

Naval  
Supply Systems  
Command

NAVSUP  
Publication 558 (Revision 1)  
December 1994 Edition

COG 01 Stock No.  
0530-LP-190-3300

---

# FUEL MANAGEMENT ASHORE



0530LP1903300



This Page Left Blank Intentionally.



**FUEL MANAGEMENT ASHORE**  
**NAVSUP Publication 558**  
**Revision 1**

**NAVY DEPARTMENT**  
**NAVAL SUPPLY SYSTEMS COMMAND**  
**1931 JEFFERSON DAVIS HIGHWAY**  
**ARLINGTON, VA 22241-5360, 21 DEC 1994**

This publication provides a consolidation of policies, guidance and direction on all aspects of fuel management ashore. Questions or comments pertaining to the information contained in this publication should be addressed to the Naval Supply Systems Command, Navy Fuel Management System (SUP 40).

Revision 1 supersedes the January 1987 Edition.

Copies may be ordered in accordance with procedures established in MILSTRIP/MILSTRAP (NAVSUP Publication 437) and in the Unabridged Navy Index of Publications and Forms (NAVSUP Publication 2002D). The COG OI Stock Number is shown on the publication cover.

**R. M. MOORE**  
**REAR ADMIRAL, SC, USN**  
**COMMANDER**

This Page Left Blank Intentionally.

PUB 558 DISTRIBUTION LIST

All activities will receive one copy unless otherwise specified.

SNDL Part I:

21A (Fleet CINCs); 23C (COMNAVRESFOR); 24A1 (COMNAVAILANT); 24A2 (COMNAVIRPAC); 24D (COMNAVSURFLANT/COMNAVSURFPAC); 27G (NAVSUPFORANTARCTICA); 42A3 (COMFAIRMED); 50A (USCINCEUR, USCINCPAC, CINCUSACOM, and USCINCCENT only)

SNDL Part II:

A3 (CNO, N41/N413/N45 only); A6 (CMC); B2A (DFAS agencies only); FA6 (NAS LANT); FA7 (NAVSTA LANT); FA46 (PWC LANT); FB6 (NAF PAC); FB7 (NAS PAC); FB10 (NAVSTA PAC); FB54 (PWC PAC); FC4 (NAF EUR); FC5 (NSA Naples only); FC7 (NAVSTA Rota); FC14 (NAS EUR); FF5 (NAVSAFECEN); FF74 (PWC CNO); FKA1A (COMNAVIAIRSYSYSCOM); FKA1B (SPAWAR); FKA1C (COMNAVFACENCOM); FKA1F (COMNAVSUPSYSYSCOM); FKA1G (COMNAVSEASYSYSCOM); FKM9 (FISC); FKM11 (FISC GUAM/ YOKOSUKA); FKM12 (NAVPEOFF); FKM13 (SPCC); FKM15 (ASO); FKM17 (FMSO); FKN1 (NAVFAC EFD); FKN7 (NFESC); FKP7 (NSY); FKR1A (NAS COMNAVIAIRSYSYSCOM); FKR6C (AIRWPNSTA); FR3 (NAS COMNAVRESFOR); FR4 (NAF Washington DC); FT2 (CNATRA); FT6 (NAS CNET); FT24 (FLETRACEN 5 copies); FT30 (SERVSCOLCOM, 5 copies); FT39 (TECH TRAINING CTR, 5 copies); FT55 (NAVSCSCOL, 5 copies); FT56 (NAVTRANSMGTSCOL Oakland, 5 copies); FT104 (PWC CNET); V5 (MCAS)

Send 5 copies to:

Advanced Petroleum & Water Division  
US Army Quartermaster School  
ATTN: Navy Representative  
Fort Lee, VA 23801-5042

Stocked at:

Naval Aviation Supply Office  
Physical Distribution Div., Code 103  
700 Robbins Avenue  
Philadelphia PA 19111-5098

This Page Left Blank Intentionally.

CHANGE RECORD

Change No.	Date	Title and/or Brief Description	Signature of Validating Ofcr

This Page Left Blank Intentionally.

## TABLE OF CONTENTS

	<u>Page</u>
<b>CHAPTER ONE: INTRODUCTION</b>	
1.1	PURPOSE..... 1-1
1.2	BACKGROUND..... 1-1
1.3	SCOPE..... 1-1
 <b>CHAPTER TWO: OPERATIONS</b>	
2.1	INTRODUCTION..... 2-1
2.2	REFERENCES..... 2-1
2.3	ORGANIZATION..... 2-2
2.3.1	Defense Fuel Support Point Personnel..... 2-2
2.3.2	Naval Air Station Personnel..... 2-4
2.3.3	Contractor Operated Naval Air Station Personnel..... 2-5
2.4	PETROLEUM OPERATIONS MANUAL CRITERIA..... 2-6
2.4.1	General Information..... 2-8
2.4.1.1	Manual Organization..... 2-8
2.4.1.2	Introduction..... 2-8
2.4.1.3	General Procedures and Guidelines..... 2-8
2.4.2	Fuel Facility Operational Procedures and Guidelines..... 2-10
2.4.2.1	Operations Orders..... 2-10
2.4.2.1.1	Specific Operations Order..... 2-10
2.4.2.1.2	Recurring Operations Order..... 2-10
2.4.2.1.3	Posting of Specific and Recurring Operations Orders..... 2-11
2.4.2.2	Standard Fuel Facility Procedures..... 2-11
2.4.2.2.1	Standard Fuel Facility Operating Procedures
2.4.2.2.2	Standard Fuel Equipment Operating Procedures..... 2-11
2.4.2.2.3	Standard Fuel Operating Procedures Documentation..... 2-12
2.4.3	Quality Surveillance Program..... 2-15
2.4.3.1	Sampling Schedules..... 2-15
2.4.3.2	Standard Laboratory Procedures..... 2-15
2.4.3.3	Standard Laboratory Test Procedures..... 2-15
2.4.3.4	Calibration Program..... 2-15
2.4.4	Preventive Maintenance and Corrective Maintenance..... 2-16
2.4.4.1	Automated Preventive Maintenance Program Procedures..... 2-16
2.4.5	Standard Operating Procedures for Emergency Response and Environmental Protection Procedures..... 2-16
2.4.6	Standard Operating Procedures for Emergency and Environmental Protection Equipment..... 2-17
2.4.7	Training and Certification Program Section..... 2-17
2.4.8	Records and Documentation..... 2-18

	<u>Page</u>	
2.4.9	Standard DOD, DLA and Navy Forms.....	2-18
2.4.10	Appendices.....	2-19
 <b>CHAPTER THREE: INVENTORY MANAGEMENT</b>		
3.1	INTRODUCTION.....	3-1
3.2	REFERENCES AND DIRECTIVES.....	3-1
3.3	DLA-OWNED PRODUCT.....	3-3
3.3.1	Accountability and Responsibility.....	3-3
3.3.2	Issue, Receipt, Order and Requisition Documents.....	3-3
3.3.3	Use of Meters for DLA-Owned Product.....	3-4
3.3.3.1	Receipts.....	3-4
3.3.3.2	Issues.....	3-5
3.3.4	Monthly Physical Inventory.....	3-5
3.3.5	Accounting for Gains/Losses (Variances)....	3-5
3.3.5.1	In-Transit Losses.....	3-6
3.3.5.2	Terminal or Operating Losses.....	3-6
3.3.5.3	Determinable Losses.....	3-6
3.3.5.4	Inventory Adjustments.....	3-7
3.3.6	Condition/Identity Changes.....	3-7
3.3.7	Defense Fuels Automated Management System (DFAMS).....	3-7
3.3.7.1	Auditable Supply Transaction System.....	3-7
3.3.7.2	DFAMS Transaction.....	3-7
3.3.7.3	Transaction Documentation.....	3-7
3.3.7.4	Transaction Reporting.....	3-7
3.3.7.5	Monthly Reconciliation.....	3-8
3.3.7.6	DFAMS Assistance.....	3-8
3.4	FUEL SUPPORT.....	3-8
3.4.1	Fuel from DFSC Facilities (DFSPs)/Contracts	
3.4.1.1	DFSP Support.....	3-9
3.4.1.2	Notification of DFSP Support.....	3-9
3.4.2	Fuel from DFSC Contracts.....	3-9
3.4.2.1	Types of Contracts.....	3-9
3.4.2.2	Notification of Contract Fuel Support.....	3-9
3.4.3	Ordering and Requisitioning.....	3-10
3.4.3.1	Post, Camp, and Station (PC&S) Contracts in CONUS.....	3-10
3.4.3.2	Bunker Contracts.....	3-11
3.4.3.3	Direct Delivery Contracts.....	3-11
3.4.3.4	Requisitions to a DFSP.....	3-11
3.4.4	Use of Meters for Navy-Owned Products.....	3-11
3.4.5	Pricing.....	3-11
3.4.6	Issue and Receipt.....	3-11
3.4.7	Inventory Management.....	3-12
3.4.8	Billing.....	3-12
3.4.9	Financial Inventory Reports and Manual Stock Record Reconciliation.....	3-13
3.5	INVENTORY ADJUSTMENT DOCUMENT (IAD).....	3-13
3.6	FUEL SURVEYS.....	3-13

	<u>Page</u>	
3.7	RECORDS, REPORTS AND PROCEDURES.....	3-14
3.7.1	Slate.....	3-14
3.7.1.1	Overseas Slate.....	3-14
3.7.1.2	CONUS Slate.....	3-14
3.7.2	Redistribution Order (RDO).....	3-14
3.7.3	Bulk Petroleum Terminal Message Report (Report Control Symbol RCS:DLA (W) 1884, DFSC-OI).....	3-15
3.8	FUEL EXCHANGE AGREEMENT (FEA).....	3-15
3.8.1	Funding.....	3-15
3.8.2	Fuel Replacement Procedures.....	3-17
3.9	BULK PETROLEUM STORAGE FACILITIES REPORT, RCS:DD-P&L(A) 506.....	3-17
3.10	INVENTORY LEVELS AND REQUIREMENTS.....	3-17
3.10.1	Peacetime Operating Stock (POS).....	3-18
3.10.2	Bulk Petroleum War Reserve Stocks (BPWRS)..	3-18
3.10.2.1	CONUS.....	3-18
3.10.2.2	Overseas.....	3-18
3.11	AUDIT PAPERWORK.....	3-18
3.12	QUANTITY MEASUREMENT.....	3-18
3.12.1	Packing Pipelines.....	3-19
3.12.2	Gauging.....	3-19
3.12.2.1	Gauging Equipment.....	3-19
3.12.2.2	Frequency of Gauging.....	3-21
3.12.2.3	Types of Gauging.....	3-22
3.12.3	Temperature Measurement.....	3-22
3.12.4	Volume Corrections.....	3-23
3.12.4.1	Tables and Strapping Charts.....	3-23
3.12.4.2	Conversion of Measured API to API Gravity at 60°F.....	3-24
3.12.4.3	Conversion of Gross Volumes to Net Volumes at 60°F.....	3-24
3.12.5	Water Cuts.....	3-24
3.12.6	Calibration of Inventory Measuring Equipment.....	3-24
 <b>CHAPTER FOUR: QUALITY SURVEILLANCE</b>		
4.1	INTRODUCTION.....	4-1
4.2	REFERENCES AND PUBLICATIONS.....	4-1
4.3	TESTING LABORATORIES.....	4-2
4.3.1	Laboratory Classification.....	4-2
4.3.2	Staffing.....	4-3
4.3.3	Technical Publications.....	4-3
4.3.4	Laboratory Responsibilities.....	4-3
4.3.5	Types/Frequency of Testing.....	4-4
4.3.6	Sampling.....	4-4
4.3.6.1	Types of Samples.....	4-5
4.3.6.2	Frequency of Sampling.....	4-5
4.3.6.3	Location of Products to be Sampled.....	4-5

	<u>Page</u>	
4.3.6.4	Size, Identification and Precautions of Sampling.....	4-5
4.3.6.5	Retention of Samples.....	4-6
4.3.7	Petroleum Laboratory Safety.....	4-6
4.4	MAINTAINING EQUIPMENT AND SUPPLIES.....	4-6
4.4.1	Procurement of Materials.....	4-6
4.4.2	Planned Replacement Program.....	4-6
4.4.3	Calibration Program.....	4-7
 <b>CHAPTER FIVE: ACTIVITY MAINTENANCE</b>		
5.1	INTRODUCTION.....	5-1
5.2	REFERENCES AND DIRECTIVES.....	5-1
5.3	PLANNED MAINTENANCE SYSTEM (PMS).....	5-2
5.3.1	Minimum Requirements.....	5-2
5.3.2	Essential Tools of PMS.....	5-3
5.3.3	PMS Schedule.....	5-4
5.3.3.1	Monthly Schedule.....	5-4
5.3.3.2	Weekly Schedule.....	5-4
5.3.3.3	Unscheduled Maintenance.....	5-4
5.3.4	PMS Action.....	5-5
5.3.5	Reporting.....	5-5
5.3.6	Equipment and Structure Maintenance History Record.....	5-6
5.3.7	Planned Maintenance System Goals.....	5-6
5.4	CORRECTIVE MAINTENANCE.....	5-6
5.4.1	Work Input Control (WIC).....	5-6
5.4.2	Priority Planning.....	5-6
5.4.3	Job Estimating.....	5-6
5.4.4	Job Scheduling.....	5-6
5.4.5	Reporting.....	5-6
5.5	STAFF CIVIL ENGINEER (SCE) ASSISTANCE.....	5-7
 <b>CHAPTER SIX: PROJECT PLANNING AND PROGRAMMING</b>		
6.1	INTRODUCTION.....	6-1
6.2	REFERENCES.....	6-1
6.3	IDENTIFYING DEFICIENCIES.....	6-2
6.3.1	Facility Inspection Program (FIP).....	6-2
6.3.2	Fuel Department Identification of Deficiencies.....	6-3
6.3.3	Identification by Other Organizations.....	6-3
6.4	DEFINITIONS.....	6-3
6.4.1	Military Construction (MILCON).....	6-3
6.4.2	Minor Construction (MC).....	6-4
6.4.3	Repair.....	6-4
6.4.4	Maintenance.....	6-4
6.4.5	Recurring Maintenance.....	6-4
6.4.6	Environmental Compliance.....	6-4
6.4.7	Maintenance, Repair and Environmental (MRE) Program.....	6-5
6.4.8	Recurring Environmental Compliance.....	6-5

	<u>Page</u>
6.4.9	DFSC Centrally Managed Programs..... 6-5
6.5	PROJECT SPONSORS..... 6-5
6.5.1	Defense Logistics Agency (DLA)/Defense Fuel Supply Center (DFSC)..... 6-6
6.5.2	Navy Sponsorship..... 6-6
6.5.3	Host Nation..... 6-7
6.5.4	Naval Supply Systems Command (NAVSUP)..... 6-7
6.5.5	Naval Facilities Engineering Command (NAVFAC)..... 6-7
6.6	DEVELOPMENT OF PROJECT DOCUMENTATION..... 6-7
6.6.1	DLA Military Construction (MILCON)..... 6-8
6.6.2	DFSC Maintenance, Repair and Environmental (MRE) Projects..... 6-8
6.6.3	Recurring Environmental Cost Program..... 6-9
6.6.4	Navy Sponsored Projects..... 6-9
6.6.5	NAVSUP Reclamation Projects..... 6-9
6.6.6	NAVFAC Sponsored Projects..... 6-9
6.7	SUBMITTAL OF PROJECT DOCUMENTATION..... 6-10
6.7.1	DLA Military Construction (MILCON)..... 6-10
6.7.2	DFSC MRE Projects..... 6-11
6.7.3	DFSC Recurring Environmental Cost Program.. 6-14
6.7.4	Submittal of Emergent Projects..... 6-14
6.7.5	Navy Sponsored Projects..... 6-14
6.7.6	NAVSUP Reclamation Program..... 6-14
6.7.7	NAVFAC Programs..... 6-14
6.8	FUNDING SUPPORT..... 6-14
6.8.1	DLA Military Construction..... 6-15
6.8.2	DFSC Maintenance, Repair and Environment... 6-15
6.8.3	Recurring Environmental Compliance..... 6-15
6.8.4	NAVSUP Reclamation Program..... 6-15
6.9	RESPONSIBILITIES OF FUEL OFFICERS AND SUPPLY DEPARTMENT OFFICERS..... 6-15
 <b>CHAPTER SEVEN: TRAINING</b>	
7.1	INTRODUCTION..... 7-1
7.2	NEW EMPLOYEE INDOCTRINATION..... 7-1
7.3	COMPETENCY BASED CERTIFICATION FOR EMPLOYEES. 7-2
7.4	PERSONNEL QUALIFICATION STANDARD (PQS)..... 7-3
7.5	RECURRING TRAINING..... 7-3
7.5.1	Monthly Stand-up Safety Meetings..... 7-3
7.5.2	Fire and Spill Control Drills..... 7-4
7.5.3	Oil Skimmer Training..... 7-4
7.5.4	Specialized Training..... 7-4
7.5.5	Review of Operations and Preventive Maintenance Procedures..... 7-5
7.6	SUPERVISORY TRAINING..... 7-5
7.7	TRAINING SCHEDULES AND RECORDS..... 7-5
7.8	AIRCRAFT REFUELER/DEFUELER DRIVER TRAINING... 7-5

	<u>Page</u>
<b>CHAPTER EIGHT: SAFETY</b>	
8.1	INTRODUCTION..... 8-1
8.2	REFERENCES AND PUBLICATIONS..... 8-1
8.3	WORKSITE ENVIRONMENT..... 8-2
8.4	TRAINING FOR A SAFETY PROGRAM..... 8-2
8.4.1	Safety Meetings and Materials..... 8-2
8.4.2	Special Hazards Session..... 8-5
8.5	PERSONNEL PROTECTION AND LIFESAVING EQUIPMENT..... 8-5
8.6	SAFETY IN THE LABORATORY..... 8-5
8.7	HAZARDS CONNECTED WITH FUEL HANDLING..... 8-8
8.7.1	Vapors..... 8-8
8.7.2	Spontaneous Ignition..... 8-8
8.7.3	Static Electricity..... 8-8
8.7.4	Petroleum Toxicity..... 8-9
8.7.4.1	Fuel Oils, Diesel Fuels, Turbine Fuels and Kerosenes..... 8-9
8.7.4.2	Gasoline and Naphtha-based Fuels..... 8-9
8.7.4.3	Fuel Additives..... 8-10
8.8	GAS-FREE ENGINEERING..... 8-11
8.8.1	Vapor-Freeing Tanks for Cleaning..... 8-11
8.8.2	Entering Confined Spaces..... 8-12
8.8.3	Hot Work..... 8-12
8.9	FIRST AID..... 8-12
<b>CHAPTER NINE: FIRE PROTECTION</b>	
9.1	INTRODUCTION..... 9-1
9.2	REFERENCES..... 9-1
9.3	ELEMENTS OF FIRE..... 9-2
9.4	TYPES OF FIRES..... 9-2
9.5	SOURCES OF IGNITION..... 9-3
9.6	VAPOR SOURCES..... 9-5
9.7	COMBUSTIBLE AND FLAMMABLE LIQUIDS..... 9-5
9.7.1	Combustible Liquids..... 9-5
9.7.2	Flammable Liquids..... 9-5
9.7.2.1	Flash Point..... 9-6
9.7.2.2	Fire Point..... 9-6
9.7.2.3	Volatility..... 9-6
9.8	PREVENTIVE MEASURES..... 9-6
9.8.1	Fire Control Plans..... 9-7
9.8.2	Firefighting Equipment Plan..... 9-7
9.8.3	Fire Drills and Training..... 9-7
9.8.4	Inspections..... 9-7
9.8.5	Fire Watches..... 9-7
9.9	PORTABLE FIREFIGHTING EQUIPMENT..... 9-8
9.9.1	Foam Extinguishers..... 9-8
9.9.1.1	Premix Foam Appliance..... 9-8
9.9.1.2	Concentrate Wheeled Diaphragm Foam Proportioner Appliances..... 9-8
9.9.1.3	Foam Pumper Truckers..... 9-8

	<u>Page</u>
9.9.2	Dry Chemical Extinguishers..... 9-9
9.9.3	Carbon Dioxide (CO <sub>2</sub> ) Extinguishers..... 9-9
9.9.4	Fire Blankets..... 9-9
9.10	FIXED FIREFIGHTING EQUIPMENT..... 9-9
9.10.1	Fire Water Mains..... 9-11
9.10.2	Foam Mains..... 9-11
9.10.3	Deluge System..... 9-11
9.10.4	Aqueous Film Forming Foam (AFFF)..... 9-11
9.10.5	Halogenated Extinguisher Agent..... 9-12
9.10.6	Alarm System..... 9-12
9.11	FIREFIGHTING PROCEDURES..... 9-13
 <b>CHAPTER TEN: ENVIRONMENTAL PROTECTION</b>	
10.1	INTRODUCTION..... 10-1
10.2	REFERENCES AND DIRECTIVES..... 10-1
10.3	BACKGROUND..... 10-2
10.4	FUEL FACILITY ENVIRONMENTAL PROTECTION..... 10-2
10.4.1	Storage Tanks..... 10-2
10.4.2	Oil Management Ashore..... 10-3
10.4.3	Oil and Hazardous Substances Contingency Planning..... 10-4
10.4.4	Spill Reporting..... 10-5
10.4.5	Oil Spill Equipment..... 10-5
10.4.6	Oil Spill Training..... 10-6
10.4.7	Marine Fuel Terminal Operations..... 10-7
10.4.8	Spill Prevention Control and Countermeasures (SPCC) Plan..... 10-8
10.5	OTHER ENVIRONMENTAL CONCERNS..... 10-8
10.5.1	Water..... 10-8
10.5.2	Air..... 10-9
10.5.3	Control of Hazardous Materials..... 10-9
10.5.4	NEPA..... 10-10
10.5.5	Noise Pollution Ashore..... 10-10
10.5.6	Natural Resources Management..... 10-10
10.5.7	Historical and Archeological Resources Protection..... 10-10
10.5.8	Overseas Environmental Programs..... 10-10
10.6	CORRECTION OF ENVIRONMENTAL DEFICIENCIES..... 10-11
10.6.1	Identification..... 10-11
10.6.2	Documentation and Reporting..... 10-12
10.6.3	Funding..... 10-13
 <b>EXHIBITS</b>	
2-1	Typical Defense Fuel Support Organization.... 2-3
2-2	Typical Naval Air Station Organization..... 2-5
2-3	Typical Contractor Operated Naval Air Station 2-7
3-1	Countries Holding Bilateral and/or Fuel Exchange Agreements with U.S. Navy..... 3-16
3-2	Tank Gauging Precautions..... 3-21

		<u>Page</u>
3-3	Product Temperature Measurements.....	3-23
3-4	Centralized Products Volume Correction to 60°F.....	3-25
3-5	Calibration of Inventory Equipment.....	3-26
4-1	Calibration of Laboratory Equipment.....	4-8
6-1	Milestone Chart for DLA MILCON Project Submittal.....	6-12
6-2	Milestone Chart for DFSC MRE Project Submittal.....	6-13
8-1	Mandatory Precautions for Handling Petroleum Fuels.....	8-3
8-2	Protective Equipment.....	8-4
8-3	Laboratory Precautions.....	8-7
8-4	First Aid For Common Accidents.....	8-13
9-1	Relationship Between Temperature, RVP and Flammable Limits of Petroleum Products at Sea Level.....	9-4
9-2	Zone Inspection Checklist.....	9-10
9-3	Selection of Extinguishers By Hazard.....	9-11
9-4	Firefighting Techniques By Hazard.....	9-14

#### LIST OF APPENDICES

APPENDIX 1	LIST OF ACRONYMS.....	A1-1
APPENDIX 2	REFERENCES.....	A2-1
APPENDIX 3	SAMPLE STANDARD OPERATING PROCEDURE FOR RECEIPT OF FUEL FROM A TANKER.....	A3-1
APPENDIX 4	SAMPLE OPERATING PROCEDURES FOR PUMPING STATION.....	A4-1
APPENDIX 5	SAMPLE LOGS.....	A5-1
APPENDIX 6	SAMPLE OPERATIONS ORDER.....	A6-1
APPENDIX 7	DLA-OWNED INVENTORY MANAGEMENT Part A: DFAMS Transaction Reporting....	A7-1
	Part B: Navy DFSP Monthly Inventory Reconciliation.....	A7-2
APPENDIX 8	POST, CAMP AND STATIONS.....	A8-1
APPENDIX 9	DBOF RECEIPTS AND ISSUES Part A: DBOF Receipt of DLA Product From a Direct Delivery Contract.....	A9-1
	Part B: Issues from DBOF Activity to End User.....	A9-2
APPENDIX 10	MONTHLY INVENTORY REPORT.....	A10-1
APPENDIX 11	NAVY FISC POL TESTING LABORATORIES.....	A11-1
APPENDIX 12	RETENTION PERIODS FOR POL SAMPLES.....	A12-1

		<u>Page</u>
APPENDIX 13	MAINTENANCE TRACKING	
	Part A: Maintenance Requirement Card...	A13-1
	Part B: Maintenance Index Page.....	A13-2
	Part C: Equipment Guide List.....	A13-3
APPENDIX 14	SAMPLE DD 1391s.....	A14-1
APPENDIX 15	MAINTENANCE DISCREPANCY CARD.....	A15-1
APPENDIX 16	TYPICAL TANK HISTORY RECORDS.....	A16-1
APPENDIX 17	NAVAL FACILITIES ENGINEERING COMMAND ENGINEERING FIELD DIVISIONS (EFDs).....	A17-1
APPENDIX 18	GUIDANCE TO NEW EPA REGULATIONS ON HAZARDOUS WASTE FUELS AND USED OIL FUELS	A18-1
APPENDIX 19	NAVY OHS POLLUTION RESPONSE ORGANIZATION	A19-1
APPENDIX 20	OIL SPILL MESSAGE FORMAT.....	A20-1
APPENDIX 21	OIL SPILL LOCKER INVENTORY.....	A21-1
APPENDIX 22	OIL SPILL EQUIPMENT.....	A22-1
APPENDIX 23	AIRCRAFT REFUELER DRIVER TRAINING.....	A23-1

This Page Left Blank Intentionally.

**Chapter One:**  
**INTRODUCTION**

This Page Left Blank Intentionally.

## CHAPTER ONE: INTRODUCTION

### 1.1 PURPOSE

This publication provides petroleum managers and operators with the necessary guidelines, general knowledge and references to operate and maintain petroleum facilities. It also is intended to be a guide for trainees and new personnel that provides an overall understanding of petroleum receipt, storage, issue, and maintenance procedures.

### 1.2 BACKGROUND

The need for a comprehensive manual to delineate petroleum management responsibilities in the U.S. Navy has been demonstrated repeatedly by technical assistance visits, Navy audits and IG inspections. Management of a petroleum facility is complex and managers must rely on the vast array of fuel-related publications that exist. With no single ready reference, it has been difficult for fuel facility managers to determine the correct course of action in both routine and crisis situations. Managers frequently relied on experience and intuitive judgment, without any assurance that their orders were suitable or conformed to all applicable regulations. This manual is intended to help managers understand their responsibilities and locate information vital to the proper management of an ashore Navy fuel facility.

### 1.3 SCOPE

This publication provides ashore petroleum management policy, guidance and direction. For detailed information and guidance, appropriate references are noted and should be consulted. This manual is applicable to and has been structured to cover all major facets of retail and wholesale petroleum management ashore within the U.S. Navy. CINCLANTFLT/ CINCPACFLTINST 4026.1 (Fuel Management Afloat Manual) is the comparable manual for fuel management afloat. Acronyms and references used throughout this manual are listed in Appendices 1 and 2, respectively.

This Page Left Blank Intentionally.

***Chapter Two:***  
***OPERATIONS***

This Page Left Blank Intentionally.

## CHAPTER TWO: OPERATIONS

### 2.1 INTRODUCTION

The mission of all Navy fuel activities is to provide on-specification petroleum products to customers in a timely manner. Fuel activities must be able to safely and efficiently receive, store and issue petroleum products, with appropriate controls to ensure adequate quality and inventory. In order to maintain adequate controls and operate efficiently, each fuel activity must establish guidelines that provide personnel with the information necessary to maintain efficient operations and to meet Federal, Navy and industry safety and environmental standards. This chapter provides the information needed to organize a fuel facility, develop a facility operations manual, and to develop appropriate operations orders, logs and records necessary to an efficient petroleum management function.

### 2.2 REFERENCES

These reference documents contain standards, establish procedures and reflect requirements pertinent to conducting an efficient fuel operation. Each should be maintained in the Fuel Department and reviewed, in detail, on a periodic basis.

33 CFR 154	Oil Pollution Regulations for Marine Transfer Facilities
40 CFR 112	Oil Pollution Prevention
DOD 4140.25M	DOD Management of Bulk Petroleum Products, Natural Gas, and Coal
OPNAVINST 4020.25	Control and Accountability for Ground Fuels
OPNAVINST 5090.1	Environmental and Natural Resources Protection Manual
OPNAVINST 5530.14	Department of the Navy Physical Security and Loss Prevention
NAVSUP P-485, Vol. II	Supply Procedures Ashore
NAVSUPINST 4355.5	Petroleum Procurement Quality Assurance Manual
NAVPEOFFINST 4100.1	Fuel Reclamation

Additional references which provide valuable guidance relevant to fuel facility operations are:

MIL-HDBK-200	Quality Surveillance Handbook for Fuel, Lubricants and Related Products
MIL-HDBK-210	Conversion Factors and Logistics Data for Petroleum Planning
NAVFAC MO-230	Maintenance Manual Petroleum Fuel Facilities
NAVAIR 00-80T-109	Aircraft Refueling NATOPS Manual
COMSCINST 3121.3	Tanker Operating Instruction (TANKOPINS)
NAVPETOFFINST 10340.1	Drumming Procedures
NAVSUPINST 12410.16	Guidance for Competency Based Certification (CBC) Training Program
NAVEDTRA 43288A	Personnel Qualification Standard for Aviation Fuel Operations Ashore

### 2.3 ORGANIZATION

Fuel organizations vary in size, complexity and type but can be classified as either a Defense Fuel Support Point (DFSP) that receives, stores issues and accounts for product at the wholesale level, or a Naval Air Station/Facility which receives, stores, issues and accounts for products at the retail level. The DFSP, or terminal activity, handles large volumes of product and may be seen as the intermediate storage point between commercial facilities and activities such as Naval Air Stations, Navy ships and other consumers of fuel products. Basic organizational structures of various activities are provided as exhibits within this chapter.

#### 2.3.1 Defense Fuel Support Point Personnel

Director: This position is generally filled by a Navy Supply Corps Officer of a rank commensurate with the responsibilities and functions of the fuel facility. The Director provides management and direction to facility operations, delegates authority as required to meet mission functions, and directly supervises staff personnel for administration, planning, budget and training in support of the primary mission.

Deputy Director. This position may vary with the size and complexity of the terminal, but it is occupied by the person authorized to act in the Director's absence. The Deputy Director's primary activity is to manage the long-range programs and funding issues.

Operations Foreman. The position of Foreman or General Foreman again will depend on the size and complexity of the

organization. The Operations Foreman is responsible for direct supervision of those activities associated with the receipt, issue and storage of the petroleum products.

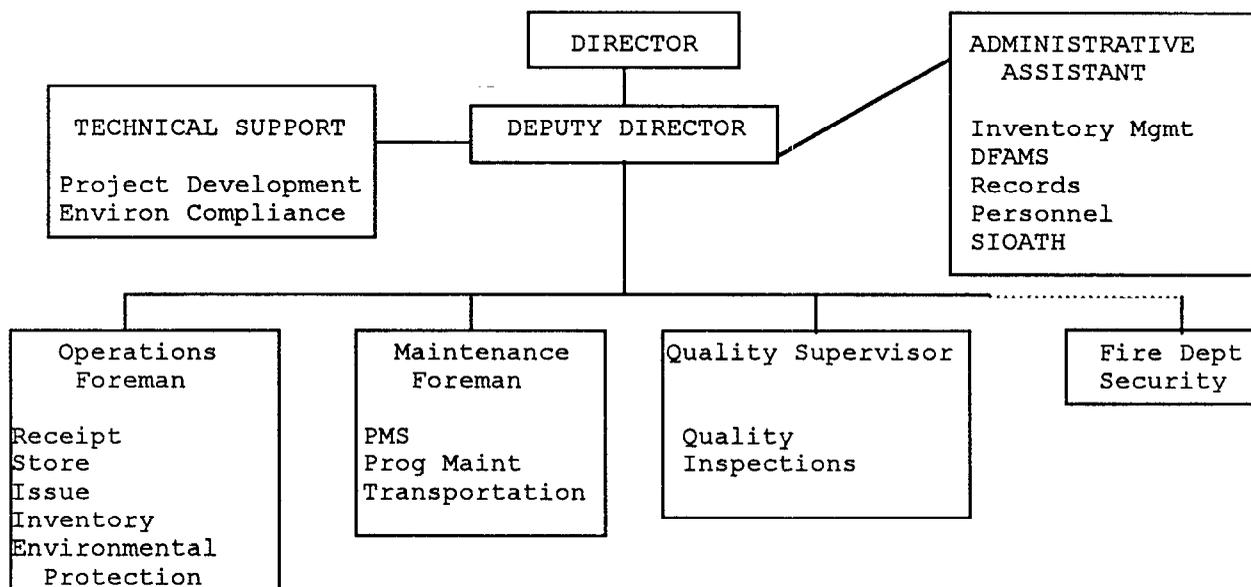
Maintenance Foreman. This position may be classified as a Foreman or General Foreman level depending on the size of the organization. The Maintenance Foreman is responsible for managing the Preventive Maintenance Program, scheduling programmed maintenance and ensuring breakdown maintenance is kept to an absolute maintenance.

Quality Surveillance Supervisor. The Quality Surveillance Supervisor reports to the Deputy Director and is responsible for managing the Quality Surveillance Program in order to maintain the quality of all petroleum products during receipt, storage and issue.

Technical Support. The technical support branch is responsible for the development and execution of maintenance, repair, and minor construction projects and managing environmental programs.

**EXHIBIT 2-1**

**TYPICAL DEFENSE FUEL SUPPORT POINT ORGANIZATION**



Administrative Assistant. This position is responsible for the review, verification and consolidation of information generated by the various fuel branches (i.e., operations, maintenance) and production of associated management reports. This person also processes receipt, storage, issue forms and documents, maintains personnel and training records, and processes the Defense Fuel Automated Management System (DFAMS) transactions.

### 2.3.2 Naval Air Station Personnel

Supply Officer. The Supply Officer has responsibility over all supply functions at the Naval Air Station, including the fuels function. The Supply Officer provides direction to fuel management through a Fuel Management Officer or a civilian fuel supervisor. The fuels operation may be government or contractor operated.

Fuel Management Officer: A military officer or civilian having responsibility for the direct management of the day-to-day fuel operations. The receipt, storage, and issuing of quality fuel products rests with the Fuel Officer. The Fuel Officer is also responsible for quality surveillance, facility maintenance, and the personnel training.

Fuel Supervisor: The Fuel Supervisor may be a civilian salaried series (GS), civilian wage grade (WG), or military enlisted, Aviation Boatswain's Mate, Fuel (ABF). In some cases the position may be held by a civilian contractor supervisor monitored by a Contracting Officer Representative (COR). The Fuel Supervisor is responsible for overall direct supervision of fuel operations (receiving, storing and issuing quality petroleum products).

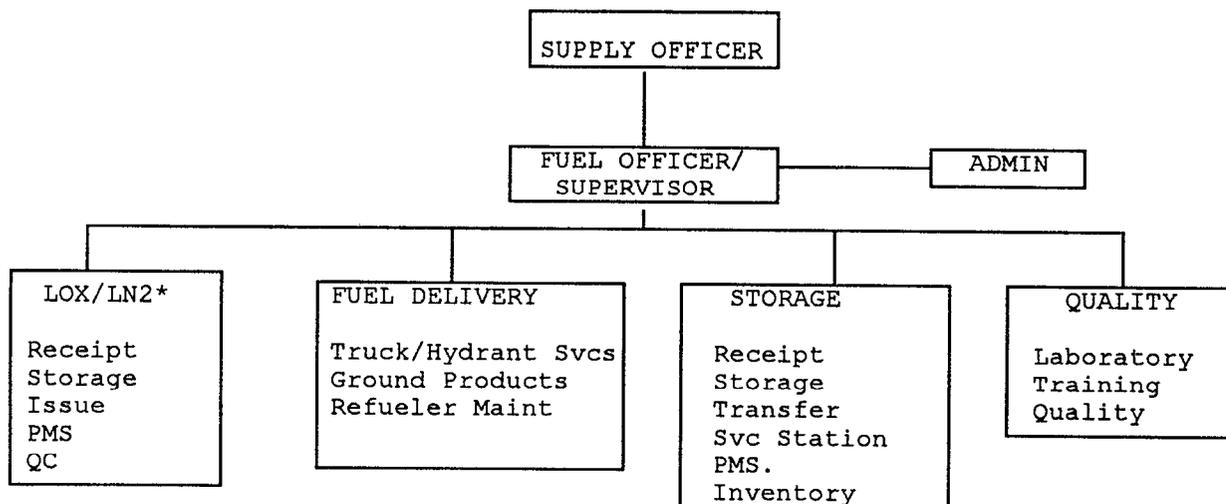
Fuel Delivery Supervisor: The Fuel Delivery Supervisor may be a military or civilian supervisor responsible for the delivery of clean, dry fuel to aircraft via refueler trucks or direct refueling systems. The individual is also responsible for the management of the Preventive Maintenance Program for all fuel delivery equipment.

Storage Supervisor: The Storage Supervisor may be a military or civilian who is responsible for all receipt, storage and transfer of fuel products. The Storage Supervisor also is responsible for all storage system preventive maintenance and the scheduling of programmed maintenance.

Fuel Inspector: The Fuel Inspector may be a military or civilian responsible for the inspection of product received, stored products and those products issued by the fuel facility to assure that it meets quality standards. This individual observes the manner in which petroleum products are handled, the quality of performance, as much as the quality of product.

## EXHIBIT 2-2

### TYPICAL NAVAL AIR STATION ORGANIZATION



\* Fire Dept. Security and LOX LN2 personnel (liquid oxygen and liquid nitrogen) may or may not be assigned at any given facility. Since they do not deal specifically with fuel, they are not discussed in this chapter.

#### 2.3.3 Contractor Operated Naval Air Station Personnel

DFSC Procuring Contracting Officer. The DFSC Contracting Officer is a warranted contracting officer that has the authority to sign contracts and obligate government resources for the purpose of carrying out the contract for services.

DFSC Administrative Contracting Specialist. The Contracting Specialist administers the contract and has the authority to change the contract, but cannot sign the contract or change order.

Navy Petroleum Office. The Navy Petroleum Office administers the Navy Alongside Aircraft Refueling Program and provides technical guidance and support to DFSC and the CORs regarding all aspects of petroleum management.

Supply Officer. The Supply Officer maintains overall control of all supply functions at the Naval Air Station, including the fuel function. The Supply Officer provides direction for the fuel management through a Contracting Officer Representative (COR).

Contracting Officer Representative (COR). The COR is the Navy's technical representation that ensures that the civilian contractor responsible for the operation of the Fuel Branch carries out all functions and duties outlined in the statement of work. The COR must be appointed in writing by DFSC.

Contractor. The contractor and the organization installed to operate the station/facility fuel function will vary by contract location. Contracts range in scope from aircraft fuel servicing only to management of the entire fuel function, from receipt and issue of product by refueler and hydrant systems.

#### 2.4 PETROLEUM OPERATIONS MANUAL CRITERIA

A comprehensive Fuel Facility Operations Manual that conforms to 33 CFR 154 and State regulations shall be prepared and maintained by each Fuel Terminal and Air Station/Facility. The approved operations manual will be used by site personnel to ensure that all fuel-related operations are conducted in a safe and efficient manner. The operations manual must include well defined site specific operational procedures complying with all standards, directives and instructions. In general, this manual will be divided into the following sections:

- o General information.

- o Fuel Facility Operational Procedures and Guidelines which includes a discussion of Site Specific Standard Fuels Operating Procedures and Site Specific Standard Fuel Equipment Operating Procedures.

- o Quality Surveillance Program which includes Site Specific Sampling Schedules, Site Specific Standard Laboratory Procedures, Site Specific Standard Laboratory Test Procedures, and Site Specific Calibration Program.

- o Preventive Maintenance and Corrective Maintenance including: Site Specific Automated Preventive Maintenance Program Procedures for Bulk Fuel Terminals or Site Specific Automated Preventive Maintenance Program Procedures for Naval Air Stations, Corrective Maintenance Procedures, and Maintenance Management and Control System Procedures.

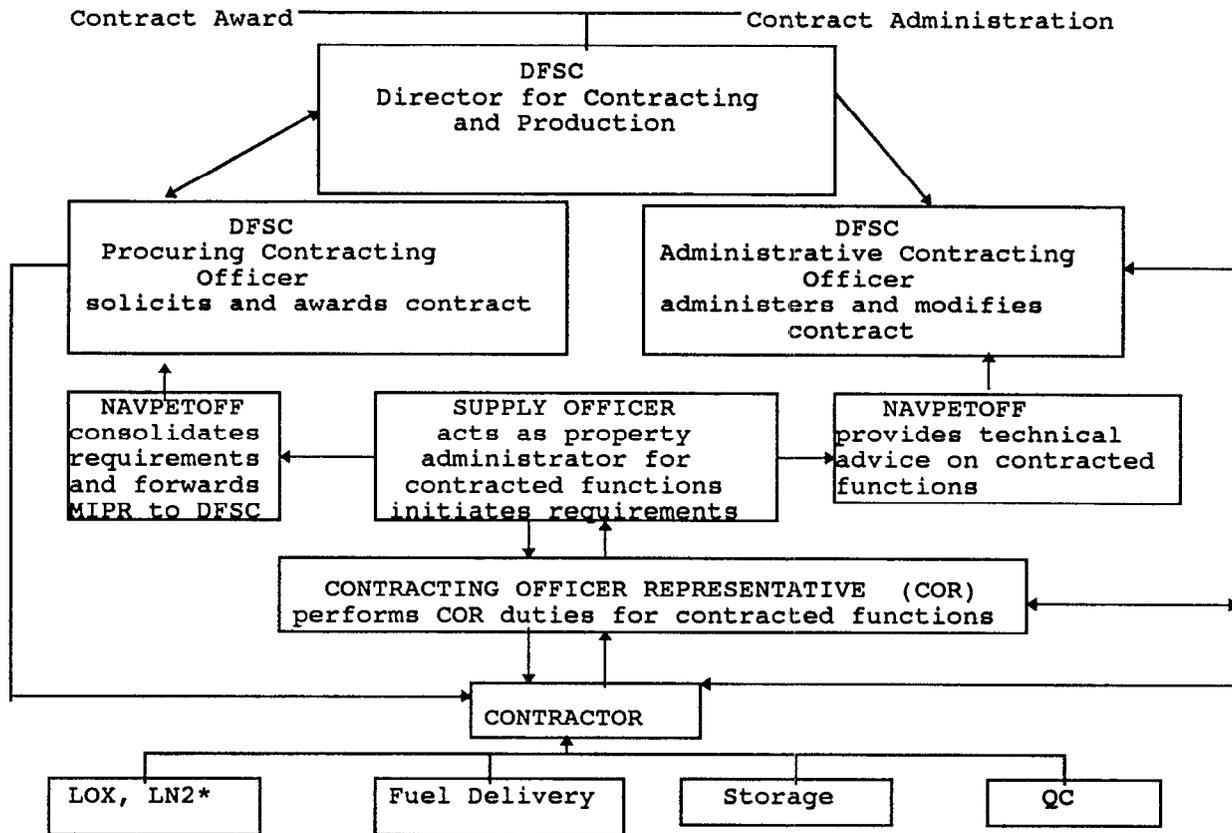
- o Emergency Procedures including Site Specific Standard Emergency Response and Environmental Protection Procedures and Site Specific Standard Operating Procedures for Emergency and Environmental Protection Equipment.

- o Site Specific Security, Safety, Fire Prevention, and Environmental Protection Procedures.

- o Site Specific Records and Documentation Procedures.

EXHIBIT 2-3

TYPICAL CONTRACTOR OPERATED NAVAL AIR STATION



Any or all of these functions can be contracted.

\* Fire Dept. Security and LOX/LN2 personnel (liquid oxygen and liquid nitrogen) may or may not be assigned at any given facility. Since they do not deal specifically with fuel, they are not discussed in this chapter.

o Site Specific Training and Certification Programs.

o Appendices.

Prior to writing an operations manual, fuel system managers must review the references cited herein and address the appropriate sections of these references in their manual. Once an operations manual has been developed, it must be reviewed and updated periodically. Reviews will be conducted annually, when major changes are issued by higher authority, or when major changes in fuel facility operations occur.

For ocean terminals, including Air Stations/Facilities that are serviced by barge, the operations manual must be reviewed by the Captain of the Port (COTP) who shall issue a "letter of adequacy" if he

used until a valid letter of adequacy has been obtained. The letter of adequacy is void if the fuel facility operator amends the operations manual or fails to amend it when required by the COTP (33 CFR 154.325).

#### 2.4.1 General Information

2.4.1.1 Manual Organization. This section should include the promulgating instruction, the record of review, the record of changes, and a table of contents.

2.4.1.2 Introduction. This section of the manual should discuss the mission of the facility, its geographic location, and provide a brief history of the facility to include major construction projects, significant changes in mission, and other significant events. An organization structure and a description of the duties and responsibilities of key personnel should also be included.

2.4.1.3 General Procedures and Guidelines. The general section of the operations manual will also provide an overview of fuel operations and facilities. Include paragraphs required by directives, instructions, standards and 33 CFR 154.310. At a minimum, this section must address the following:

- a. A physical description of the facility including:
  - (1) A plan of the facility showing its location, size, terrain, and all major structures such as tanks, piers and mooring areas, transfer stations, truck loading racks, control stations, pipelines, location and facilities of each personnel shelter, emergency shut down systems, spill containment equipment, and locations of safety equipment.
  - (2) Line and scale drawings showing the location and arrangement of all tanks, pipelines, pump stations, loading racks, piers, drainage systems, and other major structures.
  - (3) The maximum relief valve setting (or maximum system pressure when relief valves are not provided) for each section.
  - (4) The sizes, types, and number of vessels the facility can transfer fuel products to or from simultaneously.
  - (5) The sizes, types, and number of trucks or rail cars the facility can transfer fuel products to or from simultaneously.
  - (6) Quantity, type, and location of fire extinguishing equipment.

- (7) Quantity, types, and locations of any monitoring devices required by the COTP because:
  - (a) The environmental sensitivity of the area requiring added protection.
  - (b) The product transferred at the facility poses a significant threat to the environment.
  - (c) The size or complexity of the transfer operation poses a significant potential for a discharge of oil.

(8) A description of communications systems.

(9) For each product transferred at the facility:

- (a) The name of the cargo as listed in 46 CFR table 30.25-1.
- (b) A description of the appearance of the cargo.
- (c) A description of the odor of the cargo.
- (d) The hazards involved in handling the cargo.
- (e) Instructions for safe handling of the cargo.
- (f) The procedures to be followed if the cargo spills or leaks, or if a persons is exposed to the cargo.
- (g) A list of fire fighting procedures and extinguishing agents effective with fires involving the cargo.

b. A general description of valve, tank and pipeline alignments for various operations (specific alignments should be included in the standard operations section).

c. Physical security procedures and plans including activity access controls, traffic control, roving patrols, and other security measures.

d. Contract administration (if appropriate).

e. The hours of operation of the facility.

f. Names and telephone numbers of facility, Coast Guard, and other personnel who may be called by the employees of the facility in an emergency;

## 2.4.2 Fuel Facility Operational Procedures and Guidelines

2.4.2.1 Operations Orders. The operations manual is used primarily as a reference that describes a given operation. An operations order is a written order that describes who, what, where, when and why of a specific operations. The information to develop an operations order is derived from the information contained in the Operations Manual. The fuel terminal Operations Foreman or the Air Station Fuel Supervisor will normally be responsible for issuing operations orders. These orders can be divided into two general types: specific operations orders or those that cover long-term, multi-shift operations such as pipeline receipts, barge movements, or issues to ships, or recurring operations orders; those that cover short-term specific operations such as receipts by tank truck.

2.4.2.1.1 Specific Operations Order. Specific operations orders shall be issued for the following operations:

- o All receipts from or issues to waterborne craft.
- o All pipeline receipt operations.
- o All multi-car rail receipt or issue operations.
- o All inter-system transfers of product.

The responsible individual shall prepare an operations order when notified that a fuel receipt, issue or transfer operation is scheduled. The issued order then becomes the operations plan that is passed from supervisor to supervisor, shift to shift to control the flow of work and product for the given operation. As noted above, it is the written order that stipulates what product is to be moved from which tank, to what vessel, by whom, at what time, and date. At minimum, the following information shall be included in the specific operations order:

- o Date and time of the operation.
- o The numbers of the tanks to be used.
- o The berth, pipeline or railhead to be used.
- o Valve alignment for initiating and securing the operation.
- o Fuel samples, by type and location, to be taken.
- o Name of ship, if applicable, being serviced/unloaded.
- o The number and size of hoses/loading arms to be used.
- o Heavy equipment, i.e., a crane that may be required.
- o Connect telephones, if required.
- o Emergency procedures and contacts.

2.4.2.1.2 Recurring Operations Order. For frequent small receipts, the designation of issue tanks and fillstands/loading racks and other recurring operations, the Operations Foreman or Fuels Supervisor shall issue an operations order based on the anticipated volume and frequency. The recurring operations order will be reviewed with the shift supervisor, who in turn briefs the operators on the anticipated workload for the day. At a minimum, the following information should be included in a recurring operations order:

- o Date and time(s) of anticipated/scheduled operation.
- o Tank(s) to be put on line for receipts and issues.
- o Receipt header/manifold to be used.
- o Loading rack(s) to be used.
- o Product grade(s) to be loaded/received.
- o Samples required.
- o Emergency procedures and contacts.

An example of a typical operations order which can be used for both specific and recurring operations is provided in Appendix 6.

**2.4.2.1.3 Posting of Specific and Recurring Operations Orders.**

Specific and recurring operations orders will be passed and briefed shift to shift and posted in appropriate places to ensure all personnel are knowledgeable of the operations.

**2.4.2.2 Standard Fuel Facility Procedures**

**2.4.2.2.1 Standard Fuel Facility Operating Procedures.** The Standard Operating Procedures Section of the operations manual describes in detail the sequence of events required to conduct all standard operations. This section will also detail the recurring checks required to monitor standard operations. In writing standard operating procedures, the guidance of NAVAIR 00-80T-109 and NAVFAC MO-230, coupled with site specific facility, equipment, and technical literature, must be used to describe each standard operation. This section will contain a description of each operation pertaining to storage of products and the receipt and issue of each product by truck, tanker, barge, yard oiler, pipeline, railcar and so on. Each description will include a description of the typical valve, tank, and pipeline alignments for various operations. An example of a typical standard operating procedure is provided in Appendix 3. At a minimum, the following standard operations guidance must be included in this section:

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>o Receipts by tanker, barge or YO</li> <li>o Issues to tanker, barge or YO</li> <li>o Defueling from ship</li> <li>o Refueling from ship</li> <li>o Injection systems</li> <li>o Issue by pipeline</li> <li>o Receipt from tank truck</li> <li>o Receipt from tank car</li> <li>o Issue to tank truck or car</li> <li>o Vessel slop reception oil facility</li> </ul> | <ul style="list-style-type: none"> <li>o Refueling of aircraft</li> <li>o Defueling of aircraft</li> <li>o Quality surveillance</li> <li>o Ground fuels management</li> <li>o Tank-to-tank transfers</li> <li>o Receipt by pipeline</li> <li>o Issue by pipeline</li> <li>o Tank containment, berm drainage</li> <li>o Reclamation/disposal of waste oil</li> </ul> |
|--|---|

**2.4.2.2.2 Standard Fuel Equipment Operating Procedures.** This section provides a detailed description of the procedures required to operate equipment, i.e., deep well turbine pumps, and facilities, i.e., the

pumphouses, used to conduct receipt, storage and issue operations. It should also include specific procedures such as gauging aboveground tanks. General guidance can be found in MIL-HDBK-200, NAVFAC MO-230 and NAVAIR 00-80T-109; however, since operating procedures, equipment and facilities are site specific, the primary references for writing this procedure will be the technical literature on the specific equipment or facility. Equipment procedures shall be posted near the equipment. At a minimum, standard procedures must be developed for:

- | <u>Equipment</u>                                       | <u>Sub-procedures</u>                               |
|--|---|
| o Pumps, all types                                     | o Water stripping                                   |
| o Valves, all types                                    | o Line packing                                      |
| o Loading arms   | o Inspection of tanks and compartments              |
| o Truck/rail car loading racks                         | o Gauging (tanks, tank trucks, rail car, vessels)   |
| o Refuelers/Defuelers                                  | o Use of drip and discharge collection from vessels |
| o Electric Motors                                      |   |
| o Sampling (tanks, tank trucks and rail cars, vessels) |   |

Since some fuel facilities may be located in environmentally sensitive areas, special monitoring devices may be required by the COTP. Instructions for operating/observing these monitoring systems during receipt, storage, and issues should be developed.

2.4.2.2.3 **Standard Fuel Operating Procedures Documentation.** The daily operation conducted at fuel facilities must be documented in a clear and complete manner. Site specific forms and logs are used to document these operations. (All events must be recorded as they occur.) A summary of these forms and logs will be included in the operations manual. At a minimum, the following site specific logs should be included:

The person performing tank gauging normally maintains entries in the log book; however, running gauges may be called in to the fuel dispatcher by radio or telephone. The shift supervisor is responsible for checking and ensuring that log book entries have been completed for his shift.

a. **Stripping Log.** Tank stripping logs are maintained in the fuel control office and used to record the amount of water stripped from fuel storage tanks. The following information shall be logged:

- o Date
- o Tank
- o Time (start, stop and total)
- o Water level, before/after
- o Total gallons stripped
- o Name of operator

Log book entries are made by the operator (gauger). The shift supervisor ensures log entries have been completed for his shift. A typical stripping log sample is provided in Appendix 5.

b. Pass Down Log. Pass down logs are maintained by the shift supervisor and are used to pass on pertinent information or planned action to the incoming supervisor. These logs are an invaluable source of information and should be meticulously maintained. At a minimum, the following types of information should be logged in the pass down log:

- leak
  - o Any unusual event; i.e., pump failure, pipeline
  - o Tanks, pipelines or barges used during the shift
  - o Upcoming events (e.g., Texas Trader due to arrive at pier south delta 0200 7/29/93. Product to be discharged F76 75,000 bbls; JP5 35,000 bbls.)
- ships lines
  - o Overtime authorized; i.e., personnel to handle
  - o Training conducted
  - o Employees calling for sick leave
  - o PM performed; i.e., type of maintenance, number of personnel, specialized tasks (i.e., hot work, gas freeing, etc.)
- operations
  - o Weather conditions and any related modification to
  - o Notations regarding visitors

Pass down logs will be checked by the general foreman when coming on duty and at periodic intervals thereafter.

c. Pier Log. Pier logs are maintained to record the arrival and departure of ships, barges and actions relevant to fuel receipts and issues. Pier logs are maintained by the Fuels Wharfman. The following information should be recorded in the pier log:

- o Date
- o Time
- o Event(s)
- o Cargo lines used
  - oo Time docked/underway
  - oo Pipeline pressure
  - oo Draft on arrival/departure
  - oo Start/stop pumping
  - oo Log any unusual conditions; i.e., ship stopped, discharging disconnection due to pump overheating
  - oo Time of hose connection/disconnection

- oo Name of vessel
- oo Line samples
- oo Number and size of hoses or loading arms used
- o Operator

The shift supervisor checks and ensures log book entries have been completed for his shift. A typical pier log sample is provided in Appendix 5.

d. Pumphouse Log. Pumphouse logs are maintained as a record of pumphouse operations. They should be maintained by pump operators. The following information should be recorded on this log:

- o Date
- o Time
- o Oil levels and other operational checks
  - oo Time start/stop pumps
  - oo Pressures
  - oo Flow rates
  - oo Remarks section (log any unusual conditions; i.e., excessive pump noise, overheating, leakage, etc.)
  - oo Product pumped
- o Operator

Pumphouse logs should be kept for each pumphouse.

e. Barge Logs. Barge logs are kept to record the operation of each barge. They should be maintained by barge operators. The following information should be recorded in this log:

- o Date
- o Draft before and after operations
- o Time begin and end
- o Product transferred
- o Quality transferred
- o Remarks (log any unusual conditions; i.e., oil spill, operational delays, equipment failures, etc.)

f. Running Gauge Log. The running gauge log is used to document levels of product within a tank during receipt operation. Incremental levels (gauges) are compared with maximum fill levels to ensure a tank is not overfilled. The log also serves as a historical record of receipt operations and events applicable to any specific receipt. Appendix 5 provides an example of a typical running gauge log and the information entered during a receipt operation.

- o Date
- o Tank
- o Time of initial gauge
- o Gauge reading
- o Quantity of gauge

- o Maximum fill level
- o Operator

### 2.4.3 Quality Surveillance Program

All petroleum products have a limited shelf-life and must be closely monitored to ensure the quality of the product remains at or above specification. A stringent quality surveillance program for all petroleum products handled by each fuel facility must be developed and followed to ensure that the highest quality products are delivered to the customer. Procedures for sampling and testing of fuel stocks must be developed with the aid of MIL-HDBK-200, NAVAIR 00-80T-109 as appropriate.

2.4.3.1 Sampling Schedules. All fuel products shall be sampled and tested on a strict schedule to ensure that they remain within specification.

2.4.3.2 Standard Laboratory Procedures. This section of the manual provides a detailed description of the procedures required to operate a laboratory safely and efficiently. An inventory of all laboratory equipment should be included as an appendix. General guidance on the types of equipment required and used can be found in MIL-HDBK-200, NAVAIR 00-80T-109, FED-STD-791 and ASTM manuals; however, equipment and facilities are site specific; therefore, the primary references for writing this procedure will be the technical literature on the specific equipment or facility. At a minimum, standard procedures must be developed for:

- o Receiving of fuel samples
- o Labeling of fuel samples
- o Fuel sample test result logs
- o Test result and notification
- o Fuel sample retention program
- o Calibration program

2.4.3.3 Standard Laboratory Test Procedures. This section provides a detailed description of the laboratory test procedures required to ensure they are conducted safely and in accordance with ASTM standards. Standard procedures must be developed based on the requirements of MIL-HDBK-200 for terminal facilities testing at the B1 and B2 levels, and air station/facilities testing at the C level.

Different procedures will need to be developed for each type of equipment (i.e., different procedures are required for each lab station). In addition to including all standard procedures in the operations manual, specific standard procedures must be posted near the equipment addressed.

2.4.3.4 Calibration Program. Each fuel facility is to participate in a calibration program to ensure the accuracy of their gauging and testing equipment.

#### 2.4.4 Preventive Maintenance and Corrective Maintenance

The efficient operation of a fuel facility requires that preventive maintenance be conducted in a timely manner to ensure that facility operations are not interrupted due to unplanned equipment failures. Additionally, preventive maintenance plays a significant role in ensuring that equipment breakdowns do not result in environmental hazards.

2.4.4.1 Automated Preventive Maintenance Program Procedures. This section of the manual provides a detailed description of the procedures required to use the automated Preventive Maintenance System (PMS). The key to a successful preventive maintenance program is an accurate inventory of all equipment requiring maintenance as well as the maintenance of all technical information and material provided with each piece of equipment. The Fuel Officer must ensure that any new equipment purchased and installed becomes part of the automated preventive maintenance program. For the most part, the development of the PMS program is a site specific issue that requires continuous monitoring and update of PMS records. At a minimum, PMS standards, MRCs, and EGLs must be developed for the following and equipment items.

- |                              |                              |
|------------------------------|------------------------------|
| o Valves                     | Hoses                        |
| o Pumps                      | Meters (calibration program) |
| o Electric motors            | Pipelines                    |
| o Tanks                      | Truck loading racks          |
| o Refueling/Defueling trucks | Direct refueling stations    |

An inventory of all equipment requiring preventive maintenance (EGL), schedules, and MRCs should be included in an appendix. Refer to Chapter 5 for additional information on PMS.

#### 2.4.5 Standard Operating Procedures for Emergency Response and Environmental Protection Procedures

This section of the manual provides a detailed description of emergency procedures to respond to accidents, sabotage, fire and natural disasters. Environmental protection procedures should address oil spill prevention, waste oil disposal procedures and natural resources management. General guidance can be found in a number of publications; however, operating procedures, equipment and facilities are site specific, the primary references for writing this procedure will be the technical literature on the specific equipment or facility. At a minimum, standard procedures must be developed for:

- o System fires
- o Tank/line ruptures
- o Lightning strikes

- o Hazardous weather
- o Fuel spills
- o Industrial accidents
- o Oil spill prevention
- o Waste oil disposal

Procedures for responding to oil spills must contain a discussion of the quantity, type, location, and time limits for gaining access to containment equipment (33 CFR Section 154.320). Procedures responding to fire must contain a discussion of quantity, type, and location of fire extinguishing equipment (33 CFR Section 154.320).

**2.4.6 Standard Operating Procedures For Emergency and Environmental Protection Equipment**

This section of the manual provides a detailed description of the procedures required to operate emergency equipment (e.g., fire extinguisher) and facilities (e.g., foam stations) used to respond to possible threats to life, government owned and contractor owned property, and to the environment. General guidance can be found in MIL-HDBK-200, NAVFAC MO-230 and NAVAIR 00-80T-109 but because operating procedures, equipment and facilities are site specific, the primary references for writing this procedure will be the technical literature on the specific equipment or facility. At a minimum, standard procedures must be developed for:

- | <u>Equipment</u>         | <u>Sub-procedures</u> |
|--------------------------|-----------------------|
| o All fire extinguishers | o Small spills        |
| o Foam station           | o Line packing        |
| o Containment booms      | o Inspection of tanks |
| o Skimmers               |                       |
| o Waste oil treatment    |                       |
| o Monitoring systems     |                       |

Different procedures will need to be developed for each type of equipment and facility (i.e., different procedures are required for each pump station). In addition to including all standard procedures in the operations manual, specific standard procedures must be posted near the equipment addressed. An example of a standard procedure for a pumping station is provided in Appendix 4.

**2.4.7 Training and Certification Program Section**

This section of the manual provides a detailed description of the training and certification required for fuel personnel to ensure that all fuel operations are conducted safely and efficiently. General guidance can be found in NAVSUPINST 12410.16 and NAVEDTRA 43288A but because operating procedures, equipment and facilities are site specific, the primary references for writing this procedure will be the technical literature on the specific equipment or facility. Therefore, standard procedures must be tailored to the facility/equipment used.

#### 2.4.8 Records and Documentation

This section of the manual should address standard forms and logs (i.e., inventory accounting, auditing) used during fueling operations. Each form and log used will be listed with a short summary about its use. This summary must explain the purpose of the form or log, who is responsible for filling it out, how it is processed, where it is filed and how long it is retained on file. Sample logs are shown in Appendix 5.

#### 2.4.9 Standard DOD, DLA and Navy Forms

Guidance on the development of summaries for standard DOD, DLA and Navy forms can be found in DOD 4140.25-M; NAVSUP Manual, Volume II; OPNAVINST 4100.8; and Chapter 3 of this manual. At a minimum, summaries must be developed for the following forms:

SF 1103:	Government Bill of Lading (NAVSUP P-485, Vol. II, 23011)
SF 1103a:	Government Bill of Lading (NAVSUP P-485, Vol. II, 23011)
SF 361:	Discrepancy in Shipment Report (NAVSUP P-485, Vol. II, 23065)
SF 364:	Report of Discrepancy (NAVSUP P-485, Vol. II, 23065)
DD Form 250:	Material Inspection and Receiving Report (NAVSUP, Vol. II, Chapter 3)
DD Form 250-1:	Tanker/Barge Material Inspection and Receiving Report
DD Form 1149:	Requisition and Invoice/Shipping Document (NAVSUP P-485, Vol. II)
DD Form 1348:	DoD Single Line Item Requisition System Document (NAVSUP P-485, Vol II)
DD Form 1348-1:	DoD Single Line Release/Receipt Document (NAVSUP P-485, Vol. II)
DD Form 1348-M:	DoD Single Line Release/Receipt Document (NAVSUP P-485, Vol. 2, p. 5-11)
DD Form 1155:	Order for Supplies/Services (NAVSUP P-485, Vol. 2)
DD Form 1536:	Government Bill of Lading (NAVSUP P-485, Vol. II, 23011)
DD Form 2090:	Government Property, Lost or Damaged Survey Certificate (NAVSUP P-485, Vol. II, 23011)
DD Form 200:	Report of Survey (NAVSUP P-485, Vol. II, 25155)
DD Form 2090:	GPLD Survey Certificate (NAVSUP P-485, Vol. II, 25155)
DD Form 1898:	Aviation Fuel Into-Plane Contract Sales Slip (NAVSUP P-485, Vol. II, 25155)
DLA 1886:	Source Identification and Authorization Control Record
DLA 1884:	Bulk Petroleum Terminal Message Report
DFSC 21.1:	Source Identification and Authorization Form

#### 2.4.10 Appendices

The final part of the operations manual is a series of appendices that provide other information that is too detailed or voluminous to be included in the body of the operations manual. The information contained in the appendices will vary from one fuel facility to another; however, the following should be considered:

- a. A list of all references, directives, manuals and instructions located in the reference library. (At a minimum, the reference library should contain copies of all the major references listed in this manual.)
- b. An emergency recall bill listing all personnel assigned to the fuel facility by name, title, grade, address and telephone number.
- c. Examples of forms and logs.
- d. Excerpts of applicable directives.
- e. Applicable Federal, State and local environmental regulations.
- f. Product safety data for various fuels stored on-site.
- g. A list of contact points for technical information (i.e., NAVPETOFF, NAVFAC, NAVAIR, major claimants, EFD, etc.). This list will include name, address and telephone number of organization and names of specific contacts within the organization.
- h. Emergency organizations (i.e., fire department, security, duty officer, medical, etc.) and telephone numbers.
- i. Mobilization information concerning the recall of Navy Reserve Units to augment the fuel facility.
- j. Facility layout map.

This Page Left Blank Intentionally.

*Chapter Three*  
***INVENTORY  
MANAGEMENT***

This Page Left Blank Intentionally.

## CHAPTER THREE: INVENTORY MANAGEMENT

### 3.1 INTRODUCTION

The management of fuel inventories involves a full range of actions associated with orders/requisitions, receipt, transfer, issue and storage of fuel. Petroleum handling operations must be planned so that product quantities are maintained within established quantity and quality levels. The major objectives of an inventory management program at a fuel terminal are to:

- o Ensure that all orders, receipts, transfers, issues, losses, gains and adjustments are properly documented.
- o Maintain accountable records on all products.
- o Ensure audits of fuel transactions are performed.
- o Maintain control over the physical environment to ensure proper product storage can take place with minimal losses.
- o Ensure that fuel losses are held to a minimum.

Inventory management procedures depend on whether fuel is owned by the Defense Logistics Agency (DLA) or the Navy. DLA-owned product is purchased at the wholesale level by the Defense Fuel Supply Center (DFSC) for direct delivery to a customer or for storage at a Defense Fuel Support Point (DFSP). DLA ownership can take place either when the fuel is procured at origin (FOB origin) or when the shipment of product is accepted at destination (FOB destination). When the Navy orders and receives fuel from a DFSP or a DFSC contract, a "sale" takes place, and the fuel becomes Navy-owned retail stock (see section 3.4).

The revolving Navy DBOF owns the petroleum classified as "retail stocks" within the Navy. These retail stocks include fleet oiler inventories, aviation fuels aboard CVs, LHAs and LPHs, and ground and heating fuels at designated shore locations/activities (see section 3.4). Funding and accounting procedures for Navy-owned products are issued by the Fleet Material Support Office (FMSO), Mechanicsburg, Pennsylvania.

### 3.2 REFERENCES AND DIRECTIVES

The major references that are the core of direction in the field of petroleum inventory management include:

- |                       |  |
|-----------------------|--|
| DOD 4140.25-M         | - DOD Management of Bulk Petroleum Products, Natural Gas, and Coal |
| NAVSUP Manual, Vol II | - Supply Procedures Ashore   |

OPNAVINST 4020.25 - Controlling and Accounting for Ground Fuels

These references spell out the procedures and standard practices associated with inventory management. They must be reviewed periodically to avoid disagreement and confusion whenever inventory problems or questions occur. Additional pertinent references are:

- MIL-HDBK-201 - Military Standardization Handbook, Petroleum Operations
- ASTM D-1085/API STD 2545 - Gauging Petroleum and Petroleum Products
- ASTM D-1086/API STD 2543 - Measuring the Temperature of Petroleum and Petroleum Products
- ASTM D-1250-80/IP200/52 (81)/API MPMS Ch 11.1 - Petroleum Measurement Tables
- DOD 7200.10 - Guidelines for Reporting Lost, Damaged or Destroyed Government Property
- NAVPETOFFINST 4020.1 - Bulk Petroleum and Bulk Lube Oil Requirements
- NAVSUP P-485 - Afloat Supply Procedures
- NAVCOMPTINST 7000.42 - Single Point of Payment of CONUS Post, Camp and Station (PC&S) Petroleum Contracts
- American Petroleum Institute Bulletin 2516 - Evaporation Loss from Low-Pressure Tanks
- American Petroleum Institute Bulletin 2517 - Evaporation Loss from External Floating-Roof Tanks
- American Petroleum Institute Bulletin 2518 - Evaporation Loss from Fixed-Roof Tanks
- American Petroleum Institute Bulletin 2519 - Evaporation Loss from Internal Floating-Roof Tanks
- NAVSUP P-546 - Pilferage of Petroleum
- NAVSUPINST 4020.8 - Fuel Exchange Agreements with Foreign Military Forces
- OPNAVINST 4020.26 - Fuel Exchange Agreements with Foreign Military Forces

- |                       |   |
|-----------------------|---|
| NAVCOMPT Manual Vol 3 | - Appropriation Cost and Property Accounting (Field)  |
| NAVCOMPT Manual Vol 8 | - Financial Inventory Accounting, Reporting and Billing   |
| NAVSUPINST 4440.115   | - Physical Inventory Program  |
| NAVPETOFFNOTE 4265    | - Revised DOD Standard Prices and Pricing Guidance for Petroleum Products (Cognizance 9X and 1B Material) |

DFSC has developed additional reference and training materials covering DFAMS functions at DFSPs and a Customer Guide for retail activities. Copies are available from DFSC-OP. These materials are:

- o The DFAMS Desk Guide
- o DFAMS Operators Training Course
- o DFSC Customer Guide for Retail Activities

### 3.3 DLA-OWNED PRODUCT

The Defense Logistics Agency (DLA) is the Integrated Material Manager (IMM) for bulk petroleum. Ownership of bulk petroleum inventories is defined in DOD 4140.25-M.

#### 3.3.1 Accountability and Responsibility

The accountable officer for all DLA-owned product is the Commander, DFSC or his designee. He is responsible for maintaining accountability of all receipts, transfers, issues and operational losses or gains of petroleum products. The Commanding Officer or Officer-In-Charge of military activities storing DLA-owned product will appoint a responsible officer in writing. The duties and responsibilities of this officer are set forth in Chapter 10, Volume II of DOD 4140.25-M.

#### 3.3.2 Issue, Receipt, Order and Requisition Documents

Like any other government property being transported and handled, petroleum products require appropriate custodial transfer and receipt documentation. Several forms comprise the most commonly used transfer documents. These include:

- o DD Form 1155, Order for Supplies and Services. This form is used to order petroleum products from DFSC contracts. (Detailed procedures for the preparation are discussed in DOD 4140.25-M, Appendix 10).

- o DD Form 250, Material Inspection and Receiving Report. This form is used to document shipments and receipts of fuel by overland transportation or pipeline. It also is used to document shipment receipts and issues to non-DOD and foreign facilities.
- o DD Form 250-1, Tanker/Barge Material Inspection and Receiving Report. This form is used to document shipments and receipts of fuel moved by tanker or barge, regardless of source. (For detailed procedures and instructions on the use, preparation and distribution of DD Form 250 and 250-1, see DOD 4140.25-M, Volume II, Chapter 5 and Appendix A28.)
- o DD Form 1149, Requisition and Invoice/Shipping Document/ DD Form 1348, DOD Single Line Item Requisition System Document/DD Form 1348-1, DOD Single Line Item Release/ Receipt Document. These forms are used to document requisitions, issues, receipts, turn-ins/returns and inventory adjustments of petroleum or contaminated products. Detailed procedures for the use, preparation and distribution of these documentation are discussed in DOD 4140.25-M, Volume II, Chapter 4.
- o Standard Form 361, Transportation Discrepancy Report. This form is used to document shipment discrepancies. It is prepared when the quantity received varies from the quantity indicated as shipped by more than the allowed tolerance. For further guidance on shipment discrepancy documentation and loss tolerances, refer to DOD 4140.25-M, Volume II, Chapter 10.
- o DD Form 1896 (White) for Jet Fuels, and DD Form 1897 (Purple) For Aviation Fuels DOD Identaplates. Identaplates are military aviation fuel cards to be used for purchases of fuels/oils when transiting facilities or installations of another Military Service or a commercial into-plane location. Information on embossing instructions can be found in DOD 4140.25-M, Volume II, Chapter 5.

### 3.3.3 Use of Meters for DLA-Owned Product

Meters may be used when U.S. Government written agreements or contracts with a pipeline company stipulate that the quantity determination will be based on pipeline meters, with appropriate correction for temperature or by temperature compensating meters.

3.3.3.1 **Receipts.** When temperature-compensating meters are used to determine quantities received, the quantity actually received will be determined by subtracting the beginning meter reading from the ending meter reading without temperature adjustments. A beginning temperature and gauge reading will be taken in case of meter failure during the receiving process. Temperature-

compensating meters will be calibrated according to American Society of Mechanical Engineers (ASME) and American Petroleum Institute (API) Code. When nontemperature correcting meters are used to determine the quantity received and issued, the beginning meter reading will be subtracted from the ending meter reading and the resultant quantity corrected to 60°F (see section 3.12.4).

3.3.3.2 **Issues.** When the tempo of terminal operations, size of issues and/or restrictive pipeline alignments during simultaneous operations causes tank gaugings to be impractical, local commanders are authorized to establish procedures for the use of meters to issue products. In instances where DLA-owned product issues are made to customers via an intermediary means, specifically yard craft such as YO, YON or other barges, meters are authorized for use. In order to ensure inventory accuracy, only approved and certified meters will be used and they must be calibrated semiannually in accordance with American Petroleum Institute (API) standards.

#### 3.3.4 Monthly Physical Inventory

A complete monthly closing out inventory is required to:

- a. Reconcile records with actual quantities on hand.
- b. Adjust stock record account balances to reflect the actual balance on hand as a result of this inventory.
- c. Identify and document gains and losses in accordance with procedures outlined in Chapter 9, Section II of DOD 4140.25-M.

A monthly physical inventory of all DLA products (fuel, additives, slop) will be taken as of 0800 the first calendar day of each month. Volume measurements and correction to 60°F (15°C) will be made using the procedures outlined in Section 3.12 (Quantity Measurement) of this chapter.

#### 3.3.5 Accounting for Gains/Losses (Variances)

Gains or losses of petroleum products are occasionally incurred during transportation, handling, terminal operation and through evaporation. A comparison of actual versus allowable losses will be conducted monthly by the responsible officer. These losses also shall be reviewed periodically by higher commands to ensure that losses are effectively controlled and minimized. In addition, gains and losses will be charted and analyzed for trends. The three types of losses include in-transit losses, terminal or operating losses, and determinable losses. Allowable tolerances by type and product are found in Chapter 10, Volume II of DOD 4140.25-M.

3.3.5.1 In-Transit Losses. In-transit losses are losses of a quantity of product due to transportation, including shipment from procurement and transfers between two military facilities. It does not include transfers between tanks or different tank farms within a single fuel facility. When the loss exceeds the 0.5 percent allowance, the entire loss will be investigated and reported as required by Chapter 10, Volume II of DOD 4140.25-M. Within CONUS, in-transit losses by barge, pipeline or tanker are covered by carrier's tariffs, tenders and agreements. The applicable DFSC fuel region is responsible for investigating and reporting these losses upon receipt of copies of appropriate documentation (DD Form 250/250-1, pipeline reports, letter of investigation, etc.) from both origin and destination points. In-transit losses that occur in Government shipments will be computed immediately after receipt of product at final destination and documented on SF 361, Discrepancy in Shipment Report, except when the shipment is between DFSPs or transporting bulk petroleum products. When shipments are made FOB destination (acceptance at destination), in-transit losses are absorbed by the shipper.

3.3.5.2 Terminal or Operating Losses. Terminal or operating losses are losses of DLA-owned product due to terminal operations, including evaporation, temperature changes, minor immeasurable leaks and spills and handling losses. It does not include determinable losses, combat losses or major disasters. When the total operating loss of a specific petroleum product exceeds the specified allowance, the entire loss must be documented and reported on DD Form 200, Report of Survey, in accordance with DOD 7200.10-M and DOD 4140.25-M.

3.3.5.3 Determinable Losses. Quantity of product lost or destroyed from determinable causes, such as tank overflows, spills, pipeline breaks, fire, theft and unrecoverable tank bottoms is a determinable loss. Normally, these losses can be prevented or greatly minimized by effective management. These losses will be researched and reported in accordance with Chapter 2 of DOD 7200.10-M and Chapter 10 of DOD 4140.25-M. Determinable losses requiring special stock fund transactions are:

- o Combat Losses - Quantity of product lost, contaminated, or destroyed as a result of hostile actions. A combat loss may account for all or only a portion of the total quantity lost either in-transit or within the terminal. Accountability is terminated upon approval of a DD Form 1348-1 by the Commander of the organization to which the terminal is assigned.
- o Major Disasters - Quantity of product lost, damaged or destroyed by incidents such as hurricanes, flood, storms, lightning, or earthquakes. Documentation for these losses will be the same as for combat losses.

3.3.5.4 Inventory Adjustments. Gains/losses of DLA-owned products are documented and reported to DFSC as inventory adjustments as outlined in Chapters 9 and 10, Section II, DOD 4140.25-M. Determinable losses are documented and reported individually while terminal operating gains and losses are reported at the same time as the monthly physical inventory.

### 3.3.6 Condition/Identity Changes

Condition changes must be reported to DFSC when products do not meet specifications and are temporarily held from issue or when product is returned to specification limits (e.g., by blending or injecting additives). Identity changes occur, and must be reported to DFSC, when a product is downgraded or regraded from one specification to another grade (e.g., pipeline interfaces, fuel to slop, additives injected into fuel, reclaimed product, etc.). Documentation and reporting are outlined in Chapters 9 and 10, Section II of DOD 4140.25-M.

### 3.3.7 Defense Fuels Automated Management System (DFAMS)

DFAMS is the Automated Management Information System for DOD petroleum management to include accountability for all DLA-owned petroleum products, additives and slop. This automated system tracks all transactions through placement of an order/requisition shipment, receipt, payment to suppliers, and billing to customers by DFSC.

3.3.7.1 Auditable Supply Transaction System. This is operated at DFSC to receive, process and store transactions reported by HQ DFSC, DFRs and individual terminals (DFSPs). Reported transactions are accumulated on a daily basis for each product at each DFSP during a calendar month, producing a running or cumulative status of order, receipts, shipments and inventory.

3.3.7.2 DFAMS Transaction. Any action that affects the inventory of DLA-owned products such as orders/requisitions, shipments/issues, receipts, inventory adjustments, monthly physical inventory and condition/identity changes, is recorded in the automated system.

3.3.7.3 Transaction Documentation. Transactions are documented at the place where they occur on prescribed forms (DD Form 1155 series, DD Form 1149, DD Form 1348, DD Form 200, etc.). These become the source documents retained at the originating location as the auditable document copy.

3.3.7.4 Transaction Reporting. Navy-operated DFSPs usually report transactions to DFSC/DFAMS/DADS via commercial dial-up or Internet or two line message format, although some may report through a DFR under separate arrangements.

The information/data from source documents is converted to specified MILSPETS transaction (P-Series) reporting formats, determined by the type of transaction, and reported to DFSC either by the DFSP or through a DFR/DICP entry point. The system provides a notice to the originator (entry point) of each transaction indicating whether the transaction was accepted, rejected, suspended or if transactions are missing. A diagram showing typical transaction reporting by a DFSP to DFSC is provided in Appendix 7, Part A.

3.3.7.5 **Monthly Reconciliation.** Inventory reconciliation is accomplished monthly for each DLA-owned account (product) at each DFSP through the automated DFAMS program. The program compares the prior beginning inventory with the DFSP reported ending physical inventory, and all transactions reported for the period, to produce a new computed inventory and inventory variance. Steps in the reconciliation process are:

- a. Each DFSP must prepare a physical inventory document (DD Form 1348) for each product at the DFSP and report the data to DFSC as a P41 transaction.
- b. The DFSP either prepares and reports a P42 Inventory Adjustment for operating gain/loss for the product and period or the DFAMS computer program will produce the adjustment.
- c. Upon receipt of the P41, and the P42 if reported, the DFAMS program attempts to reconcile the product inventory record.
- d. If the computed inventory result is within the allowable tolerance, a Document Register is sent to the DFSP for validation of all entries against source documents at the DFSP and certification by the Responsible Officer.
- e. The document register shows the official beginning inventory figure for the next month period.
- f. A diagram outlining monthly physical inventory reconciliation responsibilities, procedures and documentation is provided in Appendix 7, part B.

3.3.7.6 **DFAMS Assistance.** In addition to DOD 4140.25-M procedures, DFSC has provided each DFSP with a DFAMS Desk Guide and Operator Training Course packages to assist personnel in DFAMS documentation, reporting and training. DFSC supplies activities with hands-on training for DFAMS.

#### 3.4 **FUEL SUPPORT**

Product may be requisitioned from either a Defense Fuel Support Point (DFSP) facility or a DFSC contract. It is important to know the source of the product, because the manner

in which fuel is requisitioned or ordered depends upon the source from which the product will come.

### **3.4.1 Fuel from DFSC Facilities (DFSPs)/Contracts**

**3.4.1.1 DFSP Support.** Defense Fuel Support Points (DFSPs) can be Navy-operated fuel terminals (GOGO), Government-owned facilities operated under contractor (GOCO) or contractor-owned and operated facilities (COCO). A Navy customer obtains fuel from a DFSP by submitting his annual bulk petroleum requirements to the Navy Petroleum Office (NAVPETOFF) per NAVPETOFFINST 4020.1 (Series). NAVPETOFF identifies specific Navy retail customers and their requirements to DFSC. This information is provided by DFSC to the applicable Defense Fuel Region (DFR) after the intended source of supply for each customer is determined (contract award).

**3.4.1.2 Notification of DFSP Support.** DFSC owns the product and controls distribution to customers by the use of the SIOATH Form, DFSC Form 21.1. SIOATHs are initiated and controlled by the Defense Fuel Regions (DFRs) and are not prepared for overseas DFSPs. For overseas DFSPs, the Joint Petroleum Office (JPO), SAPO or local command will notify an activity of terminal/contractor support. The DFR distributes the SIOATH to both customer and supplying facility. The SIOATH document indicates who is authorized to order or requisition bulk fuel directly from a designated DFSP or a commercial contractor. Occasionally, a DFSP will refuse to issue to a Navy customer if the customer is not specifically identified on an approved SIOATH or the ordering quantity exceeds the total quantity. In this situation, NAVPETOFF, Code 20, should be immediately contacted for assistance, DSN 284-7485.

### **3.4.2 Fuel From DFSC Contracts**

**3.4.2.1 Types of Contracts.** In certain cases, DFSC purchases bulk fuels through commercial contracts for direct delivery. There are numerous types of Post, Camp and Station (PC&S) Bulletins, bunker contract bulletins and direct delivery bulk contracts. Commercially procured bulk fuel may be inspected and accepted by a Government representative at the suppliers facility (FOB origin) or at the time of delivery (FOB destination). A diagram outlining responsibilities, procedures and documentation for a PC&S contract is provided in Appendix 8.

**3.4.2.2 Notification of Contract Fuel Support.** The second type of SIOATH that documents direct deliveries into retail tankage is issued by the DFR to the facility and authorizes the facility to place orders (DD Form 1155) with the contractor within the limits shown on the SIOATH. These SIOATHs differ from those issued for support from a terminal (DFSP) in several ways: the quantity shown is the maximum authorized by contract; the SIOATH conveys DFSC funding appropriation authority; and the DD Form 1155 executed by the activity is an obligation of government funds.

NOTE: SIOATHs are not issued for PC&S or bunker bulletins or for products ordered by the DFR. PC&S/bunker bulletins are the ordering authority and are provided directly to the activity by DFSC.

### 3.4.3 Ordering and Requisitioning

Orders for fuel are frequently initiated verbally. Where the source is a commercial supplier, the order must be followed by distribution of an Order for Supplies or Services (DD Form 1155) by the following work day. When the source is a Navy-operated DFSP, preparation of a Requisition and Invoice Shipping Document (DD Form 1149) may not occur until after delivery of fuel, when the precise receipt quantity is known. Under some circumstances, DFSC bills are based upon the shipment quantity -- not upon the amount of fuel received. Therefore, there may be a potential discrepancy between funds obligated (based upon a DD Form 1149 prepared at receipt) and the subsequent DFSC interfund billing (based upon DFAMS data input by the DFSP at the time of shipment). These discrepancies can be avoided by careful liaison with the supporting DFSP or DFR.

With the exception of bunkering and overseas PC&S contracts, purchases against DFSC contracts are generally paid for by DFSC and subsequently rebilled to the ordering facility at the standard price. A failure to correctly order and to properly process the ordering/receipt documents will lead to nonpayment of the supplier.

#### 3.4.3.1 Post, Camp, and Station (PC&S) Contracts (CONUS).

NAVCOMPTINST 7000.42A provides detailed guidance on CONUS PC&S contracts. The key elements are as follows:

- o All orders or amendments will be placed in accordance with terms of the contract and will be documented on a DD Form 1155.
- o Orders will be distributed within one working day -- two copies to the contractor, the original plus two copies (both signed) to Defense Finance Accounting Center, Fuel Stock Fund Accounting Branch, Columbus Center, ATTN: DFAS-CO-SFP, P.O. Box 182317, Columbus, OH 43218-6252. Orders may not cover a period in excess of one calendar month.
- o Receipts may be documented on either DD Form 250 or DD Form 1155 and will be distributed in three copies to the above address no later than one working day following receipt.
- o All orders will cite the Defense Stock Fund accounting data and MILSTRIP data specified in NAVCOMPTINST 7000.42A. This will enable DFSC to rebill the ordering facility as indicated above.

3.4.3.2 **Bunker Contracts**. There are several Navy shore activities supported by deliveries from bunkering contract items. While ordering procedures are the same as for other commercial sources (i.e., use of the DD Form 1155) distribution of the ordering and substantiating delivery documents will be in accordance with the requirements of the contract.

3.4.3.3 **Direct Delivery Contracts**. All orders will be documented on DD Form 1155 as authorized by the SIOATH from the DFR. CONUS Navy retail activities will report and/or provide copies of the order and receipts to the DFR as arranged between the activity and the DFR. The DFR will input for activity orders and receipts into DFAMS for the customer.

3.4.3.4 **Requisitions to a DFSP**. Requisitions will be prepared for support from a DFSP on DD Form 1149 or DD Form 1348-1 per arrangements between the activity and the DFR/DFSP. Requisitions are not reported to the DFR or DFSC.

#### 3.4.4 **Use of Meters for Navy-Owned Products**

Guidance on the use of meters to receive/issue product is provided in section 3.3.3.

#### 3.4.5 **Pricing**

Annually on 1 October, DFSC promulgates new standard prices for all bulk fuels and lubricants. Information to Navy activities is initially provided by NAVPETOFF which distributes the pricing data by message and subsequently by NAVPETOFFNOTE 4265.

#### 3.4.6 **Issue and Receipt**

Implementing correct procedures and strictly observing them is crucial to the proper inventory management of fuel. Regardless of the source of the fuel or the mode of its transportation, it is important to examine the shipping documents, the conveyance and the quality of fuel. Fuel quality is addressed in Chapter 4, Quality Surveillance. The identification of discrepancies in shipment and the proper method of accounting or reporting them are discussed in Chapter 5 of NAVSUP Manual, Volume II, and Chapters 5 and 10 of DOD 4140.25-M. Procedures and documentation on issue/receipt of DBOF fuel are provided in Appendix 9.

All receipts of bulk fuel from a DFSC contract source, except overseas PC&S, bunkers or into-plane, must be reported by the receiving activity. CONUS PC&S receipt documents are mailed (see 3.4.3.1) and direct delivery receipts are reported through the DFR (see 3.4.3.3). Generally, tank car/tank truck receipts from a DFSP are not reported to DFSC; receipts from a DFSP by

barge or pipeline may or may not have to be reported to DFSC (contact the DFSP/DFR or NAVPETOFF for instruction).

#### 3.4.7 Inventory Management

Management of retail fuel stocks is based upon the manual procedures specified in Chapter 4 of NAVSUP Manual, Volume II. These procedures call for use of the stock record card (NAVSUP Form 766), upon which all receipts, issues and other adjustments are recorded. The precise nature of the retail activity stock management system is included in NAVSUP Manual, Volume II.

- o Losses. Monthly operating losses are computed in accordance with Chapter 5 of NAVSUP Manual, Volume II. Losses greater than the established tolerances must be surveyed. These losses (and gains) should be charted and analyzed for trends.
- o Reconciliation. NAVSUP Manual, Volume I, Chapter 4, specifies a monthly physical inventory for the purpose of reconciling stock and financial records. There is no requirement that this inventory be conducted on the last day of the month. Since financial reporting to FMSO occurs prior to the end of the month, the date for conducting fuel inventories should be set by the facility's Comptroller. This will facilitate the financial record physical inventory reconciliation and eliminate any need for an additional inventory close-out during the month.
- o Inventory Levels. The computation of Authorized Inventory Levels (AIL) is detailed in Chapter 4 of NAVSUP Manual, Volume II.
- o Annual Requirements. Annual petroleum requirements should be submitted to the NAVPETOFF in accordance with NAVPETOFFINST 4020.1A.
- o Inventory Report. To control and assess the adequacy of a fuel operation, the monthly inventory report in Appendix 10 is recommended.

#### 3.4.8 Billing

DFSC acts as the central procurement agency for government bulk and lubricants fuel purchases and as the paying facility for suppliers. DFSC bills Navy facilities at the standard price for the purchases of fuel under the PC&S program (in CONUS), the into-plane contract bulletin program and for receipts from direct delivery bulk contracts and DFSPs. Excluded from central bill payment are purchases from the bunkering contract bulletin (CONUS and Overseas), overseas PC&S contracts and local purchases. Procedures have been incorporated within DFAMS for certain retail activities to be billed by DFSC for the quantity of fuel actually

gauged into their tanks. These procedures are applicable to commercial barge shipments and some types of pipeline deliveries. The supporting DFSP or DFR can assist in implementing receipt quantity billing for facilities that qualify.

#### **3.4.9 Financial Inventory Reports and Manual Stock Record Reconciliation**

NAVSUP Manual, Volume II contains instructions for computing monthly physical inventory adjustment (gain/loss). This adjustment is computed based upon the monthly physical inventory which is posted to stock record cards. The adjustment, if within allowable tolerances (see DOD 4140.25-M, Volume II, Chapter 10) is documented on a DD Form 1149. If outside the loss tolerances, a Report of Survey (DD Form 200) must be prepared. In addition to ensuring that stock record cards accurately reflect the inventory on hand, it is equally important to ensure that the Financial Inventory Reports (FIR) are reconciled to the Manual Stock Records (MSR). NAVSUPINST 4440.115 requires a monthly reconciliation for fuel items. This area requires particular attention since there is substantial room for error due to manual records processing. In addition, the cut-off date for financial reporting occurs well before the usual end of the month physical fuel inventory. This timing difference, plus the normal delay associated with document flow in a facility, can impede proper reconciliation. Attention to this problem is the most practical way to avoid this difficulty.

#### **3.5 INVENTORY ADJUSTMENT DOCUMENT (IAD)**

Property and accountable records at bulk fuel terminals are adjusted using DD Form 1149 (Navy-owned) or DD Form 1348-1 (DLA-owned) products, to account for all gains and losses in inventories. When the monthly terminal operating variance exceeds the established tolerance, the entire loss/gain will be investigated and documented in accordance with DOD 7200.10, Chapter 2, NAVSUP Manual, Volume II, Chapter 5 (Navy-owned product) and DOD 4140.25-M, Volume II, Chapter 10 (DLA-owned). These materials provide detailed information on how to adjust loss/gain on the stock record, the approving/disapproving authority for the adjusted item on the IAD and the requirements for preparing a report of survey.

NAVCOMPT Manual, Volume 8, Chapter 5 provides information on recording these adjustments on the Financial Inventory Report (Navy-owned product).

#### **3.6 FUEL SURVEYS**

When U.S. Government property is lost, damaged or destroyed, a survey to determine the extent of the loss or damage must be conducted. The form used to document the loss is:

- o DD Form 200, Report of Survey is used to account for losses and gains, determine the liability, provide relief from accountability where no personal responsibility is evident and for reports of survey/investigation where personal responsibility is evident and negligence can be proven. General guidance and procedures for determining the proper type of survey and documentation requirements are prescribed in DOD 4140.25-M, Volume II, Chapter 10, for DLA-owned product; and NAVSUP Manual, Volume II, Chapter 5 for Navy-owned product.

### 3.7 RECORDS, REPORTS AND PROCEDURES

Several documents or procedures are used to manage petroleum inventories at bulk fuel terminals. The next section describes some of these procedures and documents.

#### 3.7.1 Slate

A slate is a monthly report of planned requirements submitted to DFSC for tanker delivery of bulk petroleum to an ocean terminal. There are two types of bulk petroleum slates, the overseas slate and the CONUS slate.

3.7.1.1 Overseas Slate. An overseas slate establishes delivery requirements for the current month and four subsequent months. It is transmitted by Automatic Digital Network (AUTODIN) facilities in time to arrive at the DFSC on or before the tenth calendar day of each month. It is submitted by the Joint Petroleum Office (JPO) of each Unified Command reflecting the coordinated requirements of all the Services of all ocean terminals in the area of responsibility.

3.7.1.2 CONUS Slate. A CONUS slate establishes delivery requirements for the current month and three subsequent months. It is submitted by Defense Fuel Regions (DFR) based on the data prepared by individual Navy activities.

For further details on Overseas and CONUS slates, refer to Chapter 4, Volume II of DOD 4140.25-M.

#### 3.7.2 Redistribution Order (RDO)

An RDO will be used to direct and identify product movements between DFSPs and pipeline companies. An RDO is not required for the movement of product within a reporting complex, i.e., the same Department of Defense Activity Address Code (DODAAC). Further details on RDOs are covered in Chapter 4, Volume II of DOD 4140.25-M.

### 3.7.3 Bulk Petroleum Terminal Message Report (Report Control Symbol RCS:DLA(W) 1884, DFSC-OI)

This report provides data for DFSC inventory management and stock control/distribution of bulk fuels. The DFSP inventory data is used to answer inquiries at all levels of the Defense Department and Congress. Thus accurate, complete and timely reporting is crucial. Instructions for the preparation and submission of the 1884 reports are presented in Volume II, Chapter 10 of DOD 4140.25-M. The preferred method for receiving this report is through Defense Fuel Accounting Management System (DFAMS). Data received from activities will remain in DFAMS for two to three months.

### 3.8 FUEL EXCHANGE AGREEMENT (FEA)

Under an FEA, fuel will be provided to or received from a foreign government on a replacement or in kind reimbursable basis. Navy fuel facilities that receive requisitions from foreign ships and aircraft operating under an FEA will issue the requested product from DFSC-owned stocks and cite Budget Project 38 (BP38) funding. Those Navy facilities procuring fuel stocks with BP38 funds will record a receipt from procurement in cognizance symbol 9X for the value of the fuel issued to the foreign ship. The recorded amount will then be Other Supply Office (OSO) transferred to Defense Finance and Accounting Service, Defense Accounting Office, Cleveland Center (DAO-CL), Charleston, South Carolina 29408-6300 (Code BLSBC), for accountability. In accordance with NAVCOMPT 085200.2, a copy of all backup documentation will be included with the OSO Summary as submitted to DAO-CL Charleston (Code BLSBC). The interdepartmental billings from DFSC will be directed to the issuing facility. Facilities will ensure that completed copies of issue documents (DD Form 1149/1348) are forwarded to Defense Finance and Accounting Service, Defense Accounting Office-Cleveland Center (DAO-CL), (Code BLSBC), Charleston, SC 29408-6300, to enable DAO-CL to determine the chargeable country. A transaction message report must also be sent to DAO-CL, Code BLSBC, with an information copy to the appropriate Fleet Commander, NAVPETOFF, SPCC Mechanicsburg, Pennsylvania (Code 01331), and all concerned. The report should include the document number, commodity and quantity issued, name of receiving vessel and country of origin.

Countries holding bilateral and/or Fuel Exchange Agreements with the U.S. Navy are shown in Exhibit 3-1.

#### 3.8.1 Funding

Department of the Navy (DON) receipts of foreign fuel are funded through Operation and Maintenance appropriation reimbursements to the DBOF, while foreign receipts of fuel from DON are recorded as accounts receivable in the DBOF.

**EXHIBIT 3-1**

**COUNTRIES HOLDING BILATERAL AND/OR  
FUEL EXCHANGE AGREEMENTS WITH U.S. NAVY**

COUNTRY	POINT OF CONTACT	FUEL
Argentina	USDAO Buenos Aires, Argentina	Special Navy Fuel (F.O.N. 70/30), Diesel Oil - Diesel Fuel, Gas Oil - Marine Diesel Oil and other types of fuel common to both the U.S. and Argentine Navies
Australia	Commander of Australian Navy	F76, JP5/AVCAT (F44)
Canada	Commander, Maritime Command Halifax or Commander, Maritime Forces, Pacific, Esquimalt	All aviation fuels (including oils and lubricants) and all Naval ship propulsion fuels normally stocked at USN/USMC and CF facilities
Chile	USDAO Santiago, Chile	NATO F76
France	Commander, Sixth Fleet	F76, JP5
Japan (MOU)	Commander, Naval Forces Japan	F76
Korea (Navy)	Commander, U.S. Naval Forces Korea	F76, JP4, JP5, JP8, MOGAS, DFM (high sulfur), Marine lubricants lubricants
Korea (Air Force)	Commander, U.S. Naval Forces Korea	JP4, JP5
Pakistan	USDAO Islamabad, Pakistan	F76, JP5
Peru	U.S. Commander, South Atlantic Forces	F76, JP5
Singapore (MOU)	Commander in Chief, U.S. Pacific Fleet (N41B)	F76, JP5
Turkey	Commander in Chief,, Turkish Navy, Ankara, TU	F76
United Kingdom (RN) (MOU)	Commander in Chief, U.S. Naval Forces, Europe	AVCAT (NATO F44), JP5, (NATO F44), Dicso Fuel (NATO F76)

### 3.8.2 Fuel Replacement Procedures

Issues and receipts of all products will be offset on a grade-by-grade basis to the maximum extent possible as part of the reconciliation process. Both Navies shall have the right to replace the net balance or any particular issue with fuels other than those received in consonance with relative values based on the standard prices of the Navy receiving repayment and using standard prices existing at the end of the period being reconciled. The recipient shall have the option of refusal if the fuels do not meet national requirements. When mutually convenient, repayment will be made by transferring fuel at locations where both governments have POL stocks. When repayment is to be made by tanker, unless otherwise agreed in other mutual logistics support arrangements or laws, services associated with the tanker delivery will be provided on a reciprocal no-cost basis to the greatest extent possible. Where this is not possible, these charges will be borne by the Navy making repayment.

Additional guidance regarding FEAs is described in OPNAVINST 4020.26, NAVSUPINST 4020.8 and Chapter 5, Volume II of NAVSUP Manual. Accounting procedures regarding FEAs are contained in the NAVCOMPT Manual, Volume 3, Chapter 5.

### 3.9 BULK PETROLEUM STORAGE FACILITIES REPORT, RCS:DD-P&L(A) 506

DFSC-F will control and maintain the 506 data base which documents tankage data and receiving/shipping capability input by DOD components. The 506 data base allows DFSC to analyze storage capabilities and associated petroleum products worldwide in mission. Changes in tankage/receiving/shipping capability data shall be reported to DFSC. DFSPs (base-level/intermediate) will input data directly to the DFAMS data bank. DFSPs without direct access to the DFAMS data bank shall input data via worksheets to the DFR (JPO/SAPO for OCONUS) to access the DFAMS data bank. DFRs will provide the DFSPs with updated computer printouts. Classified data for the 506 Overseas Supplement Report will be input via classified worksheets to the appropriate JPO/SAPO. Tanks with capacities in excess of 500 barrels that are taken out of service for cleaning, repair, new construction or abandonment must also be reported to NAVPETOFF by priority message (for OCONUS activities, NAVPETOFF should be info addressee on messages to JPO/SAPO concerning tanks returning or going out of service). For additional information on the interim out-of-tankage report submission, refer to Chapter 6, Part E, Section III of NAVSUP Manual, Volume II.

### 3.10 INVENTORY LEVELS AND REQUIREMENTS

Volume II, Chapter 11 of DOD 4140.25-M prescribes procedures and responsibilities for managing Peacetime Operating Stocks (POS) along with Bulk Petroleum War Reserve Stocks (BPWRS) at DFSPs. Resupply of DFSPs will be based on incurring stock

availability to meet operation needs, cost effectiveness of resupply and maintaining appropriate inventory levels. BPWRS shall be in addition to POS.

### 3.10.1 Peacetime Operating Stock (POS)

POS is the amount of fuel required to sustain peacetime operations in support of military demands to be maintained at a DFSP.

### 3.10.2 Bulk Petroleum War Reserve Stocks (BPWRS)

CINCs may request waivers to the policies in order to meet specific anticipated needs of an emerging contingency or an ongoing military operation.

3.10.2.1 CONUS. Any CONUS BPWRS must be directly supporting an Operational Plan (OPLAN). It will be limited to a stockage level for mobility requirements, strategic operations, civil defense and logistics.

3.10.2.2 Overseas. There shall be BPWRS to support military operations in each CINC's theater. BPWRS may not exceed the minimum levels established in common for NATO nations.

### 3.11 AUDIT PAPERWORK

Records of quantity measurements, calculations, receipts, issues and inventory reports must be maintained. For audit trail purposes, these records must be accurate, complete and available to justify total accountability. For DLA-owned products, source documents for all orders, receipts, issues, monthly inventories, gains and losses inventory adjustments and condition/identity changes will be retained in accordance with Chapter 1, Volume II, of DOD 4140.25-M. Inspections may be performed by the DOD-IG Inspection Team once every three years as governed by a Memorandum of Understanding (MOU) between DLA and the Navy Department.

### 3.12 QUANTITY MEASUREMENT

Liquid petroleum products are transported, handled and stored many times before they are used. They must be quantitatively measured to determine inventory on hand, verify quantities received, issued or transferred, detect leaks, eliminate possibility of theft and determine the presence of water. To accurately determine the quantity of liquid petroleum products, personnel must ensure packed pipelines are in proper condition, gauge fuel tanks, obtain temperatures and take water cuts. These elements, along with up-to-date calibration and correction tables, will enable fuel distribution systems personnel to accurately compute a given volume of liquid petroleum at a standard temperature of 60°F (15°C).

### 3.12.1 Packing Pipelines

A packed pipeline is the condition in which the pipelines and manifolds are kept full of product under pressure whether the lines are in operations or not. All cargo lines must be positively pressurized to the pier manifolds to ensure that pipelines are full before and after the issue or receipt of product. Check to make sure the pipeline is packed before the fuel is measured. To aid in packing pipeline systems, use of air eliminator devices should be considered.

### 3.12.2 Gauging

Gauging is the process of measuring innage or outage, bottom sediment and water (BS&W) and temperature of the tank contents. Gauging any petroleum tank or conveyance requires care and attention to avoid potential safety and environmental hazards. Specific care and safety precautions are outlined in Exhibit 3-2.

3.12.2.1 Gauging Equipment. The instruments and materials used in gauging liquid petroleum products are discussed below.

- o Innage Tape and Bob. The steel innage tape (MIL-T-16644) is graduated in feet, inches and to one-eighth of an inch. It is wound on hand-held reel and cranked assembly in a frame or case. The tape is equipped with a brass plumb bob. From the pointed tip of the conical bob to the first number on the tape is nine inches.
- o Outage Tape and Bob. The steel outage tape is similar to the innage tape except that the readings start at the two-inch level. The zero reference is where the harness snap connects to the bob. The rectangular bob is six-inches long. However, the one-eighth inch graduation begins with the six-inch mark at the bottom and reads upward to one inch as the last whole number on the top. The bob has a flat nose.
- o Fuel Indicating Paste. A chemical paste used in measuring the amount of liquid petroleum product in a storage tank. It will change color when it comes in contact with petroleum.
- o Water-Indicating Paste. A chemical paste used to differentiate between liquid petroleum product and water. Paste changes in color when it comes in contact with water. Petroleum products do not affect the paste.

- o Hydrometers and Thermometers. These instruments are used to measure the density and temperature of fuels. This information is used to convert gross quantities of fuel to net quantities.
- o Cup Case Thermometer. A standard cup-type, ASTM 59°F thermometer. It has a range of 0°F to 180°F marked on the thermometer to 1°F divisions. The thermometer is attached to a hardwood backing, with a 100-cc capacity open metal cup surrounding the thermometer bulb. When filled with liquid, the cup case minimizes fluctuation of the reading when the thermometer is suddenly withdrawn from the tank. A special trap thermometer is used for heavy fuel oil, and it may be suspended in the tank permanently.
- o Petroleum Gauge Stick. A special petroleum gauge stick is used to determine the innage of a small horizontal tank, a nonpressurized tank car, or a tank truck. The reading is taken by measuring the distance from the bottom of the tank to the surface of the product. If a petroleum gauge stick is not available, a yardstick may be used to gauge the contents of a 55-gallon drum.
- o Tank Car Gauge Stick. A tank car gauge stick is used to determine tank car dome innages and shell outages. The stick is 36 inches long. It has a non-ferrous metal angle attached at the zero point so the stick may rest on the tank shell at the gauging reference point of the tank car. It has two scales with a common zero, 12 inches from the lower end, graduating upward and downward. The lower figures are used to measure shell outages and the upper figures are used to measure dome innages.

## EXHIBIT 3-2

### TANK GAUGING PRECAUTIONS

- a. Before gauging a tank, ground static electricity by touching the bare hand to the tank shell or handrail.
- b. Keep the tape in contact with the rim of the gauging hatch at all times to ground static electricity.
- c. Never wear clothing, such as nylon, that will generate static electricity.
- d. Gauge tanks from the side of the gauging hatch facing the wind. Exercise caution against breathing vapors from the tank's contents.
- e. Never gauge the tank at the approach of, or during an electrical storm.
- f. Avoid walking around the floating roof of the tank. When gauging must be done from the roof, stand at the same location on the roof for both opening and closing gauges.
- g. Gauge the tank to the nearest one-eighth of an inch before and after issue or receipt of product.
- h. Allow products sufficient time for settling and for vapor and air expulsion. Never gauge a tank when there is evidence of air bubbles breaking at the surface of the product.
- i. Repeat gauging until two identical gauge readings are obtained. Use the same gauging equipment and gauging hatches in obtaining both opening and closing gauges.
- j. Wipe the tape and bob dry and clean after each use.

3.12.2.2 **Frequency of Gauging.** Liquid petroleum products must be gauged and posted periodically to ensure accurate and complete inventory records. Tanks must be gauged daily, weekly and monthly as indicated below.

- o **Daily.** Active tanks should be gauged before and after receipts, issues or transfers. Check gauge at least 30 minutes after receipts. For official gauge records, gauges should be performed 12 hours after completion of receipt. New tanks and tanks that have been empty for a prolonged period should be gauged at least once a day. Tanks having irregular gauging records or leakage problems should be gauged at least once a day or more often to detect leaks.

- o Weekly. Inactive tanks. All tanks, barges and tank trucks should be gauged for close out inventory on Friday.
- o Monthly. All tanks, barges and trucks should be gauged for monthly close out inventory.

3.12.2.3 Types of Gauging. There are basically two types of gauging, automatic and hand. These methods are described below:

- o Automatic Gauging. Automatic gauging refers to the automatic measurement of product level and temperature at the tank gauge glass or remote readout device. Approval for use of automatic gauging equipment must be obtained from NAVPETOFF. Specific requirements and certifications for this type of equipment are provided in Chapter 3 of NAVSUP Manual, Volume II.
- o Hand Gauging. Hand gauging is the physical measurement of product, BS&W, temperature and water level in tanks. It is the most common and accurate method of quantity measurement. Two methods of hand gauging are innage and outage (or ullage) gauge.
  - Innage Gauge. Innage gauge is the depth of liquid in a tank measured from the surface of the liquid to the bottom of the tank. This type of measurement is used in both aboveground and underground storage tanks. Detailed procedures for innage gauge measurement are described in Chapter 4, Section 9 of MIL-HDBK-201B; Chapter 6 of NAVEDTRA 10883B; Chapter 3 of NAVSUP Manual, Volume II; and ASTM D-1085/API 2545.
  - Outage (or Ullage) Gauge. The distance from the surface of the liquid to a reference point on the gauging hatch is known as outage, or ullage gauge. This type of measurement is used to gauging deep tanks, tankers, ships and barge compartments. To convert an outage gauge to an innage gauge, subtract the outage gauge from the reference depth of the tank. Detailed procedures for outage gauge measurement also are described in the same references for innage gauge measurement.

### 3.12.3 Temperature Measurement

The volume of liquid petroleum in a container is directly proportional to its temperature; hence, an accurate product temperature measurement must be taken at the time of gauging. The measured quantity must then be corrected to the standard temperature of 60°F (15°C).

Temperature readings are taken at specified levels in tanks. These readings are then averaged mathematically to determine the mean (average) temperature of the product. Exhibit 3-3 shows the required number of product temperature measurements and their location. For additional information on temperature measurements, refer to ASTM D-1086/API STD 2543; Chapter 4, Section 9 of MIL-STD-HDBK 201B; and NAVSUP Manual, Volume II.

Immersion time is the time it takes a thermometer to reach equilibrium in the fuel. The length of time required will be a minimum of three minutes. In fuels, Naval distillate (F76), gasoline, and jet fuels, the thermometer must remain in the product a minimum of three minutes. The readings must be taken and recorded immediately upon withdrawing the thermometer from the liquid.

### 3.12.4 Volume Corrections

The volumes of liquid petroleum products vary because of changes in temperature; therefore, volume corrections must be made for all receipts of petroleum products of 3,500 gallons or greater. Burner fuel and lubricating oils must be converted regardless of the quantity received.

3.12.4.1 Tables and Strapping Charts. All storage tanks have individual strapping charts or tank tables which provide the volume figures for a product height measurement in feet, inches and fractions of an inch. These charts/tables are prepared in barrels or gallons proportional to the volume of fuel. New certified strapping charts must be prepared after any tank repair/modification which changes the volume of the tank. The date of the tank strapping must be entered on the tank history card.

## EXHIBIT 3-3

### PRODUCT TEMPERATURE MEASUREMENTS

DEPTH OF FUEL IN TANK	NUMBER OF READINGS REQUIRED	WHERE READINGS ARE TAKEN
0 - 10'	1	Middle of fuel depth
10' - 15'	2	3' below surface 3' above bottom
15' - 20'	3	3' below surface, middle and 3' above bottom
20' and over	3	4' below surface, middle and 5' above bottom

3.12.4.2 Conversion of Measured API to API Gravity at 60°F. All corrections on fuels (Naval distillate, fuel oils, jet fuels, gasoline and other light fuels) will be made at standard temperature of 60°F (15°C) in accordance with ASTM D-150/IP 200/API-2540, Tables 5B and 6B. Table 6B, shown as Exhibit 3-4, is used to reduce observed API Gravity to API Gravity at 60°F (15°C).

3.12.4.3 Conversion of Gross Volumes to Net Volumes at 60°F. Further guidance on the methods of volume correction are given in Chapter 5, Section II of DOD 4140.25-M; Chapter 4, Section 9 of MIL-HDBK-201B; Chapter 6 of NAVEDTRA 10883B; Chapter 3 of NAVSUP Manual, Volume II; and ASTM D-1085/API STD 2545.

#### 3.12.5 Water Cuts

Petroleum storage tanks usually contain water in the tank bottom. The volume of this water bottom is obtained by taking a water cut. This water cut is essential to determining the net quantity of product at 60°F (15°C). To obtain a water cut, the innage bob must be lowered and rest lightly on the tank bottom. Detailed procedures for taking a water cut are described in Chapter 4, Section 9 of MIL-HDBK-201B; Chapter 6 of NAVEDTRA 10883B; Chapter 3 of NAVSUP Manual, Volume II; and ASTM D-1085/ API STD 2545.

#### 3.12.6 Calibration of Inventory Measuring Equipment

To assure that product quantities are accurately determined, all inventory measuring equipment must be periodically calibrated against a recognized standard and inspected to ensure that it has not been damaged or altered. Frequencies for the calibration of this equipment are provided in Exhibit 3-5. Calibration must also be performed on laboratory testing and measuring instruments (see section 4.4.3).

**Exhibit 3-4**  
**Generalized Products Volume Correction to 60°F**

TEMP F	30.0	30.5	31.0	31.5	32.0	32.5	33.0	33.5	34.0	34.5	35.0	TEMP. F
45.0	1.0066	1.0067	1.0067	1.0067	1.0068	1.0068	1.0068	1.0068	1.0069	1.0069	1.0069	45.0
45.5	1.0064	1.0065	1.0065	1.0065	1.0065	1.0066	1.0066	1.0066	1.0066	1.0067	1.0067	45.5
46.0	1.0062	1.0062	1.0063	1.0063	1.0063	1.0063	1.0064	1.0064	1.0064	1.0064	1.0065	46.0
46.5	1.0060	1.0060	1.0060	1.0061	1.0061	1.0061	1.0061	1.0062	1.0062	1.0062	1.0062	46.5
47.0	1.0058	1.0058	1.0058	1.0058	1.0059	1.0059	1.0059	1.0059	1.0060	1.0060	1.0060	47.0
47.5	1.0055	1.0056	1.0056	1.0056	1.0056	1.0057	1.0057	1.0057	1.0057	1.0057	1.0058	47.5
48.0	1.0053	1.0053	1.0054	1.0054	1.0054	1.0054	1.0055	1.0055	1.0055	1.0055	1.0055	48.0
48.5	1.0051	1.0051	1.0051	1.0052	1.0052	1.0052	1.0052	1.0052	1.0053	1.0053	1.0053	48.5
49.0	1.0049	1.0049	1.0049	1.0049	1.0050	1.0050	1.0050	1.0050	1.0050	1.0051	1.0051	49.0
49.5	1.0047	1.0047	1.0047	1.0047	1.0047	1.0048	1.0048	1.0048	1.0048	1.0048	1.0048	49.5
50.0	1.0044	1.0045	1.0045	1.0045	1.0045	1.0045	1.0045	1.0046	1.0046	1.0046	1.0046	50.0
50.5	1.0042	1.0042	1.0042	1.0043	1.0043	1.0043	1.0043	1.0043	1.0044	1.0044	1.0044	50.5
51.0	1.0040	1.0040	1.0040	1.0040	1.0041	1.0041	1.0041	1.0041	1.0041	1.0041	1.0042	51.0
51.5	1.0038	1.0038	1.0038	1.0038	1.0038	1.0038	1.0039	1.0039	1.0039	1.0039	1.0039	51.5
52.0	1.0035	1.0036	1.0036	1.0036	1.0036	1.0036	1.0036	1.0037	1.0037	1.0037	1.0037	52.0
52.5	1.0033	1.0033	1.0034	1.0034	1.0034	1.0034	1.0034	1.0034	1.0034	1.0034	1.0035	52.5
53.0	1.0031	1.0031	1.0031	1.0031	1.0032	1.0032	1.0032	1.0032	1.0032	1.0032	1.0032	53.0
53.5	1.0029	1.0029	1.0029	1.0029	1.0029	1.0029	1.0030	1.0030	1.0030	1.0030	1.0030	53.5

Table 6B

Example: 175,000 barrels of diesel fuel measured at 50°F has a 31.7° API Gravity at 60°F. What is the net volume at 60°F by using this table?

Solution: Enter on the top row "API Gravity at 60°F" headed 31.5 (closed for 31.7). Read down to the observed temperature of the fuel at 50°F on the left column. The volume correction factor is 1.0045.

The net volume at 60°F in the tank is  $175,000 \times 1.0045 = 175,787.5$  barrels or 175,790 barrels.

NOTE: This table will be shown as 5B in ASTM D-1250/IP-200/API 2540.

**EXHIBIT 3-5**

**CALIBRATION OF INVENTORY EQUIPMENT**

<b>EQUIPMENT</b>	<b>STANDARD</b>	<b>CALIBRATION FREQUENCY</b>
Gauging tapes	ASTM D-1085	Annually
Thermometers	ASTM D-1086 ASTM E-1 ASTM E-77	Annually
Hydrometers	ASTM E-100 ASTM E-126	Initial Calibration Only <sup>1</sup>
Meters	API MPMS 4, 5, 6, 11.2.1, 11.2.2, 11.2.3	Semiannually
Temperature Compensation Meters	API MPMS 5.3 MPMS 4	Semiannually

**Footnote 1: No Calibration Required (NCR) after the initial calibration. ASTM Hydrometer 4H, 5H, 6H, 7H, 54H, 55H, 56H, and 57H those normally used for petroleum testing should be declared NCR after initial calibration.**

**Chapter Four:**  
**QUALITY**  
**SURVEILLANCE**

This Page Left Blank Intentionally.

## CHAPTER FOUR: QUALITY SURVEILLANCE

### 4.1 INTRODUCTION

The facility with physical possession of government-owned petroleum products is responsible for implementing and conducting a quality surveillance program. The fuel testing laboratory is the focal point for quality surveillance. When properly implemented, a quality surveillance program will establish procedures and delineate responsibilities to maintain the quality of petroleum and related products during receipt, storage and issue.

A variety of measures are necessary to determine the quality of fuels and lubricants and to suitably maintain them for their intended use. The latest revision of MIL-HDBK-200 sets forth general instructions and the required minimum quality surveillance procedures to be followed by Navy fuel facilities worldwide. DOD Manual 4140.25-M, Volume II, Chapter 7, outlines the responsibilities of Navy laboratories in conducting quality surveillance testing on DLA-owned bulk petroleum products worldwide.

Normally, Navy Petroleum, Oil and Lubricants (POL) laboratory testing capabilities will be maintained on site. However, their capabilities can be augmented by commercial or other Service laboratories depending on the fuel activity's mission and the proximity of other POL testing laboratories.

### 4.2 REFERENCES AND PUBLICATIONS

The following references are applicable to quality surveillance testing. These publications must be consulted to supplement the information contained within this chapter:

- |                              |   |
|------------------------------|---|
| MIL-HDBK-200                 | - Military Standardization Handbook<br>Quality Surveillance Handbook for<br>Fuels, Lubricants and Related<br>Products |
| DOD 4140.25-M                | - DOD Management of Bulk Petroleum<br>Products, Natural Gas, and Coal   |
| NAVAIR 00-80T-109            | - Aircraft Refueling NATOPS Manual  |
| ASTM Standards,<br>Section 5 | - Annual Book of ASTM Standards;<br>Petroleum Products, Lubricants<br>and Fossil Fuels (Vols. 05.01-05.05)            |
| OPNAV Manual 43P6A           | - Metrology Automated System for<br>Uniform Recall and Reporting  |

Additional references include:

- FED-STD-791 - Lubricant, Liquid Fuel and Related Products; Methods of Testing
- NAVSUPINST 4730.1 - Overseas Laboratories for Support of Quality Surveillance of Petroleum Products
- MIL-STD-45662 - Military Standard; Calibration Systems Requirements
- 29 CFR - Code of Federal Regulations, Occupational Safety and Health Administration
- MIL-HDBK-210 - Conversion Factors and Logistics Data for Petroleum Planning
- ASTM D-4057 - Standard Practice for Manual Sampling of Petroleum and Petroleum Products
- MIL-STD-290 - Packaging of Petroleum and Related Products
- MIL-HDBK-113 - Guide for the Selection of Lubricants, Functional Fluids, Preservatives, and Specialty Products for Use in Ground Equipment Systems
- NAVAIRINST 10300.2 - Fuels, Lubricants and Associated Products used by the North Atlantic Treaty Organization (NATO) and Armed Forces
- NAVSEAINST 10300.1
- MIL-STD-109 - Quality Assurance Terms and Definitions

#### 4.3 TESTING LABORATORIES

Navy POL testing laboratories shall be equipped, maintained and staffed in accordance with the level of testing support required for the products managed by the activity and the degree of complexity of the tests performed.

##### 4.3.1 Laboratory Classification

Because laboratories conduct a variety of tests, they are often classified by the kind of tests they can perform. Fuel testing laboratories capable of performing complete specification testing requirements along with limited investigative work are classified as

"Type A" testing laboratories. "Type B" testing laboratories conduct extensive testing but cannot perform complete specification testing. "Type C" testing laboratories can only perform basic acceptance and limited identification testing, such as visual water and solids, color and specific or API gravity.

It is not intended nor desirable for all Navy testing laboratories to be capable of conducting full specification testing on all products handled. Laboratories possessing limited testing capabilities shall forward samples requiring additional analysis to supplemental Navy, DOD or commercial laboratories. Appendix 11 provides a list of Navy FISC POL laboratories worldwide, along with their individual testing capabilities, for each of the major bulk products handled by Navy fuel facilities. MIL-HDBK-200 provides an extensive list of military Services petroleum laboratories and fuel testing capabilities.

#### 4.3.2 Staffing

Major full scale testing laboratories ("Types A and B") should be staffed with or supervised by a chemist, preferably with a petroleum background. Day-to-day testing must be performed by personnel experienced or formally trained in petroleum testing procedures. The grade of chemists, inspectors and technicians will be consistent with the requirements, responsibilities, experience and complexity of the tasks assigned.

#### 4.3.3 Technical Publications

Laboratories shall maintain a technical library containing current ASTM and Federal testing procedures, latest revisions of military POL quality surveillance handbooks and product specifications and recommended calibration techniques to ensure the accuracy of physical and chemical analyses performed.

#### 4.3.4 Laboratory Responsibilities

In addition to conducting quality surveillance testing on locally stored POL products, testing laboratories shall also perform the following:

- o Conduct POL testing for Navy, Marine Corps and Coast Guard activities within local geographical areas.

- o Conduct quality surveillance testing on fuel samples submitted by ships and air activities.

- o Test government-owned products in leased or contractor-operated terminal storage facilities.

- o Perform intermittent laboratory testing services for other Services. Requests for testing from other Services which impose

extensive workloads should be referred to the Navy Petroleum Office through normal command channels for determination of reimbursement.

- o Participate in correlation testing programs with industry and other government laboratories in order to standardize equipment and operator techniques.

- o Manage an active calibration program for laboratory testing and measuring equipment in accordance with MIL-STD-45662 (see Exhibit 4-1 for calibration frequency, to ensure accurate equipment is being utilized for testing purposes).

- o Conduct quality surveillance testing on packaged POL products in the Navy Supply System (i.e., shelf-life testing program).

- o Conduct tests, as necessary, to assist operational forces reporting fuel or lubrication problems (i.e., NAVSEA used lube oil testing program).

- o Upon request, provide quality surveillance training for ashore and afloat personnel.

#### 4.3.5 Types/Frequency of Testing

Testing is normally conducted in accordance with the American Society for Testing and Materials (ASTM), Federal Test Method Standard Number 791 or other approved methods. Testing of products will coincide with the criteria of MIL-HDBK-200 (Chapter 4 and tables II through IV). Chapter 4 outlines the minimum guidelines for quality surveillance testing. Table II describes the minimum frequency for testing petroleum and related products. Table III outlines the minimum sampling and testing requirements considered necessary for determining the quality of petroleum and related products. Table IV is a series of charts providing a detailed breakdown of the type of tests required for each class of product.

#### 4.3.6 Sampling

A sample is a representative part of a quantity of material suitable for visual or laboratory testing to show the quality, characteristics and nature of the whole quantity of that product. In general, the type, frequency, size, identification and precautions of taking samples, as well as sampling locations, are established in Chapter 5 of MIL-HDBK-200. When sampling is required, the procedures are carried out in accordance with ASTM D-4057. Table III of MIL-HDBK-200 establishes the type of samples required for a variety of product locations along with the type of tests to be performed on the samples.

4.3.6.1 Types of Samples. Some of the more common type samples are described below. Additional descriptions are provided in ASTM D-4057 and MIL-HDBK-200.

- o All Levels Samples. Sample obtained by submerging a closed sampler to a point as near as possible to the draw-off level, then releasing the sampler's stopper and raising the sample at such a rate that the container is 75-85 percent full as it emerges from the liquid.
- o Upper Sample. Sample obtained from the middle of the upper third of the tank contents.
- o Middle Sample. Sample obtained from the middle of the tank contents.
- o Lower Sample. Sample obtained from the middle of the lower third of the tank contents.
- o Single Tank Composite Sample. A blend of the upper, middle and lower samples of the tank contents. The portion of the sample quantity to be taken at each level varies according to the type of tank and will be specified in ASTM D-4057.
- o Bottom Sample. A sample obtained from the material on the bottom surface of the tank or container at its lowest point.

4.3.6.2 Frequency of Sampling. Frequency of sampling depends upon the quality and locations of the products being handled. Specific sampling frequencies are outlined in Table II of MIL-HDBK-200.

4.3.6.3 Location of Products to be Sampled. The specific type of sampling required for POL product testing depends upon the actual location of the product. POL products can be located in shore tanks, ship tanks, refueler trucks, depot warehouses, etc. Table III of MIL-HDBK-200 describes the variety of stock locations, types of samples required and tests to be performed.

4.3.6.4 Size, Identification and Precautions of Sampling. Normally, liquid samples submitted for testing shall not be less than one gallon in size while semi-solids shall not be less than five pounds. Extensive or special testing requirements can increase actual sample size. All sample containers must be labeled with a sample tag immediately after sampling. Information on the tag must include activity, name of sampler, grade of material, quantity represented, specification of product, tank number, date, type sample, contract and lot number (if applicable) and reason for sampling. Reliability of test results is based largely on the reliability of the sample itself. Accordingly, only approved type samplers, as specified in the ASTM sampling procedures, will be used. All samples and

containers must be clean, dry and free of any lint or fibrous materials. Samplers and containers must be rinsed with the product to be sampled to help prevent contamination from previous products. Sample containers will not be filled above 90 percent capacity (due to thermal expansion of sample) and must be closed tightly immediately after sampling. Additional information regarding sampling procedures is available in ASTM D-4057 and Chapter 5 of MIL-HDBK-200.

**4.3.6.5 Retention of Samples.** Appendix 12 provides guidance on sample retention. To ensure samples are not retained for excessive periods of time, inventory samples monthly and dispose of those samples for which the retention period has expired.

#### **4.3.7 Petroleum Laboratory Safety**

Most Navy POL testing laboratories conduct quality surveillance tests on flammable and combustible liquids. Because of the flammable vapors and some hazardous chemicals associated with the analysis of petroleum products, POL laboratories are classified as hazardous areas that require basic protection of human life and property. Section 8.6 reviews the guidelines for maintaining a safe laboratory. Before starting any lab work, review the precautions listed in Exhibit 8-3.

#### **4.4 MAINTAINING EQUIPMENT AND SUPPLIES**

Laboratory equipment shall be in full compliance with that specified in the applicable test method. Maintenance history records and technical manuals shall be maintained for each piece of laboratory equipment. All laboratory equipment shall be inventoried and a complete up-to-date inventory maintained.

##### **4.4.1 Procurement of Materials**

In order to minimize the financial resources necessary for equipment and supplies, facilities shall maximize their utilization of National Stock Number (NSN) material. Most materials and supplies utilized are available within the supply system at a substantial cost savings. The Identification List (IL) for the applicable Federal Supply Class (FSC) (e.g., FSC 6630, 6635, 6640; Chemical Analysis Instruments; Physical Properties and Testing Equipment and FSC 6800; Chemicals and Chemical Products) of the material being requested shall be consulted. Activities shall also cross-reference manufacturer's part numbers and NSNs by utilizing the Master Cross Reference List (MCRL-1 and MCRL-2).

##### **4.4.2 Planned Replacement Program**

An equipment replacement program shall be established for the purpose of identifying, planning, programming and budgeting for present and future equipment requirements. An effective and

aggressive replacement program will enhance overall efficiency, productivity and reliability and ensure the maximum utilization of financial and manpower resources by replacing antiquated equipment with state-of-the-art technology and equipment. Funding for equipment replacement may be achieved through the Maintenance, Repair and Environmental (MRE) Program (see Chapter 6 for additional details.)

#### 4.4.3 Calibration Program

A formal calibration program will be established and maintained to verify and control the accuracy of testing and measuring equipment and shall fully comply with requirements set forth in MIL-STD-45662. All measuring and test equipment associated with operations, maintenance, quality surveillance, inventory control and accountability shall be included in the calibration program. The calibration program shall provide for the prevention of inaccuracy by ready detection of deficiencies and timely positive action for their correction. Calibration of testing and measuring equipment can normally be accomplished via procurement of a "master set" of the applicable equipment provided it is certifiable and traceable to an appropriate national standard (e.g., National Institute of Standards and Technology (NIST) formerly National Bureau of Standards). In addition, the Metrology Automated System for Uniform Recall and Reporting (MEASURE), part of the Metrology and Calibration (METCAL) Program, should be used where available. Exhibit 4-1 summarizes prescribed standards and time intervals for calibration of some typical laboratory equipment.

**EXHIBIT 4-1**

**CALIBRATION OF LABORATORY EQUIPMENT**

<u>EQUIPMENT</u>	<u>STANDARDS</u>	<u>CALIBRATION FREQUENCY</u>
Balance and Weights	ASTM E-319	24 months
Centrifuge	ASTM D-2709	6 months
Chemical Solutions	Various	As specified in Test Method
Colorimeter	ASTM D-156	Monthly
Combustible-Gas Indicator (Explosiveness Test)	FED-STD-791	Each time used
Existent Gum Apparatus: Well Temperature Flowmeter	ASTM D-381	6 months 12 months
Flowmeters and Rotameters	ASTM D-3195/ASTM D-1071	12 months
Hydrometer	ASTM E-100/ASTM E-126	Initial Calibration Only <sup>1</sup>
JFTOT Tester: Heater Tube Temperature Controller Pressure Gauge Manometer	ASTM D-3241	Each time used 12 months 12 months
pH Meter	Mfgr	Each time used
Pressure Gauges	ASTM D-323	12 months
Ramsbottom Carbon Residue Apparatus: Furnace Thermocouple	ASTM D-524	6 months 50 hours of use
RVP Gauges	Mfgr	Each time used
Saybolt Viscosity Flasks	ASTM D-88	12 months
Smoke Point Apparatus	ASTM D-1322	Each time used
Stirrer, Demulsification Apparatus	FTMS 791 Method 3201	6 months
Stirrer, Pensky-Martens Flask	ASTM D-93	6 months
Stop Watch	Traceable to a national standard	6 months

**EXHIBIT 4-1 (CONTINUED)**

Thermometers	ASTM D-1086, ASTM E-1, ASTM E-77	12 months
Thermometers, Certified	NIST	2 years
Thermometer 8F/8C	ASTM D-86	Each time used
Viscometer Tubes	ASTM D-446, ASTM D-2162	12 months
Viscosity Oil Std	NIST	6 months
WSIM	ASTM D-2550	12 months
WSIM Apparatus:	ASTM D-2550	12 months
Thermometer		12 months
Pressure Gauge		12 months

<sup>1</sup> No Calibration Required (NCR) after the initial calibration  
ASTM Hydrometer 4H, 5H, 6H, 7H, 54H, 56H, and 57H those  
normally used for petroleum testing should be declared NCR  
after initial calibration.

**NOTE:** Laboratory equipment not listed in Exhibit 4-1 but needing  
calibration should be included in the calibration schedule.  
Frequency shall be determined by published standards or  
manufacturer's recommendations.

This Page Left Blank Intentionally.

**Chapter Five:**  
**ACTIVITY**  
**MAINTENANCE**

This Page Left Blank Intentionally.

## CHAPTER FIVE: ACTIVITY MAINTENANCE

### 5.1 INTRODUCTION

This section establishes objectives, standards and procedures for maintenance management at Naval shore facilities involved in the receipt, storage, transfer and issue of liquid petroleum fuels and lubricants. Fuel facility maintenance can be divided into two major types: Planned Maintenance and Corrective Maintenance.

The objectives of a well-integrated maintenance program are to:

- o Ensure the continued efficient operation of equipment and facilities to avoid interruption in terminal operations.

- o Prevent the loss of petroleum products because of contamination, fires, spills or leaks.

- o Prevent loss of life, injury to personnel or damage to property because of fires, explosion or accident.

- o Protect the environment against harmful effects resulting from the discharge of petroleum products.

- o Preserve the investment in equipment and facilities used in the storage and distribution of petroleum products.

### 5.2 REFERENCES AND DIRECTIVES

There are numerous publications to assist the manager of a fuel facility establishing or improving his maintenance program. Publications of primary importance are:

User's Guide	- Planned Maintenance System Version 3.01a
NAVFAC MO-230	- Maintenance Manual for Petroleum Fuel Facilities
NAVSUPINST 4750.1	- Planned Maintenance System for Bulk Fuel Shore Facilities

Additional references include:

NAVFAC MO-231	- Maintenance Management of Shore Facilities
---------------	---

- NAVFAC MO-321.1 - Maintenance Management of Public Works and Public Utilities for Small Activities
- MIL-HDBK-291CSH - Cargo Tank Cleaning
- MIL-HDBK-201B - Military Standardization Handbook for Petroleum Operations
- NAVFAC MO-117 - Maintenance of Fire Protection Systems
- NAVFAC MO-306 - Maintenance Manual - Corrosion Prevention and Control
- NAVFAC MO-307 - Corrosion Control by Cathodic Protection
- MIL-HDBK-1004/10 - Electrical Engineering Cathodic Protection
- MIL-STD-161 - Identification Method for Bulk Petroleum Systems
- MIL-STD-457 - Frequency for Inspection and Cleaning of Petroleum Fuel Operating and Storage Tanks
- MIL-STD-101 - Color Code for Pipelines and for Compressed Gas Cylinders
- API RP-1110 - Recommended Practice for the Pressure Testing of Liquid Petroleum Pipelines

### 5.3 PLANNED MAINTENANCE SYSTEM (PMS)

PMS is a systematic approach to the planning, scheduling and managing of resources (labor, materials and time) to perform those actions that contribute to the uninterrupted functioning of the fuel terminal. PMS identifies uniform maintenance standards and prescribes procedures and management techniques to accomplish the maintenance. To reduce the cost of maintenance and increase the overall effectiveness, the maintenance actions should be divided among fuel department divisions. Each division supervisor is responsible for completing all maintenance requirements scheduled for his particular division.

#### 5.3.1 Minimum Requirements

A well-managed maintenance program shall include, but not be limited to, the periodic inspecting, testing and repairing of all

equipment used in a fuel facility. Periodic inspection and testing are performed quarterly, monthly, weekly, daily or at a frequency determined to be the most suitable for the nature and physical condition of the equipment and for complying with safety requirements.

Publications such as NAVSUPINST 4750.1, Planned Maintenance System for Bulk Fuel Shore Facilities, the Planned Maintenance System User's Guide, and NAVFAC MO-230, Maintenance Manual for Petroleum Fuel Facilities, provide excellent guidance on PMS. Fuel maintenance personnel shall consult these three manuals when developing the preventive maintenance system most suited to their operations and physical plant.

### 5.3.2 Essential Tools of PMS

Several tools are required to maintain a Planned Maintenance System. These include:

- o Equipment and Facilities Inventory List. A complete, valid and up-to-date inventory listing of all equipment and facilities that require periodic maintenance.

- o Facility Area Breakdown Map. Because some fuel terminals cover a large area of real estate, a terminal may be divided into subareas, based on travel time, terrain or similarity of systems and equipment.

- o Maintenance Requirement Card (MRC). MRCs provide detailed procedures for performing the maintenance required for a particular piece of equipment or structure, and identify the resources it takes to accomplish a specific maintenance action. They also provide safety precautions prior to and during the maintenance work. There is one card per type of equipment or structure. An MRC code is assigned to each MRC to identify each type of equipment or structure and its maintenance periodicity. See Appendix 13, part A, for an example of an MRC.

- o Maintenance Index Page (MIP). MIPs are basic PMS reference documents. Each is an index listing of a complete set of MRCs applicable to a fuel terminal equipment or structure. MIPs cite equipment or structural nomenclature, control number used to identify individual type of equipment, maintenance requirements, worker skill level, maintenance frequency, estimated PMS manhours and other related maintenance that should be done at the same time. Appendix 13, part B, is an example of an MIP.

- o Equipment Guide List. EGLs show a listing of equipment or structure location within a particular subarea or facility. Each EGL is used in conjunction with a controlling MRC and each contains no more than one day's work. A sample EGL is provided as Appendix 13, part C.

o Automated PMS Computer Program. This program provides an automated system that will automatically schedule planned maintenance actions, compute maintenance performance, and track equipment maintenance history record.

o Critical Code. In order to utilize limited resources efficiently so the more important maintenance actions will receive greater attention, all PMS actions are assigned a critical code. The breakdown of the codes are:

Critical Code 1: Maintenance necessary to prevent failure of essential operational or safety equipment.

Critical Code 2: Maintenance which left undone could lead to impaired or inefficient fuel operations.

Critical Code 3: Maintenance performed on non-mission essential equipment.

### 5.3.3 PMS Schedule

There are four types of maintenance schedules in a PMS program. A typical cycle schedule reflects one year of planned maintenance requirements. Any scheduled maintenance that is accomplished or unaccomplished is annotated in the automated PMS program; the program will automatically reschedule the unaccomplished maintenance action. Unscheduled maintenance activities must be recorded and documented as well.

5.3.3.1 Monthly Schedule. A monthly schedule shows all planned maintenance scheduled for the entire facility during the month. The automated PMS program can also produce the monthly schedule based on individual work centers. Monthly schedules are further subdivided into weekly schedules and shall be updated weekly according to work status.

5.3.3.2 Weekly Schedule. A weekly schedule shows all planned maintenance scheduled for a work center/division during the week. It is used by the division supervisor to assign and monitor the completion of the PMS tasks. The weekly schedules will be updated weekly to show work completed, rescheduled and not performed within the week. Overdue required maintenance shall receive the highest priority in the following week.

5.3.3.3 Unscheduled Maintenance. A maintenance action not in the PMS, but that is initiated instead by an operator to restore a system or equipment to proper operational condition is called unscheduled maintenance. This action shall be reported to the division supervisor as an unscheduled maintenance action and should be

documented by entering the required action in the automated PMS program and developing a new MRC or modifying an existing MRC for inclusion in the PMS.

#### 5.3.4 PMS Action

The division supervisor should obtain the week's Weekly PMS Schedule generated from the PMS computer program and pass the schedule to the workers. The weekly schedule indicates equipment to be serviced and the types of services required by MRC codes. Each day, the responsible maintenance worker should obtain the appropriate MRC and EGL which can be generated from the PMS computer program so he can follow the maintenance procedures outlined in the MRC and know which group of equipment he will service that day. After completing the maintenance, he should return the MRC and EGL to the supervisor. The supervisor will sign off that maintenance action on the PMS computer program. If the assigned maintenance was not completed, the worker will submit a discrepancy card explaining the reasons for not completing the assignment. The supervisor should reschedule the maintenance as soon as possible. If equipment requires repair or service beyond the resources or capabilities of the worker, he should note it on the discrepancy card so the supervisor can log the requirement into the PMS computer program for tracking and initiate a service request to the Public Works Department/Center or the Department Maintenance Division.

#### 5.3.5 Reporting

While performing planned maintenance, any discrepancies requiring corrective action will be documented on the Maintenance Discrepancy Card (see Appendix 15 for an example). Major deficiencies and upgrade requirements should also be documented and reviewed to determine the need for submission of DLA Maintenance, Repair and Environmental (MRE) projects (see Chapter 6), MILCON (see Chapter 6), or other types of projects. Identification and documentation of facility/equipment deficiencies are essential elements of a PMS program. Record of scheduled and unscheduled maintenance accomplished, problem areas, manhours spent, and estimated date of completion for any deferred maintenance item shall be retrieved from the automated PMS program and reviewed on a monthly basis.

#### 5.3.6 Equipment and Structure Maintenance History Record

Every piece of equipment and structure should have its maintenance history record in either a computer or manual file. The record will indicate the equipment nomenclature, serial number, date of installation, date maintenance was performed, kind of service, brief description of problem, parts replaced, man-hours, cumulative manhours and next service due date. These records must be updated as soon as maintenance services have been performed. The record shall be readily available and used as a planning and estimating tool. A

sample of typical tank history records is provided in Appendix 16. The automated PMS program has the capability to track maintenance history records of service actions performed on all equipment in the PMS program.

#### 5.3.7 Planned Maintenance System Goals

At the end of each month, a management summary report generated by the automated PMS program provides an overall percentage effectiveness of PMS accomplishment. An annual goal of 90 percent for overall effectiveness and 95 percent for priority 1 accomplishment has been established.

#### 5.4 CORRECTIVE MAINTENANCE

Maintenance functions not covered by PMS and those that cannot be performed by the PMS crew are considered corrective maintenance. Corrective maintenance is primarily performed by the fuel department maintenance division or by Public Works support. The five major elements of corrective maintenance are described below.

##### 5.4.1 Work Input Control (WIC)

The Work Input Control is a formalized means of managing the maintenance workload and a centralized reference for status information on all work requests. WIC begins as soon as a maintenance deficiency is identified and entered into the automated PMS program. The backlog of maintenance projects should be monitored and reviewed.

##### 5.4.2 Priority Planning

Priorities for all work requests shall be as follows: personnel safety, mission of the facility, and improvement to operational efficiency.

##### 5.4.3 Job Estimating

All work requests will be estimated for manhours and material and required for work completion. This information will provide a guide to assigning a balanced and adequate workload in each work division.

##### 5.4.4 Job Scheduling

A weekly meeting is recommended to assign the following week's work to the appropriate maintenance shops.

##### 5.4.5 Reporting

Sufficient records for all maintenance work projects, work requests submitted to PWD, and planned maintenance backlog must be

maintained to be in the overall yearly planning and budgeting cycles. The records must be retained for inspection by auditors.

**5.5 STAFF CIVIL ENGINEER (SCE) ASSISTANCE**

Fuel officers at facilities having a Staff Civil Engineer will work closely with the SCE to ensure fuel department requirements are identified. Procedures for documenting and submitting projects to correct deficiencies is provided in Chapter 6.

This Page Left Blank Intentionally.