled. Actions that cause upset conditions disturbing facility operations are referred to herein as IEMOs. The plant areas that require protection to prevent sabotage scenarios of this type must also be designated as vital. However, for this third scenario type, note that there are two choices: the facility must so designate either (1) the areas from which a postulated saboteur can cause an IEMO, **or** (2) the areas from which related safety systems can be disabled.

**DBT refers to information about the threat required for the VAI process**

It is important to recognize that all three classes of sabotage scenarios defined above require certain assumptions to be made regarding the capabilities of postulated saboteurs. In general, the term *design basis threat* (DBT) is used herein to refer to the capabilities or other descriptive information about the threat required for the VAI process. **However**, this DBT (call it a VAI-DBT) most likely will not correspond completely to the DBT used in designing and evaluating physical protection systems (PPS) deployed at the facility for which the vital areas are being identified. The VAI-DBT relates specifically to the capability of a postulated threat to accomplish specific IEMOs and disablements. The PPS DBT relates to the capability of the threat to overcome physical protection measures.

When VAI is integral to the design of a new facility, which will allow some type of design optimization to take place in terms of area definitions, it is prudent to be forward-looking in establishing the VAI-DBT. Because basic facility and system layouts are generally considered to be fixed for plant life (e.g., 40 or more years), it is beneficial to establish the VAI-DBT so that few, if any, changes to it would be required over the plant life rather than following the six-month to two-year update cycle common to the PPS DBT.

**A sabotage scenario does not include adversary actions required to gain access to the areas from which the malicious acts can be accomplished**

It is also important to note that the adversary actions required to gain access to the areas from which the malicious acts can be accomplished are not included in a sabotage scenario. Performance-based design and evaluation of a PPS intended to protect vital areas from attack require the development of adversary action sequences or scenarios by physical security specialists. While certain concepts of physical protection are introduced in a later section of this material, the design and evaluation of a PPS are not covered in this course.

Because of the crosscutting nature of the work, completion of the VAI process will require the participation of process, safety, security, and operations specialists. In the end, successful VAI depends more on the skills and knowledge of the specialists performing the evaluation than it does on the specific method employed. Nevertheless, the VAI method presented here is structured so as to help ensure that the evaluation is technically rigorous, consistent with existing facility safety analyses (both deterministic and probabilistic), and other (e.g., policy) constraints and requirements. It is also designed to help ensure that the technical basis for the VAI is well documented and capable of review by national policy makers and regulators.

### 1.1.3 VAI Process: Safety Input

**Categories of safety**

Safety is an important consideration of the integrated engineering approach that must be taken in the design, construction, and operation of a nuclear facility. Typically, when safety and its role are considered for a nuclear facility, it is framed in two broad categories: systems safety and industrial safety. Systems safety generally deals with complex equipment-related issues (like the impact of improper operation or failure), while industrial safety typically deals with measures to protect workers from less complex workplace hazards (such as rotating machinery, electrical shock, and falls).

**Systems safety**

Systems safety—or as it also referred to, process safety or nuclear safety—is used to address the risk of accidents based on consequences and event likelihood. System-level models are generally quite complex, as they can involve the interaction of many connected subsystems. Process or systems safety analyses utilize tools such as event trees and fault trees that are capable of addressing both event frequency and consequence. The data used is based, where possible, on historical equipment records. Design acceptability, in turn, may mandate that system behavior (performance) meet risk limits or other safety performance standards defined by policy makers or regulators. The material presented in this course assumes that the facility or facilities for which vital areas are being identified have undergone a safety analysis. Insights from the safety analysis will be leveraged in the effort to identify vital areas, which is the approach taken by this course.

**Industrial safety**

Industrial safety regulatory requirements—such as the number of emergency exits or lighting levels—are generally established based upon lessons learned from previous accidents and incidents and engineering judgment rather than risk or system performance considerations. Because of their regulatory nature, they have to be taken into consideration in order to provide a prescribed level of worker protection.

**Although usually complementary, system and industrial safety can sometimes oppose each other**

These two categories of safety, while often complementary, can at times be in opposition. An example is a situation where a process building serves to contain potential releases of hazardous material. For industrial safety purposes, it is desirable to have many emergency exits and to ensure that they can be opened easily so that workers can escape quickly in the event of a release of hazardous material inside the building. However, emergency exits that are easily opened are more likely to fail to seal closed after use, providing leak paths for the hazardous material to areas outside the building; more exits means more leak paths. Thus, industrial safety improvements would reduce the capability of the process building to prevent or limit releases of hazardous material to the environment.

In the final analysis, some factors regarding the safety of the site workers, public, and the environment are not easily quantifiable. In any safety review, after all the systems and industrial safety concerns are considered, subject matter experts must still be relied on to use the data before them to make balanced decisions. The same is true in using safety data in the VAI process and physical protection.

### 1.1.4 VAI Process: Security Output

**VAI focuses on what areas to protect; PPS designs address how to protect these areas**

The output of the VAI process serves as part of the input requirements for the design of a PPS employed to protect against sabotage. That is, VAI focuses on what areas to protect, while the PPS design addresses how these areas are to be protected. VAI identifies the areas containing the systems, components, devices, or nuclear material that must be protected without consideration of those DBT attributes that relate to its capability to defeat security measures (see DBT discussion in 1.1.2 above). For the purpose of this course, the requisite attributes of a hypothetical DBT required for completing example problems will be provided.

### 1.1.5 VAI Process

**VAI team requirements**

VAI is the process of identifying one or more sets of areas containing a minimum complement of equipment items, systems, devices, or components that, if protected, will prevent sabotage. In order to complete this process, safety, security, and operations personnel need to work together as a VAI team. The safety professional(s) on the team should have completed or be very familiar with the plant-specific safety analyses (deterministic or probabilistic) that provide information about how the plant and systems will respond to the IEMOs and disablement of systems or components. The security professional(s) on the team should be knowledgeable of the plant security system and have a good understanding of the methods and tools that the VAI-DBT might use to disable the plant system and components. The operations representative should have relevant operations experience, including both routine and emergency procedures and practices; this person is also expected to provide insights about the ability to employ compensatory measures to respond to sabotage attempts. The team works together to ensure that vital area recommendations duly consider plant safety and operations requirements.

**Steps of the VAI process**

The VAI process is depicted in Figure 1.1-1[5]. The steps of VAI are as follows:

1. **Address policy considerations** – Address the key policy considerations and establish the assumptions to be used in the VAI.
2. **Evaluate site and facility characteristics** – Determine the sources of radioactive material and other information for the facility and the site.
3. **Perform conservative analysis** – Determine whether the release of the complete inventory of each source could exceed the URC criteria. Protect the locations of any such sources as vital areas.
4. **Identify initiating events of malicious origin (IEMOs)** – Identify any initiating events (IEs) that can lead indirectly to URC.
    a. Identify any IEMOs that exceed the capacity of mitigation systems. Protect as vital areas the locations in which such IEs can be caused.
    b. Conduct steps 5 through 9 below for all IEMOs that do not exceed mitigating system capacity.
5. **Identify safety systems that respond to IEMOs** – Identify the safety functions necessary to mitigate the IEMOs and the systems that perform the safety functions.
6. **Develop sabotage logic model** – Construct a sabotage logic model that identifies the combinations of events (IEMOs coupled with safety system failures) that would lead indirectly to URC.
7. **Identify locations corresponding to logic model events** – Identify the locations (areas) at which IEMOs and the other events in the sabotage logic model can be accomplished. Replace the events in the sabotage logic model with their corresponding locations.
8. **Identify candidate VA sets** – Solve the sabotage logic model to identify the combinations of locations that must be protected to ensure that radiological sabotage cannot occur.

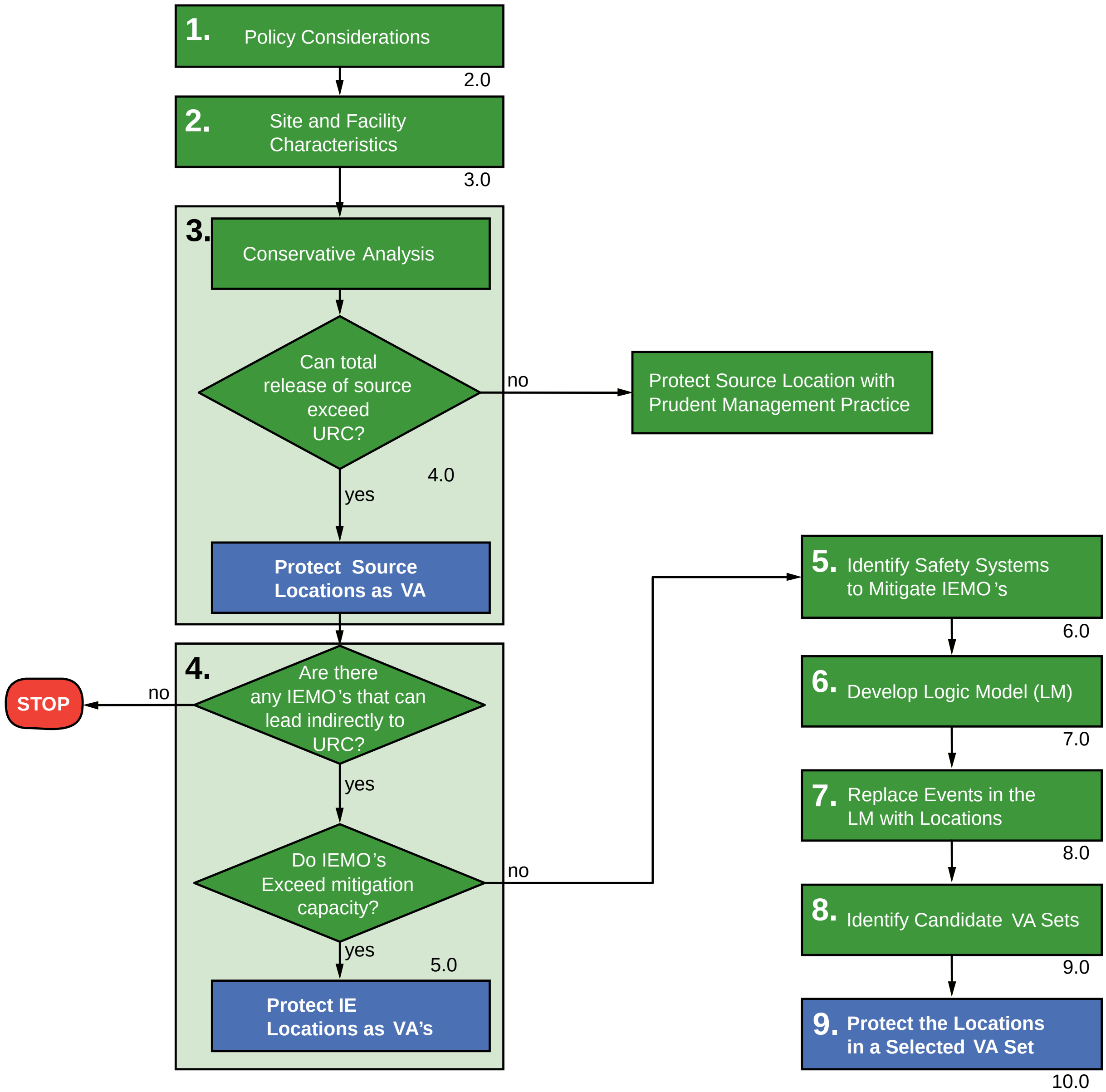
[5] See IAEA Security Series XXXX, *Guidance for Identification of Vital Areas at Nuclear Facilities for Physical Protection Against Sabotage*, P-8, Section 2-1

9. **Select a VA set** – Select the VA set that will be protected to prevent sabotage leading indirectly to URC.
10. **Determine final VA set** – Combine the results of steps 3, 4a, and 9 to define the vital areas for the facility.

As each step is completed, all process inputs, assumptions, calculations, and results should be thoroughly documented. This will allow the work to be reviewed by independent analysts and outside regulators.

View VAI Process on next page.

# VAI Process




**Note 1: The blue shaded boxes denote vital areas to be protected.**
**Note 2: Bold numbers denote step sequence**
**Note 3: Numbers adjacent to the symbols denote Section Numbers in main text.**

Figure 1.1-1

### 1.1.6 Summary

A structured process is available to guide identification of vital areas. The VAI process is accomplished by a VAI team that encompasses a broad range of facility interests, including participation by safety, security, and operations personnel. The output of the VAI process is a set of vital area sets, the protection of any one of which will prevent sabotage. The results of the VAI process are to be employed as a basis for the design of physical protection measures.

# Vital Area Identification

## 1.1—Course Overview

# VAI Course Goals

- Understand the definition of a vital area
- Understand the vital area identification (VAI) process steps
- Understand the application of a vital area identification process based on logic models

# Learning Objectives

By the end of this course, you should be able to:

- Describe what vital areas are and what a vital area set is
- Recognize the basic concepts of safety and physical protection important to vital area identification
- Identify prerequisites for vital area identification
- Explain a process for vital area identification
- Recognize resource commitments and expertise required for vital area identification

# VAI Course Structure (1 of 2)

- Section 1 – Overview
- Section 2 – Policy Considerations
- Section 3 – Site/ Facility Characterization
- Section 4 – Conservative Analysis of Radiological Consequences
- Section 5 – Identify Initiating Events of Malevolent Origin (IEMO)

# VAI Course Summary (2 of 2)

- Section 6 – Determine the Safety Functions and Associated Systems that Mitigate the IEMOs
- Section 7 – Logic Model Development
- Section 8 – Location Identification
- Section 9 – Location of Candidate Vital Area Sets
- Section 10 – Selection of a Vital Area Set

# Section 1.1 Objectives

By the end of this session, you should be able to:

- Recognize the goal of the vital area identification process
- Recognize the steps of a vital area identification process
- Identify the specialists required for the vital area identification process
- Identify the output of the vital area identification process
- Recognize the definition of the terms: *vital area identification, vital area set, vital area, candidate vital area sets, sabotage, competent authority, unacceptable radiological consequence, initiating event of malevolent origin (IEMO), and disablement*

# VAI Goal

- Identify the areas containing nuclear material or the minimum complement of equipment, systems or devices to be protected against sabotage
  - Areas are identified because physical protection measures secure areas rather than equipment
  - Protection of the areas containing the minimum complement of equipment minimizes the physical protection resources required to prevent sabotage
  - Sabotage requires the defeat of physical protection measures for at least one such area.
  - Fault tree-based VAI process also identifies sabotage target areas

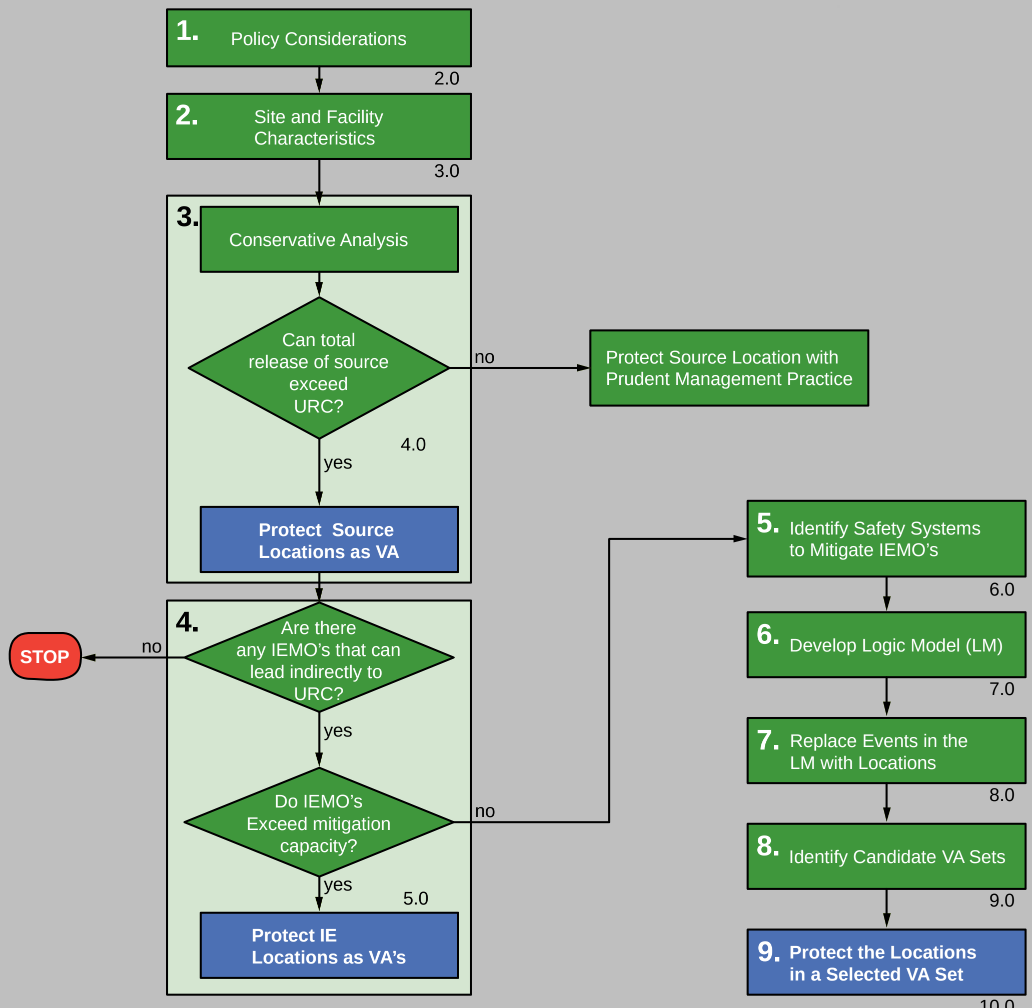
  

# 10 VAI Process Steps

After establishing applicable requirements (i.e., policies), the steps for VAI are:

1. Address policy considerations
2. Evaluate site and facility characteristics
3. Perform conservative analysis
4. Identify initiating events of malicious origin (IEMOs)
5. Identify safety systems that respond to IEMOs
6. Develop a sabotage logic model
7. Identify locations corresponding to logic model events
8. Identify candidate VA sets
9. Select a VA set
10. Determine final VA set

# VAI Process Chart




**Note 1: The blue shaded boxes denote vital areas to be protected.**
**Note 2: Bold numbers denote step sequence**
**Note 3: Numbers adjacent to the symbols denote Section Numbers in main text.**

# VAI Team

- The VAI process identifies sabotage targets and areas requiring protection to prevent sabotage.
  - Requires a detailed understanding of plant responses to a wide range of potential upset events
  - Requires understanding of sabotage protection measures
- VAI process requires a team with representatives from
  - Safety
  - Security
  - Operations

# VAI Process Output

- The output of the VAI process is one or more candidate vital area sets.
  - A candidate vital area set consists of one or more areas such that if **ALL** of the areas in the set are protected, sabotage will be prevented.
  - The VAI process generally identifies several candidate vital area sets such that if any **ONE** of the sets is protected, sabotage will be prevented.
    - The VAI process output is the input to other (e.g. physical protection) design processes.
    - Final selection of one set of vital areas must consider operational, safety, and security requirements, as well as cost impacts.

# Definitions (1 of 6)

- Vital Area Identification (VAI)
  - The process employed by safety and physical protection specialists to identify the areas containing nuclear material or the minimum complement of equipment, systems, or devices to be protected against sabotage (adapted from INFCIRC 225 Paragraph 7.1.5)
  - This is the subject of the course
- Vital Area Set
  - A vital area set is a set of areas the protection of which will ensure that unacceptable radiological consequences (herein, sabotage) will not occur. A vital area set contains a minimum complement of equipment, systems or devices, or nuclear material, that, if protected, will prevent sabotage (according to INFCIRC 225).

# Definitions (2 of 6)

- Vital Area
  - A vital area is any area that is a member of the vital area set to be protected. It is possible to clarify the INFCIRC 225 definition to match this sense as: A vital area is an area inside a protected area containing [*some of the minimum complement of*] equipment, systems or devices, or nuclear material, the sabotage of which could directly or indirectly lead to unacceptable radiological consequences (adapted from INFCIRC 225 Paragraph 2.17). Physical protection measures for at least one vital area must be defeated to commit sabotage.

# Definitions (3 of 6)

- Candidate Vital Area Sets
  - The vital area identification process will identify candidate vital area sets, one of which must be selected for protection as vital as recommended in INFCIRC 225.
- Sabotage
  - Sabotage is any deliberate act directed against a nuclear facility (or nuclear material located therein) which could directly or indirectly endanger the health and safety of personnel, the public, and the environment by exposure to radiation or release of radioactive substances [*unacceptable radiological consequences]* (adapted from INFCIRC 225 Paragraph 2.1.2). Note: Sabotage in INFCIRC 225 considers additional modes of use and storage, such as transportation.
  - Note that this course addresses only **radiological sabotage** and not the more general case of industrial sabotage.

# Definitions (4 of 6)

- Competent Authority
  - The State agency or agencies responsible for establishing and enforcing regulations, standards, or measures to ensure that appropriate levels of physical protection and safety are maintained within the State in accordance with international agreements and the requirements of the State (Inferred from INFCIRC 254/Rev. 6/ Part 1/ Appendix C, paragraph 5.)

# Definitions (5 of 6)

- Unacceptable radiological consequences
  - An unacceptable radiological consequence is a possible result of sabotage that is deemed, by the facility or competent authority, to represent a condition that would endanger the health and safety of facility personnel, the public, or the environment. An unacceptable radiological consequence is defined by one or more quantitative measures of dose or radioactive material release that have been established as thresholds (limits). Will be referred to as *sabotage criteria*
    - May also be represented by a facility condition (e.g., reactor core damage) judged as sufficiently likely to cause dose or radioactive material release in excess of sabotage criteria
    - Established by competent authority

# Definitions (6 of 6)

- Initiating Event of Malevolent Origin (IEMO).
  - An IEMO is any deliberate, malevolent act against a nuclear facility (or nuclear material located therein) resulting in a plant upset condition that, if not mitigated, will lead to sabotage.
- Disablement
  - Deliberate, malevolent acts that cause failure of equipment, systems, devices, or components, whose proper operation would otherwise mitigate an IEMO.
  - NOTE: Sabotage generally requires the threat to commit an IEMO and one or more acts of disablement.

# Summary

- The goal of the VAI process is to identify the areas containing nuclear material or the minimum complement of equipment, systems, or devices to be protected against sabotage.
- Vital areas, as recommended by INFCIRC 225, can be identified using a structured ten-step process.
- The VAI process requires specialists and organizations in the areas of safety, security, and operations.
- The output of the VAI process is one or more candidate sets of vital areas.
  - The protection of **ALL** areas in any **ONE** candidate vital area set will prevent sabotage
- The following terms are utilized in the VAI process: *vital area identification, vital area set, vital area, candidate vital area sets, sabotage, competent authority, unacceptable radiological consequence, initiating event of malevolent origin (IEMO), and disablement*