



# Vapor Recovery Monitor (VRM)

## Troubleshooting and Alarm Identification Guide

*Vapor Recovery Monitor for In-Station Diagnostics*  
*TS-EMS, Environmental Monitoring System*  
*Part of TS-5 Series Consoles*

Manual #	Revision	Date	Changes from Previous Revision
000-0529	B	Aug. 2010	Total reformat. Added troubleshooting flowcharts, DIM mapping and DTU information. Added examples of daily and weekly reports

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### References

#### **Franklin Fueling Systems:**

<http://www.franklinfueling.com>

**Tech Support: 1-800-984-6266**

#### **California Air Resources Board (CARB)**

<http://www.arb.ca.gov/vapor/vapor.htm>

#### **CARB Phase II EVR Executive Orders**

<http://www.arb.ca.gov/vapor/eo-evrphasell.htm>

**VR-201 Healy EVR Phase II without ISD**

**VR-202 Healy EVR Phase II with ISD**

#### **CARB Enhanced Vapor Recovery Compliance Guide**

<http://www.evrhome.org/>

#### **CARB Compliance Assistance Programs**

<http://www.arb.ca.gov/cap/cap.htm>

**ISD Handbook**


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## Important Safety Messages

INCON equipment is designed to be installed in association with volatile hydrocarbon liquids such as gasoline and diesel fuel. Installing or working on this equipment means working in an environment in which these highly flammable liquids may be present. Working in such a hazardous environment presents a risk of severe injury or death if these instructions and standard industry practices are not followed. Read and follow all instructions thoroughly before installing or working on this, or any other related, equipment.


As you read this guide, please be aware of the following symbols and their meanings:


**Warning**  This symbol identifies a warning. A warning sign will appear in the text of this document when a potentially hazardous situation may arise if the instructions that follow are not adhered to closely. A potentially hazardous situation may involve the possibility of severe bodily harm or even death.


**Caution**  This is a caution symbol. A caution sign will appear in the text of this document when a potentially hazardous environmental situation may arise if the instructions that follow are not adhered to closely. A potentially hazardous environmental situation may involve the leakage of fuel from equipment that could severely harm the environment.

**Danger**  This symbol identifies an electrical danger. An electrical danger sign will appear in the text of this document when a potentially hazardous situation involving large amounts of electricity may arise if the instructions that follow are not adhered to closely. A potentially hazardous situation may involve the possibility of electrocution, severe bodily harm, or even death.


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**Warning**  Follow all applicable codes governing the installation and servicing of this product and the entire system. Always lock out and tag electrical circuit breakers while installing or servicing this equipment and any related equipment. A potentially lethal electrical shock hazard and the possibility of an explosion or fire from a spark can result if the electrical circuit breakers are accidentally turned on during installation or servicing. Please refer to the *Installation and Owner's Manual* for this equipment, and the appropriate documentation for any other related equipment, for complete installation and safety information.


**Warning**  Follow all federal, state and local laws governing the installation of this product and its associated systems. When no other regulations apply, follow NFPA codes 30, 30A and 70 from the National Fire Protection Association. Failure to follow these codes could result in severe injury, death, serious property damage and/or environmental contamination.

**Warning**  Always secure the work area from moving vehicles. The equipment in this manual is usually mounted underground, so reduced visibility puts service personnel working on this equipment in danger from moving vehicles entering the work area. To help eliminate these unsafe conditions, secure the area by using a service truck to block access to the work environment, or by using any other reasonable means available to ensure the safety of service personnel.

**Warning**  When the console system is used to monitor tanks containing gasoline or other flammable substances, you may create an explosion hazard if you do not follow the requirements in this manual carefully.

**Warning**  All wiring must enter the console's enclosure through the designated knockouts. An explosion hazard may result if other openings are used.

**Warning**  All wiring from probes or sensors to the console must be run in conduit separate from all other wiring. Failure to do so will create an explosion hazard.

**Warning**  Substituting components could impair intrinsic safety. T5 series consoles are intrinsically safe for sensors installed in – Class I, Division 1, Group D – hazardous locations. Substitution of components could make the energy limiting circuitry in the system ineffective and could cause an explosion hazard. Repairs to a T5 series console or attached components should only be performed by a qualified, factory-trained technician.

## Introduction

### Contractor Requirements: Levels of Certification

A contractor must be certified to Levels 1,2, and 5 in order to work on or change setup on the INCON Vapor Recovery Monitoring (VRM) System.

- Level 1: Tank Sentinel Installation certification. An installer that successfully completes this level will be certified to install the Tank Sentinel consoles, probes, and accessories.
- Level 2: Tank Sentinel Start-up/Programming/Warranty certification. A technician that successfully completes this level will be certified to start-up, program, and perform warranty service on Tank Sentinel consoles, probes, and accessories. Prerequisite: A technician must have Level 1 installation certification before completing Level 2.
- Level 5: Vapor Recovery Monitoring (VRM). A technician that successfully completes this level will be certified to operate and perform warranty service on the VRM System. Prerequisite: A technician must have Level 1 Installation certification and Level 2 Start-up/Programming/Warranty certification before completing Level 5.

## Related Manuals

Executive Order VR-202

VRM Installation, Operators, and Maintenance Manual 000-2058

TS-VPS, Vapor Pressure Sensor, Installation Guide 000-2143

TS-VFM, Vapor Flow Meter, Installation Guide 000-2144

TS-5 Series Programming Guide 000-2142

TS-5 Series Installation Guide 000-2150

TS-5 Series Operators Guide 000-2151

TS-DTU Dispenser Retrofit Guide 000-2146

TS-DTU Console Side Installation Instructions 000-0080

Healy Troubleshooting Guide 405274001

It is recommended that Franklin Fueling System Technical Support (1-800-984-6266) be contacted for assistance with troubleshooting any alarm.

## Introduction to the Guide

The purpose of this guide is to inform about the INCON In-Station Diagnostics (ISD) used in conjunction with Healy Enhanced Vapor Recovery (EVR) Phase II System and how to properly troubleshoot these systems. For complete installation, operation, and maintenance details of this system, refer to CARB Executive Order VR-202.

An ISD system is comprised of one vapor pressure sensor per site, one vapor flow meter per dispenser, one tank gauge console, and the appropriate ISD software for use with the console.

The vapor pressure sensor's primary purpose is to continually measure the underground storage tank's vapor containment pressure. This vapor containment area includes the tank ullage area, the vapor piping, and the CAS (Clean Air Separator). ISD continually monitors the vapor pressure sensor and performs assessments for pressurization and leakage in the vapor containment area.

The vapor flow meter is a volume measuring meter. When vapors are returned from a vehicle's gasoline tank to the underground storage tank during dispensing, the volume is measured and analyzed to assess how well the vapor collection process is working.

A Healy EVR Phase II System includes one VP1000 vacuum pump per dispenser, one Clean Air Separator (CAS) per site, and the appropriate Healy hanging hardware, including Model 900 nozzles, at each fueling point.

The VP1000 Vacuum Pump is activated for each transaction and provides the vacuum for the Model 900 nozzle to collect vapors at the vehicle. The CAS is a containment vessel connected with the ullage space of all underground gasoline storage tanks to control ullage pressure.

**Note:** Clear/Reset Alarm can only be performed by a certified technician. A maintenance log entry must be made documenting the service and reason for the Clear/Reset Alarm. Clear/Reset Alarm must be performed according to the requirements of the local air district having jurisdiction over the site and CARB Executive Order VR-202.

## Notes on Troubleshooting

The main task of troubleshooting is to gather enough information to find a component or configuration that is causing an alarm condition. The service technician should first begin accumulating information. The primary source for VRM related alarms should be from the INCON ISD system.

A technician should first pull the Alarm History report for the last 30 days. This can show if there is a trend or if there is an intermittent alarm that could be influencing the current alarm condition.

Next view the Daily Report. This will show the daily averages for each fueling point and for the Ullage pressure system. The Daily Report can help identify problem fueling points or patterns in the pressure system. Zero A/L ratios typically point to a ISD related problem, while high A/L ratios is most frequently a problem with the vapor assist systems. Low average A/L ratios could have either vapor assist or ISD related causes. The Min and Max, as well as the 75 and 95%, can be found on the Daily Report and are great aids in troubleshooting Ullage Pressure warnings.

When troubleshooting the ISD system always update to the latest version of firmware. Often troubleshooting aids, such as diagnostic tools or specialized reports are added.

After the information has been collected and the firmware is brought up to the latest revision, next determine what type of alarm is present. There are a few categories of causes that the alarm can fall under:

**Collection or Pressure related alarms:** These are alarms that are related to the collection of vapor from the vehicle and the monitoring of the tank pressure. True Collection alarms/Pressure alarms are completely related to the Phase I & II systems, but can be influenced or caused by other alarm and programming conditions.

**Hardware alarms:** These alarms are related to either wiring or hardware failure, though some may be caused by Software/Programming alarms. Hardware alarms can cause both Collection and Pressure alarms to occur if they are left untreated.

**Software/Programming:** These causes may reflect themselves in either collection/pressure related alarms or in hardware related alarms.

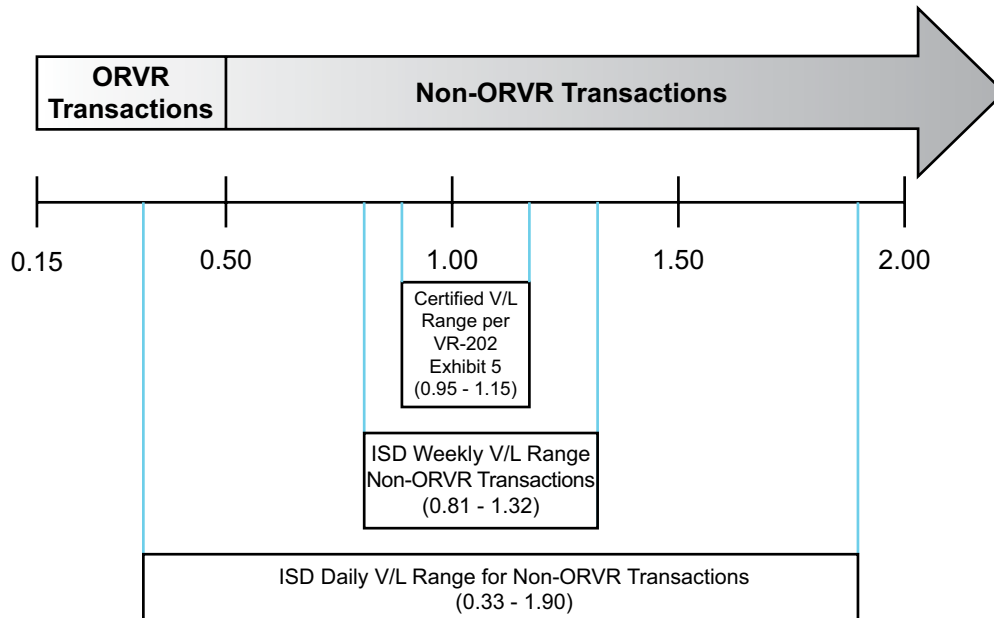
**Dispenser Interface Communication:** These causes relate to the communication between the DIM and the POS. If the connection is not made or if there is an error in the programming, a collection alarm may occur.

As with any troubleshooting, after gathering information begin the process of elimination, starting with the quickest and easiest to eliminate and working toward the more complex. The rest of this guide will help the technician to evaluate the alarm condition and the processes necessary to rectify it.

## Introduction to ISD Vapor Collection

ISD vapor collection data compares fueling point V/L's (Vapor over Liquid ratios) based on CARB specifications detailed in CP-201. V/L ratio is the amount of vapor collected in comparison to the amount of liquid dispensed. In the Healy Phase II Vapor Recovery System, the certified V/L range is 0.95 to 1.15, as determined by VR-202 Exhibit 5 testing.

If ISD vapor collection data does not meet the appropriate specifications, ISD will produce a warning alarm and then a failure alarm as specified below.



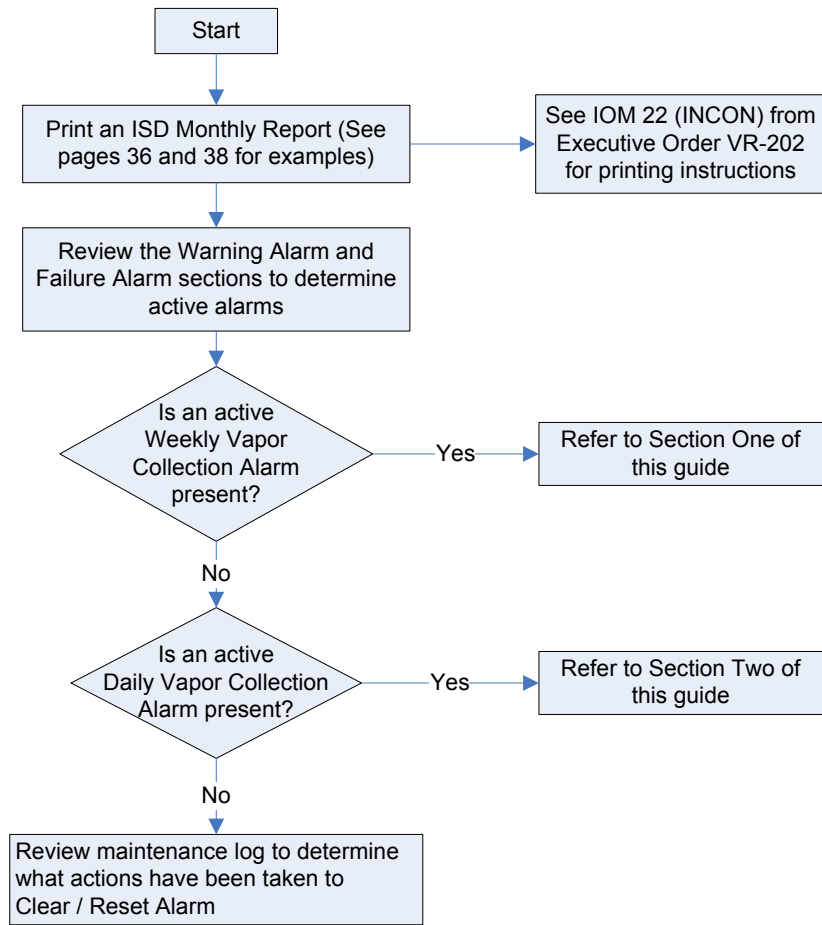
**Figure 1: ISD V/L Transaction Graph**

Condition	Value	ISD Report Term
Weekly Vapor Collection Alarm (Degradation)	V/L average for Non-ORVR transactions is greater than 1.32 or less than 0.81	INCON – Weekly Vapor Collection Warning / Failure
Daily Vapor Collection Alarm (Gross)	V/L average for Non-ORVR transactions is greater than 1.90 or less than 0.33	INCON – Daily Vapor Collection Warning / Failure

**Table 1: ISD Vapor Collection Terminology**

Note: On-Board Refueling Vapor Recovery (ORVR) equipped vehicles generate fueling point V/L ratios in the 0.15 to 0.50 range. V/L ratios below 0.15 are assessed as no vapor collection by the ISD.

# Identifying Collection Alarms



# Section One: Weekly Vapor Collection Alarms

## Introduction to Weekly Vapor Collection Alarms

This section is about ISD Weekly Vapor Collection warning and failure alarms. A Weekly Vapor Collection Alarm is an indication that based on a minimum of 30 Non-ORVR transactions the fueling point V/L average is beyond the ISD threshold on a weekly basis. This is usually an indication of a small blockage or small leak in the vapor recovery system.

### Warning Alarms

A Weekly Vapor Collection Warning Alarm is activated and recorded when the fueling point V/L average for a minimum of 30 Non-ORVR transactions is greater than 1.32 or less than 0.81 for one week. If fewer than 30 Non-ORVR events occur in a week, VRM system may accumulate events over an additional week or weeks until a minimum of 30 Non-ORVR events is reached.

**Note:** ISD evaluates weekly vapor collection alarms on a calendar week basis.

### Failure Alarms

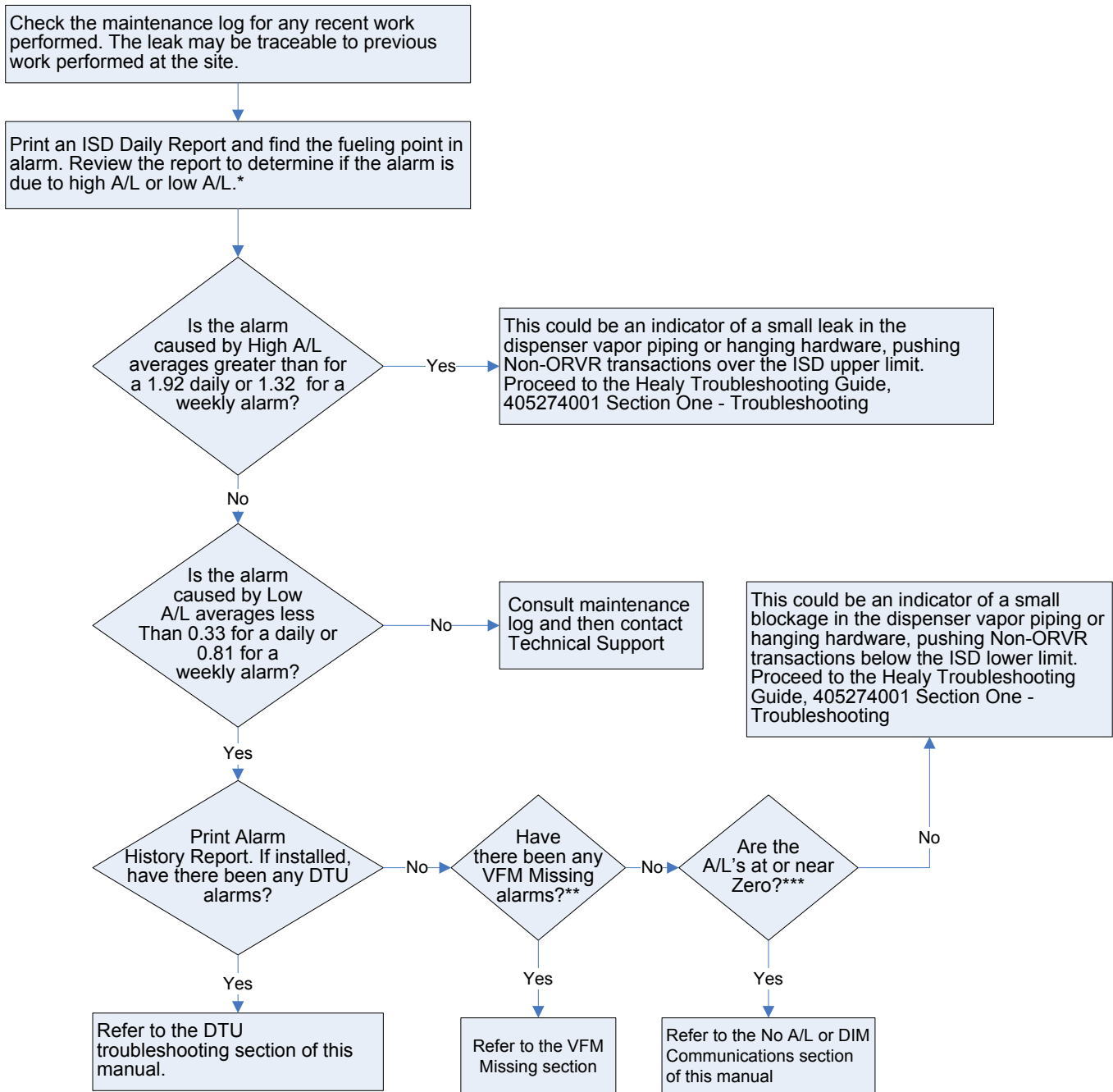
When two such consecutive failed assessments occur, ISD will activate a Weekly Vapor Collection Failure Alarm, record that event, and prohibit fuel dispensing from the affected fueling point(s).

**Note:** With ISD, a warning alarm will be posted on calendar day 7 and then post the failure alarm on calendar day 14 with a shutdown of only the affected dispensers if no action is taken to correct the condition.

### Probable Causes of Daily/Weekly Collection Alarms

- Leaking Hanging Hardware
- Leak in the vapor piping
- Damaged nozzle
- Plugged vapor piping
- DTU related issues
- VFM missing
- VFM vanes stuck or sticky
- No A/L's
- Flow rates below 6 gpm or above 10 gpm

## Daily / Weekly Vapor Collection Warnings / Alarms



\* - A Weekly Warning or Failure will not change the symbol in the Daily ISD Report for the fueling point in alarm. The symbol represents the daily result. When reviewing the Daily Report, you need to look at the averages for the 7 days prior to the alarm.

\*\* - An active VFM Missing Alarm will cause all subsequent A/Ls to go to zero. Zero A/Ls will be added to the Daily/Weekly A/L average.

\*\*\* - Programming or DIM communication errors can cause all subsequent A/Ls to go to zero. Zero A/Ls will be added to the Daily/Weekly A/L average.

## Section Two: Daily Vapor Collection Alarms

### Introduction to Daily Vapor Collection Alarms

This section of the guide is to ISD Daily Vapor Collection alarms.

A Daily Vapor Collection Alarm is an indication that based on a minimum of 15 Non-ORVR transactions the fueling point V/L average is beyond the ISD threshold on a daily basis. This is usually an indication of a large blockage or large leak in the vapor line.

A daily vapor collection alarm can also be generated if a Vapor Flow Meter (VFM) is not communicating to the console.

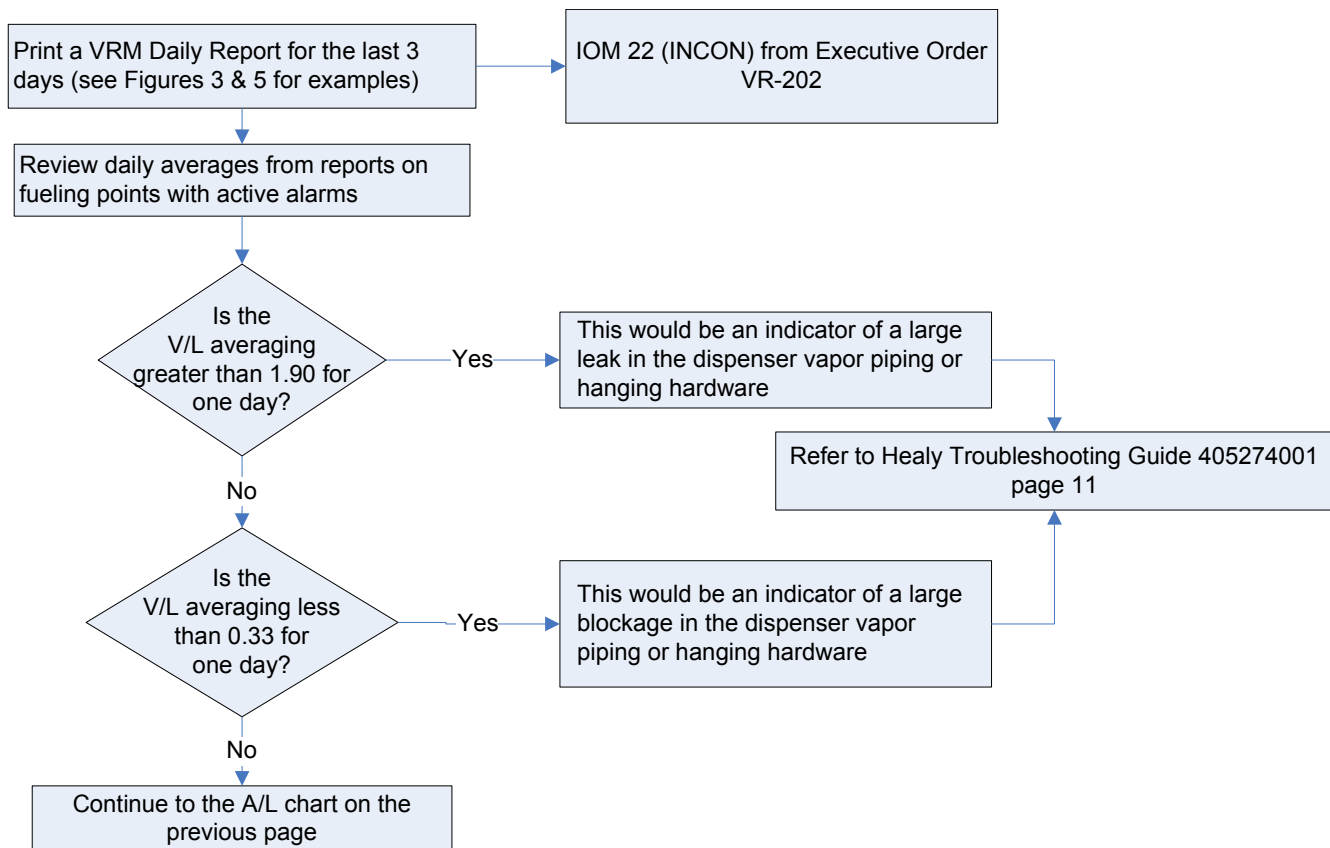
### Warning Alarms

A Daily Vapor Collection Warning Alarm is activated and recorded when the fueling point V/L average for a minimum of 15 Non-ORVR transactions is greater than 1.90 or less than 0.33 for one day. If fewer than 15 Non-ORVR events occur in a day, the ISD system may accumulate events over an additional day or days until a minimum of 15 Non-ORVR events is reached.

### Failure Alarms

When two such consecutive failed assessments occur, ISD will activate a Daily Vapor Collection Failure Alarm, record that event, and prohibit fuel dispensing from the affected fueling points.

**Note:** With Veeder-Root ISD, a failure alarm will shutdown the entire site. With INCON ISD, only the affected dispenser will be shutdown with a failure alarm.

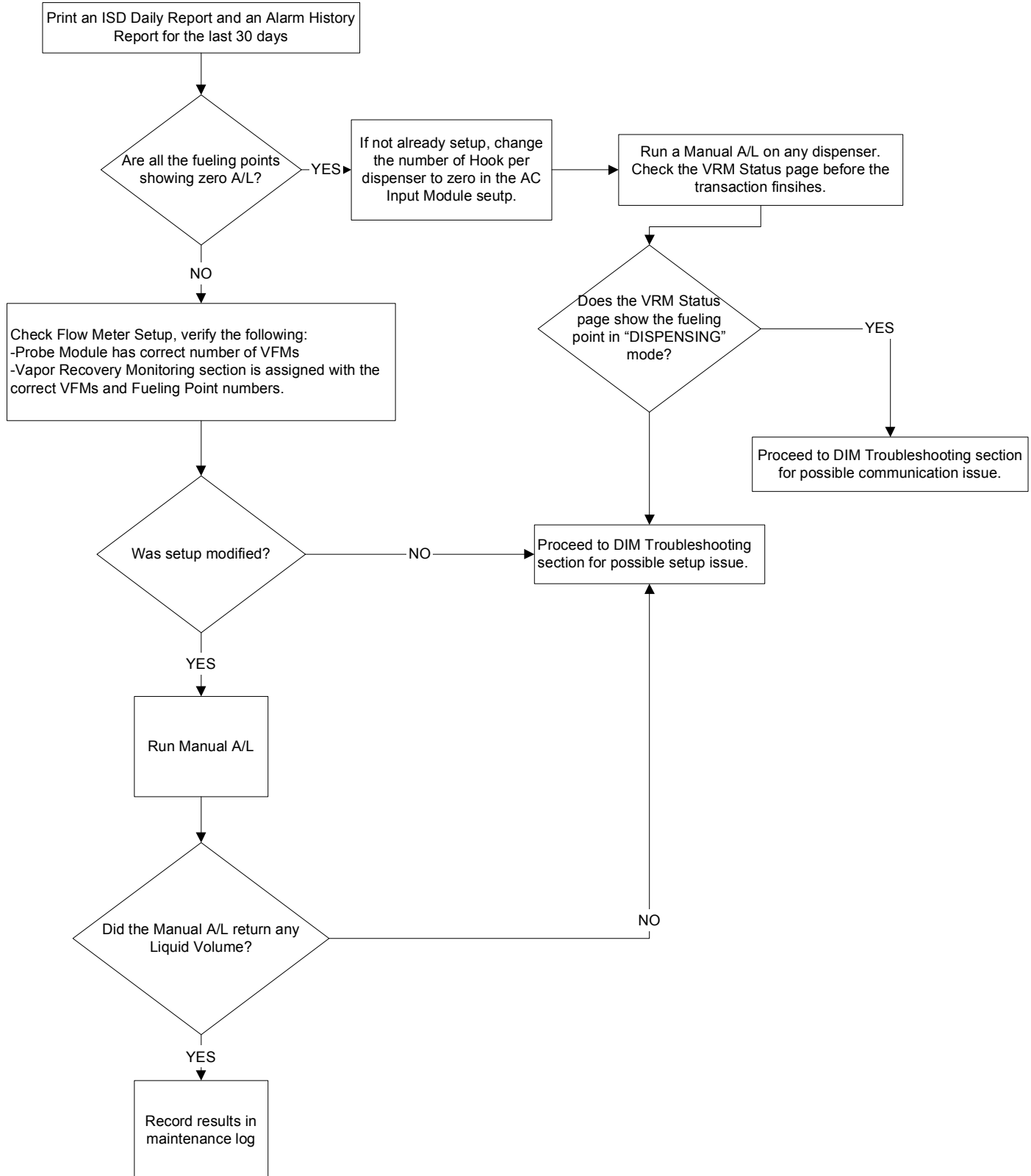


## Troubleshooting Zero A/L

Use the following chart for troubleshooting Zero A/L problems.

### Common Causes:

- Incorrect Setup
  - Probe module channel is not set to TS-VFM
  - More than one dispenser is mapped to the same VFM.
- DIM not communicating



## Introduction to ISD Ullage Pressure

The console collects ullage pressure measurements and evaluates these measurements in comparison to CARB specifications detailed in CP-201. In a properly maintained Healy EVR Phase II Vapor Recovery System, the ullage pressure will normally be at or below atmospheric pressure, thus limiting the occurrence of the following alarms.

If ISD ullage pressure data does not meet the appropriate specifications, ISD will produce a warning alarm and then failure alarm as specified below.

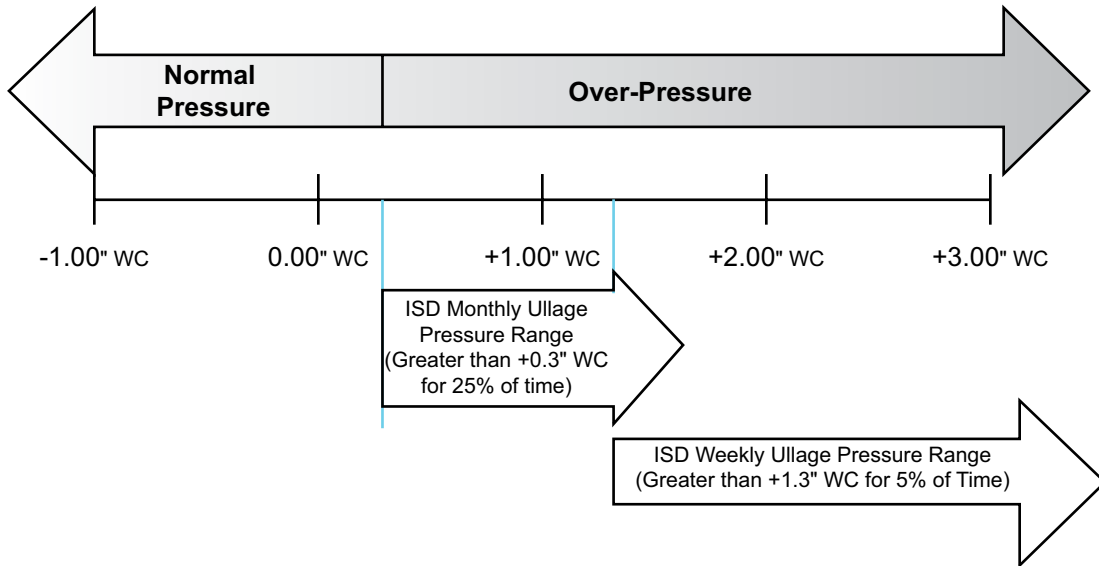
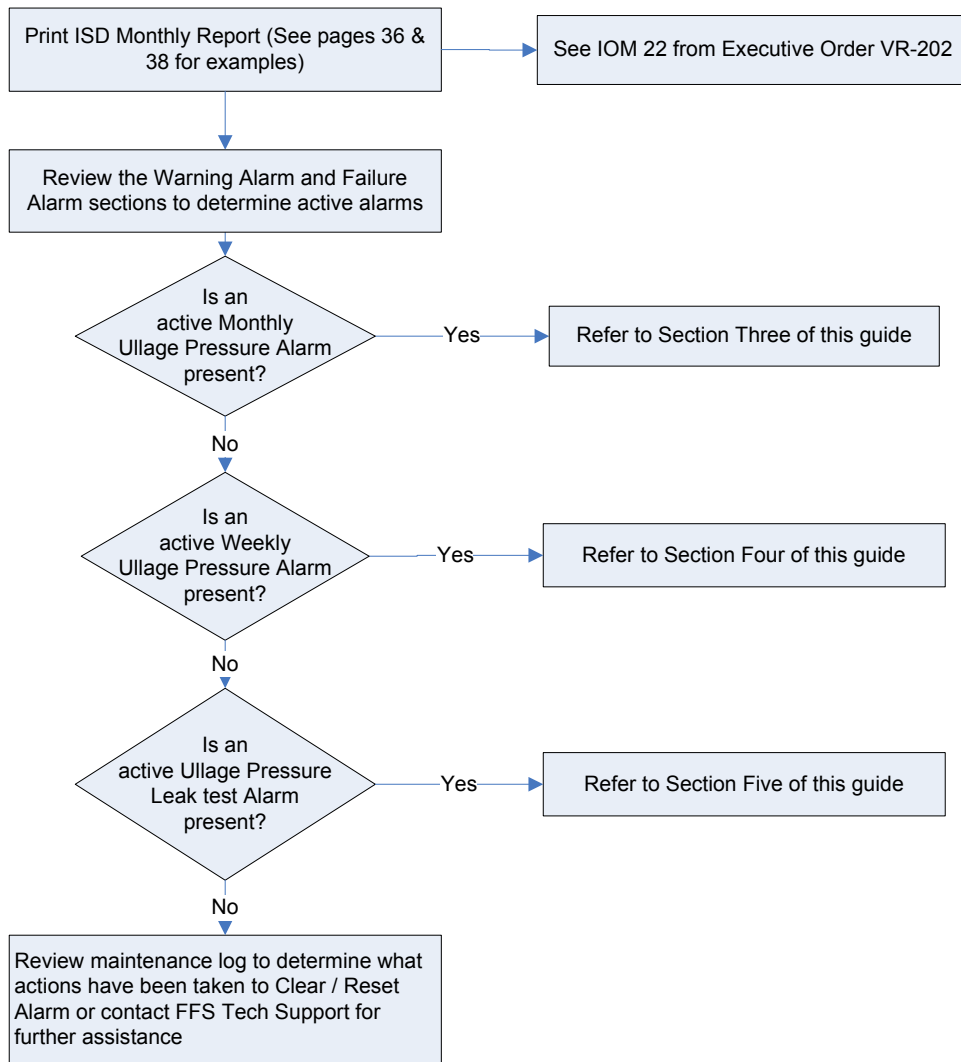


Figure 2: Ullage Pressure Graph

Condition	Value	ISD Report Term
Monthly Ullage Pressure Alarm (Degradation)	Ullage pressure is greater than +0.3" WC for 25% of time	INCON – Monthly Ullage Pressure Warning / Failure
Weekly Ullage Pressure Alarm (Gross)	Ullage pressure is greater than +1.3" WC for 5% of time	INCON – Weekly Ullage Pressure Warning / Failure
Ullage Pressure Leak Test Alarm	Leak rate at least 2 times allowable standard from TP-201.3	INCON – Weekly Ullage Pressure Leak Test Warning / Failure

Table 2: ISD Ullage Pressure Terminology

## Identifying Pressure Alarms



## Section Three: Monthly Ullage Pressure Alarms

### Introduction to Monthly Ullage Pressure Alarms

This section of the guide is to inform installers, operators, and other personnel about ISD Monthly Ullage Pressure warning and failure alarms. A Monthly Ullage Pressure Alarm is an indication that the ullage pressure is above the ISD threshold on a monthly basis.

#### Warning Alarms

A Monthly Ullage Pressure Warning Alarm is activated and recorded when the ullage pressure is greater than +0.3" WC for 25% of the time for one month.

**Note:** The console evaluates monthly ullage alarms on the first day of each month.

#### Failure Alarms

When two such consecutive failed assessments occur, the console will activate a Monthly Ullage Pressure Failure Alarm, record that event, and prohibit fuel dispensing for the entire site.

**Note:** With INCON VRM, a warning alarm will be posted on calendar day 30 and then post the failure alarm on calendar day 60 if no action is taken to correct. The entire site will be shutdown in the event of a failure alarm.

#### Probable Causes of Weekly/Monthly Pressure Alarms

- Ball Values are closed to feeding the Clean Air Separator (CAS)
- Leaking P/V Valve (on negative side, which allows for ingestion of fresh air)
- Leak in vapor path between Vapor Pump and Nozzle
- VPS Isolation Ball Valve is closed.
- Pressure Sensor Open Circuit
- DTU related issues
- Slow Flow
- Site related conditions
  - Winter Fuels
  - Deliveries schedule

# Weekly / Monthly Ullage Warning / Alarm Troubleshooting

Upgrade the console to the latest firmware revision

Are the ball valves for the Clean Air Separator in the correct operating positions?

No

Set ball valves per Exhibit 4 of Executive Order VR-202 to complete repairs.

Yes

Is the ball valve near the TSP-VPS in the correct operating position?

No

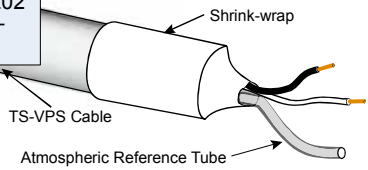
See Exhibit 10 from Executive Order VR-202 to complete repairs.

Yes

At the TS-VPS junction box, is the clear reference tube exposed to atmosphere?

No

Pull off shrink wrap and expose/remove tube from epoxy pack. See Exhibit 10 from Executive Order VR-202 to bring system to 0 and re-calibrate VPS



Yes

View the Alarm History Report. Is there any active or historic indications of a Pressure Sensor Open Circuit Alarm?

Yes

See Pressure Sensor Open Circuit portion of this Manual.

No

View Daily Report. Is there a dispenser or multiple dispensers that exhibit high A/L's?

Yes

Verify nozzle tightness by Exhibit 7 of VR-202. Verify dispenser vapor piping by performing item B-3 from the A/B Sheet of VR-202.

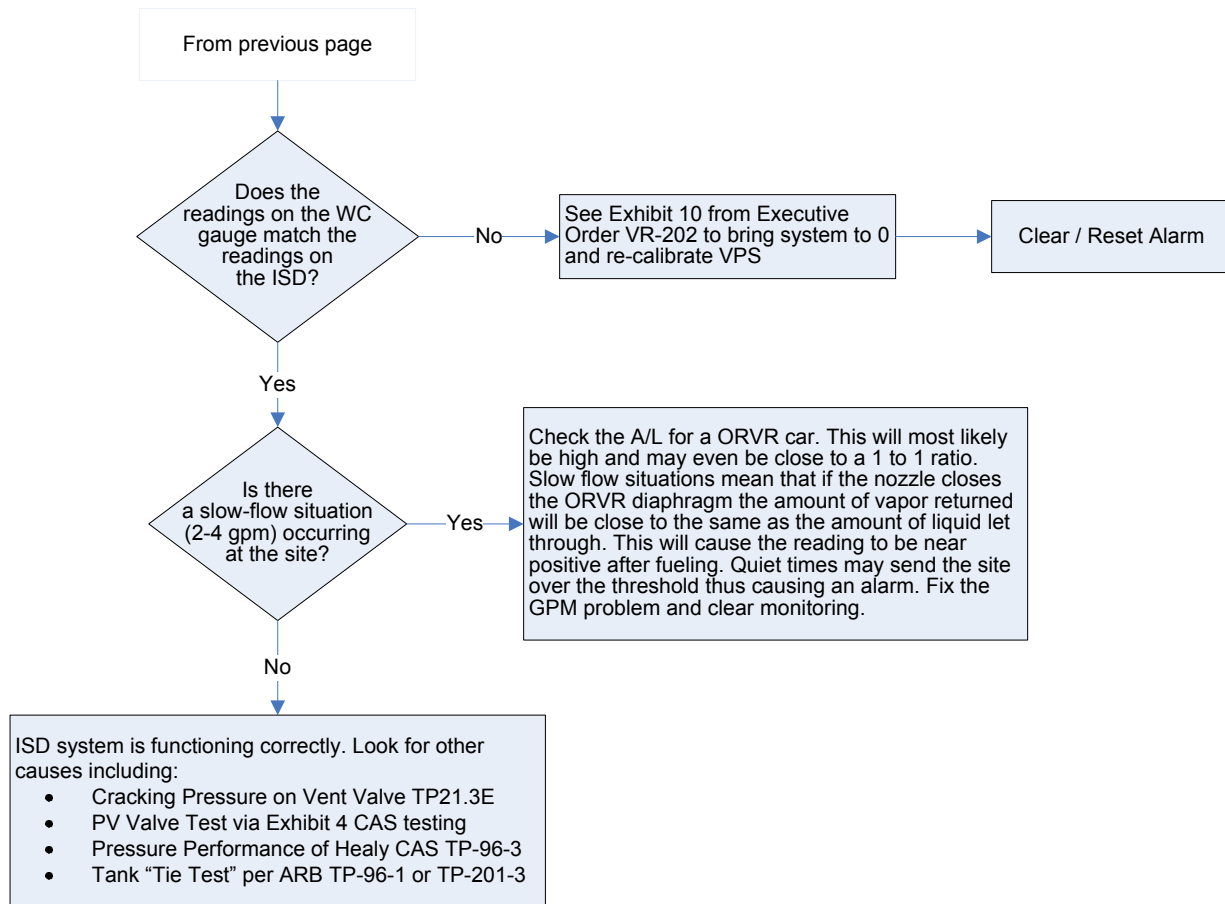
Clear / Reset Alarm

No

Install a WC gauge to the dispenser where the VPS is located (be sure the ball valve is closed until gauge is installed or the pressure will be released)

Continued on next page

Clear Monitoring



## Section Four: Weekly Ullage Pressure Alarms

### Introduction to Weekly Ullage Pressure Alarms

This section of the guide is to inform installers, operators, and other personnel about ISD weekly ullage pressure alarms. A Weekly Ullage Pressure Alarm is an indication that the ullage pressure is above the ISD threshold on a weekly basis.

#### Warning Alarms

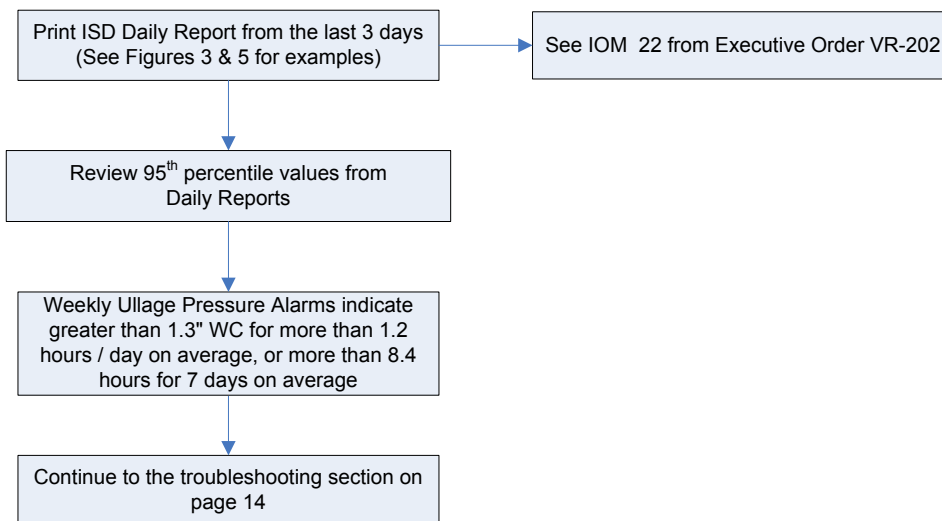
A Weekly Ullage Pressure Warning Alarm is activated and recorded when the ullage pressure is greater than +1.3" WC for 5% of the time for one week.

#### Failure Alarms

When two such consecutive failed assessments occur, the console will activate a Weekly Ullage Pressure Failure Alarm, record that event, and prohibit fuel dispensing for the entire site.

**Note:** With INCON VRM, a warning alarm will be posted on calendar day 7 and then post the failure alarm on calendar day 14 if no action is taken to correct. The entire site will be shut down in the event of a failure alarm with both Veeder-Root and INCON ISD.

#### Course of Action



## Section Five: Ullage Pressure Leak Test Alarms

### Introduction to Ullage Pressure Leak Test Alarms

This section of the guide is about ISD ullage pressure leak test alarms. An Ullage Pressure Leak Test Alarm is an indication that a leak in the Phase I and/or Phase II vapor recovery system is in excess of the CP-201 standard on a weekly basis.

### Warning Alarms

An Ullage Pressure Leak Test Warning Alarm is activated and recorded when the leak rate of the vapor recovery system is two times the allowable rate as stated in TP-201.3 for one week.

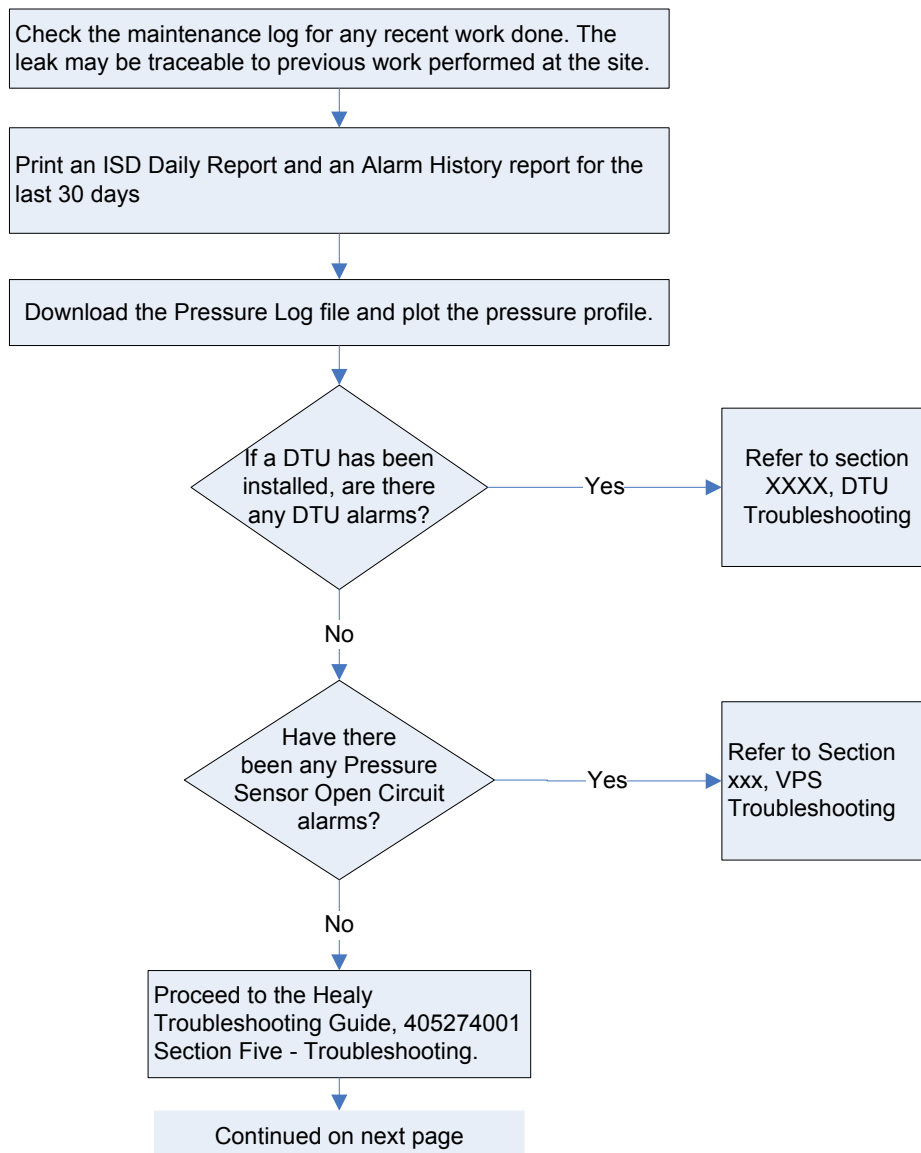
### Failure Alarms

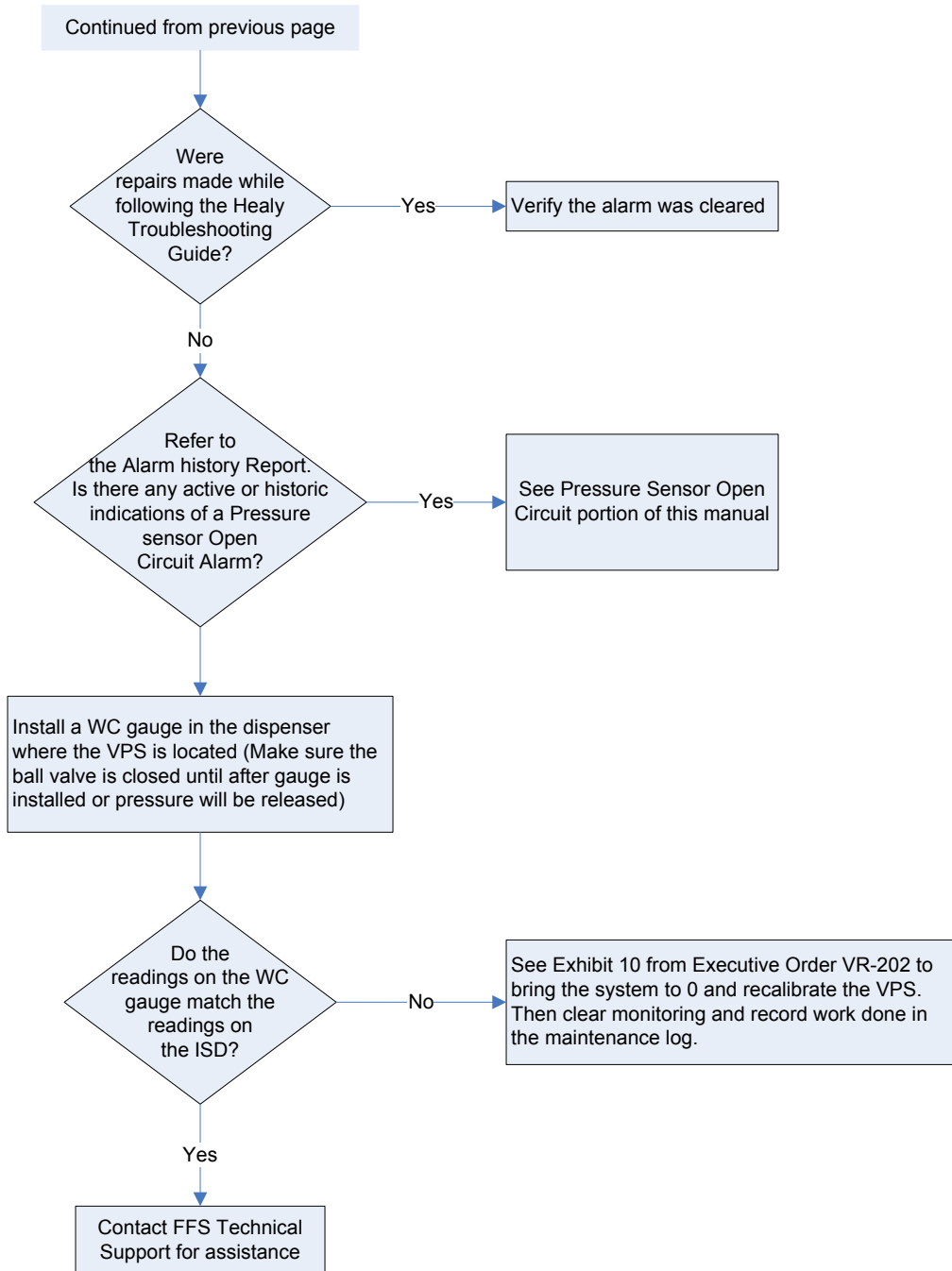
When two such consecutive failed assessments occur, ISD will activate an Ullage Pressure Leak Test Failure Alarm, record that event, and prohibit fuel dispensing for the entire site.

### Probable Causes of Ullage Pressure Leak Test Alarms

- VPS not communicating
- Incorrect programming
- Leaking Phase I or II component
- VPS Ball Valve in closed position
- Leaking hanging hardware or dispenser piping
- DTU related issues

### Course of Action

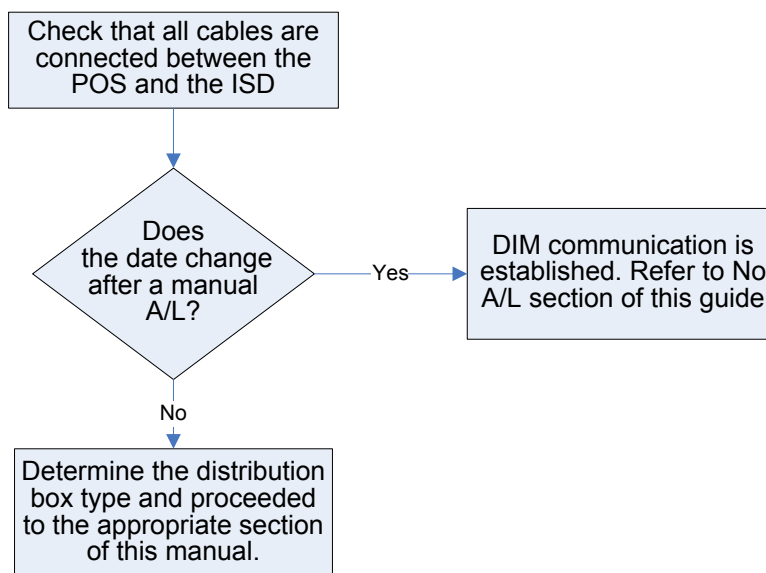
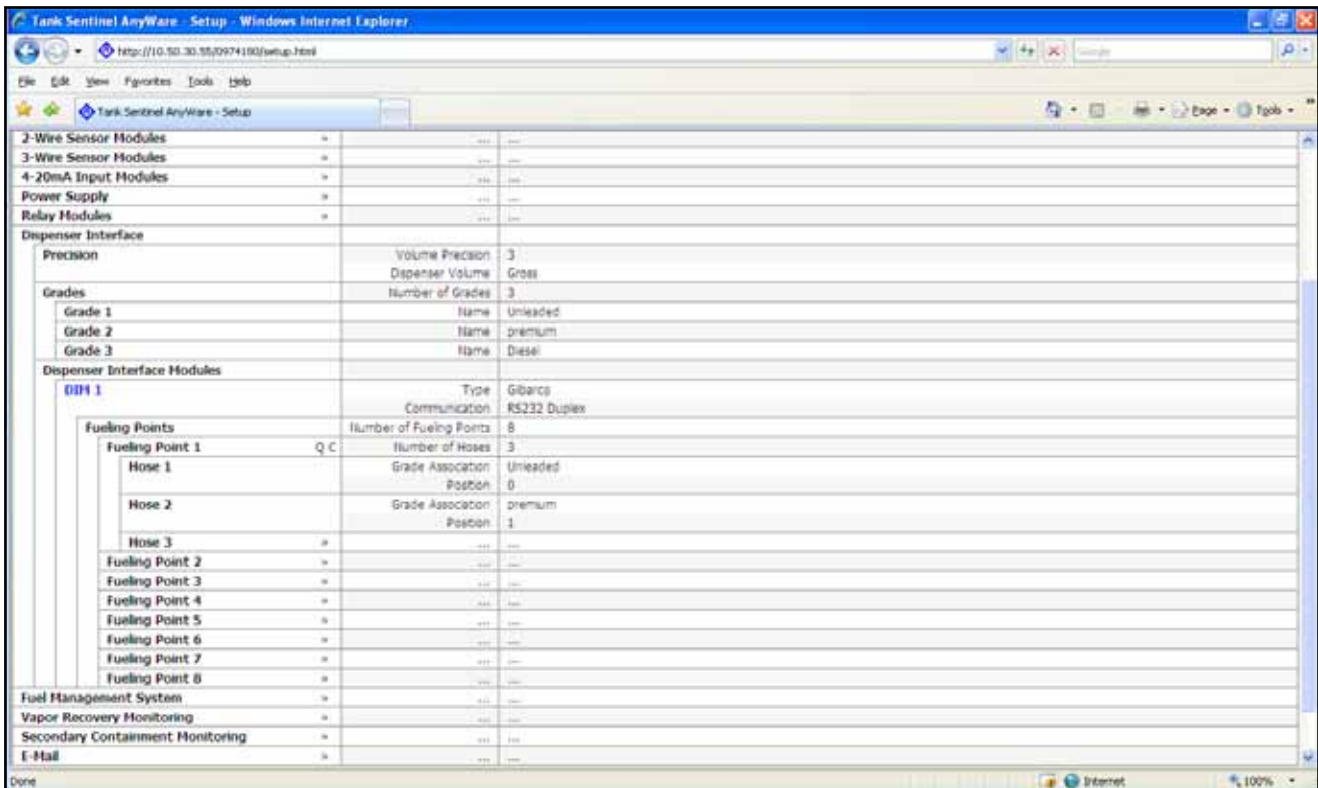




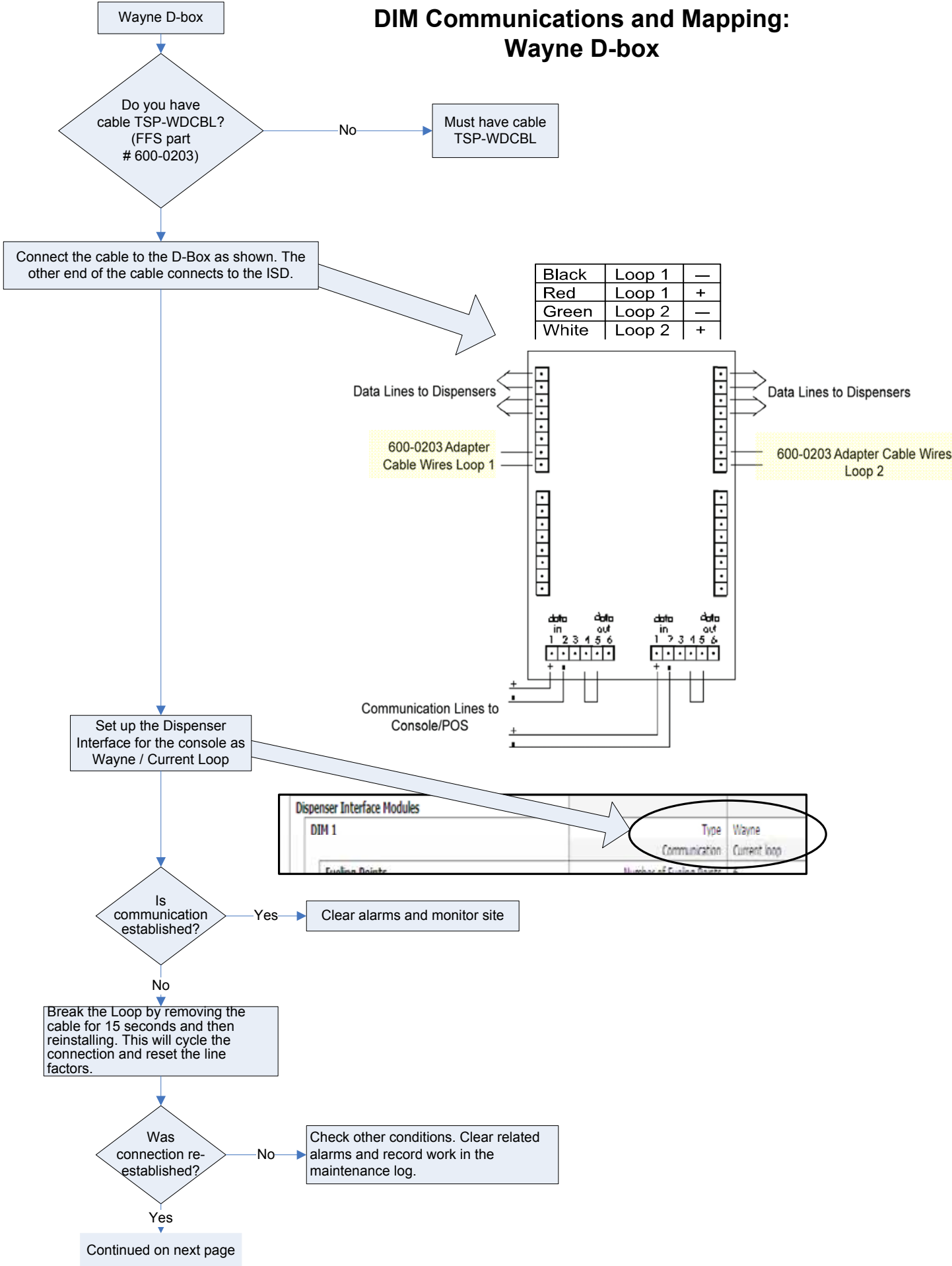
## Introduction to DIM Communication

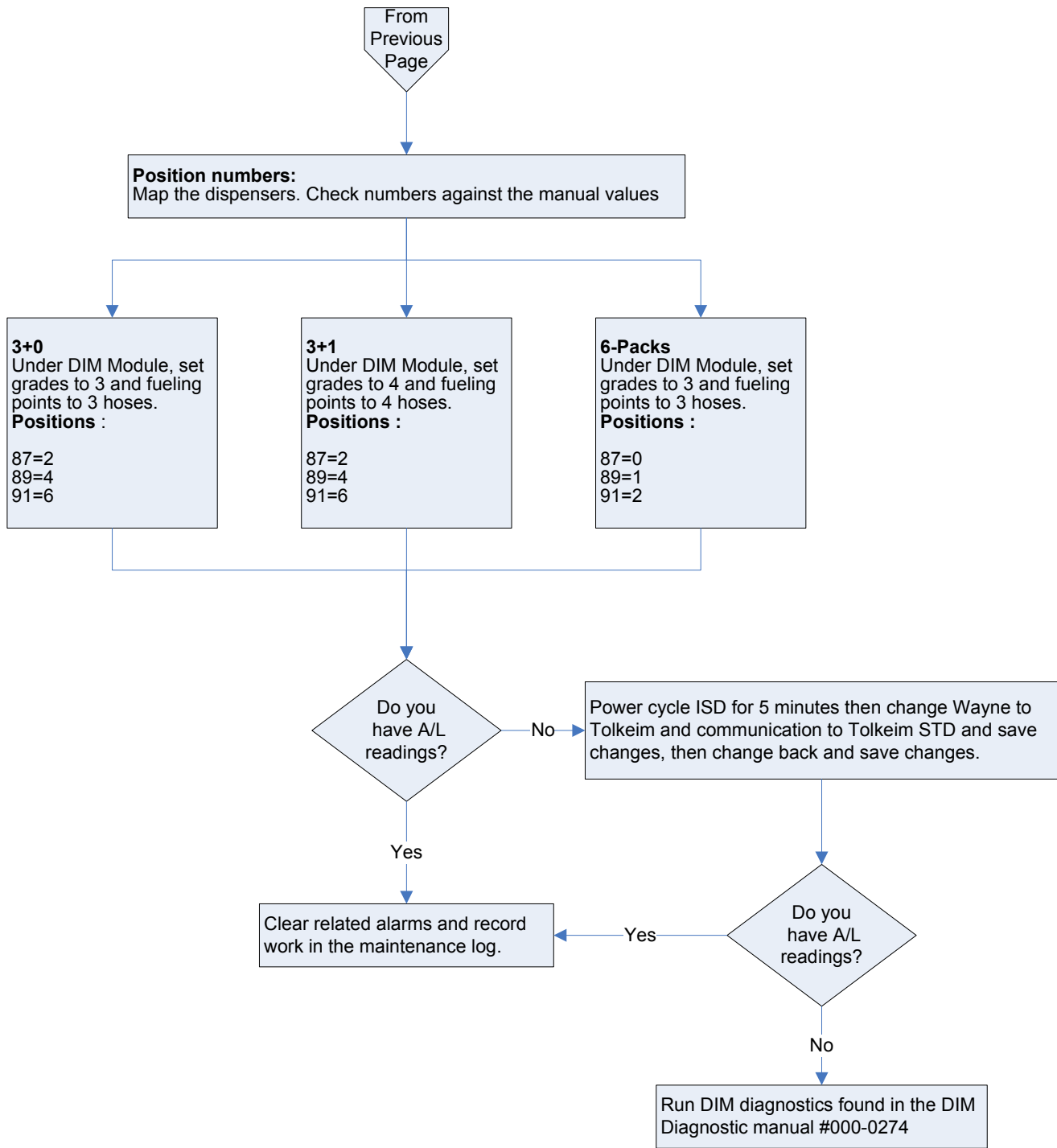
This section of the guide is to inform installers, operators, and other personnel about the DIM or Dispenser Interface Module. The DIM communicates with the sites Point of Sale (POS) distribution box to receive information about sales. Through this connection, the DIM records the volume of liquid from each sale. For ISD, we use this information to compare to the Air Volume recorded by the vapor flow meter assigned to the same dispenser. This comparison becomes the ratio of A/L or Air divided by Liquid volume.

When problems with the communication between the ISD and the POS arise, Daily/Weekly collection errors can occur. Without this connection, the A/L readings will be 0. Communication problems may be site wide, dispenser specific or grade specific.

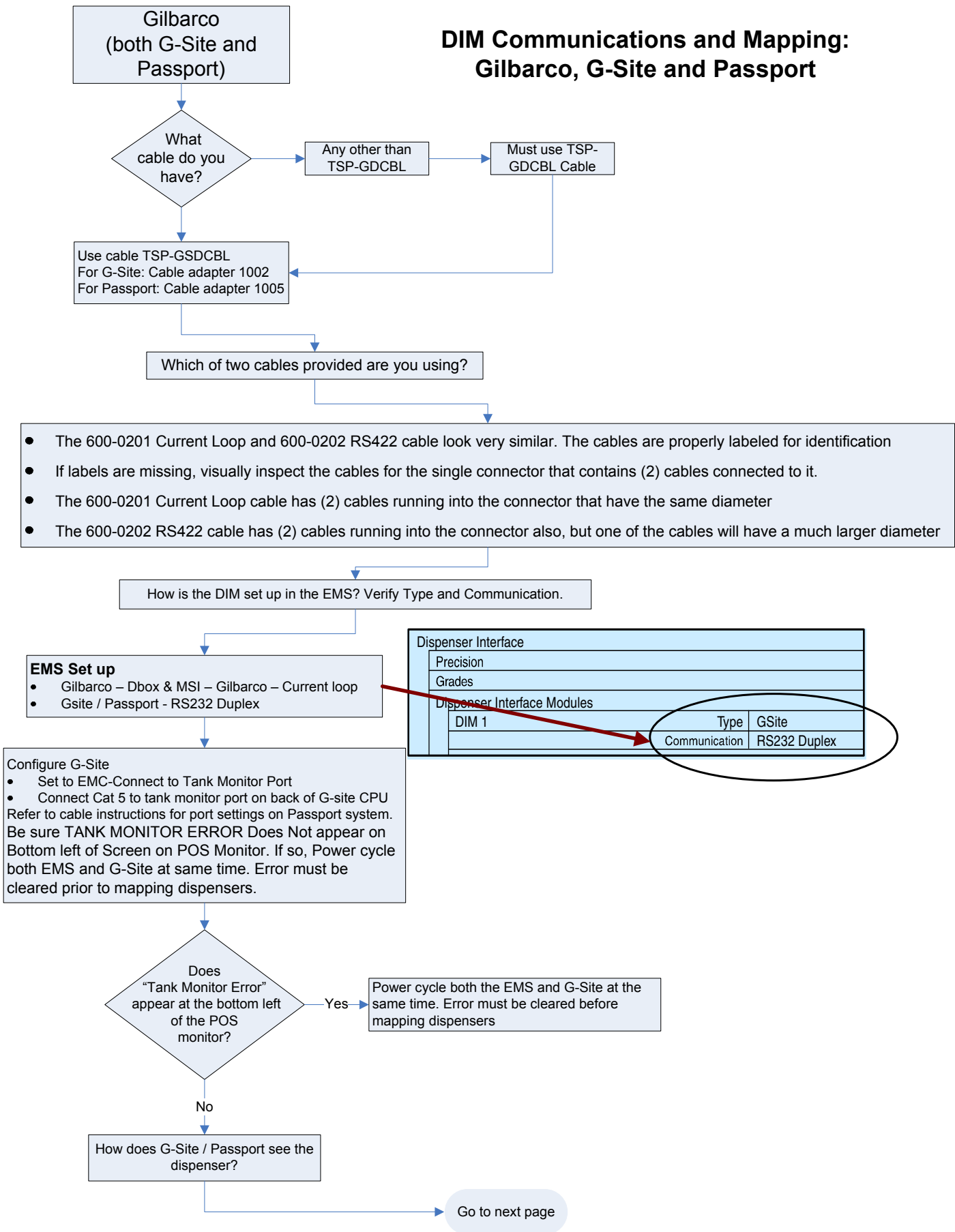


# DIM Communications and Mapping: Wayne D-box





## DIM Communications and Mapping: Gilbarco, G-Site and Passport



Dispenser Interface	
Precision	
Grades	
Dispenser Interface Modules	
DIM 1	
	Type   GSite
	Communication   RS232 Duplex

Continued from  
Previous Page

Confirm how dispensers are numbered in G-site and how G-site see dispensers (i.e. Dispenser may be numbered 1-2, 3-4, 5-6, or 13-14,15-16 but G-site may see 15-16 as 1-2).  
If this is the case the EMS will need to be wired as the G-site sees the dispensers NOT as they appear on the POS screen.

Confirm G-Site is selected as DIM type and not Gilbarco

**Blending Dispensers:**

- Under DIM Module Set Grades to 2 Unleaded and Premium Fueling points set to 2 Hoses
- Be sure both grades are set on each hose prior to querying dispensers
- Be sure both positions are at 0 prior to querying.

**Non-Blending Dispensers:**

- Under DIM module set grades to 3: Unleaded, Midgrade, Premium
- Set fueling points to 3-hose and name each grade.

**Manual Mapping:**

- Blenders = 0-unlead, 1-premium
- Non-Blenders-0-unleaded, 1-midgrade,2-premium.
- If there are 3+1 they will need to queried individually to ensure correct mapping.

Do you have  
A/L readings?

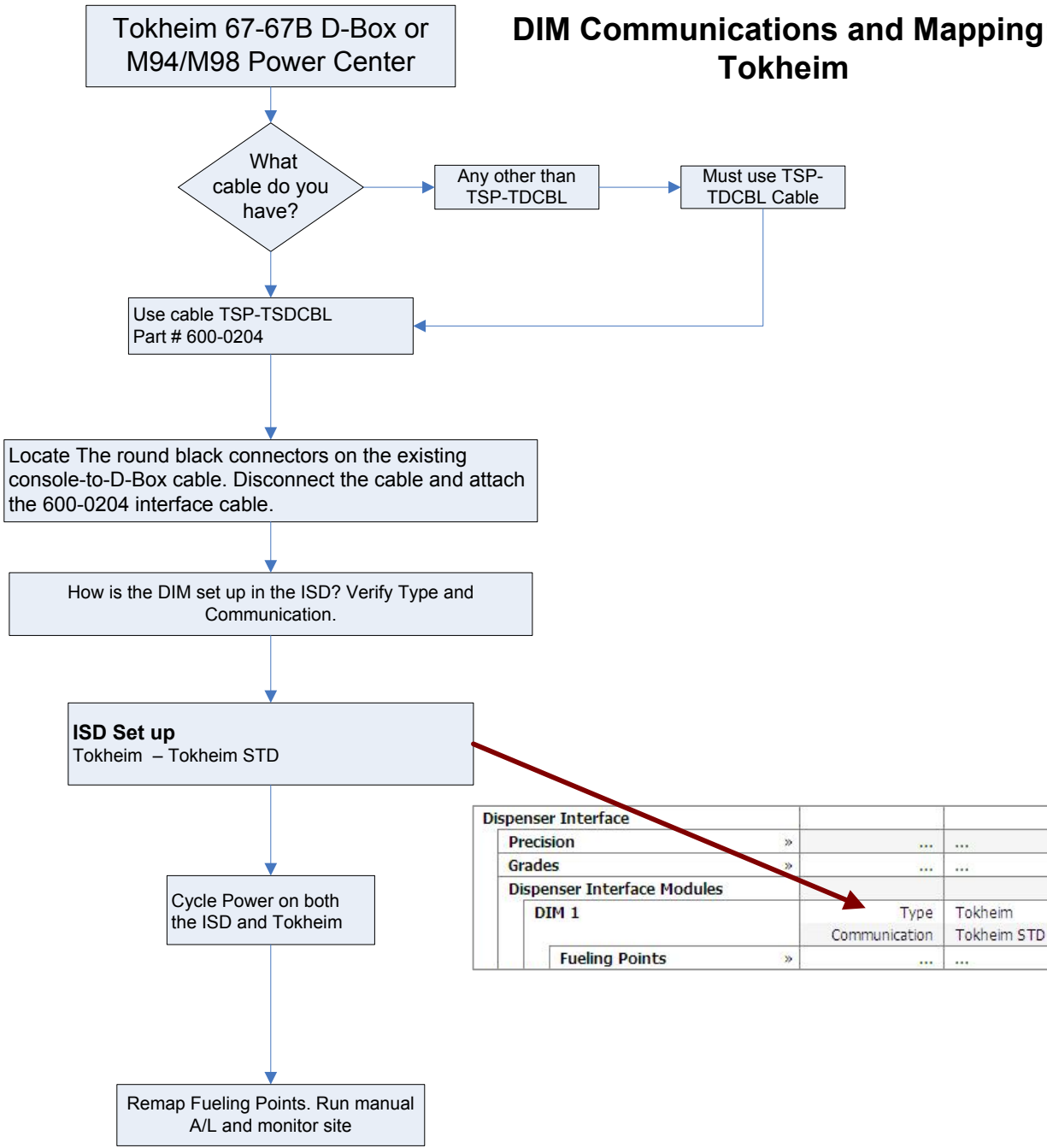
No

Power cycle EMS for 5 minutes then change G-Site to Tolkeim and communication to Tolkeim STD and save changes, then change back and save changes.

Yes

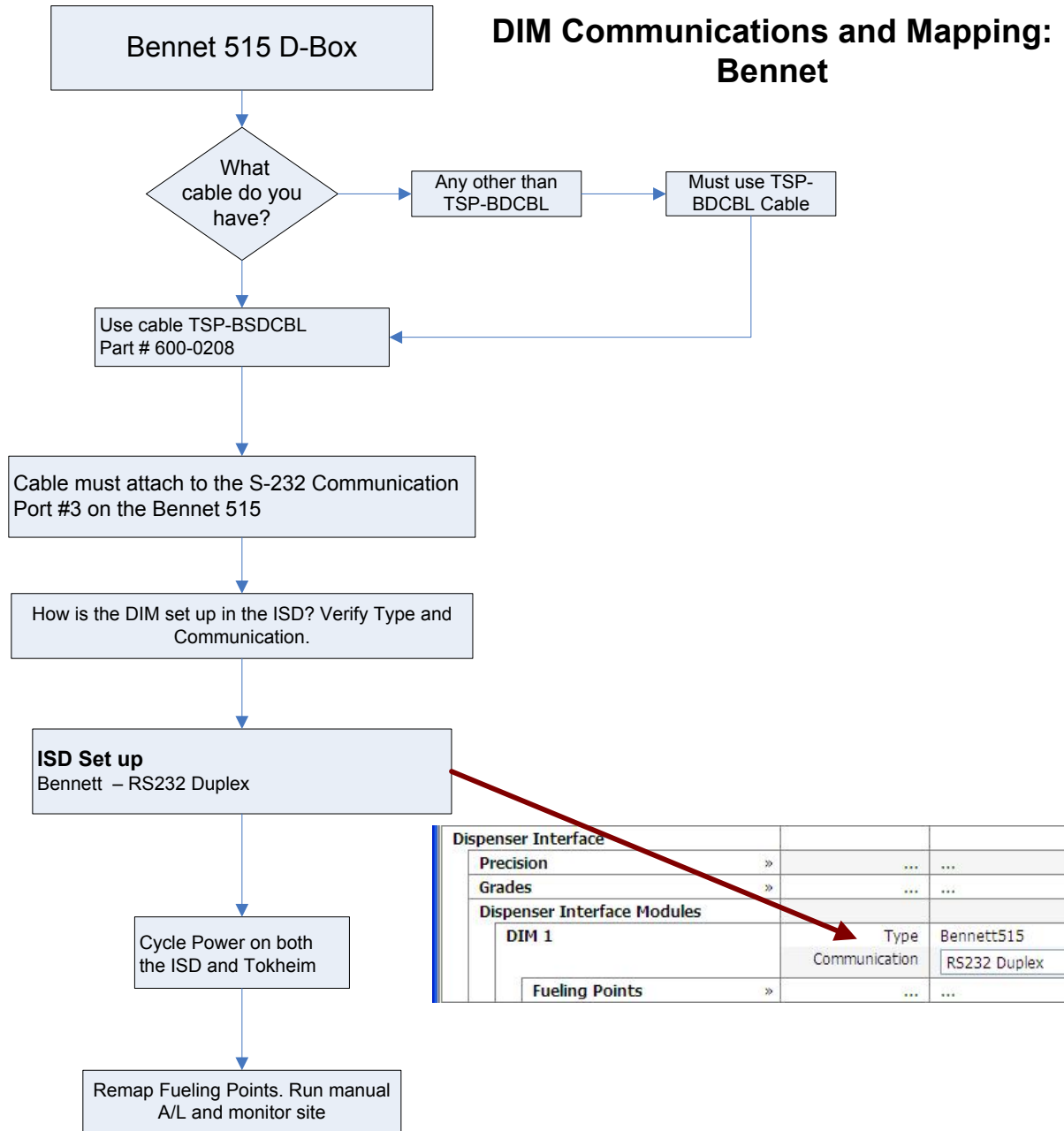
Clear all related alarms and record work in the maintenance log.

## DIM Communications and Mapping: Tokheim



<b>Dispenser Interface</b>		
Precision	»	...
Grades	»	...
<b>Dispenser Interface Modules</b>		
<b>DIM 1</b>		
	Type	Tokheim
	Communication	Tokheim STD
Fueling Points	»	...

## DIM Communications and Mapping: Bennet



<b>Dispenser Interface</b>		
Precision	»	... ..
Grades	»	... ..
<b>Dispenser Interface Modules</b>		
DIM 1	Type	Bennett515
	Communication	RS232 Duplex
<b>Fueling Points</b>		
	»	... ..

## Introduction to Hardware Alarms

Hardware related alarms are related to equipment that is physically connected to the ISD system. The ISD uses these apparatuses to collect the data that it uses to determine the vapor collection and pressure related alarms.

The hardware includes:

- Vapor Flow Meters, one is mounted in every dispenser and uses a roots style vanes to sense the vapor flow through the return line.
- Vapor Pressure Sensor, one is mounted in the dispenser closest to the tanks, this sensor monitors the vacuum or pressure on the vapor collection system.
- External Tank Gauge, on EMS, define ISD systems an external tank gauge is required to collect ullage information for each tank.
- Data Transfer Unit (DTU): One is mounted in each dispenser and one is also connected to the console. The dispenser-mounted DTUs transfer data from the VFMs and VPSs to the console.

Hardware related alarms may be caused by either a physical problem, such as a wiring connection, a damaged item or a programming error. Data Transfer Units (DTU) can influence some hardware alarms and should be taken into consideration when troubleshooting a site.

### To Start

- Pull the Alarm History for the last 30 days
- Check all cables and connections
- If the site uses DTUs, check connections

### Clearing the Alarm

Hardware alarms will clear automatically when the device returns to normal operation.

## Introduction VFM Missing

This section of the guide introduces the VFM Missing or VFM Errors. These alarms occur when either the device is not communicating or partially communicating with the console. Communication errors could be caused by:

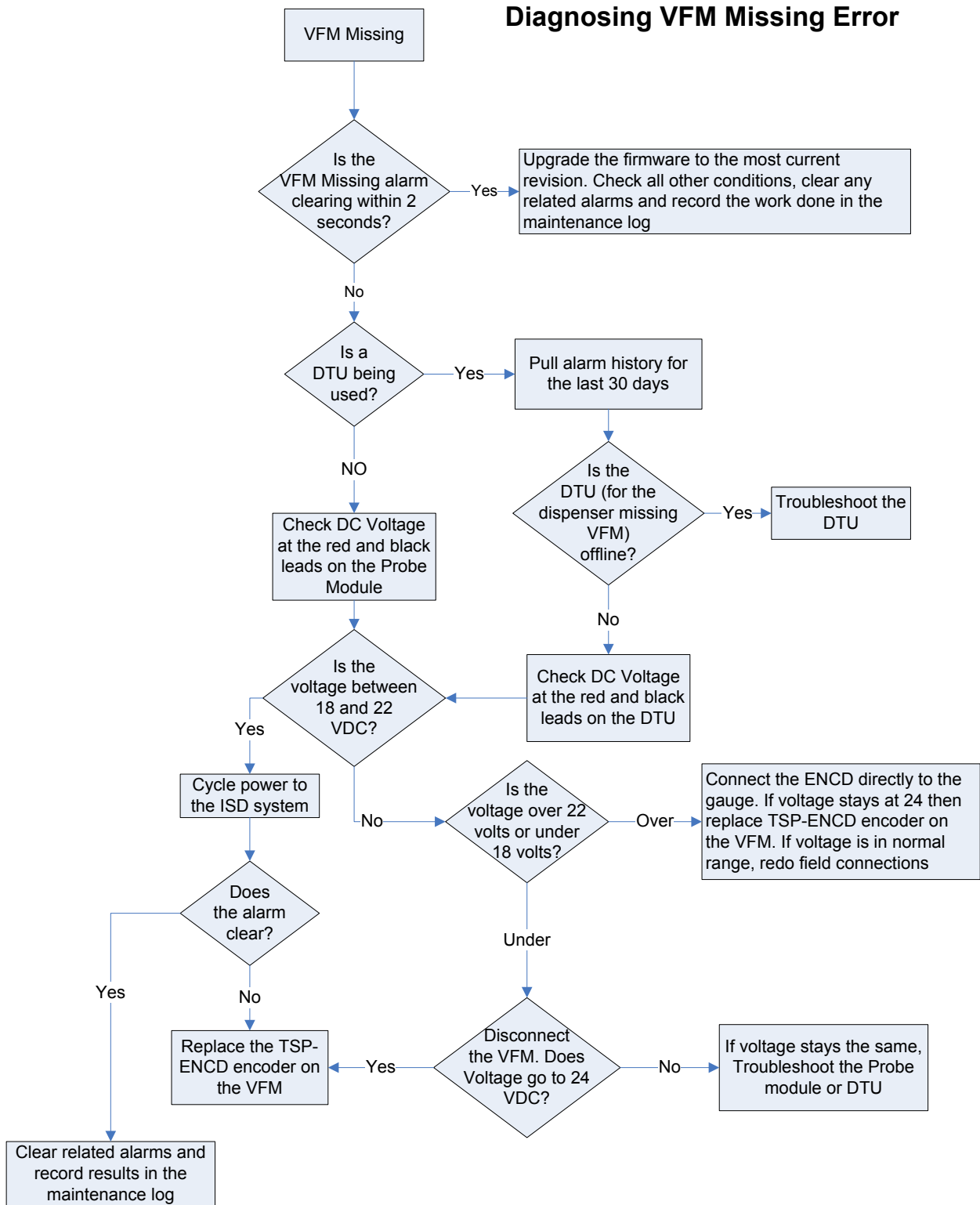
- A damaged encoder
- Wiring connections
- Faulty or improper wires
- A damaged channel on the probe module or other DTU related causes.

VFM Missing alarms can cause Daily or Weekly Vapor Collection alarms to occur due to the lack of Air Volume in the A/L ratio. VFM Missing alarms tend to be dispenser specific or DTU related.

This type of alarm will not occur due to poor flow or a blockage in the vapor recovery system. This alarm is only related to the communication of the Vapor Flow Meter.

<b>Probe Modules</b>			
<b>Module 1</b>		Channels	8
Channel 1	»	...	...
Channel 2	»	...	...
Channel 3	»	...	...
Channel 4	»	...	...
Channel 5		Name	disp 1/2 vfm
		Type	TS-VFM
Channel 6		Name	disp 3/4 vfm
		Type	TS-VFM
Channel 7	»	...	...
Channel 8	»	...	...
<b>2-Wire Sensor Modules</b>	»	...	...
<b>3-Wire Sensor Modules</b>	»	...	...
<b>4-20mA Input Modules</b>	»	...	...
<b>Power Supply</b>	»	...	...
<b>Relay Modules</b>	»	...	...
<b>Dispenser Interface</b>	»	...	...
<b>Fuel Management System</b>	»	...	...
<b>Vapor Recovery Monitoring</b>		Method Type	Assist
<b>Dispenser Configuration</b>		Dispenser Type	Wayne
		Number of Dispensers	4
<b>Dispenser 1</b>		Flow Meter	disp 1/2 vfm
		First Fueling Point	1
		Second Fueling Point	2
<b>Dispenser 2</b>	»	...	...

## Diagnosing VFM Missing Error



## Introduction to Pressure Sensor Open Circuit

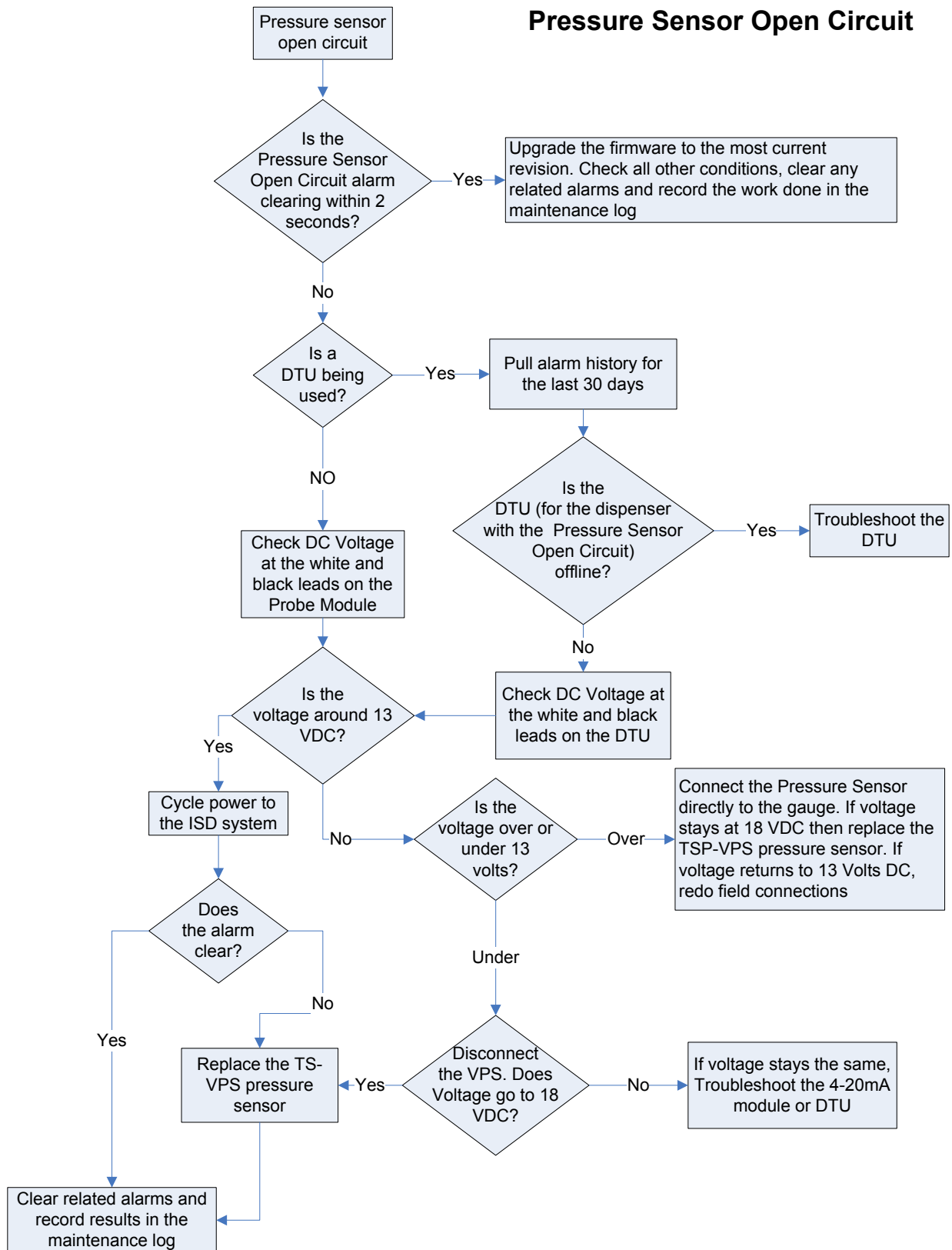
This section is about Vapor Pressure Sensor (VPS) Open Circuit. VPS Open Circuit alarms occur when the Pressure Sensor is not communicating with the console. If left in alarm until the end of the week, the VRM System will issue an Ullage Pressure Leak Test alarm.

Open Circuit errors could be caused by:

- A damaged vapor pressure sensor
- Wiring connections
- Faulty or improper wires
- A damaged channel on the 4-20mA module
- DTU related causes.

4-20mA Input Modules		
<b>Module 1</b>	Channels	8
Channel 1	»	...
Channel 2	»	...
Channel 3	»	...
Channel 4	»	...
Channel 5		Name Disp 1/2 vps
		Service Type Vapor Recovery Monitoring
Channel 6	»	...
Channel 7	»	...
Channel 8	»	...
Power Supply	»	...
Relay Modules	»	...
Dispenser Interface	»	...
Fuel Management System	»	...
Vapor Recovery Monitoring	Method Type	Assist
Dispenser Configuration	»	...
Grades	»	...
Ullage Pressure Input	Sensor	Disp 1/2 vps

# Pressure Sensor Open Circuit



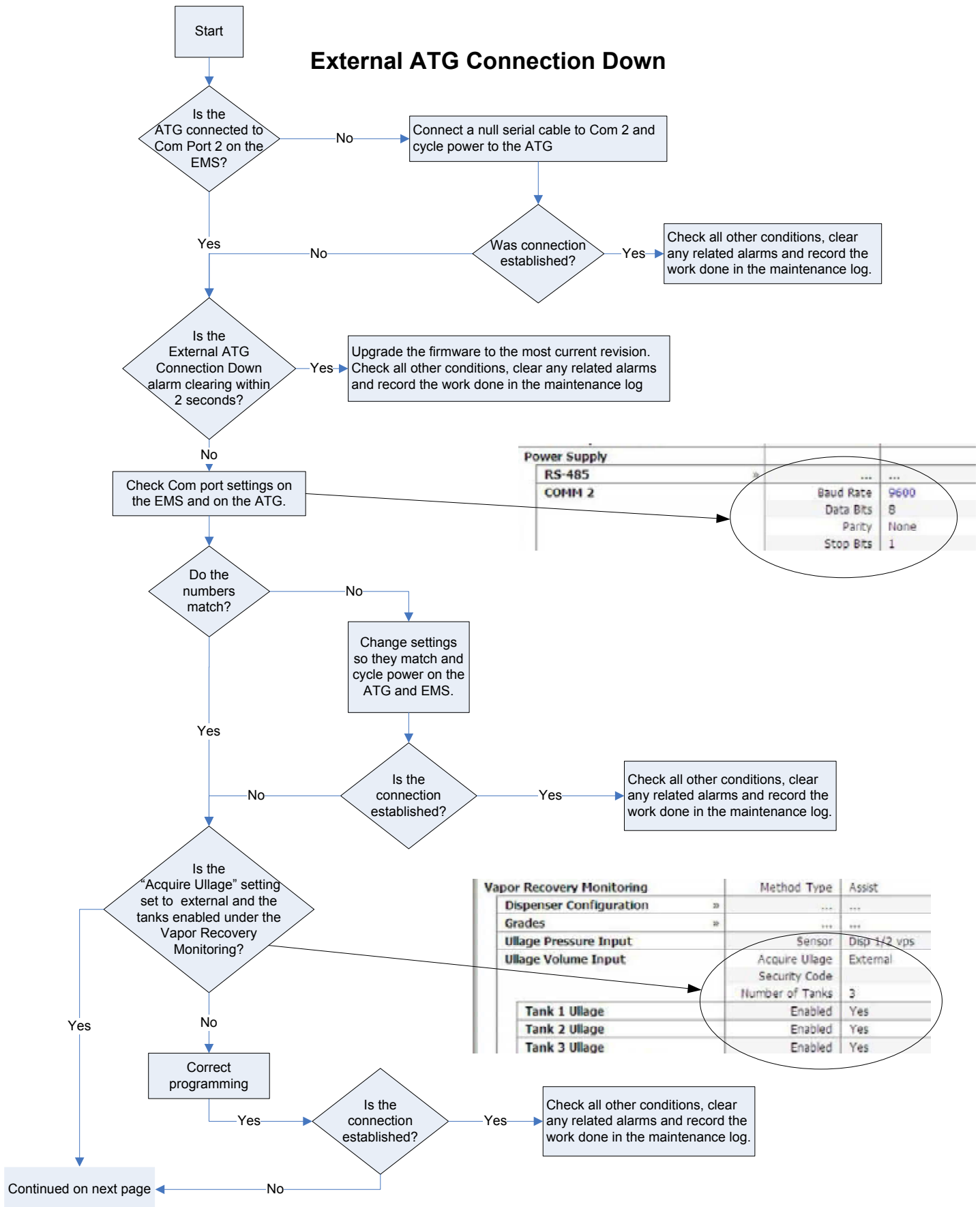
## Introduction External ATG Alarm

This section of the guide is about an External ATG Connection Down alarm. The VRM System uses ullage volume for vapor containment leak detection. The console gathers ullage volume from an external ATG. When using an existing ATG for collecting ullage, then the ATG must have an available RS-232 port and have the ability to respond to TLS-250 or TLS-350 inventory command and be connected via a “Null Serial” cable.

There are two states associated with this alarm condition. A Warning Alarm will be generated when ISD system does not receive a response from the External ATG. A Failure alarm will be generated at midnight if the connection has not been restored and the ISD system cannot generate any ullage leak results.

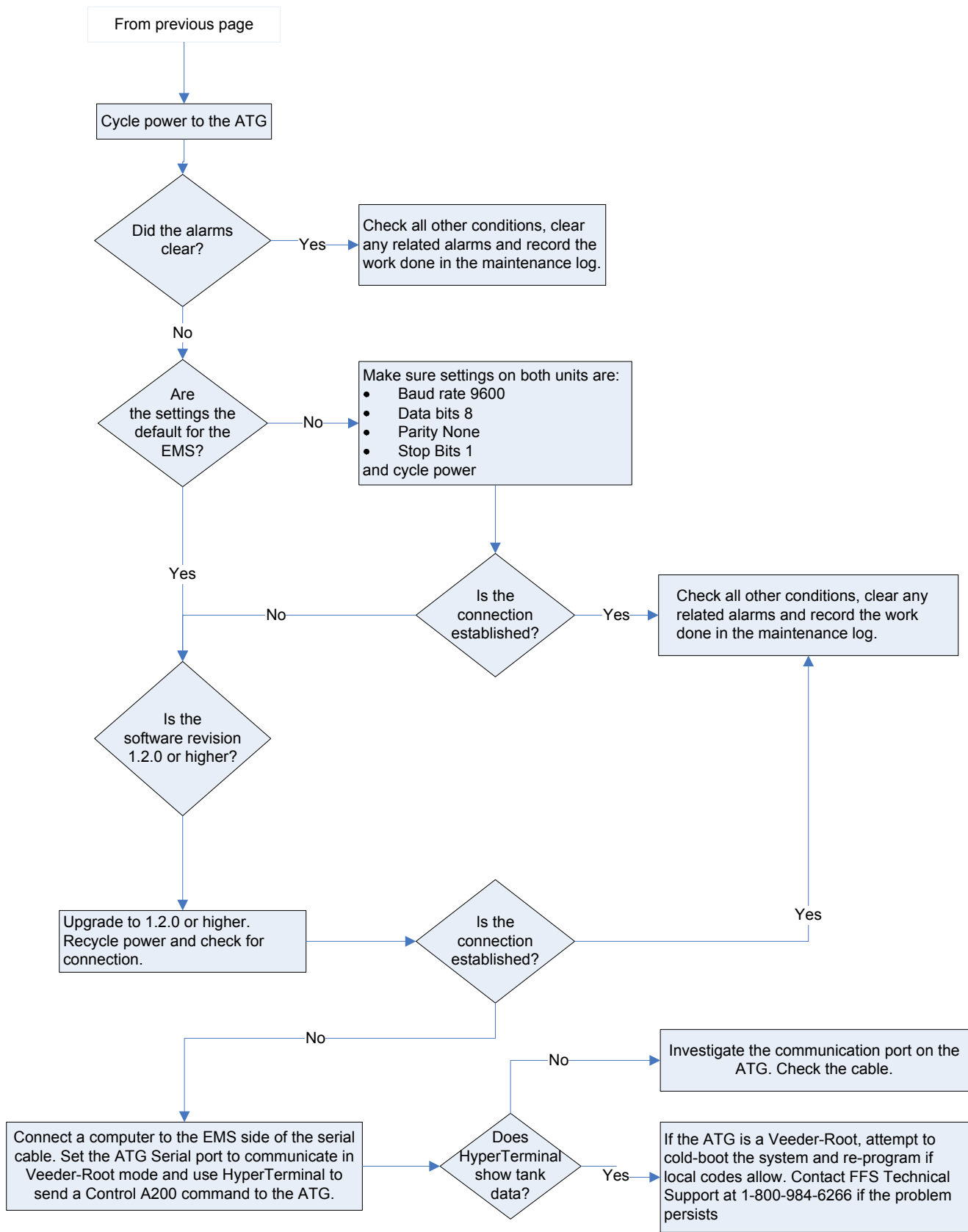
<b>Power Supply</b>		
RS-485	»	... ..
COMM 2		Baud Rate 9600
		Data Bits 8
		Parity None
		Stop Bits 1
		Response Timeout 8
Relays	»	... ..
Low Voltage Inputs	»	... ..
Relay Modules	»	... ..
Dispenser Interface	»	... ..
Fuel Management System	»	... ..
Vapor Recovery Monitoring		Method Type Assist
Dispenser Configuration	»	... ..
Grades	»	... ..
Ullage Pressure Input		Sensor Disp 1/2 vps
Ullage Volume Input		Acquire Ullage External
		Security Code
		Number of Tanks 3
Tank 1 Ullage		Enabled Yes
Tank 2 Ullage		Enabled Yes
Tank 3 Ullage		Enabled Yes
Pressure Management System	»	... ..

# External ATG Connection Down



Power Supply			
RS-485	...	...	...
COMM 2	Baud Rate	9600	
	Data Bits	8	
	Parity	None	
	Stop Bits	1	

Vapor Recovery Monitoring		Method Type	Assist
Dispenser Configuration	...	...	...
Grades	...	...	...
Ullage Pressure Input	Sensor	Disp 1/2 vps	
Ullage Volume Input	Acquire Ullage	External	
	Security Code		
	Number of Tanks	3	
Tank 1 Ullage	Enabled	Yes	
Tank 2 Ullage	Enabled	Yes	
Tank 3 Ullage	Enabled	Yes	



## Introduction to DTU Alarms

This section of the guide is about Data Transfer Unit (DTU) alarm. DTU's are used as semi-wireless units to transmit data from the VRM hardware in the dispensers to the ISD console.

There are two alarms that are directly associated with the DTU: a Console DTU mismatch and a DTU Offline. The Console DTU mismatch has to do with communication between the ISD console and the DTU that is wired into it. If the ISD console cannot establish contact with the DTU, this alarm will occur.

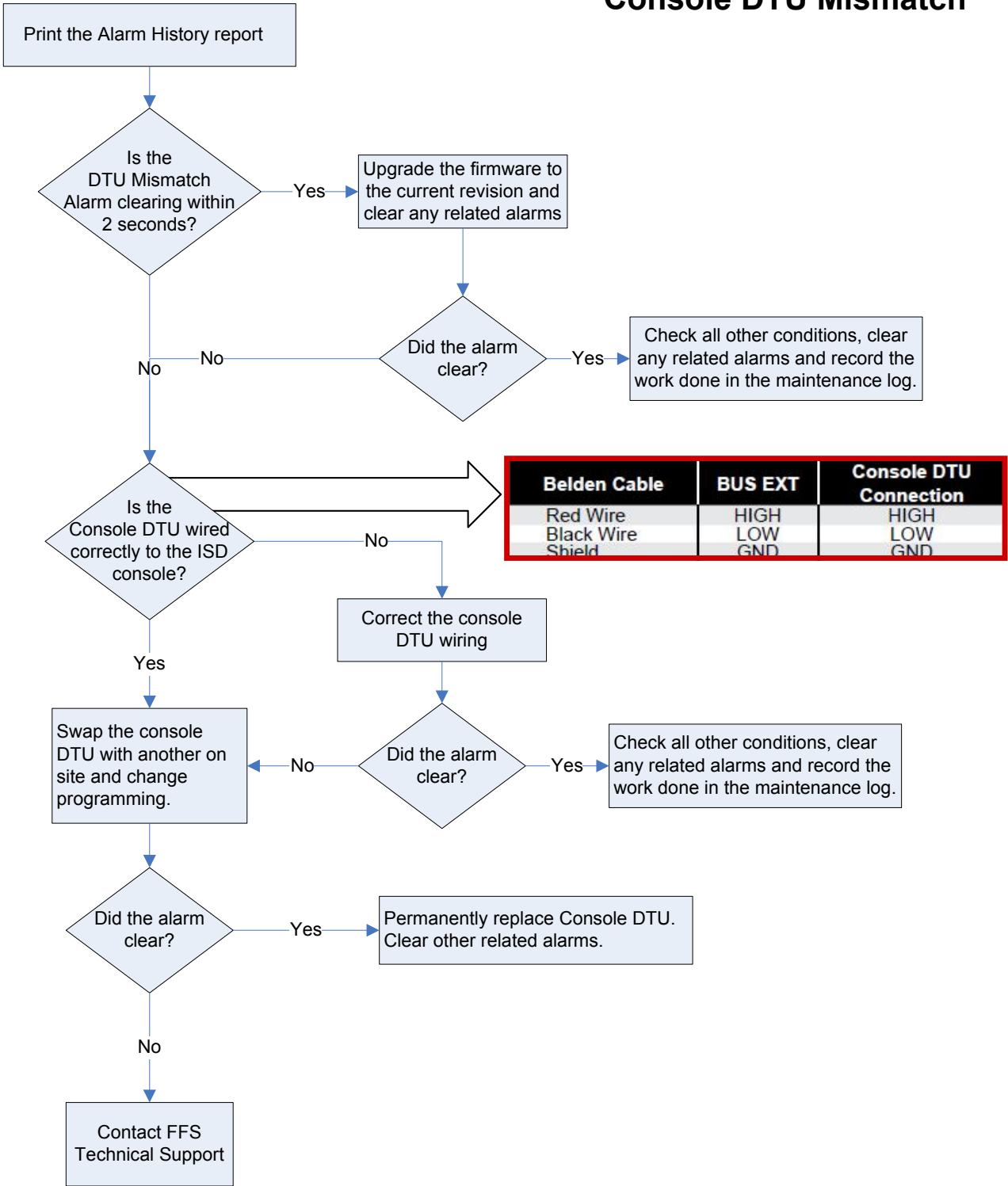
DTU Offline is an alarm pertaining to a single dispenser-mounted DTU. The ISD console has lost communication with that specific DTU. There may be many causes, but are typically programming/wiring, a bad DTU or noise interference.

While not a directly related DTU alarm, if a site is seeing large differences between the Roots meter or Tri-tester and the ISD console, then the J1 Jumper on the Power Supply Module in the console may not have been removed. This jumper must be removed when DTU's are used.

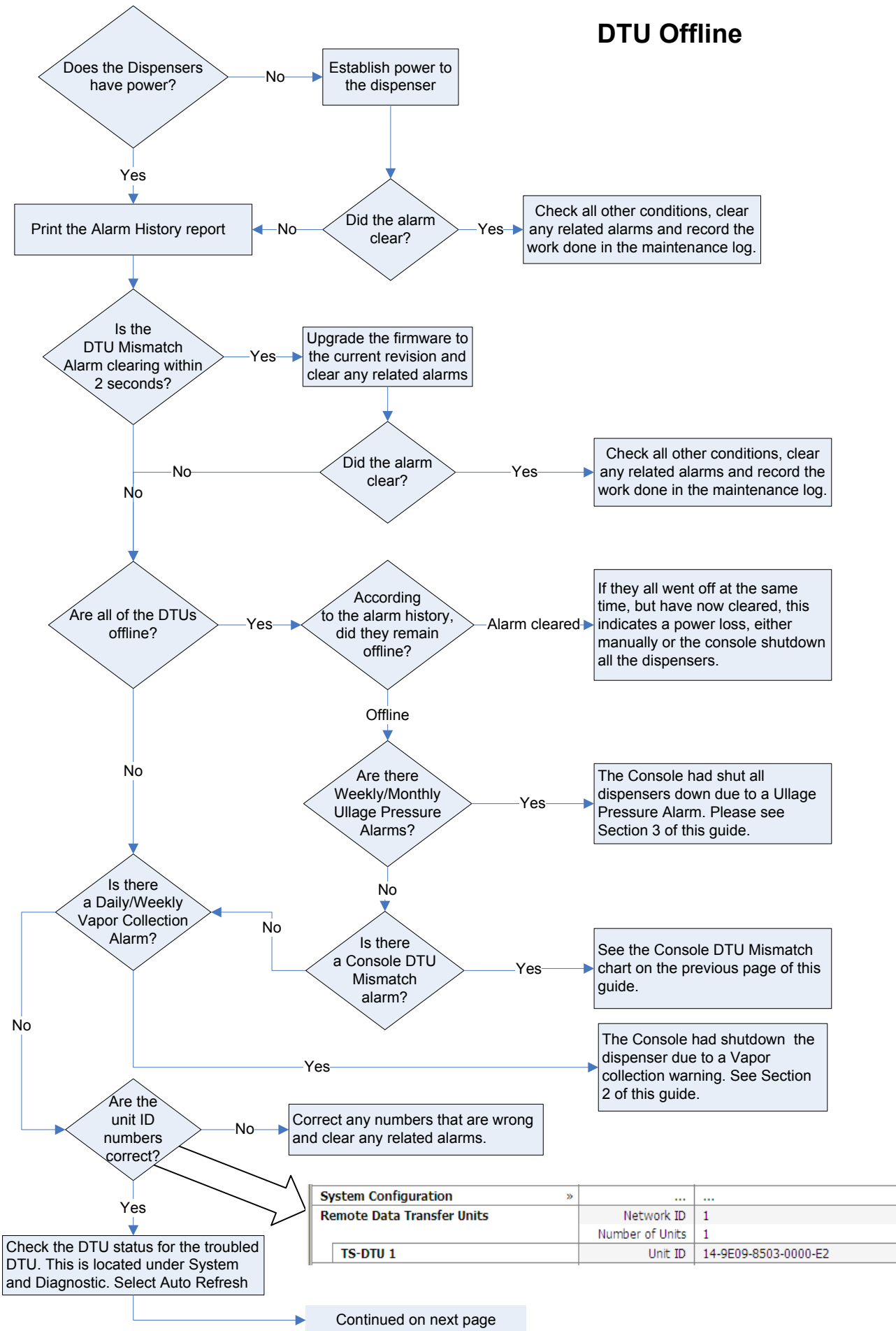
### Possible Causes:

- Faulty Wiring
- Bad DTU
- Incorrect Programming
- Noise interference
- ISD Alarms that turn off dispensers

# Console DTU Mismatch

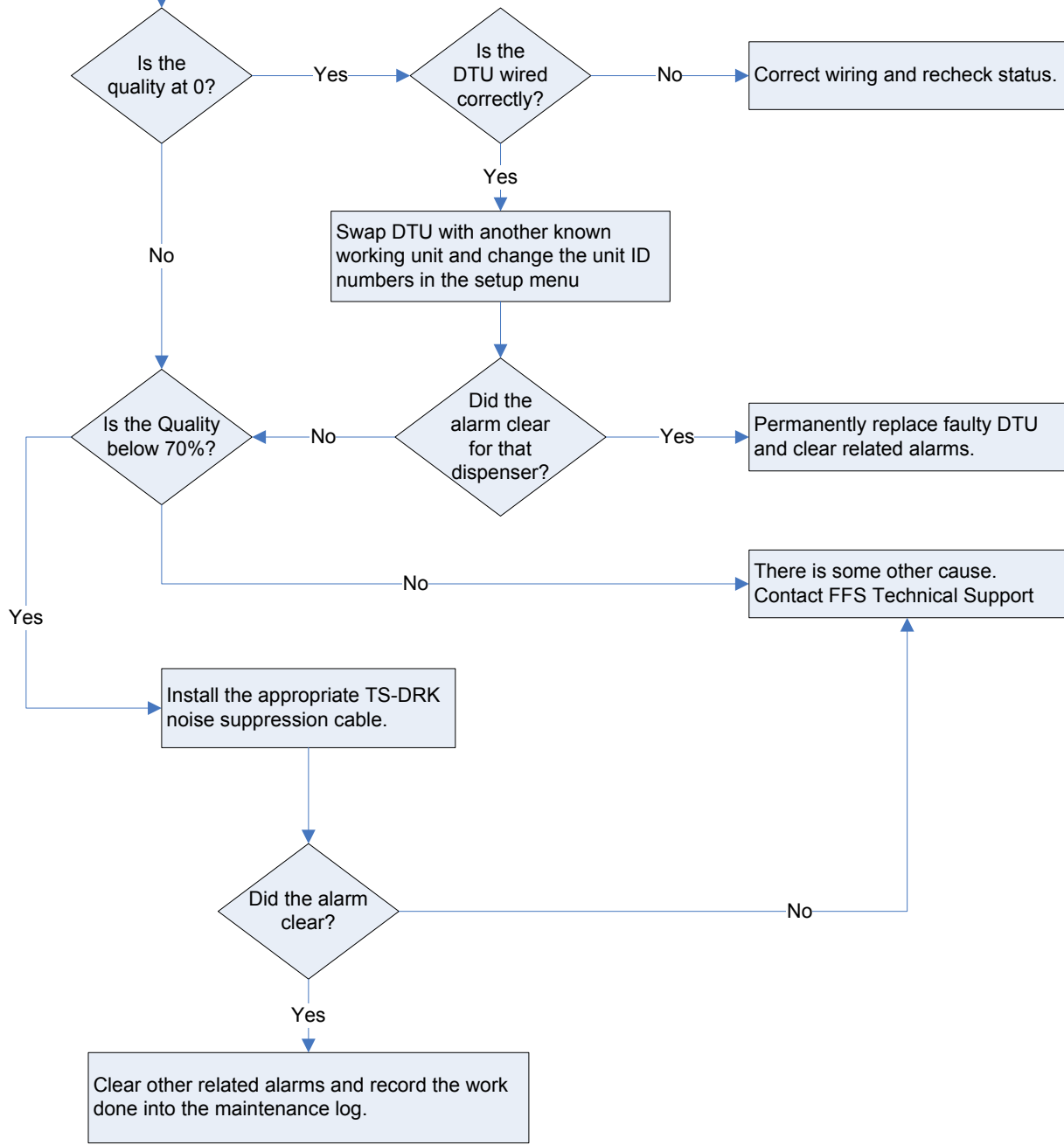


# DTU Offline



<b>System Configuration</b>	»	...	...
<b>Remote Data Transfer Units</b>		Network ID	1
		Number of Units	1
<b>TS-DTU 1</b>		Unit ID	14-9E09-8503-0000-E2

Continued from previous page



# Appendix

## ISD Daily Report

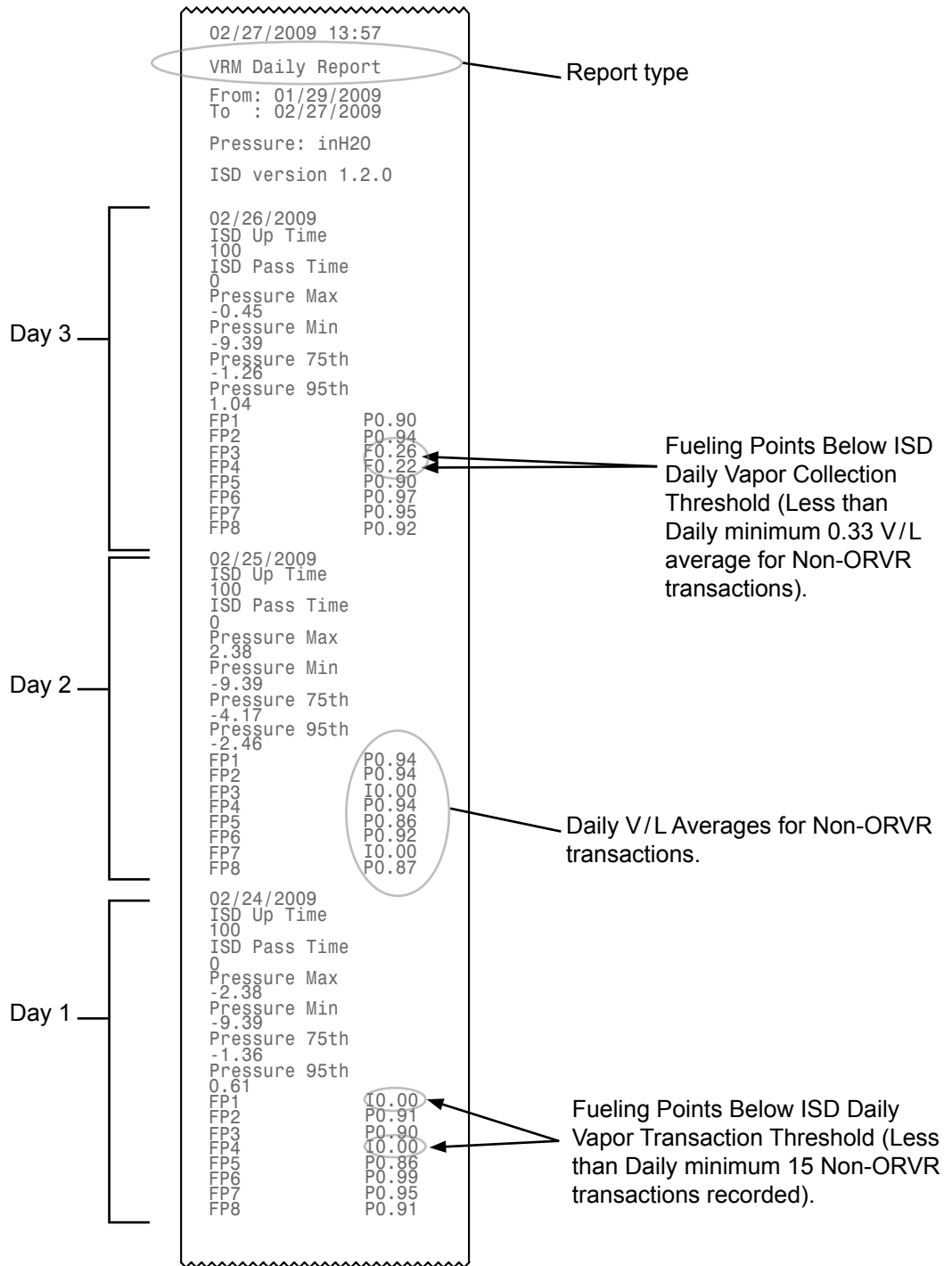
VRM 1.2.0 or higher shows the assessment type (whether it passed or failed)

This will be located just before the assessment value. For example,

FP1 P1.02  
 FP2 W0.79  
 FP3 I0.00

Where,

P = Pass  
 I = Insufficient data  
 W = Warning  
 F = Fail

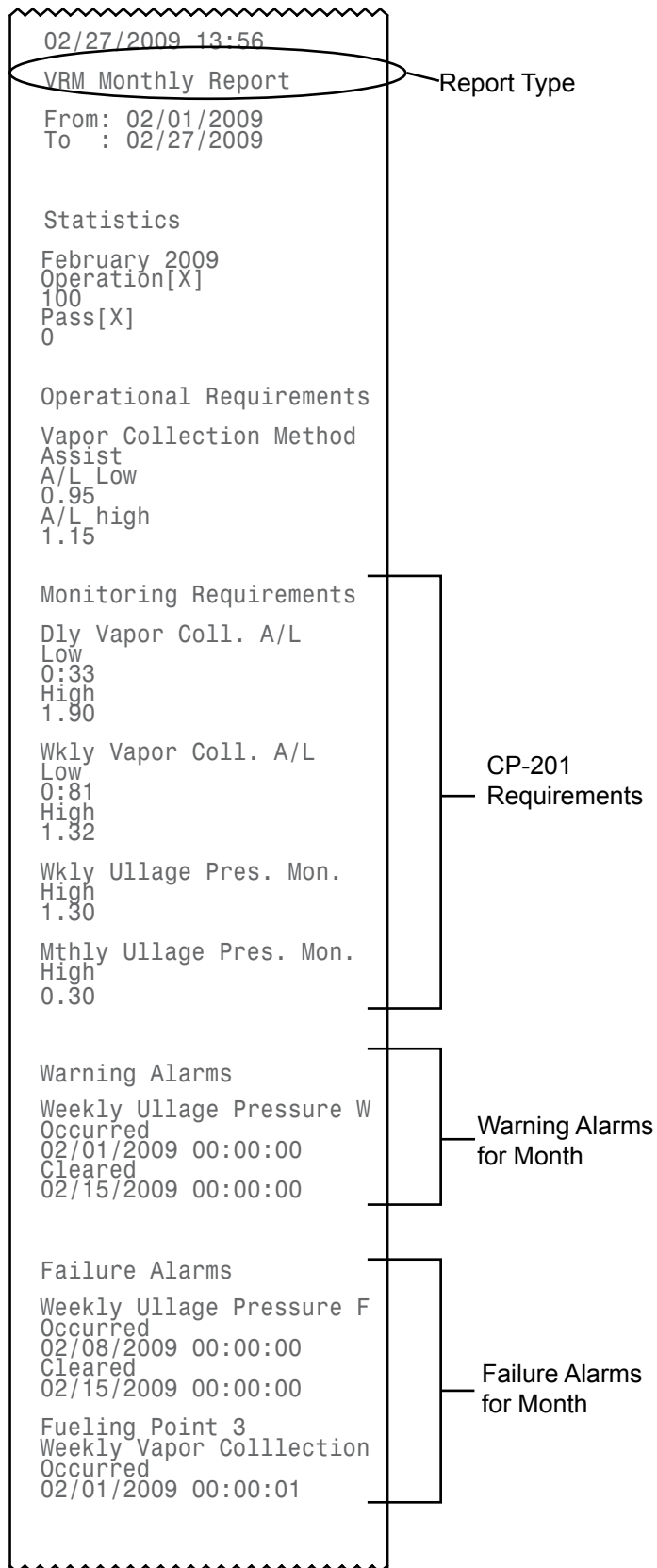


**INCON ISD Daily Report (Printout)**

**Note:** For this example on 2/24/2009, fueling points 1 and 4 are below the daily transaction threshold, resulting in no assessment for that day.

**Note:** For this example on 2/26/2009, fueling points 3 and 4 are below the daily vapor collection threshold, indicating a potential blockage for that day.

**Note:** On the daily report, pressure 75th and 95th percentile are for the given day and are for reference only.



**INCON ISD Monthly Report (Printout)**

Note: The FP3 weekly vapor collection failure alarm on the report does not meet the monitoring requirements specified by CP-201.

Note: On the monthly report refer to the values listed under monitoring requirements. These are the values that cannot be exceeded for the monitoring period. Under the warning alarm and failure alarm sections, notice the weekly ullage pressure warning alarm and then failure alarm.

From :03/17/2009  
 To :04/16/2009

04/16/2009 10:28:11

### Daily ISD Report

ISD version 1.1.0 Pressure:inH<sup>2</sup>O

#### ISD Up Time 100%

Date	ISD Up Time %	ISD Pass Time %	Pressure									
			max	min	75th	95th	1	2	3	4	5	6
03/30/2009	100	0	8.04	-5.31	4.01	5.68	✗0.00	✗0.00	✱0.00	✱0.00	✱0.00	✗0.00
03/31/2009	100	0	6.78	-8.95	6.63	7.69	✗0.00	✗0.00	✱0.00	✱0.00	✱0.00	✱0.00
04/01/2009	100	20	9.88	-4.39	4.79	6.47	✱0.00	✓0.37	✱0.00	✱0.00	✱0.00	✱0.00
04/02/2009	100	0	14.02	1.69	9.14	9.96	✓1.02	✓1.06	✓1.08	✓0.97	✓1.08	✓1.01

#### ISD Up Time

ISD Up Time %	ISD Pass Time %
100	0
100	0
100	20
100	0

The ISD up-time is the percentage that the ISD System is running the VRM application. It calculates the up-time based on actual run-time during a 24-hour period. It is stated in CP-201 that the ISD system must be running 95% of the time on an annual basis.

#### Ullage Pressure Readings

max	min
8.04	-5.31
6.78	-8.95
9.88	-4.39
14.02	1.69

The highest and lowest ullage pressure is the highest and lowest average hourly pressure for each day.

95th	75th
5.68	4.01
7.69	6.63
6.47	4.79
9.96	9.14

The VRM records and stores the 75<sup>th</sup> and 95<sup>th</sup> highest ullage pressure for each day.

# VRM Monthly Report

The ISD operation time is the cumulative operation time of the VRM application. It is stated in CP-201 that the ISD system must be running 95% of the time on an annual basis.

The EVR pass time is the percentage of time the entire EVR system is not in an Alarm state.

Gas Station FFS 3760 Marsh Road Madison, WI 53718 608-638-8796		From :09/01/2009 To :09/30/2009	10/08/2009 13:53:44
		<b>VRM Monthly Reports</b>	ISO version 1.1.0 Pressure: inH <sup>2</sup> O
<b>Statistics</b>			
<b>Operational Time [%]</b>		<b>Pass Time [%]</b>	
September 2009			
100		100	
<b>Monitoring Requirements</b>			
<b>Limits</b>	<b>LOW</b>	<b>HIGH</b>	
Daily Flow Performance	0.50		
Weekly Ullage Pressure Monitoring		1.30	
Monthly Ullage Pressure Monitoring		0.30	
<b>Operational Requirements</b>			
Vapor Collection Method	Balanced		
Vapor Collection Limit	0.50		
<b>Warnings Alarms</b> No Warnings Alarms			
<b>Failure Alarms</b> No Failure Alarms			
<b>Event Alarms</b> No Event Alarms			
Tank Sentinel AnyWare 0.9.7.4150 Copyright © 2004-2009 Franklin Fueling Systems. All rights reserved.			

The ISD monitoring requirements are the limits which trigger alarms.

The EVR Operating Requirements list the EVR components installed at the site and their operating parameters (if applicable)

This is a list of current and past VRM warnings and failures.

The event log shows a description of any shutdowns and the action to re enable any fueling points.

**INCON**<sup>®</sup>



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