CONCEPTS AND EQUIPMENT OF PETROLEUM OPERATIONS

Table of Contents

PREFACE

PART ONE - GENERAL CONSIDERATIONS

CHAPTER 1. ENVIRONMENTAL RESPONSIBILITY

CHAPTER 2 SAFETY, HEALTH, AND FIRE FIGHTING
Section I General Safety
Section II Petroleum Fire Fighting
Section III Aircraft Refueling Safety
Section IV Health Hazards

CHAPTER 3 QUANTITY AND QUALITY CONTROL
Section I Accountability and Inventory
Section II Petroleum Product Measurement
Section III Sampling
Section IV Petroleum Quality Maintenance

PART TWO - PETROLEUM TERMINAL AND PIPELINE OPERATIONS

CHAPTER 4 WATERFRONT OPERATIONS
Section I Loading and Unloading Facilities
Section II Tank Vessels
Section III Loading and Unloading Operations

CHAPTER 5 OFFSHORE PETROLEUM DISCHARGE SYSTEM
Section I OPDS Tankers
Section II Major Components (OPDS) Tanker
Section III Beach Termination Unit Procedures
Section IV Planning and Administrative Considerations
Section V Communications and Installation

CHAPTER 6 TACTICAL PETROLEUM TERMINAL (TPT)
Section I Concept and Primary Components
Section II System Components
Section III Tank Farm Installation
Section IV Terminal Operations
Section V Maintenance

DISTRIBUTION RESTRICTION: Approved for public release; distribution is unlimited.
CHAPTER 7 INLAND PETROLEUM DISTRIBUTION SYSTEM (IPDS) 7-1
Section I System Components 7-1
Section II Installation 7-10
Section III System Operation 7-16
Section IV Maintenance 7-27

CHAPTER 8 CONTROL OF PRODUCT IN PIPELINES 8-1

CHAPTER 9 PIPELINE OPERATIONS 9-1
Section I Duties of Personnel 9-1
Section II Pipeline Communications System 9-3
Section III Schedules 9-5
Section IV Line Operations 9-10
Section V Dispatching Records and Controls 9-13

CHAPTER 10 PETROLEUM INSTALLATION MAINTENANCE 10-1
Section I Tank Farms and Pipeline Surroundings 10-1
Section II Waterfront Facilities 10-4

CHAPTER 11 TANK CAR OPERATIONS 11-1
Section I Tank Cars and Facilities 11-1
Section II Procedures for Loading Tank Cars 11-5
Section III Procedures for Unloading Tank Cars 11-9

CHAPTER 12 TANKS, TANK CARS, AND TANK VEHICLES MAINTENANCE AND CLEANING 12-1
Section I Storage Tanks and Tank Maintenance 12-1
Section II Tank Cleaning Precautions and Equipment 12-12
Section III Storage Tank Cleaning 12-18
Section IV Tank Car and Tank Vehicle Cleaning 12-27

PART THREE-AIRCRAFT REFUELING

CHAPTER 13 AVIATION FUELS 13-1
Section I Description of Fuels 13-1
Section II Quality Surveillance 13-2

CHAPTER 14 AIRCRAFT REFUELING EQUIPMENT 14-1

CHAPTER 15 REFUELING FROM REFUELING SYSTEMS 15-1
Section I Forward Area Refueling Equipment 15-1
Section II Temporary and Semipermanent Refueling Systems 15-11
Section III HEMTT Tanker Aviation Refueling System 15-24
Section IV Fatcow (CH-47) Fare 15-33
Section V C-17 FARP Using the HTARS 15-34

CHAPTER 16 REFUELING FROM TANK VEHICLES 16-1
Section I Refueling Vehicles 16-1
Section II Refueling Operations 16-3

CHAPTER 17 DEFUELLING 17-1
| CHAPTER 18 | OTHER WAYS OF TRANSPORTING PETROLEUM | 18-1 |
| Section I | External Loads | 18-1 |
| Section II | Aerial Bulk Fuel Delivery System | 18-8 |
| Section III | Wet-Wing Defueling | 18-12 |
| CHAPTER 19 | AIRCRAFT FIRE FIGHTING AND RESCUE TRAINING | 19-1 |
| Section I | Basic Fire-Fighting Training | 19-1 |
| Section II | Basic Crash Rescue Training | 19-8 |
| Section III | Tactical Fire-Fighting and Rescue Training | 19-12 |

**PART FOUR-PETROLEUM SUPPLY POINT OPERATIONS**

| CHAPTER 20 | PUMPS | 20-1 |
| Section I | Hand-Operated Pumps | 20-1 |
| Section II | Power-Driven Pumps | 20-3 |
| CHAPTER 21 | FILTER/SEPARATORS | 21-1 |
| CHAPTER 22 | STORAGE CONTAINERS AND HANDLING EQUIPMENT | 22-1 |
| Section I | Packaged Petroleum Products and Fuels | 22-1 |
| Section II | Bulk Petroleum Containers | 22-14 |
| CHAPTER 23 | FUEL SYSTEM SUPPLY POINT | 23-1 |
| CHAPTER 24 | UNIT AND VEHICLES USED TO TRANSPORT BULK PETROLEUM | 24-1 |
| Section I | Tank and Pump Unit | 24-1 |
| Section II | Tank Trucks | 24-6 |
| Section III | Tank Semitrailers | 24-10 |
| Section IV | Other Considerations of Tank Vehicles | 24-24 |
| CHAPTER 25 | REFUEL ON THE MOVE | 25-1 |
| CHAPTER 26 | CLASS III SUPPLY POINT | 26-1 |
| Section I | Movement | 26-1 |
| Section II | Site Selection | 26-4 |
| Section III | Layout | 26-7 |
| Section IV | Operation | 26-12 |
| CHAPTER 27 | HOSELINE OUTFIT (ASSAULT HOSE LINE) | 27-1 |
| CHAPTER 28 | RECEIPT, STORAGE, AND ISSUE OF BULK PETROLEUM | 28-1 |
| Section I | Bulk Petroleum Operations | 28-1 |
| Section II | Receipt | 28-2 |
| Section III | Storage | 28-7 |
| Section IV | Issue | 28-8 |
| APPENDIX A | ALLOWABLE OUTAGE FOR EXPANSION OF PETROLEUM PRODUCTS IN STORAGE TANKS | A-1 |
| APPENDIX B | TANK STRAPPING | B-1 |
| APPENDIX C | FUNDAMENTALS OF PIPELINE HYDRAULICS | C-1 |
| Section I | Physical Properties of Petroleum Liquids | C-1 |
INDEX

PREFACE

This manual is a guide for commanders, staff officers, supervisors, and other personnel concerned with petroleum concepts, equipment, and operations.

This manual is a consolidation of FMs 10-18, 10-20, 10-68, 10-69, 10-70-1, and 10-71. This manual is divided into four parts. Part One describes general considerations of petroleum operations to include environmental protection, safety, and accountability. Part Two describes bulk petroleum distribution systems. Part Three describes Army aircraft refueling operations. Part Four describes petroleum handling equipment as well as Class III supply point operations. This manual is oriented toward tactical field operations and deals with the responsibilities of both management and operator personnel. It can be used in conventional and NBC warfare. However, this manual cannot be cited as an authority for requisitions. Requisitions must be based on authority such as tables of allowances or TOEs.

The proponent for this publication is HQ TRADOC. Send comments and recommendations on DA FORM 2028 (Recommended Changes to Publications and Blank Forms) directly to:

COMMANDER
USACASCOM TRAINING DIRECTORATE
ATTN ATCL AQ
801 LEE AVENUE
FORT LEE VA 23801-1713

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.
PART ONE

GENERAL CONSIDERATIONS

The three chapters in this part give general considerations for all petroleum operations in the areas of environmental protection, safety, and accountability. This includes general guidelines for conducting any type of aviation-related activities, to include refueling operations. The rest of the chapters in the book give specific considerations in these areas related to various types of petroleum operations. Anyone involved in planning, evaluating, or conducting petroleum operations should be thoroughly familiar with the contents of these three chapters. They should routinely refamiliarize themselves with them, as well as the other chapters in the book pertaining to the type of operation with which they are involved.
CHAPTER 1
PETROLEUM UNIT ENVIRONMENTAL RESPONSIBILITIES

“The Army environmental vision is to be a national leader in environmental and natural resource responsibilities for present and future generations as an integral part of our mission.”

SCOPE OF ENVIRONMENTAL RESPONSIBILITY

We must take care of the environment (that is, practice environmental stewardship). The definition of stewardship is taking care of property while also caring about the rights of others. We must plan our operations without harming the environment. Good environmental stewardship lets leaders take care of soldiers and their families. It also saves resources vital to combat readiness.

The Army has the huge task of reducing the environmental impact on its installations and units throughout the United States and the world. Within CONUS, the Army owns 20 million acres of land (an area about half the size of Virginia). This shows the vastness of this task. Each area of our daily operation has some effect on the environment.

The Army is renewing its emphasis on taking care of the environment. Petroleum and water units by their nature have a huge impact on the environment. It is critical for the leaders and soldiers in these units to follow safe, legal environmental practices. By doing so, they protect their health and the health of those around them. They also prevent long term environmental damage that can lead to fines and other legal actions.

ENVIRONMENTAL PROTECTION STEWARDSHIP GOALS AND REQUIREMENTS

The Army no longer just complies with laws, they want to be a leader in environmental protection. To do this, the Army has set goals and requirements for its leaders to follow.

Goals

• Make sure operations comply with standards. Do not receive a notice of violation or a fine for not following local, state, and federal environmental regulations.
• Clean up installations. Begin restoring all contaminated sites by 2000.
• Prevent future pollution. Reduce all hazardous waste and toxic releases.
• Integrate NEPA procedures into all operations.
• Protect natural and cultural resources.

Requirements

All Army actions require an appraisal be done on potential environmental impacts of said action. All key Army decision makers and planners are required to attend NEPA training.

ROLE OF ENVIRONMENTAL STEWARDSHIP IN LEADERSHIP

A leader who cares for the environment also cares for his people. He does this by reducing or eliminating undue health risks. He saves resources (soldiers or money) vital to his mission. He keeps training areas in excellent condition for training far into the future. He preserves cultural artifacts for study by future generations. Also, he teaches the basic moral duty of soldiers to protect and preserve the United States of America and its allies.