Appendix A – Aircraft Fueling

Disclaimer:
The inventory of aircraft fueling facilities was performed by Pond & Company. Note, the analysis was initially conducted in May 2022, prior to TAC Air being acquired by Signature Flight Support. The analysis herein has been modified to reflect Signature Flight Support as the operator; however, some information may have changed since the initial analysis.

Evaluation of Existing Fuel Storage Facility
The commercial aviation fueling facilities consist of a fuel farm owned and operated by Signature Flight Support, located on Aviation Road southwest of the terminal. Signature Flight Support performs commercial fueling operations at Blue Grass Airport ('LEX' or 'the Airport'). All commercial aircraft receive fuel at the Airport, and no carriers are known to transport fuel onboard from the airport of origin. Signature Flight Support also provides Avgas for two self-serve tanks owned by the Airport, which are located at separate general aviation areas. The fuel farm is meeting the current fuel uptake needs of the Airport. The tank, pipe, and equipment coatings are failing, and corrosion is visible. Currently, there are no provisions for the storage and issue of sustainable aviation fuels.

Signature Flight Support receives fuel daily, including three to five fuel truck deliveries of Jet-A per day. Each tanker truck provides 8,000 gallons ('gal') per delivery. During normal operations, approximately 24,000-gal are received per day. During equestrian events (i.e., Kentucky Derby, Breeders' Cup, equine auctions, and University of Kentucky events) and depending on academic schedules, daily deliveries may reach 40,000-gal. Fuel deliveries take place in the evening and overnight hours. Due to the lack of a nearby pipeline and the low overall demand, a pipeline connection is impractical. A pipeline connection generally requires regularly scheduled batch deliveries of 10,000 barrels (420,000-gal). There is a railroad a few miles north of the Airport, but there are no identified fuel terminals nearby. Deliveries by tanker trucks are necessary and shall only increase with growth and demand at the Airport.

There are six vertical tanks and three horizontal tanks located within the Signature Flight Support facility as identified in **Table A-1**. Current Jet–A storage capacity is 90,000-gal. The issue nozzle on each of the four 20,000-gal tanks is located at an elevation 48-inches above the tank bottom. This limits the usable tank volume by one-sixth, or 3,333–gal per tank. This reduces the overall usable Jet-A storage capacity to less than 78,000-gal considering all five Jet-A tanks. At peak seasons with deliveries of 40,000-gal per day, the fuel facility receives half its storage capacity daily and may not have adequate settle time in the tank rotation before issuing fuel. The Airlines for America, *Specification 103 - Standard for Jet Fuel Quality Control at Airports Manual*, recommends that fuel tanks settle one hour per foot of product height following a delivery prior to dispensing. The tank rotation schedule will place tanks in a fill, settle, and issue designation.

Current Avgas storage capacity is 10,000-gal.

Table A-1
Signature Flight Support Fuel Tanks

Tank	Product	Volume	Usable Volume	Orientation	In Service (Yes/No)
A30	Jet-A	10,000-gal	10,000-gal	Vertical	Yes
1A31	Jet-A	20,000-gal	16,666-gal	Vertical	Yes
2A31	Jet-A	20,000-gal	16,666-gal	Vertical	Yes

Tank	Product	Volume	Usable Volume	Orientation	In Service (Yes/No)
3A31	Jet-A	20,000-gal	16,666-gal	Vertical	Yes
4A31	Jet-A	20,000-gal	16,666-gal	Vertical	Yes
A32	Avgas	10,000-gal	10,000-gal	Vertical	Yes
A33	Diesel	800-gal	800-gal	Horizontal	Yes
A80	Waste Avgas	300-gal	300-gal	Horizontal	Yes
A81	Waste Jet-A	300-gal	300-gal	Horizontal	Yes

Source: Pond & Co., 2022.

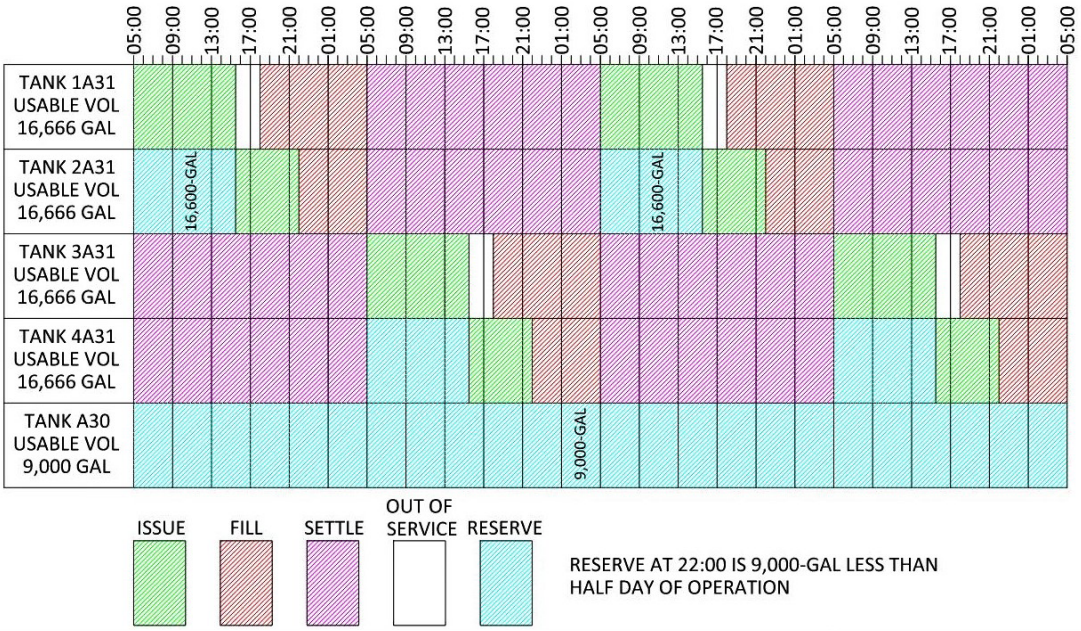
Tank rotation schedules have been prepared to illustrate the Signature Flight Support fuel facilities' ability to meet the Airport's current demands. Upon reviewing flight schedules, fueling operations typically occur between 5:00 am and 10:00 pm, issuing fuel over a 17-hour period. Fuel deliveries typically occur in the evening hours, starting around 5:00 pm and continuing through the overnight hours. With one position for refueler loading and truck offloading, deliveries would halt at 5:00 am for refueler loading, providing a 12-hour timeframe for receiving fuel.

Fuel is received from Louisville, KY and Catlettsburg, KY. Travel times for tanker trucks in each direction to either location are between two and two and a half hours. Tanker truck loading time at the terminals is typically 30 minutes, but it can be significantly longer, depending on the terminal's level of activity and the queue at the loading racks. Tanker truck offloading at the Signature Flight Support facility at the Airport is generally one hour. To fill one 20,000-gal fuel tank would require two to three tanker truck deliveries. A round trip for a single delivery tanker, beginning with offloading at 5:00 pm at Signature Flight Support, returning to the fuel terminal loading and traveling back to the Airport would take four hours. This would allow one dedicated tanker truck to make three deliveries overnight. The only time there would be a conflict with refueler loading is between 5:00 pm and 6:00 pm. Refer to **Figure A-1**. The reserve at 10:00 pm is 9,000-gal, which is less than one day's fuel requirement. This is achieved by issuing fuel from four 20,000-gal tanks.

During peak days when 40,000-gal is received and issued, four 20,000-gal tanks and one 10,000-gal tanks are utilized to meet the requirements. This scenario requires fuel deliveries from two dedicated tanker trucks. At 10:00 pm, the end of the operational day, there would be no fuel in reserve, and all tanks would be being filled or settling. See **Figure A-2**.

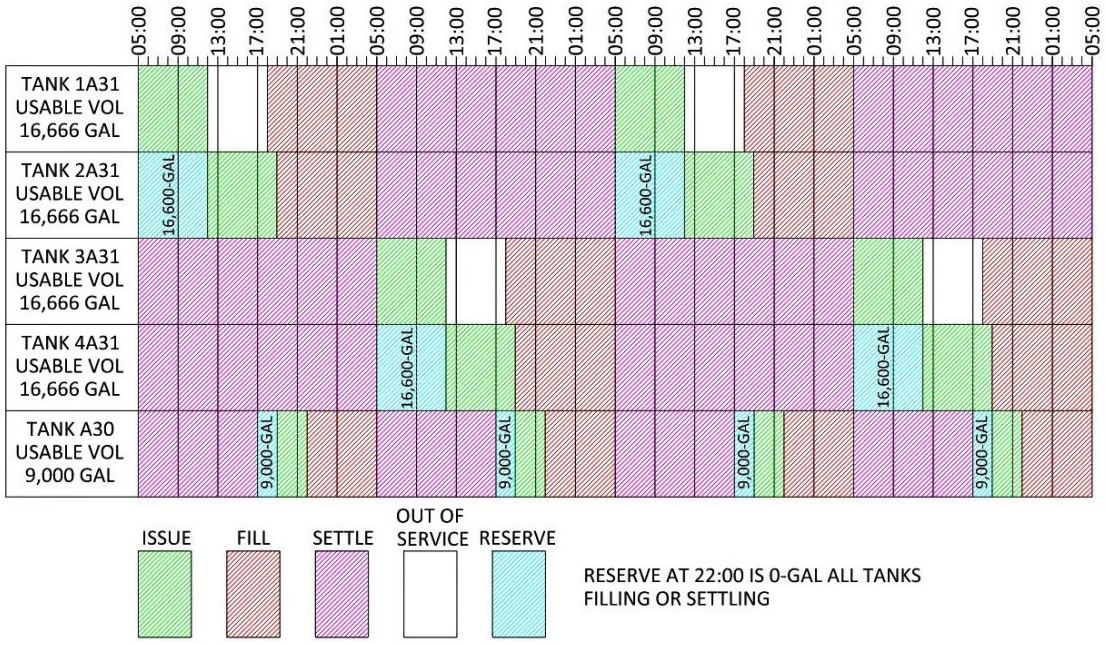
The existing fuel facility is unable to maintain a one-day reserve of Jet-A due to its limited tankage. Typically, airports of this size maintain between three and five days of reserve storage. In addition, the fueling operations area is limited due to pump and space capabilities.

Figure A-1
Signature Flight Support Facility 24,000-Gal Jet-A Per Day Five Tank Rotation



Source: Pond & Co., 2022.

Figure A-2
Signature Flight Support Facility 40,000-Gal Jet-A Per Day Five Tank Rotation



Source: Pond & Co., 2022.

All vertical tanks are single-wall, designed to UL 142 and NFPA 30. Tank spacing is slightly non-uniform with shell-to-shell dimensions ranging from 61 to 68 inches, but it is within the NFPA requirement of one-half tank diameter. All vertical tanks are equipped with the following appurtenances.

- 4-inch fill nozzle
  - 4-inch check valve
  - 4-inch butterfly valve
  - 4-inch fusible link valve
- 4-inch suction nozzle (48 inches above the tank bottom on Tanks 1A31-4A31)
  - 4-inch articulated floating suction
  - 3-inch butterfly valve
  - 4-inch fusible link valve
- 1-inch water draw
- Moorman gauge (inoperable)
- 24-inch roof manway
- 8-inch emergency vent mounted in manway
- 10-inch roof-mounted conservation vent
- 4-inch manual gauge hatch
- Automatic Tank Gauge (ATG) connection

All horizontal tanks at the Signature Flight Support facility are designed to UL 142 and NFPA 30. Tank A33, A80 and A81 are equipped with the following appurtenances.

- Bucket drain
- 1.5" fill and issue connection
- Tank vent
- Dial-type level gauge with manual gauge connection
- Tank-mounted dispensing pump with hose and nozzle (Tanks A80 & A81)
- Diesel loading connection and pump with hose and nozzle (Tank A33)

The tanks are situated within a concrete dike containment area measuring 55-feet by 45-feet by 3-feet high and have sufficient volume to contain a spill from the largest tank.

Figure A-3
Signature Flight Support Facility

Source: Pond & Co., 2022.

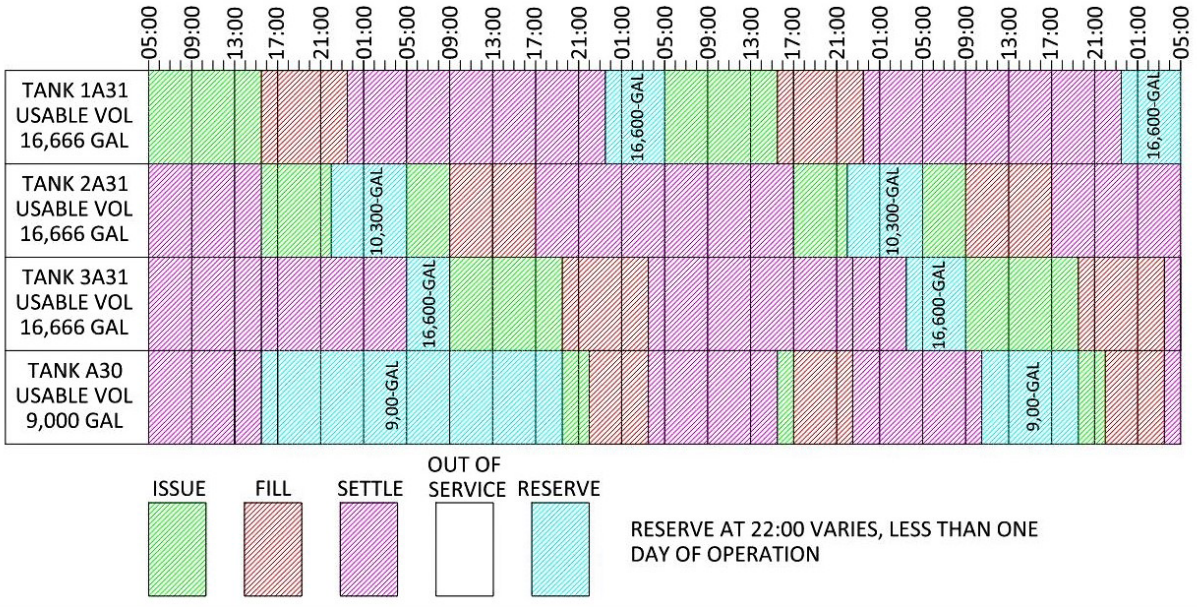
All tanks located at the Signature Flight Support facility exhibit failing coatings and visible corrosion. Except for diesel Tank A33, all tanks were last inspected on October 1, 2011. Inspections were performed to STI SP001 by Tetra Tech. All tanks currently appear to have the same issues indicated in the October 1, 2011 inspection reports. Listed deficiencies included failing coatings, visible corrosion, loose anchor bolts, and cracks in the containment dike. While cracks in the containment walls appear to have been addressed, corrosion and failing coatings have not been addressed.

The original tank gauging system is inoperable, and all vertical tanks have been retrofitted with new automatic tank gauging that is connected to a Veeder Root TLS-450 for tank monitoring. However, tank metering is inaccurate, and the fueling operations rely on the Scully Groundhog ground verification and high-level shut-off permissive signals.

All inspected tanks were given a 20-year interval, pending the next certified inspection. The assessments were performed over 10 years ago. The facility is due for re-inspection on October 1, 2031.

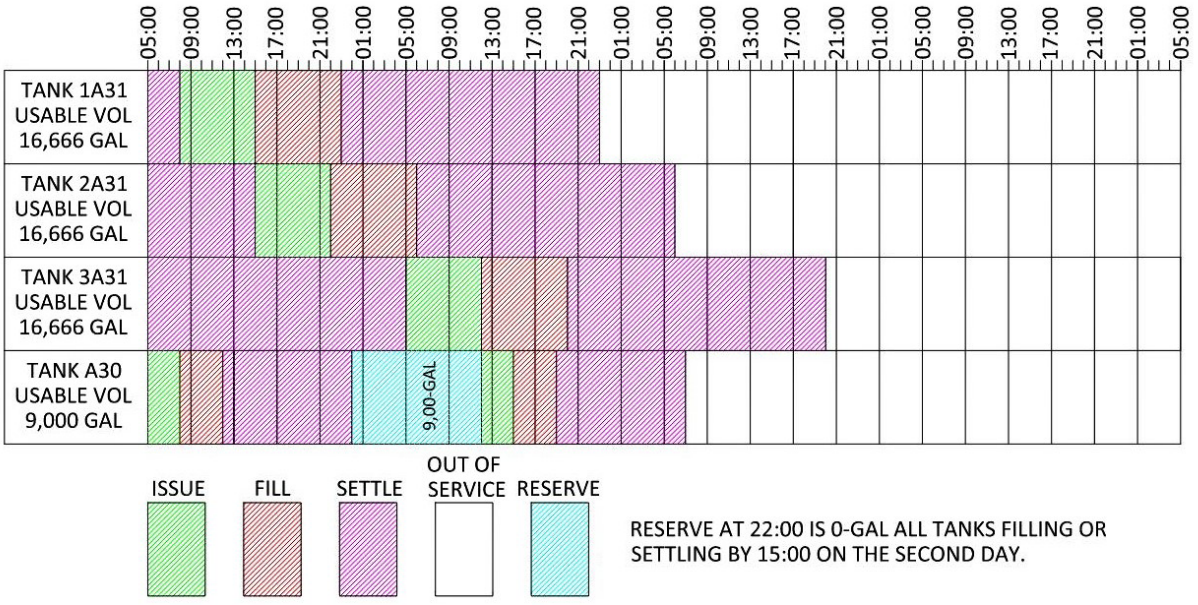
To complete the recommendations from the October 1, 2011, inspection reports, it will be necessary to remove each tank from service (one at a time) to undergo media blasting and recoating as needed. Media blasting will require encapsulation of the tanks to prevent blast and paint from contaminating or damaging the surroundings and to maintain required environmental conditions, temperature, and humidity during coating. This process would leave one tank out of service for a period of six to eight weeks, thus reducing the facilities' storage capacity to 62,000-gal. At a capacity of 62,000-gal, the Signature Flight Support fuel facility would barely be able to maintain a 24,000-gal per day tank rotation, and fuel deliveries would need to be scheduled as soon as a tank is empty. The facility would not be able to supply fuel for more than one day at 40,000-gal per day. Refer to **Figure A-4** and **Figure A-5**.

Figure A-4
Signature Flight Support Facility 24,000-Gal Jet-A Per Day Four Tank Rotation



Source: Pond & Co., 2022.

Figure A-5
Signature Flight Support Facility 40,000-Gal Jet-A Per Day Four Tank Rotation



Source: Pond & Co., 2022.

As tanks are taken out of service for coating repairs, it is advisable to perform internal inspections to assess the internal conditions, including the tank bottom plate thickness. The finding of internal inspections may require more extensive repairs. Should the findings of the internal inspections require additional repairs, the facility may have one tank out of service for a period of nearly 12 weeks. These time estimates are also best-case time estimates. Factors such as supply chain issues, workforce availability, and weather-related delays are additional factors that may prolong the refurbishment of existing tanks.

The existing 10,000 vertical Avgas tank also needs recoating. Taking this tank out of service will require tanker truck deliveries directly to the airfield dispensing tanks.

Figure A-6
Tank Typical Failed Coating and Corrosion

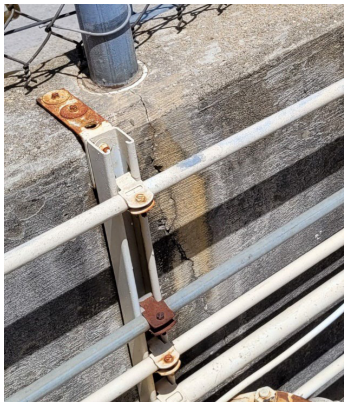
Source: Pond & Co., 2022.

Figure A-7
Tank Typical Corroded Data Plate

Source: Pond & Co., 2022.

The condition of the existing Avgas and Jet-A loading/offloading systems is similar to that of the tanks. The coatings are failing, and corrosion is visible. Basket strainers are located near the containment floor in a horizontal orientation, which does not allow complete draining through the bottom drain when servicing the strainer, increasing the likelihood of minor spills.

Figure A-8
Typical Loose Tank Anchor Bolt



Source: Pond & Co., 2022.

Figure A-9
Tank Concrete Dike Wall Cracking

Source: Pond & Co., 2022.

The existing Avgas and Jet-A loading/offloading systems include:

- Two Jet-A loading and offloading assemblies, each consisting of:
  - One 15 HP/150 gpm Blackmer positive displacement pump
  - One 270 gpm Facet filter separator with 4-inch check valve and 4-inch control valve
  - One 4-inch basket strainer
  - Necessary valving
  - One 4-inch analog meter with 4-inch control valve
- One Avgas loading and offloading assembly consisting of:
  - One 15 HP/150 gpm Blackmer positive displacement pump
  - One Avgas filter
  - One 4-inch basket strainer
  - Necessary valving
  - One 4-inch analog meter with 4-inch control valve

Figure A-10
Jet-A Loading and Offloading System

Source: Pond & Co., 2022.

Figure A-11
Avgas Loading and Offloading System

Source: Pond & Co., 2022.

Figure A-12
Tank Facility Piping

Source: Pond & Co., 2022.

In general, the Signature Flight Support fuel storage facility equipment and piping are in poor condition and near the end of their useful life. Coatings are failing and corrosion is prevalent. It was noted that some meters are not accurate and are not used for inventory purposes. Two new filter separator units are in good condition. The valves, flanges, nuts, bolts, and studs throughout the facility exhibit corrosion. In addition, the electrical components of the system show deterioration and may present unsatisfactory protection against the hazardous classification.

The diked area is equipped with a catch basin and a normally closed isolation valve leading to an oil/water separator. Based on dialogue with the facility operator, the oil/water separator is functioning properly; however, this could not be verified. There is one catch basin tied to an oil/water separator piping for loading and offloading operations of refuelers and tanker trucks, with no apparent spill containment curbing or rollover.

The pump control cabinet is currently non-operational. The offload and fillstand operations are performed utilizing the Scully Groundhog overfill protection. Overall, the conduit condition presents extended corrosion and inadequate seal-off for hazardous classification.

The Airport maintains two skid-mounted Avgas tanks (A79 and A83) located in separate general aviation areas, including the East area and the West area. Both tanks are double-wall UL 142 packaged units equipped with cabinets that include a filter, meter, hose reel, grounding reel, fill connection with spill box, control valves, and valves arranged to facilitate issue operations. Both Avgas tanks are equipped with self-serve kiosks.

Both Tank A79 and A83 are in good condition, with all equipment in good working order. Tank coating is intact with some discoloration from corrosion on manway bolts and other tank connections.

Table A-2
Self-Serve Avgas Tanks

Tank	Product	Volume	Orientation	In Service (Yes/No)	Location
A79	Avgas	2,000-gal	Horizontal	Yes	East General Aviation
A83	Avgas	3,000-gal	Horizontal	Yes	West General Aviation

Source: Pond & Co., 2022.

Figure A-13
Dike Area Drain Valve

Source: Pond & Co., 2022.

Figure A-14
Pump Control Cabinet

Source: Pond & Co., 2022.

- Tank-mounted appurtenances include:
  - Tank-mounted pump
  - 2-inch atmospheric vent
  - 2-inch manual gauge hatch
  - 2-inch dial gauge with level alarm
  - 6-inch interstitial emergency vent
  - 24-inch manway
  - 8-inch emergency vent
  - 4-inch fill connection to 2-inch fill line
  - 2-inch thermal relief return with 1-in return line
  - 2-in interstitial level gauge
  - 2-inch sump with 1.5-inch line to manual pump

Figure A-15
Tank A79

Source: Pond & Co., 2022.

Figure A-16
Tank A83

Source: Pond & Co., 2022.

Aside from the Signature Flight Support facilities, the Airport owns an abandoned fuel facility located immediately north of the Signature Flight Support facility. The facility consists of a 20,000-gal Jet-A system, 15,000-gal packaged Avgas system and a small 200-gal diesel fuel tank. These may be sold for metal recycling or purchased for reuse by others. If the Airport desires to put these tanks back in service, the tanks will require inspection, STI SP001, before determining suitability for service. All other components (i.e., electrical and mechanical) will require testing, refurbishment, or replacement if necessary.

Table A-3
Abandoned Fuel Tanks

Tank	Product	Volume	Orientation	In Service (Yes/No)
A75	Avgas	15,000-gal	Horizontal	No
A76	Jet-A	20,000-gal	Horizontal	No
A76A	Diesel	200-gal	Horizontal	No

Source: Pond & Co., 2022.

Figure A-17
Abandoned Fuel Facility

Source: Pond & Co., 2022.

- Tank A75 15,000–gal Avgas self-contained system
  - 200 gpm Fuel Receipt and Issue system
  - 200 gpm self-priming pump
  - 200 gpm filter with differential pressure gauge, thermal relief valve, and air vent
  - Grounding real
  - Piping and valving for pump receipt and issue capability
  - Refueler loading hose with tray

- 15,000-gal double wall UL 142 tank
  - 3-inch overfill prevention valve
  - Anti-siphon solenoid
  - Level alarm
  - Internal floating suction
  - Level gauge (dial type)
  - Hand-operated sump pump
  - 8-inch interstitial emergency vent
  - 8-inch emergency vent (manway mounted)
  - 24-inch manway
  - 3-inch vent
  - 2-inch manual gauge hatch
  - 2-inch tank level monitoring
  - 1-inch sump connection
  - 1-inch Interstitial monitoring
- Tank A76A 200-gal self-contained diesel fuel
  - 2-inch vent
  - 2-inch fill bung
  - Tank mounted dispensing pump with meter, hose, and nozzle
- Tank A76 20,000 Jet-A Tank with packaged fuel system
  - 200 gpm Fuel Receipt and Issue system
  - 250 gpm self-priming pump
  - 250 gpm filter separator with differential pressure gauge, thermal relief valve, and air vent
  - Product recovery tank
  - Grounding real
  - Fill connection spill box
  - Piping and valving for pump receipt and issue capability
  - Refueler loading hose with tray
  - 20,000-gal double wall UL 142 tank
    - 3-inch overfill prevention valve
    - Anti-siphon solenoid
    - Level alarm
    - Internal floating suction
    - Level gauge (dial type)
    - Hand operated sump pump
    - 8-inch interstitial emergency vent
    - 8-inch emergency vent (manway mounted)
    - 24-inch manway
    - 3-inch vent
    - 2-inch manual gauge hatch
    - 2-inch tank level monitoring
    - 1-inch sump connection
    - Interstitial monitoring

Supply Chain Investigation

Current fuel deliveries are made by USHER Fuel Transport in Louisville, KY, and Martin Fuel Transport located in Catlettsburg, KY. The main source of fuel is from terminals owned by Marathon Petroleum located in both Louisville and Catlettsburg. Marathon also owns and operates a refinery in Catlettsburg.

The Louisville terminal is approximately 80 miles due west of the Airport and is connected by Interstate I-65, which is a very reliable roadway and is rarely impacted by winter storms.

The Catlettsburg terminal is approximately 120 miles due east of the Airport and is also connected via Interstate I-65 and provides year-round travel between.

Travel times for tanker trucks in each direction to either location are between two and two and a half hours. Disruption in fuel deliveries is rare due to the proximity of the surrounding terminals. Tanker truck loading time at the terminals is typically 30 minutes, but it can be significantly longer, depending on the terminal's level of activity and the queue at the loading racks.

The limiting factor for receiving fuel at the current fuel facility is the number of truck offloading positions (two) and the pump offloading rate of 150 gpm. Tanker truck offloading at the Signature Flight Support LEX facility is generally one hour.

In general, the fuel supply chain is reliable and does not impose additional requirements to increase the needed days of reserve fuel at the Airport.

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