HANDLING ULSD AT TERMINALS

Independent Liquid Terminal Association

OPTIONS FOR TERMINALS

- Three Options Exist:
  - Handle a single grade
  - Handle multiple grades, segregating each one
  - Handle multiple grades without segregation using modified procedures
- Most Terminal Operators have not made final decisions regarding which option they will choose

TERMINAL RECEIPT ISSUES

- Spur Line Fills
  - Short Spurs must be carefully monitored and properly displaced
  - Consideration should be given to displacing spurs with low sulfur product
- Prover displacements
  - If not laid down with low sulfur product, meters should not be proved during ULSD receipts
- Pipeline transmix cannot be blended into ULSD
- Batching and interface
  - Jet fuel can no longer be downgraded to LSD
  - Failure to interface with a low sulfur product will magnify problems with missed cuts and product switches

POSSIBLE SOLUTIONS

- Communication with pipeline operators
  - Written pumping orders
  - Specific facility designations (naming conventions)
  - Redundant interface detection equipment
  - Redundant tank monitoring
- Terminal specific delivery procedures
- Pipeline and Terminal operator training
- Improved product detection/testing equipment

POTENTIAL TERMINAL CONTAMINATION POINTS

- Common headers
- Leaking valves and checks
- Dead Legs
- Pump Circuits
- Pressure relief piping
- Pump back piping
- Vapor Recovery return lines

POSSIBLE SOLUTIONS

- Terminal infrastructure inventory
  - Eliminate or control contamination risk
  - Attempt to segregate ULSD tanks, piping and loading arms - costs will vary by terminal
  - Use of double block and bleed manifold valves
- Where segregation is not possible
  - Terminal specific limits on sulfur content
  - Development of operations procedures to ensure adequate line flushes
  - Prohibiting high sulfur fuels - limiting products handled.

STORAGE TANK ISSUES

- Segregation is the best case scenario
- Preliminary testing points to sulfur stratification, even in segregated tanks
  - A single tank sample may not be representative
- It may not be possible to segregate all tanks
  - Additional time will be needed to change service
  - Product may have to be downgraded to heating oil.
  - Both of these issues may limit supply

POSSIBLE SOLUTIONS

- Each terminal must be analyzed for its realistic potential to handle ULSD
- Mixers and other modifications may be necessary
- If possible, clean and segregate tanks
  - API out-of-service inspections may be required
  - Dike modifications may be necessary
- Two turns, emptying tanks between receipts may be required to protect USLD
  - May limit product availability

SULFUR TESTING

- Cost of testing equipment is prohibitive for terminals
- Lab testing turn around time is 24+ hours in addition to transportation to the lab
- Tests are necessary to protect the operator. In the event of an NOV, actual test data would provide the highest level of security
- Impact of testing time, elimination of live tanks and lack of spare tankage will affect product availability

HEATING OIL MARKER

- In markets outside of the Northeast, installation of an additive system will be required.
  - No technical challenges
  - Capital and expense will be recovered through an additive administration charge which will eventually be passed through to the consumer

DESIGNATE AND TRACK RULES

- Increased complexity
- Potential for multiple products in the same tank
  - e.g. ULSD #1, Kero, Aviation Kero
  - or Off road 500 ppm, on road 500 ppm
- Product substitution rules will allow for swaps in and out of pool
- No specific technical challenges that will prevent implementation

TERMINAL DELIVERY ISSUES

- Terminal sulfur content
- Tank trailer type and construction
  - Flat bottom trailers will be problematic
  - Location of baffles, drain holes and sumps should be considered by transport operator
- Tank trailer operation
  - Trailer compartments must be drained
  - Slope of pavement at delivery location can be a factor
- Last product loaded.
  - The lower the sulfur, the better

TANK TRAILER SENSORS

- Retain Bottom Sensors
  - Located in the bottom of trailer compartments
  - Interface with the terminal's rack controller via the overfill protection connection
  - Ideally will disallow loading if there is any product in the cargo tank

PROBLEMS WITH BOTTOM SENSORS

- Retain bottom probes are not fail safe
  - Driver Override Switches.
  - May not detect product in trailer sumps.
- Not all trailers have retain bottom probes
  - Requires fittings to be welded in each compartment.
  - May require new overfill monitors that are compatible with top and bottom sensors.

PROCEDURAL OPTIONS

- Dedicated or Segregated Trailers
  - Essentially guarantees maintenance of sulfur content.
- Top Loading
  - No special procedures
  - Same product quality considerations as bottom loading
- Split Loading
  - Use of double bulkheads recommended.

PROCEDURAL OPTIONS (CONT'D)

- Switch Loading
  - Feasible only if terminal sulfur content is less than 15 ppm.
  - May require use of high sulfur conductivity improver.
  - Dyed product introduces further complexity.
  - All trailer compartments must be completely drained.

SWITCH LOADING

- Experience suggests that trailers are generally well drained now
- If reasonable care is taken, drainage should not be a problem
- Consideration of previous product carried is important
  - 5 gallons of 30 ppm gas will cause a 0.5% increase in sulfur level (.075 ppm) in 1,000 gallons of ULSD
  - 1 gallon of 3,000 ppm fuel will cause a 20.0% increase in sulfur level (2.98 ppm) in 1,000 gallons of ULSD

GUIDANCE FOR SWITCH LOADING TRAILERS

From	To Gasoline	To LS Diesel	To LS Diesel	To Home Heat	To Clear Kero	To Dyed Kero	To ULSD #1 or #2	To Jet A
Gasoline	OK	OK	OK	NO	NO	NO	OK	NO
LS Diesel Clear	OK	OK	OK	OK	OK	OK	OK	NO
LS Diesel Dyed	OK	NO	OK	OK	NO	OK	NO	NO
Home Heat	OK	NO	OK	OK	NO	OK	NO	NO
Clear Kerosene	OK	OK	OK	OK	OK	OK	OK	NO
Dyed Kerosene	OK	NO	OK	OK	NO	OK	NO	NO
ULSD #1 or #2	OK	OK	OK	OK	OK	OK	OK	NO
Jet A	OK	OK	OK	OK	OK	OK	NO	OK

TRAILER DRAINAGE

- Terminals will not have facilities to drain trailers
  - Sump tanks embody environmental issues:
    - Vapor recovery
    - Title V impacts
    - Containment and potential for spills
  - Many terminals are unmanned during off hours
    - Potential for abuse: waste oil, water, other
  - Potential product ownership disputes
    - Who owns the product that was previously paid for?
    - Ownership will dictate disposal options and cost allocation

RECOMMENDATIONS

- Sulfur content of ULSD at the terminal inlet flange should not exceed 11 - 13 ppm to allow for necessary flexibility to terminal and tank truck operations
- Each terminal is different and requires identification of engineering and procedural solutions to eliminate or control contamination risk
- Use of dedicated/segregated trailers is recommended.
- Switch loading is possible. The key is for the tank trailer operator to ensure that trailers are well drained prior to loading
- Drainage facilities will not be widely available at terminals
- Operators have little experience with ULSD. Further testing is required. This will require more product to be made available by refiners