U.S. ARMY

DEVCOM GROUND VEHICLE SYSTEMS CENTER

U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND
GROUND VEHICLE SYSTEMS CENTER

ARMY FUELS UPDATE

24 APRIL 2024

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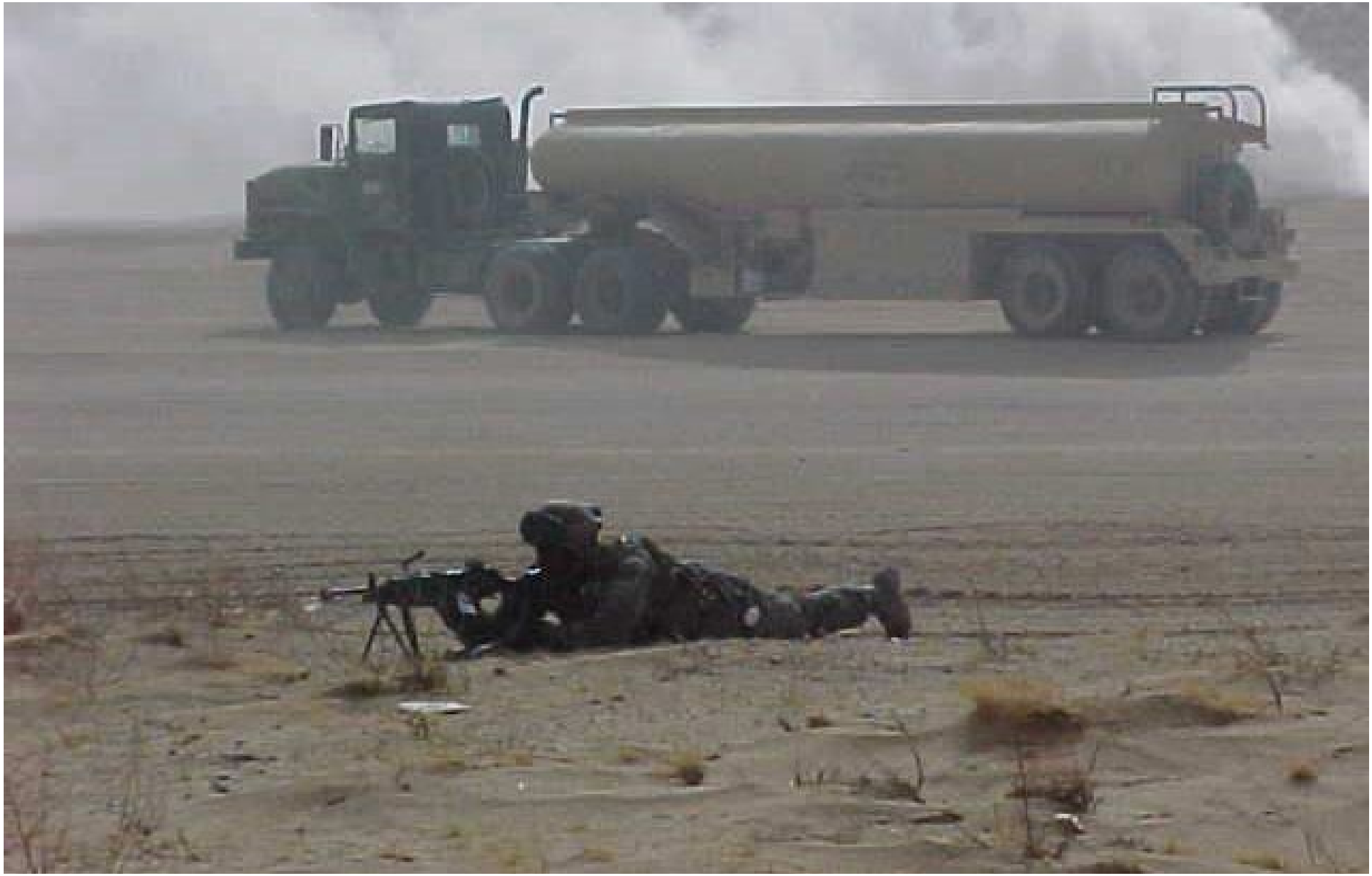
AGENDA

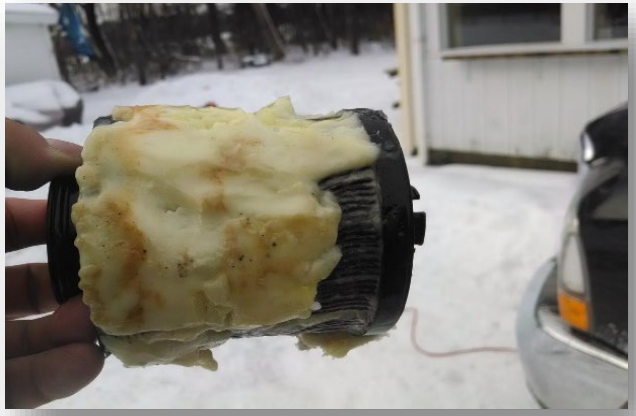
- Army Fuel Policy
- History & Background of Fuels
- Diesel Fuels
- Renewable Fuels

FUEL IS LETHALITY



HISTORY OF ARMY FUEL:
FROM A GROUND PERSPECTIVE

- **Prior to 1960s – Army operated on gasoline**



- **1960s – 1980s → Diesel Fuel (F-54)**
  - Major Problem: Waxing @ low temps
- **1981–1988 → M1 Fuel Mix AKA NATO F-65**
  - Started in Germany in 1981
  - Blended F-54 Diesel with kerosene aviation fuel (JP-5 or JP-8)
- **1988 → Implemented Single Predominate Fuel, JP-8**
  - Field test at Fort Bliss from October 1988 through July 1991
- **2013 to present → Conversion to F-24 in CONUS**
  - Official notification via ALARACT 113/2013 (30 April 2013)
  - Complete conversion in December 2014

ARMY FUEL POLICIES

- **Title 10 U.S.C.§125 - Section 125:**
  - Functions, powers, and duties: transfer, reassignment, consolidation, or abolition **gives the Secretary of the Defense the authority to assign functions to certain branches**, agencies or individuals under his control more or less.

- **DODI 4140.25 - DoD Management of Bulk Petroleum Products, Natural Gas, and Coal**
  - DoDI 4140.25, Enclosure 2 (25 Jun 15) states: 9. SECRETARY OF THE ARMY….. the Secretary of the Army provides the materiel, personnel, and management required to conduct **overland petroleum distribution from the high water mark, including inland waterways.**

- **Army Regulation 70-12 – Fuels & Lubricants**
  - Primary Fuels: JP-8 and F-24
  - ASA (ALT): approve the introduction and use of new and non-standard fuels, lubricants, and associated products.
  - Materiel Developers: Design new materiel to comply with the use of the JP-8/F-24 and standard lubricants and associated products.
  - Waivers must be submitted for fuels other than JP-8 or F-24 to APC

ARMY'S UNIQUE USE OF JP-8 AND F-24

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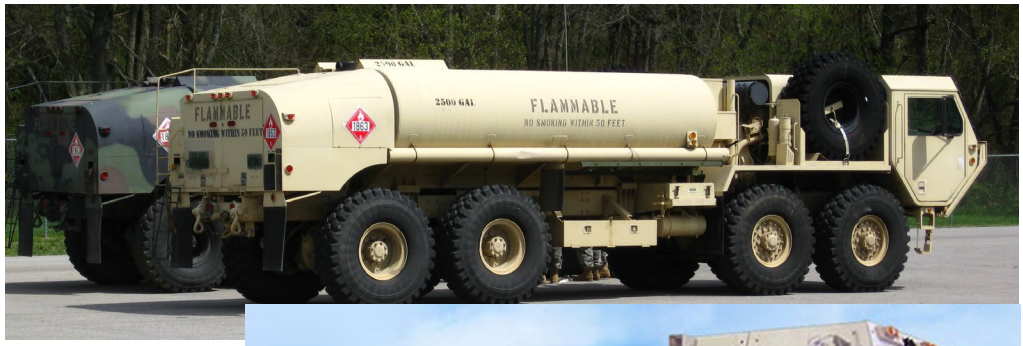
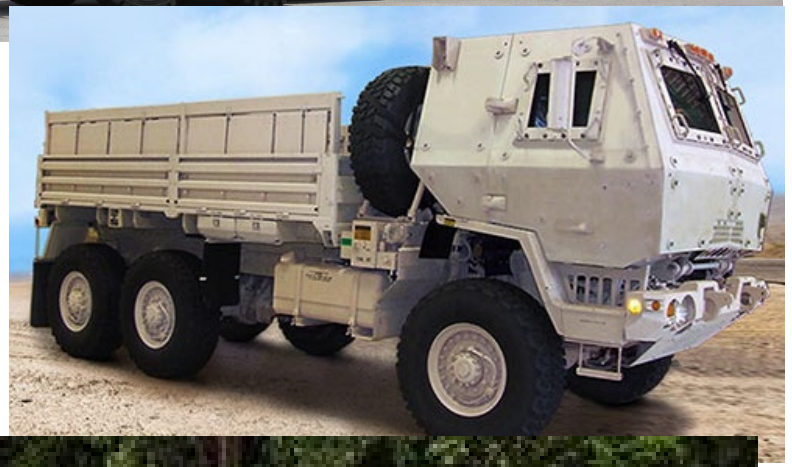
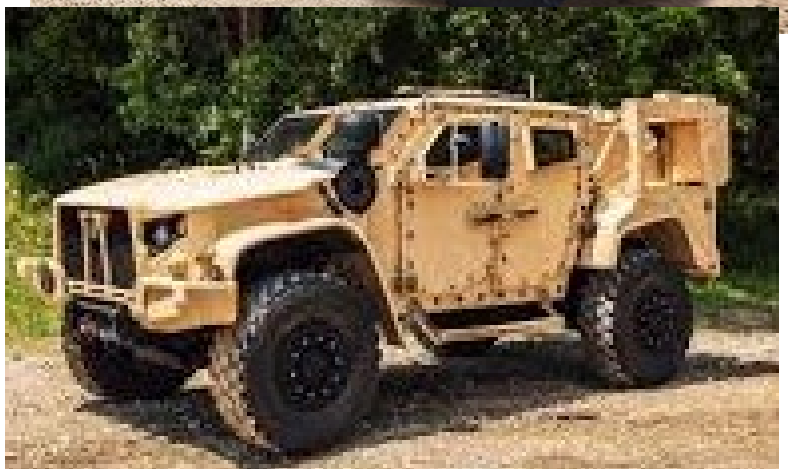
Accepted Initial Risks:
- 2-4% increase in fuel consumption
- Lubricity
- Cetane
- OEMs had limited experience



Recent Risks:
- Availability & cost of export engines



Benefits:
- Fuel specifications harmonized worldwide
- All temperature fuel
- Reduced potential for microbial contamination
- Reduced potential for fuel system corrosion
- Simplified logistics
  - Reduced infrastructure and distribution equipment
  - Increased storage capability
  - Increased flexibility for refueling
  - No segregation of products
  - Eliminated need to clean distribution equipment



DOD USE OF COMMERCIAL FUELS

- **Diesel fuel: ASTM D975, EN 590, or any country specific diesel fuel**

- **Aviation fuel:**
  - F-24 = ASTM D1655 + military additives
  - JP-8 (F-34) = MIL-DTL-83133, DEF STAN 91-091

- **DOD has moved to commercial fuels**
  - Except JP-5 & F-76
  - Aviation fuels must still be additized to meet military requirements

- **Logistically easier & cheaper to pull product off the pipeline**
  - Led to cancellation of military specifications for MOGAS, DIESEL

- **DOD has limited control over specifications**

- **Commercial fuels are intended for near-term use; military stores & consumes fuels at a slower rate**

- **DOD does not align with commercial practices for particulate contamination and filtration for diesel engines and fuel injection systems**

CHALLENGES WITH COMMERCIAL DIESEL FUEL

- **Worldwide Diesel Fuel Specifications**
  - US commercial engines are optimized for local diesel fuel
  - Not harmonized across the world
  - Spec updates driven by changes in emission standards & engine advances
  - Differences in allowed biodiesel content

- **Availability**
  - ULSD not available all over the world; sulfur content varies by country

- **Low Temperature Operability**
  - Diesel fuel is seasonal & regional
  - Ambient temperatures would have to be monitored to prevent gelling

- **Storage & Handling**
  - Addition & segregation for diesel supply chain

- **Implications to Army Force Structure & Installation Infrastructure**

RECENT ISSUES WITH DIESEL FUEL

- USAF banned the use of the B20 blends at ALL of their installations due to extensive microbial contamination

- M915 Line Haul Trucks in Bay City, MI experiencing corrosion of fuel tanks. Fielded with B20 fuel and then topped off with diesel fuel over the years. Samples sent to USAF confirmed presence of microbial contamination.

- PdM CE/MHE procurement of 10 COTS John Deere HYEX 250 for training assets that will require ULSD and DEF.

- Bradley & PIM experiencing issues with Cummins V903 – BAE using diesel fuel, but no records housekeeping

- Army Reserve unit in Maine experiencing gelling due to diesel fuel usage in the wrong season

- Unit from Fort Bliss took trucks to Alaska with Diesel Fuel – resulting in fuel gelling

RENEWABLE FUELS

Sustainable Aviation Fuels

- Drop-in SAF blends
- 100% SAF

The final blends conform to the conventional jet fuel specification approved for commercial use by airlines and aircraft engine OEMs

Renewable Diesel Fuel

- No commercial approval process
- HEFA widely approved by OEMS

Fuels produced may meet commercial fuel specifications but have not been approved by OEMs.

Deployable Synthetic Fuel Production

- DOD specific applications
- Require testing, demonstration, and approval

Fuels produced may or may not conform to conventional specifications or commercially approved pathways.

ARMY'S RISK CATEGORIES FOR RENEWABLE FUELS

Lubrication / Tribology

- Lubricity
  - Response to CI/LI
- Viscosity @ 40°C

Combustion Properties

Cetane/Ignition Delay

Cold Startability (low cetane fuels)

Primary Properties

Volatility

Atomization

Surface tension

Bulk modulus (injection delay in low pressure systems)

Composition

Viscosity (internal leakage/injector fuel return flow)

Injector Deposits

WHY DOES DOD NEED THEIR OWN PROCESS?

TRIPOL: Recognized source for harmonized technical guidance, advocacy and development of tactical fuels, associated products, and technologies across the Services**.**

- **Currently over 75% of US Military aviation fuel & 100% of military diesel fuel is procured from commercial specifications**
- **Military utilizes aviation fuel for non-aviation applications to simplify logistics**
- **Renewable diesel approvals are not standardized and approved at the OEM level**
- Services, not FAA, own Type Certificates for most of DoD Aircraft
- ASTM SAF approvals do not automatically transfer to Military platforms
  - Unique equipment, environments and missions
- Imperative to maintain 24/7/365 worldwide interoperability with other Services and Allies
- **Each Service has a different technical authority approval process; the technical information is coordinated through TRIPOL**
- Pipelines are a fungible system – cannot prevent getting a Renewable Fuel, but TRIPOL can mitigate risks

THANK YOU.

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