Term	Definition
Barrier	A control measure or grouping of control elements that on its own can prevent a threat developing into a top event (prevention barrier) or can mitigate the consequences of a top event once it has occurred (mitigation barrier). A barrier must be effective, independent, and auditable. See Bow Tie.
Bow Tie	A diagram for visualizing the types of preventive and mitigative barriers which can be used to help manage risk.
	Note: These barriers are drawn from left-to-right, with the threats (hazards) on the left, the loss event at the center, and the impact on the right, representing the "flow" of the hazardous materials or energies through potential barriers to a final destination: harm to people, to the environment, or to property. The risk can be reduced with preventive barriers (on the left of the loss event) that help reduce the frequency and with mitigative barriers (on the right of the loss event) that help reduce the consequences of the incident scenario.
Consequence	The undesirable result of the impact of a loss event, usually measured in health and safety effects, environmental impacts, loss of property, and business interruption costs. See Risk. See Impact.
Consequence Analysis	The analysis of the expected effects of incident outcome cases, independent of frequency or probability. See Worst Case.
Deviation	A process condition outside of established design limits, safe operating limits, or standard operating procedures. See HAZOP.
Frequency	Number of occurrences of an event per unit time (e.g., 1 event in 1000 yr. = 1×10^{-3} events/yr.). Interchangeable with "likelihood". See Risk.
Hazard and Operability Study (HAZOP)	A systematic qualitative technique to identify process hazards and potential operating problems using a series of guide words to study process deviations. A HAZOP is used to question every part of a process to discover what deviations from the intention of the design can occur and what their causes and consequences may be. This is done systematically by applying suitable guidewords. This is a systematic detailed review technique, for both batch and continuous plants, which can be applied to new or existing processes to identify hazards.
Independent Protection Layer (IPL)	A device, system, or action that is capable of preventing a scenario from proceeding to the undesired consequence without being adversely affected by the initiating event or the action of any other protection layer associated with the scenario. See LOPA.
	Note: There are specific functional criteria for protection layers that are designated as "independent." A protection layer meets the requirements of being an IPL when it is designed and managed to achieve the following seven core attributes: Independent; Functional; Integrity; Reliable; Validated, Maintained and Audited; Access Security; and Management of Change
Impact ("Outcome" in RAST)	A measure of the ultimate loss and harm of a loss event.
	Note: Impact may be expressed as the number of injuries and/or fatalities, the extent of the environmental damage, or the magnitude of the loss, such as property damage, material loss, production loss, market share loss, and recovery costs.

Term	Definition
Layer of Protection Analysis (LOPA)	An approach that analyzes one incident scenario (cause-consequence pair) at a time, using predefined values for the initiating event frequency, independent protection layer failure probabilities, and consequence severity, in order to compare a scenario risk estimate to risk criteria for determining where additional risk reduction or more detailed analysis is needed. Scenarios are identified elsewhere, typically using a scenario-based hazard evaluation procedure such as a HAZOP Study.
Mitigative barrier	A barrier designed to interrupt the chain of events after a loss event, given that there has been a loss of containment of a hazardous material or energy.
	Note: Specific to a hazards evaluation of an incident sequence, a mitigative barrier is in between the loss of event (the loss of containment) and the scenario's impact, helping reduce the consequences of the incident scenario, and thus, helping reduce the scenario's risk.
Normal operations (mode)	The operating mode when the process is operating between its start-up and shut-down phases (its transient operating modes) and within its normal operating conditions (its standard conditions). See HAZOP.
	For a Continuous Process (an open, steady-state system)
	The time when the process conditions, such as the flow rates, temperatures, and pressures, are not changing over time - when the process is at the normal operating conditions and within its standard operating limits.
	For a Batch Process (a closed, unsteady-state system)
	The time when the process conditions, such as temperatures, pressures, and concentrations, are changing over time - when the process is at the normal operating conditions and within its standard operating limits.
Outcome (in RAST)	See Impact.
Preventive barrier	A barrier designed to interrupt the chain of events leading up to a loss event, given that an initiating event has occurred.
	Note: Specific to the hazards evaluation of an incident sequence, a preventive barrier is in between the initiating event (the cause) and a loss event, helping reduce the frequency of the incident scenario, and thus, helping reduce the scenario's risk.
Protection layer	A concept whereby a device, system, or human action is provided to reduce the likelihood and/or severity of a specific loss event.
Quantitative Risk Analysis (QRA)	The systematic development of numerical estimates of the expected frequency and severity of potential incidents associated with a facility or operation based on engineering evaluation and mathematical techniques.
Risk	A measure of human injury, environmental damage, or economic loss in terms of both the incident likelihood (frequency) and the magnitude of the loss or injury.
	Note: A simplified version of this relationship expresses risk as the product of the frequency and the consequence's impact (i.e., Risk = Frequency x Consequence).

Term	Definition
Risk Matrix	A tabular approach for presenting risk tolerance criteria, typically involving graduated scales of incident likelihood on the Y-axis and incident consequences on the X-Axis. Each cell in the table (at intersecting values of incident likelihood and incident consequences) represents a particular level of risk. See Risk.
Safeguard	Any device, system, or action that interrupts the chain of events following an initiating event or that mitigates the consequences.
Worst Case	A conservative (high) estimate of the consequences of the most severe incident identified. See Consequence Analysis.