ADVANTAGE ROUTE SYSTEMS
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3.22: Degree Day Forecasting

Introduction

To assist users in the Bulk Propane (Retail) delivery business, this document has been created to show you how to set up, enter data on an ongoing basis, and report from Route Manager. It will cover the following:

1. Customer Setup
2. Setting up tanks
3. What happens automatically in the system?
4. Viewing ongoing data
5. Entering Daily Temperature Recordings
6. Reporting from the system and basis for calculation.

This will help you plan routes more effectively based on consumption and customer demand. This can also be based on and related to temperature changes. Thus, if the weather turns cooler, it will automatically plan for increased consumption.

How it Works

Degree Day Forecasting allows you to accurately project delivery needs based on multiple variables in Route Manager. The *Degree Day Forecasting* option provides a report based on the following:

- ***Onsite product capacity:*** Based on installed equipment.
- ***Average product consumed:*** Calculated by previous deliveries.
- ***Rate of consumption changes:*** Calculated by temperature changes. This includes temperatures observed during the consumption period and those forecasted from now until the projected delivery.
- ***Individual customer usage trends:*** Manually entered per customer (K-Factor).

By using the above data, it is possible to predict what the customer's needs will be for upcoming deliveries. While there are many variables involved in this process, it will give the route planner some idea as to a customer's remaining fuel level in their tank, per stop.

What affect does temperature have?

Temperature can play a key role in projecting customer usage. For example, in colder climates the rate of consumption will generally be higher than customers that are in warmer climates. With this variable in mind, *Degree Day Forecasting* has the ability to adjust the rate of consumption based on temperature changes.

The way we do this is by looking at temperatures in the past (over the consumption period) and also based on what the forecast is. Then, all temperatures are related to the 65 degree (Fahrenheit) base line. So, if temperatures are below 65 degrees, then that means that consumption will be higher when it is colder.

When looking back, we take the mean temperatures during the period of consumption and see if they are higher or lower than our baseline. For example, if you had a delivery on June 14 and another on June 24, we would look at the temperatures between those dates and compare them against the 65 degree baseline. From this, we get a *temperature adjusted daily consumption rate*. If, for example, the temperatures averaged 58.5 degrees during this period and your actual consumption was 10 gallons per day, then the *temperature adjusted daily consumption rate* would be 9 gallons. This means that during the period of June 14 – 24, your true consumption would have been only 9 gallons if it had been at the standard 65 degree temperature level.

If you want to enter forecasted daily temperatures, you can do that, too. You will need to record them in *Daily Temperature Recording* for as far into the future as you would like for your projection reports date. Then, the system will calculate projected usage using the base line consumption rate and compensating for temperature. For example, if it is expected to be 10% below 65 degrees (58.5 degrees), then this will adjust the planned consumption higher based on the usage of the customer. If you do not enter any values into the future, then the system will use a standard temperature (65 degrees) for its projections.

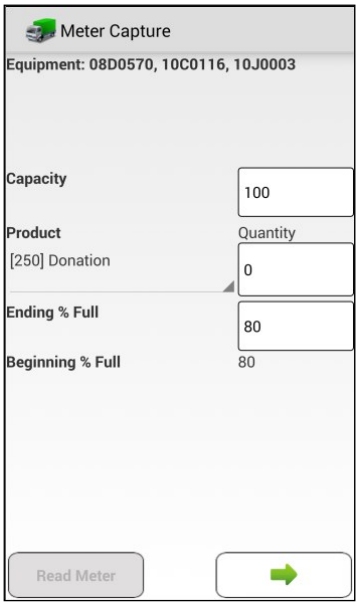
What about the handheld?

Each route driver will capture data on the handheld during each delivery. After a stop has been selected, the following information will be entered by the driver:

- The departure % tank full (normally 80 – 90%)
- The number of gallons pumped (can be automatic if interfaced with the meter)
- Optionally, the driver can select the tank capacity, but this should only be used if

Since the tank capacity is associated with each customer, Route Manager is automatically able to calculate the arrival percentage, which is another important component of route planning. Furthermore, by calculating the number of days between deliveries, an average usage (gallons) per day is maintained.

Here is as sample screen to reference as to what the driver will see as he makes a delivery.



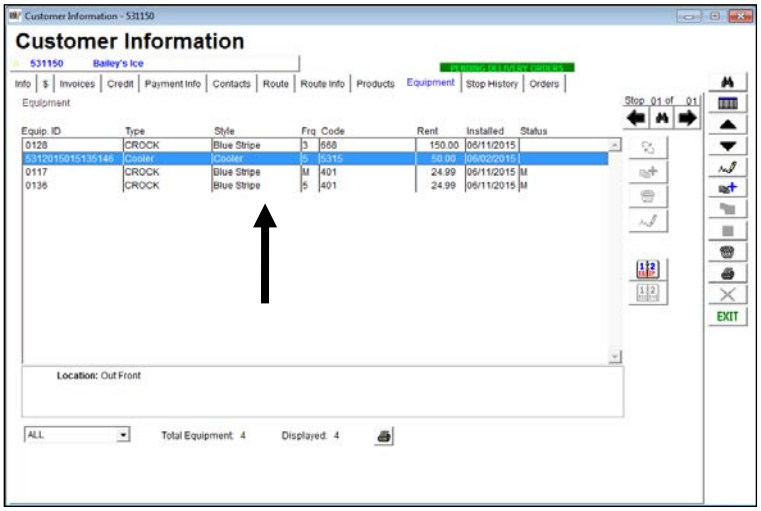
The collection of accurate data is important as this is used in projecting future requirements.

Customer Setup

Each customer that will use *Degree Day Forecasting* will require the following information established on their account.

Equipment

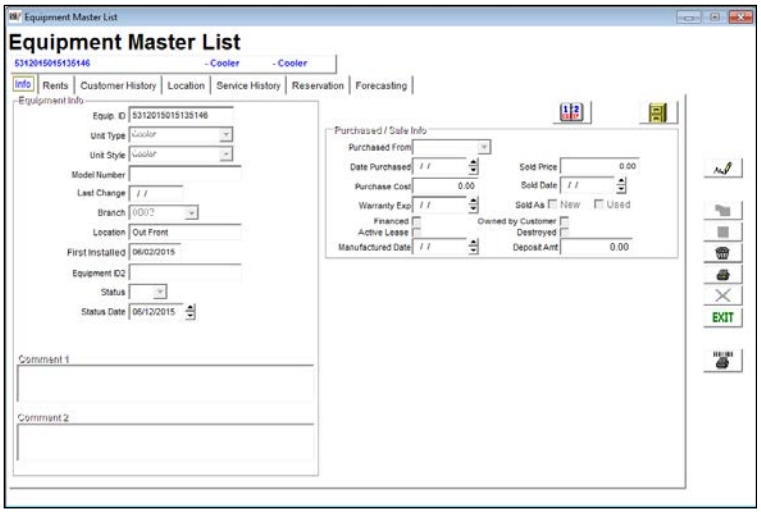
In order to forecast calculations, each customer must have one or more pieces of equipment assigned to their record.



Each piece of equipment assigned to your customers contains fields that will need to be input to use *Degree Day Forecasting*. In order for the *Daily Forecasting Report* to accurately predict a customer's needs, it will need to know what the maximum capacity is on the customer's installed equipment — typically tanks.

Navigate to the *Equipment Master List* for each account and enter the *Capacity* total. Repeat this step for each piece of equipment that is located at this site.

NOTE: The system will support a tank 'farm' and add all tanks together to determine total capacity.



The setup steps involved with *Degree Day Forecasting* are minimal. The next section defines a new option on each customer's account that allows you to view ongoing data that is used when forecasting.

Viewing Ongoing Data

Each customer's account contains a series of figures that will be updated automatically as transactions are uploaded in Route Manager. This information is used to assess each customer's delivery needs and provides important data for the *Projected Delivery Report*. Each item is defined below.

Navigate to *Lists > Customer Information > Stop History* tab, on the *Service Schedule* screen.

Each column includes the customer's last five delivery totals and an average.

- ***Units:*** The number of gallons delivered with each visit.
- ***Arrival% full***: The tank's percentage amount full on arrival.
- ***Ending % Full***: The tank's percentage amount full on departure.
- ***Average Daily Usage***: The customers average daily usage.
- ***Time:*** The total time spent on-site during delivery.
- ***K-Factor:*** This value is used to affect planned consumption rates. There are several pre-determined numbers that can be factored into the customer's forecast delivery needs:
    - **0** = Do not use *Daily Temperature Recording* for this stop.
    - **1** = Do not use *Daily Temperature Recording* when calculating percentage remaining for this stop.
    - ***2 (thru 2-9)*** = These values will amplify the effect of the *Daily Temperature Recording*, for planning purposes. Nine values can be entered (2, 2-1 thru 2-9) that will modify the forecast totals varying in total effect based on the value entered. This option allows you to make adjustments to totals based on individual customer trends.
- ***Non-Usage Days:*** The number of days since the last delivery that the customer was not using product, such as they were on vacation. This will help better calculate the Average Daily Usage.
- ***From Full Units:*** If the tank was not filled to capacity, the number of units from capacity would be stored in this field.
- ***Non-Tank Units:*** If the customer purchased product that was NOT part of their normal container/tank it will be displayed here.

- ***Days between Deliveries:*** The number of days between this delivery and the previous delivery.
- ***Date:*** The date of this delivery.

Entering Daily Temperatures

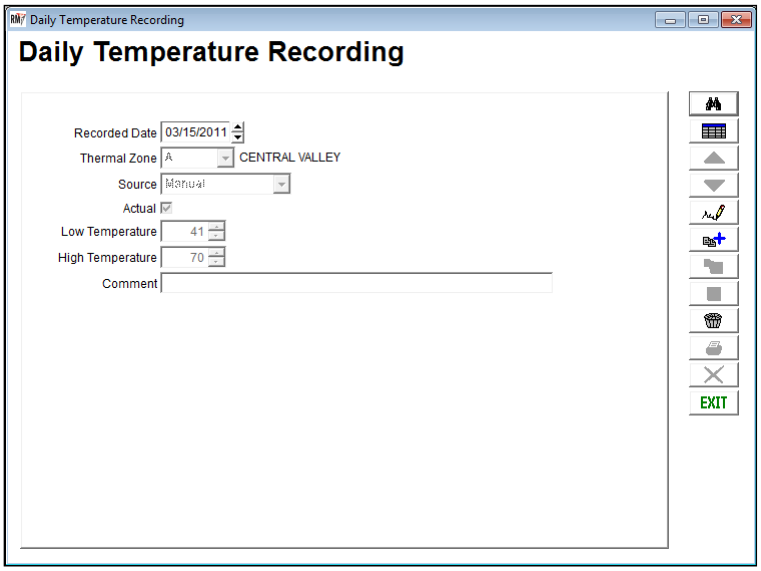
In order for *Degree Day Forecasting* to accurately predict each customer's needs, a temperature variable is implemented to account for changes in the rate of consumption based on weather conditions and housing locations. With internet access, you can visit a National Weather Service Web site to capture the data needed for your planning, such as: http://www.weather.gov/

In addition, there are many advanced thermometer options available that you can use at your office to capture the data.

Daily Temperature Recording

The *Daily Temperature Recording* option allows you to enter a daily high and low temperature that will be used when calculating totals for each customer. Typically, the actual temperatures are recorded each day.

Navigate to *Lists > Product Codes > Daily Temperature Recording*. Select the 'Add' key and use the fields defined below to create a new entry:



Fields:

Recorded Date: Enter the date for this temperature entry.

Thermal Zone: Select the Thermal Zone for this area.

Source: *Manual* is the only valid option currently. In the future, there are plans for *Automated* recording.

Actual: Select this option if you are recording the actual temperatures for the date entered. If this field is not selected, the entry is considered a forecast. You can return to forecasted temperatures and change them to what the actual high and low was for the day. Then, you will want to check the box *Actual.*

Low Temperature: Enter the lowest temperature for the date that you are forecasting.

High Temperature: Enter the highest temperature for the date that you are forecasting.

Comment: Enter any optional information here, for reference.

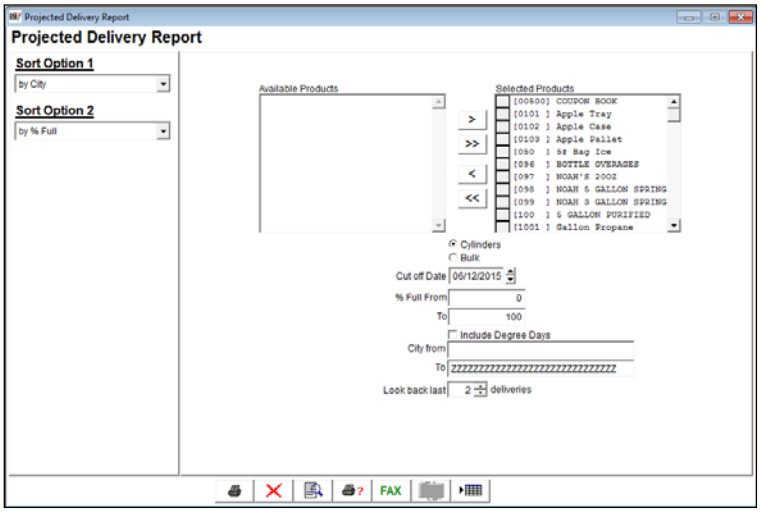
Calculation and Reporting

The daily forecasting information calculated and reported per customer is provided to you in a simple report in Route Manager.

Projected Delivery Report

The *Projected Delivery Report* calculates daily totals based on all of the criteria covered in previous sections of this document.

Navigate to *Reports > Management Reports > Projected Delivery Report*.

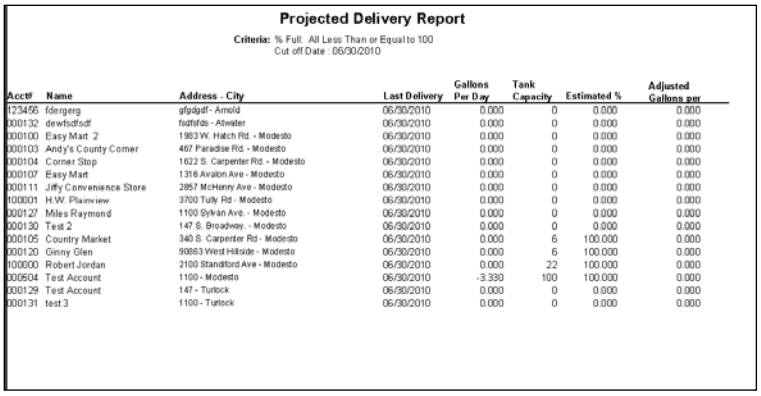


The report can be filtered by using the following fields:

- ***Selected Products:*** Add or remove the products that you would like to include in the report — if 'Bulk' is selected, you can only add one product to the list.
- ***Cylinders/Bulk:*** Choose one of the radio options to control the displayed column headings on the report:
  - *Cylinders* = Bottles per Day / Capacity of Racks (for 20lb Cylinders)
  - *Bulk* = Gallons per Day / Tank Capacity.
- ***Cut off Date:*** Enter the date you would like to use the report to project to.
- ***% Full From/To:*** Enter the *From/To* percentage full that you would like to include in the report. This allows you to specify a limited range of % full (i.e., 0 to 40%).
- ***Include Degree Days:*** Select this option to include *Daily Temperature Recording* report figures.
- ***City From/To:*** Enter the range of cities to include in the report.

- ***Look back last [ ] deliveries:*** Enter up to five previous deliveries to include in the report — increasing the number of deliveries will result in a more even approximation, as it will compensate for temperature extremes.

A sample of the *Projected Delivery Report* is shown below:



Projected Delivery Report

Criteria: % Full: All Less Than or Equal to 100
Cut off Date : 06/30/2010

Acct#	Name	Address - City	Last Delivery	Gallons Per Day	Tank Capacity	Estimated %	Adjusted Gallons per
123456	fdergerg	gfgdgdf - Arnold	06/30/2010	0.000	0	0.000	0.000
000132	dewfsdfsdf	fsdfsfds - Atwater	06/30/2010	0.000	0	0.000	0.000
000100	Easy Mart 2	1983 W. Hatch Rd. - Modesto	06/30/2010	0.000	0	0.000	0.000
000103	Andy's County Corner	467 Paradise Rd. - Modesto	06/30/2010	0.000	0	0.000	0.000
000104	Corner Stop	1622 S. Carpenter Rd. - Modesto	06/30/2010	0.000	0	0.000	0.000
000107	Easy Mart	1316 Avalon Ave - Modesto	06/30/2010	0.000	0	0.000	0.000
000111	Jiffy Convenience Store	2857 McHenry Ave - Modesto	06/30/2010	0.000	0	0.000	0.000
100001	H.W. Plainview	3700 Tully Rd - Modesto	06/30/2010	0.000	0	0.000	0.000
000127	Miles Raymond	1100 Sylvan Ave. - Modesto	06/30/2010	0.000	0	0.000	0.000
000130	Test 2	147 S. Broadway, - Modesto	06/30/2010	0.000	0	0.000	0.000
000105	Country Market	340 S. Carpenter Rd - Modesto	06/30/2010	0.000	6	100.000	0.000
000120	Ginny Glen	90863 West Hillside - Modesto	06/30/2010	0.000	6	100.000	0.000
100000	Robert Jordan	2100 Standford Ave - Modesto	06/30/2010	0.000	22	100.000	0.000
000504	Test Account	1100 - Modesto	06/30/2010	-3.330	100	100.000	0.000
000129	Test Account	147 - Turlock	06/30/2010	0.000	0	0.000	0.000
000131	test 3	1100 - Turlock	06/30/2010	0.000	0	0.000	0.000

Forecast Calculations and Examples

This section will guide you through examples of *Degree Day Forecasting* totals using real world scenarios. The formulas used for calculating forecasted totals will be outlined as well.

Three examples are included to highlight the following scenarios:

- Forecasting without *Daily Temperature Recording.*
- Forecasting with *Daily Temperature Recording.*
- Forecasting with *Daily Temperature Recording* and *K-Factor.*

Along with each example, a diagram of the calculations used to arrive at each total has been included.

Example 1 – No Temperature Recording

In this example, *Daily Temperature Recording* will not be a factor in the calculation.

Here are the specifics that will be used for the customer in this example:

- Two previous deliveries: June 24th and June 30th
- 100 gallon tank
- Report Cut-off date: July 4th

Additionally, here is the information that will be needed from each delivery to properly calculate the customer's needs:

- Arrival Capacity
- Departure Capacity
- Ending Gallons

NOTE: This information will be gathered by your route drivers during each delivery.

Here is the information gathered for this delivery:

Delivery #1 (Last Delivery)

Date	Capacity	Arrival %	Departure %	Ending Gallons
06/30/10	100	20%	80%	80

Delivery #2 (Prior Delivery 1)

Date	Capacity	Arrival %	Departure %	Ending Gallons
06/24/10	100	10%	90%	90

Using the data gathered from the previous deliveries (6/24, 6/30) and projecting to a future cut-off date (07/04), Route Manager will calculate forecasted totals using the formulas below:

Formula:	Example #1 figures:
Prior Delivery Departure % - Last Delivery Arrival % = **Total % Used**	90% - 20% = **70%**
Total % Used x Tank Capacity = **Total Gallons Used**	70% x 100 = **70**
Last Delivery Date – Prior Delivery Date = **Number of Days Between Deliveries**	06/30 – 06/24 = **6**
Total Gallons Used / Number of Days Between Deliveries = **Total Gallons Used Per Day**	70 / 6 = **11.67**
Last Delivery Date – Report Cut-Off Date (July 4th) = **Forecasted Days**	06/30 – 07/04 = **4**
Forecasted Days x Total Gallons Used Per Day = **Estimated Gallons Used**	4 x 11.67 = **46.68**
Last Departure % x Total Tank Capacity – Estimated Gallons Used = **Estimated Gallons Remaining**	80% x 100 – 46.68 = **33.32**
Estimated Gallons Remaining / Capacity = **Estimated % Full**	33.32 / 100 = **.3332 or 33.32**

Example 2 – With Temperature Recording

In this example, *Daily Temperature Recording* will be a factor in the calculation.

Here are the specifics that will be used for the customer in this example:

- Two previous deliveries: June 24th and June 30th
- Average temperature between deliveries (24th and 30th) of 78 degrees
- 100 gallon tank
- Report *Cut-Off Date*: July 4th
- Average projected temperature to *Cut-Off Date*: 65 degrees

Additionally, here is the information that will be needed from each delivery to properly calculate the customer's needs:

- Arrival Capacity
- Departure Capacity
- Ending Gallons

NOTE: This information will be gathered by your route drivers during each delivery.

Here is the information gathered for this delivery:

Delivery #1 (Last Delivery)

Date	Capacity	Arrival %	Departure %	Ending Gallons
06/30/10	100	20%	80%	80

Delivery #2 (Prior Delivery 1)

Date	Capacity	Arrival %	Departure %	Ending Gallons
06/24/10	100	10%	90%	90

Daily Temperature Recording

Prior Delivery 6/24	6/25	6/26	6/27	6/28	6/29	**Last Delivery 6/30**
Average Temperature:	78	78	78	78	78	

Projected Temperature Recording

Last Delivery 6/30	7/01	7/02	07/03	**Cut-Off Date 7/04**
Average Temperature:	78	78	78	

Using the data gathered from the previous deliveries (6/24, 6/30) and projecting to a future cut-off date (07/04), Route Manager will calculate forecasted totals using the formulas below:

Formula:	Example #1 figures:
Prior Delivery Departure % - Last Delivery Arrival % = **Total % Used**	90% - 20% = **70%**
Total % Used x Tank Capacity = **Total Gallons Used**	70% x 100 = **70**
Last Delivery Date – Prior Delivery Date = **Number of Days Between Deliveries**	06/30 – 06/24 = **6**
Total Gallons Used / Number of Days Between Deliveries = **Total Gallons Used Per Day**	70 / 6 = **11.67**
Temperature Adjustment #1: 1 + (Average Temperature Per Day – Baseline Temperature (65 degrees) / Projected Temperature) x Gallons Used Per Day = **Temperature Adjusted Gallons Used Per Day**	1 + (78 – 65 / 65) x 11.67 = **14.004 or 14**
Last Delivery Date – Report Cut-Off Date (July 4th) = **Forecasted Days**	06/30 – 07/04 = **4**
Forecasted Days x Total Gallons Used Per Day = **Estimated Gallons Used**	4 x 11.67 = **46.68**
Temperature Adjustment #2: Forecasted Days x Temperature Adjusted Gallons Used Per Day = **Temperature Adjusted Estimated Gallons Used**	4 x 14 = **56**
Last Departure % x Total Tank Capacity – Estimated Gallons Used = **Estimated Gallons Remaining**	80% x 100 – 46.68 = **33.32**
Temperature Adjustment # 3 Last Departure % x Total Tank Capacity – Temperature Adjusted Estimated Gallons Used = **Temperature Adjusted Estimated Gallons Remaining**	80% x 100 – 56 = **24**
Estimated Gallons Remaining / Capacity = **Estimated % Full**	33.32 / 100 = **.3332 or 33.32**
Temperature Adjustment # 4 Temperature Adjusted Gallons Remaining / Capacity = **Temperature Adjusted Estimated % Full**	24 / 100 = **.24 or 24**

Example 3 – With Temperature Recording and K-Factor

In this example, *Daily Temperature Recording* and *K-Factor* will be a used in the calculation.

Here are the specifics that will be used for the customer in this example:

- Two previous deliveries: June 24th and June 30th
- 100 gallon tank
- Report Cut-off date: July 4th

Additionally, here is the information that will be needed from each delivery to properly calculate the customer's needs:

- Arrival Capacity
- Departure Capacity
- Ending Gallons

NOTE: This information will be gathered by your route drivers during each delivery.

Here is the information gathered for this delivery:

Delivery #1 (Last Delivery)

Date	Capacity	Arrival %	Departure %	Ending Gallons
06/30/10	100	20%	80%	80

Delivery #2 (Prior Delivery 1)

Date	Capacity	Arrival %	Departure %	Ending Gallons
06/24/10	100	10%	90%	90

Using the data gathered from the previous deliveries (6/24, 6/30) and projecting to a future cut-off date (07/04), Route Manager will calculate forecasted totals using the formulas below:

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Forecasted Days x Total Gallons Used Per Day = **Estimated Gallons Used**	4 x 11.67 = **46.68**
Last Departure % x Total Tank Capacity – Estimated Gallons Used = **Estimated Gallons Remaining**	80% x 100 – 46.68 = **33.32**
Estimated Gallons Remaining / Capacity = **Estimated % Full**	33.32 / 100 = **.3332 or 33.32**

Summary

The *Degree Day Forecasting* option adds further flexibility to the already robust Route Manager program, and can benefit industries such as Bulk Propane with managing their products more effectively. If you have any questions or require additional assistance, please contact Advantage Route Systems.

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Warning

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