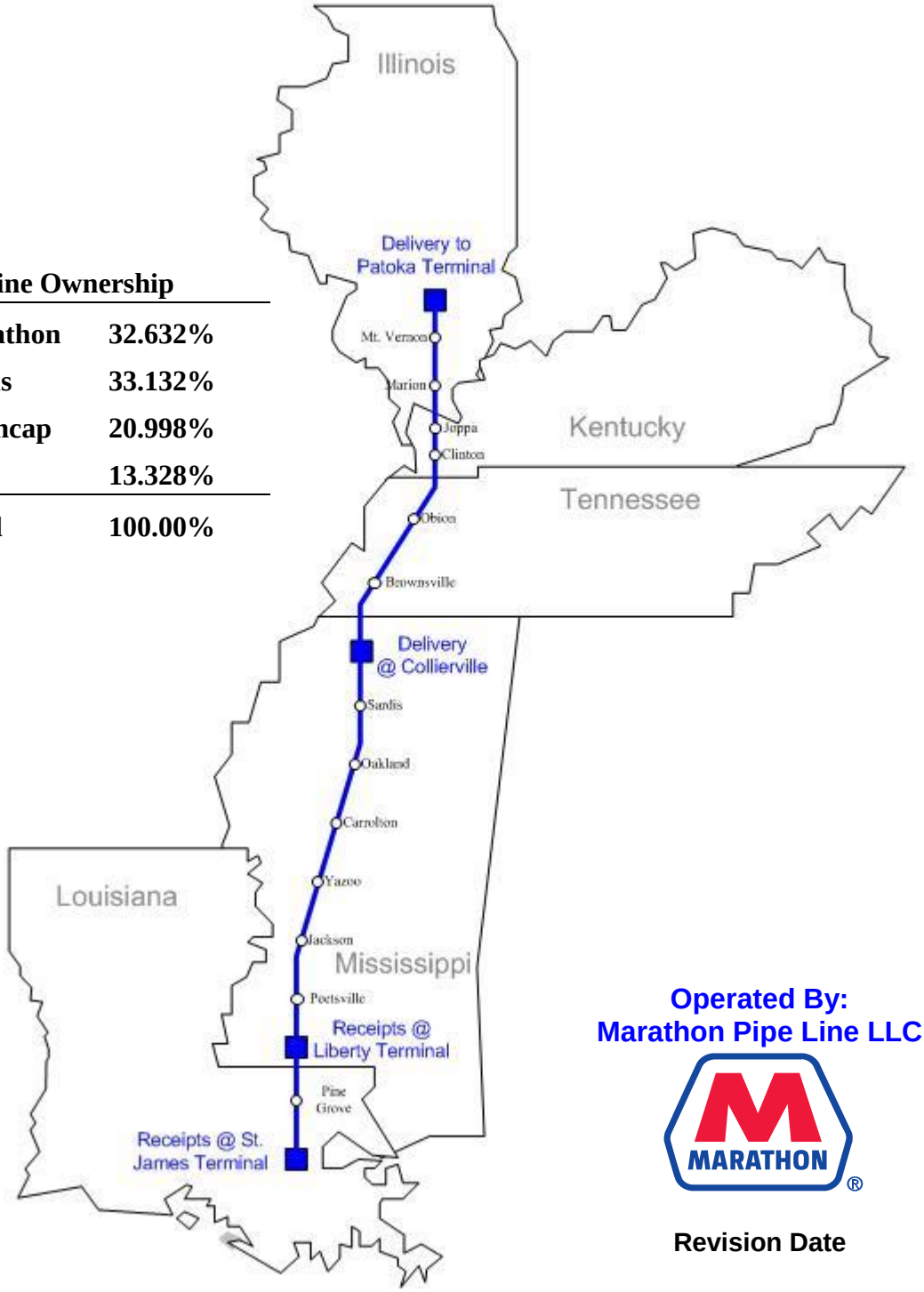
CAPLINE MEASUREMENT & QUALITY MANUAL

Capline Ownership	
Marathon	**32.632%**
Plains	**33.132%**
Southcap	**20.998%**
BP	**13.328%**
Total	**100.00%**



Operated By:
Marathon Pipe Line LLC

MARATHON®

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OCTOBER 2016

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1.0 - Measurement

1.1 - Introduction

In accordance with the Capline agreement, meters are used for custody transfer measurement of all receipts into and deliveries out of the Capline system. Crude oil is transported by the system from tankers, barges, and pipelines of participants or connecting carriers.

Many of the measurement policies and procedures located within this manual have been based upon the American Petroleum Institute's Manual of Petroleum Measurements Standards (API MPMS). The MPMS sets forth industry standards and drives expectations for custody transfer measurement. For guidance on measurement issues not specifically addressed herein, the user shall defer to the specific Site Measurement Plan in the Connection Agreement, the Marathon Pipe Line Manual of Measurements Guidelines, and finally to the appropriate MPMS standard. CAPLINE attempts to meet or exceed all MPMS requirements, however, reserves the right to deviate from the API MPMS when necessary. Variances require the unanimous approval from the owners represented through the CAPLINE Measurement and Quality Committee, and all approved variances are documented within this manual.

Custody transfer meters are located at St. James, Liberty, Collierville, and Patoka. A combination of turbine meters and positive displacement meters are provided by the system and by connecting carriers for the receipt of crude oil from tankers, barges, and pipelines of participants. As an additional check on measurement within the system, turbine meters are provided at St. James and Liberty to measure all receipts into the mainline and at Patoka to measure all deliveries out of the mainline. Although the mainline turbine meters are not typically used for primary custody transfer measurement, they are maintained at a custody transfer level and constitute the secondary points of measurement. One exception is the use of the St. James mainline meters for primary custody transfer when originating from ART and Sugarland. The final point of measurement is the delivery meters at Patoka. Positive displacement and Helical Turbine meters are used at Patoka. Turbine meters are used at Collierville for custody transfer deliveries from the mainline at these locations.

To insure accurate measurement across St James terminal, opening and closing tank gauges are recorded for each batch of crude oil stored in a tank or tanks. By applying any fluctuation (e.g. float/relief sys.) in tank inventory to receipts into St James or to deliveries out of St James, all custody meter transactions are checked. The connecting carrier records Collierville tank gauges.

In the event of an equipment malfunction (such as preamplifiers, counter, and/or flow computer failures) during custody transfer; the storage tanks involved are hand gauged. The ticket is written based on mainline meters and tank inventory change at St. James and on tank gauges at Liberty, and Collierville.

At Patoka, in cases of electronic failure, the adjustment tickets are written using mechanical totalizer readings on meter head compared to gross totalizer reading on metering electronics. In cases of mechanical failure of a meter, Patoka will write the adjustment ticket based on the gauge/inventory change procedure.

1.2 - Meters

1.2.1 - Meter Proving

Meters are proved locally. Local control panels at St. James, Liberty, Collierville, and Patoka include mimic piping with indicating lights so that valve alignment can be checked and individual meters proved from the panel. The OMNI flow controller will check for a seal indication. It will abort the proving if it does not detect a seal.

1.2.2 - Procedure for Meter Factor Determination

Mechanical displacement pipe provers are utilized by the system. A meter factor shall be determined from the average of five consecutive proving runs out ten runs that agree within 0.05 percent. If this agreement is not achieved within 10 consecutive proving runs, the proving is terminated and an investigation is made to determine the problem. Another, investigation will be made to determine the cause of the change if the resulting meter factor is outside of the acceptable range on the Meter Factor Control Chart for that meter and commodity.

1.2.3 - Prover Calibration and Recalibration

The provers were originally calibrated using the water draw method to determine the actual volume. Recalibrations are performed in the same manner.

The National Institute of Standards and Technology (formerly National Bureau of Standards) certifies the volumes of the test measures used in this process. Participating parties are invited to witness each prover calibration or recalibrations and all parties present sign the calibration certificate.

1.2.3.a - Prover Recalibration Intervals

A pipe prover should be recalibrated before the volume changes by more than 0.04 percent. Under normal operating conditions, a prover's volume will change due to wear in a fairly uniform manner with time, and historical data can be used as a basis for determining the frequency of recalibration for each prover.

Historical data for all Capline provers indicate that an interval of no more than five years will be adequate to insure that the volume has not changed more than 0.04%. If a prover's volume does deviate by more than 0.04%, that prover will be recalibrated on a more frequent basis as determined by the Capline Measurement and Quality Committee.

1.2.3.b - Test For A Good Calibration

If the new volume measured by recalibration changes more than 0.02 percent from the previous volume and history indicates the volume should not have changed more than 0.02 percent, run another check calibration or inspect the prover and ancillary equipment, or both. The new volume may be accepted if the prover is in good order and the check calibration substantiates the change in volume.

It is not uncommon for a relatively new prover's second volume to differ substantially from the initial calibration. This may be due to excessive wear during the break-in period, or to a poor initial calibration that was undetected due to lack of history.

The water draw method for prover calibration shall occur a minimum of every five (5) years from the date of the last calibration, or immediately after any alteration to the measurement section or switches on a uni-directional prover. Special recalibrations shall be required if switches are changed on a uni-directional prover or if a prover exhibits erratic performance for any reason. For example, if there is evidence of coating flaking off, the prover must be repaired and recalibrated. If an immediate water draw is impractical, e.g. at Patoka during the winter, a carefully matched switch change may be made until a water draw can be performed. If the draw volume changes more than 0.02%, corrections will be made on all tickets written after the switch change.

Capline uses Bi-directional and Uni-directional provers. The Bi-directional prover is the four-way valve type interchange and the Uni-directional provers are the dual-cup type seal or the ram type interchange seal. The design of the sealing section must be considered when performing water draw calibrations.

The dual-cup type seals create differential pressure that is monitored with pressure gauges. It is recommended that the working gauges be replaced with traceable 1-psig increment gauges when performing a calibration. If the cavity is opened to atmosphere, the cups may flex when pressure changes occur when switching cans, and force some water out of the cavity, creating the illusion of a leak. ***The volume established at recalibration would be the volume used from that date until the next recalibration.***

1.2.3.c - Meter Factor Control Charts and Records

Meter factor control charts and/or records (API MPMS Chapter 13 Section 2 Methods of Evaluating Meter Proving Data) will be kept on all meters on Capline by the appropriate personnel responsible for proving the meters so that they are available to them, and to Capline supervisors, carriers, and/or shippers for ready reference. Control Charts and records will be maintained in the POLARIS database.

1.2.3.d - Patoka

Positive displacement meters and helical turbine meters are used for deliveries out of Patoka. Each meter is proven on each batch that is delivered. Samples are collected using an in-line sampling arrangement equipped with static mixer and held until the delivery is completed. Each sample processed for S&W and gravity may be witnessed by a representative from the carrier or operator receiving the crude oil or a waiver is used if none are present.

1.3 - Automatic Sampling

Samples are collected (see Appendix 2) for each batch of crude oil received or delivered by Capline. These samples are collected either by samplers installed directly in the pipeline or by slip-stream samplers. All automatic sampling systems will be built and tested in accordance with API MPMS 8.2. Unless specifically designated below, the procedures used for all other sampling systems will follow accepted API procedures. All Sample Systems should be verified per API MPMS Chapter 8.2 to assure the samples are representative of the crude being measured.

Crude oil samples received across the docks are gathered and held in their respective sample collection containers until tankers or barges finish unloading. When the samples are processed, representatives of involved participants may witness the gravity and S&W tests. All receipts and deliveries are based on Gross Standard Volume (gross 60°F) barrels with deductions for sediment and water based on the above samples.

1.3.1 - St. James Dock No. 1

Dock 1 has two loading arms. On the dock, the two loading arms are manifold into a single line containing a static mixer and two sample probes. Each sample probe delivers samples to its own dedicated sample collection container.

Dual sample systems are in place on dock 1 for redundancy purposes only. One of these systems is stenciled as "Primary" and the other is labeled "Secondary".

Upon completion of each receipt, and barring a known physical failure in the primary sampling system, ***only*** the crude sample contained in the "primary" sample collection container will be worked for gravity and S&W determination for that transaction. ***Also***, no mixing will be performed nor tests run on the sample contained in the "secondary" (redundant) container.

Known Physical Failures are defined as:

1) A sampler malfunction, which is exhibited by:
   (a) A full Sample Pot
   (b) An inadequate sample pot volume as determined by the operator for the volume run.

2) A sample pot mixer malfunction that is exhibited by noncompliance with API Chapter 10.4 procedures.

3) Any other known physical failure as defined by the operator.

In the event of a known physical failure of the primary sampling system during the transaction, *the primary container will be purged without mixing or testing*, and gravity and S&W determination will be based on the sample collected by the secondary system.

After mixing the composite sample in the primary or secondary container, the samples are withdrawn for the gravity determination and S&W analysis.

The sampling systems are drained after an acceptable S&W determination has been made.

Sampler performance is monitored by attendants to ensure that a representative sample is obtained.

In the event that both the primary and secondary samplers fail during a discharge, the S&W volumes for the discharge will be determined through negotiation.

1.3.2 - St. James Dock No. 2, 3 and 4 Out of Service

There are no sampling equipment installed or dual sampling procedures in place or existing.

1.3.3 - API Gravity and S&W Determination

The purpose of this section is to define the procedures that will be used to determine API Gravity and Sediment & Water.

1.3.3.a - API Gravity

API Gravity - API Gravity will be determined using API MPMS Chapter 9 Section 3, Standard Test Method for Density, Relative Density and API Gravity of Crude Petroleum Products by Thermohydrometer Method.

1.3.3.b - Centrifuge Sediment & Water (S&W)

Centrifuge Sediment & Water (S&W) - S&W will be determined in most cases using API MPMS Chapter 10 Section 4, Determination of Water and/or Sediment in Crude Oil by the Centrifuge Method (Field Procedure.) This procedure normally will be followed using the equipment and solvents described below, however, changes may be made as long as they are still in accordance with the API procedure. Any desired changes that are not in accordance with the procedure will require approval by the Capline Measurement and Quality Committee.

1) Tubes - Two 100 mL (100 parts) cone-shaped calibrated and verified centrifuge tubes are used to process the samples.

2) Solvents and Demulsifiers - Stoddard (or Stoddard-type) solvent is used for more routine applications, while water saturated Toluene solvent is used for those crude oils that do not respond to tests performed with Stoddard solvent. When acceptable results cannot be obtained using Stoddard solvents, samples must then be tested using either toluene solvent or other methods. Local measurement personnel should be able to advise whether Stoddard solvent or use of other methods are required. Currently, DMO 46x is used as a demulsifier. Other demulsifiers may be tested and used as needed.

1.3.3.c - Karl Fischer Water

Karl Fischer Water - With approval of the Capline Measurement and Quality Committee, water can be determined using API MPMS Chapter 10 Section 9, Standard Test Method for Water in Crude Oils by Coulometric Karl Fischer Titration. If this method is used, an alternate API MPMS method will be used for sediment determination.

1.3.3.d - Referee Method for S&W

Referee Method for S&W - In the event of a dispute, the referee methods for S&W will be the current approved API MPMS referee method.

1.4 - Measurement Equipment and Procedures

1.4.1 - St. James Docks

A spreadsheet of current measurement equipment is included in the appendix of this manual.

Turbine meters are used for measurement on Dock I. Each meter used during the unloading of a tanker is proved approximately one-hour after start of unloading. A 22-inch unidirectional prover is used to prove the three 10-inch helical turbine meters on Dock I. The Dock 2 meters have been activated for use in measurement of cargos unloaded into the Plains St James tank farm. The Dock 1 unloading arms and sampling systems are used when unloading into the Plains St James tank farm.

1.4.2 - Custody Volume Determination

Procedures for cargos unloaded into shore tankage at St. James docks:

1) Verify the line fill prior to unloading using the current approved Capline Dock Line Fill Verification procedure. This procedure can be acquired by contacting the local Operations Supervisor.

2) Prove the dockside meters after one-hour of the unloading.

3) If the meter factor is within ± 0.0025 of the previous factor of the same crude type for the meter, the factor shall be used for the run ticket.

   NOTE: When a meter receiving a new crude type, or an infrequently handled crude type (one that has not been handled in six months) is proved, the factor obtained shall be considered the result of an initial proving and used for ticketing purposes. In such a case, an additional confirmation proving must be made later in the batch.

4) If the meter factor is within ± 0.0025 of the previous factor of the same crude type for the meter, the factor shall be used for the run ticket.
   (a) The dockside gross 60°F metered volume shall be compared with the sum of the deliveries via the mainline meters to the mainline plus/minus the change in tank inventory at low gauge (filling through emptying).
   (b) If the dockside gross 60°F metered volume is within ± 0.25 percent of the deliveries to the mainline and the change in the tank inventory, the dockside gross 60° F volume shall be used on the run ticket.
   (c) If the dockside gross 60°F volume deviation is greater than 0.25 percent from the deliveries to the mainline and the change in tank inventory, the latter shall be used for the run tickets.

5) When there is a temperature transmitter failure on a meter run(s), an adjustment is needed for the volumes that went through the affected meter(s) using the average temperatures on the other meter runs.

6) In the event the mainline meters fail during their required service as custody transfer, the cargo volume shall be determined by secondary measurement.

7) The dockside S&W determination shall always be used with either the primary or secondary gross 60°F measurement methods for the run tickets and "net 60°F barrels" calculations.

Cargo volumes are determined with the above guidelines and will be reviewed by the operator upon the carrier's request and presentation of reasonable evidence of mismeasurement.

1.4.3 - Secondary Measurement

To insure continuous measurement across St James terminal, opening and closing tank gauges are recorded for each batch of crude oil stored in a tank or tanks. By applying any fluctuation in tank inventory to receipts into the mainline or to deliveries out of the mainline, all custody transfer meter transactions are checked. In the event of equipment malfunction (such as preamplifiers, counters, temperature transmitter/compensator, or meter failure) during the custody transfer, or a meter factor deviation greater than 0.0025 from the previous meter factor, secondary measurement will be used to determine volumes.

In the event the St. James mainline meters fail during their required service as secondary measurement or when a tank is being floated and there is a malfunction, the volume shall be determined by negotiations between the carrier and the Capline operator.

Upon equipment malfunction or meter failure of one of the St. James landlines (Exxon/Mobil, Ship Shoal, Shell/Houma, LOCAP, NuStar, Ergon, ART or Sugarland) the secondary measurement volume will be determined by negotiations between the carrier and the Capline operator.

1.4.4 - Witnessing of Custody Transfer

1.4.4.a - Witnessing St. James Custody Transfer

Witnessing of custody transfer measurements associated with cargos unloaded at St. James docks is as follows:

1) Primary measurement procedures may be fully witnessed by carrier and shipper representatives.

2) If during or immediately after the unloading, the dock meter factors are determined to be out of tolerance or upon mutually acceptable evidence of mismeasurement (e.g. secondary measurement) above step in Section 1.4.3 will be checked for possible use as the custody transfer measurement method.

3) If, prior to unloading, a carrier requests witnessing of secondary measurement of a specific cargo, the carrier must comply with the following procedures:
   (a) Request for witnessing of secondary measurement should be provided by the applicable carrier at least 48 hours prior to cargo discharge. Shipper requests must be coordinated through carriers.

(b) Oral requests for witnessing of secondary measurement should be directed to: Operation Supervisor – St James Area – Marathon Pipe Line LLC at phone number (225) 265-1234.

(c) A written confirmation of each request must be furnished. The carrier and/or shipper representatives may then witness the manual tank gauges, mainline meter provings, and meter readings relative to the cargo. The witnesses retain the responsibility to be present when the normal readings are obtained. Requests for rework of the readings/observations must be directed to the St. James terminal supervisor and will be accommodated if conditions and staffing permit.

Written confirmation of requests to witness secondary measurement should be directed to the following:

Marathon Pipe Line LLC
Operation Supervisor
6770 Hwy. 18
St James, LA. 70086

4) When secondary measurement is checked and witnessed as mentioned above, the run ticket volume will be determined with the procedures stated in Sections 1.4.2 (3), 1.4.2 (5), 1.4.2 (6).

1.4.5 - St. James Land Lines

Three helical turbine meters measure crude oil received from Shell/Houma and Ship Shoal. Ship Shoal delivers through two 10-inch helical turbine meters. Shell uses one 10-inch helical turbine meter.

A 10-inch helical turbine meter run owned by Exxon/Mobil, and one 8 inch positive displacement meter (Currently Out-of-Service), owned by NuStar are set to measure receipts from Exxon/Mobil and NuStar. The NuStar 8-inch is blinded off. A 10-inch turbine meter owned by Ergon is used to measure receipts from Ergon. The 24-inch bi-directional landline prover is used to prove all of these meters.

Receipts from NuStar's Tank Farm at St. James are measured through three (3) 10 inch turbine meters. A 30-inch bi-directional prover owned by NuStar proves these meters.

Receipts from Sugarland Tank Farm to St. James tankage are measured through three (3) 12-inch turbine meters. A 24-inch unidirectional prover owned by Shell proves these meters.

Receipts from Acadian River Terminal (ART) Tank Farm to St. James tankage are measured through two (2) 10-inch helical turbine meters. A 30-inch bi-directional prover owned by Shell proves these meters.

Receipts from Plains St. James Terminal to St. James tankage or Capline mainline are measured through three (3) 12-inch and/or two (2) 16-inch helical turbine meters owned by Plains and located at the Plains St. James Terminal. A 36-inch bi-directional prover owned by Plains proves these meters.

1.4.6 - Mainline (St. James, Liberty, Patoka)

The 18-inch helical turbine meters with GFC Flow Conditioners on the mainline are designed to operate over a flow range of 9,000 (@ 30%) to 30,000 (@ 100%) barrels per hour. The ideal operating range adhered to by MPL is over a flow range of 10,500 (35%) to 25,500 (85%). Three helical turbine meters are provided at St. James and Patoka and two conventional turbines at Liberty. A 30-inch unidirectional prover is provided at each of the locations for proving the mainline meters. Samples are accumulated from the mainline to determine the gravity and S&W content of each batch of crude. The above -accumulated information is used to write a "non custody ticket" for every batch received or delivered by the mainline. Although this is not a custody transaction, the "non custody ticket" provides a method of checking the Loss/Gain at each location.

1.4.7 - Sugarland and ART Receipts to Capline Mainline

Crude oil receipts from Sugarland and ART to Capline mainline are delivered through the Capline 18-inch Helical Turbine meters. All custody transfer tickets for Sugarland and ART deliveries to the Capline Mainline are written using the mainline meters and are proved using the Capline 30-inch unidirectional prover.

1.4.8 - St. James LOCAP Receipts

Crude oil receipts from LOCAP are delivered through three (3) 16-inch conventional turbine meters owned by LOCAP. A 36-inch bi-directional prover is provided to prove the meters. A Capline ticket is written on all receipts from LOCAP to Capline at St. James. Two automatic samplers that are located on the LOCAP mainline before the meters collect samples for gravity and S&W determination.

1.4.9 - Liberty

Genesis, Plains, and Stusco deliver crude oil to the Capline system at Liberty. The following positive displacement meters (PD) are used to measure receipts into Liberty:

1.4.9.a - Liberty Meters

1) Two (2) 6-inch - System-owned (inactive)

2) One (1) 4-inch - Genesis-owned

3) One (1) 10-inch - Genesis owned

4) One (1) 8-inch - Plains-owned

5) One (1) 10-inch - Plains-owned

6) One (1) 3-inch – Stusco-owned

- *All* of these PD meters are non-temperature compensated.

- A portable prover proves the two 6-inch System-owned meters (inactive).
- Crude oil is received from the *Genesis Truck A.C.T.* The proving of the 4-inch PD meter is done by contract and witnessed by MPL personnel. MPL personnel perform the sample analysis.
- Crude oil is received from Genesis through a 10-inch PD meter A 16-inch bi-directional prover is used to prove the 10-inch meter and it is witnessed by MPL personnel. MPL personnel will perform the sample analysis.
- A stationary prover proves the two Plains-owned meters. Samples are collected from Plains deliveries by using a slipstream arrangement with a sample probe that is installed directly into the line. MPL personnel prove and perform the sample analysis.
- Crude oil is received from the *Stusco Truck A.C.T.* that has a 3-inch positive displacement meter. MPL personnel perform the sample analysis. Proving is done by contract and witnessed by MPL personnel.

1.4.10 - Collierville

Crude oil deliveries are made from the mainline to Valero tankage through two (2) 18-inch turbine meters. A 30-inch unidirectional meter proving system proves these meters. Custody is transferred to the receiving party by utilizing this measurement facility. Measurement volumes are determined by negotiations between the shipper and Capline operator when there is a meter failure.

1.4.11 - Patoka

Positive displacement meters and helical turbine meters are used for deliveries out of Patoka. Each meter is proven on each batch that is delivered. Samples are collected using an in-line sampling arrangement equipped with static mixer and held until the delivery is completed. Each sample processed for S&W and gravity may be witnessed by a representative from the carrier or operator receiving the crude oil or a waiver is used if none are present.

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2.0 - Quality Assurance

2.1 - Overview

The CRUDE OIL QUALITY ASSURANCE requirements described in this section are subject to change and, after initial approval by Capline owners, will be maintained and updated by the Operator as necessary.

Crude oil quality assurance is the responsibility of each carrier and / or shipper. These guidelines are designed to aid in the movement of merchantable oil, and to protect the Capline carriers and / or shippers.

Crude oil quality complaints should be referred to your appropriate carrier. The carrier is responsible for notifying the Operator's Supervisor, Crude Oil Movements. A sample of the Quality Assurance Customer Complaint Form is included in this Manual and is also available under Documents on the Capline Website (http://www.caplinepipeline.com/). The carrier is to, as soon as possible, complete the top half of the form, including a detailed explanation of the complaint (occurrences, barrels, economic impact, etc.), and e-mail it to the Capline, Supervisor, Crude Oil Movements at crudeoil@marathonpetroleum.com.

2.2 - Crude Oil Quality

2.2.1 - Introduction

The Capline Operator reserves the right to periodically sample and test crude oil quality delivered from the carrier and / or shipper. Sample results will be compared to the representative assay results furnished prior to connection or nomination of new crude type or to the most recent Capline assay. If the comparison indicates a significant difference in Crude Oil Properties, and / or Quality Indicators or contaminated crude oil is found in any receipt, the Capline Operator may discontinue future shipments at that location. Shipments will not resume until the Capline Operator's testing proves the stream to be clean and merchantable.

Two aspects affecting crude oil quality are degradation and contamination:

2.2.2 - Degradation

Degradation occurs during transport due to interfacial mixing, tank bottoms, dock lines, tank lines and headers, etc. Crude oil degradation can occur in both normal and abnormal flow situations.

> Cargos will be kept segregated. When operationally possible, each crude category will be moved over like, or the next most similar, dock / dock line, and tank bottom available. Each crude category will be scheduled into the mainline between similar batches when operationally possible.

2.2.3 - Contamination

Contamination is addition of an outside ingredient to crude oil, prior to or after entry into the system, for example, intentional and / or accidental dumping of used lube oils, cleaning solvents, and chemical by-products. Additives used to enhance production or transportation are not considered contaminants.

> Contaminants can cause ***damage*** to refinery processing units, refining catalysts and pipelines, potentially creating safety and environmental hazards and rendering large quantities of crude oil Non-merchantable. Traders / suppliers, producers, truckers, barge operators, gatherers, transporters and refiners MUST assume the responsibility of preventing crude oil contamination.

2.3 - Capline Contamination Protection Guidelines

2.3.1 - Introduction

The carrier and / or shipper will only deliver for transportation crude oil that complies with the latest version of the Capline Measurement Equipment and Procedures Manual, exchange agreements, tariffs, connection agreements and tie-in agreements. Capline has no obligation to accept or transport contaminated crude oil. If contaminated crude oil enters the Capline System, the carrier and / or shipper will be held responsible for disposal and for all damages and expenses incurred in returning the facilities to service.

2.3.2 - Additives

Additives – The amount and ingredients of any additive to be introduced into the Capline System **SHALL** be reported in advance of introduction into the system to the Operator's Supervisor, Crude Oil Movements.

Examples of Additives are:

- Well treating chemicals
- Producing chemicals
- Biocides
- Corrosion Inhibitors
- Paraffin cutters
- Hydrate inhibitors
- Drag reducing agents

Additives may only be introduced into the Capline System when used in normal production or transportation operations. They shall not be introduced into merchantable liquid hydrocarbon streams as a means of disposal of the additive.

At the discretion of the Capline Operator, the carrier and / or shipper may introduce into the system crude oil that contains hydrate inhibiting additives including, but not limited to, methanol as a result of production platform shutdowns including, but not limited to, planned or unplanned maintenance activities or emergency events such as hurricanes. Connecting carriers delivering such crude to Capline will be responsible for communicating, to the best of their knowledge, the total methanol concentration to the Capline Operator. The Capline Operator will communicate the information provided by the incoming carriers to the outbound connecting carriers via Capline outbound schedules.

2.3.3 - Slops

Slops - Hydrocarbon mixtures usually associated with tank cleaning operations that would result in greater than 1% Sediment and Water (S&W) in the Capline System **SHALL NOT** be introduced into the Capline System.

2.3.4 - Processed Fluids

Processed Fluids - Oil that has been through some modification process may be introduced for transportation at the discretion of the Operator's Supervisor, Crude Oil Movements. Carrier and / or shipper must understand that 125,000 Bbls. of processed fluids, after shipment in the system, may contain as high as 50% crude oil as a consequence of transportation degradation.

General requirements are:

- Low aromatics content
- Low olefin content

Examples of materials that may contain excess olefins are:

- Gasoline (not straight run)
- Diesel fuel (not straight run)
- Residual fuel oil
- Coker by-products
- Olefin plant by-products
- Cat cracked stocks
- Synthetic crude
- Upgraded crude

At the discretion of Crude Oil Movements, processed material containing olefins may be introduced into the Capline System if one of the following conditions can be met:

1. The carrier and / or shipper must have access to proprietary tankage to isolate the material and must provide sufficient (to be determined by Operator) buffer material to prevent degradation of other tenders.
2. The carrier and / or shipper must certify that the Bromine Number (ASTM D1159, Test Method for Bromine Number of Petroleum Distillates and Commercial aliphatic Olefins by Electrometric Titration) result for the naphtha cut (IBP to 475ºF of the cargo is less than 2%).

2.3.5 - Waste Materials

Waste materials **SHALL NOT** be introduced into the Capline System.

Examples of Waste Materials are:

- Used lubricating oils
- Greases
- Lead compounds
- Polychlorinated Biphenyls (PCB's)
- Cleaning solvents
- Chemical plant by-products.

2.3.6 - Organic Chlorides

Organic Chlorides - Oil having measurable organic chlorides **SHALL NOT** be introduced into the Capline System. Measurable is defined as not to exceed 1 (one) ppm in the whole crude and 5 (five) ppm in the 400ºF End Point naphtha cut. Organic chlorides do not occur naturally in crude oil, but appear when outside ingredients, such as chlorinated hydrocarbons are injected into the systems.

Examples of Organic Chlorides include, but are not limited to:

- Halogenated Hydrocarbons
- Solvents
- PCB's
- Degreasing Agents
- Carbon Tetrachloride
- Chloroform
- Ethylene Dichloride
- Dichloroethylene
- Methyl Chloride
- Ethylene Chloride
- Methylene Chloride
- "Freon" 113
- Vinyl Chloride
- 1,1 Dichloroethane
- Trichloroethane
- Tetrachloroethylene
- Trichloroethylene
- Phosgene
- Monochlorobenzene
- Chloroprene
- Perchloroethylene

2.3.7 - Oxygenated Hydrocarbons

Oxygenated Hydrocarbons - Oil having contaminant, oxygenated hydrocarbons **SHALL NOT** be introduced into the Capline System. Some oxygen containing compounds occur naturally in crude oil and some acceptable additives (examples: hydrate inhibitors, paraffin solvents, asphaltene dispersants, etc.) contain oxygenated compounds; however, neither chemical plant output nor gasoline octane enhancers, e.g., MTBE, ETBE and ethanol, occur naturally and are contaminants.

Examples of Oxygenated Hydrocarbons include, but are not limited to:

- Acetone
- Alcohols
- Aldehydes
- Glycols
- Ketones
- Phenols
- Camphor
- Esters
- Ethers
- Carone

2.4 - Crude Oil Property Limitations

2.4.1 - Introduction

Crude oil property limitations are divided into three types. There are limitations that apply to all crude and limitations that apply based on the grouping of the crude. Specifications for a particular crude stream are the third type of limitations.

2.4.2 - All Crude

All Crude - The following crude oil property limitations apply to ALL crude oils transported by Capline.

2.4.2.a - Reid Vapor Pressure

Reid Vapor Pressure (RVP) - (Not to exceed Connecting Carrier requirements or Federal, State and Local Regulations.)

Crude with an RVP of 8.6 or less may be introduced into the Capline System year-round. During the winter months, crude with a maximum RVP of 9.6 may be introduced. Crude that is above these RVP guidelines may be accepted for transportation only after temperatures are reviewed and approved by Operator's Supervisor, Crude Oil Movements. Normally, crude moved in the winter months may be introduced starting on or after October 1st and **SHALL** be clear of the system by April 30th.

2.4.2.b - Pour Point

Pour Point - Crude with a pour point above +35°F **SHALL NOT** be introduced into the Capline System in the winter and crude with a pour point above +55°F **SHALL NOT** be introduced into the Capline System in the summer. Normally, summer pour point crude may be introduced starting on or after April 1st and **SHALL** be clear of the system by September 30th.

Crude nominated for movement across the tanker dock facilities that are not within CAPLINE pour point limits **SHALL** be chemically pour point depressed. The delivering carrier and / or shipper is responsible for coordinating this activity, ensuring the chemical is compatible with other crude, and causes no contamination. The carrier / shipper assumes responsibility for the crude pour point limits through the system and timely delivery.

Connecting pipelines **SHALL** pour point depress the crude and provide supporting laboratory documentation prior to delivery to St. James Terminal. Pour point limits are not to exceed subsequent connecting carrier requirements.

Above-ground piping containing crude oil with a pour point greater than the stated limits, even if chemically pour point depressed, should not be shut down for a period longer than ambient conditions would cause the oil to congeal. If these conditions cannot be met, the line **SHALL** be displaced with crude having an acceptable pour point.

2.4.2.c - Hydrogen Sulfide

Hydrogen Sulfide (H_2S) levels in oil cargos that exceed 15 ppm in the cargo vapor space or 12 inches above any access hatch **SHALL** be handled using the Capline Operator's H2S safety procedures and equipment. Carriers and / or shippers **SHALL** notify the Capline Operator of all H_2S conditions well in advance of arrival to avoid delivery delay and vessel demurrage.

2.4.2.d - Sediment and Water

Sediment and Water (S&W) - Liquid hydrocarbons containing greater than 1.0% volume S&W **SHALL NOT** be introduced into the Capline System. In the event a condition occurs where the S&W either exceeds or will exceed 1.0%, the carrier and / or shipper producer **SHALL** contact the Operator's local Operations Supervisor regarding remedy of the situation. The Operator retains the right to shutdown production if conditions persist which cause the S&W to exceed 1.0% S&W.

2.4.2.e - Salt Content

Salt Content - Salt(s) in petroleum crude oil creates a number of problems for refiners. These include corrosion, fouling, catalyst poisoning and potential violations of EPA mandated wastewater discharge limits. Salt is also corrosive for the transportation pipelines, tankage and equipment. Crude containing greater than 200 pounds per thousand barrel (pptb) of salt should not be introduced unless approved by the shipper. In the event that a condition occurs where the salt content will exceed 200 pptb, the carrier and / or shipper or producer should contact the Operator's local Operations Supervisor regarding remedy of the situation. The Operator reserves the right to shutdown production if conditions persist which cause the Salt content to exceed 200 pptb.

2.4.3 - Crude Groupings

Crude Groupings - Additional crude oil property limitations are specified based on the group designation of the crude. Each crude will be placed under one and only one of the five groupings.

Group Number/Label	Sulfur (Wt. %)	Metals (V + Ni in Pitch-ppm)	Tan-E (mg KOH/gm) (Acid number)
SWEET-LO METALS	< 0.50	≤ 100	≤ 1.0
SWEET-HI METALS	< 0.50	≤ 250	≤ 1.0
INTERMEDIATE	≥ 0.50 ≤ 1.00	≤ 550	≤ 1.0
SOUR	> 1.00 ≤ 2.00	≤ 1,200	≤ 1.5
HI-SOUR	> 2.00	≤ 1,200	≤ 2.0

Crude nominated and delivered to CAPLINE as Sweet Crude, which when tested is found to have a sulfur content of ≥0.50% by Wt. could be re-graded to Intermediate or Sour depending on the sulfur content.

2.4.4 - LLS Specifications Program

2.4.4.a - Specifications

Specifications - LLS Common Stream Crude shipped on Capline **SHALL** meet the currently applicable specifications.

2.4.4.b - Specification Changes

Specification Changes - These specifications will be dynamic to respond to changing crude oil quality as new production is brought on stream and older wells decline. The process for changing these specifications follows:

1) Change at the Operator's Discretion - After review of data shows a significant change in the quality of the crude stream (Normally resulting from a change in the stream due to gathering system production and not to "transportation crude"), the Operator will immediately notify all carriers who will notify their shippers.

2) Change at the Request of Shippers – Upon Shipper request, Operator will review data and make recommendation to Capline Technical Committee and Capline Owners. Carriers will canvas their shippers for approval.

2.4.4.c - Testing

Testing - All incoming batches of LLS crude will be sampled at St. James and the samples sent to an independent, third party, laboratory. The samples will be retained for 90 days in the event that complaints are received. Testing of samples will be conducted as follows:

1) All Receipts - If the API gravity or sulfur content test at St. James indicates that a batch does not meet specifications, the Operator will request the third party laboratory to test the sample from that specific batch, in addition to the testing schedule discussed below.

2) Pipeline (Non-gathering system) and Terminal Receipts - Samples to be tested will be selected on a random basis at the discretion of the Operator. At least 30% of all samples will be tested. At least one sample from each carrier will be tested per month.

3) Gathering System Receipts (Example: Ship Shoal Pipeline) – Composite samples will be taken approximately weekly, depending on when month end falls and the quantity of crude being received. All composite samples will be analyzed.

4) Marine Receipts - All samples will be tested.

5) New Sources - All samples from new connecting carriers, existing connecting carriers that have not previously delivered LLS, and new terminals will be tested until the Operator is assured that the receipts are consistently meeting LLS specifications. New connecting carriers will be given the same four month grace period to comply with specifications as was given to all connecting carriers in the initial program starting September, 1998.

2.4.4.d - Enforcement

Enforcement - As a basis for enforcement, all shippers will be requested to include in their purchase contracts a statement that LLS crude delivered must meet "current Capline specifications for LLS crude". The enforcement process is detailed on the following chart.

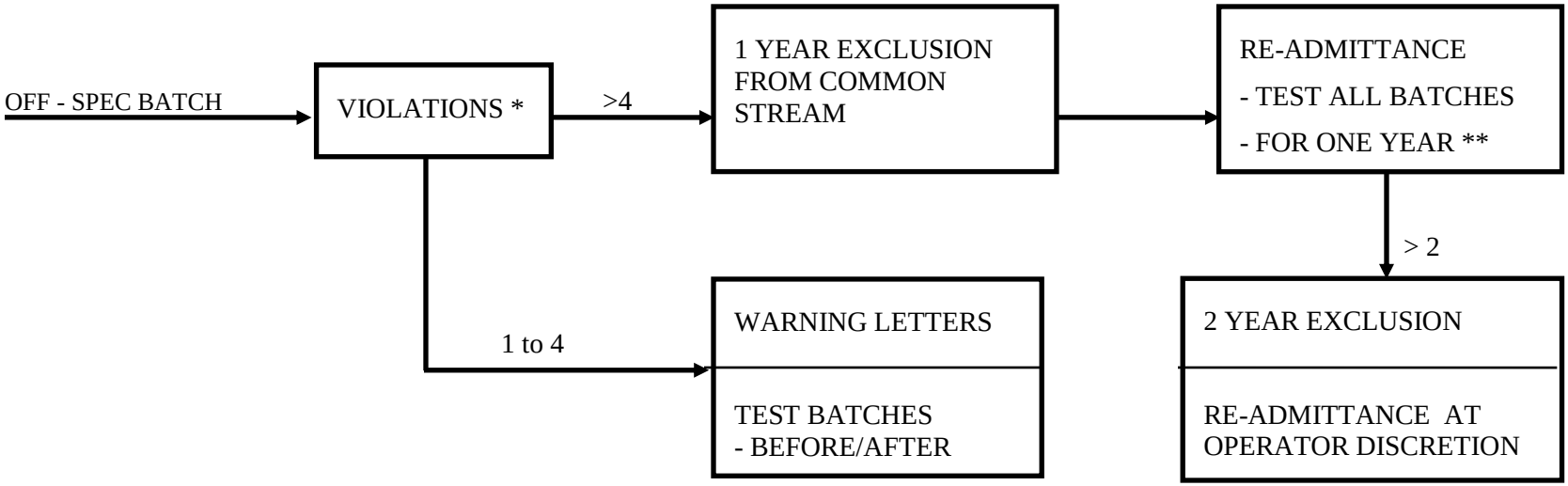
Notification of non-compliance will be communicated to the operators of terminals and connecting carriers, who will be expected to deal with the source of the problem in their own system. For marine receipts, the shipper will be notified directly. In addition, notification of the receipt of an off-specification batch will be communicated to all Capline owner representatives.

2.4.4.e - Procedure for Exclusion

Procedure for Exclusion - Any connecting carrier or terminal that receives five violations within a rolling twelve-month period will be excluded from delivery of LLS to the Capline common stream for one year. The carrier or terminal will be notified of the fifth violation and will be given ninety days from the date of notification until the actual time of exclusion. Following re-admittance, all batches from that carrier / terminal will be tested for one year and if more than two violations are received within that year, the carrier / terminal will be excluded from delivery of LLS to the Capline common stream for two years. The carrier / terminal will be notified of the third violation and will again have ninety days from the date of notification until the actual time of exclusion.

CAPLINE COMMON STREAM QUALITY

ENFORCEMENT PROCESS



* VIOLATIONS COUNT IS BASED ON ROLLING 12 MONTH PERIOD

** SHIPPER PAYS TESTING COSTS

2.5 - Assay Requirements

2.5.1 - Introduction

At least two weeks prior to start up of a new receipt connection or at the nomination of a new crude type, the carrier and / or shipper **SHALL** provide a complete assay from a reputable laboratory. The Assay Report **SHALL** include:

1. Testing laboratory name and location
2. Date sample was taken - MUST be within five (5) years
3. Date sample was tested
4. Method used for each test
5. Test results for ALL properties required below

In addition to the complete assay, a Material Safety Data Sheet and some documentation (technical bulletin or other) of the correct crude oil name (with company logo or letterhead) must be submitted.

Results of the complete up-to-date assay from a reputable laboratory will be used to determine if the crude oil is acceptable for shipment on the Capline System.

Upon approval of the newly nominated crude oil assay, the crude type will not be added to the Capline approved Crude Oil Assay Listing until it has been shipped by the nominating carrier and / or shipper and assayed by Capline. If this approved crude oil is not shipped within one year of the approval date, the crude oil approval process **SHALL** be reinstituted before it can be shipped in the system. If a crude has not been moved on the Capline System in three (3) years, it will be removed from the approved assay list.

A blended crude will be treated as a new crude and requires a complete laboratory assay when nominated, unless the component crude have been previously approved and shipped in the Capline System. When the component crude of the nominated blend have been previously accepted in the Capline System, the Carrier and/or Shipper may submit in writing a calculated assay, instead of the complete laboratory assay mentioned above.

Oil acceptance will be at the discretion of the Operator's Supervisor, Crude Oil Movements, who will make a comparison of the nominated new crude, blend, or any questionable oil, with normally accepted crude oils. (A minimum of two weeks **SHALL** be allowed for approval or rejection.)

2.5.2 - CAPLINE CRUDE OIL ASSAY REQUIREMENTS

ACCEPTANCE OF CALCULATED RESULTS IS AT DISCRETION OF OPERATOR

Properties	Units	Recommended Test Procedures
1. API Gravity	Deg. API @ 60°F	ASTM D 1298 ASTM D 5002 IP365
2. Vapor Pressure (Reid)	psia	ASTM D 323 ASTM D 6377 VP Calculated
3. Sulfur	Wt. %	ASTM D 4294 ASTM D 2622
4. Pour Point	Deg. F or C	ASTM D 97 ASTM5950
5. S & W Content S & W **OR** Water Sediment	Vol. % Vol. %	ASTM D 4928 ASTM D 4006 ASTM D 473
6. Viscosity (at 3 temperatures: 60, 80 and 100°F)	SSU, cSt or cp	ASTM D 445 IP71 ASTM D 2161
7. Hydrogen Sulfide	ppm wt.	UOP 163 IP272 ASTM D3227
8. Metals (Vanadium and Nickel) (a) Whole Crude **AND** (b) Pitch (1000+ Deg. F)	ppm wt.	IP Pm-CW/04 Mod ASTM D5708 IP437
9. Neutralization No. (TAN)	mg KOH/gm	ASTM D 664 IP177
10. Salt	lb/1000 Bbl	ASTM D 3230 IP265
11. Carbon Residue	Wt. %	ASTM D 189 (Conradson) ASTM D 4530 (Micro)
12.a) Simulated Hydrocarbon Distribution with Distillation Curve of Temp. vs. Wt. % Distilled **OR** b) Hydrocarbon Distribution with Distillation Curve of Temp. vs. Vol. % Distilled	Wt. % Vol. %	ASTM D 2887 ASTM D 7169 ASTM D 2892
13. Organic Chlorides (a) Whole Crude **AND** (b) Naphtha Cut at 400°F	µg/g (ppm wt.)	ASTM D 4929

2.6 - Quality Assurance Incident Report Form

2.6.1 - Quality Assurance Incident Report Form

Date:	Capline Incident ID Number:
Customer:	Carrier
Crude Product Type:	Batch Number:
Concern/Incident Description:	
Attachments/Supporting Documentation: Yes _____ No _____	
Signature:	Date
Contact Information:	

Date Received By Capline, Supervisor, Crude Oil Movements:		
Incident/Concern Related To: Crude Quality: _____ Measurements: _____ Other: _____		
Incident Assigned To:		Date:
MPL ALIRTS #:	Causal Factor:	
Reviewer Signature:		Date:
Reviewer Comments:		
Closure By: Letter _____ Phone: _____	Attachments: Yes: _____ No: _____	

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3.0 - Appendices

3.1 - Measurement Equipment

3.1.1 - Capline Equipment List

[Double click on the following icon to launch the Equipment List document.]

3.2 - Normal Capline Sampling Rates

3.2.1 - NORMAL CAPLINE SAMPLING RATES TABLE

	FREQUENCY (BBLS)	AMOUNT
St. James		
Docks 1	90	9 mL
Mainline	140	9 mL
Ship Shoal	50	9 mL
Shell/Houma	70	9 mL
NuStar	10	9 mL
Exxon/Mobil	150	9 mL
Ergon (Capline)	60	9 mL
Ergon (Ship Shoal)	10	9 mL
Liberty		
Mainline	60	9 mL
Plains	10	6 mL
Stusco	10	3 mL
Genesis	5	1 mL
Collierville		
Premcor	30	9 mL
Patoka		
Delivery Lines	30*	3 mL
Mainline	60	3 mL

* Where available, the sample rate will be adjusted automatically based on the batch size to maximize the sample volume. Where automation is not available, a "30-barrel setting" is used and a "20-barrel setting" may be used for small batches to ensure a container volume of at least 40%.

3.3 - Inspection and Calibration Frequencies

3.3.1 - Introduction

This section specifies the frequency of inspection and calibration to be conducted by the operator of Capline. While maximum intervals are set out, it is recognized that these intervals depend upon a number of factors such as maintenance requirements or weather conditions, the number of spare units available, the attendance at the station, and the load on the system. The time interval between inspections and servicing shall not be increased beyond the maximum outlined.

This section specifies only required inspections/calibrations and does not cover regular observations of equipment condition and performance, which is an important part of a successful maintenance program. In many cases such observations will uncover an equipment problem at an early stage, thus limiting the down time and reducing repair costs. It is recommended that these observations be made at regular intervals between required inspections as may be appropriate for each location. Normally the observation can be made in connection with other maintenance or operating activities without requiring special trips.

Inspection of equipment shall include:

1. Visual inspection to determine if there are signs of deterioration that might lead to failure.
2. Checking to verify that equipment is operating within design limits.
3. Servicing such as cleaning or lubrication.
4. The need to verify, calibrate and/or adjust devices to prescribed settings.
5. The need for repair of any device.

3.3.2 - Inspection and Calibration Intervals

INSPECTION and CALIBRATION INTERVALS TABLE

Displacement Meter Inspection/Calibration	Monthly	Quarterly	Semi-Annual	Annual
Vibration & Noise				X
Service Packing Gland	X			
Drain Meter Case	X			

Prover Inspection/Calibration	Monthly	Quarterly	Semi-Annual	Annual
All Associated Block & Bleed Valves	X			
Check Prover Temperature & Pressure	X			
Inspect and Size Prover Sphere				X

Sample System Inspection/Calibration	Monthly	Quarterly	Semi-Annual	Annual
Verify Sampler Operations		X		

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Portable Electronic Thermometers (PET) Calibration And Verification Procedures

3.3.1.a - Initial and Annual Calibration

Before initial use, and at least once a year thereafter, each portable electronic thermometer shall be calibrated in a laboratory or other qualified calibration facility.

The PET shall be calibrated by comparing it at three or more temperatures with a National Institute of Standards and Technology (NIST) certified thermometer or an equivalent thermometer of traceable accuracy. The PET manufacturer's calibration procedures shall be followed in conducting the calibration. Each calibration will ensure that accuracy is maintained to ±0.1°F.

3.3.1.b - Field Verification and Inspection

This should be completed a minimum of once monthly and prior to each use each use at two or more temperatures near the ends of its range. Each PET should be spot checked by comparing against an NIST certified thermometer (or equivalent with traceable accuracy) in a dry block calibrator. If the readings differ by more than ±0.25°F at 85°F, the PET should be recalibrated before it is used for custody transfer measurement.

Additionally, the following physical inspections should be made before each use or daily. Any damage found should be reported to your supervisor, and the PET should not be used for custody transfer until repaired and reverified or recalibrated, whichever is appropriate.

1) The junction between the cable and the probe should be inspected for mechanical damage.
2) The cable insulation should be checked for cuts, breaks, or abrasion.

3.3.2 - Operational Guidelines

3.3.3 - Operational Guidelines List

Capline System measurement practices are documented elsewhere in this manual and require the approval of Capline Owners. The following *OPERATIONAL GUIDELINES* have proven beneficial to measurement practices:

1. HIGHLY VISCOUS CRUDES with viscosity at flowing temperatures in excess of 230 SSU may cause meter factors to shift in excess of acceptable tolerances (see Section I.D.2.b and c: Measurement Equipment And Procedures, Custody Volume Determination) necessitating the use of secondary measurement. For this reason, all marine receipts of such crude will be made across Dock No. 1.
2. SOLIDS in marine cargo's, such as iron ore, sand, gravel, and grains will plug strainers and damage metering equipment. If these materials cannot be avoided, operating precautions should be taken such as extraordinary cleaning of strainers and close operating scrutiny. Secondary measurement practices must be in place for these receipts.
3. BLENDING at receipt points or within the system is PROHIBITED, as there are no facilities to accommodate this practice. All measurement is based on receipt/delivery of well-mixed, uniform, and homogeneous crude oils for best accuracy. Batches must be uniform within 1 degree API gravity and 5 degree Fahrenheit limits.
4. LOW LINE VELOCITY at metering and sampling facilities should be avoided whenever possible. During cargo stripping operations, dock meters operate below their specified low flow limits resulting in inaccurate measurement. Because of this, lengthy stripping operations should be avoided or investigated to determine if discharging should be discontinued. Minimum flow rates are:

   (a) DOCK 1 4,000 BPH

3.3.4 - Measurement and Quality Committee Representatives

COMPANY	MEASUREMENT REPRESENTATIVE	QUALITY REPRESENTATIVE
Marathon Pipe Line LLC (Operator)	Attn: Mrs. Andrea Hovest 539 S. Main St. Findlay, OH 45840 Office : 419-429-5452 E-Mail: alhovest@marathonpetroleum.com	Attn: Ms. Anna M. Morris 539 S. Main St. Findlay, OH 45840 Office: 419-672-6740 Fax: 419-421-3917 E-Mail: amorris@marathonpetroleum.com
BP Pipelines (North America), Inc.	Attn: Mr. Paul Furman 8230 Whitcomb St. Merrillville, IN 46410 Office: 219-742-4600 E-Mail: Paul.Furman@BP.com	Attn: Mr. Jeff Northing 4502 E. 41st. St. Suite 300 Tulsa, OK 74135 Office: 918-660-4372 Fax: 918-660-4393 E-Mail: jeff.northing@bp.com
Plains All American Pipeline	Attn: Mr. Derry Butler 22 Milbranch Rd. Suite 1000 Hattiesburg, MS 39402 Office: 601-271-8786 ext 1105 Cell: 601-466-3626 Fax: 601-261-4140 E-Mail: edbutler@paalp.com	Attn: Mr. Derry Butler 22 Milbranch Rd. Suite 1000 Hattiesburg, MS 39402 Office: 601-271-8786 ext 1105 Cell: 601-466-3626 Fax: 601-261-4140 E-Mail: edbutler@paalp.com

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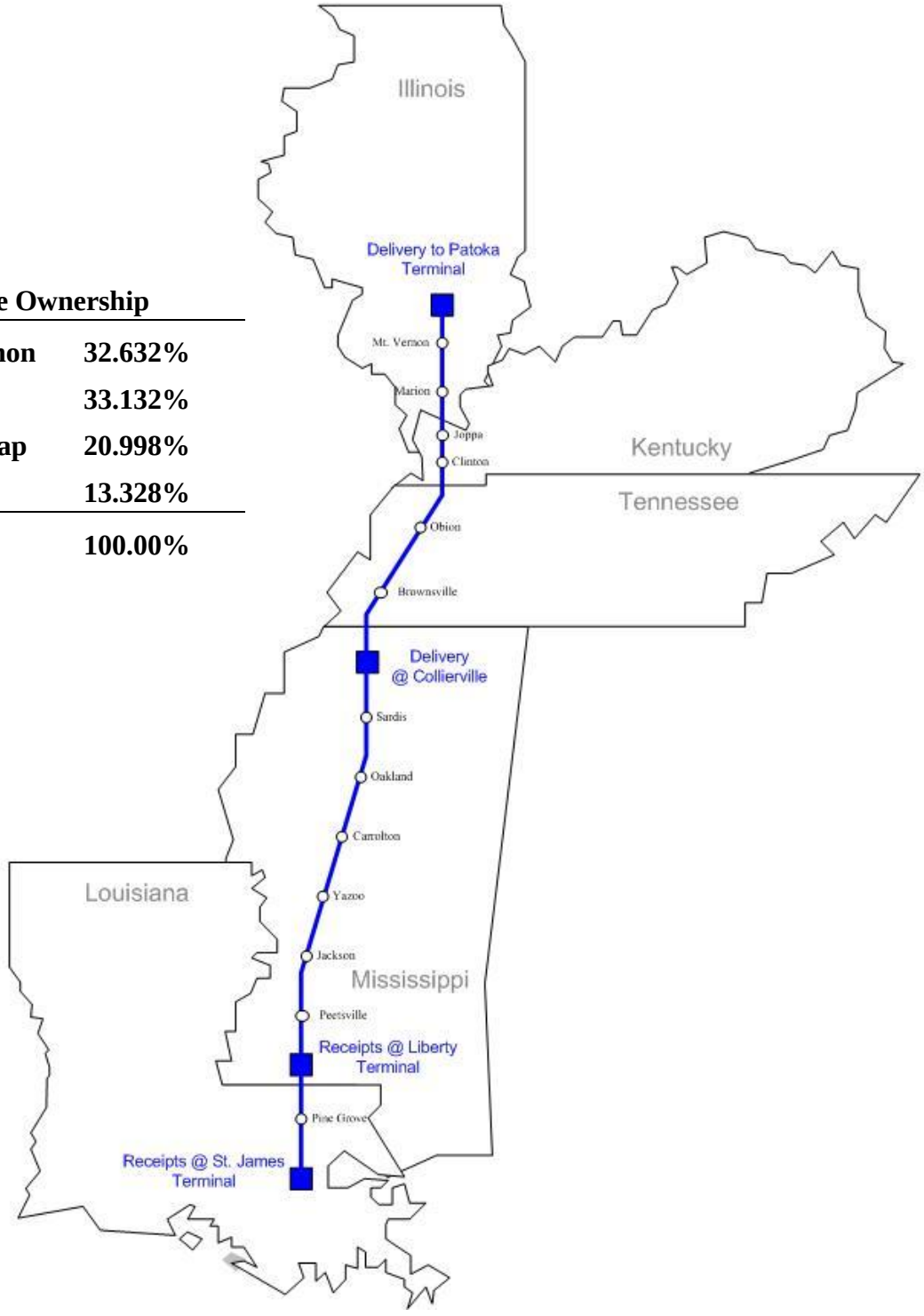
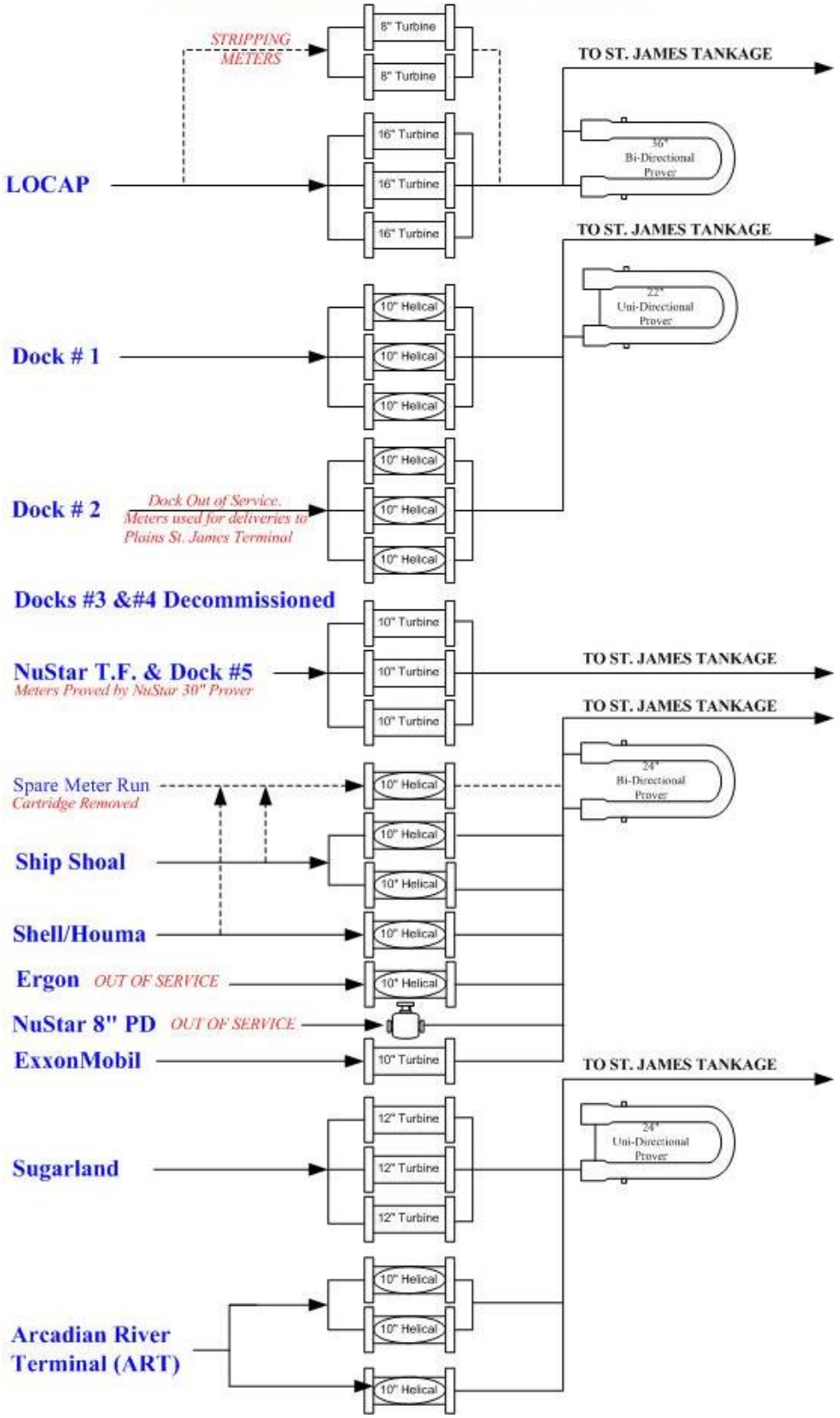
4.0 - Diagrams

4.1 - Capline System Schematic

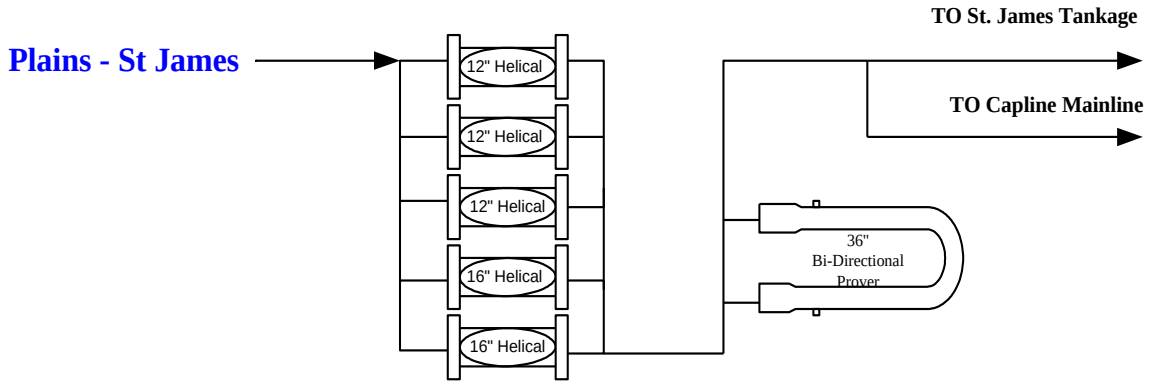
Capline Ownership	
Marathon	**32.632%**
Plains	**33.132%**
Southcap	**20.998%**
BP	**13.328%**
Total	**100.00%**



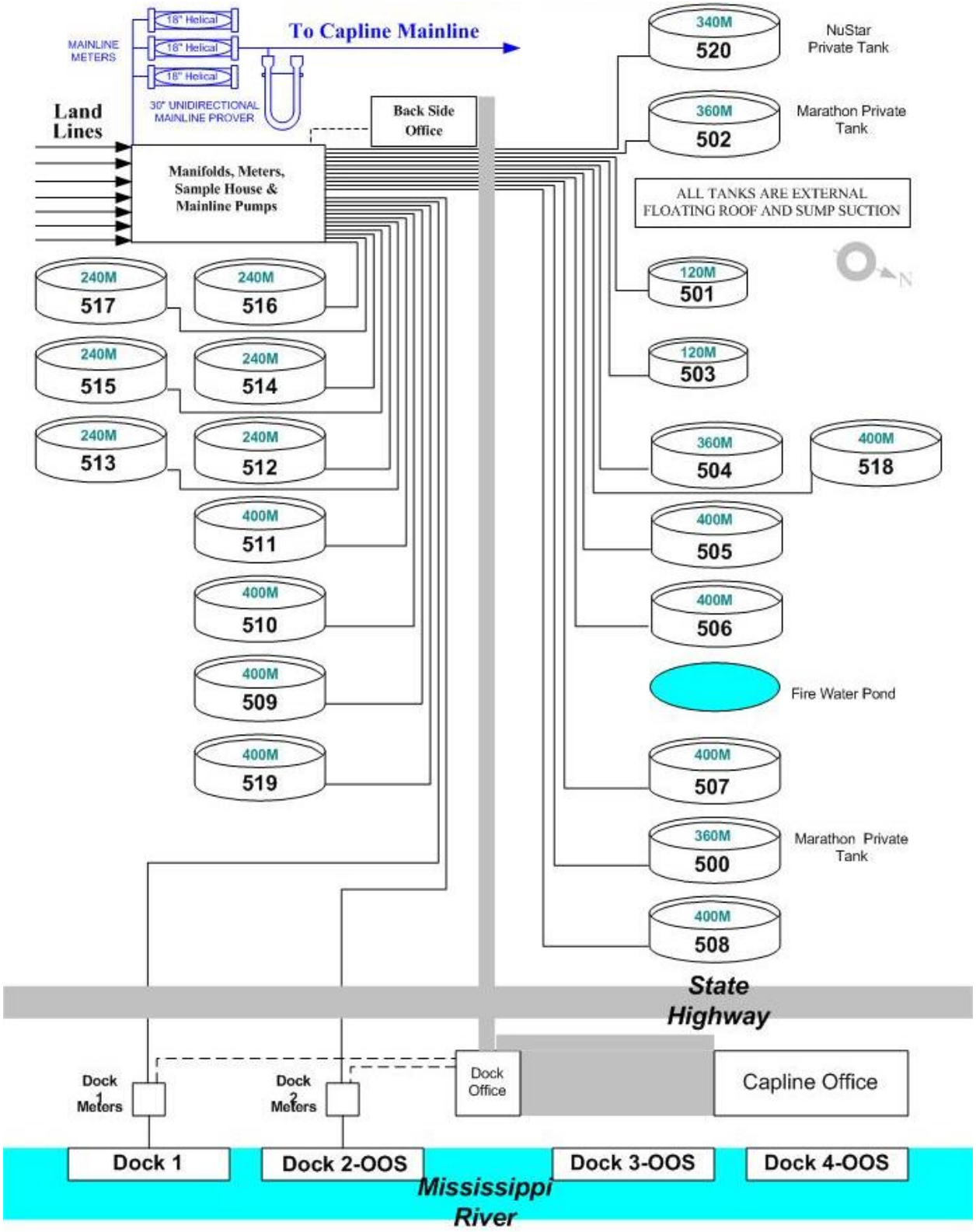
4.2 - St. James Receipts



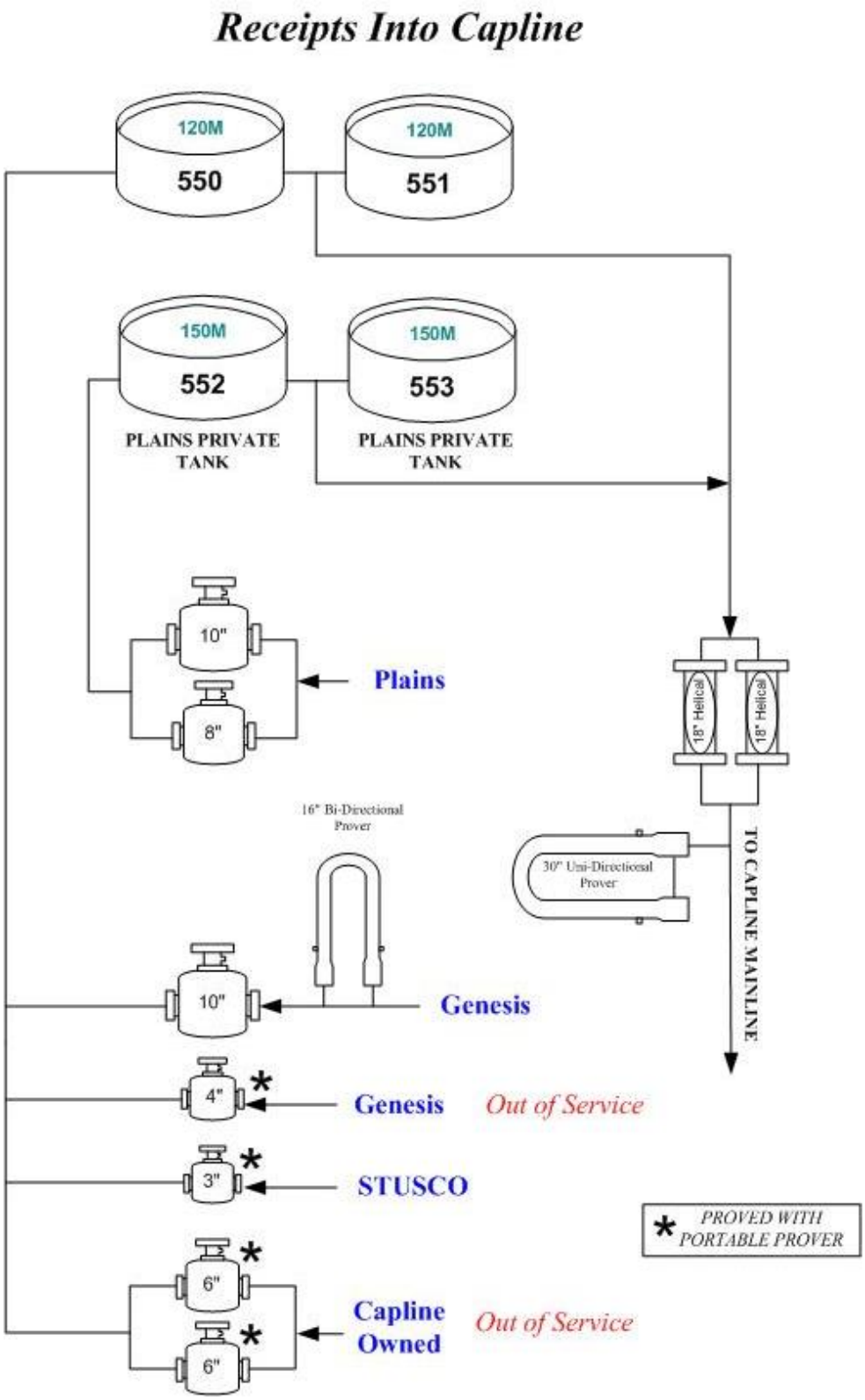
4.3 - St. James Receipts (cont.)



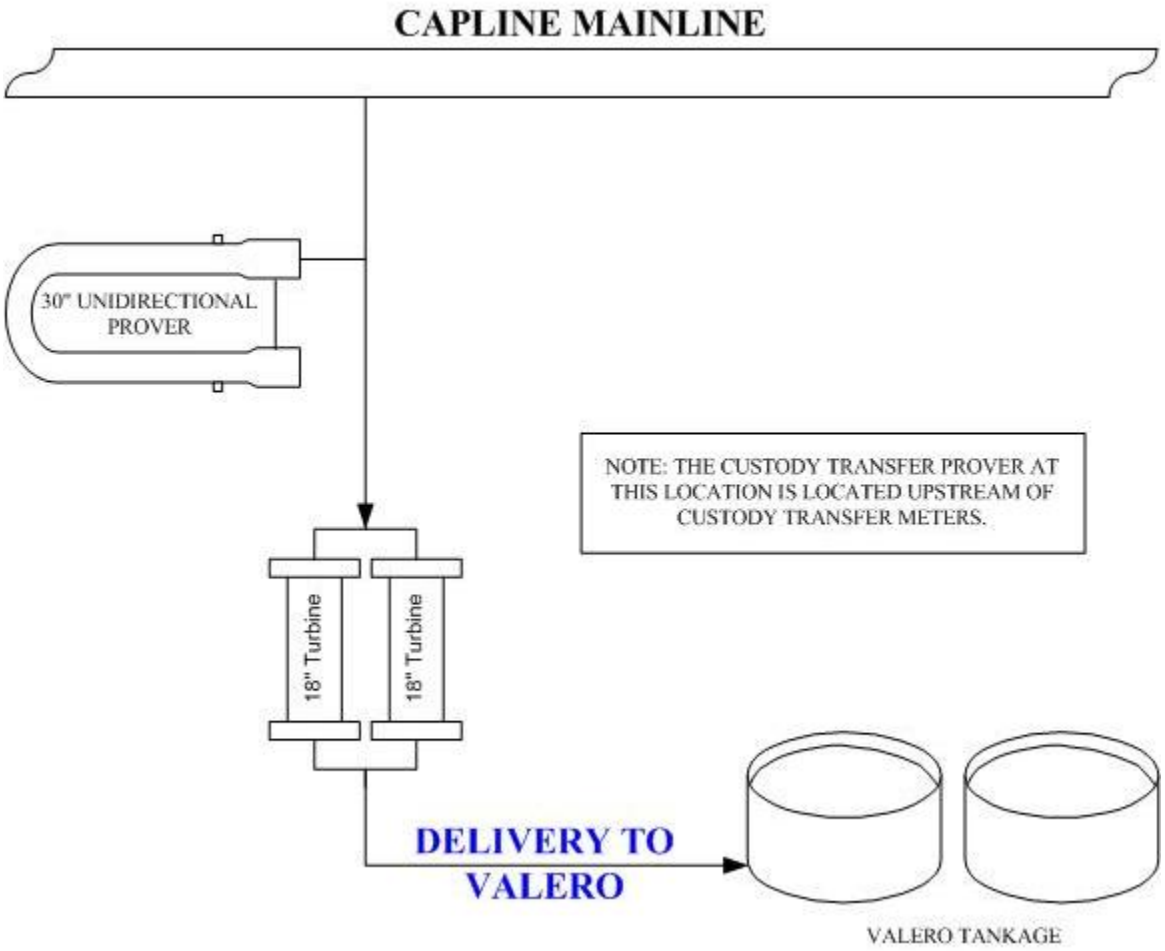
4.4 - St. James Tank Farm



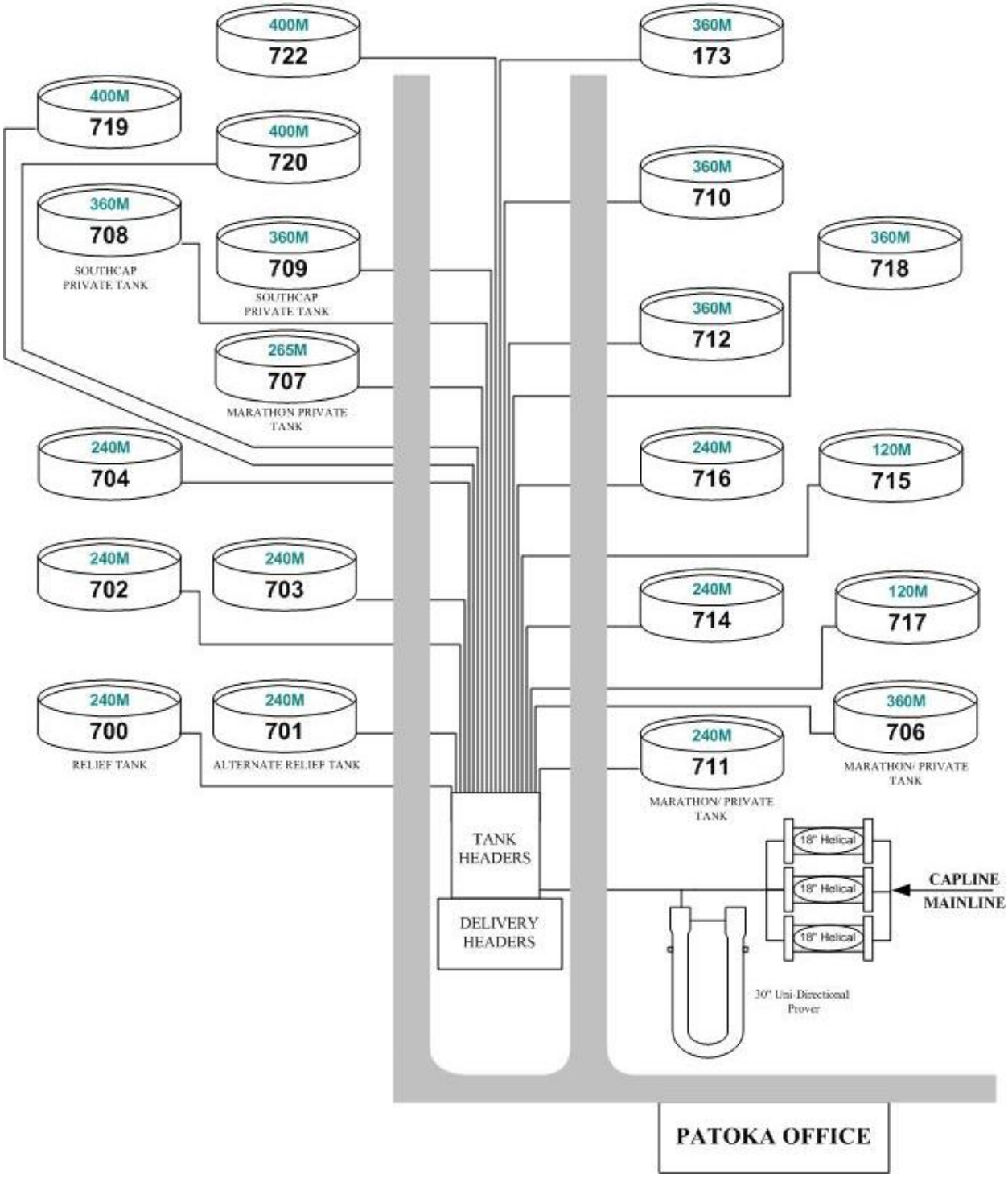
4.5 - Liberty Terminal



4.6 - Collierville



4.7 - Patoka Tank Farm



4.8 - Patoka Deliveries