STP 10-92W14-SM-TG

Soldier's Manual and Trainer's Guide

MOS 92W
WATER TREATMENT SPECIALIST
SKILL LEVELS 1, 2, 3, and 4

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Soldier's Manual and Trainer's Guide, MOS 92W, Water Treatment Specialist, Skill Levels 1, 2, 3, and 4

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PREFACE

This publication is for skill levels (SLs) 1, 2, 3, and 4 soldiers holding military occupational specialty (MOS) 92W and for trainers and first-line supervisors. It contains standardized training objectives, in the form of task summaries, to train and evaluate soldiers on the critical tasks which support unit mission during wartime. Trainers and supervisors should ensure 92W qualified soldiers have access to this publication. It should be given the widest possible dissemination in areas such as work areas, training areas, learning centers, and units, as well as virtual libraries.

All tasks in this publication are trained to peacetime/wartime conditions and apply to the Active Army, the Army National Guard/Army National Guard of the United States, and the United States Army Reserve unless otherwise stated.

The proponent of this publication is the United States Army Training and Doctrine Command. Send comments and recommendations on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to:

Commander
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Training Directorate, Sustain Division
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CHAPTER 1

Introduction

1-1. General. This soldier training publication (STP) identifies individual MOS training requirements for soldiers holding MOS 92W. Commanders, trainers, and soldiers should use it to plan, conduct, and evaluate individual training in units. The STP is the primary MOS reference for supporting self-development, evaluating MOS proficiency, and training of 92W soldiers. Commanders employ two primary methods to evaluate soldiers' proficiency:

- Commander's evaluation. Commander's evaluations are local tests or assessments of soldiers' performance of MOS-specific and common tasks critical to the unit mission. They may be conducted year-round.

- Common task test (CTT). CTTs are hands-on tests used to evaluate proficiency on common tasks. Alternate written tests are provided if equipment is not available for hands-on testing.

This publication is the soldier's primary reference to prepare for a commander's evaluation of MOS-specific tasks. It contains task summaries for all critical tasks specific to the MOS and skill level (SL). Commanders and trainers will use this soldier's manual/trainer's guide (SM/TG) to plan and conduct training and commander's evaluations.

Chapter 2, Trainer's Guide, contains information needed to plan training requirements for this MOS. The trainer's guide

- Identifies subject areas in which soldiers must be trained.

- Identifies critical tasks for each subject area.

- Specifies where soldiers are initially trained on each task.

- Recommends how often each task should be trained to sustain proficiency.

- Recommends a strategy for cross-training soldiers.

- Recommends a strategy for training soldiers to perform higher-level tasks.

Use this STP along with STP 21-1-SMCT (Soldier's Manual of Common Tasks, Skill Level 1), STP 21-24-SMCT (Soldier's Manual of Common Tasks, Skill Levels 2-4), Army training and evaluation programs (ARTEPs), FM 25-4 (How to Conduct Training Exercises), FM 25-5 (Training for Mobilization and War), FM 7-0 (Training the Force), and FM 7-1 (Battle Focused Training) to establish effective training plans and programs that integrate soldier, leader, and collective tasks.

1-2. Task Summaries. Task summaries outline wartime performance requirements for each critical task in the STP. They provide both soldier and trainer with the information necessary to prepare, conduct, and evaluate critical task training. As a minimum, task summaries include information soldiers must know and skills they must perform to standard for each task. Following is the task summary format:

- Task number. The task number is a 10-digit number that identifies the task and skill level. Include the task number and title in any correspondence relating to the task.

- Task title. The task title identifies the action to be performed.

- Conditions. The task conditions statement describes the field or garrison conditions under which the task will be performed and identifies the equipment, tools, references, job aids, and supporting personnel that the soldier needs to perform the task in wartime.

- Standards. The task standards describe how well and to what level of proficiency the soldier must perform the task under wartime conditions. Standards are typically expressed in terms of accuracy, completeness, duration, sequence, speed, and tolerance.

- Performance measures. This section identifies specific actions that the soldier must accomplish to complete the task successfully. Performance measures appear in a GO/NO-GO rating format for easy evaluation. Some tasks may also include detailed training information in a Training Information Outline and an Evaluation Preparation Section. The Evaluation Preparation Section indicates necessary modifications to task performance in order to train and evaluate a task that cannot be trained to the wartime standard under wartime conditions. It may also include special training and evaluation preparation instructions to accommodate these modifications and any instructions that should be given to the soldier before evaluation.

- References. This section identifies references that provide more detailed explanations of task performance requirements than are given in the task summary.

- Warnings. Warnings alert users to the possibility of immediate personal injury or equipment damage.

- Notes. Notes provide additional supportive explanations or tips relating to task performance.

1-3. Soldier's Responsibilities. Each soldier is responsible for performing individual tasks identified by the first-line supervisor based on the unit's mission-essential task list (METL). Soldiers must perform tasks to the standards included in the task summary. If soldiers have questions about tasks or which tasks in this manual they must perform, they are responsible for asking their first-line supervisor for clarification. First-line supervisors know how to perform each task or can direct soldiers to appropriate training materials, including current field manuals, technical manuals, and Army regulations. Soldiers are responsible for using these materials to maintain performance. They are also responsible for maintaining performance of all common tasks listed in the SMCTs at their current skill level and below. Periodically, soldiers should ask their supervisor or another soldier to check their performance to ensure that they can perform the tasks.

1-4. NCO Self-Development and the STP. Self-development is a key component of leader development. Leaders follow planned, progressive, and sequential self-development programs developed by the individual NCO and his or her first-line supervisor to enhance and sustain military competencies. Self-development consists of individual study, research, professional reading, practice, and self-assessment. The self-development concept requires NCOs, as Army professionals, to take responsibility for remaining current in all phases of their MOS. The STP is the NCO's primary source for maintaining MOS proficiency.

Another important resource for self-development is the Army Correspondence Course Program (ACCP). Refer to DA Pamphlet 350-59 (Army Correspondence Course Program Catalog) for detailed eligibility requirements and enrollment information. The catalog is available at local education centers or on line through the Army Institute for Professional Development (AIPD) web site, http://www.atsc.army.mil/accp/aipdnew.asp. The web site offers on-line enrollment.

1-5. Commander's Responsibilities. Commanders must ensure that their unit training plans prepare the unit for war by enabling soldiers to develop and sustain proficiency in their MOS and skill level tasks. Commanders should design unit training programs to provide individual training for all soldiers assigned to the unit and to evaluate soldier proficiency routinely as part of the commander's evaluation program. The unit training program should also integrate individual training with crew drills and other collective training. The MOS training plan provides information on which to base integration, cross-train, train-up, and sustainment training programs. Commanders should use the MOS training plan when developing unit training plans.

1-6. Trainer's Responsibilities. Training is the business of all unit leaders. First-line leaders are the principal trainers in the unit because they directly supervise soldiers and lead crews, squads, sections, and teams.

Trainers can use the MOS training plan to determine the critical tasks each soldier is responsible for. They should tell each soldier which tasks he or she must be able to perform. Trainers should evaluate task performance to determine which tasks each soldier can or cannot perform to standard. Soldiers who cannot perform a task to standard need further training. Developing effective training is explained in detail in FM 7-0 and FM 7-1.

Every task summary in this STP includes performance measures, which trainers may use year-round to determine if soldiers can perform critical tasks to the specified standards. The performance measures identify what the trainer needs to observe to score a soldier's performance. A blank space is provided for the trainer to check either the GO or NO-GO column for each performance measure. Some tasks require the trainer to watch the soldier perform them (evaluate the process). Other tasks call for the trainer to focus on the results of the soldier's performance (evaluate the product). Comments should not be written on the task summary.

Evaluation guides are provided to assist you in evaluating your soldier's proficiency throughout the year. It is not intended that written entries be made on these guides to record their performance. If you wish to keep a record of their performance steps, use DA Form 5164-R (Hands-On Evaluation) to record the performance measures a soldier passed or failed. The form, which may be locally reproduced, applies to all tasks in this STP. Trainers may have DA Form 5164-R overprinted with information unique to their training requirements before reproducing it. See Appendix A of this STP for instructions, a sample of this form, and also on how to obtain a blank copy. Trainers may use DA Form 5165-R (Field Expedient Squad Book) to record hands-on GO/NO-GO results for a group of soldiers (for example, a crew, section, or squad) having the same MOS and skill level. This form supports conduct of commander's evaluations and can be used to record training results gathered in the field during slack time for all MOSs and skill levels. Use of this form is optional. See Appendix B of this STP for instructions, a sample of this form, and also on how to obtain a blank copy. Trainers should work with each soldier until tasks can be performed to specific task summary standards.

1-7. Training Support. References have been identified for each task to assist in planning and conducting training. A consolidated list of references identified by type, publication number, and title and a comprehensive glossary of acronyms, abbreviations, and definitions are included in this STP.

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CHAPTER 2

Trainer's Guide

2-1. General. The MOS Training Plan identifies the essential components of a unit training plan for individual training. Units have different training needs and requirements based on differences in environment, location, equipment, dispersion, and similar factors. Therefore, the MOS Training Plan should be used as a guide for conducting unit training and not a rigid standard. The MOS Training Plan consists of two parts. Each part is designed to assist the commander in preparing a unit training plan which satisfies integration, cross training, training up, and sustainment training requirements for soldiers in this MOS.

Part One of the MOS Training Plan shows the relationship of an MOS skill level between duty position and critical tasks. These critical tasks are grouped by task commonality into subject areas.

Section I lists subject area numbers and titles used throughout the MOS Training Plan. These subject areas are used to define the training requirements for each duty position within an MOS.

Section II identifies the total training requirement for each duty position within an MOS and provides a recommendation for cross training and train-up/merger training.

Duty Position Column. This column lists the duty positions of the MOS, by skill level, which have different training requirements.

Subject Area Column. This column lists, by numerical key (see Section I), the subject areas a soldier must be proficient in to perform in that duty position.

Cross-Train Column. This column lists the recommended duty position for which soldiers should be cross-trained.

Train-Up/Merger Column. This column lists the corresponding duty position for the next higher skill level or MOSC the soldier will merge into on promotion.

Part Two lists, by general subject areas, the critical tasks to be trained in an MOS and the type of training required (resident, integration, or sustainment).

Subject Area Column. This column lists the subject area number and title in the same order as Section I, Part One of the MOS Training Plan.

Task Number Column. This column lists the task numbers for all tasks included in the subject area.

Title Column. This column lists the task title for each task in the subject area.

Training Location Column. This column identifies the training location where the task is first trained to soldier training publications standards. If the task is first trained to standard in the unit, the word “Unit” will be in this column. If the task is first trained to standard in the training base, it will identify, by brevity code (ANCOC, BNCOC, and so on), the resident course where the task was taught. Figure 2-1 contains a list of training locations and their corresponding brevity codes.

BNCOC	Basic NCO Course
ANCOC	Advanced NCO Course
AIT	Advanced Individual Training
UNIT	Trained in the Unit

Figure 2-1. Training Locations

Sustainment Training Frequency Column. This column indicates the recommended frequency at which the tasks should be trained to ensure soldiers maintain task proficiency. Figure 2-2 identifies the frequency codes used in this column.

BA	- Biannually
AN	- Annually
SA	- Semiannually
QT	- Quarterly
MO	- Monthly
BW	- Biweekly
WK	- Weekly

Figure 2-2. Sustainment Training Frequency Codes

Sustainment Training Skill Level column. This column lists the skill levels of the MOS for which soldiers must receive sustainment training to ensure they maintain proficiency to soldier's manual standards.

92F50 MSG THROUGH SGM
92W40 SFC
92W30 SSG
92W20 SGT
92W10 PV1 THROUGH SPC

Figure 2-3. Career progression chart

2-2. Subject Area Codes.

Skill Level 1

1 Water Reports, Logs, and Forms
2 Water Purification Operations
3 Water Storage, Distribution, and Issue Operations

Skill Level 2

4 Supervise Water Reports, Logs, and Forms
5 Supervise Water Purification Operations
6 Supervise Water Storage, Distribution, and Issue Operations

Skill Level 3

7 Monitor Water Reports, Logs, and Forms
8 Monitor Water Purification Operations
9 Monitor Water Storage, Distribution, and Issue Operations

Skill Level 4

10 Manage Water Reports, Logs, and Forms
11 Manage Water Purification Operations
12 Manage Storage, Distribution, and Issue Operations

2-3. Duty Position Training Requirements.

Duty Position	Subject Area	Cross-Train	Train-Up/Merger
SL 1 Water Treatment Specialist	1 - 3	NA	92W20 Water Treatment NCO for Purification or Storage and Distribution
SL 2 Water Treatment NCO	1 - 6	NA	Water Treatment Supervisor for Purification or 92W30 Assistant Water Treatment Supervisor for Storage and Distribution
SL 3 Assistant Water Purification Supervisor or Assistant Water Treatment Supervisor or Water Treatment Supervisor of Section Chief	1 - 9	NA	92W40 Water Treatment Supervisor for Purification or 92W40 Water Treatment Supervisor for Storage and Distribution or 92W40 Water Treatment NCO for MMC
SL 4 Water Purification Supervisor or Water Treatment Supervisor or Section Chief of Platoon Sergeant	1 -12	NA	92F50 Petroleum and Water Operations Sergeant or 92F50 Petroleum Supply Sergeant or 92F50 Corps/Installation Support Operation or 92F50 Petroleum NCO or Water Supply Sergeant or Quality Assurance

2-4. Critical Tasks List.

MOS TRAINING PLAN
92W14

CRITICAL TASKS

Task Number	Title	Training Location	Sust Tng Freq	Sust Tng SL
Skill Level 1				
Subject Area 1. Water Reports, Logs, and Forms				
101-92W-1064	Perform Water Reconnaissance	AIT	QT	1-4
101-92W-1065	Conduct Water Analysis Testing	AIT	MO	1-4
101-92W-1069	Complete Entries on Water Reports/Logs/Forms	AIT	QT	1-4
Subject Area 2. Water Purification Operations				
101-92W-1022	Operate a 600-GPH Reverse Osmosis Water Purification Unit (ROWPU)	AIT	MO	1-4
101-92W-1052	Set Up/Dismantle the 600-GPH Reverse Osmosis Water Purification Unit (ROWPU)	AIT	MO	1-4
101-92W-1059	Operate a 3,000-GPH Reverse Osmosis Water Purification Unit (ROWPU)	AIT	MO	1-4
101-92W-1063	Set Up/ Dismantle the 3,000-GPH Reverse Osmosis Water Purification Unit (ROWPU)	AIT	MO	1-4
101-92W-1074	Set Up/Dismantle the 1,500-GPH Tactical Water Purification System (TWPS)	AIT	MO	1-4
101-92W-1075	Set Up/Operate/Dismantle the Lightweight Water Purifier (LWP)	AIT	MO	1-4
101-92W-1077	Operate the 1,500-GPH Tactical Water Purification System (TWPS)	AIT	MO	1-4
101-92W-1078	Employ Environmental Stewardship Measures	AIT	MO	1-4
101-92W-1081	Set Up/Operate/Dismantle and PMCS the Ocean Intake Structure System (OISS)	AIT	MO	1-4
101-92W-1082	Operate/Perform PMCS on the Diesel Generators	AIT	MO	1-4
Subject Area 3. Water Storage, Distribution, and Issue Operations				
101-92W-1044	Operate/Perform PMCS on the 350-GPM Diesel Water Pump	AIT	QT	1-4
101-92W-1046	Operate/Perform PMCS on the 250-CFM Air Compressor	AIT	QT	1-4
101-92W-1047	Operate/Perform PMCS on a Wellhead	AIT	QT	1-4
101-92W-1048	Operate/Perform PMCS on the 600-GPM Diesel Water Pump	AIT	QT	1-4
101-92W-1055	Set Up, Operate, Perform PMCS/Dismantle the 100/400-GPM Hypochlorination Unit	AIT	QT	1-4
101-92W-1056	Operate/Perform PMCS on the 125-GPM Diesel Driven Pump	AIT	QT	1-4

CRITICAL TASKS

Task Number	Title	Training Location	Sust Tng Freq	Sust Tng SL
101-92W-1066	Maintain, Assemble/Disassemble the Tactical Water Distribution System (TWDS) Hose Line	AIT	QT	1-4
101-92W-1068	Maintain, Assemble/Disassemble the Potable Water Storage/Distribution System (PWS/DS)	AIT	QT	1-4
101-92W-1073	Operate Mobile Distribution Systems	AIT	QT	1-4
101-92W-1079	Perform Sling Load Operations	AIT	QT	1-4
101-92W-1080	Set Up/Maintain/Operate and Dismantle the Force Provider (FP) Potable Water Distribution and Storage Subsystem	UNIT	QT	1-4
Skill Level 2				
Subject Area 4. Supervise Water Reports, Logs, and Forms				
101-92W-2004	Supervise Water Analysis Testing	UNIT	MO	2-4
101-92W-2029	Supervise Water Reconnaissance	UNIT	QT	2-4
101-92W-2030	Supervise Completion of Water Reports/Logs/Forms	UNIT	QT	2-4
Subject Area 5. Supervise Water Purification Operations				
101-92W-2006	Supervise Operation of the 600-GPH Reverse Osmosis Water Purification Unit (ROWPU)	UNIT	MO	2-4
101-92W-2026	Supervise Operation of the 3,000-GPH Reverse Osmosis Water Purification Unit (ROWPU)	UNIT	MO	2-4
101-92W-2031	Supervise the Set Up/Dismantle of the 600-GPH Reverse Osmosis Water Purification Unit (ROWPU)	UNIT	MO	2-4
101-92W-2036	Supervise Setup/Operation/Dismantle of the Lightweight Water Purifier (LWP)	UNIT	MO	2-4
101-92W-2038	Supervise Operation of the 1,500-GPH Tactical Water Purification System (TWPS)	UNIT	MO	2-4
101-92W-2039	Supervise Environment Stewardship Measures	UNIT	MO	2-4
101-92W-2041	Supervise Setup/Operation/Dismantle of the Ocean Intake Structure System (OISS)	UNIT	MO	2-4
101-92W-2044	Supervise Operation/Perform PMCS on the Diesel Generators	UNIT	MO	2-4
Subject Area 6. Supervise Water Storage, Distribution, and Issue Operations				
101-92W-2009	Supervise the Operation/Maintenance of the 125-GPM Gas/Diesel Driven Pump	UNIT	QT	2-4
101-92W-2018	Supervise the Operation of the Potable Water Storage/Distribution System (PWS/DS)	UNIT	QT	2-4
101-92W-2019	Supervise the Operation/PMCS of the 350-GPM Diesel Water Pump	UNIT	QT	2-4
101-92W-2022	Supervise the Operation/PMCS of the 250-CFM Air Compressor	UNIT	QT	2-4
101-92W-2025	Supervise the Operation/PMCS of the 100/400-GPM Hypochlorination Unit	UNIT	QT	2-4

CRITICAL TASKS

Task Number	Title	Training Location	Sust Tng Freq	Sust Tng SL
101-92W-2033	Supervise Operation of the Tactical Water Distribution System (TWDS) Hose Line	UNIT	QT	2-4
101-92W-2040	Supervise Sling Load Operations	UNIT	QT	2-4
101-92W-2042	Supervise Operation of the Mobile Distribution Systems	UNIT	QT	2-4
101-92W-2043	Supervise the Setup/Maintain/Operate and Dismantle of the Force Provider (FP) Portable Water Distribution and Storage Subsystem	UNIT	MO	2-4
Skill Level 3				
Subject Area 7. Monitor Water Reports, Logs, and Forms				
101-92W-3001	Analyze Water Reconnaissance Results	BNCOC	SA	3-4
101-92W-3002	Analyze Water Analysis Test Results	BNCOC	QT	3-4
101-92W-3024	Analyze Entries on Water Reports/Logs/Forms	BNCOC	SA	3-4
Subject Area 8. Monitor Water Purification Operations				
101-92W-3025	Monitor Water Purification Operations	BNCOC	QT	3-4
101-92W-3028	Monitor Environmental Stewardship Program	BNCOC	QT	3-4
Subject Area 9. Monitor Water Storage, Distribution, and Issue Operations				
101-92W-3021	Monitor Water Distribution/Storage Operations	BNCOC	SA	3-4
101-92W-3029	Direct Sling Load Operations	BNCOC	SA	3-4
101-92W-3030	Monitor Mobile distribution Operations	BNCOC	QT	3-4
Skill Level 4				
Subject Area 10. Manage Water Reports, Logs, and Forms				
101-92W-4014	Manage Water Reconnaissance Operations	ANCOC	AN	4
101-92W-4015	Manage Completed Water Reports/Logs/Forms	ANCOC	AN	4
101-92W-4017	Manage Water Analysis Testing	ANCOC	SA	4
Subject Area 11. Manage Water Purification Operations				
101-92W-4016	Manage Water Purification Operations	ANCOC	SA	4
101-92W-4021	Manage Environment Stewardship Program	ANCOC	SA	4
Subject Area 12. Manage Storage, Distribution, and Issue Operations				
101-92W-4023	Manage Mobile Distribution Operations	ANCOC	SA	4
101-92W-4010	Manage Water Storage/Distribution Operations	ANCOC	AN	4
101-92W-4022	Plan Sling Load Operations	ANCOC	AN	4

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CHAPTER 3

MOS/Skill Level Tasks

Skill Level 1

Subject Area 1: Water Reports, Logs, and Forms

Perform Water Reconnaissance

101-92W-1064

Conditions: Given the requirement to conduct a ground reconnaissance (using a military standard vehicle) for a proposed water purification point in a field/coastal environment, the soldier is part of a team consisting of a 92W supervisor and one other 92W10 soldier. Materials needed: Global Positioning System, a complete Water Quality Analysis Set, a topographic map of the area, TM 10-6630-222-12&P and pencils. Form needed: DA Form 1712-R (Water Reconnaissance Report).

Given the requirement to store, issue and receive, and distribute potable water, the soldier is part of a team assigned to an operational water distribution point in a field environment. Materials needed: Global Positioning System (GPS), Water Quality Analysis Set, a topographic map of the area, and pencils. Form needed: DA Form 1712-R.

Standards: Performed observations, computations and performed water tests to confirm water quantity and quality of raw water standards. Took four of the five principles analysis tests of water (temperature, turbidity, total dissolved solids, and pH) for each proposed water purification site. Recorded the results on DA Form 1712-R and gave to the 92W supervisor.

Performance Steps

DANGER: Observe all safety procedures when conducting chemical analysis of water. Dangerous chemicals are provided in both test kits. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTION: Handle and dispose of hazardous materials (such as, chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

1. Apply risk management procedures (reference: FM 3-100.12).
   a. Understand and execute the risk management process, risk controls and command guidance directed by higher headquarters.
   b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Verify coordinates by using the Global Positioning Systems (GPS) and a Topographic Map.
3. Conduct a visual or photographic air survey disclosing changes not shown on maps.
4. Determine if proposed purification site meets operational requirements.
   a. Calculate quantity of water flowing in a stream using the following formula: Q = 6.4 x A x V.
   b. Verify raw water meets minimum requirements established in TB MED 577. Test raw water for pH, turbidity, total dissolved solids, temperature, and color.
   c. Ensure site considerations meet minimum requirements for purification operations.
   d. Consider impact of tidal fluctuation on coastal operations.
5. Determine if proposed storage and distribution site meets operational requirement.

Performance Steps

6. Develop a sketch of the proposed water point area/storage site.
   a. Ground routes of communication, setup of equipment, and proposed site improvements.
   b. Accessibility.
      (1) Road nets, turnaround/turnabouts.
      (2) Cover and concealment
      (3) Adequate bivouac, parking and staging area.
   c. Site conditions.
      (1) Drainage/soil type and terrain.
      (2) Security.
         (a) Protection from ground attacks.
         (b) Protection from infiltration and sabotage.
      (3) Support requirements and distance to consumers.
7. Submit the completed DA Form 1712-R to the reconnaissance 92W supervisor.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Verified coordinates by using the Global Positioning Systems (GPS) and a Topographic Map.	____	____
3. Conducted a visual or photographic air survey disclosing changes not shown on maps.	____	____
4. Determined if proposed purification site meets operational requirements.	____	____
5. Determined if proposed storage and distribution site meets operational requirement.	____	____
6. Developed a sketch of the proposed water point area/storage site.	____	____
7. Submitted the completed DA Form 1712-R to the reconnaissance 92W supervisor.	____	____

Evaluation Guidance: Score the soldier Go if all steps are passed. Score the soldier NO-GO if any step failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 1712-R	TM 3-6665-319-10
FM 3-100.12	TM 10-6630-246-12&P
FM 10-52	
FM 10-52-1	
TB MED 577	

Conduct Water Analysis Testing

101-92W-1065

Conditions: Given the requirement to conduct water analysis testing, the soldier, as a member of a ground reconnaissance team (consisting of a supervisor and one other 92W10 soldier) for a proposed water point in a field or coastal environment, must conduct the necessary water analysis tests. Materials needed: a Water Quality Analysis Set (WQAS), a topographic map of the area, pencils, TM 10-6630-222-12&P, TM 3-6665-319-10, and TB MED 577. Forms needed: DA Form 1712-R (Water Reconnaissance Report) and DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Given the requirement to conduct water analysis testing, the soldier, as a member of a water purification team (consisting of two other 92W10 soldiers) at an established water point on an approved raw water source, must conduct the necessary water analysis tests. Materials needed: a Water Quality Analysis Set (WQAS), TM 10-6630-222-12&P, TM 3-6665-319-10, TB MED 577, paper, and pencil. Forms needed: DA Form 2404/DA Form 5988-E and DA Form 1713-R (Daily Water Production Log - ROWPU) or ROWPU/LWP/TWPS log forms.

Given the requirement to conduct water analysis testing, the soldier, as a member of a storage and distribution team (consisting of thirteen 92W10 soldiers) operating at a GS water storage site in a field environment, must conduct water analysis tests. Materials needed: necessary water support equipment to issue/distribute potable water, a Water Quality Analysis Set (WQAS), TM 10-6630-222-12&P, TM 3-6665-319-10, TB MED 577, paper, and pencil. Forms needed: DA Form 1714-R (Daily Water Issue Log), DA Form 1714-1-R (Daily Water Distribution Log), and DA Form 2404/DA Form 5988-E.

Standards: Determined the characteristics of raw and product water, to include pH, turbidity, total dissolved solids, temperature, chlorine residual (product water only) using the Water-Quality Analysis Set-Purification. Maintained and resupplied the test kits. Performed before-, during-, and after-operations PMCS. Recorded on a DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Logged the results of analysis on DA Form 1712-R, DA Form 1713-R, DA Form 1714-R, or DA Form 1714-1-R. Gave the completed forms to the supervisor at the end of each shift.

Performance Steps

DANGER: Observe all safety procedures when conducting chemical analysis of water. Dangerous chemicals are provided in both test kits. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS:

Handle and dispose of hazardous materials (such as chemicals/solutions) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for containment devices. Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the appropriate personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

Performance Steps

1. Apply risk management procedures (reference: FM 3-100.12).
   a. Understand and execute the risk management process, risk controls and command guidance directed by higher headquarters.
   b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Analyze characteristics of water and record the results.
   a. Determine chlorine residual (in parts per million [ppm]).
   b. Determine pH (0-14).
   c. Determine turbidity (in NTUs).
   d. Determine total dissolved solids (TDS) in ppm.
   e. Determine temperature (in Fahrenheit).
3. Perform chemical analysis on water suspected of NBC agents and record the results. Compare with tables listed in FM 10-52-1.
   a. Determine arsenicals (L (lewisite), ED, PD).
   b. Determine nerve agents (GA, GB, GD, VX).
   c. Determine blood agents (AC, CK) (cyanides).
   d. Determine blister agents (HD, HN) (mustard agents).
4. Perform before-, during-, and after-operations PMCS (references: TM 10-6630-246-12&P and TM 3-6665-319-10).
   a. Correct all noted deficiencies.
   b. Record deficiencies, shortcomings, and actions not corrected on a DA Form 2404/DA Form 5988-E. Give completed forms to supervisor.
   c. Stow components of the set and kit in spaces provided as illustrated in the loading diagrams.
   d. Clean and evaluate all labware and chemical containers for function and note shortages to be ordered.
   e. Remove expired chemicals/substances from set/kit and note shortages to be ordered.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Analyzed characteristics of water.	____	____
3. Performed chemical analysis on water suspected of NBC agents.	____	____
4. Performed before-, during-, and after-operations PMCS.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

DA FORM 1712-R
DA FORM 1713-R
DA FORM 1714-R
DA FORM 1714-1-R
DA FORM 2404
DA FORM 5988-E
FM 3-100.12
FM 10-52-1
TB MED 577
TM 3-6665-319-10
TM 10-6630-222-12&P

Related

FM 10-52
TM 10-6630-246-12&P

Complete Entries on Water Reports/Logs/Forms

101-92W-1069

Conditions: Given the requirement to record water production and issue operations at the water point for future planning requirements, the soldier, as a member of a water point with an operational water purification unit, must accurately record water production and issue operations. Materials needed: Water Quality Analysis Set, FM 10-52-1 and a pencil. Forms needed: DA Form 1713-R (Daily Water Production Log – ROWPU), ROWPU/LWP/TWPS log forms, and DA Form 1714-R (Daily Water Issue Log).

Given the requirement to record water distribution operations at the water point for future support planning requirements, the soldier, as a member of a water distribution team with an operational TWDS distribution point, must accurately record water distribution operations. Materials needed: Water Quality Analysis Set, FM 10-52-1, and a pencil. Form needed: DA Form 1714-1-R (Daily Water Distribution Log).

Standards: Completed all blocks on DA Form 1713-R, ROWPU/LWP/TWPS log forms, DA Form 1714-R, and DA Form 1714-1-R accurately to record water production, issue, and distribution operations at the water point for future planning requirements. Gave the completed forms to supervisor for disposition of water reports.

Performance Steps

1. Complete DA Form 1713-R.
    a. Complete heading.
        (1) Enter shift number or shift hours.
        (2) Enter water point number and ROWPU number.
        (3) Enter NCO in charge.
        (4) Enter date.
    b. Complete Part I. Hourly Chemical Dosage Log.
        (1) Enter time of equipment startup and shutdown.
        (2) Enter knob setting and amount of chemical used for initial charge and recharge of citric acid, sodium hex, chlorine, and polymer.
        (3) Enter pH of raw water and product water every 2 hours. This includes during normal operation and the pH of the cleaning solution during RO element cleaning.
        (4) Enter chlorine residual of product water after 30 minutes of contact time. It will be measured every hour of the operating day.
        (5) Enter remarks.
            (a) Enter normal shutdown.
            (b) Enter shutdown for scheduled and nonscheduled maintenance.
            (c) Enter changes in raw water that effect chemical usage.
            (d) Enter receiving and/or issuing of chemicals.
            (e) Enter any significant event that may effect water point operations.
        (6) Enter the amount of chemicals used for operation and amount of chemicals on hand for operation.
    c. Complete Part II. Gauge and Indicator Log. Record hourly.
        (1) Enter time of water production startup and shutdown.
        (2) Enter product water flow.
        (3) Enter reverse osmosis pressure.
        (4) Enter cartridge filter pressure differential.
        (5) Enter media filter pressure differential.
        (6) Enter raw water flow.
        (7) Enter brine flow.
        (8) Enter reverse osmosis vessel pressure differential.
        (9) Enter total dissolved solids of the product water.

Performance Steps

(10) Enter remarks.
  (a) Enter normal shutdown.
  (b) Enter shutdown for scheduled and nonscheduled maintenance.
  (c) Enter changes in raw water that effect water production.
  (d) Enter receiving and/or issuing of fuel.
  (e) Enter any significant event that may effect water point operations.
(11) Enter total hours the equipment was operated.
(12) Enter amount of POL used and on hand for operation.
(13) Give completed DA Form 1713-R to team chief for disposition of water reports.

2. Complete 3,000-GPH ROWPU forms.
   a. Complete entries on the Data log.
   b. Complete entries on the Optimization Log.
   c. Complete entries on the Medial Filter Log.
   d. Give completed 3,000-GPH ROWPU forms to team chief for disposition of water reports.

3. Complete entries on the 1,500-GPH TWPS Data Sheets.
   a. Complete entries on the Operation Data Log.
   b. Complete entries on the Operator Maintenance Log.
   c. Complete entries on the RO element performance log.
   d. Give completed 1,500-GPH TWPS forms to team chief for disposition of water reports.

4. Complete entries on the LWP Data Sheets.
   a. Complete Part I. Operating Parameter Log
      (1) Enter LWP Number.
      (2) Enter NCOIC.
      (3) Enter Date.
      (4) Enter Time.
      (5) Enter Product Flow (GPM).
      (6) Enter UF Pressure (PSI).
      (7) Enter UF or Backwash Pressure (PSI).
      (8) Enter Temperature (F).
      (9) Enter Engine Shutoff Air Pressure (PSI).
      (10) Enter HP Pump Flow (GPM).
      (11) Enter RO Pressure (PSI).
      (12) Enter Feed Water TDS (PPM).
      (13) Enter Product Water TDS (PPM).
   b. Complete Part II. Chemical Log.
      (1) Enter LWP Number.
      (2) Enter NCOIC.
      (3) Enter Date.
      (4) Enter Time.
      (5) Enter Product Water Chlorine Residual.
      (6) Enter Chemical Pump Settings accordingly.
        (a) Chlorine Pump. Speed/Stroke.
        (b) Coagulant Pump. Speed/Stroke.
        (c) Antiscalant Pump. Speed/Stroke.
        (d) Give completed LWP data sheets to team chief for disposition of water reports.

5. Complete DA Form 1714-R.
   a. Enter water point number.
   b. Enter NCO in charge.
   c. Enter date.
   d. Enter the time the water was issued.
   e. Enter the amount of water issued.

Performance Steps

f. Enter the unit receiving water and the chlorine residual of water at the point of issue.
g. Enter the total amount of water issued after each form is filled.
h. Enter remarks of any significant event that may effect storage and distribution operations.
i. Forward completed DA Form 1714-R to team chief for disposition of water reports.

6. Complete DA Form 1714-1-R.
   a. Enter water point number.
   b. Enter NCO in charge.
   c. Enter date.
   d. Enter the time the water was received or dispatched.
   e. Enter the amount of water received or dispatched.
   f. Enter the unit water was received from and the chlorine residual at the point of distribution.
   g. Enter the total amount of water received and dispatched for the day.
   h. Enter the total amount of water on hand at the end of the day.
   i. Enter remarks of any significant event that may effect storage and distribution operations.
   j. Forward completed DA Form 1714-1-R to team chief for disposition of water reports.

Evaluation Preparation: The following forms are found in the FM 10-52-1; DA Form 1713-R, DA Form 1714-R, DA Form 1714-1-R.

Performance Measures	**GO**	**NO-GO**
1. Completed DA Form 1713-R.	____	____
2. Completed 3,000-GPH ROWPU forms.	____	____
3. Completed entries on the 1,500-GPH TWPS Data Sheets.	____	____
4. Completed entries on the LWP Data Sheets.	____	____
5. Completed DA Form 1714-R.	____	____
6. Completed DA Form 1714-1-R	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 1713-R	
DA FORM 1714-R	
DA FORM 1714-1-R	
FM 10-52-1	

Subject Area 2: Water Purification Operations

Operate a 600-GPH Reverse Osmosis Water Purification Unit (ROWPU)
101-92W-1022

Conditions: Given the requirement to produce potable water, the soldier (assigned to an operational DS water supply point in a field/coastal environment) must operate the 600-GPH ROWPU. Materials needed: an operationally complete 600-GPH ROWPU with diesel-driven 30-kw generator; WQAS-1 or WQAS-P; three 3,000-gallon storage tanks, and a 5-ton cargo truck; a fire extinguisher; sufficient fuel and oil to establish operations; TM 10-4610-241-10; TM 5-6115-465-12; TM 10-6630-246-12&P; TM 3-6665-319-10; earplugs; rags; and a pencil. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection and Maintenance Worksheet) and DA Form 1713-R (Daily Water Production Log – ROWPU).

Standards: Performed all before-, during-, and after-operations PMCS. Conducted initial ROWPU startup. Produced product water. Troubleshooted the 600-GPH ROWPU. Maintained reports and forms. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Gave the completed forms to immediate supervisor at the end of each shift.

Performance Steps

DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if you fail to observe cautions. Do not operate the ROWPU until the ground terminal stud on the generator set has been connected to a suitable ground. Dangerous chemicals are provided with the ROWPU. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Follow all warnings contained in TM 10-4610-241-10, TM 5-6115-465-12, TM 10-6630-246-12&P, TM 3-6665-319-10, and FM 3-100.12.

WARNING: If NBC agents are detected, give the alarm and notify supervisor. Decontaminate self and equipment at the first available opportunity.

NOTE: Operating the 30-kw generator (see task 101-92W-1082) is required to operate the 600-GPH ROWPU. Performance steps may differ due to differences in the various models of ROWPUs.

CAUTIONS:

Hearing protection is required when operating this equipment.

Handle and dispose of hazardous materials (such as used oil, contaminated fuel, and chemicals and solutions) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the appropriate personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

1. Apply risk management procedures (reference: FM 3-100.12).
    a. Understand and execute the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risk and risk reduction measures as appropriate to the chain of command.

Performance Steps

2. Perform before-operations PMCS (references: TM 10-4610-241-10, TM 5-6115-465-12, TM 10-6630-246-12&P, and TM 3-6665-319-10).
    a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of each shift.

3. Conduct initial ROWPU start-up.
    a. Pull out emergency stop button.
    b. Prime and start raw water pumps.
    c. Start chemical feed pump; set polymer to "run".
    d. Set multimedia, pulse dampener, and cartridge filter vent valves to close.
    e. Set multimedia vent valve to open, observe for steady flow of water from vent, then close vent valve.
    f. Set cartridge filter vent valve to open, start booster pump, observe for steady flow of water from vent, then close vent valve.
    g. Set pulse dampener vent valve to open, reset low pressure switch, start RO pump, observe for steady flow of water from vent, then close vent valve.

4. Produce product water.
    a. Observe water from vent vessel line for 10 minutes for adequate flow and clarity.
    b. Examine filtered water from cartridge filter drain valve number 1 for clarity.
    c. Set Sodium Hex pump to "run".
    d. Close vent vessels valve slowly.
    e. Adjust product water flow valve to obtain proper flow based on raw water (16-GPM for fresh or 12-GPM for salt).
    f. Check continuously brine flow gauge, product water flow gauge, and RO pressure gauge.
    g. Close product water vent valve and set the chlorine pump to "run".
    h. Monitor product water for compliance with TB MED 577 standards (see Task 101-92W-1065).

5. Perform during-operations PMCS (references: TM 10-4610-241-10, TM 5-6115-465-12, TM 10-6630-246-12&P, and TM 3-6665-319-10).
    a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of each shift.

6. Maintain reports and forms.
    a. Record all operational data, such as chemical dosages, pressure and flow gauge readings, backwashing times, RO element cleaning, and so forth on DA Form 1713-R.
    b. Give log to supervisor at the end of each shift.

7. Perform 600-GPH ROWPU operational maintenance.
    a. Backwash multimedia filter after 20 hours of operations, when multimedia filter gauge rises 5 psid above the reading at start-up, or above 10 psid when ROWPU is to be shut down for long term.
    b. Clean RO elements when RO pressure gauge rises above 960 psid for salt water or 500 psid for fresh water, when product water flow decreases with no change in raw water temperature, when brine flow increases and is not correctable by adjusting regulate product flow valve, when RO vessel pressure increases 20 percent over initial reading after last RO cleaning, or when RO vessel gauge reading is above 100 psid.
    c. Replace RO elements when product water TDS cannot be maintained below 1,000 ppm.
    d. Change cartridge filter tube elements when cartridge filter gauge differential pressure rises above 20 psid.
    e. Clean the backwash pump strainer each time the backwash pump is used.
    f. Replace rupture disc if blown.
    g. Replace hand-hole gaskets on the multimedia filter tank after tank cleaning if leaking occurs.
    h. Repair damages to 3,000-gallon onion tanks as they occur.

Performance Steps

i. Check and replace as necessary indicator and lighting lamps.
j. Replace NBC filters after 100 hours of usage.

8. Troubleshoot the 600-GPH ROWPU (reference: TM 10-4610-241-10).
   a. Determine problem and take corrective action.
   b. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   c. Give form to supervisor at the end of each shift.

9. Perform after-operations PMCS (references: TM 10-4610-241-10, TM 5-6115-465-12, TM 10-6630-246-12&P, and TM 3-6665-319-10).
   a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   b. Give form to supervisor at the end of each shift.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Performed before-operations PMCS.	____	____
3. Conducted initial ROWPU startup.	____	____
4. Produced product water.	____	____
5. Performed during-operations PMCS.	____	____
6. Maintained reports and forms.	____	____
7. Performed 600-GPH ROWPU operational maintenance.	____	____
8. Troubleshooted the 600-GPH ROWPU.	____	____
9. Performed after-operations PMCS.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 1713-R	D 20-1324
DA FORM 2404	FM 10-52
DA FORM 5988-E	FM 10-52-1
FM 3-100.12	TM 10-5430-237-12&P
TB MED 577	
TM 3-6665-319-10	
TM 5-6115-465-12	
TM 5-6630-215-12	
TM 10-4610-241-10	
TM 10-4610-215-10	
TM 10-6630-246-12&P	

Set Up/Dismantle the 600-GPH Reverse Osmosis Water Purification Unit (ROWPU)
101-92W-1052

Conditions: Given the requirement to move to a new operational area, the soldier, assigned to an operational DS water supply point in a field environment, must dismantle and set up the 600-GPH ROWPU. Materials needed: an operationally complete 600-GPH ROWPU with diesel-driven 30-kw generator, three 3,000-gallon storage tanks and a 5-ton cargo truck, TM 10-5430-237-12&P, TM 10-4610-241-10, TM 5-6115-465-12, a fire extinguisher, sufficient fuel and oil to establish operations, earplugs, rags, and a pencil. Form needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/ DA Form 5988-E (Equipment Inspection and Maintenance Worksheet).

Standards: Installed the 600-GPH ROWPU by installing the ROWPU components and storage tanks and pumps, connected the backwash water system, connected the water purification system, and performed before-operations PMCS. Dismantled the 600-GPH ROWPU by performing after-operations PMCS, disconnected the ROWPU components, dismantled the ROWPU components, packed ROWPU components for movement, and hitched up the ROWPU to the prime mover. Recorded on DA Form 2404/DA Form 5988-E, PMCS notations, and actions taken to correct deficiencies and shortcomings. Gave the completed forms to immediate supervisor at the end of each shift.

Performance Steps
DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if you fail to observe cautions. Do not operate the ROWPU until the ground terminal stud on the generator set has been connected to a suitable ground. Dangerous chemicals are provided with the ROWPU. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Follow all warnings contained in TM 5-6115-465-12 and TM 10-4610-241-10. Hearing protection is required when operating this equipment.

WARNING: If NBC agents are detected, give the alarm and notify supervisor. Decontaminate self and equipment at the first available opportunity.

CAUTIONS: Handle and dispose of hazardous materials (such as used oil, contaminated fuel, and chemicals/solutions) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the appropriate personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

1. Apply risk management procedures (reference: FM 3-100.12).
    a. Understand and execute the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

2. Install the ROWPU, tanks, and pumps.
    a. Position the ROWPU trailer on the pre-selected site.
    b. Disconnect the trailer from the prime mover.
        (1) Pull each jack down from under the trailer and lock it in place.
        (2) Lower the two front jacks to disconnect the hitch.
        (3) Crank all four jacks to the down position.

Performance Steps

(4) Disconnect the driving systems by removing the electrical cable, the air hose, and the safety chain.
(5) Pull up 5-ton truck to remove its hitch from the tongue of the ROWPU.

c. Set up the product water storage tanks on the pre-selected site (reference: TM 10-5430-237-12&P).
d. Set up the brine/backwash tank on the pre-selected site (reference: TM 10-5430-237-12&P).
e. Position the raw water pumps on the pre-selected sites.

3. Connect the backwash water system.

4. Connect the water purification system.
   a. Connect the raw water system.
   b. Prepare the raw water strainer and float.

NOTE: Place the strainer at least 4 inches from the surface of the water or 4 inches from the bottom of the source.

c. Connect the various water distribution hoses.
d. Connect water hoses between water storage tanks.
   (1) Use a 2-inch gate valve to isolate the tanks.
   (2) Connect the female end of a 1 1/2-inch rubber suction hose to the pipe-to-hose adapter on the suction side of the distribution pump.
e. Connect the water distribution pump.
f. Connect the wastewater and vent vessels hoses.
g. Ground the components by driving three lengths of the grounding rod into the earth within 6 feet of the generator. For grounding refer to task 101-92W-1082.

NOTE: Leave a sufficient length of the grounding rod above the ground in order to attach the ground cable.

h. Connect the raw water pump cables.
i. Connect the distribution pump power cable.
j. Connect the backwash pump power cable.
k. Connect the chemical feed tubes with strainers to the suction connections in the following manner:
   (1) Connect the blue reinforced tube to the polymer connection.
   (2) Connect the red tube to the chlorine connection.
   (3) Connect the green tube to the sodium hex connection.
   (4) Connect the yellow tube to the citric acid connection.
l. Connect the tubes without strainers to the prime connections in the same order as stated in paragraph 4k above.

5. Perform before-operations PMCS (references: TM 5-6115-465-12 and TM 10-4610-241-10).

6. Perform after-operations PMCS (references: TM 5-6115-465-12 and TM 10-4610-241-10).

7. Disconnect the ROWPU system.
   a. Remove the power cable from the control panel and wrap it around the cable holder on the pump frame.
   b. Disconnect the raw water system.
      (1) Remove the hard rubber hose from the water source, disconnect the strainer, untie the float, and unscrew the suction end from the pump.
      (2) Disconnect the canvas hose from the raw water pumps by unscrewing both ends. Then flatten the hose and roll it up.

Performance Steps

c. Disconnect the backwash system.
   (1) Remove the power cable from the control panel and wrap it around the cable holder on the pump frame.
   (2) Disconnect the canvas hose by unscrewing both hoses from the ROWPU. Then remove the end of the hose from the backwash tank. Unscrew the end of the other hose from the pump. Flatten both hoses and roll them up.
   (3) Disconnect both ends of the rubber hose and coil it loosely.

d. Disconnect the coupling hardware.
   (1) Disconnect the gate valve and the pipe-to-hose adapter from the backwash tank.
   (2) Disconnect the strainer from the discharge side of the pump.

e. Disconnect the distribution water system.
   (1) Disconnect the hose.
   (2) Disconnect the nozzles.
   (3) Flatten the hose and roll it up.

f. Disconnect the product water system.
   (1) Disconnect the canvas hose by one end of the hose from the ROWPU and the other end from the product tank. Flatten the hose and roll it up.
   (2) Disconnect the rubber hoses from between the two tanks, disconnect the gate valve and pipe-to-hose adapter, and replace the tank outlet cap. Disconnect one end of the other hose from the suction side of the distribution pump. Disconnect the other end from the tank, replace the outlet cap, and coil the hose loosely.

8. Dismantle the ROWPU.
   a. Disconnect the wastewater hose and vessels hose and flatten and roll them up.
   b. Remove the ground wire on the ROWPU.
      (1) Disconnect the grounding cable from the ROWPU grounding stud and from the clamp on the grounding rod.
      (2) Disconnect the grounding cable from the generator grounding stud.
      (3) Loosen the grounding rod and lift it from the ground.
   c. Dismantle the tanks.
      (1) Remove the tank tops and fold them.
      (2) Release air from the collar.
      (3) Flip the tanks to drain off water and let them dry.
      (4) Fold the tanks and ground cloths.
      (5) Pack tank in carrier.

9. Pack ROWPU components for movement.
   a. Load the trailer.
      (1) Load all the pumps and strap them down.
      (2) Load all tanks.
      (3) Load all hoses.
      (4) Load all tools and hardware.
      (5) Load all pails.
      (6) Load the storage boxes and strap them down.
      (7) Remove the step and tie it on top of the distribution pump frame.
   b. Secure all equipment with the hold down straps.
   c. Clamp the two cross braces to the front frame.
   d. Roll down the four canvas sides and tie them securely.

10. Hitch up the ROWPU to the prime mover.
   a. Connect the hitch.
      (1) Raise the two front jacks.
      (2) Backup the 5-ton truck to position its hitch under the tongue of the ROWPU.
      (3) Lower the front jacks to couple the hitch.
      (4) Connect the safety chain.

Performance Steps

(5) Crank all four jacks to the up position.
(6) Push each jack up toward the center of the trailer and lock it in place.

b. Connect the driving systems.
(1) Connect the electrical cable.
(2) Connect the air hose.

NOTE: The ROWPU is now ready for movement to the operational site.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Installed the ROWPU, tanks, and pumps.	____	____
3. Connected the backwash water system.	____	____
4. Connected the water purification system.	____	____
5. Performed before-operations PMCS.	____	____
6. Performed after-operations PMCS.	____	____
7. Disconnected the ROWPU system.	____	____
8. Dismantled the ROWPU.	____	____
9. Packed ROWPU components for movement.	____	____
10. Hitched up the ROWPU to the prime mover.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
FM 3-100.12	FM 10-52
DA FORM 2404	FM 10-52-1
DA FORM 5988-E	TM 10-4610-215-10
TM 5-6115-465-12	
TM 10-4610-241-10	
TM 10-5430-237-12&P	

Operate a 3,000-GPH Reverse Osmosis Water Purification Unit (ROWPU)
101-92W-1059

Conditions: Given the requirement to produce potable water, the soldier, assigned to an operational DS water supply point in a field environment, must operate the 3,000-GPH ROWPU. Materials needed: an operationally complete 3,000-GPH ROWPU with diesel-driven 60-kw generator, three 3,000-gallon storage tanks, a 5-ton tractor, MOS qualified 92W soldier, a Water Quality Analysis Set, TM 10-4610-232-12, TM 5-6115-545-12, TM 10-5430-237-12&P, a fire extinguisher, sufficient fuel and oil to establish operations, earplugs, rags, and a pencil. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet) and ROWPU operation logs.

Standards: Performed all before-, during-, and after-operations PMCS. Performed initial adjustments, checks, and self-tests. Performed start-up procedures from secured or drained condition. Backwashed the media filter and returned to normal operations. Cleaned the RO elements when the frequency or alert existed. Performed bisulfite sanitizing procedures. Shutdown equipment to "temporary secured status" or "long term secured status".

Performance Steps
DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if you fail to observe cautions. Do not operate the ROWPU until the ground terminal stud on the generator set has been connected to a suitable ground. Dangerous chemicals are provided with the ROWPU. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Follow all warnings contained in TM 5-6115-545-12 and TM 10-4610-232-12. If NBC agents are detected, give the alarm and notify your supervisor. Decontaminate yourself and your equipment at the first available opportunity.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

NOTE: Operating the 60-kw generator is required to operate the 3,000-GPH ROWPU. See task 101-92W-1082.

CAUTIONS:

Hearing protection is required when operating this equipment.

Handle and dispose of hazardous materials (such as used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the appropriate personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

1. Apply risk management procedures.
    a. Understand and execute the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

Performance Steps

2. Perform before-operations PMCS (references: TM 5-6115-545-12 and TM 10-4610-232-12).
    a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of each shift.

3. Perform initial adjustments, checks, and self-tests.
    a. Check to ensure that all hose couplings are tight, electrical cable connectors are locked, ground rod is driven in as described, and ground cables are tight at both ends.
    b. Determine the amount of turbidity in the raw water.
    c. Determine the amount of color in the raw water.
    d. Determine the amount of total dissolved solids in the raw water.
    e. Check that cartridge filters are installed in cartridge vessel.
    f. Start the generator and bring power to van unit.
    g. Check that the main control panel SYSTEM MODE switch is in SYSTEM ON position.
    h. Turn main control panel MAIN CIRCUIT BREAKER to ON position.
    i. Push SYSTEM RESET push button.
    j. Turn on lights with push button and vent fan with ON/OFF switch.
    k. Prepare the air system.
        (1) Check air compressor oil level dipstick and add oil if needed. Close air compressor bleed valve.
        (2) Check AIR COMPRESSOR hour meter and review unit log for last filter replacement. Determine if inlet/outlet filter replacement is required.
        (3) Close the air manual blowdown valve. Check to see if the high pressure air auto blowdown block valve is open.
        (4) Close the air manifold bleed valves.
        (5) Open the air storage valve.
        (6) Close the air dryer valve.
        (7) Close the media filter air purge block valve.
        (8) Open the air block valves.
        (9) Turn COMPRESSOR OFF/ON switch ON.
    l. Close all vent, drain, and sample valves.
    m. Position manual valves as follows:
        (1) Cartridge filter block V37 Closed.
        (2) Feed V14 Open.
        (3) Cleaning Bypass V13 Closed.
        (4) Product Shut-Off V64 Open.
        (5) Clean Return V50 Closed.
        (6) Clean/Flush Tank Fill V52 Closed.
        (7) Product Utility Hose V10 Closed.
        (8) System Control Valve V51 Closed.
    n. Remove utility air hose from storage box 3 and connect utility air hose to utility air connection to stable level valves. Open valve on utility air hose and fill stable levels to 30 psi.
    o. Prepare the main control panel for operation by placing SYSTEM MODE switch in ON position and SYSTEM RESET pushed in.
        (1) Push LIGHT TEST.
        (2) Push ALARM TEST.
        (3) Turn OPERATION MODE selector switch to FILTER NORMAL.
        (4) Push INITIATE.
        (5) Push MEDIA FILTER FORWARD FLUSH to open valve. A blue indicator should light up.

NOTE: A minimum air pressure of 85 psig is required to assure proper functioning of automatic valves. When the air pressure gauge shows at least 85 psig, the blue indicator lights should be on. If valve indicator lights are not as stated below, troubleshoot valves. DO NOT start ROWPU.

Performance Steps

(6) Check valve indicator (blue) lights for the following:
  (a) MEDIA FILTER INLET VALVE -ON.
  (b) MEDIA FILTER OUTLET VALVE -ON.
  (c) MEDIA FILTER FLUSH VALVE -ON.
  (d) All other blue lights should be OFF.
(7) Check EMERGENCY STOP Button.
  (a) Pull button out to reset.
  (b) Push button to stop all motors in ROWPU.
  (c) The emergency stop button should only be pushed when equipment failure or another problem demands immediate shutdown.

p. Check level of carbon monoxide in the van.

4. Perform start-up procedures from secured or drained condition.

NOTE: Refer to TM 10-4610-232-12 for procedures to "Start-up from standby" and "Start-up after emergency shutdown".

a. Perform initial polyelectrolyte set-up procedures. For fresh water with a turbidity of less than 8 NTU and color greater than 10, polyelectrolyte is not required. If this is the case, go to step b. Make sure the speed controls on all three chemical injection pumps are in the off position.
  (1) Empty the 5-gallon can of water into the polyelectrolyte tank.
  (2) Tip the polyelectrolyte jug to fill its measuring chamber to 8 ounces. Empty measuring chamber into the polyelectrolyte tank. Repeat to add one more 8-ounce measure and then a final 4-ounce measure for a total of 20 ounces.
  (3) Mix vigorously with mixing paddle for two minutes. By visual observation, make sure all polyelectrolyte is in solution. Use caution while mixing to avoid hitting the fittings or switches in the bottom of the tank.
  (4) Make certain hypochlorite and sequestrant pumps are OFF. Push CHEMICAL PUMP START.
  (5) Set speed control knob to 80 and set stroke control knob to 100.
  (6) Pull out and hold pressure release knobs until solution is being pumped out through release tubing to drain. This action removes air from the chemical system and allows polyelectrolyte to be pumped.
  (7) Reset the speed and stroke control knobs. Refer to TM 10-4610-232-12 for polyelectrolyte pump settings. These settings provide an initial adjustment only. Further adjustment of polyelectrolyte injection will be required after the sequestrant and hypochlorite system are setup and pumping.
  (8) Push CHEMICAL PUMP STOP.
b. Prime and start the raw water pump.
  (1) Close raw water pump drain valve and disconnect piping tee. Use priming can to pour water into priming port until pump is full.
  (2) Remove plug from prime assist valve and attach hand pump to prime assist valve. Open prime assist valve.
  (3) Push RAW WATER START. Operate hand pump to pull air out of suction hoses. Close prime assist valve. Remove hand pump, replace plug, and clean and store hand pump.
  (4) Check the discharge hose and the media inlet/outlet pressure gauge to assure pressure has been established.
c. Push CHEMICAL PUMP START.
d. When media inlet/outlet pressure gauge reading steadies, push BOOSTER PUMP START and slowly close feed valve until flow meter reads 100 GPM.
e. Open media filter vent valve and close when water is seen.
f. Hold steady condition (no control operations) for 10 minutes.
g. Fully open cartridge filter block valve and feed valve.
h. Push MEDIA FILTER FORWARD FLUSH. The FEED PRESSURE LOW light will go off.
i. Open cartridge filter vent valve and close when water is seen.
j. Open product shut-off valve.

Performance Steps

k. Setup the clean/flush tank.
   (1) Connect the cartridge filter water hose to the clean/flush tank inlet and open valve. Do not fill above the 100 mark until the bisulfite is added.
   (2) Loosen wing nut and access port cover. Open one small packet of bisulfite and empty into the clean/flush tank. Install cover on access port. Wash off any chemical that lies in port before closing up.
   (3) Watch level gauge. Close valve when water reaches top. Clean/Flush tank is now ready for first backwash. All yellow and red warning lights should be off.

l. Start the high pressure pump.
   (1) Ensure that the waste out flow meter and hose indicate water flow, the FEED PRESSURE LOW light is off, the system pressure control valve is open, and the cartridge inlet/outlet pressure gauge shows at least 50 psig.
   (2) Push HIGH PRESSURE PUMP START. DO NOT exceed 900 psig.
   (3) When the system pressure gauge stops rising, turn system pressure control valve slowly clockwise until product flow meter shows mission normal water flow. Do not exceed 900 psig on system pressure control valve (refer to TM 10-4610-232-12, water flow setting). The average mission normal water flow for the ROWPU is related to the type of water and its temperature as listed by TM 10-4610-232-12. Higher water flows up to limits listed may be set under "push" conditions to meet unusual mission demands. Do not push beyond the flow listed for 75 degrees Fahrenheit when operating on well-water sources.
   (4) Check generator. Adjust throttle to provide 60 Hz. Adjust voltage to provide 435 to 445 VAC.

m. Prepare the chemical system for final setup.
   (1) Prepare the polyelectrolyte for setup.
      (a) If polyelectrolyte is not being used, fill polyelectrolyte tank half full with product water. Proceed to "Prepare the sequestrant setup" below.
      (b) Add an additional 28 ounces of polyelectrolyte to the polyelectrolyte tank. The normal fill is 48 ounces in a full tank of 12 gallons of water (4 ounces per gallon of water).
      (c) Partially close the product shut-off valve to provide back pressure no greater than 20 psig. If the product shut-off valve is closed too far, the ROWPU will automatically shut down. Open fully when chemical tanks are filled.
      (d) Use the product utility hose to fill the tank with product water. Vigorously mix with mixing paddle for two minutes. Visually make sure all polyelectrolyte is in solution. Use caution to avoid hitting fittings in tank.
   (2) Prepare the sequestrant for setup.
      (a) Fill sequestrant tank half full with product water, using product utility hose.
      (b) Add sequestrant into tank per sequestrant concentrate chart. The quantity to be transferred depends on water source (refer to tables in TM 10-4610-232-12). If sequestrant is added, also add one 2-pound bag of bisulfite.
      (c) Fill tank to full level (number 12 on scale) with product water and vigorously stir with mixing paddle until all sequestrant is in solution. Use caution when mixing to avoid hitting fittings and switches in tank.
      (d) Set speed control knob to 80 and set the stroke control knob to 100.
      (e) Pull out and hold pressure release knobs until solution is being pumped out through release tubing to drain.
      (f) Reset stroke control knob to 40.
   (3) Prepare the initial hypochlorite setup.

WARNING: Wear protective shield and chemical gloves when handling calcium hypochlorite. Hypochlorite will give off chlorine vapor which will burn your nose, throat, and lungs if breathed directly. Keep head away from the top of the tank while filling it. See a medic if fumes are inhaled. Make certain vent fan is running.

      (a) Fill tank with product water using the product utility hose and turn mixer switch on.
      (b) Slowly add three packets of hypochlorite powder to tank, one packet of hypochlorite for each 6 gallons of water.

Performance Steps

(c) Set speed control knob to 80. Set stroke control knob to 100. Pull out and hold pressure release knobs until chemical solution is seen in release tubing to drain.
(d) Reset stroke and speed controls on the hypochlorite pump according to operating conditions as shown in tables in TM 10-4610-232-12.

WARNING: Do not proceed until hypochlorite pump has been adjusted as described in step above. Otherwise water that is unfit to drink will be delivered to storage tanks.

n. Direct potable water to storage. During first startup with new RO elements, continue to direct the product water to waste for at least 30 minutes to flush out preservative.
   (1) Observe the reading of the in-line TDS meter (if installed). If the reading is under 100 ppm, use the portable TDS meter to measure the TDS from the combined sample valve.
   (2) Use the portable TDS meter to measure the water source TDS. Determine the maximum product water TDS using the tables in the TM.
   (3) Compare the actual measured product water TDS with the maximum TDS. If less, proceed and direct the product water into the storage tanks by inserting the product water hose in the middle tank and strapping it down. Fill the 5-gallon plastic jug for use in next startup. Set the 5-gallon jug filled with product water in corner of the van.
   (4) If after 20 minutes the product water TDS has not dropped below the calculated maximum, refer to RO elements troubleshooting, in the TM .
o. Perform hypochlorite pump final adjustment. When storage tanks have at least 1 foot of water, check chlorine level in product water.
   (1) Use available chlorine color comparator test kit. Take water sample from dispensing nozzle. Allow water to flow for 30 seconds before collecting sample.
   (2) Unless otherwise directed by the medical team or Surgeon General directive, the pump must be adjusted to provide chlorination of at least 2 ppm.
   (3) Use the chlorine test result to calculate the proper pump setting. For example:
      (a) Test Results 6 ppm
      (b) Required 5 ppm
      (c) Pump Stroke 60
      (d) New Stroke Setting is 5/6 X 60 = 50
p. Perform polyelectrolyte optimization. After the first hour of operation, if polyelectrolyte is being used, adjust polyelectrolyte as soon as other setup tasks are complete.

CAUTION: It is essential that the amount of polyelectrolyte be optimized to provide the lowest turbidity with the least amount of polyelectrolyte. Failure to carry out this procedure will result in insufficient filtration and rapid accumulation of dirt on the RO elements. This dirt (fouling) will decrease the amount of product water produced, lead to early failure of the RO elements, and possible failure to complete the assigned mission.

(1) Setup and calibrate in-line turbidity meter (if installed).
(2) Record initial turbidity meter reading and polyelectrolyte injection pump settings on Optimization Log as shown in TM.
(3) Increase stroke setting in increments of five, wait 10 minutes, and record new turbidity reading.
(4) Continue to increase stroke setting by five, waiting 10 minutes, and then recording new turbidity reading. As the stroke is increased, the turbidity should decrease and then level out at the optimum setting. Never run at less than initial setting as determined by water type (see TM).
(5) Determine the optimum setting (see in TM).
   (a) If the turbidity decreases with increased stroke setting, but then stops changing for three successive stroke increases, set the stroke at five less than the last setting. If the turbidity increases after a stroke change, set the stroke back to the setting which first resulted in the lowest turbidity.
   (b) If the speed is at a setting of 16 or 32.5 and the stroke reaches 100 with the turbidity still decreasing with each stroke increase, set the stroke back to 50 and double the speed. Continue optimization by increasing stroke from 50.
   (c) If the speed is at 65 and the stroke reaches 100 with the turbidity still decreasing with each stroke increase, leave the stroke at 100 for the final setting.

Performance Steps

(d) If increased stroke settings from the initial setting do not result in decreasing turbidity and the speed is 32.5 or 65, decrease the speed by one half, and repeat.
(e) If increased stroke settings from the initial setting do not result in decreasing turbidity and the speed is 16, set the stroke at 10 for the final setting.

NOTE: If not enough or too much polyelectrolyte is pumped to the system, the formation of flock particles will not be controlled; a midrange concentration (optimization) of polyelectrolyte is required for operation (refer to TM 10-4610-232-12 for "Maintaining polyelectrolyte optimization").

(6) Enter Data Log information for startup (see TM 10-4610-232-12, Appendix).
(7) If allowed by mission demands, backwash media filter after optimization.

q. Perform operational set points/pressure switch tests. This is performed only at first startup.
(1) Slowly close the product block valve while watching the product water pressure gauge. The ROWPU should shut down at 35 to 45 psig.

CAUTION: Watch the product water flow meter during the next test. If the product flow starts to exceed 75 GPM, stop the test and open the system pressure control valve. The ROWPU is making too much water to finish testing of the high pressure switch. Bypass the test until next scheduled PMCS.

NOTE: Step (2) applies only when operating on salt water. If operating on brackish or fresh water, proceed to step (3).

(2) Slowly close the system pressure control valve while watching the Reverse Osmosis pressure gauge. The ROWPU should shut down at 930 to 960 psig.
(3) Slowly close the cartridge filter block valve while watching the red needle on the cartridge filter inlet/outlet pressure gauge. The booster pump and high pressure pump should shut down at 4 to 8 psig.
(4) Slowly close the feed control valve while watching the media filter differential gauge. The media filter plugged light and alarm should come on when the difference between the two needles is 22 to 28 psid.
(5) Slowly close the cartridge filter block valve while watching the cartridge filter differential pressure gauge. The cartridge filter plugged light and alarm should come on when the difference between the two needles is 13 to 18 psid.

5. Troubleshoot the 3,000-GPH ROWPU. Refer to troubleshooting procedures in the TM.
   a. Determine problem and take corrective action.
   b. Record all actions on DA Form 2404/DA Form 5988-E.

6. Perform during-operations PMCS (references: TM 10-4610-232-12 and TM 5-6115-545-12).
   a. Perform routine operational maintenance.
   b. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   c. Give form to supervisor at the end of each shift.
   d. The alert horn will sound and ROWPU will automatically shut down for the reasons listed below. Push ALARM SILENCE and refer to troubleshooting.
      (1) Feed water pressure to high pressure pump is low, FEED PRESSURE LOW red light goes on.
      (2) High pressure pump has excessive discharge pressure, HIGH PRESSURE PUMP PRESSURE HIGH red light goes on.
      (3) Product water pressure is excessive, PRODUCT PRESSURE HIGH red light goes on.
      (4) Clean/flush tank level too low, CLEAN/FLUSH TANK LOW LEVEL light goes on.

7. Backwash the media filter and return to normal operations. Suspended solids filtered from feed water will accumulate in the media filter and must be removed in accordance with the following conditions and frequencies:
   a. Conditions and Frequencies.
      (1) At least once each day.
      (2) Every six hours on rivers and lakes with a lot of organic matter, where turbidity is over 15 NTU and water temperature is over 70 degrees Fahrenheit.
      (3) Whenever media filter outlet turbidity increases by more than 0.5 NTU over lowest reading since last backwash.

Performance Steps

(4) Whenever the MEDIA FILTER PLUGGED yellow light and horn go on.
(5) When the media inlet/outlet pressure gauge reading is over 25 psi differential (warning horn should come on).
(6) As specified in shutdown procedures.

b. Prepare for backwashing the media filter.
(1) Check hypochlorite tank level. If less than 9 gallons, add 6 gallons of product water from the product utility hose and one packet of hypochlorite.
(2) Check to be sure that the clean/flush tank is full and one packet of sodium bisulfite was mixed in.
(3) Check that air tank air pressure at gauge is 900 psig or more. If less, wait until pressure builds to 900 psig. If pressure is less than 900 psig and air compressor is not running, troubleshoot air compressor.
c. Fully open system pressure control valve.
d. Push HIGH PRESSURE PUMP STOP.
e. Wait for the feed flow meter reading to stop dropping and then push in sequence, BOOSTER PUMP, CHEMICAL PUMP, and RAW WATER PUMP STOP push buttons.
f. Close system pressure control valve and close feed valve almost completely.
g. Set OPERATION MODE switch to FILTER BACKWASH, and push INITIATE.
h. If the feed pressure low alarm sounds, push SYSTEM RESET.
i. When two thirds of the flags turn white, the raw water pump should come ON. Adjust the feed valve to obtain a flow rate of 30 GPM at flow meter.
j. As the media filter level drains down, the level indicator flags flip from red to white until two thirds of the flags are white (red indicates water level). If the drain down is not observed or stops, check the media filter pressure gauge and manually assist the drain down as follows:
(1) If the pressure is over 5 psig, open the upper drain valve. Close when the raw water pump starts.
(2) If the pressure is near zero (or falls to near zero) open the lower drain valve and the vent valve. The upper drain valve should be closed. The flags should now flip showing the drain down. If not, also open the level indicator drain valve. Close drain and vent valves immediately when the raw water pump starts.
(3) Refer to troubleshooting if the raw water pump still does not start.
k. Open hypochlorite backwash pump priming valve until hypochlorite is seen. Then close valve. Make sure hypochlorite level drops about 1/2 gallon per minute during backwash.
l. Wait about two minutes until the feed water booster pump comes on. Adjust feed valve to obtain a flow rate at flow meter according to water temperature gauge as shown in TM 10-4610-232-12. If media filter outlet pressure is over 30 psig, reduce flow rate slightly to limit pressure.
m. Wait about 10 minutes. When the final backwash step begins to take water from the clean/flush tank, refer to TM 10-4610-232-12, and readjust feed valve as necessary.
n. When the horn sounds, indicating backwash is complete, return to normal operation. Set OPERATION MODE switch to FILTER NORMAL. Push INITIATE and push SYSTEM RESET.
o. Return to normal operation after backwash.
(1) Close cartridge filter block valve. Partially open feed valve.
(2) Push MEDIA FILTER FORWARD FLUSH push button. Push RAW WATER PUMP START.
(3) Push CHEMICAL PUMP START. When the MEDIA INLET/OUTLET PRESSURE gauge reads steady, push BOOSTER PUMP START and slowly close feed valve until flow meter reads 100 GPM.
(4) Open media filter vent valve. Close when water is seen at drain. Hold steady for 10 minutes.
(5) Open cartridge filter block valve. Fully open feed valve and open system pressure control valve.
(6) Push MEDIA FILTER FORWARD FLUSH push button. Restart booster pump if it goes off.

Performance Steps

(7) Open cartridge filter vent. Close when water is seen. Observe CARTRIDGE INLET/OUTLET PRESSURE gauge. Reading should rise to 50 psig minimum on the red needle.
(8) If pressure is low, check as follows:
  (a) Check blue lights. |1| MEDIA FILTER INLET light must be on. |2| MEDIA FILTER OUTLET light must be on. |3| If they are not, troubleshoot automatic valves.
  (b) Feed valve must be open.
  (c) Cartridge filter block valve must be open.
  (d) Check raw water canvas hoses to be sure pump is providing water. Hose should be firm with water pressure. If not, stop pump and recheck the prime.
  (e) Refer to troubleshooting.
(9) Ensure the product shut-off valve is open.
(10) Check system pressure control valve to be sure it is open.
(11) Fill clean/flush tank with cartridge filter water and one small packet of bisulfite.
(12) High pressure pump is ready to start when;
  (a) Waste flow meter indicates a steady flow of water.
  (b) FEED PRESSURE LOW light is OFF.
  (c) System pressure control valve is open.
  (d) CARTRIDGE INLET/OUTLET PRESSURE gauge reads 50 psig or more (red needle) and is steady.
(13) Push HIGH PRESSURE PUMP START.
(14) Slowly turn system pressure control valve clockwise until product flow meter shows mission normal or selected push condition water flow. Refer to TM 10-4610-232-12 for flow rates.
(15) Check generator and adjust throttle to provide 60 Hz. Adjust voltage to provide 435 to 445 VAC.
(16) Direct product water to storage tanks. Refill hypochlorite tank if required.
(17) Read and record the media filter differential pressure at MEDIA INLET/OUTLET gauge. If pressure differential is more than 15 psi, continue with next step. If the differential pressure is less than 15, the backwash procedure is complete.
(18) Continue operation until the air tank pressure is 900 psig, and repeat backwash steps.

NOTE: If two backwash cycles do not restore acceptable pressure differential, refer to troubleshooting procedures in TM 10-4610-232-12.

8. Clean the RO elements when the alert exists or for the following reasons: When operating with polyelectrolyte, perform Citric acid cleaning at either 100-hour operating intervals as determined from the High Pressure Pump Hour meter, 200 hours on seawater or as part of long-term secured shutdown procedures followed with detergent cleaning. When operating without polyelectrolyte, perform NTP-A cleaning at either 25-hour operating intervals as determined from the High Pressure Pump Hour meter or as part of long term secured shutdown procedures followed with detergent cleaning at 100-hour intervals.
   a. Flush the elements before any cleaning procedures begin.
      (1) Perform preliminary flush procedures by setting valves, hoses, and controls as follows:
        (a) Close feed valve. Open clean bypass valve.
        (b) Close the product shut-off valve.
        (c) Connect the product utility hose to the clean/flush tank fill connection and open the product utility hose valve.
        (d) Turn OPERATION MODE switch to SYSTEM CLEAN and push INITIATE.
      (2) Fill clean/flush tank with potable water.
        (a) Disconnect one dispensing hose from distribution pump. Connect auxiliary hose to pump.
        (b) Pass auxiliary hose through doorway and connect to clean/flush tank overflow hose.
        (c) Push DISTRIBUTION OFF push button. Selector switch on distribution pump must be in ON position in order to control the pump from the start/stop station inside the secondary access door.

Performance Steps

(d) Press DISTRIBUTION PUMP ON push button.
(e) Fill CLEAN/FLUSH TANK to 50 gallon level. Press DISTRIBUTION PUMP OFF push button.
(f) Remove chemical port cover and pour in one small bag of bisulfite. Remove any chemical that remains in port. Replace chemical port cover.
(g) Start the distribution pump and fill clean/flush tank to the top of the level gauge. Stop pump.

(3) Perform flush procedures.
(a) Fully open system pressure control valve. Push BOOSTER PUMP START. Open cartridge filter vent. Close when water is seen.
(b) After flow is established, push HIGH PRESSURE START.
(c) Water will flush from clean/flush tank through the system bypassing the media filter until the high pressure pump and booster pump stop.

(4) As a result of the flush procedure the following conditions should exist:
(a) Feed valve closed.
(b) Cleaning/Bypass valve open.
(c) Product utility hose connected to clean/flush tank fill connection and valve opened.
(d) Product shut-off valve closed.
(e) Raw water inlet connection capped.
(f) System pressure control valve fully open.
(g) SYSTEM CLEAN green light ON (OPERATION MODE switch set to SYSTEM CLEAN and INITIATE pushed).

b. Perform citric acid cleaning procedures.

(1) Setup to clean.
(a) Fill the clean/flush tank with potable water to the 100-gallon level. Remove auxiliary hose from overflow hose. Fully close system pressure control valve.
(b) Connect the clean return hose to the clean/flush tank overflow hose. Open the clean return valve.

WARNING: Use caution when using citric acid. Failure to do so could result in severe burns. Always wear chemical gloves, apron, and face shield. If citric acid comes in contact with skin or clothes, wash off immediately. If citric acid comes in contact with eyes, wash eyes immediately with clean water from eye wash station.

CAUTION: Make certain level of water in clean/flush tank is below chemical port. If level is above chemical port, open tank drain valve until level is below chemical port.

(2) Establish circulation.

CAUTION: Pouring citric acid into the clean/flush tank too fast will cause the booster pump to clog up with citric acid.

(a) Check valve positions. Clean return valve should be open and the system pressure control valve fully closed.
(b) Press BOOSTER PUMP START. Hold push button in until feed pressure low light goes off. Wait until pressure on the cartridge filter gauge is at least 50 psig before proceeding.
(c) Press HIGH PRESSURE PUMP START.
(d) Remove chemical port cover from clean/flush tank. Slowly (approximately two minutes per bag) empty two bags of citric acid into clean/flush tank chemical port. Remove any chemical lying in port.

WARNING: Keep face away from clean/flush tank port. Chemical fumes may irritate eyes.

(e) Install chemical port cover and secure with wing nut. Circulate for one hour. Press HIGH PRESSURE PUMP STOP. After one minute, press BOOSTER PUMP STOP.

Performance Steps

(3) Flush the cleaning solution.

(a) Close the clean return valve. Remove clean return hose from the clean/flush tank overflow hose. Remove waste out cap from waste out connection. Connect clean return hose to waste out connection. Open the clean return valve. Be sure that the clean return hose is laid out without sharp kinks which will restrict the water flow.

(b) Press BOOSTER PUMP START. Hold push button in until feed pressure low light goes off. Tank empties and pump stops.

(c) Open clean/flush tank drain. Connect auxiliary fill hose from distribution pump to overflow hose. When clean/flush tank is empty, press DISTRIBUTION PUMP ON to rinse tank.

(d) When one minute has passed, close clean/flush tank drain valve. Press DISTRIBUTION PUMP OFF when level reaches 75 gallons.

(e) Remove chemical port cover. Add the contents of one small bag of sodium bisulfite. Reinstall chemical port cover. Press DISTRIBUTION PUMP ON and when clean/flush tank is full, press DISTRIBUTION PUMP OFF.

(f) Press BOOSTER PUMP START to flush system. Hold push button in until feed pressure low light goes off. When tank empties, the pump stops.

(g) Repeat steps (d) through (f) for a second flush.

(h) Continue with detergent cleaning.

c. Perform detergent cleaning. As a result of citric acid or NTP-A cleaning, the ROWPU should already be set up as follows:

(1) ROWPU set-up.

(a) Operational mode switch set to system clean and light on.

(b) System pressure control valve fully closed.

(c) Clean return valve open.

(d) Cleaning bypass valve open. Feed valve closed.

(e) Product utility hose connected to clean/flush tank fill connection and valve open.

(f) Clean return hose connected to waste out.

(g) Product shut off valve closed.

(h) Raw water inlet connection capped.

(i) Clean/flush tank empty.

(j) Auxiliary fill hose connected to distribution pump and clean/flush tank overflow hose.

(k) Waste hose connected to waste out connection.

WARNING: Use caution when using detergent. Failure to do so could result in burns. Always wear chemical gloves and face shield. If detergent comes in contact with skin or clothes, wash off immediately. If detergent comes in contact with eyes, wash eyes immediately with clean water from the eye wash station.

CAUTION: Make certain level of water in clean/flush tank is below chemical port. If level is above chemical port, open tank drain valve until level is below chemical port.

(2) Flush RO vessels.

(a) Push DISTRIBUTION PUMP ON. When level reaches 75 gallons, push DISTRIBUTION PUMP OFF.

(b) Remove fill port cover. Add the contents of one small bag of bisulfite through fill port. Reinstall cover. Remove any chemical that lies in port.

(c) Push DISTRIBUTION PUMP ON. When tank is full, press DISTRIBUTION PUMP OFF.

(d) Press BOOSTER PUMP START. Hold push button in until feed pressure low light goes off. When tank empties, pump stops.

(e) Repeat steps 2(a) through 2(d) for second additional flush.

Performance Steps

(3) Perform heat-up procedures.
   (a) Close the clean return valve. Disconnect and coil the clean return hose out of the way.
   (b) Remove waste out hose from ROWPU van waste out connection. Install cap on connection. Disconnect waste out hose section connection closest to van to allow drainage before disconnecting.
   (c) Remove waste out cap and connect the heating jumper hose. Fully open the system pressure control valve.
   (d) Fill the clean/flush tank to 100 gallons following steps (a) through (c) under "flush RO vessels" paragraph (2) above.
   (e) Remove the auxiliary fill hose from the overflow hose. Connect the heating jumper hose to the overflow hose.
   (f) Press BOOSTER PUMP START. Hold push button in until feed pressure low light goes off. Wait for waste flow meter to show steady flow and then proceed.
   (g) Open cartridge filter vent and close when water is seen. Press HIGH PRESSURE PUMP START. Leave system pressure control valve fully open. Circulate until water temperature reaches 80 degrees F but not more than one hour. Temperature can be read on temperature gauge at inlet of strainer.
   (h) Press HIGH PRESSURE PUMP STOP. When the system pressure stops dropping, press BOOSTER PUMP STOP.

(4) Setup to clean.
   (a) Fully close system pressure control valve. Disconnect the heating jumper hose at both ends. Coil out of the way.
   (b) Reinstall waste out cap. Remove ROWPU van waste out connection cap and reconnect the waste out hose.
   (c) Connect the clean return hose to the clean/flush tank overflow hose. Open the clean return valve.

(5) Establish chemical circulation.
   (a) Remove the outer strainer from the basket strainer during detergent cleaning. Be sure that the clean return valve is open and the system pressure control valve is fully closed. Also be sure the product utility hose valve is open.
   (b) Push BOOSTER PUMP START. Hold push button until feed pressure low light goes off. Wait until pressure on the cartridge filter gauge is at least 50 psig before proceeding.
   (c) Press HIGH PRESSURE PUMP START. Remove chemical port cover from clean/flush tank.
   (d) Fill detergent container with water from the cartridge filter outlet sample valve and mix well. Slowly add detergent into the chemical port. Repeat the procedure until all five detergent containers have been added to the tank.

NOTE: Foaming may cause the pumps to stop. If so, allow two minutes for the foam to settle and restart the pumps. Add detergent only when the pumps are running.

   (e) Install chemical port cover after removing any chemical laying in port. Open the cartridge filter drain for three seconds and close it. Circulate for 10 minutes.
   (f) Open the cartridge filter drain for three seconds and close it. Press HIGH PRESSURE PUMP STOP. After one minute, push BOOSTER PUMP STOP. Soak for 20 minutes.
   (g) After the soak, circulate for 10 minutes by starting the BOOSTER PUMP and HIGH PRESSURE PUMP. Open the cartridge filter drain for three seconds at the beginning and the end of the 10-minute circulation while the pumps are running.
   (h) Repeat the alternating circulation and soaking periods for two hours. Open the cartridge filter drain twice during each circulation.

Performance Steps

(i) After the two hours are completed, detergent soaking can be continued for up to 24 hours total time, only if additional product water is not required to meet distribution requirements. During this extended soak, circulate for 10 minutes every four hours. Open the cartridge filter drain twice during each circulation.

(j) During the soak period, the ROWPU may be secured by closing the cartridge filter block valve and the cleaning bypass valve, turning the MAIN circuit breaker off and securing the generator. Be sure to open the cartridge filter valve and clean bypass valve before starting circulation.

(6) Flush cleaning solution. If ROWPU was secured during the soak period you must restart the generator, turn MAIN circuit breaker on, and open cleaning bypass valve and cartridge filter block valve.

(a) Close clean return valve and remove clean return hose from the clean/flush tank overflow hose. Remove waste out cap from waste out connection.

(b) Connect clean return hose to waste out connection. Open the clean return valve. Be sure that the clean return hose is laid out without sharp kinks which will restrict the water flow.

(c) Press BOOSTER PUMP START. Hold push button in until feed pressure low light goes off. Tank empties and pump stops.

(d) Open clean/flush tank drain. Connect auxiliary fill hose from distribution pump to overflow hose.

(e) When clean/flush tank is empty, press DISTRIBUTION PUMP ON to rinse tank. When one minute has passed, close clean/flush tank drain valve. Press DISTRIBUTION PUMP OFF when level reaches 75 gallons.

(f) Remove chemical port cover. Add the contents of one small bag of sodium bisulfite to chemical port and reinstall cover. Clean out any chemical left in port.

(g) Press DISTRIBUTION PUMP ON. When clean/flush tank is full, press DISTRIBUTION PUMP OFF. Press BOOSTER PUMP START to flush system. Hold push button in until low pressure light goes off. Tank empties and pump stops.

(h) Repeat steps (e) through (g) for second flush.

(i) Replace the outer strainer in the basket strainer.

(7) Return to operation.

(a) Close clean return valve. Disconnect clean return hose from waste out connection and coil out of the way. Replace waste out cap.

(b) Disconnect product utility hose and close valve. Remove raw water inlet connection cap and connect raw water hose.

(c) Close cleaning bypass valve and open feed valve. Fully open system pressure control valve.

(d) Set OPERATION MODE switch to FILTER NORMAL. Push INITIATE. Fully open product shut-off valve. Replace cartridge filter elements.

(e) Disconnect auxiliary fill hose at both ends and coil out of way. Reconnect dispensing hose. Continue start-up procedure as described by TM 10-4610-232-12.

NOTE: Product water TDS may be high for up to one hour after cleaning. It will drop back to normal after that time.

(f) If ROWPU is to be secured, continue with instructions provided in TM 10-4610-232-12. See also TM for short term and for long term shutdown.

Performance Steps

d. Perform NTP-A cleaning.

NOTE: Element flushing must be completed before proceeding (see item 7a above).

(1) Setup to clean.

(a) Fill the clean/flush tank with potable water to the 100-gallon level. Remove auxiliary hose from overflow hose.

(b) Fully close system pressure control valve. Connect the clean return hose to the clean/flush tank overflow hose. Open the clean return valve.

WARNING: Use caution when using NTP-A. Failure to do so could result in severe burns. Keep face away from clean/flush tank port. Fumes or mist may irritate eyes or skin. Always wear chemical gloves, apron, and face shield. If NTP-A comes in contact with skin or clothes, wash off immediately. If NTP-A comes in contact with eyes, wash eyes immediately with clean water from eye wash station.

(2) Establish circulation.

(a) Press BOOSTER PUMP START. Hold push button in until feed pressure low light goes off. Wait until pressure on the cartridge filter pressure gauge is at least 50 psig before proceeding.

(b) Press HIGH PRESSURE PUMP START. Remove chemical port covers from clean/flush tank. Slowly empty two containers of NTP-A into clean/flush tank chemical port.

(c) Install chemical port cover. Circulate for 10 minutes. Press HIGH PRESSURE PUMP STOP. After one minute, press BOOSTER PUMP STOP. Soak for 20 minutes. Repeat the circulation and soak one additional cycle.

(3) Flush the cleaning solution.

(a) Close the clean return valve. Remove the clean return hose from the clean/flush tank overflow hose. Remove waste out cap from waste out connection.

(b) Connect clean return hose to waste out connection. Open the clean return valve.

NOTE: Be sure the clean return hose is laid out without sharp kinks which will restrict the water flow.

(c) Press BOOSTER PUMP START. Hold push button in until feed pressure low light goes off. Tank empties and pump stops.

(d) Open clean/flush tank drain. Connect auxiliary fill hose from the distribution pump to overflow hose. When clean/flush tank is empty, press DISTRIBUTION PUMP ON to rinse tank.

(e) When one minute has passed, close the clean/flush tank drain valve. Stop distribution pump when level reaches 75 gallons.

(f) Remove chemical port cover. Add one-fourth of contents of small bag of sodium bisulfite. Reinstall chemical port cover.

(g) Press DISTRIBUTION PUMP ON and when clean/flush tank is full, press DISTRIBUTION PUMP STOP.

(h) Press BOOSTER PUMP START to flush system. Hold push button in until feed pressure low light goes off. Tank empties and pump stops.

(i) Repeat steps (e) through (h) for a second flush.

(j) At each 100-hour interval or as part of long-term shutdown, continue on with detergent cleaning.

(4) Return to operation.

(a) Close clean return valve. Disconnect clean return hose from waste out and coil out of the way. Replace waste out cap.

(b) Disconnect product utility hose and close valve. Close clean bypass valve. Open feed valve. Fully open system pressure control valve.

(c) Set OPERATION MODE switch to filter normal. Push INITIATE. Fully open product shut off valve.

(d) Disconnect auxiliary fill hose at both ends and coil out of way. Reconnect dispensing hose.

(e) Continue start-up procedure as described by TM 10-4610-232-12.

Performance Steps

9. Perform bisulfite sanitizing procedures. Bisulfite sanitizing cleaning is required as a part of short-term and long-term shutdown to secured status to prevent bacterial growth within the RO elements. It always immediately follows detergent cleaning when preparing for long-term secured shutdown. When done in sequence as a part of short-term and long-term secured shutdown, the ROWPU has been flushed. This procedure follows flushing.
    a. Fill the clean/flush tank.
        (1) Press DISTRIBUTION PUMP START. When tank level reaches 50-gallon mark, press DISTRIBUTION PUMP STOP.
        (2) Open chemical port and pour in the contents of two 2-pound bags of bisulfite. Close chemical port.
        (3) Press DISTRIBUTION PUMP START. When tank level reaches 100-gallon mark, press distribution pump stop.
    b. Set up to clean.
        (1) Remove auxiliary fill hose from clean/flush tank overflow hose. Close clean return valve. Disconnect clean return hose from waste out connection. Install cap on waste out connection.
        (2) Connect clean return hose to clean/flush tank overflow hose. Open clean return valve.
        (3) Close system pressure control valve. Connect product utility hose to clean/flush tank and open valve.
    c. Circulate the system.
        (1) Push BOOSTER PUMP START. Hold push button in until feed pressure low light goes off. Wait until pressure on the cartridge inlet/outlet pressure gauge is at least 50 psig before proceeding. Make sure clean/flush tank has 100 to 110 gallons of water.
        (2) Push HIGH PRESSURE PUMP START. Continue to circulate for one half hour. Check hose connections for leakage after pumps have been turned on.
        (3) When 30 minutes have passed, push HIGH PRESSURE PUMP STOP. Wait one minute, then push BOOSTER PUMP STOP. Close clean return valve.
        (4) Remove the clean return hose from the clean/flush tank overflow hose. Remove the waste out cap from the waste out connection.
        (5) Connect the clean return hose to the waste out connection. Open the clean return valve. Ensure that the clean return hose is laid out without any kinks which will restrict water flow.
        (6) Press BOOSTER PUMP START. Hold push button in until feed low pressure light goes off. Clean/flush tank empties and pump stops.
        (7) Close clean return valve. Open clean/flush tank drain valve. Disconnect clean return hose and coil it out of the way.

NOTE: This leaves the RO vessels full of the sodium bisulfite sanitizing solution. Drain only if the ROWPU will be subject to freezing. Refer to TM 10-4610-232-12.

        (8) Open system pressure control valve.
        (9) Return to the shutdown procedures provided in the TM for short-term shutdown or for long-term shutdown.

10. Shut down equipment to "temporary secured status" or "long-term secured status". Use 525 gallons of potable water in this procedure. Be sure water is available. Before shutdown, be sure that the 5-gallon can is filled with product water to use in the polyelectrolyte tank during next start-up.
    a. Shut down to temporary secured status. Use this shutdown procedure when the ROWPU will be shut down for three hours to three days.
        (1) Set up the media filter for backwash. Backwash media filter with product water in the clean/flush tank.
            (a) Open clean/flush tank drain valve.
            (b) Remove cartridge filter water utility hose from the clean/flush tank inlet. Connect product utility hose to the clean/flush tank inlet. When the tank is empty, close the drain valve. Fill clean/flush tank to just below 100 gallons to prevent overflow when chemical port is opened.

Performance Steps

(c) Partially close the product shut-off valve to provide back pressure. If the product shut-off valve is closed too far, the pressure will increase over 20 psig and the ROWPU will automatically shut down.

(d) Open product utility hose valve and fill to 100 gallons and close the valve. Open the chemical port cover and pour in one small packet of bisulfite. Clean off any chemical that lies in port opening. Close the cover.

(e) Open the product utility hose valve. When the level reaches the top of the level gauge, close the utility hose valve and open the product shut-off valve.

(f) Backwash the media filter. Do not forward flush media filter.

(2) Perform the hypochlorite flush. When shutdown periods exceed two days, clean hypochlorite tank and pump.

(a) Perform water flush procedures. |1| Open hypochlorite tank drain valve. |2| Wait until level drops below MIXER on tank level gauge and turn MIXER switch to OFF. |3| Disconnect one dispensing hose from distribution pump and connect auxiliary fill hose. |4| Pass auxiliary hose through doorway and connect flushing adapter to hose end. |5| Connect air/water utility "flush/purge" hose to flushing adapter. Insert into hypochlorite tank opening. Push DISTRIBUTION PUMP OFF push button and turn selector switch on pump to ON. |6| Push DISTRIBUTION PUMP ON and flush out hypochlorite tank. Close drain and partially fill tank. Then push DISTRIBUTION PUMP OFF. |7| Push CHEMICAL PUMP START. Note speed and stroke settings and reset speed to 80 and stroke to 100. |8| Flush for two to five minutes. Remove flush/purge hose and reset pump speed and stroke controls to original settings. Press CHEMICAL PUMP STOP. Open tank drain.

NOTE: The polyelectrolyte and sequestrant systems do not need to be flushed. However, these tanks should be drained prior to moving the ROWPU or if the shutdown will exceed 24 hours.

(b) Perform air purge procedures. |1| Open product shut-off valve. |2| Disconnect the flush/purge hose from flushing adapter. |3| Connect flush/purge hose to the utility air connection. |4| Connect flush/purge hose to hypochlorite purge connection. |5| Partially open hose valve and dry out chemical tubing for two minutes, then close hose valve. Disconnect flush/purge hose. |6| Close product shut-off valve.

(3) Perform system flush procedures.

(a) Make sure MAIN circuit breaker is ON and SYSTEM MODE switch is in SYSTEM ON position.

(b) Set OPERATION MODE switch to SYSTEM CLEAN. Push INITIATE. Close feed valve.

(c) Open cleaning bypass valve. Close product shut off valve and open product utility valve.

(d) Fill clean/flush tank with potable water. |1| Disconnect one dispensing hose from distribution pump. |2| Connect auxiliary hose to pump. |3| Pass auxiliary hose through doorway and connect to clean/flush tank overflow hose. Press DISTRIBUTION PUMP OFF push button. Selector switch on distribution pump must be in ON position in order to control the pump from the switch panel inside the door.

(e) Press DISTRIBUTION PUMP ON push button. Fill clean/flush tank to 50-gallon level. Press DISTRIBUTION PUMP OFF push button.

(f) Remove chemical port cover and pour in one small bag of bisulfite. Clean off any chemical that lies in port opening. Replace chemical port cover.

(g) Press DISTRIBUTION PUMP ON push button and fill the tank to the top of level gauge. Press DISTRIBUTION PUMP OFF push button when tank is full.

(h) Flush the system. |1| Fully open system pressure control valve. |2| Divert product hose to waste. |3| Push BOOSTER PUMP START. |4| After flow is established, push HIGH PRESSURE PUMP START. Water will flush from clean/flush tank through system bypassing the media filter until high pressure pump and booster pump stop.

(4) Secure equipment.

(a) Open all drain valves, except those at the RO vessel.

(b) Turn MAIN circuit breaker to OFF and secure generator.

Performance Steps

b. Shut down to long-term secured status. Use this procedure when the ROWPU will be shut down for more than three days.
   (1) Perform clean-up procedures.
      (a) Use product utility hose to wash down the ROWPU floor with product water while still producing water.
      (b) Clean up inside ROWPU as time permits during following period.
   (2) Backwash media filter. Do not forward flush media filter.
   (3) Water flush hypochlorite system. When water flush is complete, add water as needed to leave 9 gallons in the tank.
   (4) Backwash media filter again with potable water in the clean/flush tank. Fill clean/flush tank with potable water.

      |1| Disconnect one dispensing hose from distribution pump. |2| Connect auxiliary fill hose to pump. |3| Pass auxiliary fill hose through doorway and connect to clean/flush tank overflow hose. Push DISTRIBUTION PUMP OFF push button and turn selector switch on distribution pump to ON. Selector switch on distribution pump must be in ON position in order to control the pump from switch panel number 1 inside the van. |4| Press DISTRIBUTION PUMP ON push button. |5| Fill clean/flush tank to 50-gallon level. Press DISTRIBUTION PUMP OFF push button. |6| Remove chemical port cover and pour one-fourth of a small bag of bisulfite. Clean off any chemical that remains in port open. |7| Replace chemical port cover. |8| Repeat steps 4 and 5 to fill the tank to the top of sight glass by starting and stopping the distribution pump.

   (5) Backwash media filter again. Do not forward flush after backwash.
   (6) Flush piping (seawater operation only).

NOTE: This flush is critical when operating on seawater. Failure to flush will result in piping corrosion and failure.

      (a) Fill clean/flush tank with potable water.
      (b) Set OPERATION SYSTEM MODE switch to FILTER NORMAL.
      (c) Set SYSTEM MODE switch to SHUTDOWN.
      (d) Open feed valve. Close cleaning bypass valve.
      (e) Open cartridge filter block valve.
      (f) Push MEDIA FILTER FLUSH valve push button to open valve.
      (g) Push BOOSTER PUMP START. Hold push button in until pressure rises above 10 psig.
      (h) When clean/flush tank empties and pump stops, push SYSTEM RESET if alarm sounds.
   (7) Continue with RO element cleaning procedures.
   (8) Secure equipment.
      (a) Open all drain valves, vent valves, and manual valves. Do not open valves on RO vessels.

NOTE: This leaves the RO vessels full of sodium bisulfite sanitizing solution. Drain only if subject to freezing.

      (b) Remove raw water suction hose at pump and open drain valve on raw water pump.
      (c) Disconnect and coil raw water discharge and waste hoses.
      (d) Turn COMPRESSOR OFF/ON switch to OFF.
      (e) Open air manifold bleed valves.
      (f) Turn off MAIN circuit breaker.
      (g) Secure diesel generator.
      (h) Drain distribution system (pump, tanks, hoses) when appropriate.

11. Perform after-operations PMCS (references: TM 10-4610-232-12 and TM 5-6115-545-12).
   a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   b. Give form to supervisor at the end of each shift.

Performance Measures	GO	NO-GO
1. Applied risk management procedures.	____	____
2. Performed before-operations PMCS.	____	____
3. Performed initial adjustments, checks, and self-tests.	____	____
4. Performed start-up procedures from secured or drained condition.	____	____
5. Troubleshooted the 3,000-GPH ROWPU. Referred to troubleshooting procedures in the TM.	____	____
6. Performed during-operations PMCS.	____	____
7. Backwashed the media filter and returned to normal operations.	____	____
8. Cleaned the RO elements when the frequency or alert existed.	____	____
9. Performed bisulfite sanitizing procedures.	____	____
10. Shut down equipment to "temporary secured status" or "long-term secured status".	____	____
11. Performed after-operations PMCS.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 2404	FM 10-52
DA FORM 5988-E	FM 10-52-1
TM 5-6115-545-12	
TM 10-4610-232-12	
TM 10-5430-237-12&P	

Set Up/Dismantle the 3,000-GPH Reverse Osmosis Water Purification Unit (ROWPU)
101-92W-1063

Conditions: Given the requirement to move to a new operational area, the soldier, assigned to an operational DS water supply point in a field environment, must set up and dismantle the ROWPU. Materials needed: an operationally complete 3,000-GPH ROWPU with components; a diesel- driven 60-kw generator; a 5-ton tractor; three 3,000-gallon storage tanks; a fire extinguisher; TM 10-4610-232-12, TM 5-6115-545-12, TM 9-6115-672-14, and TM 10-5430-237-12&P; sufficient fuel and oil to establish operations; rags; pencil; and earplugs. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet) and ROWPU log forms.

Standards: Positioned the ROWPU. Unloaded the equipment. Set up the raw water system. Prepared the generator. Set up the waste outlet hoses, sump drain hoses, and the water distribution system. Performed before- and after-operations PMCS. Dismantled and packed system components for movement. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Gave the immediate supervisor the completed forms at the end of each shift.

Performance Steps
DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if you fail to observe cautions. Do not operate the ROWPU unless the ground terminal stud on the generator set has been connected to a suitable ground. Ground rod must be driven at least 8 feet deep to be sure of a good ground. A poor electrical ground can lead to injury or death from electrical shock. Dangerous chemicals are provided with the ROWPU. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Follow all warnings contained in TM 5-6115-545-12 and TM 10-4610-232-12.

WARNING: If NBC agents are detected, give the alarm and notify the supervisor. Decontaminate personnel and equipment at the first available opportunity.

DANGER: Check chains regularly on hoist for link damage or wear. Damaged or worn chains must be replaced immediately to prevent accidents. Crew member on ground should stand clear of pump frame to avoid being injured in event pump falls or is released too quickly. Each storage tank weighs 130 pounds. Three people are required to carry each tank. Never use potable water hoses to handle raw water or raw water hoses to handle potable water. Mixing hoses could cause contamination of water resulting in serious illness. Hoses are labeled.

CAUTIONS:

Hearing protection is required when operating this equipment.

Handle and dispose of hazardous materials (such as used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the appropriate personal protective equipment.

Performance Steps

1. Apply risk management procedures.
    a. Understand and execute the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

2. Maneuver the ROWPU into the predetermined position for setup.
    a. Whenever possible, select a smooth and clear operational work area that is 35 feet by 70 feet for equipment maneuvering and setup, with a 12-foot-wide drive-in access.
    b. Select an area which does not exceed a slope of 2 degrees crosswise and 5 degrees lengthwise.
    c. Clear a path at least 3-feet wide to the water source.
    d. Select a work area that is not more than 30 feet above the raw water pump position which is located not more than 15 feet above the surface of the raw water source.
    e. Position the ROWPU so that the water source is located at the passenger side of the truck cab and within 200 feet of the raw water pump.
    f. Whenever possible, position the ROWPU so that the front end of the ROWPU is lower than the rear for water drainage and that there is not more than a 2 percent side-to-side grade.
    g. Place wheel chocks under the wheels to prevent trailer movement.
    h. Place load boards under the landing gear, lower the landing gear, and unhook the trailer from the tractor.
    i. Use the bubble level mounted on the ROWPU to adjust the landing gear so that the front of the trailer is one half bubble lower than the back of the trailer.

3. Unload the equipment.
    a. Unzip the cover on the high pressure pump assembly (raw water side) just enough to gain access to straps holding the generator ladder. Loosen straps holding the ladder.
    b. Disconnect snap ring and slowly lower the generator ladder to the ground using the rope.
    c. Use the generator ladder to gain access to high pressure pump assembly. Loosen straps and remove the hand rails and place them on the ground.
    d. Loosen 3-inch straps which secure high pressure pump assembly to the trailer.
    e. Climb generator ladder and open and secure door. Enter van on raw water side while the two remaining crew members stay on ground.
    f. Untie tie-down straps in the van on the raw water pump and hand electrical cable to outside crew member.
    g. Remove bag from around chain hoist. Position hoist and remove pump.

NOTE: The chain hoist is wrapped in a canvas bag and tied during movement. When not in use, the chain hoist is placed in the bag and hung on hook under face shield.

        (1) Locate hook which is already attached to the eyebolt on top of raw water pump.
        (2) Pull down on one side of drive chain to raise load hook. Pull down on other side of drive chain to lower load hook.
        (3) Latch the safety latches after the hooks are attached to eyebolts.
        (4) Lift pump off floor of ROWPU and guide it so that the straps on the raw water pump face outward at doorway.
        (5) Use the hoist and push carefully on pump frame. With help from crew member on ground, "steer" the pump through the doorway and lower it to ground, while crew members on ground pull pump clear of access area.
    h. Remove straps from cyclone separator frame, ground rods, and hammer and access ladders located in van and hand them to outside crew member.
    i. Install one ROWPU access ladder at the door on the raw water side of the ROWPU.
        (1) Lean ladder against the trailer.
        (2) Slide ladder up against the ROWPU floor deck plate.
        (3) Thread chains around the trailer rail and clasp into a chain link as lightly as possible.

Performance Steps

(4) Pull bottom of ladder out until chains are tight.
(5) Install handrails on ladder and tighten wing nuts.

j. Remove storage tank.
k. Remove sump drain hoses.
l. Move 5-gallon jug close to door; it remains in van.
m. Remove straps and remove cyclone separators.
n. Remove straps holding down hoses.
o. Remove the 60-foot auxiliary fill hose, four raw water separator-to-van discharge hoses, and six waste-out hoses.
p. Install the second access ladder on distribution pump side of van.
q. Remove straps holding distribution pump and storage tanks.
r. Remove anchor and anchor rope and set footstool aside on top of table.
s. Remove distribution pump with hoist.
(1) Attach chain hoist to eyebolt.
(2) Attach chain hoist to distribution pump eyebolt.
(3) Use hoist to lift pump and guide it to door.
t. Remove remaining two storage tanks.
u. Remove straps holding down hard rubber hoses.
v. Remove two raw water pump discharge-to-separator hoses, two 2-inch diameter distribution pump suction hoses, four 10-foot product water-to-storage hoses, one 10-foot storage tank hose, two 3-inch diameter distribution pump suction hoses, 10 raw water suction hoses, and two dispensing hoses.
w. Remove the prime assist pump, the raw water T-pipe, the distribution pump discharge pipe, the storage tank connection tee, the product out adapter, the product shut-off valve, and the priming pitcher.

4. Set up the raw water system.
a. Pull the raw water pump into place using the shoulder straps, ensuring that the pump location is within operating limits and upstream of cyclone separator if water source is a river or has prevailing flow.
(1) Place intake in center of narrow rivers in deep water.
(2) Place intake at least 50 feet from shore in wide rivers.
(3) Place intake as far out as possible at ocean beaches and move pump as necessary to adjust for changing tidal conditions. Place pump less than 30 feet from water's edge.
b. Carry intake strainer, raw water suction hose sections, anchor tie-down rope, and anchor, to raw water pump location.

NOTE: Two people will be required to deploy intake strainer. Work as close as possible to the shoreline.

c. Attach the snap to the anchor eye and double back so rope length from anchor to free ends is at least 100 feet.

NOTE: Inspect hose ends and gaskets before connecting hose sections. Replace damaged gaskets.

d. Connect lengths of suction hose required to reach intake point and attach one end of hose to intake strainer keeping sand and dirt out of connectors. Check to see that gaskets are in place and connectors are tight.
e. Tightly cap raw water pump end of hose so air is trapped inside hose.
f. Snap the end of the rope to intake strainer eye and tie the free end to the suction hose. Coil rope to prevent tangling when anchor is deployed.
g. Deploy anchor.
(1) Locate good footing near the water edge.
(2) Inspect coiled rope and determine if it is free to play out.
(3) Throw anchor underhand into the water source.
(4) Pull slowly on the rope and feel for the anchor to grab. Repeat anchor deployment if anchor does not grab firmly. Throw it into an adjacent location until proper anchoring is completed.

Performance Steps

h. Untie the free end of the rope from the suction hose. Pull free end of rope as another crew member feeds out intake strainer and suction hose into water. Uncap last hose when intake strainer is in desired position, and observe the hose sink into position.
i. Tie free end of anchor rope to raw water pump frame to secure the anchor.
j. Connect or disconnect remaining suction hose sections, as required, to obtain proper length. Connect raw water suction hose to raw water pump.
k. Install pump tee to raw water pump discharge. Connect raw water pump discharge hoses to the pump tee and lay hose out to location selected for the separators.
l. Uncoil and connect electrical cable sections from raw water pump to raw water pump power outlet.
m. Set up the cyclone separator.
    (1) Position the frame on a flat area of ground within easy reach of the raw water pump discharge hoses.
    (2) Press the crossbar of frame member into the open channel of frame member to form the triangular frame. Pull out base until strap is firm.
    (3) Position one separator in place on the frame by inserting the upper and lower flange into the slots in the cross members. Place foot on frame to keep from tipping.
    (4) Push the mounted separator to the outside edge of the slots and set the remaining separator in its place.
    (5) Connect the separator discharge manifold to one separator. Leave cam levers open.
    (6) Push both separators together until the manifold connection firmly mates with the second separator. Complete connection by closing hose cam levers and direct the separator drain hoses away toward the water source.
    (7) Connect the raw water pump discharge hoses to the separators. Install the 45-degree raw water inlet adaptor at the raw water inlet connection on the ROWPU van.
    (8) Lay out and connect raw water hose sections between the separator manifold and the raw water inlet adapter. Use only the number of hose sections needed and avoid kinking.

5. Prepare the generator for use.

NOTE: Ground rod assembly (NSN 5975-00-878-3791), with special ROWPU cables, is used to ground the generator and the ROWPU. Operate and perform PMCS on the 60-kw generator according to Task 101-92W-1082 and TM 5-6115-545-12.

a. Position the three ground rod sections with cable clamps and couplings at a point where the assembled ground rods can be sunk into the earth at least 8 feet, where they will be close enough to reach the ground stud, and where the ground cables will not be ripped loose by vehicle travel or present a hazard to personnel movement.
b. Remove nut from the hammer rod. Install the slide hammer on the hammer rod and install the nut to secure the slide hammer.
c. Back the striker plate off the thread at the other end of the hammer rod and tighten the nut against the striker plate.
d. Remove cable clamps from the ground rods.
e. Turn the slide hammer and hammer rod assembly into the coupling of one of the ground rods until the nut on the hammer assembly is tight against the coupling.
f. Turn the ground rod tightly into the coupling.
g. Move the slide hammer up and down against the striker plate to drive the first rod completely into the earth.
h. Unscrew the hammer rod from the first ground rod coupling and screw the pointed end of the second ground rod into the first ground rod coupling. Repeat steps a through h for second ground rod.

Performance Steps

i. Unscrew the hammer rod from the second ground rod and screw it into the third ground rod and repeat steps a through h to drive the third ground until less than 1 foot of the ground rod protrudes from the earth. Install two cable clamps on this rod.
j. Uncoil ground cables. Unscrew the nuts from grounding lugs to expose slots. Connect the shorter cable to the generator ground lug and the longer cable to the ROWPU ground lug. Tighten the lug nuts on the cables. Connect each of the clamps on the top of the ground rod. Tighten the clamps and check all connections for tightness.

6. Set up the waste outlet hoses, sump drain hoses, and the water distribution system.
   a. Connect waste outlet 45-degree adaptor to waste-out connection. Connect waste hose sections as needed to reach water directed at least 50 feet away from intake (downstream in a river). Remove any sharp kinks in hose.
   b. Connect sump drain hoses to drain-out connections and place discharge ends downstream and away from work areas. Inspect hose gaskets before making connections. Replace damaged gaskets.
   c. Remove storage tanks, tank covers, and ground cloths from protective covers. Spread out ground cloths where potable water storage tanks will be located. Refer to TM 10-5430-237-12&P for tank setup.
   d. Unfold tanks on ground cloths. Spread out to round shape and avoid ridges in the bottom. Pull out at tank connections to be sure they will be clear when tanks are filled.
   e. Remove hose connection covers from tank connection hoses and distribution tee. Connect storage to pump suction hose sections together.
   f. Place distribution pump into final position and connect suction hose to pump.
   g. Connect product shutoff valve to the product out connection. Connect potable water hose sections to the product shutoff valve and add sections as needed. Lay hose out on the ground with end directed away from the work area.
   h. Connect distribution pump outlet piping to the distribution pump outlet. Connect both dispensing hoses (with nozzles) to distribution pump outlet piping. Put dispensing nozzles in cups on pump frame.
   i. Connect the electrical power cable from distribution pump to the distribution pump power outlet. Connect the electrical control cable from the distribution pump to the distribution pump control outlet.
   j. Inflate storage tank collars using air pump. Install tank covers and support balls.

NOTE: The 3,000-GPH ROWPU is now ready for operations.

7. Perform before-operations PMCS (reference: TM 10-4610-232-12).
   a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   b. Give form to supervisor at the end of each shift.

8. Perform after-operations PMCS (reference: TM 10-4610-232-12).
   a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   b. Give form to supervisor at the end of each shift.

9. Dismantle and pack system components for movement.
   a. Check that all shutdown procedures have been completed and that the unit is ready for dismantling. Refer to TM or task 101-92W-1059 for shutdown procedures.
   b. Pack the system support items into four separate storage boxes. Refer to TM 10-4610-232-12 for the contents of storage boxes.

NOTE: If the ROWPU van is to be shipped by air or if the van or high pressure pump assembly is to be removed from the trailer for any reason, notify unit maintenance so that interconnecting hoses between the van and high pressure pump assembly can be disconnected and other pre-shipment service performed.

Performance Steps

c. Prepare the system components for packing.
   (1) Prepare the in-line turbidity meter for movement.
      (a) Close the turbidity inlet valve and set the range selector to 1,000 (if installed).
      (b) Gently lift the flow-thru cell from the sample well. Unscrew the flow-thru cuvette, clean it out, and place it in the protective box. Reinsert the flow-thru cell.
   (2) Disconnect and coil all electrical cables and ground wire. Cap electrical outlets.
   (3) Pull and disassemble ground rods.
   (4) Pull in the anchor, intake strainer, and raw water suction hose sections using anchor rope.
   (5) Disconnect intake strainer from raw water suction hose.
   (6) Disconnect, drain and cap all exterior hoses; coil canvas hoses, and cap outer ends after coiling.
   (7) Drain the storage tanks. Deflate the cover floats and the tank collars. Fold the tanks and secure them in their covers.
   (8) Use straps to pull the raw water pump and carry the distribution pump to their nearest access door.
   (9) Disassemble the cyclone separator and carry components to the nearest access door.
   (10) Remove external adapters from the van. Cap outlets.

d. Pack the system components. Refer to TM 10-4610-232-12 for packing diagram.
   (1) Place all tools in boxes.
   (2) Place storage one box on accessory table and set heat lamps on top with cords in between lights.
   (3) Hook strap in position.
   (4) Thread strap through handles of box and heat lamps and tighten strap.

NOTE: Make sure RO element pusher under table is in its storage position and secured by J-bolts under the accessory table.

   (5) Hook strap in position.
   (6) Place two storage boxes in place. Set adjustment kit on top of box.
   (7) Thread strap through handles in boxes, and tighten strap.

NOTE: Make sure eyewash station is secured by its mounting straps.

   (8) Place filters boxes in place behind control panel.
   (9) Place detergent jugs and chemical bottles next to filter boxes behind control panel.
   (10) Place raw water and distribution pump covers on top of storage box and between storage box as shown in TM.
   (11) Install gate on accessory table.
   (12) Hook a straps and in position.
   (13) Place distribution pump skid upside down on table.
   (14) Place raw water pump skid right side up on top of distribution pump skid.
   (15) Coil and store four raw water discharge hoses on skids.
   (16) Coil and store six waste out hoses on raw water discharge hoses.
   (17) Coil and store auxiliary hose on suction hoses.
   (18) Coil and store cleaning heat-up jumper hose on suction hoses.
   (19) Store strainer assembly on top with hose end over cleaning heat-up jumper hose.
   (20) Coil and store raw water and distribution pump drain hoses on top of auxiliary hose.
   (21) Secure both stacks of hoses with corresponding straps.

NOTE: Route strap over hose end of strainer assembly, not over top of strainer.

   (22) Hook two straps and in position. Connect the straps to front loop nearest RO elements.
   (23) Coil and store ten raw water suction hoses, four product water to storage hoses, one storage tank hose, two distribution pump suction hoses, two raw water discharge hoses, two distribution pump suction hoses, two dispensing hoses, one NBC operating hose 41.50-inch, and one NBC operating hose 71.50-inch.
   (24) Store inside the hoses the raw water T-pipe, the distribution pump discharge pipe, the storage tank connection tee, the product out adapter pipe, the priming pitcher, the primer pump assembly, the waste out adapter, and the separator adapter.
   (25) Secure by tightening straps.

Performance Steps

(26) Store the two storage tanks and hook strap to foot loop.
(27) Disassemble access ladder.
(28) Hook strap in position.
(29) Attach chain hoist to eyebolt over distribution side access door and to eyebolt on distribution pump. Using chain hoist, lift the distribution pump into van and position distribution pump with drain pipe facing door.
(30) Disconnect chain hoist hook and take down chain hoist from eyebolt and re-hook at front door.
(31) Using the generator ladder, store anchor, anchor rope, and stool (upside down) on top of distribution pump.
(32) Secure by tightening straps.
(33) Close and secure door.
(34) Hook straps in position.
(35) Store separators and secure with straps.
(36) Coil sump drain hoses and store beside control panel.
(37) Place 5-gallon jug between NBC tank and sump drain hoses (make sure jug is filled with product water).
(38) Store funnel assembly and fuel line next to 5-gallon jug.
(39) Store storage tank in front of control panel.
(40) Disassemble access ladder.
(41) Hook straps in position.
(42) Store access ladder, separator frame, and sandwich in ground rods, ground wire, slip hammer, and ground rod clamp.
(43) Secure by tightening straps. Keep pads over corner of ladder and separator frame.
(44) Hook two straps in position.
(45) Hook chain hoist in eyebolt, hoist raw water pump through door, and rotate 90 degrees with caution plate facing door.
(46) Store electrical cables on top of raw water pump. Keep eyebolt accessible.
(47) Secure tank and raw water pump with straps.
(48) Store remainder of chain in hoist bag and tie closed.
(49) Secure van door.
(50) Using generator ladder, store handrails (two long ones first then four short) and secure with straps.
(51) Zip cover closed down past second door strap and secure top two straps.
(52) Deflate stable level air bags and secure both 3-inch straps.
(53) Connect rope to ladder using snap hook.
(54) Hoist ladder and secure rope using snap hook in eyebolt.
(55) Secure ladder with strap in cross pattern.
(56) Zip cover down all the way closed and secure lower strap.

Performance Measures	GO	NO-GO
1. Applied risk management procedures.	____	____
2. Positioned the ROWPU.	____	____
3. Unloaded the equipment.	____	____
4. Setup the raw water system.	____	____
5. Prepared the generator.	____	____
6. Setup the waste outlet hoses, the sump drain hoses, and the water distribution system.	____	____
7. Performed before-operations PMCS.	____	____
8. Performed after-operations PMCS.	____	____
9. Dismantled and pack component systems for movement.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 2404	FM 10-52
DA FORM 5988-E	FM 10-52-1
TM 5-6115-545-12	
TM 9-6115-672-14	
TM 10-4610-232-12	
TM 10-5430-237-12&P	

Set Up/Dismantle the 1,500-GPH Tactical Water Purification System (TWPS)
101-92W-1074

Conditions: Given the requirement to move to a new operational area, the soldier, assigned to an operational DS water supply point in a field/coastal environment, must set up and dismantle the 1,500-GPH Tactical Water Purification System (TWPS). Materials needed: an operationally complete 1,500-GPH TWPS with a 60-kw Tactical Quiet Generator (TQG), five 3,000-gallon storage tanks, a PLS truck or a HEMTT-LHS truck; TM 10-4610-309-14, TM 10-5430-237-12&P, TM 5-6115-545-12, TM 9-6115-672-14, a fire extinguisher, sufficient fuel and oil to establish operations, earplugs; rags; and a pencil. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Standards: Set up the 1,500-GPH TWPS by installing the TWPS components, storage tanks and pumps, connecting raw water system, connecting the water purification system, connecting the distribution system and performing before-operations PMCS. Dismantled the 1,500-GPH TWPS by performing after-operations PMCS, disconnecting the TWPS components, packing TWPS components for movement. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Gave the completed forms to immediate supervisor at the end of each shift.

Performance Steps
DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if you fail to observe cautions. Do not operate the 1,500 Gallon Per Hour (GPH) Tactical Water Purification System (TWPS) until the ground terminal stud on the generator set has been connected to a suitable ground. Dangerous chemicals are provided with the TWPS. Death, health, hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Follow all warnings contained in TM 10-4610-309-14 and TM 9-6115-672-14.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS:

Hearing protection is required when operating this equipment.

Handle and dispose of hazardous materials (such as used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the appropriate personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

1. Apply Risk Management Procedures (reference: FM 100-14).
    a. Understand and execute the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Position the TWPS trailer on the pre-selected site and do the following:
    a. Remove panels.
    b. Set deck and deck support system.
    c. Set and secure top panel.

Performance Steps

3. Unload equipment from the following areas:
    a. Station area.
    b. Equipment area.
    c. Generator area.

NOTE: If there is an immediate requirement for water; establish electrical power as soon as possible so the air compressor can be started. Starting the compressor as early as possible allows the compressor to pressurize the air supply tank (in about 30 minutes) while other setup steps are performed.

4. Set up raw water system.
    a. Position the raw water pumps and cyclone separators to the desire configuration and according to the conditions.
    b. Connect the raw water adaptors and hoses. Assemble the anchor, rope, inlet strainer, and hoses.
        (1) Attach the shackle and pulley to the anchor eye and double the rope back so that the rope length from the anchor to the free end is at least 150 feet.
        (2) Inspect the gaskets in the female ends of the hoses. Replace any damaged or missing gaskets.
        (3) Always rinse off the hose ends with water to remove dirt and sand.
        (4) Connect the number of 10-ft., green-banded suction hoses to each other that will be required to deploy the inlet strainer to the desired location in the raw water source.
        (5) Connect one end of the hose assembly to the inlet strainer. Install the 3 in. plug in the other end of the raw water hose assembly. This traps air inside the hose that will allow the hose to float until the inlet strainer is positioned at the desired location in the raw water source.
        (6) Shackle the end of the rope to the inlet strainer eye and tie the free end to the suction hose.
        (7) Carefully coil the rope to prevent it from tangling when the anchor is deployed.
    c. Deploy the floating inlet strainer and anchor. If the raw water source is from a sandy beach location and if, surf and tide conditions are impossible to deploy the floating inlet strainer, use the Ocean Intake Structure System (OISS). See OISS set up in the TM. Also see task, 101-92W-1081.

WARNING: Health hazard. Do not attempt to use product water hoses to handle raw water or raw water hoses to handle product water. When installed with the proper adaptors as directed, the hose cannot be interchanged. Failure to observe this warning and mixing hoses could cause contamination of water resulting in serious illness.

NOTE: The floating strainer and anchor may be used in conjunction with the OISS. If the OISS is to be used, refer to the OISS setup instructions on the TM. When deploying the floating inlet strainer, keep the following in mind:

-Two persons are required to deploy the inlet strainer.
-Place the inlet strainer in deep water and the center of narrow rivers.
-Place the inlet strainer as far from shore as possible in wide rivers.
-Place the inlet strainer as far out as possible at ocean beaches.
-Flat tidal beaches may require moving the pump according to tide conditions.
    (1) Gain good footing near the water's edge.
    (2) Make sure the rope is free to play out.
    (3) Throw the anchor underhand into the water source.
    (4) At beach sites, walk or carry the anchor to the desired location about 30 feet past the desire location of the inlet strainer.
    (5) Pull slowly on the rope and feel for the anchor to grab. If it does not grab, repeat the anchor deployment throwing it into an adjacent location.

Performance Steps

d. Complete the raw water connections.
   (1) Untie the free end of the rope from the suction hose.
   (2) One crew-member pulls the free end of the rope as another feeds out the inlet strainer and suction hose into the water.
   (3) When the inlet strainer is in the desired position, uncap the hose end and the hose will sink.
   (4) Tie the free end of the anchor rope to the raw water pump frame to secure the anchor.
   (5) Connect the uncapped end of the raw water suction hose to Adaptor A-01 at the raw water pump inlet.

NOTE: The MF feed tank and pump skid are very heavy. Serious injury can result from improper lifting on heavy items. Observe the marking on the item to be lifted as to the number of persons required to lift the unit. Do not attempt to lift heavy items without the use of the block and tackle during off-loading procedures.

5. Set up the Micro-Filtration (MF) system.
   a. Position the MF feed tank, tripod, and MF feed pump as follows:
      (1) Place the MF feed tank in its rough location (about 20 feet from the TWPS).
      (2) Unfold the ground cloth from around the tank and unfold the tank on the ground cloth.
      (3) Spread the tank out to its final shape and eliminated any ridges in the bottom.
      (4) Insert the MF feed tank Bag Strainer S-1 inside the MF feed tank. Overlap the top of the strainer over the open lip of the feed tank.
      (5) Tighten the strainer draw rope to take up the slack and place it under a little tension.
      (6) Pull the tank inlet and outlet connections out away from the tank bottom so that they will be clear when the tank is filled.
      (7) Set up the tripod at the side of the tank where the 2 x 10 raw water hose will be inserted.
      (8) Move Motor-Driven MF Feed Pump Skid P-3 within 3 feet of the discharge side of the tank.
      (9) Place the pump skid on solid footing and as level as possible.
   b. Connect the hoses.
      (1) Collect the following hoses: One 3 inch x 3 foot, green-banded raw water suction hose and one or two 3 inch x 10 foot, green-banded raw water discharge hoses.
      (2) Inspect the gaskets in the female ends of the hoses. Replace any damaged or missing gaskets. (Wash both ends with water before connecting).
      (3) Connect one or two 3 inch x 10 foot, green-banded discharge hose to the raw water inlet connection at the TWPS and to the discharge outlet of the MF feed pump.
      (4) Move the pump as needed to give a long smooth curve in the 3 inch discharge hose.
      (5) Connect the 3 inch x 3 foot, green-banded suction hose to the outlet of the MF feed tank and to the suction inlet of MF Feed Pump P-3. Move the tank as needed to allow the connection.
      (6) Place the open end of the 2 inch x 10 foot, green-banded raw water suction into the MF feed tank as far as it will go. Place the middle of the hose on top of the tripod and secure the hose to the tripod with a hook and loop strap.
   c. Install the waste outlet connections.
      (1) Connect the 4 inch x 5 foot, red-banded suction hose to the waste outlet at the TWPS (wash ends before connecting).
      (2) Connect Adaptor A-09 to the end of the 4 inch x 5 foot, suction hose.

Performance Steps

(3) Connect the 6 inch x 50 foot, red-banded discharge hose to the other end of adaptor A-09.
(4) Place the other end of the waste hose so that it discharges as far downstream from the raw water inlet as possible. Remove any sharp kinks or bends in the hose.

WARNINGS: A good ground is required to protect operators and equipment. The ground rod must be driven into the ground at least 8 feet to be sure of a good ground. Check to make sure the grounding cable is securely attached to the grounding lugs. Failure to properly ground the generator and the TWPS platform could result in injury or death from electrical shock.

Potential electrical hazard to other personnel. The crew member who is establishing electrical power to the TWPS should make the cable connections from the pumps to the Power Distribution Panel (PDP). Before making the power connection, notify all crew members. Do NOT continue with these procedures until all crew members are notified. Failure to observe this warning may result in injury of death due to electrocution.

Electrical hazard. The TWPS operates on 416 volts AC. First connect the pump skid power cables to their respective pump skid junction box. Next, make sure the main breaker on the PDP is switched to OFF. Last, connect the pump skid power cables to the PDP power outlet. Failure to observe this warning may result in serious injury of death from electrocution.

d. Connect the power cables to the TWPS.
(1) Connect the Motor-Driven Pump Skid P-2 and MF pump Skid P-3 electrical power cables to the PDP.
(2) After making sure that all connections have been completed, switch the Main Breaker on the PDP back to the ON position.

6. Set up the standard distribution system.

NOTE: All of the distribution hoses and adaptors are provided with caps or plugs for the couplings to keep the inside of the hoses and adaptors clean. The caps and plugs are not chained. They are to be removed as each hose and adaptor is installed and placed into storage box # 3.

a. Position product water distribution tanks, making sure the first tank is approximately 40 feet from the TWPS product water outlet.
b. Unfold ground cloths and place the tanks six feet apart on top each ground cloth. Pull any ridges in the bottoms. Ensure the tanks connected are aligned with each other.
c. Move the motor driven Product Water Distribution Pump Skid P-7 into place. Place the pump skid on solid footing and as nearly level as possible.
d. Connect the adapters, hoses and dispensing nozzles to complete the distribution system setup.

WARNINGS:

Health hazard. Do not attempt to use product water hoses to handle raw water or raw water hoses to handle product water. When installed with the proper adaptors as directed, the hose cannot be interchanged. Failure to observe this warning and mixing hoses could cause contamination of water resulting in serious illness.

Health hazard. Do not connect the product water hose from the TWPS to adaptor A-15 at the product water distribution tank at this time. Initial product water discharge from the product water outlet of the TWPS will not be of adequate purity. Product water is not discharged into the product water tanks until after clean product water flow is established. Failure to observe this warning could cause contamination of the product water.

e. Connect the Motor-Driven Product Water Distribution Pump P-7 electrical power cables.
(1) Ensure the distribution pump P-7 is shut off (push the distribution pump stop button on the PDP).
(2) Close and secure the OCP cover.
(3) Uncoil the electrical power cable for Motor-Driven Distribution Pump P-7.
(4) Connect the power cable to the P-7 skid junction box.

Performance Steps

(5) Connect the power cable to the P-7 power source connector at the PDP.
(6) Open the OCP cover and continue with start-up and normal operation.

NOTE: Fabric wall setup is not required to run the TWPS.

f. Conduct Pre-Operational Checks. Before starting the TWPS to begin producing potable water, perform the following checks:
(1) Check all hose couplings and verify that the cam-lock connectors are locked in place.
(2) Check that the ground rod has been installed and that the ground connections are tight at both ends.
(3) Check that all raw water, MF feed pump, and product water distribution pump power cables are properly connected.

CAUTION: The high pressure pump mounting flange drain tube must be positioned lower than the flange and must be free of obstructions so that the tube drains freely. Failure to observe this caution may result in water accumulating in the flange, which can lead to pump shaft and bearing corrosion and failure.

(4) Check that the HP pump mounting flange drain tube is directed off the TWPS and is free of any obstructions.
(a) The drain tube on the MC-TWPS extends to the edge of the TWPS frame.
(b) The drain tube on the A-TWPS is slightly longer so that the end can be directed down between the right edge of the deck and the fabric wall.

7. Set up the Fabric Wall. After the TWPS is running and producing product water set up the fabric walls if required for protection against the weather.

WARNING: Potential for head injury. Hold the top panel while removing the pins from the top panel supports. Failure to do so could result serious head injuries.

a. Unfold the fabric wall and lay it on the ground oriented as follows:
(1) The outside of the wall on the ground and the inside of the wall facing up.
(2) The bottom of the zippered, roll-up door closest to the TWPS.
(3) The 3 inch hose feed-through opposite the raw water inlet of the TWPS.
(4) The 4 inch hose feed-through opposite the waste water outlet of the TWPS.
(5) Get the straps laid out for easy access.
b. Two people carefully remove the pins from the top panel supports and lower the top panel to about a 45 degree angle with about 18 inches of the support extended. Insert the pins to hold this position.
c. Attach the top, front, and side edges of the wall to the top panel as follows:
(1) Lift the fabric wall by the top, front edge.
(2) Secure the hook and loop strip on the top edge of the wall to the hook and loop strip on the top panel.
(3) Loop each of the straps through its corresponding footman loop on the top panel and secure each strap in its buckle.
d. Two people raise the top panel with the attached fabric wall into position.
e. The third person inserts the pins in the top panel supports to secure the top panel.
f. Attach the side edge of both end walls as follows:
(1) Match and smooth the hook and loop strip on the side edge of the wall side flap to the hook and loop strip on the TWPS frame.
(2) Loop each side wall strap through its corresponding footman loop on the end panel and secure the strap in its buckle.
g. Attach the bottom edge of both wall side flaps to the bottom panel as follows:
(1) Fit the opening in the wall side flap for the support leg over the support leg.
(2) Match and smooth the hook and loop strip on the bottom edge of the wall side flap to the hook and loop strip on the bottom panel.
(3) Loop both of the straps on the bottom of one wall side flap through its corresponding footman loop on the bottom panel and secure each strap in its buckle.

Performance Steps

h. Attach the bottom, front edge of the wall to the deck as follows:
   (1) Fit the openings in the wall front for the support legs over the support legs.
   (2) Fit the sleeves in the wall front for the raw water hose and the waste-water hose over the hoses. Close the sleeves snug around the hoses using the hook and loop strip at the bottom of the sleeve and with the tie cord.
   (3) Match and smooth the hook and loop strip on the bottom edge of the wall to the hook and loop strip on the bottom panel.
   (4) Loop each of the straps on the bottom, front edge of the wall through its corresponding footman loop on the bottom panel and secure each strap in its buckle.

8. Lowering and raising the Bail Bar. The TWPS flat rack bail is lowered as required for access to the TQG (Tactical Quiet Generator), such as may be needed to perform TQG PMCS.
   a. Lower the flat rack bail bar as follows:

WARNING: Crushing hazard. Always attach the winch cable hook to the bail bar ring before removing any bolts from the bail bar. Failure to observe this warning could result in the bail bar falling down unrestrained, killing anyone underneath it.

   (1) Attach the winch cable hook onto the ring near the top of the bail bar.
   (2) Remove the hardware that secures the bail bar to the flat rack as follows:
      (a) Remove the eleven bolts, lock washers, and flat washers that secure the bail bar to the top horizontal beam of the flat rack.
      (b) Remove the four bolts, eight flat washers, four lock washers, and four nuts that secure the bail bar to the diagonal beam of the flat rack.
      (c) Insert the flat end of the pinch bar between the large back nut and the flat rack frame at the bottom of the flat rack.
      (d) Unscrew the bolt out of the nut using the bail bar socket wrench. Retain the bolt, lock washer and nut.
      (e) Remove the back bolt, lock washer and nut at the other side of the bail bar in the same manner.
   (3) Turn the winch crank handle to lower the bail bar to the desired position.
   (4) Disconnect the cable and move it out of the way so it is not a hazard.

   b. Raise and secure the bail bar as follows:
   (1) Connect the cable to the bail bar.
   (2) Turn the winch crank handle to raise the bail bar.

NOTE: Installing the two large bolts, lock washers, and nuts at the bottom of the bail bar first helps align the holes for the other bolts and makes the other bolts easier to install.

   (3) Install the two large bolts, lock washers, and nuts that secure the bottom of the bail bar to the flat rack.

WARNING: A minimum of 6 bolts in the front of top horizontal beam of the flat rack and a minimum of 3 bolts in the underside of the top horizontal beam are required in order to safely lift the flat rack by the bail bar. Failure to observe this warning may result in equipment damage and severe injury of death.

NOTE: The middle and upper bail bar bolts must be installed in their proper location to ensure that the bail bar is properly secured. There are three different length bolts that are used. The longest of the three is used with washers and nuts to secure the bail bar to the diagonal beam of the flat rack. The other two shorter bolts thread into rivet nuts, which are threaded inserts that are welded in the top horizontal beam of the flat rack.

   (4) Separate the three different size bolts that are used to secure the middle of the bail bar to the diagonal beam of the flat rack and the top of the bail bar to the top horizontal flat rack beam.
   (5) Loosely secure the top part of the bail bar to the front of the top horizontal flat rack beam using the seven short bolts with their lock washers and flat washers. Do NOT tighten yet.
   (6) Loosely secure the top part of the bail bar to the underside of the top horizontal flat rack beam using the four longer bolts with their lock washers and flat washers. Do NOT tighten yet.

Performance Steps

(7) Secure the middle of the bail bar to the diagonal flat rack beams using the four longest bolts with eight flat washers, four lock washers, and four nuts.
(8) Tighten all 15 bolts. Torque to 250-in-lbs.

9. Conduct before operation PMCS.
   a. Log all deficiencies on DA Form 2404/DA Form 5988-E.
   b. Give form to supervisor at the end of each shift.
10. Conduct after operations PMCS.
   a. Log all deficiencies on DA Form 2404/DA Form 5988-E.
   b. Give form to supervisor at the end of each shift.

11. Dismantle the Tactical Water Purification System.
   a. Dismantle the fabric wall and fold it up as follows:
      (1) Lay the wall out flat, with the white inner side facing up.
      (2) From both ends, fold the wall in toward the middle about halfway.
      (3) Fold the ends in again so they meet in the middle.
      (4) Fold the wall in half, then in half again.

WARNING: High voltage electrical hazard. High voltage is produced when the generator set is in operation. Make sure that the Tactical Quiet Generator has been properly shut down before attempting to disconnect the power or ground cable from the TQG. Failure to observe this warning could result in injury or death from electrical shock.

NOTE: All product water hoses have caps and plugs that should be installed on the end of the hoses during dismantling and packing to keep the product hoses clean.

   b. Dismantle the distribution system.
      (1) Drain product water tanks.
      (2) Disconnect and drain the product hoses, connectors, and pump.
      (3) Roll all the hoses, and place connectors and distribution nozzles in the corresponding box.
   c. Dismantle the micro-filtration system.
      (1) Disconnect the MF feed tank.
      (2) Disconnect and roll the hoses and power cables.
      (3) Drain the MF unit.
   d. Dismantle the raw water system.
      (1) Disconnect and recover the raw water intake.
      (2) Disconnect and drain the raw water hoses and adaptors. Allow them to drain.
      (3) Disconnect the raw water pumps and drain.
   e. Load equipment in the following areas:
      (1) Station area.
      (2) Equipment area.
      (3) MF skid.
      (4) Generator area.
      (5) Flat rack area.
   f. Replace panels.
   g. Conduct after-operations PMCS.
      (1) Log all deficiencies on DA Form 2404/DA Form 5988-E.
      (2) Give form to supervisor at the end of each shift.

Performance Measures	GO	NO-GO
1. Applied Risk Management Procedures.	____	____
2. Positioned the TWPS trailer on the pre-selected site and did the following: a. Removed panels. b. Set deck and deck support system. c. Set and secure top panel.	____	____
3. Unloaded equipment.	____	____
4. Set up raw water system.	____	____
5. Set up the Micro-Filtration (MF) system.	____	____
6. Set up the standard distribution system.	____	____
7. Set up the Fabric Wall.	____	____
8. Lowered and raised the Bail Bar.	____	____
9. Conducted before operations PMCS.	____	____
10. Conducted after operations PMCS.	____	____
11. Dismantled the Tactical Water Purification System.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 2404	AR 200-1
DA FORM 5988-E	FM 10-52
FM 100-14	FM 10-52-1
TM 5-6115-545-12	TB MED 577
TM 9-6115-672-14	
TM 10-4610-309-14	
TM 10-5430-237-12&P	

Set Up/Operate/Dismantle the Lightweight Water Purifier (LWP)

101-92W-1075

Conditions: Given the requirement to move to a new operational area and produce potable water, the soldier, assigned to an operational water supply point in a field/coastal environment, must maintain, set up, operate, and dismantle the Lightweight Purifier (LWP) System. Materials needed: an operationally complete LWP with a 3-kw Tactical Quiet Generator (TQG), and a 1/4 ton utility cargo HMMWV truck, a Water Quality Analysis Set, TM 10-4610-310-14, TM 9-6115-639-13&P, a fire extinguisher, sufficient fuel and oil to establish operations, earplugs; rags; and a pencil. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet) and LWP data sheets.

Standards: Unloaded, set up, performed before-, during, and after-operations PMCS, operated, dismantled and loaded the lightweight water purifier. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Gave the completed forms to immediate supervisor at the end of each shift.

Performance Steps

DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if you fail to observe cautions. Do not operate the Lightweight Water Purifier (LWP) until the ground terminal stud on the generator set has been connected to a suitable ground. Dangerous chemicals are provided with the LWP. Death, health, hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Follow all warnings contained in TM 10-4610-310-14 and TM 9-6115-639-13&P.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS:

Hearing protection is required when operating this equipment.

Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

Comply with unit SOP, OPORD, local regulations, and/or HN laws for drip pans or secondary containment devices. Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS).

Wear the proper personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

1. Apply Risk Management Procedures (reference: FM 100-14).
    a. Understand and execute the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Unload the Lightweight Water Purifier (LWP).
    a. Position the HMMWV next to the pre-selected site.
        (1) Place vehicle in park and apply parking brakes.
        (2) Place chalk block on the tire and oil drip pan underneath the vehicle.

Performance Steps

b. Unload equipment.

WARNING: Caution must be exercised when off loading/loading the LWP from the HMMWV. There is the possibility of slips and/or falls. Personnel must use caution when off loading/loading the LWP to prevent serious injury to personnel and/or damage to the equipment.

(1) Remove the cargo compartment cover, and bows to facilitate the unloading of the LWP.
(2) Remove straps and foldable ramp.

WARNINGS: Make sure chains are pulled tight through lifting shackles and secured over or through the lifting shackles to prevent shifting or sliding on the tailgate. Damage to equipment or injury to personnel could result.

The load limit for the foldable ramp is 600 pounds. Do not exceed this weight. Injury to personnel may result.

NOTE: Review the recommended distances between the components in the TM and the site layout plan before unloading components. Place the chemical injection/cleaning module on top of the RO system and the control panel on top of the chemical and cleaning module.

(3) Secure ramp on the back of the truck.
(4) Remove the hand truck.
(5) Unload the pumps module.
(6) Unload the chemical module.
(7) Unload the RO element module.
(8) Unload the ultra filtration (UF) module.
(9) Unload the control module
(10) Unload the high pressure pump.
(11) Unload all hoses and electrical cables.
(12) Unload the settling and product tanks.
(13) Unload the BII and COEI boxes.

WARNING: Maintain control of equipment while moving down the ramp. Do not place yourself in front of the 3-kw TQG set when traveling down the ramp. Personnel should assist unloading. Serious injury to personnel could result.

(14) Unload the 3-kw generator using a strap to secure it to the hand car. Slide the generator unto the hand car with the control panel facing the hand car.

3. Set Up LWP.
   a. Set up the 3-kw generator.
   b. Set up Raw Water System.
      (1) Set up settling tank within 50 feet from the raw water source and within 25 feet of the Ultrafiltration module. Make sure the 2-inch female cam-lock fitting is facing the raw water source. Connect the inlet spool, the coagulant hose line, the outlet spool and the floating strainer.
      (2) Setup the raw water pump, suction hoses and strainer. Deploy raw water intake strainer and connect the raw water power cable to the pump and the necessary canvas hoses (marked green) to begin filling the settling tank. Perform before PMCS before turning the unit on. After PMCS, turn the generator on, the raw water pump on, and begin filling the tank.
      (3) Connect the booster pump to the hose on the outlet spool already attached to the tank, making sure the ball valve in the spool is closed. Connect a canvas hose (marked green) from the pump outlet, to the feed inlet on the UF module. Connect the booster pump power cable to the pump and power panel.

Performance Steps

c. Set up the Ultra Filtration System.

WARNING: All modules, tanks and the high pressure pump skid are very heavy. Serious injury can result from improper lifting of heavy items. Observe the marking on the item to be lifted as to the number of persons required to lift the unit. Do not attempt to lift heavy items without the use of the block and tackle during off-loading or setup procedures.

(1) Position the backwash pump.
(2) Connect one 12-foot rubber hose (marked orange) from the UF fabric filtrate tank (outlet 2) to the HP pump inlet.
(3) Connect one 10-foot rubber hose (marked yellow) from the backwash pump inlet on the UF module to the fabric filtrate tank (outlet 1).
(4) Connect a section of hose (yellow) from the backwash pump discharge fitting to the backwash inlet on the UF module.
(5) Connect one reject hose (red) to the UF reject, and place the other end down stream or in a sump on the ground.

d. Set up High Pressure Pump.
(1) Check the hose connection between the filtrate tank outlet (02) to the high pressure pump inlet.
(2) Connect a 14-foot stainless steel hose from the high pressure module outlet to the RO module inlet.
(3) Connect the power cable from the HP module to the control panel.

e. Set up the RO Module.
(1) Check proper connection of high pressure hose.
(2) Close all the valves on the RO vessels with exception of the RO reject (product shutoff).
(3) Connect a 10-foot rubber hose (marked white) to the RO outlet and connect the other end to the chemical module inlet.
(4) Connect one reject hose (red) to the RO reject pipe, and place the other end down stream or in a sump on the ground.

f. Set up the Chemical Module.

NOTE: Place the Chemical Module on top of the RO module.

(1) Check the connection between the RO outlet and the chemical inlet on the Chemical Module.
(2) Connect the power cable to the control panel.
(3) Connect the three chemical tanks to the unit.

g. Set up the Distribution System.
(1) Set up the product water tank. Connect the inlet and the outlet spool pieces.
(2) Connect two 10-foot hoses (marked white) together, then take one end an connect it to the chemical module outlet. Take the other end and connect it to the product inlet (once the water quality has been established).
(3) Connect the distribution pump to the outlet spool piece on the tank.
(4) Connect the 25-foot canvas hose (marked Blue) to the distribution pump, and connect distribution nozzle on the hose.
(5) Connect power cable from the pump to the control module.

4. Conduct pre-checks operations.
a. Raw Water System.
(1) Check the level in the raw water tank. It must be at least half full.
(2) Check raw water and booster pump power connection and hose connection.

b. UF Module.
(1) Check power and hose connections.
(2) Check drain valves. All drain valves should be closed.

c. RO Module.
(1) Check power and hose connections.
(2) Check drain valves. All valves should be closed with exception of the reject control valve (product shut off).

Performance Steps

d. Chemical Module.
   (1) Check power cables and hose connections.
   (2) Check drain valves.
   (3) Check chemicals levels (refer to TM for proper amount).
   (4) Check settings on the chemical pumps (refer to TM for proper settings).
e. High Pressure Pump.
   (1) Check the air, fuel, and oil.
   (2) Check for proper hose and power connection.
f. Power Panel Module.
   (1) Check for power on the module. Power must be ON.
   (2) Check all module connections.
   (3) Check the EMERGENCY STOP button. It should be out.
   (4) Check control panel for correct positioning of switches and cycles (1-Cycle).

5. Conduct before operations PMCS.
   a. Log all deficiencies on DA 2404/5988-E.
   b. Give form to supervisor at the end of each shift.

6. Operate the Lightweight Water Purifier (LWP).
   a. Normal operations.
      (1) Fill raw water tank at least half before allowing any water to the rest of the unit.

NOTE: If coagulant or Vitec-3000 (antiscalant) is needed, see the TM for proper setting of chemical pumps.

      (2) Open the valve on the settling tank outlet spool piece.
      (3) Place the BOOSTER PUMP and BACKWASH PUMP switch selector in AUTO position. It might be necessary to prime the booster pump.
      (4) Disconnect the end of the fabric hose connected to the inlet of the UF module and flush it out. Reconnect the hose after 10 to 15 seconds.
      (5) Prime the backwash pump during initial startup. Check for the following:
         (a) Make sure that the filtrate tank on the UF module is at least half full.
         (b) Disconnect the backwash pump discharge hose (yellow) from UF module backwash inlet.
         (c) Place BACKWASH PUMP selector switch in the ON position on the control module.
         (d) Allow the hose to be flushed for 5 seconds and ensure that the cam-lock fittings are thoroughly cleaned.
         (e) Reconnect the hose to the backwash inlet on the UF module.
         (f) Place the backwash pump switch in the AUTO position.
      (6) The filtrate tank will begin to fill as indicated on the flow indicator.

NOTE: Ensure the filtrate tank on the UF module is completely full before continuing.

      (7) Open the ball valve on the product tank inlet spool piece.
      (8) Start the high pressure pump following the proper procedures. Refer to the TM for starting the diesel engine.

CAUTIONS: Do not use the manual override for other than emergency situations. Damage to equipment may result.

Do not operate the diesel engine on a slope higher than 20 degrees. Damage to the engine may result due to insufficient lubrication.

      (9) When the high pressure pump starts running adjust the throttle to obtain output flow between 3.4-GPM to 3.8-GPM. The flow is read at the top of the flow meter on the high-pressure pump module.
      (10) Once the proper flow to the RO module is achieved, adjust the reject control valve (product shutoff) on the RO module for product water flow.

NOTE: Raw water is treatable up to 60,000 ppm TDS. 125-GPH is produced from freshwater and 75-GPH from saltwater (20,000 to 45,000 ppm TDS). If the feed water TDS is higher than 45,000 ppm, see operations under unusual conditions in the TM.

Performance Steps

(11) Open or close slowly the reject valve to produce a water flow of 2.1-GPM for freshwater or 1.25-GPM for salt water in the meter located in the chemical module. Monitor the pressure on the RO pressure gauge while adjusting the RO reject control valve.
(12) Do not collect product sample until the unit has been flushed for at least 10 minutes.
(13) Once the water quality has been established according to Tri-Service Standard (less than 1000 ppm of total dissolved solids (TDS) and at least 2 ppm of Chlorine) in the product water, connect the product water hose from the chemical module outlet to the product tank inlet spool piece.

NOTE: During operation of the LWP the normal operating parameter will be follow as indicated in the TM.

b. Perform operational maintenance as required.
(1) Fill chemicals.
(2) Ensure the backwash process is done automatically.
(3) Conduct element cleaning if necessary.
c. Conduct during Operation PMCS.
(1) Record all deficiencies in DA Form 2404/DA Form 5988-E.
(2) Give form to supervisor at the end of each shift.
d. Troubleshoot LWP. Refer to troubleshooting procedures in the TM.
(1) Determine problem and take corrective action.
(2) Log all actions taken in DA Form 2404/DA Form 5988-E.
e. Shut down the Unit. See TM for instructions on Short Term Shutdown (less than 96hours and /or moving) and Long Term Shutdown/Preservation (more than 96 hours).
f. Unusual operations.
(1) Cold weather operations.

NOTE: For operations on cold weather, the unit will need a tent and another 3-kw generator to run the cold weather kit. See TM for setup.

(2) Hot weather and NBC operations see TM.

7. Conduct after operations PMCS.

a. Record all deficiencies on DA Form 2404/DA form 5988-E.
b. Give form to supervisor after each shift.

8. Dismantle the LWP.
a. Dismantle the raw water system.
b. Dismantle the UF system.
c. Disconnect the control panel.
d. Disconnect the power cable on the generator and the ground rod.
e. Dismantle the distribution system.

9. Load LWP on the HMMWV in accordance with the loading plan. See TM.
a. Place two straps at the rear of vehicle and drape over the vehicle's cab.
b. Place the 3-kw generator in the rear of vehicle, behind the driver's seat.
c. Place one box on top of the generator and the other 2 boxes to the right of generator.
d. Place the High Pressure pump next. Shift it to the right. Place the control panel on the left.
e. Place the UF module on top of the High Pressure pump.
f. Place the RO next. Place the chemical module on top.
g. Set the pump module on the right hand side on top of the right wheel well of the vehicle.
h. Place the ramp on the left side and the hand car on top of the ramp.
i. Set two straps to go around the equipment on the vehicle.
j. Place the two tanks on top of the BII boxes and the hoses between the boxes and UF module.
k. Secure equipment with straps.

Performance Measures	GO	NO-GO
1. Applied Risk Management Procedures.	____	____
2. Unloaded the LWP.	____	____
3. Set Up the LWP.	____	____
4. Conducted Pre-checks.	____	____
5. Conducted before operations PMCS.	____	____
6. Operated the LWP.	____	____
7. Conducted after operations PMCS.	____	____
8. Dismantled the LWP.	____	____
9. Loaded LWP on the HMMWV.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 2404	AR 200-1
DA FORM 5988-E	FM 10-52
FM 100-14	FM 10-52-1
TM 9-6115-639-13&P	
TM 10-4610-310-14	

Operate the 1,500-GPH Tactical Water Purification System (TWPS)

101-92W-1077

Conditions: Given the requirement to produce potable water, the soldier, assigned to an operational DS water supply point in a field/coastal environment, must operate the 1,500-GPH TWPS. Materials needed: an operationally complete 1,500-GPH TWPS with diesel-driven 60-kw Tactical Quiet Generator (TQG); a Water Quality Analysis Set; five 3,000-gallon storage tanks, and a HEMTT-LHS or PLS truck; a fire extinguisher; sufficient fuel and oil to establish operations; TM 10-4610-309-14, TM 9-6115-672-14, and TM 10-5430-237-12&P; earplugs; rags; and a pencil. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet) and operating data log.

Standards: Performed all before-, during-, and after-operations PMCS. Conducted initial TWPS startup. Produced product water. Performed maintenance required on the 1,500-GPH TWPS. Maintained reports, logs and forms. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Gave the completed forms to immediate supervisor at the end of each shift.

Performance Steps

DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if you fail to observe cautions. Do not operate the 1,500-GPH TWPS until the ground terminal stud on the generator set has been connected to a suitable ground. Dangerous chemicals are provided with the TWPS. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Follow all warnings contained in TM 10-4610-309-14 and TM 9-6115-672-14.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS:

Handle and dispose of hazardous materials (such as used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the proper personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

NOTE: Operating the 60-kw TQG is required to operate the 1,500-GPH TWPS (see task 101-92W-1082).

1. Apply risk management procedures (reference: FM 100-14).
    a. Understand and execute the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Perform before-operations PMCS (references: TM10-4610-309-14, TM 9-6115-672-14, and TM 10-5430-237-12&P).
    a. Log all deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of each shift.

Performance Steps

3. Start-up TWPS.
    a. Establish electrical power. Refer to Establishing Electrical Power in the TM.
    b. Start-up the Air Compressor.
        (1) Check the oil level. Add oil, if needed.
        (2) Start the air compressor.
            (a) Close the low pressure (LP) air vent valve (V-910).
            (b) Close the high pressure air vent valve (V-904).
            (c) Open the air receiver tank valve V-907.
            (d) Turn the air compressor switch on the Operator Control Panel (OCP).
    c. Conduct initial inspections, checks, and adjustments.
        (1) Check valve positions. Refer to table in the manual for valve positions.
        (2) Disconnect product hose from distribution tank.
        (3) Perform the pre-operational self-test procedure (built-in-tests or BIT).
    d. Start-up Sodium Bisulfite chemical system.

CAUTION: If the raw water source is chlorinated water or well water, the sodium bisulfite chemical system must be set up and started before raw water flow is established. Failure to provide sodium bisulfite injection will result in the destruction of the MF and RO membranes.

NOTE: If the raw water source is NOT chlorinated water or well water, skip this procedure and move on to Establishing Raw Water Flow With Raw Water Pump or Establishing Raw Water Flow With Only the Electric Raw Water Pump, depending on how you set up the raw water system.

(1) Set up the sodium bisulfite injection system as described in the procedures for Sodium Bisulfite Injection System Deployment in the TM. See operations under unusual conditions.
(2) Set the bisulfite pump switch on the control panel to ON.
(3) Check to ensure the speed dial on the bisulfite pump is set to OFF.
(4) Fill the bucket with the blue cover with raw water to the 5-gallon level.

WARNING: Hazardous chemical dust and/or fumes. Wear the protective face shield, chemical gloves, and a dust mask when handling sodium bisulfite. Avoid inhaling chemical dust or fumes. Failure to observe this warning may result in irritation of the nose, throat, eyes, and skin.

(5) Rinse the mixing paddle with raw water.
(6) Pour one 13-ounce packet of sodium bisulfite into the bucket and mix with the water using the mixing paddle.
(7) Place the chemical injection pump suction tube and return line hose through the cover hole and into the chemical bucket. Be sure the suction hose inlet rests near the bottom of the bucket, but not flat on the bottom.
(8) Turn the speed dial on the chemical pump to 80, note that the pump has started, and then rotate the stroke dial to 80.
(9) Rotate the black knob on the priming valve one-half turn.
(10) Note that the chemical solution is drawing up the suction tube and entering the pump housing.
(11) Rotate the black knob on the priming valve back to its original position when discharge is noted back to the tank and air is not noted in the suction tube or the pump head. The pump is now primed.
(12) Set the speed dial to 70 percent and the stroke to 60 percent.
(13) Turn the bisulfite pump switch on the control panel to AUTO.

Performance Steps

e. Establish raw water flow with both pumps.

NOTE: If only the electric raw water pump is deployed, see the procedures for "Establishing Raw Water Flow with Only the Motor-Driven Raw Water Pump" that immediately follow these procedures for "Establishing Raw Water Flow with Both Raw Water Pumps".

(1) Set valve positions as follows:
  (a) Partially OPEN Raw Water Flow Control Valve V-107 on adaptor A-05.
  (b) Fully OPEN vent valve V-102 on adaptor A-02.
  (c) Check that pump drain valve V-103 on the diesel-driven pump skid is closed.
(2) Disconnect the pump vent hose from the top of adaptor A-02.
(3) Use the priming pitcher to pour water through vent valve V-102 until the pump case is full.
(4) Reconnect the vent hose.

WARNING: Combustion hazard. Fuel the diesel engine in a well ventilated area with the engine stopped. Do not smoke or allow flames or sparks in the area where the engine is fueled or where the fuel is stored. Failure to observe this warning may result in fire and severe injury. Do not overfill the fuel tank. Make sure the filler cap is securely closed after fueling. Be careful not to spill fuel when fueling. If any fuel is spilled, make sure the area is dry before starting the engine. Failure to observe this warning may result in fire and severe injury.

CAUTION: Potential for engine damage. The diesel engine may be damaged if operated with insufficient oil. It is also dangerous to supply too much oil to the engine because a sudden increase in engine RPM could be caused by its combustion. Failure to observe this caution may result in engine damage. Only use the correct diesel fuel. Use of the wrong fuel may cause engine damage. When adding fuel to the fuel tank, be careful not to push the fuel screen filter into the tank.

(5) Check the diesel fuel level and engine oil levels in accordance with the PMCS schedule before starting the diesel engine pump. When checking the oil level, make sure the engine is on a level surface with the engine stopped.
(6) Start the diesel engine using the following procedure:
  (a) Set the fuel cock clockwise to the OPEN position.
  (b) Put the engine speed lever in the START position.
  (c) Slowly pull out the recoil-starting handle until you feel strong resistance, then return it to the initial position.
  (d) Push down the decompression lever. If the lever does not stay down by itself, it may be necessary to pull the recoil starting handle out a little more. The decompression lever will return to the up position automatically when the recoil starter is pulled all the way out to start the engine.
  (e) Pull out the recoil-starting handle briskly with both hands to start the engine.
  (f) If the engine fails to start; return to paragraph c. initial start of a new engine may require six or more pulls to clear the air from the fuel lines).
  (g) Move the engine speed lever to a middle position to reduce the engine speed to idle.
(7) Warm up the engine at idle for about three minutes. Then set the speed lever to START.
(8) Close vent valve V-102.
(9) If the expected time for priming is exceeded, stop and check all of the hose couplings that are out of the water. Specifically check the gaskets to be certain that they are free of sand and dirt. Remove check valve adaptor A-01 from the pump skid and make certain that the flapper seat is clean. Install and fill the pump again and repeat. If after 20 minutes the pump has not primed, refer to troubleshooting in the TM.
(10) Start the motor-driven pump P-2 after the discharge hose from P-1 pump is pressurized. Start the P-2 pump by pushing the raw water pump #2 START button on the control panel.
(11) Adjust raw water flow control valve V-107 about half open to provide a steady flow of raw water into the MF feed tank once the P-1 and P-2 pumps are operating and the system is primed. Depending on the elevation, if the valve is opened too much initially, the pump could lose prime.

Performance Steps

(12) Adjust the Cyclone Separator flow control valve V-104 on adaptor A-03 to 4 to 5 gpm. A 5-gallon chemical bucket can be used to provide measurement.

CAUTION: Do not leave the P-1 pump running with valve V-107 closed without cracking open the vent valve V-102. Failure to observe this caution will cause the pump to overheat and damage the shaft seal.

(13) If the MF feed tank reaches 3/4 full and you are not ready to continue with start-up, close raw water flow control valve V-107, stop motor driven raw water pump P-2 (if in use as the second pump), crack open vent valve V-102, and leave the diesel-driven raw water pump P-1 running at idle.

(14) Take a raw water sample from the MF feed tank and measure the TDS using the TDS meter. Adjust the feed water TDS set dial on the control panel until the feed water TDS display indicates the measured TDS.

f. Establish the raw water Flow with only the electric pump.

(1) Set valve positions as follows:

(a) Partially OPEN the raw water flow control valve V-107 on adaptor A-05.

(b) Fully OPEN vent valve V-102 on adaptor A-02.

(c) Check that the pump drain valve V-105 on motor-driven pump P-2 is closed.

(2) Disconnect the pump vent hose from the top of adaptor A-02.

(3) Use the priming pitcher to pour water through vent valve V-102 until the pump case is full. Then connect the vent hose after priming.

(4) Start the P-2 pump by pushing the raw water pump #2 START button on the control panel.

(5) Close vent valve V-102.

NOTE: The pump will draw the air out of the suction hose and pump it through the open vent valve V-102 and the vent hose. As the air is removed the water follows. When pressurized water is observed discharging from the vent hose, the pump is primed. Close vent valve V-102.

CAUTION: Potential for overheating. While the pump is evacuating air from the suction hose, the priming water circulates in the pump. After a period of time, the water and pump may get hot. Check the pump regularly with your hand for heating. If the pump starts getting hot, remove the vent hose, add more water to the pump, then reinstall the vent hose. Repeat as needed to keep the pump cool until it begins pumping water. Failure to observe this caution may result in overheating and damage to the pump.

(6) If the expected time for priming is exceeded, stop the pump and check all of the hose couplings that are out of the water. Specifically check the gaskets to be certain that they are free of sand and dirt. Remove check valve adaptor A-01 from the pump skid and make certain that the flapper seat is clean. Install and fill the pump again and repeat. If after 20 minutes, the pump has not primed, refer to troubleshooting.

(7) Adjust the raw water flow control valve V-107 about half open to provide a steady flow of raw water into the MF feed tank. Once P-2 is operating and the system is primed and depending on the elevation and if the valve is opened too much initially, the pump could lose prime.

(8) Take a raw water sample from the MF feed tank and measure the TDS using the TDS meter. Adjust the feed water TDS set dial on the control panel until the feed water TDS display indicates the measured TDS.

Performance Steps

g. Flushing preservative/cleaning solution.

NOTES: If the MF does NOT contain preservative or cleaning solution, skip this procedure and move on to MICRO-FILTRATION SYSTEM START-UP.

The following are common mistakes made during start-up:

-MODE switch is put in the wrong position.
- MF feed pump manually started or stopped at the wrong time.
- MF feed tank runs out of water during initial startup or during backwash.
- Air Pressure Low alarm sounds during initial backwash.
- RO feed tank runs out of water during initial startup or during a backwash.
- RO Feed Pressure Low alarm sounds during initial startup or during a backwash.

If any of the above or similar errors occur, perform the following steps to re-initialize (or reset) the PLC.

- Return the system mode switch to the STANDBY.
- Drain the RO feed tank.
- Power down the system by opening the MAIN Circuit Breaker at the PDP (switch to OFF).
- Power up the system by closing the MAIN Circuit Breaker at the PDP (switch to ON).
- Wait for the air compressor to stop.
- Proceed with a normal startup.

(1) Collect the following items (if using):
- 1,500-gallon rinse water waste tank.
- Three 2 inch x 10 foot, red-banded, suction cleaning waste hoses.
- Adaptor A-10.
- Adaptor A-12.
- Two A-16 Adaptors.

(2) Set up the Cleaning Rinse Water Waste Tank as follows:
(a) Within 20 feet of the TWPS waste out connection. Face the female tank connection toward the TWPS skid.
(b) Set the tank at an elevation so that the top of the full tank will be below the bottom of the RO feed tank, If the terrain allows.
(c) Connect adaptors A-16 to both of the tank female connectors on the waste tank. Be sure that the tank top zipper is zipped closed.

(3) Put citric acid in the tank for neutralizing the preservative/cleaning solution when the solution is flushed into the tanks as follows:

WARNING: Acid chemical. Wear a protective face shield, chemical gloves, and a chemical apron when handling citric acid. Avoid inhaling chemical fumes. If acid spills, immediately flush the areas with water from the auxiliary hose. Failure to observe this warning may result in mild irritation of the nose, throat, eyes, and skin.

(a) Ensure a bucket of water is placed near the cleaning waste tank to rinse any area of skin or clothing that comes in contact with citric acid.
(b) Open the cleaning waste tank zipper.
(c) Open the AC-210 citric acid bucket. Using the priming pitcher, measure out 2 lbs (600 ml) of AC-210 citric acid and pour it into the cleaning waste tank.
(d) Close the cleaning waste tank zipper.
(e) Rinse the pitcher and chemical gloves in the bucket of water before removing the gloves.

(4) Set the waste hoses as follows:
(a) Disconnect the 4 inch x 6 inch adaptor A-09 and the 6 inch red-banded waste out hose from the 4 inch x 5 foot waste outlet hose of the TWPS.
(b) Connect the 4 inch x 2 inch adaptor A-10 to the 4 inch x 5 foot waste outlet hose.

Performance Steps

(c) If using the cleaning waste storage tank, perform the following steps:
-Connect a 2 inch x 10 foot, red banded cleaning waste hose to Adapter A-10.
-Connect one or two additional 2 inch x 10 foot, red-banded hoses as needed to reach the waste tank.
-Connect Adaptor A-12 to the end of the last hose.
-Connect Adaptor A-12 to Adaptor A-16 on the waste tank with the female end exposed to open the two valves.
-Leave valve V-706 on the other adaptor A-16 closed.

(d) If NOT using the rinse water waste tank, set up the cleaning waste hoses as follows:
-Connect a 2 inch x 10 foot, red-banded, cleaning waste suction hose to Adaptor A-10.
-Connect one 50-foot, green banded, raw water discharge hose to the 2 inch x 10 foot, red-banded cleaning waste hose.
-Connect one 2 inch x 10 foot, red-banded, cleaning waste suction hose to the other end of the 50-foot hose.
-Connect Adaptor A-12 to the end of the second cleaning waste hose.
-Open Adaptor A-12 valve V-705.
-Direct A-12 discharge hose into a depression in the ground away from the TWPS.

(5) Ready the micro-filter assembly as follows:
(a) Make sure strainer S-2 drain valve V-109 is closed.
(b) Check the MF trans-membrane pressure reading on the control panel. If it is not 0.0, turn the MF trans-membrane zero adjust dial until a reading of 0.0 is obtained.
(c) Check to be sure that the SYSTEM MODE SWITCH is set to STANDBY.

(6) If raw water flow has stopped, re-establish raw water flow and partially open the raw water flow control valve V-107.

NOTES: The PLC automatic control moves through the cycle steps and controls the MF feed pump as needed to fill and flush the MF modules. The time required is 45 seconds. The blinking STANBY light indicates cycle completion. The MF feed pump will shut down.

After the MF feed pump comes on, check the MF filtrate flow indicator to make sure flow is indicated. If no flow, refer to troubleshooting procedures.

(7) Set the SYSTEM MODE SWITCH to MF FILL/HOLD. Adjust the raw water flow control valve as necessary to maintain the MF feed tank about three quarters (3/4) full.
(8) When Fill/Hold is completed (MF feed pump "START" button light goes off), set the SYSTEM MODE SWITCH back to STANBY.
(9) After the Standby light comes on, set the SYSTEM MODE SWITCH to MF FILL/HOLD for a second fill. This procedure will flush most of the preservative solution out of the MF.
(10) Repeat steps 7 and 8 one more time.
(11) Open main RO feed tank drain valve V-412. Close when drained.
(12) Replace hoses (if using the cleaning rinse water waste tank) as follows:
(a) After the RO feed tank is drained, close the adaptor A-16 valve at the waste tank and then adaptor A-12 valve at the end of the waste hose. Disconnect adaptor A-12 valve from adaptor A-16.
(b) Direct the cleaning waste hose into bucket and open adaptor A-12 valve V705 and drain contents of the hose into the bucket. When drained, disconnect the cleaning waste hose.
(c) Remove adaptor A-10. Install adaptor A-09 and the 6-inch red banded waste out hose.
(d) Open the waste tank and empty the bucket into the tank.

If not using the cleaning rinse water waste tank;
-Remove adaptor A-10, the cleaning waste hoses, and adaptor A-12.
-Install adaptor A-09 and the 6-inch red-banded waste out hose.

NOTE: For procedures on Cleaning, Preservation, Cleaning Waste Neutralization and Pump-Out, and waste water transfer from the cleaning waste storage tank, see the TM.

Performance Steps

(13) Fill, flush, and fill RO feed tank.
- (a) Set the SYSTEM MODE SWITCH to MF Fill/Hold.
- (b) When Fill/Hold is complete (MF feed pump "START" button light goes off), set the SYSTEM MODE SWITCH to RUN.
- (c) After the RUN light comes on, start the MF feed pump.

NOTE: The pump will not start if the MF FILL/HOLD step has not been completed.

- (d) Be sure RO feed tank drain valve V-412 is closed. When the RO feed tank level reaches the high level setting, the MF feed pump will stop. Wait for this before continuing.
- (e) Open RO feed tank drain valve V-412. Close when drained.
- (f) Set the SYSTEM MODE SWITCH back to STANBY.
- (g) Set the SYSTEM MODE SWITCH to FILL/HOLD. When Fill/Hold is complete (MF feed pump "START" button light goes off), set the SYSTEM MODE SWITCH to RUN.
- (h) After the RUN light comes on, start the MF feed pump.
- (i) Be sure RO feed tank drain valve V-412 is closed. When the RO feed tank level reaches the high level setting, the MF feed pump will stop. Wait for this before continuing.
- (j) Continue with RO System startup.

NOTES: If the MF does not contain preservative or cleaning solution skip this procedure and proceed to Micro-Filtration Start-Up.

If you did NOT need to perform the Flushing Preservative/Cleaning Solution procedures, continue with the Micro-Filtration System Start-Up procedures.

The following are common mistakes made during start-up:
- -MODE switch is put in the wrong position.
- -MF feed pump manually started or stopped at the wrong time.
- -MF feed tank runs out of water during initial startup or during a backwash.
- -Air pressure low alarm sounds during initial backwash.
- -RO feed tank runs out of water during initial startup or during a backwash.
- -RO feed pressure low alarm sounds during initial startup or during a backwash.

If you performed the preceding Flushing Preservative/Cleaning Solution procedures, the necessary MF start-up steps were included. You would skip the Micro-Filtration System Start-Up.

h. Start-up micro-filtration system.

(1) Ready the Micro-filter assembly as follows:
- (a) Make sure strainer S-2 drain valve V-109 is closed.
- (b) Check to be sure that the SYSTEM MODE SWITCH is set to STANBY
- (c) Check the MF trans-membrane pressure reading. If it is not 0.0, turn the MF Trans-membrane Zero adjust dial until a reading of 0.0 is obtained.

(2) If stopped, re-establish raw water flow and partially open the raw water flow control valve V-107.

NOTE: The PLC automatic control moves through the cycle steps and controls the MF feed pump as needed to fill and flush the MF modules. The time required is 45 seconds. The blinking STANDBY light indicates cycle completion. The MF feed pump will shut down.

After the MF feed pump comes on, check the MF filtrate flow indicator to make sure flow is indicated. If no flow, refer to troubleshooting in the TM.

(3) Set the SYSTEM MODE SWITCH to MF FILL/HOLD. Adjust raw water flow control valve V-107 as necessary to maintain the MF feed tank about 3/4 full.

(4) When the Fill/Hold is complete (MF feed pump "START" button light goes off), set the SYSTEM MODE SWITCH to RUN.

(5) After the RUN light comes on, start the MF feed pump.

NOTE: The pump will not start if the MF FILL/HOLD step has not been completed.

Performance Steps

(6) Close RO feed tank drain valve V-412. When the RO feed tank level reaches the high level setting, the MF feed pump will stop. Wait for this before continuing to RO System Start-Up.

i. Start-up RO system.

(1) At the antiscalant and hypochlorite chemical pumps, set the SPEED switches fully counter clockwise to OFF. When starting with empty chemical buckets, the chemical pumps are switched OFF until the chemical buckets are setup.

(2) Check to make sure that main pressure control valve HVC-401 and the auxiliary pressure control valve HCV-401A are fully open (see TM for location).

(3) Toggle the ALARM switch to RESET to clear the RO feed tank level low alarm.

(4) Ensure the MF feed pump has stopped (the MF pump indicator light should go off).

(5) Ensure the HP pump valve V-212 is open, then start the RO feed pump.

(6) Wait until a steady RO reject flow rate greater than 10 gpm is indicated and the RO feed pressure is steady. If RO feed tank level drops below 85 percent, start the MF feed pump.

NOTE: HP pump P-5 starts first followed by pump P-6 after a 10 second time delay. It is normal for a high product TDS alarm to sound after the high pressure pumps are started.

(7) Start the MF feed pump if not already on.

(8) Immediately start the high pressure pumps.

CAUTION: The MF will not begin the automatic timing of the backwash interval until the first backwash is manually initiated. Failure to do this will lead to rapid fouling of the MF membrane, which will require chemical cleaning to restore.

(9) Make sure the MF feed tank is at least 3/4 full, then push the MF backwash start button to manually initiate the first backwash cycle. (The backwash start button green light will stay lit until the PLC detects that the air compressor is off and the RO tank level is at 100 to 105 percent. Then the PLC will start the backwash and establish the normal automatic backwash timing. The green light will flash on and off during the backwash then stay off when backwash cycle is done.)

NOTE: Several HCV-401 valve adjustments will be required to obtain the correct product flow. Allow up to several minutes between valve adjustments for flow and pressure to stabilize. Normal product flow is 20.5 to 21 gpm on seawater and 25.5 to 26 gpm on freshwater and brackish water up to 20,000 mg/l TDS surface water or 2,500 mg/l TDS ground water.

(10) Set the pressure control valve.

(a) For seawater: fully close Auxiliary Pressure Control valve V-401A, then slowly CLOSE Main RO Pressure Control Valve HCV-401A until the normal product flow rate is obtained, or the RO feed pressure reaches 1200 psig or the valve is closed.

(b) For fresh or brackish waters set Auxiliary Pressure Control Valve HCV-401A to 50 percent closed, then slowly CLOSE Main RO Pressure Control Valve HCV-401 until the normal product flow rate is obtained. If HCV-401 is fully closed and the normal product flow is not obtained, open HCV-401, fully close HCV-401A and then adjust HCV-401.

(11) Reset the high TDS alarm if on. If the alarm will not reset, refer to RESPONDING TO NORMAL OPERATION ALARMS in the TM.

(12) Re-check the TQG voltage and adjust to 416 volts if needed.

j. Start up antiscalant and hypochlorite chemical system.

(1) Set the antiscale/chlorine switch on the control panel to ON.

(2) Make sure that the SPEED dial on each pump is set to OFF (dial turned fully counterclockwise).

(3) Make sure that the chemical buckets are properly located for operation in front of the chemical labels on the chemical buckets.

(a) Sodium Bisulfite bucket cover BLUE.

(b) Antiscalant bucket cover YELLOW.

(c) Calcium Hypochlorite bucket cover RED.

Performance Steps

(4) Set-up the antiscalant system as follows:

WARNING: Irritant. Wear a protective face shield and chemical gloves when handling antiscalant chemical. Avoid inhaling chemical fumes. Failure to observe this warning may result in irritation of the nose, throat, eyes, and skin.

(a) Fill the antiscalant buckets with the utility hose to the 5-gallon level.
(b) Rinse the mixing paddle with product water from the product utility hose.
(c) Fill the AC-110 measuring cup with AC-110 antiscalant to the 650 milliliter level. Slowly pour into the antiscalant bucket and then mix with the paddle.
(d) Place the chemical injection pump suction tube and return line hose through the cover hole and into the chemical bucket. Be sure the suction hose inlet rests near the bottom of the bucket, but not flat on the bottom.
(e) Turn the speed dial on the chemical pump to 80, note that the pump has started, and then rotate the stroke dial to 80.
(f) Rotate the black knob on the priming valve one-half turn.
(g) Note that the chemical solution is drawing up the suction tube and entering the pump housing.
(h) Rotate the black knob on the priming valve back to its original position when discharge is noted back to the tank and air is not noted in the suction tube or the pump head. The pump is now primed.
(i) Set the speed dial to 70 percent.
(j) Set the stroke dial to 60 percent.

(5) Set-up the hypochlorite system as follows:

WARNING: Hazardous chemical dust and/or fumes. Wear the protective face shield, chemical gloves, and dust mask when handling calcium hypochlorite. Avoid inhaling chemical dust or fumes. Hypochlorite will give off chlorine vapor, which will burn your nose, throat, and lungs if breathed directly. Keep your head away from the top of the bucket while filling. Inhalation of calcium hypochlorite dust may cause severe chemical burns. Direct contact with the eyes may cause severe eye damage.

NOTES: When operating on fresh water and brackish water that contains up to 20,000 mg/L TDS surface water or 2,500 mg/L TDS ground water, the product water flow can initially be assumed to be 25.5 to 26 gpm.

When operating on seawater or brackish water that contains over 20,000 mg/L TDS surface water or over 2,500 mg/L TDS ground water, the product water flow can initially be assumed to be 20.5 to 21 gpm.

Refer to the TM for the required free chlorine concentration to be established in the product water with a product water flow of 25.5 or 21 gpm (depending on the source water and its TDS as described in the note above). The calcium hypochlorite is mixed with four gallons of water in the hypochlorite bucket.

Refer to TM for information on the correct chemical injection pump stroke and speed settings for given product flow rates and free chlorine required.

(a) Fill the hypochlorite bucket with product water to the 4-gallon level.
(b) Rinse the mixing paddle with product water from the product utility hose.
(c) Pour the required quantity of hypochlorite into the hypochlorite bucket and mix using the mixing paddle. Mix until the hypochlorite is dissolved.
(d) Place the chemical injection pump suction tube and return line hose through the cover hole and into the chemical bucket. Be sure the suction hose inlet rests near the bottom of the bucket, but not flat on the bottom.
(e) Turn the speed dial on the chemical pump to 80, note that the pump has started, and then rotate the stroke dial to 80.
(f) Rotate the black knob on the priming valve one-half turn.
(g) Note that chemical solution is drawing up the suction tube and entering the pump housing.

Performance Steps

(h) Rotate the black knob on the priming valve back to its original position when discharge is noted back to the tank and air is not noted in the suction tube or the pump head. The pump is now primed.

(i) Set the stroke and speed as required for the expected product flow rate and the free chlorine concentration required (see the tables located in the TM).

(j) Turn the antiscale/chlorine switch on the operator control panel to AUTO.

k. Completing TWPS start-up procedures.

(1) If the product flow is less than the normal 20.5 to 21 gpm or 25.5 to 26 gpm and cannot be adjusted to the normal product flow rate, refer to the tables in the TM and change the hypochlorite pump speed (strokes/min) and stroke length settings as listed for the flow rate and required free chlorine concentration. If the flow is between two listed flows, use the higher flow setting.

(2) Before connecting the product hose to the distribution tank, refer to Water Quality Measurement in the TM and verify the free chlorine residual in the product water using the WQAS-P chlorine test kit.

(3) Connect the product water hose (from the TWPS product water discharge) to the distribution tank.

(4) Check the MF feed tank. Just before a backwash it should be approximately 3/4 full. If low, slightly open the raw water flow valve V-107.

(5) Refer to the TM for maintaining Normal Operation; complete the operator's data log and check to ensure that all readings are within normal values.

4. Maintain normal operations.

a. Perform Routine Crew Operational Services. Schedule routine crew operational services. Refer to the TM for the Routine Schedule Services tables.

b. Conduct during- operation PMCS.

(1) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.

(2) Give form to supervisor at end of each shift.

c. Troubleshoot TWPS as required. Refer to troubleshooting procedures in the TM.

d. Maintain product flow.

NOTE: To assure the mission water production requirements are met, the flow should be adjusted 0.5 to 1 gpm higher than the normal flow rate. Do not set the water flow more than 1 gpm higher than the normal flow listed. The high TDS concentration in the reject may result in scaling of the RO elements, which will require acid cleaning to remove.

(1) If the product flow rate is less than that shown in the tables (see TM), increase the RO feed pressure by slowly closing the main pressure control valve HCV-401 until the flow is obtained, the RO feed pressure reaches 1200 psi, or the valve is closed.

(2) Adjustments will not be frequent but will be needed if the water temperature changes or wind and tide change the TDS of the raw water source.

NOTES: Below 50 degrees F, the full 1,200 gph water production on a seawater source may not be reached at 1200 psi, especially with older RO elements.

Do not exceed 15 gpm when operating on seawater over 50,000 mg/l, even if a higher flow can be obtained. See the Normal Product Flow Rates table in the TM.

e. Maintain distribution.

(1) Complete the chlorine and TDS measurements checks before distributing product water after initial startup.

(2) Start the distribution pump P-7 to distribute water and use the distribution hoses and nozzles to dispense the water. The water level in the tanks must be at least 12 inches above the outlet to deliver the full flow rate through the nozzles.

(3) Fill the standard 6,000-gallon distribution system at least half full before beginning to fill the 9000 gallon system. If supply demands allow, wait until the 6,000-gallon system is full before filling the 9,000-gallon system.

Performance Steps

(4) Respond to Normal Operations Alarms.
  (a) After correcting the cause of the alarm or after shutdown to standby to correct the cause of the alarm, turn the alarm switch to RESET.
  (b) For alarms during normal operation, refer to table 5 in the manual, to determine the corrective action to be taken.
  (c) For alarms during startup and cleaning, refer to the specific startup or cleaning procedures.

f. Make entries in the operating data. Complete data entries in the Operation Data Log once each hour. Refer to TM.

g. Measure the water quality. The raw water feed, the product water TDS and the product water free chlorine level are measured hourly and the results are entered into the operating data log.
  (1) Use the feed water TDS set adjustment on the control panel to set the feed water TDS display to the value measured for the raw feed water.
  (2) Open the instrument/solenoid panel and make sure the conductivity transmitter ON/OFF switch is at the ON position.
  (3) Compare the measured product water TDS with the value displayed by the operator control panel.
    [a] Calibrate the TWPS conductivity transmitter CT-501 during the PMCS shut down if significantly different.
    [b] Estimate the percent salt rejection based on the measured value as follows:
      100-(100-OCP Percent Salt Rejection) X (Measure TDS/OCP TDS)
  (4) Move the conductivity transmitter ON/OFF switch on the instruments/solenoid panel to the OFF position, if the mission requires low EMI emissions.
  (5) Compare the measured free chlorine level with the requirement established for the mission. Adjust the hypochlorite pump if needed by changing the speed setting as follows:
    CM= measured chlorine level
    CR= required chlorine level
    S1= pump speed dial setting
    S2= new pump speed dial setting required
    S2= S1 x CR/CM

h. Check and refill chemicals.

WARNING: Irritant. Wear a protective face shield and chemical gloves when handling antiscalant chemical, hypochlorite and bisulfite. Avoid inhaling chemical fumes or dust. Failure to observe this warning may result in mild irritation of the nose, throat, eyes, and skin.

CAUTION: The stroke length should only be adjusted when the pump is running.
  (1) Check Antiscalant and refill if necessary as described in the manual.
  (2) Check Hypochlorite and refill if necessary.
  (3) Check Bisulfite and refill if necessary.

i. Evaluate RO % clean and RO % salt rejection.

NOTE: The evaluation of the RO clean and salt rejection percentages indicates the condition of the RO membranes and the need to clean or replace the RO elements. Refer to the TM for procedures.

j. Determine RO cleaning requirements.

NOTE: If not certain of which RO cleaning procedure is needed, complete both the low pH acid and the high pH detergent cleaning. Refer to Cleaning and Preservation Introduction, for cleaning procedures in the TM.

Performance Steps

k. Perform micro-filtration integrity and sonic test.

NOTES: This is an automated self-test. From STANDBY with the MF full of water, the filtrate is drained and purged with air. An air pressure of approximately 15 psi is then applied to the MF modules and shut off. Broken membrane fibers will leak air out the open ends of the fibers into the feed water (shell) side of the modules. As the air leaks out, the air pressure will decrease. The PLC notes the air pressure after 2 minutes and again after 2 additional minutes. The PLC compares the pressures to determine if the leakage is excessive. If MF filtrate pressure transmitter PT-102 is not functioning properly (TMP cannot be zeroed), the automatic test will give a fail indication. In this event, the MF Pressure Integrity can be checked manually using readings from MF Filtrate Pressure Gauge PI-201.

New MF membranes will not be fully wetted until they have been operated for 50-200 hours. Without full wetting, they will not pass the integrity test. This does not indicate a problem.

(1) Perform the MF pressure integrity test. See manual for procedure.
(2) Perform the Sonic test.

l. Perform RO element product flow and conductivity tests.

NOTE: A product TDS high alarm at startup and a TDS reading that does not drop below 1000 mg/L after a few minutes of operation is an indication of a damaged RO vessel O-ring or RO elements failure. If you get a high TDS alarm, perform a conductivity test and correct as indicated. RO product water flow and conductivity test are also performed at the beginning of deployment and after 500 hours of operation. Product water flow test and conductivity test are typically performed at the same time. The product water flow test is performed for a given element first and is immediately followed with the conductivity test for the element. See manual for procedure.

m. Manual flow control.

NOTE: Manual flow control is used as a backup control procedure if the automatic control fails to properly fill the RO feed tank or if the automatic control overflows the tank.

(1) Turn the feed control selector handle from the Auto position to the manual position at the feed flow control panel.
(2) Use the manual feed control to adjust the MF feed flow. Turn the control dial clockwise to decrease the flow. Turn the control counter-clockwise to increase the flow.
(3) Open the RO feed tank cover to observe the level if the RO feed tank level display is not working.
(4) Set the flow to approximately 65 gpm until the level is within 4 inches of the top. The tank must be refilled before the backwash begins. Then reduce the flow to approximately 55 gpm or as needed to hold the level at or above 4 inches from the top without overflowing until the backwash begins.
(5) Increase the flow to fill the tank again as soon as the backwash is complete.

n. Respond to normal operations alarms.

(1) Turn the alarm switch to SILENCE when an alarm sounds.
(2) Turn the alarm switch to RESET after correction of the alarm, or after shutdown to standby to correct the cause of the alarm.
(3) Refer to the TM to determine the corrective action to be taken for alarms during normal operations.
(4) Refer to the specific startup or cleaning procedures for alarms during startup and cleaning.

o. Respond to Changes In Normal Instrument Readings. See table in the TM for normal instrument readings.

Performance Steps

5. Perform TWPS standby or short-term Shutdown procedures.
   a. Perform standby shutdown procedures without draining down.

NOTE: This procedure applies to routine shutdown during a mission for periods not exceeding four hours for normal operation and 30 minutes for cold weather operation. The system is not drained, but remains ready for operation.

(1) Fully OPEN main pressure control valve HCV-401 and then auxiliary pressure control valve HCV-401A.
(2) Turn the SYSTEM MODE SWITCH to STANDBY. The PLC automatically performs the following actions:
   (a) HP pumps are stopped.
   (b) MF feed pump is stopped.
   (c) Automatic valves are cycled to the standby position.
   (d) RO feed pump remains ON to flush the RO membranes until the RO feed tank empties. The low level alarm will sound when the tank is empty and the pump will stop.
(3) Stop Motor-Driven raw water pump P-2 if in use.
(4) Close raw water flow control valve V-107.
(5) If Diesel Engine-Driven pump P-1 is used, it may remain running for short shutdowns.
   (a) Reduce the engine speed to idle.
   (b) Crack open vent valve V-102 on adaptor A-02 at the pump discharge and leave the pump running for short shutdowns.
(6) Stop Diesel Engine-Driven raw water pump P-1 when required.
(7) Shutdown the Tactical Quiet Generator (TQG).
   Perform the following steps in order:
   (a) STOP the air compressor by turning the air compressor switch to OFF.
   (b) Switch the main circuit breaker on the power distribution panel to OFF.
   (c) Shut down the TQG as described in the proper TM.

   b. Perform Standby Shutdown Procedures for Cold Weather Operation.

NOTE: The following procedure should be followed during cold weather deployment if the TWPS is to be shut down for less than 30 minutes, the TQG is to remain running, and the diesel-fired heater remains on.

(1) Fully OPEN main pressure control valve HCV-401 and then Auxiliary pressure control valve HCV-401A.
(2) Turn the SYSTEM MODE SWITCH to STANDBY. The PLC automatically performs the following actions:
   (a) HP pumps are stopped.
   (b) The MF feed pump is stopped.
   (c) Automatic valves are cycled to the standby position.
   (d) The RO feed pump remains on to flush the RO membranes until the RO feed tank empties. The low level alarm will sound when the tank is empty and the pump will stop.
(3) Stop motor-driven raw water pump P-2 if in use.
(4) Close raw water flow control valve V-107.
(5) Reduce the speed to idle, if diesel raw water pump P-1 is used, leave vent valve V-102 on adaptor A-02 at the pump discharge closed and leave the pump running for short shutdown not exceeding 30 minutes.
(6) Stop diesel engine-driven raw water pump P-1, proceed to Raw Water Diesel Engine Shutdown and then drain the raw water system to prevent freezing when required.
(7) Leave the hose heating blankets and pump heating collars installed and the hose/pump heater switch set to ON.

Performance Steps

c. Perform standby shutdown procedures with drain-down.

NOTE: Follow this procedure when an operational situation requires a system drain-down.

(1) Complete the procedure for Standby Shutdown Without Drain Down. Leave TQG in operation.
(2) Set the SYSTEM MODE SWITCH to MF Drain.
  (a) The PLC automatic control purges the water form the MF using air.
  (b) The automatic valves return to Standby positions at completion.
(3) After one minute, return the SYSTEM MODE SWITCH to STANDBY.
(4) Move the drain and vent valves to the position listed in the valve position table found in the TM.

NOTE: The product RO element 3-way valves are in the drain position when the middle pointer on the valve handle is pointing toward the RO vessel.

(5) Continue with the draining of the raw water and distribution systems as required.
(6) Perform the following steps in order if the TQG is to be shut down:
  (a) STOP the air compressor by turning the air compressor switch to OFF.
  (b) Switch the main circuit breaker on the power distribution panel (PDP) to OFF.
  (c) Shut down the TQG as described in TM.

d. Perform short term shutdown procedures for normal operation. This procedure applies to any shutdown anticipated to be over 4 hours but less than 54 hours.

(1) Perform shutdown to standby procedures as follows:
  (a) Fully OPEN main pressure control valve HCV-401 and then auxiliary pressure control valve HCV-401A.
  (b) Turn the SYSTEM MODE SWITCH to STANDBY. The PLC automatically performs the following actions:
    [1] HP pumps are stopped.
    [2] MF feed pump is stopped.
    [3] Automatic valves are cycled to the standby position.
    [4] RO feed pump remains ON to flush the RO membranes until the RO feed tank empties. The low level alarm will sound when the tank is empty and the pump will stop.
  (c) Stop motor-driven raw water pump P-2 if in use.
  (d) Close raw water flow control valve V-107.
  (e) Open RO feed tank drain valve V-412 after the RO feed pump shuts off. Close the valve when the tank is drained.
  (f) Stop Diesel Engine-Driven raw water pump P-1, if in use.
(2) Backwash the MF with product water as follows:
  (a) Drain the MF feed tank. Disconnect the MF feed pump suction hose from the tank and lift the MF feed tank to drain as much remaining water as possible.
  (b) Reconnect the MF feed pump suction hose to the tank.

WARNING: Chemical dust. Wear the protective face shield, goggles, chemical gloves, and a dust mask when handling sodium bisulfite. Avoid inhaling chemical dust or fumes. Failure to observe this warning may result in mild irritation of the nose, throat, eyes, and skin. Failure to add sodium bisulfite to the chlorinated product water that is used for flushing will result in MF membrane failure.

NOTE: Open one of the 12 ounce sodium bisulfite packets and pour it into the bottle provided in the BII. The bisulfite powder will be used to neutralize the chlorine in the product water when product water is required for flushing or cleaning.

  (c) Fill the MF feed tank with product water from the product water distribution system by connecting the end of a blue-banded product distribution hose to raw water adapter A-05 and opening V-107.
  (d) Use the bottle of bisulfite, fill the bottle cap with bisulfite twice and empty it into the MF feed tank while it is filling with product water.
  (e) Set the SYSTEM MODE SWITCH to MF Fill/ Hold, when ready.
  (f) Set the SYSTEM MODE SWITCH to Run, when the Standby light comes on again.

Performance Steps

(g) Start the MF feed pump when the air compressor stops (or if already stopped).
(h) Wait a few seconds and then push MF backwash start to manually initiate a backwash using product water from the MF feed tank.
(i) STOP the MF feed pump when the backwash is completed.
(j) Set the SYSTEM MODE SWITCH back to Standby.

NOTE: Make sure the RO feed tank level is at or below 50 percent before continuing. If it is not, open RO feed tank main drain valve V-412 and drain water from the tank until the level drops to 50 percent. If you proceed to the second backwash with a high RO feed tank level, the RO tank will overflow during the second backwash.

(3) Backwash the MF with product water a second time and fill the RO feed tank as follows:
(a) Set the SYSTEM MODE SWITCH to MF fill/hold when the air compressor stops again.
(b) Set the SYSTEM MODE SWITCH to run when the Standby light comes on again.
(c) Start the MF feed pump, wait a few seconds and push MF backwash Start to manually initiate a second backwash.
(d) Leave the MF feed pump on when the second backwash is completed. It will stop automatically when the RO feed tank is filled.
(4) Flush the RO with potable water as follows:
(a) Reset any alarms and then start the RO feed pump.
(b) Turn the SYSTEM MODE SWITCH to STANDBY. The PLC automatically performs the following actions:
1. The automatic valves are cycled to the standby position.
2. The RO feed pump remains ON to flush the membranes until the RO feed tank empties. The low level alarm will sound when the tank is empty and the pump will stop.
(5) Complete the drain-down after the RO feed pump turns off as follows:
(a) Set SYSTEM MODE SWITCH to MF DRAIN.
1. The PLC automatic control purges the water from the MF using air.
2. The automatic valves return to Standby position at completion.
(b) Return the SYSTEM MODE SWITCH to STANDBY after one minute.
(c) Move the drain and vent valves to the position listed in the valve position table in the TM.
(d) Continue with the draining of the raw water and distribution systems as required.
(6) Perform the following steps in order If the TQG (generator) is to be shut down:
(a) STOP the air compressor by turning the air compressor switch to OFF.
(b) Switch the main circuit breaker on the power distribution panel to OFF.
(c) Shut down the TQG as described in the TM.

e. Perform short term shutdown-cold weather operation.

NOTE: The following procedure should be followed if the TWPS is to be shut sown for more than 30 minutes but less than 54 hours, or if the TQG is to be shut down.

(1) Perform the standby shut down procedures in "Standby Shutdown-Cold Weather Operation".
(2) Complete MF drain procedures.
(a) Set the SYSTEM MODE SWITCH to MF DRAIN from Standby.
(b) Set the SYSTEM MODE SWITCH to STANDBY when completed.
(c) Wait 10 seconds, then set the SYSTEM MODE SWITCH back to MF DRAIN to initiate the second drain. Repeat for a total of 4 drains.
(d) When complete, set the SYSTEM MODE SWITCH to STANDBY again.
(e) Open the following valves:
1. MF vent valve V-114.
2. MF Cleaning valve V-704.
3. Clean mixing valve V-703.
4. MF filtrate drain valve V-203.
5. MF shell drain valve V-403.

Performance Steps

(f) Drain into buckets if required to prevent freezing at the hose ends or the hose ends from becoming frozen to the ground. Use the heat gun to thaw any hose end that becomes blocked with ice.

(3) Leave the diesel-fired space heater on if not moving or as long as possible if moving.

(4) Leave the TQG running until all draining has been completed.

(5) Open RO feed tank drain V-412 and V-210.

CAUTION: Do not disconnect the hose heater blanket and pump heater collar electrical power cables at this time.

(6) Drain the MF tank and strainer as follows:

(a) Open the strainer S-2 drain valve V-109 and the vent valve V-110.

(b) Disconnect the 3 inch x 3 foot hose from P-3 MF feed pump suction side.

(c) Remove the 2 inch x 10 foot, green-banded raw water suction hose from the MF feed tank and disconnect it from adaptor A-05.

(d) Disconnect the 2 inch x 50 foot, green-banded raw water discharge hose from adapter A-05.

(e) Disconnect the green-banded, 3 inch x 3 foot suction hose from the MF feed tank outlet. Lift the MF feed tank on the side opposite of the tank discharge connection to drain as much water out of the tank as possible.

(f) Remove the hoses from the MF feed pump and drain.

(g) Open the MF feed pump drain.

(7) Drain the raw water system as soon as possible after draining the MF feed tank as follows:

(a) Remove the discharge hose at the first raw water pump, and then at the suction side of the second pump. Drain the hose.

(b) Leave the hose heater blanket and pump heater collar electrical power cables connected.

(c) Remove the discharge hose from the second pump and drain.

(d) Do not disconnect the hose heater blanket and pump heater collar electrical power cables.

(e) Stop the diesel driven pump if in use. Open the pump drain valve.

(f) Open the raw water pump P-2 drain valve if in use.

(g) Remove the suction hose at the suction inlet of the first raw water pump.

(h) Pull the hose out of the water source and drain it. Disconnect the ice hole strainer.

(i) Remove adaptor A-01.

(j) Do not disconnect the hose heater blanket and pump heater collar electrical power cables.

(8) Drain the RO system as follows:

(a) Open RO vessel drain valve V-408. Direct the hose off the skid and into a bucket to avoid freezing of the hose end.

(b) Force-air drain the RO elements and feed/reject piping as follows:

1. Connect one end of the auxiliary air hose (from BII) to the quick-disconnect fitting above the compressor and opposite pressure gauge PI-902.

2. Connect the other end of the auxiliary air hose to the quick-disconnect fitting at the RO air purge valve V-913 in the feed inlet to RO vessel #1.

3. Partially open air purge valve V-913.

(c) Set the product RO element 3-way valves V-501 through V-510 to the drain position while force air draining the RO elements. Position each 3-way valve handle so that the middle pointer points toward the RO vessel.

(d) Open RO drain valves V-302, V-303, V-304, and V-410 until air is noted. Then close until the purge is completed.

(e) Close RO air purge valve V-913 when only a trickle of water is draining out the RO vessel drain valve V-408.

(f) Disconnect the auxiliary air hose at the V-913 end and connect the air gun to the air hose.

Performance Steps

(g) Blow the water out of the HP pumps as follows:
[1] Open valve V-215 under the HP pumps.
[2] Disconnect the HP pump cooling water return tubes from the RO feed tank.
[3] Connect one end of the auxiliary air hose to the quick-disconnect fitting above the compressor opposite Pressure Gauge PI-902.
[4] Connect the auxiliary air gun to the other end of the auxiliary air hose.
[5] Using the air gun, blow air into each of the cooling water return tubes to push water out of the pumps and out the tube at valve V-215.
[6] - Reconnect the HP pump cooling water return tubes after the pumps are drained.

NOTE: Before opening a drain valve, if the temperature is cold enough to freeze water, set the end of the drain hose into a bucket so that water in not drained onto the ground around the TWPS where it can freeze into ice and create a hazard. Use the heat gun to thaw any drain tube end that becomes block with ice. Note that the heat gun must be plugged into the generator 110-volt outlet and not the TWPS PDP 110-volt outlet.

(h) Set all valves to the Drain-Down position as listed in tables shown in the TM. Be sure to open valves V-302, V-303, V-304 and V-410 that were closed in step d.
(i) When water stops draining from a drain tube, disconnect the tube from its valve and hold the end up to drain the residual water from the tube. Then reconnect the tube to its valve. (It is not necessary to perform this step for a drain tube that is secured to its valve with a hose clamp.

(9) Drain the product water distribution system as follows:
(a) Remove the distribution nozzles from the distribution hoses.
(b) Pump the distribution tanks out through the distribution hoses.
(c) Lift each distribution tank on the side opposite of the tank discharge connection to allow the distribution pump to pump as much water out of the tank as possible.
(d) Stop the distribution pump.
(e) Disconnect and drain the distribution hoses from the distribution pump and from the distribution tanks.
(f) Do not disconnect the hose heater blanket and pump heater collar electrical power cables.
(g) Open the distribution pump drain.
(h) Finish emptying the distribution tanks.

WARNING: Electrical hazard. To prevent an electrical hazard, do not disconnect the hose heater blanket and pump heater collar electrical power cables until the hose/pump heater switch has been turned OFF and the main breaker has been switched to the OFF position. Failure to observe this warning may result in injury or death from electrocution.

(10) Drain the hoses as follows:
(a) Open up all of the hose heat blankets. Do not disconnect the electrical connectors.
(b) Walk the raw water and distribution hose without delay to complete the draining (lift the hose at one end and walk along the length of the hose, raising the hose as you go along to cause all the water to drain out of the hose). Roll the hose up if the unit is to be packed. Continue until all hoses have been drained and, if required, rolled up.
(c) Close the blankets over the hoses If not packing up and if the hoses have not been rolled up.
(d) Remove all adapters and place inside the TWPS.

(11) Secure electrical power as follows:
(a) Wait until the TWPS skid drains have stopped flowing.
(b) Switch the diesel fueled heater switch to OFF.
(c) Turn the hose/pump heat switch OFF.
(d) Stop the air compressor by turning the air compressor switch to OFF.
(e) Switch the main breaker to the OFF position.
(f) Shut down the TQG as described in the TGQ TM.

Performance Steps

f. Shutdown raw water diesel engine.
   (1) Before stopping the engine, move the engine speed lever to the idle mark and run the engine for about 3 minutes.
   (2) Move the engine speed lever to the STOP position. The engine should turn off (if it does not, the engine will stop when the next step is performed).
   (3) Turn the fuel cock lever counter clockwise to the closed position (except for standby shutdown).
   (4) Slowly pull out the recoil handle until pressure is felt and leave the handle in this position. This step sets the engine so that the intake and exhaust valves are closed and helps prevent rust from forming while the engine is not in use.

g. Conduct after- operations PMCS.
   (1) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   (2) Give form to supervisor at the end of each shift.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Performed before-operations PMCS.	____	____
3. Started Up TWPS.	____	____
4. Maintained normal operations.	____	____
5. Performed Standby or Short-Term Shutdown Procedures.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 2404	AR 200-1
DA FORM 5988-E	FM 10-52
FM 100-14	FM 10-52-1
TM 9-6115-672-14	TM 5-6115-545-12
TM 10-4610-309-14	TM 9-6115-645-10
TM 10-5430-237-12&P	

Employ Environmental Stewardship Measures

101-92W-1078

Conditions: Given the requirement to minimize adverse effects on the environment, without impairing the mission, the soldier assigned as a water treatment specialist in garrison or a field environment will apply sound stewardship principles to water operations to include the handling, storage, and disposal of hazardous materials, waste, or substances. Materials needed: AR 200-1, DA PAM 200-1, FM 100-14, FM 3-100.4, and FM 10-52-1.

Standards: Disposed of all hazardous materials, substances, and waste water discharge. Minimized and limited the potential impact on the environment during operations.

Performance Steps

DANGER: Dangerous chemicals are used with water purification equipment. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced.

CAUTIONS: Handle and dispose of hazardous materials (HM) (such as used oil, contaminated fuel, chemicals, solutions, and waste water discharge) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate manufacturer's Material Safety Data Sheet (MSDS). Wear the appropriate personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

1. Apply Risk Management Procedures (reference FM 100-14).
    a. Understand and execute the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

2. Comply with state, local laws, and installation policies for environmental protection.
    a. Read unit environmental SOPs. Be alert for local laws which are different than to those you are accustomed.
    b. The U.S. Army in foreign nations will comply with environmental standards defined by the following documents:
        (1) Applicable international agreements such as treaties, Status of Forces Agreements (SOFAs), and supplementary or other bilateral and multilateral agreements.
        (2) Country-specific Final Governing Standards (FGS) or, in the absence of FGS, the Overseas Environmental Baseline Guidance Document (OEBGD).
        (3) Executive Order 12088 (Federal Compliance with Pollution Control Standards).
    c. Advise the chain of command on techniques to ensure compliance with environmental regulatory requirements.
    d. Limit environmental damage by applying awareness to daily activities.
    e. Identify the environmental risks associated with individual and team tasks.
    f. Support Army recycling programs.
    g. Employ waste minimization techniques as part of pollution and chemical efforts.
    h. Remove Hazardous Material/Hazardous Waste (HM/HW) in a timely and appropriate manner.
    i. Use appropriate preventive medicine and sanitation procedures to prevent surface water and ground water contamination.
    j. Ensure soldiers are aware of wetland and coastal water areas and the restrictions for areas of operation.
    k. Comply with wastewater discharge permits that allow regulated discharges from units into a water source.

Performance Steps

l. Direct unregulated ROWPU discharges into sumps to prevent gross contamination of the water source.
m. Ensure soldiers do not pour chemicals into sinks or storm drains.
n. Make sound environmental decisions in the absence of a supervisor or specific command guidance by considering the following:
   (1) Training.
   (2) Guidance from the chain of command.
   (3) Concept of right and wrong.
   (4) Common sense.
   (5) Environmental ethics.

3. Maintain a clean and safe work area.
   a. Clean as you go to minimize spread of hazardous waste.
   b. Dispose of hazardous waste and related contaminated materials (oil-soaked rags) in accordance with local procedures in an environmentally safe manner. Do not throw hazardous materials in the trash or down the drain.

4. Properly store chemicals.
   a. Store chemicals in a cool, dry, well ventilated container.
   b. Use separate containers for each chemical.
   c. Clearly mark each container.
   d. Place the proper MSDS sheet on each container.
   e. Do not store chemicals with any other materials such as fuels, oils, paint products, or ammonia.

5. Use all safety equipment required by local policy or law when handling hazardous materials and waste.
   a. Examine the manufacturer's MSDS to determine specific hazards associated with hazardous materials.
   b. Identify local policies on the appropriate PPE for counteracting health hazards associated with hazardous materials and waste.

6. Select correct handling procedures for materials and waste.
   a. Consult manufacturer's MSDSs for specific guidance on handling hazardous materials.
   b. Know local SOPs for handling hazardous materials, substances, and waste.

7. Report spills and other violations in accordance with Installation Spill Contingency Plan (ISCP). Reporting procedures and reportable quantities may vary from installation to installation.

8. Turn-in hazardous substances.
   a. Ensure hazardous substances are in durable, leak proof containers appropriate for the type of hazardous material.
   b. Ensure containers are labeled in accordance with local SOPs.
   c. Transport substances to turn-in point in accordance with hazardous material transporting procedures as outlined in unit SOP.

9. Conserve resources.
   a. Recover useable items; recycle and reuse them whenever possible.
   b. Do not stockpile items, particularly hazardous materials. Order only what is needed.
   c. Use nonhazardous substitutes for items whenever possible.
   d. Do not use and reuse natural resources until they become unserviceable. Examples include using camouflage nets instead of tree branches to camouflage vehicles, conducting cross country marches along varying routes to preserve the land, and practicing water crossing techniques on dry land prior to crossing the actual water crossing site.
   e. Consolidate potentially environmentally-damaging activities in one location to minimize damage. An example is mixing chemicals for numerous ROWPUs in the same spot.

Performance Measures	GO	NO-GO
1. Applied Risk Management Procedures.	____	____
2. Complied with environmental law and local procedures for environmental protection.	____	____
3. Maintained a clean and safe work area.	____	____
4. Stored chemicals properly.	____	____
5. Used all safety equipment required by local policy or law when handling hazardous materials and waste.	____	____
6. Selected correct handling procedures for materials and waste.	____	____
7. Reported spills and other violations in accordance with local Installation Spill Contingency Plan.	____	____
8. Turned in hazardous substances per local operating procedures.	____	____
9. Conserved resources.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
AR 200-1	
DA PAM 200-1	
FM 3-100.4	
FM 10-52-1	
FM 100-14	

Set Up/Operate/Dismantle and PMCS the Ocean Intake Structure System (OISS)

101-92W-1081

Conditions: Given the requirement to produce potable water, the soldier, assigned to an operational DS water supply point in a coastal environment, must deploy the Ocean Intake Structure System (OISS). Materials needed; an operational complete ROWPU with the OISS, a raw water storage tank, a water pump, a wet suit (if needed), and at least two flotation devices. Form needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Standards: Set up, operated, dismantled, and performed before-, during-, and after-operations PMCS on the OISS.

Performance Steps

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

NOTE: Components of the 2-, 4-, and 6-points systems may vary. This task is based on the 4-point system used with the 1,500-GPH TWPS.

1. Apply risk management procedures (reference: FM 3-100.12).
    a. Understand and execute the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

2. Set Up the OISS.
    a. Perform inventory.
    b. Check for accountability.
    c. Perform before-operations PMCS. Check and inspect all hoses, fittings, valves, gaskets, well point fabric protectors, well point fabrics and screens, well point jetting shoes and valves, and discharge valves for obvious damage.
    d. Inspect water pump.
    e. Lay components out according to desired configuration (two, four, or six well points) and make all the connections necessary to begin jetting the points.

NOTE: "Jetting the wellpoints" is a procedure for forcing water through the risers, out the wellpoints and into the sand. The jet of water fluidizes the sand and allows the wellpoint to easily sink down into the sand. A water source is required to jet the wellpoints. Each of the four wellpoints are jetted into the sand in essentially the same manner with a few changes in connections. Refer to the TM for an illustration of how various raw water system components are assembled in order to jet a wellpoint.

3. Operate the OISS.
    a. Jetting the First Point.

WARNING: Water pressure will fluidize the sand and could create a large unstable area surrounding the well point. As a result, the person inserting the well point could sink below the surface of the water or under the sand. The person holding the well point must wear flotation gear and be tied to a safety line. Additional personnel must be present to retrieve the individual if the individual falls or sinks into the sand as it is fluidized. Failure to observe this warning may result in death from drowning or suffocation.

    (1) Connect a 2 inch x 50 foot, green-banded raw water discharge hose from the discharge of the diesel-driven pump to a 2 inch x 10 foot, yellow-banded OISS suction hose that is connected to the elbow of the first wellpoint to be jetted.
    (2) Start the diesel-driven pump as described in TM.
    (3) For low tide installations, one person holds the safety line and a second person remains near the person installing the wellpoint. The second person holds the suction hose and assists the person installing the wellpoint in the event the person falls or sinks into the sand as it is fluidized.

Performance Steps

(4) Move the wellpoint into position in a vertical orientation and insert the bottom of the wellpoint into sand. Do not force the wellpoint. Allow it to drive itself into the sand, raising and lowering the wellpoint to wash fine material from the well location.
(5) Continue jetting the wellpoint until the elbow or tee is just above the sand level.
(6) Continue pumping water into the wellpoint for five minutes to flush fine materials from the well. During this five minute period, raise and lower the wellpoint about one foot every ten seconds.
(7) After flushing for five minutes, slow the diesel engine to idle speed.

b. Jetting the Second Point.
(1) Disconnect the 2 inch x 50 foot, green-banded discharge hose from the 2 inch x 10 foot, yellow-banded OISS suction hose.
(2) Connect the discharge hose to another 2 inch x 10 foot, yellow-banded OISS suction hose that is connected to the 2 inch tee of a second wellpoint/riser assembly. Cap the unused port of the tee.
(3) Increase the diesel engine speed to establish flow for jetting the wellpoint.
(4) Connect a second 2 inch x 10 foot, yellow-banded OISS suction hose to the first hose on the jetted wellpoint to determine where to jet the second wellpoint into the sand using the same procedures that were followed to jet the first wellpoint.
(5) Jet the second wellpoint into the sand using the same procedures that were followed to jet the first wellpoint. Observe the warning.
(6) After flushing the second wellpoint for five minutes, slow the diesel engine to idle speed.
(7) Remove the discharge hose from the 2 inch x 10 foot, yellow-banded OISS suction hose.
(8) Connect the two 10-foot, yellow-banded suction hoses from the first wellpoint to the 2nd wellpoint.

c. Jetting the Third Point.
(1) If the floating inlet strainer is used as the water source for jetting the wellpoints, repeat the procedures that were followed for the first two wellpoints to jet the third and fourth wellpoints into the sand. Use the yellow-banded OISS suction hoses as a guide to determine the location of the wellpoints. Insert the 2 x 2 x 3 inch tee adapter between the second and third wellpoints.
(2) If two submerged wellpoints are used as the water source, use the two jetted wellpoints as the source of water for jetting the third and fourth wellpoints as follows:
(a) Remove the submerged wellpoint assembly from the water.
(b) Connect on 10 foot, yellow-banded OISS suction hose to the 2 inch tee of the second wellpoint.
(c) Connect the 2 x 2 x 3 inch tee adapter to the other end of the hose.
(d) Cap the other 2 inch end of the tee assembly.
(e) Connect the 2 inch discharge hose from the raw water pump to another 10 foot, yellow-banded OISS suction hose that is connected to the 2 inch tee of the third wellpoint/riser assembly. Remove the hose from the other end of the tee and cap the tee.
(f) Increase the diesel engine speed to establish flow for jetting the wellpoint.
(g) Using the 10 foot suction hose on the third wellpoint as a guide, determine the location of the third wellpoint form the 2 x 2 x 3 inch tee adapter.
(h) Jet the third wellpoint into the sand using the same procedures that were followed to jet the first and second wellpoints. Observe the warning.
(i) After flushing the third well point for five minutes, slow the diesel engine to idle speed.
(j) Remove the discharge hose from the 10 foot suction hose.
(k) Connect the suction hose to the 2 x 2 x 3 inch tee adapter.
(l) Connect a 10 foot suction hose from the tee of the jetted third wellpoint and cap the other end of the hose.

Performance Steps

d. Jetting the Fourth Point.
   (1) Connect a 2 inch x 10 foot, yellow-banded OISS suction hose to the fourth wellpoint.
   (2) Using the 10 foot hose on the third wellpoint and the 10 foot hose on the fourth wellpoint, determine where to jet the fourth wellpoint.
   (3) Jet the fourth wellpoint into the sand using the same procedures that were followed to jet the other three wellpoints. Observe the warning.
   (4) After flushing the fourth wellpoint for five minutes, shut down the diesel pump.
   (5) Remove the discharge hose from the 10 foot suction hose.
   (6) Connect the two 10 foot suction hoses between the third and fourth wellpoints.
   (7) If the OISS is going to be submerged at high tide, secure all cam locks with plastic wire ties.
   (8) Perform during-operations PMCS.
      (a) Perform routine maintenance as required.
      (b) Troubleshoot system as needed.
      (c) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
      (d) Give form to supervisor at the end of shift.

4. Dismantle the OISS.

NOTE: When removing the well point (s), the area near the hole will fluidize, creating a wide hole. This could result in loss of solid footing and the operator could fall into the hole being drilled. This could result in death by drowning. Ensure that there is someone nearby who may render assistance while the well points are being removed.

a. Remove well points
   (1) Pull the well point out of the sand by hand if possible.
   (2) If not by hand, keep enough water to assist removing the well points. Start by connecting the hoses on the pump as if to insert a well point (suction side connected to the water source and the distribution side connected to the hose and well point assembly).
   (3) Connect the 2-inch gate valve to the distribution side of the raw water hose.
   (4) Turn the pump on in order to produce a jet of water and place it around the well point assembly being pulled. Move the jet of water up and down and the jet of water will loosen the sand around the well point in the ground. Have another soldier pull the well point out. When done, remove the other points using the same procedure.
   (5) Conduct after operations PMCS. Check and inspect all hoses, fittings, valves, gaskets, well point fabric protectors, well point fabrics and screens, well point jetting shoes and valves, and discharge valves for obvious damage done during operations. Write all deficiencies in DA Form 2404/DA Form 5988-E. Perform routine maintenance as required to prevent corrosion.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Set Up the OISS.	____	____
3. Operated the OISS.	____	____
4. Dismantled the OISS.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 2404	AR 200-1
DA FORM 5988-E	FM 10-52
FM 3-100.12	FM 10-52-1
	FM 100-14

Operate/Perform PMCS on the Diesel Generators

101-92W-1082

Conditions: Given the requirement to produce potable water or operate a well-head, the soldier, assigned to an operational DS water supply point in a field environment, must operate/perform PMCS on the diesel-driven, 3-kw/15-kw/30-kw/60-kw generator. Materials needed: a grounded diesel-driven 3-kw/15-kw/30-kw/60-kw generator, a fire extinguisher, 15 gallons of fuel, 3 quarts of oil, TM 9-6115-639-13&P, TM 9-6115-464-12, TM 5-6115-465-12, TM 5-6115-545-12, TM 9-6115-645-10, TQG, rags, pencil, and earplugs. Form needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/ DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Standards: Performed before-, during-, and after-operations PMCS. Set the controls. Started the generator. Operated the generator. Shut down the generator. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Gave the completed forms to immediate supervisor at the end of each shift.

Performance Steps

DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if cautions are not observed. Do not operate the generator until the ground terminal stud has been connected to a suitable ground.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS:

Hearing protection is required when operating this equipment.

Handle and dispose of hazardous materials and waste (such as used oil, contaminated fuel, and chemical solutions) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws. Wear the appropriate personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

1. Apply risk management procedures (reference: FM 3-100.12).
    a. Understand and execute the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

WARNINGS: Use caution when lifting or moving the 3-kw generator set to prevent injury to personnel and damage to equipment. Use lifting rings for lifting device and forklift pockets for forklift only. Do not lift object over personnel. Failure to observe this warning can result in personal injury and/or equipment damage.

If damaged or defective components are discovered, repair must be performed before operation can begin. Perform required repairs and adjustments before proceeding. Do not operate the generator set with damaged components. Personal injury can occur if damaged parts are left unfixed. Failure to observe this warning can result in personal injury and/or equipment damage.

2. Perform before-operations PMCS.
    a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of each shift.

Performance Steps

3. Operate the 3-kw generator.
    a. Set the controls.
        (1) Position Volt-amps transfer switch to L3-L1.
        (2) Turn Voltage rheostat knob to left position.
        (3) Flip engine primer switch to off position.
        (4) Flip start/run/stop switch to stop position.
        (5) Flip circuit breaker to open position.
        (6) Flip panel light switch to off position.
        (7) Flip voltage sensing switch to local position.
        (8) Flip operations switch to single unit operation.
        (9) Push DC circuit breaker to closed position.
        (10) Push manual speed control knob fully in.
    b. Start the generator.

CAUTION: Do not crank engine for more than 15 seconds. Damage to starter motor can occur. Wait 15 seconds before attempting to crank again. If engine does not run after third attempt, refer to Troubleshooting.

        (1) Pushed in DC circuit breaker.
        (2) Flip start/run/stop switch in the run position.
        (3) Flip battle short switch on.
        (4) Test fault indicator light.
        (5) Flip battle short switch off.
        (6) Check air cleaner, circuit breaker, and battle short indicator lights.
        (7) Flip start/run/stop switch to start.
        (8) Flip start/run/stop switch to run.
        (9) Adjust speed control knob to achieve 60 Hz on frequency meter.
        (10) Adjust voltage adjust knob to corresponding reading.
        (11) Flip circuit breaker to close.
    c. Perform during-operations maintenance.
        (1) Perform routine operation maintenance as required.
        (2) Troubleshoot generator as needed.
        (3) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
        (4) Give form to supervisor at the end of each shift.
    d. Operate the generator.
        (1) Observe engine for normal indications.
        (2) Observe generator instruments for normal indications.
        (3) Refuel and add oil to generator as required; annotate on DA Form 2404/DA Form 5988-E.
    e. Shutdown the generator.
        (1) Flip AC circuit breaker to open.
        (2) Allow engine to operate for three minutes.
        (3) Flip start/run/stop switch to stop.
        (4) Pull out DC circuit breaker button.
    f. Perform after-operations maintenance.
        (1) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
        (2) Give form to supervisor at the end of each shift.

4. Operate the 15-kw generator.
    a. Perform before-operations PMCS.
        (1) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
        (2) Give form to supervisor at the end of each shift.
    b. Set controls.
        (1) Check that the reconnection board is in the 416V position.
        (2) Check that the frequency selector switch is set to 60 Hz.

Performance Steps

(3) If an auxiliary fuel supply is used, position the fuel selector valve handle in the AUXILIARY position. If using the generator set, position the handle in the SET TANK position.
(4) Close all access doors with the exception of the generator air vent and the control cubicle. Lock the generator set air inlet doors in the open position.
(5) Check that the DC circuit breaker is in the close position.
(6) If the generator set fuel tank is being used place the start/run/stop switch in the run position and the battle short switch in the on position. Check fuel level gauge for sufficient fuel indication.
(7) Leave the start/run/stop switch in the run position and the battle short switch in the on position a sufficient length of time to ensure the day tank assembly contains enough fuel for starting.
(8) Place the battle short switch in the off position.
(9) Depress the fault location indicator TEST or RESET switch, and check that all fault location indicator lights illuminate.
(10) Pull the manual speed control all the way out, then push it approximately halfway in.

WARNING: Never attempt to start the generator set if it is not properly grounded. Failure to observe this warning may result in serious injury or death by electrocution.

CAUTION: Do not crank the engine in excess of 15 seconds. Allow the starter assembly to cool at least 15 seconds between cranking.

c. Start the generator.
(1) Hold the start/run/stop switch in the start position until the engine oil pressure gauge indicates oil pressure and voltmeter indicates voltage.
(2) Release the start/run/stop switch to the run position.
(3) If the ambient temperature is below 50 degrees Fahrenheit, the use of the start aid assembly may be required.
--Crank the generator set engine.
--Inject a "shot" of ether into the air cleaner assembly by placing the engine primer switch in the ON position and then releasing.

CAUTION: If the engine fails to start after injecting three "shots" of ether, cease operation and notify maintenance personnel.

(4) If the engine fails to start within 15 seconds, release the start/run/stop switch and allow the cranking motor to cool at least three minutes and repeat the steps for using the start aid assembly.
(5) Place the VOLTS/AMPS transfer switch to the 416V operation position.
(6) Rotate the VOLTAGE ADJUST rheostat until 416V is indicated on the AC Voltmeter.
(7) Adjust frequency to 60 Hz as indicated on the frequency meter by rotating the manual speed control.

CAUTION: If any of the indicator lights illuminate, stop the generator set and correct the indicated fault before proceeding with operations.

(8) Hold the circuit breaker switch in the close position until the circuit breaker indicator illuminates.
(9) Observe all engine and generator instruments for normal readings.
(10) Perform during-operations maintenance.
(a) Perform routine operation maintenance as required.
(b) Troubleshoot generator as needed.
(c) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
(d) Give form to supervisor at the end of each shift.

d. Run the generator.
(1) Rotate the VOLTS-AMPS transfer switch to each phase position while observing the AC AMPMETER. If more than rated load is indicated in any phase, replace generator set.
(2) Check the kilowatt meter gauge. If the gauge is indicating more than 100 percent rated load, replace generator set.
(3) Check oil pressure gauge located on engine. It should indicate 20 psi minimum.
(4) Check running time meter periodically in order to perform PMCS at proper intervals.

Performance Steps

(5) Check battery indicator. It should indicate positive while battery is charging and near zero when battery is fully charged.
(6) Check AC Voltmeter. It should indicate 416V.
(7) Check frequency meter. It should indicate 60 Hz.
(8) Check fuel and oil lines and connections for leaks.

e. Shut down the generator.
(1) Place the circuit breaker switch in the OPEN position.
(2) Place the start/run/stop switch in the STOP position.
(3) Perform after-operations maintenance.
(a) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E
(b) Give form to supervisor at the end of the shift.

5. Operate the 30-kw generator.
a. Perform before-operations PMCS.
(1) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
(2) Give form to supervisor at the end of each shift.
b. Set the controls.
(1) Position Volt-Amps transfer switch to L3-L1.
(2) Turn VOLTAGE rheostat knob to LEFT position.
(3) Flip engine primer switch to off position.
(4) Flip start/run/stop switch to stop position.
(5) Flip circuit breaker to open position.
(6) Flip PANEL LIGHT switch to off position.
(7) Flip VOLTAGE sensing switch to local position.
(8) Flip operations switch to single unit operation.
(9) Push DC circuit breaker to closed position.
(10) Push manual speed control knob fully in.
c. Start the generator.
(1) Push in DC circuit breaker.
(2) Flip start/run/stop switch to run.
(3) Flip battle short switch on.
(4) Test fault indicator light.
(5) Flip battle short switch to off.
(6) Check air cleaner, circuit breaker, and battle short indicator lights.
(7) Flip start/run/stop switch to start.
(8) Release the start/run/stop switch to the run position.
(9) Adjust speed control knob to achieve 60 Hz on frequency meter.
(10) Adjust voltage adjust knob for 208 volts AC.
(11) Flip circuit breaker to close.
(12) Perform during-operations PMCS (reference: TM 5-6115-465-12).
(a) Perform routine operation maintenance as required.
(b) Troubleshoot generator as needed.
(c) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
(d) Give form to supervisor at the end of each shift.
d. Run the generator.
(1) Observe engine for normal indications.
(2) Observe generator instruments for normal indications.
(3) Refuel and add oil to generator as required; annotate on DA Form 2404/DA Form 5988-E.
e. Shut down the generator.
(1) Flip AC circuit breaker to open.
(2) Allow engine to operate for three minutes.
(3) Flip start/run/stop switch to stop.
(4) Pull out DC circuit breaker button.

Performance Steps

(5) Perform after-operations PMCS (reference: TM 5-6115-465-12).
(a) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
(b) Give form to supervisor at the end of each shift.

6. Operate the 60-kw generator.
a. Perform before-operations PMCS.
(1) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
(2) Give form to supervisor at the end of each shift.
b. Set the controls.
(1) Connect generator set to load.
(2) Close DC control circuit breaker.
(3) Check fuel level on fuel level gauge by placing start/run/stop switch in run position and battle short switch in on position.
(4) Check that low oil pressure under volt and under frequency fault indicators light.
(5) Press TEST or RESET switch.
(6) Return both switches to the stop and off position, respectively.
(7) Make sure shutters on radiator end of the engine generator are not manually locked open and check that shutters open and close freely when actuated by shutter manual control handle.
(8) Close all doors except those on control cubicle end of engine generator set.
(9) Fasten control cubicle doors and doors below control cubicle in open position using door latches.
(a) Perform routine operation maintenance as required.
(b) Troubleshoot generator as needed.
(10) Connect battery terminal minus (-) to the ground.
c. Start the generator.
(1) Crank engine by placing start/run/stop switch in start position.

CAUTION: Do not hold the switch for more than 15 seconds at a time. Allow at least 15 seconds to elapse between starting attempts.

(2) When air temperature is below plus 40 degrees Fahrenheit, engine ether primer may be required. To use ether primer, momentarily place engine primer switch in the ON position and release while cranking the engine. Each time the switch is cycled, one metered shot of ether is injected into engine air intake system.
(3) After engine starts, continue to hold start/run/stop switch in start position until oil pressure gauge reading is above 20 psi and main generator voltage is normal. AC voltmeter should indicate 208/416 volts if AMPS-VOLTS selector switch is set at L1-L2, L2-L3 or L1-L3.
(4) Position voltage adjust rheostat as required to obtain proper voltage output (440 VAC).
(5) Adjust manual throttle control to obtain 60 Hz on frequency meter.
(6) Allow engine to warm up to normal operating temperature (100 degrees Fahrenheit to 150 degrees Fahrenheit) with no load applied.

CAUTION: To prevent engine carbon deposits, do not run engine-generator sets for more than five minutes at governed speed without load.

(7) Reset fault indicator lights by pressing test or reset switch. If fault indicators are extinguished after being reset, proceed with step 8. If any fault indicator lights up, the indicated fault must be corrected before proceeding.
(8) Close main AC contactor by momentarily placing circuit breaker switch in close position. Momentarily placing circuit breaker switch in open position will open the AC contactor.
(9) Perform during-operations PMCS (reference: TM 5-6115-545-12).
(a) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
(b) Give form to supervisor at the end of each shift.

Performance Steps

d. Run the generator.
   (1) Observe engine normal indications.
   (2) Observe generator instruments for normal indications.
   (3) Refuel and add oil to generator as required; annotate on DA Form 2404/DA Form 5988-E.

e. Shut down the generator.
   (1) Open main AC contactor by momentarily placing circuit breaker switch in open position.
   (2) Allow three minutes to elapse, and then flip the start/run/stop switch to the stop position.
   (3) After engine stops, remove DC control power by opening DC control circuit breaker.
   (4) Perform after-operations PMCS (reference: TM 5-6115-545-12).
      (a) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
      (b) Give form to supervisor at the end of each shift.

7. Operate the 60-kw Tactical Quiet Generator (TQG).

a. Initial Adjustments and Self Test.
   (1) Place dead crank switch in normal position.
   (2) Push DC control power circuit breaker in.
   (3) Place frequency select switch to 50/60 Hz.
   (4) Ensure voltage reconnection terminal board is positioned to match voltage requirements. If voltage reconnection board must be changed, notify next higher maintenance level.
   (5) Place AM-VIM transfer switch in a position corresponding to output terminal load connections.
   (6) Place parallel unit switch in unit position.
   (7) Pull out emergency stop switch.

b. Self Test.
   (1) Place master switch to prime and run position.
   (2) Push press to test push button on malfunction indicator panel. Ensure all indicator lights are lit. When press to test push button is released, all lights should go out.
   (3) Press battle short press to test light on the control panel assembly. Ensure indicator light is lit. When press to test light is released, light should go out.
   (4) Press AC circuit interrupter press to test light on the control panel assembly. Ensure indicator light is lit. When press to test light is released light should go out.

WARNINGS: High voltage is produced when generator set is in operation. Improper operation could result in personal injury or death.

Exhaust discharge contains deadly gases. Do not operate the generator in enclosed areas unless exhaust discharge is properly vented outside. Severe personal injury or death due to carbon monoxide poisoning could result.

NOTE: If generator set is to be operated in parallel with another unit, refer to parallel unit operation.

c. Start generator.

CAUTION: Do not crank engine in excess of fifteen seconds. Allow starter to cool at least fifteen seconds. Failure to observe this caution could result in damage to the starter.

NOTE: At temperatures below 40 degrees Fahrenheit (4 degrees Celsius) it may be necessary to use the cold weather starting aid. Ensure all generator set access doors, except control panel access door are closed.

   (1) Rotate master switch to start position.
   (2) During cold weather conditions, push ether switch to on position as required, until engine accelerates to governed speed.
   (3) Hold master switch in start position until oil pressure reaches at least 25 psi (172 kPa), voltage has increased to its approximate rated value, and engine has reached stable operating speed.
   (4) Release master switch to prime and run position.

Performance Steps

(5) When operating with an auxiliary fuel source, rotate master switch to prime and run auxiliary fuel position.

NOTE: Warm up engine without load for five minutes. If required, load can be applied immediately.

(6) Check coolant temperature (170 to 200 degrees F, 77 to 93 C) and oil pressure (25 to 60 psi (172 to 414 kPa) indicators for normal readings.
(7) Turn voltage and frequency adjust potentiometers to required values for voltage and frequency.
(8) Press ground fault circuit interrupter test push button. Ensure indicator window is clear. Press reset push button and ensure indicator is red.
(9) Ensure voltage and frequency are still at rated values. Adjust if necessary.
(10) Rotate AM-VM transfer switch to each phase position while observing ammeter (PERCENT RATED CURRENT). If more than rated load is indicated in any phase, reduce load.
(11) Check kilowatt meter (PERCENT POWER). If indication is more than 100 percent rated load, reduce load.

WARNING: With any access door open, the noise level of this generator set when operating could cause hearing damage. Hearing protection must be worn when working near the generator set while running.

(12) Perform during-operations PMCS (reference: TM 9-6115-645-10).
  (a) Perform routine operation maintenance as required.
  (b) Troubleshoot generator as needed.
  (c) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
  (d) Give form to supervisor at the end of each shift.

d. Run the generator.
  (1) Observe engine and generator instruments for normal indications.
  (2) Refuel and add oil to generator as required; annotate on DA Form 2404/DA Form 5988-E.

e. Shut down the generator.
  (1) Place AC circuit interrupter switch in open position.
  (2) Allow generator to operate five minutes with no load applied.
  (3) Place master switch in off position.
  (4) Place dead crank switch in off position.
  (5) Perform after-operations PMCS (reference: TM 9-6115-645-10).
    (a) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    (b) Give form to supervisor at the end of each shift.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Performed before-operations PMCS.	____	____
3. Operated a 3-kw generator.	____	____
4. Operated a 15-kw generator.	____	____
5. Operated a 30-kw generator.	____	____
6. Operated a 60-kw generator.	____	____
7. Operated a 60-kw TQG generator.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required

DA FORM 2404
DA FORM 5988-E
FM 3-100.12
TM 5-6115-465-12
TM 5-6115-545-12
TM 9-6115-464-12
TM 9-6115-639-13&P
TM 9-6115-645-10

Related

FM 10-52
FM 10-52-1

Subject Area 3: Water Storage, Distribution, and Issue Operations

Operate/Perform PMCS on the 350-GPM Diesel Water Pump
101-92W-1044

Conditions: Given the requirement to distribute potable water at a DS/GS water point, the soldier must perform PMCS, operate and maintain the 350-GPM diesel pump. Materials needed: a 350-GPM pump, a fire extinguisher, 15 gallons of fuel, 1 quart of oil, earplugs, TM 10-4320-226-14, and a pencil. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet), DD Form 1970 (Motor Equipment Utilization Record)/ DA Form 5987-E (Motor Equipment Dispatch), and DA Form 1714-R (Daily Water Issue Log).

Standards: Performed before-, during-, and after-operations PMCS. Positioned the pump. Connected, operated, and shut down the pump. Completed entries on DA Form 1714-R for daily water issues and DD Form 1970/DA Form 5987-E for hours of operation. Recorded on DA Form 2404/DA Form 5988-E actions taken to correct deficiencies and shortcomings. Gave the completed forms to immediate supervisor at the end of each shift.

Performance Steps
WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

NOTE: There are various models of the 350-GPM pump where information may differ slightly in other technical manuals.

CAUTIONS: Hearing protection is required when operating this equipment.

Handle and dispose of hazardous material (such as used oil, contaminated fuel, and chemicals/solutions) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

1. Apply risk management procedures (reference: FM 3-100.12).
    a. Understand and execute the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Perform before-operations PMCS (reference: TM 10-4320-226-14).
    a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of the shift.
3. Position the pump.
    a. Select a level site not more than 25 feet above the water supply.
        (1) Clean and clear the site.
        (2) Ensure the surface is firm.
    b. Extend trailer support legs, disconnect the pump from the cargo truck pintle, and chock wheels.
    c. Move fuel selector valves to "Fuel Tank" position.
    d. Position pump as close as possible to source, making sure there is enough room on all sides to operate and ventilate the unit.
4. Connect the pump.
    a. Connect hard rubber hose(s) to the suction inlet.
    b. Connect hose(s) to the discharge outlet.

Performance Steps

5. Operate the pump.

CAUTION: Never operate pump in an enclosed area unless the exhaust gases are piped to the outside. Wear ear protection while pump is operating.

a. Close suction and discharge valves, open vent valve, and prime the pump.
b. Push and raise throttle control from detent latch, release it, and adjust to the idle position.
c. Pull out Emergency Stop switch.

CAUTION: Do not operate starter motor for more than 10 seconds, damage to starter can result.

d. Push in start switch and oil pressure bypass switch simultaneously.
e. Upon engine start, release start switch.

NOTE: The engine will shut down when oil pressure bypass switch is released if oil pressure is less than 8 psi.

f. Allow engine to idle two minutes.
g. Open suction valve.
h. Observe the end of the vent line for water flowing from it. Close vent valve once water begins to flow from line.
i. Slowly open discharge valve.
j. Turn throttle control counterclockwise to increase or clockwise to decrease engine speed.

CAUTION: As the pump begins to pump, increase engine speed slowly to prevent hydraulic shock to the system when line is filled too fast, causing hose rupture and fitting failure.

k. Adjust pump speed to desired level.

CAUTION: Do not exceed 2,400 revolutions per minute (RPM) as indicated on gauge.

6. Perform during-operations PMCS (reference: TM 10-4320-226-14).
   a. Perform routine maintenance as required.
   b. Troubleshoot pump as needed.
   c. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   d. Give form to supervisor at the end of the shift.

7. Shut down the pump.

CAUTION: Do not shut engine down suddenly from full speed unless an emergency exists. Allow engine to stabilize at idle before shutdown.

   a. Turn throttle control clockwise to decrease engine speed to idle.
   b. After two minutes, close discharge valve and suction valve.
   c. Push in Emergency Stop switch.

8. Perform after-operations PMCS (reference: TM 10-4320-226-14).
   a. Log deficiencies on DA Form 2404/DA Form 5988-E.
   b. Give form to supervisor at the end of the shift.

9. Complete entries on water reports, logs, and forms.
   a. Record all daily water issues on DA Form 1714-R.
   b. Complete DD Form 1970/DA Form 5987-E for hours of operation and fuel/oil expenditures.
   c. Give form to supervisor at the end of the shift.

Performance Measures	GO	NO-GO
1. Applied risk management procedures.	____	____
2. Performed before-operations PMCS.	____	____
3. Positioned the pump.	____	____
4. Connected the pump.	____	____
5. Operated the pump.	____	____
6. Performed during-operations PMCS.	____	____
7. Shut down the pump.	____	____
8. Performed after-operations PMCS.	____	____
9. Completed entries water reports, logs, and forms.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required
DA FORM 1714-R
DA FORM 2404
DA FORM 5987-E
DA FORM 5988-E
DD FORM 1970
FM 3-100.12
TM 10-4320-226-14

Related
FM 10-52-1

Operate/Perform PMCS on the 250-CFM Air Compressor

101-92W-1046

Conditions: Given the requirement to evacuate the TWDS hose, the soldier, in a field environment, must operate and perform PMCS on the 250-CFM air compressor. Materials needed: an operationally complete 250-CFM rotary air compressor, a deployed TWDS hose line, TM 5-4310-452-14, TM 10-4320-303-13, a fire extinguisher, sufficient fuel and oil to establish operations, and earplugs. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Standards: Performed before-, during-, and after-operations PMCS. Moved the air compressor. Set up the air compressor. Set initial adjustments. Started the air compressor. Stopped the air compressor. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Gave the completed forms to immediate supervisor at the end of each shift.

Performance Steps

DANGER: Death or severe injury may result if you fail to observe precautions listed in TMs. To prevent air compressor assembly from rolling or sliding, securely lock the parking brakes. Do not operate engine around open fuel. Never refuel hot or running engines. Avoid overfilling the fuel tank. Keep open flame and sparks away from the fuel tank and battery. Wear hearing protection when within 50 feet of operating air compressor.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS: Hearing protection is required when operating this equipment.

Handle and dispose of hazardous materials (such as used oil, contaminated fuel, and chemicals/solutions) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws for drip pans or secondary containment devices.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

1. Apply risk management procedures (reference: FM 3-100.12).
    a. Understand and execute the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Perform before-operations PMCS (reference: TM 5-4310-452-14).
    a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of each shift.
3. Move the air compressor.
    a. Engage parking brake.
    b. Remove chocks from holders and install at wheels.
    c. Swing rear jacks to travel position. Store jack handles in tool boxes located at the rear of the air compressor.
    d. Position tow vehicle so the pintle hook can engage hitch (use front jack to raise or lower drawbar as necessary).
    e. Engage the tow vehicle hitch with the trailer pintle eye.
    f. Engage the tow vehicle parking brake and chock the wheels of tow vehicle.

Performance Steps

g. Use the trailer front jack to lower the drawbar until the pintle eye sits on the hitch. Continue to raise front jack until it clears ground.
h. Remove jack locking pin and fold it up to the travel position. Fully insert pin to lock. Store jack handle in clip on drawbar.
i. Attach safety chains to towing vehicle.

CAUTION: Brake hoses are crossed at the relay under the trailer frame. Do not cross hoses when hitching trailer to vehicle. Damage to brake system will occur.

j. Connect service and emergency air brake lines to tow vehicle.
k. Connect electric cable to tow vehicle.
l. Remove wheel chocks from trailer wheels and store them in holders. Attach straps to hold them in position.
m. Release trailer parking brake.

NOTE: Trailer is now ready to be towed.

CAUTION: Do not tow trailer faster than 55 miles per hour (MPH) over paved highways, 10 MPH over graded gravel roads, or 8 MPH over rough, cross-country terrain. Do not tow trailer on side slope of more than 8 degrees or up or down a ramp having a slope of more than 30 degrees.

4. Set up the air compressor.

WARNING: Do not detach from tow vehicle on slopes greater than 7 degrees.

a. Engage trailer parking brake and chock wheels.
b. Engage tow vehicle parking brake and turn off vehicle.
c. Disconnect electric cable and place plug in holder.
d. Disconnect air lines and install in dummy couplers. Pull air tank drain cable to discharge water from air tank.
e. Disconnect safety chains from tow vehicle and hook to front cross member.
f. Remove pin and swing front jack down. Fully insert pin to lock jack in position.
g. Operate front jack to lift pintle eye out of hitch.
h. Release tow vehicle parking brake and move tow vehicle away from trailer.
i. Use front jacks to level trailer.
j. Swing rear jacks down and use pins to lock in position.
k. Lower rear jacks until firm contact is made with ground.

5. Set initial adjustments.
   a. Level the unit, using the jacks, to within 15 degrees and set the parking brakes.
   b. Relieve receiver/separator system pressure.
   c. Drain water from engine fuel water separator.
   d. Ensure all service air valves are closed.
   e. Drain service air manifold.

6. Start the air compressor.
   a. Open manual blow down valve to ensure pressure is relieved from receiver/separator system. Close valve after relieving pressure.
   b. Loosen thumbscrew and drain water from water separator.
   c. Secure all service valves.

CAUTION: All service valves must be closed or the system will not build up enough air pressure to lubricate the compressor.

   d. Push manual stop handle in completely.

NOTE: The service-air valve, located on the control panel, allows the unit to start at a reduced load. When the pressure reaches approximately 50 psi, as observed on the discharge pressure gauge, the pressure reduces the engine speed. After running at reduced speed, the engine and compressor will reach operating temperature. Then press the service-air button to increase the engine speed. When the unit is stopped and air pressure is relieved, the valve automatically returns to the START position.

CAUTION: Do not operate starting motor more than 30 seconds at a time. Allow starting motor to cool approximately two minutes between starting attempts.

Performance Steps

e. Press the START button and the SAFETY CIRCUIT BYPASS button at the same time.
f. When the engine starts, release the START button but not the SAFETY CIRCUIT BYPASS button.
g. When the air pressure reaches 40 psi, release the SAFETY CIRCUIT BYPASS button.

WARNING: Do not connect the air discharge on this unit into any other unit of any description or any other source of compressed air without first installing a check valve between the common header and this unit. If this unit is connected in parallel with another unit of higher discharge pressure and capacity, a safety hazard could occur in a back-flow condition.

NOTE: When the unit reaches normal air pressure, 80 to 120 psi, it is ready for operation.

7. Perform during-operations PMCS (reference: TM 5-4310-452-14).
   a. Perform routine schedule maintenance as required.
   b. Troubleshoot compressor as needed.
   c. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   d. Give form to supervisor at the end of each shift.

8. Stop the air compressor.
   a. Close all service valves.

CAUTION: Allow the engine to idle three to five minutes without a load before turning it off.

   b. Pull the manual stop handle out and hold it out until the engine comes to a complete stop.

NOTE: As soon as the engine stops, the automatic blowdown valve should begin to relieve all pressure from the receiver-separator system.

CAUTION: Never allow the unit to sit stopped with pressure in the receiver-separator system.

   c. If the automatic blowdown valve fails to operate, use the manual blowdown valve and relieve pressure from the system.

9. Perform after-operations PMCS (reference: TM 5-4310-452-14).
   a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   b. Give form to supervisor at the end of each shift.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Performed before-operations PMCS.	____	____
3. Moved the air compressor.	____	____
4. Set up the air compressor.	____	____
5. Set initial adjustments.	____	____
6. Started the air compressor.	____	____
7. Performed during-operations PMCS.	____	____
8. Stopped the air compressor.	____	____
9. Performed after-operations PMCS.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

DA FORM 2404
DA FORM 5988-E
FM 3-100.12
TM 5-4310-452-14
TM 10-4320-303-13

Related

FM 10-52
FM 10-52-1

Operate/Perform PMCS on a Wellhead

101-92W-1047

Conditions: Given the requirement to produce potable water, the soldier, at an operational water well site in a field environment, must operate and perform PMCS on a wellhead. Materials needed: an operationally complete Army-drilled water well with either a 15-kw (TM 9-6115-464-12) or 30-kw (TM 9-6115-644-10) generator, TM 5-3820-256-10, TM 5-3820-257-10, TM 10-5430-237-12&P, paper, and pencil. Form needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/ DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Standards: Performed before-, during-, and after-operations PMCS. Installed generator on completed wellhead. Setup storage tanks. Started pumping operations. Assisted in well pumping tests. Stopped pumping operations. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Gave the completed forms to immediate supervisor at the end of each shift.

Performance Steps

DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if soldier fails to observe cautions. Do not allow soldier to operate the generator until the ground terminal stud has been connected to a suitable ground. Hearing protection is required when operating this equipment.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

NOTE: Check to ensure that soldier knows, understands, and follows the performance measures from task 101-92W-1082.

CAUTIONS: Always ground the distribution box to the ground rod and always ground the pumping assembly through the wellhead assembly to the ground rod. Never energize the distribution box or operate the pumping assembly unless they are both grounded. Injury, death, or damage to the pumping assembly, distribution box, or generator could result if a short occurs without the pumping assembly and distribution box being grounded.

Handle and dispose of hazardous materials (such as used oil, contaminated fuel, and chemicals/solutions) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

1. Apply risk management procedures (reference: FM 3-100.12).
    a. Understand and execute the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Install generator on completed wellhead.
    a. Insert the end of the power cable coming from the wellhead into the distribution box through one of the connectors. The outer jacketed part of the cable must be through and up to the output terminal lugs marked T1, T2, and T3.
    b. Connect the leads as follows: black to T1, red to T2, and yellow to T3.
    c. Insert the end of the power cable going to the generator to the connector in the bottom of the distribution box.
    d. Connect the leads as follows: black to Line 1, red to Line 2, and yellow to Line 3.
    e. Check that the three fuses are in place and not cracked or damaged.

Performance Steps

f. Insert the other end of the power cable to the generator.
g. Connect the leads as follows: Line 1 to L1, Line 2 to L2, and Line 3 to L3.

3. Perform before-operations PMCS (reference: TM 5-3820-256-10).
   a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   b. Give form to supervisor at the end of each shift.
4. Setup storage tank(s) (reference: TM 10-5430-237-12&P).
5. Start pumping operations.
   a. Close and lock the door of the distribution box.
   b. Energize the box by starting the generator.
   c. Open 2-inch gate valve on wellhead.
   d. Turn the switch on the front of the distribution box to "ON" and then push the "START" button.
   e. If the well water is muddy, place the product hose to discharge the water out and away from the storage tank. When water clears, place hose in tank.
6. Perform during-operations PMCS (reference: TM 5-3820-256-10).
   a. Perform routine maintenance as required.
   b. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   c. Troubleshoot wellhead as needed.
   d. Give form to supervisor at the end of each shift.
7. Assist in well pumping test.
   a. Determine the time it takes to fill up a 5-gallon bucket.
   b. Divide the time into 60 seconds.
   c. Multiply that number by five to give the gallons per minute pumped.
8. Stop pumping operations.
   a. Close 2-inch gate valve on wellhead.
   b. Push "STOP" button on distribution box. Then turn switch to "OFF".
   c. Shut down generator according to TM.
9. Perform after-operations PMCS (reference: TM 5-3820-256-10).
   a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   b. Give form to supervisor at the end of each shift.
   c. Record all supplies spent.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Installed generator on complete wellhead.	____	____
3. Performed before-operations PMCS.	____	____
4. Set storage tanks.	____	____
5. Started pumping operations.	____	____
6. Performed during-operations PMCS.	____	____
7. Assisted in well pumping tests.	____	____
8. Stopped pumping operations.	____	____
9. Performed after-operations PMCS.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 2404	FM 10-52
DA FORM 5988-E	FM 10-52-1
FM 3-100.12	
TM 5-3820-256-10	
TM 5-3820-257-10	
TM 9-6115-464-12	
TM 9-6115-644-10	
TM 10-5430-237-12&P	

Operate/Perform PMCS on the 600-GPM Diesel Water Pump

101-92W-1048

Conditions: Given the requirement to operate the 600-GPM water pump, the soldier, as a member of a Tactical Water Distribution Team, must operate the 600-GPM pump. Materials needed: a 600-GPM pump with an operational Tactical Water Distribution System (TWDS), a fire extinguisher, 15 gallons of fuel, 1 quart of oil, earplugs, TM 10-4320-317-13, TM 10-4320-315-10, and a pencil. Form needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet) and DD Form 1970 (Motor Equipment Utilization Record)/DA Form 5987-E (Motor Equipment Dispatch).

Standards: Performed before-, during-, and after-operations PMCS. Positioned the pump. Connected the pump. Operated the pump. Shut down the pump. Completed entries on DD Form 1970/DA Form 5987-E for hours of operation and record on DA Form 2404/DA Form 5988-E actions taken to correct deficiencies and shortcomings. Gave the completed forms to immediate supervisor at the end of the shift.

Performance Steps

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS: Hearing protection is required when operating this equipment.

Handle and dispose of hazardous materials (such as used oil, contaminated fuel, and chemicals/solutions) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulation, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

NOTE: There are various models of the 600-GPM. Operating procedures may vary depending on the model of pump used.

1. Apply risk management procedures (reference: FM 3-100.12).
    a. Understand and execute the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Perform before-operations PMCS (references: TM 10-4320-317-13 and TM 10-4320-315-10).
    a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of each shift.
3. Position the pump.
    a. Select a level site not more than 25 feet above the water supply.
        (1) Clean and clear the site.
        (2) Ensure the surface is firm.
    b. Position pump as close as possible to source, making sure there is enough room on all sides to operate and ventilate the unit.

CAUTION: Never operate pump in an enclosed area unless the exhaust gases are piped to the outside. To prevent pumping assembly from rolling or sliding, securely lock the parking brakes. Do not operate engine around open fuel. Never fuel hot or running engines. Avoid overfilling the fuel tank. Keep open flame and sparks away from the fuel tank and battery. Operating the pump against a closed suction or discharge valve will cause overheating. Wear hearing protection when within 50 feet of operating pump. Do not use a fuel transfer pump to transfer water.

Performance Steps

4. Connect the pump.
    a. Connect a hard rubber hose to the suction inlet.
    b. Connect a collapsible hose and check valve to the discharge outlet.

5. Start the pump.
    a. Start the pump using the manual mode.
        (1) Ensure the pump casing is filled with water to the level of the suction port.
        (2) Open the butterfly valves on the suction and discharge lines.
        (3) Pull out the mode switch to unlock and push left to the manual throttle position.
        (4) Turn the fuel rack handle left to the unlock position. Pull the handle fully out and turn right to the lock position.
        (5) Push the engine switch right to the start position and release. When the engine switch is released, the engine will start and run at idle speed (1,000 RPM). If the engine alarm switch sounds:
            (a) Set the engine switch to the OFF position.
            (b) Push the engine alarm reset button.
            (c) Allow one minute before restarting the engine.
    b. Start the pump using the electric manual mode.
        (1) Ensure before-operations PMCS has been completed.
        (2) Ensure the pump casing is filled to the level of the suction port.
        (3) Open the butterfly valve or the suction and discharge lines.
        (4) Turn the pressure regulator switch left to the start position.
        (5) Turn the electric speed control left to the idle position.
        (6) Pull out the mode switch and push right to the pressure regulator (normal) position.
        (7) Turn the manual throttle right until it is fully in.
        (8) Turn the fuel rack handle left to the unlock position. Push the handle fully in and turn right to the lock position.
        (9) Push the engine switch right to the start position and release. When the engine switch is released, the engine will start and run at idle speed (1,000 RPM). If the alarm sounds:-
            (a) Set the engine switch to the OFF position.
            (b) Push the engine alarm reset button.
            (c) Allow one minute before restarting the engine.
        (10) Turn the manual throttle left until it is fully out.
        (11) Set the pressure regulator switch to the electric position.
        (12) Increase the engine speed by turning the electric speed control right until the pump takes suction. If the pump fails to take suction after three minutes or overheats:
            (a) Shut down the engine.
            (b) Check the suction lines for leaks or blockage.
    c. Start the pump using the electric automatic mode.
        (1) Set the controls the same as you set them for the electric manual up to the point of setting the pressure regulator switch in step (11).
        (2) Set the pressure regulator switch right to the AUTO position. The engine speed is now automatically controlled by the pressure regulator. The regulator provides 150 psi discharge pressure at suction pressures of 20 psi to 120 psi.

6. Operate the pump.
    a. Operate the pump in manual mode.
        (1) Start the pump according to previously listed directions.
        (2) Turn the manual throttle left until the pump takes suction. If the pump fails to take suction after three minutes or overheats, shut down the engine and notify organizational maintenance.
        (3) Be sure the suction pressure does not fall below 10 psi or the discharge pressure rise above 150 psi to prevent damage to the pump. Suction and discharge pressure will vary depending on operating conditions and engine speed.

Performance Steps

(4) Monitor the suction and discharge pressures when the pump is operated in the manual mode. If the suction pressure falls below 10 psi or if the discharge pressure rises above 150 psi, reduce the engine speed to regain proper pressure. If needed, cut back to idle until the problem is corrected.
(5) Use the manual throttle to adjust the engine speed. Turn left (out) to increase speed. Turn right (in) to decrease speed.

b. Operate pump in electric manual mode.
(1) Start the pump according to previously listed directions.
(2) Use the electric speed control to adjust the engine speed. Turn right to increase speed. Turn left to decrease speed.
(3) Monitor the suction and discharge pressures when the pump is operated in the electric manual mode. If the suction pressure falls below 10 psi or if discharge pressure rises above 150 psi, reduce the engine speed to regain the proper pressure. If needed, cut back to idle until the problem is corrected.

c. Operate the pump in electric automatic mode.
(1) Start the pump according to previously listed directions.
(2) Set the pressure regulator switch. The engine speed is automatically controlled by the pressure regulator, which provides 150 psi discharge pressure at suction pressures of 20 to 120 psi.

7. Perform during-operations PMCS (references: TM 10-4320-317-13 and TM 10-4320-315-10).
a. Perform routine maintenance as required.
b. Troubleshoot pump as needed.
c. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
d. Give form to supervisor at the end of the shift.

8. Shut down the pump.
a. Stop pump using manual mode.
(1) Turn the manual throttle to fully IN position.
(2) Let the engine idle two or three minutes.
(3) Push the engine switch left to the OFF position. The engine will shut down.
b. Stop pump using electric manual mode.
(1) Turn the electric speed control left to the idle position.
(2) Let the engine idle for two or three minutes.
(3) Push the engine switch left to the OFF position. The engine will shut down.
c. Stop pump using electric automatic mode.
(1) Turn the electric speed control left to the idle position.
(2) Turn the pressure regulator switch left to the electric position.
(3) Push the engine switch left to the OFF position.

9. Perform after-operations PMCS (references: TM 10-4320-317-13 and TM 10-4320-315-10).
a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
b. Record hours of operation and fuel/oil expenditures.
c. Give form to supervisor at the end of the shift.

10. Complete entries on water reports, logs, and forms.
a. Complete DD Form 1970/DA Form 5987-E for hours of operation and fuel/oil expenditures.
b. Give form to supervisor at the end of the shift.

Performance Measures	GO	NO-GO
1. Applied risk management procedures.	____	____
2. Performed before-operations PMCS.	____	____
3. Positioned the pump.	____	____
4. Connected the pump.	____	____
5. Started the pump.	____	____
6. Operated the pump.	____	____
7. Performed during-operations PMCS.	____	____
8. Shut off the pump.	____	____
9. Performed after-operations PMCS.	____	____
10. Completed entries on water reports, logs, and forms.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 2404	FM 10-52-1
DA FORM 5987-E	
DA FORM 5988-E	
DD FORM 1970	
FM 3-100.12	
TM 10-4320-315-10	
TM 10-4320-317-13	

Set Up, Operate, Perform PMCS/Dismantle the 100/400-GPM Hypochlorination Unit
101-92W-1055

Conditions: Given the requirement to distribute potable water, the soldier, assigned to a GS water unit in a field environment, must set up, operate, perform PMCS, and dismantle the 100/400-GPM hypochlorination unit. Materials needed: an operationally complete hypochlorination unit, a 125-GPM and 350-GPM water pumps, a Potable Water Storage and Distribution System (PWS/DS), a fire extinguisher, TM 5-4610-233-13&P, TM 5-4610-228-13, TM 10-4610-244-13, sufficient fuel and oil to establish operations, and earplugs. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet), DA Form 1714-R (Daily Water Issue Log), and DA Form 1714-1-R (Daily Water Distribution Log).

Standards: Performed before-, during-, and after-operations PMCS. Prepared hypochlorination unit for use. Performed initial startup. Set solution feed adjustment. Refilled reservoir tank. Shut down hypochlorination unit. Prepared hypochlorination unit for movement. Recorded on DA Form 2404/5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Gave the completed forms to immediate supervisor at the end of each shift.

Performance Steps
WARNINGS: The hypochlorination unit weighs over 175. At least four people are needed to lift it to prevent personal injury or damage to the equipment. The hypochlorite solution is toxic to skin and eyes. If calcium hypochlorite comes into contact with skin or eyes, flush right away with water. Seek medical help. Store calcium hypochlorite in a cool, dry place. Keep container closed. Mix only in accordance with directions for use. DO NOT allow calcium hypochlorite to mix with any other materials, such as fuels, oils, paint products, or ammonia. This may cause fire or hazardous gases. The hypochlorination unit contains water under high pressure during and after operation. If this pressure is not relieved before working on the unit, serious injury may occur. If the hypochlorination unit stops working properly or residual test does not give satisfactory reading, immediately shut down operation of distribution point, notify your supervisor, and take corrective action.

CAUTIONS: Handle and dispose of hazardous materials (such as used oil, contaminated fuel, and chemicals/solutions) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the appropriate personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

1. Apply risk management procedures (reference: FM 3-100.12).
    a. Understand and execute the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

2. Perform before-operations PMCS (references: TM 5-4610-233-13&P and TM 10-4320-303-13).
    a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of each shift.

3. Prepare hypochlorination unit for use.
    a. Close all drain cocks/valves.
    b. Close all inlet and outlet cocks/valves.
    c. Connect hose from water supply to manifold inlet and hose from reservoir tank to manifold outlet.

Performance Steps

d. Fill reservoir tank with 4 gallons of clear water.

WARNING: Wear protective shield and chemical gloves when handling calcium hypochlorite. Hypochlorite will give off chlorine vapor which will burn your nose, throat, and lungs if breathed directly. Keep head away from the top of reservoir tank while filling it. Seek medical attention if fumes are inhaled.

NOTE: Premixing calcium hypochlorite with water in a bucket will help dissolve the calcium hypochlorite more effectively.

e. Add one gallon of water and the required amount of calcium hypochlorite to a bucket for desired parts per million. Refer to hypochlorination unit instruction plate.
f. Stir vigorously until calcium hypochlorite is dissolved.
g. Add the premixed solution of calcium hypochlorite and water to the reservoir tank.
h. Stir the calcium hypochlorite solution in the reservoir.

4. Perform initial startup.
   a. Set solution feed pump/stroke adjust knob to 50 percent.
   b. Loosen injection nozzle tube nut.
   c. Move foot valve assembly suction tube up and down rapidly several times to prime solution feed pump.
   d. Tighten injection nozzle tube nut.
   e. Ensure range adjusting valve is in fully open position (parallel to manifold flow) and insert quick-release pin to secure valve.
   f. With shutoff valve at water pump discharge closed, start the 125 and 350-GPM water pumps (references: TM 5-4320-304-14, TM 5-4320-208-12&P, TM 10-4320-309-14, TM 10-4320-226-14, and TM 10-4320-325-14).
   g. With the valve downstream of the hypochlorination unit closed, slowly open valve at the discharge side of the water pump.
   h. Slowly open the downstream valve and allow water to fill the line.
   i. Remove quick-release pin from range adjusting valve and set range adjusting valve for water line flow rate. Install quick-release pin to secure range adjusting valve (refer to hypochlorination unit instruction plate).
   j. Open inlet shutoff valve, outlet shutoff valve, and hypochlorite solution shutoff valve.
   k. Check that operating pressure indicated on pressure gauge is between 25 and 100 psi.

5. Set solution feed adjustment.

NOTE: Hypochlorination unit should operate for 5 minutes before testing. Conduct chlorine residual test as prescribed in TM 10-6630-222-12&P.

   a. Obtain water sample for testing and perform a chlorine residual test.
   b. Record results.

NOTE: If chlorine residual level indication is below desired level go to step d (reference: TB MED 577)

   c. Set solution feed pump stroke adjusting knob to 30 percent and go to step e.
   d. Set the solution feed pump stroke adjusting knob to 70 percent.
   e. Repeat step a.

NOTE: If chlorine residual level indication is below desired level, go to step g (reference: TB MED 577).

   f. Add chlorine-free water to reservoir tank using tank fill valve and go to step h.
   g. Adjust solution feed pump stroke adjusting knob to a slightly higher setting.
   h. Do steps a and b and continue to adjust solution feed pump stroke adjusting knob until the desired chlorine residual is achieved.

6. Perform operational maintenance.
   a. Refill reservoir tank.
      (1) Close outlet valve.

NOTE: Premix in a bucket to dissolve calcium hypochlorite more effectively.

      (2) Add required ounces of calcium hypochlorite to reservoir tank for desired ppm dosage.
      (3) Pour calcium hypochlorite solution into reservoir.

Performance Steps

(4) Open valve to refill reservoir tank with water.
(5) Close valve when tank is full.
(6) Stir solution in reservoir.
(7) Open outlet valve.
(8) Adjust solution feed pump, if required.

b. Troubleshoot unit as required. Refer to TM.
(1) Determine problem and take corrective action.
(2) Record actions taken in DA Form 2404/DA Form 5988-E.

7. Perform during-operations PMCS (references: TM 5-4610-233-13&P and TM 10-4320-303-13).
a. Perform routine maintenance as required.
b. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
c. Give form to supervisor at the end of each shift.

8. Operation in unusual conditions.
a. Cold Weather.
(1) Operating the hypochlorination unit in temperatures below 32 degrees Fahrenheit requires taking precautions. Take advantage of existing shelter and windbreaks when locating equipment. Protect equipment with tent shelter. Prevent water from freezing by using some type of approved heating device.
(2) When equipment is shut down, drain all hoses, flow controller, and solution feed pump as soon as possible. Open all valves and check equipment closely to assure complete drainage.
b. Dusty and Sandy Areas.
(1) Use existing shelter and windbreaks to keep sand and dirt from equipment during refill of reservoir tank assembly. Keep cover on reservoir tank assembly.
(2) Check that water supply is protected to keep out sand and dirt.
(3) When equipment is not in use, install dust caps on 4-inch manifold.

9. Shut down hypochlorination unit.
a. Close inlet, outlet, and hypochlorite solution valves.
b. Close water supply shutoff valves at water pump and downstream of hypochlorination unit.
c. Shut down 125- and 350-GPM water pumps (references: TM 5-4320-304-14, TM 5-4320-208-12&P, TM 10-4320-309-14, TM 10-4320-226-14, and TM 10-4320-325-14).
d. Slowly open globe valve to vent pressure.

10. Prepare hypochlorination unit for movement.
a. Clean inlet, outlet, and hypochlorite solution valves.
b. Close water supply shutoff valves at water pump and downstream of hypochlorination unit.
c. Shut down 125- and 350-GPM water pump (references: TM 5-4320-304-14, TM 5-4320-208-12&P, TM 10-4320-309-14, TM 10-4320-226-14, and TM 10-4320-325-14).
d. Slowly open glove valve to vent pressure.

NOTE: Retain washers during disconnection of water supply inlet and outlet for use at later time.

e. Disconnect water supply inlet and outlet connections to manifold.

WARNING: Hypochlorite solution is toxic to skin and eyes. Avoid repeated or prolonged contact. Wear skin and eye protection to prevent personal injury.

f. Remove reservoir fill tube from reservoir tank.
g. Disconnect and remove liquid head assembly suction and discharge tubes.
h. Remove reservoir tank from hypochlorination unit. Dispose of remaining solution in reservoir tank in accordance with SOP, local regulations and/or host nation laws.
i. Install reservoir tank on hypochlorination unit.

Performance Steps
NOTE: Flush chemical solution from tank, tubing and valves with water.

WARNING: Hypochlorination unit weighs over 175 pounds. At least four people are needed to lift it to prevent personal injury or damage to the equipment.

NOTE: Flow controller drain cock must remain open during movement.

j. Tip hypochlorination unit and open drain valve (counterclockwise).
k. Open inlet, outlet, and hypochlorite solution valves.
l. Tip hypochlorination unit from side to side to drain water from hoses, tubes, and components.
m. Install reservoir fill tube, liquid head assembly washers, and suction and discharge tubes.
n. Install suction tube and washer to bottom of liquid pump.
o. Install discharge tube and washer to top of liquid pump.
p. Set range adjusting valve to fully open position.

11. Perform after-operations PMCS (references: TM 5-4610-233-13&P and TM 10-4320-303-13).
    a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of each shift.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Performed before-operations PMCS.	____	____
3. Prepared hypochlorination unit for use.	____	____
4. Performed initial startup.	____	____
5. Set solution feed adjustment.	____	____
6. Performed operational maintenance.	____	____
7. Performed during-operations PMCS.	____	____
8. Operated in unusual conditions.	____	____
9. Shut off the hypochlorination unit.	____	____
10. Prepared hypochlorination unit for movement.	____	____
11. Performed after-operations PMCS.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

DA FORM 1714-R
DA FORM 1714-1-R
DA FORM 2404
DA FORM 5988-E
FM 3-100.12
TB MED 577
TM 5-4320-208-12&P
TM 5-4320-304-14
TM 5-4610-228-13
TM 5-4610-233-13&P
TM 10-4320-226-14
TM 10-4320-303-13
TM 10-4320-309-14
TM 10-4320-325-14
TM 10-6630-222-12&P

Related

FM 10-52
FM 10-52-1

Operate/Perform PMCS on the 125-GPM Diesel Driven Pump

101-92W-1056

Conditions: Given the requirement to distribute potable water at a DS/GS water point, the soldier must operate and maintain the 125-GPM pump. Materials needed: a 125-GPM pump, a fire extinguisher, 1 gallon of fuel, 1 quart of oil, earplugs, TM 5-4320-304-14, TM 10-4320-309-14, TM 10-4320-325-14, and a pencil. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/ DA Form 5988-E (Equipment Inspection Maintenance Worksheet), DA Form 5987-E (Motor Equipment Dispatch), DD Form 1970 (Motor Equipment Utilization Record)/DA Form 5987-E (Motor Equipment Dispatch), and DA Form 1714-R (Daily Water Issue Log).

Standards: Performed before-, during-, and after-operations PMCS. Set up the 125-GPM pump. Operated the 125-GPM pump. Shut down the 125-GPM pump. Completed entries on DA Form 1714-R for daily water issues and DD Form 1970/DA Form 5987-E for equipment operation. Recorded on DA Form 2404/DA Form 5988-E actions taken to correct deficiencies and shortcomings. Gave completed forms to immediate supervisor at the end of each shift.

Performance Steps

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS: Hearing protection is required when operating this equipment.

Handle and dispose of hazardous materials (such as used oil, contaminated fuel, and chemicals/solutions) in accordance with unit Standing Operating Procedures (SOPs)/Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

NOTES: The 125-GPM pump models for TM 10-4320-309-14 and TM 10-4320-325-14, are the same for operation and operator maintenance. However, these models contain different internal parts and are not interchangeable.

There are various models of the 125-GPM pump where information may differ slightly in other technical manuals.

1. Apply risk management procedures (reference: FM 3-100.12).
    a. Understand and execute the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Perform before-, during-, and after-operations PMCS as required (references: TM 5-4320-304-14, TM 10-4320-309-14 or TM 10-4320-325-14).
    a. Perform routine maintenance schedule as required.
    b. Troubleshoot pump as needed. Refer to troubleshooting procedures in the TM.
    c. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    d. Give form to supervisor at the end of the shift.
3. Set up the 125-GPM pump.
    a. Select a level site not more than 25 feet above the water supply.
        (1) Clean and clear the site.
        (2) Ensure the surface is firm.
    b. Position pump as close as possible to source, making sure there is enough room on all sides to operate and ventilate the unit.

Performance Steps

c. Connect hard rubber hose(s) to the suction inlet.
d. Connect hose(s) to the discharge outlet.

4. Operate the 125-GPM pump.

CAUTION: Never operate pump in an enclosed area unless the exhaust gases are piped to the outside. Wear ear protection while pump is operating.

a. Operate the 125-GPM diesel driven pump (refer to TM).
(1) Prime the pump.

CAUTION: Do not start pump without priming with water. Dry operation will damage pump seals and cause pump to fail. After priming, do not operate pump for more than three to five minutes without water flowing through it.

NOTE: Allow engine sufficient warm up time before starting pumping operation at IDLE speed not to exceed three minutes.

(2) Move choke control to Close.
(3) Turn fuel shut-off valve to Open.
(4) Move throttle control to half throttle and tighten throttle nut.
(5) Set the ignition switch to Run.
(6) Place the inlet air temperature control in Summer position.
(7) Wind start rope around starter pulley and pull rope sharply.
(8) After engine starts and warms up, slowly open choke, and maintain smooth operation until choke is fully open.
(9) Let engine run at about one-half throttle until it reaches operating temperature.
(10) Move throttle control to full throttle for maximum pumping rate. If less than maximum pumping rate is desired, adjust throttle control position to the required speed setting.
(11) To stop pumping without stopping engine, move throttle control to idle position and allow engine to idle.
(12) To resume pumping operation, move throttle control to desired speed setting.

b. Operate the 125-GPM diesel, self-priming pump (references: TM 10-4320-309-14 and TM 10-4320-325-14).
(1) Set fuel cock to open position (6 o'clock) by turning handle to the downward position.
(2) Loosen engine speed control lever knob and move engine speed control lever to the Start (downward) position. Tighten knob to hold in start position.
(3) Slowly pull out starting handle until you feel resistance and then return it to the initial position.
(4) Push the decompression lever down and release. It will return automatically to the normal position (12 o'clock) when the recoil starter is pulled.
(5) Hold recoil starting handle firmly and pull out the handle briskly. Engine will start and go to maximum operating speed.

c. Operate the 125-GPM diesel, self-priming pump (reference: TM 5-4320-304-14).
(1) Move throttle control hand lever to High position on throttle plate.
(2) Pull out extra fuel device button until fully extended.
(3) Turn decompression lever clockwise to position Two (12 o'clock).

CAUTION: If engine does not start on initial attempt, allow engine rotation to stop completely before engaging crank handle.

(4) Engage crank handle in gear housing.
(5) Turn crank handle clockwise with increasing speed.
(6) Obtain highest speed when the decompression lever reaches the zero position. Engine will start and go to maximum operating speed.
(7) Adjust throttle control hand lever to desired speed.

NOTE: If engine does not start on first pull, repeat steps (3), (4), and (5).

Performance Steps

(8) After one to three minutes the centrifugal pump will start pumping water.
(9) Adjust engine speed.
(a) Loosen speed control lever and adjust to desired speed by moving lever up to decrease speed and down to increase speed.
(b) Tighten up speed control lever knob at desired speed.

5. Shut down the 125-GPM pump.
   a. Shut down the 125-GPM gas driven pump, Model 2-125-50-G (reference: TM 10-4320-309-14 and TM 10-4320-325-14).
      (1) Place throttle control in the idle position and let the engine idle for three to five minutes.
      (2) Set the engine switch to off.
   b. Shut down the 125-GPM diesel, self-priming (references: TM 10-4320-309-14 and TM 10-4320-325-14).

CAUTION: Do not stop engine suddenly. Reduce load slowly and allow engine to run at idle speed for three minutes. Do not stop engine with the decompression lever as engine damage may result. If the engine cannot be stopped by the speed control knob lever, move the fuel cock to the closed (3 o'clock) position.

(1) Slowly move speed control lever knob upward until engine is running at idle speed. Allow engine to run at idle speed for three minutes.
(2) Close any discharge valves, then any suction valves that are installed in the hoses to retain the pump prime.
(3) Move engine speed control lever knob all the way to the Stop position.

6. Complete entries on water reports, logs, and forms.
   a. Record all daily water issues on DA Form 1714-R.
   b. Complete DD Form 1970/DA Form 5987-E for hours of operation and fuel/oil expenditures.
   c. Give form to supervisor at the end of the shift.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Performed before-, during, and after-operations PMCS.	____	____
3. Set up the 125-GPM pump.	____	____
4. Operated the 125-GPM pump.	____	____
5. Shut off the 125-GPM pump.	____	____
6. Completed entries on water reports, logs, and forms.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 1714-R	FM 10-52-1
DA FORM 2404	
DA FORM 5987-E	
DA FORM 5988-E	
DD FORM 1970	
FM 3-100.12	
TM 5-4320-304-14	
TM 10-4320-309-14	
TM 10-4320-325-14	

Maintain, Assemble/Disassemble the Tactical Water Distribution System (TWDS) Hose Line
101-92W-1066

Conditions: Given the requirement to distribute potable water, the soldier, a member of a TWDS team in a field environment, must maintain, assemble, and disassemble the TWDS hose line. Materials needed: an operationally complete TWDS set, a 250-CFM rotary air compressor, a cargo truck, a fire extinguisher, TM 10-4320-303-13 or TM 10-4320-317-13, sufficient fuel and oil to maintain operations, and earplugs. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet), DA Form 1714-R (Daily Water Issue Log), and DA Form 1714-1-R (Daily Water Distribution Log).

Standards: Performed before-, during-, and after-operations PMCS. Prepared hose for installation. Installed hose line. Disconnected and evacuated the hose line. Repacked hose line segment in flaking boxes. Maintained reports/logs/forms. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Gave the completed forms to the immediate supervisor at the end of each shift.

Performance Steps
DANGER: Observe all safety procedures noted in TM 10-4320-303-13 and TM 10-4320-317-13 when maintaining, assembling, and disassembling the TWDS. Death or severe injury may result if soldiers fail to observe precautions. To prevent air compressor assembly from rolling or sliding, securely lock the parking brakes. Do not operate engine around open fuel. Never refuel hot or running engines. Avoid overfilling the fuel tank. Keep open flame and sparks away from the fuel tank and battery. Wear hearing protection when within 50 feet of operating air compressor.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS:

Hearing protection is required when operating this equipment.

Handle and dispose of hazardous materials (such as used oil, contaminated fuel, and chemicals solutions) in accordance with unit Standing Operating Procedures (SOPs), Operations Orders (OPORDs), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORDs, local regulations, and/or HN laws for drip pans or secondary containment devices.

1. Apply risk management procedures (reference: FM 3-100.12).
    a. Understand and execute the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Perform before-operations PMCS (reference: TM 10-4320-317-13).
    a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of each shift.

Performance Steps

3. Load tricons on trucks.

WARNING: Make sure crane or forklift has minimum lifting capacity of 6000 lb. Do not stand under load being lifted. Death or serious injury may result.

a. Using crane or forklift with 6,000 lb lifting capacity, lift and stack tricons with hoselines on truck bed.
b. If truck does not have sidewalls, use lifting devices as attachment points and securely tie tricons to truck.
c. Refer to applicable technical manual for preparing tricons for hose-laying operation.

NOTE: One 6-inch bolt less coupling is required for each 500 foot hoseline assembly used. One swivel joint is required for every 1,000 foot of hoseline.

4. Layout and install hoses.

CAUTION: After removing components from boxes, be sure to protect them from sand and grit, they may cause equipment failure.

a. Remove 6-inch boltless coupling from leading ends of hose.
b. Connect leading end of fourth hose to trailing end of third hose with 6-inch boltless coupling.
c. Connect swivel joint to leading end of the third hose with 6-inch boltless coupling.
d. Connect trailing end of second hose to swivel joint with 6-inch boltless coupling.
e. Connect leading end of hose of second hose to trailing end of hose of first hose with 6-inch boltless coupling.
f. Connect swivel joint to trailing end of hose of fourth hose with 6-inch boltless coupling.
g. Connect leading end of first hose to relief valve on discharge of lead pumping station. Attach hose with 6-inch boltless coupling.
h. Restrain hose manually until first 50 feet of hose is in position. After 50 feet of hose is in position, the weight of the hose will hold line in place.
i. Continue to lay hose until all four hoselines have been laid.
j. Connect hoseline to each boost pumping station and storage assembly as those installation sites are reached.
k. Connect end on last segment with 6-inch boltless coupling.
l. Retain empty tricons for reuse.

NOTE: Road crossing guards and suspension kits are used when the hoseline crosses roads or obstacles in the terrain.

5. Install road crossing guards.

6. Install suspension devices.

NOTE: The pressure reducing valve is needed when pressure at a certain point in the hoseline is expected to exceed 225 psi. If the hoseline crosses over a steep hill or ridge, then a pressure reducing valve may be required on the downhill side of the hoseline route.

7. Install Pressure-Reducing Valve.

8. Install Storage and Distribution Assemblies.

9. Assemble Lead pumping stations.

a. Remove plastic cap from suction port on pump.
b. Locate 6 inch x 10 foot lengths of rigid-walled, wire reinforced suction hose with quick-disconnect fittings.

CAUTION: To prevent leakage, close both cam arms at the same time. Do not strike cam arms to close. Damage to coupling could result.

c. Connect suction hose to suction port. Close cam arms.
d. Install 6-inch butterfly valve on suction hose with 6-inch boltless coupling. Set valve to fully opened position.
e. Install additional hose lengths with bolt less couplings to butterfly valve until pump is connected to water source.

Performance Steps

f. Remove plastic cap from discharge port on pump.

CAUTION: Make sure arrow on check valve points away from pump. Damage to pump may occur if pump discharge is blocked.

g. Install 6-inch check valve on pump discharge port with 6-inch boltless coupling.

WARNING: Personal injury may result from high pressure water, if pressure-relief valve faces butterfly valve when installed incorrectly.

h. Install pressure-relief valve assembly to 6-inch boltless coupling.
i. Connect 6 inch x 20 foot discharge hose to pressure-relief valve assembly with 6-inch boltless coupling.
j. Retrain hose manually until first 50 feet of hose is in position. After 50 feet of hose is in position, the weight of the hose will hold line in place.

10. Assemble Boost Pumping Stations.
    a. Remove plastic cap from suction port on pump.
    b. Locate 6 inch x 10 foot lengths or rigid-walled, wire reinforced suction hose with quick-disconnect fittings.

CAUTION: To prevent leaks, close both cam arms at the same time. Do not strike cam arms to close. Damage to coupling could result.

    c. Connect suction hose to suction port. Close cam arms.
    d. Install one 6-inch butterfly valve on suction hose with 6-inch boltless coupling. Set valve to fully opened position.
    e. Install lateral grooved T-fitting to 6-inch boltless coupling.
    f. Connect end of TWDS hose to lateral grooved Y-fitting with 6-inch boltless coupling.
    g. Install butterfly valve to lateral grooved Y-fitting with 6-inch boltless coupling.
    h. Connect 6 inch x 75 foot discharge hose to butterfly valve with 6-inch boltless coupling.

CAUTION: To prevent damage to pump, make sure arrow on check valve points away from pump.

    i. Install 6-inch check valve on pump discharge port with 6-inch boltless coupling.

WARNING: Personal injury may result from high pressure water if pressure-relief valve faces butterfly valve when installed incorrectly.

    j. Install pressure-relief valve assembly to 6-inch boltless coupling.
    k. Connect 6 inch x 20 foot discharge hose to pressure-relief valve assembly with 6-inch bolt less coupling.
    l. Install butterfly valve to 6 inch x 20 foot discharge hose with 6-inch boltless coupling. Set valve to closed position.
    m. Install lateral grooved Y-fitting to 6-inch butterfly valve with 6-inch boltless coupling.
    n. Connect other end of 6 inch x 75 foot discharge hose to lateral grooved Y-fitting with 6-inch boltless coupling.
    o. Connect lateral groove Y-fitting to TWDS hose with 6-inch boltless coupling.
    p. Restrain hose manually until first 50 foot of hose is in position. After 50 foot of hose is in position, the weight of the hose will hold line in place.

11. Perform during-operations PMCS (reference: TM 10-4320-317-13).
    a. Perform routine maintenance as required.
    b. Troubleshoot system as needed.
    c. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    d. Give form to supervisor at the end of each shift.

12. Evacuate and Disassemble the TWDS.

NOTE: Evacuating hoseline begins at the lead pumping station and proceeds downline.

    a. Remove the 6-inch boltless coupling connecting end of hoseline segment to the next downline hose segment (or swivel joint).
    b. Separate two hoseline segments (or hoseline segment and swivel joint).
    c. Locate ball receiver, consisting of two 8 inch x 6 inch reducers. One reducer has been modified to prevent displacement ball from being ejected from ball receiver.
    d. Connect 6-inch end of unmodified reducer to downline end of first hoseline segment using grooved-end pipe boltless coupling.

Performance Steps

e. Locate 8-inch snaplock coupling. Open coupling.
f. Fit halves of snaplock coupling over the joined ends of reducers. Close coupling over reducer ends. Lock snaplock coupling.
g. Connect nipple to the up line end of the first hoseline segment using boltless coupling.
h. Place wet displacement ball inside nipple.
i. Locate pneumatic coupler and modified end cap (with tapped hole). Attach pneumatic coupler to modified end cap.
j. Connect modified end cap with pneumatic coupler into air compressor line.
k. Locate pneumatic coupler. Screw pneumatic coupler into air compressor line.
l. Locate ejector assembly, ball valve, and two pneumatic couplers. Install pneumatic couplers on threaded fittings on ejector assembly.
m. Install ball valve on end of ejector assembly. Close ball valve.
n. Connect ejector assembly to end cap by connecting pneumatic couplers.
o. Start compressor and pressurize hoseline to 80 to 90 psi. Displacement ball will be forced through hose, displacing any residual water. A sound will be heard when the ball reaches receiver.
p. Shut off compressor when displacement ball reaches receiver.
q. Open snaplock coupling connecting two reducers. Pull snaplock coupling back and separate two hinged coupling halves of snaplock coupling. Set snaplock coupling, displacement ball, and modified reducer aside.
r. Remove boltless coupling connecting unmodified reducer to hoseline segment.
s. Locate end cap. Connect end cap to end of hoseline segment with boltless coupling.
t. Open ball valve on ejector assembly.
u. Start air compressor and apply air pressure to ejector assembly. Operate compressor until hoseline collapses for repacking.
v. Turn off the air compressor and disconnect the air compressor line.
w. Disconnect ejector assembly and set aside.
x. Remove boltless coupling connecting end cap with pneumatic coupler to nipple.
y. Remove boltless coupling connecting nipple to hoseline segment.

NOTE: End caps must be installed on collapsed hoseline to prevent hose from expanding before it is packed.

z. Connect end cap to hoseline segment using boltless coupling.
aa. Repeat steps until each hoseline segment down the line is evacuated.

NOTE: When a hoseline length has been evacuated, collapsed, and capped, it is ready for packing in a tricon box.

13. Disassemble Components.
    a. Disassemble Suspension Devices.
    b. Disassemble Pressure-Reducing Valve.
    c. Disassemble Road Crossing Guards.
    d. Disassemble Boost Pumping Station.
    e. Disassemble Lead Pumping Station.
    f. Disassemble Storage Assembly.
    g. Disassemble Distribution Points.

14. Perform after-operations PMCS (reference: TM 10-4320-317-13).

15. Maintain reports/logs/forms.
    a. Record all operations data, such as chemical dosages, pressure and flow gauge readings, and so forth on DA Form 1714-R and DA Form 1714-1.
    b. Give reports/logs/forms to supervisor at the end of each shift.

Performance Measures	GO	NO-GO
1. Applied risk management procedures.	____	____
2. Performed before-operations PMCS.	____	____
3. Loaded tricons on trucks.	____	____
4. Laid out and installed hoses.	____	____
5. Installed road crossing guards.	____	____
6. Installed suspension devices.	____	____
7. Installed pressure-reducing valve.	____	____
8. Installed storage and distribution assemblies.	____	____
9. Assembled lead pumping stations.	____	____
10. Assembled boost pumping stations.	____	____
11. Performed during-operations PMCS.	____	____
12. Evacuated and disassembled the TWDS.	____	____
13. Disassembled components.	____	____
14. Performed after-operations PMCS.	____	____
15. Maintained reports/logs/forms.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 1714-R	FM 10-52
DA FORM 1714-1-R	FM 10-52-1
DA FORM 2404	TB MED 577
DA FORM 5988-E	
FM 3-100.12	
TM 10-4320-303-13	
TM 10-4320-317-13	

Maintain, Assemble/Disassemble the Potable Water Storage/Distribution System (PWS/DS)
101-92W-1068

Conditions: Given the requirement to receive, store, issue, and distribute potable water, the soldier, assigned to an operational water distribution point in a field environment, must maintain, assemble, and disassemble the Potable Water Storage and Distribution System (PWS/DS). Materials needed: a complete PWS/DS with all components, which includes a 125-GPM pump, a 350-GPM pump, a hypochlorinator, at least two 20,000-gallon collapsible fabric tanks and all necessary manifolding and hoses; TM 10-4320-226-14; fire extinguishers; earplugs, and sufficient fuel and oil to start operations. Forms needed: DA Form 1714-R (Daily Water Issue Log), DA Form 1714-1-R (Daily Water Distribution Log), and DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Standards: Performed before-, during-, and after-operations PMCS. Set up 125-GPM pump number 1 and the storage tanks. Set up the 350-GPM pump, 125-GPM pump number 2, and the pump bypass. Set up the hypochlorinator and bypass. Set up the distribution hoses and nozzles. Operated PWS/DS. Distributed potable water. Shut down the system. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Maintained distribution and issue forms. Gave the completed forms to immediate supervisor at the end of each shift.

Performance Steps
DANGER: Observe all safety procedures when conducting chemical analysis of water. Dangerous chemicals are provided in both test kits. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Refer to task 101-92W-1065 for more safety information concerning chemical analysis testing.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

DANGER: Death or severe injury man result if you fail to observe precautions listed in TMs when operating pumps. To prevent pumping assembly from rolling or sliding, securely lock the parking brakes. Do not operate engine around open fuel. Never refuel hot or running engines.

CAUTIONS:

Avoid overfilling the fuel tank. Keep open flame and sparks away from the fuel tank and battery. Do not operate the pump against a closed suction or discharge port. This will cause overheating.

Wear hearing protection when within 50 feet of operating pumps. Do not use a fuel transfer pump to transfer water. Refer to Task 101-92W-1056 and Task 101-92W-1044 for more safety information concerning 125-GPM and 350-GPM pump operations.

The hypochlorination unit weighs over 175 pounds. At least four people are needed to lift it to prevent personal injury or damage to the equipment. Hypochlorite solution is toxic to skin and eyes. If calcium hypochlorite comes into contact with skin or eyes, flush with water. Seek medical help. Store calcium hypochlorite in a cool, dry place. Keep container closed. Mix in accordance with directions for use. DO NOT allow calcium hypochlorite to mix with other materials, such as fuels, oils, paint products, or ammonia. This may cause fire or hazardous gases.

1. Apply risk management procedures.
    a. Understand and execute the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

Performance Steps

2. Perform before-operations PMCS (reference: TM 10-4320-226-14).
    a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of each shift.

3. Set up 125-GPM pump number 1 and the storage tanks.
    a. Attach the 4-inch suction hose from the water source to a 4-inch gate valve.
    b. Attach a gate valve to the suction side of 125-GPM pump number 1.
    c. Attach a check valve to the discharge side of 125-GPM pump number 1 so that the arrow on the valve points away from the pump.
    d. Attach a gate valve to the check valve.
    e. Attach the female end of a 4-inch hose to the gate valve.
    f. Attach a 4-inch tee assembly to the male end of the hose so that the branch points to tank number 1 (this is the first tee assembly).
    g. Connect together as many 4-inch hoses as necessary to reach from the tee assembly to tank number 1.
    h. Attach the male end of the hoses to the branch on the tee assembly.
    i. Connect a gate valve to the female end of the hoses.
    j. Attach a gate valve to the filler assembly on tank number 1.
    k. Attach a gate valve to the discharge assembly on tank number 1.
    l. Attach the branch of a tee assembly to the gate valve.
    m. Cap off one end on the trunk of the tee assembly with a 4-inch quick-release cap.
    n. Connect together as many 4-inch hoses as necessary to reach from tank number 1 to tank number 2.
    o. Connect the male end of the hoses to the remaining opening on the tee assembly.
    p. Connect a tee assembly to the female end of the hoses so that the branch points to tank number 2.
    q. Attach a gate valve to the branch on the tee assembly.
    r. Attach a gate valve to the discharge assembly on tank number 2.
    s. Connect together as many 4-inch hoses as necessary to reach from the first tee assembly to tank number 2.
    t. Attach the female end of the hoses to the remaining opening on the tee assembly.
    u. Attach a tee assembly to the male end of the hoses so that the branch points to tank number 2.
    v. Attach a gate valve to the branch on the tee assembly.
    w. Cap off the remaining opening on the tee assembly with a 4-inch quick-release cap.
    x. Attach a gate valve to the remaining filler assembly on tank number 2.

4. Set up the 350-GPM pump, 125-GPM pump number 2, and the pump bypass.
    a. Connect together as many 4-inch hoses as necessary to reach from the tee at the discharge side of tank number to the start of the bypass for 125-GPM pump number 2.
    b. Attach the female end of the hoses to the remaining opening on the tee assembly near the gate valve.
    c. Attach a tee assembly to the male end of the hoses so that the branch points away from the main line.
    d. Connect together as many 4-inch hoses as necessary to reach from the tee assembly to the 125-GPM pump number 2.
    e. Attach the female end of the hoses to the branch on the tee assembly.
    f. Attach a gate valve to the male end of the hoses.
    g. Attach the gate valve to the suction side of the 125-GPM pump number 2.
    h. Connect together as many 4-inch hoses as necessary to reach from the tee assembly to the 350-GPM pump.
    i. Attach the female end of the hoses to the remaining opening on the tee assembly.
    j. Attach a gate valve to the male end of the hoses.
    k. Attach the gate valve to the suction side of the 350-GPM pump.
    l. Attach a gate valve to the discharge side of the 350-GPM pump.

Performance Steps

m. Connect together as many 4-inch hoses as necessary to reach from the gate valve to the start of the bypass for the hypochlorination unit.
n. Connect the female end of the hoses to the gate valve.
o. Attach a tee assembly to the male end of the hoses so that the branch points away from the main line.
p. Attach a check valve to the discharge side of the 125-GPM pump number 2 so that the arrow on the valve points away from the pump.
q. Attach a gate valve to the check valve.
r. Connect together as many 4-inch hoses as necessary to reach from the gate valve to the tee assembly.
s. Attach the female end of the hoses to the gate valve.
t. Attach the male end of the hoses to the branch on the tee assembly.
u. Attach the female end of a 4-inch hose to the remaining opening on the tee assembly.

5. Set up the hypochlorinator and bypass.

NOTE: The hypochlorinator can be installed on either the input or the discharge side of the PWS/DS.

a. Attach a tee assembly to the male end of the hose so that the branch points away from the main line.
b. Attach the female end of a 4-inch hose to the remaining opening on the trunk of the tee assembly.
c. Attach a tee assembly to the male end of the hose so that the branch points away from the main line.
d. Attach 4-inch-to-2-inch reducers to the branches on both tee assemblies.
e. Attach the female end of a 2-inch hose to the reducer on the first tee assembly on the hypochlorination bypass.
f. Attach the male end of the hose to the inlet on the hypochlorination unit.
g. Attach the female end of a 2-inch hose to the outlet of the hypochlorination unit.
h. Attach the male end of the hose to the reducer on the second tee assembly of the hypochlorination unit.

6. Set up the distribution hoses and nozzles.

a. Attach a quick release male adapter to the remaining opening on the second tee assembly.
b. Attach the branch of a tee assembly to the adapter.
c. Attach the female end of a 4-inch hose to the LEFT opening on the trunk of the tee assembly.
d. Attach a tee assembly to the male end of the hose so that the branch points away from the system.
e. Attach a gate valve to the branch on the tee assembly.
f. Attach a 4-inch-to-2-inch reducer to the gate valve.
g. Attach a 2-inch distribution hose to the reducer.
h. Repeat steps c through g for the seven remaining valves.
i. Attach the female end of a 4-inch hose to the RIGHT opening on the trunk of the tee assembly.
j. Attach a tee assembly to the male end of the hose so that the branch points away from the system.
k. Attach a gate valve to the branch on the tee assembly.
l. Attach a 4-inch-to-2-inch reducer to a gate valve.
m. Attach the female end of a distribution hose to the reducer.
n. Attach a distribution nozzle to the male end of the hose.
o. Repeat steps i through n for the remaining three valves.
p. Cap off the remaining openings on the tee assembly.

7. Operate PWS/DS.

a. Prime the 125-GPM pump number 1.
b. Start 125-GPM pump number 1 and fill tanks 1 and 2 to capacity.
c. Prepare a hypochlorite solution and pour it into the reservoir on the hypochlorination unit.
d. Prime the 125-GPM pump number 2 and the 350-GPM pump.
e. Start the 125-GPM pump number 2 and the 350-GPM pump.

Performance Steps

f. Set the pump stroke adjustment control on the hypochlorination unit at 50 percent.
g. Prime the inlet hose to the hypochlorination unit.
h. Set the flow rate valve on the hypochlorination unit.
i. Open the flow regulator valve on the hypochlorination unit until the water meter shows 5 gallons per minute.

8. Distribute potable water.
   a. Operate a distribution nozzle to obtain a water sample.
   b. Monitor the controls and instruments on the 350-GPM pump.
   c. Inspect the 350-GPM pump periodically for leaks.
   d. Inspect the 125-GPM pump periodically for leaks and listen for unusual noises and vibrations.
   e. Inspect tanks 1 and 2 periodically for leaks and inspect the filler and discharge assemblies, the vent pipe assemblies, and the drain fittings assemblies periodically for leaks and damage.
   f. Inspect the hoses, valve assemblies, and distribution nozzles periodically for leaks and damage.
   g. Log all water issued/distributed on DA Form 1714-R or DA Form 1714-1-R.

9. Perform during-operations PMCS (reference: TM 10-4320-226-14).
   a. Perform system routine maintenance as required.
   b. Troubleshoot system as needed.
   c. Perform chlorine residual tests at 30-minute intervals to ensure that the proper residual is being maintained. Log chlorine residual tests results on DA Form 1714-R or DA Form 1714-1-R.
   d. Prepare hypochlorite solution when the level in the reservoir drops to within 2 or 3 inches of the bottom.
   e. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   f. Give form to supervisor at the end of each shift.

10. Shut down and dismantle the system.
    a. Shut down the 350-GPM pump and the 125-GPM pumps.
    b. Open all valves in the storage and distribution system and the drain fittings on tanks 1 and 2 and allow the system to drain completely.
    c. Dismantle system and components.

11. Perform after-operations PMCS (reference: TM 10-4320-226-14).
    a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of each shift.

Performance Measures	GO	NO-GO
1. Applied risk management procedures.	____	____
2. Performed before-operations PMCS.	____	____
3. Set up 125-GPM pump number 1 and the storage tanks.	____	____
4. Set up the 350-GPM pump, 125-GPM pump number 2, and the pump bypass.	____	____
5. Set up the hypochlorinator and bypass.	____	____
6. Set up the distribution hoses and nozzles.	____	____
7. Operated PWS/DS.	____	____
8. Distributed potable water.	____	____
9. Performed during-operations PMCS.	____	____
10. Shut down and dismantle the system.	____	____
11. Performed after-operations PMCS.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 1714-R	FM 10-52
DA FORM 1714-1-R	FM 10-52-1
DA FORM 2404	TM 5-4610-228-13
DA FORM 5988-E	TM 10-4320-309-14
FM 3-100.12	
TM 10-4320-226-14	

Operate Mobile Distribution Systems

101-92W-1073

Conditions: Given the requirement to receive, store, and issue potable water, the soldier, assigned to an operational water distribution point in a field environment, must set up, operate, perform PMCS, and dismantle the Forward Area Water Point Supply System (FAWPSS). Materials needed: a complete FAWPSS with all components (which includes a 125-GPM pump and six 500-gallon drums), all necessary manifolding and hoses, TM 5-4320-208-12&P, TM 5-4320-301-13&P, a fire extinguisher, earplugs, and sufficient fuel and oil to start operations. Forms needed: DA Form 1714-R (Daily Water Issue Log) and DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Given the requirement to receive and distribute potable water, the soldier, assigned to an operational water distribution point in a field environment, must maintain, assemble, and disassemble a 3,000/4,570-gallon Semitrailer Mounted Fabric Tank (SMFT). Materials needed: an SMFT with all components (which includes all necessary manifolding and hoses); TM 5-5430-212-13&P or TM 5-5430-213-13&P; a potable water source with water pump; fire extinguishers; sufficient fuel and oil; and earplugs. Forms needed: DA Form 1714-R and DA Form 2404/DA Form 5988-E.

Given the requirement to distribute and receive potable water, the soldier, assigned to an operational water distribution point in a field environment, must maintain, and operate the Load Handling System (LHS) Compatible Water Tank Rack (HIPPO). Materials needed: a HIPPO with all components; TM 10-5430-244-10; a potable water source with water pump; fire extinguishers; sufficient fuel and oil; and earplugs. Forms needed: DA Form 1714-R and DA Form 2404/DA Form 5988-E.

Standards: Performed before-, during-, and after-operations PMCS. Set up the FAWPSS. Operated the FAWPSS. Stopped operation of the FAWPSS. Dismantled the FAWPSS. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Maintained DA Form 1714-R. Gave the completed forms to immediate supervisor at the end of each shift.

Performed before-, during-, and after-operations PMCS. Uncrated the SMFT. Installed the SMFT. Filled the SMFT. Emptied the tank. Folded the SMFT. Cleaned the SMFT. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Maintained DA Form 1714-R. Gave the completed forms to immediate supervisor at the end of each shift.

Performed before-, during-, and after-operations PMCS. Conducted Pre-Checks. Filled the HIPPO. Discharged the HIPPO. Retrieved the HIPPO. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Maintained DA Form 1714-R. Gave the completed forms to immediate supervisor at the end of each shift.

Performance Steps

DANGER: Observe all safety procedures when conducting chemical analysis of water. Dangerous chemicals are provided in both test kits. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Death or severe injury may result if precautions listed in TMs are not observed when operating pumps. Do not operate engine around open fuel. Never refuel hot or running engines. Avoid overfilling the fuel tank. Keep open flame and sparks away from the fuel tank and battery. Do not operate the pump with a closed suction or discharge port (this will cause overheating). Wear hearing protection when within 50 feet of operating pumps. Do not use a fuel transfer pump to transfer water. Refer to Task 101-92W-1056 for more safety information concerning 125-GPM pump operations.

Performance Steps

1. Apply Risk Management Procedures (reference: FM 100-14).
   a. Understand and execute the risk management process, risk controls and command guidance directed by higher headquarters.
   b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

2. Operate the Forward Area Water Point Supply System (FAWPSS).
   a. Perform before-operations PMCS (refer to TM).
      (1) Check all hoses for gaskets.
      (2) Check the 125-GPM pump for oil and fuel.
      (3) Log all actions and deficiencies on DA Form 2404/DA Form 5988-E.
      (4) Give form to supervisor at the end of the shift.
   b. Set up the FAWPSS.
      (1) Unload the pump, hoses, and supporting equipment from the storage boxes.
      (2) Place the 125-GPM pump in approximately the center of the area selected for the FAWPSS.
      (3) Attach the male end of a 2-inch suction hose (10-foot) to the female end of the pump.
      (4) Attach a male-to-male adapter to the female end of a 2-inch suction hose.
      (5) Attach the female end of a wye-fitting to the male adapter.
      (6) Attach a valve assembly to each end of the wye-fitting.
      (7) Attach the female end of a 2-inch suction hose (10-foot) to the male end of one of the valve assemblies.
      (8) Attach the female end of another 2-inch suction hose (10-foot) to the male end on the other valve assembly.
      (9) Use a towing and lifting yoke to position two full water storage and dispensing drums so that the sides with 2-inch elbow couples are close enough to the suction hose to permit attachment.
      (10) Attach one of the male ends of one of the suction hoses to the female end on one of the 2-inch elbow couplers.
      (11) Attach the male end of the other suction hose to the female end on the other 2-inch elbow coupler.
      (12) Attach the female end of a 2-inch discharge hose (10-foot) to the male end on the pump.
      (13) Attach the male end of a 2-inch discharge hose (10-foot) to the female end of a wye-fitting.
      (14) Attach the female end of a 2-inch discharge hose (25-foot) to one of the male ends of a wye-fitting.
      (15) Attach the female end of a second 2-inch discharge hose (25-foot) to the male end of the first 25-feet of discharge hose.
      (16) Attach the male end of the second discharge hose to the female end of a wye-fitting.
      (17) Attach the female end of a 2-inch to 1 ½-inch reducer to one of the female ends on the wye-fitting.
      (18) Attach the female end of a 1 ½-inch discharge hose (5-foot) to the male end on the reducer.
      (19) Set up a tripod stand close to the unconnected male end of 1 1/2-inch discharge hose.
      (20) Attach a quick-disconnect to threaded end adapter to the male end of the 1 1/2-inch discharge hose.
      (21) Attach a distribution nozzle to the threaded end of the adapter and hook the nozzle to the tripod stand.
      (22) Repeat steps to complete the other end of the wye-fitting.
      (23) Use the same procedures described above to complete the set up.

Performance Steps

c. Operate the FAWPSS.
   (1) Open one of the valves so that water flows from one of the storage and dispensing drums into the hoses.
   (2) Prime the pump.
   (3) Start the engine on the pump.
   (4) Check the entire system for leaks.

NOTE: Stop the pump and replace the defective gasket or hose if a leak is found.

   (5) Check each of the four distribution nozzles to ensure that they operate at full flow and that no foreign matter is present. Flush the lines until they are clean if foreign matter is present.
   (6) Fill user water containers and tanks on demand. Log all issues on DA Form 1714-R.
   (7) Turn the valves to turn off the line from the empty storage and dispensing drum and start flow from a full drum.
   (8) Disconnect the suction hose from the elbow coupler on the empty storage and dispensing drum.
   (9) Move the empty storage and dispensing drum out of the way.
   (10) Use a towing and lifting yoke to position a full water storage and dispensing drum so that the side with a 2-inch elbow coupler is close enough to the suction hose to permit attachment.
   (11) Attach the suction hose to the elbow coupler on the storage and dispensing drum.
   (12) Repeat steps 1-11 as needed.

d. Perform during-operations PMCS.
   (1) Troubleshoot FWPSS as need it.
      (a) Determine problem and take corrective action. Refer to TM.
      (b) Record action taken on DA Form 2404/DA Form 5988-E.
      (c) Log all deficiencies on DA Form 2404/DA Form 5988-E.
   (2) Give forms to supervisor at the end of each shift.

e. Stop operation of the FAWPSS.
   (1) Drain the water from the partially-filled dispensing drum by operating one of the dispensing nozzles.
   (2) Turn the engine on the 125-GPM pump and disconnect the suction and discharge hoses.

f. Perform after-operations PMCS.
   (1) Log all actions and deficiencies on DA Form 2404/DA Form 5988-E.
   (2) Give form to supervisor at the end of each shift.

g. Dismantle the FAWPSS.
   (1) Put pump into storage box.
   (2) Disconnect the suction hose form any storage and dispensing drum that is full, drain and cap the hose, and cap off the drum.
   (3) Disconnect, drain, and cap all other hoses.
   (4) Fold any empty storage and dispensing drum and pack it in a storage box.
   (5) Pack hoses and supporting equipment in storage boxes.

3. Operate the Semitrailer Mounted Fabric Tank (SMFT).

WARNING: Death or severe injury can result if precautions listed in TM are not observed when working with the unit.

a. Perform before-operations PMCS (refer to TM).
   (1) Log all actions and deficiencies on DA Form 2404/DA Form 5988-E.
   (2) Give form to supervisor at the end of each shift.

Performance Steps

b. Uncrate the SMFT. When the tank is received in the crate, unload it as near to its point of installation as possible.
   (1) Remove the rails from the crate top and remove top from the crate.

CAUTION: Remove all protruding nails and other objects prior to attempting to remove the tank from the container. This is essential in order to avoid puncturing the tank.

   (2) Using a lifting device (such as a small forklift), grasp the lift straps of the sling and gently lift the tank out of its crate and transport it to its designated point of installation.

c. Install the SMFT. The 5,000-gallon SMFT tank is to be installed on the flatbed of an M-872 Semitrailer ONLY. The 3,000-gallon tank can be installed on the flatbed of an M-872, M-871, or M-127 Semitrailer. The sequence of complete assembly is as follows:
   (1) Clear trailer bed of splinters, protruding nails, and other foreign objects that could puncture or chafe the tank.
   (2) The tank will be secured to the trailer with a four belt tie-down kit.
   (3) Locate the anchor points and install the tie-down points. Recheck the area for sharp objects. If the surface is rough and jagged, it will be necessary to place plywood or a tarpaulin down for the tank to rest upon.
   (4) Lay the straps crosswise to the length of the Semitrailer bed and at a slight angle. Make sure the belts are centered accurately between the eye bolts. Let the portion of the belts lie over the side of the trailer. Care should be taken to ensure that each strap is not twisted and is lying flat. The trailer is now prepared for tank unfolding.
   (5) Position the tank so that it will unroll toward the front of the semitrailer and center the tank on the bed so that it will not hang over the sides and will not rub against the truck when the tank is filled.
   (6) Remove the lift straps and unroll the tank.
   (7) Inspect the tank for damage.

NOTE: Do not walk unnecessarily on the tank and walk on it only with soft-sole shoes.

d. Fill the SMFT.
   (1) Check to see that the tank is properly installed. The trailer bed should be level to prevent the tank from rolling.
   (2) Tighten all bolts in fitting, using 70-foot pounds torque (+/-5 foot pounds) on the 1/2-inch diameter bolts in the end clamps.
   (3) Attach the pressure gauge to the filler/discharge valve and open the pressure gauge valve.

NOTE: Before using the tank for the first time or after prolonged storage, flush the tank with a disinfectant/potable water solution.

   (4) Force all air from the tank so that the tank lies flat on the bed and then close pressure gauge valve.
   (5) Purge the air filler hose by opening the valve on the hose near the pump until water comes out and then close the valve.
   (6) The free ends of the hold-down belts should now be brought over the top of tank and down the other side through the ratchet take-up mechanism attached to the truck bed. Slide ends of belt 2 feet through slot in ratchet assembly. Fold end back on belt and hold manually until one turn has been taken on roll-up spool.
   (7) Attach the hose to the tank filler/discharge valve.
   (8) Open the valve at the water supply.
   (9) Open the filler/discharge valve back on the tank.
   (10) No pressure will show in the pressure gauge until the tank is approximately 2 feet high. Periodically close the tank filler and discharge valve to obtain a precise tank pressure reading. Open the valve after the reading has been taken and resume filling.
   (11) After pressure reading has been taken, open the 4-inch filler/discharge valve on the tank and resume filling to 2 to 3 psig.
   (12) Open the relief valve on the top of the tank until water flows from valve.

Performance Steps

(13) The belts may now be tightened with the portable ratchet wrench. Tighten belts to the maximum possible with one hand on the ratchet handle. The second hand should be used to steady the ratchet assembly. Ensure that the ratchet handle has dropped securely into the locking mechanism. When all ratchet assemblies have been tightened uniformly, the pressure in the tank will be increased approximately 1/2 psi.

NOTE: If the tank is not level properly with the floor of the trailer with reference to the sides, the tank may be rolled by releasing the ratchet on one side of the tank and then taking up the slack by tightening the opposite ratchet.

(14) After filling the tank to correct pressure (4 to 6 psi), shut off filling line valve first, then shut off tank filler/discharge valve. Disconnect filling line. Some loss of water between the valves will be experienced at this point. Material is under pressure between the valves, low pressure if the filling line valve is shut off first as directed above, and high pressure if the tank valve is shut off first.

NOTE: The closed system of filling a tank allows the pressure to build up very rapidly as the tank reaches full capacity. It is recommended that tank containers be filled to final minimum pressure of 4 psi and a maximum of 6 psi.

(15) The tank is now properly secured for transportation. Regular periodic checks for tight belts are recommended. They should be tightened at least every two hours. Transport tank only when completely full or empty.

e. Perform during-operations PMCS.
   (1) Troubleshoot SMFT as need it.
      (a) Determine problem and take corrective action.
      (b) Record action taken in DA Form 2404/DA Form 5988-E.
      (c) Log all deficiencies on DA Form 2404/DA Form 5988-E.
   (2) Give form to supervisor at the end of each shift.

f. Empty the SMFT.
   (1) Empty by gravity.
      (a) Empty by means of gravity by raising one end of the trailer, attaching discharge hose to the fill and discharge valve, and opening valve. The discharge hose should be at the lowest level of the tank. Use grade elevation or portable ramps under the appropriate trailer wheels.
      (b) Connect one end of the 20 ft. by 4 in. diameter hose to the tank filler/discharge valve.
      (c) Connect the other end of the hose to the line or container requiring the potable water.
      (d) Close the tank pressure gauge valve.
      (e) Open the filler/discharge valve on the tank to start the dispensing of water.
      (f) After the operation is complete, close filler/discharge valve at the end of the tank.
   (2) Empty by pump.
      (a) Attach suction hose from pump to the filler/discharge valve.
      (b) Open filler/discharge valve on the tank.
      (c) Open the filler/discharge valve on the suction line and start pump.
      (d) Pump water from tank until tank is empty.

g. Perform after-operations PMCS.
   (1) Log all actions and deficiencies on DA Form 2404/DA Form 5988-E.
   (2) Give form to supervisor at the end of each shift.

h. Clean the SMFT.
   (1) When the tank is flat and completely empty on the truck, partially fill it with 100 to 300 gallons of clean disinfectant and water solution. The solution consists of 1/2 gallon of commercial bleach mixed in 250 gallons of fresh water. Surge truck with abrupt starts and stops. The resultant surge will clean or rinse the collapsed tank without exposing its interior to contaminants or foreign objects.

NOTE: Dispose of cleaning solution in accordance with SOP or local laws.

   (2) When the cleaning solution is drawn off, close the tank valve immediately to hermetically seal out contaminants.

Performance Steps

i. Fold the SMFT.
(1) Close the filler/discharge valve, disconnect discharge hose, and remove pressure gauge.
(2) Disconnect ratchet take up mechanism and move tie-down straps off the top of the tank.
(3) Make necessary repairs.
(4) Roll tank up from front to rear of semitrailer.
(5) Attach lift straps and lift tank off semitrailer using a forklift.
(6) Remove tie-down straps from semitrailer.

4. Operate the Water Tank Rack (HIPPO).
a. Perform before- during- and after operations PMCS (refer to TM).
(1) Check the 125-GPM pump for oil and fuel.
(2) Perform routine maintenance as required.
(3) Log all deficiencies on DA Form 2404/DA Form 5988-E.
(4) Give form to supervisor at the end of the shift.
b. Troubleshoot HIPPO as required.
(1) Determine problem and take corrective action.
(2) Record all actions taken on DA Form 2404/DA Form 5988-E.
c. Conduct Pre-Checks.
(1) Check valve positions for correct operation mode. See table in TM.
(2) Prime the pump using the auxiliary water source or the water on-board.

NOTE: The following procedure can be performed with the HIPPO on the ground or mounted on a prime mover.

(3) Ground the unit.
(a) Remove grounding rod.
(b) Remove the grounding cable assembly from the container located on the inside of the Main Access Door.
(c) Locate a suitable location for the grounding rod which is within 20 feet of the rear end of the HIPPO. Insert the ground rod into the ground by threading it in a clockwise direction. Make sure the ground is at least 4 feet into the ground.
(d) Attach the ring terminal of the cable to the lug on top of the grounding rod.
(e) Attach the spring loaded hand clamp onto the surface of the HIPPO (be sure the clamp has a firm grip on the HIPPO).
(f) Reverse the above steps to return the rod and cable to their stowage locations.

WARNINGS: When the engine is running during normal operations, all personnel within 9 feet of the HIPPO pump operator position are required to wear hearing protection. Failure to comply may result in severe hearing lost.

Before starting the engine, make sure that no personnel are in the danger area (moving parts on engine). Ensure that all safety guards are in place. Ensure that area is clear from loose parts. Never use any spray starting aids. Failure to comply may result in injury to personnel.

NOTES: At temperatures below 0 degrees Celsius, winter grade fuel should be used.

The HIPPO can be filled by the use of its internal pump or using an auxiliary pump. The HIPPO can be filled by either the 4-inch fill port located on the top of the HIPPO, or through the bottom fill port, Port 3.

d. Fill the HIPPO.
(1) Use Internal Pump
(a) Position the rear of the prime mover within 20 feet to the water source.
(b) Remove the ladder assembly (See TM for procedure). If the HIPPO is used when mounted on the prime mover, use the center inserts for this operation.

WARNING: When any access door is open, the safety brace must be used to brace the access door open. Failure to comply may result in serious personnel injury or damage to equipment.

(c) Open the Control Access Door and secure it using the safety brace on the inside of the access door.

Performance Steps

(d) Open the Main Access Door and secure the Main Access Door using the safety brace on the inside of the access door. Use interior lights if needed.
(e) Remove dust cap from hose. Unlock the hose reel by rotating the hose reel locking mechanism counterclockwise until the hose reel moves easily.
(f) Disconnect sufficient hose length from the hose reel to make the proper connection to the source.
(g) Open the port cover on Port 3 and secure in place with the safety chain.
(h) Remove the protective cap on Port 3 and connect the hose to the suction port.
(i) Brace the adapter access door using the safety brace on the inside of the door and select and install the appropriate adapter to connect the hose to the water source. Open the adapter access door if needed.
(j) Connect the suction hose to the water supply or source.
(k) Open valve C and valve F.
(l) Close the Main Access Door and the Adapter Access Door.
(m) Ensure that the valves/controls at the water source are properly positioned to allow the water to flow.

CAUTION: Ensure that all valves are in their proper position before starting the engine or damage to equipment may result. Also, ensure that the pump is primed. After starting pump, watch hose for movement, indicating the pump is primed.

(n) Start the engine by doing the following:
- Open Main Access door and secure with safety brace on the inside of the door.
-Remove fire extinguisher from interior bracket and mount in exterior bracket.
-Unfasten the ladder on the Control Panel Access Door.
-Open the Control Panel Access Door and secure with the safety brace on the inside of the door.
-Ensure Emergency Stop is pulled out.
-Depress Main Power button.
- Wait ten seconds for Control Panel to register any faults. Observe Control Panel indicators (Low Oil Pressure, Engine Over Temperature, High and Low Water Level).
- Troubleshoot, if the Low Oil Pressure or the Engine Over Temperature indicators are illuminated.
- Override the automatic engine cutoff by placing the Level Override in the ON position, when the engine cuts off.
- Place the Engine Run switch in the ON position.
- Push START button. Engine should start without shutting off.
-When engine runs for 15 seconds, high and low level indicator will turn off. Return level override to OFF position.

WARNING: When filling tank, ensure that hissing or whistling noise is coming from the vents on top of the tank. If vents are clogged, stop pumping. Pressure can build up, causing injury or death to personnel.

CAUTION: Once water has begun pumping, ensure to return the Level Override to the OFF position. Failure to comply may result in tank overflow and cause damage to equipment.

(o) Monitor tank fill level by observing the water level indicator gauge.
(p) When pumping operation is complete, shut down engine by doing the following:
- Return the Engine Run switch to the OFF position.
-Push the Emergency Stop button, to power down the HIPPO.
(q) Stow hoses on hose reel. Lock hose reel and place dust cap on end of hose.
(r) Stow adapters if used.
(s) Replace fire extinguisher to inside bracket.
(t) Shutdown main power using the Emergency Stop button on the control panel.
(u) Close all access doors.
(v) Stow ladders (See TM for "Assembly/Deployment of Ladder").
(w) Close port covers.

Performance Steps

(2) Use External Pump.

(a) Place the ladder handhold in the upright position, ensuring that it is in the locked position.

(b) Safely climb to the top of the unit using the ladder, and unlock the handrail. Pull the hand rail up, ensuring that it locks into place.

(c) Unlock and open the manhole protective cover.

(d) Remove the quick disconnect cap from the 4-inch port located within the spill box area (next to the manhole).

WARNING: When using an auxiliary pump to fill the HIPPO through the 4-inch fill port on the top of the unit, the operator must loosen the manhole cover latches prior to filling. Failure to do so could create a hazardous situation with pressure buildup inside the tank. The vents will not be able to relieve the pressure build up and could create a dangerous situation causing damage to equipment and/or injury to personnel.

(e) Loosen all of the toggle clamps on the manhole cover so the manhole cover is resting in the closed position.

(f) Attach the hose from the filling source to the 4-inch port. Use an adapter from storage compartment, if required, to connect to filling source.

(g) Begin the filling operation. All valves should be closed.

(h) Have an assistant monitor the water level indicator located on the side of the water tank. As it reaches 2,000 gallons (full), stop the filling operation. If no assistant is available to monitor the gauge, open the manhole cover and visually watch the water until it reaches the bottom of the manhole opening, and then stop the filling operation.

(i) Disconnect the filling source hose from the 4-inch port on the HIPPO.

(j) Place the quick disconnect cap on the 4-inch port.

(k) If the manhole cover is open, close the manhole cover.

(l) Tighten all the toggles on the manhole cover.

(m) Close the manhole protective cover and lock the latches.

(n) Unlock the handrail and fold it down into the stowage configuration.

(o) Using the handhold, safely descend the ladder.

(p) Fold the handhold down to place it in the stowage configuration.

(3) Use the Bottom Port (Port 3).

CAUTION: DO NOT attempt to transfer water into the HIPPO with the following procedure if the ambient temperature drops below 30 degrees Fahrenheit.

(a) Open the Main Access Door to access valves. Brace the door using the safety brace on the inside of the access door.

(b) Remove sufficient hose from the hose reel to reach from Port 3 to the auxiliary pump. Connect to Port 3 and ensure proper connections are available.

(c) Close valve E and valve D. Open valve F and valve C.

(d) Start the pumping process by energizing the auxiliary pump.

(e) Continuously monitor the water level indicator on the side of the HIPPO in order to shut the pump OFF when the water load has reached 2,000 gallons. Upon shutdown of the auxiliary pump, close valve C and valve F.

(f) Disconnect hose and return the hose to the hose reel within the housing. Lock hose reel and connect dust cap.

(g) Close and secure Main Access Door.

(h) Secure the HIPPO for transport.

Performance Steps

e. Discharge from HIPPO.

NOTES: Refer to valve position chart in the TM for valve location and operation.

There are three discharge port locations. Two discharge ports are mounted on the outside of the unit with a 2-inch standard port valve to accept the 70-foot hose that is supplied with the HIPPO. The third discharge port is the hose reel. An adjustable discharge nozzle is supplied to adjust the flow control when filling water bladders or water trailers and a filling station is also supplied with the unit to provide a fill station for five-gallon water can refill or initial canteen refill. The 70-foot hose is divided into three different hose length segments: One 35-foot ribbed non-collapsible hose, one 20-foot ribbed collapsible hose, and one 15-foot ribbed non-collapsible hose.

(1) Position the HIPPO for discharge operations.
(2) Open Main Access Door, brace the door using the safety brace on the inside of the door.
(3) Remove the ladder section. Open the control panel access door; brace the door using the safety brace on the inside of the door.
(4) Turn on Cabinet Light, if needed.
(5) Move fire extinguisher from interior bracket to exterior bracket.
(6) Unlock the hose reel by rotating the hose reel locking mechanism counterclockwise until the hose reel moves easily.
(7) Remove the cap on hose end.
(8) Remove sufficient hose from the hose reel to reach from Port 1 or Port 2 to the container receiving the water.
(9) Open the port cover and secure with the safety chain.
(10) Connect to the selected discharge port to be used-Port 1 or Port 2.

WARNING: Relieve pressure before disconnecting hose by closing Valve A or Valve B and opening fill port on fill station. Failure to relieve pressure could result in severe injury or death to personnel or damage to equipment.

(11) Select method of discharging.
  (a) Discharge nozzle (go to step 12).
  (b) Filling station (go to steps 13 through 17).
(12) Connect the nozzle to the end of the hose. Continue with step 18.
(13) Remove the two supporting legs for the filling station by releasing the pins from the mounting bracket.
(14) Remove the center component of the filling station by releasing the pins from the //mounting bracket. Push the release button on the head of the pin to release the lock.
(15) Identify level ground to set up filling station.
(16) Insert supporting legs into center component slot. Align the holes on the legs and the center component of the filling station, and insert the locking pins to secure them together.
(17) Reverse above steps to disassemble.

WARNING: When the engine is running during normal operations, all personnel within 9 feet of the HIPPO pump operator position are required to wear hearing protection. Failure to comply may result in hearing loss.

CAUTION: Ensure the discharge port valve is closed before starting the engine. Failure to comply may result in damage to equipment.

(18) Open valve E. Close valve D and valve F, if necessary.

NOTE: When discharge has begun, the closing of valve F will increase the discharge rate by approximately 20 percent. However, before shutting off the discharge operation, valve F should be opened to eliminate pressure buildup within the plumbing system. If using fill station or nozzle and pressure is too high, opening of valve F will decrease the flow rate by 20 percent.

(19) Close Main Access Door. Start the engine as described in the filling procedure (see filling the HIPPO).

Performance Steps

(20) Open port valve A or B for the selected method of distribution to be utilized.

CAUTION: Once the tank has reached a low level, the water Low Level indicator will illuminate and the engine will shutdown the engine. This is to prevent possible damage to the water pump.

(21) When pumping operations is complete, close the Port valve A or B.

f. Retrieving the HIPPO.

(1) Ensure Port valve A or B is closed.
(2) Shut down the engine by returning the Engine Run switch to the OFF position.
(3) Remove nozzle or fill station.

WARNING: Relieve pressure before disconnecting hoses by closing valve A or Valve B and opening nozzle. Failure to relieve pressure could result in severe injury or death to personnel or damage to equipment.

(4) Return the nozzle to its stowage location within the housing.
(5) Disconnect hoses and return to the hose reel within the housing. To facilitate draining of the hose, keep end of hose uncapped while cranking hose reel.
(6) Place tethered cap on the end of the hose and place the hose in its stowed configuration by rotating the hose reel counterclockwise until the tethered cap is taut and rotate hose reel locking mechanism clockwise until tight.
(7) Return the adapters to the stowage location within the housing, if used.
(8) Move fire extinguisher to interior bracket.
(9) Shut down main power using Emergency Stop button.
(10) Close access doors.
(11) Stow ladder and close port covers.
(12) Secure the HIPPO for transport.

Performance Measures	**GO**	**NO-GO**
1. Applied Risk Management Procedures.	____	____
2. Operated the Forward Area Water Point Supply System (FAWPSS).	____	____
3. Operated the Semitrailer Mounted Fabric Tank (SMFT).	____	____
4. Operated the Water Tank Rack (HIPPO).	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 1714-R	FM 10-52
DA FORM 2404	FM 10-52-1
DA FORM 5988-E	TM 10-4320-346-12&P
FM 100-14	
TM 5-4320-208-12&P	
TM 5-4320-301-13&P	
TM 5-5430-212-13&P	
TM 5-5430-213-13&P	
TM 10-5430-244-10	

Perform Sling Load Operations

101-92W-1079

Conditions: Given a helicopter, 500-gallon collapsible drums, fabricated static electricity discharge probe, clevis assembly, slings, tape, helmet, goggles, earplugs, multiple leg sling, FM 10-52-1, and FM 10-450-4, this task is performed under all environmental conditions except during electrical storms.

Standards: Sling loaded the 500-gallon collapsible drums for external airlift without error. Hooked cargo to the aircraft.

Performance Steps

DANGER: Failure to perform this task correctly may result in damage to equipment, injury, or death to personnel.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

NOTE: Check the 500-gallon drums for leaks or damage.

1. Apply Risk Management Procedures (reference: FM 100-14).
    a. Understand and execute the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

2. Rig the 500-gallon collapsible drum for external airlift using the sling set.
    a. Locate the drum at the rigging site.

NOTE: More than one drum can be airlifted with the multiple-sling leg.

    b. Attach a small clevis assembly to the lifting eye on each end of the drum.
    c. Pass the chain of one leg through the clevis assembly of the lifting eye on the left end of the drum.
    d. Hook a clevis assembly to the end of the chain and connect it to the grab link.
    e. Pass the chain of the second leg through the clevis assembly of the lifting eye on the left end of the drum.
    f. Hook a clevis assembly to the end of the chain and connect it to the grab link.
    g. Hook the grab link to a 12-inch ring.

3. Hook the cargo to the helicopter.

CAUTION: Ground personnel involved in helicopter external load operations are exposed to hazards that could cause serious injury. These hazards include noise, rotor wash, static electricity, flying debris, and operations around suspended cargo. Wear the appropriate personal protective equipment (such as helmet, goggles, electrical protective gloves, and leather gloves). To prevent clothing from flapping or snagging on cargo, the ground crew will roll their sleeves down and button their shirts and jackets.

    a. Direct the helicopter to the cargo using hand signals.
    b. Discharge the static electricity from the helicopter using the discharge probe.
    c. Hook the 12-inch ring from the load to the hook on the helicopter.
    d. Check to make sure the hook is locked by giving a sharp pull on the sling legs.
    e. Break contact from the static wand and the aircraft after checking the hook up connection.
    f. Place static discharge wand on the ground near grounding rod.
    g. Hookup team departs the hookup area forward of the aircraft's 8 or 4 o'clock position to the rendezvous point or other briefed location. Initially, they should move away from the load about 50 feet.
    h. Direct the helicopter to raise load and send off using proper hand and arm signals after the hook up team is clear.

Performance Measures	GO	NO-GO
1. Applied Risk Management Procedures.	____	____
2. Rigged the 500-gallon drum.	____	____
3. Hooked the cargo to the helicopter.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
FM 10-52-1	FM 3-04.111
FM 10-450-5	FM 3-100.4
FM 100-14	FM 3-100.12
	FM 10-52
	FM 10-450-3
	FM 10-450-4

Set Up/Maintain/Operate and Dismantle the Force Provider (FP) Potable Water Distribution and Storage Subsystem

101-92W-1080

Conditions: The Force Provider (FP) company or platoon has occupied an operational site for a FP module. The site has been prepared in accordance with the site plan and is secure. The components of the water storage and distribution site have been unpacked and inventoried and are operational. The water treatment NCO has ensured that all components are present, clean, and serviceable and has reported all shortages and unserviceable components to company or platoon HQ. The power generation and gray water collection subsystems are operational. A berm has been constructed at the water distribution and storage site and a berm drain installed with gate valve. The potable water distribution and storage site will initially be serviced by line haul tankers. For training purposes, extend water to one user facility and assemble one nozzle kit for the other user line. Four soldiers and one NCO have been assigned to set up, maintain, and operate one potable water distribution and storage site. After the storage tank is set up, two soldiers may be released. Materials needed: FM 100-14, TM 5-4610-228-13, TM 5-4610-233-13&P, DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet), DA Form 1714-R (Daily Water Issue Log), and commercial instructions supplied with the potable water distribution and storage subsystem are available.

Standards: Performed before-, during-, and after-operations PMCS. Set up, operated, and dismantled the potable water distribution and storage (PWDS) site in accordance with TM.

Performance Steps

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, waste water or chemical testing kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

Comply with unit SOP, OPORD, local regulations, and/or HN laws for containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the proper personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

1. Apply Risk Management Procedures (reference: FM 100-14).
    a. Understand and execute the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Perform before-operation PMCS (refer to TMs).
    a. Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
    b. Give form to supervisor at the end of each shift.
3. Set up the 20,000-gallon collapsible fabric tank.
    a. Position the rolled tank in the center of lower end (down slope) of the site.
    b. Unroll the tank toward the higher end (up slope), placing the drain assembly on the lower side of the tank.
    c. Unfold the tank, using the handles to center the tank inside the site.
    d. Check the tank for damage, punctures, or tears.

Performance Steps

e. Check that each female coupling on the filler/discharge assemblies and drain hose has a sealing gasket, cam arms that operate correctly, and gate valves that open and close correctly.
f. Install two poles on either side of the tank, joined by a taut rope or line four feet above the ground, to use as a visual check against overfilling the tank.

WARNING:

CONTAMINATION HAZARD

Assembly of Quick Disconnect (QDISC) couplings must be accomplished in accordance with instructions. Failure to do so may cause sickness or death to personnel resulting from contamination of potable water equipment and water supply.

4. Prepare the 20,000-gallon collapsible fabric tank for operation.

WARNING:

CONTAMINATION HAZARD

Force Provider uses similar tanks for potable water (Tank Type 1) and wastewater (Tank Type 2). Never store potable water in a Type 2 tank or any tank which has previously been used for wastewater. Using a substandard or contaminated tank for potable water can cause death or severe illness to individuals who drink or contact contaminated water.

a. Unfold the tank envelope to lie flat in its original position.
b. Remove dust caps and dust plugs from tank vent assembly, elbows, hose, and valve assembly, and clean any dirty elbows, hose, and valve assembly, and clean any dirty sealing surfaces with a clean cloth.
c. Install the vent assembly, 4-inch female x 4-inch female elbow on the filler side, 4-inch female x 4-inch male elbow on the discharge side followed by a 4-inch male x 2-inch female reducer and 2-inch male x 11/2-inch male reducer.
d. Install the 1 1/2-inch discharge elbow with reducer to the drain assembly, if present.

5. Assemble the fill side of the potable water distribution and storage site.
   a. Connect a 4-inch x 10-foot potable water hose to the 4-inch female x 4-inch female filler elbow already installed on the 20,000-gallon tank.
   b. Install the hypochlorinator T-assembly to the end of the hose.
   c. Connect the female-male-female T-assembly to the hypochlorination T-assembly, orienting the male fitting so that it points toward the discharge side of the tank.
   d. Install a 4-inch gate valve to the opposite side of the female-male-female T-assembly.
   e. Connect a 4-inch x 20-foot potable water hose to the gate valve, extending the hose toward the water source or delivery point and leaving the dust plug in place at the end of the hose until ready to fill the tank.
   f. Connect all loose dust caps and plugs.

6. Assemble the discharge side of the potable water distribution and storage site.
   a. Connect the 1 1/2-inch x 15-foot QDISC female-female potable water hose assembly to the 1 1/2-inch reducer fitting on the discharge elbow already installed on the 20,000-gallon tank.
   b. Install the electric water pump assembly by doing the following:
      (1) Position the electric water pump assembly on the discharge side of the tank.
      (2) Connect the 1 1/2-inch x 15-foot QDISC female-female potable water hose from the discharge elbow to inlet port of the pump.
      (3) Remove the threaded plug from the priming port of the pump and store it for later use.
      (4) Install the test valve assembly into the priming port or QDISC ensuring that the valve is left closed.
      (5) Install the check valve assembly into the pump's outlet port on the discharge side of the pump.
      (6) Connect a 1 1/2-inch x 10-foot potable water hose to the check valve assembly.

Performance Steps

c. Install the expansion tank assembly.
   (1) Position the expansion tank assembly.
   (2) Connect the 1 1/2-inch x 10-foot potable water hose from the water pump to the female QDISC fitting of the expansion tank assembly's cross fitting.
   (3) Connect another 1 1/2-inch x 10-foot potable water hose to the male QDISC fitting of the expansion tank assembly's cross fitting.

7. Install the recirculation loop of the potable water distribution and storage site.
   a. Connect the preassembled recirculation T-assembly, with the two gate valves, to the end of the 1 1/2-inch x 10-foot potable water hose from the expansion tank assembly.
   b. Connect four 1 1/2-inch x 20-foot potable water hoses from the side gate valve on the recirculation T-assembly and extend the hoses back toward the fill side of the tank.
   c. Install a 1 1/2 -inch female x 2-inch male reducer and a 2-inch female x 4-inch male reducer onto the open end of the fourth potable water hose.
   d. Connect the 2-inch x 4-inch reducer to the female-male-female T-assembly installed on the fill side of the tank.

8. Extend the potable water supply to user connection point.
   a. Connect a 1 1/2-inch x 20-foot potable water hose to the recirculation T-assembly.
   b. Install a female-male-male user T-assembly to the opposite end of the above 1 1/2-inch x 20-foot potable water hose.
   c. Install two 1 1/2-inch gate valves onto the male QDISC couplings of the user T-assembly.
   d. Connect as many 1 1/2-inch x 20-foot potable water hoses as needed to extend from the gate valves to the staked potable water user connection point (s), leaving the dust caps on the end of the water hose(s) in place until ready to make the connection to the user facility.

9. Install the hypochlorination unit to the fill side of the tank site.
   a. Identify the hypochlorinator T-assembly.
   b. Position the hypochlorination unit on stable ground close to the hypochlorinator T-assembly.
   c. Extend the output line from the hypochlorinator to the T-assembly.
   d. Thread the 1/4-inch output line fitting onto the ball valve of the T-assembly, tightening the fitting.

10. Assemble a large and small nozzle kit.
   a. Assemble a large nozzle kit at the designated location.
      (1) Ensure the gate valve at the male QDISC coupling half of the user T-assembly is closed.
      (2) Position the nozzle stand at the designated location.
      (3) Connect, as needed, one or two 1 1/2-inch x 25-foot discharge hoses from the gate valve, to the nozzle stand.
      (4) Connect a 1 1/2-inch nozzle to the end of the free end of the discharge hose at the nozzle stand.
      (5) Place the nozzle on the nozzle stand.
      (6) Ensure that all loose dust caps are connected together.
   b. Assemble a small nozzle kit at the designated location.
      (1) Ensure the gate valve at the male QDISC coupling half of the T-assembly is closed.
      (2) Position the nozzle stand at the designated location.
      (3) Connect, as needed, one or two 1 1/2-inch x 25-foot discharge hoses, a 1 1/2-inch x 1-inch reducer, and as needed 1-inch x 10-foot discharge hoses.
      (4) Connect a 1-inch nozzle to the end of the free end of the discharge hose at the nozzle stand.
      (5) Place nozzle on the nozzle stand.
      (6) Ensure that all loose dust caps are connected together.

Performance Steps

11. Connect the electrical connections to the potable water distribution and storage site.
    a. Locate and identify the Power Distribution Illumination System Electrical (PDISE-M100) that supports the potable water distribution and storage site.
    b. Check that the circuit breakers inside the PDISE-M100 for the 20-amp and 40- or 60-amp receptacle assigned to the site are in the OFF position.
    c. Lay out the power cable with the commercial-to-class L connector from the expansion tank assembly toward the PDISE-M100.
    d. Check that the electric water pump power switch is OFF.
    e. Check that the metering pump control unit on top of the hypochlorination unit is OFF (toggle switch in the EXTERNAL CONTROL [OFF] position).
    f. Connect the power cable with the 20-amp connector from the expansion tank assembly to the power receptacle of the electric water pump.
    g. Connect the power cable with the commercial-to-class L connector from the expansion tank assembly to a 40- or 60- amp output receptacle (J3, J4, J5, or J6) on the PDISE-M100.
    h. Use commercial extension cords, supplied with the module, to connect the hypochlorination unit to the nearest 120V power source.

12. Prepare the hypochlorination unit for operation.

WARNING:

TOXIC CHEMICAL

Calcium hypochlorite is toxic to skin and eyes. Do not ingest or inhale calcium hypochlorite dust particles. Stand upwind when handling hypochlorite granules. Wear eye protection, protective apron, respirator, and gloves. Failure to observe this warning may result in serious injury to personnel from contact with calcium hypochlorite.

    a. Ensure the toggle switch on the metering pump control unit is placed to the EXTERNAL CONTROL (up) position.
    b. Add approximately 15 pounds of calcium hypochlorite to a 5-gallon bucket of potable water and mix until the granules dissolve.
    c. Remove the fill cap from the top of the hypochlorination unit.
    d. Add the calcium hypochlorite solution to the 100-liter hypochlorination unit tank and fill the tank to the 50-liter mark with potable water. Mix the solution with the unit's hand mixer.
    e. Replace fill cap.
    f. Loosen the locking screw on metering pump control unit.
    g. Set stroke length to "10."
    h. Re-tighten locking screw.
    i. Set stroke frequency to "10."
    j. Place the toggle switch to the INTERNAL CONTROL (down) position and observe for priming of the metering pump.
    k. If pump does not prime.
        (1) Place the toggle switch on the metering pump control unit to the EXTERNAL CONTROL (up) position.
        (2) Detach the discharge check valve.
        (3) Pour potable water or chemical solution from step 12d, directly into the pump head.
        (4) Replace the discharge check valve.
        (5) Place the toggle switch on the metering pump control unit to the INTERNAL CONTROL (down) position, allowing the pump to prime again.
        (6) Check for the flow of the solution through the metering pump and re-prime the pump, if necessary.
    l. When the metering pump is primed, place the toggle switch on the metering pump control unit to the EXTERNAL CONTROL (up) position that turns the unit OFF.

Performance Steps

13. Perform initial checks on the potable water distribution and storage subsystem.
    a. Check QDISC coupling halves for leaks, tightness, and cracked, bent, or broken locking arms.
    b. Check suction and discharge hoses for cuts, tears, and deep abrasions.
    c. Check T-assemblies for cracks, breaks, and severe corrosion.
    d. Check gate valves for loose or missing hand wheels.
    e. Check that all gate valves in the potable water distribution and storage site are closed.
    f. Check that all unused potable water supply hoses remain capped with dust caps or plugs.
    g. Check for damaged or loose electrical cables or connections.

14. Power up the potable water distribution and storage site.
    a. Set the circuit breakers in the PDISE-M100 to the ON position.
    b. Prime the electric water pump with potable water through its priming port.
    c. Set the power switch on the electric water pump to the ON position.
    d. Visually check that the impeller on the pump rotates in the direction of the arrow on the housing and then turn the pump power switch to OFF.

15. Fill the 20,000-gallon collapsible fabric storage tank.
    a. Record the geographic source of the potable water on the appropriate water supply record or log.
    b. Test the residual chlorine level of the potable water using the Water Quality Analysis Set-Purification (WQAS-P) or other suitable test kit at the delivery source (tanker or municipal water system). Results will be used later.
    c. Locate the appropriate adapter in the potable water accessory kit to connect the delivery tanker or municipal water system to the 4-inch x 20-foot potable water hose on the fill side of the site.
    d. Ensure the gate valve on the fill side and the gate valve on the recirculation loop are closed.
    e. Connect the water supply main (from the tanker or municipal system) to the 4-inch x 20-foot potable water hose on the fill side of the site.
    f. Open the gate valve on the fill side.

CAUTION: Do not allow height of tank to exceed four feet. Tank may rupture causing damage to surrounding equipment.

    g. Fill tank to the height of four feet, and then close the gate valve on the fill side when complete.
    h. Disconnect the water supply main from the 4-inch x 20-foot potable water hose on the fill side of the site and then reinstall the dust plug.

16. Adjust chlorine residual.
    a. If chlorine residual meets desired level, no action is necessary.
    b. If the tested chlorine level is less than desired level, do the following:
        (1) Loosen the locking screw on the metering pump control unit.
        (2) Set the stroke length to 7.5 on the meter and tighten the locking screw.
        (3) Set the stroke frequency to 7.5 on the meter.
        (4) Place the toggle switch on the metering control pump to the INTERNAL CONTROL (down) position and observe that the metering pump starts the chemical solution through the line to the hypochlorinator T-fitting.
        (5) Allow the water to recirculate and monitor the chlorine residual until the desired level is achieved.
        (6) It may be necessary to increase the stroke settings to obtain the desired level.
    c. If the tested chlorine level is at desired level then turn OFF the hypochlorination unit.

17. Sanitize the user facilities.
    a. Ensure gate valves to user supply lines are closed.
    b. Open the gate valve on the user side of the discharge T-assembly.
    c. Inspect for leaks up to the gate valve on the user side of the discharge T-assembly, taking corrective action to turn the pump OFF and repair or replace hoses or connections as necessary, and turning the pump back ON when repairs are completed.

Performance Steps

d. Close the gate valves to the recirculation loop.
e. Open gate valves to each user facility and/or nozzle kit slowly, allowing air to escape during the filling process.
f. Open gate valves completely for each user facility and/or nozzle kit.
g. Inspect user facility and nozzle kit for leaks, taking corrective action to turn the pump OFF, close the appropriate user gate valve, repair or replace hoses or connections as necessary, turn the pump back ON when repairs are complete, and reopen the appropriate user gate valve.
h. Open the valves within each user facility serviced by the site, flushing the facilities potable water lines for three minutes and then closing the valves.
i. Place, but do not immerse, nozzle ends in the nearest sewage ejection pump (SEP) or approved gray water collection point, flushing the nozzle and its lines for three minutes, turning off the nozzle when complete and replacing it on the stand.

18. Operate the FP potable water distribution and storage site.
    a. Perform during operations PMCS on the system.
        (1) Perform maintenance as required.
        (2) Troubleshoot the system as needed.
        (3) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
        (4) Give form to supervisor at the en of each shift.
    b. Perform maintenance as required.
    c. Troubleshoot the system as needed.
    d. Test the chlorine level at the electric water pump test valve assembly.
    e. Maintain desired residual chlorine level at the electric water pump and at each user facility and nozzle. Adjust the residual levels by performing the procedures in step 16.
    f. Turn off the electric water pump if the potable water distribution and storage site (user facilities for nozzles serviced by the site) will not be used for 24 hours or more.
    g. Monitor the height of the 20,000-gallon collapsible fabric water tank so that it never exceeds four feet high nor drops below six inches in height.
    h. If the height approaches six inches, notify the site supervisor.
    i. Refill the 20,000-gallon collapsible fabric water tank from the tanker or municipal water system.

19. Dismantle potable water distribution and storage site.
    a. Elevate the site's potable water supply residual chlorine level to 5 ppm.
        (1) Reduce the water level in the tank to a maximum of 5,000-gallons (tank height of approximately one foot) by draining or transfer to a tanker.
        (2) Close the gate valves at the user T-assembly and open the gate valves on the recirculation loop.
        (3) Set the toggle switch on the hypochlorination unit metering pump control unit to the EXTERNAL CONTROL (up) position.
        (4) Loosen the locking screw on the control unit.
        (5) Increase the stroke length on the meter.
        (6) Tighten the locking screw.
        (7) Increase the stroke frequency on the meter to the same reading as the stroke length.
        (8) Place the toggle switch on the metering pump control unit to the INTERNAL CONTROL (down) position.
        (9) Test the chlorine level using the WQAS-P or other suitable test kit at the test valve assembly on the electric water pump.
        (10) If the tested chlorine level is less than 5 ppm at the water pump, then increase the stroke setting or increase the chemical concentration in the hypochlorination unit and follow the instructions in the hypochlorination unit's commercial technical manual.

Performance Steps

(11) If the tested chlorine level is higher than 5 ppm at the pump, then turn OFF hypochlorination unit.

NOTE: When the target super chlorinated levels are achieved, do the following:

(12) Open the gate valves at the user T-assembly and close the gate valves on the recirculation loop.
(13) Open the valves within each facility serviced by the site, flush the facilities' potable water lines with highly chlorinated water for three minutes, and then close the valves.
(14) Place, but do not immerse, nozzle ends in the nearest sewage ejection pump (SEP) or approved gray water collection point, flush the nozzle and its lines with highly chlorinated water for three minutes, turn off the nozzle when complete, and then replace it on its stand.
(15) When there is no further requirement for highly chlorinated water, close the gate valves at the user T-assembly.
(16) Open the gate valves at the recirculation T-assembly.
(17) Turn the hypochlorination unit off (place toggle in EXTERNAL CONTROL [up] position).

b. Perform after-operations PMCS on potable water distribution equipment and components.
c. Disassemble the electrical connections to the potable water distribution and storage site.
(1) Turn the circuit breakers inside the PDISE-M100 for the 20-amp and 40- or 60-amp receptacle assigned to the site to the OFF position.
(2) Turn the electric water pump power switch OFF.
(3) Disconnect the power cable with the 20-amp connector from the expansion tank assembly from the power receptacle of the electric water pump and then coil it neatly for re packing.
(4) Disconnect the power cable with the commercial-to-class L connector from the expansion tank assembly from the 40- or 60-amp output receptacle (J3, J4, J5, or J6) on the PDISE-M100 and then coil it neatly for re packing.
(5) Check that the metering pump control unit on top of the hypochlorination unit is OFF (toggle switch in the EXTERNAL CONTROL [OFF] position).
(6) Disconnect the commercial extension cords from the hypochlorination unit and the 120V-power source and neatly coil them for repacking.
d. Disassemble discharge side of tank.
(1) Close gate valves at the recirculation T-assembly and the user T-assembly.
(2) Identify the lowest point on the discharge side of the tank.
(3) Disconnect a hose section at this lowest point, permitting the water in the hoses to drain by gravity.
e Disassemble the nozzle kits.
(1) For the large nozzle kit, disassemble the QDISC couplings on the nozzle, gate valve on the nozzle side of the user T-assembly, and 1 1/2-inch x 25-foot hoses.
(2) For the small nozzle kit, disassemble the QDISC coupling on the nozzle, gate valve on the nozzle side of the user T-assembly, 1 1/2-inch x 25-foot hoses, 1 1/2-inch 1-inch reducer, and 1-inch x 10-foot hoses.
(3) Carry the nozzle kit and gate valve to the TRICON staging areas for repacking.
f. Disassemble the remaining user branch.
(1) Disassemble the QDISC coupling on the gate valve on the facility side of the user T-assembly, the user T-assembly, and 1 1/2 x 20-foot hoses.
(2) Carry the hoses, gate valve, and user T-assembly to the TRICON staging area for repacking.
g. Disassemble the recirculation loop.
(1) Disassemble the QDISC coupling on the recirculation T-assembly, the four 1 1/2-inch x 20-foot hoses, 1 1/2-inch x 2-inch reducer, and 2-inch x 4-inch reducer.
(2) Carry the hoses, T-assembly, and reducers to the TRICON staging area for packing

Performance Steps

h. Disassemble the discharge side of the tank.
   (1) Disassemble the QDIS coupling on the 1 1/2-inch x 10-foot hoses form the expansion tank assembly cross, check valve assembly, and electric water pump outlet port.
   (2) Disassemble the QDISC coupling on the 1 1/2-inch x 15-foot female-female hose connecting the tank discharge elbow to the electric water pump inlet port.
   (3) Remove the test valve assembly from the electric water pump priming port, open the pump's petcock valve, and tip the pump up so the residual water can drain from the petcock.
   (4) Leave the petcock and priming port open to allow the water pump to air dry
   (5) Carry the hoses, check valve, power cord, expansion tank assembly, test valve assembly, and electric water pump (when dry) to the TRICON staging area for repacking.
   (6) Replace the threaded plug in the electric water pump priming port.

i. Disassemble the hypochlorination unit.
   (1) Coil the unit's power cord neatly.
   (2) Loosen the 1/4-inch output line fitting from the ball valve of the hypochlorinator T-assembly and remove the outlet line form the valve.
   (3) Coil the output line neatly.
   (4) Open the filler cap and drain the calcium hypochlorite solution into a bucket or other suitable container.
   (5) Dispose of the calcium hypochlorite solution in accordance with current directive for hazardous waste.
   (6) Rinse the hypochlorination unit tank with potable water, catch the rinse water in a suitable container, and then dispose of the rinse water as hazardous waste in accordance with current directives.
   (7) Replace the filler cap.
   (8) Carry the hypochlorination unit to the TRICON staging area for repacking.

j. Disassemble the fill side of the tank.

k. Perform after-operation PMCS.
   (1) Log all actions/deficiencies on DA Form 2404/DA Form 5988-E.
   (2) Give form to supervisor at the end of each shift.

20. Prepare the 20,000-gallon collapsible fabric storage tank for storage or shipment, in accordance with TM 5-5430-226-12.
    a. Reinstall all dust caps and dust plugs on the fill/discharge elbows and drain assembly.
    b. Fold the up-sloped end of tank to the opposite side.
    c. Roll the up-slope end of the folded tank toward the drain assembly.
    d. Collect all tank and remaining distribution and storage site components, and take them to the TRICON staging area for repacking.
    e. Using a forklift, move the rolled 20,000-gallon tank to the TRICON staging area for repacking.

21. Prepare potable water distribution and storage site components for movement and storage.
    a. Perform PMCS on the site's components and equipment, in accordance with TM 5-4610-233-13&P.
    b. Perform periodic maintenance on the 20,000-gallon tank, in accordance with TM 5-5430-226-12.
    c. Perform periodic maintenance on the hypochlorination unit, in accordance with TM 5-4610-228-13 and its commercial technical manual.
    d. Perform periodic maintenance on the electric water pump, in accordance with its commercial technical manual.
    e. Perform periodic maintenance on the expansion tank assembly, in accordance with its commercial technical manual.

Performance Measures	GO	NO-GO
1. Applied Risk Management Procedures.	____	____
2. Performed before-operations PMCS.	____	____
3. Set up the 20,000-gallon collapsible fabric tank.	____	____
4. Prepared the 20,000-gallon collapsible fabric tank for operation.	____	____
5. Assembled the fill side of the potable water distribution and storage site.	____	____
6. Assembled the discharge side of the potable water distribution and storage site.	____	____
7. Installed the recirculation loop of the potable water distribution and storage site.	____	____
8. Extended the potable water supply to user connection point.	____	____
9. Installed the hypochlorination unit to the fill side of the tank site.	____	____
10. Assembled a large and small nozzle kit.	____	____
11. Connected the electrical connections to the potable water distribution and storage site.	____	____
12. Prepared the hypochlorination unit for operation.	____	____
13. Performed initial checks on the potable water distribution and storage subsystem.	____	____
14. Powered up the potable water distribution and storage site.	____	____
15. Filled the 20,000-gallon collapsible fabric storage tank.	____	____
16. Adjusted chlorine residual.	____	____
17. Sanitized the user facilities.	____	____
18. Operated the FP potable water distribution and storage site.	____	____
19. Dismantle potable water distribution and storage site.	____	____
20. Prepared the 20,000-gallon collapsible fabric storage tank for storage or shipment, in accordance with TM 5-5430-226-12.	____	____
21. Prepared potable water distribution and storage site components for movement and storage.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required
DA FORM 1714-R
DA FORM 2404
DA FORM 5988-E
FM 100-14
TM 5-4610-228-13
TM 5-4610-233-13&P
TM 5-5430-226-12

Related
TM 10-3510-222-10
TM 10-8340-224-13

Skill Level 2

Subject Area 4: Supervise Water Reports, Logs, and Forms

Supervise Water Analysis Testing
101-92W-2004

Conditions: Given the requirement to supervise water analysis testing, the soldier (as supervisor of a ground reconnaissance team, consisting of one other 92W10 soldier, for a proposed water point in a field environment) must supervise the 92W10 conducting the necessary water analysis tests. Materials needed: a Water Quality Analysis Set, a topographic map of the area, TB MED 577, TM 10-6630-222-12&P, TM 3-6665-319-10, and pencils. Forms needed: DA Form 1712-R (Water Reconnaissance Report) and DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Given the requirement to supervise water analysis testing, the soldier (as the supervisor of a reverse osmosis water purification unit (ROWPU) team, consisting of two other 92W10 soldiers, at an established water point on an approved raw water source) must supervise the necessary water analysis tests. Materials needed: ROWPU, Water Quality Analysis Set with TM, TB MED 577, TM 10-6630-222-12&P, TM 3-6665-319-10, paper, and pencil. Forms needed: DA Form 1713-R (Daily Water Production Log – ROWPU) or ROWPU/LWP/TWPS log forms, DA Form 2404/DA Form 5988-E, and DA Form 1714-R (Daily Water Issue Log).

Given the requirement to supervise water analysis testing, the soldier (as a supervisor of a storage and distribution team, consisting of 13, 92W10 soldiers, operating at a GS water storage site in a field environment) must supervise water analysis tests. Materials needed: necessary water support equipment to issue/distribute potable water, Water Quality Analysis Set, TB MED 577, TM 10-6630-222-12&P, TM 3-6665-319-10, paper, and pencil. Forms needed: DA Form 1714-R (Daily Water Issue Log) or DA Form 1714-1-R (Daily Water Distribution Log) and DA Form 2404/DA Form 5988-E.

Standards: Checked the accuracy of the water analysis tests conducted by the 92W10 soldiers. Reviewed completed DA Form 1712-R, DA Form 1713-R or ROWPU/LWP/TWPS log forms, DA Form 1714-R and DA Form 1714-1-R for accuracy and verified that the chemical analysis, to include NBC tests, of the tested water has been reported. Compared the information on the form to the minimum requirements for water in TB MED 577. Forwarded completed forms to supervisor or higher headquarters.

Performance Steps

DANGER: Observe all safety procedures when conducting chemical analysis of water. Dangerous chemicals are provided in both test kits. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

Performance Steps
CAUTIONS:

Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

Comply with unit SOP, OPORD, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the proper personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

1. Apply risk management procedures.
   a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
   b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Check results of water tests.
   a. Initiate corrections to tests, as identified in task 101-92W-1065, conducted erroneously.
   b. Check accuracy of results logged on DA Form 1712-R, DA Form 1713-R or ROWPU/LWP/TWPS log forms, DA Form 1714-R, and DA Form 1714-1-R.
3. Collect completed DA Form 2404/DA Form 5988-E after each shift for PMCS conducted.
   a. Check accuracy of data provided on DA Form 2404/DA Form 5988-E.
   b. Give DA Form 2404/DA Form 5988-E to supervisor daily.
4. Analyze reported test results.
   a. Compare findings on the DA Form 1712-R report to the minimum requirements for source water contained in TB MED 577.
   b. Compare the DA Form 1713-R or ROWPU/LWP/TWPS log forms report to requirements for operating the purification equipment (refer to appropriate TM) and the requirements for potable water standards contained in TB MED 577.
   c. Compare all the reports to the requirements for potable water standards in TB MED 577.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Checked results of water tests.	____	____
3. Collected completed DA Form 2404/DA Form 5988-E after each shift for PMCS conducted.	____	____
4. Analyzed reported test results.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

DA FORM 1712-R
DA FORM 1713-R
DA FORM 1714-R
DA FORM 1714-1-R
DA FORM 2404
DA FORM 5988-E
TB MED 577
TM 3-6665-319-10
TM 10-6630-222-12&P

Related

FM 10-52
FM 10-52-1
TM 5-6630-215-12

Supervise Water Reconnaissance

101-92W-2029

Conditions: Given the requirement to supervise a ground reconnaissance for a proposed water purification point in a field/coastal environment, the soldier (as supervisor for a team consisting of two other 92W10 soldiers) must conduct a ground reconnaissance using a military standard vehicle. Materials needed: Global Positioning System (GPS), a complete Water Quality Analysis Set (WQAS-1 or WQAS-P) with a M-272 Chemical Test Kit, a topographic map of the area, pencils, TM 10-6630-222-12&P, TM 10-6630-246-12&P, TM 3-6665-319-10, and compass. Form needed: DA Form 1712-R (Water Reconnaissance Report).

Given the requirement to supervise a ground reconnaissance for a water storage site in a field environment, the soldier (as supervisor of a team consisting of two other 92W10 soldiers) must conduct a ground reconnaissance using a military standard vehicle. Materials needed: GPS, a complete Water Quality Analysis Set (WQAS-1 or WQAS-P) with a M-272 Chemical Test Kit, a topographic map of the area, pencils, TM 10-6630-222-12&P, TM 10-6630-246-12&P, TM 3-6665-319-10 and compass. Form needed: DA Form 1712-R.

Standards: Planned a water reconnaissance. Coordinated aerial/ground support requirements with S3. Tasked members of reconnaissance team to perform required test to determine if proposed purification/distribution site met requirements. Received, consolidated, and forwarded DA Form 1712-R to supervisor.

Performance Steps

DANGER: Observe all safety procedures when conducting chemical analysis of water. Dangerous chemicals are provided in both test kits. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTION: Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

1. Apply risk management procedures.
    a. Understand and supervise the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Plan a water reconnaissance.
    a. Receive mission guidance, to include total daily water requirements (in gallons) and recommended area of operations.
    b. Organize and brief team members.
    c. Obtain intelligence reports, aerial photos, and maps of area.
    d. Inspect all testing equipment for serviceability.
3. Coordinate aerial support requirements with S3.
4. Task members of the reconnaissance team to perform selected performance measures from Task 101-92W-1064.

Performance Steps

5. Receive from reconnaissance team members completed DA Forms 1712-R that detail their analysis of assigned performance measures, which will include the water quality, site conditions, and the quality of raw water, to include pH, turbidity, total dissolved solids, temperature, and color.
6. Review data from one DA Forms 1712-R and forward to immediate supervisor.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Planned a water reconnaissance.	____	____
3. Coordinated aerial support requirements with S3.	____	____
4. Tasked members of the reconnaissance team to perform selected performance measures from Task 101-92W-1064.	____	____
5. Received from reconnaissance team members completed DA Forms 1712-R that detail their analysis of assigned performance measures, which will include the water quality, site conditions, and the quality of raw water, to include pH, turbidity, total dissolved solids, temperature, and color.	____	____
6. Reviewed data from DA Forms 1712-R and forwarded to immediate supervisor.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 1712-R	FM 10-52
TM 3-6665-319-10	FM 10-52-1
TM 10-6630-222-12&P	TB MED 577
TM 10-6630-246-12&P	

Supervise Completion of Water Reports/Logs/Forms

101-92W-2030

Conditions: Given the requirement to conduct water purification operations, the soldier (as team chief of a water point consisting of four 92W10 soldiers) must review and approve the completed DA Form 1714-R (Daily Water Issue Log), DA Form 1713-R (Daily Water Production Log – ROWPU), or ROWPU/LWP/TWPS log forms. Materials needed: FM 10-52-1 and a pencil. Forms needed: DA Form 1714-R, DA Form 1713-R, or ROWPU/LWP/TWPS log forms.

Given the requirement to operate a TWDS distribution point, the soldier (as a team chief of a water distribution team consisting of eight 92W10 soldiers) must review and approve the completed DA Form 1714-1-R (Daily Water Distribution Log). Materials needed: FM 10-52-1 and a pencil. Form needed: DA Form 1714-1-R.

Standards: Reviewed and verified the completed DA Forms/log forms for accurately recorded water production operations at the water point, to include, hourly chemical dosage and the gauge and indicator readings of the ROWPU/LWP/TWPS. Reviewed and verified the completed DA Form 1714-R for accurately recorded water issue operations at the water point, to include, the time, the amount of water issued, and the using unit.

Reviewed DA Form 1714-1-R for accurately recorded water distribution operations to include, the time, the amount of water received, the amount of water distributed, the using unit, and the amount of water storage available.

Performance Steps

1. Supervise the soldier's completion of one DA Form 1713-R per unit per shift. Ensure the following entries are made:
    a. Heading.
        (1) Shift number or shift hours.
        (2) Water point Number and ROWPU Number.
        (3) NCO in charge.
        (4) Date.
    b. Part I. Hourly Chemical Dosage Log.
        (1) Time of equipment startup and shutdown.
        (2) Knob setting and amount of chemical used for initial charge and recharge of citric acid, sodium hex, chorine, and polymer. All changes are annotated in the remarks column.
        (3) The pH of raw water and product water. This includes during normal operation and the pH of the cleaning solution during RO. Element cleaning. Measure every two hours of the operating day.
        (4) Chlorine residual of product water after 30 minutes of contact time. Measure every hour of the operating day.
        (5) Remarks.
            (a) Normal shutdown.
            (b) Shutdown for scheduled and nonscheduled maintenance.
            (c) Changes in raw water that effect chemical usage.
            (d) Receiving and/or issuing of chemicals.
            (e) Any significant event that may effect water point operations.
        (6) Amount of chemicals used for operation and amount of chemicals on hand for operation. Check inventory for accuracy.
    c. Part II. Gauge and Indicator Log. Recorded hourly.
        (1) Time of water production startup and shutdown. Record the time the ROWPU began producing potable water.
        (2) Product water flow.
        (3) Reverse osmosis pressure.

Performance Steps

(4) Cartridge filter pressure differential.
(5) Media filter pressure differential.
(6) Raw water flow.
(7) Brine flow.
(8) Reverse osmosis vessel pressure differential.
(9) Total dissolved solids of the product water.

NOTE: Take immediate action on any gauge and indicator readings that do not comply with the technical manual's recommendations.

(10) Remarks.
  (a) Normal shutdown.
  (b) Shutdown for scheduled and nonscheduled maintenance.
  (c) Changes in raw water that affect water production.
  (d) Receiving and/or issuing of fuel.
  (e) Any significant event that may affect water point operations.
(11) Total hours the equipment was operated.
(12) Amount of POL used and on hand for operation.
(13) Note any requirements for nonscheduled maintenance to the NCOIC of the water point.
(14) Review, sign, and forward completed DA Form 1713-R to NCO in charge for disposition of water report.

2. Supervise the soldier's completion of the 3,000-GPH ROWPU log forms to verify that the following entries are done:
   a. Entries on the Data Log.
   b. Entries on the Optimization Log.
   c. Entries on the Media Filter Log.
   d. Review, sign, and forward completed logs to NCOIC for disposition of water reports.

3. Supervise the soldier's completion of the 1,500-GPH TWPS Data Sheets to verify that the following entries are done:
   a. Entries on the Operation Data Log.
   b. Entries on the Operator Maintenance Log.
   c. Entries on the RO Element Performance Log.
   d. Review, sign, and forward completed logs to NCOIC for disposition of water reports.

4. Supervise the soldier's completion of the LWP Data Sheets to verify that the following entries are done:
   a. Part I. Operating Parameter Log.
      (1) LWP number.
      (2) NCOIC.
      (3) Date.
      (4) Time.
      (5) Product flow (GPM).
      (6) UF Pressure (PSI).
      (7) UF or Backwash Pressure (PSI).
      (8) Temperature (F).
      (9) Engine Shutoff Air Pressure (PSI).
      (10) HP Pump Flow (PSI).
      (11) RO Pressure (PSI).
      (12) Feed Water TDS (PPM).
      (13) Product Water TDS (PPM).
   b. Part II. Chemical Log.
      (1) LWP number.
      (2) NCOIC.
      (3) Date.
      (4) Time.
      (5) Product Water Chlorine Residual.

Performance Steps

(6) Chemical Pump Settings.
  (a) Chlorine Pump. Speed/Stroke.
  (b) Coagulant Pump. Speed/Stroke.
  (c) Antiscalant Pump. Speed/Stroke.
(7) Review, sign, and forward completed logs to NCOIC for disposition of water reports.

5. Supervise the soldier's completion of DA Form 1714-R to verify that the following entries are correct:
   a. Water point No.
   b. NCO in charge.
   c. Date.
   d. The time the water was issued.
   e. The amount of water issued.
   f. Unit receiving water and the chlorine residual of water at the point of distribution.
   g. Review, sign, and forward complete DA Form 1714-R to NCO in charge for disposition of water report.

6. Supervise the soldier's completion of DA Form 1714-1-R to verify the following entries are correct:
   a. Water point No.
   b. NCO in charge.
   c. Date.
   d. Time the water was received and dispatched.
   e. The amount of water received and dispatched.
   f. The unit water was dispatched to and the chlorine residual at the point of distribution.
   g. Total amount of water received and dispatched for the day.
   h. Total amount of water on hand at the end of the day.
   i. Indication in the Remarks Section the amount of water on hand at the start of each shift. Also included any significant event that may effect storage and distribution operations.
   j. Review, sign, and forward completed DA Form 1714-1-R to NCO in charge for disposition of water report.

Performance Measures	**GO**	**NO-GO**
1. Supervised the soldier's completion of one DA Form 1713-R per unit per shift to verify that all entries were made.	____	____
2. Supervise the soldier's completion of the 3,000-GPH ROWPU log forms to verify that entries were correct.	____	____
3. Supervise the soldier's completion of the 1,500-GPH TWPS Data Sheets to verify that entries were correct.	____	____
4. Supervise the soldier's completion of the LWP Data Sheets to verify that entries were correct.	____	____
5. Supervised the soldier's completion of DA Form 1714-R to verify that entries were correct.	____	____
6. Supervised the soldier's completion of DA Form 1714-1-R to verify that entries were correct.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

DA FORM 1713-R
DA FORM 1714-R
DA FORM 1714-1-R
FM 10-52-1

Related

Subject Area 5: Supervise Water Purification Operations

Supervise Operation of the 600-GPH Reverse Osmosis Water Purification Unit (ROWPU) 101-92W-2006

Conditions: Given the requirement to produce potable water, the soldier (a team chief of an operational DS water supply point in a field/coastal environment) must supervise water purification operations. Materials needed: an operationally complete 600-GPH ROWPU with diesel-driven 30-kw generator, two MOS-qualified 92W10 soldiers, a WQAS-P or WQAS-1, TM 3-6665-319-10, TM 5-6115-465-12, TM 5-6630-215-12, TM 10-4610-241-10, TM 10-4610-215-10, paper, and pencil. Forms needed: DA Form 1713-R (Daily Water Production Log – ROWPU) and DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Standards: Supervised before-, during-, and after-operations PMCS. Supervised initial ROWPU startup. Supervised production of product water. Maintained reports and forms. Supervised 600-GPH ROWPU operational maintenance. Supervised troubleshooting the 600-GPH ROWPU. Scheduled DS/GS maintenance. Requisitioned expendable supplies.

Performance Steps

DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if soldiers fail to observe caution. Do not allow soldiers to operate the generator until the ground terminal stud has been connected to a suitable ground. Dangerous chemicals are provided with the ROWPU. Death, health hazards or injuries such as severe burns, impaired vision and internal tissue destruction may be experienced if personnel fail to observe precautions. Ensure soldiers follow all warnings contained in TM 3-6665-319-10, TM 5-6115-465-12, and TM 10-4610-241-10. Hearing protection is required when operating this equipment.

WARNING: If NBC agents are detected, ensure soldiers give the alarm and notify supervisor immediately. Require soldiers to decontaminate themselves and their equipment at the first available opportunity.

CAUTIONS:

Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

Comply with unit SOP, OPORD, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the proper personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

NOTE. Check that soldier knows, understands, and follows the performance measures from Task 101-92W-1022.

1. Apply risk management procedures.
    a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Supervise before-, during-, and after-operations PMCS.
3. Supervise initial ROWPU startup.

Performance Steps

4. Supervise production of product water.
   a. Ensure soldier is operating the unit within the limits allowed according to the source. Refer to the TM.
   b. Ensure the soldier is conducting all test required.
   c. Ensure the soldier is refilling all chemicals.

5. Maintain reports and forms.
   a. Maintain a separate file of all DA Forms 2404/DA Form 5988-E and DA Form 1713-R provided by equipment operators.
   b. Use a file to supervise preventive maintenance program.
   c. Record on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings.
   d. Give the immediate supervisor the completed forms at the end of each shift.

6. Supervise 600-GPH ROWPU operational maintenance.
   a. Supervise Backwash procedures.
   b. Supervise RO cleaning.
   c. Supervise Cartridge filters replacement.
   d. Supervise RO membrane replacement.

7. Supervise troubleshooting the 600-GPH ROWPU when needed.
   a. Ensure the problem was found and the corrective action was taken.
   b. Record all major deficiencies to section sergeant.

8. Schedule DS/GS maintenance.
   a. Schedule shop maintenance, when required, so that no more than one ROWPU is in the shop at any one time.
   b. Check on status of ROWPU equipment in DS/GS shop daily.
   c. Inform supervisor of equipment status daily.

9. Requisition expendable supplies.
   a. Request through S4 sufficient expendable supplies to maintain operational readiness and meet mission requirements.
   b. Annotate on DA Form 1713-R all expendable supplies consumed.
   c. Forward DA Form 1713-R to water section NCOIC.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised before-, during-, and after-operations PMCS.	____	____
3. Supervised initial ROWPU startup.	____	____
4. Supervised production of product water.	____	____
5. Maintained reports and forms.	____	____
6. Supervised 600-GPH ROWPU operational maintenance.	____	____
7. Supervised troubleshooting the 600-GPH ROWPU.	____	____
8. Scheduled DS/GS maintenance.	____	____
9. Requisitioned expendable supplies.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

DA FORM 1713-R
DA FORM 2404
DA FORM 5988-E
TM 3-6665-319-10
TM 5-6115-465-12
TM 5-6630-215-12
TM 10-4610-215-10
TM 10-4610-241-10

Related

FM 10-52
FM 10-52-1
TM 10-5430-237-12&P

Supervise Operation of the 3,000-GPH Reverse Osmosis Water Purification Unit (ROWPU)
101-92W-2026

Conditions: Given the requirement to produce potable water, the soldier (a team chief of an operational DS water supply point in a field environment) must supervise operation of the 3,000-GPH ROWPU. Materials needed: an operationally complete 3,000-GPH ROWPU with diesel-driven 60-kw generator, three 3,000-gallon storage tanks and a 5-ton tractor, MOS-qualified 92W10 soldiers, a Water-Quality Analysis Set (WQAS-P or WQAS-1), an M-272 chemical test kit, TM 10-4610-232-12, TM 5-6115-545-12, TM 10-5430-237-12&P, a fire extinguisher, sufficient fuel and oil to establish operations, earplugs, rags, and a pencil. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/ DA Form 5988-E (Equipment Inspection Maintenance Worksheet) and ROWPU operation logs.

Standards: Supervised before-, during-, and after-operations PMCS. Supervised initial adjustments, checks, and self-tests. Supervised start-up procedures from secured or drained condition. Supervised backwashing the media filter and returning to normal operations. Supervised cleaning the RO elements when the frequency or alert exists. Supervised bisulfite sanitizing procedures. Supervised shutting down equipment to "temporary secured status" or "long-term secured status". Scheduled DS/GS maintenance. Requisitioned expendable supplies.

Performance Steps
DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if you fail to observe caution. Do not operate the ROWPU until the ground terminal stud on the generator set has been connected to a suitable ground. Dangerous chemicals are provided with the ROWPU. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Follow all warnings contained in TM 5-6115-545-12 and TM 10-4610-232-12.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS:

Hearing protection is required when operating this equipment.

Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

Comply with unit SOP, OPORD, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the proper personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

NOTE: Check that soldier knows, understands, and follows the performance measure from Task 101-92W-1059 and Task 101-92W-1063.

1. Apply risk management procedures.
    a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

Performance Steps

2. Supervise before-, during, and after-operations PMCS (references: TM 5-6115-545-12 and TM 10-4610-232-12).
   a. Troubleshoot ROWPU as needed.
   b. Ensure soldier records any deficiencies in DA Form 2404/DA Form 5988-E.
3. Supervise initial adjustments, checks, and self-tests.
4. Supervise start-up procedures from secured or drained condition.
5. Supervise backwashing the media filter and returning to normal operations.
6. Supervise cleaning the RO elements.
7. Supervise bisulfite sanitizing procedures.
8. Supervise shutting down equipment to "temporary secured status" or "long-term secured status".
9. Schedule DS/GS maintenance.
   a. Schedule shop maintenance when required so that no more than one ROWPU is in the shop at any one time.
   b. Check on status of ROWPU equipment in DS/GS shop daily.
   c. Inform supervisor of equipment status daily.
10. Requisition expendable supplies.
    a. Request through S4 sufficient expendable supplies to maintain operational readiness and meet mission requirements.
    b. Annotate on ROWPU operation logs all expendable supplies consumed.
    c. Forward ROWPU operation logs to water section NCOIC.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised before-, during, and after-operations PMCS.	____	____
3. Supervised initial adjustments, checks, and self-tests.	____	____
4. Supervised start-up procedures from secured or drained condition.	____	____
5. Supervised backwashing the media filter and returning to normal operations.	____	____
6. Supervised cleaning the RO elements.	____	____
7. Supervised bisulfite sanitizing procedures.	____	____
8. Supervised shutting down equipment to temporary secured status or long-term secured status.	____	____
9. Scheduled DS/GS maintenance.	____	____
10. Requisitioned expendable supplies.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 2404	FM 10-52
DA FORM 5988-E	FM 10-52-1
TM 5-6115-545-12	
TM 10-4610-232-12	
TM 10-5430-237-12&P	

Supervise the Set Up/Dismantle of the 600-GPH Reverse Osmosis Water Purification Unit (ROWPU)

101-92W-2031

Conditions: Given the requirement to move to a new operational area, the soldier (a team chief of an operational DS water supply point in a field environment) must supervise the setup and dismantle of the 600-GPH ROWPU. Materials needed: an operational 600-GPH ROWPU with 30-kw generator, three 3,000-gallon storage tanks and a 5-ton cargo truck, a fire extinguisher, sufficient fuel and oil to establish operations, TM 10-4610-241-10, TM 5-6115-465-12, and TM 10-5430-237-12&P, earplugs, MOS-qualified 92W10 soldier, paper, and pencil. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Standards: Supervised installation of the ROWPU components and storage tanks and pumps. Supervised connection of the backwash water system, connection of the water purification system, and performed before-operations PMCS. Supervised the after-operations PMCS, disconnected the ROWPU components, dismantled the ROWPU components, packed ROWPU components for movement, and hitched up the ROWPU to the prime mover. Maintained reports and forms.

Performance Steps

DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if soldiers fail to observe caution. Do not allow soldiers to operate the generator until the ground terminal stud has been connected to a suitable ground. Do not operate the 600-GPH ROWPU until the ground terminal stud on the generator set has been connected to a suitable ground. Dangerous chemicals are provided with the 600-GPH ROWPU. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Ensure soldiers follow all warnings contained in TM 5-6115-465-12 and TM 10-4610-241-10. Hearing protection is required when operating this equipment.

WARNING: If NBC agents are detected, ensure soldiers give the alarm and notify supervisor. Require soldiers to decontaminate themselves and their equipment at the first available opportunity.

NOTE. Check that soldier knows, understands, and follows the performance measures in Task 101-92W-1052.

1. Apply risk management procedures.
   a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
   b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Supervise installing the ROWPU components, storage tanks, and pumps.
3. Supervise connecting the backwash water system.
4. Supervise connecting the water purification system.
5. Supervise before-operations PMCS (references: TM 5-6115-465-12 and TM 10-4610-241-10).
6. Supervise after-operations PMCS (references: TM 5-6115-465-12 and TM 10-4610-241-10).
7. Supervise disconnecting the ROWPU components.
8. Supervise dismantling the ROWPU components.
9. Supervise packing ROWPU components for movement.

Performance Steps

10. Supervise hitching up the ROWPU to the prime mover.
11. Maintain reports and forms.
    a. Maintain a separate file of all DA Form 2404/DA Form 5988-E provided by equipment operators.
    b. Use a file to supervise preventive maintenance program.
    c. Record on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings.
    d. Provide to immediate supervisor the completed forms at the end of each shift.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised installing the ROWPU, tanks, and pumps.	____	____
3. Supervised connecting the backwash water system.	____	____
4. Supervised connecting the water purification system.	____	____
5. Supervised before-operations PMCS.	____	____
6. Supervised after-operations PMCS.	____	____
7. Supervised disconnecting the ROWPU components.	____	____
8. Supervised dismantling the ROWPU components.	____	____
9. Supervised packing ROWPU components for movement.	____	____
10. Supervised hitching up the ROWPU to the prime mover.	____	____
11. Maintained reports and forms.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 2404	FM 10-52
DA FORM 5988-E	FM 10-52-1
TM 5-6115-465-12	
TM 10-4610-241-10	
TM 10-5430-237-12&P	

Supervise the Set Up/Dismantle of the 3,000-GPH Reverse Osmosis Water Purification Unit (ROWPU)

101-92W-2032

Conditions: Given the requirement to move to a new operational area, the soldier (a team chief of an operational DS water supply point in a field environment) must supervise the setup and dismantle of the 3,000-GPH ROWPU. Materials needed: an operationally complete 3,000-GPH ROWPU with components, MOS-qualified 92W10 soldiers, a diesel driven 60-kw generator, a 5-ton tractor, three 3,000-gallon storage tanks, a fire extinguisher, sufficient fuel and oil to establish operations, TM 10-4610-232-12, TM 5-6115-545-12, TM 9-6115-672-14, TM 10-5430-237-12&P, rags, pencil, and earplugs. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet) and ROWPU operation logs.

Standards: Supervised positioning the ROWPU. Supervised unloading the equipment. Supervised setting up the raw water system. Supervised preparing the generator. Supervised setting up the waste outlet hoses, sump drain hoses, and the water distribution system. Supervised before- and after-operations PMCS. Supervised dismantling and packing system components for movement. Maintained reports, logs, and forms.

Performance Steps

DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if you fail to observe caution. Do not operate the ROWPU unless the ground terminal stud on the generator set has been connected to a suitable ground. Ground rod must be driven at least 8 feet deep to be sure of a good ground. A poor electrical ground can lead to injury or death from electrical shock. Dangerous chemicals are provided with the ROWPU. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Follow all warnings contained in TM 5-6115-545-12 or TM 9-6115-672-14, TM 10-4610-232-12 and TM 10-5430-237-12&P.

WARNING: If NBC agents are detected, give the alarm and notify the supervisor. Decontaminate personnel and equipment at the first available opportunity.

DANGER: Check regularly chains on hoist for link damage or wear. Damaged or worn chains must be replaced immediately to prevent accidents. Crew member on ground should stand clear of pump frame to avoid being injured in the event pump falls or is released too quickly. Each storage tank weighs 130 pounds. Three people are required to carry each tank. Never use potable water hoses to handle raw water or raw water hoses to handle potable water. Mixing hoses could cause contamination of water resulting in serious illness. Hoses are labeled.

CAUTION: Hearing protection is required when operating this equipment.

NOTE: Check that soldier knows, understands, and follows the performance measures listed in Task 101-92W-1063.

1. Apply risk management procedures.
   a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
   b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Supervise positioning the ROWPU.
3. Supervise unloading the equipment.
4. Supervise setting up the raw water system.
5. Supervise preparing the generator.

Performance Steps

6. Supervise setting up the waste outlet hoses, sump drain hoses, and the water distribution system.
7. Supervise before- and after-operations PMCS.
8. Supervise dismantling and packing system components for movement.
9. Maintain reports, logs, and forms.
   a. Maintain a separate file of all DA Form 2404/DA Form 5988-E provided by equipment operators.
   b. Use a file to supervise preventive maintenance program.
   c. Record on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings.
   d. Provide to immediate supervisor the completed forms at the end of each shift.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised the positioning the ROWPU.	____	____
3. Supervised unloading the equipment.	____	____
4. Supervised setting up the raw water system.	____	____
5. Supervised preparation of the generator.	____	____
6. Supervised the set up of waste outlet hoses, sump drain hoses, and the water distribution system.	____	____
7. Supervised before- and after-operations PMCS.	____	____
8. Supervised dismantling and packing of the component systems for movement.	____	____
9. Maintained reports, logs, and forms.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 2404	FM 10-52
DA FORM 5988-E	FM 10-52-1
TM 5-6115-545-12	
TM 9-6115-672-14	
TM 10-4610-232-12	
TM 10-5430-237-12&P	

Supervise Set Up/Operation/Dismantle of the Lightweight Water Purifier (LWP)
101-92W-2036

Conditions: Given the requirement to move and produce water in a new operational area, a 92W NCO, assigned to an operational water supply point in a field/coastal environment must supervise setting up, operating, and dismantling the Lightweight Purifier System (LWP). Materials needed: an operationally complete LWP with a 3-kw Tactical Quiet Generator and a 1/4 ton utility cargo HMMWV truck; a complete Water Quality Analysis Set (WQAS-1 or WQAS-P) with an M-272 Chemical Test Kit, TM 10-4610-310-14; TM 9-6115-639-13&P; a fire extinguisher; sufficient fuel and oil to establish operations; earplugs; rags; and a pencil. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/ DA Form 5988-E (Equipment Inspection Maintenance Worksheet) and LWP data sheets.

Standards: Supervised the set up, PMCS, operation, and dismantle of the lightweight water purifier. Recorded on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Gave the immediate supervisor the completed forms at the end of each shift.

Performance Steps
DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if you fail to observe caution. Do not operate the LWP unless the ground terminal stud on the generator set has been connected to a suitable ground. Ground rod must be driven at least 8 feet deep to be sure of a good ground. A poor electrical ground can lead to injury or death from electrical shock. Dangerous chemicals are provided with the LWP. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Follow all warnings contained in the TMs.

WARNING: If NBC agents are detected, give the alarm and notify the supervisor. Decontaminate personnel and equipment at the first available opportunity.

DANGER: Never use potable water hoses to handle raw water or raw water hoses to handle potable water. Mixing hoses could cause contamination of water resulting in serious illness. Hoses are labeled.

CAUTION: Hearing protection is required when operating this equipment.

NOTE: Check that soldier knows, understands, and follows the performance measures listed in Task 101-92W-1075.

1. Apply risk management procedures.
    a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

2. Supervise the set up of the Lightweight Water Purifier (LWP).

NOTE: To avoid moving the components too far from each other, place them on the following order from left to right: raw water pump, raw water tank, booster pump, ultrafiltration system (UF), RO system (leave three feet between the UF and RO). Place the chemical injection/cleaning module on top of the RO System and the control panel on top of the chemical and cleaning module.

    a. Ensure correct positioning of the vehicle.
    b. Ensure correct placement of the ramp.

WARNING: The load limit for the foldable ramp is 600 pounds. Do not exceed this weight. Injury to personnel may result.

    c. Supervise unloading procedures.
    d. Ensure the system is completely set up.
        (1) Check hoses connections.
        (2) Check cable connections.

Performance Steps

3. Supervise before-operations PMCS.
4. Supervise the pre-checks operations.
5. Supervise the operation of the LWP.

CAUTION: A good ground is required to protect operators and equipment. The ground rod must be driven into the ground at least eight feet to be sure of a good ground. Check to make sure the grounding cable is securely attached to the grounding lugs. Failure to properly ground the generator and the TWPS platform could result in injury or death from electrical shock. Ground the TQG to the ground rod in accordance with TM 9-6115-639-13&P.

   a. Ensure that chemicals are monitored.
   b. Ensure soldier troubleshoots unit as needed.
   c. Monitor drastic changes on the gauges.
   d. Maintain an operational maintenance schedule.
   e. Supervise during-operations PMCS.

6. Supervise the dismantling of the LWP.
7. Supervise after-operations PMCS.
8. Supervise the loading of the LWP.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised the set up of the Lightweight Water Purifier (LWP).	____	____
3. Supervised before-operations PMCS.	____	____
4. Supervised the pre-checks operations.	____	____
5. Supervised the operation of the LWP.	____	____
6. Supervised dismantling the LWP.	____	____
7. Supervised after-operations PMCS.	____	____
8. Supervised loading the LWP.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 2404	FM 10-52
DA FORM 5988-E	FM 10-52-1
TM 9-6115-639-13&P	FM 100-14
TM 10-4610-310-14	TB MED 577

Supervise Operation of the 1,500-GPH Tactical Water Purification System (TWPS)
101-92W-2038

Conditions: Given the requirement to produce potable water, the soldier (a team chief of an operational DS water supply point in a field/coastal environment) must supervise the setup, operation, and dismantling of the 1,500-GPH Tactical Water Purification System (TWPS). Materials needed: a PLS truck or HEMTT-LHS truck, two 92W10 soldier, an operationally complete 1,500-GPH TWPS with a 60-kw Tactical Quiet Generator, five 3,000-gallon storage tanks, a complete Water Quality Analysis Set (WQAS-1 or WQAS-P) with a M-272 Chemical Test Kit, TM 10-4610-309-14, TM 10-5430-237-12&P, TM 5-6115-545-12, TM 9-6115-645-10, TM 9-6115-672-14, a fire extinguisher, sufficient fuel and oil to establish operations, earplugs, rags, and a pencil. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet) and TWPS operation data logs.

Standards: Supervised the installation, PMCS, operation, and dismantling of the 1,500-GPH TWPS unit. Maintained records of maintenance and operations. Gave forms to immediate supervisor at end of each shift.

Performance Steps
DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if you fail to observe cautions. Do not operate the 1,500 Gallon Per Hour (GPH) Tactical Water Purification System (TWPS) until the ground terminal stud on the generator set has been connected to a suitable ground. Dangerous chemicals are provided with the TWPS. Death, health, hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Follow all warnings contained in TM 10-4610-309-14 and TM 9-6115-672-14.

Dangerous chemicals are used with water purification equipment. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS:

Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

Comply with unit SOP, OPORD, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the proper personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

NOTE: Check that soldier knows, understands and follows the performance measures in Task 101-92W-1082.

1. Apply risk management procedures.
    a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Supervise TWPS setup.

Performance Steps

3. Supervise before-operations PMCS.
4. Supervise the following TWPS start-up procedures.
   a. Ensure Initial Inspections, checks, and adjustments are performed.
   b. Ensure the electric power has been established in accordance with TM.
   c. Ensure air compressor is checked before starting.
   d. Ensure the Sodium Bisulfite Chemical System Start-up is completed in accordance with conditions and procedures in the TM.
   e. Establish raw water flow with both pumps.
   f. Establish raw water flow with only the electrical pump.
   g. Ensure soldier performs the pre-operational diagnostic self-test.
   h. Ensure soldier performs the flushing preservative/cleaning solution procedures.
   i. Ensure soldier performs the Micro-filtration start-up.
   j. Ensure soldier performs the RO System start-up
   k. Ensure Antiscalant and hypochlorite chemical system Start-Up is done in accordance with conditions and procedures in TM.
   l. Ensure complete start-up procedures are performed.
5. Supervise routine operations.
   a. Ensure soldier conducts during-operations PMCS.
   b. Troubleshoot unit as needed.
   c. Ensure soldier is conducting routine crew operational services.
   d. Ensure that soldier knows how to respond to normal operations alarms.
   e. Ensure that soldier knows the normal instrument readings and how to respond to changes.
   f. Ensure interchange of chemical pumps is completed in accordance with the TM when required.
6. Supervise TWPS Standby or Short-Term Shutdown.
   a. Ensure soldier performs standby shutdown without draining down.
   b. Ensure soldier performs standby shutdown-cold weather operation.
   c. Ensure soldier performs standby shutdown with drain-down.
   d. Ensure soldier performs short term shutdown-normal operation.
   e. Ensure soldier performs short term shutdown-cold weather operation.
   f. Ensure soldier shutdowns the raw water diesel engine.
7. Supervise after-operations PMCS.
8. Supervise dismantling the TWPS.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised TWPS setup.	____	____
3. Supervised before-operations PMCS.	____	____
4. Supervised TWPS start-up.	____	____
5. Supervised routine operations.	____	____
6. Supervised TWPS Standby or Short-Term Shutdown.	____	____
7. Supervised after-operations PMCS.	____	____
8. Supervised dismantling the TWPS.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required

DA FORM 2404
DA FORM 5988-E
TM 5-6115-545-12
TM 9-6115-645-10
TM 9-6115-672-14
TM 10-4610-309-14
TM 10-5430-237-12&P

Related

FM 10-52
FM 10-52-1

Supervise Environment Stewardship Measures

101-92W-2039

Conditions: Given the requirement to conduct water operations, the soldier (assigned to an operational water unit in a field environment, must supervise water operations minimizing adverse effects on the environment, to include handling, storage, and disposal of any hazardous material (HM) and hazardous waste (HW). Materials needed: AR 200-1, DA PAM 200-1, FM 100-14, FM 3-100.4 and FM 10-52-1.

Standards: Protected the environment by supervising the handling, storing, and disposing of all hazardous materials.

Performance Steps

DANGER: Dangerous chemicals are used with water purification equipment. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced.

CAUTIONS:

Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

Comply with unit SOP, OPORD, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the proper personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

NOTE: Check that soldier knows, understands, and follows the performance measures from Task 101-92W-1078.

1. Apply risk management procedures.
    a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

2. Brief soldiers on local, state, federal and host nation laws and regulations.
    a. Ensure unit hazardous waste and material management policy is complied with.
    b. Strictly enforce safety precautions in all missions.
    c. Strictly enforce environmental permits for water operations.

3. Supervise proper use of hazardous materials (HM) and disposal of hazardous wastes (HW).
    a. Enforce use of personnel protective equipment.
    b. Ensure that hazardous material is use according to instructions.
    c. Report HM and HW spills immediately.

4. Supervise storage of hazardous material.
    a. Identify the number of containers needed.
    b. Ensure all containers are properly marked.
    c. Ensure MSDS are placed on each storage container.

NOTE: Consult the direct support unit for packaging and movement instructions prior to turn-in. You are responsible for hazardous waste and hazardous material from the time it is received to the final disposition.

Performance Steps

5. Supervise proper clean up and/or turn in of HM and HW.
   a. Observe operation to prevent and/or clean up spills.
   b. Ensure all spills and leaks are reported to the chain of command in accordance with the Installation Spill Contingency Plan (ISCP) and Spill Prevention, Control and Countermeasures (SPCC) and the unit hazardous waste/hazardous material management policy.
   c. Supervise proper clean up and/or turn in of HM and HW.
6. Ensure soldiers understand and support the Environmental Stewardship Program.
   a. Ensure compliance with environmental requirements in unit and installation SOPs.
   b. Maintain environmental awareness throughout daily operations.
   c. Identify environmental risks associated with daily water operations.
   d. Make sound environmental decisions based on guidance.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Briefed soldiers on local and state laws and regulations.	____	____
3. Supervised proper use of hazardous materials.	____	____
4. Supervised storage of hazardous material.	____	____
5. Supervised proper clean up and/or turn in of hazardous material.	____	____
6. Ensured soldiers understood and supported the Environmental Stewardship Program.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	**Related**
AR 200-1	FM 10-52
DA PAM 200-1	
FM 3-100.4	
FM 10-52-1	
FM 100-14	

Supervise Setup/Operation/Dismantle of the Ocean Intake Structure System (OISS)

101-92W-2041

Conditions: Given the requirement to produce potable water, the NCO assigned to an operational DS water supply point in a coastal environment, must supervise the setup, operation, and dismantle of the OISS. Materials needed: an operationally complete TWPS with Ocean Intake Structure System (OISS), a raw water storage tank, a water pump, generator, oil, fuel, a wet suit (if needed), at least two flotation devices and two 92W soldiers. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Standards: Supervised the set up, operation, dismantle, and PMCS of the OISS.

Performance Steps

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

NOTE: Components of 2-, 4-, and 6-points systems may vary. This task is based on the 4-point system used with the 1,500-GPH TWPS.

1. Apply risk management procedures (reference: FM 100-14).
    a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards and report risks and risk reduction measures as appropriate to the chain of command.

2. Supervise the set up of the OISS.
    a. Supervise inventory of all parts.
    b. Maintain accountability records.
    c. Supervise before-operations PMCS of all hoses, pipes, components, and water pump.
    d. Inspect proper configuration for equipment to be used.

3. Supervise OISS operation.

NOTE: When installing the wellpoint (s), the area near the hole will fluidize, creating a wide hole. This could result in loss of solid footing and the operator could fall into the hole being drilled. This could also result in death by drowning. Ensure that there are flotation devices and someone nearby who may render assistance while the well points are being drilled.

    a. Check for proper priming of the pump.
    b. Ensure correct installation of the well points.
    c. Troubleshoot OISS when need it.
    d. Supervise during operations PMCS.

4. Supervise dismantling the OISS.
    a. Supervise proper removal of well points.
    b. Ensure after-operations PMCS is performed.
    d. Forward forms to immediate supervisor at the end of each shift.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised the set up of the OISS.	____	____
3. Supervised OISS operation.	____	____
4. Supervised dismantling the OISS.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 2404	AR 200-1
DA FORM 5988-E	FM 10-52
FM 100-14	FM 10-52-1

Supervise Operation/Perform PMCS on the Diesel Generators

101-92W-2044

Conditions: Given the requirement to produce potable water or operate a well-head, the NCO (assigned to an operational DS water supply point team in a field environment) must supervise the operation and PMCS of the diesel-driven 3-kw/15-kw/30-kw/60-kw generator. Materials needed: a soldier, a grounded diesel-driven 3-kw/15-kw/30-kw/60-kw generator, a fire extinguisher, 15 gallons of fuel, 3 quarts of oil, TM 9-6115-639-13&P, TM 9-6115-464-12, TM 5-6115-465-12, TM 5-6115-545-12, TM 9-6115-645-10, rags, pencil, and earplugs. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Standards: Supervised soldier performing before-, during-, and after-operations PMCS. Supervised the proper operation of the generator; to include starting, operating, and shutting down the unit. Collected complete DA Form 2404/DA Form 5988-E and the list of expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings. Gave the immediate supervisor the completed forms at the end of each shift.

Performance Steps

DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if caution is not observed. Do not operate the generator until the ground terminal stud has been connected to a suitable ground.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS: Handle and dispose of hazardous materials and waste (such as, used oil, contaminated fuel, and chemicals solutions) in accordance with unit Standing Operating Procedures (SOP)/Operations Orders (OPORD), local regulations, and/or host nation (HN) laws.

Comply with unit SOPs, OPORD, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate manufacturer's Material Safety Data Sheet (MSDS). Wear the appropriate personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

NOTE: Check that soldier knows, understands, and follows the performance measures from Task 101-92W-1082.

1. Apply risk management procedures.
    a. Understand and supervise the risk management process, risk controls, and command guidance by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Supervise before-, during-, and after operation PMCS. Refer to TM.
3. Supervise setting the controls.
4. Supervise starting the generator.
5. Supervise operating the generator.
6. Supervise shutting down the generator
7. Maintain reports, logs, and forms.
    a. Maintain a separate file of all DA Form 2404/DA Form 5988-E provided by equipment operators.
    b. Use a file to supervise preventive maintenance program.

Performance Steps

c. Record on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies or shortcomings.
d. Provide to immediate supervisor the complete forms at the end of each shift.

8. Schedule DS/GS maintenance.
   a. Schedule shop maintenance, when required. Do not have more than one unit in the shop at one time.
   b. Check on status of equipment in DS/GS shop daily.
   c. Inform supervisor of equipment status daily.
9. Requisition expendable supplies.
   a. Request through S4 sufficient expendable supplies to maintain operational readiness and meet mission requirements.
   b. Annotate on DA Form 1713-R (Daily Water Production Log – ROWPU) all expendable supplies consumed.
   c. Forward DA 1713-R to NCOIC.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised before-operations PMCS maintenance.	____	____
3. Supervised operation of generator (5-kw, 15-kw, 30-kw, or 60-kw).	____	____
4. Supervised after-operations PMCS maintenance.	____	____
5. Supervised operating the generator.	____	____
6. Supervised shutting down the generator.	____	____
7. Maintained reports, logs, and forms.	____	____
8. Scheduled DS/GS maintenance.	____	____
9. Requisitioned expendable supplies.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 2404	AR 200-1
DA FORM 5988-E	FM 100-14
TM 5-6115-465-12	
TM 5-6115-545-12	
TM 9-6115-464-12	
TM 9-6115-639-13&P	
TM 9-6115-645-10	

Subject Area 6: Supervise Water Storage, Distribution, and Issue Operations

Supervise the Operation/Maintenance of the 125-GPM Gas/Diesel Driven Pump
101-92W-2009

Conditions: Given the requirement to distribute potable water at a DS/GS water point, the soldier must supervise operation/maintenance of the 125-GPM pump. Materials needed: a 125-GPM pump, a fire extinguisher, 1 gallon of fuel, 1 quart of oil, earplugs, TM 5-4320-208-12&P or TM 5-4320-304-14 or TM 10-4320-325-14, TM 10-4320-309-14, and a pencil. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet), DD Form 1970 (Motor Equipment Utilization Record)/DA Form 5987-E (Motor Equipment Dispatch), and DA Form 1714-R (Daily Water Issue Log).

Standards: Supervised before-, during-, and after-operations PMCS. Supervised positioning the pump. Supervised connecting the pump. Supervised operating the pump. Supervised shutting down the pump. Maintained reports and forms. Scheduled DS/GS maintenance. Requisitioned expendable supplies.

Performance Steps
WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS:

Hearing protection is required when operating this equipment.

Never operate pump in an enclosed area unless the exhaust gases are piped to the outside. Wear hearing protection while pump is operating. Do not start pump without priming with water. Dry operation will damage pump seals and cause pump to fail. After priming, do not operate pump for more than three to five minutes without water flowing through it.

Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

NOTE: Check that the soldier knows, understands, and follows the performance measures in Task 101-92W-1056.

1. Apply risk management procedures.
    a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Supervise before-, during-, and after operations PMCS.
    a. Ensure soldier records all actions/deficiencies.
    b. Troubleshoot pump as needed.
    c. Ensure soldier performs routine maintenance.
3. Supervise pump positioning.
4. Supervise pump connection.
    a. Ensure the suction hoses go on the suction port.
    b. Ensure discharge hose is on the discharge port.

Performance Steps

5. Supervise pump operation.
   a. Ensure soldier follows the starting procedures according to TM.
   b. Ensure soldier monitors the pump for unusual noise or operation.
6. Supervise pump shutdown.
7. Maintain reports, logs, and forms.
   a. Maintain a separate file of all DA Form 2404/DA Form 5988-E, DD Form 1970/DA Form 5987-E, and DA Forms 1714-R provided by the equipment operators.
   b. Use a file to supervise preventive maintenance program.
   c. Check recording of expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings on DA Form 2404/DA Form 5988-E.
   d. Check DD Form 1970/DA Form 5987-E for accuracy and sign it.
   e. Check DA Form 1714-R for accuracy.
8. Schedule DS/GS maintenance.
   a. Schedule shop maintenance for equipment repair, when required, to assure continuous operations.
   b. Check on status of equipment in DS/GS maintenance daily.
   c. Provide equipment status report to supervisor daily.
9. Requisition expendable supplies.
   a. Annotate all expendable supplies consumed on DD Form 1970/DA Form 5987-E, DA Form 2404/DA Form 5988-E, or DA Form 1714-R.
   b. Forward forms to water section NCOIC.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised before-, during-, and after operation PMCS.	____	____
3. Supervised positioning the pump.	____	____
4. Supervised connecting the pump.	____	____
5. Supervised operating the pump.	____	____
6. Supervised shutting down the pump.	____	____
7. Maintained reports, logs, and forms.	____	____
8. Scheduled DS/GS maintenance.	____	____
9. Requisitioned expendable supplies.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

DA FORM 1714-R
DA FORM 2404
DA FORM 5987-E
DA FORM 5988-E
DD FORM 1970
TM 5-4320-208-12&P
TM 5-4320-304-14
TM 10-4320-325-14
TM 10-4320-309-14

Related

FM 10-52-1

Supervise the Operation of the Potable Water Storage/Distribution System (PWS/DS)

101-92W-2018

Conditions: Given the requirement to receive, store, issue, and distribute potable water, the soldier (a team chief of an operational water distribution point in a field environment) must supervise operation of the Potable Water Storage and Distribution System. Materials needed: a complete PWS/DS with all components (which includes a 125-GPM and 350-GPM pump), a hypochlorinator, at least two 20,000-gallon collapsible fabric tanks, all necessary manifolding and hoses, MOS-qualified 92W10 soldiers, TM 5-4610-228-13, fire extinguishers, sufficient fuel and oil, and earplugs. Forms needed: DA Form 1714-R (Daily Water Issue Log), DA Form 1714-1-R (Daily Water Distribution Log), and DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Standards: Supervised before-, during-, and after-operations PMCS. Supervised setting up 125-GPM pump number 1 and the storage tanks. Supervised setting up the 350-GPM pump, 125-GPM pump number 2, and the pump bypass. Supervised setting up the hypochlorinator and bypass. Supervised setting up the distribution hoses and nozzles. Supervised operating the PWS/DS. Supervised distributing potable water. Supervised shutting down the PWS/DS. Maintained reports, logs, and forms. Scheduled DS/GS maintenance. Requisitioned expendable supplies.

Performance Steps

DANGER: Observe all safety procedures when conducting chemical analysis of water. Dangerous chemicals are provided in both test kits. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Refer to Task 101-92W-1065 for more safety information concerning chemical analysis testing.

WARNING: If NBC agents are detected, give the alarm and immediately notify supervisor. During storage, issue, or distribution, stop all operations. Destroy contaminated water when directed to do so. Decontaminate self and equipment when mission permits.

CAUTIONS: Death or severe injury may result if you fail to observe precautions listed in TMs when operating pumps. To prevent pumping assembly from rolling or sliding, securely lock the parking brakes. Do not operate engine around open fuel. Never refuel hot or running engines. Avoid overfilling the fuel tank. Keep open flame and sparks away from the fuel tank and battery. Do not operate the pump against a closed suction or discharge (this will cause overheating). Wear hearing protection when within 50 feet of operating pumps. Do not use a fuel transfer pump to transfer water. Refer to Task 101-92W-1056 and Task 101-92W-1044 for more safety information concerning 125-GPM and 350-GPM pump operations.

The hypochlorination unit weighs 175 pounds. At least four people are needed to lift it to prevent personal injury or damage to the equipment. Hypochlorite solution is toxic to skin and eyes. If calcium hypochlorite comes into contact with skin or eyes, flush with water. Seek medical help. Store calcium hypochlorite in a cool, dry place. Keep container closed. Mix in accordance with directions for use. DO NOT allow calcium hypochlorite to mix with other materials, such as fuels, oils, paint products, or ammonia. This may cause fire or hazardous gases.

1. Apply the risk management procedures.
    a. Understand and execute the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Supervise before-, during-, and after-operations PMCS (reference: TM 5-4610-228-13).
    a. Ensure soldier uses TM.
    b. Troubleshoot equipment when required.
3. Supervise setting up 125-GPM pump number 1 and the storage tanks.

Performance Steps

4. Supervise setting up the 350-GPM pump, 125-GPM pump number 2, and the pump bypass.
5. Supervise setting up the hypochlorinator and bypass.
6. Supervise setting up the distribution hoses and nozzles.
7. Supervise operating the PWS/DS.
8. Supervise distributing potable water.
    a. Ensure the soldiers wear hearing protection when working within 50-feet of the pumping station.
    b. Ensure water quality meets command standards.
9. Supervise shutting down the PWS/DS.
10. Maintain reports and forms.
    a. Maintain a separate file for all DA Form 2404/DA Form 5988-E given to you by equipment operators.
    b. Use a file to supervise preventive maintenance program.
    c. Record on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings.
    d. Provide to immediate supervisor the completed forms at the end of each shift.
11. Schedule DS/GS maintenance.
    a. Schedule shop maintenance, when required.
    b. Check on status of PWS/DS equipment in DS/GS shop daily.
    c. Inform supervisor of equipment status daily.
12. Requisition expendable supplies.
    a. Request through S4 sufficient expendable supplies to maintain operational readiness and meet mission’s requirements.
    b. Annotate on DA Form 2404/DA Form 5988-E all expendable supplies consumed daily.
    c. Forward copy of DA Form 2404/DA Form 5988-E to water section NCOIC daily.

Performance Measures	GO	NO-GO
1. Applied the risk management procedures.	____	____
2. Supervised before-, during-, and after-operations PMCS.	____	____
3. Supervised setting up 125-GPM pump number 1 and the storage tanks.	____	____
4. Supervised setting up the 350-GPM pump, 125-GPM pump number 2, and the pump bypass.	____	____
5. Supervised setting up the hypochlorinator and bypass.	____	____
6. Supervised setting up the distribution hoses and nozzles.	____	____
7. Supervised operating the PWS/DS.	____	____
8. Supervised distributing potable water.	____	____
9. Supervised shutting down the PWS/DS.	____	____
10. Maintained reports and forms.	____	____
11. Scheduled DS/GS maintenance.	____	____
12. Requisitioned expendable supplies.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 1714-R	FM 10-52
DA FORM 1714-1-R	FM 10-52-1
DA FORM 2404	
DA FORM 5988-E	
TM 5-4610-228-13	

Supervise the Operation/PMCS of the 350-GPM Diesel Water Pump

101-92W-2019

Conditions: Given the requirement to distribute potable water at a DS/GS water point, the soldier a team chief must supervise operation/maintenance of the 350-GPM pump. Materials needed: a soldier, a 350-GPM pump, a fire extinguisher, 15 gallons of fuel, 1 quart of oil, earplugs, FM 10-52-1, TM 10-4320-226-14, and a pencil. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/ DA Form 5988-E (Equipment Inspection Maintenance Worksheet), DD Form 1970 (Motor Equipment Utilization Record)/DA Form 5987-E (Motor Equipment Dispatch), and DA Form 1714-R (Daily Water Issue Log).

Standards: Supervised before-, during-, and after-operations PMCS. Supervised the positioning and connection of the pump. Supervised the operation of the pump. Supervised shutting down the pump. Maintained reports, logs, and forms. Scheduled DS/GS maintenance. Requisitioned expendable supplies.

Performance Steps

CAUTION: Never operate pump in an enclosed area unless the exhaust gases are piped to the outside. Wear ear protection while pump is operating. Do not start pump without priming with water. Dry operation will damage pump seals and cause pump to fail. After priming, do not operate pump for more than three to five minutes without water flowing through it.

NOTE: Check that the soldier knows, understands, and follows the performance measures in Task 101-92W-1044.

1. Apply risk management procedures.
    a. Understand and supervise the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Supervise before-, during-, and after-operations PMCS.
    a. Ensure soldier uses TM.
    b. Ensure soldiers follow TM step by step.
3. Supervise positioning the pump.
4. Supervise connecting the pump.
5. Supervise operating the pump.
    a. Ensure soldier follows starting procedures in accordance with TM.
    b. Ensure soldier monitors pump gages and listens for unusual noise.
    c. Ensure soldier performs routine maintenance as required.
    d. Troubleshoot pump as needed.
6. Supervise shutting down the pump.
7. Maintain reports, logs, and forms.
    a. Maintain a separate file of all DA Form 2404/DA Form 5988-E, DD Form 1970/DA Form 5987-E, and DA Forms 1714-R provided by the equipment operators.
    b. Use file to supervise preventive maintenance program.
    c. Check recording of expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings on DA Form 2404/DA Form 5988-E.
    d. Check DD Form 1970/DA Form 5987-E for accuracy and sign it.
    e. Check DA Form 1714-R for accuracy.

Performance Steps

8. Schedule DS/GS maintenance.
    a. Schedule shop maintenance for equipment repair, when required, to assure continuous operations.
    b. Check on status of equipment in DS/GS maintenance daily.
    c. Provide equipment status report to supervisor daily.

9. Requisition expendable supplies.
    a. Annotate all expendable supplies consumed on DD Form 1970/DA Form 5987-E, DA Form 2404/DA Form 5988-E, or DA Form 1714-R.
    b. Forward forms to water section NCOIC.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised before-, during-, and after-operations PMCS.	____	____
3. Supervised positioning the pump.	____	____
4. Supervised connecting the pump.	____	____
5. Supervised operating the pump.	____	____
6. Supervised shutting down the pump.	____	____
7. Maintained reports, logs, and forms.	____	____
8. Scheduled DS/GS maintenance.	____	____
9. Requisitioned expendable supplies.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 1714-R	
DA FORM 2404	
DA FORM 5987-E	
DA FORM 5988-E	
DD FORM 1970	
FM 10-52-1	
TM 10-4320-226-14	

Supervise the Operation/PMCS of the 250-CFM Air Compressor

101-92W-2022

Conditions: Given the requirement to evacuate the TWDS hose, the soldier (a team chief of a Tactical Water Distribution Team in a field environment) must supervise the operation and PMCS of the 250-CFM air compressor. Materials needed: an operationally complete 250-CFM rotary air compressor, MOS-qualified 92W10 soldier, a deployed TWDS hose line, TM 5-4310-452-14, TM 10-4320-303-13, a fire extinguisher, sufficient fuel and oil to establish operations, and earplugs. Form needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Standards: Supervised before-, during-, and after-operations PMCS. Supervised moving the air compressor. Supervised setting up the air compressor. Supervised setting initial adjustments. Supervised starting the air compressor. Supervised stopping the air compressor. Maintained reports and forms. Scheduled DS/GS maintenance for air compressor. Requisitioned expendable supplies.

Performance Steps

DANGER: Death or severe injury may result if caution is not observed. To prevent air compressor assembly from rolling or sliding, have soldiers securely lock the parking brakes. Do not allow soldiers to operate the engine around open fuel. Never allow soldiers to refuel hot or running engines. Soldiers must avoid overfilling the fuel tank. Keep open flame and sparks away from the fuel tank and battery. Require soldiers to wear hearing protection when within 50 feet of operating air compressor.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS:

Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

Comply with unit SOP, OPORD, local regulations, and/or HN laws for drip pans or secondary containment devices.

NOTE: Check that soldier knows, understands, and follows the performance measures in Task 101-92W-1046.

1. Apply risk management procedures.
    a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Supervise before-, during-, and after-operations PMCS.
    a. Ensure soldier records all actions/deficiencies.
    b. Troubleshoot unit as needed.
    c. Ensure soldier performs routine maintenance on the air compressor.
3. Supervise moving the air compressor.
4. Supervise setting up the air compressor.
5. Supervise setting initial adjustments.
6. Supervise starting the air compressor.

Performance Steps

7. Supervise stopping the air compressor.
8. Maintain reports and forms.
   a. Maintain a separate file of all DA Form 2404/DA Form 5988-E provided by equipment operators.
   b. Use a file to supervise preventive maintenance program.
   c. Record on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings.
   d. Provide to immediate supervisor the completed forms at the end of each shift.
9. Schedule DS/GS maintenance.
   a. Schedule shop maintenance, when required.
   b. Check on status of air compressor in DS/GS shop daily.
   c. Inform supervisor of equipment status daily.
10. Requisition expendable supplies.
    a. Request through S4 sufficient expendable supplies to maintain operations readiness and meet mission requirements.
    b. Annotate on DA Form 2404/DA Form 5988-E all expendable supplies consumed.
    c. Forward DA Form 2404/DA Form 5988-E to water section NCOIC at the end of each shift.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised before-, during-, and after-operations PMCS.	____	____
3. Supervised moving the air compressor.	____	____
4. Supervised setting up the air compressor.	____	____
5. Supervised setting initial adjustments.	____	____
6. Supervised starting the air compressor.	____	____
7. Supervised stopping the air compressor.	____	____
8. Maintained reports and forms.	____	____
9. Scheduled DS/GS maintenance.	____	____
10. Requisitioned expendable supplies.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 2404	FM 10-52
DA FORM 5988-E	FM 10-52-1
TM 5-4310-452-14	
TM 10-4320-303-13	

Supervise the Operation/PMCS of the 100/400-GPM Hypochlorination Unit

101-92W-2025

Conditions: Given the requirement to distribute potable water, the soldier (assigned to a GS water unit in a field environment) must supervise the setup, operation, PMCS, and dismantling of the 100/400-GPM hypochlorinator. Materials needed: an operationally complete hypochlorinator, a 125-GPM and 350-GPM water pumps, a Potable Water Storage and Distribution System (PWS/DS), a fire extinguisher, TM 5-4610-233-13&P, TM 5-4610-228-13, sufficient fuel and oil to establish operations, and earplugs. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet), DA Form 1714-R (Daily Water Issue Log), and DA Form 1714-1-R (Daily Water Distribution Log).

Standards: Supervised before-, during-, and after-operations PMCS. Supervised preparing the hypochlorinator for use. Supervised the initial startup. Supervised setting the solution feed adjustment. Supervised refilling the reservoir tank. Supervised shutting down the hypochlorinator. Supervised preparing the hypochlorinator for movement. Maintained reports, logs, and forms. Scheduled DS/GS maintenance for hypochlorinator. Requisitioned expendable supplies.

Performance Steps

WARNINGS: The hypochlorination unit weighs over 175 pounds. At least four people are needed to lift it to prevent personal injury or damage to the equipment. Hypochlorite solution is toxic to skin and eyes. If calcium hypochlorite comes into contact with skin or eyes, flush right away with water and seek medical help. Store calcium hypochlorite in a cool, dry place. Keep container closed. Mix only in accordance with directions for use. DO NOT allow calcium hypochlorite to mix with any other materials (such as fuels, oils, paint products, or ammonia) since this may cause fire or hazardous gases. The hypochlorinator contains water under high pressure during and after operation. If this pressure is not relieved before personnel work on the unit, serious injury may occur. Be sure to relieve pressure before beginning any disassembly. If hypochlorinator stops working properly or residual test does not give satisfactory reading, immediately notify supervisor, shut down operation of distribution point, and take corrective action.

CAUTIONS:

Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

Comply with unit SOP, OPORD, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the proper personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

NOTE: Check that soldier knows, understands, and follows the performance measures in task 101-92W-1055.

1. Apply risk management procedures.
    a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess the variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Supervise before-, during-, and after-operations PMCS.
    a. Ensure soldier records all actions/deficiencies.
    b. Troubleshoot unit as needed.
    c. Ensure soldier performs routine maintenance.

Performance Steps

3. Supervise preparing the hypochlorinator for use.
4. Supervise the initial startup.
5. Supervise setting the solution feed adjustment.
6. Supervise refilling the reservoir tank.
7. Supervise shutting down the hypochlorinator.
8. Supervise preparing the hypochlorinator for movement.
9. Supervise disposal of any leftover chemical solution IAW environmental regulations.
10. Maintain reports/logs/forms.
    a. Maintain a separate file of all DA Forms 2404/DA Forms 5988-E and DA Forms 1714-R and DA Forms 1714-1-R provided by equipment operators.
    b. Use a file to supervise preventive maintenance program.
    c. Record on DA Form 2404/DA Form 5988-E expendable supplies used, PMCS notations, and actions taken to correct deficiencies and shortcomings.
    d. Provide to immediate supervisor the completed forms at the end of each shift.
11. Schedule DS/GS maintenance for hypochlorinator.
    a. Schedule shop maintenance, when required.
    b. Check on status of repairs in DS/GS shop daily.
    c. Inform supervisor of equipment status daily.
12. Requisition expendable supplies.
    a. Request through S4 sufficient expendable supplies to maintain operational readiness and meet mission requirements.
    b. Forward completed DA Form 1714-R and DA Form 1714-1-R to water section NCOIC.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised before-, during-, and after-operations PMCS.	____	____
3. Supervised preparing the hypochlorinator for use.	____	____
4. Supervised the initial startup.	____	____
5. Supervised setting the solution feed adjustment.	____	____
6. Supervised refilling the reservoir tank.	____	____
7. Supervised shutting down the hypochlorinator.	____	____
8. Supervised preparing the hypochlorinator for movement.	____	____
9. Supervised disposal of any leftover chemical solution IAW environmental regulations.	____	____
10. Maintained reports/logs/forms.	____	____
11. Scheduled DS/GS maintenance for hypochlorinator.	____	____
12. Requisitioned expendable supplies.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 1714-R	FM 10-52
DA FORM 1714-1-R	FM 10-52-1
DA FORM 2404	TB MED 577
DA FORM 5988-E	
TM 5-4610-228-13	
TM 5-4610-233-13&P	

Supervise Operation of the Tactical Water Distribution System (TWDS) Hose Line
101-92W-2033

Conditions: Given the requirement to distribute potable water, the soldier (a team chief of a TWDS team in a field environment) must supervise operation of the TWDS hose line. Materials needed: an operationally complete TWDS set, 10-MOS-qualified 92W10 soldiers, a 250-CFM rotary air compressor, a cargo truck, a fire extinguisher, TM 10-4320-303-13 or TM 10-4320-317-13, sufficient fuel and oil to maintain operations, and earplugs. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet), DA Form 1714-R (Daily Water Issue Log), and DA Form 1714-1-R (Daily Water Distribution Log).

Standards: Supervised before-, during-, and after-operations PMCS. Supervised preparation of hose for flaking. Supervised hose line installation. Supervise 600-GPM pump station setup, operation, and dismantling. Supervised disconnecting and evacuating the hose line. Supervised repacking hose line segments in flaking boxes. Maintained reports/logs/forms. Scheduled DS/GS maintenance. Requisitioned expendable supplies.

Performance Steps
DANGER: Observe all safety procedures noted in TM 10-4320-303-13 or TM 10-4320-317-13 when maintaining, assembling, and disassembling the TWDS. Death or severe injury may result if soldiers fail to observe precautions. To prevent air compressor assembly from rolling or sliding, securely lock the parking brakes. Do not operate engine around open fuel. Never refuel hot or running engines. Avoid overfilling the fuel tank. Keep open flame and sparks away from the fuel tank and battery. Wear hearing protection when within 50 feet of operating air compressor.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS:

Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

Comply with unit SOP, OPORD, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the proper personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

NOTE: Check that soldier knows, understands, and follows the performance measures in task 101-92W-1066.

1. Apply risk management procedures.
    a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Supervise before-, during-, and after-operations PMCS.
3. Supervise preparing hose line for flaking.
4. Supervise hose line installation.
5. Supervise 600-GPM pump station setup, operation, and dismantling.

Performance Steps

6. Supervise disconnecting and evacuating the hose line.
7. Supervise repacking hose line segment in flaking boxes.
8. Maintain reports/logs/forms.
   a. Maintain a separate file for all DA Forms 2404/DA Forms 5988-E and DA Forms 1714-R and DA Forms 1714-1-R provided by equipment operators.
   b. Use a file to supervise preventive maintenance program.
   c. Record on DA Form 2404/DA Form 5988-E PMCS notations, and actions taken to correct deficiencies and shortcomings.
   d. Provide to immediate supervisor the completed forms at the end of each shift.
9. Schedule DS/GS maintenance.
   a. Schedule shop maintenance, when required.
   b. Check on status of equipment in DS/GS shop daily.
   c. Inform supervisor of equipment status daily.
10. Requisition expendable supplies.
    a. Request through S4 sufficient expendable supplies to maintain operational readiness and meet mission requirements.
    b. Annotate on DA Form 1714-R and DA Form 1714-1-R all expendable supplies consumed.
    c. Forward DA Form 1714-R and DA Form 1714-1-R to supervisor.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised before-, during-, and after-operations PMCS.	____	____
3. Supervised preparing hose line for flaking.	____	____
4. Supervised hose line installation.	____	____
5. Supervised 600-GPM pump station setup, operation, and dismantling.	____	____
6. Supervised disconnecting and evacuating the hose line.	____	____
7. Supervised repacking hose line segments in flaking boxes.	____	____
8. Maintained reports/logs/forms.	____	____
9. Scheduled DS/GS maintenance.	____	____
10. Requisitioned expendable supplies.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 1714-R	FM 10-52
DA FORM 1714-1-R	FM 10-52-1
DA FORM 2404	TB MED 577
DA FORM 5988-E	
TM 10-4320-303-13	
TM 10-4320-317-13	

Supervise Sling Load Operations

101-92W-2040

Conditions: Given a helicopter, packaged potable water, a fabricated static electricity discharge probe, clevis assembly, slings, tape, helmet, goggles, earplugs, multiple leg sling set, pickup zone markers and marker light set, personnel to perform the task, an NCO, FM 10-450-4, and FM 10-52-1. This task is performed in day time and night time environments.

Standards: Identified the type of helicopter required. Identified safety equipment to be used. Prepared and set up LZ for operations. Prepared load for pick up. Prepared and distributed DA Form 7382-R (Sling Load Inspection Record). Organized and trained the hook up team for operations. Established air-to-ground communications.

Performance Steps

DANGER: Failure to perform this task correctly may result in damage to equipment or injury or death to personnel.

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

NOTE: Check that soldier knows, understands, and follows the performance measures from Task 101-92W-1079.

1. Apply risk management procedures (reference: FM 100-14).
    a. Understand and supervise the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Identify the type of helicopter required to conduct sling load operations according to FM 10-450-3.
3. Identify the following safety equipment to be used by the ground crew.
    a. Identification tags.
    b. Goggles.
    c. Ear plugs.
    d. Shock proof gloves or leather gloves.
    e. Survival knife.
    f. Static discharge wand.
    g. Helmet or Kevlar.
    h. Smoke grenade.
    i. Flashlight with wand.
4. Prepare and set up LZ to conduct sling load operations according to FM 10-450-3.
    a. Select location of the aircraft landing site to best support the operation in coordination with the unit liaison officer.
    b. Clear obstacles on and around the LZ.
    c. Check the slope of the ground surface for day and night operations.
    d. Check the aircraft approach to the landing site for day and night approaches.
    e. Check the aircraft formation landing approach for a large tactical relocation resupply mission.

Performance Steps

f. Mark landing points according to type of aircraft.
g. Mark obstacles that are difficult to detect or impossible to remove, such as wires, holes, stumps, and rocks.

NOTE: All trees, brush, stumps, or other obstacles that could cause damage to the rotor blades or the underside of the aircraft must be cleared around the landing points. If trees must be cut, stumps in the immediate vicinity of the landing points must be cut as close to ground level as possible. If a fire risks exist, clear grass taller than one foot. Hard packed sod makes the best natural landing area.

5. Prepare the load for pickup.
   a. Identify the cargo slings for operation.
   b. Make sure that the sling set fits the load.
   c. Inspect 500-gallon rig.
6. Prepare and distribute DA Form 7382-R to the appropriate units.
7. Organize and train the hook up team for sling operations.
   a. Designate the duties and responsibilities of the hook up team during sling load operations according to FM 10-450-3.
      (1) Identify general hook up procedures.
      (2) Identify safety precautions for the hook up team.
      (3) Identify the responsibilities of the hook up man.
      (4) Identify the responsibilities of the static probe (wand) person.
   b. Designate the signalman duties and responsibilities of loading and take off for sling load operations according to the FM.
   c. Supervise cargo hook up.
8. Establish air-to-ground communications.
   a. Verify the radio frequency.
   b. Monitor the communications device throughout the sling load operation.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Identified the type of helicopter required to conduct sling load operations according to FM 10-450-3.	____	____
3. Identified safety equipment used by the ground crew.	____	____
4. Prepared and set up LZ to conduct sling load operations according to FM 10-450-3.	____	____
5. Prepared the load for pickup.	____	____
6. Prepared and distributed DA Form 7382-R to the appropriate units.	____	____
7. Organized and trained the hook up team for sling operations.	____	____
8. Established air-to-ground communications.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 7382-R	FM 10-52
FM 10-52-1	
FM 10-450-3	
FM 10-450-4	
FM 100-14	

Supervise Operation of the Mobile Distribution Systems

101-92W-2042

Conditions: Given the requirement to receive, store, and issue potable water, the NCO (assigned to an operational water distribution point in a field environment) must supervise the set up, operation, PMCS, and dismantling of the Forward Area Water Point Supply System (FAWPSS). Materials needed: a complete FAWPSS with all components (which includes a 125-GPM pump and six 500-gallon drums); all necessary manifold and hoses; a soldier, a 5-Ton cargo truck, TM 10-4320-346-12&P, TM 10-4320-309-14, a fire extinguisher, sufficient fuel, oil, and earplugs. Forms need: DA Form 1714-R (Daily Water Issue Log) and DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet).

Given the requirement to receive and distribute potable water, the NCO (assigned to an operational water distribution point in a field environment) must supervise uncrating, the set up, operation, and dismantling of the Semitrailer Mounted Fabric Tank (SMFT). Materials needed: a SMFT, with all components; a required trailer, TM 5-5430-212-13&P or TM 5-5430-213-13&P; a potable water source with water pump; fire extinguisher, sufficient fuel and oil; and earplugs. Forms needed: DA Form 2404/DA Form 5988-E and DA Form 1714-R.

Given the requirement to receive and distribute potable water, the NCO (assigned to an operational water distribution point in a field environment) must supervise the maintenance and operation of the Water Tank Rack (HIPPO). Materials needed: a HIPPO, with all components; a PLS truck or HEMTT-LHS truck; TM 10-5430-244-10; fire extinguisher; sufficient fuel and oil; and earplugs. Forms needed: DA Form 2404/DA Form 5988-E and DA Form 1714-R.

Standards: Supervised the, setup, operation, and dismantling of the FAWPSS. Scheduled maintenance (if necessary) and ordered replacement parts (if needed).

Supervised the uncrating, setup, operation, and dismantling of the SMFT. Scheduled maintenance (if necessary) and ordered replacement parts (if needed).

Supervised the operation of the Water Tank Rack (HIPPO). Scheduled maintenance (if necessary) and ordered replacement parts (if needed).

Performance Steps

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS:

Hearing protection is required when operating this equipment.

Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

Comply with unit SOP, OPORD, local regulations, and/or HN laws for drip pans or secondary containment devices.

NOTE: Check that soldier knows, understands and follows the performance measures from Task 101-92W-1073.

Performance Steps

1. Apply risk management procedures (reference: FM 100-14).
   a. Understand and supervise the risk management process, risk controls and command guidance by higher headquarters.
   b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.

2. Supervise the operation of the Forward Area Water Point Supply System (FAWPSS).
   a. Supervise before-, during-, and after-operations PMCS.
      (1) Ensure soldier uses the TM during PMCS.
      (2) Ensure soldier checks fluid levels in the 125-GPM pump.
      (3) Troubleshoot system when needed.
   b. Supervise the FAWPSS set up.
      (1) Ensure the 125-GPM pump is set in the selected area according to site layout plan.
      (2) Ensure all components are connected properly.
   c. Supervise the FAWPSS operation.
      (1) Ensure soldier knows how to open the valves in the drums.
      (2) Ensure soldier knows how to start the pump.
      (3) Ensure soldier knows how to fill and remove water out of the drums.
      (4) Ensure soldier knows how to stop the water pump.
   d. Supervise the dismantling of the FAWPSS.
      (1) Ensure all water is out of the drums.
      (2) Ensure soldier drains, caps, and rolls all hoses.
      (3) Ensure soldier conducts an inventory of the FAWPSS.

3. Supervise the operation of the Semitrailer Mounted Fabric Tank (SMFT).
   a. Supervise the removal of the SMFT from the crate.

NOTE: When lifting the SMFT using a forklift, make sure soldier has two ground guides.

   b. Supervise before-, during-, and after-operations PMCS.
   c. Supervise the installation of the SMFT.
      (1) Ensure soldier checks surface of the semitrailer for protruding nails or other objects.
      (2) Ensure that all the tie down points are in the correct place and are tightened.
      (3) Ensure that straps are not frayed or worn out.
   d. Supervise filling the SMFT.
   e. Supervise emptying the SMFT.
   f. Supervise folding the SMFT.
      (1) Ensure the SMFT is folded before removing the tie-down points.
      (2) Ensure the SMFT is folded from the front of the trailer to the back in order to lift it out.
   g. Supervise cleaning of the SMFT when required.
      (1) Ensure proper cleaning procedures are used.
      (2) Ensure the solution for cleaning is disposed of IAW environmental regulations.

4. Supervise the Operation of the Water Tank Rack (HIPPO).
   a. Supervise before-, during-, and after-operations PMCS.
   b. Supervise the pre-operation checks.
   c. Supervise filling of the HIPPO.
   d. Supervised the discharge of the HIPPO.
   e. Supervise the retrieval of the HIPPO.

Performance Measures	GO	NO-GO
1. Applied risk management procedures.	____	____
2. Supervised the operation of the Forward Area Water Point Supply System (FAWPSS).	____	____
3. Supervised the operation of the Semitrailer Mounted Fabric Tank (SMFT).	____	____
4. Supervised the operation of the Water Tank Rack (HIPPO).	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 1714-R	FM 10-52
DA FORM 2404	FM 10-52-1
DA FORM 5988-E	
FM 100-14	
TM 5-5430-212-13&P	
TM 5-5430-213-13&P	
TM 10-4320-309-14	
TM 10-4320-346-12&P	
TM 10-5430-244-10	

Supervise the Setup/Maintain/Operate and Dismantle of the Force Provider (FP) Portable Water Distribution and Storage Subsystem

101-92W-2043

Conditions: You are the supervisor of a team of soldiers who will set up, operate, conduct PMCS, and dismantle a Force Provider potable water storage and distribution site. Two soldiers are available to assist you. Two additional soldiers are available to assist in setting up or dismantling the 20,000-gallon tank. The potable water storage and distribution site has been specified in the staking plan and all its components are present and operational. The FP power generation and graywater collection subsystems are set up and operational. Materials required: a complete potable water storage and distribution subsystem, a general mechanic's tool kit, a plumber's tool kit, electrical power, graywater collection support, a Water Quality Analysis Set, TM 5-4610-228-13, TM 5-4610-233-13&P, and the assistance of five other soldiers.

Standards: Supervised the set up, operation, PMCS, and dismantling of the potable water storage and distribution site in accordance with all performance steps and the steps contained in the appropriate technical and commercial manuals. Ensured all environmental constrictions are observed.

Performance Steps

WARNING: If NBC agents are detected, immediately give the alarm and notify supervisor. Decontaminate self and equipment when mission permits.

CAUTIONS: Handle and dispose of hazardous materials (such as, used oil, contaminated fuel, and chemical test kits) in accordance with unit Standing Operating Procedures (SOP)/Operations Order (OPORD), local regulations, and/or host nation (HN) laws.

Comply with unit SOP, OPORD, local regulations, and/or HN laws for drip pans or secondary containment devices.

Before performing this task, read and comply with the appropriate Material Safety Data Sheet (MSDS). Wear the proper personal protective equipment (PPE). Clean and secure the PPE upon completion of this task.

NOTE: Check that soldier knows, understands, and follows the performance measures from Task 101-92W-1080

1. Apply risk management procedures (reference: FM 100-14).
    a. Understand and supervise the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
2. Supervise the positioning and set up of the 20,000-gallon tank at the site and its preparation for operation.
3. Supervise the assembly of the fill side of the potable water distribution and storage site.
4. Supervise the assembly of the discharge side of the potable water distribution and storage site.
5. Supervise the assembly of the recirculation loop.
6. Supervise the installation of the hypochlorination unit on the fill side of the site.
7. Supervise the assembly of the nozzle kit and user branch supply lines.
8. Supervise the lay out and connection of the site's electrical components to the power source.

Performance Steps

9. Supervise the preparation of the hypochlorination unit for operation.
10. Supervise the conduct of the initial checks and before-operations PMCS on the potable water distribution and storage subsystem.
11. Supervise the power up of the potable water distribution and storage site, notifying the Facilities Support Section to correct the power phasing of the power group or equipment, if necessary.
12. Check the site preparation and sanitary conditions in accordance with TB MED 577 and direct corrective action, as necessary.
13. Supervise the initial receipt of potable water and its chlorination to achieve residual chlorine level required by TM MED 577.
14. Supervise the initial operation of the potable water distribution and storage site and the adjustment of the residual chlorine levels at the pump's test valve assembly and at the user's nozzle or facility.
15. Supervise the operation of the potable water distribution and storage site.
    a. Supervise chlorine testing and adjustment.
    b. Ensure the electric water pump is turned off if the site will not be used for 24 hours or more.
    c. Ensure the tank is not filled to a height of more than four feet and does not drop below six inches in height.
    d. Supervise refilling of the tank.
    e. Supervise replacing the chemical solution in the hypochlorination unit when the low chemical level light illuminates on the metering pump control unit.
    f. Troubleshoot system when needed.
16. Supervise during-operations PMCS and periodic maintenance on the potable water distribution and storage site.
    a. Supervise maintenance on the site's components in accordance with TM.
    b. Supervise maintenance on the 20,000-gallon tank in accordance with TM.
    c. Supervise maintenance on the hypochlorination unit in accordance with TM and its commercial TM.
    d. Supervise maintenance on the electric water pump in accordance with TM.
    e. Supervise maintenance on the expansion tank assembly in accordance with its commercial TM.
17. Supervise the flushing of the potable water distribution and storage site and user lines with highly chlorinated water in preparation for dismantling.
18. Supervise after-operations PMCS on potable water distribution and storage site equipment.
19. Ensure the site is powered down properly.
20. Supervise the initial disassembly of the discharge side of the tank.
    a. Identify the lowest point on the discharge side.
    b. Direct a hose section to be disconnected at the lowest point to permit the hoses to drain by gravity.
21. Supervise the draining of the 20,000-gallon tank by using either a mobile tank and pump apparatus or drain hose.
22. Supervise the disassembly of the nozzle kit(s), user branch, recirculation loop, and remainder of the discharge side. Clean components, and move them to the staging area for repacking.

Performance Steps

23. Supervise the disassembly of the hypochlorination unit, its cleaning, and movement to the staging area for repacking.
24. Supervise the disassembly of the fill side, cleaning of its components, and carrying them to the staging area for repacking.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Supervised the positioning and set up of the 20,000-gallon tank at the site and its preparation for operation.	____	____
3. Supervised the assembly of the fill side of the potable water distribution and storage site.	____	____
4. Supervised the assembly of the discharge side of the potable water distribution and storage site.	____	____
5. Supervised the assembly of the recirculation loop.	____	____
6. Supervised the installation of the hypochlorination unit on the fill side of the site.	____	____
7. Supervised the assembly of the nozzle kit and user branch supply lines.	____	____
8. Supervised the lay out and connection of the site's electrical components to the power source.	____	____
9. Supervised the preparation of the hypochlorination unit for operation.	____	____
10. Supervised the conduct of the initial checks and before-operations PMCS on the potable water distribution and storage subsystem.	____	____
11. Supervised starting up the potable water distribution and storage site, notifying the Facilities Support Section to correct the power phasing of the power group or equipment, if necessary.	____	____
12. Checked the site preparation and sanitary conditions in accordance with TB MED 577, and direct corrective action, as necessary.	____	____
13. Supervised the initial receipt of potable water and its chlorination to achieve residual chlorine level required by TB MED 577.	____	____
14. Supervised the initial operation of the potable water distribution and storage site and the adjustment of the residual chlorine levels to at the pump's test valve assembly and at the user's nozzle or facility.	____	____
15. Supervised the operation of the potable water distribution and storage site.	____	____
16. Supervised during-operations PMCS and periodic maintenance on the potable water distribution and storage site.	____	____
17. Supervised the flushing of the potable water distribution and storage site and user lines with highly chlorinated water in preparation for dismantling.	____	____
18. Supervised after-operations PMCS on potable water distribution and storage site equipment.	____	____
19. Ensured the site is powered down properly.	____	____
20. Supervised the initial disassembly of the discharge side of the tank.	____	____

Performance Measures	GO	NO-GO
21. Supervised the draining of the 20,000-gallon tank by using either a mobile tank and pump apparatus or drain hose.	____	____
22. Supervised the disassembly of the nozzle kit(s), user branch, recirculation loop, and remainder of the discharge side. Cleaned components, and moved them to the staging area for repacking.	____	____
23. Supervised the disassembly of the hypochlorination unit, its cleaning, and movement to the staging area for repacking.	____	____
24. Supervised the disassembly of the fill side, cleaning of its components, and carrying them to the staging area for repacking.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
FM 100-14	AR 200-1
TB MED 577	AR 200-2
TM 5-4610-228-13	FM 10-52
TM 5-4610-233-13&P	FM 10-52-1
	FM 3-100.4

Skill Level 3

Subject Area 7: Monitor Water Reports, Logs, and Forms

Analyze Water Reconnaissance Results

101-92W-3001

Conditions: Given the requirement to establish water purification operations at a new water point in a field environment, the soldier must direct the reconnaissance team (consisting of one 92W20 supervisor and two 92W10 soldiers) to conduct an aerial reconnaissance using a helicopter. Materials needed: a complete Water Quality Analysis Set (WQAS-1 or WQAS-P) with an M-272 Chemical Test Kit. Form needed: DA Form 1712-R (Water Reconnaissance Report).

Given the requirement to establish water purification operations in a field environment, the soldier must direct the reconnaissance team (consisting of one 92W20 supervisor and two 92W10 soldiers) to conduct a ground reconnaissance using a military standard vehicle. Materials needed: a complete Water Quality Analysis Set (WQAS-1 or WQAS-P) with an M-272 Chemical Test Kit. Form needed: DA Form 1712-R.

Given the requirement to establish a water storage and distribution site in a field environment, the soldier must direct the reconnaissance team (consisting of one 92W20 supervisor and two 92W10 soldiers) to conduct a ground reconnaissance using a military standard vehicle. Materials needed: a complete Water Quality Analysis Set (WQAS-1 or WQAS-P) with an M-272 Chemical Test Kit. Form needed: DA Form 1712-R.

Standards: Briefed members on the reconnaissance mission. Selected a site based on data from DA Form 1712-R that provides the best routes of communication, cover, and concealment; adequate dispersion factors/site conditions and the least site preparation; and sufficient water quantity and quality that meets TB MED 577 raw water quality standards.

Performance Steps

1. Apply risk management procedures (reference: FM 100-14).
    a. Understand and implement the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
    c. Monitor and evaluate the execution of risk controls and incorporate into AARs.
2. Provide mission guidance.
    a. Brief team supervisor on total daily water requirements (in gallons), in recommended area of operations.
    b. Provide intelligence reports, aerial photos, and maps of area.
    c. Brief environmental and safety considerations and requirements.
3. Recommend aerial reconnaissance requirements.
4. Review recorded reconnaissance observations from DA Form 1712-R.
    a. Review data for analysis based on performance measures supporting Task 101-92W-1064.
    b. Determine the best proposed water purification site based on ground routes of communication, cover and concealment, protection from encirclement, infiltration or attack, water quantity and quality, site conditions, and site preparation requirements.
    c. Determine the best proposed water storage and distribution site based on available cover and concealment, road nets/ground routes of communication, dispersion factors, terrain conditions, and site preparation requirements.
    d. Determine the effects of tidal fluctuations on coastal operations.
    e. Determine if engineer support is required.

Performance Steps

f. Identify environmental risk associated with conducting water operations at proposed sites.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Provided mission guidance.	____	____
3. Recommended aerial reconnaissance requirements.	____	____
4. Reviewed recorded reconnaissance observations from DA Form 1712-R.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 1712-R	FM 10-52
FM 100-14	FM 10-52-1
TB MED 577	

Analyze Water Analysis Test Results

101-92W-3002

Conditions: Given the requirement to analyze raw water to select a water purification site, the soldier must analyze the tests conducted by the ground reconnaissance team. Materials needed: TB MED 577. Form needed: DA Form 1712-R (Water Reconnaissance Report).

Given the requirement to certify potability of product water, the soldier must analyze the water test results conducted by the purification, storage, and distribution equipment operators. Materials needed: TB MED 577. Forms needed: DA Form 1714 (Daily Water Issue Log), DA Form 1714-1 (Daily Water Distribution Log), DA Form 1713-R (Daily Water Production Log – ROWPU), or ROWPU/LWP/TWPS operation logs.

Standards: Compared the information on the DA Form 1712-R to the requirements for source water contained in TB MED 577 and eliminated from consideration sites that do not meet standards. From all DA Forms 1712-R, selected the site for purification operations that best meets the requirements for conducting operations. Compared the information on the DA Form 1714-R, DA Form 1714-1-R, and DA Form 1713-R or ROWPU/LWP/TWPS log forms to the standards contained in TB MED 577. Certified potability and authorized issue/distribution of water that meets standard.

Performance Steps

1. Apply risk management procedures (reference: FM 100-14).
    a. Understand and implement the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
    c. Monitor and evaluate the execution of risk controls and incorporate into AARs.
2. Review water analysis test findings from DA Form 1712-R, DA Form 1713-R or equipment operation logs, DA Form 1714-R, and DA Form 1714-1-R.
    a. Compare the findings on the DA Form 1712-R to minimum requirements for source water in TB MED 577. Eliminate from consideration sites that do not meet standards.
    b. Compare the findings on DA Form 1713-R or equipment operation logs to requirements for operating the purification equipment and requirements for potable water standards in TB MED 577.
        (1) Identify the cause if tests results for processed water exceed the correct operating dosages or maximum permissible concentration (MPC) for the purification equipment.
        (2) Identify cause and delay issue and distribution operations if test results for product water do not meet standards.
        (3) Make recommendations to correct problem(s).
    c. Compare the findings on DA Form 1714-R and DA Form 1714-1-R to the requirements for potable water standards in TB MED 577.
        (1) Identify cause, and delay issue and distribution operations if test results for product water do not meet standard.
        (2) Make recommendations to correct problems(s).
3. Forward summary of water quality analysis to supervisor/higher headquarters/logistical support and management units requiring water quality analysis reports.
4. Enforce and monitor Water Quality Assurance/Surveillance Program standards.

Performance Measures	GO	NO-GO
1. Applied risk management procedures.	____	____
2. Reviewed water analysis test findings from DA Form 1712-R, DA Form 1713-R or equipment operation logs, DA Form 1714-R, and DA Form 1714-1-R.	____	____
3. Forwarded summary of water quality analysis to supervisor/higher headquarters/logistical support and management units requiring water quality analysis reports.	____	____
4. Enforced and monitored Water Quality Assurance/Surveillance Program standards.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 1712-R	FM 10-52
DA FORM 1713-R	FM 10-52-1
DA FORM 1714-R	
DA FORM 1714-1-R	
FM 100-14	
TB MED 577	

Analyze Entries on Water Reports/Logs/Forms

101-92W-3024

Conditions: Given the requirement to conduct water purification operations, the soldier (as the noncommissioned officer in charge (NCOIC) of a water point consisting of two 92W20 soldiers and eight 92W10 soldiers) must analyze the entries made on DA Form 1713-R (Daily Water Production Log – ROWPU) or ROWPU/LWP/TWPS operator logs, DA Form 1714-R (Daily Water Issue Log), and DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet). Materials needed: FM 10-52-1. Forms needed: completed DA Form 1713-R or ROWPU/LWP/TWPS operator logs, DA Form 1714-R, DA Form 2404/DA Form 5988-E, and DA Form 5456-R (Water Point Inspection).

Given the requirement to operate a GS water distribution point, the soldier (as the NCOIC of a water distribution team) must analyze the entries made on DA Form 1714-1-R (Daily Water Distribution Log). Materials needed: FM 10-52-1. Forms needed: completed DA Form 1714-1-R and DA Form 2404/DA Form 5988-E.

Standards: Analyzed completed DA Form 1713-R or ROWPU/LWP/TWPS operator logs, DA Form 1714-R, DA Form 1714-1-R, DA Form 2404/DA Form 5988-E, and DA Form 5456-R for accurate water production, distribution, and storage operations. Used the analysis to program maintenance, ordered supplies, and developed work schedules.

Performance Steps

1. Analyze completed DA Form 1713-R or ROWPU/LWP/TWPS operator logs for accurate recording of water production operations to include hourly chemical dosage, and gauge and indicator readings.
    a. Identify any unusual chemical/fuel consumption, down time, and/or gauge/indicator reading.
    b. Identify supplies (chemical/POL) required for reordering based on on-hand basic load, consumption rate of the product, unit size of issue, and supply turnaround time.
    c. Plan scheduled and nonscheduled maintenance of equipment where one unit will always be in operation or ready for operation to continue the mission.
    d. Schedule personnel requirements for peak periods of production, issue, and maintenance so that the shifts are properly manned.
    e. Forward copy of completed operator logs to supervisor for disposition of water report.
    f. Verify that system cleaning and preservation are performed as required on ultrafiltration, microfiltration, and RO elements.
    g. Make recommendations/corrections as needed.
2. Analyze completed DA Forms 1714-R for accurate recording of water issue operation to include time, amount of water issued, using unit, and chlorine residual.
    a. Verify that the level of chlorine residual adheres to the surgeon general's specifications.
    b. Schedule personnel for peak periods of issue and maintenance so that the shifts are properly manned.
    c. Forward copy of completed DA Forms 1714-R to supervisor for disposition of water report.
    d. Review the Remarks block for comments which may impact operations.
    e. Make recommendations/corrections as needed.
3. Analyze completed DA Forms 1714-1-R for accurate recording of GS water distribution operations to include time, amount of water received, amount of water distributed, amount of water storage available, and chlorine residual.
    a. Verify that the level of chlorine residual adheres to the surgeon general's specifications.
    b. Schedule personnel for peak periods of issue and maintenance so that the shifts are properly manned.
    c. Forward a copy of completed DA Forms 1714-1-R to supervisor for disposition of water report.
    d. Review the Remarks block for comments which may impact operations.
    e. Make recommendations/corrections as needed.

Performance Steps

4. Develop personnel work schedules for the water point.
   a. Arrange for adequate personnel coverage for each 24 hours of operation at water point.
   b. Schedule adequate meal, sleep, and break times.
   c. Avoid conflict with maintenance, issue, and/or distribution schedules.
   d. Obtain supervisor's approval of work schedule.

5. Develop equipment maintenance schedule for the water point.
   a. Schedule four hours of maintenance for every 20 hours of operation.
   b. Schedule no more than one unit down for maintenance at a time.
   c. Avoid conflict with work, issue, and/or distribution schedules.
   d. Obtain supervisor's approval of maintenance schedule.

6. Inspect water point using DA Form 5456-R.
   a. Record inspection results on DA Form 5456-R. Forward report to G4/CMMC.
   b. Inspect the development, bivouac area, and water source at each water point.
   c. Inspect equipment such as intake systems, discharge lines, purifiers, generators, and storage tanks.
   d. Check that operator safety procedures meet requirements such as operators wearing hearing protection, rubber gloves, and goggles.
   e. Inspect report and logs for timely and accurate recording of all gauge and meter readings.
   f. Inspect chemical containers for proper labeling, capping, and storage.
   g. Check that materials safety data sheets are available to operators.
   h. Check that all environmental operational requirements are adhered to for each area of operation.
   i. Make corrections/recommendations as needed.

Performance Measures	**GO**	**NO-GO**
1. Analyzed completed DA Forms 1713-R or ROWPU/LWP/TWPS operator logs for accurate recording of water production operations to include hourly chemical dosage and gauge and indicator readings.	____	____
2. Analyzed completed DA Forms 1714-R for accurate recording of water issue operation to include time, amount of water issued, using unit, and chlorine residual.	____	____
3. Analyzed completed DA Forms 1714-1-R for accurate recording of GS water distribution operations to include time, amount of water received, amount of water distributed, amount of water storage available, and chlorine residual.	____	____
4. Developed personnel work schedules for the water point.	____	____
5. Developed equipment maintenance schedule for the water point.	____	____
6. Inspected water point using DA Form 5456-R.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

DA FORM 1713-R
DA FORM 1714-R
DA FORM 1714-1-R
DA FORM 2404
DA FORM 5456-R
DA FORM 5988-E
FM 10-52-1

Related

Subject Area 8: Monitor Water Purification Operations

Monitor Water Purification Operations
101-92W-3025

Conditions: Given the requirement to provide potable water supplies, the soldier (a water section NCOIC in a field environment) must monitor water purification operations. Materials needed: an operationally complete water purification section in a QM Water Purification and Distribution Company (which might include the 600-GPH ROWPU with diesel-driven 30-kw generator, the 3,000-GPH ROWPU with diesel-driven 60-kw generator, the 1,500-GPH TWPS with a 60-kw generator or the LWP with a 3-kw generator); MOS-qualified 92W10 and 92W20 soldiers; WQAS-P or WQAS-1 with M-272 chemical test kit; FM 10-52; TM 10-4610-232-12, TM 10-4610-309-14, TM 10-4610-241-10, or TM 10-4610-215-10, TM 10-4610-310-14, TM 5-6115-545-12, TM 9-6115-672-14, TM 5-6115-465-12, TM 9-6115-639-13&P; TB MED 577; paper; and pencil. Forms needed: DA Form 1713-R (Daily Water Production Log – ROWPU) or ROWPU/LWP/TWPS operator logs, DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet), and DA Form 5456-R (Water Point Inspection).

Standards: Reviewed mission water requirements to meet total daily water needs of the supported force. Enforced preventive maintenance program objectives. Provided expendable supplies (such as chemicals, POL, filter, and so forth) in sufficient quantities to support purification operations. Coordinated DS/GS maintenance support required for purification and related equipment. Conducted inspections of purification operations. Monitored raw and product water quality to TB MED 577 standards.

Performance Steps

DANGER: High voltage is produced when the generator set is operated. Death or severe burns may result if soldiers fail to observe caution. Do not allow soldiers to operate the generator until the ground terminal stud has been connected to a suitable ground. Do not operate the ROWPU, TWPS or LWP until the ground terminal stud has been connected to a suitable ground. Dangerous chemicals are provided with the ROWPUs, LWPs, and TWPSs. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Ensure soldiers follow all warnings contained in TMs. Hearing protection is required when operating this equipment.

WARNING: If NBC agents are detected, ensure soldiers give the alarm and notify supervisor. Require soldiers to decontaminate themselves and their equipment at the first opportunity.

1. Apply risk management procedures.
    a. Understand and implement the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
    c. Monitor and evaluate the execution of risk controls and incorporate into AARs.
2. Review mission water requirements to meet total daily water needs of the supported force.
    a. Receive command guidance on mission.
        (1) Determine gallon-per-man-per-day consumption factor based on echelon level and environment.
        (2) Estimate daily water requirement by multiplying previously determined consumption rate by supported troop strength.
        (3) Determine required number of water points to support tactical mission.

Performance Steps

b. Compute daily water production rate.
   (1) Multiply hourly production rate of the ROWPU, TWPS or LWP by number of operational ROWPUs, TWPSs or LWPs assigned to determine hourly production.
   (2) Multiply hourly production rate by 20 to determine total daily production capability.
   (3) Adjust estimated production rate if quality of raw water is less than optimal (such as high TDS or lower temperature).
c. Compare daily water requirement to daily production capability to determine if shortfall exists.
   (1) Inform DMMC/CMMC if mission requirements cannot be met and request additional required equipment/personnel.
   (2) Adjust operation schedule if all assigned personnel/equipment are not needed to meet mission requirements.

3. Enforce Maintenance Program objectives in accordance with TMs.
   a. Receive DA Form 2404/DA Form 5988-E from water team chief daily.
   b. Check that PMCS is being performed.
   c. Check that water team chief is scheduling DS maintenance when required.
   d. Check that cleanings are being performed on elements when required.
   e. Evaluate and troubleshoot maintenance problems when required.

4. Provide expendable supplies in sufficient quantities to support purification operations.
   a. Receive water production/operator logs daily from water team chief.
   b. Determine usage rate of expendable supplies.
   c. Requisition through S4 sufficient supplies to meet mission requirements.
   d. Ensure chemicals and hazardous materials use and storage adhere to material safety data sheets.

5. Coordinate DS/GS maintenance support required for purification and related equipment.
   a. Receive maintenance support request from water team chief.
   b. Coordinate maintenance with maintenance support unit.
   c. Check on status of water purification equipment in shop daily.

6. Conduct inspection of purification operations.
   a. Record inspection results on DA Form 5456-R. Forward copy of report to G4/CMMC.
   b. Inspect the development, bivouac area, and water source at each water point.
   c. Inspect equipment, such as intake systems, discharge lines, purifiers, generators, and storage tanks.
   d. Check that operator safety procedures meet requirements, such as operators wearing hearing protection, rubber gloves, and goggles.
   e. Inspect reports and logs for timely and accurate recording of all gauge and meter readings.
   f. Inspect chemical containers for proper labeling, capping, and storage.
   g. Recommend corrective action as necessary to rectify deficiencies.
   h. Provide recommendations to improve storage and distribution operations.

7. Enforce Water Quality Assurance/Surveillance Program standards.
   a. Review water production/operator logs for reports of raw and product water characteristics.
   b. Check that frequency of NBC testing is conducted as specified in TB MED 577.
   c. Move water point operations to a new location if raw water characteristics do not conform to standards in TB MED 577.
   d. Coordinate with preventive medicine inspector for inspection results.
   e. Monitor raw and product water quality to TB MED 577 standards.

8. Enforce Environmental Stewardship Program standards.
   a. Train subordinates to be good stewards of the environment.
   b. Brief environment considerations and enforce requirements for area of operation.

Performance Steps

9. Enforce safety awareness.
    a. Check that operator safety procedures meet requirements, such as operators wearing hearing protection, rubber gloves, and goggles.
    b. Ensure soldiers are familiar with first aid procedures for hazardous materials.
    c. Ensure material safety data sheets are on hand and accessible.
    d. Ensure soldiers are aware of dangers or coastal operations and the impact of tidal fluctuations.
    e. Ensure first aid equipment such as eyewash stations are accessible and ready for use.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Reviewed mission water requirements to meet total daily water needs of the supported force.	____	____
3. Enforced Preventive Maintenance program objectives.	____	____
4. Provided expendable supplies in sufficient quantities to support purification operations.	____	____
5. Coordinated DS/GS maintenance support required for purification and related equipment.	____	____
6. Conducted inspection of purification operations.	____	____
7. Enforced Water Quality Assurance/Surveillance Program standards.	____	____
8. Enforced Environmental Stewardship Program standards.	____	____
9. Enforced safety awareness.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 2404	FM 10-52-1
DA FORM 5456-R	TM 3-6665-319-10
DA FORM 5988-E	TM 9-6115-645-10
FM 10-52	
TB MED 577	
TM 5-6115-465-12	
TM 5-6115-545-12	
TM 9-6115-639-13&P	
TM 9-6115-672-14	
TM 10-4610-215-10	
TM 10-4610-232-12	
TM 10-4610-241-10	
TM 10-4610-309-14	
TM 10-4610-310-14	

Monitor Environmental Stewardship Program

101-92W-3028

Conditions: Given a mission to conduct water purification and storage/distributions operations to include handling, moving, or disposing hazardous materials in an area of operations in a field environment. Materials needed: AR 200-1.

Standards: Monitored missions to meet local, state, and foreign country policies applicable to environmental regulations. Enforced environmental ethics. Provided training and guidance to support missions. Coordinated with local authorities for support. Conducted visual storage inspections of hazardous material.

Performance Steps

1. Apply risk management procedures (reference: FM 100-14).
   a. Understand and implement the risk management process, risk controls and command guidance directed by higher headquarters.
   b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
   c. Monitor and evaluate the execution of risk controls and incorporate into AARs.
2. Identify and communicate any environmental risks associated with missions prior to conducting the mission.
3. Plan and conduct environmentally sustainable actions and training. Contact the base civil engineers for training requirements and guidance.
4. Protect the environment during training and operations.
5. Ensure proper conservation of resources.
6. Ensure the hazardous substances are stored in accordance with material safety data sheets and applicable environmental regulations.
7. Ensure the appropriate equipment is on hand for handling, using, and disposing hazardous chemicals.
8. Ensure the personnel conducting an operation have guidance on spill cleanup procedures.
9. Ensure that any chemical spills generated by operations are cleaned up immediately and reported.
10. Incorporate environmental considerations into AARs.
11. Ensure all environmental regulations/operating permits for areas of operation are enforced.

Performance Measures	GO	NO-GO
1. Applied risk management procedures.	____	____
2. Identified and communicated any environmental risks associated with missions prior to conducting the mission.	____	____
3. Planned and conducted environmentally sustainable actions and training. Contacted the base civil engineers for training requirements and guidance.	____	____
4. Protected the environment during training and operations.	____	____
5. Ensured proper conservation of resources.	____	____
6. Ensured the hazardous substances are stored in accordance material safety data sheets and applicable environmental regulations.	____	____
7. Ensured the appropriate equipment was on hand for handling, using, and disposing hazardous chemicals.	____	____
8. Ensured the personnel conducting an operation had guidance on spill cleanup procedures.	____	____
9. Ensured that any chemical spills generated by operations were cleaned up immediately and reported.	____	____
10. Incorporated environmental considerations into AARs.	____	____
11. Ensured all environmental regulations/operating permits for areas of operations were enforced.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
AR 200-1	FM 10-52
FM 100-14	FM 10-52-1
	TB MED 577

Subject Area 9: Monitor Water Storage, Distribution, and Issue Operations

Monitor Water Distribution/Storage Operations
101-92W-3021

Conditions: Given the requirement to provide potable water supplies at the GS level, the soldier (a water section NCOIC in a QM Water Purification and Distribution Company) must monitor water distribution/storage operations. Materials needed: two 800,000-gallon PWS/DS and at least one TWDS team; a Medium Truck Company with 5,000-gallon Semitrailer Mounted Fabric Tank (SMFT); MOS-qualified 92W10 and 92W20 soldiers; WQAS-P or WQAS-1 with M-272 chemical test kit; FM 10-52; TM 10-4320-303-10, TM 5-4610-228-13, TM 5-5430-212-13&P; TB MED 577; paper; and pencil. Forms needed: DA Form 1714-R (Daily Water Issue Log), DA Form 1714-1-R (Daily Water Distribution Log), DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet), and DA Form 5456-R (Water Point Inspection).

Given the requirement to provide potable water supplies at the DS level, the soldier (a water section NCOIC in a field environment) must monitor water distribution/storage operations. Materials needed: an operationally complete 40,000-gallon PWS/DS; a 3,000-gallon Semitrailer Mounted Fabric Tank (SMFT); a FAWPSS; MOS-qualified 92W10 and 92W20 soldiers; WQAS-P or WQAS-1 with M-272 chemical test kit; FM 10-52, TM 5-4320-301-13&P, TM 5-4610-228-13, TM 5-5430-213-13&P; TB MED 577; paper; and pencil. Forms needed: DA Form 1714-R, 1714-1-R, DA Form 2404/DA Form 5988-E, and DA Form 5456-R.

Standards: Reviewed mission water requirements to meet total daily water distribution needs of the supported force. Enforced preventive maintenance program objectives. Provided expendable supplies (such as chemicals and POL) in sufficient quantities to support distribution operations. Coordinated DS/GS maintenance support required for distribution and related equipment. Conducted inspections of distribution operations. Monitored product water quality to TB MED 577 standards.

Performance Steps

DANGER: Dangerous chemicals are provided with the TWDS. Death, health hazards, or injuries such as severe burns, impaired vision, and internal tissue destruction may be experienced if personnel fail to observe precautions. Ensure soldiers follow all warnings contained in technical manuals. Hearing protection is required when operating this equipment.

WARNING: If NBC agents are detected, ensure soldiers give the alarm and notify supervisor. Require soldiers to decontaminate themselves and their equipment at the first opportunity.

1. Apply risk management procedures.
   a. Understand and implement the risk management process, risk controls and command guidance directed by higher headquarters.
   b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
   c. Monitor and evaluate the execution of risk controls and incorporate into AARs.
2. Review mission water requirements to meet total daily water distribution/storage needs of the supported force.
   a. Receive command guidance on mission.
      (1) Determine gallon-per-man-per-day consumption factor based on echelon level and environment.
      (2) Estimate daily water requirement by multiplying previously determined consumption rate by supported troop strength.
      (3) Determine if mission requires only direct support (DS) or if general support (GS) water support is necessary for the tactical mission.
   b. Compute daily water distribution/storage requirement.

Performance Steps

(1) Determine the location of supported units and their daily water requirement, by echelon.
(2) Double the daily storage requirement at corps and echelons above corps (EAC) to provide an additional day of supply at these levels.
(3) If GS support is required, compute to determine the number of TWDS teams needed by allocating one team per 10 miles distance.
(4) If GS support is required, compute to determine the number of Water Supply Companies needed by dividing the total storage requirement by 1.6 million (the storage capacity, in gallons, of one water supply company).

c. Compare daily water distribution/storage requirement to assigned unit capability to determine if shortfall exists.
(1) Inform G4/CMMC if mission requirements cannot be met and request additional required equipment/personnel.
(2) Adjust operation schedule if all assigned personnel/equipment are not needed to meet mission requirements.

3. Enforce Maintenance Program objectives IAW TMs.
a. Receive DA Form 2404/DA Form 5988-E daily.
b. Check that PMCS is being performed.
c. Check that DS/GS maintenance is scheduled when required.
d. Evaluate and troubleshoot maintenance problems when required.

4. Provide expendable supplies in sufficient quantities to support distribution/storage operations.
a. Receive DA Form 1714-R and DA Form 1714-1-R daily.
b. Determine usage rate of expendable supplies.
c. Requisition through S4 sufficient supplies to meet mission requirements.
d. Ensure chemical and hazardous materials use and storage adhere to material safety data sheets (MSDS).

5. Coordinate DS/GS maintenance support required for distribution/storage and related equipment.
a. Receive maintenance support request from team chiefs.
b. Coordinate GS maintenance with maintenance support unit.
c. Check on status of water distribution/storage equipment in shop daily.

6. Conduct inspection of distribution/storage operations.
a. Record inspection results on DA Form 5456-R. Forward copy of report to DMMC/CMMC.
b. Inspect the storage/distribution/issue operations and bivouac area at each water point.
c. Inspect equipment, such as storage bags, distribution hose lines, nozzles, and hypochlorinator.
d. Inspect reports/logs/forms for timely and accurate recording of all gauge and meter readings.
e. Inspect chemical containers for proper labeling, capping, and storage.
f. Recommend corrective action as necessary to rectify deficiencies.
g. Provide recommendations to improve storage and distribution operations.

7. Enforce Water Quality Assurance/Surveillance Program standards.
a. Review DA Form 1714-R and DA Form 1714-1-R for reports of product water characteristics.
b. Check that frequency of NBC testing is conducted as specified from TB MED 577.
c. If possible, move water distribution/storage operations to a new location if NBC agents are suspected or confirmed.
d. Coordinate with Preventive Medicine inspector for inspection results.
e. Monitor product water quality to TB MED 577 standards.

8. Enforce Environmental Stewardship Program standards.
a. Train subordinates to be good stewards of the environment.
b. Brief environment considerations and enforce requirements for area of operation.

Performance Steps

9. Enforce safety awareness.
   a. Ensure material safety data sheets are on hand and accessible.
   b. Check that operator safety procedures meet requirements, such as operators wearing hearing protection, rubber gloves, and goggles.
   c. Ensure soldiers are familiar with first aid procedures for hazardous materials.
   d. Ensure first aid equipment is accessible and ready for use.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Reviewed mission water requirements to meet total daily water distribution/storage needs of the supported force.	____	____
3. Enforced Maintenance Program objectives IAW TMs.	____	____
4. Provided expendable supplies in sufficient quantities to support distribution/storage operations.	____	____
5. Coordinated DS/GS maintenance support required for distribution/storage and related equipment.	____	____
6. Conducted inspection of distribution/storage operations.	____	____
7. Enforced Water Quality Assurance/Surveillance Program standards.	____	____
8. Enforced Environmental Stewardship Program standards.	____	____
9. Enforced safety awareness.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	**Related**
DA FORM 1714-R	FM 10-52-1
DA FORM 1714-1-R	TM 3-6665-319-10
DA FORM 2404	TM 5-6630-215-12
DA FORM 5456-R	TM 10-4320-303-13
DA FORM 5988-E	
FM 10-52	
TB MED 577	
TM 5-4610-228-13	
TM 5-4320-301-13&P	
TM 5-5430-212-13&P	
TM 5-5430-213-13&P	

Direct Sling Load Operations

101-92W-3029

Conditions: Given the requirement to provide water to an isolated area of operations, the soldier, a water section NCOIC, must direct sling load operations. Materials needed: a helicopter, packaged potable water, fabricated static electricity discharge probe, clevis assembly, slings, tape helmet, goggles, earplugs, multiple-leg sling set, soldiers to perform the task, and FM 10-450-4.

Standards: Directed sling load operations, ensuring final coordination with aviation unit was done; equipment and personnel were available; operations, safety and environmental briefing were conducted; site preparation was done; proper forms were filled; supervision and PMCS were done to standards.

Performance Steps

DANGER: Failure to perform this task correctly may result in damage to equipment personal injury or death to personnel.

1. Apply risk management procedures (reference: FM 100-14).
   a. Understand and implement the risk management process, risk controls and command guidance directed by higher headquarters.
   b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
   c. Monitor and evaluate the execution of risk controls and incorporate into AARs.
2. Conduct final coordination with the aviation unit for airlift assets.
3. Ensure that all necessary equipment and personnel are available for the operation.
4. Ensure the personnel conducting the operation are briefed on safety and environmental hazards.
5. Ensure the site is prepared in accordance with FM 10-450-3, paragraph4-3.
6. Check that DA Form 7382-R (Sling Load Inspection Record) is properly filled out according to FM 10-450-3, Appendix I, and distributed to the appropriate units.
7. Supervise the sling load operations in accordance with FM 10-450-3 and make on-the-spot corrections as necessary.
8. Ensure PMCS is performed on the equipment being used in the operation.
9. Ensure equipment is stored properly.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Conducted final coordination with the aviation unit for airlift assets.	____	____
3. Ensured all necessary equipment and personnel were available for the operation.	____	____
4. Ensured the personnel conducting the operation were briefed on safety and environmental hazards.	____	____
5. Ensured the site was prepared in accordance with FM 10-450-3, paragraph 4-3.	____	____
6. Checked that DA Form 7382-R (Sling Load Inspection Record) was properly filled out according to FM 10-450-3, Appendix I, and distributed to the proper units.	____	____
7. Supervised the sling load operations in accordance with FM 10-450-3 and made on-the-spot corrections as necessary.	____	____

Performance Measures	GO	NO-GO
8. Ensured PMCS were performed on the equipment used in the operation.	____	____
9. Ensured equipment was stored properly.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 7382-R	FM 10-52
FM 100-14	FM 10-52-1
FM 10-450-3	
FM 10-450-4	

Monitor Mobile distribution Operations

101-92W-3030

Conditions: Given the requirement to deliver potable water to DSA, BSA, TFSA or other area of responsibility, the soldier (a water section NCOIC in a Water Purification and Distribution Company in a field environment) must monitor the mobile distribution operations. Materials needed: an operationally complete FAWPSS with a 5-Ton Cargo Truck; a Tractor Truck with a trailer for a 3,000 or 5,000-gallon Semitrailer Mounted Fabric Tank (SMFT); a HEMMT-LHS truck, and a complete Water Tank Rack (HIPPO); MOS-qualified 92W10 and 92W20 soldiers; WQAS-1 or WQAS-P; FM 10-52; TM 5-4320-301-13&P or TM 10-4320-346-12&P, TM 5-5430-212-13&P or TM 5-5430-213-13&P, TM 10-5430-244-10. Forms needed: DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet) and DA Form 1714-R (Daily Water Issue Log).

Standards: Monitored the operations of the mobile distribution systems. Coordinated with higher echelons for further instructions on water delivery and locations of the units. Reviewed mission requirement for each mission to meet water needs for the supported force. Enforced preventive maintenance program objectives. Coordinated with DS/GS maintenance support for required operations. Provided expendable supplies (replacement parts, fuel, and so forth) in sufficient quantities to support operations. Conducted inspections during operations. Monitored water quality to TB MED 577 standards.

Performance Steps

1. Apply risk management procedures (reference: FM 100-14).
    a. Understand and implement the risk management process, risk controls, and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
    c. Monitor and evaluate the execution of risk controls and incorporate into AARs.
2. Review mission water requirements to meet the needs of the supported force.
    a. Receive command guidance on mission.
        (1) Determine gallon-per-man-per-day consumption factor based on echelon level and environment.
        (2) Estimate daily water requirement.
    b. Compare mission requirements to assigned unit capability to determine if short fall exists.
        (1) Inform higher headquarters if mission requirements cannot be met and request additional required equipment and personnel.
        (2) Adjust operation schedule as needed to meet mission requirements.
        (3) Determine requirement for aerial delivery of water.
        (4) Determine logistic package (LOGPAC) requirements.
3. Enforce Maintenance Program objectives.
    a. Receive DA Form 2404/DA Form 5988-E daily.
    b. Check that PMCS are being performed.
    c. Check that DS/GS maintenance is scheduled when required.
4. Coordinate mission requirements.
    a. Brief personnel on the details of the operation.
    b. Review coordinates and timelines for the logistic release points (LRP).
    c. Coordinate actions with the appropriate element, if part of a LOGPAC operation.
    d. Ensure personnel are trained on convoy survivability and the movement tracking system (MTS).
    e. Provide technical expertise and make recommendations as needed.

Performance Steps

5. Provide expendable supplies (replacement parts, fuel, and so forth) in sufficient quantities to support operations.
   a. Receive DA Forms 1714-R and 1714-1-R daily.
   b. Determine usage rate of expendable supplies.
   c. Requisition through S4 sufficient supplies to meet mission requirements.
6. Coordinate DS/GS maintenance support required for mobile distribution systems.
   a. Receive maintenance support request from team chiefs.
   b. Coordinate GS maintenance with higher echelons maintenance support unit.
   c. Check on status of the mobile distribution systems in the shop daily.
7. Conduct inspections of mobile distribution operations.
   a. Record inspection results on DA Form 5456-R (Water Point Inspection). Forward copy of report to DMMC/CMMC.
   b. Inspect equipment, such as SMFTs bags, FAWPSS, HIPPO, distribution hoses, and nozzles.
   c. Inspect reports/logs/forms for timely and accurate recording of all gauge and meter reading.
8. Enforce Water Quality Assurance/Surveillance Program standards.
   a. Review DA Forms 1714-R and 1714-1-R for reports of product water characteristics.
   b. Check that frequency of NBC testing is conducted as specified from TB MED 577.
   c. If possible, move water distribution operations to a new location if NBC agents are suspected or confirmed.
   d. Coordinate with Preventive Medicine inspector for inspection results.
   e. Monitor water quality to TB MED 577 standards.
9. Enforce Environmental Stewardship Program standards.
   a. Train subordinates to be good stewards of the environment.
   b. Brief environment considerations and enforce requirements for area of operation.
10. Enforce safety awareness.
    a. Check that operator safety procedures meet requirements, such as operators wearing hearing protection, rubber gloves, and goggles.
    b. Ensure material data safety sheets are on hand and accessible.
    c. Ensure soldiers are familiar with first aid procedures for hazardous materials.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Reviewed mission water requirements to meet the needs of the supported force.	____	____
3. Enforced Preventive Maintenance Program objectives.	____	____
4. Coordinated mission requirements.	____	____
5. Provided expendable supplies (replacement parts, fuel, and so forth) in sufficient quantities to support operations.	____	____
6. Coordinated DS/GS maintenance support required for mobile distribution systems.	____	____
7. Conducted inspections of mobile distribution operations.	____	____
8. Enforced Water Quality Assurance/Surveillance Program standards.	____	____
9. Enforced Environmental Stewardship Program standards.	____	____
10. Enforced safety awareness.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 1714-R	AR 200-1
DA FORM 1714-1-R	FM 3-100.4
DA FORM 2404	FM 10-52-1
DA FORM 5456-R	FM 10-450-3
DA FORM 5988-E	FM 10-450-4
FM 10-52	FM 100-14
TB MED 577	TM 5-4320-208-12&P
TM 5-4320-301-13&P	
TM 5-5430-212-13&P	
TM 5-5430-213-13&P	
TM 10-4320-346-12&P	
TM 10-5430-244-10	

Skill Level 4

Subject Area 10: Manage Water Reports, Logs, and Forms

Manage Water Reconnaissance Operations
101-92W-4014

Conditions: Given the requirement to manage air or ground reconnaissance for a water purification or distribution point, the soldier (working at a Materiel Management Center) will manage the reconnaissance. This task is not performed in MOPP 4. Material needed: AR 200-1. Form needed: completed DA Form 1712-R (Water Reconnaissance Report).

Given the requirement to manage air or ground reconnaissance for a water purification or distribution point, the soldier (a Platoon sergeant for a water purification and distribution company) will manage the reconnaissance. This task is not performed in MOPP 4. Material needed: AR 200-1. Form needed: completed DA Form 1712-R.

Standards: Analyzed data from reconnaissance report and DA Form 1712-R to determine feasibility of the sites for providing the best routes of communication, cover and concealment, adequate dispersion factors/site conditions; the least site preparation; and sufficient water quantity to meet mission requirements and quality that meet TB MED 577 raw water quality standards. Monitored training of 92W personnel to certify that they can perform their reconnaissance mission. Conducted environmental risk assessment to determine high risks. Complied with all pertinent environmental regulations. Made decisions to minimize environmental impact of mission. Developed a plan to minimize environmental impact of mission.

Performance Steps

1. Apply risk management procedures (reference: FM 100-14).
    a. Understand and implement the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
    c. Integrate risk management into planning and preparing for operations and training activities.
    d. Assess subordinates effectiveness in managing risk in order to gain insight into areas for improvement and gather feedback on their understanding and application of risk guidance.
2. Provide mission guidance.
    a. Notify water section supervisors of total daily water requirements (in gallons) and recommended area of operations.
    b. Compile intelligence and field reports, aerial photos, and maps of recommended areas of operation.
    c. Provide support to subordinate elements.
    d. Coordinate with local communities or HN for semi-fixed or fixed water source.
3. Coordinate aerial reconnaissance requirements with aviation support unit.
4. Coordinate throughout the command during all phases of the reconnaissance, from initial planning to deployment to final completion. Ensure that all necessary equipment and support, to include soldier support such as food, shelter, security protection, are provided when and where required.
5. Review water section supervisor's recommendations on the selection of sites from the reconnaissance.
    a. Provide assistance with site selection and make recommendations.
    b. Identify secondary/backup sites to support mission requirements.
    c. Evaluate engineer support requirements for potential sites.

Performance Steps

6. Monitor unit training to verify that all 92W personnel have been trained to perform reconnaissance tasks.
7. Comply with command guidance, host nation, local, state, and federal environmental laws and regulations.
   a. Follow all host nation, local, state and federal environmental laws and regulations.
   b. Follow all installation/Army regulations.
   c. Identify hazards to the environment during mission analysis and planning.
      [1] Identify potential hazards to streams, lakes, ponds, wetlands, and beach heads.
      [2] Identify potential hazards to threatened and endangered species.
      [3] Identify potential hazards to historical and archeological sites.
      [4] Identify potential hazards for maneuver damage.
   d. Assess the probability of environmental damage/violations using environmental risk assessment matrixes.
      [1] Evaluate potential archeological and historical site hazards for each type of unit operation.
      [2] Evaluate potential hazardous materials and waste problems for each type of unit operation.
      [3] Evaluate potential threatened and endangered species hazards for each type of unit operation.
      [4] Evaluate potential water pollution hazards for each type of unit operation.
      [5] Evaluate potential dangers to wetlands for each type of unit operation.
      [6] Determine overall environmental risk.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Provided mission guidance.	____	____
3. Coordinated aerial reconnaissance requirements with aviation support unit.	____	____
4. Coordinated throughout the command during all phases of the reconnaissance, from initial planning to deployment to final completion. Ensured that all necessary equipment and support, to include soldier support such as food, shelter, security protection, were provided when and where required.	____	____
5. Reviewed water section supervisor's recommendations on the selection of sites from the reconnaissance.	____	____
6. Monitored unit training to verify that all 92W personnel have been trained to perform reconnaissance tasks.	____	____
7. Complied with command guidance, host nation, local, state, and federal environmental laws and regulations.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	**Related**
AR 200-1	FM 10-52
DA FORM 1712-R	FM 10-52-1
FM 100-14	
TB MED 577	

Manage Completed Water Reports/Logs/Forms

101-92W-4015

Conditions: Given the requirement to manage water purification and supply points, the soldier (as the NCOIC of a water section) must manage completed water reports. This task is not performed in MOPP 4. Materials needed: FM 10-52-1. Forms needed: completed DA Form 1713-R (Daily Water Production Log – ROWPU) or ROWPU/LWP/TWPS operator logs, DA Form 1714-R (Daily Water Issue Log), DA Form 1714-1-R (Daily Water Distribution Log), DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet), and DA Form 5456-R (Water Point Inspection).

Standards: Reviewed completed DA Form 1713-R or ROWPU/LWP/TWPS operator logs, DA Form 1714-R, DA Form 1714-1-R, DA Form 2404/DA Form 5988-E, and DA Form 5456-R. Determined the continued suitability of selected sites. Used reports/logs/forms to plan for mission requirements. Provided subordinate units distribution and issue schedules. Received work and maintenance schedules from the NCOIC of water points and received completed issue and distribution schedules for supported units. Compiled information from water reports to complete a memorandum for record for the commander or higher headquarters.

Performance Steps

1. Use data from DA Form 1713-R or ROWPU/LWP/TWPS operator logs to determine the continued suitability of selected site.
    a. Note any changes in the raw water pH which may indicate pollutants and/or NBC agents.
    b. Note a pH of 3.5 or below during RO element cleaning which may indicate damaged RO elements.
    c. Note a decrease in product water output of several gallons per minute, without a change in raw water temperature, which may indicate that RO element cleaning is required.
    d. Note an increase in product water flow which may indicate damaged RO elements or a change in the total dissolved solids of the raw water source.
    e. Note when the reverse osmosis pressure shown rises, which may indicate RO element cleaning is required or the pressure gauge may be defective.
    f. Note when the cartridge filter pressure differential shown rises over 20 psi, which may indicate the cartridge filters need to be replaced or the pressure gauge may be defective.
    g. Note when the media filter pressure differential shown rises over 10 psid or 5 psid over initial reading, which may indicate backwashing is required or the pressure gauge may be defective.
    h. Note when the raw water flow is less than normal, which may indicate troubleshooting is required or the gauge may be defective.
    i. Note when there is a noticeable increase in brine flow and the adjustment of the regulate product flow valve does not correct the problem which may indicate RO element cleaning is required or the gauge may be defective.
    j. Note when there is a 20 percent increase in the reverse osmosis vessel pressure differential initial reading, which may indicate RO element cleaning is required or the gauge may be defective.
    k. Note when there is a total dissolved solids of the product water reading of over 1,000 ppm, which may indicate RO element cleaning is required or the gauge may be defective.
    l. Analyze any periods of down time that impact operations or any unusual consumption of supplies.
    m. Recommend corrective action as necessary.
2. Use data from DA Form 1713-R or ROWPU/LWP/TWPS operator logs to plan and organize DS/GS mission requirements.
    a. Reorder supplies based on unit's basic load on hand, rates of consumption of the products, size of issue, and the supply turn-around.
    b. Organize scheduled and nonscheduled maintenance where one water point (or one ROWPU at each site) is always operational.

Performance Steps

c. Organize personnel requirements for peak periods of production, issue, and maintenance so that the water points are properly manned.
d. Develop water issue and distribution schedules.
e. Analyze any periods of down time that impact operations or any unusual consumption of supplies.
f. Recommend corrective action as necessary.

3. Use data from DA Forms 1714-R to plan issue mission requirements.
   a. Identify units using assigned water point for water supply.
   b. Verify units are arriving at scheduled times to receive water.
   c. Verify units are receiving amount of water that was planned.
   d. Verify chlorine residual is at recommended level as prescribed by the surgeon general.
   e. Organize personnel for peak periods of issue and maintenance so that the water points are properly manned.
   f. Analyze any periods of down time that impact operations or any unusual consumption of supplies.
   g. Recommend corrective action as necessary.

4. Use data from DA Form 1714-1-R to plan distribution mission requirements.
   a. Identify units using assigned water point for water supply.
   b. Verify units are arriving at scheduled times to receive water.
   c. Verify units are receiving amount of water that was planned.
   d. Verify chlorine residual is at recommended level as prescribed by the surgeon general.
   e. Organize personnel for peak periods of issue and maintenance so that the water points are properly manned.
   f. Analyze any periods of down time that impact operations or any unusual consumption of supplies.
   g. Recommend corrective action as necessary.

5. Approve work and maintenance schedules from NCOICs of water points.

6. Use data from DA Form 5456-R (Water Point Inspection) to plan improvement and corrections.
   a. Receive from water section NCOIC of a water purification and distribution company completed DA Form 5456-R.
   b. Verify reports that do not meet TB MED 577 standards.
      (1) Notify NCOIC and water team chief of problem.
      (2) Suggest correction to problem.
      (3) Conduct follow-up inspection.
      (4) Notify OIC and command surgeon if problem is not resolved.
   c. Review daily water issue and distribution logs for unit that received nonacceptable water and take corrective action, if necessary.

7. Compile data to complete issue schedules.
   a. Coordinate with supported units to ensure timely and efficient issue of water supplies.
   b. Schedule the units nearest the water points to receive water first. Establish an issue schedule using the HIPPO, SMFT, or FAWPSS if supported units have no organic transportation.
   c. Coordinate with surgeon general or his representative for the appropriate chlorine residual at the point of distribution.
   d. Prepare a DA Form 1714-R which will affect equal issue of water sufficient to meet operational needs to all supported units.
   e. Prepare an issue schedule on a memorandum for the commander that designates the water point units will use, date and time units will receive water, and troop strength of supported units. Include consumption factor and the estimated gallons per day for the supported unit and total daily production requirement.
   f. Distribute the signed issue schedule to each water point.
   g. Distribute issue schedule to supported units.

Performance Steps

8. Compile data to complete distribution schedules.
    a. Coordinate with units issuing water by TWDS, hard walled tanker, SMFT or HIPPO to the storage site.
    b. Coordinate with NCOIC of the storage site receiving water.
    c. Coordinate the dispatching of water to using units.
    d. Coordinate with surgeon general or his representative for the appropriate chlorine residual at the point of distribution.
    e. Prepare a DA Form 1714-1-R which will affect equal issue of water sufficient to meet operational needs to all supporting and supported units.
    f. Prepare a distribution schedule on a memorandum for the commander that designates which water point units will use, date and time units will receive water, and date and time units will dispatch water. Includes troop strength of supported units, consumption factor and the estimated gallons per day for the supported unit and total daily production requirement.
    g. Distribute the signed distribution schedule to each water point.
    h. Distribute the distribution schedule to supported units.

9. Prepare a memorandum for record (MFR) for higher headquarters based on data from DA Form 1713-R or ROWPU/LWP/TWPS operator logs, DA Form 1714-R, DA Form 1714-1-R, DA Form 2404/DA Form 5988-E, and DA Form 5456-R.
    a. Complete report daily, weekly, monthly, and/or quarterly as determined by the higher headquarters standing operating procedure (SOP).
        (1) Include the number of personnel and amount of equipment assigned to the water section.
        (2) Identify production and storage capability.
        (3) Identify total hours of operation and the amount of water actually produced daily.
        (4) Identify the amount of water actually issued or distributed daily.
        (5) Identify total amount of POL and chemicals used.
        (6) Identify the units and number of personnel of the supported units.
        (7) Identify the estimated gallons per man per day for the supported units.
        (8) Record the surgeon general's or his representative's recommended chlorine residual at the point of distribution.
        (9) Attach copies of issue and distribution schedules.
        (10) Attach appropriate cover sheet for security of the document.
        (11) Forward report to officer in charge (OIC) for disposition of water report to higher headquarters.

Performance Measures	GO	NO-GO
1. Used data from DA Form 1713-R or ROWPU/LWP/TWPS operator logs, to determine the continued suitability of selected site.	____	____
2. Used data from DA Form 1713-R or ROWPU/LWP/TWPS operator logs, to plan and organize DS/GS mission requirements.	____	____
3. Used data from DA Forms 1714-R to plan issue mission requirements.	____	____
4. Used data from DA Form 1714-1-R to plan distribution mission requirements.	____	____
5. Approved work and maintenance schedules from NCOICs of water points.	____	____
6. Used data from DA Form 5456-R to plan improvement and corrections.	____	____
7. Compiled data to complete issue schedules.	____	____
8. Compiled data to complete distribution schedules.	____	____
9. Prepared a memorandum for record (MFR) for higher headquarters based on data from DA Form 1713-R or ROWPU/LWP/TWPS operator logs, DA Form 1714-R, DA Form 1714-1-R, DA Form 2404/5988-E, and DA Form 5456-R.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 1713-R	
DA FORM 1714-R	
DA FORM 1714-1-R	
DA FORM 2404	
DA FORM 5456-R	
DA FORM 5988-E	
FM 10-52-1	
TB MED 577	

Manage Water Analysis Testing
101-92W-4017

Conditions: Given the requirement to establish a water quality assurance/surveillance program, the soldier (working at a Material Management Center) must develop a program for water quality assurance/surveillance from the water source to the consumer that addresses three different areas of concern: reconnaissance, purification operations, and issue and distribution of potable water supplies.

Standards: Established a water quality assurance/surveillance program. Required that NCOICs of the various water sections provide production, issue and distribution, and PMCS summaries. Established preventive maintenance program. Monitored training of 92W personnel to certify that they can perform their water analysis mission.

Performance Steps

1. Apply risk management procedures (reference: FM 100-14).
    a. Understand and implement the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
    c. Integrate risk management into planning and preparing for operations and training activities.
    d. Assess subordinates effectiveness in managing risk in order to gain insight into areas for improvement and gather feedback on their understanding and application of risk guidance.

2. Establish a water quality assurance/surveillance program.
    a. Require water support soldiers to determine, using the water quality analysis set, and the M-272 test kit, the characteristics of tested water and report the findings on DA Form 1712-R (Water Reconnaissance Report), DA Form 1714-R (Daily Water Issue Log), DA Form 1714-1-R (Daily Water Distribution Log), DA Form 1713-R (Daily Water Production Log – ROWPU), or ROWPU/LWP/TWPS operator logs.
    b. Require supervisors to compile and forward summaries of production, distribution, and storage on the respective forms.
    c. Require supervisors to maintain good record keeping of daily operations.
    d. Require operators at issue/distribution points to inspect water tanker, trailer, and container interiors for cleanliness prior to filling them. Recommend cleaning and sanitizing guidance.
    e. Ensure the required tests are performed and the frequency of testing is in accordance with TB MED 577.
    f. Require supervisors to conduct weekly unannounced random water quality testing at production, distribution, and issue sites.
    g. Require subordinate water support elements to incorporate water testing requirements into their SOPs.
    h. Ensure all MSDS's are up to date and available to operators.
    i. Ensure water issue/distribution operations identify consumers so units that received unacceptable water can be identified and action taken.
    j. Provide guidance for preventive medicine testing certification, and product water sampling.
    k. Implement field water quality standards for consumption in accordance with TB MED 577 or at a higher level as prescribed by the chain of command/command surgeon.
        (1) Maintain at least 2 MG/L (ppm) potable water chlorine residual at purification sites and at places where purification operations do not occur but water tanks/SMFTS and other bulk containers have been pre-positioned as dry distribution points. This includes issue points along TWDS/800k/300k/40k systems.
        (2) Maintain the chlorine residual at the point of consumption such as unit water trailers, collapsible fabric drums and lister bags at least 1MG/L.

Performance Steps

3. Receive production memorandums for record from subordinate water supervisors.
    a. Review the report to determine if the requirements for operating the purification equipment and the requirements for potable water standards contained in TB MED 577 are being met.
    b. Ensure test results for processed water that exceeds the correct operating dosages for the purification equipment be accompanied by an explanation as to the cause and action taken by the supervisor.
    c. Ensure test results for raw water which does not meet standards be accompanied with information concerning the movement of the purification operations to a new location.
    d. Ensure test results for product water which does not meet standards be accompanied with information confirming that all water issue and distribution operations were halted, the cause was determined, and product water was brought back to standard.
    e. If NBC agents were detected, ensure the summary details the specific nature and location of the contamination. Inform the NCOIC of the water site, based on command guidance and METT-T, either to move the water point to a new location, stop operations and wait for the contamination to subside, or continue water support operations.

4. Receive issue/distribution summary from subordinate water supervisors.
    a. Review the summary to determine if the requirements for potable water standards in TB MED 577 are being met.
    b. Look for an indication of decreasing chlorine residual. This could mean contamination exists somewhere in the distribution system.
    c. If decreased residuals were discovered, ensure issue and/or distribution operations have been stopped, the cause found, and product water returned to standard.
    d. If NBC agents were detected ensure all issue and/or distribution operations have been stopped immediately.

5. Establish a maintenance program that requires soldiers to inspect the water testing equipment for defects every time they use the equipment.
    a. Maintain chemical and hardware inventory.
    b. Ensure M-272 chemical agent test kit contains sufficient analysis materials for 1 day of testing at MOPP 4.

6. Require supervisors to review completed DA Form 2404/5988-E, and annotate all corrections, deficiencies, and shortcomings recorded by the soldier and forward summary of deficiency and actions taken.

7. Monitor unit training to verify that all 92W personnel have been trained to perform water analysis testing, to inspect water tanks, trailers and containers and understand equipment cleaning and sanitizing procedures.

8. Coordinate throughout the command during all phases of the water assurance/surveillance program from initial planning to deployment, and finally to issue, ensuring that all water quality criteria are met.

Performance Measures	GO	NO-GO
1. Applied risk management procedures.	____	____
2. Established a water quality assurance/surveillance program.	____	____
3. Received production memorandums for record from subordinate water supervisors.	____	____
4. Received issue/distribution summaries from subordinate water supervisors.	____	____
5. Established a maintenance program that requires soldiers to inspect the water testing equipment for defects every time they use the equipment.	____	____
6. Required supervisors to review the completed DA Form 2404/5988-E, and annotated all corrections, deficiencies, and shortcomings recorded by the soldier and forwarded summary of deficiencies and actions taken.	____	____
7. Monitored unit training to verify that all 92W personnel have been trained to perform water analysis testing, to inspect water tanks, trailers and containers and understand equipment cleaning and sanitizing procedures.	____	____
8. Coordinated throughout the command during all phases of the water quality assurance/surveillance program from initial planning to deployment, and finally to issue, ensured that all water quality criteria are met.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 1712-R	FM 10-52
DA FORM 1713-R	
DA FORM 1714-R	
DA FORM 1714-1-R	
DA FORM 2404	
DA FORM 5988-E	
FM 100-14	
TB MED 577	

Subject Area 11: Manage Water Purification Operations

Manage Water Purification Operations
101-92W-4016

Conditions: Given the requirement to provide potable water supplies, the soldier (a water NCO in the general supply section of the G4/CMMC/QM Water Purification Company) must manage water purification operations. Materials needed: FM 10-52, TB MED 577, paper, and pencil. Forms needed: DA Form 1713-R (Daily Water Production Log – ROWPU) or ROWPU/LWP/TWPS operator logs, DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet), and DA Form 5456-R (Water Point Inspection).

Standards: Prepared, reviewed, and approved detailed water purification plans. Managed receipt and processing of requirements for water supplies from supported units. Coordinated with division engineer staff for support. Provided planning data to division G4. Managed command inspection program of water points. Established water quality assurance/surveillance, environmental stewardship, maintenance and safety programs.

Performance Steps

1. Apply risk management procedures.
    a. Understand and implement the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
    c. Integrate risk management into planning and preparing for operations and training activities.
    d. Assess subordinates effectiveness in managing risk in order to gain insight into areas for improvement and gather feedback on their understanding and application of risk guidance.

2. Prepare, review, and approve detailed water purification plans.
    a. Receive command guidance on mission.
    b. Develop detailed water purification plan.
        (1) Analyze courses of action that meet mission requirements and factors for each course of action indicating problems and deficiencies.
        (2) Evaluate the advantages/disadvantages for each course of action under consideration and determine which can best be logistically supported.
    c. Provide input to the water portion of Logistic Estimate.
    d. Provide input to the water portion of supply and service Annex to the OPLAN.
    e. Integrate risk controls, environmental considerations, and safety into training, operation orders (OPORDS), operation plans (OPLANS), and standing operating procedure (SOPs).
    f. Apply applicable quadripartite standardization agreement (QSTAG) and standardization agreement (STANAG), to OPLAN.
    g. Determine need for operation project (OPROJ) stock to support plans.
    h. Determine specific water support requirements for other services, allied forces, or host nation labor forces.
    i. Determine ability of host nation to assist in meeting water requirements.

3. Manage receipt and processing of requirements for water supplies from supported units.
    a. Receive from forward and main water points total daily water requirements.
    b. Determine if divisional purification capability is less than, equal to, or greater than divisional requirements.
    c. Cross-level main and forward water points purification capability to requirements where possible. Ensure each echelon has necessary purification to meet mission requirements, but no more.
    d. Submit to COSCOM MMC/higher headquarters purification requirement shortfalls.

Performance Steps

4. Coordinate with division/corps engineer staff for support.
   a. Request tactical engineer support for water point construction/improvement.
   b. Coordinate for operation of fixed or semi-fixed water purification installation.
   c. Request well drilling when required by OPLAN.
   d. Request diving support when required by OPLAN.
5. Provide planning data to division/corps G4.
   a. Receive from forward and main water points expendable supply requirements.
   b. Pass requirements to division G4 for future supply planning.
6. Manage command inspection program of water points.
   a. Receive from water section NCOICs complete DA forms 5456-R.
   b. Plan periodic unannounced inspections of all water operations.
   c. Verify reports that do not meet TB MED 577 standards.
      (1) Notify NCOIC and water team chief of problem.
      (2) Suggest correction to problem.
      (3) Conduct follow-up inspection.
      (4) Notify OIC and command surgeon if problem is not resolved.
   d. Review daily water production log, from the water point that provided nonacceptable or poor quality water, and take corrective action.
7. Establish Water Quality Assurance/Surveillance, Environmental Stewardship, Maintenance and Safety Programs.
   a. Establish programs in subordinate water elements as required.
   b. Ensure programs contain command guidance and objectives.
   c. Ensure subordinate elements are enforcing program objectives.
   d. Review all objectives and standards periodically and update as required.
   e. Ensure the Maintenance Program supports the following:
      (1) Provide objectives that allow for timely maintenance procedures to be performed in accordance with applicable TM's.
      (2) Maintain equipment in a state of repair that prolongs the life cycle of the equipment.
      (3) Provide training on troubleshooting and maintenance procedures with special emphasis on cleanings and preserving RO, micro-filtration, and ultra-filtration elements.
      (4) Maintain accurate record keeping for maintenance procedures to include element cleaning and preservations.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Prepared, reviewed, and approved detailed water purification plans.	____	____
3. Managed receipt and processing of requirements for water supplies from supported units.	____	____
4. Coordinated with division/corps engineer staff for support.	____	____
5. Provided planning data to division/corps G4.	____	____
6. Managed command inspection program of water points.	____	____
7. Established Water Quality Assurance/Surveillance, Environmental Stewardship, Maintenance and Safety Programs.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 1713-R	FM 10-52-1
DA FORM 2404	TM 3-6665-319-10
DA FORM 5456-R	TM 5-6115-465-12
DA FORM 5988-E	TM 5-6630-215-12
FM 10-52	TM 10-4610-215-10
TB MED 577	TM 10-4610-232-12

Manage Environment Stewardship Program

101-92W-4021

Conditions: Given the requirement to provide water supplies, the soldier, an NCO in the general supply section of the G4/CMMC, must manage an Environmental Stewardship Program. Materials needed: a water purification unit, paper, pencil, installation spill control plan (ISCP), Material Safety Data Sheets (MSDS), hazardous material information sheets(HMIS), the installation environmental guidance, personal protective equipment (PPE), AR 200-1, FM 10-52-1, TB MED 577, FM 3-100.4, and FM 3-100.12.

Standards: Managed an environmental control program which ensures minimal pollution of environment in the area of operations.

Performance Steps

1. Apply risk management procedures (reference: FM 100-14).
   a. Understand and implement the risk management process, risk controls and command guidance directed by higher headquarters.
   b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
   c. Integrate risk management into planning and preparing for operations and training activities.
   d. Assess subordinates effectiveness in managing risk in order to gain insight into areas for improvement and gather feedback on their understanding and application of risk guidance.
2. Establish procedures to contain and clean up water purification discharges and chemicals in all environments using available equipment.
3. Establish procedures for proper disposal of microfiltration, ultrafiltration, cartridge and RO elements.
4. Manage all operations to ensure compliance with applicable environmental law, policies, and regulations.
5. Check that chemical and others waste materials are collected and disposed of in an environmentally safe manner.
6. Check that assigned personnel receive comprehensive environmental training.
7. Establish a unit SOP which reflects applicable environmental laws, regulations, and policies and command guidance.
8. Develop a environmental stewardship program.
   a. Establish unit management of the environmental stewardship program, which includes:
      (1) Appointment of an environmental compliance/hazardous waste coordinator.
      (2) Requirement for the environmental compliance/hazardous waste coordinator to be trained within 30 days of being assigned to duty.
      (3) Requirement for the environmental compliance officer or hazardous waste coordinator to maintain a file of applicable references, appointment orders, and inspection records for the last 24 months.
      (4) Requirement for scheduled and unscheduled inspections.
      (5) Requirement for a unit environmental training program.
      (6) Requirement for the unit SOP to cover spill prevention and response.
      (7) Requirement for the unit SOP to cover the HAZCOM program.
      (8) Requirement that all applicable Material Safety Data Sheets (MSDS) be maintained and available to all assigned personnel.
      (9) Requirement that the unit has a pollution prevention/hazardous minimization (HAZMIN) program.
      (10) Requirement that the unit has a recycling program.
      (11) Requirement for the unit to maintain high cleanliness standards for all water treatment chemicals and hazardous storage areas.

Performance Steps

(12) Requirement that the unit minimizes chemical spills in the field.
(13) Requirement that waste storage areas are inspected weekly. Inspection is documented and records are maintained for three years.
(14) Requirement for personal protective equipment (PPE) training.

b. Establish hazardous Material/Hazardous Waste management, which requires that:
(1) Only the amount of hazardous material needed is ordered.
(2) The unit hazardous chemicals are up to date, containers are not damaged and no hazardous waste remains on site longer than it needs to be.
(3) Hazardous waste is collected and stored in authorized containers.
(4) The HM/HW is disposed of according to directives.
(5) Containers are labeled according to directives.
(6) Containers are in good condition and close tightly at all times except when adding materials.
(7) Each container is marked with accumulation start dates.
(8) Accumulation tanks used for collecting are properly marked. Waste is segregated by type and storage procedures are adhered to.
(9) Danger and warning signs are conspicuously placed.
(10) Spill prevention and control equipment is adequate.
(11) Personnel are trained in the proper handling, collection, storage, and transportation of HM/HW.

c. Establish solid waste management, that requires:
(1) Procedures to reduce production of waste are enforced.
(2) Product separation and recycling efforts are in effect.
(3) Source reduction practices are enforced.
(4) The unit is requisitioning supplies only as needed.
(5) Purification chemicals are never discharged into the street, storm drainage system, or ground water source.

d. Establish spill prevention management that requires:
(1) Oil, fuel, waste water or other hazardous pollutants spills (over 5 gallons in volume or 100 square feet in areas), or any detectable amount that falls in the water is reported immediately according to local SOP.
(2) Creek/drainage channels are free of pollution.
(3) Pollutants are never discharge into storm or wash rack drains or poured on the ground or along fence lines (oil, solvent, soap, diesel, gasoline, battery acid, chemicals waste, antifreeze, paint, and grease).
(4) Small oil spill are clean in a timely manner.
(5) Drip pans are used under vehicles/equipment and POL product barrels whenever spills are likely to occur.
(6) Contaminated soil is properly disposed of (soil is taken to a designated authorized disposal area).

e. Establish recycling program management, that requires:
(1) The unit is delivering material to the installation recycling center.
(2) Recyclable materials sources are separated (that is, there are separate collection containers for paper, aluminum, and other items).
(3) Garbage containers are free of recyclable items.
(4) Used cleaning solvents are being recycled or collected properly.

f. Establish land management, that requires:
(1) Vehicles are parked or driven only in authorized areas.
(2) Surface areas and curbs are free of vehicular damage.
(3) Vehicle parking areas are free of litter.
(4) Gravel is used only in authorized areas and in an authorized manner.
(5) Archeological or historical sites are safeguarded.
(6) Live or dead trees or limbs are felled, removed, or used only with approval (range control/forester).

Performance Steps

(7) Unit personnel know the correct procedures for disposing of garbage, refuse, and rubbish in range areas.
(8) Storm-water ditches in the vicinity of motor pools are free of POL or other HM/HW.
(9) Retention ponds, waste-and-sump collection points, and vehicle inspection points are functional and being serviced properly.
(10) Paint spray, battery, and radiation repair operations are operated properly and coordinated with the environmental management officer and safety and preventive medicine officers.
(11) Collection points are established with the proper containers and servicing for all maintenance generated wastes.
(12) The unit follows procedures for fording streams which prevent environmental damage and uses only operational fording areas.
(13) The unit follows local range procedures for digging and covering fighting positions in the local range area.
(14) The unit's refueling operation SOP address practices to minimize spills.
(15) The unit has on-hand material to clean up spills (spill kits).

g. Establish storm water pollution prevention measures, that include:
(1) Garbage container lids are to be kept closed.
(2) Inspect all drip pans for accumulated water and remove when appropriate.
(3) Use dry sweep or other absorbent materials to clean up spills.
(4) Disposal of contaminated dry sweep according to unit SOP.
(5) All hazardous materials to be stored on secondary containment pallets or in areas with secondary containment.
(6) In garrison, maintain grassed areas to prevent erosion and corresponding run off.
(7) Conduct a visual inspection daily.
(8) Maintain and inventory of all hazardous materials.
(9) Reduce the exposure of hazardous materials to storm water whenever possible (cover with tarps, store indoors, and so on).

9. Discuss and plan for the impact of water operations development and waste control program with the unit environmental compliance coordinator.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Established procedures to contain and clean up water purification discharges and chemicals in all environments using available equipment.	____	____
3. Established procedures for proper disposal of microfiltration, ultrafiltration, cartridge and RO elements.	____	____
4. Managed all operations to ensure compliance with applicable environmental law, policies, and regulations.	____	____
5. Checked that chemical and others waste materials were collected and disposed of in an environmentally safe manner.	____	____
6. Checked that assigned personnel received comprehensive environmental training.	____	____
7. Established a unit SOP which reflects applicable environmental laws, regulation, and policies.	____	____
8. Developed an environmental control program.	____	____
9. Discussed and planned for the impact of water operations development and waste control program with the unit environmental compliance coordinator.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
AR 200-1	
FM 3-100.4	
FM 3-100.12	
FM 10-52-1	
FM 100-14	
TB MED 577	

Subject Area 12: Manage Storage, Distribution, and Issue Operations

Manage Mobile Distribution Operations
101-92W-4023

Conditions: Given the requirement to provide potable water to DSA, BSA, TFSA or other area of responsibility, the soldier, an NCO in the general supply section of the DMMC/CMMC, or QM Water Purification and Distribution Company, must manage mobile distribution operations. Materials needed: an operationally complete FAWPSS with a 5-Ton cargo truck; a Tractor truck with trailer for a 3,000 or 5,000-gallon Semitrailer Mounted Fabric Tank (SMFT); a HEMMT-LHS truck, and a complete Water Tank Rack (HIPPO); MOS qualified 92W10 and 92W20 soldiers; a WQAS-1 or WQAS-P; FM 10-52-1, FM 10-52. Forms needed: DA 2404/5988-E, DA 1714-R, DA 5456-R.

Standards: Prepared, reviewed and approved detailed water mobilization operations. Managed receipt and processing of unit requirements for water. Coordinated with units for support. Provided planning data to higher echelons. Established water quality assurance/surveillance, environmental stewardship, maintenance and safety programs.

Performance Steps

1. Apply risk management procedures.
    a. Understand and implement the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
    c. Integrate risk management into planning and preparing for operations and training activities.
    d. Assess subordinates effectiveness in managing risk in order to gain insight into areas for improvement and gather feedback on their understanding and application of risk guidance.
2. Prepare, review and approve detailed water distribution plans.
    a. Receive command guidance on mission.
    b. Develop detailed distribution plan.
        (1) Analyze courses of action that meet mission requirements and factors for each course of action indicating problems and deficiencies.
        (2) Evaluate the advantages/disadvantages for each course of action under consideration and determine which can best be logistically supported.
    c. Integrate risk controls, environmental considerations, and safety into training, OPORDS, OPLANS and SOPs.
    d. Determine specific water support requirements for other services, allied forces, or host nation (HN).
    e. Determine ability of host nation to assist in meeting water distribution requirements.
3. Manage receipt and processing of requirements for water supplies from supported units.
    a. Receive from forward and main water units the total of daily water requirement.
    b. Determine if divisional distribution capability is less than, equal to or greater than divisional requirements.
    c. Cross-level main and forward mobile water distribution capability to requirements where possible.
    d. Submit to higher headquarters distribution requirement shortfalls.
4. Coordinate with units involved for support.
    a. Plan Aerial delivery requirements.
    b. Plan LOGPAC requirements.

Performance Steps

5. Provide planning data to division G4/higher headquarters.
   a. Receive from forward and main water points expendable supply requirements.
   b. Pass requirements to division G4/higher headquarters for future supply planning.
6. Establish Water Quality Assurance/Surveillance, Environmental Stewardship, Maintenance and Safety Programs.
   a. Establish programs in subordinate water elements as required.
   b. Ensure programs contain command guidance and objectives.
   c. Ensure subordinate elements are enforcing program objectives.
   d. Review all objectives and standards periodically and update as required.
   e. Ensure the Maintenance Program supports the following:
      (1) Provide objectives that allow for timely maintenance procedures to be performed in accordance with applicable TM's.
      (2) Maintain equipment in a state of repair that prolongs the life cycle of the equipment.
      (3) Provide training on troubleshooting and maintenance procedures.
      (4) Maintain accurate record keeping for maintenance procedures.

Performance Measures	**GO**	**NO-GO**
1. Applied risk management procedures.	____	____
2. Prepared, reviewed and approved detailed water distribution plans.	____	____
3. Managed receipt and processing of requirements for water supplies from supported units.	____	____
4. Coordinated with units involved for support.	____	____
5. Provided planning data to division G4/higher headquarters.	____	____
6. Established Water Quality Assurance/Surveillance, Environmental Stewardship, Maintenance and Safety Programs.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	**Related**
FM 10-52	FM 100-14
FM 10-52-1	TM 10-4320-346-12&P
	TM 5-5430-213-13&P

Manage Water Storage/Distribution Operations

101-92W-4010

Conditions: Given the requirement to provide potable water supplies at the GS level, the soldier (a water section NCOIC in a field environment) must manage water distribution/storage operations. Materials needed: two operationally complete 800,000-gallon PWS/DS and at least one TWDS team; a Medium Truck Company with 5,000-gallon Semitrailer Mounted Fabric Tanks (SMFTs); MOS-qualified 92W10 and 92W20 soldiers; WQAS-1or WQAS-P with M-272 chemical test kit; FM 10-52; TM 5-4610-228-13, TM 10-4320-303-13, and TM 5-5430-212-13&P; TB MED 577; paper; and pencil. Forms needed: DA Form 1714-R (Daily Water Issue Log), DA Form 1714-1-R (Daily Water Distribution Log), DA Form 2404 (Equipment Inspection and Maintenance Worksheet)/DA Form 5988-E (Equipment Inspection Maintenance Worksheet), and DA Form 5456-R (Water Point Inspection).

Given the requirement to provide potable water supplies at the DS level, the soldier (a water section NCOIC in a field environment) must monitor water distribution/storage operations. Materials needed: an operationally complete 40,000-gallon Potable Water Storage and Distribution System (PWS/DS); a Tractor w/Trailer with a 3,000-gallon Semitrailer Mounted Fabric Tank (SMFTs); a 5-Ton Cargo Truck with a Forward Area Water Point Supply System (FAWPSS); MOS-qualified 92W10 and 92W20 soldiers; WQAS-1 or WQAS-P with M-272 chemical test kit; FM 10-52, TM 5-4610-228-13, TM 5-5430-213-13&P, TM 10-4320-346-12&P or TM 5-4320-301-13&P; TB MED 577; paper; and pencil. Forms needed: DA Form 1714-R, 1714-1-R, DA Form 2404/DA Form 5988-E, and DA Form 5456-R.

Standards: Prepared, reviewed, and approved detailed water distribution/storage plans. Managed receipt and processing of requirements for water supplies from supported units. Coordinated with division engineer staff for support. Provided planning data to division G4. Managed command inspection program of water points. Established water quality assurance/surveillance, environmental stewardship, maintenance and safety programs.

Performance Steps

1. Apply risk management procedures.
    a. Understand and implement the risk management process, risk controls and command guidance directed by higher headquarters.
    b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
    c. Integrate risk management into planning and preparing for operations and training activities.
    d. Assess subordinates effectiveness in managing risk in order to gain insight into areas for improvement and gather feedback on their understanding and application of risk guidance.

2. Prepare, review, and approve detailed water distribution/storage plans.
    a. Receive command guidance on mission.
    b. Develop detailed DS/GS water distribution/storage plan.
        (1) Analyze courses of action that meet mission requirements and factors for each course of action indicating problems and deficiencies.
        (2) Evaluate the advantages/disadvantages for each course of action under consideration and determine which can best be logistically supported.
    c. Provide input to the water portion of Logistic Estimate.
    d. Provide input to the water portion of Supply and Service Annex to operation plan (OPLAN).
    e. Integrate risk controls, environmental considerations, and safety into training, OPORDS, OPLANS and SOPs.
    f. Apply applicable quadripartite standardization agreement (QSTAG) and standardization agreement (STANAG) to OPLAN.
    g. Determine need for operation project (OPROJ) stock to support plans.
    h. Determine specific water support requirements for other services, allied forces, or host nation (HN) labor forces.
    i. Determine ability of host nation to assist in meeting water distribution/storage requirements.

Performance Steps

3. Manage receipt and processing of requirements for water supplies from supported units.
    a. Receive from forward and main water points total daily water requirements.
    b. Determine if divisional distribution/storage capability is less than, equal to, or greater than divisional requirements.
    c. Cross-level main and forward water distribution/storage capability to requirements where possible.
    d. Submit to COSCOM MMC/higher headquarters distribution/storage requirement shortfalls.

4. Coordinate with division engineer staff for support.
    a. Request tactical engineer support for water storage site, pump stations and TWDS construction/improvement.
    b. Coordinate for operation of fixed or semi-fixed water distribution/storage equipment and installations.
    c. Request well drilling when required by OPLAN.

5. Provide planning data to division G4/higher headquarters.
    a. Receive from forward and main water points expendable supply requirements.
    b. Pass requirements to division G4/higher headquarters for future supply planning.

6. Manage command inspection program of water points.
    a. Receive from water section NCOIC/surgeon general representative complete DA Form 5456-R.
    b. Verify reports that do not meet TB MED 577 standards.
        (1) Notify NCOIC and water team chief of problem.
        (2) Suggest correction to problem.
        (3) Conduct follow-up inspection.
        (4) Notify OIC and command surgeon general if problem is not resolved.
    c. Plan periodic unannounced inspections of all water operations.
    d. Review daily water distribution/issue logs for units that received non acceptable water and take corrective action if necessary.

7. Establish Water Quality Assurance/Surveillance, Environmental Stewardship, Maintenance and Safety Programs.
    a. Establish programs in subordinate water elements as required.
    b. Ensure programs contain command guidance and objectives.
    c. Ensure subordinate elements are enforcing program objectives.
    d. Review all objectives and standards periodically and update as required.
    e. Ensure the Maintenance Program supports the following:
        (1) Provide objectives that allow for timely maintenance procedures to be perform in accordance with applicable TM's.
        (2) Maintain equipment in a state of repair that prolongs the life cycle of the equipment.
        (3) Provide training on troubleshooting and maintenance procedures.
        (4) Maintain accurate record keeping for maintenance procedures.

Performance Measures	GO	NO-GO
1. Applied risk management procedures.	____	____
2. Prepared, reviewed, and approved detailed water distribution/storage plans.	____	____
3. Managed receipt and processing of requirements for water supplies from supported units.	____	____
4. Coordinated with division engineer staff for support.	____	____
5. Provided planning data to division G4/higher headquarters.	____	____
6. Managed command inspection program of water points.	____	____
7. Established Water Quality Assurance/Surveillance, Environmental Stewardship, Maintenance and Safety Programs.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
DA FORM 1714-R	FM 10-52-1
DA FORM 1714-1-R	TM 3-6665-319-10
DA FORM 2404	TM 5-6115-465-12
DA FORM 5456-R	TM 5-6630-215-12
DA FORM 5988-E	TM 10-4610-215-10
FM 10-52	TM 10-4610-232-12
TB MED 577	
TM 5-4610-228-13	
TM 5-5430-212-13&P	
TM 10-4320-303-13	

Plan Sling Load Operations

101-92W-4022

Conditions: Given the requirement to deliver water to an isolated area, the soldier, a NCO in a general supply section of a DMMC/CMMC, must plan sling load operations. Materials needed: a helicopter, packaged potable water, fabricated static electricity discharge probe, clevis assembly, sling, tape, helmet, goggles, earplugs, multiple-leg sling set, and soldiers to perform the task. Materials needed: FM 10-450-4, FM 10-450-3, FM 100-14, and FM 10-52-1.

Standards: Planned sling-load operations. Ensured the risk assessment and procedures were done and briefed correctly. Ensured appropriate personal protective equipment was available. Determined amount of personnel and equipment was needed. Coordinated with the aviation support unit to configured weight requirements and helicopters needed. Developed and issue operation order for the mission. Maintained continuous coordination with supporting aviation units.

Performance Steps

1. Apply risk management procedures (reference: FM 100-14).
   a. Understand and implement the risk management process, risk controls and command guidance directed by higher headquarters.
   b. Assess variable hazards continuously and report risks and risk reduction measures as appropriate to the chain of command.
   c. Integrate risk management into planning and preparing for operations and training activities.
   d. Assess subordinates effectiveness in managing risk in order to gain insight into areas for improvement and gather feedback on their understanding and application of risk guidance.
2. Ensure the appropriate personal protective equipment (PPE) is available.
3. Coordinate with aviation support unit to determine the maximum load weight required load configuration and number of helicopters available to perform a left mission. Using this information determine the number of sling loads required to move a given amount of cargo.
4. Determine the type and quantity of equipment and the number of people required to perform the task.
5. Select a site for sling load operations. If possible, the site should be:
   a. Level
   b. Open enough to offer easy access for helicopters.
   c. Easily accessible to vehicles bringing the load to the site.
   d. Easy to secure, both for safety and tactical reasons.
   e. Away from waterways and other environmentally sensitive areas.
6. Developed and issue an operations order which gives details of the mission (who, what, when, and where). Include the applicable environmental and safety considerations.
7. Maintain continuous coordination up and down the chain of command and with supporting aviation units to monitor conditions which may cause last minute changes to the mission.

Performance Measures	GO	NO-GO
1. Applied risk management procedures.	____	____
2. Ensured the appropriate personal protective equipment (PPE) was worn.	____	____
3. Coordinated with aviation support unit to determine the maximum load weight required load configuration and number of helicopters available to perform a left mission. Used this information to determine the number of sling loads required to move a given amount of cargo.	____	____
4. Determined the type and quantity of equipment and the number of people required to perform the task.	____	____
5. Selected a site for sling load operations.	____	____
6. Developed and issued an operations order which gave details of the mission (who, what, when, and where). Included the applicable environmental and safety considerations.	____	____
7. Maintained continuous coordination up and down the chain of command and with supporting aviation units to monitor conditions which may have caused last minute changes to the mission.	____	____

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what was done wrong and how to do it correctly.

References

Required	Related
FM 10-52-1	FM 10-52
FM 100-14	
FM 10-450-3	
FM 10-450-4	

CHAPTER 4

Duty Position Tasks

92W-Water Treatment Specialist, CMF 92

(SL1) MOSC 92W10 soldiers assist in water reconnaissance, site preparation, and setup of water treatment activity. Operate and maintain water treatment equipment. Receive, issue, and store potable water. Perform water quality analysis testing and verification.

(SL2) MOSC 92W2O soldiers conduct water reconnaissance. Develop water sources and water points. Supervise and train soldiers to perform water treatment tasks. Perform operator maintenance and inspects operational condition and maintenance of equipment. Determine treatment method and treats water for purification. Analyze and verify test results of raw and treated water. Maintain and inventory water treatment equipment and chemical supplies. Prepare water treatment reports.

(SL3) MOSC 92W3O soldiers interpret water reconnaissance results to determine location of water sites. Direct water reconnaissance and water point development. Provide technical guidance to personnel.

(SL4) MOSC 92W4O soldiers direct water reconnaissance and water point development for division, corps, and echelons above corps. Manage operation and ensure quality control of water supply, storage, distribution and purification activities. Perform staff and advisory duties. Furnishes reports to higher headquarters. Develop area water supply and treatment plan and supervises operation.

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APPENDIX A

HANDS-ON EVALUATION (DA FORM 5164-R) INSTRUCTIONS

DA Form 5164-R (Hands-On Evaluation) allows the trainer to keep a record of the performance measures a soldier passes or fails on each task.

Before evaluation:

1. Obtain a blank copy of DA Form 5164-R, which you may locally reproduce on 8 ½ x 11 paper.
2. Enter the task title and 10-digit number from the STP task summary.
3. In Column a, enter the performance measure numbers from the task summary.
4. In Column b, enter the performance measure corresponding to the number in Column a (you may abbreviate this information, if necessary).
5. Locally reproduce the partially completed form when evaluating more than one soldier on the task or when evaluating the same soldier more than once.

During evaluation:

1. Enter the date just before evaluating the soldier's task performance.
2. Enter the evaluator's name, the soldier's name, and the unit.
3. For each performance measure in Column b, enter a check in Column c (PASS) or Column d (FAIL), as appropriate.
4. Compare the number of performance measures the soldier passes (and, if applicable, which ones) against the task standards specified in the task summary. If the standards are met or exceeded, check the GO block under STATUS; otherwise, check the NO-GO block.

HANDS-ON EVALUATION For use of this form, see AR 350-57; the proponent agency is ODCSOPS		DATE 1 November 2004	
TASK TITLE Prepare an Equipment Maintenance Work Request		TASK NUMBER 101-92A-1113	
ITEM a	PERFORMANCE STEP TITLE b	SCORE (Check One) PASS c	 FAIL d
1.	Prepared a DA Form 2407 for direct support maintenance for a not mission capable (NMC) item of equipment.	☒ P	☐ F
2.	Prepared a DA Form 2407 for direct support maintenance requesting a Modification Work Order (MWO) to unit equipment.	☐ P	☒ F
3.	Prepared a DA Form 2407 for direct support maintenance requesting an estimated cost of damage (ECOD).	☒ P	☐ F
4.	Copied the work order request information from DA Form 2407 to DA Form 2405.	☒ P	☐ F
		☐ P	☐ F
		☐ P	☐ F
		☐ P	☐ F
		☐ P	☐ F
		☐ P	☐ F
		☐ P	☐ F
		☐ P	☐ F
		☐ P	☐ F
		☐ P	☐ F
		☐ P	☐ F
EVALUATOR'S NAME SSG Powell		UNIT W Co, 244th QM BN	
SOLDIER'S NAME PV2 Howard		STATUS ☐ GO	☒ NO GO
DA FORM 5164-R, SEP 85	EDITION OF DEC 82 IS OBSOLETE		USAPPC V2.00

Figure A-1. Sample of a completed DA Form 5164-R

APPENDIX B

FIELD EXPEDIENT SQUAD BOOK

FIELD EXPEDIENT SQUAD BOOK (DA FORM 5165-R) INSTRUCTIONS

DA Form 5165-R (Field Expedient Squad Book) allows the trainer to keep a record of task proficiency for a group of soldiers.

Before evaluation:

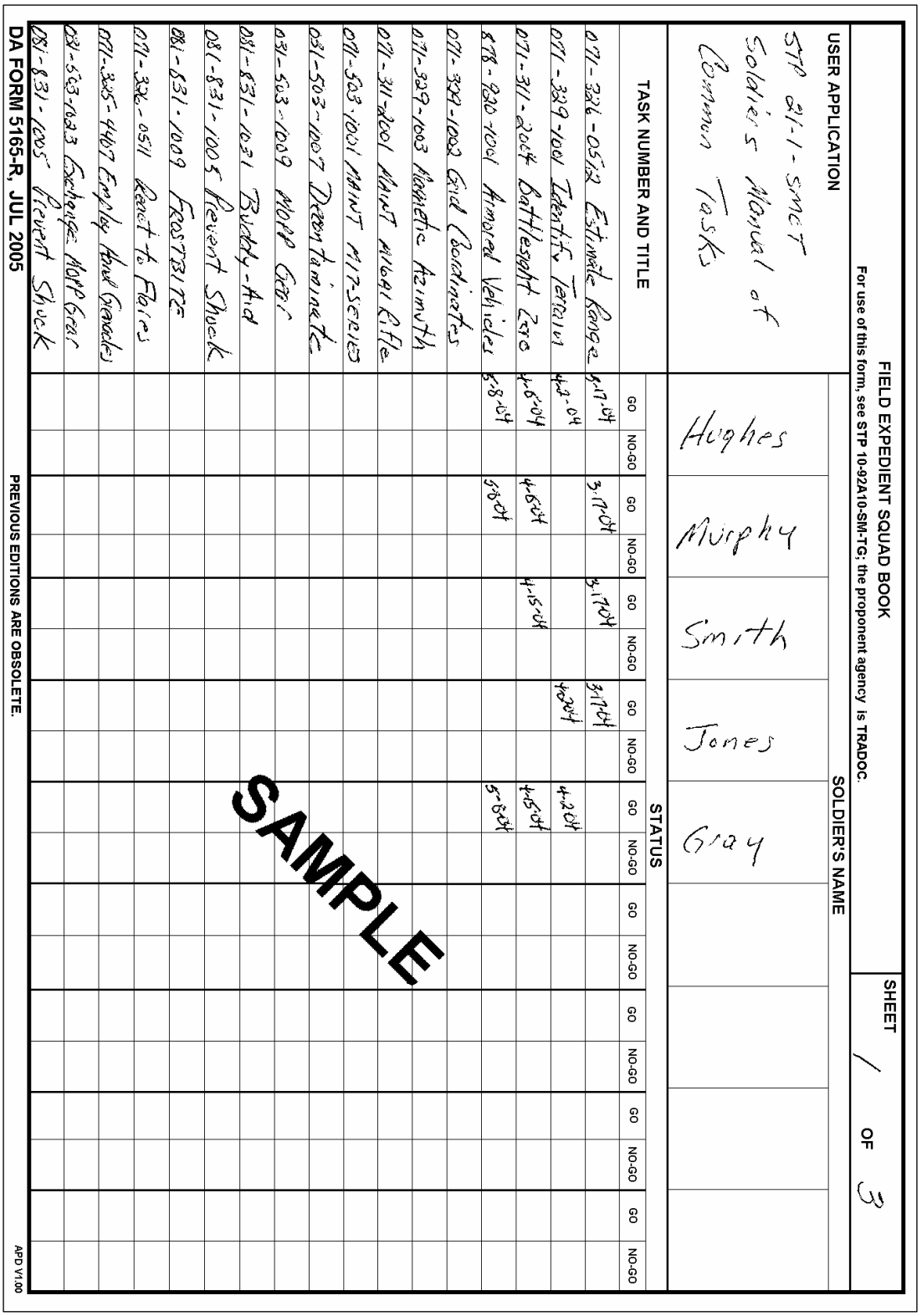
1. Obtain a blank copy of DA Form 5165-R, which you may locally reproduce on 8 ½" x 11" paper.
2. Locally reproduce the partially completed form if you are evaluating more than nine soldiers.

During evaluation:

1. Enter the names of the soldiers you are evaluating, one name per column, at the top of the form.
2. Under STATUS, record (in pencil) the date in the GO block if the soldier demonstrated task proficiency to soldier's manual standards. Keep this information current by always recording the most recent date on which the soldier demonstrated task proficiency. Record the date in the NO-GO block if the soldier failed to demonstrate task proficiency to soldier's manual standards. Soldiers who failed to perform the task should be retrained and reevaluated until they can meet the standards. When the standards are met, enter the date in the appropriate GO block and erase the previous entry from the NO-GO block.

After evaluation:

1. Read down each column (GO/NO-GO) to determine the training status of an individual. This will give you a quick indication of which tasks a soldier needs training on.
2. Read across the rows for each task to determine the training status of all soldiers. You can readily see which tasks to focus training on.
3. Line through the STATUS column of any soldier who leaves the unit.



FIELD EXPEDIENT SQUAD BOOK

For use of this form, see STP 10-92A10-SM-TG; the proponent agency is TRADOC.

SHEET 1 OF 3

USER APPLICATION

STP 21-1-SMCT Soldier's Manual of Common Tasks

SOLDIER'S NAME

Hughes | Murphy | Smith | Jones | Gray

TASK NUMBER AND TITLE	STATUS															
	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO
071-326-0532 Estimate Range	5-17-04		3-17-04		3-17-04		3-17-04		4-2-04		4-5-04					
071-329-1001 Identify Terrain	4-3-04						4-20-04				5-6-04					
071-311-2004 Battlesight Zero	4-6-04		4-6-04		4-15-04											
578-820-1001 Armored Vehicles	5-8-04		5-8-04													
071-329-1003 Grid Coordinates																
071-329-1003 Magnetic Azimuth																
071-311-2001 Maint M16A1 Rifle																
071-503-1001 Maint M17-Series																
051-503-1007 Determine Mils																
031-503-1019 MOPP Gear																
051-831-1021 Buddy-Aid																
051-831-1005 Prevent Shock																
081-531-1019 Frostbite																
071-326-0511 React to Flares																
071-335-4407 Employ Hand Grenades																
031-503-1023 Exchange MOPP Gear																
081-831-1005 Prevent Shock																

SAMPLE

DA FORM 5165-R, JUL 2005 PREVIOUS EDITIONS ARE OBSOLETE. APD V1.00

Figure B-1. Sample of a completed DA Form 5165-R

GLOSSARY

Section I
Acronyms & Abbreviations

AC	alternating current
ACCP	Army Correspondence Course Program
AIPD	Army Institute for Professional Development
AIT	advanced individual training
amp	ampere
AN	annually
ANCOC	Advanced NCO Course
AR	Army regulation
ARTEP	Army Training and Evaluation Program
ATTN	attention
BA	biannually
BII	basic issue items
BIT	built-in tests
BNCOC	Basic NCO Course
BSA	brigade support area
BW	biweekly
C	Celsius
CFM	cubic feet per minute
class	classification
CMMC	corps materiel management center
COEI	components of end item
COSCOM	corps support command
CTT	common task test

DA	Department of the Army
D.C.	District of Columbia
DC	direct current
DMMC	division materiel management center
DOD	Department of Defense
DS	direct support
DSA	division support area
EAC	echelons above corps
F	Fahrenheit
FAWPSS	Forward Area Water Point Supply System
FM	field manual
FP	Force Provider
Freq	frequency
FSG	Final Governing Standards
FY	fiscal year
G4	Assistant Chief of Staff, Logistics
GPD	gallons per day
GPH	gallons per hour
GPM	gallons per minute
GPS	Global Positioning System
GS	general support
HEMTT	Heavy Expanded Mobility Tactical Truck
HM	Hazardous Material
HMMWV	high-mobility multipurpose wheeled vehicle
HN	host nation
HP	horse power
HQ	headquarters

HW	Hazardous Waste
Hz	hertz
ISCP	Installation Spill Contingency Plan
JTU	Jackson Turbidity units
kw	Kilowatt
lb	pound(s)
LHS	Load Handling System
LOGPAC	logistics package
LP	low pressure
LRP	logistics release point
LWP	Lightweight Purifier System
METL	mission essential task list
METT-T	mission, enemy, terrain, troops, and time available
MF	Micro-Filtration
MFR	memorandum for record
mg/l	milligrams per liter
ml	milliliter
MMC	materiel management center
MO	monthly
MOPP	mission oriented protective posture
MOS	military occupational specialty
MOSC	military occupational specialty code
MPC	maximum permissible concentration
MPH	miles per hour
MSDS	material safety data sheet
MSG	Master Sergeant
MTS	Movement Tracking System

NA	not applicable
NBC	nuclear, biological, and chemical
NCO	noncommissioned officer
NCOIC	noncommissioned officer in charge
No	number
NSN	national stock number
NTU	nephelometric turbidity unit
OCP	Operator Control Panel
OEBGD	Overseas Environmental Baseline Guidance Document
OIC	officer in charge
OISS	Ocean Intake Structure System
OPLAN	operations plan
OPORD	operations order
OPROJ	operations project
PAM	pamphlet
PDP	Power Distribution Panel
pH	potential hydrogen
PLC	programmable logic controller
PLS	Palletized Load System
PMCS	preventive maintenance checks and services
POL	petroleum, oils, and lubricants
PPE	personal protective equipment
ppm	parts per million
PSI	pounds per square inch
psid	pounds per square inch differential
psig	pounds per square inch gauged
PV1	Private One

PVNTMED	preventive medicine
PWS/DS	Potable Water Storage/Distribution System
QM	Quartermaster
QSTAG	Quadripartite Standardization Agreement
QT	quarterly
RO	reverse osmosis
ROWPU	reverse osmosis water purification unit
RPM	revolutions per minute
S3	battalion operations officer
S4	supply officer (US Army)
SA	semiannually
SFC	Sergeant First Class
SGM	Sergeant Major
SGT	Sergeant
SL	skill level
SM	soldier's manual
SMCT	soldier's manual of common tasks
SMFT	semitrailer-mounted fabric tank
SOFA	Status of Forces Agreement
SOP	standing operating procedure
SPC	Specialist
SSG	Staff Sergeant
STANAG	Standardization Agreement
STP	soldier training publication
SUST	sustainment

TB MED	technical bulletin (medical)
TDS	total dissolved solids
TFSA	task force support area
TG	trainer's guide
TM	technical manual
Tng	training
TQG	tactical quiet generator
TWDS	Tactical Water Distribution System
TWPD	Tactical Water Purification System
UF	ultra filtration
UNIT	Trained in the Unit
US	United States
VA	Virginia
VAC	volts alternating current
WK	weekly
WQAS-P	Water Quality Analysis Set - Purification

Section II
Terms

Alkalinity
A term that represents the content of carbonates, bicarbonates, hydroxides, and occasionally borates, silicates, and phosphates in water. The concentration of alkali or alkaline quality of a substance.

arsenicals
A chemical agent relating to or containing arsenic; a trivalent and pentavalent solid poisonous element.

backwash
The reversal of flow through a filter to wash clogging material out of the filtering medium and reduce conditions causing loss of head. Also called filter wash or backwash waste.

blister agents
Chemical agents that injure the eyes and lungs and burn or blister the skin.

blood agents
A chemical compound, including the cyanide group, which affects bodily functions by preventing the normal transfer of oxygen from the blood to body tissues. Also called cyanogen agent.

brackish water
Water rendered unfit for drinking because of salty or unpleasant tastes caused by the presence of excessive amounts of dissolved chemicals, chlorides, sulfates, and alkalis. Brackish waters are highly mineralized and have a TDS concentration between 1,000 ppm and 15,000 ppm.

brine
Water saturated or strongly impregnated with salts; in reverse osmosis operations, a continuous waste stream.

cartridge filter
wound fiber filters contained within a cylindrical container, functioning primarily as depth filters. Usually rate by size of particle removed. Army cartridge filters are rated at 2 to 5 micron.

chlorides
A compound of chlorine with another element or group, usually a salt of ester of hydrochloric acid.

chlorination
Treatment of water by the addition of chlorine either as a gas or liquid, or in the form of hypochlorite, usually for the purpose of disinfection, oxidation, and so forth.

chlorine (Cl)
A powerful disinfectant used extensively in water treatment. As a gas, its color is greenish yellow and it is about 2 1/2 times heavier than air. As a liquid, it is amber-colored and about 1 1/2 times heavier than water. It is toxic to all organisms and corrosive to most metals.

chlorine residual
The total amount of chlorine (combined and free available chlorine) remaining in water at the end of a specified contact period following chlorination.

citric acid
A tricarboxylic acid occurring in cellular metabolism that is used as a treatment aid and cleaning agent for RO membranes.

color, apparent
Pigmentation due to the presence of suspended solids in a water supply.

color, true
Pigmentation due to the presence of finely divided particles or droplets either dispersed, or in solution, in a water supply.

contact time
The amount of time chlorine is in water before an analysis is conducted to determine residual, usually prescribed by the medical authority at 30 minutes.

contaminant
A foreign substance in a product.

contamination
A general term signifying the introduction into water of microorganisms, chemicals, wastes, or sewage, which render the water unfit for its intended use. Usually considered to imply the presence, or possible presence, of disease-producing organisms, chemical agent, or radiological presence.

disinfectant
Any oxidant, including, but not limited to chlorine, chlorine dioxide, chloramines, and ozone added to water in any part of the treatment or distribution process, that is intended to kill or inactivate pathogenic microorganisms.

disinfection
The process of killing most (but not necessarily all) of the harmful and objectionable microorganisms in a fluid by various agents such as chemicals, heat, ultraviolet light, ultrasonic waves, radiation, and so forth.

dissolved solids
Solids that are present in solution.

drawdown
The lowering of the water surface in a well and of the water table or piezometric surface adjacent to the well, resulting from the withdrawal of water from the well by pumping. Drawdown is the difference between static level and pumping level.

field water supply system
That assemblage of purification, storage, and distribution equipment and personnel to provide potable water to field units in both training and actual employment environments.

filter
A device or structure for removing solid or colloidal matter (which usually cannot be removed by sedimentation) from water, or other liquids or semiliquids, by a straining process whereby the solids are held on a medium of some kind (such as granular, diatomaceous earth, woven, porous) while the liquid passes through.

fixed installation
An installation that, through extended use, has gained those structures and facilities not initially found or intended for use at a "temporary" standard facility (for example, paved roads, fixed electrical distribution systems, fixed water treatment facilities, and underground distribution lines).

fresh water
Fresh water has a TDS concentration of less than 1,000 ppm. For water to be considered potable, it must be fresh.

ground water
Water occurring in a stratum (aquifer) below the surface of the ground. The term is not applied to water which is percolating or held in the top layers of the soil, but to that below the water table.

hardness
A characteristic of water, chiefly due to the existence therein of the carbonates and sulfates (and occasionally the nitrates and chlorides) of calcium, iron, and magnesium; causes "curding" of water when soap is used, increased consumption of soap, deposition of scale in boilers, injurious effects in some industrial processes and sometimes objectionable taste in the water. Commonly computed from the amounts of calcium and magnesium in the water and expressed as equivalent calcium carbonate.

health hazards
Any condition, including any device or water treatment practice, which may create an adverse effect on a person's well-being.

hypochlorinators
Hypochlorinators are devices that are used to feed calcium or sodium hypochlorite as the disinfecting agent.

hypochlorites
Compounds containing chlorine that are used for disinfection. They are available as liquids or solids.

infiltration
(1) The flow or movement of water through the pores of a soil or other porous medium. (2) The absorption of liquid water by the soil, either as it falls as precipitation or from a stream flowing over the surface. Also called seepage.

lbs
pounds

level, pumping
The elevation of water table or pressure surface after a prescribed period of pumping.

level, static
The elevation of water table or pressure surface when it is not influenced by pumping or other form of extraction from the groundwater body. It is the level of groundwater in a well before pumping.

manifold
A pipe of hose fitting with several lateral outlets for connecting one pipe or hose with others.

maximum permissible concentration
The maximum permissible level of a contaminant in water which is delivered to a free flowing outlet of the ultimate user of a military water system, except in the case of turbidity where the maximum permissible level is measured at the point of entry to the distribution system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.

media filter
These filters use sand and crushed anthracite coal on a graded gravel base arranged in a coarse-to-fine gradation in direction of water flow.

microorganism
A minute plant or animal in water or earth that is visible only through a microscope.

milligrams per liter (mg/l)
A unit of the concentration of water or wastewater constituent. It has replaced the parts per million unit (ppm), to which it is approximately equivalent, in reporting the results of water analyses.

nerve agent
A lethal chemical that causes paralysis by interfering with the transmission of nerve impulses.

nonpotable water
Water that has not been examined, properly treated, and approved by appropriate authorities as being safe for soldiers' consumption. All waters are considered nonpotable until declared potable.

organic
(1) Characteristic of, pertaining to, or derived from living organisms. (2) Pertaining to a class of chemical compounds containing carbon.

osmosis
The passage of a liquid from a weak solution to a more concentrated solution across a semipermeable membrane. The membrane allows the passage of the water (solvent) but not the dissolved solids (solutes). This process tends to equalize the conditions of either side of the membrane.

palatable water
Water that is pleasing to the taste; significantly free from color, turbidity, taste, and odor. Does not imply potability.

pH
potential hydrogen - A measure of the acidity or alkalinity of a solution. A value of seven is neutral; low numbers are acid, large numbers are alkaline. Strictly speaking, pH is the negative logarithm of the hydrogen-ion concentration.

pollution
The addition of sewage, industrial wastes, or other harmful or objectionable material to water. A general term that does not necessarily signify the presence of disease-producing bacteria.

polyelectrolyte
A high-molecular-weight (relatively heavy) substance having points of positive or negative electrical charges that is formed by either natural or man-made processes. Natural polyelectrolytes may be of biological origin or derived from starch products and cellulose derivatives. Man-made polyelectrolytes consist of simple substances that have been made into complex, high-molecular-weight substances. Used with other chemical coagulants to aid in binding small suspended particles to larger chemical flocs for their removal from water. Often called a POLYMER.

polymer
A chemical formed by the union of many monomers (a molecule of low molecular weight). Polymers are used with other chemical coagulants to aid in binding small suspended particles to larger chemical flocs for their removal from water. All polyelectrolytes are polymers, but not all polymers are polyelectrolytes.

potable
(1) Water which contains no objectionable substances or pollution, and is satisfactory for human consumption. (2) Water that is free from disease-producing organisms, poisonous substances, and chemical or biological agents and radioactive contaminants which make it unfit for human consumption and many other uses. Potable water may or may not be palatable.

pressure
(1) The total load or force acting upon a surface. (2) In hydraulics the term when used without qualifications usually means pressure per unit area (pounds per square inch, or kilograms per square centimeter) above local atmospheric pressure.

priming
Displacement of air on the suction site of a centrifugal pump between the source of the supply and the point intake in the pump. Pump can be primed by filling the pump casing with product to be pumped.

product water
This water is the product from the water treatment process and is ready to be consumed (also called FINISHED WATER).

rate of flow
The volume of water per unit of time which is passing a certain observation point at a particular instant. Common expressions are cubic feet per second (cfs), gallons per minute (GPM), gallons per day (GPD), million gallons per day (MGD).

raw water
Untreated water; usually the water entering the first treatment unit of a water purification unit. Water used as a source of water supply taken from a natural or impounded body of water, such as a stream, lake, pond, or groundwater aquifer.

recovery rate
The rate of flow of water into a well through the pores of the surrounding ground. Recovery is expressed as a percent of the well's total water.

reverse osmosis (RO)
The application of pressure to a concentrated solution which causes the passage of a liquid from the concentrated solution to a weaker solution across a semipermeable membrane. The membrane allows the passage of the solvent (water) but not the dissolved solids (solutes). The liquid produced is a demineralized water.

RO Element
Sheets of semipermeable membranes in a spirally-wound tube. The membrane allows product water to pass through while rejecting impurities.

saltwater
Water rendered unfit for drinking because of salty or unpleasant tastes caused by the presence of excessive amounts of dissolved chemicals, chlorides, sulfates, and alkalis. Salt or sea waters are highly mineralized and have a TDS concentration greater than 15,000 ppm.

sodium hex
A dispersant chemical used to pretreat the influent stream to the RO block.

solution
A gas, liquid, or solid dispersed homogeneously in a gas, liquid, or solid.

solution feeder
A feeder for dispensing a chemical or other material in the liquid or dissolved state to water at a rate controlled manually or automatically by the quantity of flow. The constant rate is usually volumetric.

specific capacity
The rate at which water may be drawn from a formation through a well, to cause a drawdown of a stipulated depth. The usual units of measurement are gallons per minute per foot and liters per minute per meter.

specific gravity
Ratio of the weight of a unit volume of a substance to an equal volume or water under standard conditions.

spring
A surface feature where water issues from a rock or soil onto the land or into a body of water, the place of issuance being relatively restricted in size. Springs are classified in accordance with many criteria, including character of water, geologic formation, geographical location, and so forth.

sulfates
A salt or ester of sulfuric acid. Sulfate appears in natural waters in a wide range of concentrations. Mine, well, and industrial effluents frequently contain large amounts of sulfate from pyrite oxidation and the use of sulfuric acid.

suspended solids
All visible material in water which at the time of sampling is not dissolved, and which can be removed by filtration.

temperature
(1) The thermal state of a substance with respect to its ability to communicate heat to its environment. (2) The measure of the thermal state on the arbitrarily chosen numerical scale, usually Centigrade or Fahrenheit.

total dissolved solids
All of the dissolved solids in a water. TDS is measured on a sample of water that has passed through a very fine mesh filter to remove suspended solids. The water passing through the filter is evaporated, and the residue represents the dissolved solids.

treated Water
Water that has undergone processing such as sedimentation, filtration, softening, or disinfection and is ready for consumption. Included is purchased potable water which is retreated (chlorinated, fluoridated, and so forth). Does not imply potability until inspected by PVNTMED personnel and approved by the command surgeon.

turbidity
(1) A condition in water caused by the presence of suspended matter, resulting in the scattering and absorption of light rays. (2) A measure of fine suspended matter in liquids. (3) An analytical quantity usually reported in arbitrary turbidity units determined by measurements of light diffraction.

turbidity units (TU)
Turbidity units are a measure of the cloudiness of water. If measured by a nephelometric (deflected light) instrumental procedure, turbidity units are expressed in nephelometric turbidity units (NTU) or simply TU. Those turbidity units obtained by visual methods are expressed in Jackson turbidity units (JTU), which are a measure of the cloudiness of water. They are used to indicate the clarity of water. There is no real connection between NTUs and JTUs. The Jackson Turbidimeter is a visual method, and the nephelometer is an instrumental method based on deflected light.

water
A chemical compound consisting of two parts of hydrogen and one part of oxygen and usually having other solid, gaseous, or liquid materials in solution or suspension.

water quality
The chemical, physical, and biological characteristics of water with respect to its suitability for a particular purpose. The same water may be of good quality for one purpose or use, and bad for another, depending on its characteristics and the requirements for the particular use.

water table
The upper surface of a zone of saturation (in ground- water) where the aquifer is not confined by an overlying impermeable formation.

well
An artificial excavation that derives water from the interstices of the rocks or soil which it penetrates.

well, artesian
A well tapping a confined or artesian aquifer in which the static water level stands above the bottom of the confining bed and the top of the aquifer. The term is used to include all wells tapping such basins or aquifers. Those in which the head is insufficient to raise the water to or above the land surface are called subartesian wells.

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REFERENCES

Required Publications

Required publications are sources that users must read in order to understand or to comply with this publication.

Army Regulations

AR 200-1	Environmental Protection and Enhancement 21 February 1997

Department of Army Forms

DA Forms are available on the Army Electronic Library (AEL) CD-ROM (EM 0001) and the APD Web site at *www.apd.army.mil*.

DA FORM 1712-R	Water Reconnaissance Report
DA FORM 1713-R	Daily Water Production Log - ROWPU
DA FORM 1714-R	Daily Water Issue Log
DA FORM 1714-1-R	Daily Water Distribution Log
DA FORM 2028	Recommended Changes to Publications and Blank Forms
DA FORM 2404	Equipment Inspection and Maintenance Worksheet
DA FORM 5164-R	Hands-On Evaluation
DA FORM 5165-R	Field Expedient Squad Book
DA FORM 5456-R	Water Point Inspection
DA FORM 5987-E	Motor Equipment Dispatch
DA FORM 5988-E	Equipment Inspection Maintenance Worksheet
DA FORM 7382-R	Sling Load Inspection Record

Department of Army Pamphlets

DA PAM 200-1	Handbook for Environmental Impact Analysis (GPO SN: 0820-00551-7) 17 January 2002

Department of Defense Form

DD Forms are available from the OSD Web site at w*ww.dior.whs.mil/ICDHOME/DDEFORMS.HTM*.

DD FORM 1970	Motor Equipment Utilization Record

Field Manuals

FM 3-100.4	Environmental Considerations in Military Operations [MCRP 4-11B] 15 June 2000
FM 3-100.12	Risk Management for Multiservices Tactics, Techniques, and Procedures 15 February 2001
FM 7-0	Training The Force 22 October 2002
FM 7-1	Battle Focused Training 15 September 2003
FM 10-52	Water Supply in Theaters of Operations 11 July 1990
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AR 200-2	Environmental Effects of Army Actions 23 December 1988

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DA PAM 350-59	Army Correspondence Course Program Catalog 1 October 2002

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Training Aids

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20 November 2005

By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

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