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SURVEY OF CURRENT US ARMY POL DOCTRINE, PROCEDURES, PERSONNEL, AND EQUIPMENT FOR THE SUPPLY AND INLAND DISTRIBUTION OF BULK POL

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The Army is responsible for inland distribution of bulk POL to all services. The Army's forecasted requirements for POL have increased significantly. Under Air-Land Battle and Army 21 concepts, POL requirements will increase further. Eighty to ninety percent of POL units assigned responsibility for POL supply are in the Reserve and/or National Guard structure. Most of these units are undermanned, under trained, and have critical shortages in POL vehicles and equipment. This study identified 19 specific problem areas and suggests corrective action to resolve some of the more critical problems.
The second half of the report focuses on POL supply in the forward area of the battlefield. It provides a simplified methodology for computing and/or estimating fuel requirements based on the percentage of cross-country versus secondary road travel a tank battalion may experience in a particular operation. Potential areas for future US Army Human Engineering Laboratory effort are also identified.
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The Army is continuing to focus its efforts on the modernization of combat and combat support equipment. Modernization of the logistics system is now receiving much higher priority and for the first time, logistics research and development programs are being established. Although the Army 21 logistical requirements have not yet been fully defined, based on today's projections, the demand for ammunition and POL resupply can be expected to grow. The fielding of new weapons like the M1 tank, the Bradley Fighting Vehicles (BFVs) and the Multiple Launch Rocket System (MLRS), all with increased rates of fire over their predecessors, have significantly increased the requirement for ammunition. Similarly, the introduction of large numbers of these and other new and greater fuel consuming vehicles and equipment, when coupled with greater mobility requirements of the expanded battlefield, significantly increases the demand for POL.

The US Army Human Engineering Laboratory, in concert with the US Army Missile and Munitions Center and School, has been studying the ammunition resupply problem for several years. This study effort is now beginning to pay dividends with the establishment of new ammunition resupply concepts which envision the automated handling of ammunition through the use of robots for unloading, sorting, repackaging and uploading of ammunition. A similar effort aimed at increasing the productivity of current POL units is now required.

The combination of existing combat, combat support and combat service support vehicles use a wide variety of commercial and military engines. There is no stringent fuel economy requirement in the procurement of these engines. The Combat Service Support Mission Area Analysis (CSS-MAA) and other recent POL studies question the capability of the current organization and equipment for POL distribution to meet this increased POL demand.

Two methods have been postulated for solving the problems, neither of which are fully acceptable to the user. One would be to increase the support structure by adding personnel and equipment. With the high demand for personnel to meet the many new requirements of the fighting elements of the force structure, it is highly unlikely that additional personnel can be made available to man the additional equipment needed to provide the increased quantities of POL. A second alternative would be to reduce the requirement through the application of technology to improve the efficiency of the engines. Although technology can reduce the rate of growth, it cannot reduce the absolute growth brought about by the increased numbers of vehicles entering the system, and the increased demands on these vehicles in terms of increased mobility required by the Army 21 battlefield concepts.
Within the current research and development program, there is an apparent absence of emphasis on POL consumption rates as compared to range, mobility and overall performance.

BACKGROUND

The Army is responsible for the inland distribution of bulk POL to all services in both a developed and undeveloped theater of operations. The Army's forecasted requirements for inland distribution of POL have increased significantly. With the introduction of new, greater fuel consuming vehicles and equipment, and in greater numbers, this trend can be expected to continue. Under the Army 21 Airland Battle Concept, POL logistics can also be expected to increase because of the greater mobility of forces.

The US Army Army Science Board, Summer 1984 POL Study Group, concluded in its final report that: "If the current trend continues, the vehicle fleet is projected to grow from 240,000 to 340,000 (42%) and annual fuel consumption from 115 million gallons to 283 million (146%)."

In view of the above, the US Army Human Engineering Laboratory tasked Armament Systems, Inc. (ASI) to perform a Human Factors Engineering survey of POL support personnel, organization, doctrine, procedures and equipment in order to provide a current POL distribution capabilities baseline.

OBJECTIVE

The objective of this initial report is to present the results of an HFE survey of POL support personnel, organizations, doctrine, procedures and equipment, and to document a current capabilities baseline. This report also identifies some of the doctrinal/procedural and/or equipment shortfalls and problems which adversely impact the inland POL supply and distribution functions.

(NOTE: The US Army is responsible for the inland distribution of all POL. This includes delivery to meet all US Army and US Air Force (USAF) requirements. However, in this study, the focus has been limited to the consumption of POL by US Army units. It is currently estimated that the USAF consumes 65% of the inland POL, this figure will not change significantly in the next 10-15 years. Therefore, the reader should keep in mind that the problems discussed in the subsequent pages of this report address only those problems associated with the
Army's POL requirements, and represent only about 35% of the total POL inland distribution problem. Addressing the USAF consumption, both current and projected, is beyond the scope of this effort.)

METHODOLOGY

The initial step was to perform a literature search of Training Manuals (TMs), Field Manuals (FMs), Tables of Organization and Equipment (TO&Es) and related documents concerned with the distribution of POL.

The second step was to extend our knowledge and understanding of the POL inland distribution system through the review of selected Transportation and Quartermaster Schools' Programs of Instruction (POI's) and doctrinal and procedural studies and directives concerned with the in-theater distribution and handling of POL at the retail level, supplemented by discussions with the Schools' instructors and combat developments doctrinal personnel and selected personnel assigned to TO&E POL units. The literature search and discussions served as the basis for the documentation of the current POL baseline capabilities and the identification of problem areas.

DISCUSSION

Current Organizations, Missions and Functions

General

Figure 1 is a schematic of the current distribution and supply system for Class III (POL) for a developed theater of operations. POL comes in to the theater from ocean tankers. If permanent piers are available, they are used. The more likely requirement is to transfer the POL over-the-shore using either floating hoselines or, in a more stable environment, sunken or submerged pipelines connected to an onshore POL base terminal. Typically, an existing in-country POL distribution system is normally operating in support of the peacetime civilian economy and military forces. POL doctrine indicates that whenever possible, active duty US Army personnel should be trained to operate these existing distribution systems. However, in time of war, these existing facilities are often partially or completely destroyed and it becomes necessary to modify or renovate the old facilities, and add new or additional facilities to meet the POL requirements.
Figure 1. Bulk Petroleum Distribution System in Developed Theaters.
From the base terminal, the POL is moved forward by barges, rail cars, eight inch and six inch tactical pipelines, flexible hoses, and long-haul highway tank trucks. Resupply in the forward areas is accomplished using tactical tank trucks and flexible hoselines. High priority POL requirements are met by aerial delivery (external and internal stores via helicopter) or "wet wing" using fixed wing transport aircraft.

Figure 2 is a schematic of a bulk petroleum distribution system in undeveloped theaters. The primary differences are the lack of permanent type port facilities, permanent pipelines, and a network of existing improved highways and railroads. The Army must construct hoselines and pipelines in greater numbers and a large number of high volume collapsible storage tanks are required to store the POL due to the absence of permanent storage facilities.

Figure 2. Bulk Petroleum Distribution System in Undeveloped Theaters.
POL Organizations

Developed Theater

Figure 3 is the Petroleum organization for a developed theater of operations.

Theater Petroleum Item Manager

There is a Theater Petroleum Item Manager who controls both bulk and packaged petroleum products and is responsible for all POL operations, including long range petroleum requirements for the theater.

Petroleum Group

The Petroleum Group is the principal organization for carrying out the bulk fuels distribution mission in the Communications Zone (COMMZ) and is assigned directly to the Theater Army. The Petroleum Group and its subordinate units operate the bulk fuel distribution system extending from ports of entry through the COMMZ and as far into the combat zone as practicable. The Petroleum Division of the Materiel Management Center (MMC), Theater Army Area Command (TACCOM) is responsible for receiving requirements for POL supplies and directing provision of wholesale supplies through the Petroleum Supply Battalions to the Supply and Service Companies. The Petroleum Division of the TACCOM MMC also coordinates with the Theater Army MMC for bulk petroleum resupply to the petroleum supply battalion in its area.
Figure 3. Petroleum Organization in a Developed Theater of Operations.
Appendix A contains the detailed statement of mission and capabilities for each of the units assigned POL functions within a theater. The POL storage capacities, line haul capabilities and major items of equipment are also included for each type unit. For those units that support other classes of supplies as well as POL, each class of support is identified together with the major items of equipment used for transport.

Undeveloped Theater

Figure 4 is a type corps organization for petroleum operations in an undeveloped theater.

Figure 4. Type Corps Organization for Petroleum Operations in an Undeveloped Theater.
Corps Area POL Operations

Although the petroleum group in the undeveloped theater is at the corps level, it has the same functions as the petroleum group at the theater level, in the developed theater.

Division Area POL Operations

At the division level, the missions and functions of the Petroleum Pipeline and Terminal Operations Battalions and Companies, and Petroleum Supply Battalions and Companies are the same for the undeveloped theater as in the developed theater.

Current TO&E Prescribed Capabilities

Table 1 is a summary of prescribed mission POL storage and handling capabilities for POL units within the force structure up through the Direct Support (DS) units. It does not include the Division Supply and Transportation Units operating in the forward division areas.

**TABLE 1.**

**TO&E POL Units - Prescribed Capabilities**

<table>
<thead>
<tr>
<th>Type Unit</th>
<th>POL Storage Capacity</th>
<th>Daily Local Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum Pipeline and Terminal Operating Co</td>
<td>5.50 Mil Gal</td>
<td>52,000 Gal</td>
</tr>
<tr>
<td>Petroleum Supply Co¹/</td>
<td>1.48 Mil Gal</td>
<td>685,000 Gal</td>
</tr>
<tr>
<td>Supply &amp; Svc Co (Non-Div, DS)</td>
<td>.10 Mil Gal</td>
<td>81,000 Gal</td>
</tr>
<tr>
<td>Trans Med Tk Co (POL)</td>
<td>--</td>
<td>900,000 Gal²/</td>
</tr>
</tbody>
</table>

¹/ With Logistics Unit Productivity Study (LUPS), personnel and equipment augmentation storage capacity increases to 2.52 mil gal and receipts and issues increase to 1.24 mil gal.

²/ Operating two shifts--local haul. Line haul is 450,000 gal/day.
Table 2 is a summary of the total POL units by type in the current force structure, stratified by Active Army, Reserve and National Guard. The Petroleum Pipeline & Terminal Operating Battalions and Companies, as well as the petroleum supply battalions, supporting supply companies and medium truck companies are aligned under the two groups. The mobile laboratories are generally assigned on a theater or corps basis. The reserve petroleum groups have active duty as well as reserve POL battalions and companies and medium truck companies are aligned under the two groups. A detailed listing of these units, including their current locations, is contained in Appendix B. As can be seen, 81% of the total POL units are either Reserve or National Guard. The Department of the Army, Deputy Chief of Staff for Logistics (DA, DCSLOG), has stated that the Reserve and National Guard Units are being relied upon to provide 80% to 90% of the POL supply capability for all future conflicts.

**TABLE 2.**

**POL Units in Current Force Structure**

<table>
<thead>
<tr>
<th>Type POL Unit</th>
<th>Active Army</th>
<th>Reserve Units</th>
<th>National Guard</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum Group</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Petroleum Pipeline and Term Oper Bn</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Petroleum Pipeline and Term Oper Co</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Petroleum Supply Battalion</td>
<td>1</td>
<td>6</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Petroleum Supply Company</td>
<td>4</td>
<td>18</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Petroleum Mobile Laboratory</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Petroleum Medium Truck Company</td>
<td>6</td>
<td>14</td>
<td>9</td>
<td>29</td>
</tr>
</tbody>
</table>

**Current Capabilities - Actual**

As shown earlier in Table 1, a Petroleum Supply Company is able to store 1.48 million gallons of bulk POL and to receive and issue a maximum of 685,000 gallons per day. Theoretically, if one were to multiply the number of POL supply companies in the
force structure by the quantity of receive and issue gallons per
day, and do the same thing with the other POL resupply units, a
total POL delivery capability could be estimated. It is
recognized, however, that the actual performance capability can,
and often does, vary significantly below the calculated capability
depending on the condition of the units' operating equipment, the
degree of training and experience of unit personnel, and the
actual operating conditions or environment within a given tactical
area of operations.

The Army Training and Evaluation Programs (ARTEPs) are held
periodically to test the actual performance capabilities of a unit
and to identify areas where a unit's performance is deficient. A
review of ARTEP manual 10-227 and related ARTEP manuals for POL
units, revealed that although applicable missions and related
tasks are listed, and required times are indicated for the
performance of various administrative tasks, there are no
standards of performance requirements listed for the basic
operating mission of receipt and issue of bulk and packaged POL. A
review of studies and reports associated with POL operations,
discussions with training personnel, including school instructors,
and with TO&E unit officers, revealed that very few ARTEPs or
training exercises are being held which actually test the basic
capabilities of a POL supply unit to perform under operational or
near operational conditions.

Adequacy of Unit Training

Most of the POL units are in the Army's reserve forces
and participate in weekend drills. However, they participate in
meaningful field exercises on an average of only once in three
years.

Adequacy of Formal School (MOS) Training

The Transportation School and Quartermaster School were
called and asked to provide their latest Programs of Instruction
(POIs) on all of their POL handling and transport MOS courses.
These were reviewed in detail to determine the scope of
instruction for the handling and transport of POL. The TC school
courses pertain primarily to the operation of POL vehicles (MOS
64C30). The POIs were dated October 1983. As such, the training
does not include the newer items such as the 2500 gallon Heavy,
Expanded Mobility Tactical Truck (HEMTT) POL transporter.
Otherwise, the POIs appear to be adequate for training of motor
transport operators of POL vehicles and ancillary POL equipment.

POIs from the US Army Quartermaster School for Petroleum
Supply Specialist MOS 76W10 and 76W30 dated 31 December 1984 were
also reviewed. The technical phase of the 76W30 course represented
a reduction of 62 hours from the earlier POI which had been
superseded. A review of the equipment list for this course
revealed the same shortfall as the TC course, i.e., the latest equipment which is currently in the process of being fielded such as the 2500 gallon HEMTT POL transporter was not included.

With the exception of training on the latest makes and models of POL equipment, the MOS or "how to" aspects such as "How to process and distribute POL products", "How to lay out and test petroleum pipelines/hoselines", "How to gauge and sample POL storage tanks", etc., are very well covered. As indicated earlier in the report however, little evidence was found of realistic unit training on operating the basic POL system. No evidence was found to indicate that the total system interfaces between the various POL units, i.e., Petroleum Pipeline and Terminal Operating Units, Petroleum Supply Units, Petroleum Medium Truck Units, etc., have ever been exercised.

**Lack of Systems Approach**

Although the Army has instituted an "Army Energy R&D Plan" and specific programs are in effect in the Army Materiel Command (AMC) aimed at reducing POL usage, there is little evidence of an integrated systems approach to the solution of POL problems. The Army continues to focus on weapon system development without commensurate consideration for the system's logistics requirement.

**Fuel Consumption Rates**

Table 3 provides an example of the increased fuel consumption rates of recently fielded tracked vehicles in comparison with the earlier models they will replace. As can be seen, the M1 tank requires 53% more fuel than the older M60 for idling, and the M2 and M3 vehicles require 17% more fuel than its predecessor, the M113 when operating 50% cross country and 50% secondary roads.
# Table 3.

## POL Consumption Rates - Tracked Vehicles*

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Fuel Capacity</th>
<th>X-Country</th>
<th>Secondary Roads</th>
<th>Idle (GAL/HR)</th>
<th>Expected Consumption Rate (GAL/MI)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>502</td>
<td>56.6 gal/hr @ 17 MPH (3.33 GPM)</td>
<td>43.8 gal/hr @ 25 MPH (1.75 GPM)</td>
<td>11.2</td>
<td>2.54</td>
</tr>
<tr>
<td>M60</td>
<td>385</td>
<td>47.0 gal/hr @ 14.4 MPH (3.26 GPM)</td>
<td>27.5 gal/hr @ 20 MPH (1.38 GPM)</td>
<td>5.3</td>
<td>2.32</td>
</tr>
<tr>
<td>M2/M3</td>
<td>175</td>
<td>12.0 gal/hr @ 17 MPH (.71 GPM)</td>
<td>9.4 gal/hr @ 25 MPH (.38 GPM)</td>
<td>1.0</td>
<td>.65</td>
</tr>
<tr>
<td>M113</td>
<td>95</td>
<td>8.9 gal/hr @ 14.4 MPH (.62 GPM)</td>
<td>6.2 gal/hr @ 20 MPH (.31 GPM)</td>
<td>1.0</td>
<td>.47</td>
</tr>
</tbody>
</table>

* Data Source: Armor Board, Fort Knox, KY.

** Based on 50% X-Country and 50% Secondary Roads.

Table 4 provides similar information for some of the newer wheeled vehicles entering the inventory.

Table 5 provides similar information for Army helicopters. As can be seen, the newer helicopters, similar to the newer vehicles, consume more fuel than the older models they are replacing.
### TABLE 4.
POL Consumption Rates - Wheeled Vehicles (Miles/Gallon)

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Fuel Capacity (GAL)</th>
<th>Fuel Consumption</th>
<th>Expected Consumption***</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Highway</td>
<td>X-Country</td>
</tr>
<tr>
<td>HEMTT*</td>
<td>154</td>
<td>4.8</td>
<td>3.2</td>
</tr>
<tr>
<td>HMMWV*</td>
<td>25</td>
<td>11.0</td>
<td>7.1</td>
</tr>
<tr>
<td>CUCV*</td>
<td>20</td>
<td>12.0</td>
<td>7.5</td>
</tr>
<tr>
<td>10-Ton Tractor**</td>
<td>83</td>
<td>4.2</td>
<td>-</td>
</tr>
<tr>
<td>M123A1C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-Ton Cargo</td>
<td>78</td>
<td>4.5</td>
<td>-</td>
</tr>
<tr>
<td>M813A1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 1/2-Ton Cargo**</td>
<td>50</td>
<td>7.0</td>
<td>-</td>
</tr>
<tr>
<td>M35</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* CSTA, APG, MD, Initial Production Test Reports
** TM 9-2320
*** 50% Cross Country, 50% Highway

### TABLE 5.
POL Consumption Rates - Army Helicopters

<table>
<thead>
<tr>
<th>Type Aircraft</th>
<th>Fuel Consumed (Gal/Hr)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>AH-1S</td>
<td>123*</td>
<td>Follow-On to AH-1S</td>
</tr>
<tr>
<td>AH-64</td>
<td>141*</td>
<td></td>
</tr>
<tr>
<td>UH-1H</td>
<td>80*</td>
<td></td>
</tr>
<tr>
<td>UH-60</td>
<td>169*</td>
<td>Follow-On to UH-1H</td>
</tr>
<tr>
<td>CH-47C</td>
<td>497**</td>
<td>Follow-On to CH-47A</td>
</tr>
<tr>
<td>CH-47D</td>
<td>497**</td>
<td>Follow-On to CH-47C</td>
</tr>
</tbody>
</table>

* Typical mission fuel consumption rates based on SB 710-2.
** FM 101-20
A final report of the 1984 Army Science Board, Subject: "Technology to Improve Logistics and Weapons support for Army 21", dated December 1984 and published by the Assistant Secretary of the Army, Research, Development and Acquisition states that "Unconstrained, POL consumption will continue to increase." There is not yet a figure of merit developed to define a cap or limit on the projected total fleet size or on the total POL consumption. As an example, the above referenced report states that, "For combat tactical vehicles, today's fleet is projected to grow from 240,000 vehicles to 340,000 (+42%) vehicles from 1982 to 2000 and the annual fuel consumption from today's 115 million gallons to 283 million gallons (146%) if technology advances are not made, or to 158 million gallons (+32%) if R&D efforts to increase engine efficiency are funded and successful." It is further stated that a typical heavy division (DIV 86 POL Profile), in a mid-intensity European combat scenario, would have a daily planned requirement of 549,308 gallons of which the M1, M2 and M3 combat vehicles would consume 47%. The report concluded that "Army 21 is not supportable unless constraints are placed on POL consumption".

(NOTE: The reader should keep in mind that Army POL requirements represent only about 35% of the total theater requirements.)

Warsaw Pact POL Capabilities

As part of the background literature review in preparation for this POL baseline study, ASI reviewed selected Defense Intelligence Agency (DIA) and US Army Intelligence Agency (USAIA) documents relative to POL requirements and capabilities of the Warsaw Pact countries. These documents include contributions from the Threat Analysis Center, Foreign Science and Technology Center and the Missile Intelligence Agency. They contain, for example, estimates of percent of available transport capability required for transport of POL, basic doctrinal concepts which underlie POL logistics operations, selected unit fuel requirements and the system of military controlled POL depot storage requirements and capabilities. Manning levels are also provided. Provision of specific information relative to the above is beyond the scope of this study; however, reference to the Warsaw Pact POL requirements and capabilities is made so that the readers can be made aware of the ready availability of such information in the ASI Aberdeen library should it be required for future related study efforts.

MAJOR PROJECTS IN PROCESS TO IMPROVE POL SUPPLY & DISTRIBUTION CAPABILITIES

Although the lack of a fully integrated and coordinated systems approach to the solution of POL problems is evident,
Considerable effort is underway to solve individual problems such as improvements to doctrine, establishment of priorities for equipment procurement, correction or redesign of individual components of a system that are not functioning properly, and improvements in the training activities where deficiencies have been noted. Those actions are being documented in the Master Petroleum Materiel Requirements Plan (MPMRP) and progress is reported during the Annual Petroleum Materiel Requirements Conference.

A series of Logistics Unit Productivity Studies (LUPS) has been performed and others are in process to improve the productivity of CSS units. A petroleum supply company substudy performed by the US Army QM School (report dated 15 December, 1983) concluded that the petroleum supply company per capita productivity output (POL issues) can be increased (approximately 80% increase in total output with a 7% increase in personnel) by changing the types and quantities of key items of POL handling equipment. Some of the major changes include the replacement of Rough Terrain Forklifts (RTFLs) with High Mobility Materiel Handling Equipment (HMMHE), increasing the number of 5000 gallon semitrailers, 5-ton trucks, 22 1/2 ton trailers, and 10,000 and 20,000 gallon storage tanks and by adding 50,000 gallon storage tanks. Final actions relative to the implementation of these recommendations are still pending.

A high priority joint Army/Navy project under the title of "Southwest Asia Petroleum Distribution Operational Project (SWAPDOP)," briefly mentioned earlier in this report, is underway. It consists of two major elements, the Offshore Petroleum Distribution System (OPDS) and the Inland Petroleum Distribution System (IPDS). The US Navy has the lead for the OPDS which is planned as a joint procurement action. The Army has the lead for the IPDS. These off-shore and inland petroleum distribution systems will be used to support contingency operations in Southwest Asia. Primary components of the OPDS are a Single Anchor Leg Mooring System (SALM), a four mile ship-to-shore petroleum discharge line, and warping tugs for emplacement of the system. A joint Army/Navy development effort is also underway to develop a one mile system which uses a Propellant Imbedded Anchor Mooring System (PEAMS). A recent Army/Navy agreement reached on 9 July 1985 provided for assignment to the Navy of total responsibility for off-shore POL discharge systems up to the high water mark at which point the Army assumes responsibility for all Inland POL distribution and storage systems. The interface between the off-shore and inland systems will be a joint effort.

Testing of the OPDS elements is scheduled for the latter part of CY 1985, and testing of the IPDS is scheduled for 1986. Once the IPDS is procured and tested, it will be stored at the Pueblo Army Depot pending outbreak of hostilities in SW Asia. Training modules will be procured and used for training of personnel.
required for installation and operation of the IPDS. Of interest is the fact that the OPDS is a Non-Developmental Item (NDI). Installation, operation and maintenance of the system will be accomplished by civilian personnel under the direction of the US Navy. Completion of the OPDS project will increase the Navy's capability for POL operations as follows.

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Projected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anchor of POL tankers offshore</td>
<td>25,000 DWT</td>
<td>70,000 DWT</td>
</tr>
<tr>
<td>Ship-to-Shore POL discharge</td>
<td>1 mile</td>
<td>4 miles</td>
</tr>
<tr>
<td>Quantity of POL product discharged</td>
<td>17,000 BPD</td>
<td>34,000 BPD</td>
</tr>
</tbody>
</table>

Legend: DWT = Dead Weight Tons
        BPD = Barrels Per Day (20 hours of operation)

Overall management and control of SWAPDOP is being exercised by an Action Officer Workshop (AOW) chaired by a DCSLOG staff officer with membership from all participating Army, Navy and Air Force agencies and activities. A General Officer Steering Group (GOSG) provides guidance for conduct of the total effort.

(NOTE: The AOW appears to be an efficient operation. The recent addition of HEL as a member is paying dividends in terms of calling attention to shortfalls in the total systems program such as the need for improved C3.)

POL PROBLEM AREAS

Based on an extensive review of literature (see partial list of documents reviewed at Appendix C); discussions with key members of the AMC POL Project Manager's Staff, the TRADOC Systems Manager and his staff and other organizations charged with the responsibility for development and procurement of POL distribution equipment; attendance at meetings of the POL Action Officers Workshop (AOW); and discussions with officers and NCO's of TO&E POL units, both active and reserve, a number of problems have been identified. Some of these are understandably hypotheses or assertions at this point in time which should be subjected to further study and verification to assure that they are, in fact, really problems. Others have already been proven to be problems requiring some type of corrective action. As a general statement, it is safe to state that, based on a preponderance of information reviewed, the existing POL structure and operating system does not meet the requirements of the existing or projected POL consuming fleet of ground and air vehicles and stationary equipment. As this demand on POL logistics continues to grow, with greater requirements for mobility, agility and survivability, the gap between demand and supply capability will continue to widen. With these introductory remarks serving as a backdrop, the following
POL problems are presented for consideration and corrective action as may be indicated. (As noted in the OBJECTIVE of this study, the US Army only consumes about 35% of the inland POL. The remaining 65% is consumed by the USAF.)

**General**

a. Clarification of Requirements. A clear definition of the quantities of POL that are required to support both the current and projected military vehicle and equipment fleet is lacking. Also, there is a need for users to state, as part of their requirement for future vehicles, the refueling rate. This would facilitate the design of not only the on board refueling port(s) of the vehicle, but also the design of refueling equipment such as the Forward Area Refueling Equipment (FARE), and it would aid in the decision as to whether the refueling system should be open or closed port, etc.

b. A Systems Approach. Reference to lack of a complete integrated systems approach to the solution of POL problems has been made several times in this report. The importance of this problem cannot be over emphasized. The result is that major efforts are sometimes directed towards the correction of a "bottleneck" at one juncture in a system only to find that it creates an even greater "bottleneck" at another juncture. Priorities under a "fix each weak link as it is discovered" approach becomes meaningless and the entire process is stretched out when it is discovered that one correction may not be compatible with another later correction and the initial one must undergo further design changes resulting in increased costs and delays in time. Is the most serious problem between the off-shore to on-shore terminal capability; is it in the intermediate distribution system from the port forward through the COMMZ; or is it in the forward areas? Is the problem with pipeline laying techniques; with long-haul tank trucks; with shortfalls in pumping substations; or perhaps lack of communications through the various echelons of POL supply operators and/or users? High volume pumps are being procured for movement of POL through the wholesale pipeline system as well as for distribution from tactical POL tank trucks into combat vehicles with little regard as to whether or not the wholesale POL storage facilities can handle the increased flow rates or whether or not the tactical fighting vehicles can accept the faster fill rates of pumps on tactical POL vehicles. It is suggested that until these interfaces of the system have been identified and the problems associated with each such interface placed in proper perspective, it will not be possible to prepare a master program in which concurrent and coordinated corrective actions can be accomplished. Time will not permit the solution of POL problems in a sequential manner, nor can the Army afford the increased costs associated with such an approach.
c. A Master Priority List. The importance of a total systems approach, coupled with a realistic master priority list that interrelates each problem and corrective action with the total systems requirements can be best illustrated through one example. The Director of Logistics, US Mission to NATO has stated that the Central Europe Pipeline System, although chronologically old, is, in a sense, modern and complex in its operation. It cannot, however, meet daily projected combat requirements, either on a storage or throughput basis in its current configuration. Further, the NATO POL distribution system in Turkey is at the other end of the spectrum being comprised of very obsolete, worn out, incomplete subsystems or equipment that is also incapable of meeting the daily requirements either on a storage or throughput basis. The lack of a systems approach supported by a master priority list, makes it difficult if not impossible to answer such questions as: "Should these pipeline systems be upgraded to meet current and projected demands, or should the emphasis be placed on providing a modern vehicle tanker fleet?" If the choice becomes a modern tanker fleet, will the in-theater highway system accommodate such high volume highway movements, particularly in time of major conflict? What about railroads for transport of POL? Today's higher priority project in terms of personnel, dollars and management attention is with the Southwest Asia Petroleum Distribution System Operational Project (SWAPDOP), not with Europe. Of 19 major initiatives dealing with the correction of POL problems, seven have no funding through FY87 even though some of these unfunded projects are identified as high-priority efforts. It is not the purpose of this study to suggest which problem should be given the higher priority. It is the purpose, by citing examples, to stress the importance of a "total systems approach" to include a meaningful master priority list for the correction of POL supply problems.

d. Inadequate POL Units, Personnel, and Equipment. Eighty to 90% of the POL units assigned responsibility for POL supply are in the Reserve and/or National Guard structure. These Reserve and National Guard units will be called upon during time of conflict to provide most of the POL resupply capability. The few POL units within the active force structure are undermanned, undertrained, and have many critical shortages of POL vehicles and equipment similar to the reserve/NG units. The equipment they do have is, in many instances, old and in poor operating condition. Many of the units have never been tested to determine their capability to meet their primary mission requirements.

Specific Problems

a. The Army Research and Development community, to include that part of TRADOC associated with specifying system requirements, is focused on weapons system performance in terms of lethality, speed, survivability, maneuverability, etc., without commensurate consideration for the POL logistics requirements to
support such modern fighting vehicles. Maintenance is beginning to receive appropriate attention in the design and development of a fighting vehicle, yet little, if any, real attention is being given to reducing the POL consumption requirements of such vehicles, or to improved, more rapid refueling conditions.

b. Over-the-shore POL logistics capability during early stages of employment in an undeveloped theater of operations is marginal.

c. Outmoded pipeline technology imposes labor and time-intensive requirements for rapid pipeline deployment.

d. The Current POL highway tanker fleet is slow, vulnerable and plagued with a mix of vehicles and engines. Some are very old and are experiencing high maintenance requirements.

e. Lack of a standardized rapid refueling system has resulted in gross inefficiencies in refueling operations. There is a need for a standardized refueling system (SRS) to accommodate interfaces between wheeled and tracked ground vehicles, aircraft, and the refueling equipment.

f. A tradeoff analysis is needed to determine whether the current FARE should be product improved or whether a new-start program incorporating present state-of-the-art technology for a new FARE is more desirable.

g. A front end analysis (FEA) is required for the automated pipeline equipment system (APES) to insure that it will satisfy all user requirements. HFE interfaces should be carefully analyzed as part of this FEA.

h. There is a need to determine whether the higher priority should be given to the modernization of a wheeled vehicle tanker fleet or to the development and fielding of an armored combat vehicle refueller.

i. The Navy has been given the lead for development of a four mile off-shore to on-shore POL discharge system, to include a single point mooring system with an on-the-bottom POL discharge capability. The Army has been given responsibility for developing a one-mile system. The Army apparently has the lead for the design of the one-mile system and the Navy is responsible for developing alternatives. The Navy is responsible for the tanker ship or barge to POL off-shore pipeline interfaces, and the Army is responsible for the off-shore pipeline to on-shore POL terminal interfaces. From an operational point of view, the Army is responsible for the connection to the Navy installed Beach Termination Unit (BTU) and all operations on-shore. Alternatives for installation and operation of the various off-shore to on-shore POL discharge systems include civilian installation and operation with Navy
control; Army Corps of Engineers installation; and US Navy installation and operation. There is a need to clarify the many interfaces in terms of compatibility and installation/operation responsibilities.

j. There is a need to clarify the requirements for command, control and communications (C3) between off-shore and on-shore operations; between POL terminal facilities and pumping substations along with a POL pipeline; and the intra-POL terminal facility. There is also a need to clarify the communication requirements between the POL operating units up through the Direct Support (DS) level and the combat and combat support users of POL products. Once this command, control and communications requirements network has been defined, there is a need to procure the C3 equipment to provide the required communications capability.

k. Collapsible storage tanks, in capacities of 10,000, 20,000, and 50,000 gallons have an operational (in use) life and a shelf (in storage) life of only one and five years, respectively. Because of the tremendous reliance on these tanks to provide essential POL support, the shelf and operational life should be extended. These collapsible tanks are often the only storage capability available to support combat operations until such time as more permanent facilities can be constructed.

l. Currently there is no capability to quickly determine the type or usability of fuel which has been captured. Airland Battle Concepts envision deep penetrations behind enemy lines where traditional petroleum supply support may not always be possible. As such, there will be a need to identify fuels of opportunity for combat vehicle use in order to complete the mission. By using a small, lightweight, simplified testing kit, it would be possible for combat vehicle crewmen to determine fuel usability in a short period of time.

(Note: It is understood that AMC has such a development project ongoing.)

m. The current family of US Army POL equipment assemblies does not include a small, lightweight, easily operated system which armor or mechanized infantry platoon-sized units could carry into battle and use to refuel their vehicles from sources of opportunity under emergency conditions. Without such a system, units operating behind enemy lines are limited by both the amount of fuel they are capable of carrying and by constrained aerial resupply.
n. Of the 25 technical publications on POL that were available for a literature search, 44% (11) were found to be six years old or older from the date of publication; one was found to be 20 years old. Less than a third of these publications have had revisions or changes appended.

o. The current inventory of storage tanks, vehicle tankers and pipelines is highly vulnerable to the wide range of enemy fire from small arms, fragmentation, shrapnel, artillery, rockets and aircraft. Preventive measures that may alleviate this threat to some degree range from self-sealing materials to blanket-type ballistic protection.

p. This document is essentially a status list of hardware that is either presently in the inventory or in the developmental phase of its life cycle. It includes taskings to various commands as a result of a Petroleum Materiels Requirement conference as well as a general description of how the POL distribution system functions. The Combat Development Directorate of the Quartermaster School is responsible for its publication and distribution. Revisions and/or reorganization of the document to more directly relate requirements to R&D and procurement programs would improve its utility.

q. Packaged POL products have proliferated over the years to the point that excessive and unnecessary demands have been placed on the logistics system. The entire spectrum of products needs to be analyzed with the thought of modernizing packaging concepts for this expensive commodity.

r. There is a general consensus that there are insufficient resources in terms of trained personnel and adequate equipment available in both the active Army and Reserves to properly staff Petroleum Pipeline and Terminal Operating Units, Petroleum Supply Units and Engineer Pipeline Construction Units. This is particularly acute when these units have the mission to establish a POL distribution system in an undeveloped theater scenario.

s. During tactical operations involving deep penetrations, crew-personnel required for refueling operations may be exposed to a wide range of hostile fire from ground and air delivery systems. Proposals for an armored tracked refuel system, advocated by several Government contractors appear to offer a viable solution to the refueling and rearming problem. However, a detailed Cost and Operational Effectiveness Analysis (COEA) and other types of analyses would be necessary to determine if the proposal has positive merit.
POL RE SUPPLY IN FORWARD AREAS

Although, as presented in the paragraph entitled "POL Problem Areas", numerous problems exist throughout the POL supply system, major efforts are either underway or are planned to resolve many of them. There are two major priority efforts, both of which have been mentioned previously.

* First is the Action Officers Workshop (AOW) chaired by a DA, DCSLOG representative with membership from all three services whose primary concern is the Southwest Asia Petroleum Distribution Operational Project (SWAPDOP).

* Second is the Annual Materiel Requirements Conference wherein all petroleum problems/projects are documented, complete with schedules of corrective action in the Master Petroleum Materiel Requirements Plan (MPMRP).

It is noted, however, that the greatest majority of problems, by a large margin, which have been identified and for which corrective action is underway, is within the rear echelons or wholesale area. There are problems associated with the offload of POL from off-shore tankers to on-shore terminals, and with moving the bulk product forward from Theater to Army and from Army to Corps, with little emphasis on the forward areas from the end of the POL pipeline forward.

The doctrine, policies and procedures for the handling and distribution of POL products within the rear areas is considered to be well documented as are the problems associated with this part of the POL system. Likewise, R&D and procurement projects are either underway or planned to resolve many major problems associated with handling and distribution of POL in these areas. Conversely, efforts to identify a systematic or integrated approach to the identification and resolution of POL supply and distribution problems in the forward areas of the battlefield have not been as fruitful. It is strongly suspected that no overall coordinated systems approach to the resolution of POL supply and distribution problems in the forward areas exists at the present time.

Based on the above, ASI focused the remainder of the study research effort on POL supply and distribution in the forward areas (division forward) of the present and projected future battlefield as a potential area wherein the Army's Human Engineering Laboratory might make a greater contribution to the resolution of the forward area POL supply system, particularly the soldier/machine interface problems.
The Forward Area POL Supply System

Bulk fuel, like ammunition, is a continuous supply requirement that increases or decreases according to the combat situation. Fuel requirements are based on forecasts provided by combat battalions through supply channels. Brigade logistics personnel forecast the fuel consumption rates for their attached battalions. The forecasts for the Armor, Infantry, Mechanized Infantry, etc., units are consolidated at the brigade level and forwarded to the Division Materiel Management Center (MMC).

(NOTE: When a brigade is not operating under a division, the brigade requirements are forwarded to the Corps Support Command (COSCOM).

In consolidating and refining POL requirements at the brigade, the S-4s must consider special circumstances that could result in unusually high fuel consumption rates such as vehicles operating over hilly terrain which causes higher than normal fuel consumption.

Forward Area POL Resupply

Once fuel requirements are forecast, the brigade S-4s and division G-4 must determine if battalions can carry and distribute their own fuel. Battalions are generally equipped with either tank trucks or with fuel pods mounted on cargo-carrying vehicles and/or trailers. In divisional units, the Supply and Transport (S&T) Battalion has tank trucks and semi-trailers as well as collapsible bulk fuel storage tanks and drums. These are often positioned in the brigade support area or other locations relatively close to using units. QM POL supply companies from COSCOM may provide tankers or collapsible tanks and drums to supply non-divisional battalions.

Table 6 is an extract of the fuel handling equipment and transport vehicles assigned to the S&T battalions of the various type divisions.

The final and perhaps most important node in the POL supply chain is the POL personnel and handling and transport equipment integral to the combat maneuver battalions. Table 7 is an extract of POL handling/transport equipment currently assigned to the four major types of combat maneuver battalions.
### TABLE 6.

**Fuel Handling Equipment & Transport Vehicles**

Assigned to S&T Battalions

<table>
<thead>
<tr>
<th>Type Unit</th>
<th>5,000 Gal Semi-Tlrs</th>
<th>10,000 Gal Collapsible Tanks</th>
<th>5,000 Gal Collapsible Drums</th>
<th>FARE</th>
<th>FSSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>S &amp; T Bn, Air Assault Div</td>
<td>10</td>
<td>36</td>
<td>304</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>S &amp; T Bn, Armored Div</td>
<td>34</td>
<td>12</td>
<td>27</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>S &amp; T Bn, Inf Div, Mech</td>
<td>29</td>
<td>12</td>
<td>27</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>S &amp; T Bn, Inf Div</td>
<td>16</td>
<td>6</td>
<td>27</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: "H" Series TO&E's.

### TABLE 7.

**POL Handling/Transport Equipment**

**Combat Maneuver Battalions**

<table>
<thead>
<tr>
<th>Type Unit</th>
<th>TO&amp;E No.</th>
<th>TRK, Tank Fuel Svc, 2500 Gal</th>
<th>Tank &amp; Pump Unit, TRK Mtd</th>
<th>Tank Unit Liquid, TLR Mtd</th>
<th>65 GPM Pump, Gas Driven Frame Mtd</th>
</tr>
</thead>
<tbody>
<tr>
<td>FA Bn, SP, Heavy Div</td>
<td>06356J410</td>
<td>3</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>M1 Tank Bn</td>
<td>17236J210</td>
<td>12</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Mech Inf Bn W/BFVS</td>
<td>07245J210</td>
<td>7</td>
<td>7</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>FA Bn, 8 In/MLRS</td>
<td>03395J200</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Source: "J" Series TO&E's.
It should be noted that all but the mechanized infantry battalions with the BFVS will be equipped with the new HEMTT 2500 gallon fuel trucks. It is understood that the mechanized infantry battalions have expressed a preference to retain the truck mounted tank and pump units and trailer mounted tank units in lieu of the HEMTT. Based on the fuel consumption rates for the various combat vehicles as shown in Tables 3 and 4, and assuming, for example, that a tank battalion will travel approximately 100 km per day, an M1 tank battalion consisting of 58 M1 tanks would require refueling once a day (3.33 gal/mi x 100 mi = 333 gal per tank x 58 tanks = 19,314 gal). Twelve 2500 gallon tankers can carry 30,000 gallons and would therefore have to pick up fuel at an FSSP only once a day. Similar computations for the other types of units also indicate that the quantity of POL handling and transport equipment assigned to the combat maneuver battalions appears to be adequate to perform the POL resupply mission under a variety of scenarios. The reader must remember, however, that these computations assume all of the POL vehicles, like the combat vehicles, are operational and will be able to rendezvous at a designated point to refuel the combat vehicles. The proponents of armored POL resupply vehicles will argue that the unarmored POL resupply vehicle on a future battlefield will have an unacceptably high mortality rate. Also, resupply of POL to combat units engaged in a "deep penetration" scenario behind enemy lines as visualized by Army 21, would also present a challenge to both an armored and unarmored POL resupply vehicle.

(Note: Appendix A contains complete lists of fuel handling, fuel transport, storage capabilities, and other POL information for each type POL unit responsible for the handling/transport of POL from the port, forward to division trains. The question that must be answered is: "Are these units capable of providing the required quantities of POL at the right place and at the right time to the combat forces?")

**Computing Unit Fuel Consumption Rates**

Just as was found with the study of Class V, there are a myriad of POL consumption planning factors and models for computing fuel consumption rates. Prior to 1973, the military had the luxury of estimating POL requirements and adding a "fudge factor" which increased the total quantity necessary to complete an assigned mission. Since that time, the shortage of crude oil, the increased numbers and rates of consumption of military vehicles, and limitations on the capability to transport and distribute fuel to highly maneuvering units on a highly mobile battlefield have all but eliminated the luxury of overestimating refined petroleum products to meet a particular mission need.
Methods presently available to calculate fuel consumption/planning factors include:

FM 101-10-1, July 1976
FM 10-17, June 1979
STANAG 2115
CAA FASTALS Model (short tons per soldier per day)
SB 710-2 (gallons per soldier per day)
SB 710-2 (gallons per mile/kilometer traveled per day)
Gallons per hour
Pounds per soldier per day
Fuel consuming items combat profile

Source: CSS-MAA, Supply Substudy, Part 3, USA QM School, Ft. Lee, Virginia

The M1 tank is one of the largest consumers of fuel on the battlefield today. Studies performed by the QM school have determined that it is impractical to conceptualize fuel consumption based on a number of miles traveled when dealing with a tank deployed on a battlefield. The amount of maneuvering and jockeying of a tank in a combat situation may cover considerable distance and consume considerable fuel without any appreciable advance or withdrawal. The study states that "A tank engine will probably operate for at least 10 to 12 hours per day on a battlefield environment". During the extremely intense Yom Kippur War, the Israelis reported tank engine operation averaging about 20 hours per combat day. In this regard, the Israelis use the single figure of approximately 60 liters (15.85 gallons) per hour as a consumption planning factor which proved to be extremely accurate for their M60 tanks. Although US planners are reluctant to use a general consumption factor such as 100 miles of estimated travel for a tank for a typical combat day, such a figure would equate to less than 8 hours of tank road movement time when using the Israeli planning factor.

Table 3, presented earlier on page 13 of this report, showed that the fuel consumption rates for selected combat vehicles, including the M1 tank, varied significantly depending on whether a vehicle was moving across country, on secondary roads, or simply standing still with the engine idling. Figure 5 represents a model for computing the fuel consumption for the M1 tank using the same POL consumption rates as shown in Table 3 (converted to gallons/mile). In this model, the S-4 POL planner can vary the percentage of time the tank travels cross country with the time traveled on secondary roads and select from the graph an estimated fuel consumption rate for an M1 tank battalion operating on the battlefield for a 24 hour period. For example the graph shows that if 50% was cross country and 50% was on secondary roads, the consumption would be 14,732 gallons per M1 tank battalion per day. Note that this model assumes a 100 mile distance traveled or equivalent hours of operation,
similar to the Israeli approach, the accuracy of which was validated during the Yom Kippur War.

**METHOD FOR COMPUTING FUEL CONSUMPTION RATE FOR M1 TANK**

(1 BN - 58 TANKS, 100 MILES PER 24 HOUR PERIOD)

<table>
<thead>
<tr>
<th>PERCENT CROSS COUNTRY</th>
<th>GAL/BN/24 HR</th>
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<tbody>
<tr>
<td>100</td>
<td>19.314</td>
</tr>
<tr>
<td>80</td>
<td>17.480</td>
</tr>
<tr>
<td>60</td>
<td>15.648</td>
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<tr>
<td>40</td>
<td>14.732</td>
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<td>20</td>
<td>13.815</td>
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<tr>
<td>0</td>
<td>11.983</td>
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</table>

<table>
<thead>
<tr>
<th>PERCENT SECONDARY ROADS</th>
<th>GAL/BN/24 HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>19.314</td>
</tr>
<tr>
<td>20</td>
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<td>80</td>
<td>13.815</td>
</tr>
<tr>
<td>100</td>
<td>11.983</td>
</tr>
</tbody>
</table>

Figure 5. M1 Tank Battalion (58 Tanks) Fuel Consumption Rates.

As a matter of comparison, during the Operational Test III (OT III) of the M1 tank at Fort Knox, it was reported that fuel consumption was 3.5 gallons/mile. The same fuel consumption was reported for the OT III portion of the tests performed at Fort Hood. When new trainees were trained on the M1 tank at Fort Knox however, and it is understood that the majority of the training was performed on cross country type terrain, fuel consumption jumped to 8.0 gallons/mile. Considering the Fort Knox OT III testing as a conservative estimate of fuel consumption for an M1 tank battalion (which is similar to the estimate shown in Figure 5), and the fuel consumption based on the preliminary driver training for tank drivers as representing the "worst case" as shown by the two diagonal lines in Figure 6, one can see the wide divergence in estimating fuel consumption for a one-day operation of an M1 Tank Battalion.
Figure 6. M1 Tank Battalion (58 Tanks) Fuel Consumption: Fort Knox Conservative Vs. Fort Knox Driver Training.

For example, using the worst case presented in Figure 6., i.e., 100% cross country at 8 gallons/mile versus the best case of 100% secondary road travel at 3.5 gallons/mile, the variance is 357% \( (46,400 - 10,150 = 36,250 \div 10,150 = 357\%) \). A more realistic comparison might be to assume a 50% cross country - 50% secondary roads for both the 3.5 gallons/mile Ft. Knox DT III test experience and the gal/mi Ft. Knox Driver Training experience (14,732 gallons/24 hours versus 34,800 gallons/24 hours in which case the variance would be 136%). Hopefully, this illustrates the importance of providing a realistic planning factor to tank commanders for accurately estimating fuel requirements in support of a Heavy Armored Division operating in an Airland Battle or Army 21 battlefield environment.

**FINDINGS**

**POL Unit Force Structure**

1. Eighty-one percent of the POL units and approximately 80-90% of POL supply and transport capability rests with the Reserve and National Guard.

2. The Army Science Board 1984 Summer Study "Technology to Improve Logistics and Weapons Support for Army 21" concluded that: "Army 21 is not supportable unless significant constraints
are placed on POL consumption." This conclusion cannot be fully verified until Army 21 operational concepts have been fully defined and an accurate Day of Supply (DOS) methodology is available for computing quantitative requirements.

POL Policy, Doctrine and Concepts

3. The policy, doctrine, organizations, methods and procedures for the movement and distribution of bulk POL from the port to the using units is well documented and appears to be adequate with some exceptions as follows:

   a. Currently, there exists eight military approved and documented sources and nine methods for the computation of a POL Day of Supply (DOS), none of which are universally accepted as the best or most accurate method.

   b. Current DoD doctrine results in an overlap of responsibility between Army and Navy for movement of POL from an offshore tanker to an onshore facility. The Navy has primary responsibility for this mission in support of the US Marine Corps and the Army has primary responsibility for support of the Army and Air Force.

(NOTE: A Memorandum of Agreement (MOA) was signed on 9 July 1985 tasking a Joint Army/Navy study group to clarify this mission assignment and develop doctrine which will assign primary responsibility to the US Navy for movement of all POL from offshore to onshore (Logistics Over-the-shore [LOTS]) up to the high water mark. This does not include off-load of POL from tankers moored to a pier in a developed theater of operations which will remain a US Army responsibility.)

   c. Operational concepts for conduct of future warfare are out of phase with logistical concepts. For example, Army 21 tactics and strategy call for a "deep penetration: in which sizeable forces are deployed deep into enemy territory. Yet, there are no companion tactics and strategy for the resupply of these forces which may not be able to return to friendly areas without resupply (see paragraph 2 above).

POL Quantitative Requirements

4. In addition to the need for the clarification of doctrine relative to the methodology for computing POL requirements, there is a need to clarify the requirements in terms of "how rapidly does a user need his fighting vehicles refueled?". Times can vary from a few minutes per vehicle to in excess of thirty minutes depending on the type vehicle and conditions under which refueling is being accomplished.
**Systems Versus "Fix Weakest Link" Approach**

5. Although many actions are either planned or in process to correct POL supply and distribution shortfall, there is little evidence of a totally integrated systems approach to the resolution of POL problems. For example, high volume pumps are being procured for movement of POL through the wholesale pipeline system as well as for distribution from tactical POL tank trucks into combat vehicles with little regard as to whether or not the wholesale POL storage facilities can handle the increased flow rates or whether or not the tactical fighting vehicles can accept the faster fill rates of pumps on tactical POL vehicles.

**Master Priority List**

6. The Master Priority List is inconsistent with program execution. For example, of nineteen major initiatives dealing with the correction of POL problems, seven have no funding through FY 87 even though some of these unfunded projects are identified as high-priority efforts.

**Personnel and Training**

7. POL unit training is minimal within both the reserve and active units due to the shortages of equipment and environmental restrictions. Reserve units have the opportunity to participate in major field exercises on an average of only once in three years and the benefits of such exercises are significantly degraded due to equipment shortages and environmental restrictions in designated training areas which preclude meaningful training with POL products.

**Technical Publications**

8. A review was made of TMs, FMs and other technical publications dealing with POL maintenance and operations. Forty-four percent were found to be six or more years old. With the many changes that are occurring not only in tactics and doctrine relative to Airland Battle/Army 21, but also in the fielding of new equipment, the need for updating POL technical publications is apparent.

**Other Problems**

A number of problems identified in earlier studies that were also noted during the conduct of this study, but for which little evidence of corrective action was either planned or underway, are listed below. When corrective action was identified, such information is also provided.
9. The Army is focussed on weapons system performance in terms of lethality, speed, survivability, maneuverability, etc., without commensurate consideration for fuel economy requirements.

Corrective Action: AMC identified 4 initiatives in the Army Energy R&D Plan for 1983 including fleet dieselization, M1 tank engine improvement, advanced integration propulsion system for the next generation tank, and micro-processor control. It remains to be seen whether such programs will fall into a category like the NBC initiatives, many of which are first to be reduced or eliminated by a project manager when funding shortages or program delays occur, or whether they will, in fact, be executed as part of the basic project effort.

10. Over-the-shore POL logistics capability during early stages of employment in an undeveloped theater of operations is marginal.

Corrective Action: A joint Army/Navy procurement program is in process to increase distance by which over-the-shore POL off-loading can be performed from one to four miles. Also, by use of the SALM, off-loading can be continued during Sea State 3 and higher (previously limited to Sea State 2).

11. Outmoded pipeline technology imposes labor and time intensive requirements for rapid pipeline deployment.

Corrective Action: An AMC R&D project is underway for an automated pipeline laying system (APES) to increase capability from as little as one mile per day to up to three miles per hour.

12. Current POL highway tanker vehicle fleet is slow, vulnerable and plagued with a mix of vehicles and engines. Some are very old and are experiencing high maintenance requirements.

13. Lack of a standardized refueling system has resulted in gross inefficiencies in refueling operations. Some of the new tactical vehicles recently fielded have multi-refueling ports with no cross leveling capability and utilize the slow "open port" method of refueling.

14. Some of the Forward Area Refueling Equipment (FARE) units are old and in need of repair. When used for multi-vehicle refueling (4 vehicles at a time), rate of refueling is sometimes less than 25 GPM per vehicle.

15. Command, Control and Communications (C³) capabilities for both intra-POL terminals and inter-POL pipeline pumping stations are considered to be grossly inadequate. This seriously degrades POL system operations.
Corrective Action: During the AOW 11 Conference, 9 June 1985, the Army Signal Center and School representative was tasked to define a communications system capable of meeting C³ requirements for the Southwest Asia Petroleum Distribution Operational Program (SWAPDOP) which represents the most critical and most challenging C³ requirements.

16. Operational life of the collapsible POL storage tanks, the main and often the sole item used for storage of POL in operating head terminals, is only one year.

17. There is currently no capability to quickly determine the type or useability of fuel which has been captured.

Corrective Action: An AMC R&D project is underway to develop a small lightweight kit for rapid analysis of captured enemy POL products.

18. Current family of US Army POL equipment assemblages does not include a small, lightweight, easily operated system which armor or mechanized infantry platoon-sized units can carry into battle and use to refuel their vehicles from sources of opportunity under emergency conditions.

19. The current inventory of storage tanks, vehicle tankers and pipelines are highly vulnerable to a wide range of enemy fire from small arms, fragments, shrapnel, artillery, rockets and aircraft weapons. Little project effort can be found to improve survivability of this equipment.

20. The Master Petroleum Materiel Requirements Plan is generally devoid of timely combat development input from QM School, i.e., requirements information. This unnecessarily limits its usefulness.

21. There is limited crew protection for forward area refueling operations.

Corrective Action: Proposals for an armored tracked refueling system have been advocated by Government contractors; however, no known COEA or similar Government sponsored type of analysis has been performed to determine the merits of such a proposal.

POTENTIAL AREAS FOR FUTURE USA HEL EFFORT

Based on a review of the above findings and on the authors' understanding and background knowledge of the experience and capabilities of the US Army Human Engineering Laboratory (USAHEL), the following is a list of some of the areas in which it is felt
the USAHEL can make the greatest contributions in terms of improving the POL supply and distribution system and primarily its performance capabilities.

Field Data Collection, Study and Analysis

- Time Trials - Time to refuel selected combat vehicles. (BFVs, M1, M60, etc.)

- Concurrent rearm and refuel of combat vehicles is not done. "Refuel and rearm procedures and times" is a valid issue.

- POL consumption rates

- Concurrent versus sequential vehicle refueling/rearming

- Queuing of vehicles for rearming/refueling--2500 gallon HEMTT tankers versus FARE units versus new technology items.

FSSP Operations, Study and Experimental Field Trials

- Where to establish an FSSP
- How much POL on ground versus on tankers/trailers
- FSSP night operations
- Replace or PIP the FARE
- How to reduce signature of an FSSP
- Hot refueling/rapid refueling
- Open versus closed port refueling

Requirement for Refueling Under Armor

- Robotic refueler
APPENDIX A

POL Unit Missions and Capabilities
**ORGANIZATION, MISSION AND FUNCTIONS CHART**

**POL ORGANIZATIONS WITHIN A THEATER OF OPERATIONS**

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>TO&amp;E #</th>
<th>MISSION</th>
<th>FUNCTIONS/ CAPABILITIES</th>
<th>PARENT ORGANIZATION</th>
<th>BASIS OF ALLOCATION</th>
<th>GENERAL LOCATION</th>
<th>SUPPORT (TYPE &amp; UNIT)</th>
<th>STORAGE CAPACITY CL III</th>
<th>LINE HAUL CAPABILITY CL III</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;T BN, Armored Div.</td>
<td>29115H000</td>
<td>See A Below</td>
<td>DISCOM, Armored Div.</td>
<td>One Per DISCOM</td>
<td>Division &amp; Brigade Support Areas</td>
<td>All Classes of Supply, Bde ATP's</td>
<td>12,000-10,000 Gal Collapsible Tanks</td>
<td>34 - 5000 Gal Semitrailers</td>
<td>5 - FARE's</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12 - 10,000 Gal Collapsible Tanks</td>
<td>34 - 5000 Gal Semitrailers</td>
<td>5 - FARE's</td>
<td></td>
</tr>
</tbody>
</table>

**A. MISSION:** To provide combat service support, commensurate with stated capabilities, to all organic and attached elements of the division.

**B. CAPABILITIES:** This unit:

1. Division and brigade supply and distribution points for receipt, temporary storage, and issue of all classes of supply for which the battalion has been assigned responsibility.
2. Ground transportation for unit distribution of supplies for which the battalion is responsible and supplemental transportation in support of organic elements of the division.
3. Maintenance of and transportation for moving the division reserve supplies for which the battalion is responsible.
4. Unclassified materiel supply service to the division and attached units.
5. Salvage service for materiel and supplies except ammunition, explosives, toxic agents and radioactivity materials, vehicles, aircraft, COMSEC supplies, and medical supplies.
6. The Command and Control Headquarters for the Supply and Transport Battalion's organic and attached units.
7. Brigade ammunition transfer points (ATP).
8. Emergency water distribution when supported units are unable to pick up water from water points.
9. When augmented, the unit provides clothing exchange and beth (CEB), graves registration and a central issue facility.

**C. DOCTRINE:**

The following doctrinal publications are applicable to the operation of this unit:

- FM 10-24, Ration Breakdown Point Operations.
- FM 10-30, Central Issue Facility.
- FM 10-70, Inspecting and Testing Petroleum Products.
- FM 29-50, Supply and Services in Divisions and Separate Brigade.
- FM 55-31, Army Motor Transport Units.
- FM 100-10, Combat Service Support.
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<th>STORAGE CAPACITY CL III</th>
<th>LINE HAUL CAPABILITY CL III</th>
<th>REMARKS</th>
</tr>
</thead>
</table>

A. MISSIONS:

a. To support the division and attached units by providing Class I, II, III, IV, and VII supplies, ammunition transfer points in brigade areas, and limited salvage classification and disposal service.

b. To provide CEB and GREG services when authorized appropriate augmentation.

c. To operate the division central issue facility (CIF).

B. CAPABILITIES:

When organized under TO&E 10007H020, the company:

a. Operates supply and distribution points in the division support area and in the brigade support areas.

b. Receives, provides temporary storage for, and issues 61.98 short tons of Class I; 30.16 short tons of Class II; 11.56 short tons of Class III (packaged); 78.63 short tons of Class IV (except operational project supplies); and 39.5 short tons of Class VII supplies, except COMSEC supplies, aircraft, ADPE, classified maps, and air drop equipment.

c. Is capable of storing and issuing 133,500 gallons of Class III bulk petroleum per day.

d. Provides salvage service for materiel and supplies of all types, except COSMEC supplies, toxic agents, radioactive materials, vehicles, aircraft, ammunition and explosives, and medical supplies.

e. Provides a nucleus for a CIF for the stockage, issue, exchange, inspection, and turn-in of organizational clothing and equipment.

f. Coordinates and transmits requests for Class I supplies from user to the DMMC.

g. Provides emergency water distribution for supported units unable to pick up water at the water points.

h. Maintains the division reserve of supplies and equipment for which the company is responsible.

i. Provides up to five FARE filling station operations for ground vehicles.

C. DOCTRINE:

The following doctrinal publications are applicable to the operation of this unit:

- FM 10-60, Subsistence Supply and Management in Theaters of Operation.
- FM 10-68, Aircraft Refueling.
- FM 10-70, Inspecting and Testing Petroleum Products.
- FM 29-50, Supply & Services in Div and Separate Brigades.
## ORGANIZATION, MISSION AND FUNCTIONS CHART

### POL ORGANIZATIONS WITHIN A THEATER OF OPERATIONS

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<thead>
<tr>
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<th>LINE HAUL CAPABILITY CL III</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;T Bn., Inf Div</td>
<td>29005H000</td>
<td>See A Below</td>
<td>See B Below</td>
<td>Division Support Command</td>
<td>Division &amp; Brigade Support Areas</td>
<td>All Classes of Supply, Operate ATP, Motor Transport for Division Assets</td>
<td>27 - 500 Gal Collapsible Drums</td>
<td>6 - 10,000 Collapsible Tanks</td>
<td>16 - 5,000 Gal Semitrailers</td>
<td>5 - FAE's</td>
</tr>
</tbody>
</table>

A. MISSION: To provide combat service support, commensurate with stated capabilities, to all organic and attached elements of the division.

B. CAPABILITIES:

1. Division and brigade supply and distribution points for receipt, temporary storage, and issue of all classes of supply for which the battalion has been assigned responsibility.
2. Ground transportation for unit distribution of supplies for which the battalion is responsible and supplemental transportation in support of organic elements of the division.
3. Maintenance of and transportation for moving the division reserve supplies for which the battalion is responsible.
4. Unclassified map supply service to the division and attached units.
5. Salvage service for materiel and supplies except ammunition, explosives, toxic agents and radioactive materials, vehicles, aircraft, COMSEC supplies, and medical supplies.
6. The command and control headquarters for the Supply and Transport Battalion's organic and attached units.
7. Brigade ammunition transfer points (ATP).
8. Emergency water distribution when supported units are unable to pick up water from water points.
9. When augmented, the unit provides clothing exchange and bath (CEB), graves registration and a central issue facility.

C. DOCTRINE:

The following doctrinal publications are applicable to the operation of this battalion:

- FM 10-24, Ration Breakdown Point Operations.
- FM 10-30, Central Issue Facility.
- FM 10-70, Inspecting and Testing Petroleum Products.
- FM 29-50, Supply and Services in Division and Separate Brigade.
- FM 55-31, Army Motor Transport Units.
- FM 100-10, Combat Service Support.
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<tr>
<td>5th BN, Inf Div.</td>
<td>29065000</td>
<td>See A Below</td>
<td>See B Below</td>
<td>DISCOM, Inf Div (Mech)</td>
<td>One Per DISCOM</td>
<td>Division &amp; Brigade Support Areas</td>
<td>All Classes of Supply Bde ATP's</td>
<td>27 - 500 Gal Collapsible Drums</td>
<td>29 - 5000 Gal Semitrailers</td>
<td>5 - FARE's 2 - FSSP's</td>
</tr>
</tbody>
</table>

A. MISSION: To provide combat service support, commensurate with stated capabilities, to all organic and attached elements of the division.

B. CAPABILITIES: This unit provides:

1. Division and brigade supply and distribution points for receipt, temporary storage, and issue of all classes of supply for which the battalion has been assigned responsibility.
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9. When augmented, the unit provides clothing exchange and bath (CEB), graves registration and a central issue facility.

C. DOCTRINE:

The following doctrinal publications are applicable to the operations of this unit:

- FM 10-24, Ration Breakdown Point Operations.
- FM 10-30, Central Issue Facility.
- FM 10-70, Inspecting and Testing Petroleum Products.
- FM 29-50, Supply and Services in Divisions and Separate Brigades.
- FM 55-31, Army Motor Transport Units.
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<th>LINE HAUL CAPABILITY</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation Medium Truck Co. (Petroleum)</td>
<td><strong>5501B6620</strong></td>
<td>See A Below</td>
<td>See B Below</td>
<td>Normally Attached to Petrol Supply Bn</td>
<td>One Per the Requirement to line haul (*450,000) or (**225,000) Gallons of Bulk POL</td>
<td>Division, Corps or Theater Army Support Area</td>
<td>Line-haul and Local Transportation of Bulk POL</td>
<td>None</td>
<td>80 - 5000 Gal Semitrailers</td>
<td><em>178 personel</em>*</td>
</tr>
</tbody>
</table>

A. MISSION: To provide transportation for the movement of bulk petroleum products by motor transport.

B. CAPABILITIES:

1. Operating two shifts with 75% vehicle availability (45 semitrailer combinations). Four round trips per day (two per operating shift) in local hauls or two round trips per day (one per operating shift) in line hauls, has the following capabilities:

   When equipped with 5000-gallon tank, fuel semitrailer (SRC 5501B6620): *
   1. Local Hauls - 900,000 gallons
   2. Line Hauls - 450,000 gallons

2. Operating one shift with 75% vehicle availability (45 semitrailer combinations), two round trips per day (per one operating shift) in local hauls or one round trip per day (per one operating shift) in line hauls, has the following capabilities:

   When equipped with 5000-gallon tank, fuel semitrailer (SRC 5501B6650): **
   1. Local Hauls - 450,000 gallons
   2. Line Hauls - 225,000 gallons

C. DOCTRINE:

The following doctrinal publications are applicable to the operation of this unit:

- FM 55-31, Army Motor Transport Units Equipment.

![Diagram of organizational structure](attachment:org_diagram.png)
**ORGANIZATION, MISSION AND FUNCTIONS CHART**

**POL ORGANIZATIONS WITHIN A THEATER OF OPERATIONS**

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<th>STORAGE CAPACITY CL III</th>
<th>LINE HAUL CAPABILITY CL III</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum Pipeline and Terminal Operating Co.</td>
<td>10207H300</td>
<td>See A Below</td>
<td>See B Below</td>
<td>Petroleum Pipeline and Terminal Operating Bn.</td>
<td>One Co. for One Tactical Petroleum Terminal or One Co. per 500,000 Barrel Storage Capacity and 100 Kilometers Pipeline</td>
<td>In the COMMZ at a Tactical Petroleum Terminal</td>
<td>Supports the POL Inland Distribution System</td>
<td>Operates two Tank Farms with a Total Capacity of 500,000 Barrels of Bulk POL. Can Store 45,000 Gals in Collapsible Tanks</td>
<td>Operates a Loading Facility with 52,000 Gal Capacity on a Daily Basis</td>
<td>1 - FARE 1 - FSSP 183 Personnel</td>
</tr>
</tbody>
</table>

A. MISSION: To operate military petroleum terminal and pipeline facilities for the storage and distribution of bulk petroleum products.

B. CAPABILITIES:

1. Operate petroleum terminal facilities for the receipt, storage, bulk transfer, issue and distribution of petroleum products to include:
   
   A. Operation of a tank farm complex for storage of 100,000 to 500,000 barrels of bulk petroleum depending upon capacity and type of storage facilities available. The complex of two tank farms, each with a capacity ranging from 50,000 to 250,000 barrels, and
   
   B. Operation of loading facilities for shipment of products by coastal tanker, barge, rail tank cars and tank trucks based on 75% availability of organic vehicles, provides for local delivery of 52,000 gallons of bulk products daily, and
   
   C. Limited bulk reduction capabilities and local delivery of packaged products.

2. Operates four pump stations for delivery of bulk petroleum via six or eight-inch multiproduct pipeline. On level terrain, this constitutes the operation of approximately 100 kilometers (60 miles) of pipeline.

3. Maintains a prescribed reserve of bulk petroleum products for the theater.

4. Provides storage for 45,000 gallons of bulk fuel in collapsible tanks, based on a 75% in-service available storage capacity.

5. Has capacity to operate a tactical marine petroleum terminal.

C. DOCTRINE:

The following doctrinal publications are applicable to the operation of this unit:

- FM 10-18, Petroleum Terminal and Pipeline Operations.
- FM 10-20, Organizational Maintenance-Military Petroleum Pipeline, Tanks and Related Equipment.
- FM 10-69, Petroleum Supply Point Equipment and Operations.
- FM 5-343, Military Petroleum Pipeline Systems.
### Organization, Mission and Functions Chart

#### POL Organizations Within a Theater of Operations

<table>
<thead>
<tr>
<th>Organization</th>
<th>TOAE #</th>
<th>Mission</th>
<th>Functions/Capabilities</th>
<th>Parent Organization</th>
<th>Basis of Allocation</th>
<th>General Location</th>
<th>Support (Type &amp; Unit)</th>
<th>Storage Capacity CL III</th>
<th>Line Haul Capability CL III</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply &amp; Service Co., Direct Support Non-divisional</td>
<td>29147H520</td>
<td>See A Below</td>
<td>See B Below</td>
<td>Corps or Theater Army Support Command</td>
<td>Variable Mission Dependent (1 Unit/15,000 Troops)</td>
<td>Division, Corps, or Theater Army Support Area</td>
<td>CL 1, II, III, IV &amp; VII Supplies</td>
<td>100,000 Gals Per Day</td>
<td>9 - 5000 Gal Semitrailers</td>
<td>2 - FSSP's 284 Personnel</td>
</tr>
</tbody>
</table>

A. MISSION: To operate a direct supply and service facility in support of non-divisional troops.

B. CAPABILITIES:

1. When organized under TOE 29147H520: Requisitioning, receiving, storing and issuing 40.725 short tons of Class I supplies; 52.275 short tons of Class II supplies; 9.75 short tons of Class III (packaged) supplies; 63.75 short tons of Class IV supplies (less operational project supplies); 20.08 short tons of Class VII supplies.

2. Class III POL storage and distribution based on 83% availability of tanks and 75% availability of fuel dispensing trucks and fuel servicing trailers.
   - Storing 100,000 gallons of bulk petroleum a day.
   - Distributing 81,900 gallons of bulk petroleum a day.
   - Gravel registration: 50 remains handled per month.
   - One-half pound of fresh bread per man per day for 15,000 troops per day.
   - Bulk laundry service at the rate 6 pounds of laundry per man per week for 15,000 non-divisional troops.
   - Bath and clothing exchange service for 15,000 non-divisional troops per week.
   - Potable water support as follows:
     - On a 2-shift basis, produces 180,000 gallons of potable water per day at up to six locations.
     - Treats nuclear, chemical, biological (NBC) contaminated water at a rate of 180,000 gallons per hour (GPH) when augmentation equipment is provided.

C. DOCTRINE:

The following doctrinal publications are applicable to the operation of this unit:

- FM 10-60, Subsistence Supply and Management in Theater of Operations.
- FM 10-68, Aircraft Refueling.
- FM 10-70, inspecting and Testing Petroleum Products.
- FM 10-267, General Repair for Clothing and Textiles.
- FM 29-147, Supply and Service Company, Direct Support.
- FM 38-741, DS Support Unit Storage Operations.
- FM 54-7, Theater Army Logistics.
- FM 54-9, Corps Support Command.
### ORGANIZATION, MISSION AND FUNCTIONS CHART

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</thead>
<tbody>
<tr>
<td>HHD, Petroleum Group</td>
<td>10202H200</td>
<td>See A Below</td>
<td>See B Below</td>
<td>Theater Army or Corps Support Command</td>
<td>One per Theater Army or Independent Corps</td>
<td>Theater Army or Corps Support Area</td>
<td>Provides Command and Control for all Theater/ Corps POL Units</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

A. MISSION: To plan and manage petroleum distribution for the theater to provide liaison to host nation staffs for coordination of petroleum logistics support and command of interzonal pipelines to command and control assigned and attached units.

B. CAPABILITIES:

1. Provides command, administrative, technical, and operational supervision for petroleum pipeline and terminal operating battalions and other assigned or attached units required for the operation and maintenance of international military petroleum distribution systems.
2. Conducts operational planning for the development, rehabilitation, and extension of the petroleum distribution system(s).
3. Coordinates requirements for construction, rehabilitation and maintenance of POL facilities with the Engineer Command.
4. Establishes and manages theater petroleum quality surveillance program.
5. Develops detailed plans for receipt, storage, and distribution of petroleum.
6. Conducts liaison with host nation staffs for coordination of US/Allied distribution support.

C. The following organizations may be assigned or attached to this headquarters:

1. TOE 10-206, Headquarters and Headquarters Company Petroleum Pipeline and Terminal Operating Battalion.
2. TOE 10-207, Petroleum Pipeline and Terminal Operating Company.
3. TOE 55-16, Headquarters and Headquarters Detachment, Transportation Motor Transport Battalion.
4. TOE 55-18, Transportation Medium Truck Company.
5. TOE 10-226, Headquarters and Headquarters Detachment, Petroleum Supply Battalion.
6. TOE 10-227, Petroleum Supply Company.

D. DOCTRINE: The following doctrinal publications are applicable to the operation of this unit:
FM 100-10, Combat Service Supply.
FM 100-16, Echelons Above Corps.

---

**Diagram:**

- **CORPS**
- **MCC**
- **GOSCOM**
- **NMC**
- **PETROL GP**
- **SPT GP**
- **SUP & SVC BN**
- **SUP & SVC CO (D&F)**
- **PETROL TANK CO**
- **TRANSPORTATION**
- **PETROL SUP CO**
- **PETROL TANK CO (PETROL)**
- **PETROL TANK CO (PETROL)**
### ORGANIZATION, MISSION AND FUNCTIONS CHART

#### POL ORGANIZATIONS WITHIN A THEATER OF OPERATIONS

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>TOAE #</th>
<th>MISSION</th>
<th>FUNCTIONS/ CAPABILITIES</th>
<th>PARENT ORGANIZATION</th>
<th>BASIS OF ALLOCATION</th>
<th>GENERAL LOCATION</th>
<th>SUPPORT (TYPE &amp; UNIT)</th>
<th>STORAGE CAPACITY CL III</th>
<th>LINE HAUL CAPABILITY CL III</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrol Supply Co (LUPS)</td>
<td>1027H500</td>
<td>See A Below</td>
<td>See B Below</td>
<td>Petrol Supply Bn or COSCOM</td>
<td>**</td>
<td>Corps or Theater Army Support Area</td>
<td>Receives, Stores and Issues CL III Bulk POL</td>
<td>2,520,000 Gallons Per Day</td>
<td>1,244,558 Gallons Per Day</td>
<td>6 - FARE's</td>
</tr>
</tbody>
</table>

### A. MISSION:

1. Establish and operate temporary petroleum storage facilities for general support of divisional and non-divisional units at no more than two locations.
2. Lay, operate and retrieve petroleum hoses lines.
3. Maintain a portion of the command bulk petroleum reserve stock.

### B. CAPABILITIES:

1. Receive or issue a total of 1,244,558 gallons while maintaining a pure reserve stock.
2. Operate collapsible bulk petroleum storage facilities as follows:

#### STORAGE CAPABILITY (GALLONS) AT 100% AVAILABILITY

<table>
<thead>
<tr>
<th>COLLAPSIBLE TANKS</th>
<th>COMPANY</th>
<th>PLATOON</th>
<th>SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 Ea 10,000 Gal</td>
<td>1,800,000</td>
<td>900,000</td>
<td>300,000</td>
</tr>
<tr>
<td>24 Ea 20,000 Gal</td>
<td>480,000</td>
<td>240,000</td>
<td>80,000</td>
</tr>
<tr>
<td>24 Ea 10,000 Gal</td>
<td>240,000</td>
<td>120,000</td>
<td>40,000</td>
</tr>
</tbody>
</table>

TOTAL 2,520,000 1,260,000 420,000

*Includes a portion of the command reserve stock.

3. Store a portion of the command reserve stock up to 2,520,000 gallons.
4. Lay and operate approximately 16KM (10 miles) of collapsible hose line.
5. Provide limited mobile filling station support.
6. Establish and operate bulk Class III supply points at no more than two locations.

**a. Corps. One per armor or mechanized division Bn and one per two air-borne, air assault or infantry divisions or combinations thereof.

b. COMM2 (LR3) One per 1,244,558 gallon daily requirement or fraction thereof for issue of bulk petroleum.

### C. DOCTRINE:

The following doctrinal publications are applicable to the operation of this unit:

- FM 10-69, Petroleum Supply Point Equipment and Operations.
- FM 10-227, Petroleum Supply Company.
- Logistic Unit Productivity Study, USAOMS, Dec 83.
### ORGANIZATION, MISSION AND FUNCTIONS CHART

**POL ORGANIZATIONS WITHIN A THEATER OF OPERATIONS**

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>TOAE #</th>
<th>MISSION</th>
<th>FUNCTIONS/ CAPABILITIES</th>
<th>PARENT ORGANIZATION</th>
<th>BASIS OF ALLOCATION</th>
<th>GENERAL LOCATION</th>
<th>SUPPORT (TYPE &amp; UNIT)</th>
<th>STORAGE CAPACITY CL III</th>
<th>LINE HAUL CAPABILITY CL III</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrol Supply Co.</td>
<td>10227H500</td>
<td>See A Below</td>
<td>See B Below</td>
<td>Petrol Supply Bn</td>
<td>One Per 685,000 Gallons Daily</td>
<td>Corps or Theater Army Support Area</td>
<td>Receives, Stores</td>
<td>1,480,000 Gallons</td>
<td>8 - 5000 Gal Semitrailers</td>
<td>4 - FSSP's 4 - FARE's</td>
</tr>
</tbody>
</table>

**A. MISSION:**

1. To establish and operate temporary petroleum storage facilities for general support transfer operations in support of divisional and non-divisional units.
2. To lay, operate, and retrieve petroleum hoses.
3. To maintain a portion of the command bulk petroleum reserve stocks.

**B. CAPABILITIES:**

1. Receive and issue a total of 685,000 gallons of bulk petroleum per day.
2. Operate collapsible bulk petroleum storage facilities as follows:
   
   **STORAGE CAPABILITY (GALLONS) AT 100% AVAILABILITY**
   
<table>
<thead>
<tr>
<th>COLLapsible TANKS</th>
<th>COMPANY</th>
<th>PLATOON</th>
<th>SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Ea 50,000 Gal</td>
<td>1,200,000</td>
<td>600,000</td>
<td>300,000</td>
</tr>
<tr>
<td>28 Ea 10,000 Gal</td>
<td>280,000</td>
<td>140,000</td>
<td>70,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1,480,000</strong></td>
<td><strong>740,000</strong></td>
<td><strong>370,000</strong></td>
</tr>
</tbody>
</table>

3. Store a prescribed portion of the command petroleum reserve stock.
4. Install and operate approximately 16KM (10 miles) of collapsible hose line.
5. Provide limited mobile filling station service.
6. Establish and operate supply points at two locations.

**C. DOCTRINE:**

The following doctrinal publications are applicable to the operation of this unit:

FM 10-69, Petroleum Supply Point Equipment and Operations.
FM 10-227, Petroleum Supply Company.

![Diagram](image-url)
**A. MISSION:** To provide command administrative technical and operational supervision for the operation and maintenance of a military petroleum distribution system or portion thereof to command and control assigned and detached units.

**B. CAPABILITIES:**

1. Commands two to five petroleum pipeline and terminal operating companies. TOE 10-207, and other assigned and attached units supporting the pipeline and terminal operations.

2. Plans, controls, and supervises the operation and maintenance of a military petroleum distribution system consisting of approximately 500 kilometers (300 miles) of multiproduct petroleum pipelines and related terminal facilities.

3. Supervises a program for quality surveillance of petroleum products and

   (A) When organized under SRC 10206H400, operates a base petroleum products laboratory.

   (B) When organized under SRC 10206H420, operates a mobile petroleum products laboratory.

4. Operates a central dispatching agency to schedule and direct the flow of bulk petroleum through the multiproject military pipeline.

**C. DOCTRINE:**

The following doctrinal publications are applicable to the operation of this unit:

- FM 10-18, Petroleum Terminal and Pipeline Operations.
- FM 5-343, Military Petroleum Pipeline Systems.

---

**Table:**

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<tr>
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<th>STORAGE CAPACITY</th>
<th>LINE HAUL CAPABILITY</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHC, Petroleum Pipeline and Terminal Operating Bn.</td>
<td>10206H400</td>
<td>See A Below</td>
<td>See B Below</td>
<td>Normally Assigned to Petroleum Gp or Attached to an Independent Corps</td>
<td>One per Petroleum Port of Entry</td>
<td>Communications Zone or Theater Army or Corps Rear Area</td>
<td>Provides Command and Control for Theater or Corps POL Distribution System</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

---

**Diagram:**

- NHC (Navy Headquarter)
- BN HQ (Battalion Headquarters)
- HO CO (Headquarters and Operations Center)
- 64 SEC (Supporting Element Company)
- 67/82 SEC (Supporting Element Company)
- CO HQ (Company Headquarters)
- COMM SEC (Communications Section)
- SCY PLANE & TNG BR (Supporting Element Company Plane and Training Brigade)
- PETR FLR (Petroleum Flotation)
- PETR LAB (Petroleum Laboratory)
- PETR INHANT PLT (Petroleum Inherent Platoon)

Augmentation not included in totals.
### ORGANIZATION, MISSION AND FUNCTIONS CHART

#### POL ORGANIZATIONS WITHIN A THEATER OF OPERATIONS

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>T&amp;E #</th>
<th>MISSION</th>
<th>FUNCTIONS/</th>
<th>PARENT ORGANIZATION</th>
<th>BASIS OF</th>
<th>GENERAL LOCATION</th>
<th>SUPPORT</th>
<th>STORAGE CAPACITY</th>
<th>LINE HAUL</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>H&amp;H Det., Petrol Supply Bn.</td>
<td>10266H500</td>
<td>See A Below</td>
<td>See B Below</td>
<td>Petrol Gp or</td>
<td>One Per Two to</td>
<td>Corps or</td>
<td>Command &amp; Control</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>COSCOM</td>
<td>Six Petrol</td>
<td>Theater Army</td>
<td>&amp; Admin. Tech &amp;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Supply Companies &amp;</td>
<td>Support Area</td>
<td>Operational</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Trans Med Frk Companies (POL)</td>
<td></td>
<td>Supervision</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**A. MISSION:**

1. To provide command and control, administrative, technical and operational supervision over assigned or attached petroleum supply companies and transportation medium truck companies (petroleum).
2. Supervise the command petroleum quality surveillance program.

**B. CAPABILITIES:**

1. Commands two to six petroleum supply and medium truck companies (petroleum).
2. Plans for the storage, distribution and quality surveillance of bulk petroleum products required by divisional and nondivisional direct support (DS) units in the Corps/TAACOM areas.
3. Insures that a prescribed portion of the Corps/TAACOM petroleum reserve is maintained by attached petroleum supply units.

**C. DOCTRINE:**

The following doctrinal publications are applicable to the operation of this unit:

- FM 10-69, Petroleum Supply Point Equipment and Operations.
- FM 10-227, Petroleum Supply Company.

---

![Diagram](image-url)
A. MISSIONS:
   a. To support the division and attached units by providing Class I, II, III, IV, and VII supplies, ammunition transfer points in brigade areas, and limited salvage classification and disposal service.
   b. To provide CEB and GREG services when authorized appropriate augmentation.
   c. To operate the division central issue facility (CIF).

B. CAPABILITIES:
   When organized under SRC 10007HO00, the company:
   a. Operates supply and distribution points in the division support area and in the brigade support areas.
   b. Receives, provides temporary storage for, and issues 61.98 short tons of class I; 30.16 short tons of Class II; 11.56 short tons of Class III (packaged); 78.63 short tons of Class IV (except operational project supplies); and 39.5 short tons of Class VII supplies, except communication security (COMSEC) supplies, aircraft, automatic data processing equipment (ADPE), classified maps, and air drop equipment.
   c. Is capable of storing and issuing 73,500 gallons of Class III bulk petroleum per day.
   d. Provides salvage service for materiel and supplies of all types except COMSEC supplies, toxic agents, radioactive materials, vehicles, aircraft, ammunition and explosives, and medical supplies.
   e. Provides a nucleus for a CIF for the stockage, issue, exchange, inspection, and turn-in of organizational clothing and equipment.
   f. Coordinates and transmits requests for Class I supplies from user to the division materiel management center (DMMC).
   g. Provides emergency water distribution for supported units unable to pick up water at water points.
   h. Maintains the division reserve of supplies and equipment for which the company is responsible.
   i. Provides up to five forward area refueling equipment (FARE) filling station operations for ground vehicles.
   j. Provides ammunition transfer points in the brigade areas.

C. DOCTRINE:
   The following doctrinal publications are applicable to the operation of this unit:
   FM 10-7, Supply and Service Company, Supply and Transport Battalion.
   FM 10-60, Subsistence Supply and Management in Theaters of Operation.
   FM 10-68, Aircraft Refueling.
   FM 10-70, Inspecting and Testing Petroleum Products.
   FM 29-50, Supply and Service in Division and Separate Brigades.
## ORGANIZATION, MISSION AND FUNCTIONS CHART

### POL ORGANIZATIONS WITHIN A THEATER OF OPERATIONS

<table>
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<tr>
<th>ORGANIZATION</th>
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<th>PARENT ORGANIZATION</th>
<th>BASIS OF ALLOCATION</th>
<th>GENERAL LOCATION</th>
<th>SUPPORT (TYPE &amp; UNIT)</th>
<th>STORAGE CAPACITY CL III</th>
<th>LINE HAUL CAPABILITY CL III</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply &amp; Service Co., Direct Support (Non-divisional)</td>
<td>29147H500</td>
<td>See A Below</td>
<td>See B Below</td>
<td>Corps or Theater Army Support Command</td>
<td>Variable - Mission Dependent (1 Unit/ 8000 Troops)</td>
<td>Division, Corps, or Theater Army Support Area</td>
<td>CL I, II, III, IV &amp; VII Supplies</td>
<td>49,800 Gallons Per Day</td>
<td>Issues 39,300 Gallons Per Day</td>
<td>5 - 5000 Gal Semitrailers</td>
</tr>
</tbody>
</table>

### A. MISSION:

To operate a direct support supply and service facility in support of non-divisional troops.

### B. CAPABILITIES:

1. When organized under TOE 29147H500: Requisitioning, receiving, storing and issuing 21.72 short tons of Class I supplies; 27.88 short tons of Class II supplies; 5 short tons of Class III (packaged) supplies; 34 short tons of Class IV supplies (less operational project supplies); 10.71 short tons of Class VII supplies.

2. Class III POL storage and distribution based on 83% availability of tanks and 75% availability of fuel dispensing trucks and fuel servicing trailers.
   - Storing 49,800 gallons of bulk petroleum a day.
   - Distributing 39,300 gallons of bulk petroleum a day.

3. Graves registration: 24 remains handled per month.

4. One-half pound of fresh bread per man per day for 8,000 troops.

5. Bulk laundry service at the rate 6 pounds of laundry per man per week for 8,000 individual troops.

6. Bath and clothing exchange service for 8,000 non-divisional troops per week.

7. Potable water support as follows:
   - On a 2-shift basis, produces 120,000 gallons of potable water per day up to four locations.
   - Treats nuclear, chemical, biological (NBC) contaminated water at a rate of 12,000 gallons per hour (GPH) when augmentation equipment is provided.
   - Provides storage for 180,000 gallons of potable water.

### C. DOCTRINE:

The following doctrinal publications are applicable to the operation of this unit:

* FM 10-60, Subsistence Supply and Management in Theater of Operations.
* FM 10-68, Aircraft Refueling.
* FM 10-70, Inspecting and Testing Petroleum Products.
* FM 10-267, General Repair for Clothing and Textiles.
* FM 29-147, Supply and Service Company, Direct Support.
* FM 38-741, DS Support Unit Storage Operations.
* FM 54-7, Theater Army Logistics.
* FM 54-9, Corps Support Command.
### ORGANIZATION, MISSION AND FUNCTIONS CHART

#### POL ORGANIZATIONS WITHIN A THEATER OF OPERATIONS

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<tr>
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<th>GENERAL LOCATION</th>
<th>SUPPORT (TYPE &amp; UNIT)</th>
<th>STORAGE CAPACITY CL III</th>
<th>LINE HAUL CAPABILITY CL III</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply &amp; Service Co., S&amp;T Bn., Air Assault Div.</td>
<td>29097J000</td>
<td>See A Below</td>
<td>S&amp;T Bn, Air Assault Div.</td>
<td>One Per S&amp;T Bn, Air Assault Div.</td>
<td>Division &amp; Brigade Support Areas</td>
<td>CL I, II, III, IV, V, &amp; VII Supplies, CEB, GREG &amp; CIF Services</td>
<td>Stores &amp; Issues 317,600 Gal Per Day at 3 Different Locations</td>
<td>None</td>
<td>18 - FARE's 6 - FSSP's 186 Personnel</td>
<td></td>
</tr>
</tbody>
</table>

A. MISSION: To support the division and attached units by providing CL I, II, III, IV, V and VII supplies and to provide clothing exchange and batch service, graves registration service, and a central issue facility when authorized appropriate augmentation.

B. CAPABILITIES: This unit:

1. Operates supply and distribution points in the division support area and supports the brigade supply and distribution points.

2. Receives, provides temporary storage for and issues 60.97 short tons of Class I supplies; 29.66 short tons of Class II supplies; 11.65 short tons of Class III (packaged) supplies; 77.39 short tons of Class IV supplies (less operational project supplies); 200 to 300 short tons of Class V supplies; and 38.55 short tons of Class VII supplies (less communications security (COMSEC) supplies, aircraft, automatic data processing equipment (ADPE), airdrop equipment, and classified maps).

3. Is capable of storing and issuing 317,600 gallons of bulk petroleum per day at three different locations.

4. Provides a nucleus for a central issue facility for the storage, issue, exchange, inspection, and turn-in of organizational clothing and equipment.

5. Coordinates and transmits requests for Class I supplies from user to the division material management center (DMMC).

6. Provides emergency water distribution for supported units unable to pick up water at the water point(s).

7. Maintains the division reserve of supplies and equipment for which the company is responsible.

8. Operates six forward area refueling equipment (FARE) for refueling ground vehicles.

9. Provides bulk POL for support of forward area rearm and refuel point (FARRP).

10. Unloads and loads aircraft, clears airfields and heliports of supplies and equipment, and prepares sling loads of supplies and equipment for helicopter lift.

11. Provides a nucleus for graves registration service within the division.


13. Provides organizational maintenance of organic equipment (less CE) for communications-electronics (C-E) for Headquarters & Headquarters Detachment, TOE 29-96.

C. DOCTRINE:

The following doctrinal publications are applicable to the operation of this unit:

- **FM 10-19**, Airmobile Aviation Fuel Laboratory.
- **FM 10-30**, Central Issue Facility.
- **FM 10-68**, Aircraft Refueling.
- **FM 29-50**, Supply and Services in Divisions and Separate Brigades.
- **FM 29-96**, Supply and Service Battalion, Airmobile Division.

![Diagram](attachment:image.png)
APPENDIX B

Roster of Military POL Units
Petroleum Group

RESERVE

469th QM Group (Petroleum)
400 Wyoming Blvd. NE
Albuquerque, NM 87123
Com: 505-292-4664

475th QM Group (Petroleum)
950 New Castle Road
Farrell, PA 16121
Com: 412-981-2021

Petroleum Pipeline & Terminal Operating Battalion

ACTIVE ARMY

240th Petroleum Pipeline & Terminal Operating Bn
Building 9203
Fort Lee, VA 23801
AV: 687-4012

RESERVE

259th Petroleum Pipeline & Terminal Operating Bn
635 South Locust Avenue
Pleasant Grove, UT 84062
Com: 801-225-6073/328-4727

383rd Petroleum Pipeline & Terminal Operating Bn
301 Ascarate Park Road
El Paso, TX 79905
Com: 915-772-3238

Petroleum Supply Battalion

ACTIVE ARMY

260th Petroleum Supply Bn
Hunter Army Airfield, GA 31409
AV: 971-5143/5144/5145

RESERVE

316th Petroleum Supply Bn
Drawer E
Steigler, OK 74462
Com: 918-967-3321

319th Petroleum Supply Bn
25445 Harvard Road
Cleveland, OH 44122
Com: 216-464-8724

325th Petroleum Supply Bn
Building 330
Richards Gebaur AFB, MO 64030
Com: 816-348-2227/2326
362nd Petroleum Supply Bn
Rt. 7, Box 89-E
Kinston, NC 28501
Com: 919-522-0001

372d Petroleum Supply Bn
400 Wyoming Blvd. NE
Albuquerque, NM 87123
Com: 505-292-4667

402d Petroleum Supply Bn
950 New Castle Road
Farrell, PA 16121
Com: 412-981-9933

NATIONAL GUARD

30th Petroleum Supply Bn
P. O. Box 190
Tullahoma, TN 37388
Com: 615-455-0656

150th Petroleum Supply Bn
P. O. Box 4098
Meridian, MS 38301
AV: 363-9287

540th Petroleum Supply Bn
P. O. Box 1830
Lenoir, NC 28645
Com: 704-754-2876

1120th Petroleum Supply Bn
1614 W. Roosevelt Street
Phoenix, AZ 85007
Com: 602-225-4891

Petroleum Pipeline & Terminal Operating Company

ACTIVE ARMY

109th Petroleum Pipeline & Terminal Operating Co.
Building 9303
Fort Lee, VA 23801
AV: 687-2751/2491

267th Petroleum Pipeline & Terminal Operating Co.
Building 9302
Fort Lee, VA 23801
AV: 687-2128

549th Petroleum Pipeline & Terminal Operating Co.
Fort Story, VA 23459
AV: 927-9652/9692/9632

RESERVE

173d Petroleum Pipeline & Terminal Operating Co.
P. O. Box 1380
Greenwood, MS 38930
Com: 601-453-1865
347th Petroleum Pipeline & Terminal Operating Co.
950 New Castle Road
Farrell, PA 16121
Com: 412-981-2021

380th Petroleum Pipeline & Terminal Operating Co.
2900 Division Street
Evansville, IN 47714
Com: 812-476-1357

417th Petroleum Pipeline & Terminal Operating Co.
Armor Drive & Hazzard Street
Scottsburg, IN 47170
Com: 812-752-3665

646th Petroleum Pipeline & Terminal Operating Co.
P. O. Box 626/Kingston Road
Kingwood, WV 26537
Com: 304-329-1680

Petroleum Supply Company

ACTIVE ARMY

53d Petroleum Supply Company
Fort Hood, TX 76544
AV: 737-1310

102th Petroleum Supply Company
Fort Campbell, KY 42223
AV: 635-3029/5190

108th Petroleum Supply Company
Fort Rucker, AL 33662
AV: 558-2505/5493/3590

110th Petroleum Supply Company
Hunter Army Airfield, GA 31409
AV: 971-5143

RESERVE

104th Petroleum Supply Company
13th & Richey Streets, Box 829
Artesia, NM 88210
Com: 505-746-3791

175th Petroleum Supply Company
450 Pennsylvania Avenue
Delaware, OH 43015
Com: 614-369-3264

192d Petroleum Supply Company
1119 W. Mason Road
Milan, OH 44846
Com: 419-359-1317

277th Petroleum Supply Company
9400 Porter Road
Niagra Falls, NY 14304
Com: 716-694-6642
352d Petroleum Supply Company
206 Park Avenue
Oil City, PA 16301
Com: 814-676-9521

377th Petroleum Supply Company
212 N. Victory Drive
Tifton, GA 31794
Com: 912-382-7412

387th Petroleum Supply Company
2408 East Main Street
Danville, IN 61832
Com: 217-446-7114

425th Petroleum Supply Company
11th & Pen Streets
Jeffersonville, IN 41730
Com: 812-288-3254

439th Petroleum Supply Company
200 Wintergreen Avenue
New Haven, CT 06515
Com: 203-387-4357

444th Petroleum Supply Company
P. O. Box 3008
Warren, OH 44485
Com: 216-394-9409

449th Petroleum Supply Company
Building 131
Fort Douglas, UT 84113
AV: 924-5964
Com: 801-582-1441

475th Petroleum Supply Company
150 Janet Street
Beaver Falls, PA 15010
Com: 412-846-2810

786th Petroleum Supply Company
1355 North 2nd West
Provo, UT 84604
Com: 801-374-0288

842th Petroleum Supply Company
1325 North 78th Street
Kansas City, KS 66112
Com: 913-299-6030

858th Petroleum Supply Company
950 New Castle Road
Farrell, PA 16121
Com: 412-981-2021

894th Petroleum Supply Company
4350 South Drive
Jackson, MS 39209
Com: 601-355-3327

900th Petroleum Supply Company
301 Ascarate Park Road
El Paso, TX 79905
Com: 915-772-3238
941st Petroleum Supply Company  
P. O. Box 7601  
Ponce, PR 00732  
Com: 809-840-4165/842-4165

Petroleum Lab (Mobile)

RESERVE

401st Petroleum Lab (Mobile)  
1020 Sandy Street  
Norristown, PA 19401  
Com: 215-279-0232

690th Petroleum Lab (Mobile)  
2900 Division Street  
Evansville, IN 47714  
Com: 812-476-1357

935th Petroleum Lab (Mobile)  
2300 Tenth Street  
Lake Charles, LA 70601  
Com: 318-439-9000/9009

Petroleum Medium Truck Company

ACTIVE ARMY

40th Petroleum Medium Truck Company  
APO New York 09166  
AV: 434-8264/7123

109th Petroleum Medium Truck Company  
APO New York 09166  
AV: 434-8109/7113

360th Petroleum Medium Truck Company  
Fort Carson, CO 80913  
AV: 691-2927/2837

416th Petroleum Medium Truck Company  
Fort Rucker, AL 33662  
AV: 558-4307/5596

418th Petroleum Medium Truck Company  
Fort Hood, TX 76544  
AV: 737-5041/7469

541st Petroleum Medium Truck Company  
Fort Campbell, KY 44223  
AV: 635-7606

RESERVES

182d Petroleum Medium Truck Company  
901 Airport Access Road  
Traverse City, MI 49684  
Com: 616-946-6756
281st Petroleum Medium Truck Company
1300 W. Brown Road
Las Cruces, NM  88004  Com:  505-526-6321

296th Petroleum Medium Truck Company
917 Highway 51 North
Brookhaven, MS  39601  Com:  601-833-6101

298th Petroleum Medium Truck Company
1545 Airport Road
Franklin, PA  16323  Com:  814-432-5422

419th Petroleum Medium Truck Company
4550 South 1300 East
Salt Lake City, UT  84117  Com:  801-266-2749

425th Petroleum Medium Truck Company
1700 South Broadway
Salina, KS  67401  Com:  913-827-2302

495th Petroleum Medium Truck Company
905 North Ingraham Avenue
Lakeland, FL  33801  Com:  813-687-8700

656th Petroleum Medium Truck Company
1515 West High Street
Springfield, OH  45506  Com:  513-323-1088

705th Petroleum Medium Truck Company
38 North Woodman Drive
Dayton, OH  45431

724th Petroleum Medium Truck Company
1429 Northmoor Road
Peoria, IL  61614  Com:  309-691-3411

737th Petroleum Medium Truck Company
Route 3, Box 706B
Yakima, WA  98901  Com:  509-575-6880

773rd Petroleum Medium Truck Company
180 High Street
Fairfield, CT  06430  Com:  203-259-7819

920th Petroleum Medium Truck Company
1 Chapel Avenue
Jersey City, NJ  07305  AV:  247-6269
Com:  201-333-0360

941st Petroleum Medium Truck Company
P. O. Box 9188
Charleston, SC  29410  AV:  794-2924/2925
NATIONAL GUARD

222d Petroleum Medium Truck Company
1614 West Roosevelt Street
Phoenix, AZ 85007 Com: 602-225-5134

319th Petroleum Medium Truck Company
3311 Wrightsboro Road
Augusta, GA 30909 Com: 404-736-0265

781st Petroleum Medium Truck Company
P. O. Drawer M
Fort Deposit, AL 36032 Com: 205-227-4346

786th Petroleum Medium Truck Company
P. O. Box 587
Luceedale, MS 39452 Com: 601-947-2751

1032d Petroleum Medium Truck Company
2100 East Shawnee Avenue
Big Stone Gap, VA 24219 Com: 703-523-1330

1148th Petroleum Medium Truck Company
P. O. Box 3509
Augusta, GA 30904 Com: 404-733-1050

1174th Petroleum Medium Truck Company
P. O. Box 260
Dresden, TN 38225 Com: 901-364-3691

1450th Petroleum Medium Truck Company
P. O. Box 623
Jefferson, NC 28640 Com: 919-982-3777

2222d Petroleum Medium Truck Company
P. O. Box 66
Douglas, AZ 85607 Com: 602-364-3931
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References
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700-80 Logistics
701-58 Planning Logistic Support for Military Operations

Technical Manuals

5-343 Military Petroleum Pipeline Systems
5-678 Repair & Utilities: POL
5-848-2 Storage, Distributing & Dispensing Aircraft & Automobile Fuels

Supply Bulletins

710-2 Supply Control: Combat Rates for Ground and Aviation POL Products

TO&E's

5-115E000 Engineer Construction Battalion
5-177H400 Engineer Pipeline Construction Support Company
10-7H000 Supply & Service Company, Supply & Transport Battalion, AIM
10-202H200 Headquarters & Headquarters Petroleum Group
10-206H400 Headquarters & Headquarters Petroleum Pipeline & Terminal Operating Battalion
10-207H300 Petroleum Pipeline & Terminal Operating Company
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Petroleum Supply Company

10-560H6JA  
Petroleum Supply & Operation Teams

29-1H000  
DISCOM, Infantry Division

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29-21H000  
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29-41H000  
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Supply & Transport Battalion, DISCOM, Mechanized Division

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29-95J000  
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29-97J000  
Main Supply & Service Company, Supply & Transport Battalion, Air Assault Division

29-118H100  
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29-147H500  
Supply & Service Company (Non-Divisional)

55-18H610  
Transportation Medium Truck Company (POL)

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703-1 w/Ch 3  
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Supply Policies Below Wholesale Level

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1135  
Introduction of Fuels, Lubricants and Oils in NATO

2924  
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Forward Area Refueling Equipment
Program of Instruction (POI)


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