One Network Enterprises

Multi-Echelon Inventory Optimization (MEIO) User Guide

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1   MEIO Engine Overview

The Multi-Echelon Inventory Optimization (MEIO) Engine calculates the optimal inventory levels to satisfy desired fill rates and minimize inventory cost with the ability to set enterprise-wide constraints (budgets), site constraints (capacity, and item constraints (critical items). The engine runs for multiple sites and multiple items concurrently to balance the needs across the entire network. The MEIO Engine is a METRIC Algorithm where fill rate is derived from stocking level where that stocking level is increased at the buffers that would drive the network to the desired fill rate the most for the least cost.

The multi-item, multi-echelon engine builds a network of buffers (items at sites) that contain information such as current stocking level, safety stock, and other attributes. Buffers are connected by buffer lanes that identify an item, ship from sites, and ship to sites. All buffers for an item are connected but are disconnected from buffers of another item.

Within the network of buffers, the MEIO engine uses the historical data from the Multi-Tier Inventory Planning (MTIP) Statistics Engine and reads the mean and standard deviation of supply (lead time) and demand (forecast and forecast error). It also reads the current safety stock quantity and determines the minimum and maximum safety stock required to meet the desired service levels. Next, the user defines the desired service level in a scenario, a collection of flags that describe how the user wants the engine to execute. In the scenario the engine uses, the user may set the minimum and maximum service levels required and other parameters such as the service level for critical items, the safety stock budget, the safety stock optimization policy, and more. The user also sets objectives for the MEIO Engine, which are the engine's targets and can vary by item group.

Once the scenario and objectives for the engine are set, the MEIO engine runs. After the run, users view the MEIO Recommended Policy Report. The report enables users to review the resulting safety stock calculations from the engine, check for errors, and determine if they agree with the engine's solution. From the report, they can accept the values and update the safety stock for all buffers. The new safety stock will appear on the next run.

Typically, the steps in the MEIO process are configured to run automatically as a scheduled part of a chain of preplanned actions that are configured when the system is implemented. However, this user guide will cover configuring and running these steps individually.

2 MEIO Process Overview

This ordered list describes the steps in the Multi-Echelon Inventory Optimization (MEIO) process. Many of these steps are configured to run automatically, but many may also be completed manually. Click a link to view more detailed information about that step in the process.

1. If necessary, create or update the **Multi-Tier Inventory Planning Statistical Engine (MTIP Stat) Scenario** to set the desired parameters for the MTIP Stat engine run. (Once a scenario has been configured, this step will rarely need to be completed again.)

2. If necessary, create or update the **MEIO Scenario** to set the desired parameters for the MEIO engine run. (Once a scenario has been configured, this step will rarely need to be completed again.)

3. If necessary, create or update the MEIO Objectives for the MEIO engine to set up desired targets. (This step is only necessary if the engine targets have changed.)

4. View the IP Data Sanity Summary to check for issues with the data the MEIO engine will use. Correct the master data if required. This action should be taken before the monthly scheduled run of the MEIO engine.

5. Provide relevant statistical data as input for MEIO engine:

    A. Order Lead Time Std Deviation
    B. Production Demand Statistics

6. Set up Safety Stock constraints on Buffers if needed. For more information, see the "Buffers" section in the current release of *Online Help*. Safety stock constraints include:

    A. Max Safety Stock Change as Percentage
    B. Min/Max Safety Stock constraints
    C. Min/Max Safety Stock constraints effective period

7. Run IP master data management script. This step is only run automatically as part of a scheduled IP functionality chain and cannot be run manually. Users should be aware that the script is part of the process they will need to check if they experience issues with the MEIO process. The purposes of this script are to:

    A. Set up Order Lead time on Buffer Lanes
    B. Manage buffers not requiring safety stock optimization
    C. Manage master data errors: disable circular buffer lanes

8. Run the MTIP Stat Engine. (This engine is usually scheduled to run automatically as part of a monthly scheduled IP functionality chain.)

9. Run the MEIO Engine. (This engine is usually scheduled to run automatically as part of a monthly scheduled IP functionality chain.)

10. View the results in the MEIO Run Summary report and MEIO Recommended Policy Report and check for errors.

11. Make adjustments to the safety stock levels on Buffers based on the MEIO Recommended Policy Report recommendations to achieve the desired service level. The safety stock levels can be updated at all buffers from the MEIO Recommended Policy Report.

3 Creating And Working With MTIP Stats Engine Scenarios

Complete the following steps to create a new multi-tier stat scenario:

1. Log in to the ONE system.
2. Select **Menu/Favs > Inventory Planning > Configuration > Multi-Tier Stat Scenario > New Multi-Tier Stat Scenario.**
   The New Multi-Tier Stat Scenario screen appears.
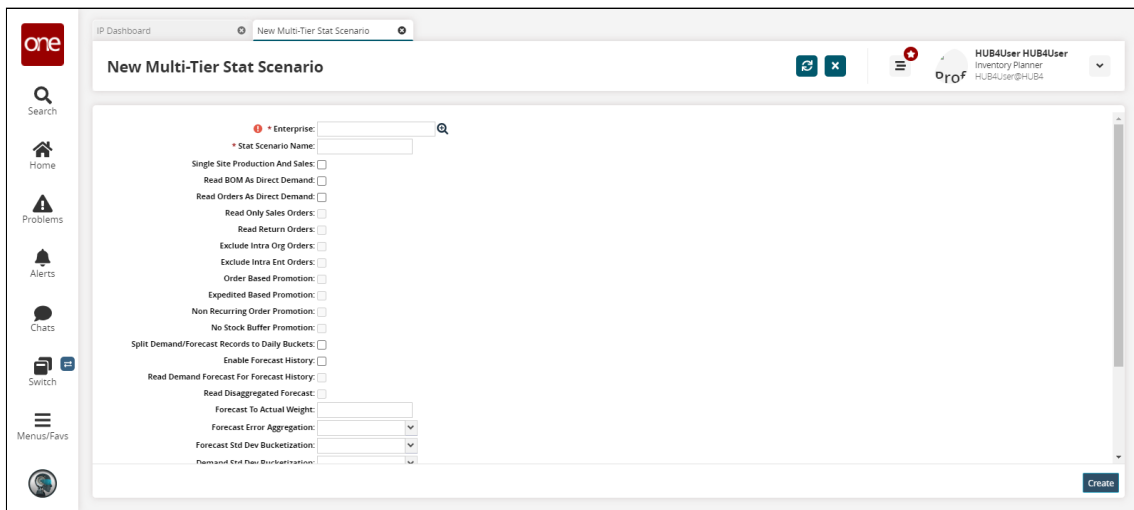
3. Fill out the following fields. Fields marked with an asterisk (*) are required. Ensure the **Calculate Multi-Source Lead Time Stats** checkbox is selected for this workflow.

Field	Description
*Enterprise	Select an enterprise using the picker tool. For this example, we will select **HUB4**.
*Stat Scenario Name	Enter a stat scenario name. Take note of the name you input here, as it will be used later in the workflow.
Single Site Production And Sales	Select this checkbox to have a single site for both production and sales.

Field	Description
Read BOM As Direct Demand	Select this checkbox to read BOMs as direct demand.
Read Orders As Direct Demand	Select this checkbox to read orders as direct demand.
Read-Only Sales Orders	This field is only active if the **Read Orders As Direct Demand** checkbox is selected. Select this checkbox to set sales orders as read-only.
Read Return Orders	This field is only active if the **Read Orders As Direct Demand** checkbox is selected. Select this checkbox to read return orders.
Exclude Intra Org Orders	This field is only active if the **Read Orders As Direct Demand** checkbox is selected. Select this checkbox to exclude intra-organization orders.
Exclude Intra Ent Orders	This field is only active if the **Read Orders As Direct Demand** checkbox is selected. Select this checkbox to exclude intra-enterprise orders.
Order Based Promotion	This field is only active if the **Read Orders As Direct Demand** checkbox is selected. Select this checkbox to order based on promotion.
Expedited Based Promotion	This field is only active if the **Read Orders As Direct Demand** checkbox is selected. Select this checkbox to expedite based on promotion.
Non-Recurring Order Promotion	This field is only active if the **Read Orders As Direct Demand** checkbox is selected. Select this checkbox to have non-recurring order promotions.
No Stock Buffer Promotion	This field is only active if the **Read Orders As Direct Demand** checkbox is selected. Select this checkbox to have no-stock buffer promotions.
Split Demand/Forecast Records to Daily Buckets	Select this checkbox to split demand and forecast records into daily buckets.
Enable Forecast History	Select this checkbox to enable forecast history.

Field	Description
Read Demand Forecast For Forecast History	This field is only active if the **Enable Forecast History** checkbox is selected. Select this checkbox to read demand forecasts for forecast histories.
Read Disaggregated Forecast	This field is only active if the **Read Demand Forecast For Forecast History** checkbox is selected. Select this checkbox to read disaggregated forecasts.
Forecast To Actual Weight	This field is only active if the **Read Disaggregated Forecast** checkbox is selected. Enter a value.
Forecast Error Aggregation	Select a value from the drop-down menu.
Forecast Std Dev Bucketization	Select **Daily** or **Monthly** from the drop-down menu.
Demand Std Dev Bucketization	Select **Daily** or **Monthly** from the drop-down menu.
Strictly Use Start And End History Dates	Select this checkbox to strictly use start and end history dates.
Ordering UOM As Computation UOM	Select this checkbox to set the ordering UOM as the computation UOM.
Computation UOM	Select a value from the drop-down menu.
Disable Production Demand Calc	Select this checkbox to disable production demand calculations.
Calculate Item Cost	Select this checkbox to calculate item costs.
Calculate Multi-Source Lead Time Stats	Select this checkbox to calculate multi-source lead time statistics.

4. Click **Create**.
   A success message appears.

4 Creating And Working With MEIO Scenarios

Scenarios are the configuration models for the MEIO engine, which set up the parameters the engine uses for computation when it runs. A scenario is a collection of flags that describe how the user wants the engine to execute. When users create a scenario, they set specific values that tell the engine how to perform the calculations to achieve the desired fill rate. Once initially created, users will typically not need to update or change the scenario.

Complete the following steps to search or view existing MEIO scenarios:

1. Log in to the ONE system.
2. Select **Menu/Favs > Inventory Planning > Configuration > Search MEIO Scenario**. The **Search MEIO Scenario** screen displays.

3. Click the **Filters (edit)** link to reduce the number of entries shown in the report.
4. Click a link in the **Scenario Name** column to view and/or update the scenario's details. The scenario details will open in a new tab.
5. Click the **Export to CSV** button to export the report to a CSV file. You can also click the **Download** button to download a CSV file in an integrated format.
6. Click **Upload** to upload a new scenario in CSV format.
7. Click **New MEIO Scenario** to create a new MEIO scenario. The **New MEIO Scenario** screen displays. Follow the instructions below, beginning at #3.

Complete the following steps to create a New MEIO Scenario:

1. Log in to the ONE system.
2. Select **Menu/Favs > Inventory Planning > Configuration > New MEIO Scenario**.
3. The **New MEIO Scenario** screen displays.

4. Fill out the following fields. Fields with an asterisk (*) are required.

Field Name	Description
*Enterprise	Enter the Enterprise for the scenario or use the picker tool to select an Enterprise.
*Scenario Name	Enter a unique name for the new scenario.
*Desired Service Level	Enter a number between 0-100 for the target service level for the network.
Item Min Service Level	Enter a number between 0-100 for the required minimum service level for buffers.
Item Max Service Level	Enter a number between 0-100 for the maximum service level for buffers.
Item Critical Service Level	Enter a number between 0-100 for the service level for critical buffers.
Safety Stock Budget	Enter the safety stock budget constraint.
Back Order Epsilon	Enter the back order epsilon. This value is used for back order computation tuning.

| Field Name	Description
Back Order Max Steps	Enter the maximum number of back order steps. This value is used for back order computation tuning.
Back Order Step Size Scaling Factor	Enter the step-size scaling factor for back orders. This value is used for back order computation tuning.
Safety Stock Optimization Policy	Select a Safety Stock Optimization Policy from the drop-down list. These options set the policy for the desired incremental approach for safety stock optimization.
EBO Min Threshold	Enter the EBO minimum threshold. This setting is required if Dynamic Increment Stocking Heuristic (DISH) is selected as the Safety Stock Optimization Policy.
EBO Proportion Threshold	Enter the EBO proportion threshold. This setting is required if Dynamic Increment Stocking Heuristic (DISH) is selected as the Safety Stock Optimization Policy.
Update Buffer SS	Check the box to update the buffer safety stock.
Apply Max SS Change	Check the box to apply the maximum safety stock change.
Update SS Rule	Select an option from the drop-down list.

5. Click **Update**.
   A success message appears.

# 5   Creating And Working With MEIO Objectives

MEIO objectives customize the targets of the MEIO engine for particular data subnets, such as the product group level or the site group level. The values in MEIO Objectives override the values of the associated MEIO scenario.

Complete the following steps to search or view existing MEIO objectives:

1. Log in to the ONE system.
2. Select **Menu/Favs** > **Inventory Planning** > **Configuration** > **Search MEIO Objectives**. The **Search MEIO Objectives** screen displays.
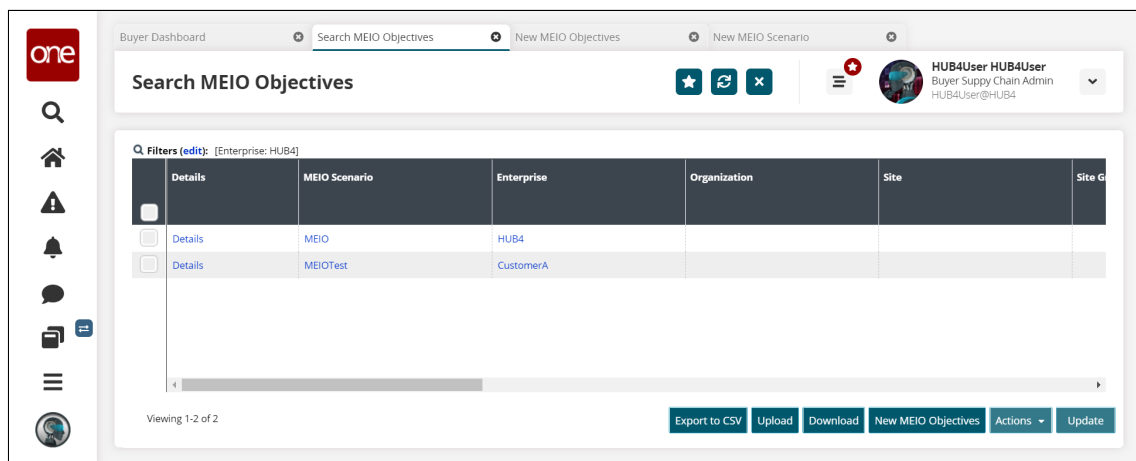

3. Click the **Filters (edit)** link to reduce the number of entries shown in the report.
4. Click the link in the **Details** column to view and update an existing MEIO objective. In addition, click the links in the **MEIO Scenario** and **Enterprise** columns to view that information as well. The links open in a new tab.
5. Click the **Export to CSV** button to export the report to a CSV file. You can also click the **Download** button to download a CSV file in an integrated format.
6. Click **Upload** to upload new objectives in CSV format.
7. Click **New MEIO Objectives** to create new MEIO objectives in a new tab. For more information, see the section below on creating new MEIO objectives.
8. Click the checkbox beside a set of objectives, and click the **Update** button to make changes to those objectives.
9. To remove a set of objectives from the list, click the checkbox beside the set of objectives you want to remove, click the **Actions** button, and select **Delete**.
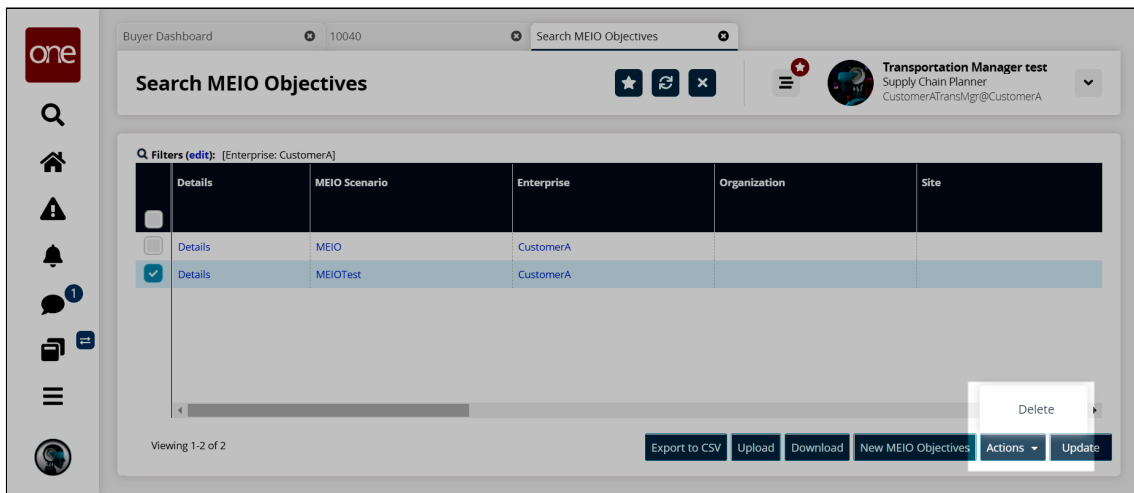
Complete the following steps to create new MEIO objectives:

1. Log in to the ONE system.
2. Select **Menu/Favs** > **Inventory Planning** > **Configuration** > **New MEIO Objectives**. The **New MEIO Objectives** screen displays.
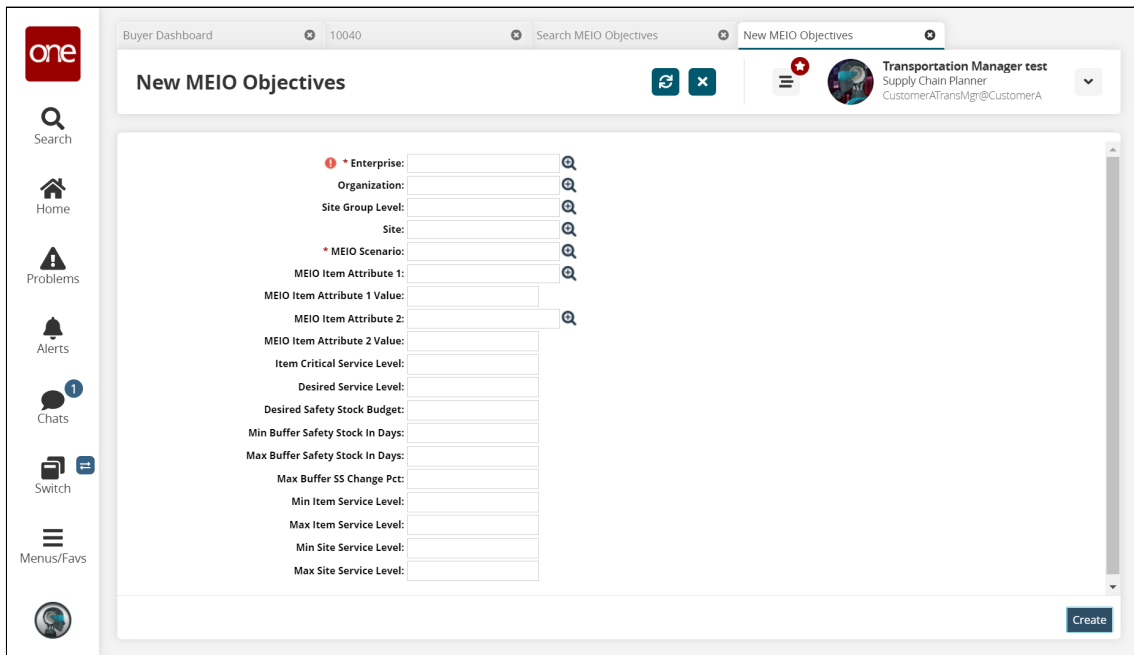
3. Fill out the following fields. Fields with an asterisk (*) are required.

Field Name	Description
*Enterprise	Enter the Enterprise or use the picker tool to select an Enterprise.

| Field Name	Description
Organization	Enter the organization name or use the picker tool to select an organization.
Site Group Level	Enter a site group level or use the picker tool to select a site group level.
Site	Enter a site or use the picker tool to select a site.
*MEIO Scenario	Enter an MEIO scenario or use the picker tool to select an MEIO scenario.
MEIO Item Attribute 1	Enter the name of an MEIO item attribute or use the picker tool to select an item attribute.
MEIO Item Attribute 1 Value	Enter the value for item attribute 1.
MEIO Item Attribute 2	Enter the name of an MEIO item attribute or use the picker tool to select an item attribute.
MEIO Item Attribute 2 Value	Enter the value for Item Attribute 2.
Item Critical Service Level	Enter the item critical service level.
Desired Service Level	Enter the desired service level.
Desired Safety Stock Budget	Enter the desired safety stock budget.
Min Buffer Safety Stock In Days	Enter the minimum buffer safety stock in days.
Max Buffer Safety Stock In Days	Enter the maximum buffer safety stock in days.
Max Buffer SS Change Pct	Enter the maximum buffer safety stock change in percent.
Min Item Service Level	Enter the minimum item service level.
Max Item Service Level	Enter the maximum item service level.
Min Site Service Level	Enter the minimum site service level.
Max Site Service Level	Enter the maximum site service level.

4. Click **Create**.

6   Viewing The IP Data Sanity Summary

The IP Data Sanity Summary report shows users the master data from the Multi-Tier Inventory Planning (MTIP) Stats Engine that is used as input for the Multi-Echelon Inventory Optimization (MEIO) Engine, enabling them to identify and fix issues before the MEIO engine is run. Users can review the IP Data Sanity Summary report before the monthly MEIO engine run to ensure the master data from the MTIP Stats Engine does not have any errors that would lead to incorrect results from the MEIO Engine.

Complete the following steps to view the IP Data Sanity Summary report:

1. Log in to the ONE System.
2. Select **Menu/Favs** > **Inventory Planning** > **IP Data Sanity Summary**.
   The **IP Data Sanity Summary** report filters display.
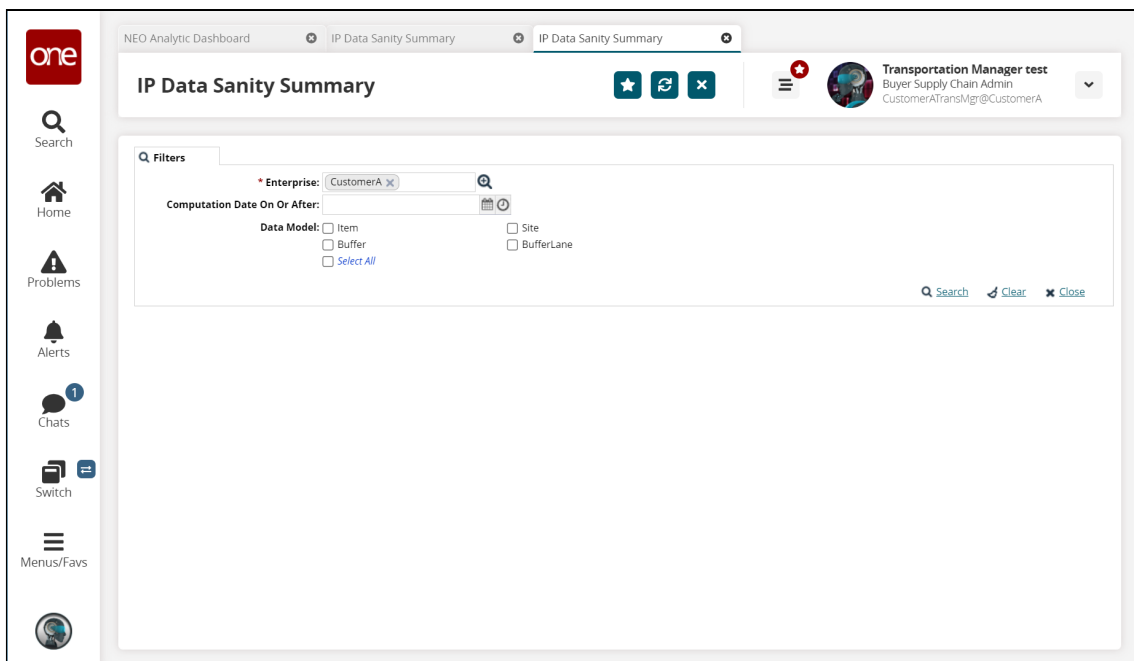
3. Enter the **Enterprise** or use the picker tool to select an **Enterprise**. This field is required.
4. If desired, enter a time and date in the **Computation Date On Or After** field or use the calendar and time icons to select the date from which you want the data summary to begin calculation.
5. If desired, select the checkbox next to each **Data Model** you want to be included in the data summary. You may select more than one.
6. Click the **Search** link.
   The **IP Data Sanity Summary** report displays the data from the **MTIP Stats Engine** calculations for the selected Enterprise.
7. Click the **Export to CSV** button to export the report to a CSV file.

7 Providing Statistical Data For The MEIO Engine

Complete the following steps to ensure the buffer lanes have relevant statistical values:

1. Log in to the ONE system.
2. Select **Menu/Favs > Inventory Planning > Multi-Tier Inventory Planning Stats > Buffer Lane Stats Engine Values**.
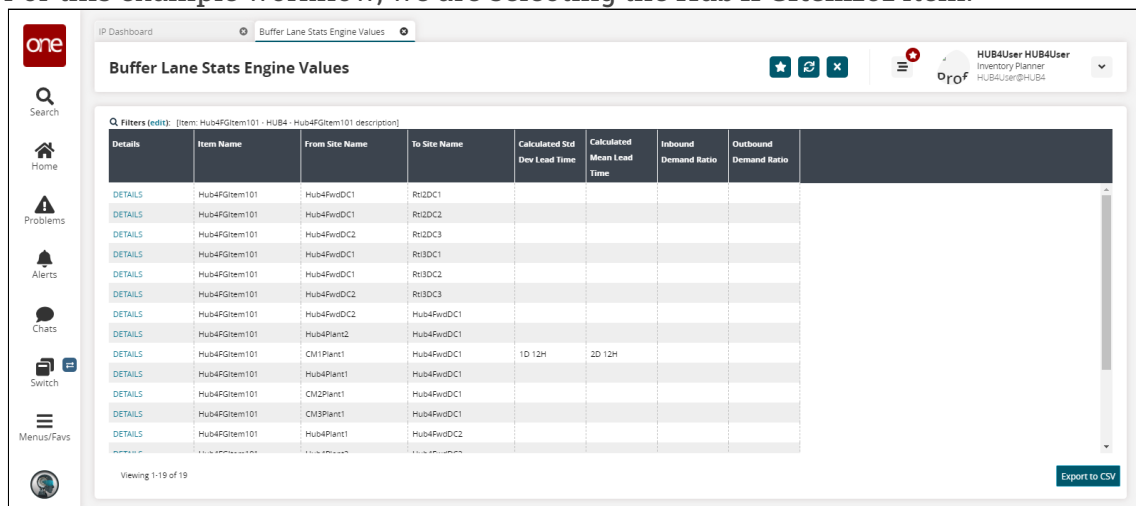   The Buffer Lane Stats Engine Values screen appears.
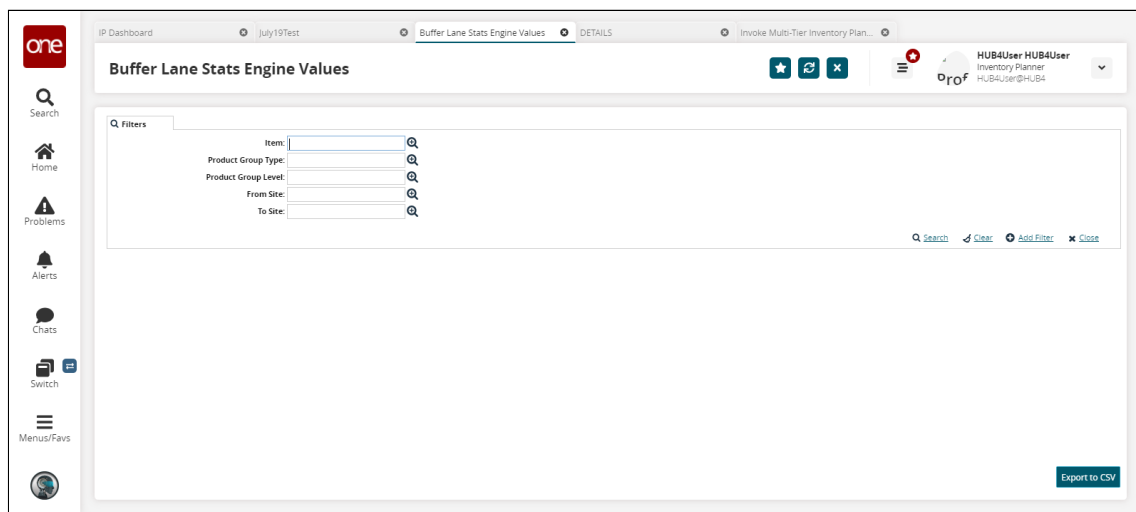
3. Input the desired filters and click the **Search** link.
   The search results appear.
   For this example workflow, we are selecting the **Hub4FGItem101** item.

For this example workflow, we need a number of buffer lanes with specified values in the **Calculated Std Dev Lead Time** and **Calculated Mean Lead Time** columns. To accomplish this, we will input that information manually.

4. Click the **DETAILS** link for a buffer lane.
   The details page appears.
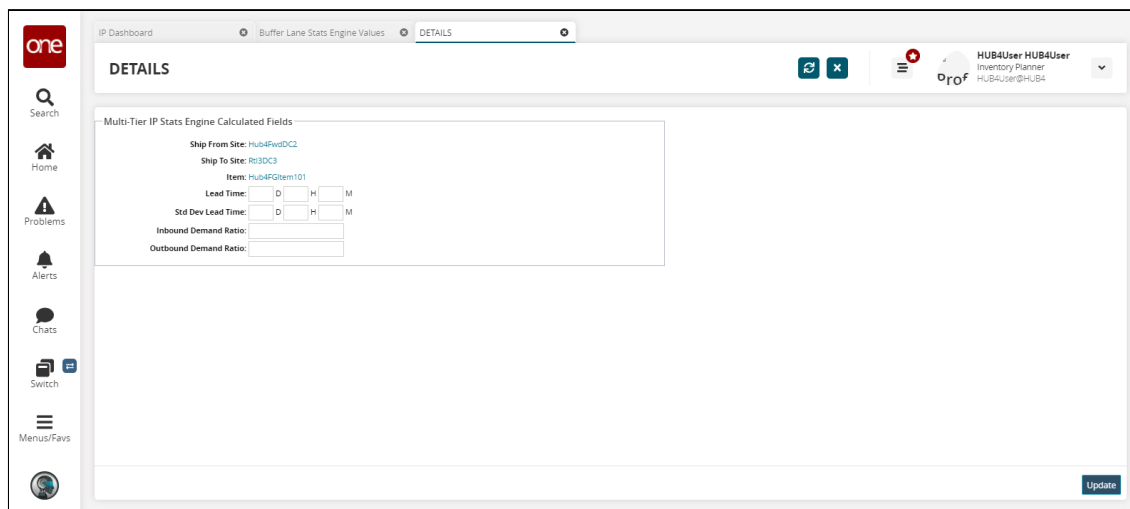
5. Input values in the **Lead Time** and **Std Dev Lead Time** fields in days, hours, and minutes.
6. Click **Update**.
7. Repeat the previous steps to update the lead times for buffer lanes on as many buffer lanes as desired.

8 Running The MTIP Stats Engine

Complete the following steps to run the Multi-Tier Inventory Planning (MTIP) Stats engine:

1. Log in to the ONE system.
2. Select **Menu/Favs > Inventory Planning > Multi-Tier Inventory Planning Stats > Invoke Multi-Tier Inventory Planning Stat Engine**.
   The Invoke Multi-Tier Inventory Planning Stat Engine screen appears.
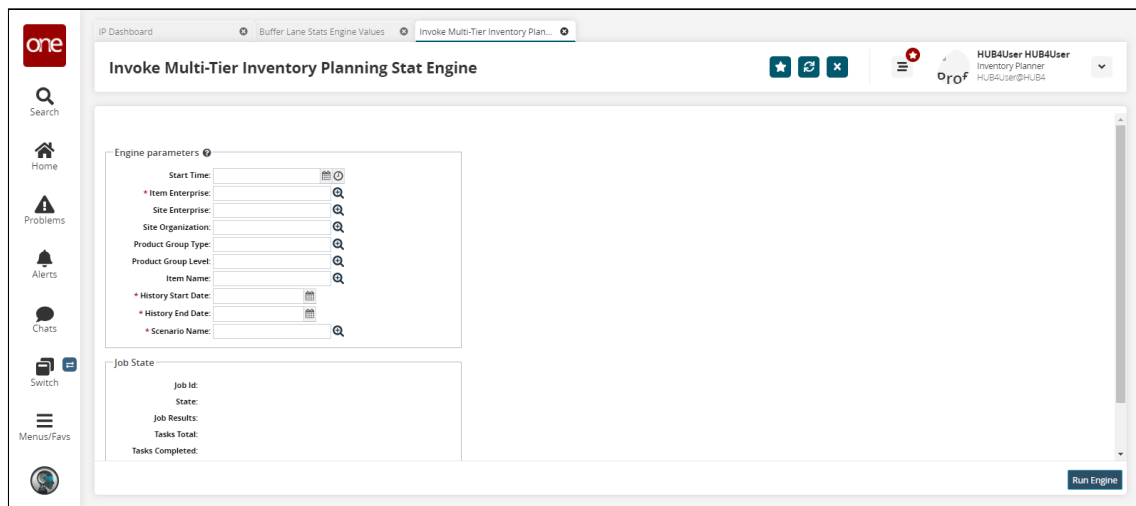
3. Fill out the required fields. See the "Invoking the Multi-Tier Inventory Planning Engine" section in the *Online Help* for more information.
   For this example workflow, ensure that the **Item Enterprise** field is **HUB4**, the **Item Name** field is Hub4FGItem101, and the **Scenario Name** field is what was entered in the **Stat Scenario Name** field earlier in the workflow.
4. Click **Run Engine.**
   A success message appears.
5. Select **Menu/Favs > Inventory Planning > Multi-Tier Inventory Planning Stats > Multi-Tier IP Stats Buffer Search Detail** Report.
   The Multi-Tier IP Stats Buffer Search Detail Report screen appears.
6. Scroll to the right and the **Mean Lead Time** and **Std Dev Lead Time** columns are populated.

9   Running The MEIO Engine

Users can run the MEIO engine to calculate safety stock for all items and sites. The MEIO engine is almost always scheduled to run automatically on a regular basis as part of a chain of preplanned actions, usually configured during implementation. However, a user can also invoke the engine manually if desired.

Before completing the steps below to run the engine, the MTIP Stats engine should have already been run to provide the MEIO engine with the historical data required. The data from this MTIP Stats engine run can be checked for accuracy in the IP Data Sanity Summary. In addition, at least one scenario with objectives must have been created before running the MEIO engine. For more information, see the following topics:

- Viewing the IP Data Sanity Summary
- Creating and Working with MEIO Scenarios
- Creating and Working with MEIO Objectives

Complete the following steps to run the MEIO engine:

1. Log in to the ONE system.
2. Click **Menus/Favs** > **Inventory Planning** > **MEIO Engine** > **Invoke MEIO Engine**. The **Invoke MEIO Engine** screen appears.
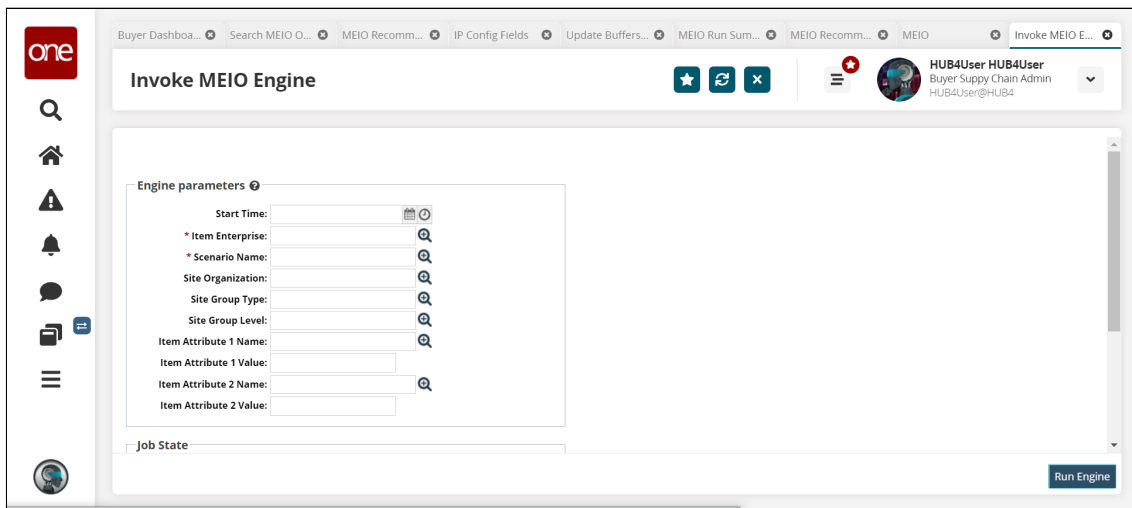
3. Fill out the following fields. Fields marked with an asterisk (*) are required.

Field	Description
Start Time	Enter the start time and date to invoke the engine.

Field	Description
*Item Enterprise	Use the picker tool to select an item enterprise. Multiple values can be selected for this field.
*Scenario Name	Use the picker tool to select a scenario name.
Site Organization	Use the picker tool to select a site organization.
Site Group Type	Use the picker tool to select a site group type.
Site Group Level	Use the picker tool to select a site group level.
Item Attribute 1 Name	Use the picker tool to select a name for item attribute 1.
Item Attribute 1 Value	If the **Item Attribute 1 Name** field is filled, enter a value for item attribute 1.
Item Attribute 2 Name	Use the picker tool to select a name for item attribute 2.
Item Attribute 2 Value	If the **Item Attribute 2 Name** field is filled, enter a value for item attribute 2.

4. Click **Run Engine**.
   The engine run information appears in the **Job State** section.

10 Working With The MEIO Recommended Policy Report

After the MEIO engine runs, the MEIO Recommended Policy Report displays the details of safety stock results generated by the engine for all buffers within the scope of the engine's execution. The report's recommended safety stock results from the Calculated Safety Stock being subjected to Minimum/Maximum Safety Stock Days, the Actual Fill Rate, the Target Fill Rate, and other parameters. Users can review the resulting safety stock calculations from the engine, check for errors, and determine if they agree with the report's recommended solution. In addition, users can update the safety stock for all buffers, configure the IP fields, or download the buffers from the report.

Complete the following steps to view the MEIO Recommended Policy Report:

1. **Log in to the ONE system.**
2. Select Menu/Favs > Inventory Planning > MEIO Engine > MEIO Recommended Policy Report.
   The **MEIO Recommended Policy Report** displays with the filters automatically open.
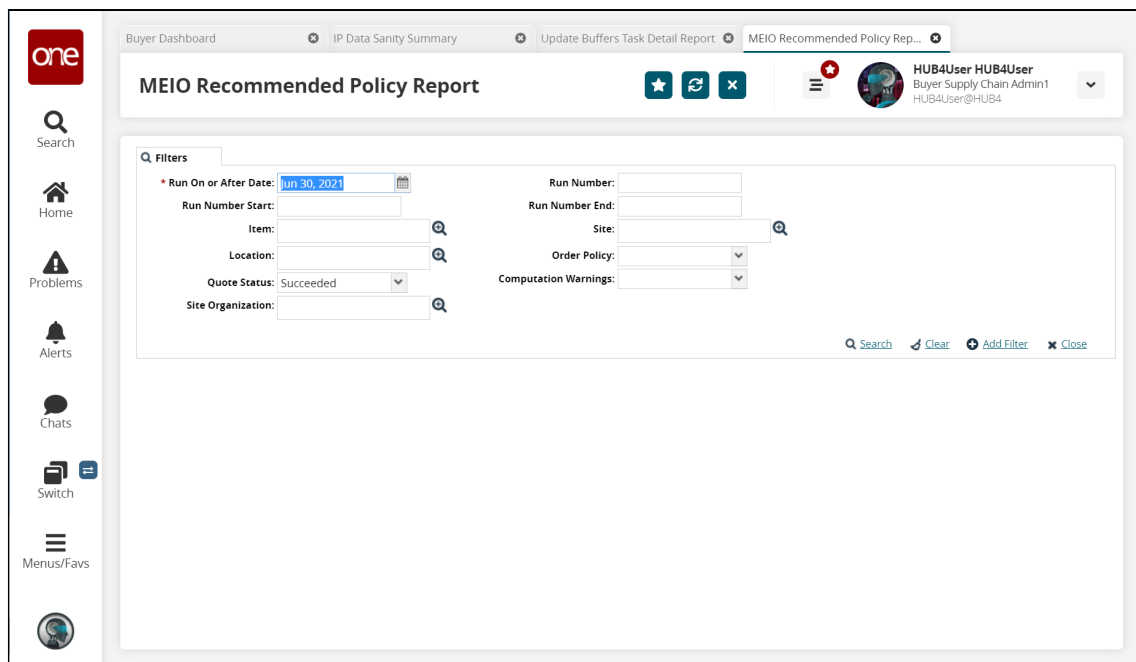
3. Enter a date in the **Run On or After Date** filter field to specify which MEIO engine runs you want to be included in the report.
4. Enter information in other filter fields as desired, or click the **Add Filter** link to add additional filters.
5. Click the **Search** link.
   The MEIO Recommended Policy Report displays.

6. Click the **Export to CSV** button to export the report to a CSV file.
7. Click **Download Buffer** to download the buffer details as a CSV file in an integrated format.
8. Click **Set IP Fields** to configure the IP fields for the buffers in a new tab.
9. Click **Update All Buffers** to accept the recommendations on the report and copy the safety stock value to the buffer.
   The **Update Buffers Task Detail Report** opens in a new tab with the option to export the report to a CSV file.

11 Working With The MEIO Run Summary

The MEIO Run Summary displays a top-level summary of an MEIO engine run, including Run Number, Run Date, Total Run Time, Total Service Level, and more.

Complete the following steps to view the MEIO Run Summary:

1. Log in to the ONE system.
2. Select **Menu/Favs** > **Inventory Planning** > **MEIO Engine** > **MEIO Run Summary**.
   The **MEIO Run Summary** screen appears with the filters displayed.
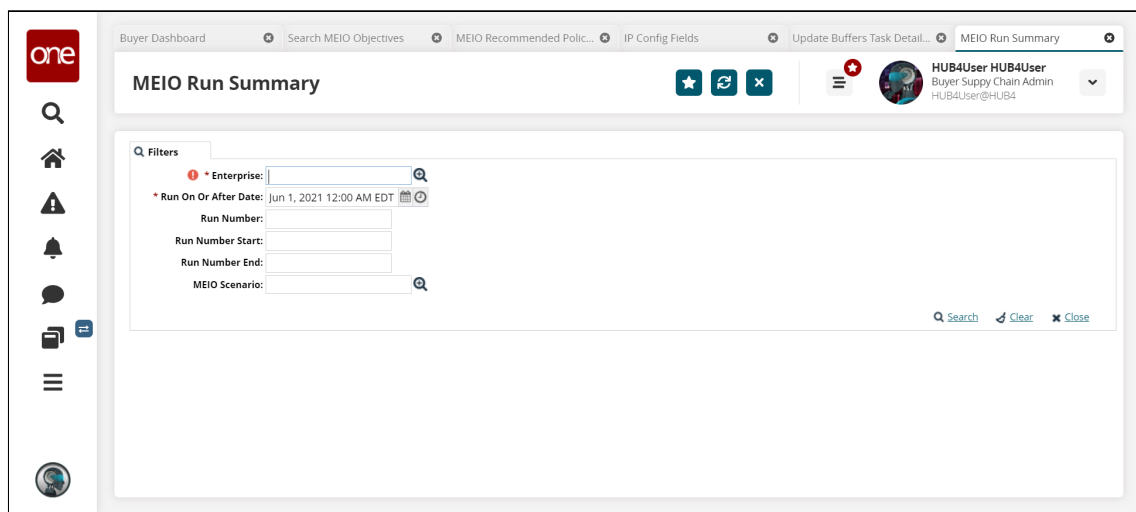
3. Fill out the following fields. Fields with an asterisk (*) are required.

Field Name	Description
*Enterprise	Enter the enterprise for the scenario or use the picker tool to select an enterprise.
*Run On Or After Date	Enter a date for the Run On Or After Date or use the calendar and clock icon to select a date a time.
Run Number	Enter a run number.
Run Number Start	Enter a starting run number to search for a range of engine runs.
Run Number End	Enter an ending run number to search for a range of engine runs.

Field Name	Description
MEIO Scenario	Enter an MEIO scenario used for the run or use the picker tool to select an MEIO scenario.

4. Click the **Search** link.
   The **MEIO Run Summary** screen displays the results.

5. Click the Filters (edit) link to reduce the number of entries shown in the report.
6. Click a link in the **Run Number** column to view the **MEIO Recommended Policy Report** in a new tab. See the Working with the MEIO Recommended Policy Report section in Online Help for more information.
7. Click the Export to CSV button to export the report to a CSV file.

# 12 Viewing MEIO Engine Output In The IP Workbench

Users can view and compare the output from Multi-Echelon Inventory Optimization (MEIO) engine runs in the Inventory Planning (IP) Workbench.

Complete the following steps to view the MEIO engine output in the IP Workbench:

1. Log in to the ONE system.
2. Click **Menu/Favs** > **Inventory Planning** > **IP Workbench**.
   The IP Workbench screen displays.
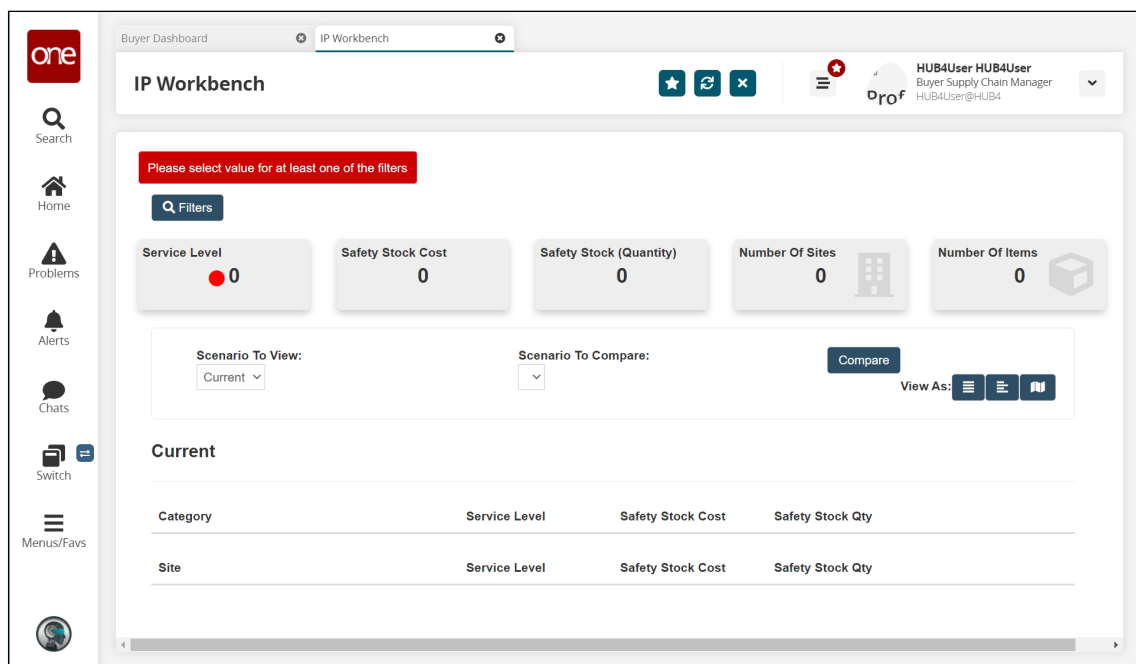
3. Click the **Filters** button.
   The IP Workbench filter fields appear.
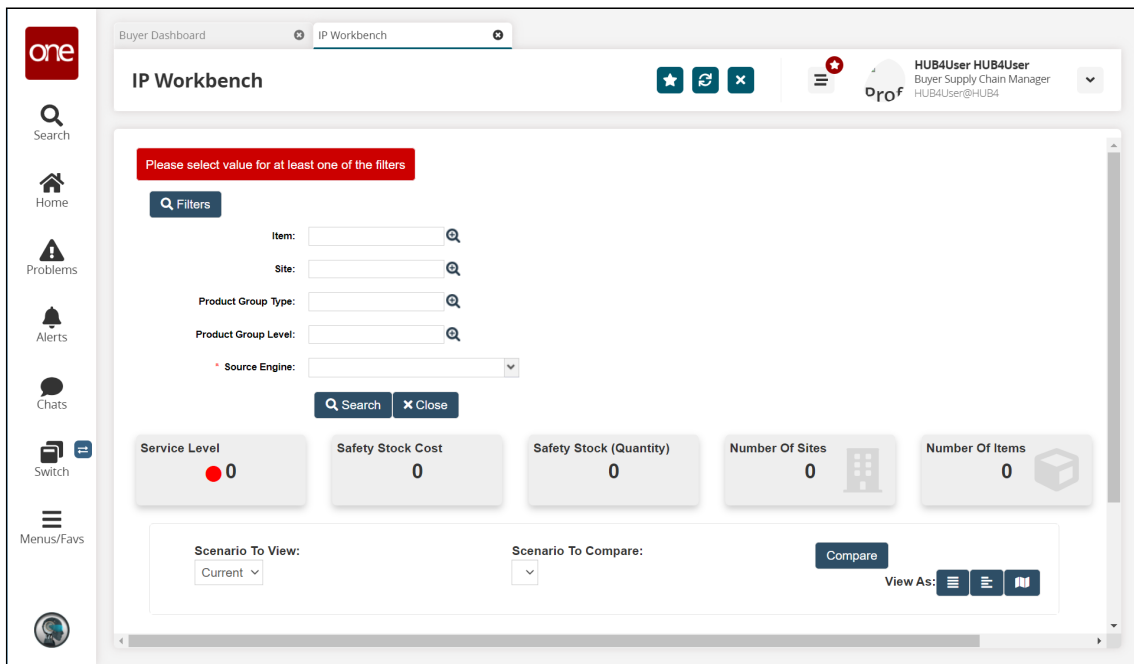
4. In the ***Source Engine** dropdown list, select **Multi-Echelon Inventory Optimization**. Fields with an asterisk (*****) are required.
5. Fill in the remaining filter fields as desired.

Field	Description
Item	Enter an item name or use the picker tool to select an item.
Site	Enter a site name or use the picker tool to select a site.
Product Group Type	Enter a product group type or use the picker tool to select a product group type.
Product Group Level	Enter a product group level or use the picker tool to select a product group level.

6. Click the **Search** button.
   The IP Workbench screen displays the results of the most recent MEIO engine run with the currently configured scenario.
7. In the **Scenario To Compare** dropdown list, select a previous MEIO engine run to compare the output of that scenario with the current MEIO engine results.
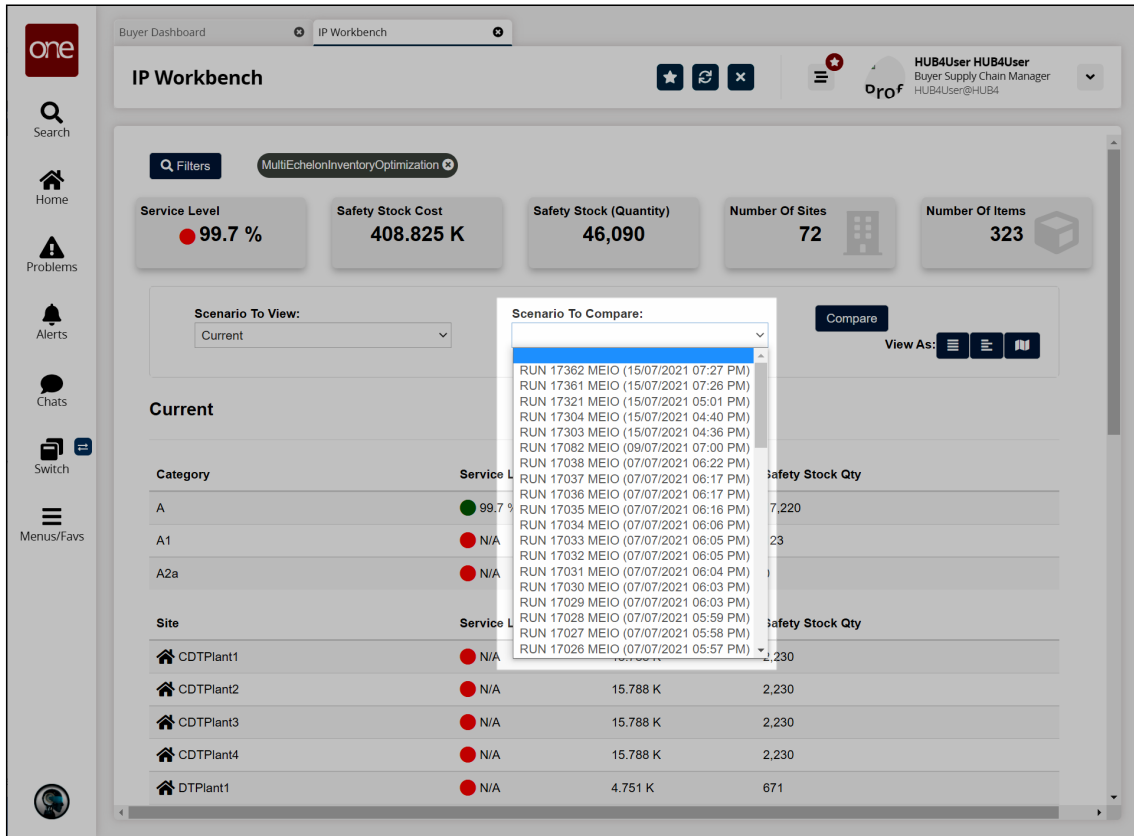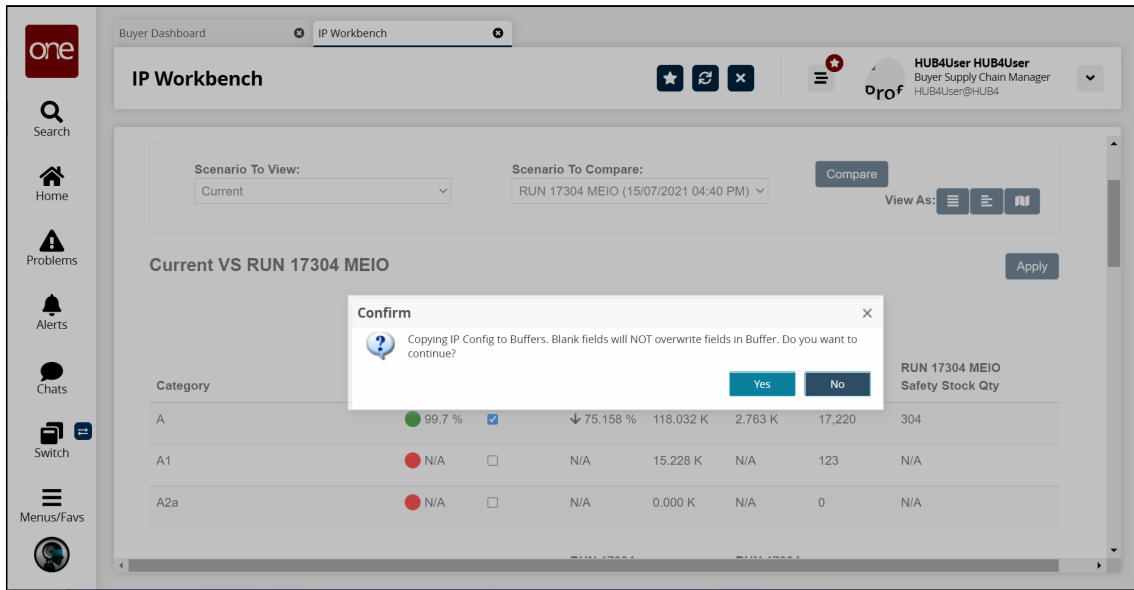
8. Click the **Compare** button.
   A comparison of the output from the two MEIO engine runs displays.
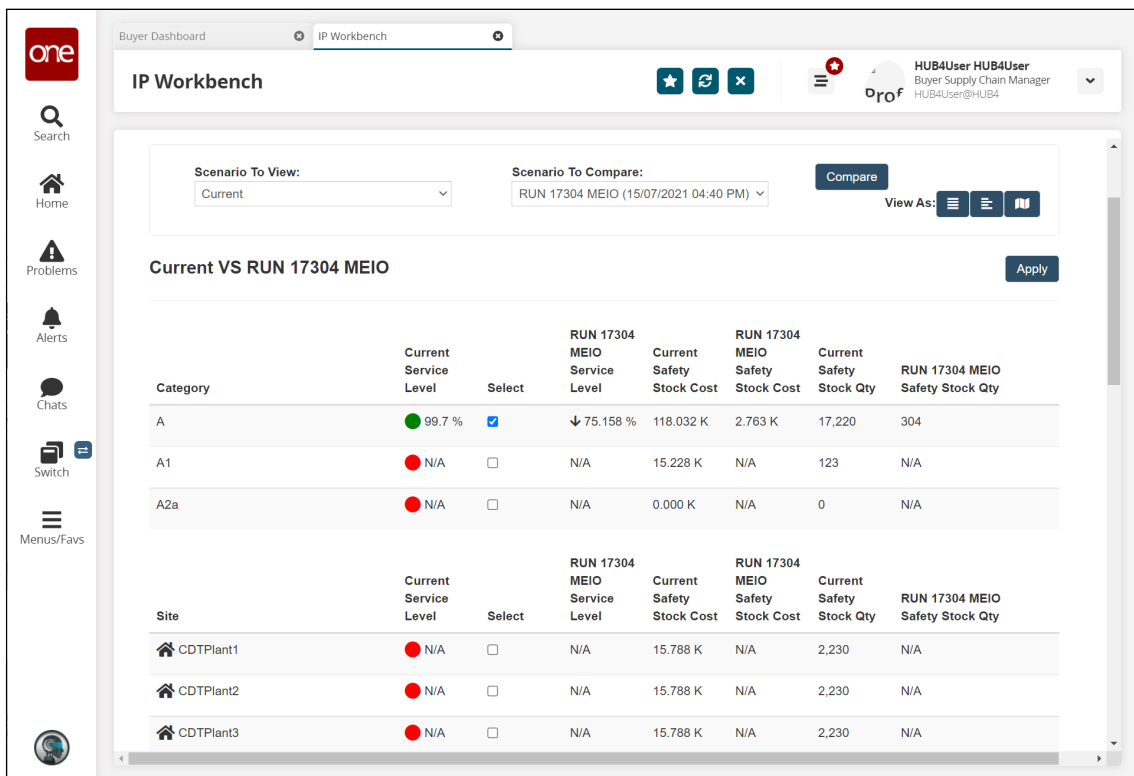
9. To copy an IP configuration to the buffer for any of the categories or sites listed, click the checkbox in the **Select** column for that category or item and click the

Apply button.

A confirmation message appears.

10. Click **Yes** to update the IP configuration.

About One Network

One Network is the intelligent business platform for autonomous supply chain management. Powered by NEO, One Network's machine learning and intelligent agent technology, this multi-party digital platform delivers rapid results at a fraction of the cost of legacy solutions. The platform includes modular, adaptable industry solutions for multi-party business that help companies lower costs, improve service levels and run more efficiently, with less waste. This SaaS and aPaaS platform enables leading global organizations to achieve dramatic supply chain network benefits and efficiencies across their ecosystem of business partners. One Network offers developer tools that allow organizations to design, build and run multi-party applications. Leading global organizations have joined One Network, helping to transform industries like Retail, Food Service, Consumer Goods, Automotive, Healthcare, Public Sector, Defense and Logistics. To date, more than 75,000 companies have joined One Network's Real Time Value Network™ (RTVN™). Headquartered in Dallas, One Network also has offices in Japan, Europe, and India.

For more information, please visitwww.onenetwork.com.

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