

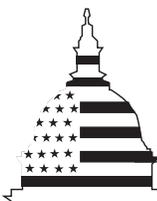
GAO

Report to the Chairman and
Ranking Minority Member,
Committee on Environment and
Public Works, U.S. Senate

January 2003

ENVIRONMENTAL PROTECTION

Information on the Purchase, Use, and Disposal of Engine Lubricating Oil



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ENVIRONMENTAL PROTECTION

Information on the Purchase, Use, and Disposal of Engine Lubricating Oil

Highlights of [GAO-03-340](#), a report to the Chairman and Ranking Minority Member, Committee on Environment and Public Works, U.S. Senate

Why GAO Did This Study

Concerned with the time, money, and resources that the federal government expends servicing its vehicle and engine fleet, the Committee asked GAO to compile information on the government's use of engine lubricating oil.

GAO was asked to determine:

- How much engine lubricating oil the federal government bought in fiscal years 1999, 2000, and 2001;
- What costs are incurred for the disposal and recycling of engine lubricating oil;
- What costs are incurred for changing motor oil in military and civilian fleets;
- What logistical implications exist for the transport of engine lubricating oil during recent military operations; and
- What options exist for reducing purchase, maintenance, and disposal costs for engine lubricating oil.

To conduct its study, GAO focused on three agencies that account for 79 percent of all non-tactical vehicles owned or leased by the U.S. government: the U.S. Postal Service (USPS), the Department of Defense (DOD), and the General Services Administration (GSA). It compiled information only on engine lubricating oil used in ground vehicles and equipment and not in aircraft and ships.

www.gao.gov/cgi-bin/getrpt?GAO-03-340.

To view the full report, including the scope and methodology, click on the link above. For more information, contact William M. Solis at (202) 512-8365 or solisw@gao.gov.

What GAO Found

There is no aggregate data on the purchase, use, and disposal of engine lubricating oil for the federal government as a whole. However, the three agencies included in GAO's review—USPS, DOD, and GSA—collectively bought nearly 41 million quarts of engine lubricating oil, valued at about \$37.3 million, from fiscal years 1999 to 2001.

Only limited data is available on the costs for disposing and recycling engine lubricating oil used in the land-based vehicle fleets of these three agencies. The Army and Navy maintain some disposal data, but the Air Force, GSA, and USPS do not have any aggregate information available. In addition, information is not readily available on the number of labor hours and costs incurred in changing oil in the agencies' vehicles. Finally, it is difficult, if not impossible, to estimate the costs of transporting engine lubricating oil during military operations because the transportation costs depend largely on the specific scenario.

Several methods were identified for reducing the cost and use of engine lubricating oil:

- **Bypass filters**, used in conjunction with traditional oil filters, can substantially reduce the number of oil changes required by increasing the intervals between oil changes by two to ten times.
- **Synthetic lubricating oils** have the potential to increase the length of time between oil changes, reduce engine wear, and enhance the engine's operation over a greater range of temperatures.
- **Oil analysis programs** can also reduce engine oil use. These programs determine when it is time to change the oil by testing its condition in the engine rather than by following a regularly scheduled oil change based on mileage or usage.

Engine Lubricating Oil Purchases for Selected Agencies (FY 1999-2001)

Fiscal year	DOD/Military				Total	USPS	GSA	Total
	Army	Air Force	Navy	Marine Corps				
Dollars in millions								
2001	\$6.2	\$1.5	\$0.9	\$0.7	\$9.3	\$2.1	\$1.5	\$12.9
2000	6.1	1.4	1.0	0.6	9.1	2.0	1.5	12.6
1999	5.3	1.7	0.7	0.5	8.2	2.2	1.4	11.8
Total	\$17.6	\$4.6	\$2.6	\$1.8	\$26.6	\$6.3	\$4.4	\$37.3
Quarts in millions								
2001	6.4	1.7	1.0	0.8	9.9	2.1	1.4	13.4
2000	6.8	1.8	1.3	0.7	10.6	2.1	1.3	14.0
1999	6.0	2.1	1.0	0.6	9.7	2.3	1.3	13.3
Total	19.2	5.6	3.3	2.1	30.2	6.5	4.0	40.7

Source: Data and estimates provided by USPS, GSA, and DOD.

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Abbreviations

AOAP	Army Oil Analysis Program
DLA	Defense Logistics Agency
DOD	Department of Defense
GSA	General Services Administration
NCDOT	North Carolina Department of Transportation
USPS	U.S. Postal Service



United States General Accounting Office
Washington, DC 20548

January 2, 2003

The Honorable James M. Jeffords
Chairman
The Honorable Bob Smith
Ranking Minority Member
Committee on Environment and Public Works
United States Senate

As you requested, we are providing you with information on the purchase, use, and disposal of engine lubricating oil by the federal government. You were concerned about the money, time, and resources that the federal government spends servicing its vehicle and engine fleet. As agreed with your offices, our work focused, to the extent that data was available, on the following five areas:

- How much engine lubricating oil did the federal government purchase and what did those purchases cost for each of the most recent 3 fiscal years for which such information was available?
- How much in direct costs did the federal government pay for the disposal and/or recycling of engine lubricating oil in each of the most recent 3 fiscal years for which such information was available?
- How much in direct contracted costs or federal employee labor costs were incurred by the federal government for the changing of motor oil in federal civilian and military fleet engines in each of the most recent 3 fiscal years for which such information was available?
- What were the costs and other logistical implications for the transport of engine lubricating oil by the military in recent military operations such as the Persian Gulf War and peacekeeping efforts in the Balkans?
- What are options for reducing the costs of the purchase, maintenance, and disposal of engine lubricating oil, including the use of technologies that would eliminate the need for frequent oil changes?

On November 21, 2002, we provided your offices with a briefing on the results of this review, including our scope and methodology. This report transmits the briefing, which is reprinted as an appendix.

Summary

There is no aggregate data on the purchase, use, and disposal of engine lubricating oil for the federal government. The three agencies included in our review—the Department of Defense (DOD), the General Services Administration (GSA), and the U.S. Postal Service—collectively purchased about 41 million quarts of engine lubricating oil, valued at about \$37.3 million, from 1999 to 2001. DOD’s data reflects purchases that the military services made from the Defense Logistics Agency for both combat and commercial-type vehicles, but it does not include oil that the services bought from commercial vendors on the local economy.¹ DOD officials could not estimate the magnitude of these purchases from the commercial market. Because GSA does not perform oil changes itself, its data is based on estimates of the number of oil changes that commercial vendors or other federal maintenance facilities performed on the fleet. As such, the cost of the oil used in these changes cannot be identified separately from other maintenance costs. GSA’s data excludes oil changes performed on GSA vehicles by other federal agencies’ maintenance facilities. The Postal Service’s data may not include some oil purchases, such as oil bought using petty cash, and oil changes performed by commercial vendors. However, Postal Service officials estimate that the amount of purchases not captured in this data is minimal (1 percent or less).

Our work indicated that only limited data on engine oil disposal and recycling costs is available from the agencies we reviewed. The Air Force and Postal Service do not have any aggregate disposal data available for engine lubricating oil. GSA also does not have disposal data because it relies on commercial vendors or other federal maintenance facilities to change and dispose of oil. However, the Army and Navy do maintain some information on engine oil disposal. For example, the Chief of Naval Operations and the Commandant of the Marine Corps report annually on disposal and recycling costs/quantities for waste oil for Navy and Marine Corps installations. On average, the Navy and Marine Corps annually disposed of 14,741 tons and 2,892 tons of waste oil, respectively during fiscal years 1999 to 2001. The Army has disposal data for only a few selected installations from its automated hazardous materials tracking system, which has been partially fielded only as a pilot project thus far.

Our review indicated that records on actual labor hours and costs incurred for oil changes are not readily available at the three agencies we reviewed.

¹ DOD’s data includes engine lubricating oil used in internal combustion engines for ground vehicles and equipment, but does not include lubricating oil for aircraft or ship engines.

However, we noted that some data exists that would help them estimate labor hours and other costs for oil changes for selected vehicles. For example, Army officials told us that a draft Army Oil Analysis Program study includes estimated data on labor and other costs for oil changes on selected tactical vehicles. Also, GSA and Postal Service officials said they could estimate the number of oil changes for their vehicle fleets based on maintenance schedules. They could then calculate the costs for an oil change after making certain assumptions, such as the amount and cost of labor involved in making each oil change and that oil changes were actually performed as scheduled.

DOD officials told us that transportation costs for engine lubricating oil during military operations are scenario dependant and difficult, if not impossible, to determine. Typically, the military services store and transport oil to sustain them for the short term during contingency operations, usually for the first 30 days. They usually transport oil with other supplies and equipment or preposition oil supplies on ships or land overseas.

The Defense Logistics Agency (DLA) generally provides for follow-on supplies to the theater, which are requisitioned by the services as needed. DLA may transport oil to the theater from the United States or purchase it locally at overseas locations where needed, depending on the specific operation to be supported. In the case of Desert Storm, for example, DLA officials stated that some engine lubricating oil was provided by Saudi Arabia at no cost to the U.S. government, while some oil was purchased commercially by DLA from the United Kingdom.

Our limited literature search and discussions with agency officials to date have identified several options for reducing the costs of engine lubricating oil use. They are:

- **Bypass filters**, which are used in conjunction with traditional oil filters to remove smaller contaminant particles. These filters are currently in use in private industry, at the North Carolina Department of Transportation (NCDOT), and at some U.S. military locations. Studies have shown that bypass filters substantially reduce the numbers of oil changes required by increasing the intervals between oil changes from as much as 2 to 10 times. For example, in using these filters, NCDOT dump truck intervals increased from 5,000 miles to 10,000 miles and Scott Paper Company woodlands equipment intervals increased from 100 hours to 1,000 hours.

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- **Synthetic lubricating oils**, which can potentially increase the length of time between oil changes, reduce engine wear, and enhance the engine's operation over a greater range of temperatures. The Army is currently funding research in this area.
 - **Oil analysis programs**, which determine when oil changes are due based on the condition of oil samples drawn from vehicles regularly and tested in labs. Oil changes are made only when they are recommended by the lab, rather than performed on a regularly scheduled basis. Preliminary analyses performed by the Army as part of the Army Oil Analysis Program (AOAP) have indicated that the Army has saved about \$81 million in oil change costs during the past 3 fiscal years, excluding disposal costs or AOAP lab operating costs. We have not validated the study's findings or its methodology.

Scope and Methodology

To conduct our review, we obtained information on engine oil purchases, disposal, and use from three agencies that account for 79 percent of the total non-tactical vehicles owned or leased by the U.S. government—the U.S. Postal Service (35 percent); GSA (29 percent); and DOD (15 percent). We held discussions or obtained data from GSA's Federal Supply Service; U.S. Postal Service headquarters; the White House Task Force on Recycling; DOD's Offices of the Deputy Under Secretary of Defense for Logistics and Materiel Readiness and the Deputy Under Secretary of Defense for Installations and Environment; DLA's Defense Supply Center Richmond and the Defense Reutilization and Marketing Service; and several other subordinate agencies and offices in each of the military services. We did not validate any of the data provided by the selected agencies or assess the merits of the options identified for reducing the costs of engine lubricating oil use. We performed our work from August through December 2002 in accordance with generally accepted government auditing standards.

Agency Comments

In providing oral comments on the briefing slides pertaining to their agencies, GSA and Postal Service representatives stated that they agreed with the information presented. Additional comments on the material were incorporated as appropriate. DOD provided technical comments on a draft of this report, which we have also incorporated as appropriate.

We are sending copies of this report to the Chairmen and Ranking Minority Members of other Senate and House committees and

subcommittees that have jurisdiction and oversight responsibilities for DOD, GSA, and the Postal Service. We are also sending copies to the Secretary of Defense, the Administrator of GSA, the Postmaster General, and the Director of the Office of Management and Budget. Copies will also be available at no charge on our Web site at www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-8365 or e-mail me at solisw@gao.gov. Key contributors to this report were Ken Knouse, Cary Russell, Betsy Mead, and Andria Key.

A handwritten signature in black ink, appearing to read 'W. Solis', with a large, stylized initial 'W'.

William M. Solis
Director, Defense Capabilities
and Management

Appendix I: Briefing to the Senate Committee on Environment and Public Works



Information on the Purchase, Use, and Disposal of Engine Lubricating Oil

**Briefing to the Senate Committee on
Environment and Public Works**

November 21, 2002



Introduction

As you requested, we are providing information on the purchase, use, and disposal of engine lubricating oil by the federal government. You were concerned that, at this time of heightened attention to military effectiveness, government efficiency, energy security, and environmental protection, the money, time, and resources that the federal government spends servicing its vast vehicle and engine fleet are of critical importance.



Objectives

- How much engine lubricating oil did the federal government purchase and what was the cost of those purchases for each of the most recent 3 fiscal years for which such information was available?
- How much in direct costs did the federal government pay for the disposal and/or recycling of engine lubricating oil in each of the most recent 3 fiscal years for which such information was available?
- How much in direct contracted costs or federal employee labor costs were incurred by the federal government for the changing of motor oil in federal civilian and military fleet engines in each of the most recent 3 fiscal years for which such information was available?
- What were the costs and other logistical implications for the transport of engine lubricating oil by the military in recent military operations, such as the Persian Gulf War and peacekeeping efforts in the Balkans?
- What are the options for reducing the costs of the purchase, maintenance, and disposal of engine lubricating oil, including the use of technologies that would eliminate the need for frequent oil changes?



Scope and Methodology

- Focused on three agencies that account for 79 percent of the total non-tactical vehicles owned or leased by the U.S. government:
 - U.S. Postal Service (USPS) - 35 percent
 - General Services Administration (GSA) - 29 percent
 - Department of Defense (DOD) - 15 percent.
(DOD also maintains numerous tactical vehicles, which were also part of our review.)
 - Found no aggregate data on oil use available for the U.S. government as a whole.
 - Compiled data only on engine lubricating oil used in internal combustion engines for ground vehicles and equipment. Did not include lubricating oils for aircraft or ship engines.
-



Scope and Methodology

- Identified 5 different types of oil based on DOD specifications:

Description of Specification	Specification Number
Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service	ML-PRF-2104
Lubricating Oil, Automotive Engine, API Service SH	CID A-A-52039
Lubricating Oil, Heavy-Duty Diesel Engine	CID A-A-52306
Lubricating Oil, Internal Combustion Engine (Preservation & Break-In)	ML-PRF-21260
Lubricating Oil, Internal Combustion Engine, Arctic	ML-PRF-46167

Source: DOD.

- Did not validate any data provided by the selected agencies.
- Performed review from August through December 2002 in accordance with generally accepted government auditing standards.



Scope and Methodology

Held discussions and/or obtained data from the following organizations:

- GSA's Federal Supply Service
 - USPS Headquarters
 - White House Task Force on Recycling
 - DOD: Office of the Deputy Under Secretary of Defense for Logistics and Materiel Readiness, and the Office of the Deputy Under Secretary of Defense for Installations and Environment
 - Defense Logistics Agency: Defense Supply Center Richmond, and Defense Reutilization and Marketing Service
-

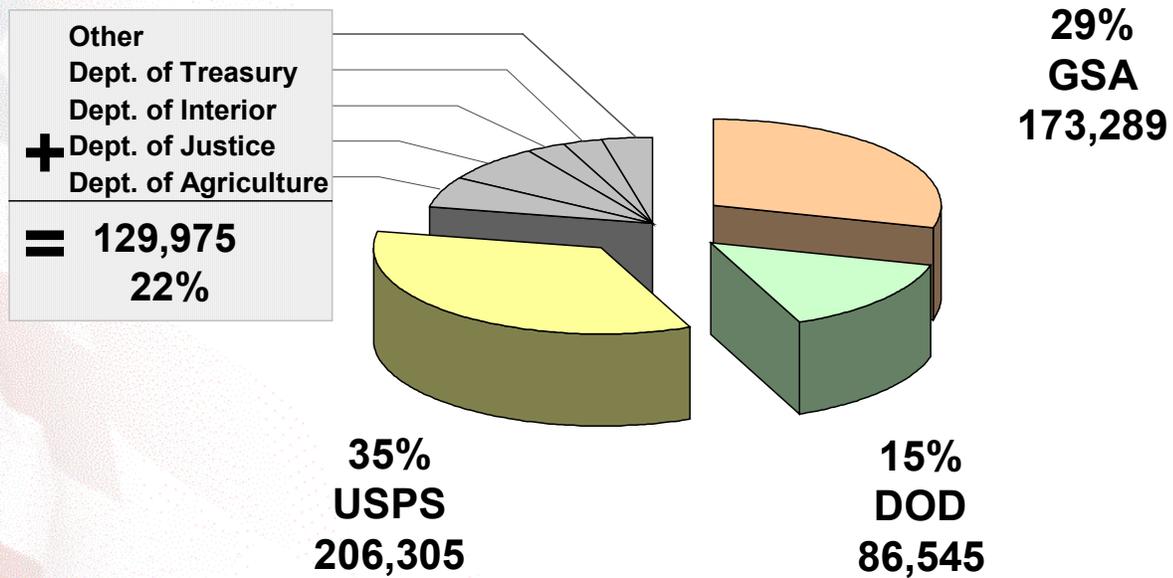


Scope and Methodology

- U.S. Army: Office of the Deputy Chief of Staff G-4, U.S. Army Materiel Command, and the U.S. Army Environmental Center
 - U.S. Air Force: Office of the Deputy Chief of Staff for Installations and Logistics, and Air Force Center for Environmental Excellence
 - U.S. Navy: Naval Facilities Engineering Command, and Naval Supply Systems Command
 - U.S. Marine Corps: Installations and Logistics Department
-



Worldwide Non-Tactical Vehicle Inventory by Federal Agency (FY 2001)

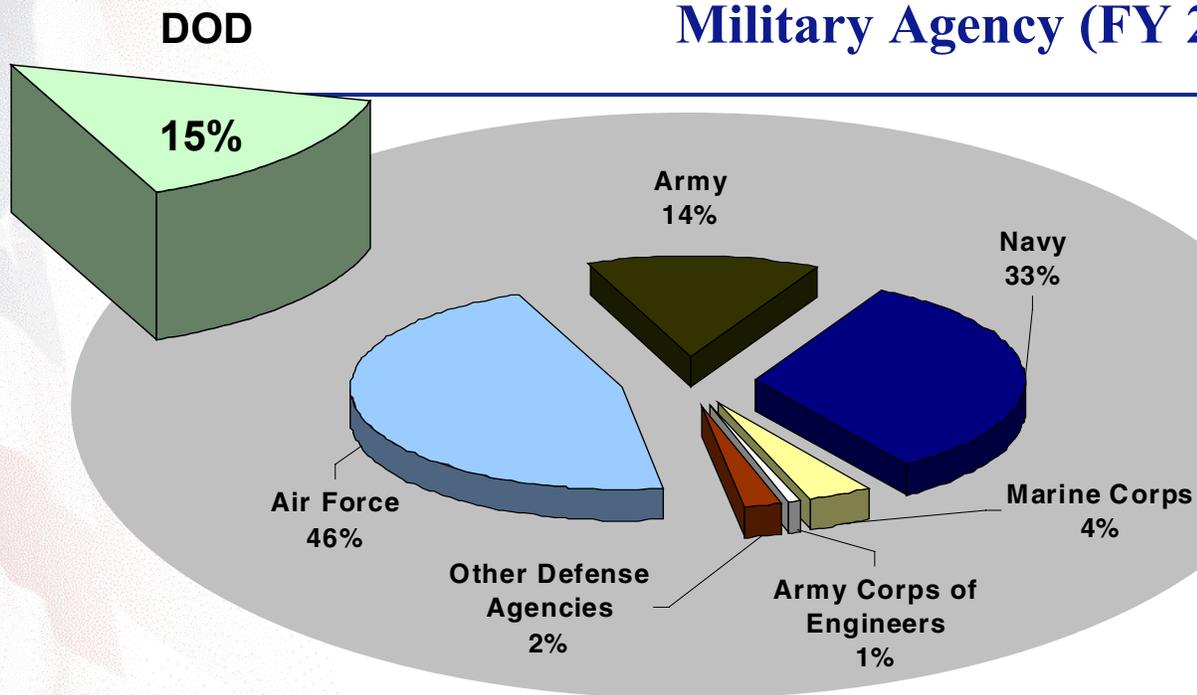


Note: Numbers may not add to 100 percent due to rounding.

Source: GSA Fiscal Year 2001 Federal Fleet Report.



DOD Non-Tactical Vehicle Usage by Military Agency (FY 2001)



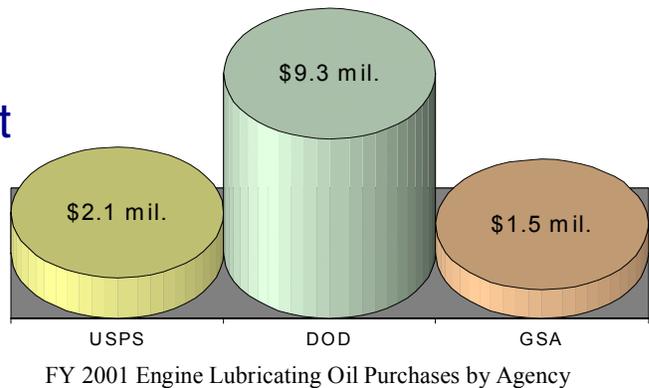
Note: Figure does not include vehicles leased from GSA. In fiscal year 2001, DOD leased 98,576 vehicles from GSA.

Source: GSA Fiscal Year 2001 Federal Fleet Report.



Engine Lubricating Oil Purchases for Selected Agencies

- DOD has fewer non-tactical vehicles than GSA and USPS. However, it also has a large number of tactical vehicles operated by the military services.
- As a result, DOD has a significantly higher amount of oil purchases.



Source: Defense Logistics Agency, U.S. Postal Service, and the General Services Administration.



Engine Lubricating Oil Purchases for Selected Agencies (FY 1999-2001)

	Fiscal Year	DOD/Military ¹					USPS ²	GSA ³	TOTAL
		Army	Air Force	Navy	Marine Corps	Total			
\$ Millions	2001	\$6.2	\$1.5	\$0.9	\$0.7	\$9.3	\$2.1	\$1.5	\$12.9
	2000	6.1	1.4	1.0	0.6	9.1	2.0	1.5	12.6
	1999	5.3	1.7	0.7	0.5	8.2	2.2	1.4	11.8
	Total	\$17.6	\$4.6	\$2.6	\$1.8	\$26.6	\$6.3	\$4.4	\$37.3
Quarts (Millions)	2001	6.4	1.7	1.0	0.8	9.9	2.1	1.4	13.4
	2000	6.8	1.8	1.3	0.7	10.6	2.1	1.3	14.0
	1999	6.0	2.1	1.0	0.6	9.7	2.3	1.3	13.3
	Total	19.2	5.6	3.3	2.1	30.2	6.5	4.0	40.7

¹DOD/military data reflects purchases made by the military services from the Defense Logistics Agency (DLA). These purchases do not include oil bought from commercial vendors by the services on the local economy. DOD officials could not estimate the magnitude of the purchases not included in the data.

²Postal Service data may not include some oil purchases, such as oil bought using petty cash and oil changes performed by commercial vendors. However, Postal Service officials believe the amount of purchases not captured in this data is minimal (1 percent or less).

³GSA data is based on estimates of the number of oil changes performed. GSA does not actually perform oil changes itself. Rather, they are performed by commercial vendors or other federal maintenance facilities. As such, the cost of the oil used in these changes cannot be identified separately from other maintenance costs. The GSA data above excludes oil changes performed on GSA vehicles by other federal agencies' maintenance facilities.

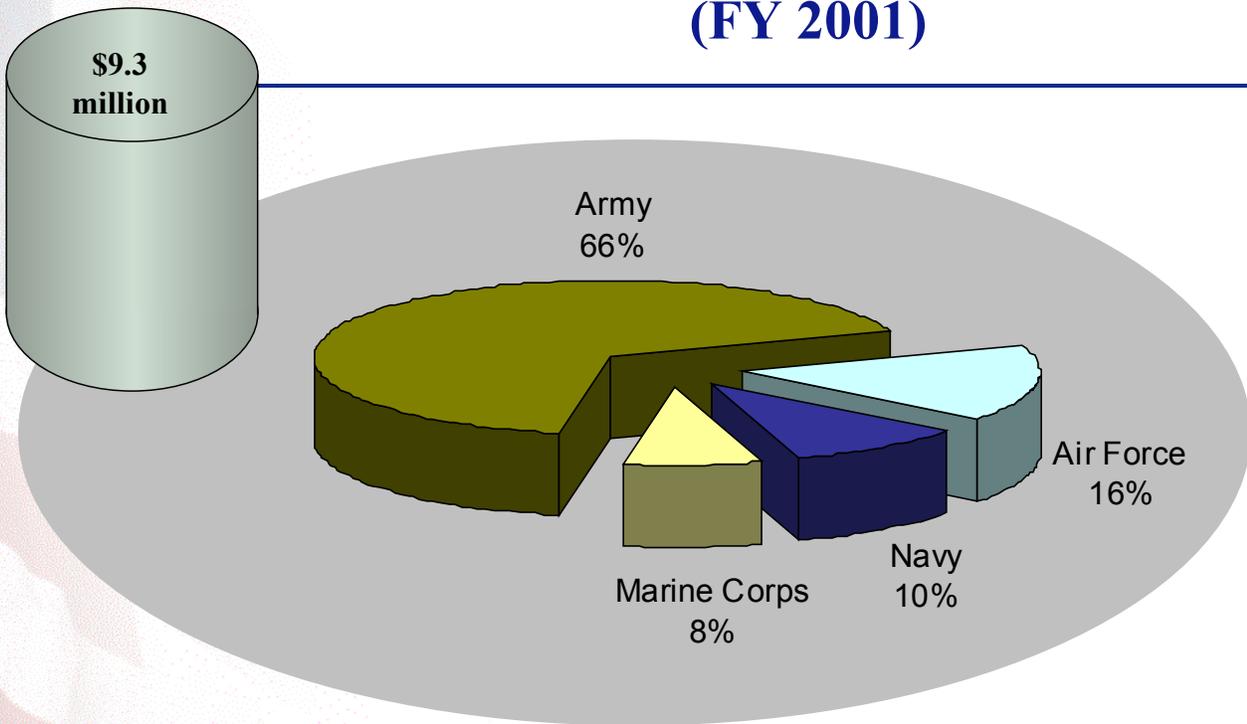
Source: Defense Logistics Agency, U.S. Postal Service, and the General Services Administration.

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DOD

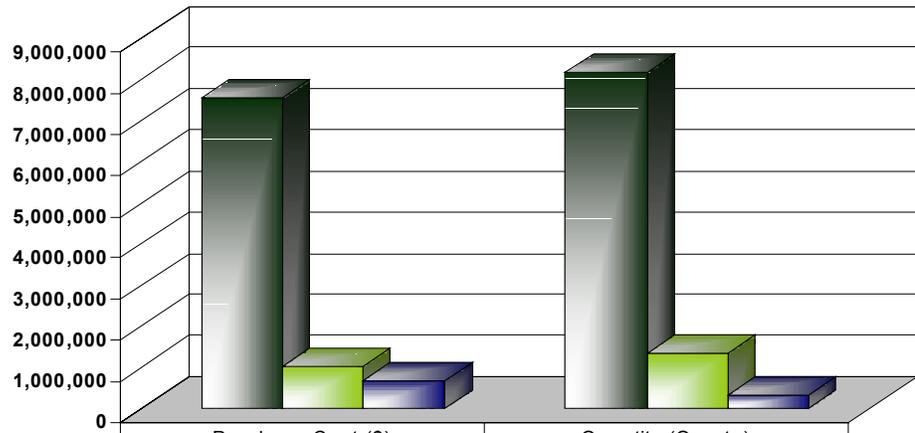
Oil Purchases by Military Service (FY 2001)



SOURCE: Defense Logistics Agency.



Military Service Purchases by Oil Type (FY 2001)



	Purchase Cost (\$)	Quantity (Quarts)
COMBAT & TACTICAL SERVICE	\$7,542,256.65	8,179,637
COMMERCIAL OILS	\$1,030,133.59	1,343,092
OTHER MILITARY APPLICATIONS	\$667,837.90	322,580

Note: Commercial oils are used in administrative use commercial type vehicles, but are also used in some tactical wheeled vehicles.

Source: Defense Logistics Agency.

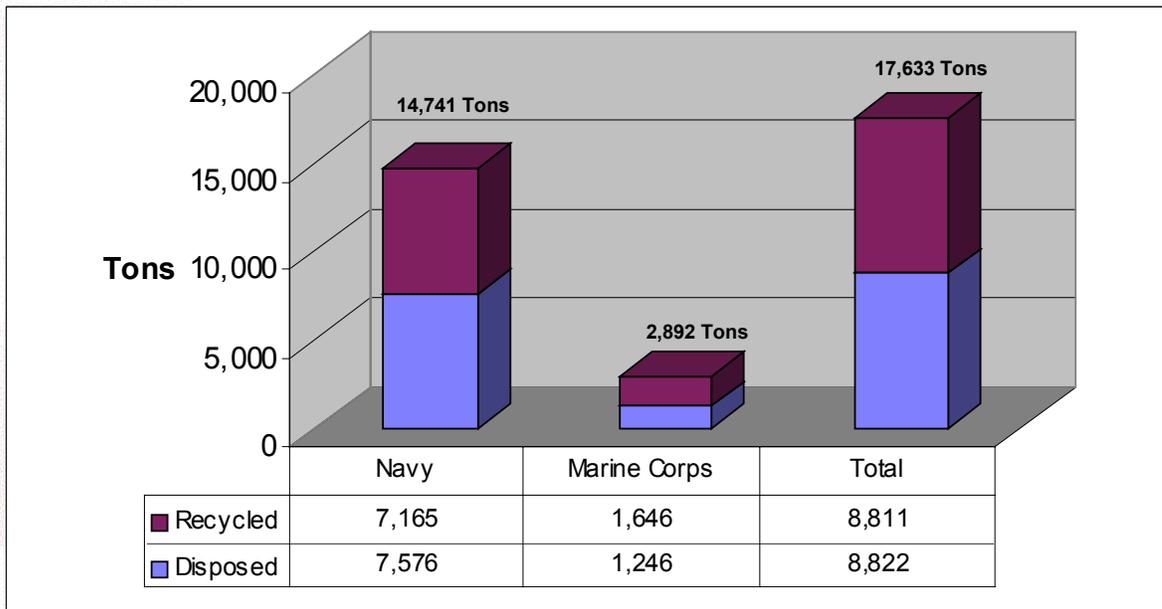


Disposal and Recycling Costs for Engine Lubricating Oil

- Only limited data is available from certain agencies.
 - Chief of Naval Operations and Commandant of the Marine Corps report annually on disposal and recycling costs/quantities for waste oil (for Navy and Marine Corps installations).
 - Army has disposal data for only a few selected installations from its automated hazardous materials tracking system (system only partially fielded as a pilot project).
 - Air Force and USPS do not have any aggregate disposal data available for engine lubricating oil. GSA also does not have disposal data because it relies on commercial vendors or other federal maintenance facilities to change and dispose of oil.



Average Annual Waste Oil Disposal/Recycling Amounts for the Navy and Marine Corps

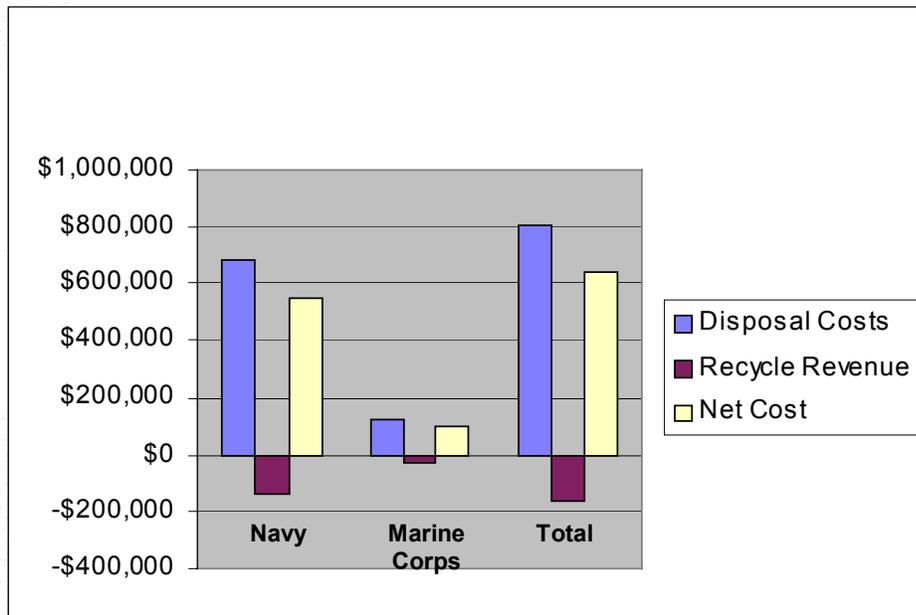


Note: Waste oil includes engine lubricating oil as well as other waste, such as transmission and hydraulic fluids.

Source: GAO analysis of Navy data for fiscal years 1999-2001.



Average Annual Waste Oil Disposal/Recycling Net Costs for the Navy and Marine Corps



Source: GAO analysis of Navy data for fiscal years 1999-2001.



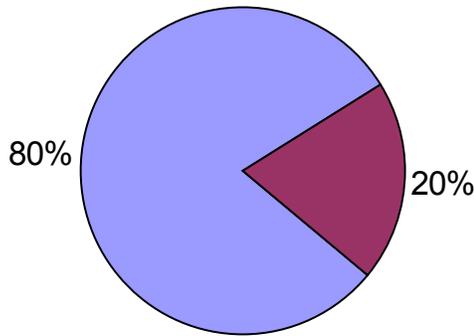
Labor and Contract Costs for Changing Engine Lubricating Oil

- Records were not readily available on actual labor hours and costs incurred for oil changes at the selected agencies.
- Potential exists for estimating labor hours and other costs for oil changes for selected vehicles. For example,
 - A draft Army Oil Analysis Program (AOAP) study includes estimated data on labor and other costs for oil changes on selected tactical vehicles. Could potentially duplicate part of study methodology to examine additional Army vehicles.
 - GSA and USPS can estimate numbers of oil changes for their vehicle fleets based on maintenance schedules. Costs for an oil change can also be estimated using assumptions about costs, such as the amount and cost of labor per change and the fact that oil changes were actually performed as scheduled.



Oil Change Costs for Selected Army Ground Vehicles from Draft AOAP Study

Percent of Total AOAP Ground Equipment Oil Samples Represented by Selected Army Vehicles (FY1999-2001)



Selected Equipment

HMMWV



M1A1/A2 Series Abrams Tank



M2/M3 Bradley Fighting Vehicle



Multiple Launch Rocket System (MLRS)



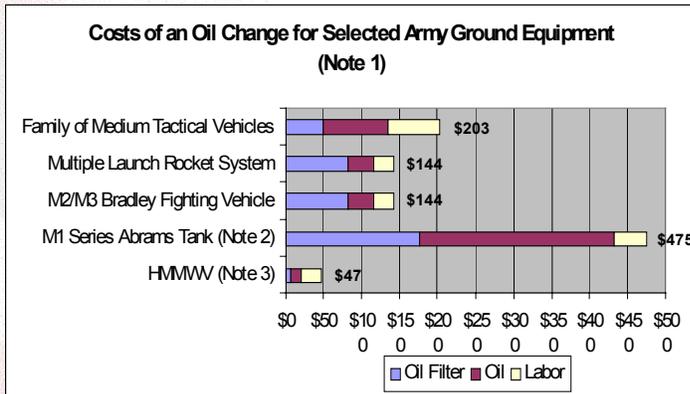
Family of Medium Tactical Vehicles (FMTV)



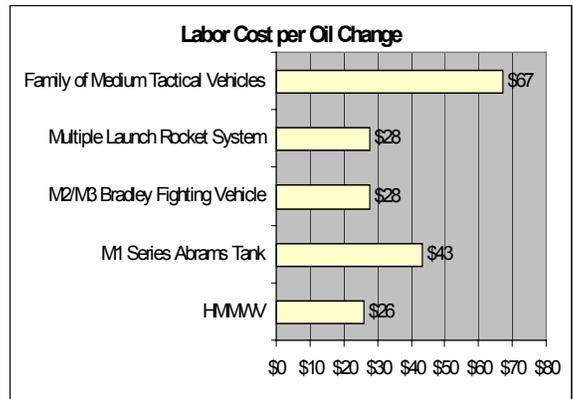
Source: GAO analysis of data from Army-sponsored study, *United States Department of Army, Army Oil Analysis Program Economic Benefits Analysis*, University of Alabama in Huntsville.



Oil Change Costs for Selected Army Ground Vehicles from Draft AOAP Study



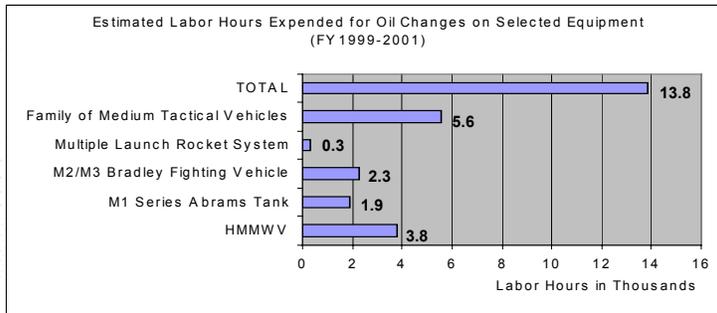
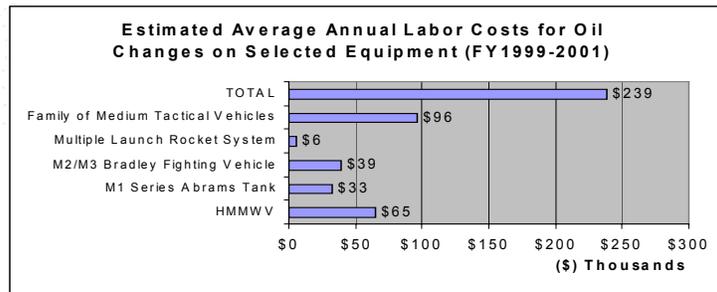
- NOTES:**
1. An oil change for the purposes of the Army study included oil for both the engine crankcase and the transmission. However, some of the vehicles also use engine lubricating oil in other vehicle components such as the steering system and the hydraulic system. Oil in these other systems is not included in this data.
 2. Total oil costs for the M1 of \$254.70 includes \$91.50 for aircraft turbine engine oil, which was not one of the oils in the scope of our review.
 3. Total oil costs for the HMMWV of \$14.52 includes \$6.36 for automatic transmission fluid, which was not one of the lubricating oils in the scope of our review.



Source: GAO analysis of data from Army-sponsored study, *United States Department of Army, Army Oil Analysis Program Economic Benefits Analysis*, University of Alabama in Huntsville.



Oil Change Costs for Selected Army Ground Vehicles from Draft AOAP Study



Source: GAO analysis of data from U.S. Army sponsored study, *United States Department of Army, Army Oil Analysis Program Economic Benefits Analysis*, University of Alabama in Huntsville.



Transportation of Oil for Military Operations

- Transportation costs for engine lubricating oil during military operations are scenario-dependant and difficult (if not impossible) to determine.
- Military services store and transport oil to sustain them for the short term during operations (usually for the first 30 days).
 - Oil is transported with other supplies and equipment, or prepositioned overseas on ships or on land.
 - Costs attributed to transporting the oil are difficult to determine.
- Defense Logistics Agency (DLA) provides for follow-on supplies to the theater, and these are requisitioned by the services as needed.
 - DLA may transport oil to theater from U.S. or purchase it locally at overseas locations where needed (dependant on specific operations).
 - For Desert Storm, some engine lubricating oil was provided by Saudi Arabia at no cost to the U.S. government, while some oil was purchased commercially by DLA from the United Kingdom.
 - Costs for transporting oil are difficult to determine because contract prices from suppliers often include transportation.



Options for Reducing Oil Cost and Use

- Our limited literature searches and discussions with agency officials have identified some methods for reducing costs of engine lubricating oil use
 - Bypass filters
 - Used in conjunction with traditional oil filters to remove smaller contaminant particles.
 - Currently in use in private industry, North Carolina Department of Transportation (NCDOT), and some U.S. military locations.
 - Studies show bypass filters significantly reduce the number of oil changes required. Increases in intervals between oil changes of 2 to 10 times have been realized.
 - NCDOT dump truck intervals increased from 5,000 miles to 10,000 miles.
 - Scott Paper Company woodlands equipment from 100 hours to 1,000 hours.
 - Synthetic lubricating oils
 - Potentially decrease number of oil changes needed. Reductions of up to two to five times versus conventional motor oil are possible.
 - Research is being funded by the Army.



Options for Reducing Oil Cost and Use

- Oil analysis programs
 - Oil analysis determines when oil changes are due based on oil condition
 - Oil samples are drawn from vehicles regularly and tested in labs.
 - Oil changes are made only when recommended by lab (as opposed to performing regularly scheduled oil changes).
 - Oil analysis used in industry and government to extend oil change intervals.
 - Trucking companies
 - U.S. military



Options for Reducing Oil Cost and Use

- A recent draft study estimates the AOAP has saved the Army over \$80 million in oil change costs during the past 3 fiscal years (not including disposal costs or AOAP lab operating costs).
 - Army uses AOAP to identify when oil changes are needed for certain vehicles and equipment.
 - Most combat and tactical equipment is covered by AOAP (aviation and ground equipment).
 - Study compared estimated costs for oil changes on vehicles enrolled in AOAP against estimated costs if AOAP were not used (i.e., oil changes based on scheduled intervals).
 - Cost estimates were based on projection of oil change costs/frequencies for 10 aviation and ground systems.
 - Draft study findings and methodology were not validated by GAO.
 - We did not assess the merits of the options identified for reducing the costs of engine lubricating oil use.
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Cost Savings Estimates from Army Oil Analysis Program (AOAP) Draft Study

Dollars in millions

	Fiscal Year 2001	Total FY99-01
Estimated Oil Change Costs Using AOAP	\$21.6	\$70.3
Estimated Oil Change Costs Without AOAP	\$47.4	\$151.6
Estimated Savings	\$25.8	\$81.3

Source: GAO analysis of data from Army-sponsored study, *United States Department of Army, Army Oil Analysis Program Economic Benefits Analysis*, University of Alabama in Huntsville.

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