



BLUEPRINT

embark. explore. embrace.

Introduction to MEIO

Multi-Echelon Inventory Optimization

Blue Ridge's solution of managing multiple levels of demand signals throughout your supply chain. Projections at all levels drive the right quantity to the right place at the right time.



Agenda

What is MEIO?

Key Terms

Multi-Echelon Environment

Replenishment with MEIO

Questions

What is MEIO?

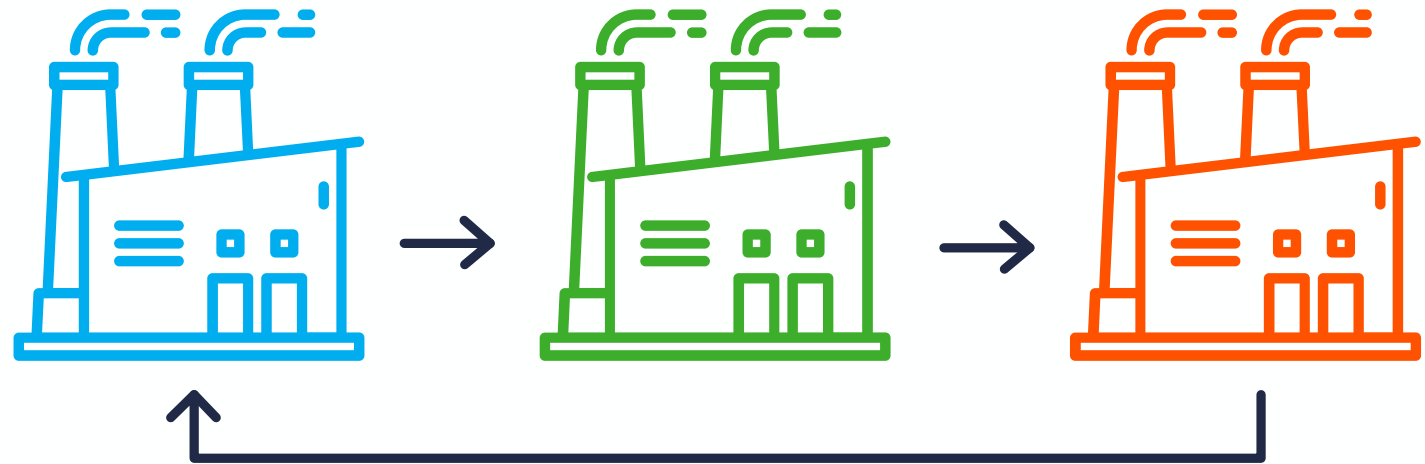
Multi-Echelon Inventory Optimization



What is MEIO?

The SCP solution that manages demand signals for a Supply Chain with multiple levels

One or more location is dependent on another location for supply rather than replenishing directly from the Supplier.



What is MEIO?

Benefits of MEIO

- MEIO orders at the upper echelon to support projected orders at the lower echelon (rather than aggregated sales or forecasts)
- Projected orders are based on the actual SOQ considering buying constraints (such as pack size and bracket building), hold-outs, reserves, events, etc.

MEIO is designed to:

- Eliminate redundant safety stock
- Achieve customer service goals
- And do this on the most profitable investment!



Agenda

What is MEIO?

Key Terms

Multi-Echelon Environment

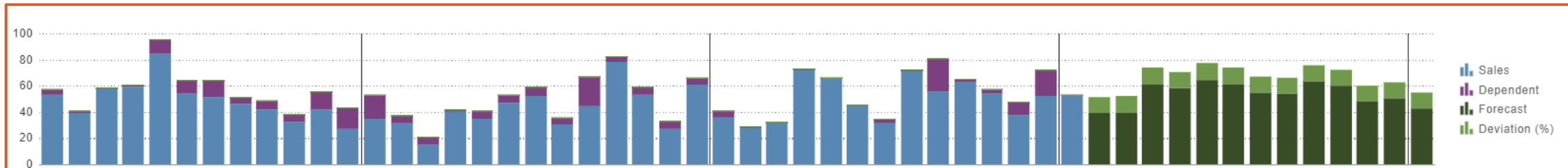
Replenishment with MEIO

Questions

Key Terminology

Independent Demand (ID) - Customer-level demand on the item

Dependent Demand (DD) - Demand placed on a higher supply chain tier/echelon (for example, a DC) to support the replenishment needs of a lower tier/echelon



Upper Echelon (UE) – Hub

Lower Echelon (LE) – Spoke



Agenda

What is MEIO?

Key Terms

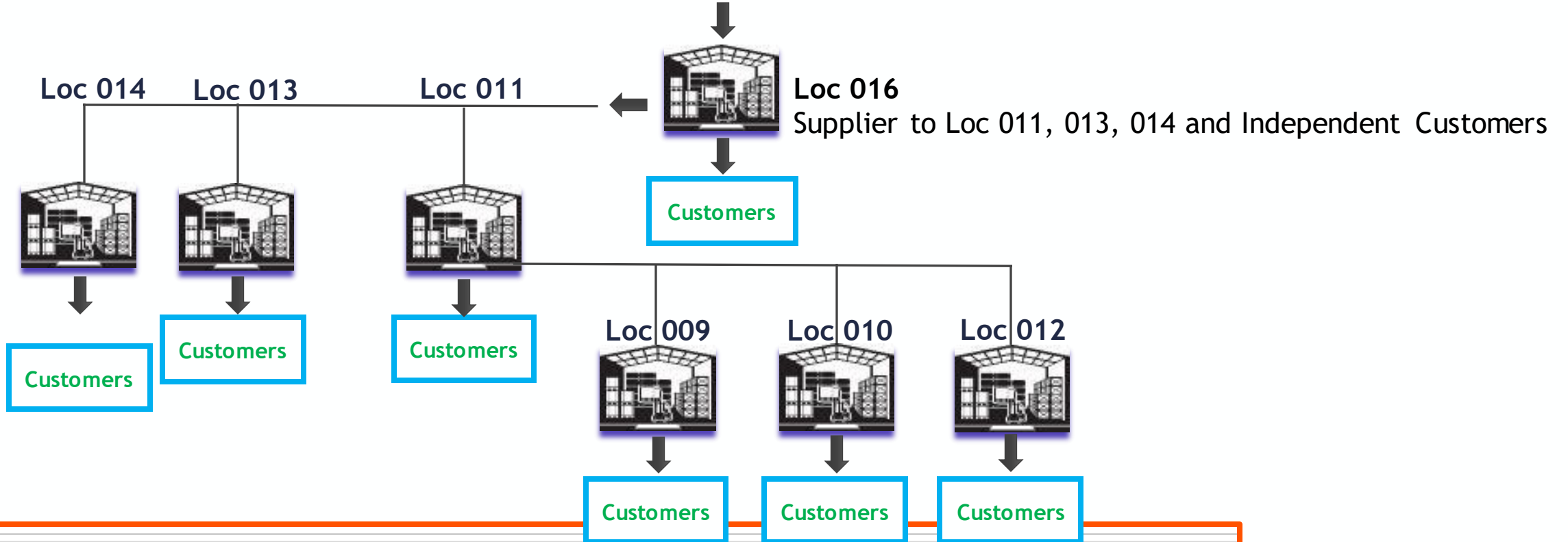
Multi-Echelon Environment

Replenishment with MEIO

Questions

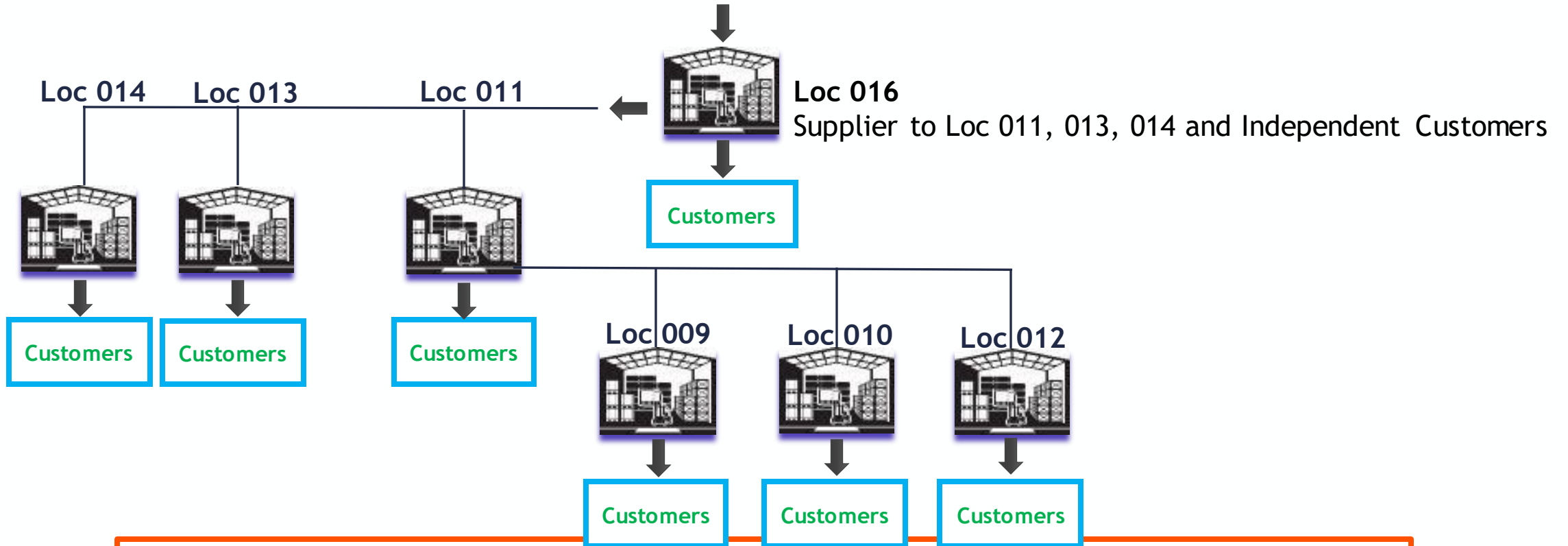
Multi-Tier Environment

SUPPLIER NDSMRI - NDS Drip Irrigation
ITEM 303G00UB - Comp Hose End Plug 1/2" Cap 3/4"



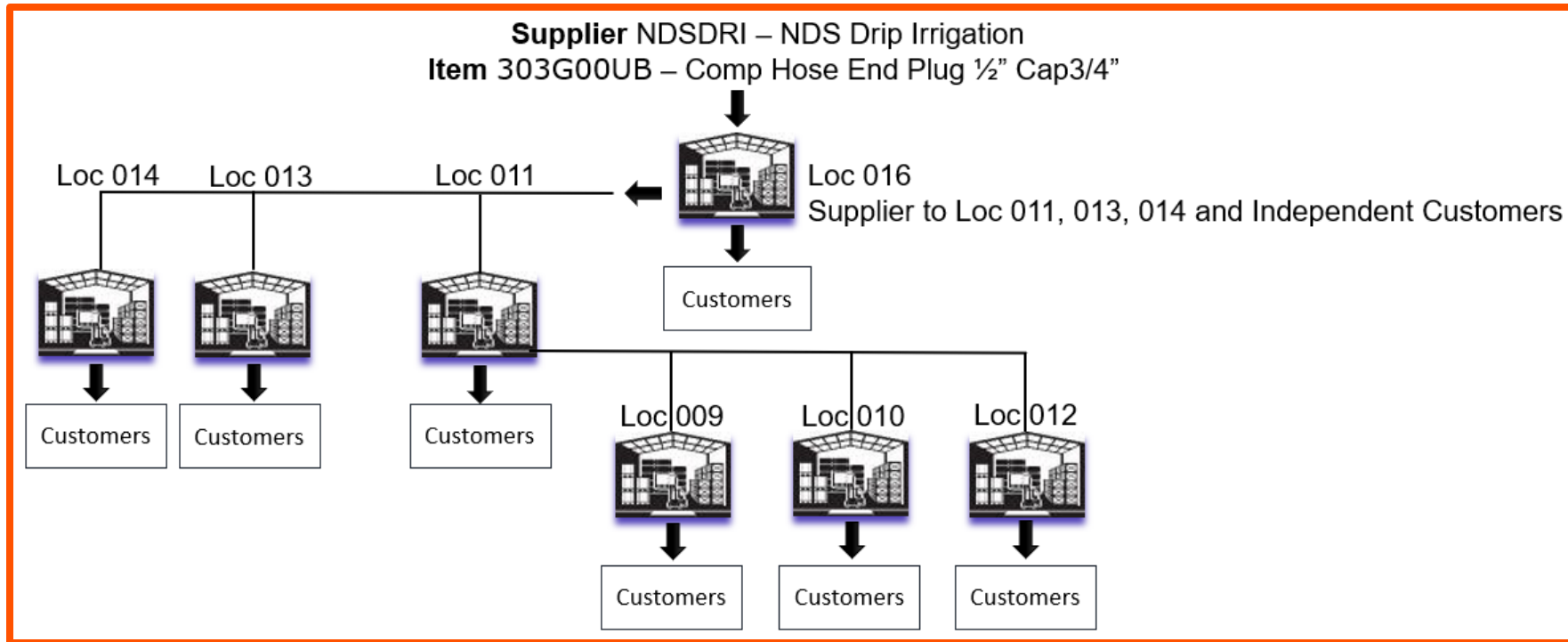
Item ID	Description	Supplier ID ▼	Supplier Name	Location	Forecast 4 Weekly	Activity Code
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	NDSMRI	NDS Drip Irrigation	016	0.00	A - Active
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	016	Customer A North California	011	0.53	A - Active
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	016	Customer A North California	013	4.78	A - Active
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	016	Customer A North California	014	5.86	A - Active
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	011	Customer A Indiana	010	0.04	A - Active
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	011	Customer A Indiana	012	4.70	A - Active
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	011	Customer A Indiana	009	0.76	A - Active

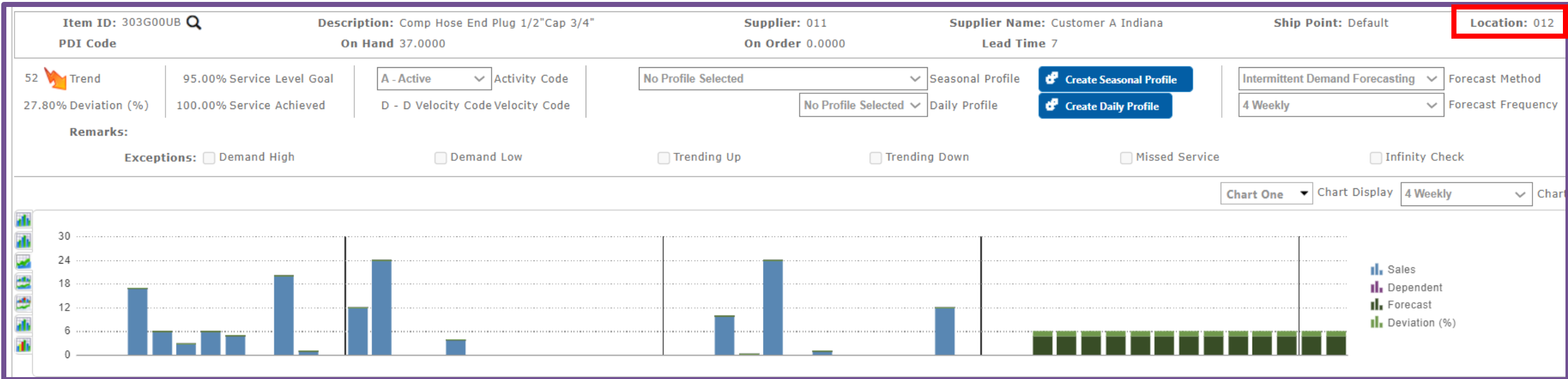
SUPPLIER 011 - NDS Drip Irrigation
ITEM 303G00UB - Comp Hose End Plug 1/2" Cap 3/4"



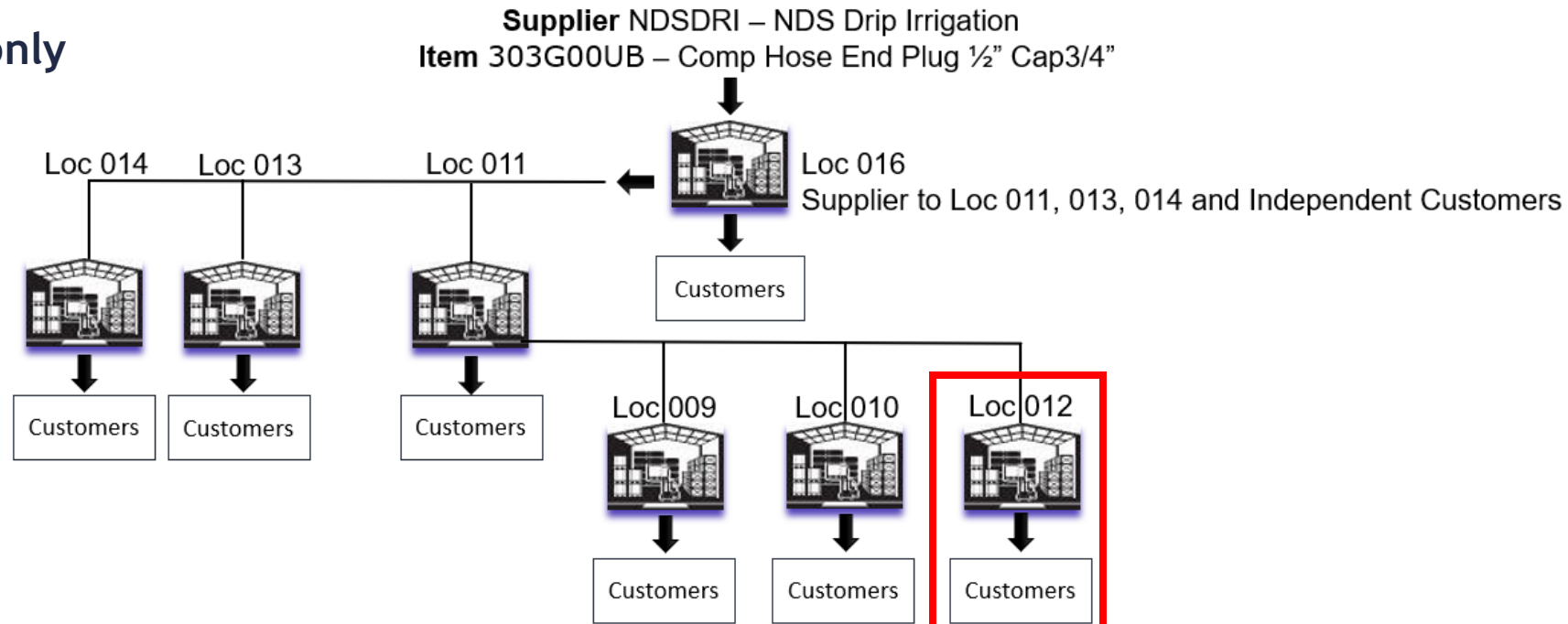
Item ID	Description	Supplier ID	Supplier Name	Location	Forecast 4 Weekly	Activity Code
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	NSDRI	NDS Drip Irrigation	016	0.00	A - Active
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	016	Customer A North California	011	0.53	A - Active
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	016	Customer A North California	013	4.78	A - Active
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	016	Customer A North California	014	5.86	A - Active
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	011	Customer A Indiana	010	0.04	A - Active
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	011	Customer A Indiana	012	4.70	A - Active
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	011	Customer A Indiana	009	0.76	A - Active

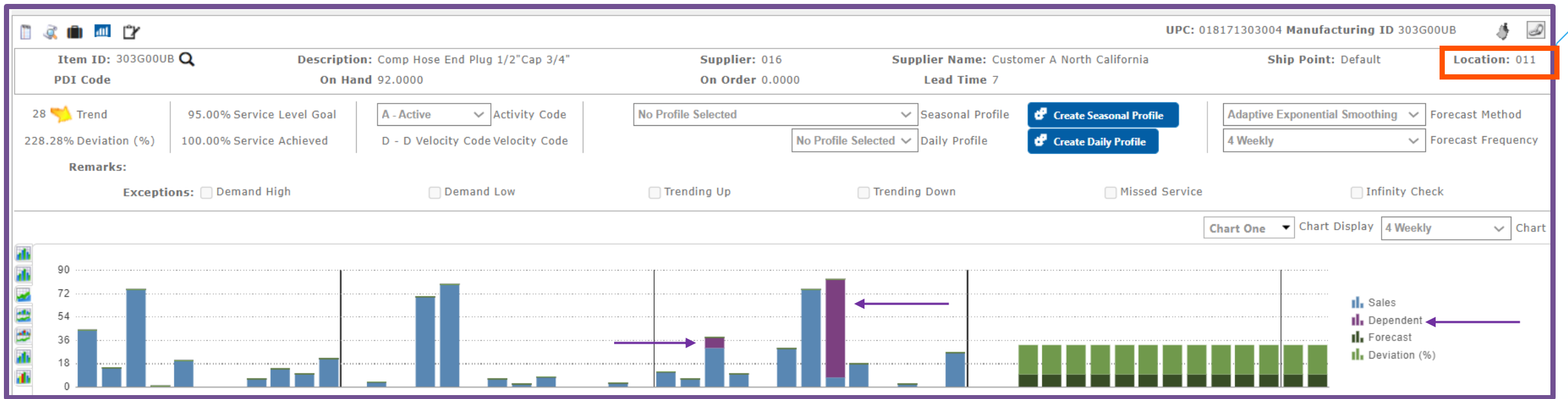
- Loc 016 – Supplier ID is NDSMRI
- Loc 014, 013 and 011 are **Dependent** on Location 016 for supply – Supplier ID is 016
- Location 009, 010, and 012 are Dependent on Location 011 for supply – Supplier ID is 011
- Each Location may have customers driving demand and a demand forecast = Independent Demand
 - Some locations may not, they only carry this item to support LE locations





Location 012 services customers only
All Demand is Independent





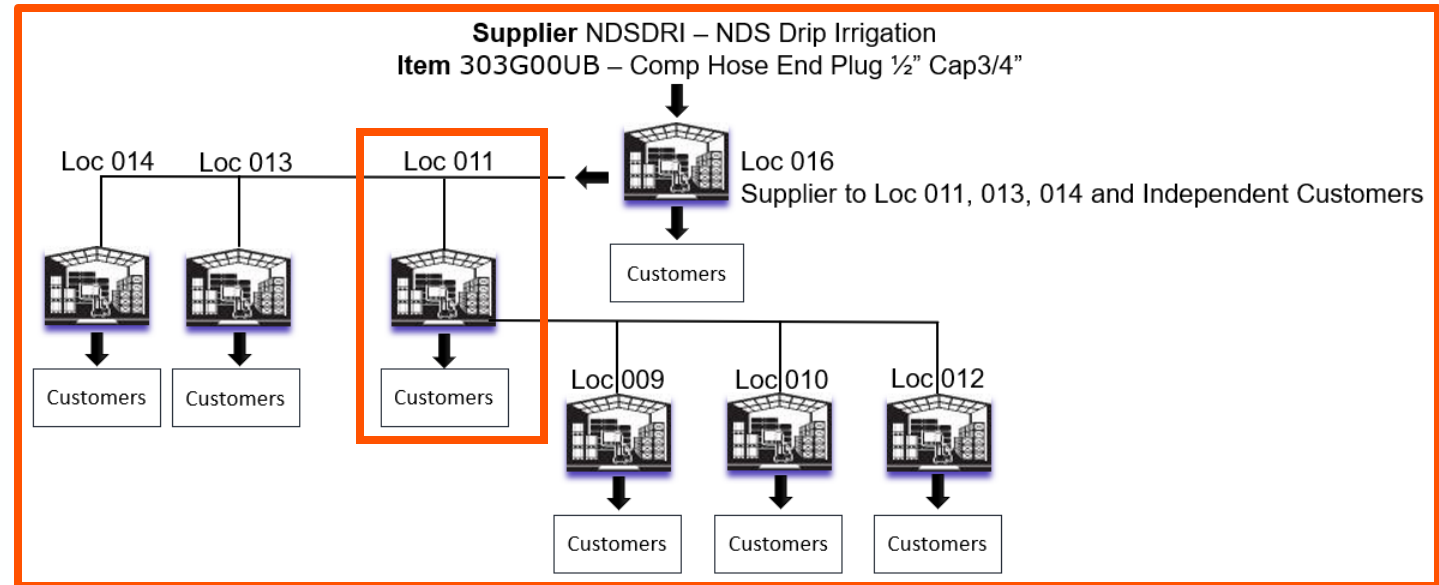
Location 011 services customers and other locations

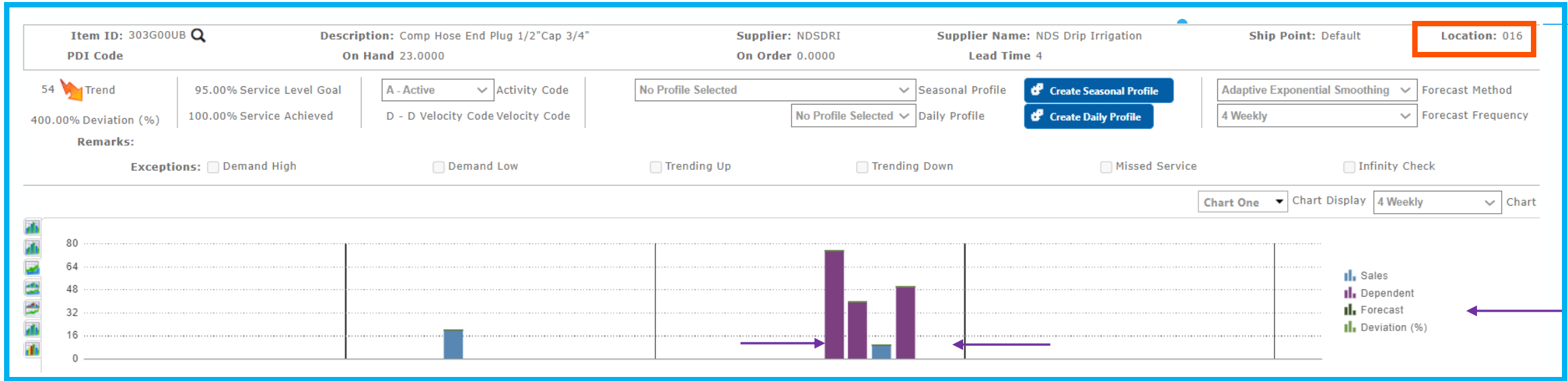
Demand is from Independent Customers (blue)

- Forecast
- Deviation %
- Trend
- Exceptions

Dependent Demand shipped to other locations (purple)

- Visibility here only
- Not included in Loc 011 forecast components
- Sending Dependent Demand signal





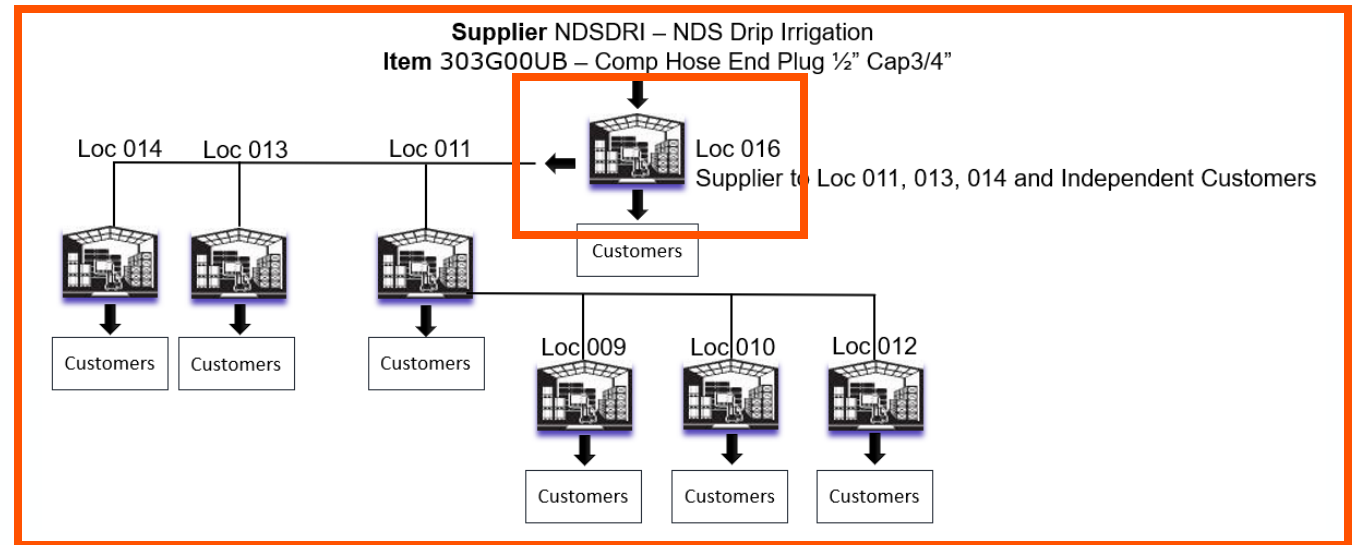
Location 016 services customers and other locations

Demand is from Independent Customers (blue)

- Forecast - zero today
- Deviation %
- Trend
- Exceptions

Dependent Demand shipped to other locations (purple)

- Visibility here only
- Not included in Loc 016 forecast components
- Sending Dependent Demand signal





Agenda

What is MEIO?

Key Terms

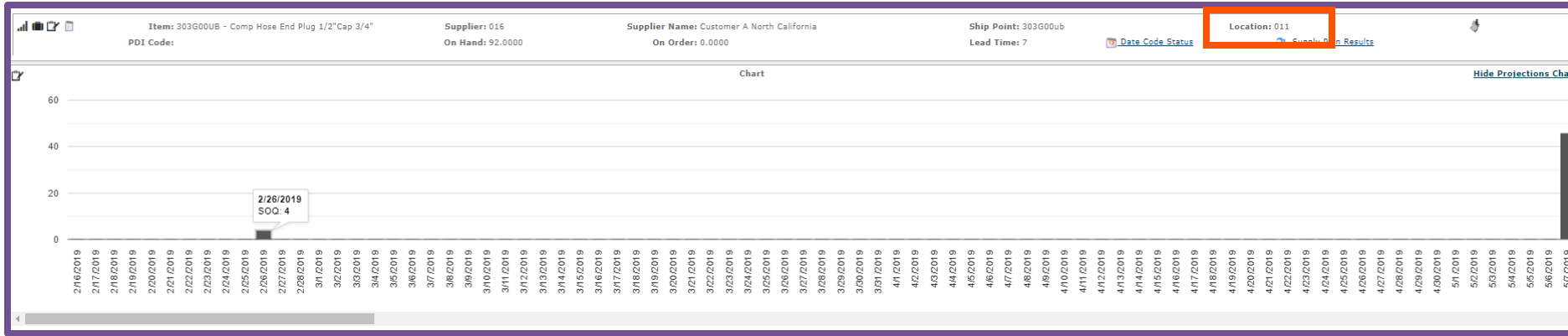
Multi-Echelon Environment

Replenishment with MEIO

Questions

How does the Upper Echelon know when and how much to Replenish?

LOWER ECHELON LOCATIONS, SOQ PROJECTIONS



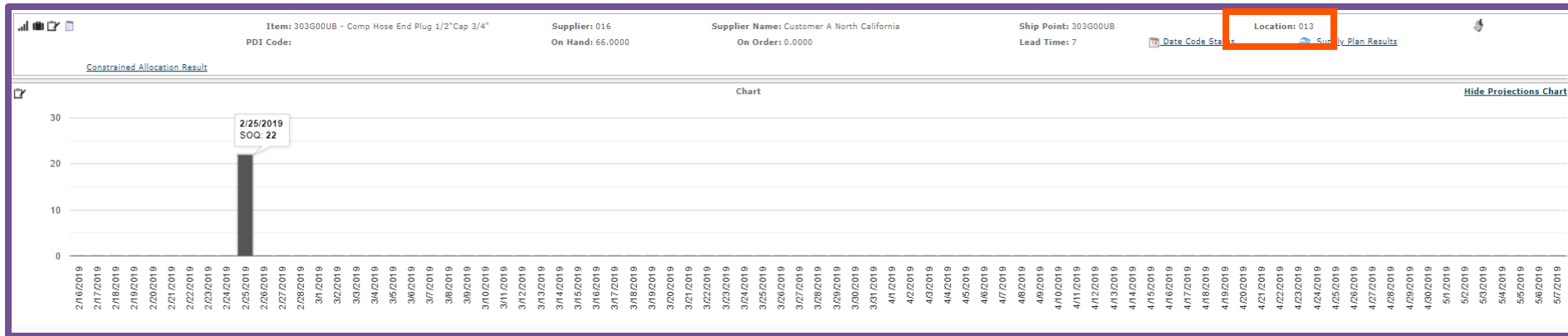
Loc 016, Upper Echelon

Item Details

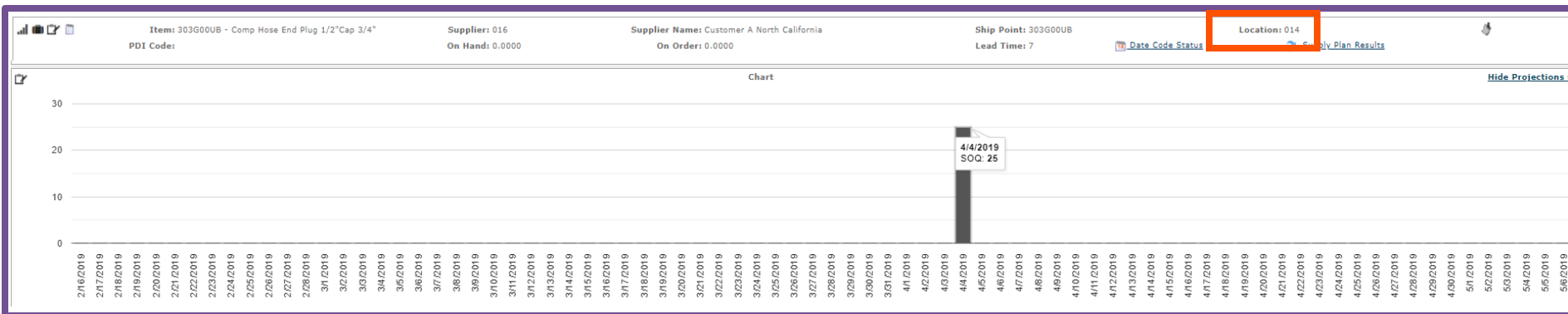
- 0.00 4 Weekly Forecast
- None Seasonal 4 Weekly Forecast
- 95.00 Service Level Goal
- \$0.65 Selling Unit Cost
- 0.65 Alternate Cost
- \$0.65 Effective Cost
- 51.0 Dependent Demand**

Recent Demand History

- 0.00 Demand WTD
- 0.00 2/17/2019
- 0.00 2/10/2019
- 0.00 2/3/2019
- 0.00 1/27/2019



Loc 011, 4 Units 2/26
 Loc 013, 22 Units 2/25
 Loc 014, 25 Units 4/04

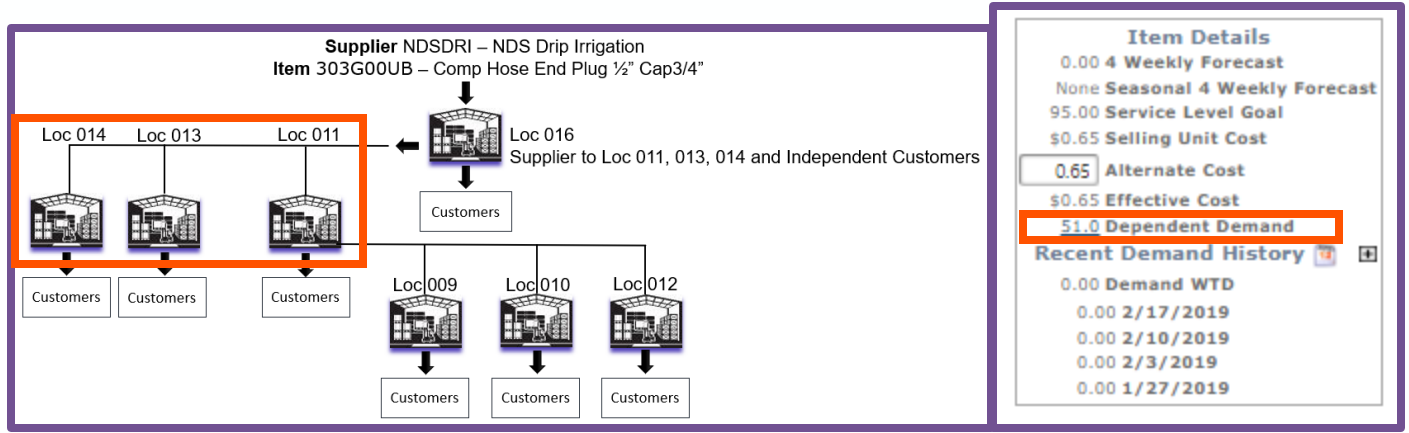


Projected SOQs are calculated at the Lower Echelon location

Location 016

Highest level in this Echelon

Dependent Demand signals from 014, 013, 011



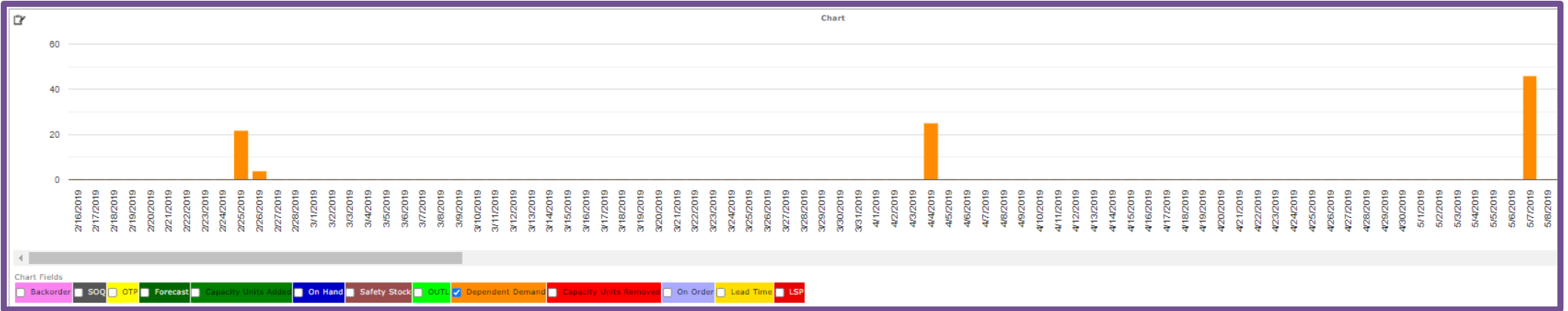
Order Summary > Order Item Detail > Dependent Demand

Item ID	Description	Location	SOQ	Projected Dependent Demand
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	011	0	4
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	013	21	22
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	014	0	25

013 is producing an SOQ today (FYI only)

Loc 011, 013 and 014 projection of 51 through the Lead Time + Effective Order Cycle of the UE

2/25, 22 units
2/26, 4 units
4/04, 25 units



MIDDLE ECHELON SOQ PROJECTIONS



Item Details

9.69 4 Weekly Forecast
 None Seasonal 4 Weekly Forecast
 95.00 Service Level Goal
 \$0.65 Selling Unit Cost

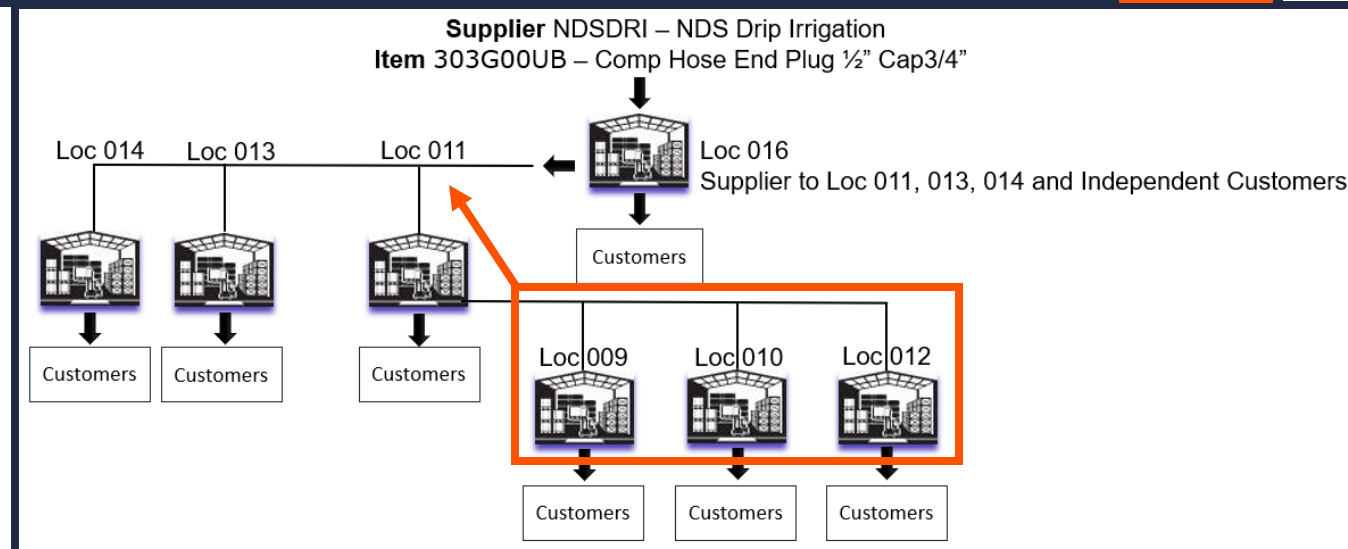
0.65 Alternate Cost
 \$0.65 Effective Cost

0.0 Dependent Demand

Recent Demand History

0.00 Demand WTD
 0.00 2/17/2019
 0.00 2/10/2019
 0.00 2/3/2019
 0.00 1/27/2019

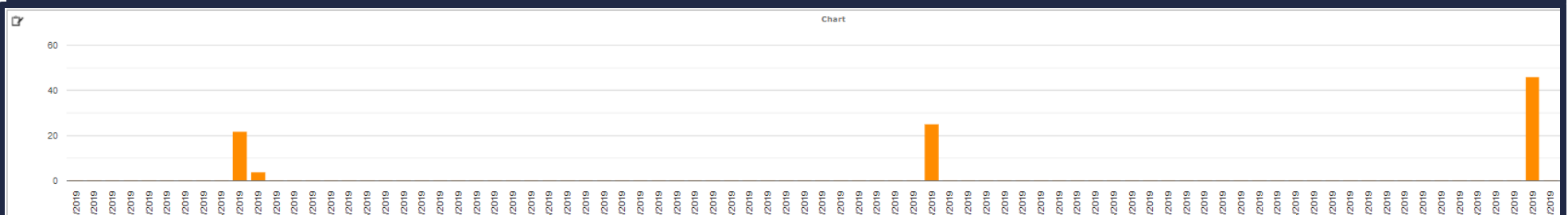
Item ID	Description	Location
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	010
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	012
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	009



UPPER ECHELON PROJECTED SOQS ARE CALCULATED AT THE LOWER ECHELON LOCATION

- Location 016
- Highest level in this Echelon
- **Dependent Demand signals**

Item ID	Description	Supplier Name	Ship Point	Supplier ID	Location
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	NDS Drip Irrigation	Default	NDSMRI	016
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	Customer A North California	303G00ub	016	011
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	Customer A North California	303G00UB	016	013
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	Customer A North California	303G00UB	016	014
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	Customer A Indiana	303G00UB	011	010
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	Customer A Indiana	303G00UB	011	012
303G00UB	Comp Hose End Plug 1/2"Cap 3/4"	Customer A Indiana	303G00UB	011	009



Item: 303G00UB - Comp Hose End Plug 1/2"Cap 3/4" Supplier: 016 Supplier Name: Customer A North California Ship Point: 303G00ub **Location: 011**

PDI Code: On Hand: 92.0000 On Order: 0.0000 Lead Time: 7 [Date Code Status](#) [Supplier Plan Results](#)

Chart showing projected SOQs for item 303G00UB at location 011. The Y-axis represents SOQs (0 to 60). The X-axis represents dates from 2/16/2019 to 5/17/2019. A callout highlights a data point on 2/26/2019 with an SOQ of 4.

Chart Fields: Backorder SOQ OTP Forecast Capacity Units Added On Hand Safety Stock OUTL Dependent Demand Capacity Units Removed On Order Lead Time LSP

4 - day Lead Time
57 - day Effective Order Cycle

51.0	136.9	96.9	Order Up To Level	
0.0	0.0	0.0	Shelf Life (0.0)	
51.0	57.0	41.0	Effective Order Cycle (0.0)	
26.0	86.9	60.9	Order Trigger Point	
26.0	7.0	5.0	Supplier Order Cycle	
0.0	79.9	55.9	Low Stock Point	
0.0	4.0	2.0	Lead Time	
0.0	75.9	53.9	Safety Stock	

Item Details

0.00 4 Weekly Forecast

None Seasonal 4 Weekly Forecast

95.00 Service Level Goal

\$0.65 Selling Unit Cost

0.65 Alternate Cost

\$0.65 Effective Cost

51.0 Dependent Demand

Recent Demand History

0.00 Demand WTD

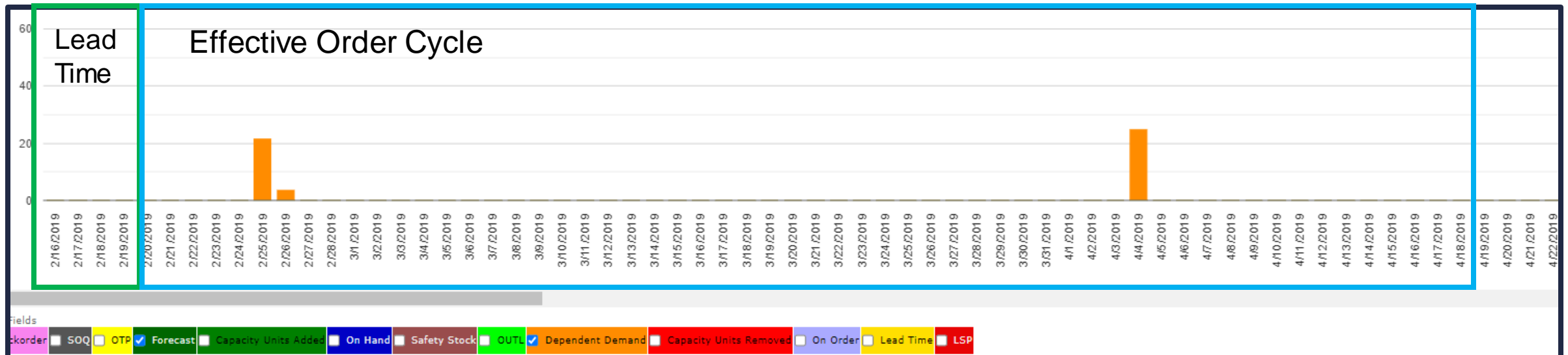
0.00 2/17/2019

0.00 2/10/2019

0.00 2/3/2019

0.00 1/27/2019

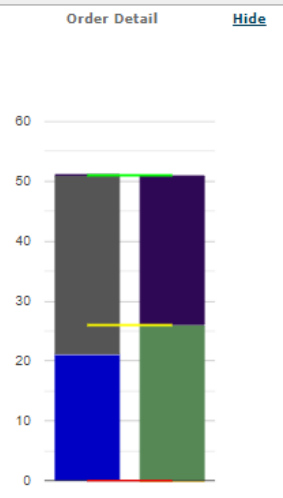
Loc 016, the Upper Echelon



UPPER ECHELON, LOC 016, BUILDING TO THE SOQ

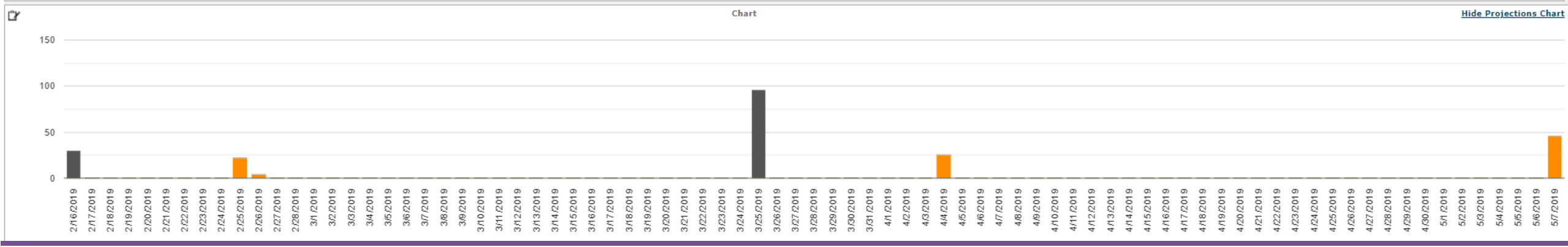
Item: 303G00UB - Comp Hose End Plug 1/2"Cap 3/4" **Supplier:** NDSMRI **Supplier Name:** NDS Drip Irrigation **Ship Point:** Default **Location:** 016
 PDI Code: **On Hand:** 23.0000 **On Order:** 0.0000 **Lead Time:** 4 [Date Code Status](#) [Supply Plan Results](#)

Units	Cal Days	Sell Days	
30.0	40.2	28.2	SOQ
0.0	0.0	0.0	Capacity
0.0	0.0	0.0	Maximum Qty (0.0)
0.0	0.0	0.0	Precision
0.0	0.0	0.0	Warehouse Multiple (0.0)
0.0	0.0	0.0	Buying Multiple (6.0)
0.0	0.0	0.0	Minimum Qty (1.0)
0.0	0.0	0.0	Days Adjusted (0)
0.0	0.0	0.0	Special Orders
0.0	0.0	0.0	Event (0.0)
0.0	0.0	0.0	Fwd Buy (0.0)
30.0	40.2	28.2	Need
21.0	7.0	5.0	Balance
21.0	N/A	N/A	On Hand
0.0	N/A	N/A	On Order
0.0	N/A	N/A	Backorder
0.0	N/A	N/A	Reserved
51.0	136.9	96.9	Order Up To Level
51.0	57.0	41.0	Effective Order Cycle (0.0)
26.0	86.9	60.9	Order Trigger Point
26.0	7.0	5.0	Supplier Order Cycle
0.0	79.9	55.9	Low Stock Point
0.0	4.0	2.0	Lead Time
0.0	75.9	53.9	Safety Stock



Item Details

- 0.00 4 Weekly Forecast
- None Seasonal 4 Weekly Forecast
- 95.00 Service Level Goal
- \$0.65 Selling Unit Cost
- 0.65 Alternate Cost
- 51.0 Dependent Demand
- Recent Demand History
- 0.00 Demand WTD
- 0.00 2/17/2019
- 0.00 2/10/2019
- 0.00 2/3/2019
- 0.00 1/27/2019



Example with Forecast & DD

110.0	43.4	31.4	Order Up To Level
0.0	0.0	0.0	Shelf Life (0.0)
5.5	7.0	5.0	Effective Order Cycle (0.0)
110.2	43.4	31.4	Order Trigger Point
5.5	7.0	5.0	Supplier Order Cycle
104.7	36.4	26.4	Low Stock Point
96.4	25.0	19.0	Lead Time
8.2	11.4	7.4	Safety Stock

25-day Lead Time = 96.4 cases
76 DD + **20.4** daily forecast

Item Details

23.28 Monthly Forecast

None **Seasonal Monthly Forecast**

96.00 **Service Level Goal**

\$0.00 **Selling Unit Cost**

0.00 **Alternate Cost**

\$0.00 **Effective Cost**

76.0 Dependent Demand

Recent Demand History 12 +

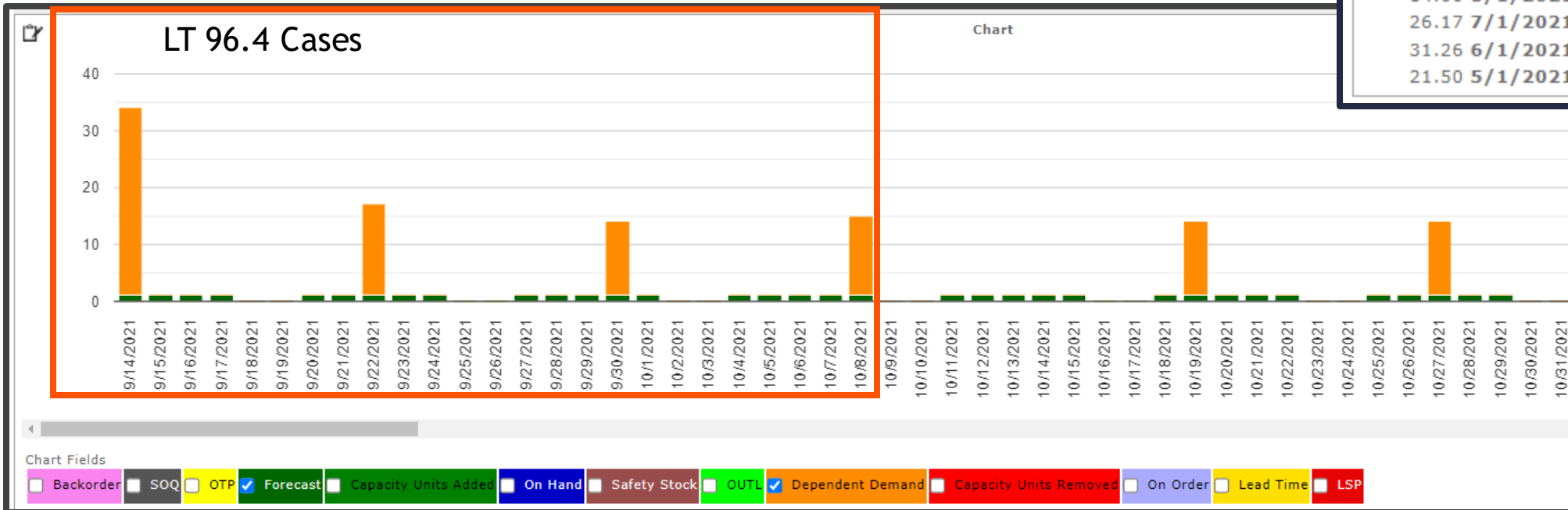
1.00 **Demand MTD**

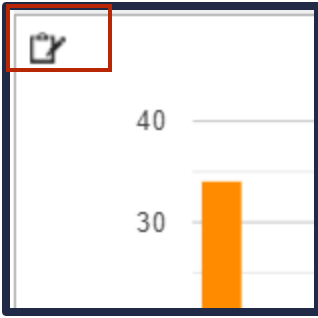
14.00 **8/1/2021**

26.17 **7/1/2021**

31.26 **6/1/2021**

21.50 **5/1/2021**





25-day Lead Time = 96.4 cases
76 DD + **20.4** daily forecast

Date	Item Number	Order Id	On Hand	On Order	OUTL	Economic Order Cycle	OTP	Vendor Order Cycle	LSP	SS	LT	SOQ	Backorder	Receipt Quantity	Forecast	On Hold	On Reserve	Balance	Delay Days	Dependent Demand Units
9/14/2021	9004	12187691	0.833	110.75	110	0	110.2010820€	0	104.6580554€	8.2496390391	96.40841636€	0	0	0	34.05821418	0	0	111.583	17	33
9/15/2021	9004	12187691	0.75	110	110	0	110.2010820€	0	104.6580554€	8.2496390391	96.40841636€	0	0	0.75	1.058214181	0	0	110.75	16	
9/16/2021	9004	12187691	0	110	110	0	110.2010820€	0	104.6580554€	8.2496390391	96.40841636€	0	0	0	1.058214181	0	0	110	15	
9/17/2021	9004	12187691	0	110	110	0	110.2010820€	0	104.6580554€	8.2496390391	96.40841636€	0	0	0	1.058214181	0	0	110	14	
9/18/2021	9004	12187691	0	110	110	0	110.2010820€	0	104.6580554€	8.2496390391	96.40841636€	0	0	0	0	0	0	110	13	
9/19/2021	9004	12187691	0	110	110	0	110.2010820€	0	104.6580554€	8.227393507€	96.40841636€	0	0	0	0	0	0	110	12	
9/20/2021	9004	12187691	0	110	110	0	110.2010820€	0	104.6580554€	8.177002355€	96.40841636€	0	0	0	1.058214181	0	0	110	11	
9/21/2021	9004	12187691	0	110	110	0	110.2010820€	0	104.6580554€	8.126611204€	96.40841636€	0	0	0	1.058214181	0	0	110	10	
9/22/2021	9004	12187691	0	110	110	0	110.2010820€	0	104.6580554€	8.126611204€	96.40841636€	0	0	0	17.05821418	0	0	110	9	16
9/23/2021	9004	12187691	0	110	110	0	110.2010820€	0	104.6580554€	8.126611204€	96.40841636€	0	0	0	1.058214181	0	0	110	8	
9/24/2021	9004	12187691	0	110	110	0	110.2010820€	0	104.6580554€	8.076220052€	96.40841636€	0	0	0	1.058214181	0	0	110	7	
9/25/2021	9004	12187691	0	110	110	0	110.2010820€	0	104.6580554€	8.025828901€	96.40841636€	0	0	0	0	0	0	110	6	
9/26/2021	9004	12187691	0	110	110	0	110.2010820€	0	104.6580554€	7.975437749€	96.40841636€	0	0	0	0	0	0	110	5	
9/27/2021	9004	12187691	110	0	110	0	110.2010820€	0	104.6580554€	7.925046597€	96.40841636€	0	0	110	1.058214181	0	0	110	4	
9/28/2021	9004	12187691	108.94178581	0	110	0	110.2010820€	0	104.6580554€	7.874655446€	96.40841636€	0	0	0	1.058214181	0	0	108.94178581	3	
9/29/2021	9004	12187691	107.8835716€	0	110	0	110.2010820€	0	104.6580554€	7.874655446€	96.40841636€	0	0	0	1.058214181	0	0	107.8835716€	2	
9/30/2021	9004	12187691	106.8253574€	0	110	0	110.2010820€	0	104.6580554€	7.874655446€	96.40841636€	0	0	0	14.05821418	0	0	106.8253574€	1	13
10/1/2021	9004	12187691	92.76714327€	0	72	0	72.21358162€	0	53.72094611€	7.874655446€	45.84629066€	0	0	0	1.108605333	0	0	92.76714327€	1	
10/2/2021	9004	12187691	91.65853793€	0	72	0	72.16319047€	0	53.72094611€	7.874655446€	45.84629066€	0	0	0	0	0	0	91.65853793€	0	
10/3/2021	9004	12187691	91.65853793€	0	73	0	73.22140465€	0	67.82955144€	7.874655446€	59.954896	0	0	0	0	0	0	91.65853793€	19	
10/4/2021	9004	12187691	91.65853793€	0	73	0	73.22140465€	0	67.82955144€	7.874655446€	59.954896	0	0	0	1.108605333	0	0	91.65853793€	18	
10/5/2021	9004	12187691	90.54993260€	0	73	0	73.22140465€	0	67.82955144€	7.874655446€	59.954896	0	0	0	1.108605333	0	0	90.54993260€	17	
10/6/2021	9004	12187691	89.44132727€	0	73	0	73.22140465€	0	67.82955144€	7.874655446€	59.954896	0	0	0	1.108605333	0	0	89.44132727€	16	
10/7/2021	9004	12187691	88.33272193€	0	73	0	73.22140465€	0	67.82955144€	7.874655446€	59.954896	0	0	0	1.108605333	0	0	88.33272193€	15	
10/8/2021	9004	12187691	87.22411660€	0	73	0	73.22140465€	0	67.82955144€	7.874655446€	59.954896	0	0	0	15.10860533	0	0	87.22411660€	14	14

7-day Effective Order Cycle = 5.5 cases
0 DD + **5.5** daily forecast

110.0	43.4	31.4	Order Up To Level
0.0	0.0	0.0	Shelf Life (0.0)
5.5	7.0	5.0	Effective Order Cycle (0.0)
110.2	43.4	31.4	Order Trigger Point
5.5	7.0	5.0	Supplier Order Cycle
104.7	36.4	26.4	Low Stock Point
96.4	25.0	19.0	Lead Time
8.2	11.4	7.4	Safety Stock

Item Details

23.28 Monthly Forecast

None Seasonal Monthly Forecast



96.00 Service Level Goal

\$0.00 Selling Unit Cost

0.00 Alternate Cost

\$0.00 Effective Cost

76.0 Dependent Demand

Recent Demand History  

1.00 Demand MTD

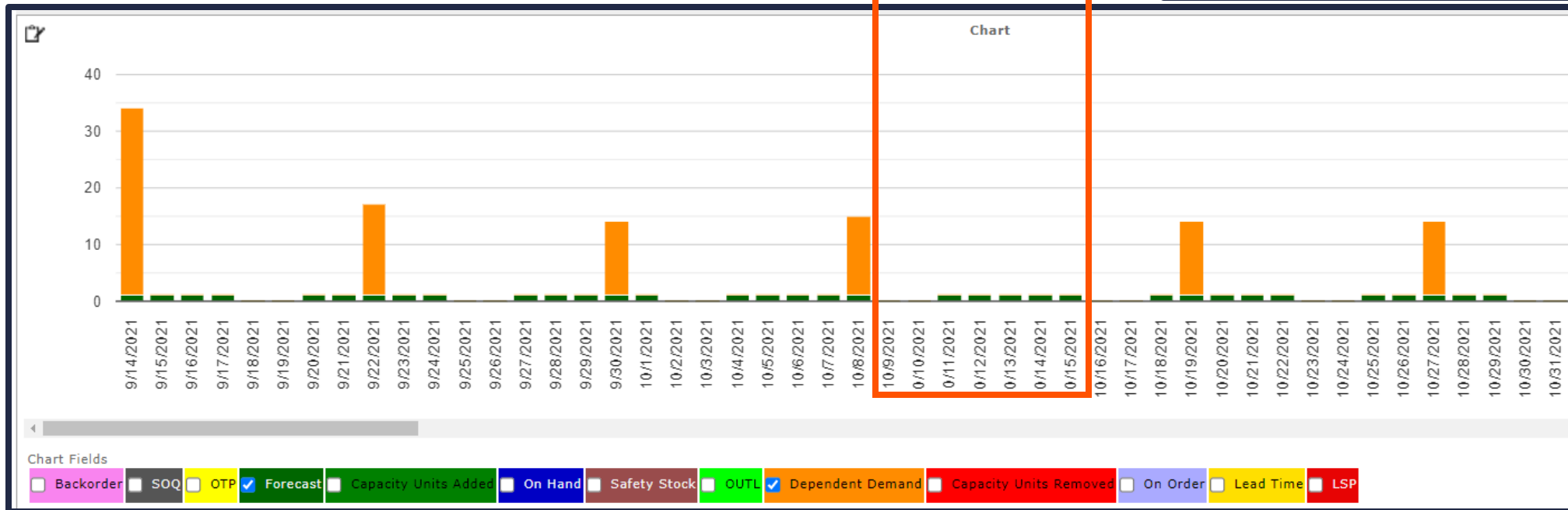
14.00 8/1/2021

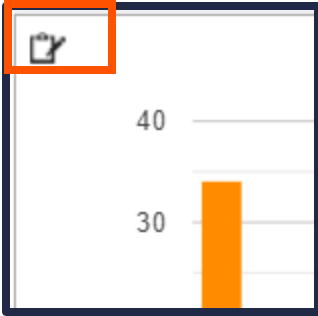
26.17 7/1/2021

31.26 6/1/2021

21.50 5/1/2021

EOC 5.5 Cases





7-day Lead Time = 5.5 cases
0 DD + **5.5** daily forecast

Date	Item Number	Order Id	On Hand	On Order	OURL	Economic Order Cycle	OTP	Vendor Order Cycle	LSP	SS	LT	SOQ	Backorder	Receipt Quantity	Forecast	On Hold	On Reserve	Balance	Delay Days	Dependent Demand Units
10/9/2021	9004	12187691	72.115511272	0	73	0	73.22140465	0	67.82955144	7.874655446	59.954896	0	0	0	0	0	0	72.115511272	13	
10/10/2021	9004	12187691	72.115511272	0	73	0	73.22140465	0	67.82955144	7.874655446	59.954896	0	0	0	0	0	0	72.115511272	12	
10/11/2021	9004	12187691	72.115511272	0	73	0	73.22140465	0	67.82955144	7.874655446	59.954896	0	0	0	1.108605333	0	0	72.115511272	11	
10/12/2021	9004	12187691	71.006905935	0	73	0	73.22140465	0	67.82955144	7.874655446	59.954896	0	0	0	1.108605333	0	0	71.006905935	10	
10/13/2021	9004	12187691	69.89830060	0	73	0	73.22140465	0	67.82955144	7.874655446	59.954896	0	0	0	1.108605333	0	0	69.89830060	9	
10/14/2021	9004	12187691	68.789695272	0	73	0	73.22140465	0	67.82955144	7.874655446	59.954896	0	0	0	1.108605333	0	0	68.789695272	8	
10/15/2021	9004	12187691	67.681089935	0	73	0	73.22140465	0	67.82955144	7.874655446	59.954896	0	0	0	1.108605333	0	0	67.681089935	7	

110.0	43.4	31.4	Order Up To Level
0.0	0.0	0.0	Shelf Life (0.0)
5.5	7.0	5.0	Effective Order Cycle (0.0)
110.2	43.4	31.4	Order Trigger Point
5.5	7.0	5.0	Supplier Order Cycle
104.7	36.4	26.4	Low Stock Point
96.4	25.0	19.0	Lead Time
8.2	11.4	7.4	Safety Stock

Example with Forecast & DD

Zero SOQ today, Balance satisfies dependent demand + forecast

Units	Cal Days	Sell Days	
0.0	0.0	0.0	SOQ
0.0	0.0	0.0	Capacity
0.0	0.0	0.0	Maximum Qty (0.0)
0.0	0.0	0.0	Precision
0.0	0.0	0.0	Warehouse Multiple (0.0)
0.0	0.0	0.0	Buying Multiple (11.0)
0.0	0.0	0.0	Minimum Qty (55.0)
0.0	0.0	0.0	Days Adjusted (0)
0.0	0.0	0.0	Special Orders
0.0	0.0	0.0	Event (0.0)
0.0	0.0	0.0	Fwd Buy (0.0)
0.0	0.0	0.0	Need
111.6	46.5	34.5	Balance
0.8	0.0	0.0	On Hand
110.8	46.5	34.5	On Order
0.0	0.0	0.0	Backorder
0.0	0.0	0.0	Reserved
0.0	0.0	0.0	Held Qty (0.0)
110.0	43.4	31.4	Order Up To Level
0.0	0.0	0.0	Shelf Life (0.0)
5.5	7.0	5.0	Effective Order Cycle (0.0)
110.2	43.4	31.4	Order Trigger Point
5.5	7.0	5.0	Supplier Order Cycle
104.7	36.4	26.4	Low Stock Point
96.4	25.0	19.0	Lead Time
8.2	11.4	7.4	Safety Stock

Order Detail Hide

Item Details

23.28 Monthly Forecast

None Seasonal Monthly Forecast

96.00 Service Level Goal

\$0.00 Selling Unit Cost

0.00 Alternate Cost

50.00 Effective Cost

76.0 Dependent Demand

Recent Demand History

- 1.00 Demand MTD
- 14.00 8/1/2021
- 26.17 7/1/2021
- 31.26 6/1/2021
- 21.50 5/1/2021

Questions?



BLUEPRINT

embark. explore. embrace.