Meridium APM Hazards Analysis

3.6.1.3.0

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About This Document

This file is provided so that you can easily print this section of the Meridium APM Help system.

You should, however, use the Help system instead of a printed document. This is because the Help system provides hyperlinks that will assist you in easily locating the related instructions that you need. Such links are not available in a print document format.

The Meridium APM Help system can be accessed within Meridium APM itself or via the Meridium APM Documentation Website (https://www.meridium.com/documentation/WebHelp/WebHelpMaster.htm).

Note: If you do not have access to the Meridium APM Documentation Website, contact Meridium Global Support Services.

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Overview of Hazards Analysis

The *Hazards Analysis* module lets you examine the processes that are performed by the equipment in a facility to identify existing and potential hazards that are associated with those processes under both normal and abnormal conditions. Using Hazards Analysis, for a given process, you can identify *risks*, which are events that might occur that threaten safety, either of humans or the environment, and cause negative outcomes such as human injury, death, or environmental degradation. You can then perform a risk assessment to answer the following questions:

- *How probable is it that the risk will have a negative safety or environmental impact?*
- *How would I rate the severity of this safety or environmental impact?*

For a given process, the combination of the risk and the risk assessment is defined as a *hazardousScenario* (sometimes referred to simply as a *Scenario*). Identifying these Scenarios could mean the difference between life and death.

For example, suppose that in your facility, you have two tanks that are connected with a tube, where hazardous chemicals in one tank are transferred to the other tank through the tube. The continual process of monitoring the pressure in each tank, increasing or decreasing it as needed, and transporting the chemicals from the source tank to the target tank is a potentially hazardous process that presents risk. During this process, for example, if the pressure monitor malfunctions, the pressure in the tube could increase too rapidly and cause the chemicals in the source tank to leak out, causing damage to the environment or personnel.

After you identify the hazardous Scenarios associated with a process, you can use Hazards Analysis to:

- Define the characteristics of the Scenarios, including the risks that they include.
- Assess the likelihood of the risks in each Scenario actually occurring.
- Identify ways to prevent the risk in each Scenario from occurring.
- Make recommendations for actions that can be taken within the facility to prevent the risks in each Scenario from occurring or to mitigate the risks in some way (e.g., lower the severity of the safety or environmental impact).

For example, suppose that for the preceding process (transporting hazardous chemicals between two tanks), you identify a risk that the pressure monitor will stop working and a chemical spill will occur. Through a risk assessment, you also determine that the chemical spill is very likely to cause a negative impact to both human safety and the environment. Based on this assessment, you might determine that the only way to prevent the risk is to be alerted when the pressure in the tank is increasing too quickly. In this case, you may recommend that a safety system be put in place to alert someone if the pressure in the tank is rising too quickly.

Using the Hazards Analysis module, you can conduct the following types of *Hazards Analyses*:

- **Hazards and Operability (HAZOP) Analysis:** Lets you document the *known* hazardous Scenarios associated with a process, assess the likelihood of the risks in those Scenarios occurring, and determine the best way to mitigate the risk in those Scenarios.
- **What If Analysis:** Lets you hypothesize about the *possible* hazardous Scenarios and determine the risk associated with them and determine the best way to mitigate those risks.

The Meridium APM Hazards Analysis module and supporting documentation are dedicated in memory of Steve Soos IV, Product Manager, whose knowledge, dedication, and vision are realized therein.

Hazards Analysis System Requirements

The *Hazards and Operability Analysis* license is required to take advantage of Hazards Analysis functionality. In addition, your system must contain the basic Meridium APM system architecture.

In order to use the integration between Hazards Analysis and SIS Management, the *SIS Management* license is also required.

Hint: Details on the system requirements for the basic Meridium APM system architecture and activating licenses can be found in the Installation, Upgrade, and System Administration section of the Meridium APM Help system.

After you have installed and configured the basic system architecture, you will need to perform some configuration tasks specifically for the Hazards Analysis feature.

Components in Hazards Analyses

A Hazards Analysis is made up of records and links as defined by the Hazards Analysis data model. But beyond understanding a Hazards Analysis at the entity level, it is helpful to visualize it at a conceptual level, where groups of records and links make up the main elements of the analysis, as defined in the following list:

- **Process:** A series of actions that are performed by multiple pieces of equipment or locations in a single system.
- **Scenario:** For a given process, the combination of a risk and its risk assessment, where a risk is any event that can occur that threatens safety, either human or the environment, and the negative outcome associated with that event (e.g., human injury). You can define multiple Scenarios for a single process.

  While at a *high* level a Scenario is a combination of a risk and its risk assessment, each Scenario can be broken down into the following more granular parts:

  - **Deviation:** A condition that deviates from the normal behavior of the process and directly leads to a risk.
  - **Cause:** The event that results from the deviation and leads to a negative safety or environmental outcome.
  - **Consequence:** The negative safety or environmental outcome that results from the cause.

  Note: Together, the cause and the consequence define the risk.

  - **Risk Assessment:** Identifies the probability that the risk will have a negative safety or environmental impact and the severity of that negative safety or environmental impact.
  - **Safeguard:** A safety instrumented system or other safety device that prevents the risk from occurring or lowers the probability or severity identified by the risk assessment.

Overview of the Hazards Analysis Data Model

The Hazards Analysis data model uses families to represent the components of a Hazards and Operability (HAZOP) Analysis or a What If Analysis. Meridium APM leverages its fundamental entity and relationship family infrastructure to store data related to these analyses. When attempting to understand and make sense of the Meridium APM Hazards Analysis functionality, it is helpful to visualize the data model for the:

- HAZOP Analysis (pronounced *HazOp*)
- What If Analysis

Because you should already be familiar with the concept of records and viewing records in the Meridium APM Record Manger, as you attempt to get your bearings in Hazards Analysis, it may be useful to remember that Hazards Analysis is simply a customized view of individual records that work together to make up a HAZOP Analysis or a What If Analysis.

All HAZOP Analyses and What If Analyses begin with a *Hazards Analysis record*. Each Hazards Analysis record will be linked to:

- One or more Human Resource records.
- One or more Reference Document records.
- One or more Hazards Analysis System/Node records.

Depending on whether you are conducting a HAZOP Analysis or What If Analysis, each Hazards Analysis System/Node record will be linked to:

- One or more HAZOP Deviation records (for a HAZOP Analysis).

  -or-

- One or more What If records (for a What If Analysis).

Note: The record to which the Hazards Analysis System/Node record is linked is the only difference between the HAZOP Analysis data model and the What If Analysis data model.

Each HAZOP Deviation or What If record will be linked to one or more Hazards Analysis Cause records.

Each Hazards Analysis Cause record will be linked to:

- One Equipment or Functional Location record.
- One or more Hazards Analysis Consequence records.

Each Hazards Analysis Consequence records will be linked to:

- One or more Risk Assessment Recommendation records.

> **Note:** Risk Assessment Recommendation records can be linked to Equipment records through the *Safety Analysis Has Equipment* relationship. To simplify the data model images, this relationship is not included in the images.

- One Risk Assessment record.
- One or more Hazards Analysis Safeguard records.

Each Hazards Analysis Safeguard record will be linked to:

- One Equipment or Functional Location record.
- One Risk Assessment record.
- One Instrumented Function record.

> **Note:** Instrumented Function records are also used by SIS Management to store details on the instrumented function for a given safety system.

In addition to the relationships explained above, families exist that are used by Hazards Analysis to support Revision History. The family caption for these families matches the source family name, appended with *Revision* to indicate that the family is a Revision family. For details on these families and how they are related to one another, see the Hazards Analysis Revision data model image.

Illustration of the HAZOP Analysis Data Model

The following diagram illustrates the families that participate in a HAZOP Analysis.

In this image:

- The shaded boxes represent entity families.
- The solid arrows represent relationship families.

You can determine the direction of each relationship definition from the direction of the arrow head: the box from which the arrow originates is the predecessor in that relationship definition, and the box to which the arrow head points is the successor in that relationship definition.

Illustration of the HAZOP Analysis Data Model

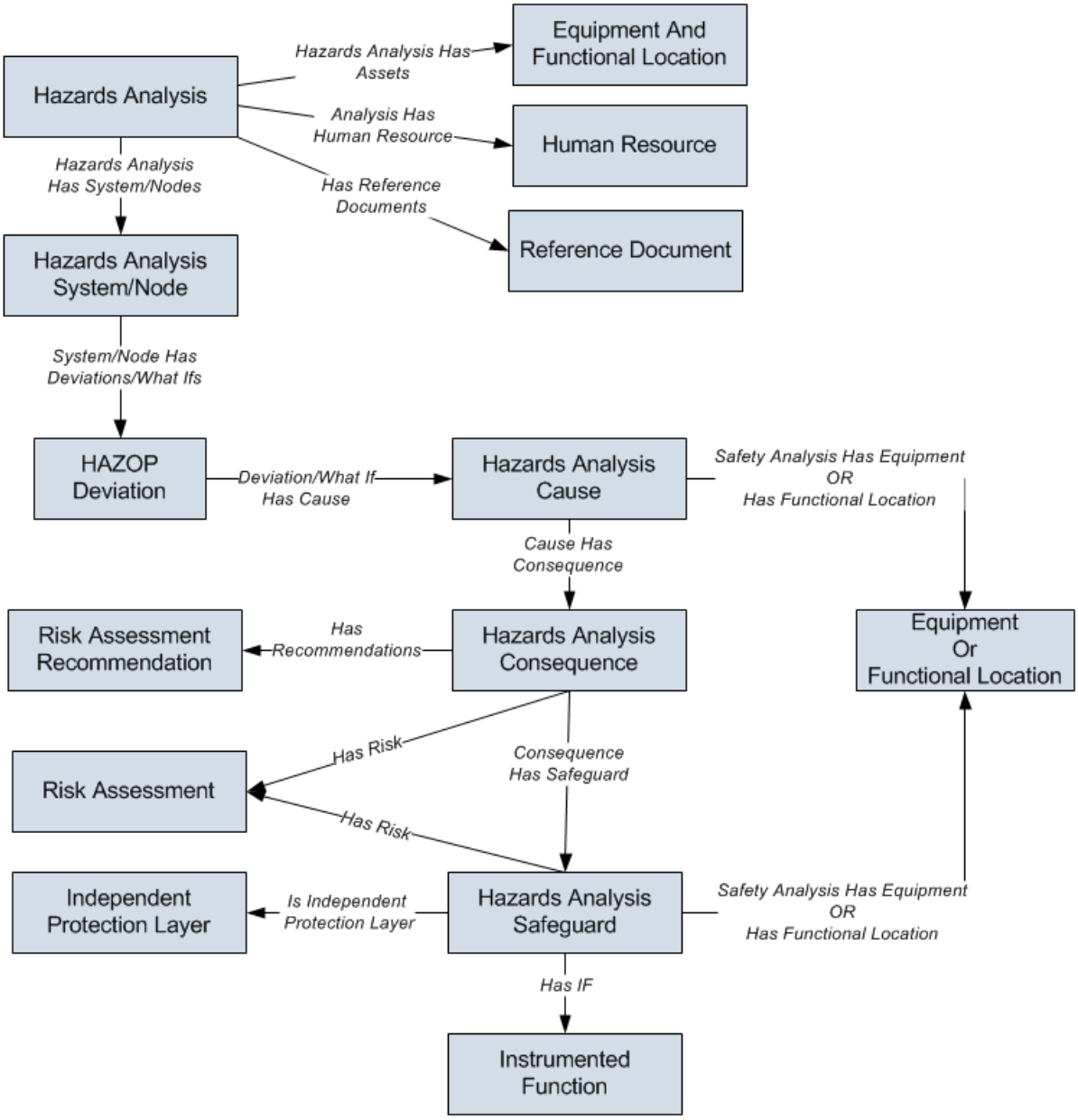


Illustration of the What If Analysis Data Model

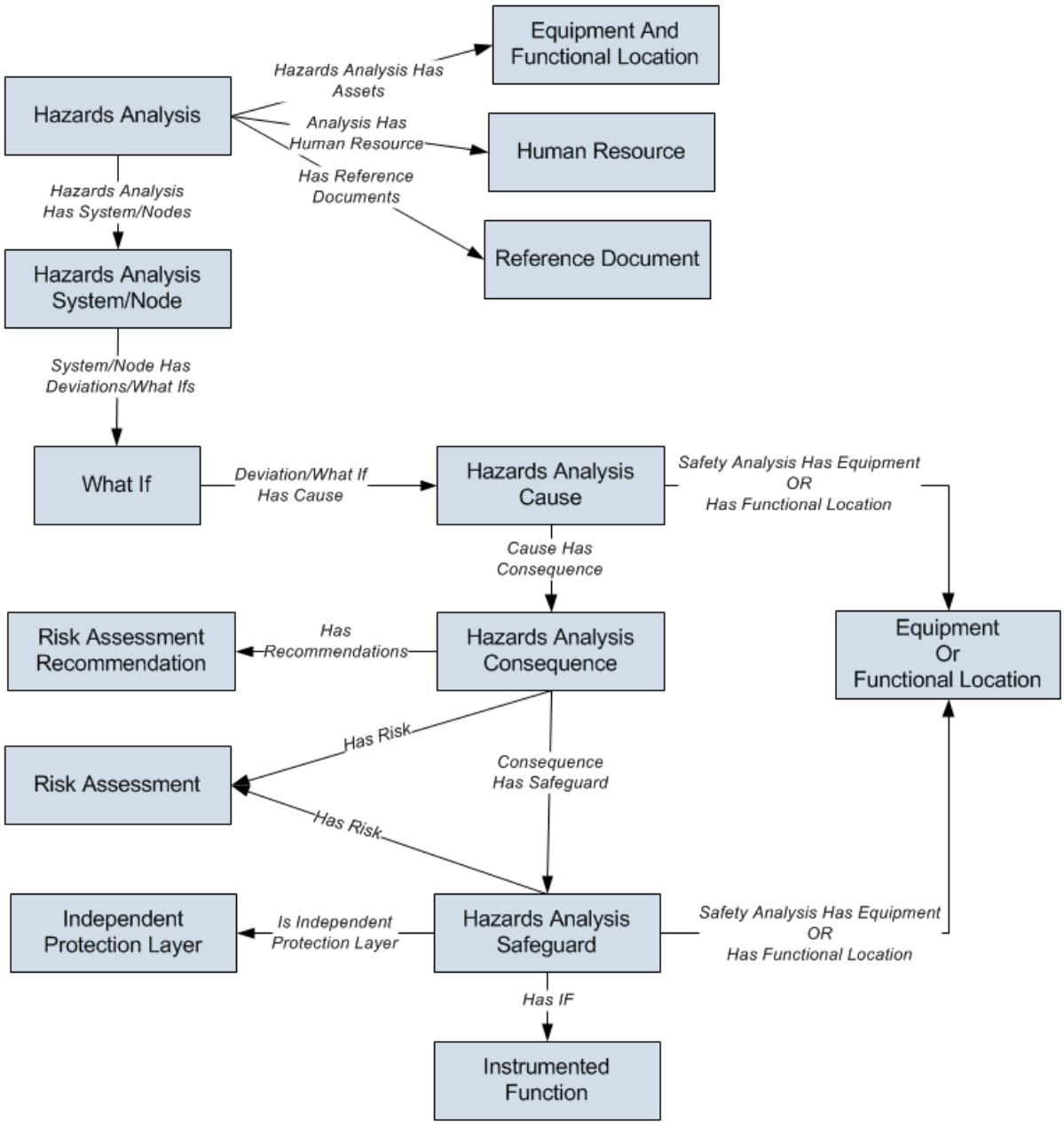
The following diagram illustrates the families that participate in a What If Analysis.

In this image:

- The shaded boxes represent entity families.
- The solid arrows represent relationship families.

You can determine the direction of each relationship definition from the direction of the arrow head: the box from which the arrow originates is the predecessor in that relationship definition, and the box to which the arrow head points is the successor in that relationship definition.

Illustration of the What If Analysis Data Model



About Hazards Analysis Record States

When you are working with Hazards Analysis records for a HAZOP Analysis or What If Analysis, you can use state management to facilitate a workflow that tracks the progress of the analysis.

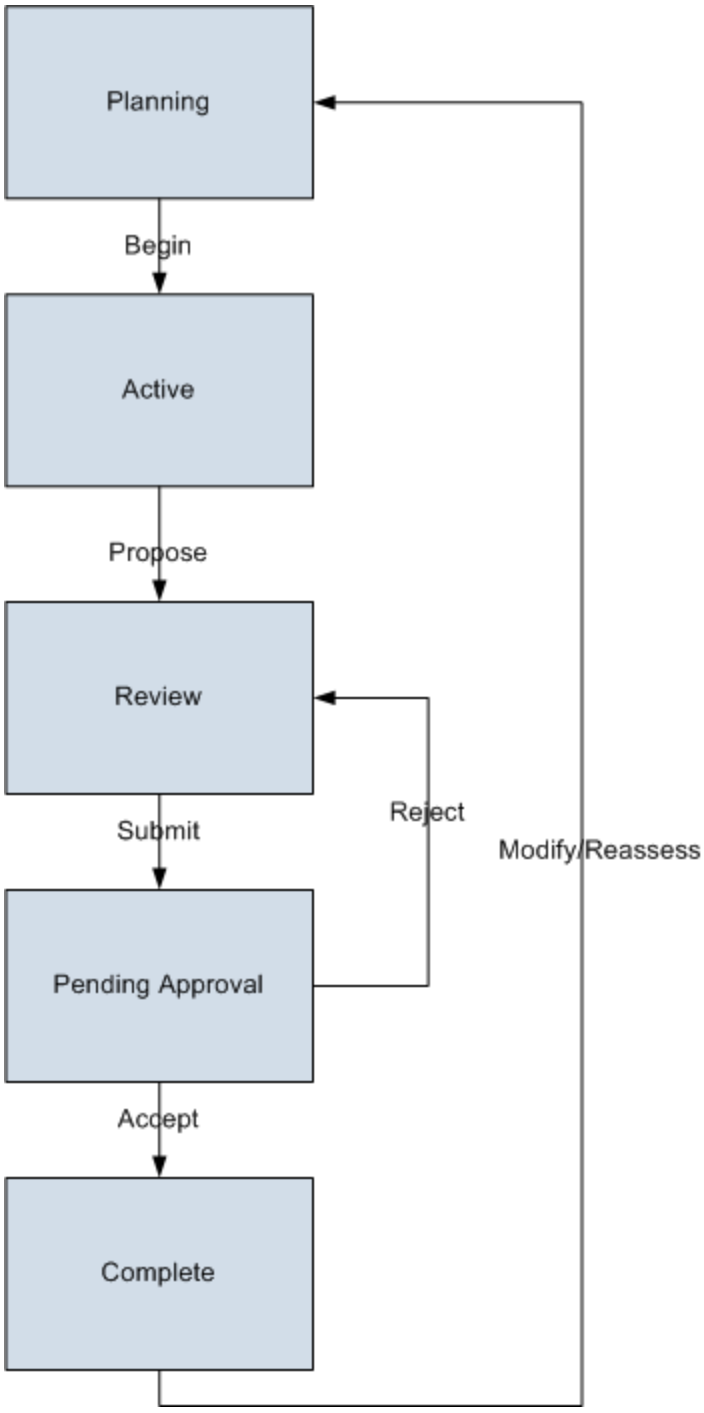
Above the Hazards Analysis datasheet, options appear that you can use to manage the states for that record. You can follow the standard procedure for managing record states. The following baseline record states are configured for the Hazards Analysis family:

- **Planning:** Indicates that the analysis is in the planning state.
- **Active:** Indicates that the analysis is active.
- **Review:** Indicates that the analysis has been sent for review.
- **Pending Approval:** Indicates that the analysis has been reviewed and is awaiting approval.
- **Complete:** Indicates that the analysis is complete. After a Hazards Analysis record state is changed to *Complete*:
  - The numeric value in the Revision Number field in the Hazards Analysis record is increased by one.
  - A Hazards Analysis Revision record is created, which stores a snapshot of the Hazards Analysis record when the state was changed to *Complete*.

Note: To change the Hazards Analysis record state, you must be a Super User or a member of the MI HA Owner Security Group or MI HA Facilitator Security Group.

Illustration of Hazards Analysis Record States

By default, the following baseline State Configuration exists for the Hazards Analysis family.



Initial State

The Planning state is the initial state of all new Hazards Analysis records.

Datasheet Configuration

By default, states and operations will appear on the datasheet when you are viewing a Hazards Analysis record in Hazards Analysis, the Record Manager, or the Bulk Data Form.

Reserved States and Operations

The following table lists the baseline states and operations and indicates which of these states and operations are reserved. You cannot remove or modify reserved states or operation. You can, however, add your own states and operations to the State Configuration.

States	
State	**Is Reserved?**
Planning	Yes
Active	Yes
Review	Yes
Pending Approval	Yes
Complete	Yes
Operations	
Operation	**Is Reserved?**
Begin	No
Propose	No
Submit	No
Accept	No
Reject	No
Modify/Reassess	No

State Configuration Roles

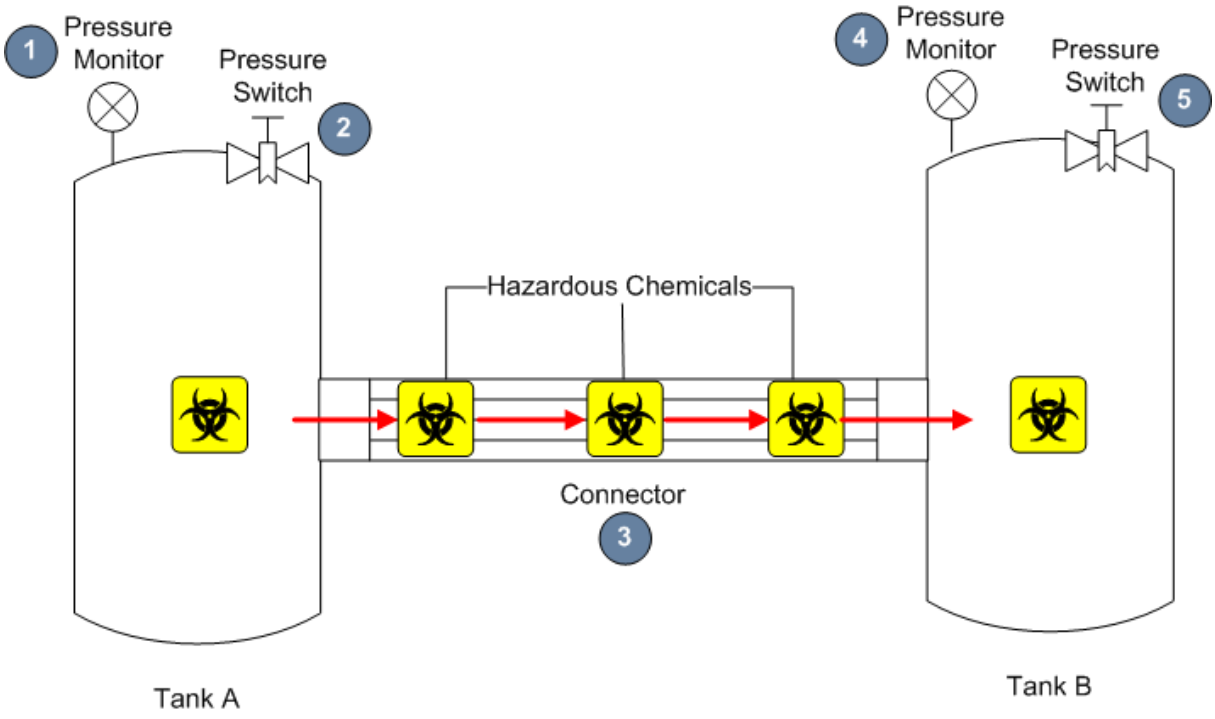
The following table lists the baseline states and indicates which State Configuration Roles are assigned to each state.

State	Security Groups
Planning	MI HA Facilitator MI HA Owner
Active	MI HA Facilitator MI HA Owner
Review	MI HA Facilitator MI HA Owner
Pending Approval	MI HA Owner
Complete	MI HA Owner

If desired, you can assign other State Configuration Roles to any state. In addition, for each state, the **Require a specific user to be assigned to a state** check box is *selected*.

Example of a Hazardous Process

Consider the following image, which illustrates the process of transferring hazardous chemicals from Tank A to Tank B. In the image, each step in the process is numbered to indicate the chronological order of events that occur in the process.



From the numbers in the image, you can see that the process involves the following steps:

1. In Tank A, the pressure monitor tracks the pressure level in the tank.
2. Based on the pressure monitor readings for Tank A, the pressure switch opens or closes to increase or decrease the pressure as it fluctuates due to changing environments (e.g., the pressure rises when humidity increases).
3. Hazardous chemicals are transferred from Tank A to Tank B through the connector.
4. In Tank B, the pressure monitor tracks the pressure level in the tank.
5. Based on the pressure monitor readings for Tank B, the pressure switch opens or closes to increase or decrease the pressure as it fluctuates due to changing environments (e.g., the pressure rises when humidity increases).

Note: This example represents a simplified process and is provided to explain the terminology and concepts that you will need to understand in order to work with the Hazards Analysis module. Depending on the types of processes in your facility, the complexity of your analyses will differ. For example, your process might include

multiple deviations, or it might include deviations that are also causes of other deviations.

Example Scenario 1

From the example process of transporting hazardous chemicals from Tank A to Tank B, consider a Scenario that includes the following risk and risk assessment:

- **Risk:** Hazardous chemicals leak out of the connector, causing multiple fatalities.
- **Risk Assessment:** The probability of multiple fatalities having a negative safety impact is very high, and the severity of the impact is also very high. However, multiple fatalities are not likely to cause a negative environmental impact.

The specific parts of the Scenario are outlined in the following list:

- **Deviation:** Pressure builds up in Tank A.
- **Cause:** Hazardous chemicals leak out of the connector.
- **Consequence:** Multiple people around the connector at the time of the leak are killed.
- **Risk Assessment:** The probability of multiple fatalities having a negative safety impact is very high, and the consequence of the impact is also very high. However, multiple fatalities are not likely to cause a negative environmental impact.
- **Safeguard:** A toxicity detector, which sounds an alarm when the toxicity levels in the facility reach high-risk levels.

Note: This example represents a simplified Scenario and is provided to explain the terminology and concepts that you will need to understand in order to work with the Hazards Analysis module. Depending on the types of processes in your facility, the complexity of your analyses will differ. For example, your Scenario might include multiple deviations, or it might include deviations that are also causes of other deviations.

Example: Scenario 2

From the example process of transporting hazardous chemicals from Tank A to Tank B, consider a Scenario that includes the following risk and risk assessment:

- **Risk:** Hazardous chemicals leak out of the connector, causing environmental degradation.
- **Risk Assessment:** The probability of environmental degradation having a negative safety impact is very low. However, the probability of environmental degradation having a negative environmental impact if very high, but the severity of the impact is medium.

The specific parts of the Scenario are outlined in the following list:

- **Deviation:** Pressure builds up in Tank A.
- **Cause:** Hazardous chemicals leak out of the connector.
- **Consequence:** Environmental degradation.
- **Risk Assessment:** The probability of environmental degradation having a negative safety impact is very low. However, the probability of environmental degradation having a negative environmental impact if very high, but the severity of the impact is medium.
- **Safeguard:** A toxicity detector, which sounds an alarm when the toxicity levels in the facility reach high-risk levels.

Note: This example represents a simplified Scenario and is provided to explain the terminology and concepts that you will need to understand in order to work with the Hazards Analysis module. Depending on the types of processes in your facility, the complexity of your analyses will differ. For example, your Scenario might include multiple deviations, or it might include deviations that are also causes of other deviations.

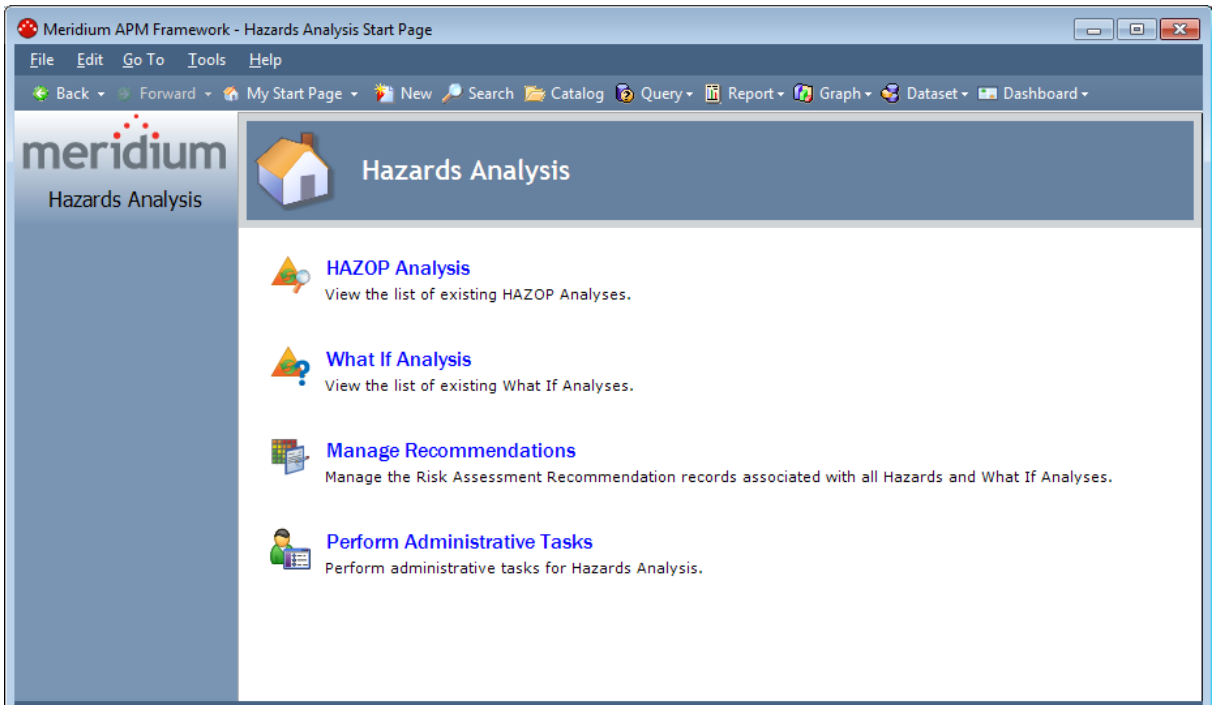
Accessing the Hazards Analysis Start Page

The **Hazards Analysis Start Page** provides a starting point from which you can access the features in Hazards Analysis. You can use this page to navigate to the features in the Hazards Analysis module.

To access the Hazards Analysis Start Page:

- On the Meridium APM Framework main menu, click **Go To**, point to **Asset Safety**, and then click **Hazards Analysis**.

  The **Hazards AnalysisStart Page** appears.



Aspects of the Hazards Analysis Start Page

The **Hazards Analysis Start Page** contains the following links:

- **HAZOP Analysis:** Displays the **HAZOP Analysis Search** page, from which you can open an existing HAZOP Analysis or create a new one.
- **What If Analysis:** Displays the **What If Analysis Search** page, from which you can open an existing What If Analysis or create a new one.
- **Manage Recommendations:** Displays the **Recommendation Management** page, where you can view a list of the Risk Assessment Recommendation records that are associated with all HAZOP Analyses and What If Analyses.
- **Perform Administrative Tasks:** Displays the **Hazards Analysis Administration** page, where you can specify the queries that are used to search for existing Hazards Analyses records for both HAZOP Analyses and What If Analyses. This links appears only to Super Users and members of the MI HA Facilitator or MI HA Owner Security Group.

Integration with SIS Management

After you asses risk for a Scenario in a Hazards Analysis, you can use that information in the SIS Management module to assess risk for an instrumented function within an SIL Analysis. To take advantage of this functionality, you will need to complete some pre-requisite steps in SIS Management.

Risk assessments from Hazards Analysis that are used in SIS Management in this way cannot be modified via SIS Management. If you make changes to a risk assessment in the Hazards Analysis module, and you want those changes to also appear in the SIS Management module, you will need to assess the SIL Level again in the SIS Management module using the modified Risk Assessment record.

First-Time Deployment Workflow

Deploying and configuring Hazards Analysis for the first time includes completing multiple steps, which are outlined in the table in this topic. The steps in this section of the documentation provide all the information that you need to deploy and configure the Hazards Analysis module on top of the basic Meridium APM system architecture.

Whether a step is required or optional is indicated in the **Required/Optional** cell. Steps are marked as *Required* if you must perform the steps to take advantage of Hazards Analysis functionality.

The person responsible for completing each task may vary within your organization. We recommend, however, that the steps be performed in relatively the same order in which they are listed in the table.

Step	Task	Required/Optional	Notes
1	Review the Hazards Analysis data model to determine which relationship definitions you will need to modify to include your custom equipment or location families. Modify any relationship definitions as needed via Configuration Manager.	Optional	This task is necessary only if you store equipment or location information in families other than the baseline Equipment and Functional Location families.
2	Assign the desired Security Users to one or more Hazards Analysis Security Groups in Configuration Manager.	Required	Users will not be able to access Hazards Analysis unless they have permissions to the Hazards Analysis families.
3	Define alternate search queries.	Optional	This task is necessary only if you do not want to use the baseline search queries.
4	Associate HAZOP Analyses and What If Analyses with a specific site.	Optional	None

Step	Task	Required/Optional	Notes
5	Activate the SIS Management license in Configuration Manager.	Optional	This is necessary only if you want to take advantage of the integration between the SIS Management module and Hazards Analysis.
6	Assign Security Users to the MI SIS Administrator or MI SIS Engineer Security Group in Configuration Manager.	Optional	This is necessary only if you want to take advantage of the integration between the SIS Management module and Hazards Analysis.

Upgrade or Update Hazards Analysis to 3.6.1.3.0

The following tables list the steps that are required to update or upgrade Hazards Analysis for 3.6.1.3.0. These steps assume that you have completed the steps for upgrading the components in the basic Meridium APM system architecture.

Update from any version V3.6.1.0.0 through V3.6.1.2.0

This module will be updated to 3.6.1.3.0 automatically when you update the components in the basic Meridium APM system architecture. No additional steps are required.

Upgrade from any version V3.6.0.0.0 through V3.6.0.12.6

Step	Task	Required/Optional	Notes
1	Activate the SIS Management license in Configuration Manager.	Optional	This is necessary only if you want to take advantage of the integration between the SIS Management module and Hazards Analysis.
2	Assign Security Users to the MI SIS Administrator or MI SIS Engineer Security Group in Configuration Manager.	Optional	This is necessary only if you want to take advantage of the integration between the SIS Management module and Hazards Analysis.

Upgrade from any version V3.5.1.0.0 through V3.5.1.12.0

Step	Task	Required/Optional	Notes
1	Activate the SIS Management license in Configuration Manager.	Optional	This is necessary only if you want to take advantage of the integration between the SIS Management module and Hazards Analysis.
2	Assign Security Users to the MI SIS Administrator or MI SIS Engineer Security Group in Configuration Manager.	Optional	This is necessary only if you want to take advantage of the integration between the SIS Management module and Hazards Analysis.

Upgrade from any version V3.5.0 SP1 LP through V3.5.0.1.9.0

Step	Task	Required/Optional	Notes
1	Activate the SIS Management license in Configuration Manager.	Optional	This is necessary only if you want to take advantage of the integration between the SIS Management module and Hazards Analysis.
2	Assign Security Users to the MI SIS Administrator or MI SIS Engineer Security Group in Configuration Manager.	Optional	This is necessary only if you want to take advantage of the integration between the SIS Management module and Hazards Analysis.

Upgrade from any version V3.5.0 through V3.5.0.0.7.1

Step	Task	Required/Optional	Notes
1	Activate the SIS Management license in Configuration Manager.	Optional	This is necessary only if you want to take advantage of the integration between the SIS Management module and Hazards Analysis.
2	Assign Security Users to the MI SIS Administrator or MI SIS Engineer Security Group in Configuration Manager.	Optional	This is necessary only if you want to take advantage of the integration between the SIS Management module and Hazards Analysis.

Upgrade from any version V3.4.5 through V3.4.5.0.1.4

Step	Task	Required/Optional	Notes
1	Activate the SIS Management license in Configuration Manager.	Optional	This is necessary only if you want to take advantage of the integration between the SIS Management module and Hazards Analysis.
2	Assign Security Users to the MI SIS Administrator or MI SIS Engineer Security Group in Configuration Manager.	Optional	This is necessary only if you want to take advantage of the integration between the SIS Management module and Hazards Analysis.

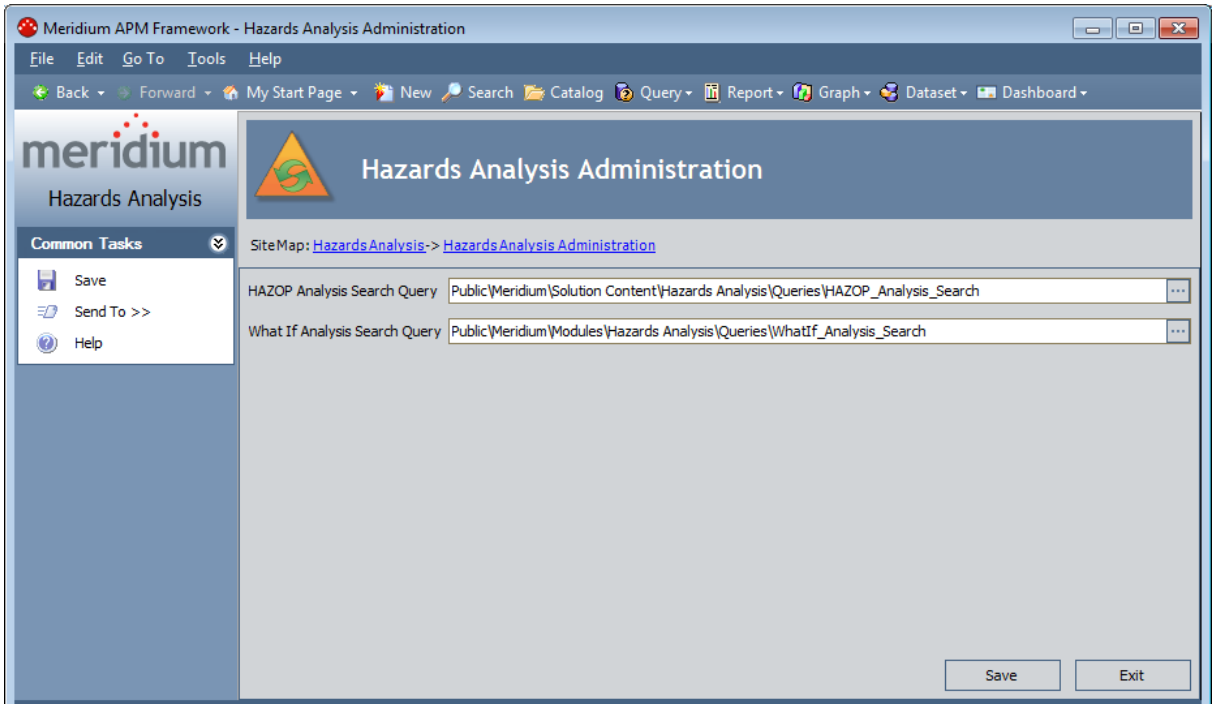
Accessing the Hazards Analysis Administration Page

The **Hazards Analysis Administration** page lets you specify the queries that you want to use to search for Hazards Analysis records for HAZOP and What If Analyses. To access the **Hazards Analysis Administration**page, you must be a Super User or a member of the MI HA Facilitator or MI HA Owner Security Group.

To access the Hazards Analysis Administration page:

- On the **Hazards Analysis Start Page**, click the **Perform Administrative Tasks** link.

  The **Hazards Analysis Administration** page appears.



Aspects of the Hazards Analysis Administration Page

The **Hazards Analysis Administration** page contains the following text boxes:

- **HAZOP Analysis Search Query:** Identifies the query whose results will appear on the **HAZOP Analysis Search** page. The query \\Public\Meridium\Module\Hazards Analysis\Queries\Hazop_Analysis_Search is specified for this setting by default.
- **What If Analysis Search Query:** Identifies the query whose results will appear on the **What If Analysis Search** page. The query \\Public\Meridium\Module\Hazards Analysis\Queries\WhatIf_Analysis_Search query is specified for this setting by default.

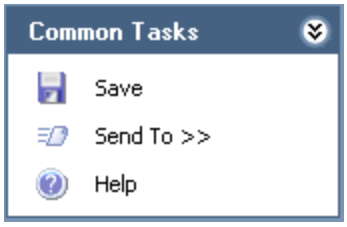
In either text box, you can specify a different query if desired.

At the bottom of the page, the following options appear:

- **Save:** Saves your changes.
- **Exit:** Displays the **Hazards Analysis Start Page**. If you have unsaved changes on the **Hazards Analysis Administration** page, a message will appear, asking if you want to save those changes, and then the **Hazards Analysis Start Page** appears.

The **Hazards Analysis Administration** page contains one task menu, **Common Tasks**.

Common Tasks



The **Common Tasks** menu on the **Hazards Analysis Administration** page contains the following links:

- **Save:** Saves your changes.
- **Send To:** Displays a submenu with options that let you provide a link to the current page on your desktop (create shortcut), in an email message, or on a Home Page.
- **Help:** Displays the context-sensitive help topic for the **Hazards Analysis Administration** page.

Hazards Analysis Security Groups

The following Security Groups are provided for use with Hazards Analysis:

- MI HA Administrator
- MI HA Owner
- MI HA Facilitator
- MI HA Member

These groups are intended to support the three main types of users who will use Hazards Analysis. Each of these groups has privileges assigned to it by default. The baseline family-level privileges are summarized in the following table.

Family	MI HA Administrator	MI HA Owner	MI HA Facilitator	MI HA Member
Entity Families				
Alert	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	None
Consequence	View, Update, Insert, Delete	View	View	View
Equipment	View	View	View	View
Functional Location	View	View	View	View
Hazards Analysis	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Hazards Analysis Cause	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Hazards Analysis Consequence	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View

Family	MI HA Administrator	MI HA Owner	MI HA Facilitator	MI HA Member
Hazards Analysis Safeguard	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Hazards Analysis System/Node	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
HAZOP Deviation	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Human Resource	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Independent Protection Layer	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Instrumented Function	View	View	View	View
Probability	View, Update, Insert, Delete	View	View	View
Protection Level	View, Update, Insert, Delete	View, Insert	View, Insert	View, Insert
Reference Document	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Risk Assessment	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View

Family	MI HA Administrator	MI HA Owner	MI HA Facilitator	MI HA Member
Risk Assessment Recommendation	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Risk Category	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Risk Matrix	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Risk Rank	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Risk Threshold	View, Update, Insert, Delete	View	View	View
Site Reference	View	View	View	View
What If	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Relationship Families				
Analysis Has Human Resource	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Cause Has Consequence	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View

Family	MI HA Administrator	MI HA Owner	MI HA Facilitator	MI HA Member
Cause Revision Has Consequence Revision	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Consequence Has Safeguard	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Consequence Revision Has Safeguard Revision	View, Update, Insert, Delete	View, update, Insert, Delete	View, update, Insert, Delete	View
Deviation\What If Has Cause	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Deviation\What If Revision Has Cause Revision	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Equipment Has Equipment	View	View	View	View
Functional Location Has Equipment	View	View	View	View
Functional Location Has Functional Location	View	View	View	View
Has Hazards Analysis Revision	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Has HAZOP Reference	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	None

Family	MI HA Admin-istrator	MI HA Owner	MI HA Facil-itator	MI HA Mem-ber
Has IF	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Has Functional Location	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Has Recom-mendations	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Has Reference Documents	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Has Reference Val-ues	View, Update, Insert, Delete	View	View	View
Has Risk	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Has Risk Category	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Has Risk Matrix	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Has Site Reference	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View

Family	MI HA Administrator	MI HA Owner	MI HA Facilitator	MI HA Member
Hazards Analysis Has Assets	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Hazards Analysis Revision Has System/Nodes Revisio	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Hazards Analysis Has System/Nodes	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Is Independent Protection Layer	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Mitigates Risk	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Safety Analysis Has Equipment	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
Safeguard Revision Has IPL Revision	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
System/Node Has Deviations/What Ifs	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View
System/Node Has Deviations/What Ifs Revis	View, Update, Insert, Delete	View, Update, Insert, Delete	View, Update, Insert, Delete	View

Specifying Different Search Queries

The following instructions provide details on specifying a different search query. You can perform this task on the **Hazards Analysis Administration** page.

To specify a different search query:

1. Access the **Hazards Analysis Administration** page.
2. In the text box that corresponds to the search query that you want to specify (i.e., HAZOP Analysis or What If Analysis), click the ... button.

   The **Select Query** dialog box appears.
3. Navigate to the desired query, and then click the **Open** button.

   The path to the desired query is displayed in the text box from which you accessed the **Select Query** dialog box.
4. At the bottom of the **Hazards Analysis Administration** page, click the **Save** button.

   Your changes are saved.

Associating HAZOP Analyses and What If Analyses with a Specific Site

Some companies that use the Meridium APM software have facilities at multiple sites or locations around the world. Each site contains unique equipment and locations.

If desired, you can define these sites and associated equipment or locations with the site to which they belong. You can also associate risk matrices with specific sites. If a risk matrix is associated with a site, you can specify which site you want to associate with a HAZOP Analysis or a What If Analysis by selecting the ID of the desired Site Reference record in the Site ID field of the Hazards Analysis record for that analysis.

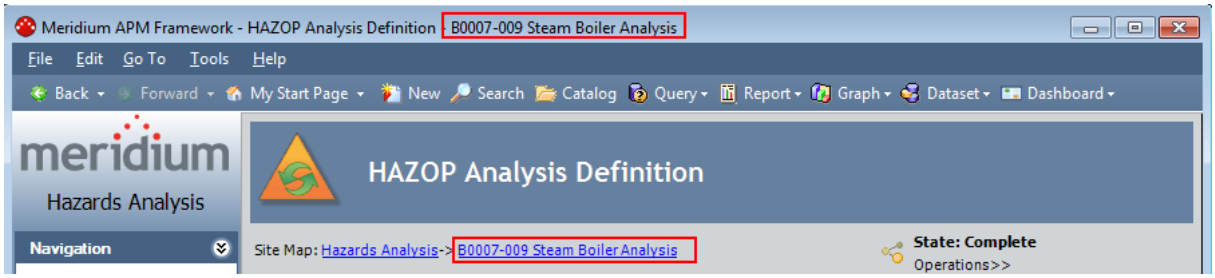
After a HAZOP Analysis or a What If Analysis is associated with a site, when you create a Risk Assessment record for a Hazards Analysis Safeguard or Hazards Analysis Consequence record associated with an analysis, rather than seeing the default risk matrix, you will see the risk matrix that is associated with that site.

Navigating Hazards Analysis

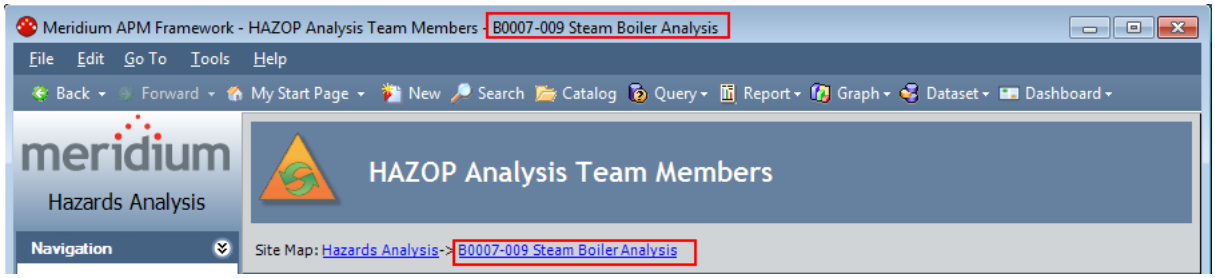
Hazards Analysis is context-driven, which means that each page that you view within the module will contain data related only to the analysis with which you are currently working. After you have opened a Hazards Analysis record on either the **HAZOP Analysis Definition** or **What If Analysis Definition** page, the ID of the Hazards Analysis record will appear on the site map and the title bar on each page within the module, indicating the analysis with which you are currently working.

The **Navigation** menu appears on most pages in Hazards Analysis. You can use the links on this menu to access the pages that contain the features that allow you to create and conduct HAZOP Analyses or What If Analyses. After you open a Hazards Analysis record on either the **HAZOP Analysis Definition** or **What If Analysis Definition** page, you can use the links on the **Navigation** menu to facilitate a workflow for creating the remaining records that make up that analysis.

For example, assume that the Hazards Analysis record *B0007-009 Steam Boiler Analysis* appears on the **HAZOP Analysis Definition** page. The site map and the title bar contain the text *B0007-009 Steam Boiler Analysis*, as shown in the following image.



To define the HAZOP Analysis team for the HAZOP Analysis *B0007-009 Steam Boiler Analysis*, you would click the **Team Members** link on the **Navigation** menu and see that the site map and title bar on the **HAZOP Analysis Team Members** page still contain the Hazards Analysis ID *B0007-009 Steam Boiler Analysis*.



About Conducting a HAZOP Analyses

A Hazards and Operability (HAZOP) Analysis lets you document the *know*n hazardous Scenarios that are associated with a process, assess the likelihood of the risks in those Scenarios occurring, and determine the best way to mitigate those risks.

Conducting a HAZOP Analysis includes completing the following steps:

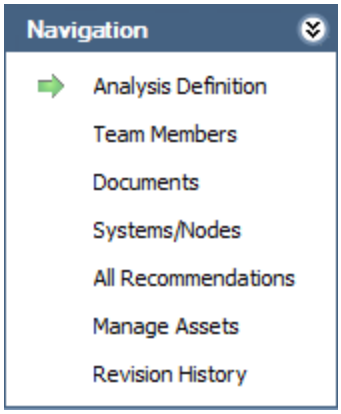
1. Create one Hazards Analysis record, which stores the details of the HAZOP Analysis that you want to perform, including the start and end dates for the analysis.
2. Define the HAZOP Analysis team,who will conduct the analysis.
3. Link the Hazards Analysis record to reference documents, which contain reference material relevant to the analysis.
4. Define Scenarios, which includes identifying the following items:
    - The system in which the hazardous Scenario originates.
    - The condition under which the Scenario may appear.
    - What *causes* the condition to occur.
    - The risks associated with that Scenario.
    - The safeguards that are currently in place to mitigate the risk in that Scenario.
    - The probability and severity of the safety or environmental impact of the risk associated with the Scenario *if a safeguard is in place*.
5. Define recommendations for actions that should be take to mitigate the risk in that Scenario.

The Navigation Menu for a HAZOP Analysis

The **Navigation** menu appears on most pages in Hazards Analysis when you are working with a HAZOP Analysis and provides access to the Hazards Analysis features.

Note: The **Navigation** menu does not appear on the **Hazards Analysis Administration** page or the **HAZOP Analysis Search** page.

A green arrow to the left of an option indicates the feature that you are currently viewing. The following image shows the **Navigation** menu as it appears on the **HAZOP Analysis Definition** page.



The **Navigation** menu in Hazards Analysis contains the following links:

- **Analysis Definition:** Displays the **HAZOP Analysis Definition** page, where you can manage Hazards Analysis records.
- **Team Members:** Displays the **HAZOP Analysis Team Members** page, where you can manage the HAZOP Analysis team.
- **Documents:** Displays the **Reference Documents** page, where you can manage Reference Document records that are associated with the HAZOP Analysis.
- **Systems/Nodes:** Displays the **HAZOP Nodes** page, where you can define the hazards that you want to analyze.
- **All Recommendations:** Displays in Recommendation Management the list of all Risk Assessment Recommendation records that are linked to the current Hazards Analysis record.
- **Manage Assets:** Displays the **HAZOP Analysis Assets** page, which contains a list of all the Equipment and Functional Location records that are linked to the current Hazards Analysis record.
- **Revision History:** Displays the **Analysis Revision History** page, where you can manage the Hazards Analysis Revision records that exist for an analysis. This link is enabled only if the state of the Hazards Analysis record with which you are currently working has ever been set to Complete.

These links are enabled after you have created a new Hazards Analysis record or opened an existing one (i.e., an Analysis ID appears in the title bar).

About Hazards Analysis Records and the HAZOP Analysis

Hazards Analysis records store information about a HAZOP Analysis. Creating a Hazards Analysis record is the first step in creating a HAZOP Analysis. All other records that you create for the HAZOP Analysis will be linked directly or indirectly to the Hazards Analysis record.

After you have defined the Hazards Analysis record on the **HAZOP Analysis Definition** page, you can use the links on the **Navigation** menu to:

- Define the HAZOP Analysis team.
- Add reference documents to the analysis.
- Define the existing Scenarios whose risk you want to assess.
- Create Risk Assessment Recommendation records for actions that should be taken to mitigate the risks in those Scenarios.

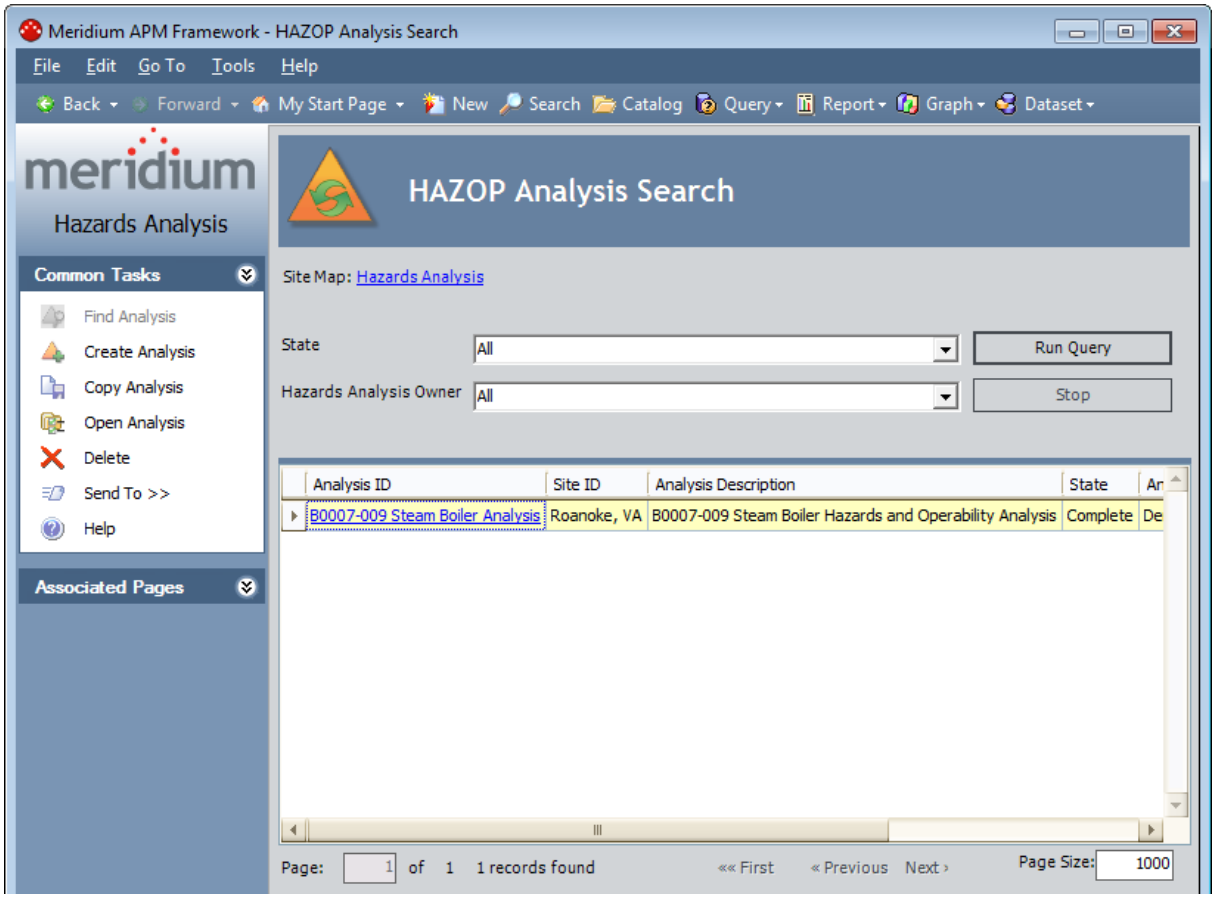
Accessing the HAZOP Analysis Search Page

The **HAZOP Analysis Search** page lets you search for an existing Hazards Analysis record for a HAZOP Analysis.

To access the HAZOP Analysis Search page:

1. Access the **Hazards Analysis Start Page**.
2. Click the **HAZOP Analysis** link.

   The **HAZOP Analysis Search** page appears.



Aspects of the HAZOP Analysis Search Page

The **HAZOP Analysis Search** page contains the results of the query that is specified in the **HAZOP Analysis Search Query** text box on the **Hazards Analysis Administration** page. This documentation assumes that you are using the baseline HAZOP_Analysis_ Search query, which contains two prompts that appear as lists at the top of the **HAZOP Analysis Search** page:

- **State:** Contains a list of record states that have been configured for the Hazards Analysis family. You can choose from the following baseline states:
  - **All:** Displays all the existing Hazards Analysis records that are in any state.
  - **Active:** Displays the Hazards Analysis records that are in the *Active* state.
  - **Complete:** Displays the Hazards Analysis records that are in the *Complete* state.
  - **Pending Approval:** Displays the Hazards Analysis records that are in the *Pending Approval* state.
  - **Planning:** Displays the Hazards Analysis records that are in the *Planning*state.
  - **Review:** Displays the Hazards Analysis records that are in the *Review* state.
- **Hazards Analysis Owner:** Contains the value *All* and a list of names of the HAZOP Analysis team members whose names appear in the Analysis Owner field in Hazards Analysis records.

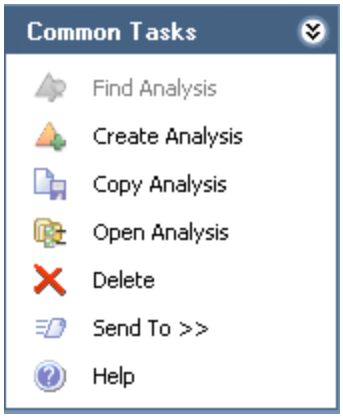
This query is run automatically using the default prompt value *All*. If you select different criteria, you can click the **Run Query** button to run the query and display the results in the grid at the bottom of the page. The query results will include hyperlinked Analysis IDs, which you can use to open the Hazards Analysis record on the **HAZOP Analysis Definition** page.

Below the query results are options that you can use to navigate the results.

The **HAZOP Analysis Search** page contains the following task menus:

- Common Tasks
- Associated Pages

Common Tasks Menu



The **Common Tasks** menu on the **HAZOP Analysis Search** page contains the following links:

- **Find Analysis:** This link is disabled on the **HAZOP Analysis Search** page.
- **Create Analysis:** Displays a new blank Hazards Analysis record on the **HAZOP Analysis Definition** page.
- **Copy Analysis:** Displays on the **HAZOP Analysis Definition** page a new Hazards Analysis record, populated with information from the source record.
- **Open Analysis:** Displays the currently selected record on the **HAZOP Analysis Definition** page.
- **Delete:** Displays a confirmation message, and then deletes the selected Hazards Analysis record.
- **Send To:** Displays a submenu with options that let you provide a link to the current page on your desktop (create shortcut), in an email message, or on a Home Page.
- **Help:** Displays the context-sensitive help topic for the **HAZOP Analysis Search** page.

Searching for Hazards Analysis Records on the HAZOP Analysis Search Page

To search for Hazards Analysis records on the HAZOP Analysis Search page:

1. Access the **HAZOP Analysis Search** page.
2. If desired, in the **HAZOP Analysis Search** workspace, in the **State** list, select the record state by which you want to filter the query results.
3. If desired, in the **Hazards Analysis Owner** list, select the user ID of the desired analysis owner.
4. Click the **Run Query** button.

   The query results appear in the grid. At this point, you can open an existing Hazards Analysis record, copy an existing Hazards Analysis record, or create a new Hazards Analysis record.

Accessing the HAZOP Analysis Definition Page

The **HAZOP Analysis Definition** page lets you create and modify Hazards Analysis records.

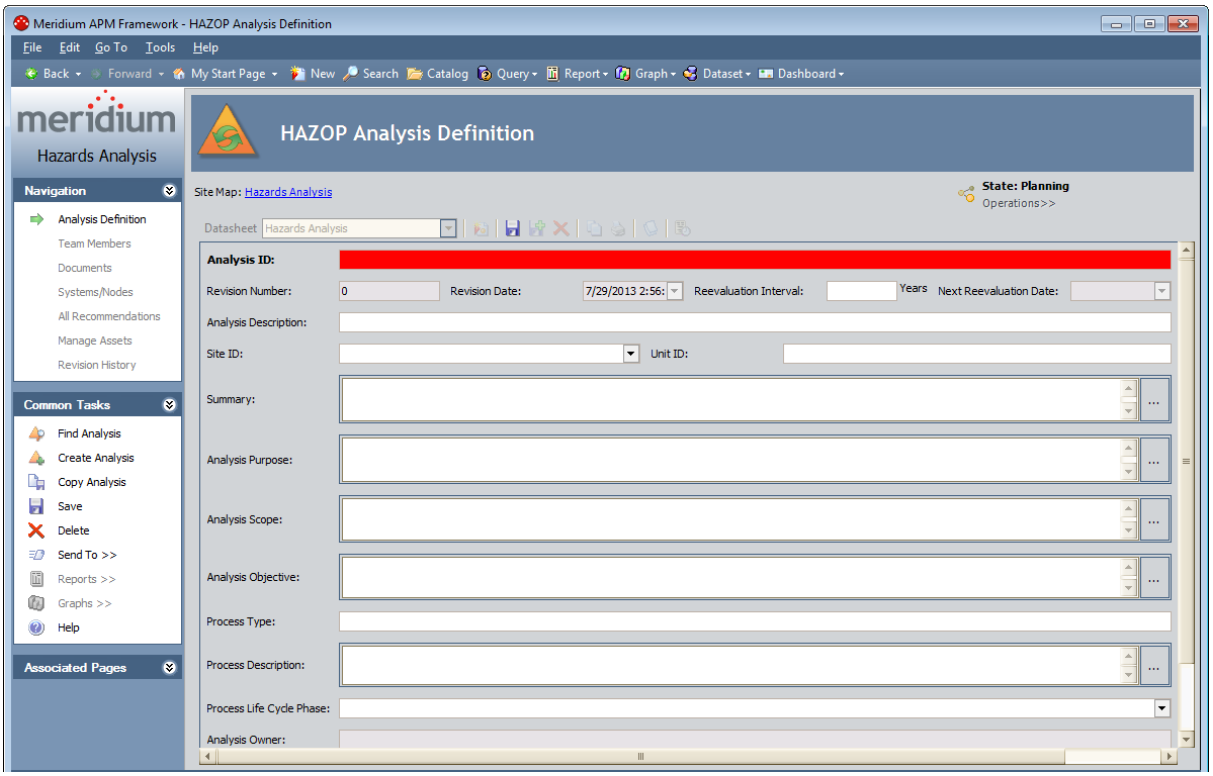
To access the HAZOP Analysis Definition page:

1. Access the **HAZOP Analysis Search** page.
2. On the **Common Tasks** menu, click the **Create Analysis** link.

   -or-

   In the grid, in the **Analysis ID** cell in the row that contains the desired Hazards Analysis record, click the hyperlinked Analysis ID.

   The **HAZOP Analysis Definition** page appears.



Aspects of the HAZOP Analysis Definition Page

The **HAZOP Analysis Definition** page displays the datasheet for a Hazards Analysis record, where you can manage the properties of the HAZOP Analysis.

- If you accessed the **HAZOP Analysis Definition** page by clicking the **Create Analysis** link, a blank datasheet for a new Hazards Analysis record appears.
- If you accessed the **HAZOP Analysis Definition** page by opening an existing Hazards Analysis record, the datasheet for the selected record appears.

Above the datasheet, the following options are enabled:

Saves the current Hazards Analysis record.

Displays the **Reference Documents** window, where you can manage the Reference Document records that are linked to the current Hazards Analysis record.

Displays the **Field Change History** dialog box, where you can view the revision history for all fields for which revision history exists.

> **Note:** If the revision history feature has not been enabled in the Configuration Manager for any fields, a message will appear, indicating that no revision history is available.

Displays the **State Assignments** dialog box, where you can manage the Security Users that are assigned to the states that are defined for the Hazards Analysis family. To the right of the icon, the following items appear:

State indicator: Displays the current state of the Hazards Analysis record.

Operations menu: Displays the operations that are available for selection. You can use this option to change the state of the Hazards Analysis record. This link is enabled only when you are viewing an existing Hazards Analysis record.

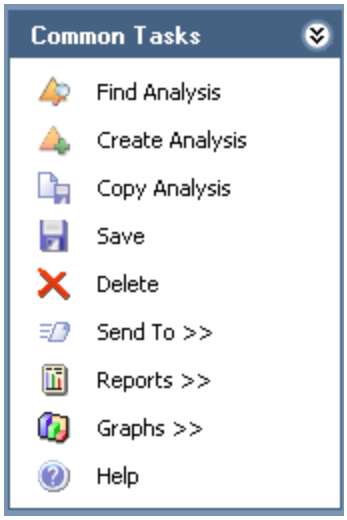
The **HAZOP Analysis Definition** page contains the following task menus:

- Common Tasks
- Navigation
- Associated Pages

Using the **HAZOP Analysis Definition** page, you can:

- Create new Hazards Analysis records.
- Modify existing Hazards Analysis records.
- Assign a Security User to a Hazards Analysis record state. Doing so will allow this Security User to transition the Hazards Analysis record from the assigned state to a successor state. A Security User must also be assigned to the successor state before a Security User can transition to that state.
- Transition the Hazards Analysis record state to a different state.

Common Tasks Menu



The **Common Tasks** menu on the **HAZOP Analysis Definition** page contains the following links:

- **Find Analysis:** Displays the **HAZOP Analysis Search** page, where you can search for an existing Hazards Analysis record.
- **Create Analysis:** Displays a new blank Hazards Analysis record on the **HAZOP Analysis Definition** page.
- **Copy Analysis:** Displays a new Hazards Analysis record that is populated with values from the Hazards Analysis record that you are currently viewing.
- **Save:** Saves the current record.
- **Delete:** Displays a confirmation message, and then deletes the current record.
- **Send To:** Displays a submenu with options that let you provide a link to the current page on your desktop (create shortcut), in an email message, or on a Home Page.
- **Reports:** Displays a submenu that contains the caption of the Catalog item *Hazards Analysis Report* as a link. This link is enabled only when you are viewing an existing Hazards Analysis record and displays the Hazards Analysis Report in the Report Viewer.
- **Graphs:** Displays a submenu that contains the caption of the Catalog item *Hazards Analysis Mitigated Risk* as a link. This link is enabled only when you are viewing an existing Hazards Analysis record and displays the Hazards Analysis Mitigated Risk graph in the Graph Viewer.
- **Help:** Displays the context-sensitive help topic for the **HAZOP Analysis Definition** page.

Creating New Hazards Analysis Records

To create a new Hazards Analysis record for a HAZOP Analysis:

1. Access the **HAZOP Analysis Search** page or the **HAZOP Analysis Definition** page.
2. On the **Common Tasks** menu, click the **Create Analysis** link.

   A new blank Hazards Analysis record appears on the **HAZOP Analysis Definition** page.
3. In the Analysis ID field, type a name for the HAZOP Analysis. This field is required.
4. Provide values in the remaining fields as desired.
5. On the **Common Tasks** menu, click the **Save** link.

   The record is saved.

Copying Hazards Analysis Records

When you copy an existing Hazards Analysis record, you are creating a new Hazards Analysis record that will be populated with the values from the record that was copied. The values in all the fields from the source record will be copied to the new record with the exception of the following fields:

- Analysis ID
- Analysis Start Date
- Analysis End Date field
- Last Modified By
- Last Modified Date
- Revision Date field
- Revision Number field

To copy a Hazards Analysis record to create a new one:

1. Access the **HAZOP Analysis Search** page.
2. In the grid, select the row containing the record you want to copy.
3. On the **Common Tasks** menu, click the **Copy Analysis** link.

   A new record appears on the **HAZOP Analysis Definition** page, which is populated automatically with values from the selected record.
4. In the Analysis ID field, type a name for the HAZOP Analysis. This field is required.
5. In the Analysis Start Date field, select a start date for the analysis, if desired. This field is populated automatically with the current date.
6. In the Analysis End Date field, select an end date for the analysis, if desired. This field is cleared when you copy an analysis.
7. Provide values in the remaining fields as desired.
8. On the **Common Tasks** menu, click the **Save** link.

   The record is saved.

Opening Existing Hazards Analysis Records

To open an existing Hazards Analysis record for a HAZOP Analysis:

1. On the **HAZOP Analysis Search** page, search for the Hazards Analysis record that you want to open.
2. In the search results, in the **Analysis ID** cell, click the hyperlinked ID for the record that you want to open.

   The selected record appears on the **HAZOP Analysis Definition** page.

Modifying Hazards Analysis Records

To modify a Hazards Analysis record for a HAZOP Analysis:

1. Open the Hazards Analysis record that you want to modify.
2. Modify the values in the fields as desired.
3. On the **Common Tasks** menu, click the **Save** link.

   Your changes are saved.

Flagging a Hazards Analysis as Complete

If you are finished with a HAZOP Analysis and no longer want to see its Hazards Analysis record in the query results on the **HAZOP Analysis Search** page, you can remove the Hazards Analysis record from the query results via the **Delete** option on the **Common Tasks** menu.

Using the **Delete** option does not *delete* the Hazards Analysis record from the database. Instead, the **Is Deleted**check box in the record is selected, causing that record to no longer appear in the query results.

You can remove a Hazards Analysis record from the query results on the **HAZOP Analysis Search** page regardless of the state of the record. After a Hazards Analysis record has been removed from the query results, you can still access the record via a search or a custom query.

To remove a Hazards Analysis record from the HAZOP Analysis Search page:

1. On the **HAZOP Analysis Search** page, select the row containing the Hazards Analysis record that you want to remove.
2. On the **Common Tasks** menu, click the **Delete** link.

   A confirmation message appears, asking if you really want to delete the Hazards Analysis record and all the records linked to that record.
3. Click the **Yes** button.

   The Hazards Analysis record is removed from the **HAZOP Analysis Search** page.

About the HAZOP Analysis Team

The *HAZOP Analysis team* is a group of individuals who will complete the HAZOP Analysis. You can add Meridium APM users and non-Meridium APM users to the HAZOP Analysis team.

- Meridium APM users will have an existing Meridium APM Security User record and an associated Human Resource record that was created automatically when the Security user record was created.
- Non-Meridium APM users will not have a Meridium APM Security User record or a Human Resource record. To add a non-Meridium APM user to the HAZOP Analysis team, you will need to create a Human Resource record for that user. You can do so via the **HAZOP Analysis Team Members** page or by using the Meridium APM Framework Tools.

Note: A Security User record is required for logging in to the Meridium APM Framework application and using Hazards Analysis. HAZOP Analysis team members who do not have a Security User account may participate in and contribute to the analysis but will not be able to use the application.

Any member of the HAZOP Analysis team can be assigned a role within the HAZOP Analysis team, which provides a reference of the tasks for which the team member is responsible.

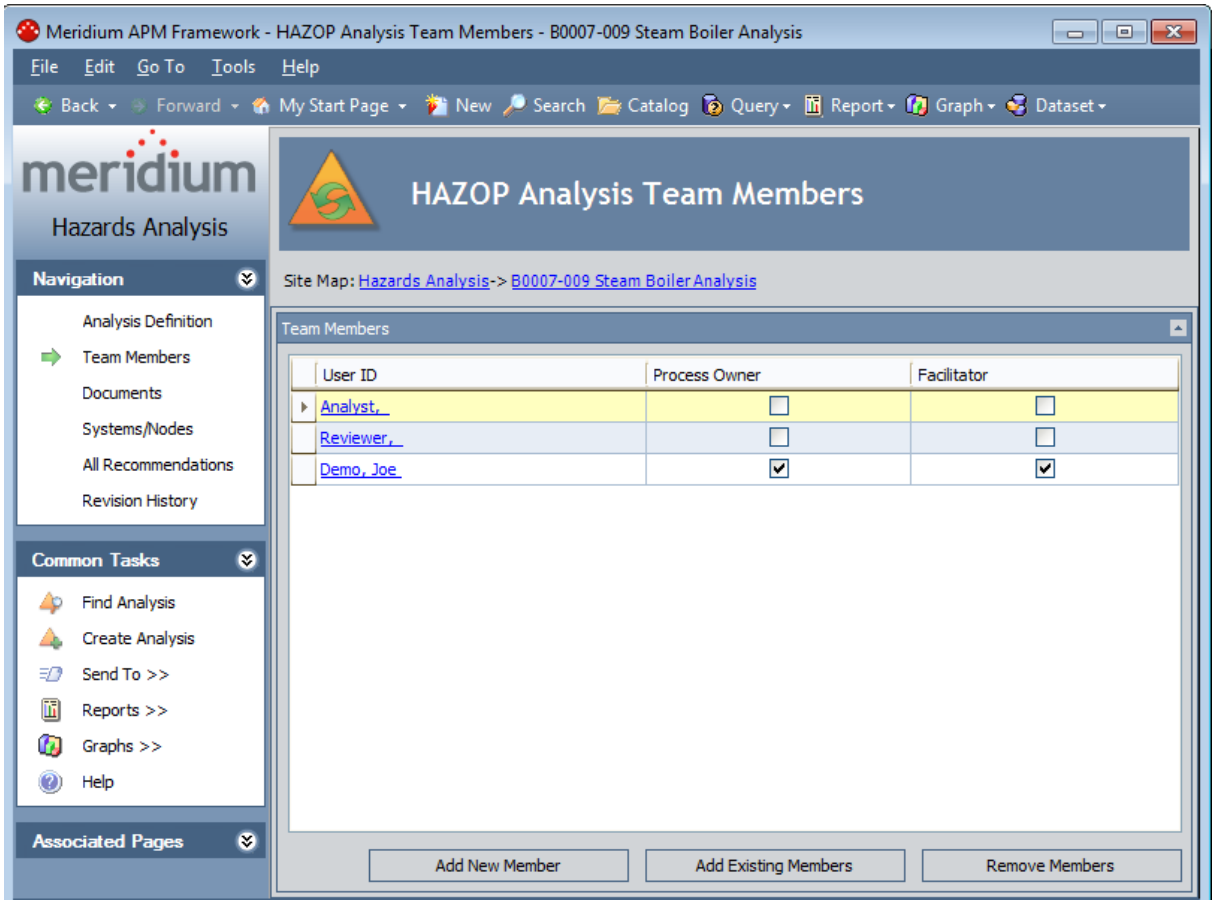
Accessing the HAZOP Analysis Team Members Page

On the **HAZOP Analysis Team Members** page, you can add team members to the HAZOP Analysis team and assign team members the role of Process Owner or Facilitator.

To access the HAZOP Analysis Team Members page:

1. Open the Hazards Analysis record that is included in the HAZOP Analysis whose team you want to define.
2. On the **Navigation** menu, click the **Team Members** link.

   The **HAZOP Analysis Team Members** page appears.



Aspects of the HAZOP Analysis Team Members Page

The **HAZOP Analysis Team Members** page displays the **Team Members** workspace, which consists of a modifiable grid that displays information about the HAZOP Analysis team members. Each row in the grid represents one Human Resource record. For each Human Resource record that appears in the grid, the following information is displayed by default:

- **User ID:** Contains a hyperlinked name of the team member as it appears in the Human Resource record for that user. You can click any hyperlink to view the data-sheet for that Human Resource record.
- **Process Owner:** Contains a check box that indicates whether or not the team member has the role of Process Owner. You can select the check box in any row to identify the team member that is the Process Owner. This check box can be selected, however, for only ONE team member per HAZOP Analysis team.
- **Facilitator:** Contains a check box that indicates whether or not the team member has the role of Facilitator. You can select the check box in any row to identify the team member that is the Facilitator. This check box can be selected, however, for only ONE team member per HAZOP Analysis.

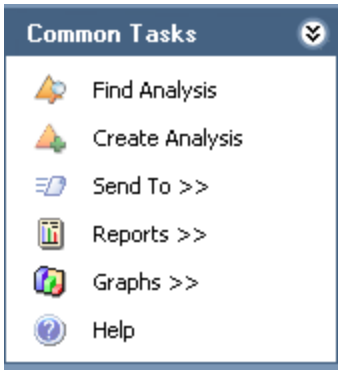
Below the grid, the following buttons appear:

- **Add New Member:** Displays a new Human Resource record that you can define and link to the Hazards Analysis record.
- **Add Existing Members:** Displays the **Find Items** window, where you can search for an existing Human Resource record and link it to the Hazards Analysis record.
- **Remove Members:** After asking for confirmation, removes the selected user from the team. This button is enabled only when records appear in the grid.

The **HAZOP Analysis Team Members** page contains the following task menus:

- Navigation
- Common Tasks
- Associated Pages

Common Tasks Menu



The **Common Tasks** menu on the **HAZOP Analysis Team Members** page contains the following links:

- **Find Analysis:** Displays the **HAZOP Analysis Search** page, where you can search for an existing Hazards Analysis record.
- **Create Analysis:** Displays a new blank Hazards Analysis record on the **HAZOP Analysis Definition** page.
- **Send To:** Displays a submenu with options that let you provide a link to the current page on your desktop (create shortcut), in an email message, or on a Home Page.
- **Reports:** Displays a submenu that contains the caption of the Catalog item *Hazards Analysis Report* as a link. When you click this link, it displays the Hazards Analysis Report in the Report Viewer.
- **Graphs:** Displays a submenu that contains the caption of the Catalog item *Hazards Analysis Mitigated Risk* as a link. When you click this link, it displays the Hazards Analysis Mitigated Risk graph in the Graph Viewer.
- **Help:** Displays the context-sensitive help topic for the **HAZOP Analysis Definition** page.

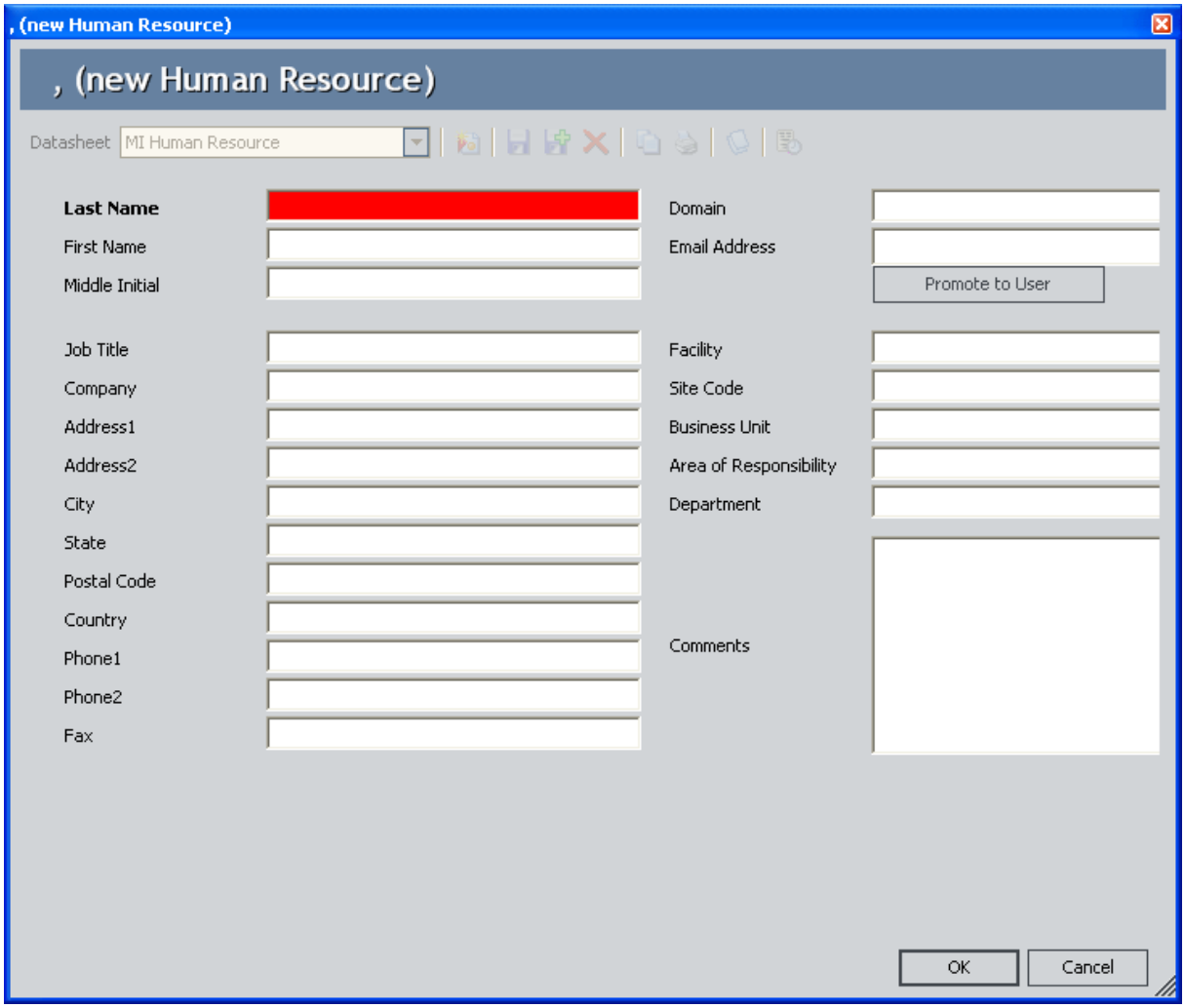
Creating New Users and Adding Them to the HAZOP Analysis Team

When you create new users and add them to the HAZOP Analysis team, you are creating new Human Resource records in the Meridium APM database and linking them to the Hazards Analysis record. This option should be used for team members who are not Meridium APM system users. If you want to add a team member who is already a Meridium APM system user, see the topic for adding new team members who already have Human Resource records.

To create a new user and add that user to the HAZOP Analysis team:

1. Access the **HAZOP Analysis Team Members** page.
2. At the bottom of the **Team Members** workspace, click the **Add New Member** button.

   A new Human Resource record appears.



3. Enter values in the fields on the datasheet as desired. Note that the Last Name field is required.
4. Click **OK**.

   The Human Resource record is saved, and the new HAZOP Analysis team member appears in the **Team Members** workspace.

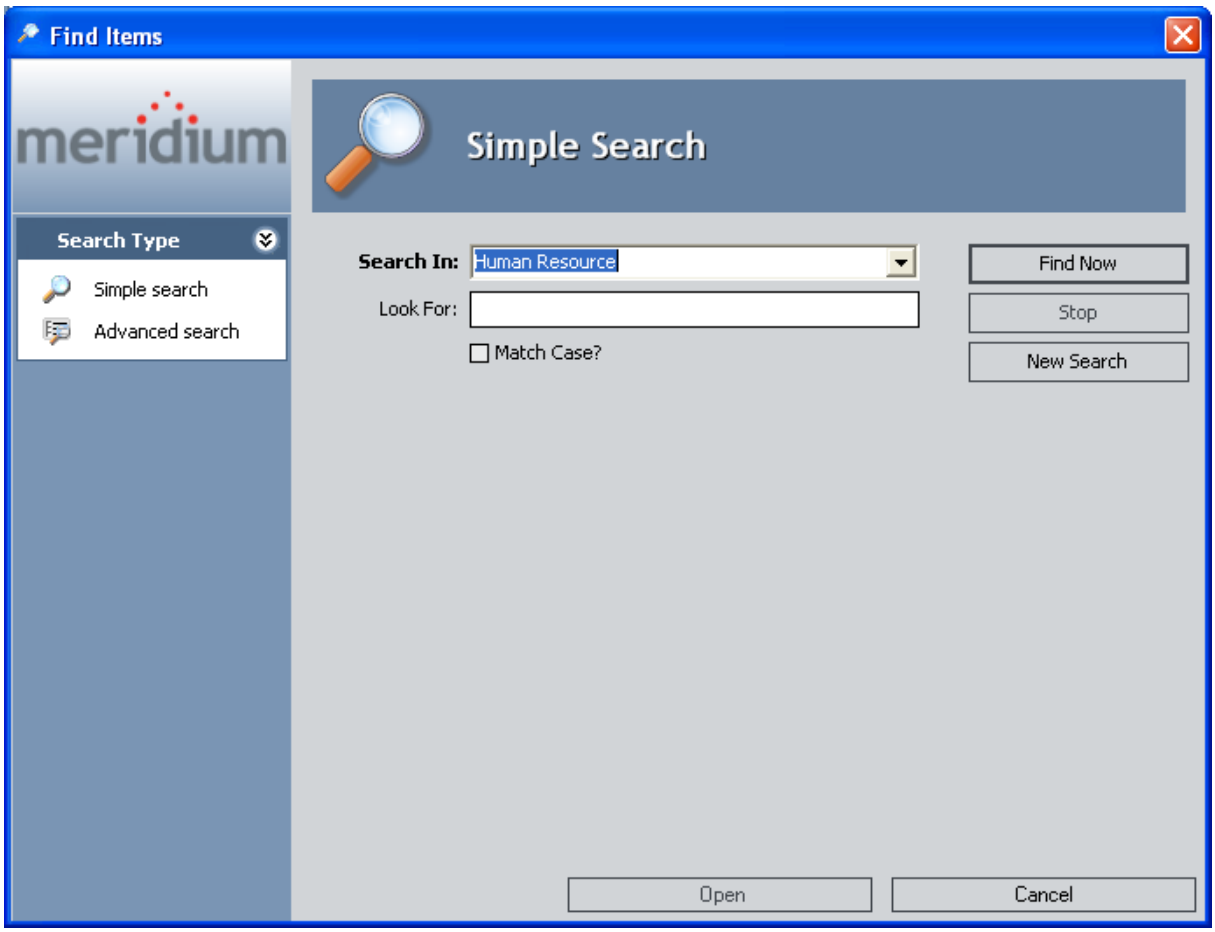
Adding New HAZOP Analysis Team Members Who Already Have Human Resource Records

When you add a new HAZOP Analysis Team Member who already has a Human Resource record, you are linking an existing Human Resource record to the Hazards Analysis record. This option should be used for team members who already have a Human Resource record. If you want to add a new HAZOP Analysis team member who does not already have a Human Resource record, see the topic for creating a new user to add to the HAZOP Analysis team.

To add a new HAZOP Analysis team member who already has a Human Resource record:

1. Access the **HAZOP Analysis Team Members** page.
2. At the bottom of the **Team Members** workspace, click the **Add Existing Members** button.

   The **Find Items** window appears, and the Human Resource family is selected in the **Search In** list by default.



3. If desired, type your search criteria in the **Look For** text box, and then click the **Find Now** button.

   The search results appear.

4. Select the row containing the desired Human Resource record, and then click the **Open** button.

   The new HAZOP Analysis team member appears in the **Team Members** work-space.

About HAZOP Analysis Team Member Roles

HAZOP Analysis team member roles serve as a reference of which HAZOP Analysis team member is responsible for a given task related to the HAZOP Analysis. The following roles are available for a HAZOP Analysis:

- **Process Owner:** The team member who is responsible for managing the HAZOP Analysis and seeing it through to completion. After you assign a team member the role of Process Owner, that team member's name will appear in the Analysis Owner field in the Hazards Analysis record. The Process Owner should be a member of the MI HA Owner Security Group, which provides that user with the ability to manage the Hazards Analysis record state.
- **Facilitator:** The team member who is in charge of conducting the HAZOP Analysis and organizing the HAZOP Analysis team. The Facilitator should be a member of the MI HA Owner Security Group, which provides that user with the ability to manage the Hazards Analysis record state.

There can be only one Process Owner and one Facilitator per analysis. A single team member, however, can be designated as both the Process Owner and Facilitator.

Assigning Roles to HAZOP Analysis Team Members

The following instructions provide details on designating a team member as the Process Owner or Facilitator. Assigning a team member a role serves as a reference for the team.

To assign a role to a HAZOP Analysis team member:

1. Access the **HAZOP Analysis Team Members** page.
2. In the **Team Members** workspace, locate the row containing the team member that you want to assign the role of Process Owner or Facilitator.
3. In either the **Process Owner** or **Facilitator** column, select the check box to indicate that the team member is assigned to the corresponding role.

   The team member is assigned the specified role, and the Analysis Owner field on the Hazards Analysis datasheet is populated with that team member's name.

   To assign a role to a different team member, select the **Process Owner** or **Facilitator** check box in the row that represents that team member.

Viewing Human Resource Records for HAZOP Analysis Team Members

To view the Human Resource record for a HAZOP Analysis team member:

1. Access the **HAZOP Analysis Team Members** page.
2. In the **Team Members** workspace, locate the row containing the team member whose Human Resource record you want to view.
3. In the **User ID** column, click the team member's hyperlinked User ID.

   The Human Resource record for that team member appears in a new window. At this point, you can modify the fields if desired.
4. Click **OK**.

   Your changes are saved.

Removing Team Members from the HAZOP Analysis Team

When you remove a team member from a HAZOP Analysis team, you are deleting the link between the Human Resource record and the Hazards Analysis record for that HAZOP Analysis.

Additionally, if you remove from the HAZOP Analysis team a team member who is assigned the role of Process Owner, the Owner field in the Hazards Analysis record will be cleared.

To remove a team member from the HAZOP Analysis team:

1. Access the **HAZOP Analysis Team Members** page.
2. In the **Team Members** workspace, select the rows containing the team members that you want to remove from the HAZOP Analysis team.
3. At the bottom of the **Team Members** workspace, click the **Remove Members** button.

   A confirmation message appears, asking if you really want to remove the selected team members.
4. Click the **Yes** button.

   The selected team members are removed from the HAZOP Analysis team.

About Defining Scenarios for HAZOP Analyses

To *define Scenarios for HAZOP Analyses*, the HAZOP Analysis team will:

- Review the hazardous processes that take place in a facility.
- Identify the steps in those processes that cause abnormal or unsafe results.
- Create records to represent the various Scenarios for each process.

As part of defining the Scenarios, the HAZOP Analysis team will:

- Assess the risk associated with the Scenarios.
- Determine actions that should be taken to mitigate the risk associated with the Scenario and create records to represent those actions.

For example, assume the HAZOP Analysis team has discussed a process that is controlled by System 1A. During the discussion, the team describes the following Scenario for System 1A.

When the pressure monitor stops working, the pressure switch is not be triggered to open or close appropriately, causing hazardous chemicals to leak out of the connector, which may result in human injury. To prevent this condition, a toxicity detector is in place, which sounds an alarm when the toxicity levels in the facility reach a high-risk level.

To define this Scenario within Hazards Analysis, the team would create one record in each family described in the following table. The column **In the example, this record represents...**contains an item from the previous example and serves as a reference for the type of information that record represents in the HAZOP Analysis.

A record in this family:	...Stores:	In the example, this record represents:
Hazards Analysis System/Node	Details on the group of equipment or locations that is used to perform the process.	System 1A
HAZOP Deviation	Details about the condition that deviates from the normal behavior of that process and directly leads to a risk.	Pressure increases.

A record in this family:	...Stores:	In the example, this record represents:
Hazards Analysis Cause	Details on the event that results from the deviation that is defined in the HAZOP Deviation record, including how frequently it may occur, and the equipment or location that is associated with it. Causes can include human error, equipment failure, or other factors.	Chemicals leak.
HAZOP Deviation	Details about the condition that deviates from the normal behavior of that process and directly leads to a risk. This condition is referred to as a *deviation orguideword*. A deviation has a cause, which is defined in a Hazards Analysis Cause record.	Pressure switch is not triggered to open or close appropriately.
Hazards Analysis Consequence	Details on the negative outcome that results from the event that is defined in the Hazards Analysis Cause record.	Multiple fatalities
Hazards Analysis Safeguard	Details on the safety precautions that are currently in place to prevent or lessen the impact of the negative outcome that is defined in the Hazards Analysis Consequence record.[1]	Toxicity detector
Independent Protection Layer	Additional details about a safeguard defined in a Hazards Analysis Safeguard record that is considered to be an independent layer of protection. Not all safeguards are IPLs, so not all Hazards Analyses will contain these records.	Toxicity detector

If the safeguard is an instrumented function that exists within a safety system and is represented by an Instrumented Function record in the Meridium APM database, you can link that Instrumented Function record to the Hazards Analysis Safeguard record. For

more details on instrumented functions and safety systems, see the SIS Management section of this Help system.

In addition to the records described in the table, the HAZOP Analysis team would create two *Risk Assessment records*, where:

1. **One is linked to the Hazards Analysis Consequence record** to store the unmitigated risk value associated with the Scenario *without* a safeguard in place. In other words, the team will define the risk value that is associated with that Scenario without the toxicity detector.
2. **One is linked to the Hazards Analysis Safeguard record** to store the mitigated risk rank value of the Scenario *with* that safeguard in place. In other words, the team will define the risk value associated with a Scenario when the toxicity detector is in place.

After the team has defined the Scenario and assessed the risk associated with it, they would create one Risk Assessment Recommendation record per action that the team suggests for mitigating that risk. For example, the team may create a Risk Assessment Recommendation record to add more safety equipment on the pressure switch to reduce the risk of it failing and causing a chemical spill.

After the recommended action has been taken, the team would reassess the risk associated with the Scenario after the additional safety precautions are in place. In other words, they would determine the mitigated risk of the Scenario with the extra safety equipment in place on the pressure switch.

When you create records as described here, the ID of that record will appear in a column in the **HAZOP Nodes** grid on the **HAZOP Nodes** page.

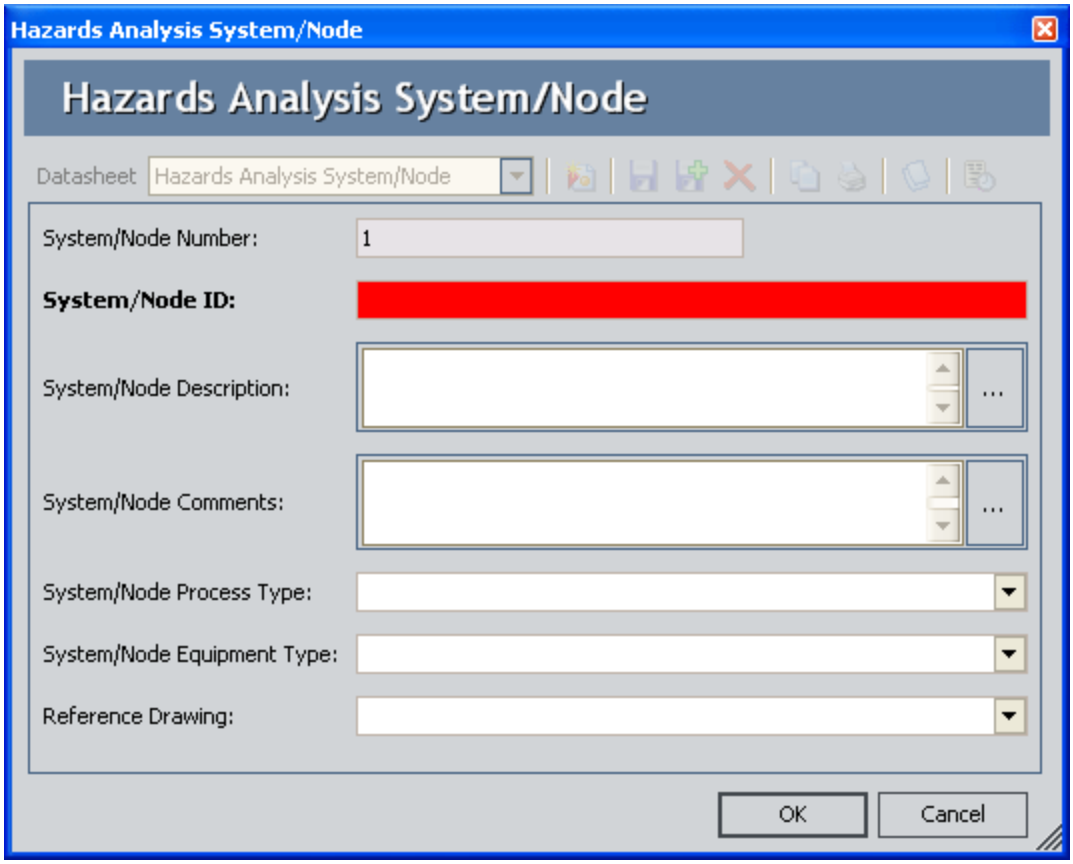
Accessing the HAZOP Nodes Page

The **HAZOP Nodes** page lets you define the known hazardous conditions that exist in your facility as a result of the process that is specified in the current Hazards Analysis record.

To access the HAZOP Nodes page:

1. Open the Hazards Analysis record for the desired HAZOP Analysis.
2. On the **Navigation** menu, click the **Systems/Nodes** link.

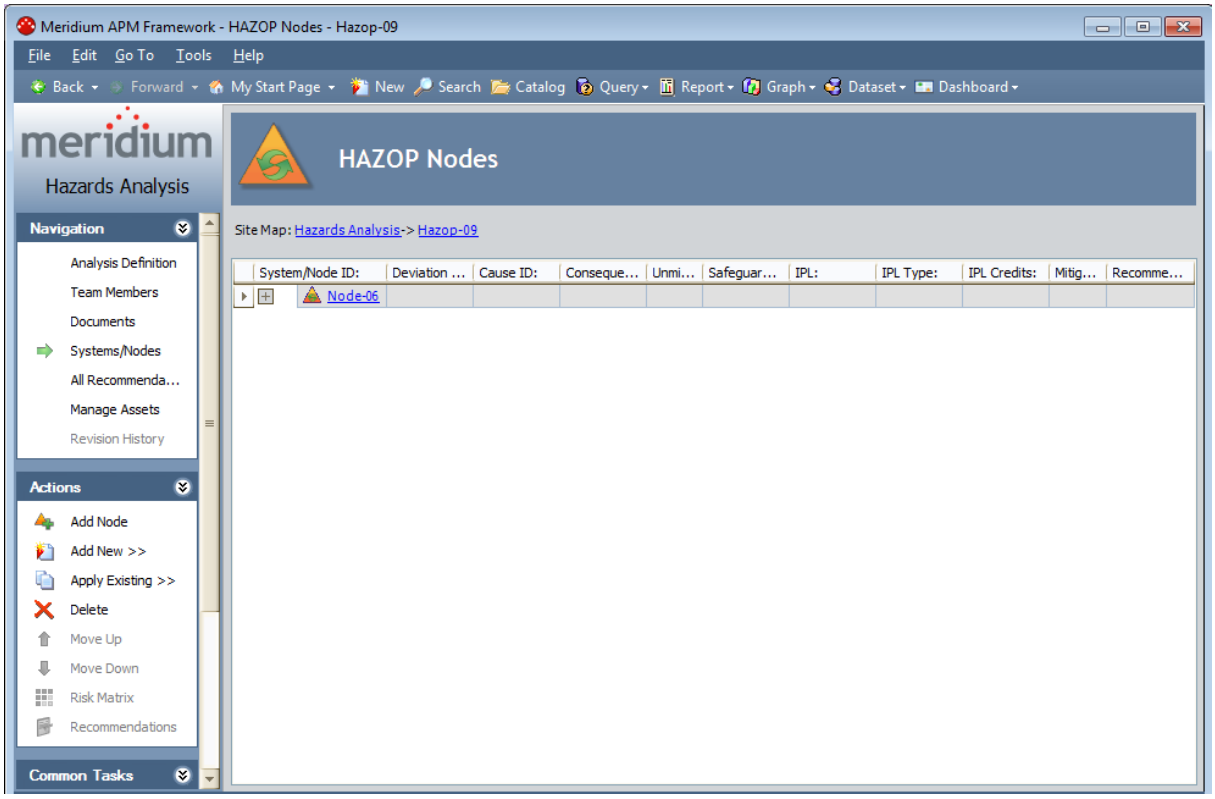
   If a Hazards Analysis System/Node record has not yet been linked to the Hazards Analysis record for the current HAZOP Analysis, a new blank Hazards Analysis System/Node record appears.



   These instructions assume that you have not yet associated a Hazards Analysis System/Node record with the HAZOP Analysis.

3. Complete the Hazards Analysis System/Node datasheet as desired, and click **OK**. Note that the System/Node ID field is required.

The Hazards Analysis System/Node record is linked to the Hazards Analysis record, and the **HAZOP Nodes** page appears, displaying the new Hazards Analysis System/Node record.



Aspects of the HAZOP Nodes Page

The **HAZOP Nodes** page contains the **HAZOP Nodes** grid, which displays in hierarchical format the hyperlinked Record IDs for the records that are used to define hazardous Scenarios.

All Scenarios for a given HAZOP Analysis are represented on the same **HAZOP Nodes** page.

Each separate row in the grid represents a separate record, with the exception of Risk Assessment records, Risk Assessment Recommendation records, and Independent Protection Layer records, which appear on the *same* row as the record to which they are linked.

Each column in the grid corresponds to the name of the family to which the record belongs. When you select a row in the grid, you are selecting the record that is represented by the Record ID that appears in that row. The grid provides *some* standard grid customization options that you can use to customize the layout of the query results.

The following columns appear in the grid:

- **System/Node ID:** Contains the hyperlinked Record ID of the Hazards Analysis System/Node records that belong to the HAZOP Analysis. The ID of each Hazards Analysis System/Node record that you add to the HAZOP Analysis will appear in a new row in this column.
- **Deviation ID:** Contains the hyperlinked Record ID of the HAZOP Deviation records that belong to the HAZOP Analysis. The ID of each HAZOP Deviation record that you add to the HAZOP Analysis will appear in a new row in this column directly below the row containing the Hazards Analysis System/Node record to which it is linked.
- **Cause ID:** Contains the hyperlinked Record ID of the Hazards Analysis Cause records that belong to the HAZOP Analysis. The ID of each Hazards Analysis Cause record that you add to the HAZOP Analysis will appear in a new row in this column directly below the row containing the HAZOP Deviation record to which it is linked.
- **Consequence ID:** Contains the hyperlinked Record ID of the Hazards Analysis Consequence records that belong to the HAZOP Analysis. The ID of each Hazards Analysis Consequence record that you add to the HAZOP Analysis will appear in a new row in this column below the Hazards Analysis Cause record to which it is linked.
- **Unmitigated Risk:** Displays the total unmitigated risk rank value as it appears in the Risk Assessment record that is linked to the Hazards Analysis Consequence record in that row. When you link a Risk Assessment record to a Hazards Analysis Consequence record, the unmitigated risk rank value will appear in this column on the same row as the Hazards Analysis Consequence record to which the Risk Assessment record is linked.
- **Safeguard ID:** Contains the hyperlinked Record ID of the Hazards Analysis Safeguard records that belong to the HAZOP Analysis. Each Hazards Analysis

Safeguard record that you add to the HAZOP Analysis will appear in a new row in this column below the Hazards Analysis Consequence record to which it is linked.

- **IPL:** Indicates whether or not the safeguard shown in the **Safeguard ID** column is an independent protection layer (IPL). This cell is populated automatically based on the settings on the **IPL checklist** tab in the Hazards Analysis Safeguard record. This column can contain the following values:
  - **True:** Indicates that the safeguard *is* an IPL and that an Independent Protection Layer record is linked to the Hazards Analysis Safeguard record. This value will appear only if *all* the logical fields on the **IPL Checklist** tab are set to *True*.
  - **False:** Indicates that the safeguard is *not* an IPL.
- **IPL Type:** If the safeguard shown in the **Safeguard ID** cell is an IPL, this cell indicates the type of IPL. There are two types of IPLs:
  - **Consequence Reducing IPLs:** Reduce the severity of the failure (e.g., fatality to injury).
  - **Frequency Reducing IPLs:** Reduce how often the failures occur (e.g., every 100 years to every 1,000 years).

  The **IPL Type** cell is populated automatically based on the value in the **IPL** column. If the value in the **IPL** column is:
  - **False:** This column is blank.
  - **True:** This column displays the value from the IPL Type field in the Independent Protection Layer record that is linked to the Hazards Analysis Safeguard record.
- **IPL Credits:** Displays the value stored in the IPL Credits field in the Independent Protection Layer record that is linked to the Hazards Analysis Safeguard record.
- **Mitigated Risk:** Displays the total mitigated risk rank value as it appears in the Risk Assessment record that is linked to the Hazards Analysis Safeguard record in that row. When you link a Risk Assessment record to a Hazards Analysis Safeguard record, the mitigated risk rank value will appear in this column on the same row as the Hazards Analysis Safeguard record to which the Risk Assessment record is linked. If more than one Hazard Analysis Safeguard record is linked to an Hazards Analysis Consequence record, the mitigated risk rank value for each subsequent Hazards Analysis Safeguard record will further mitigate the mitigated risk rank value of the previous Hazards Analysis Safeguard record, so that the mitigated risk rank value associated with the last safeguard listed for a consequence is the*total*mitigated risk rank value. If one of the Hazard Analysis Safeguard records is deleted, the mitigated risk rank values will be recalculated automatically.

> **Note:** If you modify the value in the IPL Type field in a Hazard Analysis Safeguard record after you have defined a mitigated risk value for that safeguard, the value in the **Mitigated Risk** column will be cleared, and you will have to re-evaluate the mitigated risk.

- **Recommendations:** Contains the hyperlinked value ***<number>* recommendations**, where **<number>** is a numeric value, indicating the number of Risk Assessment Recommendation records that are linked to the Hazards Analysis Consequence record in that row. When you link a Risk Assessment record to a Hazards Analysis Consequence record, the **<number>** value in this column is increased by one and appears in the same row as the Hazards Analysis Consequence record to which the Risk Assessment Recommendation records are linked.

As you add records to the grid, a plus (+) or minus (-) sign appears to the left of the predecessor record. You can expand a level of the hierarchy by clicking the plus sign, or you can collapse a level of the hierarchy by clicking the minus sign. Note that when you expand the root level of the hierarchy (i.e. the **System/Node ID** column), all levels of the hierarchy will be expanded by default.

The **HAZOP Nodes** page contains the following task menus:

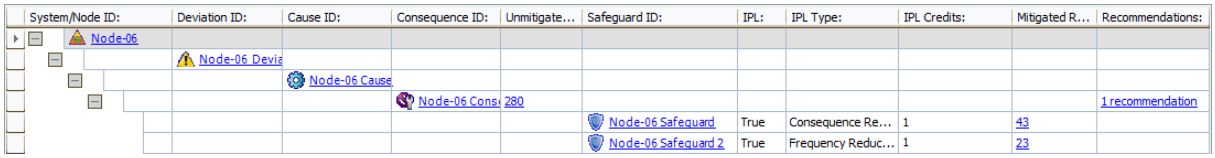
- Navigation
- Actions
- Common Tasks
- Associated Pages

Using the **HAZOP Nodes** page, you can:

- Create new records that describe the Scenarios that you are assessing and link them to the HAZOP Analysis.
- Add existing records that describe the Scenarios that you are assessing and link them to the HAZOP Analysis.
- Assess the risk associated with the defined Scenarios.

The Hierarchy in the HAZOP Nodes Grid

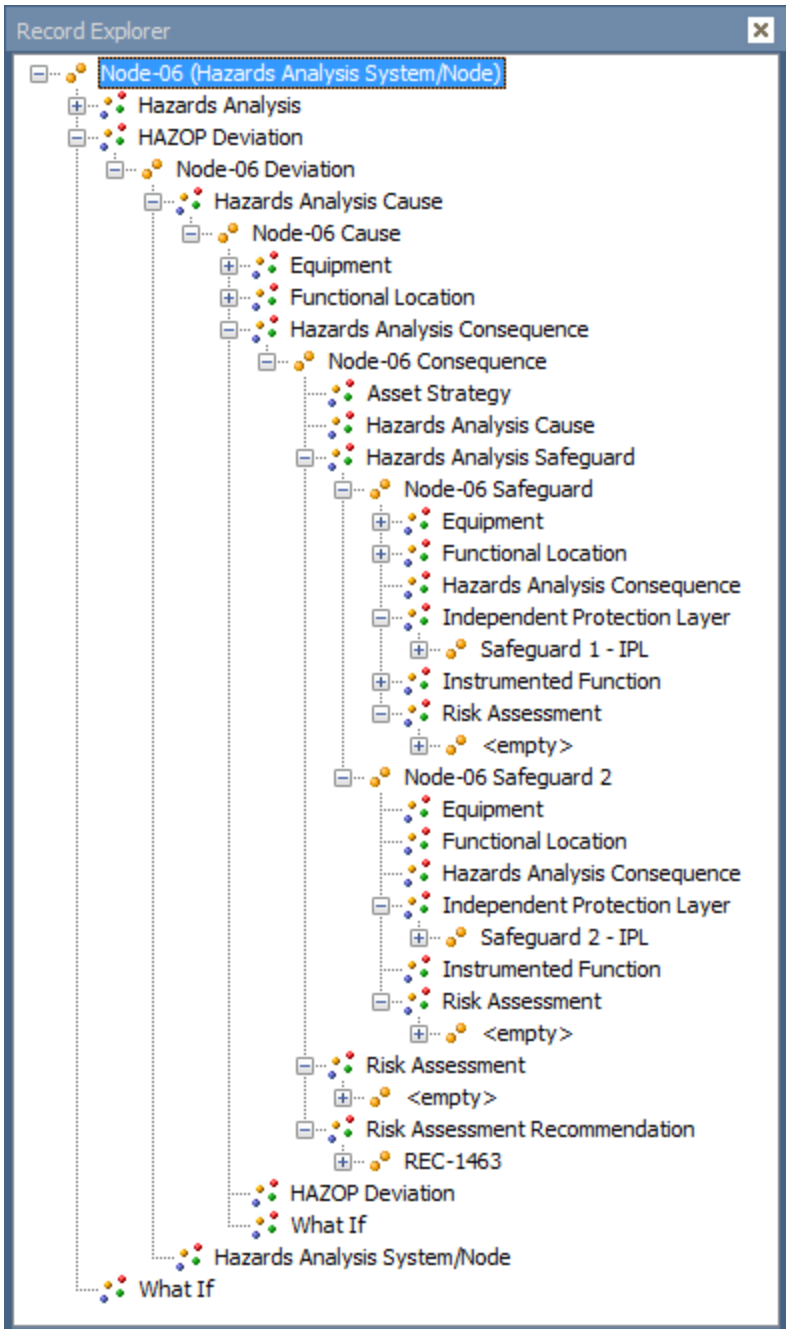
The **HAZOP Nodes** grid provides a hierarchical view of the records that are used to describe a Scenario. In other words, the grid provides an alternate view of the record hierarchy for the Hazards Analysis System/Node family. The following image shows an example of how the **HAZOP Nodes** grid appears after you have defined a Scenario for an HAZOP Analysis.



In this image, you can see the following relationships:

- The Hazards Analysis System/Node record *Node-06* is linked to the HAZOP Deviation record *Node-06 Deviation*.
- The HAZOP Deviation record *Node-06 Deviation* is linked to the Hazards Analysis Cause record *Node-06 Cause*.
- The Hazards Analysis Cause record *Node-06 Cause* is linked to the Hazards Analysis Consequence record *Node-06 Consequence*.
- The Hazards Analysis Consequence record *Node-06 Consequence* is linked to:
  - A Risk Assessment record with the unmitigated risk rank value of 280.
  - One Risk Assessment Recommendation record.
  - The Hazards Analysis Safeguard record *Node-06 Safeguard*, which is a Consequence Reducing IPL.
  - The Hazards Analysis Safeguard record *Node-06 Safeguard 2*, which is a Frequency Reducing IPL.
- The Hazards Analysis Safeguard record *Node-06 Safeguard* is linked to:
  - A Risk Assessment record with the unmitigated risk rank value of 280.
  - A Risk Assessment record with the mitigated risk rank value of 43.
  - An Independent Protection Layer record that stores the values in the **IPL Type** and **IPL Credits** column.
- The Hazards Analysis Safeguard record *Node-06 Safeguard 2* is linked to:
  - A Risk Assessment record with the unmitigated risk rank value of 280.
  - A Risk Assessment record with the mitigated risk rank value of 23.
  - An Independent Protection Layer record that stores the values in the **IPL Type** and **IPL Credits** column.

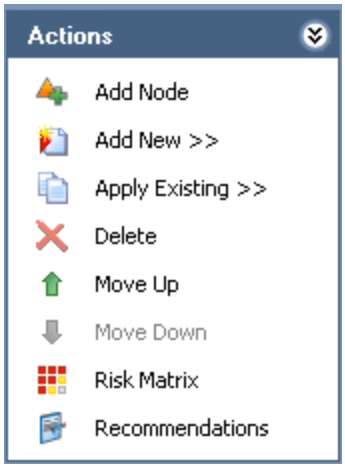
If you were to view the record hierarchy for the Hazards Analysis System/Node record *Node-06* in the Record Manager, it would look something like this:



In this image, you can see the same relationships in a similar format to what you see in the **HAZOP Nodes** grid. For example, Hazards Analysis Consequence record *Node-06 Consequence* is linked to:

- The Hazards Analysis Safeguard records *Node-06 Safeguard* and *Node-06 Safeguard 2*.
- One Risk Assessment record.
- One Risk Assessment Recommendation record.

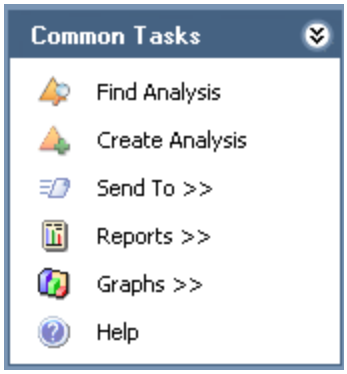
Actions



The **Actions** menu on the **HAZOP Nodes** page contains the following links:

- **Add Node:** Displays a new blank Hazards Analysis System/Node record in a new window.
- **Add New:** Displays a submenu of options that you can use to link a record to the record that is currently selected in the grid. The submenu is dynamic, meaning that the menu will contain only the options that are valid for the currently selected record. This link is enabled only if a Hazards Analysis System/Node record appears in the grid.
- **Apply Existing:** Displays a submenu of options that you can use to search for an existing record to link to the record that is currently selected in the grid. This sub-menu is dynamic, meaning that the menu will contain only the options that are valid for the currently selected record. This link is enabled only if a Hazards Analysis System/Node record appears in the grid.
- **Delete:** Displays a confirmation message, and then deletes the selected record and all the records that are linked to that record as a successor. This link is enabled only if a Hazards Analysis System/Node record appears in the grid.
- **Move Up:** Moves the selected record up one row in the grid. This link is enabled only when the selected record appears in a column that contains more than one record.
- **Move Down:** Moves the selected record down one row in the grid. This link is enabled only when the selected record appears in a column that contains more than one record.
- **Risk Matrix:** Displays the Risk Assessment Interface, where you can assess the risk associated with the item represented by the selected record. This link is enabled only when a Hazards Analysis Consequence record or Hazards Analysis Safeguard record is selected in the grid.
- **Recommendations:** Displays the **Recommendations** dialog box, where you can manage Risk Assessment Recommendation records for the selected record.

Common Tasks



The **Common Tasks** menu on the **HAZOP Nodes** page contains the following links:

- **Find Analysis:** Displays the **Hazards Analysis Search** page, where you can search for an existing Hazards Analysis record.
- **Create Analysis:** Displays a new blank Hazards Analysis record on the **Hazards Analysis Definition** page.
- **Send To:** Displays a submenu with options that let you provide a link to the current page on your desktop (create shortcut), in an email message, or on a Home Page.
- **Reports:** Displays a submenu that contains the caption of the Catalog item *Hazards Analysis Report* as a link. When you click this link, it displays the Hazards Analysis Report in the Report Viewer.
- **Graphs:** Displays a submenu that contains the caption of the Catalog item *Hazards Analysis Mitigated Risk* as a link. When you click this link, it displays the Hazards Analysis Mitigated Risk graph in the Graph Viewer.
- **Help:** Displays the context-sensitive help topic for the **HAZOP Nodes** page.

The Submenu on the Actions Menu

The **Add New** or **Apply Existing** links on the **Actions** menu let you link records to the record that is currently selected in the grid. When you click the **Add New** or **Apply Existing** link, a submenu appears. The links that appear on the submenu will vary depending on the record that is currently selected in the **HAZOP Nodes** grid. The links that appear are based on the relationship definitions that exist between the selected record and the other records that can be displayed in the grid.

For example, the Hazards Analysis System/Node family participates as a predecessor in a relationship with the HAZOP Deviation family, so when you select a Hazards Analysis System/Node record in the grid and view the **Add New** or **Apply Existing** submenus, the only available option is to link a HAZOP Deviation record to the selected Hazards Analysis System/Node record.

The following table describes the options that appear on these submenus when a record is selected in the grid. You can use this table and the options that you see on the submenus to determine which records you can link to one another on the **HAZOP Nodes** page.

When a record in this family is selected:	...The Add New submenu contains these links:	...The Apply Existing submenu contains these links:
Hazards Analysis System/Node	**Deviation**	**Deviation**
HAZOP Deviation	**Deviation** **Cause**	**Deviation** **Cause**
Hazards Analysis Cause	**Cause** **Consequence**	**Cause** **Consequence**
Hazards Analysis Consequence	**Consequence** **Safeguard**	**Consequence** **Safeguard**
Hazards Analysis Safeguard	**Safeguard**	**Safeguard**

About Adding Records to the HAZOP Nodes Grid

When you add a record to the **HAZOP Nodes** grid, you are defining a part of a Scenario. Each record that you add to the gird is linked automatically to another record that defines another part of the Scenario, with the exception of the Hazards Analysis System/Node record, which is linked automatically to the Hazards Analysis record for the current HAZOP Analysis.

Before you can begin adding to the **HAZOP Nodes** grid records that represent parts of a Scenario, you must first define a Hazards Analysis System/Node record that will appear as the root record in the first column in the grid. At any given time, the records that you are allowed to add is determined based upon the relationship definitions that exist between the family of the new record and the record to which you are trying to link it. You will know that you can add a record in a given family if that family name appears on the **Add New** or **Apply Existing** submenus on the **Actions** menu.

After you have added to the **HAZOP Nodes** grid the desired records that describe the hazardous Scenario you want to study, you can assess the risk values that are associated with that Scenario.

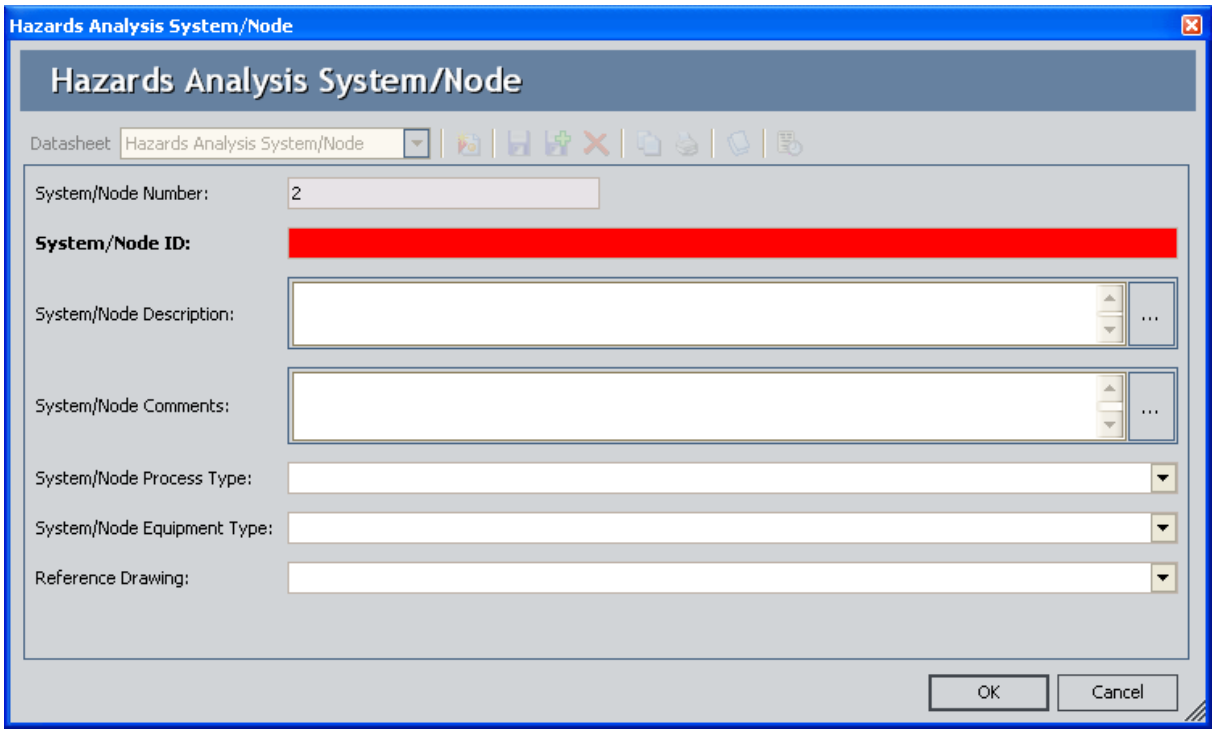
Adding Hazards Analysis System/Node Records to the HAZOP Nodes Grid

The following instructions provide details on adding a new Hazards Analysis System/Node record to the **HAZOP Nodes** grid. These instructions assume that one Hazards Analysis System/Node record already appears in the grid (i.e., the record was defined when you accessed the **HAZOP Nodes** page for the first time).

To add a new Hazards Analysis System/Node record to the HAZOP Nodes grid:

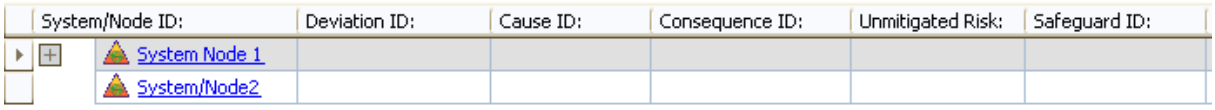
1. Access the **HAZOP Nodes** page.
2. On the **Actions** menu, click the **Add Node** link.

   A new blank Hazards Analysis System/Node record appears in a new window.



3. In the System/Node ID text box, type a name for the system/node. This field is required.
4. Provide values in the remaining fields on the datasheet as desired, and then click **OK**.

   The new record is linked to the Hazards Analysis record for the current HAZOP Analysis and appears in the **System/Node ID** column below the existing Hazards Analysis System/Node record.


System/Node ID:
Deviation ID:
Cause ID:
Consequence ID:
Unmitigated Risk:
Safeguard ID:
System Node 1
System/Node2

Creating Other Records and Adding Them to the HAZOP Nodes Grid

The following instructions provide details on adding records in the following families to the **HAZOP Nodes** grid. These instructions assume that you are familiar with the HAZOP Analysis data model and the records that you need to create to define a Scenario.

- HAZOP Deviation
- Hazards Analysis Cause
- Hazards Analysis Consequence
- Hazards Analysis Safeguard

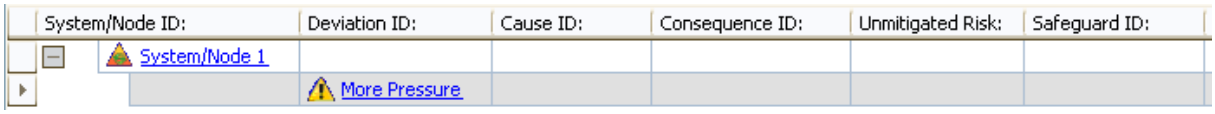
To create a new record and add it to the HAZOP Nodes grid:

1. Access the **HAZOP Nodes** page.
2. In the **HAZOP Nodes** grid, select the row containing the record to which you want to link a new record.
3. On the **Actions** menu, click the **Add New** link.

   A context-sensitive submenu appears that contains the family names for the records that you can link to the currently selected record.
4. On the submenu, click the name of the family in which you want to create a new record.

   A new blank record in that family appears in a new window.
5. Provide a value in the required fields on the datasheet.
6. Provide values in the remaining fields on the datasheet as desired, and then click **OK**.

   The record is linked to the currently selected record and appears in a new row in the grid below the record to which it is linked and in the column that displays records in that family. For example, if you create a new HAZOP Deviation record *More Pressure* and link it to the Hazards Analysis System/Node record *System/Node 1*, the new HAZOP Deviation record *More Pressure* will appear in the **Deviation ID** column in the row below the Hazards Analysis System/Node record *System/Node 1* as shown in the following image.



   You can continue to add records to the grid in this way until you have defined the Scenario that you want to study. After you have defined the Scenario, you can assess the risk associated with it.

Adding Existing Records to the HAZOP Nodes Grid

The following instructions provide details on adding existing records in the following families to the **HAZOP Nodes** grid. Adding an existing record means that you can search for a record that already exists in the Meridium APM database and link that record to the HAZOP Analysis.

These instructions assume that you are familiar with the HAZOP Analysis data model and the records that you need to create to define a Scenario.

- HAZOP Deviation
- Hazards Analysis Cause
- Hazards Analysis Consequence
- Hazards Analysis Safeguard

To add an existing record to the HAZOP Nodes grid:

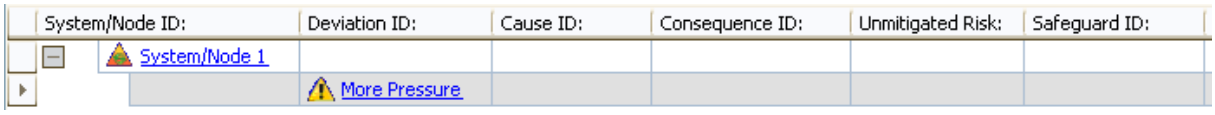
1. Access the **HAZOP Nodes** page.
2. In the **HAZOP Nodes** grid, select the row containing the record to which you want to link an existing record.
3. On the **Actions** menu, click the **Apply Existing** link.

   A context-sensitive submenu appears that contains the family names for the records that you can link to the currently selected record.
4. On the submenu, click the name of the family containing the existing record that you want to add to the gird.

   The **Find Items** window appears, and the name of the family that you selected on the submenu appears in the **Search In** list by default.
5. If desired, specify the desired search criteria, and then click the **Find Now** button.

   The search results appear.
6. In the search results, locate the desired record, and then click the **Open** button.

   The record is linked to the currently selected record and appears in a new row in the grid below the record to which it is linked and in the column that displays records in that family. For example, if you link the existing HAZOP Deviation record *More Pressure* to the Hazards Analysis System/Node record *System/Node 1*, the HAZOP Deviation record *More Pressure* will appear in the **Deviation ID** column in the row below the Hazards Analysis System/Node record *System/Node 1* as shown in the following image.



You can continue to add records to the grid in this way until you have defined the Scenario that you want to study. After you have defined the Scenario, you can assess the risk associated with it.

Modifying Records in the HAZOP Nodes Grid

To modify a record in the HAZOP Nodes grid:

1. Access the **HAZOP Nodes** page.
2. In the **HAZOP Nodes** grid, in the row containing the record that you want to modify, click the hyperlinked ID for that record. For example, if you want to modify a HAZOP Deviation record, in the **Deviation ID** cell, click the hyperlinked value.

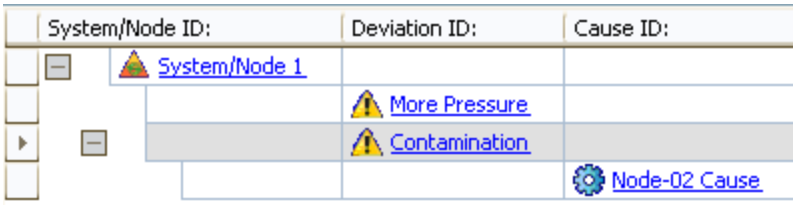
   The record appears in a separate window.
3. Modify the values in the fields on the datasheet as desired, and then click **OK**.

   Your changes are saved.

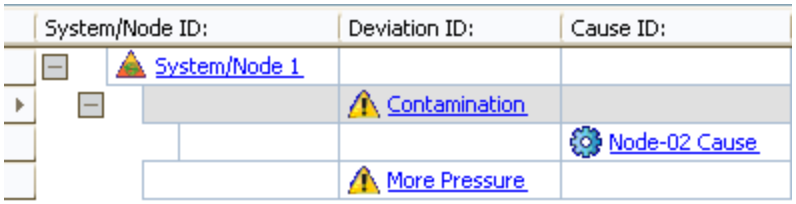
Moving Records to Different Rows in the HAZOP Nodes Grid

If desired, when a column contains more than one record, you can move the records up or down to different rows. When you move a record in the grid, the records that are linked to that record will also move, and the hierarchical format will be retained. You will know that can move a record up or down a row in the grid when the **Move Up** or **Move Down** links are enabled on the Actions menu.

For example, the following image shows a portion of the **HAZOP Nodes** grid, which contains two HAZOP Deviation records: *More Pressure* and *Contamination*. The HAZOP Deviation record *Contamination* is linked to the Hazards Analysis Cause record *Node-02 Cause*.



If you were to move the HAZOP Deviation record *Contamination* up one row, the **HAZOP Nodes** grid would look similar to the following image, where the relationship between the HAZOP Deviation record *Contamination*and the Hazards Analysis Cause record*Node-02 Cause*is retained.



To move a record to a different row in the HAZOP Nodes grid:

1. Access the **HAZOP Nodes** page.
2. In the grid, select the row containing the record that you want to move.
3. On the **Actions** menu, click one of the following links:
   - **Move Up:** Moves the selected record up a row in the grid.
   - **Move Down:** Moves the selected record down a row in the grid.

   The selected record appears in the specified location.

Deleting Records from the HAZOP Nodes Grid

When you delete a record from the **HAZOP Nodes** grid, you are deleting the selected record and all the records that appear below that record in the same record hierarchy. For example, if you delete a record in the HAZOP Deviation family, you are also deleting the records in the following families, which appear in subsequent rows in the grid:

- Hazards Analysis Cause
- Hazards Analysis Consequence
- Risk Assessment (unmitigated risk)
- Risk Assessment Recommendation
- Hazards Analysis Safeguard
- Risk Assessment (mitigated risk)

To delete a record from the HAZOP Nodes grid:

1. Access the **HAZOP Nodes** page.
2. In the grid, select the row containing the record that you want to delete.
3. On the **Actions** menu, click the **Delete** link.

   A confirmation message appears, asking if you really want to delete the selected record along with all the records that are linked to it.
4. Click the **Yes** button.

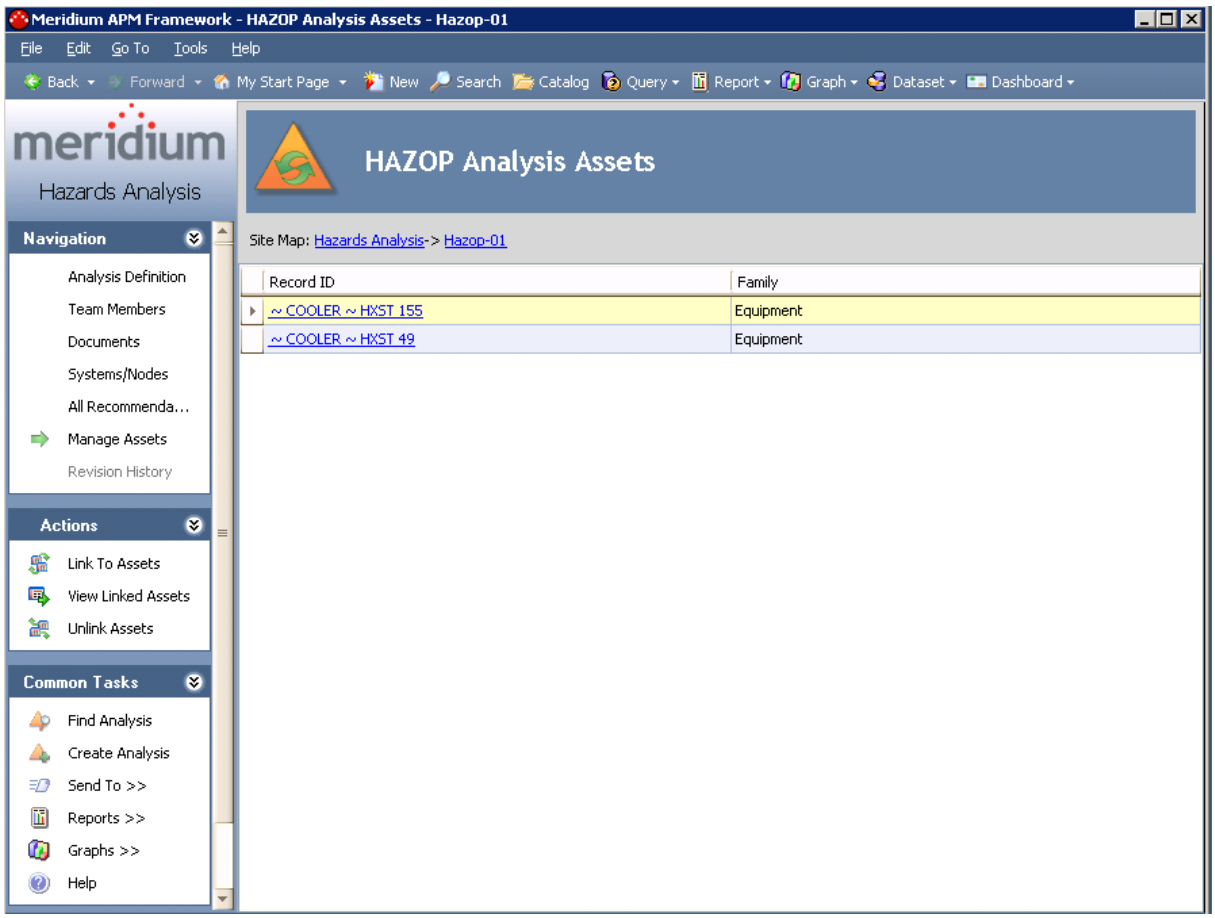
   The selected record and all the records that appear below that record in the grid are deleted.

Accessing the HAZOP Analysis Assets Page

To access the HAZOP Analysis Assets page:

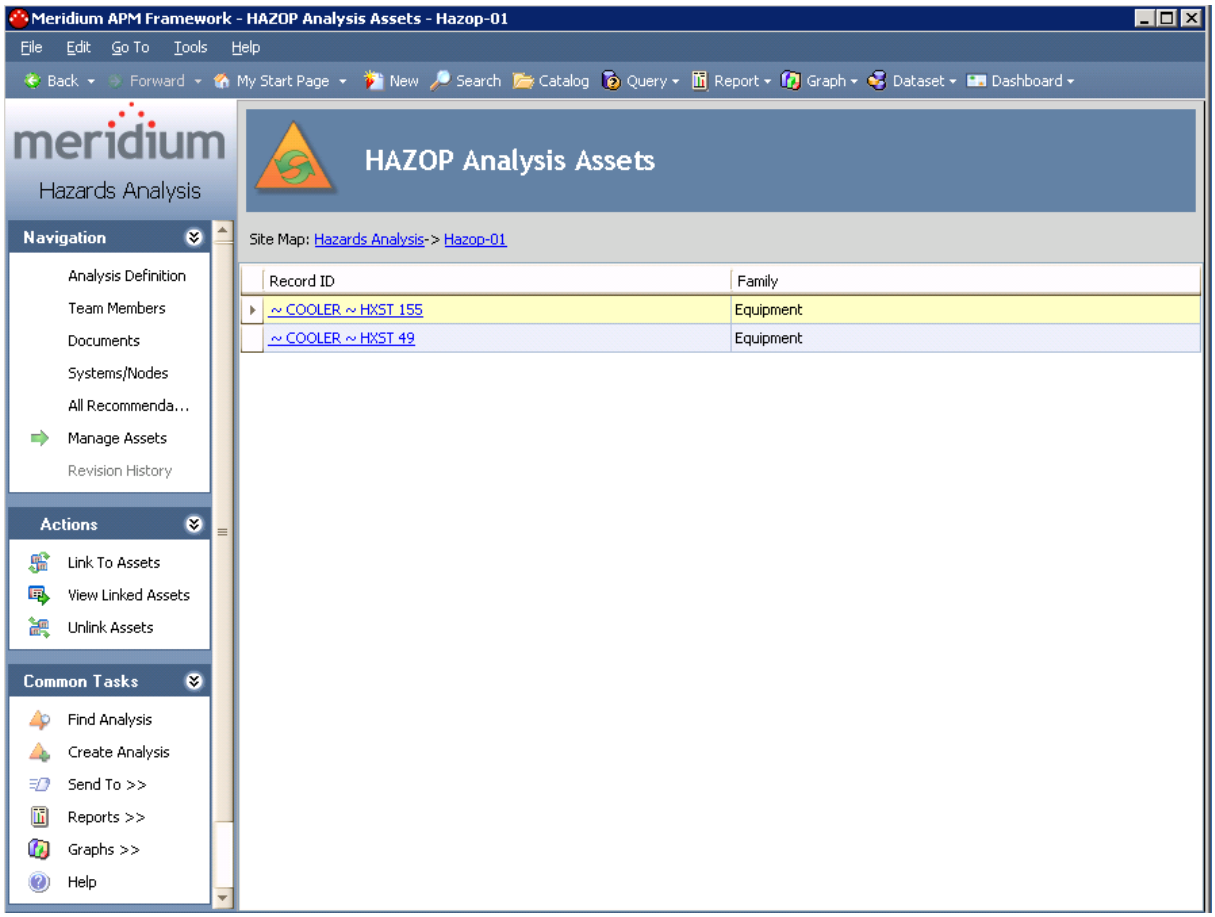
- On the **Navigation** menu, click the **Manage Assets** link.

  The **HAZOP Analysis Assets** page appears, displaying a list of Equipment and Functional Location records that are linked to the Hazards Analysis record for the current analysis.



Aspects of the HAZOP Analysis Assets Page

The **HAZOP Analysis Assets** page displays a list of Equipment and Functional Location records that are linked to the Hazards Analysis record associated with the current Hazards Analysis.



The grid on the **HAZOP Analysis Assets** page contains the Record ID and the family of each record that is linked to the Hazards Analysis record.

- For Equipment records, the **Record ID** column is populated with the Record ID of the linked Equipment record, and the **Family** column is populated with *Equipment*.
- For Functional Location records, the **Record ID** column is populated with the Record ID of the linked Functional Location record, and the **Family** column is populated with *Functional Location*. By default, linked records will be listed alphabetically, first by the **Family** column, and then by the **Record ID** column.

The **HAZOP Analysis Assets** page contains the following task menus:

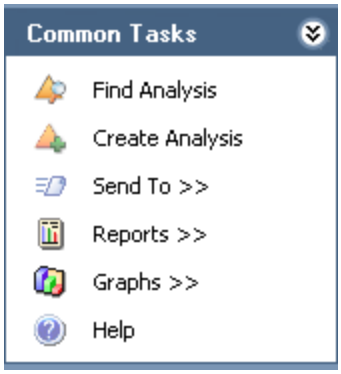
- Navigation
- Actions
- Common Tasks

Actions Menu

The **Actions** menu on the **HAZOP Analysis Assets** page contains the following links:

- **Link to Assets:** Displays the **Asset Finder** window, where you can search for the Equipment or Functional Location records that you want to link to the Hazards Analysis record.
- **View Linked Assets:** Displays the selected Equipment and Functional Location records in the Record Manager. This link is enabled only if the current Hazards Analysis record is already linked to an Equipment or Functional Location record.
- **Unlink Assets:** Displays a confirmation message, asking if you really want to unlink the selected Equipment or Functional Location records from the current Hazards Analysis and then deletes the link between the Hazards Analysis record and the Equipment or Functional Location records. This link is enabled only if the current Hazards Analysis record is already linked to an Equipment or Functional Location record.

Common Tasks Menu



The **Common Tasks** menu on the **HAZOP Analysis Assets** page contains the following links:

- **Find Analysis:** Displays the **HAZOP Analysis Search** page, where you can search for an existing Hazards Analysis record.
- **Create Analysis:** Displays a new blank Hazards Analysis record on the**HAZOP Analysis Definition**page.
- **Send To:** Displays a submenu with options that let you provide a link to the current page on your desktop (create shortcut), in an email message, or on a Home Page.
- **Reports:** Displays a submenu that contains the caption of the Catalog item *Hazards Analysis Report* as a link. When you click this link, it displays the Hazards Analysis Report in the Report Viewer.
- **Graphs:** Displays a submenu that contains the caption of the Catalog item *Hazards Analysis Mitigated Risk* as a link. When you click this link, it displays the Hazards Analysis Mitigated Risk graph in the Graph Viewer.
- **Help:** Displays the context-sensitive help topic for the **HAZOP Analysis Assets** page.

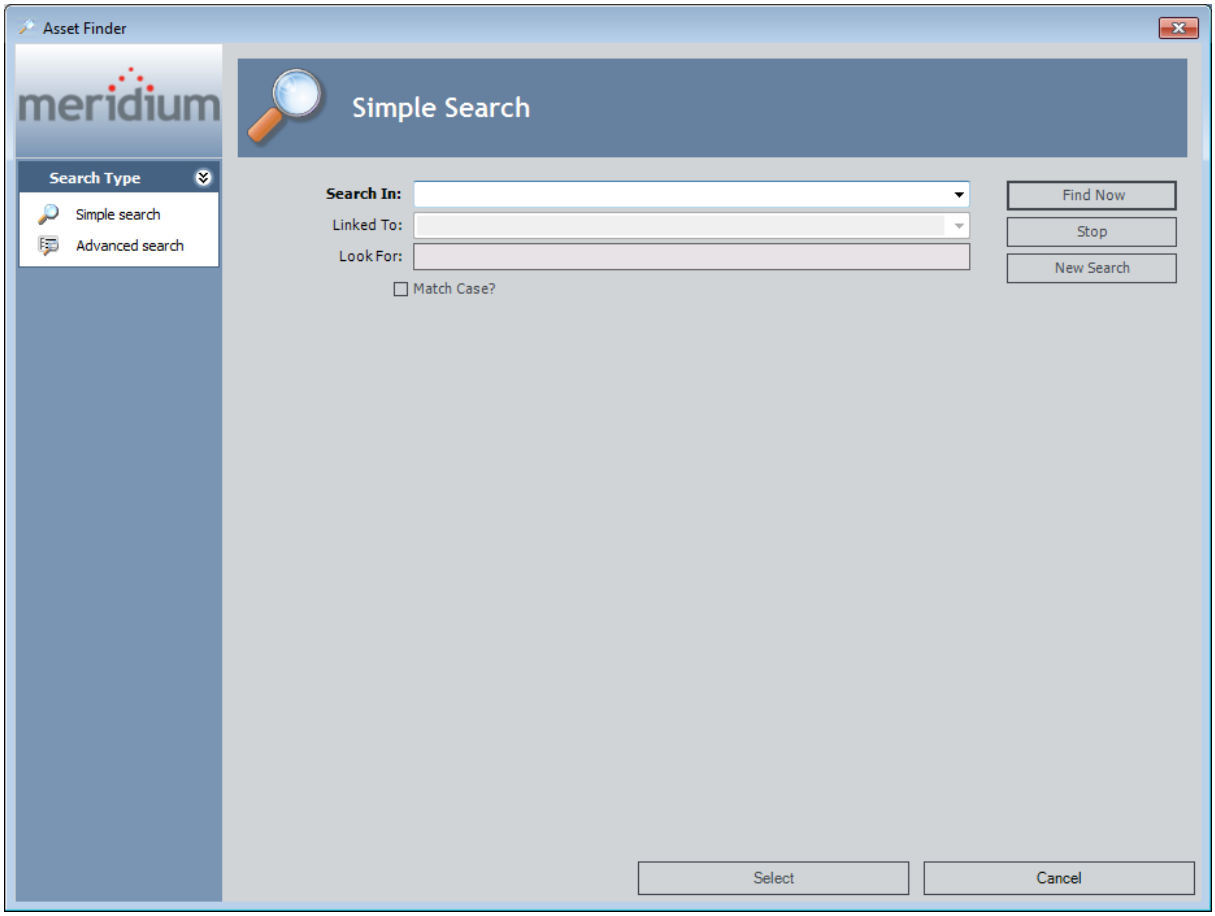
Linking Assets to a HAZOP Analysis

The following instructions provide details on linking an Equipment or Functional Location record to an existing Hazards Analysis record.

To link an Equipment record or Functional Location record to an existing Hazards Analysis record:

1. Access the **HAZOP Analysis Assets** page.
2. On the **Actions** menu, click the **Link To Assets** link.

   The Search Tool appears.



3. Perform a search to find the Equipment or Functional Location record you want to link to the Hazards Analysis record.
4. In the search results list, select the Equipment or Functional Location record(s) that you want to link to the Hazards Analysis record.
5. Click the **Select** button.

The **Asset Finder** window closes, and the selected Equipment or Functional Location records appear on the **HAZOP Analysis Assets** page and are now linked to the Hazards Analysis record.

Opening Assets Linked to a HAZOP Analysis

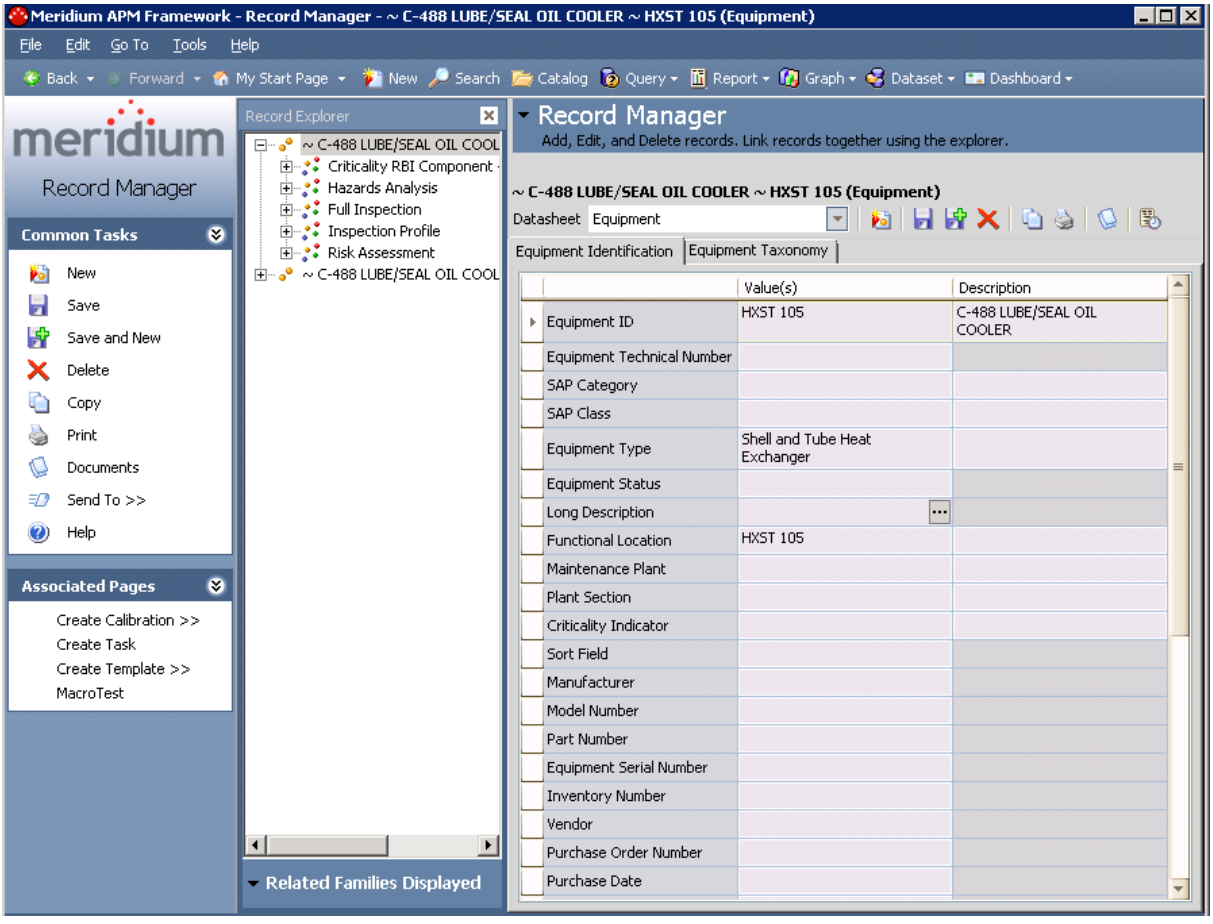
To open the Equipment and Functional Location records that are currently linked to a Hazards Analysis record:

1. Access the **HAZOP Analysis Assets** page.
2. In the grid, select one or more rows containing the Equipment and Functional Location records that you want to open.

   > **Hint:** Alternatively, if you only want to open one Equipment or Functional Location record, you can click the hyperlinked Record ID of the record you want to view.

3. On the **Actions** menu, click the **View Linked Assets** link.

   The Record Manager appears, displaying the selected Equipment and Functional Location records.



If you selected more than one record, multiple records will appear in Record Manager. The first record that you selected in the grid on the **HAZOP Analysis Assets**

page will be expanded in the **Record Explorer** pane and displayed in the datasheet area. The rest of the records appear collapsed in the **Record Explorer** pane.

Unlinking Assets from a Hazards Analysis

To delete the link between an Equipment or Functional Location record and a Hazards Analysis record:

1. Access the **HAZOP Analysis Assets** page.
2. Select the Equipment and Functional Location records you want to unlink from the analysis by selecting one or more rows in the **HAZOP Analysis Assets** grid.
3. On the **Actions** menu, click the **Unlink Assets** link.

   A confirmation message appears, asking if you really want to delete the link.
4. Click **OK**.

   The links between the selected Equipment and Functional Location records and the Hazards Analysis record are deleted, and the Equipment and Functional Location records no longer appear in the list on the **HAZOP Analysis Assets** page.

About the Hazards Analysis Report

The Hazards Analysis Report provides an overview of the HAZOP Analysis and contains the following sections:

- **Cover:** Displays the text *HAZOP Final Report For:* appended with the value that exists in the Analysis Description field in the associated Hazards Analysis record.
- **Summary:** Displays the value that exists in the Summary field in the associated Hazards Analysis record.
- **Purpose:** Displays the value that exists in the Analysis Purpose field in the associated Hazards Analysis record.
- **Objectives:** Displays the value that exists in the Analysis Objective field in the associated Hazards Analysis record.
- **Process Description:** The value that exists in the Process Description field in the associated Hazards Analysis record.
- **Scope of Study:** Displays the value that exists in the Analysis Scope field in the associated Hazards Analysis record.
- **Methodology:** Displays the text *The Hazard and Operability (HazOp) methodology was used to revalidate the PHA study using the Meridium Software Program for documenting the PHA study results*.
- **Hazards Analysis Team Members:** Displays a table with a list of the members of the HAZOP Analysis team. Each row in the table corresponds to one Human Resource record. For each Human Resource record, the following information is displayed:
  - **Name:** The first and last name of the team member as it appears in the Last Name and First Name fields in the associated Human Resource record.
  - **Department:** The value that exists in the Department field in the associated Human Resource record.
- **Hazards Analysis Documentation:** Displays a table with a list of the reference documents that are associated with the analysis. Each row in the table corresponds to one Reference Document record. For each record, the following information is displayed:
  - **Name:** The value that exists in the ID field in the Reference Document record.
  - **Description:** The value that exists in the Description field in the Reference Document record.
- **Hazards Analysis Scope:** Displays a table with a list of Equipment and Functional Location records that are linked to the analysis. Each row in the table corresponds to one Equipment or Functional Location record. For each record, the following information is displayed:
  - **Asset ID:** The value that exists in the Equipment ID field of the Equipment record *or* the Functional Location field of the Functional Location record.

    - **Asset Short Description:** The value that exists in the Equipment Short Description field of the Equipment record *or* the Functional Location Description field of the Functional Location record.
    - **Asset Long Description:** The value that exists in the Equipment Long Description field of the Equipment record *or* the Functional Location Long Description field of the Functional Location record.
- **Node List:** Displays a table that contains a list of the records that describe the hazardous Scenarios that are analyzed by the HAZOP Analysis. The table contains records that appear in the grid on the **HAZOP Nodes** page.

Accessing the Hazards Analysis Report for the HAZOP Analysis

You can access the Hazards Analysis Report via the **Reports** link on the **Common Tasks** menu on any page where the link is enabled.

To access the Hazards Analysis Report for the HAZOP Analysis:

1. Open the desired Hazards Analysis record.
2. On the **Common Tasks** menu, click the **Reports** link.

   A submenu appears.
3. On the submenu, click the **Hazards Analysis Report** link.

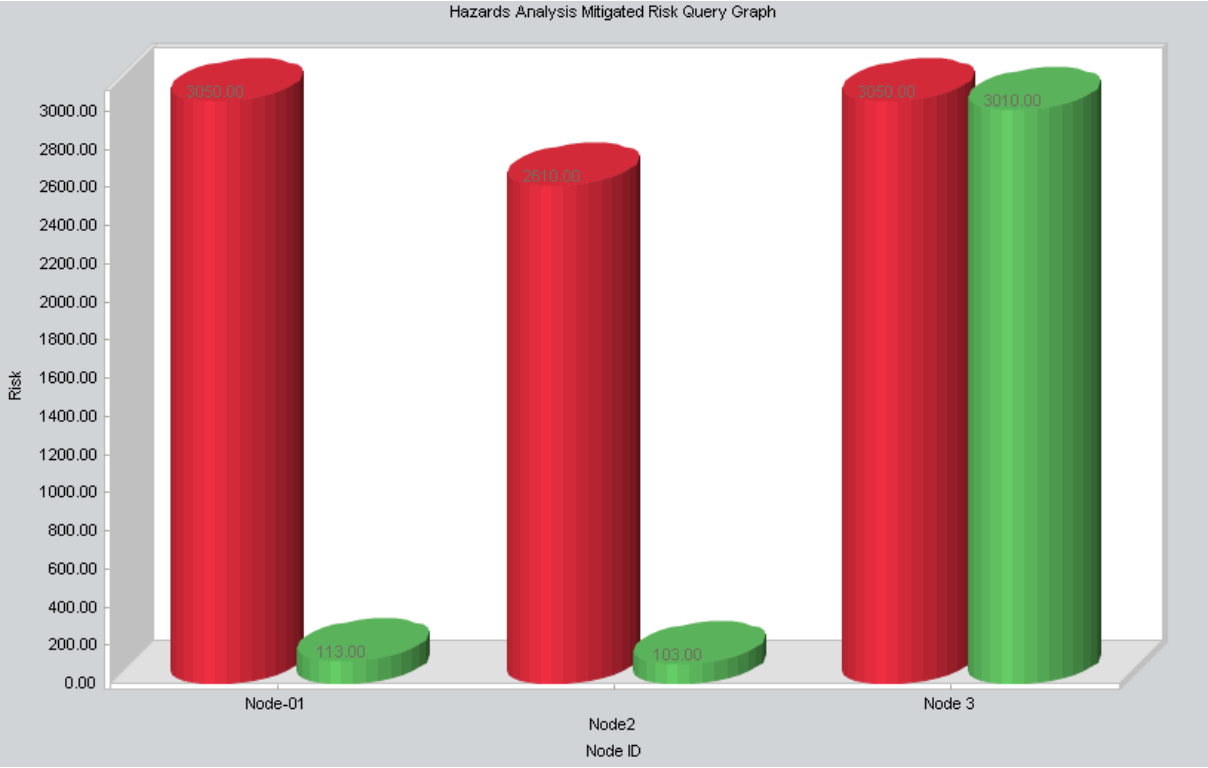
   Note: The name of the link is the caption of the Catalog item Hazards Analysis Report. By default, this value is *Hazards Analysis Report.*

   The Hazards Analysis Report appears in the Report Viewer.

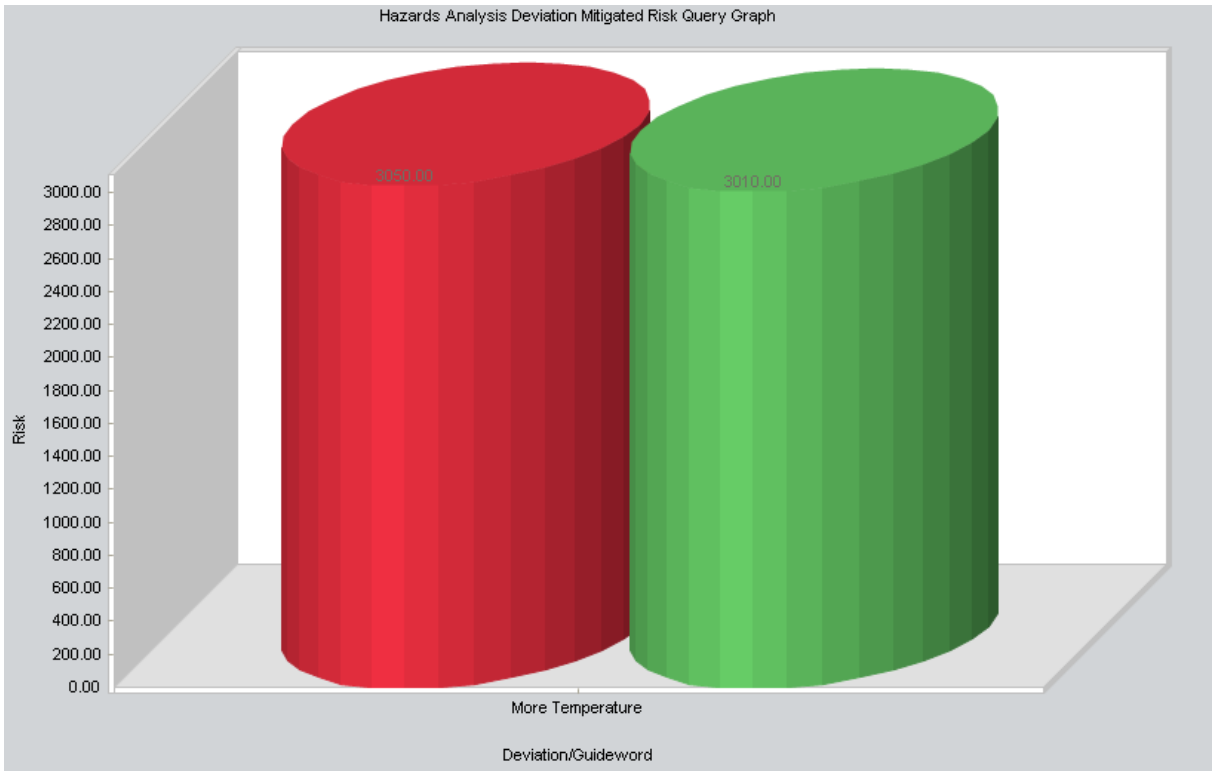
About the Hazards Analysis Mitigated Risk Graph

The Hazards Analysis Mitigated Risk graph displays a graphical summary of the risk rank values associated with the Hazards Analysis System/Node records and HAZOP Deviation records that appear on the **Hazards Analysis System/Nodes** page.

For example, when the graph appears, the y-axis displays the unmitigated and mitigated risk rank values and the x-axis displays ALL the Hazards Analysis system/Node records that are associated with an analysis.



If you drill down in the graph (i.e., click a column), the graph will display the unmitigated and mitigated risk rank values associated with the HAZOP Deviation record that is linked to the Hazards Analysis System/Node record whose column you clicked in the graph.


Hazards Analysis Deviation Mitigated Risk Query Graph
3050.00
3010.00
3000.00
2800.00
2600.00
2400.00
2200.00
2000.00
1800.00
1600.00
1400.00
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
Risk
More Temperature
Deviation/Guideword

Accessing the Hazards Analysis Mitigated Risk Graph

You can access the Hazards Analysis Mitigated Risk graph via the **Graphs** link on the **Common Tasks** menu on any page where the link is enabled.

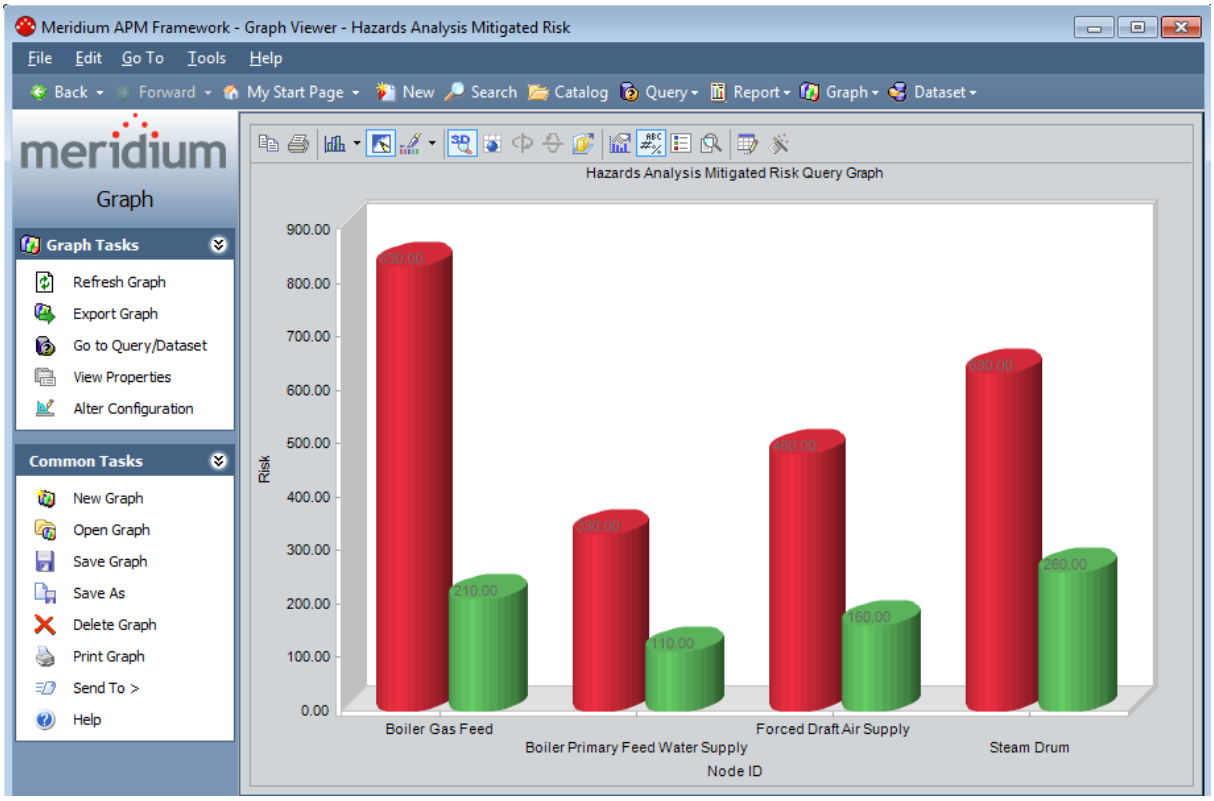
To access the Hazards Analysis Mitigated Risk graph for the HAZOP Analysis:

1. Open the desired Hazards Analysis record.
2. On the **Common Tasks** menu, click the **Graphs** link.

   A submenu appears.
3. On the submenu, click the **Hazards Analysis Mitigated Risk** link.

   Note: The name of the link is the caption of the Catalog item Hazards Mitigated Risk. By default, this value is *Hazards Mitigated Risk.*

   The Hazards Analysis Mitigated Risk graph appears in the Graph Viewer.



About Conducting a What If Analysis

A What If Analysis lets you document the *potential* hazardous Scenarios that may be associated with a process, assess the likelihood of that Scenario occurring, and determine the best way to mitigate the risk associated with that Scenario. A What If Analysis lets your team analyze the possible Scenarios that may include a hazardous outcome. The Scenarios that you define for a What If Analysis will describe events, deviations, and risks that meet either of the following criteria:

- They might but have not yet occurred on any of your existing equipment or locations.
- They may occur on equipment or locations that you implement in the future.

Conducting a What If Analysis includes completing the following steps:

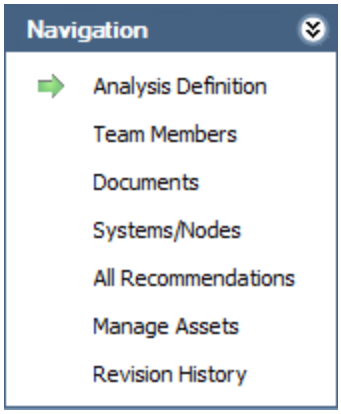
1. Create one Hazards Analysis record, which stores the details of the What If Analysis that you want to perform, including the start and end dates for the analysis.
2. Define the What If Analysis team, who will conduct the analysis.
3. Link reference documents to the Hazards Analysis record, which contain reference material relevant to the analysis.
4. Define Scenarios, which includes identifying the following characteristics of that Scenario:
    - The system from which the hazardous Scenario could originate.
    - The *condition* under which the hazardous Scenario may appear.
    - What could *cause* the condition to occur.
    - The risks associated with that Scenario.
    - The safeguards that would mitigate the risk of the Scenario.
    - The risk associated with the Scenario *with a safeguard in place*.
5. Define recommendations for actions that should be take to mitigate the risk of that Scenario occurring.

The Navigation Menu for a What If Analysis

The **Navigation** menu appears on most pages in Hazards Analysis when you are working with a What If Analysis and provides access to the Hazards Analysis features.

Note: The **Navigation** menu does not appear on the **Hazards Analysis Administration** page or the **What If Analysis Search** page.

A green arrow to the left of an option indicates the feature that you are currently viewing. The following image shows the **Navigation** menu as it appears on the **What If Analysis Definition** page.



The **Navigation** menu in Hazards Analysis contains the following links:

- **Analysis Definition:** Displays the **What If Analysis Definition** page, where you can manage Hazards Analysis records.
- **Team Members:** Displays the **What If Analysis Team Members** page, where you can manage the What If Analysis team.
- **Documents:** Displays the **Reference Documents** page, where you can manage Reference Document records that are associated with the What If Analysis.
- **Systems/Nodes:** Displays the **What If Analysis Systems** page, where you can define the hazards that you want to analyze.
- **All Recommendations:** Displays in Recommendation Management the list of all Risk Assessment Recommendation records that are linked to the current Hazards Analysis record.
- **Manage Assets:** Displays the **What If Analysis Assets** page, which contains a list of all the Equipment and Functional Location records that are linked to the current Hazards Analysis record.
- **Revision History:** Displays the **Analysis Revision History** page, where you can manage the Hazards Analysis Revision records that exist for an analysis. This link is enabled only if the state of the Hazards Analysis record with which you are currently working has ever been set to Complete.

These links are enabled after you have created a new Hazards Analysis record or opened an existing one (i.e., an Analysis ID appears in the title bar).

About Hazards Analysis Records and the What If Analysis

Hazards Analysisrecords store information about a What If Analysis. Creating a Hazards Analysis record is the first step in creating a What If Analysis. All other records that you create for the What If Analysis will be linked directly or indirectly to the Hazards Analysis record.

After you have defined the Hazards Analysis record on the **What If Analysis Definition** page, you can use the links on the **Navigation** menu to:

- Define the What If Analysis team.
- Add reference documents to the analysis.
- Define the possible Scenarios whose risks you want to assess.
- Create Risk Assessment Recommendation records for actions that should be taken to mitigate the risk of those Scenarios.

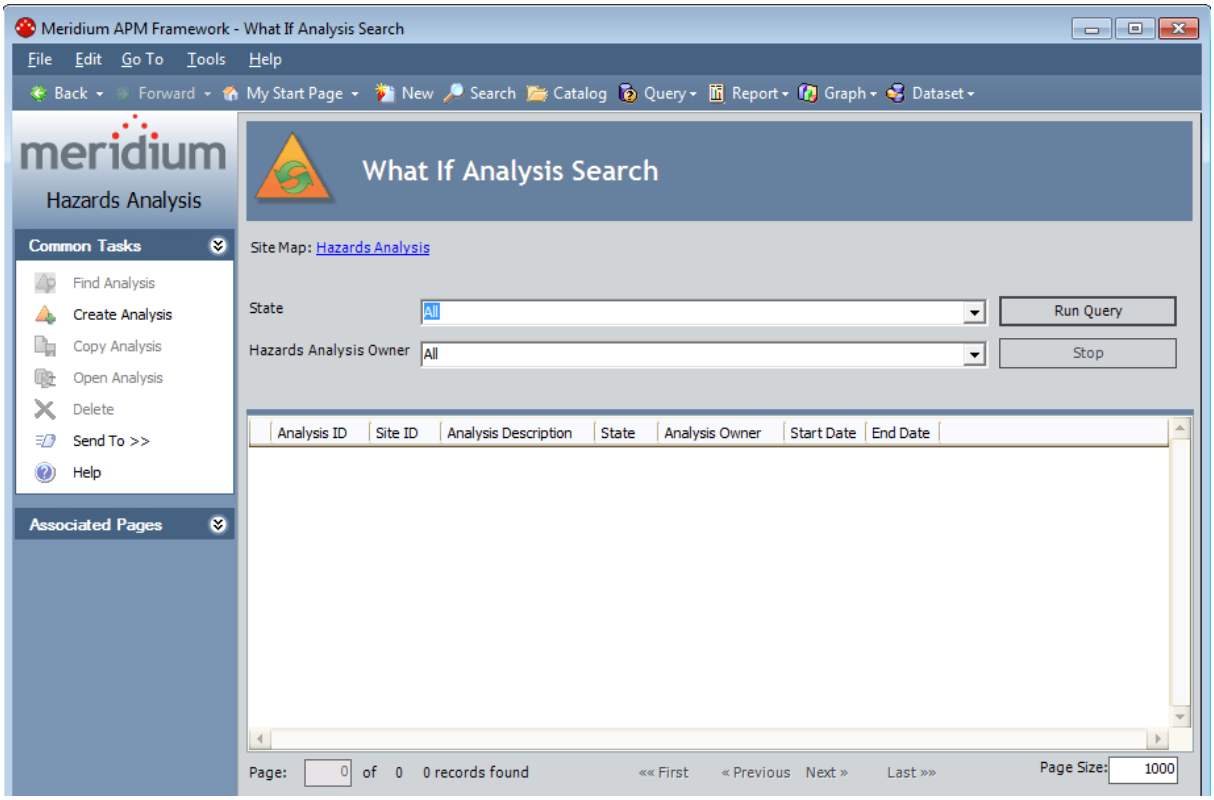
Accessing the What If Analysis Search Page

The **What If Analysis Search** page lets you search for an existing Hazards Analysis record for a What If Analysis.

To access the What If Analysis Search page:

1. Access the **Hazards Analysis Start Page**.
2. Click the **What If Analysis** link.

   The **What If Analysis Search** page appears.



Aspects of the What If Analysis Search Page

The **What If Analysis Search** page contains the results of the query that is specified in the **What If Analysis Search Query** text box on the **Hazards Analysis Administration** page. This documentation assumes that you are using the baseline WhatIf_Analysis_ Search query, which contains two prompts that appear as lists at the top of the **What If Analysis Search**page:

- **State:** Contains a list of record states that have been configured for the Hazards Analysis family. You can choose from the following baseline states:
  - **All:** Displays all the existing Hazards Analysis records that are in any state.
  - **Active:** Displays the Hazards Analysis records that are in the *Active* state.
  - **Complete:** Displays the Hazards Analysis records that are in the *Complete* state.
  - **Pending Approval:** Displays the Hazards Analysis records that are in the *Pending Approval* state.
  - **Planning:** Displays the Hazards Analysis records that are in the *Planning* state.
  - **Review:** Displays the Hazards Analysis records that are in the *Review* state.
- **Hazards Analysis Owner:** Contains the value *All* and a list of names of the What If Analysis team members whose names appear in the Analysis Owner field in any Hazards Analysis records.

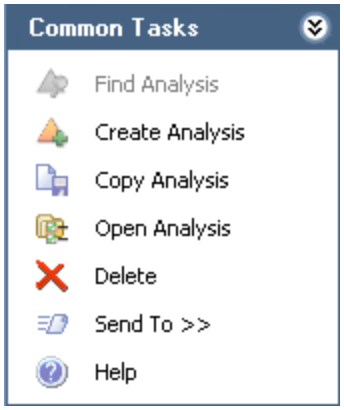
The query is run automatically using the default prompt value *All*. If you select different criteria, you can click the **Run Query** button to run the query and display the results in the grid at the bottom of the page. The query results will include hyperlinked Analysis IDs, which you can use to open the Hazards Analysis record on the **What If Analysis Definition** page.

Below the query results are options that you can use to navigate the results.

The **What If Analysis Search** page contains the following task menus:

- Common Tasks
- Associated Pages

Common Tasks Menu



The **Common Tasks** menu on the **What If Analysis Search** page contains the following links:

- **Find Analysis:** This link is disabled on the **What If Analysis Search** page.
- **Create Analysis:** Displays a new blank Hazards Analysis record on the **What If Analysis Definition** page.
- **Copy Analysis:** Displays on the **What If Analysis Definition** page a new Hazards Analysis record, populated with values from the Hazards Analysis record that you are currently viewing.
- **Open Analysis:** Displays the currently selected record on the **What If Analysis Definition** page.
- **Delete:** Displays a confirmation message, and then deletes the selected Hazards Analysis record.
- **Send To:** Displays a submenu with options that let you provide a link to the current page on your desktop (create shortcut), in an email message, or on a Home Page.
- **Help:** Displays the context-sensitive help topic for the **What If Analysis Search** page.

Searching for Hazards Analysis Records on the What If Analysis Search Page

To search for Hazards Analysis records on the What If Analysis Search page:

1. Access the **What If Analysis Search** page.
2. If desired, in the **What If Analysis Search** workspace, in the **State** list, select the record state by which you want to filter the query results.
3. If desired, in the **Hazards Analysis Owner** list, select the user ID of the desired analysis owner.
4. Click the **Run Query** button.

   The query results appear in the grid. At this point, you can open a Hazards Analysis record, copy a Hazards Analysis record, or create a new one.

Accessing the What If Analysis Definition Page

The **What If Analysis Definition** page lets you create and modify Hazards Analysis records.

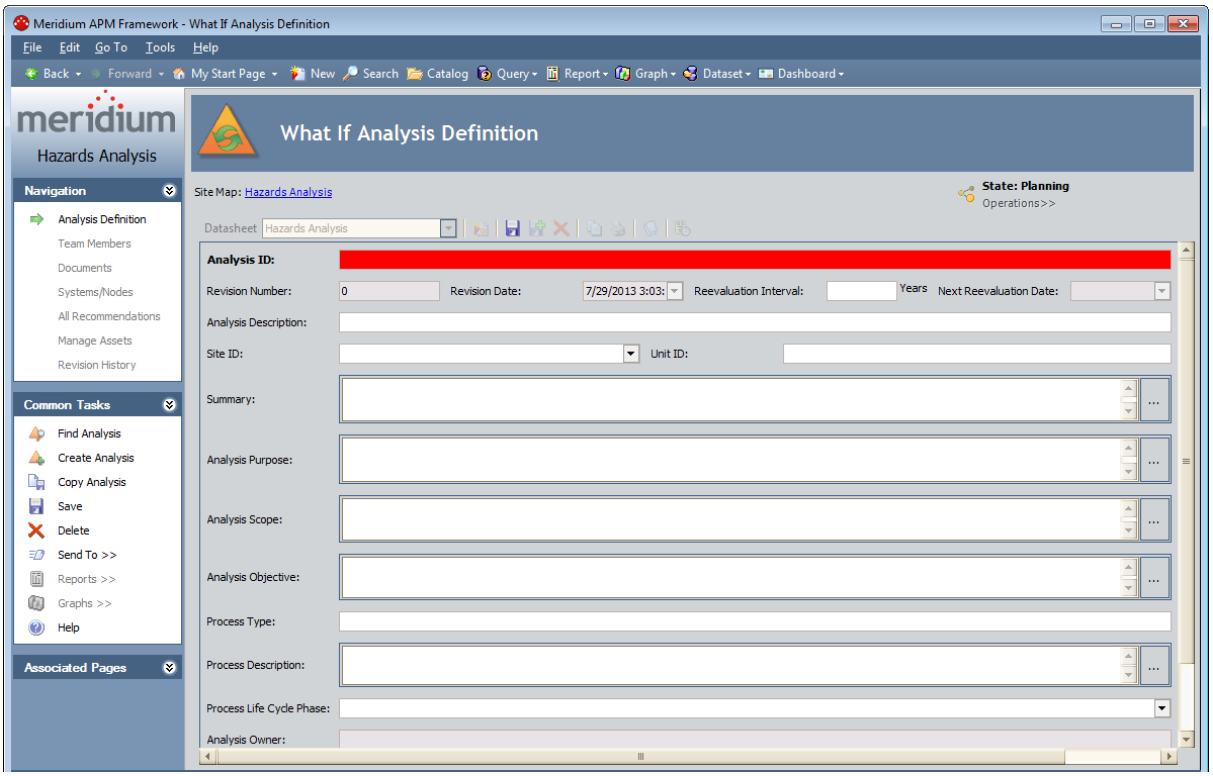
To access the What If Analysis Definition page:

1. Access the **What If Analysis Search** page.
2. On the **Common Tasks** menu, click the **Create Analysis** link.

   -or-

   In the grid, in the **Analysis ID** cell in the row that contains the desired Hazards Analysis record, click the hyperlinked Analysis ID.

   The **What If Analysis Definition** page appears.



Aspects of the What If Analysis Definition Page

The **What If Analysis Definition** page displays the datasheet for a Hazards Analysis record, where you can manage the properties of the What If Analysis.

- If you accessed the **What If Analysis Definition** page by clicking the **Create Analysis** link, a blank datasheet for a new Hazards Analysis record appears.
- If you accessed the **What If Analysis Definition** page by opening an existing Hazards Analysis record, the datasheet for the selected record appears.

Above the datasheet, the following options are enabled:

Saves the current Hazards Analysis record.

Displays the **Reference Documents** window, where you can manage the Reference Document records that are linked to the current Hazards Analysis record.

Displays the **Field Change History** dialog box, where you can view the revision history for all fields for which revision history exists.

> **Note:** If the revision history feature has not been enabled in the Configuration Manager for any fields, a message will appear, indicating that no revision history is available.

Displays the **State Assignments** dialog box, where you can manage the Security Users that are assigned to the states that are defined for the Hazards Analysis family. To the right of the icon, the following items appear:

State Indicator: Displays the current state of the Hazards Analysis record.

Operations Menu: Displays the operations that are available for selection. You can use this option to change the state of the Hazards Analysis record. This link is enabled only when you are viewing an existing Hazards Analysis record.

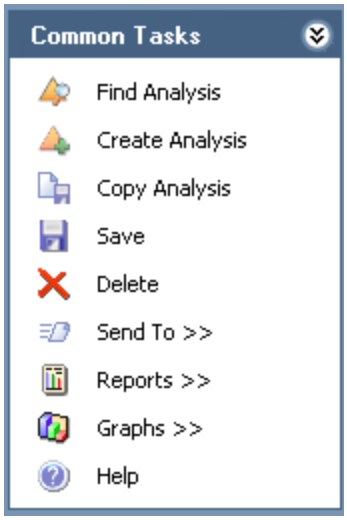
The **What If Analysis Definition** page contains the following task menus:

- Common Tasks
- Navigation
- Associated Pages

Using the **HAZOP Analysis Definition** page, you can:

- Create new Hazards Analysis records.
- Modify existing Hazards Analysis records.
- Assign a Security User to a Hazards Analysis record state. Doing so will allow this Security User to transition the Hazards Analysis record from the assigned state to a successor state. A Security User must also be assigned to the successor state before a Security User can transition to that state.
- Transition the Hazards Analysis record state to a different state.

Common Tasks Menu



The **Common Tasks** menu on the **What If Analysis Definition** page contains the following links:

- **Find Analysis:** Displays the **What If Analysis Search** page, where you can search for an existing Hazards Analysis record.
- **Create Analysis:** Displays a new blank Hazards Analysis record on the **What If Analysis Definition** page.
- **Copy Analysis:** Displays a new Hazards Analysis record that is populated with values from the Hazards Analysis record that you are currently viewing.
- **Save:** Saves the current record.
- **Delete:** Displays a confirmation message and then deletes the current record.
- **Send To:** Displays a submenu with options that let you provide a link to the current page on your desktop (create shortcut), in an email message, or on a Home Page.
- **Reports:** Displays a submenu that contains the caption of the Catalog item *What If Analysis Report* as a link. This link is enabled only when you are viewing an existing Hazards Analysis record and displays the What If Analysis Report in the Report Viewer.
- **Graphs:** Displays a submenu that contains the caption of the Catalog item *What If Mitigated Risk* as a link. This link is enabled only when you are viewing an existing Hazards Analysis record and displays the What If Mitigated Risk graph in the Graph Viewer.
- **Help:** Displays the context-sensitive help topic for the **What If Analysis Definition** page.

Creating New Hazards Analysis Records

To create a new Hazards Analysis record for a What If Analysis:

1. Access the **What If Analysis Search** page or the **What If Analysis Definition** page.
2. On the **Common Tasks** menu, click the **Create Analysis** link.

   A new blank Hazards Analysis record appears on the **What If Analysis Definition** page.
3. In the Analysis ID field, type a name for the What If Analysis. This field is required.
4. Provide values in the remaining fields as desired.
5. On the **Common Tasks** menu, click the **Save** link.

   The record is saved.

Copying Hazards Analysis Records

When you copy an existing Hazards Analysis record, you are creating a new Hazards Analysis record that will be populated with the values from the record that was copied. The values in all the fields from the source record will be copied to the new record with the exception of the following fields:

- Analysis ID
- Analysis Start Date
- Analysis End Date field
- Last Modified By
- Last Modified Date
- Revision Date field
- Revision Number field

To copy a Hazards Analysis record to create a new one:

1. Access the **What If Analysis Search** page.
2. In the grid, select the row containing the record you want to copy.
3. On the **Common Tasks** menu, click the **Copy Analysis** link.

   A new record appears on the **What If Analysis Definition** page, which is populated automatically with values from the selected record.
4. In the Analysis ID field, type a name for the What If Analysis. This field is required.
5. In the Analysis Start Date field, select a start date for the analysis, if desired. This field is populated automatically with the current date.
6. In the Analysis End Date field, select an end date for the analysis, if desired. This field is cleared when you copy an analysis.
7. Provide values in the remaining fields as desired.
8. On the **Common Tasks** menu, click the **Save** link.

   The record is saved.

Opening Existing Hazards Analysis Records

To open an existing Hazards Analysis record for a What If Analysis:

1. On the **What If Analysis Search** page, search for the Hazards Analysis record that you want to open.
2. In the search results, in the **Analysis ID** cell, click the hyperlinked ID for the record that you want to open.

   The selected record appears on the **What If Analysis Definition** page.

Modifying Hazards Analysis Records

To modify a Hazards Analysis record for the What If Analysis:

1. Open the Hazards Analysis record that you want to modify.
2. Modify the values in the fields as desired.
3. On the **Common Tasks** menu, click the **Save** link.

   Your changes are saved.

Flagging Hazards Analysis Records as Complete

If you are finished with a What If Analysis and no longer want to see its Hazards Analysis record in the query results on the **What If Analysis Search** page, you can remove the Hazards Analysis record from the query results via the **Delete** option on the **Common Tasks** menu.

Using the **Delete** option does not *delete* the Hazards Analysis record from the database. Instead, when you remove a Hazards Analysis record, the **Is Deleted**check box in the record is selected, and that record will no longer appear in the query results.

You can remove a Hazards Analysis record from the query results on the **What If Analysis Search** page regardless of the state of the record. After a Hazards Analysis record has been removed from the query results, you can still access the record via a search or a custom query.

To remove a Hazards Analysis record from the What If Analysis Search page:

1. On the **What If Analysis Search** page, select the row containing the Hazards Analysis record that you want to remove.
2. On the **Common Tasks** menu, click the **Delete** link.

   A confirmation message appears, asking if you really want to delete the Hazards Analysis record and all the records linked to it.
3. Click the **Yes** button.

   The Hazards Analysis record is removed from the **What If Analysis Search** page.

About the What If Analysis Team

The *What If Analysis team* is a group of individuals who will complete the What If Analysis. You can add Meridium APM users and non-Meridium APM users to the What If Analysis team.

- Meridium APM users will have an existing Meridium APM Security User record and an associated Human Resource record that was created automatically when the Security user record was created.
- Non-Meridium APM users will not have a Meridium APM Security User record or Human Resource record. To add a non-Meridium APM user to the HAZOP Analysis team, you will need to create a Human Resource record for that user. You can do so via the **What If Analysis Team Members** page or by using the Meridium APM Framework Tools.

Note: A Security User record is required for logging in to the Meridium APM Framework application and using Hazards Analysis. What If Analysis team members who do not have a Security User account may participate in and contribute to the analysis but will not be able to use the application.

Any member of the What If Analysis team can be assigned a role within the What If Analysis team, which provides a reference of the tasks for which the team member is responsible.

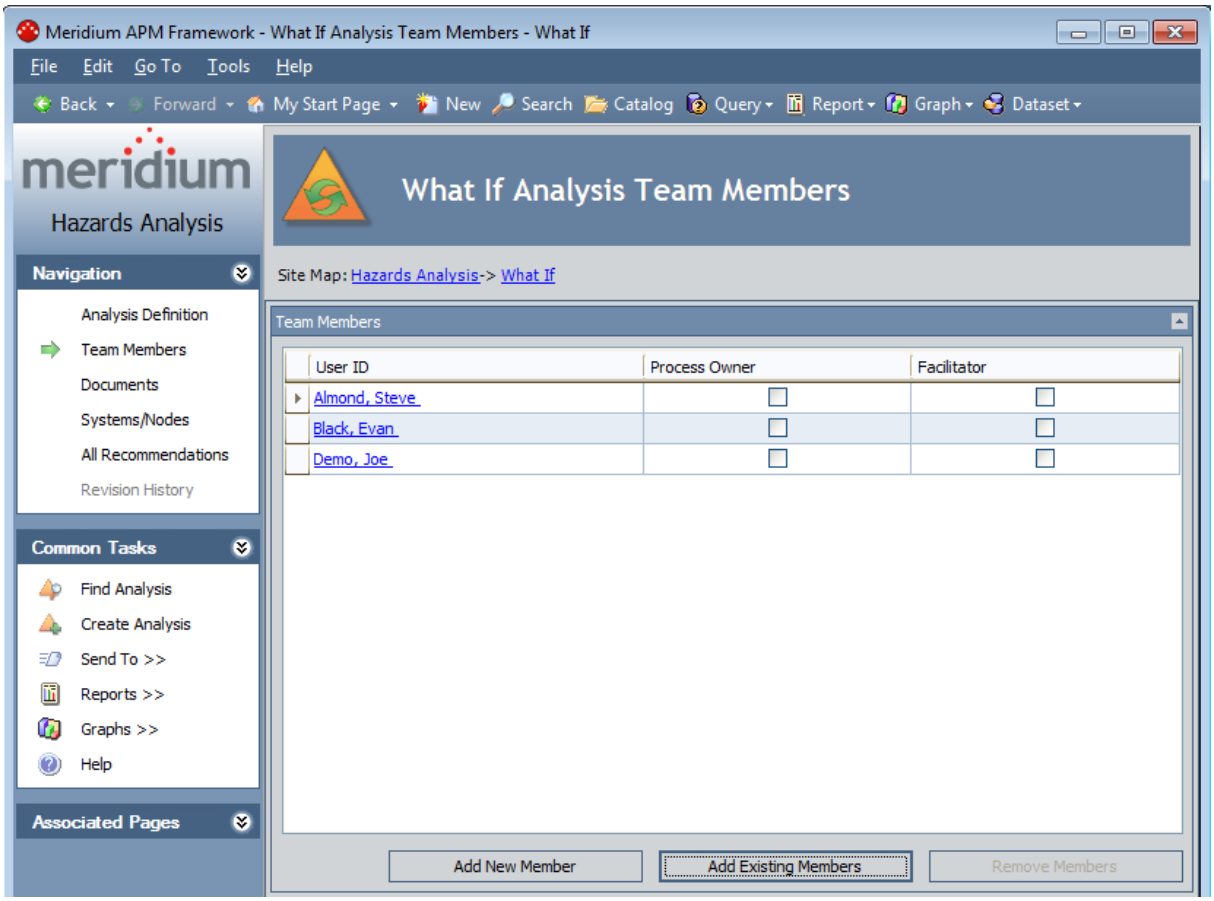
Accessing the What If Analysis Team Members Page

On the **What If Analysis Team Members** page, you can add team members to the What If Analysis team and assign team members the role of Process Owner or Facilitator.

To access the What If Analysis Team Members page:

1. Open a Hazards Analysis record that is included in the What If Analysis whose team you want to define.
2. On the **Navigation** menu, click the **Team Members** link.

   The **What If Analysis Team Members** page appears.



Aspects of the What If Analysis Team Members Page

The **What If Analysis Team Members** page displays the **Team Members** workspace, which consists of a modifiable grid that displays information about the What If Analysis team members. Each row in the grid represents one Human Resource record. For each Human Resource record that appears in the grid, the following information is displayed by default:

- **User ID:** Contains a hyperlinked name of the team member as it appears in the Human Resource record for that user. You can click any hyperlink to view the data-sheet for that Human Resource record.
- **Process Owner:** Contains a check box that indicates whether or not the team member has the role of Process Owner. You can select this check box in any row to identify the team member that is the Process Owner. This check box can be selected, however, for only ONE team member per What If Analysis team.
- **Facilitator:** Contains a check box that indicates whether or not the team member has the role of Facilitator. You can select this check box in any row to identify the team member that is the Facilitator. This check box can be selected, however, for only ONE team member per What If Analysis.

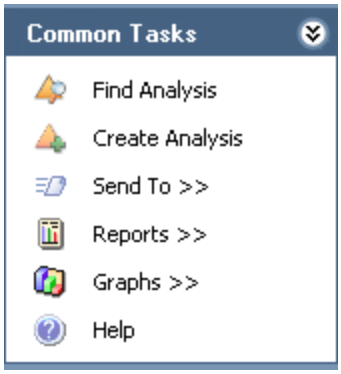
Below the grid, the following buttons appear:

- **Add New Member:** Displays a new Human Resource record that you can define and link to the Hazards Analysis record.
- **Add Existing Members:** Displays the **Find Items** window, where you can search for an existing Human Resource record and link it to the Hazards Analysis record.
- **Remove Members:** After asking for confirmation, removes the selected user from the team. This button is enabled only when records appear in the grid.

The **HAZOP Analysis Team Members** page contains the following task menus:

- Navigation
- Common Tasks
- Associated Pages

Common Tasks Menu



The **Common Tasks** menu on the **What If Analysis Team Members** page contains the following links:

- **Find Analysis:** Displays the **What If Analysis Search** page, where you can search for an existing Hazards Analysis record.
- **Create Analysis:** Displays a new blank Hazards Analysis record on the **What If Analysis Definition** page.
- **Send To:** Displays a submenu with options that let you provide a link to the current page on your desktop (create shortcut), in an email message, or on a Home Page.
- **Reports:** Displays a submenu that contains the caption of the Catalog item *What If Analysis Report* as a link. When you click this link, it displays the What If Analysis Report in the Report Viewer.
- **Graphs:** Displays a submenu that contains the caption of the Catalog item *What If Mitigated Risk* as a link. When you click this link, it displays the What If Mitigated Risk graph in the Graph Viewer.
- **Help:** Displays the context-sensitive help topic for the **What If Analysis Definition** page.

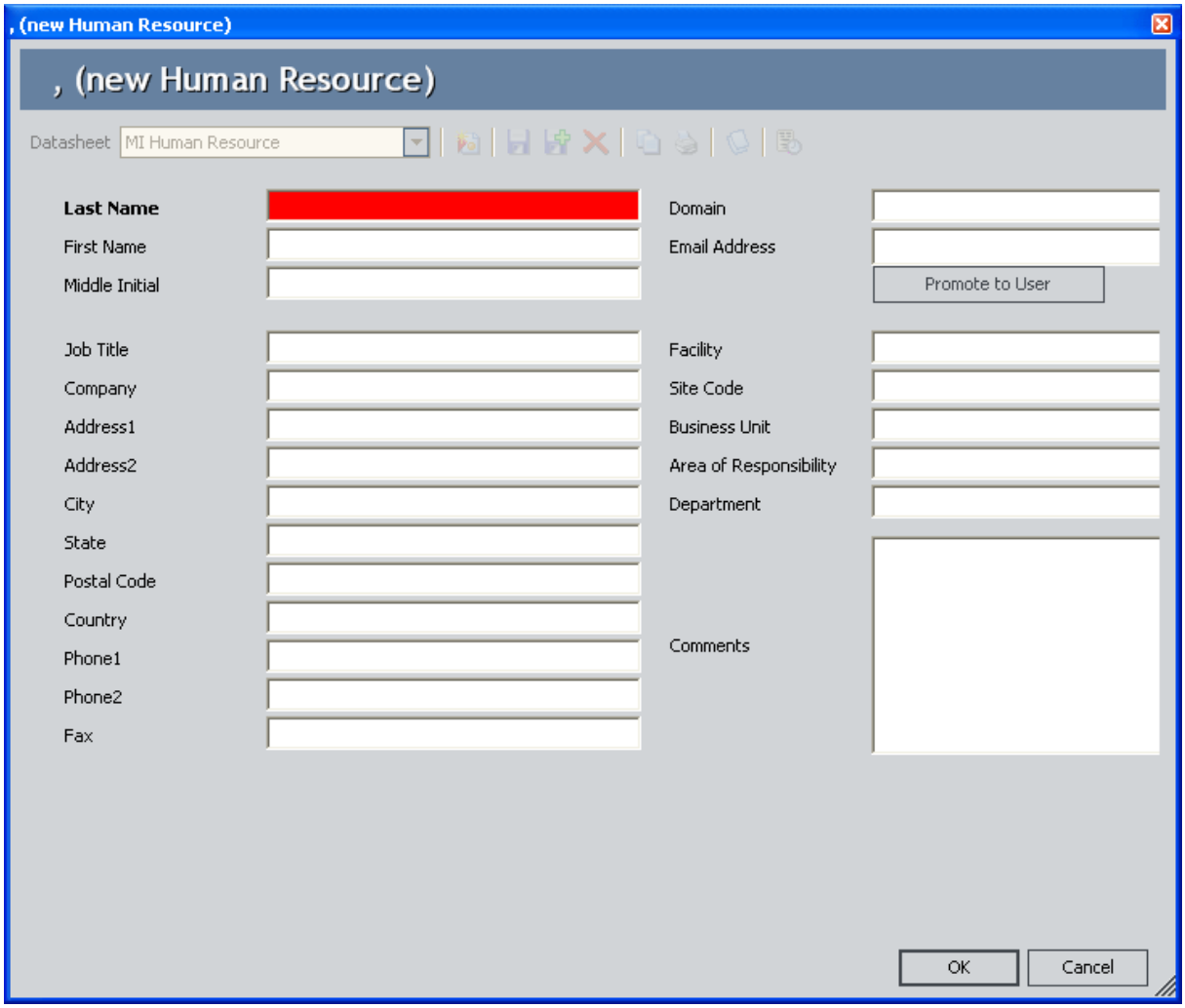
Creating New Users and Adding Them to the What If Analysis Team

When you create new users and add them to the What If Analysis team, you are creating new Human Resource records in the Meridium APM database and linking them to the Hazards Analysis record. This option should be used for team members who are not Meridium APM system users. If you want to add a team member who is already a Meridium APM system user, see the topic for adding new team members who already have Human Resource records.

To create a new user and add that user to the What If Analysis team:

1. Access the **What If Analysis Team Members** page.
2. At the bottom of the **Team Members** workspace, click the **Add New Member** button.

   A new Human Resource record appears.



3. Enter values in the fields on the datasheet as desired. Note that the Last Name field is required.
4. Click **OK**.

   The Human Resource record is saved, and the new What If Analysis team member appears in the**Team Members**workspace.

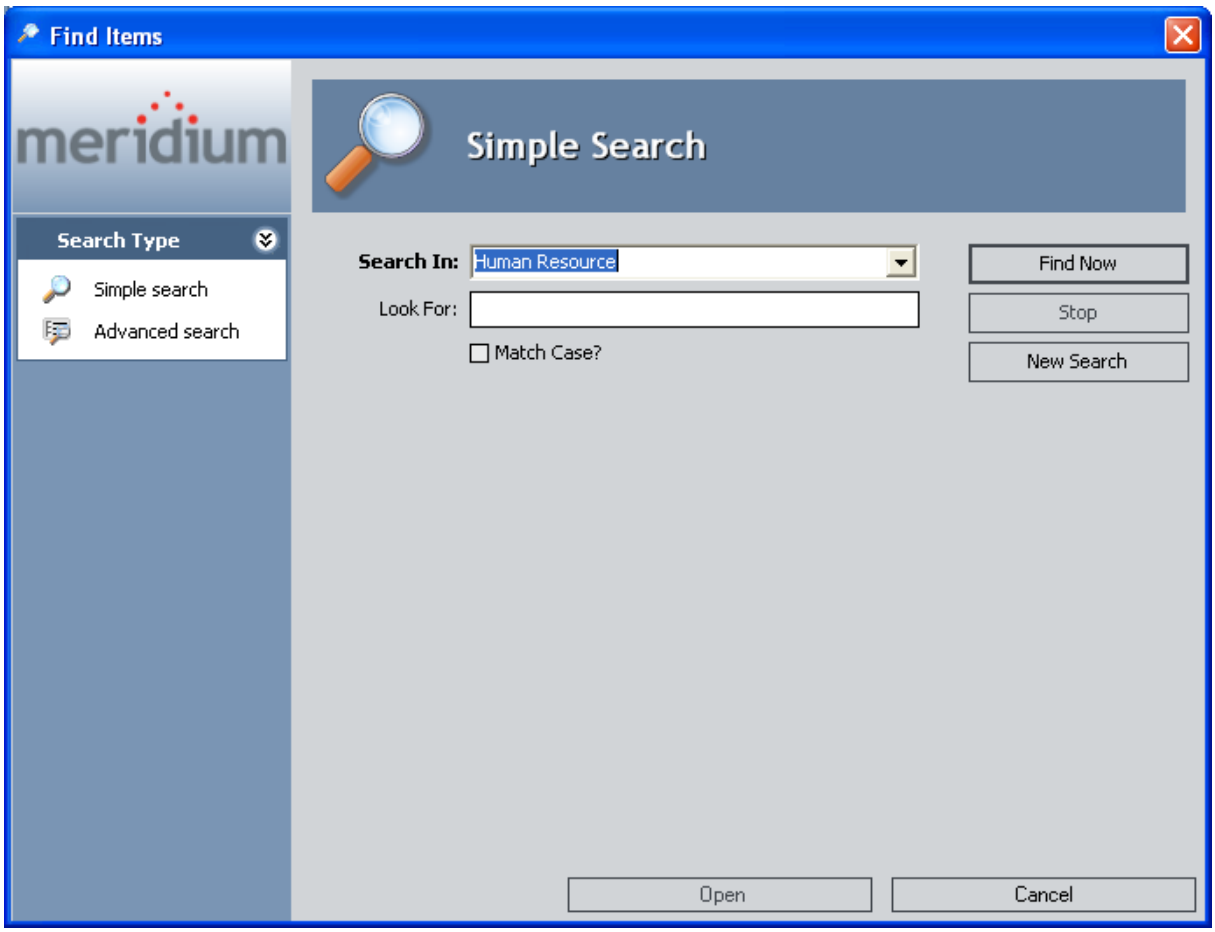
Adding New What If Analysis Team Members Who Already Have Human Resource Records

When you add a new What If Analysis Team Member who already has a Human Resource record, you are linking an existing Human Resource record to the Hazards Analysis record. This option should be used for team members who already have a Human Resource record. If you want to add a new What If Analysis team member who does not already have a Human Resource record, see the topic for creating a new user to add to the What If Analysis team.

To add a new What If Analysis team member who already has a Human Resource record:

1. Access the **What If Analysis Team Members** page.
2. At the bottom of the **Team Members** workspace, click the **Add Existing Members** button.

   The **Find Items** window appears, and the Human Resource family is selected in the **Search In** list by default.



3. If desired, type your search criteria in the **Look For** text box, and then click the **Find Now** button.

   The search results appear.

4. Select the row containing the desired Human Resource record, and then click the **Open** button.

   The new What If Analysis team member appears in the **Team Members** work-space.

About What If Analysis Team Member Roles

What If Analysis team member roles serve as a reference of which What If Analysis team member is responsible for a given task related to the What If Analysis. The following roles are available for a What If Analysis:

- **Process Owner:** The team member who is responsible for managing the What If Analysis and seeing it through to completion. After you assign a team member the role of Process Owner, that team member's name will appear in the Analysis Owner field in the Hazards Analysis record. The Process Owner should be a member of the MI HA Owner Security Group, which provides that user with the ability to manage the Hazards Analysis record state.
- **Facilitator:** The team member who is in charge of conducting the What If Analysis and organizing the What If Analysis team. The Facilitator should be a member of the MI HA Facilitator Security Group, which provides that user with the ability to manage the Hazards Analysis record state.

There can be only one Process Owner and one Facilitator per analysis. A single team member, however, can be designated as both the Process Owner and Facilitator.

Assigning Roles to What If Analysis Team Members

The following instructions provide details on designating a team member as the Process Owner or Facilitator. Assigning a team member a role serves as a reference for the team.

To assign a role to a What If Analysis team member:

1. Access the **What If Analysis Team Members** page.
2. In the **Team Members** workspace, locate the row containing the team member that you want to assign the role of Process Owner or Facilitator.
3. In either the **Process Owner** or **Facilitator** column, select the check box to indicate that the team member is assigned to the corresponding role.

   The team member is assigned the specified role, and the Analysis Owner field on the Hazards Analysis datasheet is populated with that team member's name.

   To assign a role to a different team member, select the **Process Owner** or **Facilitator** check box in the row that represents that team member.

Viewing Human Resource Records for What If Analysis Team Members

To view the Human Resource record for a What If Analysis team member:

1. Access the **What If Analysis Team Members** page.
2. In the **Team Members** workspace, locate the row containing the team member whose Human Resource record you want to view.
3. In the **User ID** column, click the team member's hyperlinked User ID.

   The Human Resource record for that team member appears in a new window. At this point, you can modify the fields if desired.
4. Click **OK**.

   Your changes are saved.

Removing Team Members from the What If Analysis Team

When you remove a team member from a What If Analysis team, you are deleting the link between the Human Resource record and the Hazards Analysis record for that What If Analysis.

Additionally, if you remove from the What If Analysis team a team member who is assigned the role of Process Owner, the Owner field in the Hazards Analysis record will be cleared.

To remove a team member from the What If Analysis team:

1. Access the **What If Analysis Team Members** page.
2. In the **Team Members** workspace, select the rows containing the team members that you want to remove from the What If Analysis team.
3. At the bottom of the **Team Members** workspace, click the **Remove Members** button.

   A confirmation message appears, asking if you really want to remove the selected team members.
4. Click the **Yes** button.

   The selected team members are removed from the What If Analysis team.

About Defining Scenarios for What If Analyses

To define Scenarios for What If Analyses, the What If Analysis team will:

- Hypothesize about the hazardous processes that take place in a facility.
- Identify steps in those processes that have the potential to cause abnormal or unsafe results.
- Create records to represent the various Scenarios for each process.

As part of defining the Scenarios, the What If Analysis team will:

- Assess the risk associated with the Scenarios.
- Determine actions that should be taken to mitigate the risk associated with the Scenario and create records to represent those actions.

For example, assume the What If Analysis team has discussed a process that is controlled by System 1A. During the discussion, the team defines the following Scenario, which is a Scenario that *could* occur.

When the pressure monitor stops working, the pressure switch is not be triggered to open or close appropriately, causing hazardous chemicals to leak out of the connector, which may result in environmental degradation. To prevent this condition, a toxicity detector is in place, which sounds an alarm when the toxicity levels in the facility reach a high-risk level.

To define this Scenario within Hazards Analysis, the team would create one record in each family described in the following table. The column **In the example, this record represents...** contains an item from the previous example and serves as a reference for the type of information that record represents in the What If Analysis.

A record in this family:	...Stores:	In the example, this record represents:
Hazards Analysis System/Node	Details on the group of equipment or locations that is used to perform the process.	System 1A
What If	Details about the condition that deviates from the normal behavior of that process and directly leads to a risk.	Pressure increases.

A record in this family:	...Stores:	In the example, this record represents:
Hazards Analysis Cause	Details on the event that results from the deviation that is defined in the HAZOP Deviation record, including how frequently it may occur, and the equipment or location that is associated with it. Causes can include human error, equipment failure, or other factors.	Chemicals leak.
Hazards Analysis Consequence	Details on the negative outcome that results from the event that is defined in the Hazards Analysis Cause record.	Multiple fatalities.
Hazards Analysis Safeguard	Details on the safety precautions that are currently in place to prevent or lessen the impact of the negative outcome that is defined in the Hazards Analysis Consequence record.[1]	Toxicity detector
Independent Protection Layer	Additional details about a safeguard defined in a Hazards Analysis Safeguard record that is considered an independent layer of protection. Not all safeguards are IPLs, so not all Hazards Analyses will contain these records.	Toxicity detector

If the safeguard is an instrumented function that exists within a safety system and is represented by an Instrumented Function record in the Meridium APM database, you can link that Instrumented Function record to the Hazards Analysis Safeguard record. For more details on instrumented functions and safety systems, see the SIS Management section of this Help system.

In addition to the records described in the table, the What If Analysis team would create two *Risk Assessment records*, where:

1. **One is linked to the Hazards Analysis Consequence record** to store the unmitigated risk value associated with the Scenario *without* a safeguard in place. In other words, the team will define the risk value that is associated with that Scenario without the toxicity detector.
2. **One is linked to the Hazards Analysis Safeguard record** to store the mitigated risk

rank value of the Scenario *with* that safeguard in place. In other words, the team will define the risk value associated with a Scenario when the toxicity detector is in place.

After the team has defined the Scenario and assessed the risk associated with it, they would create one Risk Assessment Recommendation record per action that the team suggests for mitigating that risk. For example, the team may create a Risk Assessment Recommendation record to add more safety equipment on the pressure switch to reduce the risk of it failing and causing a chemical spill.

After the recommended action has been taken, the team would reassess the risk associated with the Scenario after the additional safety precautions are in place. In other words, they would determine the mitigated risk of the Scenario with the extra safety equipment in place on the pressure switch.

When you create records as described here, the ID of that record will appear in the **What If Analysis Systems** grid on the **What If Analysis Systems** page.

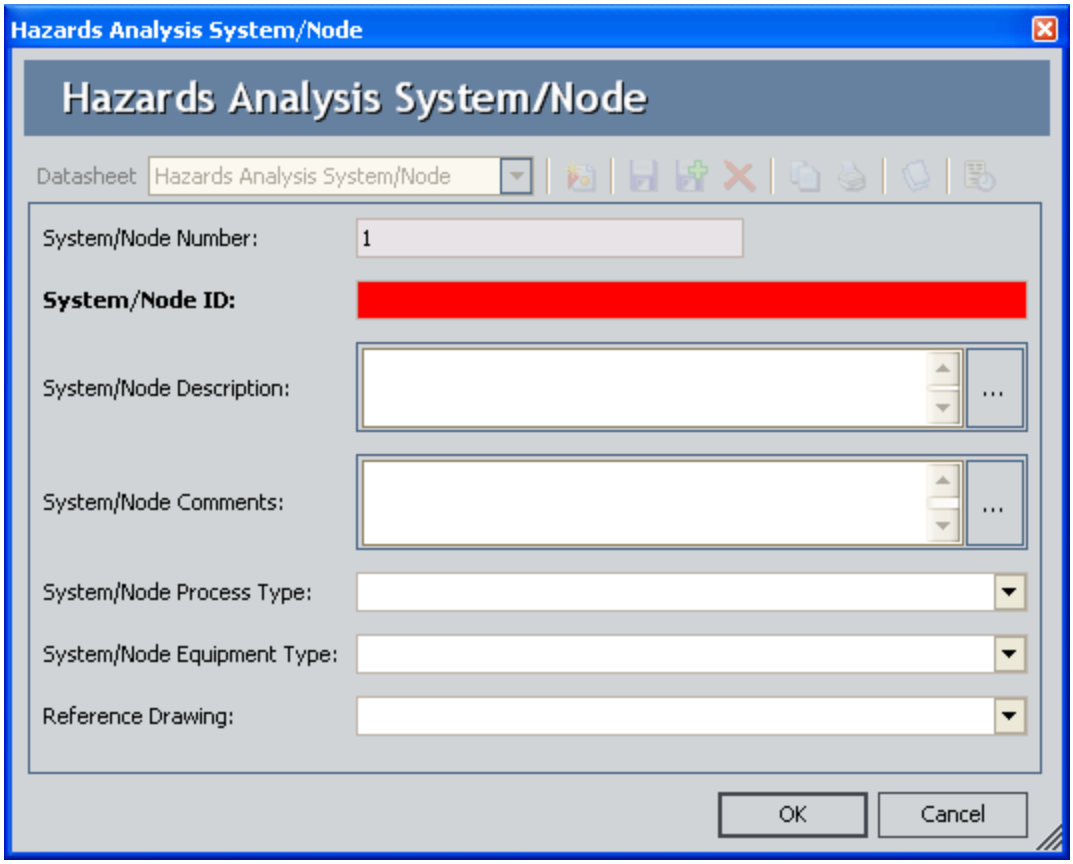
Accessing the What If Analysis Systems Page

The **What If Analysis Systems** page lets you define the possible hazardous conditions that could occur in your facility as a result of the process that is specified in the current Hazards Analysis record.

To access the What If Analysis Systems page:

1. Open the Hazards Analysis record for the desired What If Analysis.
2. On the **Navigation** menu, click the **Systems/Nodes** link.

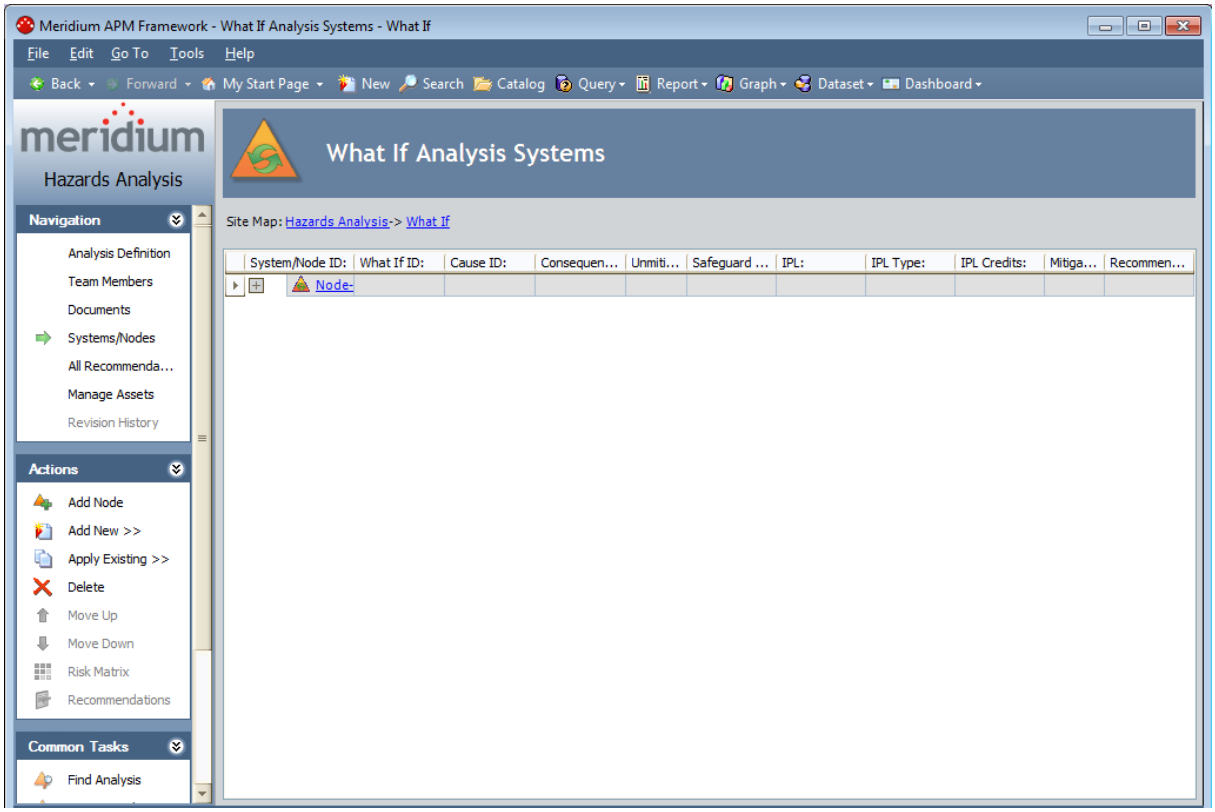
   If a Hazards Analysis System/Node record has not yet been linked to the Hazards Analysis record for the current What If Analysis, a new blank Hazards Analysis System/Node record appears.



   These instructions assume that you have not yet associated a Hazards Analysis System/Node record to the What If Analysis.

3. Complete the Hazards Analysis System/Node datasheet as desired, and click **OK**. Note that the System/Node ID field is required.

The Hazards Analysis System/Node record is linked to the Hazards Analysis record, and the **What If Analysis Systems** page appears, displaying the new Hazards Analysis System/Node record.



Aspects of the What If Analysis Systems Page

The **What If Analysis Systems** page contains the **What If Analysis Systems** grid, which displays in hierarchical format the hyperlinked Record IDs for the records that are used to define Scenarios.

All Scenarios for a given What If Analysis are represented on the same **What If Analysis Systems** page.

Each separate row in the grid represents a separate record, with the exception of Risk Assessment records, Risk Assessment Recommendation records, and Independent Protection Layer records, which appear on the *same* row as the record to which they are linked.

Each column in the grid corresponds to the name of the family to which the record belongs. When you select a row in the grid, you are selecting the record that is represented by the Record ID that appears in that row. The grid provides *some* standard grid customization options that you can use to customize the layout of the query results.

The following columns appear in the grid:

- **System/Node ID:** Contains the hyperlinked Record ID of the Hazards Analysis System/Node records that belong to the What If Analysis. The ID of each Hazards Analysis System/Node record that you add to the What If Analysis will appear in a new row in this column.
- **What If ID:** Contains the hyperlinked Record ID of the What If records that belong to the What If Analysis. The ID of each What If record that you add to the What If Analysis will appear in a new row in this column directly below the row containing the Hazards Analysis System/Node record to which it is linked.
- **Cause ID:** Contains the hyperlinked Record ID of the Hazards Analysis Cause records that belong to the What If Analysis. The ID of each Hazards Analysis Cause record that you add to the What If Analysis will appear in a new row in this column directly below the row containing the What If record to which it is linked.
- **Consequence ID:** Contains the hyperlinked Record ID of the Hazards Analysis Consequence records that belong to the What If Analysis. The ID of each Hazards Analysis Consequence record that you add to the What If Analysis will appear in a new row in this column below the Hazards Analysis Cause record to which it is linked.
- **Unmitigated Risk:** Displays the total unmitigated risk rank value as it appears in the Risk Assessment record that is linked to the Hazards Analysis Consequence record in that row. When you link a Risk Assessment record to a Hazards Analysis Consequence record, the unmitigated risk rank value will appear in this column on the same row as the Hazards Analysis Consequence record to which the Risk Assessment record is linked.
- **Safeguard ID:** Contains the hyperlinked Record ID of the Hazards Analysis Safeguard records that belong to the What If Analysis. Each Hazards Analysis Safeguard record that you add to the What If Analysis will appear in a new row in this

column below the Hazards Analysis Consequence record to which it is linked.

- **IPL:** Indicates whether or not the safeguard shown in the Safeguard ID column is an independent protection layer (IPL). This cell is populated automatically based on the settings on the **IPL checklist** tab in the Hazards Analysis Safeguard record. This column can contain the following values:
  - **True:** Indicates that the safeguard *is* an IPL and that an Independent Protection Layer record is linked to the Hazards Analysis Safeguard record. This value will appear only if *all* the logical fields on the **IPL Checklist** tab are set to *True*.
  - **False:** Indicates that the safeguard is *not* an IPL.
- **IPL Type:** If the safeguard shown in the **Safeguard ID** cell is an IPL, this cell indicates the type of IPL. There are two types of IPLs:
  - **Consequence Reducing IPLs:** Reduce the severity of the failure (e.g., fatality to injury).
  - **Frequency Reducing IPLs:** Reduce how often the failures occur (e.g., every 100 years to every 1,000 years).

  The **IPL Type** cell is populated automatically based on the value in the **IPL** column. If the value in the **IPL** column is:
  - **False:** This column is blank.
  - **True:** This column displays the value from the IPL Type field in the Independent Protection Layer record that is linked to the Hazards Analysis Safeguard record.
- **IPL Credits:** Displays the value is stored in the IPL Credits field in the Independent Protection Layer record that is linked to the Hazards Analysis Safeguard record.
- **Mitigated Risk:** Displays the total mitigated risk rank value as it appears in the Risk Assessment record that is linked to the Hazards Analysis Safeguard record in that row. When you link a Risk Assessment record to a Hazards Analysis Safeguard record, the mitigated risk rank value will appear in this column on the same row as the Hazards Analysis Safeguard record to which the Risk Assessment record is linked. If more than one Hazard Analysis Safeguard record is linked to an Hazards Analysis Consequence record, the mitigated risk rank value for each subsequent Hazards Analysis Safeguard record will further mitigate the mitigated risk rank value of the previous Hazards Analysis Safeguard record, so that the mitigated risk rank value associated with the last safeguard listed for a consequence is the*total*mitigated risk rank value. If one of the Hazard Analysis Safeguard records is deleted, the mitigated risk rank values will be recalculated automatically.

  Note: If you modify the value in the IPL Type field in a Hazard Analysis Safeguard record after you have defined a mitigated risk value for that safeguard, the value in the **Mitigated Risk** column will be cleared, and you will have to re-evaluate the mitigated risk.

- **Mitigated Risk:** Displays the total mitigated risk rank value as it appears in the Risk Assessment record that is linked to the Hazards Analysis Safeguard record in that

row. When you link a Risk Assessment record to a Hazards Analysis Safeguard record, the mitigated risk rank value will appear in this column on the same row as the Hazards Analysis Safeguard record to which the Risk Assessment record is linked.

- **Recommendations:** Contains the hyperlinked value ***<number>* recommendations**, where **<number>** is a numeric value, indicating the number of Risk Assessment Recommendation records that are linked to the Hazards Analysis Consequence record in that row. When you link a Risk Assessment record to a Hazards Analysis Consequence record, the **<number>** value in this column is increased by one and appears in the same row as the Hazards Analysis Consequence record to which the Risk Assessment Recommendation records are linked.

As you add records to the grid, a plus (+) or minus (-) sign appears to the left of the predecessor record. You can expand a level of the hierarchy by clicking the plus sign, or you can collapse a level of the hierarchy by clicking the minus sign. Note that when you expand the root level of the hierarchy (i.e. the **System/Node ID** column), all levels of the hierarchy will be expanded by default.

The **What If Analysis Systems** page contains the following task menus:

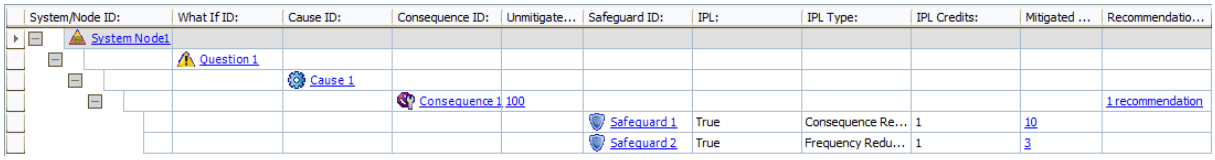
- Navigation
- Actions
- Common Tasks
- Associated Pages

Using the **What If Analysis Systems** page, you can:

- Create new records that describe the Scenarios that you are assessing and link them to the What If Analysis.
- Add existing records that describe the Scenarios that you are assessing and link them to the What If Analysis.
- Assess the risk associated with the defined Scenarios.

The Hierarchy in the What If Analysis Systems Grid

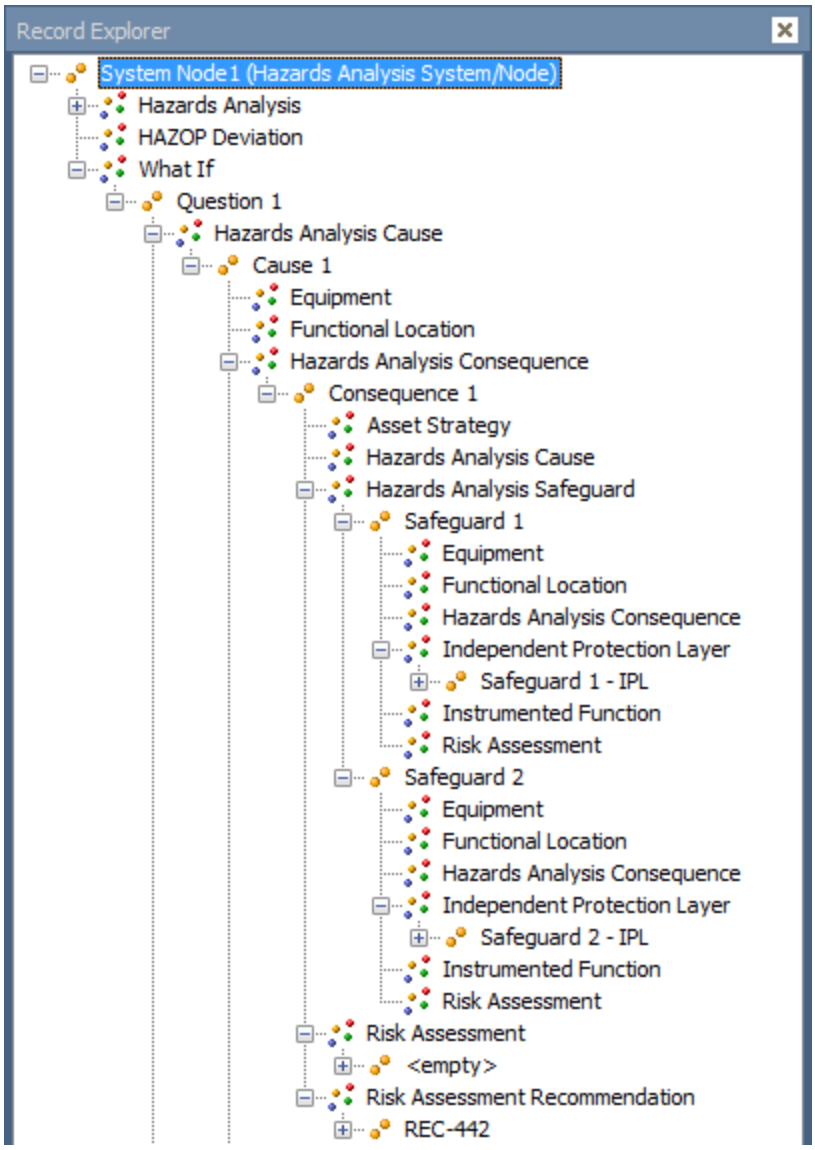
The **What If Analysis Systems** grid provides a hierarchical view of the records that are used to describe a Scenario. In other words, the grid provides an alternate view of the record hierarchy for the Hazards Analysis System/Node family. The following image shows an example of how the **What If Analysis Systems** grid appears after you have defined a Scenario for a What If Analysis.



In this image, you can see the following relationships:

- The Hazards Analysis System/Node record *System Node1* is linked to the What If record *Question 1*.
- The What If record *Question 1* is linked to the Hazards Analysis Cause record *Cause 1*.
- The Hazards Analysis Cause record *Cause 1* is linked to the Hazards Analysis Consequence record *Consequence 1*.
- The Hazards Analysis Consequence record *Consequence 1* is linked to:
  - A Risk Assessment record with the unmitigated risk rank value of 100.
  - One Risk Assessment Recommendation record.
  - The Hazards Analysis Safeguard record *Safeguard 1*, which is a Consequence Reducing IPL.
  - The Hazards Analysis Safeguard record *Safeguard 2*, which is a Frequency Reducing IPL.
- The Hazards Analysis Safeguard record *Safeguard 1* is linked to:
  - A Risk Assessment record with the unmitigated risk rank value of 100.
  - A Risk Assessment record with the mitigated risk rank value 10.
  - An Independent Protection Layer record that stores the values in the **IPL Type** and **IPL Credits** column.
- The Hazards Analysis Safeguard record *Safeguard 2* is linked to:
  - A Risk Assessment record with the unmitigated risk rank value of 100.
  - A Risk Assessment record with the mitigated risk rank value 3.
  - An Independent Protection Layer record that stores the values in the **IPL Type** and **IPL Credits** column.

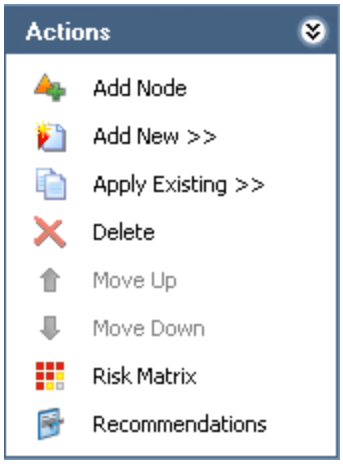
If you were to view the record hierarchy for the Hazards Analysis System/Node record *System Node1* in the Record Manager, it would look something like this:



In this image, you can see the same relationships in a similar format to what you see them in the **What If Analysis Systems** grid. For example, Hazards Analysis Consequence record *Consequence 1* is linked to:

- The Hazards Analysis Safeguard records *Safeguard 1* and *Safeguard 2*.
- One Risk Assessment record.
- One Risk Assessment Recommendation record.

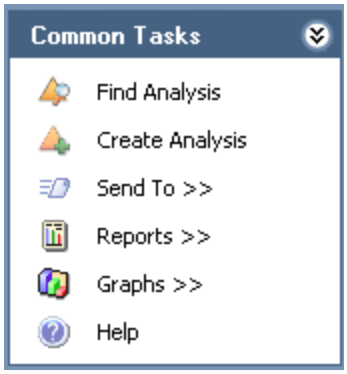
Actions



The **Actions** menu on the **What If Analysis Systems** page contains the following links:

- **Add Node:** Displays a new blank Hazards Analysis System/Node record in a new window.
- **Add New:** Displays a submenu of options that you can use to link a record to the record that is currently selected in the grid. The submenu is dynamic, meaning that the menu will contain only the options that are valid for the currently selected record. This link is enabled only if a Hazards Analysis System/Node record appears in the grid.
- **Apply Existing:** Displays a submenu of options that you can use to search for an existing record to link to the record that is currently selected in the grid. This submenu is dynamic, meaning that the menu will contain only the options that are valid for the currently selected record. This link is enabled only if a Hazards Analysis System/Node record appears in the grid.
- **Delete:** Displays a confirmation message, and then deletes the selected record and all the records that are linked to that record as a successor. This link is enabled only if a Hazards Analysis System/Node record appears in the grid.
- **Move Up:** Moves the selected record up one row in the grid. This link is enabled only when the selected record appears in a column that contains more than one record.
- **Move Down:** Moves the selected record down one row in the grid. This link is enabled only when the selected record appears in a column that contains more than one record.
- **Risk Matrix:** Displays the Risk Assessment Interface, where you can assess the risk associated with the item represented by the selected record. This link is enabled only when a Hazards Analysis Consequence record or Hazards Analysis Safeguard record is selected in the grid.
- **Recommendations:** Displays the **Recommendations** dialog box, where you can manage Risk Assessment Recommendation records for the selected record.

Common Tasks



The **Common Tasks** menu on the **What If Analysis Systems** page contains the following links:

- **Find Analysis:** Displays the **What If Analysis Search** page, where you can search for an existing Hazards Analysis record.
- **Create Analysis:** Displays a new blank Hazards Analysis record on the **What If Analysis Definition** page.
- **Send To:** Displays a submenu with options that let you provide a link to the current page on your desktop (create shortcut), in an email message, or on a Home Page.
- **Reports:** Displays a submenu that contains the caption of the Catalog item *What If Analysis Report* as a link. When you click this link, it displays the What If Analysis Report in the Report Viewer.
- **Graphs:** Displays a submenu that contains the caption of the Catalog item *What If Mitigated Risk* as a link. When you click this link, it displays the What If Mitigated Risk graph in the Graph Viewer.
- **Help:** Displays the context-sensitive help topic for the **What If Analysis Systems** page.

The Submenu on the Actions Menu

The **Add New** or **Apply Existing** links on the **Actions** menu let you link records to the record that is currently selected in the grid. When you click the **Add New** or **Apply Existing** link, a submenu appears. The links that appear on the submenu will vary depending on the record that is currently selected in the **What If Analysis Systems** grid. The links that appear are based on the relationship definitions that exist between the selected record and the other records that can be displayed in the grid.

For example, the Hazards Analysis System/Node family participates as a predecessor in a relationship with the What If family, so when you select a Hazards Analysis System/Node record in the grid and view the **Add New** or **Apply Existing** submenus, the only available option is to link a What If record to the selected Hazards Analysis System/Node record.

The following table describes the options that appear on these submenus when a record is selected in the grid. You can use this table and the options that you see on the submenus to determine which records you can link to one another on the **What If Analysis Systems** page.

When a record in this family is selected:	...The Add New submenu contains these links:	...The Apply Existing submenu contains these links:
Hazards Analysis System/Node	**What If**	**What If**
What If	**What If** **Cause**	**What If** **Cause**
Hazards Analysis Cause	**Cause** **Consequence**	**Cause** **Consequence**
Hazards Analysis Consequence	**Consequence** **Safeguard**	**Consequence** **Safeguard**
Hazards Analysis Safeguard	**Safeguard**	**Safeguard**

About Adding Records to the What If Analysis Systems Grid

When you add a record to the **What If Analysis Systems** grid, you are defining a part of a Scenario. Each record that you add to the gird is linked automatically to another record that defines another part of the Scenario with the exception of the Hazards Analysis System/Node record, which is linked automatically to the Hazards Analysis record for the current What If Analysis.

Before you can begin adding to the **What If Analysis Systems** grid records that represent parts of a Scenario, you must first define a Hazards Analysis System/Node record that will appear as the root record in the first column in the grid. At any given time, the records that you are allowed to add is determined based upon the relationship definitions that exist between the family of the new record and the record to which you are trying to link it. You will know whether you can add a record in a given family to the grid if that family name appears on the **Add New** or **Apply Existing** submenus on the **Actions** menu.

After you have added to the **What If Analysis Systems** grid the desired records that describe the hazardous Scenario you want to study, you can assess the risk values that are associated with that Scenario.

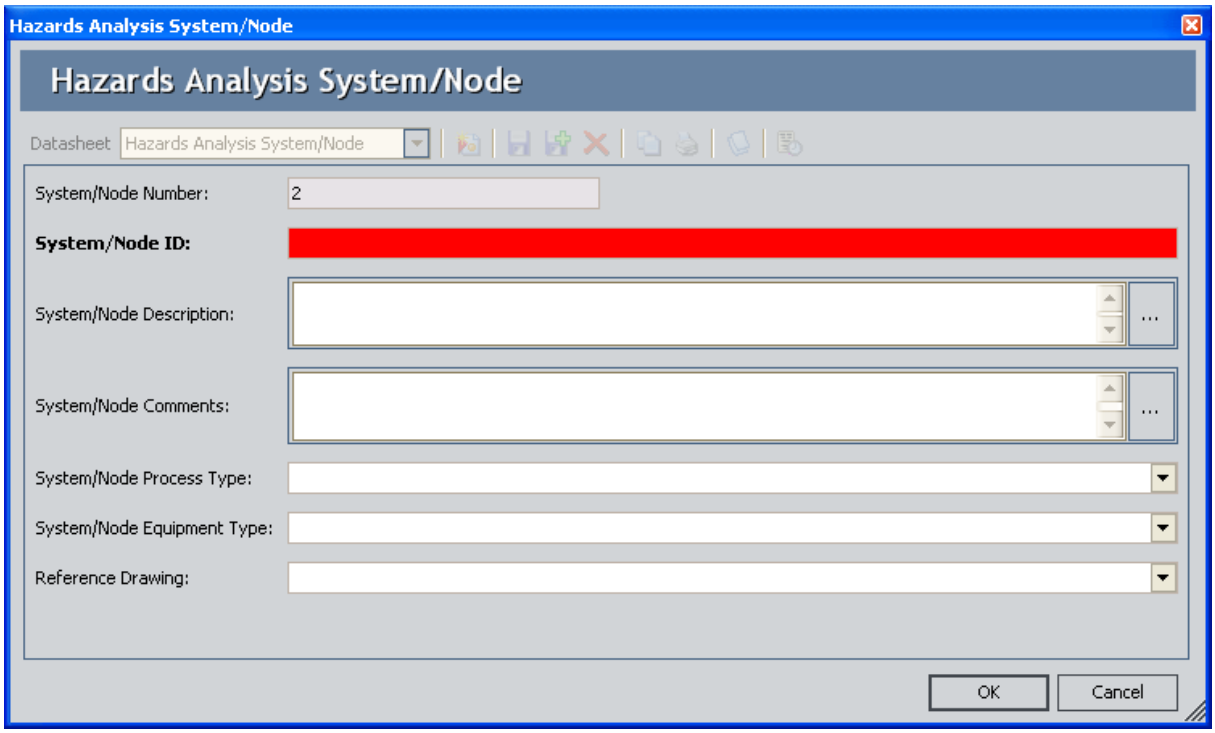
Adding Hazards Analysis System/Node Records to the What If Analysis Systems Grid

The following instructions provide details on adding a new Hazards Analysis System/Node record to the **What If Analysis Systems** grid. These instructions assume that one Hazards Analysis System/Node record already appears in the grid (i.e., the record was defined when you accessed the **What If Analysis Systems** page for the first time).

To add a new Hazards Analysis System/Node record to the What If Analysis Systems grid:

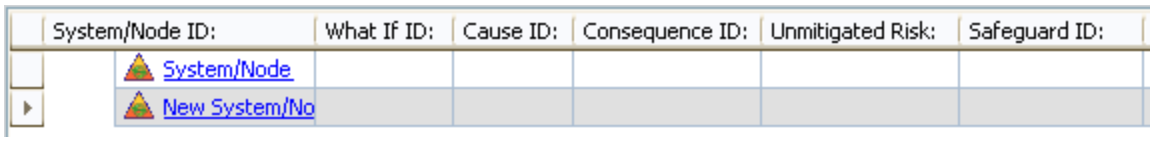
1. Access the **What If Analysis Systems** page.
2. On the **Actions** menu, click the **Add Node** link.

   A new blank Hazards Analysis System/Node record appears in a new window.



3. In the System/Node ID text box, type a name for the system/node. This field is required.
4. Provide values in the remaining fields on the datasheet as desired, and then click **OK**.

   The new record is linked to the Hazards Analysis record for the current What If Analysis and appears in the **System/Node ID** column below the existing Hazards Analysis System/Node record.


System/Node ID:
What If ID:
Cause ID:
Consequence ID:
Unmitigated Risk:
Safeguard ID:
System/Node
New System/No

Creating Other Records and Adding Them to the What If Analysis Systems Grid

The following instructions provide details on adding records in the following families to the **What If Analysis Systems** grid. These instructions assume that you are familiar with the What If Analysis data model and the records that you need to create to define a Scenario.

- What If
- Hazards Analysis Cause
- Hazards Analysis Consequence
- Hazards Analysis Safeguard

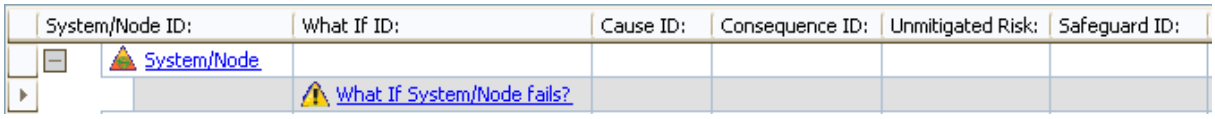
To create a new record and add it to the What If Analysis Systems grid:

1. Access the **What If Analysis Systems** page.
2. In the **What If Analysis Systems** grid, select the row containing the record to which you want to link a new record.
3. On the **Actions** menu, click the **Add New** link.

   A context-sensitive submenu appears that contains the family names for the records that you can link to the currently selected record.
4. On the submenu, click the name of the family in which you want to create a new record.

   A new blank record in that family appears in a new window.
5. Provide a value in the required fields on the datasheet.
6. Provide values in the remaining fields on the datasheet as desired, and then click **OK**.

   The record is linked to the currently selected record and appears in a new row in the grid below the record to which it is linked and in the column that displays records in that family. For example, if you create a new What If record and link it to the Hazards Analysis System/Node record *System/Node*, the new What If record will appear in the **What If ID** column in the row below the Hazards Analysis System/Node record *System/Node* as shown in the following image.



   You can continue to add records to the grid in this way until you have defined the Scenario that you want to study. After you have defined the Scenario, you can assess the risk associated with it.

Adding Existing Records to the What If Systems Grid

The following instructions provide details on adding existing records in the following families to the **HAZOP Nodes** grid. Adding an existing record means that you can search for a record that already exists in the Meridium APM database and link that record to the HAZOP Analysis.

These instructions assume that you are familiar with the What If Analysis data model and the records that you need to create to define a Scenario.

- What If
- Hazards Analysis Cause
- Hazards Analysis Consequence
- Hazards Analysis Safeguard

To add an existing record to the What If Analysis Systems grid:

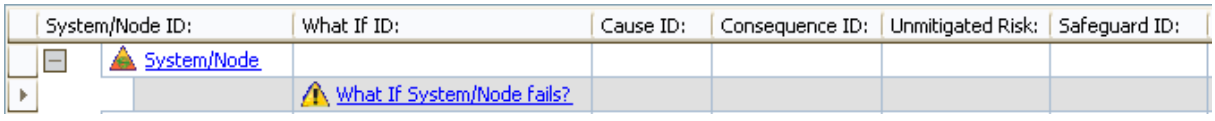
1. Access the **What If Analysis Systems** page.
2. In the **What If Analysis Systems** grid, select the row containing the record to which you want to link an existing record.
3. On the **Actions** menu, click the **Apply Existing** link.

   A context-sensitive submenu appears that contains the family names for the records that you can link to the currently selected record.
4. On the submenu, click the name of the family containing the existing record that you want to add to the grid.

   The **Find Items** window appears, and the name of the family that you selected on the submenu appears in the **Search In** list by default.
5. If desired, specify the desired search criteria, and then click the **Find Now** button.

   The search results appear.
6. In the search results, locate the desired record, and then click the **Open** button.

   The record is linked to the currently selected record and appears in a new row in the grid below the record to which it is linked and in the column that displays records in that family. For example, if you link the existing What If record to the Hazards Analysis System/Node record *System/Node*, the What If record will appear in the **What If ID** column in the row below the Hazards Analysis System/Node record *System/Node* as shown in the following image.



You can continue to add records to the grid in this way until you have defined the Scenario that you want to study. After you have defined the Scenario, you can assess the risk associated with it.

Modifying Records in the What If Analysis Systems Grid

To modify a record in the What If Analysis Systems grid:

1. Access the **What If Analysis Systems** page.
2. In the **What If Analysis Systems** grid, in the row containing the record that you want to modify, click the hyperlinked ID for that record. For example, if you want to modify a What If record, in the **What If ID** cell, click the hyperlinked value.

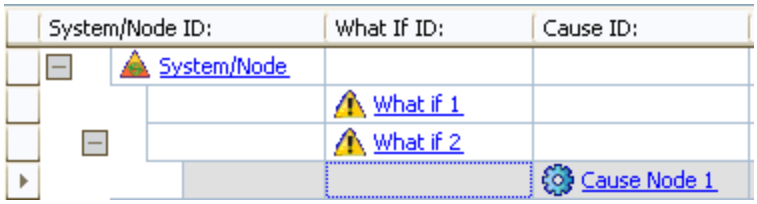
   The record appears in a separate window.
3. Modify the values in the fields on the datasheet as desired, and then click **OK**.

   Your changes are saved.

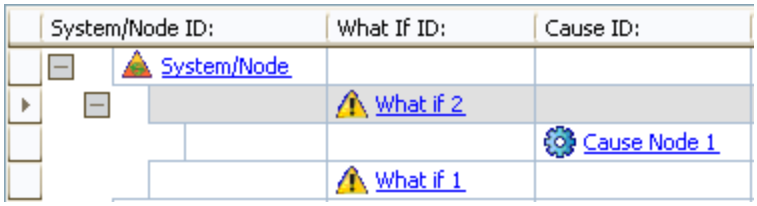
Moving Records to Different Rows in the What If Analysis Systems Grid

If desired, when a column contains more than one record, you can move the records up or down to different rows. When you move a record in the grid, the records that are linked to that record will also move, and the hierarchical format will be retained. You will know that you can move a record up or down a row in the grid when the **Move Up** or **Move Down** links are enabled on the Actions menu.

For example, the following image shows a portion of the **What If Analysis Systems** grid, which contains two What If records: *What if 1*and*What if 2*. The What If record *What if 2*is linked to the Hazards Analysis Cause record *Cause Node 1*.



If you were to move the What If record *What if 2* up one row, the **What If Analysis Systems** grid would look similar to the following image, where the relationship between the What If record *What if 2* and the Hazards Analysis Cause record *CauseNode 1* is retained.



To move a record to a different row in the What If Analysis Systems grid:

1. Access the **What If Analysis Systems** page.
2. In the grid, select the row containing the record that you want to move.
3. On the **Actions** menu, click one of the following links:
   - **Move Up:** Moves the selected record up a row in the grid.
   - **Move Down:** Moves the selected record down a row in the grid.

   The selected record appears in the specified location.

Deleting Records from the What If Analysis Systems Grid

When you delete a record from the **What If Analysis Systems** grid, you are deleting the selected record and all the records that appear below that record in the same record hierarchy. For example, if you delete a record in the What If family, you are also deleting the records in the following families, which appear in subsequent rows in the grid:

- Hazards Analysis Cause
- Hazards Analysis Consequence
- Risk Assessment (unmitigated risk)
- Risk Assessment Recommendation
- Hazards Analysis Safeguard
- Risk Assessment (mitigated risk)

To delete a record from the What If Analysis Systems grid:

1. Access the **What If Analysis Systems** page.
2. In the grid, select the row containing the record that you want to delete.
3. On the **Actions** menu, click the **Delete** link.

   A confirmation message appears, asking if you really want to delete the selected record along with all the records that are linked to it.
4. Click the **Yes** button.

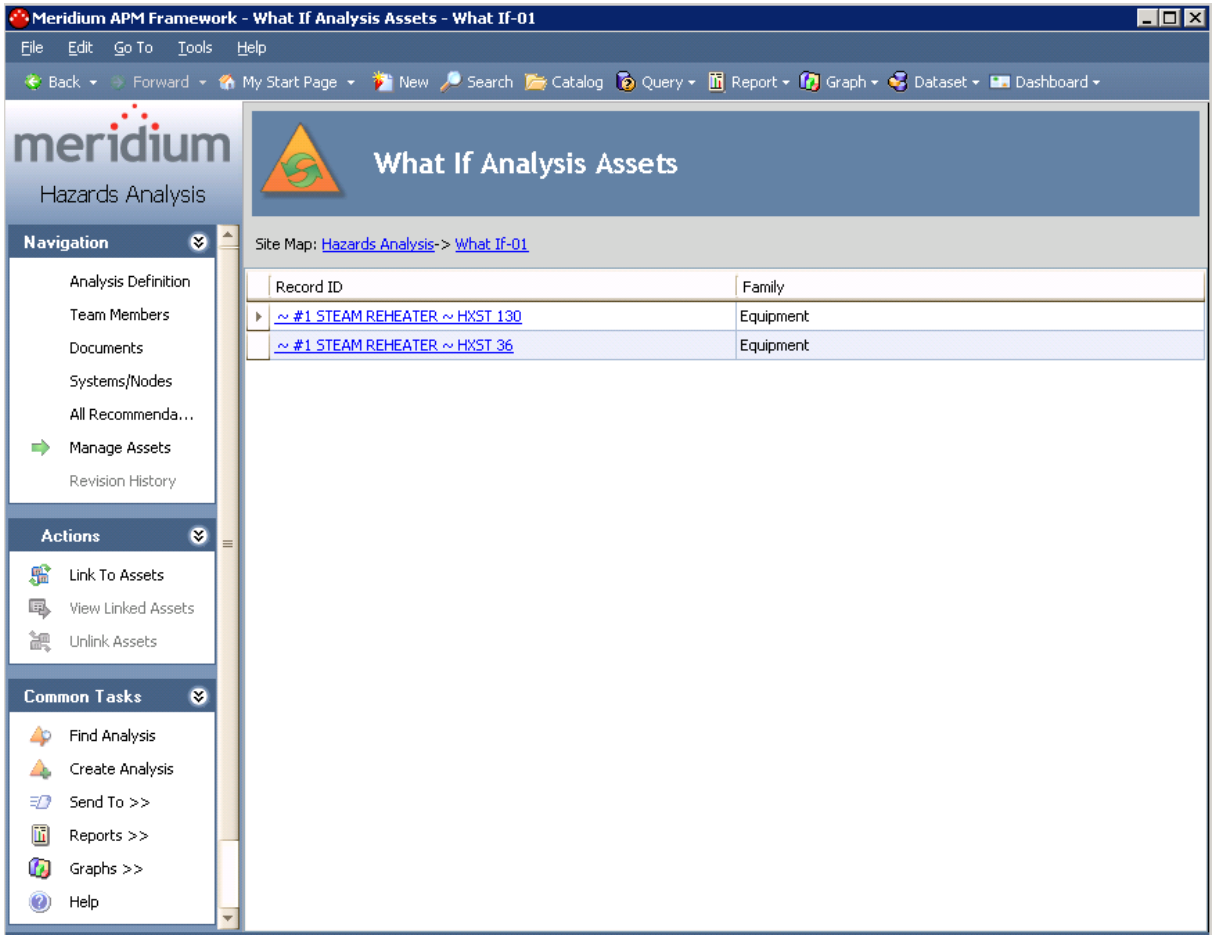
   The selected record and all the records that appear below that record in the grid are deleted.

Accessing the What If Analysis Assets Page

To access the What If Analysis Assets page:

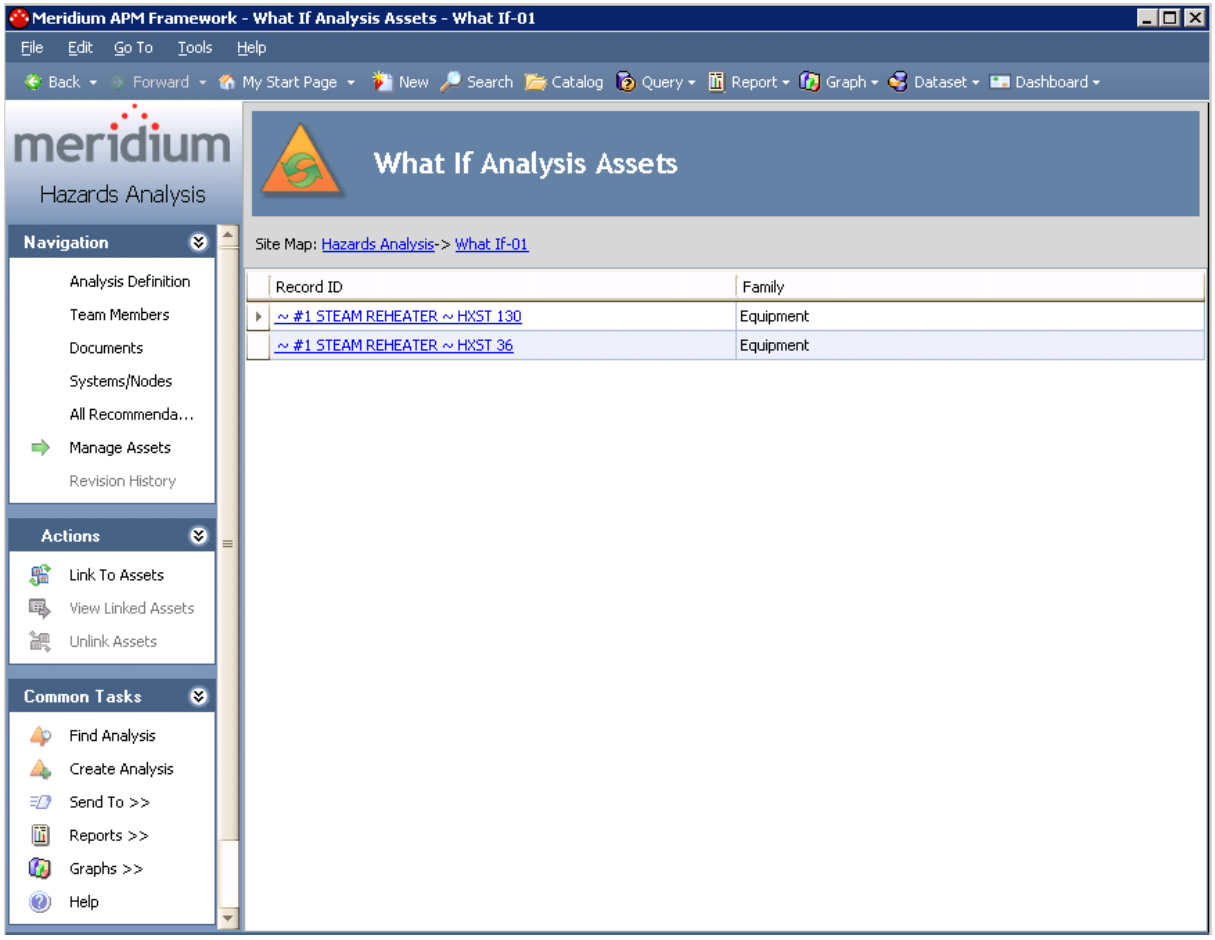
- On the **Navigation** menu, click the **Manage Assets** link.

  The **What If Analysis Assets** page appears, displaying a list of Equipment and Functional Location records that are linked to the Hazards Analysis record for the current What If analysis.



Aspects of the What If Analysis Assets Page

The **What If Analysis Assets** page displays a list of Equipment and Functional Location records that are linked to the Hazards Analysis record associated with the current What If Analysis.



The grid on the **What If Analysis Assets** page contains the Record ID and the family of each record that is linked to the Hazards Analysis record.

- For Equipment records, the **Record ID** column is populated with the Record ID of the linked Equipment record, and the **Family** column is populated with *Equipment*.
- For Functional Location records, the **Record ID** column is populated with the Record ID of the linked Functional Location record, and the **Family** column is populated with *Functional Location*. By default, linked records will be listed alphabetically, first by the **Family** column, and then by the **Record ID** column.

The **What If Analysis Assets** page contains the following task menus:

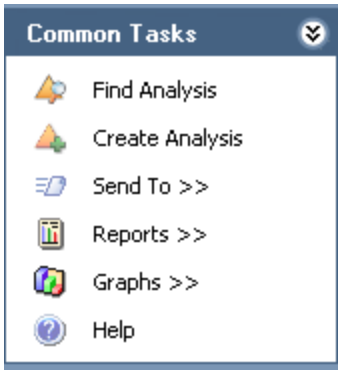
- Navigation
- Actions
- Common Tasks

Actions Menu

The **Actions** menu on the **What If Analysis Assets** page contains the following links:

- **Link to Assets:** Displays the **Asset Finder** window, where you can search for the Equipment or Functional Location records that you want to link to the Hazards Analysis record for the What If Analysis.
- **View Linked Assets:** Displays the selected Equipment and Functional Location records in the Record Manager. This link is enabled only if the current Hazards Analysis record is already linked to an Equipment or Functional Location record.
- **Unlink Assets:** Displays a confirmation message, asking if you really want to unlink the selected Equipment or Functional Location records from the current Hazards Analysis record and then deletes the link between the Hazards Analysis record and the Equipment or Functional Location records. This link is enabled only if the current Hazards Analysis record is already linked to an Equipment or Functional Location record.

Common Tasks Menu



The **Common Tasks** menu on the **What If Analysis Assets** page contains the following links:

- **Find Analysis:** Displays the **What If Analysis Search** page, where you can search for an existing Hazards Analysis record.
- **Create Analysis:** Displays a new blank Hazards Analysis record on the **What If Analysis Definition** page.
- **Send To:** Displays a submenu with options that let you provide a link to the current page on your desktop (create shortcut), in an email message, or on a Home Page.
- **Reports:** Displays a submenu that contains the caption of the Catalog item *What If Analysis Report* as a link. When you click this link, it displays the What If Analysis Report in the Report Viewer.
- **Graphs:** Displays a submenu that contains the caption of the Catalog item *What If Mitigated Risk* as a link. When you click this link, it displays the What If Mitigated Risk graph in the Graph Viewer.
- **Help:** Displays the context-sensitive help topic for the **What If Analysis Assets** page.

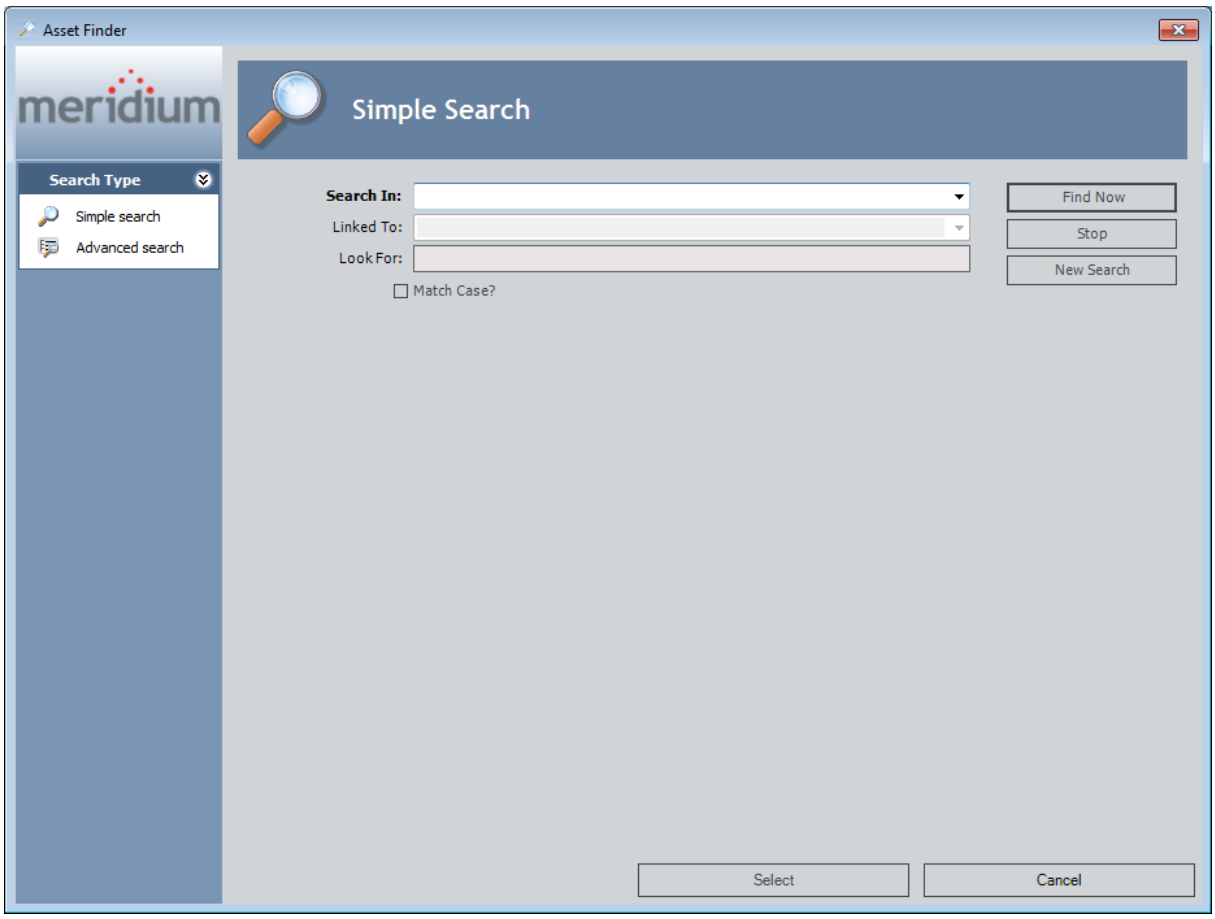
Linking Assets to a What If Analysis

The following instructions provide details on linking an Equipment or Functional Location record to an existing Hazards Analysis record that is associated with a What If Analysis.

To link an Equipment record or Functional Location record to an existing Hazards Analysis record:

1. Access the **What If Analysis Assets** page.
2. On the **Actions** menu, click the **Link To Assets** link.

   The Search Tool appears.



3. Perform a search to find the Equipment or Functional Location record you want to link to the Hazards Analysis record.
4. In the search results list, select the Equipment or Functional Location record(s) that you want to link to the Hazards Analysis record.
5. Click the **Select** button.

The **Asset Finder** window closes, and the selected Equipment or Functional Location records appear on the **What If Analysis Assets** page and are now linked to the Hazards Analysis record.

Opening Assets Linked to a What If Analysis

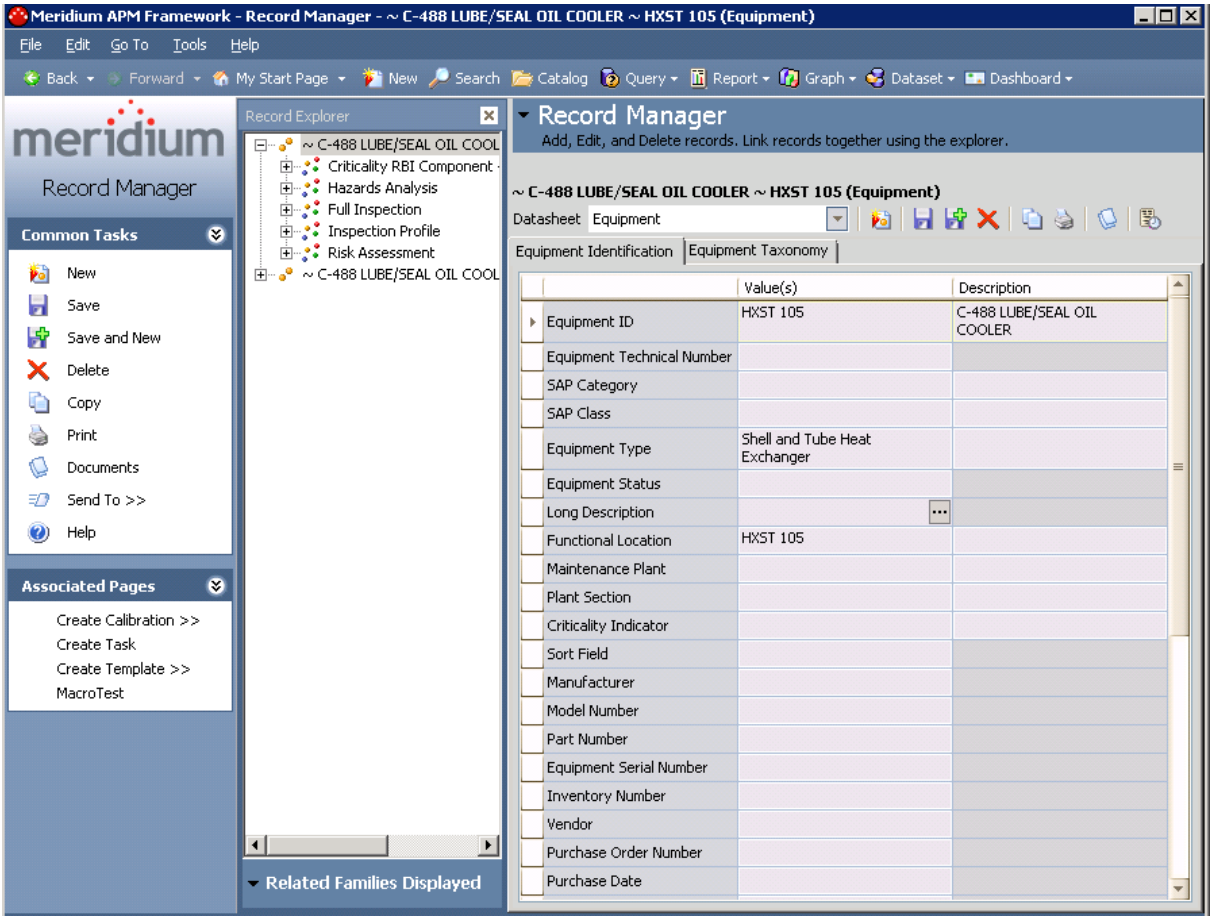
To open the Equipment and Functional Location records that are currently linked to a Hazards Analysis record:

1. Access the **What If Analysis Assets** page.
2. In the grid, select one or more rows containing the Equipment and Functional Location records that you want to open.

   > **Hint:** Alternatively, if you only want to open one Equipment or Functional Location record, you can click the hyperlinked Record ID of the record you want to view.

3. On the **Actions** menu, click the **View Linked Assets** link.

   The Record Manager appears, displaying the selected Equipment and Functional Location records.



If you selected more than one record, multiple records will appear in Record Manager. The first record that you selected in the grid on the **What If Analysis Assets**

page will be expanded in the **Record Explorer** pane and displayed in the datasheet area. The rest of the records appear collapsed in the **Record Explorer** pane.

Unlinking Assets from a What If Analysis

To delete the link between an Equipment or Functional Location record and a Hazards Analysis record:

1. Access the **What If Analysis Assets** page.
2. Select the Equipment and Functional Location records you want to unlink from the analysis by selecting one or more rows in the **What If Analysis Assets** grid.
3. On the **Actions** menu, click the **Unlink Assets** link.

   A confirmation message appears, asking if you really want to delete the link.
4. Click **OK**.

   The links between the selected Equipment and Functional Location records and the Hazards Analysis record are deleted, and the Equipment and Functional Location records no longer appear in the list on the **What If Analysis Assets** page.

About the What If Analysis Report

The What If Analysis report provides an overview of the What If Analysis and contains the following sections:

- **Cover:** Displays the text *What If Final Report For:* appended with the value that exists in the Analysis Description field in the associated Hazards Analysis record.
- **Summary:** Displays the value that exists in the Summary field in the associated Hazards Analysis record.
- **Purpose:** Displays the value that exists in the Analysis Purpose field in the associated Hazards Analysis record.
- **Objectives:** Displays the value that exists in the Analysis Objective field in the associated Hazards Analysis record.
- **Process Description:** Displays the value that exists in the Process Description field in the associated Hazards Analysis record.
- **Scope of Study:** Displays the value that exists in the Analysis Scope field in the associated Hazards Analysis record.
- **Methodology:** Displays the text *The Hazard and Operability (HazOp) methodology was used to revalidate the PHA study using the Meridium Software Program for documenting the PHA study results*.
- **What If Analysis Team Members:** Displays a table with a list of members of the What If Analysis team. Each row in the table corresponds to one Human Resource record. For each Human Resource record, the following information is displayed:
  - **Name:** The first and last name of the team member as it appears in the Last Name and First Name fields in the associated Human Resource record.
  - **Department:** The value that exists in the Department field in the associated Human Resource record.
- **What If Analysis Documentation:** Displays a table with a list of reference documents that are associated with the analysis. Each row in the table corresponds to one Reference Document record. For each record, the following information is displayed:
  - **Name:** The value that exists in the ID field in the Reference Document record.
  - **Description:** The value that exists in the Description field in the Reference document record.
- **What If Analysis Scope:** Displays a table with a list of Equipment and Functional Location records that are linked to the analysis. Each row in the table corresponds to one Equipment or Functional Location record. For each record, the following information is displayed:
  - **Asset ID:** The value that exists in the Equipment ID field of the Equipment record *or* the Functional Location field of the Functional Location record.
  - **Asset Short Description:** The value that exists in the Equipment Short

Description field of the Equipment record *or* the Functional Location Description field of the Functional Location record.

- **Asset Long Description:** The value that exists in the Equipment Long Description field of the Equipment record *or* the Functional Location Long Description field of the Functional Location record.

- **Node List:** Displays a table that contains a list of the records that describe the hazardous conditions that are analyzed by the What If Analysis. The table contains the records that appear in the grid on the **What If Analysis Systems** page.

Accessing the What If Analysis Report

You can access the What If Analysis Report via the **Reports** link on the **Common Tasks** menu on any page where the link is enabled.

To access the What If Analysis Report for the What If Analysis:

1. Open the desired Hazards Analysis record.
2. On the **Common Tasks** menu, click the **Reports** link.

   A submenu appears.
3. On the submenu, click the **What If Analysis Report** link.

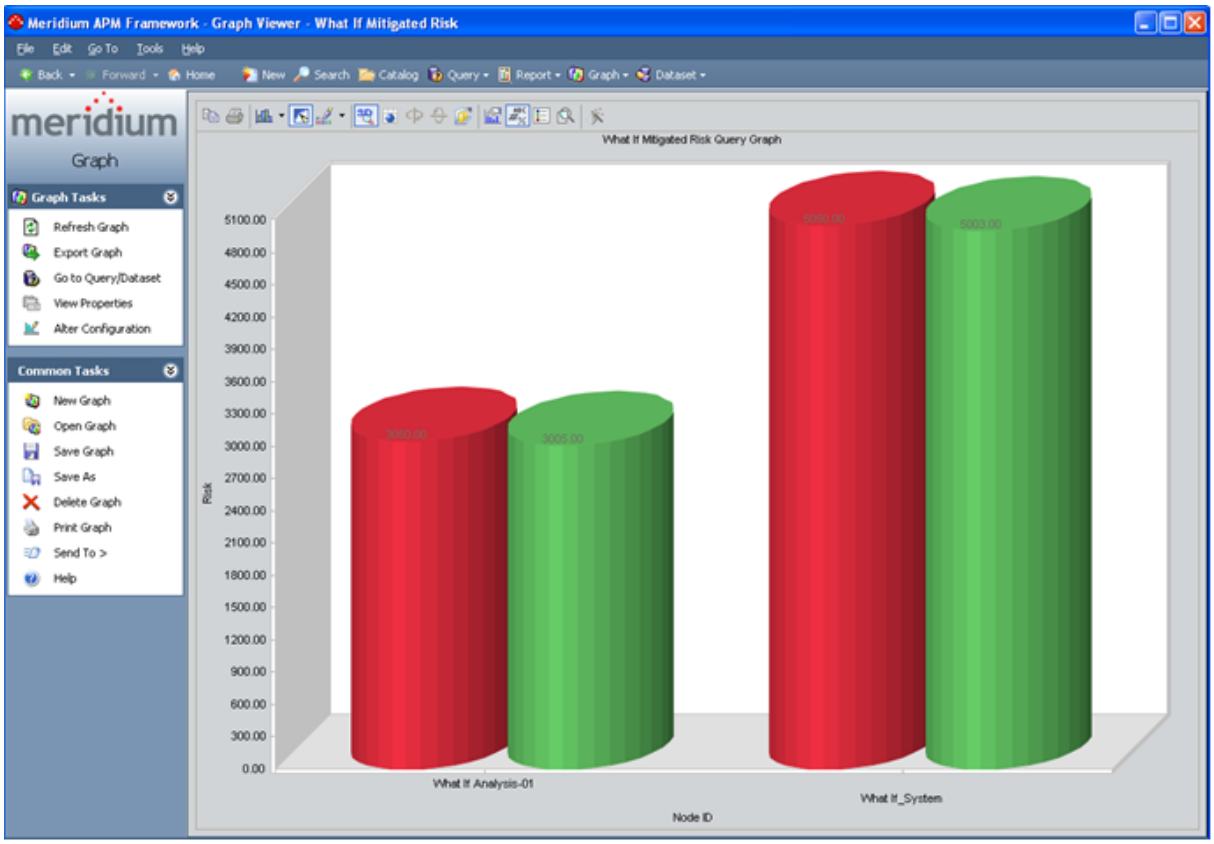
   Note: The name of the link is the caption of the Catalog item What If Analysis Report. By default, this value is *What If Analysis Report*.

   The What If Analysis Report appears in the Report Viewer.

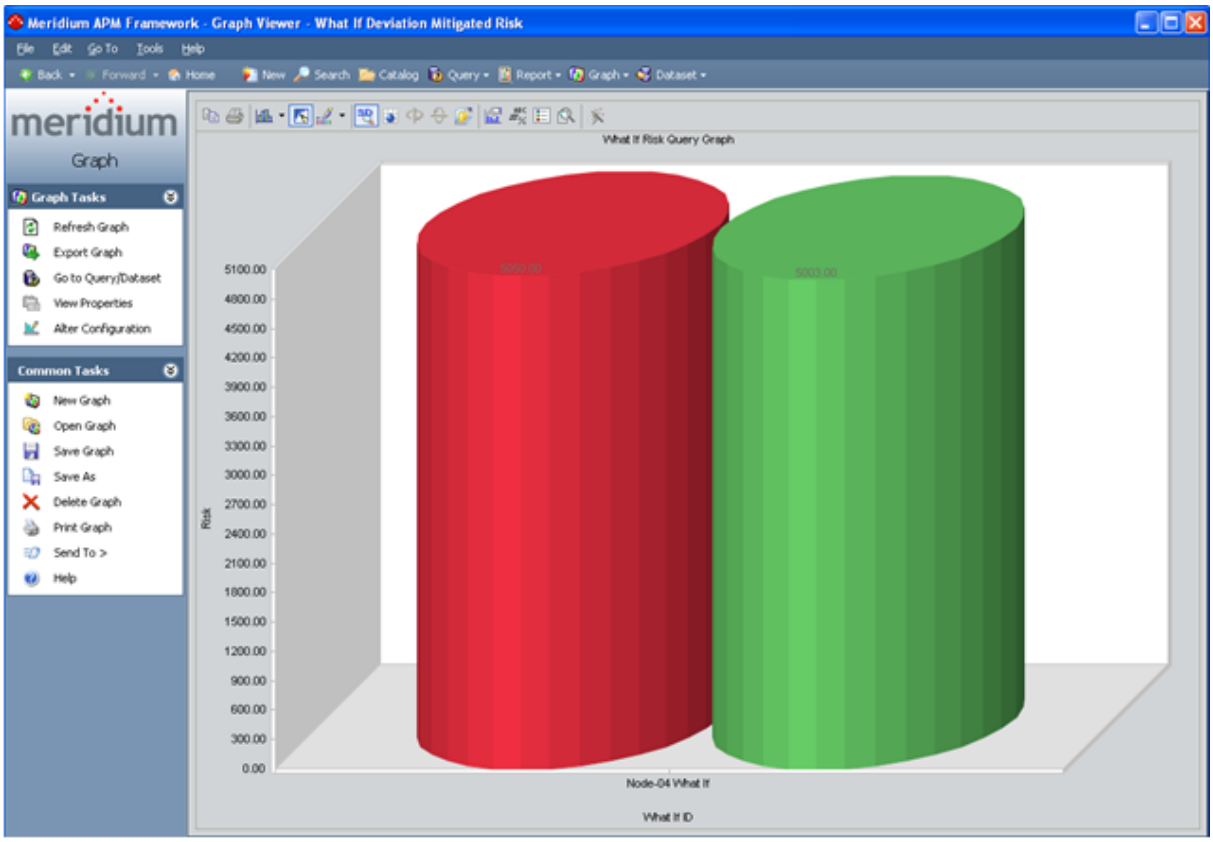
About the What If Mitigated Risk Graph

The What If Mitigated Risk graph displays a graphical summary of the risk rank values associated with the Hazards Analysis System/Node records and What If records that appear on the **What If Analysis Systems** page.

For example, when the graph appears, the y-axis displays the unmitigated and mitigated risk rank values and the x-axis displays ALL the Hazards Analysis system/Node records that are associated with an analysis.



If you drill down in the graph (i.e., click a column), the graph will display the unmitigated and mitigated risk rank values associated with the What If records that are linked to the Hazards Analysis System/Node record whose column you clicked in the graph.


Meridium APM Framework - Graph Viewer - What If Deviation Mitigated Risk
File Edit Go To Tools Help
Back Forward Home New Search Catalog Query Report Graph Dataset
meridium
Graph
Graph Tasks
Refresh Graph
Export Graph
Go to Query/Dataset
View Properties
Alter Configuration
Common Tasks
New Graph
Open Graph
Save Graph
Save As
Delete Graph
Print Graph
Send To >
Help
What If Risk Query Graph
5100.00
4800.00
4500.00
4200.00
3900.00
3600.00
3300.00
3000.00
2700.00
2400.00
2100.00
1800.00
1500.00
1200.00
900.00
600.00
300.00
0.00
Risk
Node-04 What If
What If ID

Accessing the What If Mitigated Risk Graph

You can access the What If Mitigated Risk graph via the **Graphs** link on the **Common Tasks** menu on any page where the link is enabled.

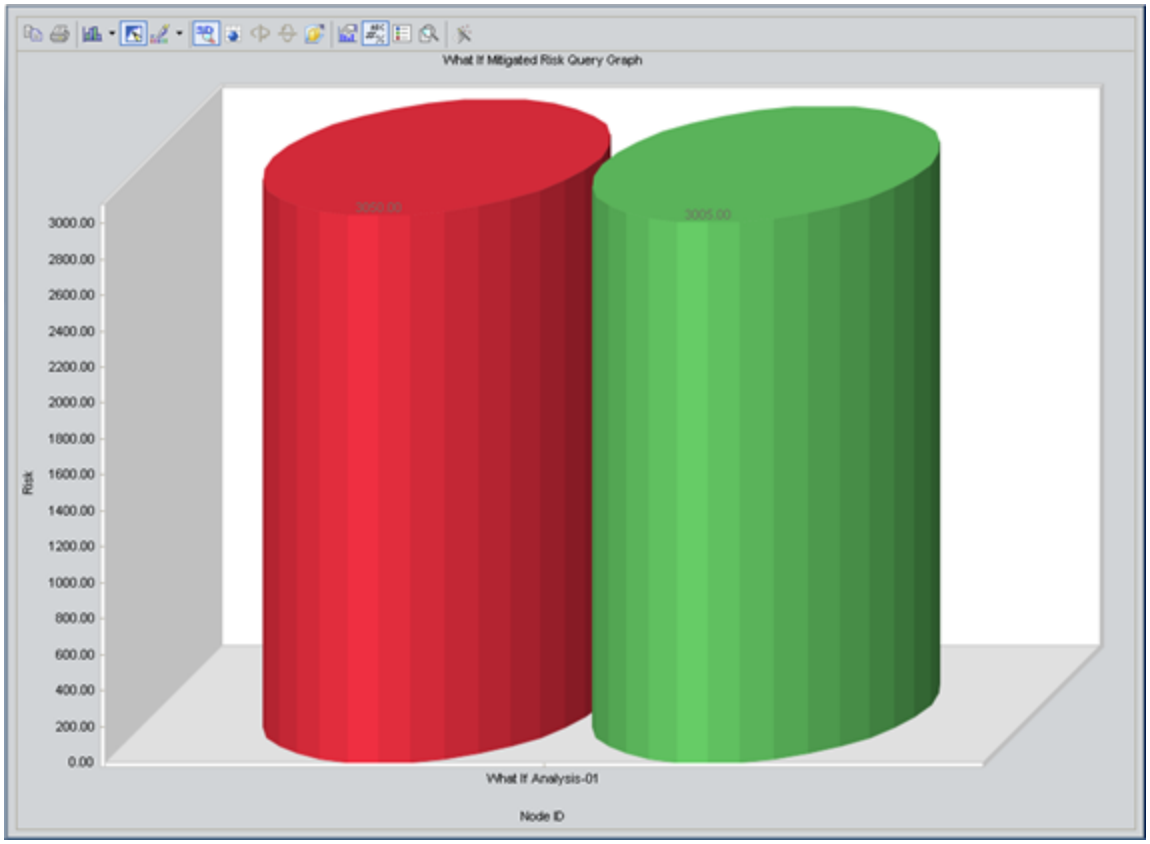
To access the What If Mitigated Risk graph for the What If Analysis:

1. Open the desired Hazards Analysis record.
2. On the **Common Tasks** menu, click the **Graphs** link.

   A submenu appears.
3. On the submenu, click the **What If Mitigated Risk** link.

   Note: The name of the link is the caption of the Catalog item What If Mitigated Risk. By default, this value is *What If Mitigated Risk.*

   The What If Mitigated Risk graph appears in the Graph Viewer.



About Assessing Risk in Hazards Analyses

When you conduct a HAZOP Analysis or What If Analysis, you will assess the risk associated with a given hazardous Scenario to help you determine what actions should be taken to prevent or lessen the consequences of that Scenario. Using the tools provided on the **HAZOP Nodes** page or the **What If Systems** page, you will specify the following risk rank values for each Scenario:

- **Unmitigated:** The current risk level associated with that Scenario *before* any actions have been put in place to lessen the risk associated with the hazardous Scenario. Based on this risk level, the analysis team may decide that actions need to be taken to mitigate that risk. For example, the team may create a Risk Assessment Recommendation record to recommend that a safety system be put in place.

  The unmitigated risk rank is stored in a Risk Assessment record that is linked to the Hazards Analysis Consequence record.

- **Mitigated:** The risk level associated with that Scenario *after* actions have been put in place that should lessen the risk of a hazardous Scenario or prevent the Scenario from occurring. Based on this risk level, the analysis team may decide that additional actions need to be taken to further mitigate the risk.

  The mitigated risk rank is stored in a Risk Assessment record that is linked to the Hazards Analysis Safeguard record.

To assess the risk associated with a Scenario, you will create TWO Risk Assessment records:

1. One will store the unmitigated risk rank value and is linked to the Hazards Analysis Consequence record. The unmitigated risk rank value indicates the probability and consequence of the risk if it occurs.
2. One will store the mitigated risk rank value and is linked to a Hazards Analysis Safeguard record. The mitigated risk rank value indicates the probability and consequence of the risk occurring if:
   - The safeguard represented by the Hazards Analysis Safeguard record is in place to mitigate the risk.
   - The safeguard is also an independent layer of protection (IPL). If the safeguard is *not* an IPL, the Risk Assessment interface will be disabled, and you will not be able to define a mitigated risk rank.

When you create the Risk Assessment records, if the Hazards Analysis record for the current analysis is associated with a specific site, the Risk Assessment interface will display the Risk Matrix that is associated with that site. If the analysis is not associated with a specific site, the default Risk Matrix will be used.

About Independent Layers of Protection (IPLs)

An independent layer of protection (IPL) is a system, action, or item that mitigates the risk associated with a hazardous scenario. All IPLs are safeguards, but *not* all safeguards are IPLs. In order to truly mitigate a risk, the safeguard must be an IPL.

The following criteria are required in order for a safeguard to be considered an IPL:

- The safeguard must be independent of the risk so that a failure associated with the risk will not also cause the safeguard to fail.
- The safeguard must be auditable in that it must be tested and verified using an industry standard (e.g., a risk based inspection).
- The safeguard must be capable in that it is available at least 90 percent of the time.
- The safeguard must be specific in that it can detect a potential failure and is able to take action to prevent the failure from occurring.

For example, in a hazardous scenario a high pressure separator releases liquid to downstream equipment. If the liquid level in the high pressure separator decreases to a certain level, pressure could be released to downstream equipment and cause it to rupture. In this scenario, a controller monitors the liquid level. If the level gets too low, the controller closes a valve so that the pressure is not released to downstream equipment.

An IPL for this scenario would be a second controller and valve. The safeguard is independent because if the first controller fails, the second controller will still be able to shut off its valve and prevent a failure. The safeguard is auditable because the second controller and value can be routinely inspected. The safeguard is capable because it is available at least 90 percent of the time. The safeguard is specific because the controller detects potential failures by measuring the liquid level and will close the value when the potential failure is detected. Since the safeguard meets each piece of criteria, it is considered an IPL and can reduce the risk associated with the hazards scenario.

In Hazard Analyses and What If Analyses, Hazards Analysis Safeguard records that *are* IPLs are linked to an Independent Protection Layer record, which stores additional information about the IPL.

About Defining the Mitigated Risk Rank

When the Risk Assessment record that will store the mitigated risk rank is created, the Meridium APM system will populate values in the Risk Assessment interface based on criteria defined in other records.

The Meridium APM system uses the relationship between the Hazards Analysis Consequence record and the Hazards Analysis Safeguard record to:

- Automatically populate the Risk Matrix with the unmitigated risk rank value that you specified in the Risk Assessment record that is linked to the Hazards Analysis Consequence record.
- Disable the cells in the Risk Matrix that represent a risk rank that is higher than the *unmitigated* risk.

The Meridium APM system then uses values stored in the Hazards Analysis Safeguard record to disable Risk Matrix cells depending on the type of IPL. If the safeguard:

- Is *not* an IPL, all the cells are disabled.
- *Is* an IPL and the IPL type is *Frequency Reducing*, only probability values in the Risk Matrix lower than the unmitigated risk will be enabled.
- *Is* an IPL and the IPL Type is *Consequence Reducing*, only consequence values in the Risk Matrix lower than the unmitigated risk will be enabled.

For example, assume that you have:

- One *Risk Assessment* record with the unmitigated risk rank value *830* that is linked to the Hazards Analysis Consequence record *Flame out which could lead to explosion*.
- One Hazards Analysis Safeguard record *High Gas Pressure Indicator and Alarm* that is a Consequence Reducing IPL, which is linked to the Hazards Analysis Consequence record *Flame out which could lead to explosion.*

If you create a *Risk Mitigation Assessment* record to link to the Hazards Analysis Safeguard record *High Gas Pressure Indicator and Alarm*, the unmitigated risk rank value will be populated automatically in the risk matrix.

Note that the enabled cells correspond to the type of IPL (i.e., Consequence Modifier), so that the only cells that are enabled are the cells that represent a lower *consequence* risk than the unmitigated value. Before you select a mitigated risk value, the unmitigated and mitigated risk values are the same, and the unmitigated risk icon and mitigated risk icon appear in the same cell. When you select the mitigated risk value, the mitigated risk icon appears in the selected cell, and the unmitigated risk icon remains in the cell that represents the unmitigated risk rank.

Defining the Unmitigated Risk Rank

When you define the unmitigated risk rank for a risk, a Risk Assessment record is created and linked to the Hazards Analysis Consequence record that identifies the risk.

To define the unmitigated risk rank for a risk:

1. Access the **HAZOP Nodes** page or the **What If Analysis Systems** page.
2. In the grid, select the row containing the Hazards Analysis Consequence record, representing the risk whose unmitigated risk rank you want to define.
3. On the **Actions** menu, click the **Risk Matrix** link.

   The **Unmitigated Risk Assessment** dialog box appears, displaying the Risk Assessment interface.
4. Define the unmitigated risk across all categories as desired, and then click the **Save** button. Note that when you select a cell in the risk matrix, the unmitigated risk icon will appear in the selected cell.

   The record is saved, and the total unmitigated risk rank value appears in the **Unmitigated Risk** column in the same row as the Hazards Analysis Consequence record to which the Risk Assessment record is linked.

Defining the Mitigated Risk Rank

You cannot define the mitigated risk rank until you define the unmitigated risk rank. When you define the mitigated risk rank for a risk, a Risk Assessment record is created and linked to the Hazards Analysis Safeguard record that identifies the safeguard that is in place to mitigate the risk.

To define the mitigated risk rank for a risk:

1. Access the **HAZOP Nodes** page or the **What If Analysis Systems** page.
2. In the grid, select the row containing the Hazards Analysis Safeguard record representing the safeguard that corresponds to the risk whose mitigated risk rank you want to define.
3. On the **Actions** menu, click the **Risk Matrix** link.

   The **RiskMitigation Assessment** dialog box appears, displaying the Risk Assessment interface. The interface is populated automatically according to values stored in the following records:

   - The Hazards Analysis Safeguard record you selected.
   - The Risk Assessment record that is linked to the Hazards Analysis Consequence record to which the Hazards Analysis Safeguard record is linked.
4. Define the mitigated risk across all categories as desired, and then click the **Save** button. Note that when you select a cell in the risk matrix, the mitigated risk icon will appear in the selected cell.

   Note: If you do *not* mitigate the risk by the same number of steps across each category (i.e., safety, environmental, operations), when you click the **Save** button, a message will appear asking if you have intentionally mitigated the risk by different amounts. If you have done this intentionally, click the **Yes** button. The **IPL Credits** column on **HAZOP Nodes** page or **What If Analysis Systems** page the will indicate the greatest number of steps reduced in a single category. Otherwise, click the **No** button to return to the risk matrix.

   The record is saved, and the total mitigated risk rank value appears in the **Mitigated Risk** column in the same row as the Hazards Analysis Safeguard record to which the Risk Assessment record is linked.

Modifying Risk Ranks

To modify a risk rank:

1. Access the **HAZOP Nodes** page or the **What If Analysis Systems** page.
2. In the grid, locate the row containing the risk rank that you want to modify.
3. In the **Unmitigated Risk** or **Mitigated Risk** cell, click the hyperlinked risk rank value that you want to modify.

   The Risk Assessment interface appears, where you can change the current risk rank value.
4. Modify the risk rank values as desired.
5. Click the **Save** button.

   Your changes are saved.

> **Note:** If you modify the value in the **Unmitigated Risk** cell *after* you have defined a mitigated risk value, the value in the **Mitigated Risk** cell will be cleared automatically, and you will have to re-evaluate the mitigated risk.

About Risk Assessment Recommendation Records

Risk Assessment Recommendation records store details about the analysis team's suggestion for an action that should be taken to mitigate the risk associated with a Scenario. Risk Assessment Recommendation records can be linked only to Hazards Analysis Consequence records.

You can manage Risk Assessment Recommendation records for individual Hazards Analysis Consequence records via the **Recommendations** dialog box. Additionally, via Recommendation Management, you can manage the Risk Assessment Recommendation records for:

- One HAZOP Analysis or What If Analysis
- All Hazards Analyses (i.e., HAZOP Analyses and What If Analyses)

The Risk Assessment Recommendation datasheet contains two tabs:

- **General Information:** Contains fields that you can use to describe the recommendation, assign the recommendation to a Security User, and specify due dates for the recommendation. Additionally, you can use the **Status** list and the various assignee fields in the Risk Assessment Recommendation record to track the progress of the action suggested by the analysis team.
- **Alert:** Contains fields that you can use to schedule alerts to be sent to specified recipients when a recommendation or reevaluation is due.

After you link a Risk Assessment Recommendation record to a Hazards Analysis Consequence record, the Risk Assessment record is part of the analysis with which you are currently working.

Accessing the Recommendations Dialog Box

The **Recommendations** dialog box lets you manage Risk Assessment Recommendation records that are linked to Hazards Analysis Consequence records within a HAZOP Analysis or What If Analysis. Using the **Recommendations** dialog box, you can:

- View the Risk Assessment Recommendation records that are currently linked to the Hazards Analysis Consequence record.
- Create new Risk Assessment Recommendation records and link them to the Hazards Analysis Consequence record.
- Link existing Risk Assessment Recommendation records to Hazards Analysis Consequence record.
- Remove the link between a Risk Assessment Recommendation record and the Hazards Analysis Consequence record.

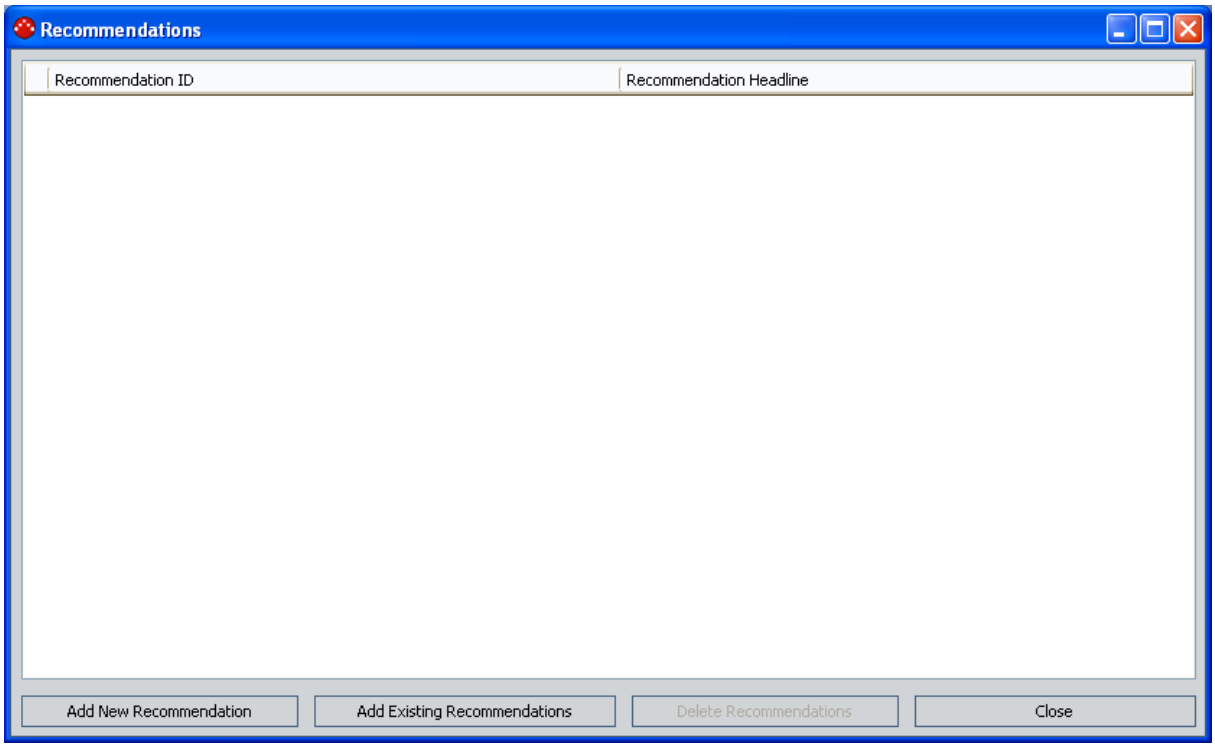
The following instructions assume that you are viewing one of the following pages within Hazards Analysis:

- HAZOP Nodes
- What If Analysis Systems

To access the Recommendations dialog box:

1. In the grid, select the row containing the Hazards Analysis Consequence record whose recommendations you want to view.
2. On the **Actions** menu, click the **Recommendations** link.

   The **Recommendations** dialog box appears.


Recommendations
Recommendation ID
Recommendation Headline
Add New Recommendation
Add Existing Recommendations
Delete Recommendations
Close

Aspects of the Recommendations Dialog Box

The **Recommendations** dialog box displays a list of Risk Assessment Recommendation records that are linked to the Hazards Analysis Consequence record that is currently selected. Each row in the list represents one Risk Assessment Recommendation record. For each Risk Assessment Recommendation record that appears in the list, the following information is displayed:

- **Recommendation ID:** The ID for the recommendation as it appears in the Recommendation ID field in the Risk Assessment Recommendation record.
- **Recommendation Headline:** The description of the recommendation as it appears in the Recommendation Headline field in the Risk Assessment Recommendation record.

Below the list, the following buttons appear:

- **Add new Recommendation:** Displays a new blank Risk Assessment Recommendation datasheet in a new window, where you can create a new Risk Assessment Recommendation record. After you save the new record, it will appear in the list on the **Recommendations** dialog box.
- **Add Existing Recommendations:** Displays the **Find Items** window, where you can search for an existing Risk Assessment Recommendation record to link to the selected Hazards Analysis Consequence record.
- **Delete Recommendations:** Displays a confirmation message, and then deletes the link between the Risk Assessment Recommendation record and the selected Hazards Analysis Consequence record and remove the Risk Assessment Recommendation record from the list. This link is enabled only if at least one Risk Assessment Recommendation record appears in the list.
- **Close:** Closes the **Recommendations** dialog box, displaying the page from which it was accessed.

Using the Status Field in Recommendations

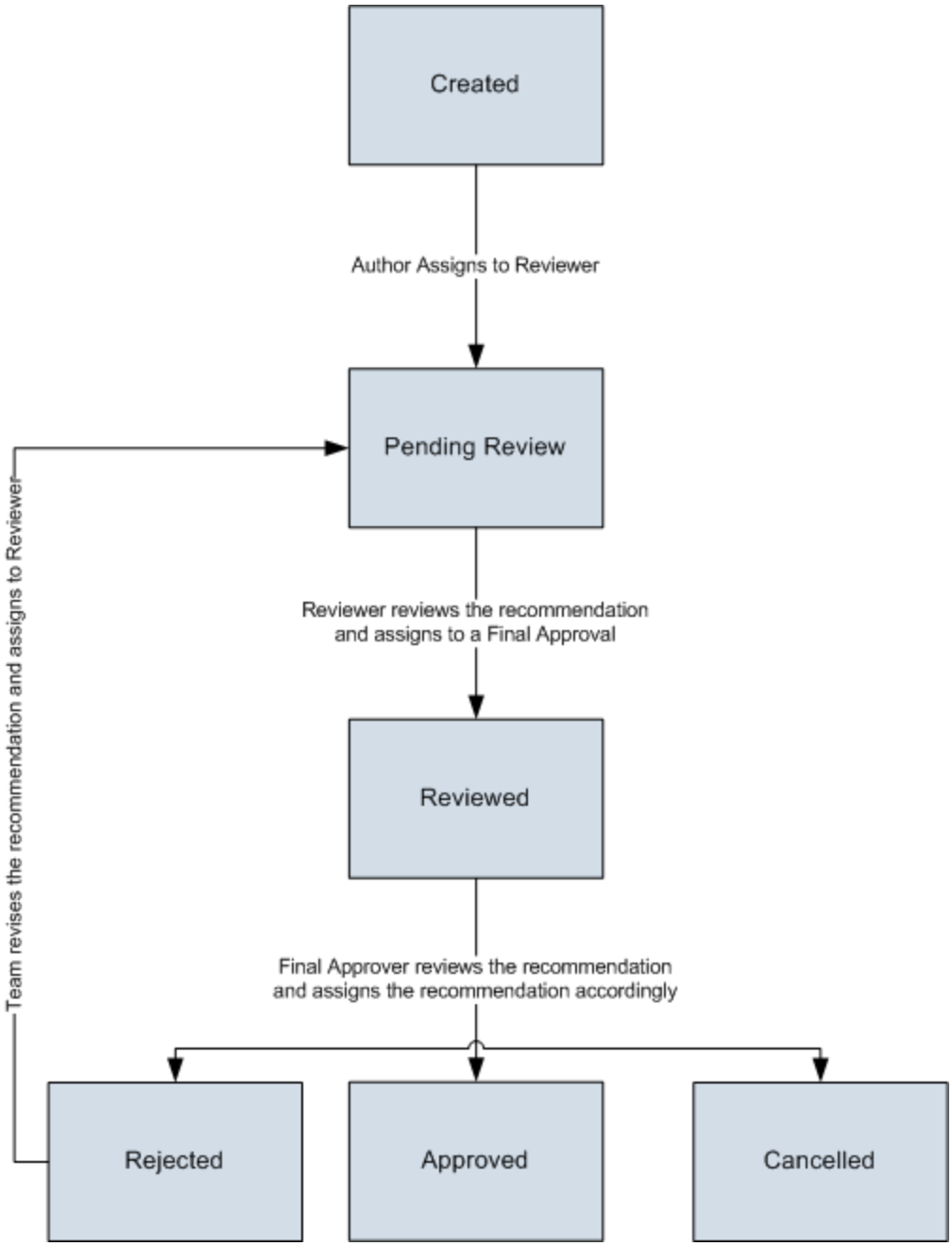
You can use the values in the **Status** list in a Risk Assessment Recommendation record to facilitate a workflow to track the progress of the recommendation.

The **Status** list contains the following values:

- **Approved:** You can use this status to indicate that the recommended action has been approved and can be assigned to someone to implement in your facility.
- **Created:** This status indicates that the Risk Assessment Recommendation record and the associated recommendation are new. This is the default state.
- **Pending Review:** You can use this status to indicate that the recommended action is assigned to someone so that they can review it and obtain approval to implement the suggested action.
- **Reviewed:** You can use this status to indicate that the recommended action has been reviewed and is waiting for approval.
- **Rejected:** You can use this status to indicate that the recommended action has been not been approved.
- **Cancelled:** You can use this status to indicate that the previously approved or reviewed action will no longer be implemented.
- **Superseded:** You can use this status to indicate that the previously approved or reviewed action will no longer be implemented because a different action supersedes it.

Depending on the value that exists in the Status field, you will need to assign the Risk Assessment Recommendation to an analysis team member or the individual within your organization who is responsible for the current task associated with that recommendation. Additionally, when the Status field contains a certain value, in order to change that value, you must be logged in as the user to whom the record is assigned based on the current value in the Status field. For example, only the person whose name appears in the Reviewer Name field can change the value in the Status field to *Reviewed*.

The following diagram illustrates the workflow that you can use when working with the Status field to track the progress of a given recommendation. The boxes represent a Status value that appears in the **Status** field, and the arrows represent actions taken by the current assignee.



Note: Risk Assessment Recommendation records that are set to the Approved state cannot be deleted.

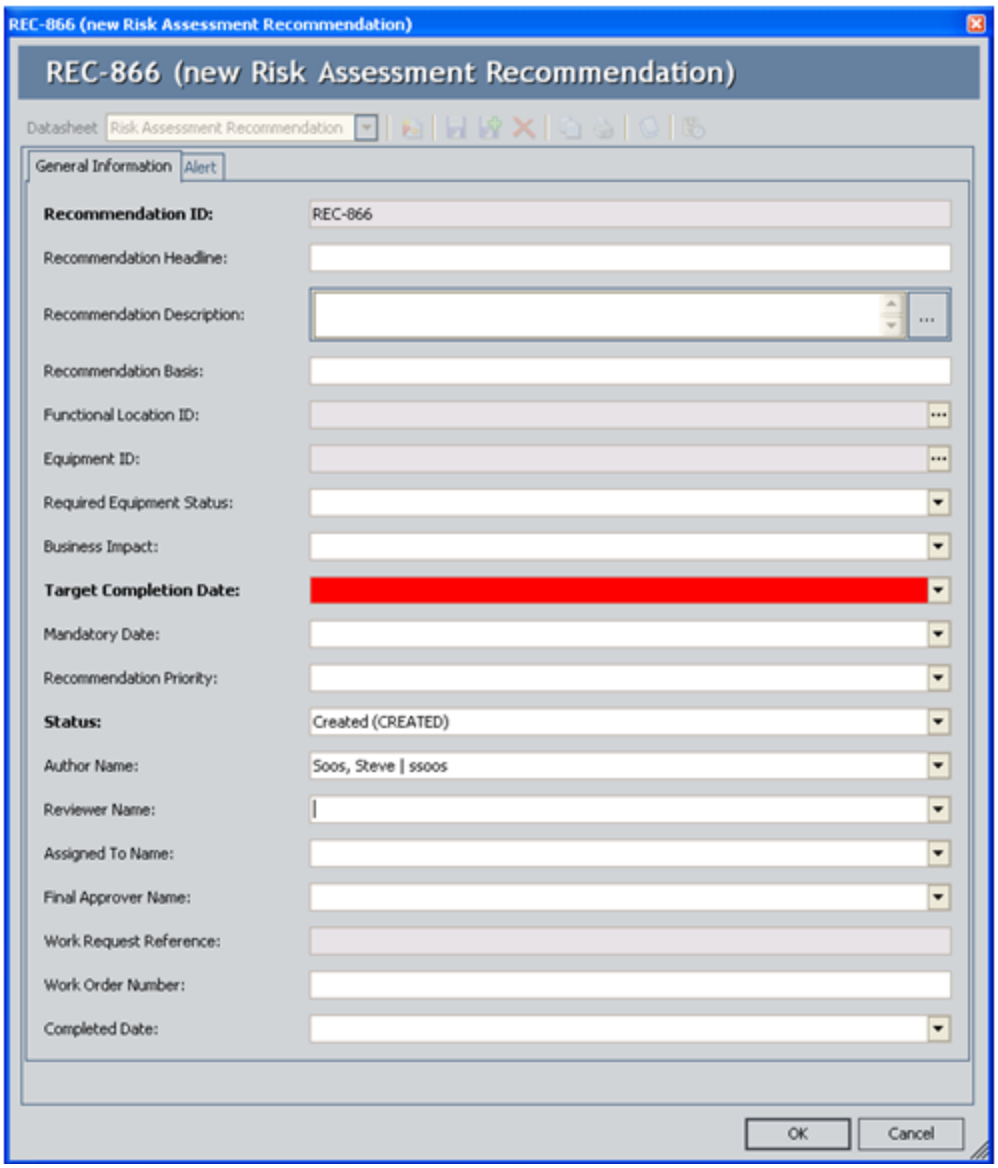
Creating New Risk Assessment Recommendation Records

The following instructions provide details on creating a new Risk Assessment Recommendation record via the **Recommendations** dialog box. These instructions assume that you are familiar with the fields in the Risk Assessment Recommendation family.

To create a new Risk Assessment Recommendation record:

1. Access the **Recommendations** dialog box.
2. Below the grid, click the **Add New Recommendation** button.

   A new Risk Assessment Recommendation record appears in a new window.



3. On the **General Information** tab, in the **Target Completion Date** box, type or select the date on which the recommended action should be completed. This field is required.
4. Provide values in the remaining fields as desired.
5. If desired, on the **Alert** tab, provide values in the fields to schedule an alert to be sent to the assignee when the recommendation is due.

   Note: On the **Alert** tab, you can also schedule an alert to be sent to a list of recipients when the recommendation is due for reevaluation.

6. Click **OK**.

   The selected record appears in the list on the **Recommendations** dialog box and is linked to the Hazards Analysis Consequence record that is currently selected on the page from which you accessed the **Recommendations** dialog box.

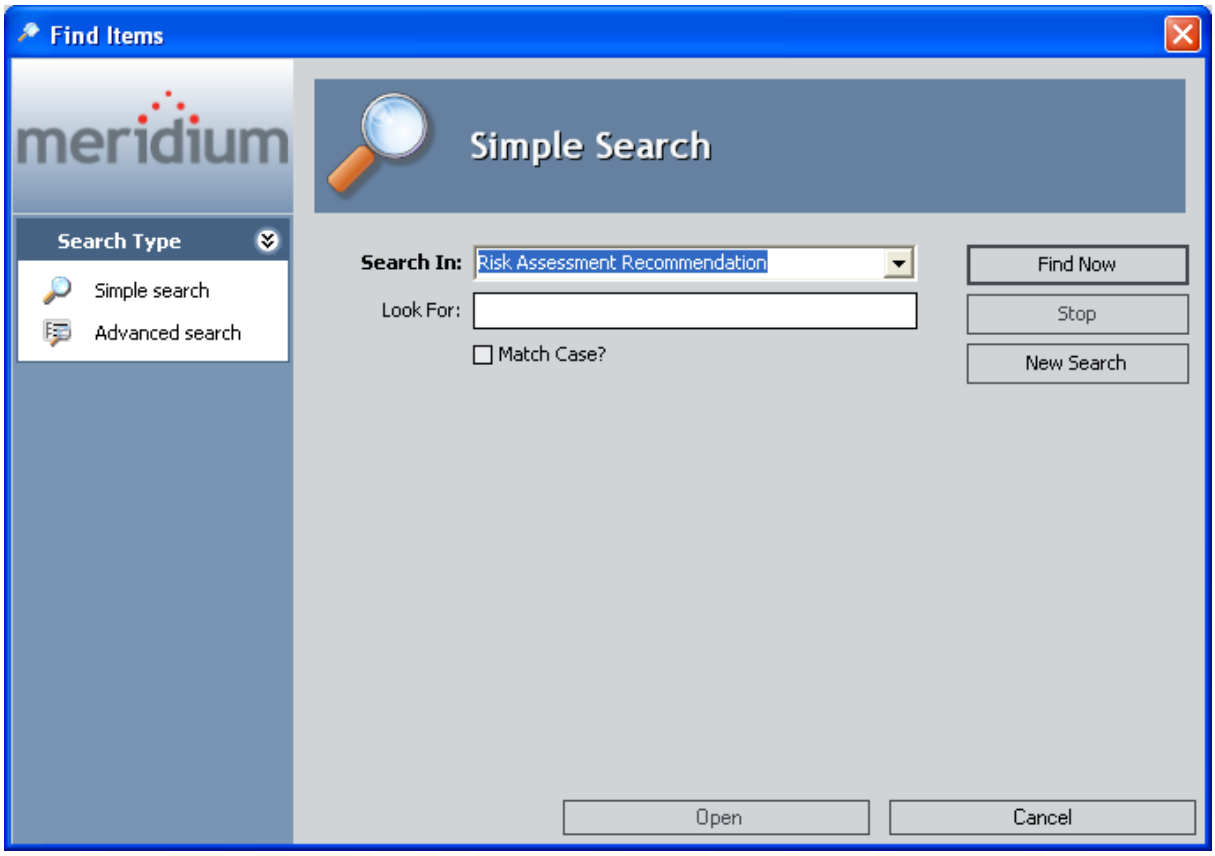
Adding Existing Risk Assessment Recommendation Records to the Analysis

The following instructions provide details on searching for an existing Risk Assessment Recommendation record to link to a Hazards Analysis Consequence record. When you link and existing Risk Assessment Recommendation record to a Hazards Analysis Consequence record, you are adding that Risk Assessment Recommendation record to the analysis with which you are currently working.

To add an existing Risk Assessment Recommendation record to the analysis:

1. Access the **Recommendations** dialog box.
2. Below the grid, click the **Add Existing Recommendations** button.

   The **Find Items** window appears.



3. If desired, provide search criteria, and then click the **Find Now** button.

   The search results appear.
4. In the search results list, select the row containing the desired record.
5. Click the **Open** button.

The selected record appears in the list on the **Recommendations** dialog box and is linked to the record that is currently selected on the page from which you accessed the **Recommendations** dialog box.

Opening Risk Assessment Recommendation Records from the Recommendations Dialog Box

To open a Risk Assessment Recommendation record from the Recommendations dialog box:

1. Access the **Recommendations** dialog box.
2. In the grid, locate the row containing the Risk Assessment record that you want to open.
3. In the **Recommendation ID** cell, click the hyperlinked Record ID for the desired record.

   The selected Risk Assessment Recommendation record appears in a new window. At this point, you can modify the record as desired, and then click **OK** to save your changes.

Removing Risk Assessment Recommendation Records from the Analysis

When you remove a Risk Assessment Recommendation record from an analysis, you are deleting the link between the Risk Assessment Recommendation record and the Hazards Analysis Consequence record that is part of the HAZOP Analysis or What If Analysis.

To remove a Risk Assessment Recommendation record from the analysis:

1. Access the **Recommendations** dialog box.
2. In the grid, select the row containing the Risk Assessment record that you want to remove from the analysis.
3. Click the **Delete Recommendations** button.

   A confirmation message appears, asking if you really want to remove the link between the Risk Assessment Recommendation record and the record to which it is linked.
4. Click the **Yes** button.

   The selected Risk Assessment Recommendation record is removed from the **Recommendations** list and the analysis.

About Scheduling Risk Assessment Recommendation Alerts

The **Alerts** tab on the Risk Assessment Recommendation datasheet contains fields that you can use to schedule an email message to be sent to someone. You can schedule alerts to be sent when:

- The recommended action is due to be completed (via the **Alert Assignee When Due?** check box and associated fields).
- The recommended action is due for reevaluation (via the **Reevaluate?** check box and associated fields).

For an email message to be sent to a recipient, the specified recipient must have a valid email address specified in the Email Address field in a Human Resource record in the Meridium APM database.

When you save a Risk Assessment Recommendation record whose Status field contains the value *Approved* and whose alert schedule has been defined on the **Alerts** tab, the following items are automatically created in the Meridium APM database:

- One Alert record that is linked to the Risk Assessment Recommendation record.
- One Scheduled Item in the Meridium APM Schedule Manager.

After these items exist, the email message will be sent to the specified recipient according to the schedule that is defined in the Risk Assessment Recommendation record.

Scheduling Alerts to Notify Assignees When a Recommended Action is Due

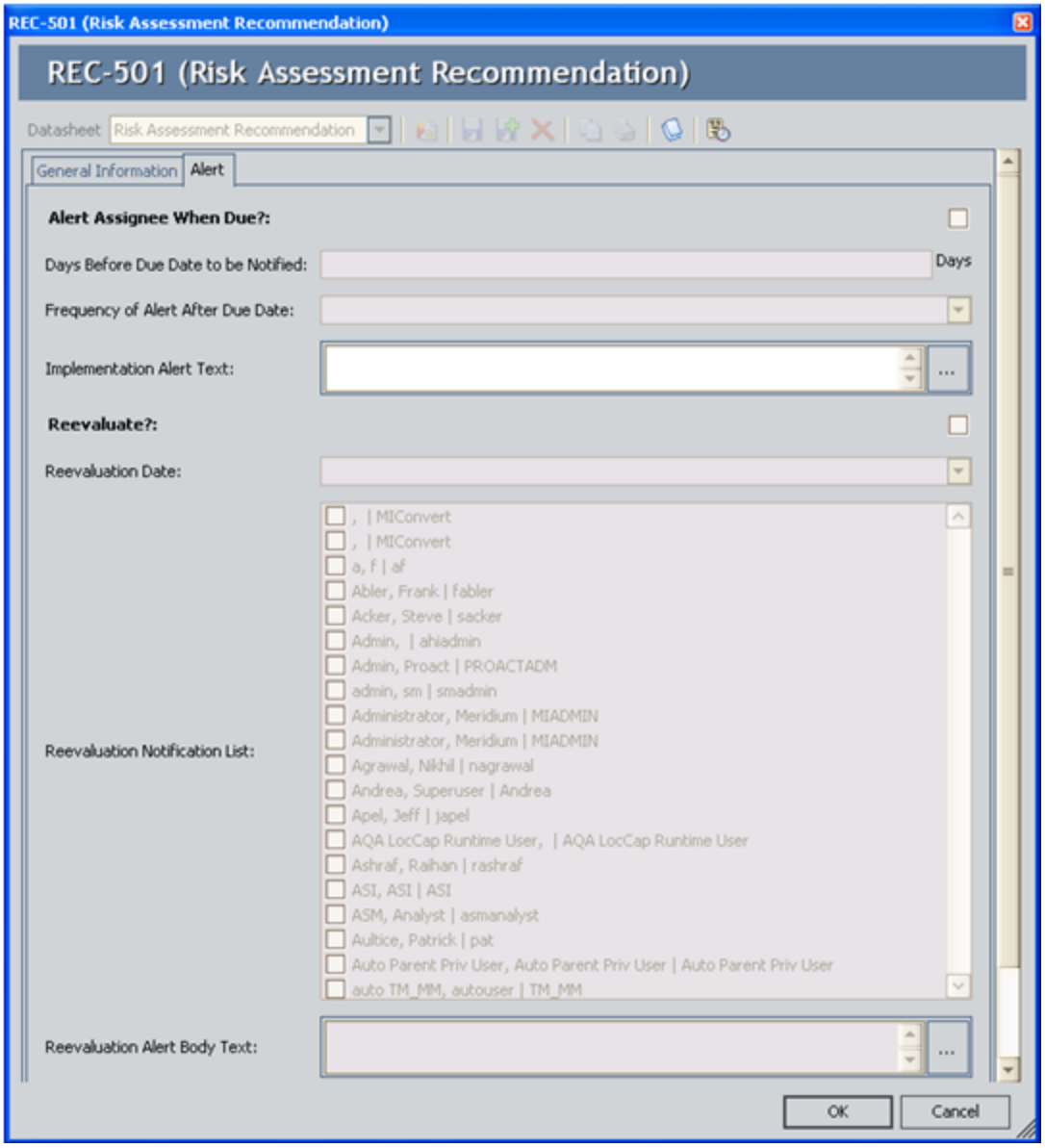
The following instructions provide details on using the fields on the **Alert** tab on the Risk Assessment Recommendation datasheet to schedule an email message alert to be sent to an email recipient when a recommended action is due. For details on scheduling email messages to notify a recipient when a recommendation is due for reevaluation, see the topic for scheduling alerts to notify assignees when a recommendation is due for reevaluation.

These instructions assume that you have specified a user in the Assigned To Name field on the **General Information** tab and that their Human Resource record contains a valid email address.

To schedule an email message to notify an assignee when a recommended action is due:

1. Open the Risk Assessment Recommendation record for which you want to configure email message alerts.
2. Click the **Alert** tab.

   The **Alert** tab appears.



3. Select the **Alert Assignee When Due?** check box, and then click in a different field.

   The following fields are enabled and required:

   - Days Before Due Date to be Notified
   - Frequency of Alert After Due Date

4. In the **Days Before Due Date to be Notified** text box, type a numeric value that represents the number of days prior to the due date that the assignee should be notified of that due date.
5. In the **Frequency of Alert After Due Date** list, select the value that represents the

frequency by which an assignee should be notified *after* the due date has passed.

6. In the **Implementation Alert Text** text box, type the message that you want to appear in the email message that is sent to the assignee.
7. At the bottom of the Risk Assessment Recommendation datasheet, click **OK**.

   The record is saved.

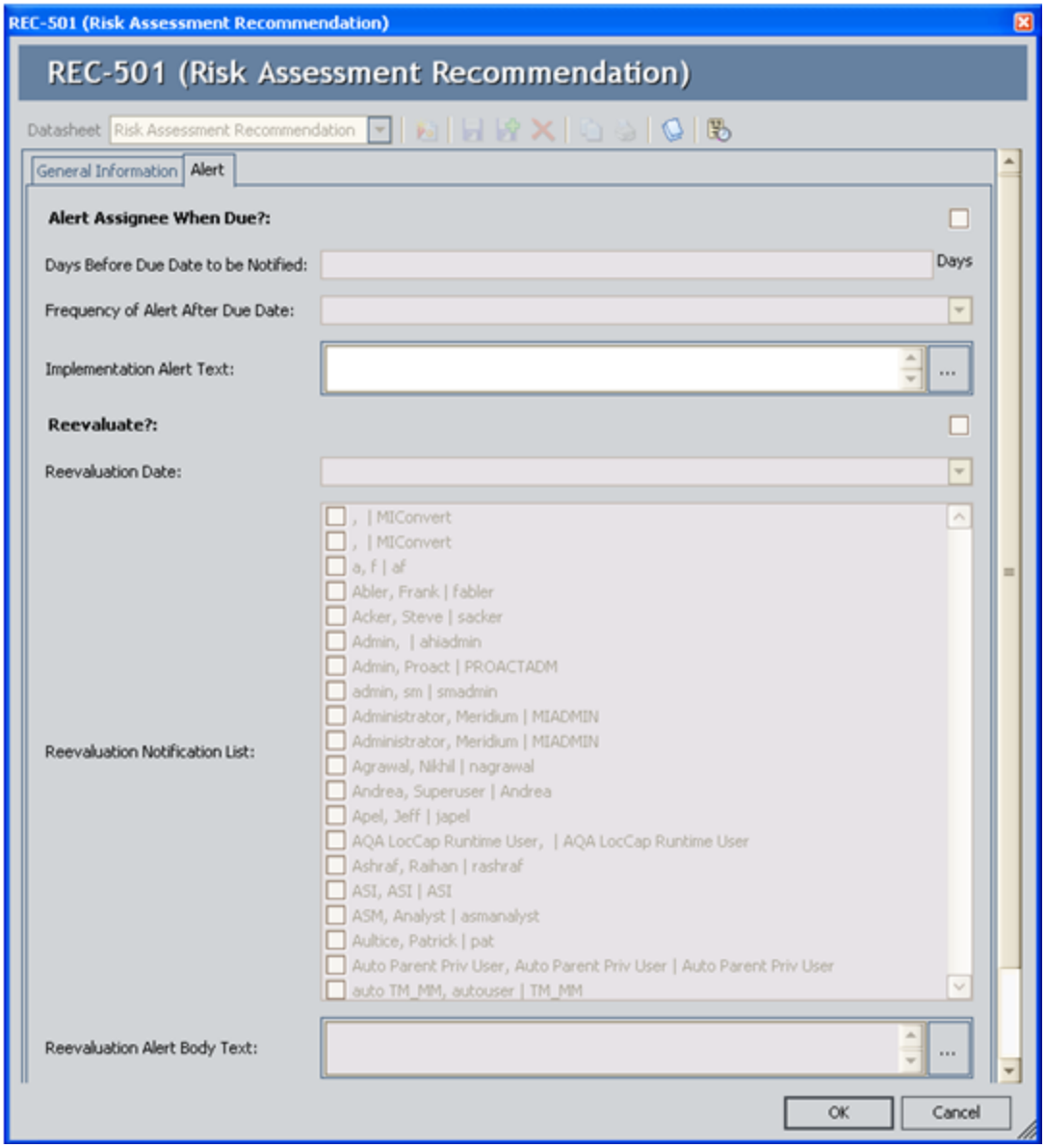
Scheduling Alerts to Notify Assignees When a Recommended Action is Due for Reevaluation

The following instructions provide details on using the fields on the **Alert** tab on the Risk Assessment Recommendation datasheet to schedule an email message alert to be sent to an email recipient when a recommendation is due for reevaluation. For details on scheduling alerts to notify a recipient when a recommendation is due, see the topic for scheduling alerts to notify assignees when a recommendation is due.

To schedule an email message to notify an assignee when a recommended action is due for reevaluation:

1. Open the Risk Assessment Recommendation record for which you want to configure email message alerts.
2. Click the **Alert** tab.

   The **Alert** tab appears.



3. Select the **Reevaluate?** check box, and then click in a different field.

   The following fields are enabled and required:

   - Reevaluation Date
   - Reevaluation Alert Body Text

4. In the **Reevaluation Date** box, type or select the date on which the reevaluation is due.
5. In the **Reevaluation Notification List**, select the check box to the left of the Meridium APM user who will receive the reevaluation email message if this user is different from the user specified in the Assigned To Name field.

Note: For a user to receive a reevaluation alert, a valid email address must be stored in the user's Human Resource record.

6. In the **Reevaluation Alert Body Text** text box, type the message that you want to appear in the email message that is sent to the assignee.
7. At the bottom of the datasheet, click **OK**.

   The record is saved.

Viewing the List of Risk Assessment Recommendation Records for the Current Analysis

The following instructions provide details on viewing the list of Risk Assessment Recommendation records that are associated with the current HAZOP Analysis or What If Analysis. For details on viewing the list of Risk Assessment Recommendation records for ALL HAZOP Analyses or What If Analyses, see the topic for viewing the list of Risk Assessment Recommendation records for all analyses.

To view the list of Risk Assessment Recommendation records for the current analysis:

1. Open the Hazards Analysis record for the desired HAZOP Analysis or What If Analysis.
2. On the **Navigation** menu, click the **All Recommendations** link.

   The **Recommendation Management** page appears, displaying the results of the:

- HAZOP Analysis Recommendations query (for an HAZOP Analysis)

  -or-

- What If Analysis Recommendations query (for a What If Analysis)

Viewing the List of Risk Assessment Recommendation Records for All Hazards Analyses

The following instructions provide details on viewing the list of Risk Assessment Recommendation records that are associated with ALL HAZOP Analyses and What If Analyses that exist in the Meridium APM database. For details on viewing a list of Risk Assessment Recommendation records for a *single* analysis, see the instructions for viewing the list of Risk Assessment Recommendation records for the current analysis.

To view the list of Risk Assessment Recommendation records for ALL analyses:

- On the **Hazards Analysis Start Page**, click the **Manage Recommendations** link.

  The **Recommendation Management** page appears, displaying the results of the *All HAZOP Analysis Recommendations* query, which returns a list of ALL Risk Assessment Recommendation records that are associated with any Hazards Analysis.

About Revision History in Hazards Analysis

In addition to the Meridium APM Framework Tool that provides revision history for field values, which you can use to manage revisions that are made on individual fields in a family, Hazards Analysis provides a Revision History feature that you can use to manage the revisions made for an entire analysis (i.e., HAZOP or What If). When you create an analysis, you link records in multiple families to the Hazards Analysis record, which represents the entire analysis. When you complete an analysis (i.e., it has been approved), you will change the state of the Hazards Analysis record to Complete. When you do so, a snapshot is taken of the Hazards Analysis record and each record to which it is linked, either directly or indirectly.

When the Hazards Analysis record state is changed to Complete, one record in each of the following families will be created:

- Hazards Analysis Revision
- Hazards Analysis System/Node Revision
- HAZOP Deviation Revision (for HAZOP Analyses)
- What If Revision (for What If Analyses)
- Hazards Analysis Cause Revision
- Hazards Analysis Consequence Revision
- Hazards Analysis Safeguard Revision
- Independent Protection Layer Revision

In other words, after the record state for the Hazards Analysis record is changed to Complete, one Revision record is created for each record that is linked to the Hazards Analysis record (with the exception of the Human Resource, Risk Assessment Recommendation, and Risk Assessment families). Each Revision record stores a snapshot of the source record as it appeared when the state of the Hazards Analysis record was changed. For details on how these families are related to one another, see the illustration of the Hazards Analysis revision data model.

If the analysis requires reassessment, after the reassessment takes place, the state of the Hazards Analysis record will be changed again to the Complete state and a second set of Revision records will be created, and so on.

You can access the Hazards Analysis Revision records via the **Revision History** link on the **Navigation** menu.

Available Revision Families

The following families are not included in the Hazards Analysis data model image but are also used by Hazards Analysis to support Revision History. The family captions for these families match the source family name, appended with *Revision* to indicate that the family is a Revision family:

- Hazards Analysis Revision
- Hazards Analysis System/Node Revision
- HAZOP Deviation Revision (for a HAZOP Analysis)

  -or-

  What If Revision (for a What If Analysis)
- Hazards Analysis Cause Revision
- Hazards Analysis Consequence Revision
- Hazards Analysis Safeguard Revision
- Independent Protection Layer Revision

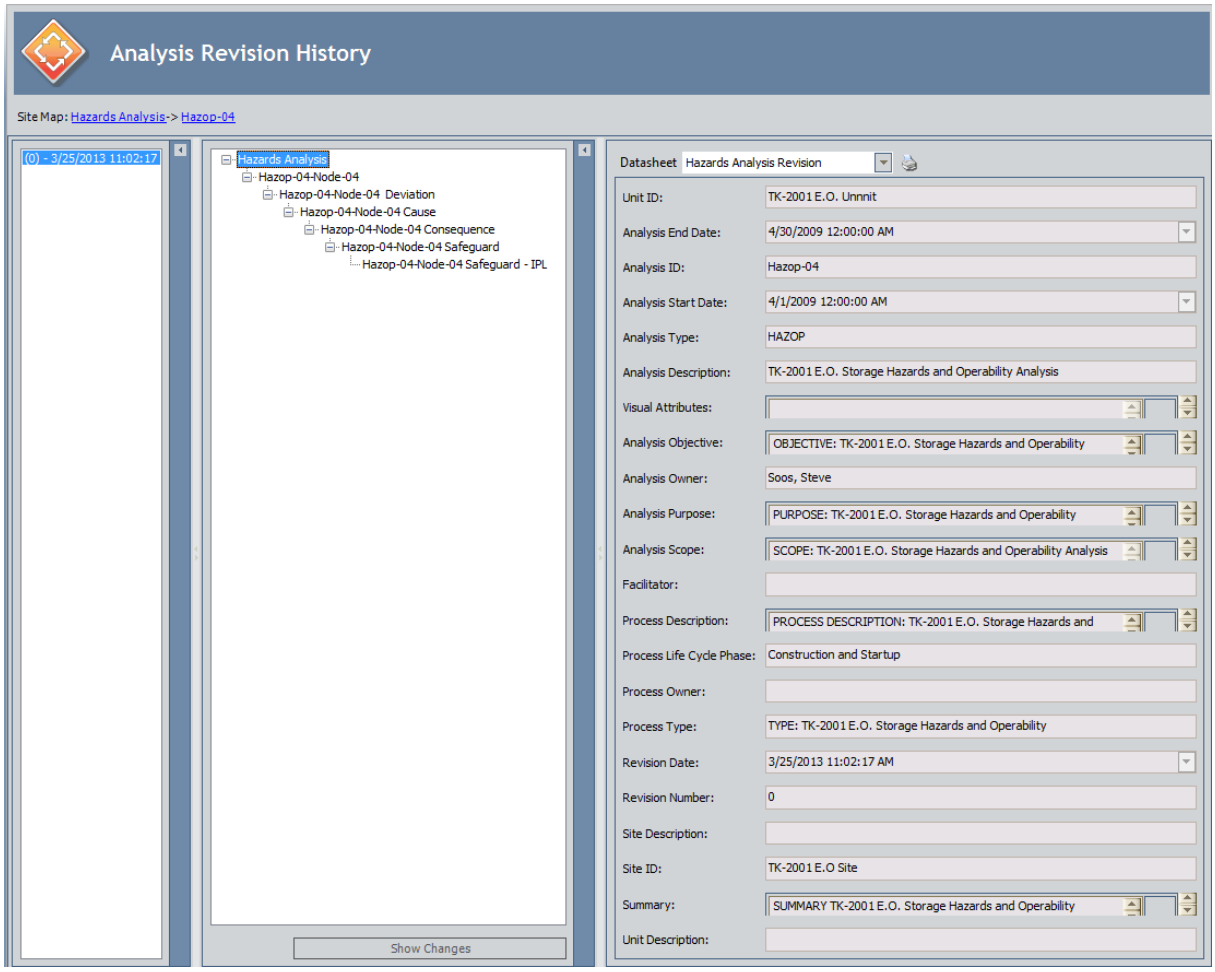
Accessing Hazards Analysis Revisions

The following instructions provide details on accessing the **Analysis Revision History** page, where you can view the Revision records that exist for a given analysis.

To access the Analysis Revision History page:

1. Open the desired Hazards Analysis record.
2. On the **Navigation** menu, click the **Revision History** link.

   The **Analysis Revision History** page appears.



Note: The **Revision History** link is enabled only if the Hazards Analysis record for the current analysis has ever been set to the Complete state.

Aspects of the Analysis Revision History Page

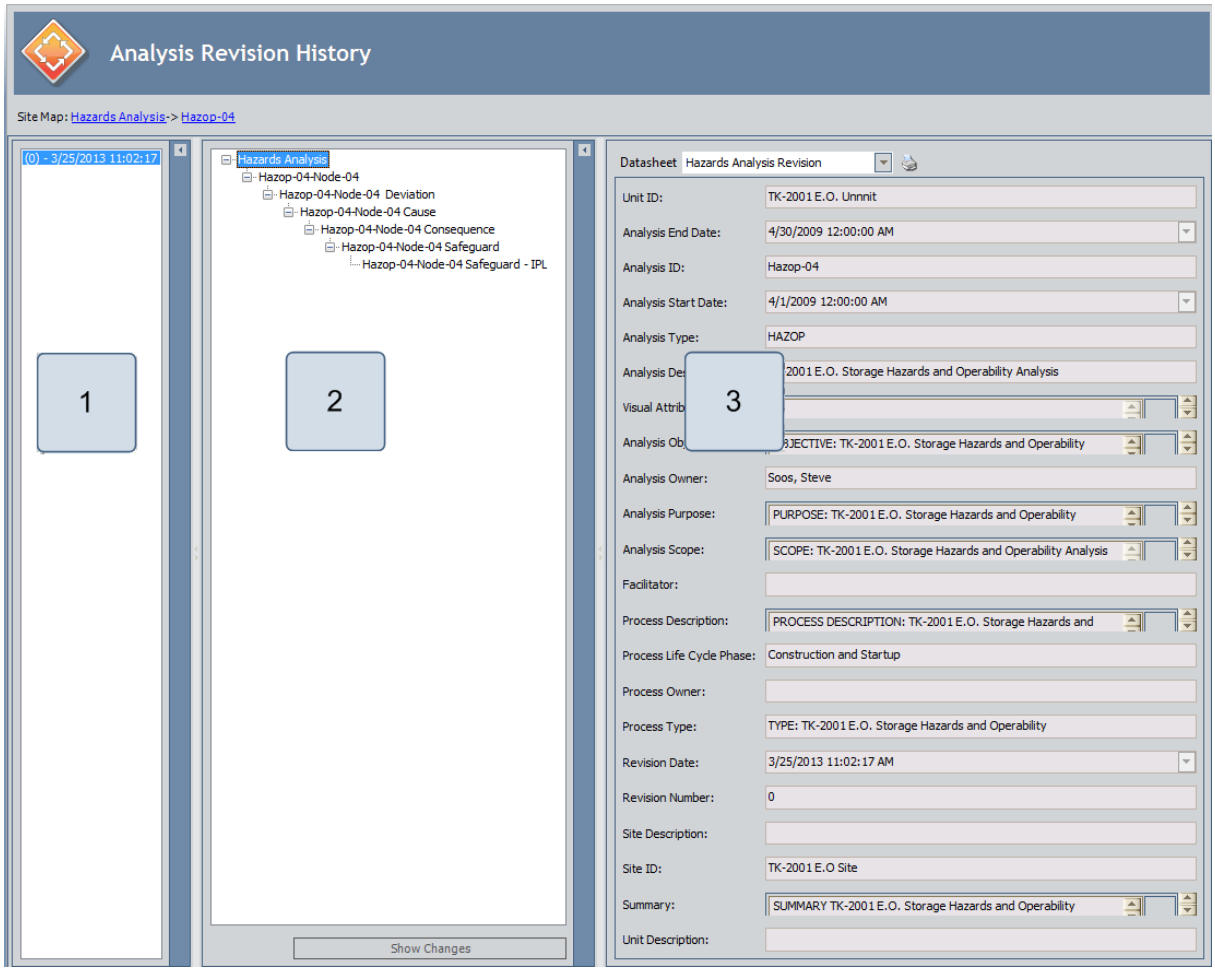
The **Analysis Revision History** page contains the following panes:

1. **Revisions pane:** Contains a list of all Hazards Analysis Revision records that have been created for the HAZOP or What If Analysis from which you accessed the **Analysis Revision History** page. Each row in the list represents one Hazards Analysis Revision record, and each item in the list is labeled using the value that exists in the Revision Date field in that Hazards Analysis Revision record. The rows appear in the reverse order in which they were created and are numbered, starting with 0, where 0 is the first revision. In other words, the most recent revision will appear first in the list. When you select a row in the list:
   - A hierarchical view of the HAZOP or What If Analysis that existed at the time that revision was created will appear in the **Selected Revision** pane.
   - The corresponding Hazards Analysis Revision record will be displayed in the datasheet area.
2. **Selected Revision pane:** Displays a hierarchical view of the records that belong to the HAZOP or What If Analysis whose revision is selected in the **Revisions** pane.

   At the bottom of this section, the **Show Changes** button appears, which you can click to view the changes that were made to the selected record during this revision. This button is enabled only if the selected record contains values that were changed since the previous revision.

   Note: If you are viewing the revision history for a What If Analysis, the root node contains the text *What If Analysis* instead of *Hazards Analysis*.
3. **Datasheet pane:** Displays the Hazards Analysis Revision record that is currently selected in the **Revisions** pane. Above the datasheet, the **Print** button appears, which you can use to print the record that is displayed in the datasheet area.

The following image shows the **Analysis Revision History** page, where callouts have been provided to identify the numbered panes described above.



The **Analysis Revision History** page contains the following task menus:

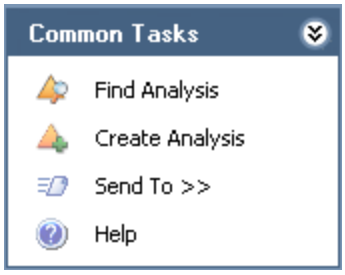
- Navigation
- Common Tasks
- Associated Pages

The options that appear on these task menus is consistent with the options that appear on that menu when you are viewing it on other pages in Hazards Analysis.

On the **Analysis Revision History** page, you can:

- View the Revision record for the desired record.
- View the specific changes that were made to a given Revision record.

Common Tasks Menu



The **Common Tasks** menu on the **Analysis Revision History** page contains the following links:

- **Find Analysis:** Displays the **<Analysis Type> Analysis Search** page, where **<Analysis Type>** is either HAZOP or What If, depending on the type of analysis you were working with when you accessed the **Reference Documents** page.
- **Create Analysis:** Displays a new blank Hazards Analysis record on the **<Analysis Type> Analysis Definition** page, where **<Analysis Type>** is either HAZOP or What If, depending on the type of analysis you were working with when you accessed the **Reference Documents** page.
- **Send To:** Displays a submenu with options that let you provide a link to the current page on your desktop (create shortcut), in email message, or on a Home Page.
- **Help:** Displays the context-sensitive help topic for the **Analysis Revision History** page.

Viewing the Datasheet for a Revisions Record

To view the datasheet for a Revision record:

1. Access the **Analysis Revision History** page.
2. In the **Revisions** pane, select the row that represents the revision of the Hazards Analysis that you want to view.

   The corresponding Hazards Analysis Revision record appears in the **Datasheet** pane, and the corresponding revision appears in the **Selected Revision** pane.
3. In the **Selected Revision** pane, select the Revision record whose datasheet you want to view.

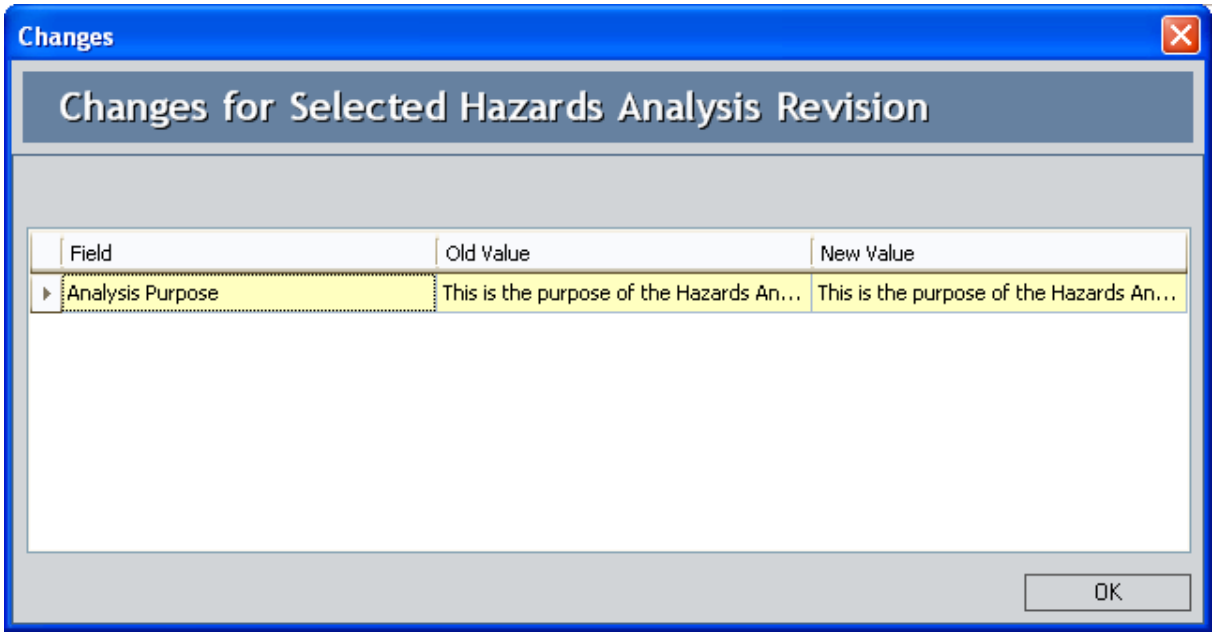
   The Revision record for the selected record appears in the **Datasheet** pane.

Viewing Changes That Were Made Between Revisions

To view changes that were made between revisions:

1. Access the **Analysis Revision History** page.
2. In the **Revisions** pane, select the revision for which you want to see the modified values.
3. In the **Selected Revisions** pane, select the record for which you want to see the modified values.
4. At the bottom of the **Selected Revisions** pane, click the **Show Changes** button.

   The **Changes** dialog box appears.



4. Review the changes and click **OK** when you are finished.

   The **Changes** dialog box closes.

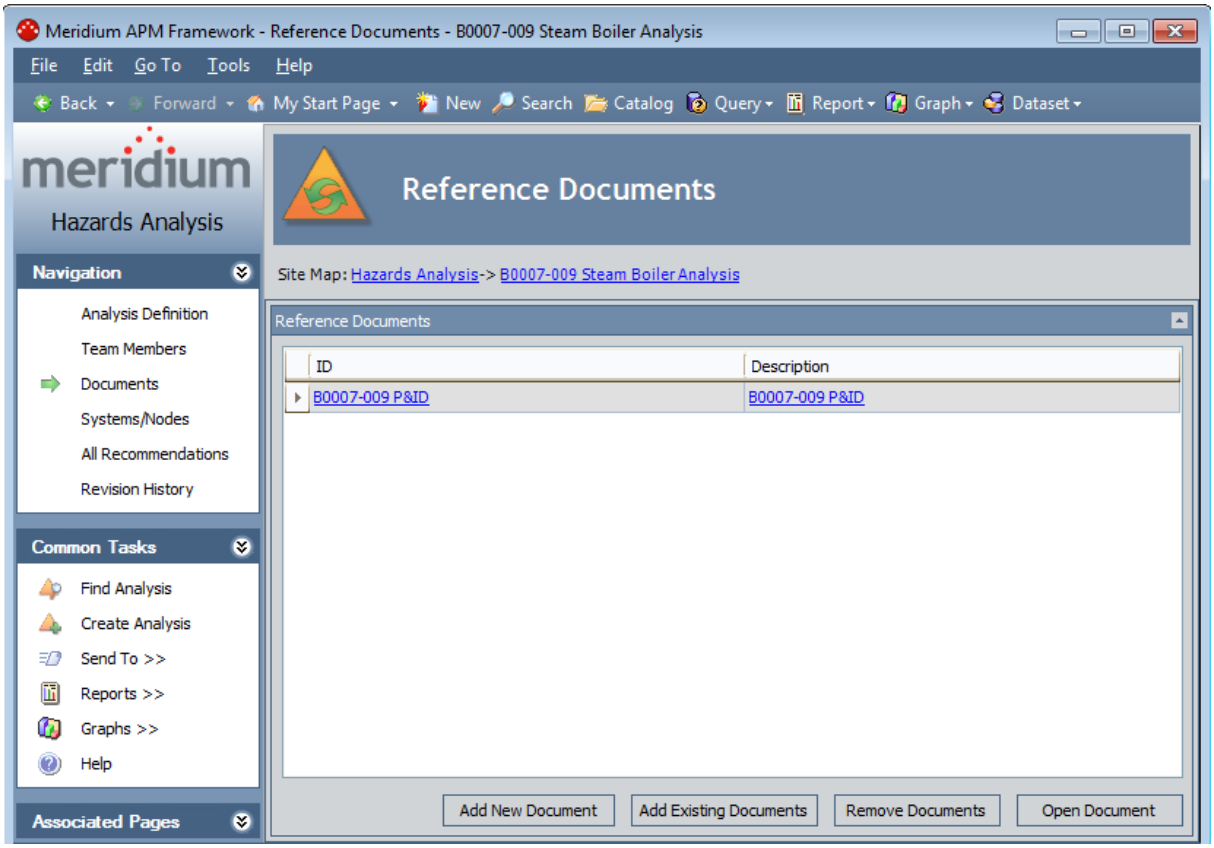
Accessing the Reference Documents Page

On the **Reference Documents** page, you can manage the Reference Document records that are linked to the Hazards Analysis record for the current analysis (i.e., HAZOP or What If). The following instructions provide details on accessing the **Reference Documents** page whether you are currently working with a HAZOP Analysis or a What If Analysis.

To access the Reference Documents page:

1. Open the Hazards Analysis record for the desired analysis: HAZOP or What If.
2. On the **Navigation** menu, click the **Documents** link.

   The **Reference Documents** page appears.



Aspects of the Reference Documents Page

The **Reference Documents** page contains the **Reference Documents** workspace, which contains a grid that displays a list of Reference Document records that are linked to the Hazards Analysis record for the current HAZOP Analysis or What If Analysis. Each row in the grid represents one Reference Document record. For each Reference Document record that appears in the grid, the following information is displayed:

- **ID:** The value that exists in the ID field of the associated Reference Document record.
- **Description:** The value that exists in the Description field of the associated Reference Document record.

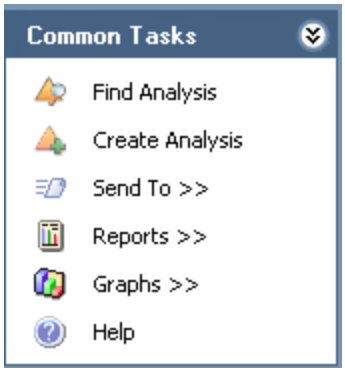
Below the grid, the following buttons appear:

- **Add New Document:** Displays a new blank Reference Document record in the **<empty> (new Reference Document)** dialog box.
- **Add Existing Documents:** Displays the **Find Items** window, where you can search for an existing Reference Document record to link to the Hazards Analysis record for the current HAZOP Analysis or What If Analysis.
- **Remove Documents:** Displays a confirmation message and then removes the Reference Document record from the analysis. This button is enabled only when a row in the grid is selected.
- **Open Document:** Opens the file associated with the selected Reference Document record. This button is enabled only when a row in the grid is selected.

The **Reference Documents** page contains the following task menus:

- **Navigation:** Contains the options that are common to this menu whether you are working with a HAZOP Analysis or What If Analysis.
- Common Tasks
- Associated Pages

Common Tasks



The **Common Tasks** menu on the **Reference Documents** page contains the following links:

- **Find Analysis:** Displays the **<Analysis Type> Analysis Search** page, where **<Analysis Type>** is either HAZOP or What If, depending on the type of analysis you were working with when you accessed the **Reference Documents** page.
- **Create Analysis:** Displays a new blank Hazards Analysis record on the **<Analysis Type> Analysis Definition** page, where **<Analysis Type>** is either HAZOP or What If, depending on the type of analysis you were working with when you accessed the **Reference Documents** page.
- **Send To:** Displays a submenu with options that let you provide a link to the current page on your desktop (create shortcut), in an email message, or on a Home Page.
- **Reports:** Displays a submenu that contains the caption of one of the following Catalog items:
  - Hazards Analysis Report (for HAZOP Analyses)
  - What If Analysis Report (for What If Analyses)

  The option that appears depends upon the type of analysis you were working with when you accessed the **Reference Documents** page.
- **Graphs:** Displays a submenu that contains the caption of one of the following Catalog items:
  - **Hazards Analysis Mitigated Risk** (for HAZOP Analyses)
  - **What If Mitigated Risk** (for What If Analyses)

  The option that appears depends upon the type of analysis you were working with when you accessed the **Reference Documents** page.
- **Help:** Displays the context-sensitive help topic for the **Reference Documents** page.

Creating New Reference Document Records and Adding Them to the Analysis

When you create a new Reference Document record and add it to a HAZOP Analysis or What If Analysis, you are linking the new Reference Document record to the Hazards Analysis record for that analysis.

To create a new Reference Document record and add it to the analysis:

1. Access the **Reference Documents** page.
2. Below the grid, click the **Add New Documents** button.

   A new Reference Document record appears.
3. Follow the standard procedure for creating a Reference Document record.

   The Reference Document record is saved and appears in a new row in the grid.

Adding Existing Reference Document Records to the Analysis

When you add an existing Reference Document to a HAZOP Analysis or What If Analysis, you are linking the Reference Document record to the Hazards Analysis record for the analysis.

To add an existing Reference Document record to the analysis:

1. Access the **Reference Documents** page.
2. Below the grid, click the **Add Existing Documents** button.

   The **Find Items** window appears, and the Reference Document family appears in the **Search In** list by default.
3. Provide additional search criteria if desired, and then click the **Find Now** button.

   The search results appear.
4. In the search results grid, select the rows containing the Reference Document records that you want to link to the Hazards Analysis record.
5. Click the **Open** button.

   The selected records appear in new rows in the grid.

Viewing Reference Documents

When you view a reference document, you are opening the file specified in the Reference Document record. To be able to view a reference document on your computer:

- The file must be saved in a location that can be accessed from your computer.
- The application required to open that document must be installed on your computer.

To view a reference document:

1. Access the **Reference Documents** page.
2. In the grid, select the row containing the reference document that you want to view.
3. Below the grid, click the **Open Document** button.

   The reference document file appears in the application required to display it. For example, if the reference document is a word document, it will appear in the Microsoft Word application.

Modifying Reference Document Records

To modify a Reference Document record:

1. Access the **Reference Documents** page.
2. In the grid, locate the row containing the Reference Document record that you want to modify.
3. In the **ID** column, click the hyperlinked Record ID of the record.

   The Reference Document record appears in a new window.
4. Modify the values in the fields as desired.
5. Click **OK**.

   Your changes are saved.

Removing Reference Document Records from the Analysis

When you remove a Reference Document record from a HAZOP or What If Analysis, you are deleting the link between the Reference Document record and the Hazards Analysis record for the analysis. You are not deleting the Reference Document record from the database.

To remove a Reference Document record from the analysis:

1. Access the **Reference Documents** page.
2. In the grid, select the row containing the Reference Document record that you want to remove from the analysis.
3. Below the grid, click the **Remove Documents** button.

   A confirmation message appears, asking if you really want to remove the selected records.
4. Click the **Yes** button.

   The selected records are removed from the analysis and are no longer displayed in the grid.

Associated Pages - Hazards Analysis

The **Associated Pages** menu appears throughout Hazards Analysis and displays Associated Pages that have been configured for the families that participate in the Hazards Analysis data model. The baseline Meridium APM database does not contain Associated Pages for Hazards Analysis families by default.

About the Hazards Analysis Catalog Folder Structure

The Hazards Analysis Catalog folders contain queries, graphs, and reports that appear throughout Hazards Analysis and display information contained in the records that make up a HAZOP Analysis or a What If Analysis. The Catalog folder \\Public\Meridium\Modules\Hazards Analysis contains the following subfolders:

- **HAZOP:** Contains the following subfolders:
  - **Graphs:** Contains the Hazards Analysis Mitigated Risk graph and the Subgraphs folder.
  - **Queries:** Contains various queries that are used to display information related to a HAZOP Analysis.
  - **Reports:** Contains the Hazards Analysis Report report and the Subreports folder.
- **Queries:** Contains the queries that are used by Hazards Analysis to display search results for Hazards Analysis records for either a HAZOP Analysis or a What If Analysis.
- **What If:** Contains the following subfolders:
  - **Graphs:** Contains the What If Mitigated Risk graph and the Subgraphs folder.
  - **Queries:** Contains various queries that are used to display information related to a What If Analysis.
  - **Reports:** Contains the What If Analysis Report report and the Subreports folder.

The topics in this section of the Help system describe the content of each Catalog folder in the previous list. You should not modify the names of these Catalog folders or the names of the items that exist in these folders or move the items to another Catalog folder.

Graphs Folder

The Catalog folder **\\Public\Meridium\Modules\Hazards Analysis\HAZOP\Graphs** contains the following items:

Item Name	Behavior and Usage
Hazards Analysis Mitigated Risk	A graph that displays a prompt for the Entity Key of a Hazards Analysis record whose HAZOP Analysis data you want to view in the Graph Viewer.
Subgraphs	A subfolder that contains the Hazards Analysis Deviation Mitigated Risk graph, which supports the Hazards Analysis Mitigated Risk graph.

Queries Folder

The Catalog folder **\\Public\Meridium\Modules\Hazards Analysis\HAZOP\Queries** contains the following queries:

Query Name	Behavior and Usage
All HAZOP Analysis Recommendations	Displays a list of ALL the Risk Assessment Recommendation records that are associated with a Hazards Analysis (includes What If Analyses).
Hazards Analysis Deviation Mitigated Risk Query	Displays a prompt for the Entity Key of the desired Hazards Analysis System/Node record and then displays the unmitigated and mitigated risk rank values organized by the HAZOP Deviation record with which they are associated. This query supports the Hazards Analysis Mitigated Risk graph that is stored in the folder \\Public\Meridium\Modules\Hazards Analysis\HAZOP\Graphs.
Hazards Analysis Mitigated Risk Query	Displays a prompt for the Entity Key of the desired Hazards Analysis record and then displays the unmitigated and mitigated risk rank values organized by the Hazard Analysis System/Node records with which they are associated. This query supports the Hazards Analysis Mitigated Risk graph that is stored in the folder \\Public\Meridium\Modules\Hazards Analysis\HAZOP\Graphs.
Hazards Analysis Query	Displays a prompt for the Entity Key of the desired Hazards Analysis record and then displays various information about the HAZOP Analysis, including values that appear in the Hazards Analysis record and Record IDs of the records that are linked to the HAZOP Analysis. This query supports the Hazards Analysis Report that is stored in the Reports folder.
HAZOP Analysis Recommendations	Displays a prompt for the Entity Key of the desired Hazards Analysis record and then displays a list of the Risk Assessment Recommendation records that are associated with the HAZOP Analysis that is represented by that Hazards Analysis record.
HAZOP Locations and Equipment	Displays a prompt for the Entity Key of the desired Hazards Analysis System/Node record and then displays the Entity Keys for the Equipment and Functional Location records that are associated with the specified record.

Query Name	Behavior and Usage
HAZOP Max Risk Rank for Node	Displays a prompt for the Entity Key of the desired Hazards Analysis System/Node record and then displays the unmitigated risk rank value for the Hazards Analysis Consequence record that is linked to the specified record.
Hazop_Reference_Documents_Query	Displays a prompt for the Entity Key of the desired Hazards Analysis record and then displays a list of Reference Document records and various details from those records that are linked to the specified record. This query supports the Hazop_Reference_Document_Report, which is stored in the folder \\Public\Meridium\Modules\Hazards Analysis\HAZOP\Reports\Subreports.
Hazop_Team_Member_Query	Displays a prompt for the Entity Key of the desired Hazards Analysis record and then displays the list of Human Resource records that are linked to the specified record. This query supports the Hazop_Team_Member_Report, which is stored in the folder \\Public\Meridium\Modules\Hazards Analysis\HAZOP\Reports\Subreports.

Reports Folder

The Catalog folder **\\Public\Meridium\Modules\Hazards Analysis\HAZOP\Reports** contains the following items:

Item Name	Behavior and Usage
Hazards Analysis Report	A report that displays a prompt for the Entity Key of the desired Hazards Analysis record and then displays in the Report Viewer various information about the HAZOP Analysis, including the field values from the Hazards Analysis record and details on the records that make up that analysis.
Subreports	A folder that contains the reports with the following names, which support the Hazards Analysis Report: • Hazop_Reference_Document_Report • Hazop_Team_Member_Report

Queries Folder

The Catalog folder **\\Public\Meridium\Module\Hazards Analysis\Queries** contains the following queries, which are used to display search results for Hazards Analysis records for HAZOP Analyses and What If Analyses:

Query Name	Behavior and Usage
HAZOP_Analysis_Search	A search that displays the following prompts and then displays all the Hazards Analysis records whose Analysis Type field contains the value*HAZOP*and meets the specified criteria: ■ **State:** The record states that have been configured in the Configuration Manager for the Hazards Analysis family. By default, this list contains the following values: ◦ All ◦ Active ◦ Complete ◦ Pending Approval ◦ Planning ◦ Review ■ **Hazards Analysis Owner:** The names of the users whose names appear in the Analysis Owner field in a Hazards Analysis record. This query appears by default on the **HAZOP Analysis Search** page.

Query Name	Behavior and Usage
WhatIf_Analysis_Search	A search that displays the following prompts and then displays all the Hazards Analysis records whose Analysis Type field contains the value *What If* and meets the specified criteria: ■ **State:** The record states that have been configured in the Configuration Manager for the Hazards Analysis family. By default, this list contains the following values: ◦ All ◦ Active ◦ Complete ◦ Pending Approval ◦ Planning ◦ Review ■ **Hazards Analysis Owner:** The names of the users whose names appear in the Analysis Owner field in a Hazards Analysis record. This query appears by default on the **What If Analysis Search** page.

Graphs Folder

The Catalog folder **\\Public\Meridium\Modueles\Hazards Analysis\What If\Graphs** contains the following items:

Item Name	Behavior and Usage
What If Mitigated Risk	A graph that displays a prompt for the Entity Key of a Hazards Analysis record whose What If Analysis data you want to view in the Graph Viewer.
Subgraphs	A subfolder that contains the What If Deviation Mitigated Risk graph, which supports the What If Mitigated Risk graph.

Queries Folder

The Catalog folder **\\Public\Meridium\Modules\Hazards Analysis\What If\Queries** contains the following queries:

Query Name	Behavior and Usage
What If Analysis Query	Displays a prompt for the Entity Key of the desired Hazards Analysis record and then displays various information about the What If Analysis, including values that appear in the Hazards Analysis record and Record IDs of the records that are linked to the What If Analysis.
What If Analysis Recommendations	Displays a prompt for the Entity Key of the desired Hazards Analysis record and then displays a list of the Risk Assessment Recommendation records that are associated with the Analysis that is represented by that Hazards Analysis record.
What If Locations and Equipment	Displays a prompt for the Entity Key of the desired Hazards Analysis System/Node record and then displays the Entity Keys for the Equipment and Functional Location records that are associated with the specified record.
What If Max Risk Rank for System	Displays a prompt for the Entity Key of the desired Hazards Analysis System/Node record and then displays the unmitigated risk rank value for the Hazards Analysis Consequence record that is linked to the specified record.
What If Mitigated Risk Query	Displays a prompt for the Entity Key of the desired Hazards Analysis record and then displays unmitigated and mitigated risk rank values organized by the Hazard Analysis System/Node records with which they are associated.
What If Risk Query	Displays a prompt for the Entity Key of the desired Hazards Analysis record and then displays the mitigated and unmitigated risk rank values organized by the Hazards Analysis record with which they are associated.

Reports Folder

The Catalog folder **\\Public\Meridium\Modueles\Hazards Analysis\What If\Reports** contains the following items:

Item Name	Behavior and Usage
What If Analysis Report	A report that displays a prompt for the Entity Key of the desired Hazards Analysis record and then displays in the Report Viewer various information about the What If Analysis, including the field values from the Hazards Analysis record and details on the records that make up that analysis.
Subreports	A folder that contains the reports with the following names, which support the What If Analysis Report: ■ What If Reference Document Report ■ What If Team Member Report

Hazards Analysis

Hazards Analysis records store details about the Hazards Analysis that you are conducting. The following table provides and alphabetical list and description of the fields that exist for the Hazards Analysis family and appear on the Hazards Analysis datasheet, unless otherwise specified. The information in the table reflects the baseline state and behavior of these fields. This list is not comprehensive.

Field	Data Type	Description	Behavior and Usage
Analysis Description	Character	A brief description for the Hazards Analysis.	On the datasheet, this field appears as a text box labeled **Analysis Description**, in which you can enter your own value.
Analysis End Date	Date	The date on which the Hazards Analysis will end.	On the datasheet, this field appears as a text box labeled **Analysis End Date** and contains a button, which you can click to access the Calendar feature. The date in this field must be later than the date in the Analysis Start Date field, or an error message will appear. When you copy a Hazards Analysis record, the value in this field is *not* copied.
Analysis ID	Character	The ID for the Hazards Analysis.	On the datasheet, this field appears as a text box labeled **Analysis ID**. This field is required, and the value that you enter must be unique compared to the value in the Analysis ID field in other Hazards Analysis records.
Analysis Objective	Text	A description of the goals for the analysis.	On the datasheet, this field appears as a text box labeled **Analysis Objective** and contains a ... button, which you can click to access the Text Editor.
Analysis Owner	Character	The analysis team member whose name appears in the Process Owner field.	On the datasheet, this field is disabled and populated automatically.

Field	Data Type	Description	Behavior and Usage
Analysis Purpose	Text	A description of the purpose for the analysis.	On the datasheet, this field appears as text box labeled **Analysis Purpose** and contains a ... button, which you can click to access the Text Editor.
Analysis Scope	Text	A description of the methods and resources used to conduct the analysis.	On the datasheet, this field appears as a text box labeled **Analysis Scope** and contains a ... button, which you can click to access the Text Editor.
Analysis Start Date	Date	The date on which the Hazards Analysis will begin.	On the datasheet, this field appears as a text box labeled **Analysis Start Date** and contains a button, which you can click to access the Calendar feature. This date must be earlier than the date in the Analysis End Date field, or an error message will appear. When you copy a Hazards Analysis record, this field is populated automatically with the current date in the new record.
Analysis Type	Character	The type of Hazards Analysis that you are conducting (i.e., *HAZOP* or *What If*).	This field does not appear on the Hazards Analysis datasheet by default. This field is disabled and populated automatically with the appropriate value based on the page in the Hazards Analysis module from which you create the Hazards Analysis record.
Facilitator	Character	The name of analysis team member who is specified as the Facilitator.	This field does not appear on the Hazards Analysis datasheet by default.

Field	Data Type	Description	Behavior and Usage
Is Deleted	Logical	Indicates whether the Hazards Analysis record has been removed from searches within the Hazards Analysis module.	This field does not appear on the Hazards Analysis datasheet by default. This value is set automatically when you flag a Hazards Analysis record as complete. This value is used by the Meridium APM system, so you should not modify it manually.
Last Modified By	Character	The name of the user who was logged in when the Hazards Analysis record was last modified.	On the datasheet, this field is disabled and populated automatically. When you copy a Hazards Analysis record, the value in this field is *not* copied.
Last Modified Date	Date	The date on which the Hazards Analysis record was last modified.	On the datasheet, this field is disabled and populated automatically. When you copy a Hazards Analysis record, the value in this field is *not* copied.
Next Reevaluation Date	Date	The date on which the Hazards Analysis should be reevaluated.	This field is disabled and populated automatically with the output of the following calculation: **Next Reevaluation Date = Revision Date + Reevaluation Interval**
Process Description	Text	A longer description of the process that you are studying.	On the datasheet, this field appears as a text box and contains a … button, which you can click to access the Text Editor.
Process Life Cycle Phase	Character	The phase that corresponds to the phase within the life cycle for the process that you are analyzing.	On the datasheet, this field appears as a list labeledProcess Life Cycle Phaseand contains the description of all System Codes in the MI_HAZARDS_ANALYSIS_LIFE_CYCLE_PHASE System Code Table. You can choose from the following baseline values: ~~Design and Development~~ Construction and Startup Operate and Maintain Decommissioning

Field	Data Type	Description	Behavior and Usage
Process Owner	Character	The name of the analysis team member who is specified as the Process Owner.	This field does not appear on the datasheet by default and is automatically populated when you flag a team member as the Process Owner via the **HAZOP Analysis Team Members** or **What If Analysis Team Members** page. This value is used to populate the Analysis Owner field.
Process Type	Character	A brief description of the process that you are studying.	On the datasheet, this field appears as a text box labeled **Process Type** in which you can enter your own value.
Reevaluation Interval	Number	The number of years between evaluations of the Hazards Analysis.	You can populate this field *manually* on the datasheet.
Revision Date	Date	The date and time on which the revision of the Hazards Analysis was created.	On the datasheet, this field is disabled and populated automatically with the date and time of the most recent revision. When you copy a Hazards Analysis record, this field is populated automatically with the current date and time in the new record.
Revision Number	Character	A number that represents the number of times the Hazards Analysis record state has been changed to *Complete*. This field contains the value *0*by default.	On the datasheet, this field is disabled and populated automatically. When you copy a Hazards Analysis record, this field is populated automatically with *0* in the new record.
Site Description	Character	A description of the site that is specified in the Site ID field.	This field does not appear on the Hazards Analysis datasheet by default. This value is set automatically when you select a Site ID in the Site ID field.

Field	Data Type	Description	Behavior and Usage
Site ID	Character	The ID of the site that is associated with the Hazards Analysis.	On the datasheet, this field appears as a list labeled **Site ID** and contains the values stored in the Name field in existing Site Reference records. You can select a value in the list. The value that you select in the list is used to identify which risk matrix to display when you create Risk Assessment records in Hazards Analysis. If this field is empty, the default risk matrix will be used.
Summary	Text	A summary of the analysis that was conducted.	On the datasheet, this field appears as a text box labeled **Summary** and contains a ... button, which you can click to access the Text Editor.
Unit Description	Character	A description of the unit that is specified in the Unit ID field.	This field does not appear on the Hazards Analysis datasheet by default.
Unit ID	Character	The ID for the unit that is associated with the processes for which you are conducting a Hazards Analysis.	On the datasheet, this field appears as a text box labeled **Unit ID**, in which you can enter your own value.

Hazards Analysis Cause

Hazards Analysis Cause records store details on the cause of a particular event or condition within a process. The following table provides an alphabetical list and description of the fields that exist for the Hazards Analysis Cause family and appear on the Hazards Analysis Cause datasheet, unless otherwise specified. The information in this table reflects the baseline state and behavior of these fields. This list is not comprehensive.

Field	Data Type	Description	Behavior and Usage
Cause Comment	Text	Comments about the cause.	On the datasheet, this field appears as a text box labeled **Cause Comment** and contains a ... button, which you can click to access the Text Editor.
Cause Description	Text	A detailed description of the cause.	On the datasheet, this field appears as a text box labeled **Cause Description** and contains a ... button, which you can click to access the Text Editor.
Cause Frequency (per year)	Number	A numeric value that represents the number of times per year the cause may occur.	On the datasheet, this field appears as a text box labeled **Cause Frequency (per year)**, in which you can enter your own value.
Cause ID	Character	A brief description of the cause.	On the datasheet, this field appears as a text box labeled **Cause ID**. This value will appear in the Cause ID cell in either the HAZOP Nodes or What If Analysis Systems grid, depending on the type of analysis with which you are currently working. This field is required.

Field	Data Type	Description	Behavior and Usage
Cause Number	Character	A set of three numeric values, separated by decimal points, which represents the location in which the Hazards Analysis Cause record appears in either the **HAZOP Nodes** or **What If Analysis Systems** grid, depending on the type of analysis with which you are currently working.	On the datasheet, this field is disabled and populated automatically with a set of three numbers, separated by decimal points (e.g. 2.1.1). Specifically: • The first two numbers correspond to the value that exists in the What If Number field in the What If record or Deviation/Guideword Number field in the HAZOP Deviation record to which the Hazards Analysis Cause record is linked. • The third number is the value that exists in the Sequence Number field in the Hazards Analysis Cause record.
Cause Type	Character	The type of cause.	On the datasheet, this field appears as a list labeled **Cause Type** and contains the description of the System Codes that exist in the MI_HAZOP_CAUSE_TYPE System Code Table. You can choose from the following baseline values: Equipment Failure Human Error Process Upset Flooding Lightning Power Loss Terrorism
Equipment ID	Character	The Record ID of the Equipment record that is linked to the Hazards Analysis Cause record through the *Safety Analysis Has Equipment* Relationship family.	On the datasheet, this field is disabled and contains a ... button, which you can click to display the **Find Items** window, where you can search for an existing Equipment record to link to the Hazards Analysis Cause record.
Equipment Entity Key	Number	The Entity Key for the Equipment record whose Record ID appears in the Equipment ID field.	This field is used by the Meridium APM system and does not appear on the Hazards Analysis Cause datasheet by default.

Field	Data Type	Description	Behavior and Usage
Functional Location ID	Character	The Record ID for the Functional Location record that is linked to the Hazards Analysis Cause record through the Has Functional Location Relationship family.	On the datasheet, this field is disabled and contains a ... button, which you can click to display the **Find Items** window, where you can search for an existing Functional Location record to link to the Hazards Analysis Cause record.
Functional Location Entity Key	Number	The Entity Key for the Functional Location record whose Record ID appears in the Functional Location ID field.	This value is used by the Meridium APM system, and the field does not appear on the Hazards Analysis Cause datasheet by default.
Sequence Number	Number	A numeric value that represents the position in which the Hazards Analysis Cause record appears in the grid, relative to the other Hazards Analysis Cause records that are linked to the same HAZOP Deviation or What If record.	This field does not appear on the datasheet by default.

Hazards Analysis Consequence

Hazards Analysis Consequence records store details on the specific risk that is associated with a given Scenario. The following table provides an alphabetical list and description of the fields that exist for the Hazards Analysis Consequence family and appear on the Hazards Analysis Consequence datasheet by default, unless otherwise specified. The information in the table reflects the baseline state and behavior of these fields. This list is not comprehensive.

Field	Data Type	Description	Behavior and Usage
Consequence Comment	Text	A comment about the risk.	On the datasheet, this field appears as a text box labeled **Consequence Comment** and contains a ... button, which you can click to access the Text Editor.
Consequence Description	Text	A detailed description of the risk.	On the datasheet, this field appears as a text box labeled **Consequence Description** and contains a ... button, which you can click to access the Text Editor.
Consequence ID	Character	A brief description of the risk.	On the datasheet, this field appears as a text box, labeled **Consequence ID**, in which you can enter your own value. This value will appear in the **Consequence ID** cell in either the **HAZOP Nodes** or **What If Analysis Systems** grid, depending on the type of analysis with which you are currently working. This field is required.

Field	Data Type	Description	Behavior and Usage
Consequence Number	Character	A set of four numeric values, separated by a decimal point, which represents the location in which the Hazards Analysis Consequence record appears in either the **HAZOP Nodes** or **What If Analysis Systems** grid, depending on the type of analysis with which you are currently working.	On the datasheet, this field is disabled and populated automatically with numbers, separated by decimal points (e.g., 2.1.1.1). Specifically: • The first three numbers correspond to the value that exists in the Cause Number field in the Hazards Analysis Cause record to which the Hazards Analysis Consequence record is linked. • The fourth number is the value that exists in the Sequence Number field in the Hazards Analysis Consequence record.
Consequence Type	Character	The type of risk.	On the datasheet, this field appears as a list labeled **Consequence Type** and contains the description of the System Codes that exist in the MI_HAZOP_CONSEQUENCE_TYPE System Code Table. You can choose from the following baseline values: • Fire • Explosion • Single Fatality • Multiple Fatality • Equipment Damage • Production Loss

Field	Data Type	Description	Behavior and Usage
Sequence Number	Number	A numeric value that represents the position in which the Hazards Analysis Consequence record appears in the grid, relative to the other Hazards Analysis Consequence records that are linked to the same Hazards Analysis Cause record.	This field is used to populate the Consequence Number field and does not appear on the Hazards Analysis Consequence datasheet by default.

Hazards Analysis Safeguard Records

Hazards Analysis Safeguard records store details on safeguards that may be in place to mitigate the risk associated with a Scenario. The following table provides an alphabetical list and description of the fields that exist for the Hazards Analysis Safeguard family and appear on the Hazards Analysis Safeguard datasheet, unless otherwise specified. The information in this table reflects the baseline state and behavior of these fields. This list is not comprehensive.

Field	Data Type	Description	Behavior and Usage	Datasheet Tab
Equipment ID	Character	The Record ID for the Equipment record that is linked to the Hazards Analysis Safeguard record through the *Safety Analysis Has Equipment* Relationship family.	On the datasheet, this field is disabled and contains a ... button, which you can click to display the **Find Items** window, where you can search for an existing Equipment record to link to the Hazards Analysis Safeguard record.	Hazards Analysis Safeguard
Equipment Entity Key	Number	The Entity Key of the Equipment record whose Record ID appears in the Equipment ID field.	This value is used internally by the Meridium APM system.	This field does not appear on the Hazards Analysis Safeguard datasheet by default.

Field	Data Type	Description	Behavior and Usage	Datasheet Tab
Functional Location ID	Character	The Record ID for the Functional Location record that is linked to the Hazards Analysis Safeguard record through the Has Functional Location Relationship family.	On the datasheet, this field is disabled and contains a ... button, which you can click to display the **Find Items** window, where you can search for an existing Functional Location record to link to the Hazards Analysis Safeguard record.	Hazards Analysis Safeguard
Functional Location Entity Key	Number	The Entity Key for the Functional Location record whose Record ID appears in the Functional Location ID field.	This value is used internally by the Meridium APM system.	This field does not appear on the Hazards Analysis Safeguard datasheet by default.
IF ID	Character	The Record ID of the Instrumented Function record that is linked to the Hazards Analysis Safeguard record.	On the datasheet, this field is disabled and contains a ... button, which you can click to display the Find Items window, where you can search for an existing Instrumented Function record to link to the Hazards Analysis Safeguard record.	Hazards Analysis Safeguard

Field	Data Type	Description	Behavior and Usage	Datasheet Tab
IF Entity Key	Number	The Entity Key for the Instrumented Function record whose Record ID appears in the IF ID field.	This value is used internally by the Meridium APM system.	This field does not appear on the Hazards Analysis Safeguard datasheet by default.
IPL Reference Key	Number	The Entity Key for the Independent Protection Layer record that is linked to the Hazards Analysis Safeguard record.	This value is used internally by the Meridium APM system.	This field does not appear on the Hazards Analysis Safeguard datasheet by default.

Field	Data Type	Description	Behavior and Usage	Datasheet Tab
IPL Type	Character	If the safeguard is an IPL, this value indicates the type of risk the IPL reduces.	On the datasheet, this field appears as a list labeled **IPL Type** and contains the following options: • Consequence Reducing IPL • Frequency Reducing IPL This field is disabled by default, meaning that the safeguard is *not* an IPL. If all of the following fields contain the value *True*, the safeguard *is* an IPL, and the IPL Type field is enabled: • Is the IPL auditable with applicable industry standard? • Is the IPL capable with respect to its availability • Is the IPL independent of the initiating cause of the hazardous secnario? • Is the IPL specific in that has the ability to detect the hazardous scenario? When the IPL Type	IPL Checklist

Field	Data Type	Description	Behavior and Usage	Datasheet Tab
			field is enabled, it contains the value *Consequence Reducing IPL* by default. Alternatively, you can select *Frequency Reducing IPL* from the list.	
Is the IPL auditable with applicable industry standard?	Logical	Indicates if the safeguard is tested and verified using an industry standard (e.g., a risk based inspection).	This value is *False* by default. This field must be *True* in order for the IPL Type field to be enabled.	IPL Checklist
Is the IPL capable with respect to its availability?	Logical	Indicates if the safeguard is available at least 90 percent of the time and if the risk associated with the safeguard reflects that availability.	This value is *False* by default. This field must be *True* in order for the IPL Type field to be enabled.	IPL Checklist
Is the IPL independent of the initiating cause of the hazardous scenario?	Logical	Indicates if the safeguard is independent of the risk so that a failure associated with the risk will not also cause the safeguard to fail.	This value is *False* by default. This field must be *True* in order for the IPL Type field to be enabled.	IPL Checklist

Field	Data Type	Description	Behavior and Usage	Datasheet Tab
Is the IPL specific in that it has the ability to detect the hazardous scenario?	Logical	Indicates if the safeguard can detect a potential failure and is able to take action to prevent the failure from occurring.	This value is *False* by default. This field must be *True* in order for the IPL Type field to be enabled.	IPL Checklist
Safeguard Comment	Text	A comment about the safeguard.	On the datasheet, this field appears as a text box labeled **Safeguard Comment** and contains a ... button, which you can click to access the Text Editor.	Hazards Analysis Safeguard
Safeguard Description	Text	A detailed description of the safeguard.	On the datasheet, this field appears as a text box labeled **Safeguard Description** and contains a ... button, which you can click to access the Text Editor.	Hazards Analysis Safeguard
Safeguard ID	Character	A brief description for the safeguard.	On the datasheet, this field appears as a text box labeled **Safeguard ID**, in which you can enter your own value. This value will appear in the **Safeguard ID** cell in either the **HAZOP Nodes** or **What If Analysis Systems** grid, depending on the type of analysis with which you are currently working. This field is required.	Hazards Analysis Safeguard

Field	Data Type	Description	Behavior and Usage	Datasheet Tab
Safeguard Number	Character	A set of five numeric values, separated by a decimal point, which represents the location in which the Hazards Analysis Safeguard record appears in either the **HAZOP Nodes** or **What If Analysis Systems** grid, depending on the type of analysis with which you are currently working	On the datasheet, this field is disabled and populated automatically with a set of five numbers (e.g., 1.1.1.1.1). Specifically: • The first four numbers correspond to the value that exists in the Consequence Number field in the Hazards Analysis Consequence record to which the Hazards Analysis Safeguard record is linked. • The fifth number is the value that exists in the Sequence Number field in the Hazards Analysis Safeguard record.	Hazards Analysis Safeguard

Field	Data Type	Description	Behavior and Usage	Datasheet Tab
Safeguard Type	Character	The type of safeguard.	On the datasheet, this field appears as a list labeled **Safeguard Type** and contains the description of the System Codes that exist in the MI_HAZOP_SAFEGUARD_TYPE System Code Table. You can choose from the following baseline values: • Process Design • Process Control System • PSC • Operator • Deluge System • Fire Alarm • Process Alarm	Hazards Analysis Safeguard
Sequence Number	Number	A numeric that represents the position in which the Hazards Analysis Safeguard record appears in the grid, relative to the other Hazards Analysis Safeguard records that are linked to the same Hazards Analysis Consequence record.	This field is used to populate the Safeguard Number field.	This field does not appear on the Hazards Analysis Safeguard datasheet by default.

Hazards Analysis System/Node

Hazards Analysis System/Node records store details on the group of equipment or locations that perform the process that you are studying. The following table provides an alphabetical list and description of the fields that exist for the Hazards Analysis System/Node family and appear on the Hazards Analysis System/Node datasheet, unless otherwise specified. The information in the table reflects the baseline state and behavior of these fields.

Field	Data Type	Description	Behavior and Usage
Hazards Analysis Key	Number	A numeric value identifying the Hazards Analysis record to which the Hazards Analysis System/Node record is linked.	This field does not appear on the Hazards Analysis System/Node datasheet by default.
Modified By	Character	The name of the user who was logged in when the Hazards Analysis System/Node record was last modified.	This field does not appear on the Hazards Analysis System/Node datasheet by default.
Modified Date	Date	The date on which the Hazards Analysis System/Node record was last modified.	This field does not appear on the Hazards Analysis System/Node datasheet by default.
Reference Drawing	Character	A value identifying the reference document. This value exists in the Name field in the corresponding Reference Document record.	On the datasheet, this field appears as a list labeled **Reference Drawing** and contains the Record IDs of the Reference Document records that are linked to the Hazards Analysis record to which the Hazards Analysis System/Node record is linked.

Field	Data Type	Description	Behavior and Usage
System/Node Comments	Text	Comments about the system/node.	On the datasheet, this field appears as a text box labeled **System/Node Comments** and contains a ... button, which you can click to access the Text Editor.
System/Node Description	Text	A detailed description of the system/node.	On the datasheet, this field appears as a text box labeled **System/Node Description** and contains a ... button, which you can click to access the Text Editor.
System/Node Equipment Type	Character	The type of equipment that corresponds to the system that the Hazards Analysis System/Node record represents.	On the datasheet, this field appears as a list labeled **System/Node Equipment Type** and contains the System Codes in the MI_Equipment_Type System Code Table.
System/Node ID	Character	A brief description of the system/node.	On the datasheet, this field appears as a text box labeled **System/Node ID**, in which you can enter your own value. This value will appear in the System Node ID cell in either the HAZOP Nodes or What If Analysis Systems grid, depending on the type of analysis with which you are currently working. This field is required.
System/Node Number	Number	A numeric value representing the location in which the Hazards Analysis System/Node record appears in either the HAZOP Nodes or What If Analysis Systems grid, depending on the type of analysis with which you are currently working.	On the datasheet, this field is disabled and populated automatically. When you move a Hazards Analysis System/Node record in the grid, this value will change according to the record's current location in the grid. For example, the Hazards Analysis System/Node record that appears second in the grid will contain the value *2*.

Field	Data Type	Description	Behavior and Usage
System/Node Process Type	Character	The type of process that you are studying.	On the datasheet, this field appears as a list labeled **System/Node Process Type** and contains the following hard-coded values: ~~Gas/Oil Feed Steam Boiler~~ (Steam Generation) Ethylene Oxide storage (EO Storage) FCCU (Fluid Catalytic Cracking Unit)

HAZOP Deviation

HAZOP Deviation records store details on the condition within a process that deviates from the normal behavior during that process, resulting in a risk. The following table provides an alphabetical list and description of the fields that exist for the HAZOP Deviation family and appear on the HAZOP Deviation datasheet, unless otherwise specified. The information in this table reflects the baseline state and behavior of these fields.

Field	Data Type	Description	Behavior and Usage
Deviation/Guideword	Character	A brief description of the deviation.	On the datasheet, this field appears as a list labeled **Deviation/Guideword** and contains the description of the System Codes that exist in the MI_HAZOP_DEVIATIONS_TYPE System Code Table. You can choose from the following baseline values: More Pressure Less Pressure More Temperature Less Temperature More Flow Less Flow No Flow This value appears in the **Deviation ID** cell in the **HAZOP Nodes** grid. This field is required.
Deviation/Guideword Number	Character	A set of numeric values, separated by a decimal point, which represents the location in which the HAZOP Deviation record appears in the HAZOP Nodes grid.	On the datasheet, this field is disabled and populated automatically with a set of numeric values, separated by a decimal point. Specifically: • The first number is the value that exists in the System/Node Number field in the Hazards Analysis System/Node record to which the HAZOP Deviation record is linked. • The second number is the value that exists in the Sequence Number field in the HAZOP Deviation record. For example, *1.2*.

Field	Data Type	Description	Behavior and Usage
Sequence Number	Number	A numeric value that represents the sequence in which the HAZOP Deviation record appears in the grid, relative to the other HAZOP Deviation records that are linked to the same Hazards Analysis System/Node record.	This field does not appear on the datasheet by default. This value in this field is used to populate the Deviation/Guideword Number field.

Independent Protection Layer

Independent Protection Layer records store additional information about safeguards that are considered to be independent layers of protection. The following table provides an alphabetical list and description of the fields that exist for the Independent Protection Layer family. The information in the table reflects the baseline state and behavior of these fields. This list is not comprehensive.

Field	Data Type	Description	Behavior and Usage	Datasheet
Equipment ID	Character	The ID of the Equipment record that is linked to the Hazards Analysis Safeguard record to which the Independent Protection Layer record is linked.	This field is populated automatically with the value stored in the Equipment ID field in the Hazards Analysis Safeguard record to which the Independent Protection Layer record is linked.	None
Functional Location ID	Character	The ID for the Functional Location record that is linked to the Hazards Analysis Safeguard record to which the Independent Protection Layer record is linked.	This field is populated automatically with the value stored in the Functional Location field in Hazards Analysis Safeguard record to which the Independent Protection Layer record is linked.	None

Field	Data Type	Description	Behavior and Usage	Datasheet
IPL Credits	Number	The number of steps in the risk matrix that a risk is reduced by the IPL.	On the datasheet, this field is disabled and populated automatically with the number of steps between the unmitigated and mitigated risk rank values in the Risk Matrix. If the risk is *not* reduced by the same number of steps across each risk category (e.g., Safety), the value in the IPL Credits field will be the greatest number of steps reduced in a single category. For example, if each risk category is reduced by one step, the value in the IPL Credits field would be *1*. If two categories are reduced by one step and one category is reduced by two steps, the value in the IPL Credits field would be *2*. If the safeguard is *not* an IPL, the value in the IPL Credits field would be *0*. This value appears in the **IPL Credits** column on the **Hazop Nodes** and **What If Analysis Systems** grids.	Independent Protection Layer

Field	Data Type	Description	Behavior and Usage	Datasheet
IPL ID	Character	The ID of the independent protection layer.	On the datasheet, this value is disabled and populated automatically with *<Safeguard ID> - IPL*, where *<Safeguard ID>* is the value stored in the Safeguard ID field in the Hazards Analysis Safeguard record that is linked to the Independent Protection Layer record.	Independent Protection Layer
IPL Type	Character	The type of risk the IPL reduces. Consequence Reducing IPLs reduce the severity of the failure (e.g., fatality to injury. Frequency Reducing IPLs reduce how often the failures occur (e.g., every 100 years to every 1,000 years).	On the datasheet, this field is populated automatically with the value stored in the IPL Type field in the Hazards Analysis Safeguard record to which the Independent Protection Layer record is linked. This value appears in the **IPL Type** column on the **Hazop Nodes** and **What If Analysis Systems** grids and determines which cells in the Risk Matrix will be enabled when you define the mitigated risk rank for a hazardous Scenario.	Independent Protection Layer

What If

What If records store details about the hypothetical condition that may occur during process and lead to a risk. The following table provides an alphabetical list and description of the fields that exist for the What If family and appear on the What If datasheet, unless otherwise specified. The information in this table reflects the baseline state and behavior of these fields.

Field	Data Type	Description	Behavior and Usage
Sequence Number	Number	A numeric value that represents the position in which the What If record appears in the grid, relative to the other What If records that are linked to the same Hazards Analysis System/Node record.	This field does not appear on the datasheet by default. This field is used to populate the What If Number field.
What If Description	Text	A detailed description of the specific event or condition within a Scenario that deviates from the normal behavior of that process and directly leads to a risk.	On the datasheet, this field appears as a text box labeled **What If Description** and contains a button, which you can click to access the Text Editor.
What If ID	Character	A brief description of the event or condition within the Scenario that deviates from the normal behavior of the process.	On the datasheet, this field appears as a text box labeled **What If ID**, in which you can enter your own value. This value appears will appear in the What If ID cell in the What If Analysis Systems grid. This field is required.

Field	Data Type	Description	Behavior and Usage
What If Number	Character	A set of numeric values, separated by a decimal point, which represents the location in which the What If record appears in the **What If Analysis Systems** grid.	On the datasheet, this field is disabled and populated automatically with a set of numeric values. Specifically: • The first number is the value that exists in the System/Node Number field in the Hazards Analysis System/Node record to which the What If record is linked. • The second number is the value that exists in the Sequence Number field in the What If record.

System Code Tables Used by Hazards Analysis

The following System Code Tables are used by Hazards Analysis.

Table ID	Table Description	Function
MI_HAZARDS_ANALYSIS_LIFE_CYCLE_PHASE	Hazards Analysis Life Cycle Process Phase	Used to populate the Process Life Cycle Phase field in Hazards Analysis records.
MI_HAZOP_CAUSE_TYPE	HAZOP Cause Type	Used to populate the Cause Type field in Hazards Analysis Cause records.
MI_HAZOP_CONSEQUENCE_TYPE	HAZOP Consequence Type	Used to populate the Consequence Type field in Hazards Analysis Consequence records.
MI_HAZOP_DEVIATIONS	HAZOP Deviations	Used to populate the Deviation/Guideword field in HAZOP Deviation records.
MI_HAZOP_IPL_TYPE	IPL Types	Used to populate the IPL Type field in Hazards Analysis Safeguard records.
MI_HAZOP_SAFEGUARD_TYPE	HAZOP Safeguard Type	Used to populate the Safeguard Type field in Hazards Analysis Safeguard records.

Parameters for the Hazards Analysis Base URL

There is one root URL associated with Hazards Analysis: **meridium://HAZOP**. A link constructed from the path alone will open the **Hazards Analysis Start Page**. In addition, you can use any of the parameters described in the following table.

Parameter Name	Description	Accepted Value (s)	Notes
Page	Specifies the page in Hazards Analysis that you want to view.	Search Definition Revisionhistory Team Documents Nodes ManageAssets	The Page parameter is required. Use the following links to view notes about each value that is accepted by the Page parameter. Search Displays the **<Analysis Type> Search** page, where **<Analysis Type>** specifies the type of Hazards Analysis records you can search for using the page (e.g., **HAZOP Analysis** page). The analysis type is determined by the AnalysisType parameter value. If no AnalysisType parameter is provided in the URL, the **HAZOP Analysis Search** page will be displayed. Definition Displays a new or existing Hazards Analysis record on the **<Analysis Type> Definition** page, where **<Analysis Type>** specifies the type of analysis to which the record belongs. The analysis type is determined by the AnalysisType parameter. If the EntyKey parameter is included in the URL, the page will display the *existing* Hazards Analysis record with the specified Entity Key. If, however, the EntyKey parameter is omitted from the URL, the page will display a *new* Hazards Analysis record for the analysis type that is identified by the AnalysisType parameter value. If the AnalysisType parameter is included in the URL, the page dis-

Parameter Name	Description	Accepted Value (s)	Notes
			plays a Hazards Analysis record on the **What If Analysis Definition** page. If the AnalysisType parameter is omitted from the URL, the page will display a Hazards Analysis record on the **HAZOP Analysis Definition** page. Revisionhistory Displays the **Analysis Revision History** page for the Hazards Analysis record specified in the EntyKey parameter. If the Revisionhistory parameter is included in the URL, the EntyKey parameter is required. The analysis type is determined by the Analysis Type parameter. If the AnalysisType parameter is included in the URL, the **Analysis Revision History** page displays content in the context of a What If Analysis. If the AnalysisType parameter is omitted from the URL, the page displays content in the context of a HAZOP Analysis. Team Displays the **<Analysis Type> Team Members** page for the Hazards Analysis that is specified by the EntyKey parameter, where **<Analysis Type>** is the type of analysis to which the team members belong. The analysis type is determined by the Analysis Type parameter. If the Team parameter is included, the EntyKey parameter is required. If the AnalysisType parameter is included in the URL, the **What If Analysis Team Members** page is

Parameter Name	Description	Accepted Value (s)	Notes
			displayed. If the AnalysisType parameter is omitted from the URL, the **HAZOP Analysis Team Members** page is displayed. Documents Displays the **Reference Documents** page for the Hazards Analysis specified by the EntyKey parameter. The analysis type is determined by the AnalysisType parameter. If the Documents parameter is included, the EntyKey parameter is required. If the AnalysisType parameter is included in the URL, the content of the page appears in context of a What If Analysis. If the AnalysisType parameter is omitted from the URL, the content of the page appears in context of a HAZOP Analysis. Nodes Displays either the **What If Analysis Systems** page or the **HAZOP Nodes** page for the Hazards Analysis specified by the EntyKey parameter. The analysis type is determined by the AnalysisType parameter. If the Nodes parameter is included in the URL, the EntyKey parameter is required. If the AnalysisType parameter is included in the URL, the **What If Analysis Systems** page is displayed. If the AnalysisType parameter is omitted from the URL, the **HAZOP Nodes** page is displayed.

Parameter Name	Description	Accepted Value (s)	Notes
			ManageAsssets Displays either the **What If Analysis Assets** page or the**HAZOP Analysis Assets** page for the Hazards Analysis specified by the EntyKey parameter. The analysis type is determined by the AnalysisType parameter. If the ManageAssets parameter is included, the EntyKey parameter is required. If the AnalysisType parameter is included in the URL, the **What If Analysis Assets** page is displayed. If the AnalysisType parameter is omitted from the URL, the **HAZOP Analysis Assets** page is displayed.
EntyKey	Specifies the Entity Key of the record that you want to manage on the specified page.	Numeric Entity Key	The EntyKey parameter is required for the following Page parameter values: • Revisionhistory • Team • Documents • Nodes
AnalysisType	Specifies the desired analysis type.	WhatIf	This parameter is required *only* if you want to manage a Hazards Analysis record in the context of a What If Analysis. If you exclude this parameter, features specific to HAZOP Analyses will appear by default.

Examples of Hazards Analysis URLs

- Meridium://HAZOP

  Displays the **Hazards Analysis Start Page**.

- Meridium://HAZOP**?Page=Search**

  Displays the **HAZOP Analysis Search** page.

- Meridium://HAZOP?Page=Search**&AnalysisType=WhatIf**

  Displays the **What If Analysis Search** page.

- Meridium://HAZOP**?Page=Definition**

  Displays a new Hazards Analysis record on the **HAZOP Analysis Definition** page.

- Meridium://HAZOP**?Page=Definition&AnalysisType=WhatIf**

  Displays a new Hazards Analysis record on the **What If Analysis Definition** page.

- Meridium://HAZOP?Page=Definition**&EntyKey=64251874508**

  Displays on the **HAZOP Analysis Definition** page the Hazards Analysis record with the Entity Key 64251874508.

- Meridium://HAZOP?Page=Definition**&AnalysisType=WhatIf&EntyKey=64251876497**

  Displays on the **What If Analysis Definition** page the Hazards Analysis record with the Entity Key 64251876497.

- Meridium://HAZOP**?Page=RevisionHistory&EntyKey=64251874508**

  Displays within the context of a HAZOP Analysis the **Analysis Revision History** page for the Hazards Analysis record with the Entity Key 64251874508.

- Meridium://HAZOP?Page=RevisionHistory**&AnalysisType=WhatIf&EntyKey=64251876497**

  Displays within the context of a What If Analysis the **Analysis Revision History** page for the Hazards Analysis record with the Entity Key 64251876497.

- Meridium://HAZOP**?Page=Team&EntyKey=64251874508**

  Displays the **HAZOP Analysis Team Members** page that is associated with the Hazards Analysis record with the Entity Key 64251874508.

- Meridium://HAZOP?Page=Team**&AnalysisType=WhatIf&EntyKey=64251876497**

  Displays the **What If Analysis Team Members** page that is associated with the Hazards Analysis record with the Entity Key 64251876497.

- Meridium://HAZOP**?Page=Documents&EntyKey=64251874508**

Displays within the context of a HAZOP Analysis the **Reference Documents** page for the Hazards Analysis record with the Entity Key 64251874508.

- Meridium://HAZOP?Page=Documents**&AnalysisType=WhatIf&EntyKey=64251876497**

  Displays within the context of a What If Analysis the **Reference Documents** page for the Hazards Analysis record with the Entity Key 64251876497.

- Meridium://HAZOP**?Page=Nodes&EntyKey=64251874508**

  Displays the **HAZOP Nodes** page for the Hazards Analysis record with the Entity Key 64251874508.

- Meridium://HAZOP?Page=Nodes**&AnalysisType=WhatIf&EntyKey=64251876497**

  Displays the **What If Analysis Systems** page for the Hazards Analysis record with the Entity Key 64251876497.

- Meridium://HAZOP**?Page=ManageAssets&EntyKey=64251874508**

  Displays the **HAZOP Analysis Assets** page for the Hazards Analysis record with the Entity Key 64251874508.

- M
  eridium://HAZOP?Page=ManageAssets
  &AnalysisType=WhatIf&EntyKey=64251874508

  Displays the **What If Analysis Assets** page for the Hazards Analysis record with the Entity Key 64251874508.

Cause

An event that results from a deviation and leads to a negative safety or environmental outcome.

Consequence

A negative safety or environmental outcome that results from a cause.

Deviation

A condition that deviates from the normal behavior of the process and directly leads to a risk.

Hazards and Operability (HAZOP) Analysis

An analysis that allows you to document the *known* hazardous Scenarios associated with a process, assess the likelihood of the risks in those Scenarios occurring, and determine the best way to mitigate the risk in those Scenarios.

Independent Layer of Protection

A system, action, or item that mitigates the risk associated with a hazardous scenario. IPLs must be independent, auditable, capable, and specific.

Process

A series of actions that are performed by multiple pieces of equipment or locations in a single system.

Safeguard

A safety instrumented system or other safety device that prevents a risk from occurring or lowers the probability or severity identified by a risk assessment.

Scenario

For a given process, the combination of a risk and its risk assessment, where a risk is any event that can occur that threatens safety, either human or the environment, and the negative outcome associated with that event (e.g., human injury). You can define multiple Scenarios for a single process.

What If Analysis

An analysis that allows you to hypothesize about the *possible* hazardous Scenarios, determine the risk associated with those Scenarios, and determine the best way to mitigate those risks.