OPERATION AND MAINTENANCE OF THE MULTI-PURPOSE DECONTAMINATION SYSTEM (MPDS)

NEW EQUIPMENT TRAINING (NET) COURSE

INSTRUCTOR GUIDE

November 15, 2004

This training guide was developed by Radian Inc., Alexandria, VA for MARCOR, Quantico, Virginia. It is designed to support New Equipment Training (NET) of the MPDS. It is not designed to replace or supplement official DoD technical publications. Excerpts from Military and Commercial Technical Manuals are for instructional purposes only.

OPERATION AND MAINTENANCE OF THE MULTI PURPOSE DECONTAMINATION SYSTEM

NEW EQUIPMENT TRAINING COURSE

INSTRUCTOR GUIDE
(Lessons A001-A008)

This training guide was developed by Radian Inc, Petersburg, Virginia for the Marine Corps System Command, Program Manager for Nuclear Biological Chemical (MARCOSYSCOM PM NBC) Defense System Program Office, Quantico, Virginia. It is designed to support students attending New Equipment Training (NET) of the Multi Purpose Decontamination System (MPDS). It is not designed to replace or supplement official Department of Defense doctrinal or technical publications. Excerpts from Department of Defense doctrinal or technical publications are for instructional purposes only.

TABLE OF CONTENTS

SECTION I
INTRODUCTION

1. This Instructor New Equipment Training guide is provided to each qualified Instructor. This guide is intended to provide personnel with an insight into the knowledge of the equipment and technical information required to operate the Mutli Purpose Decontamination System (MPDS) and Accessories during Nuclear, Biological, and Chemical (NBC) Agent Decontamination Operations.

2. Purpose. This guide provides you with the course outline showing the sequence of instruction that includes equipment specific information, capabilities, and a course evaluation form.

3. Training Schedule. The Government Contractor presenting this training will furnish you with a copy of the training schedule for this course. The training schedule is subject to change based upon the skills that the student may already have acquired using similar equipment and doctrinal instruction.

SECTION II

TRAINING SUPPORT PACKAGE

PREFACE

Purpose

This Training Support Package provides the instructor with a standardized lesson plan to instruct New Equipment Training to MOS specific military personnel on the Multi Purpose Decontamination System (MPDS) and accessories. This training will be conducted by Radian, Inc. at Military Installation as directed by the Program Manager; Nuclear, Biological, and Chemical Decontamination Systems; PMM-163, Quantico, Virginia

All Courses Including This Lesson

Course Number	Course Title
MPDS NET-1	New Equipment Training for the Karcher Multi Purpose Decontamination System (MPDS) and accessories.

Task(s) Supported

031-503-3014	Support Decontamination Procedures
031-503-1015	Protect yourself from chemical biological contamination
031-503-1035	Protect yourself from chemical/biological contamination using assigned protective mask
031-503-1036	Maintain protect mask
031-503-7000	Integrate NBC Concepts
031-503-2001	Identify chemical agents using M256 kit

Reinforced Task(s)

Task Number	Task Title
031-503-1037	Detect chemical agents using M8/M9 paper
031-503-1013	Decontamination yourself/individual equipment using chemical decon kit
031-503-7000	Integrate NBC Concepts
031-503-1015	Protect yourself from chemical biological contamination

Academic Hours

The academic hours required to teach this TSP are as follows:

	Resident Hours/Methods
	6.0/ Conference / Discussion/Demonstration
	2.0/ PE
Test	.0
End of Course Survey	.2
Total Hours:	8.0

Prerequisite Lesson(s)

Lesson Number	Lesson Title
	None

Clearance Access

Security Level: Unclassified

Requirements: There are no clearance or access requirements for the lesson.

Terminal Learning

NOTE: Inform the students of the following Terminal Learning Objective requirements.

Objective

At the completion of this lesson, you [the student] will:

Action:	Identify Decontamination Tactics, Techniques and Procedures, perform PMCS, Set-up and Operate, Disassemble and place into storage, and apply limited Troubleshooting of the MPDS and its Accessories.
Conditions:	In a classroom, given student handouts.
Standards:	Correctly identify decontamination tactics, techniques and procedures, perform PMCS, set-up and operate, disassemble and place into storage, and apply limited troubleshooting techniques the MPDS and its accessories in accordance to standard operating procedures (SOP).

Safety Requirements

Report all unsafe conditions to your instructor for corrective action. Students must follow all safety requirements provided in this instruction when performing decontamination operations during the PE and use all required safety equipment and clothing. Remember safety is everyone's concern and responsibility. Think Safety at all times.

Risk Assessment Level

Low

Environmental Considerations

AR 200-1 delineates the responsibilities to integrate environmental requirements and ensure all training procedures, materials, and doctrine, including sound environmental practices and considerations are followed. Even though only water will be used as a training media to simulate decontamination procedures, instructors will ensure that all fluids used in training are disposed of IAW local disposal regulations. This Training Support Package meets this standard.

Evaluation

You will complete a PE at the end of the lesson and demonstrate knowledge by setting up and operating the MPDS.

Instructional Lead-In

As a chemical operations specialist, it is your responsibility to ensure that decontamination tactics, techniques and procedures, maintenance and operation of the MPDS are performed correctly. The success of the organization's mission depends on having a system that can provide decontamination support for both personnel and equipment. This lesson will provides the information that you will need to perform these tasks.

References

Number	Title	Date	Additional Information
	Karcher MPDS Manual	April 2004	
AR 385-10	Safety	29 February 2000	
AR 200-1	Environmental Protection and Enhancement	21 March 1997	AR 200-1
AR 200-2	Environmental Effects of Army Action	23 December 1988	AR 200-2
FM 3-5	NBC Decontamination	28 July 2000	

Student Study Assignments

None

Instructor Requirements

(1) Instructor: must be able to correctly assemble, disassemble, perform limited operator level repairs, and cold weather storage procedures on the MPDS and its accessories.

(2) Assistant Instructor (if utilized) for the practical exercise: must be able to correctly assemble, disassemble, perform limited operator level repairs, and cold weather storage procedures on the MPDS and its accessories.

Additional Support Personnel Requirements

Material Handling Equipment (forklift) may be required depending upon the location and terrain were the Practical Exercises are to be conducted.

Equipment Required

Name	Qty	Expendable
One Computer with Projection System or Overhead projector	1	No
Petroleum Spill Kit	1	Yes
Material Handling Equipment (forklift) if required	1	No

Materials Required

INSTRUCTOR MATERIALS:

Lesson Plan

MPDS Student Handout

STUDENT MATERIALS: Pen or Pencil and note paper

Classroom, Training Area, and Range Requirements

CLASSROOM

A suitable training area is required with a clean water source available.

Ammunition Requirements

Name	Student Qty	Misc Qty
None	N/A	N/A

Instructional Guidance

NOTE: Before presenting this lesson, instructors must thoroughly prepare by studying this lesson, having all equipment ready and fully operational that will be used for the practical exercise (fuel spill clean-up operations), and ensure that all reference material and handouts are on hand in the quantities required for the class.

Proponent Lesson Plan Approvals

Name	Rank	Position	Date
Mr. Victor Murphy	N/A	PM	15 November, 20

PM NBCD Systems (PMM-163)
Project Officer, JSFDS
(703) 432-3193
Quantico, Virginia 22134

SECTION III
MPDS_001-NET
STUDENT PROGRESS CONTROL RECORD

NAME/RANK:_____

UNIT:_____

TRAINING LOCATION:_____

POI FILE NUMBER	PE MASTERED	DATE	REMARKS

Instructions: Make all entries in ink.

1. Students: Fill out name/rank, unit, and training location.

2. Instructors: Enter the task number and the date of PE completion, indicate remarks as appropriate.

Note: Reproduce copies of this form as required.

SECTION IV
MPDS_001-NET
STUDENT QUESTIONNAIRE/ END OF COURSE CRITIQUE

DATE_____NAME/RANK_____

MOS_____UNIT_____

We would appreciate your comments about the course you have just completed. We will consider your comments thoroughly as we review/revise the lessons. Your comments are important.

1. Overall, how well did you like the course?

_ 5 - Extremely Well
_ 4 - Very Well
_ 3 - Fairly Well
_ 2 - Not Too Well
_ 1 - Not at All

2. How well did the course prepare you for job tasks taught in the course?

_ 5 - Extremely Well
_ 4 - Very Well
_ 3 - Fairly Well
_ 2 - Not Too Well
_ 1 - Not at All

3. I found the course...

_ 5 - Very Interesting
_ 4 - Somewhat Interesting
_ 3 - Fairly Interesting
_ 2 - Not Very Interesting
_ 1 - Boring

4. How well is the course divided into "bite sized" segments of instruction?

_ 5 - Extremely Well
_ 4 - Very Well

_ 3 - Fairly Well
_ 2 - Not Too Well
_ 1 - Not at All

5. Which lessons were particularly useful?

6. Which lessons posed problems? Please explain.

7. What features of the course did you like best?

8. What features of the course did you like the least?

9. What types of instructor assistance were most helpful?

10. Did the training meet your needs? If not, please indicate where it fell short.

11. How beneficial is the course to you personally?

_ 5 - Extremely Beneficial
_ 4 - Very Beneficial
_ 3 - Fairly Beneficial
_ 2 - Not Beneficial
_ 1 - Waste of Time

12. Do you have any suggestions about any of the course content or methods of instruction to make this training more useful?

_ Yes
_ No

TAB A

Multi Purpose Decontamination System (MPDS)

COURSE INTRODUCTION

SLIDE NET-1 (on)

The purpose of this block of instructions is to familiarize DOD personnel with the operation and maintenance of the Multi-Purpose Decontamination System (MPDS)

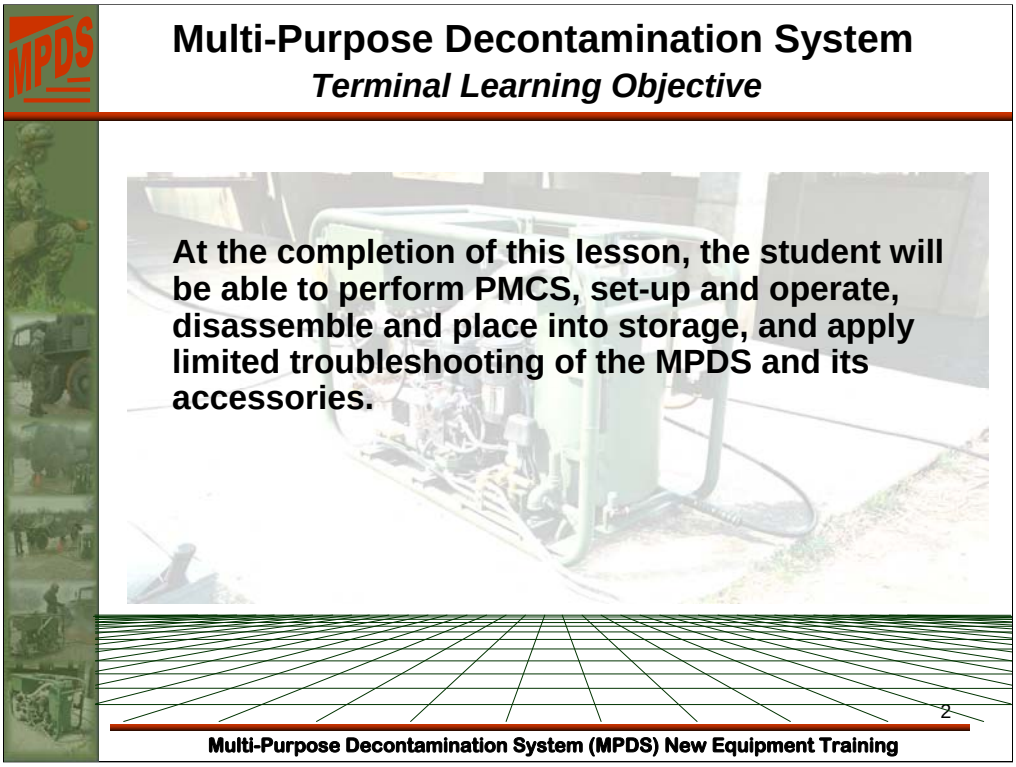
It addresses the use of tactics, techniques, and procedures (TTP) to support the decontamination process as well as safety consideration that must be observed when operating the MPDS.

NOTE:

DOD personnel must also be aware of decontamination planning and operational considerations in order to properly employ and operate the MPDS effectively.

Motivator

Introduce the procedures for the Multi-Purpose Decontamination lesson. The MPDS is a critical item to units operating on the battlefield. The MPDS is designed to decontaminate personnel and equipment in a NBC environment. As a chemical specialist, it is very important that you know how to maintain and operate this system property. Recent deployments have shown that soldiers on the battlefield need to know how to perform decontamination procedures. This lesson will provide you the knowledge required to perform all necessary decontamination operations safety utilizing the MPDS and its accessories.



SLIDE NET-1 (off)

SLIDE NET-2 (on)

INSTRUCTOR NOTE: Review the lesson objective with the students.

Terminal Learning Objective

Identify Decontamination Tactics, Techniques and Procedures, perform PMCS, Set-up and Operate, Disassemble and place into storage, and apply limited Troubleshooting of the MPDS and its Accessories.

Safety Requirements

Report all unsafe conditions to your instructor for corrective action. Students must follow all safety requirements provided in this instruction when performing decontamination operations during the PE and use all required safety equipment and clothing. Remember safety is everyone's concern and responsibility. Think Safety at all times.

TAB B

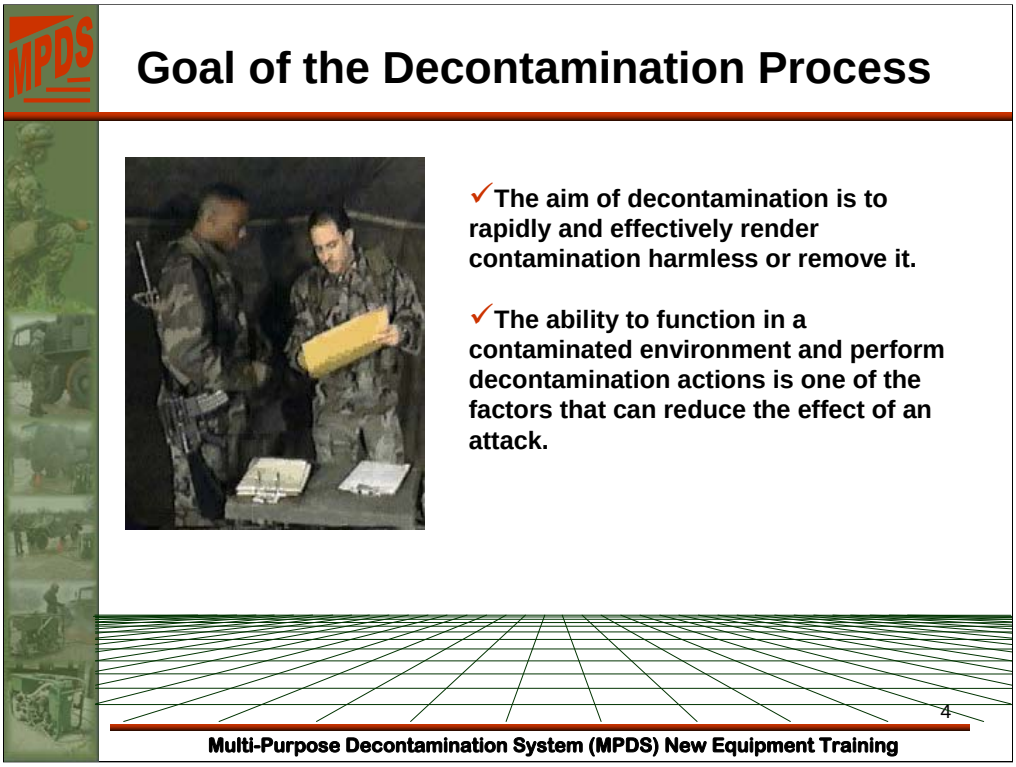
Multi Purpose Decontamination System (MPDS)

PFN NO: A-001
Basic Tactics, Techniques and Procedures

SLIDE NET-2 (off)

SLIDE NET-3 (on)

a. Explain to the students that before deploying on any type of mission that it is very important that they filly understand the decontamination tactics, techniques and procedures required for any successful operation. Tactics are employment of units for maximizing there full potential. Techniques are the methods in which the equipment is used. Procedures are standard detailed course of action that describes how to accomplish the task.



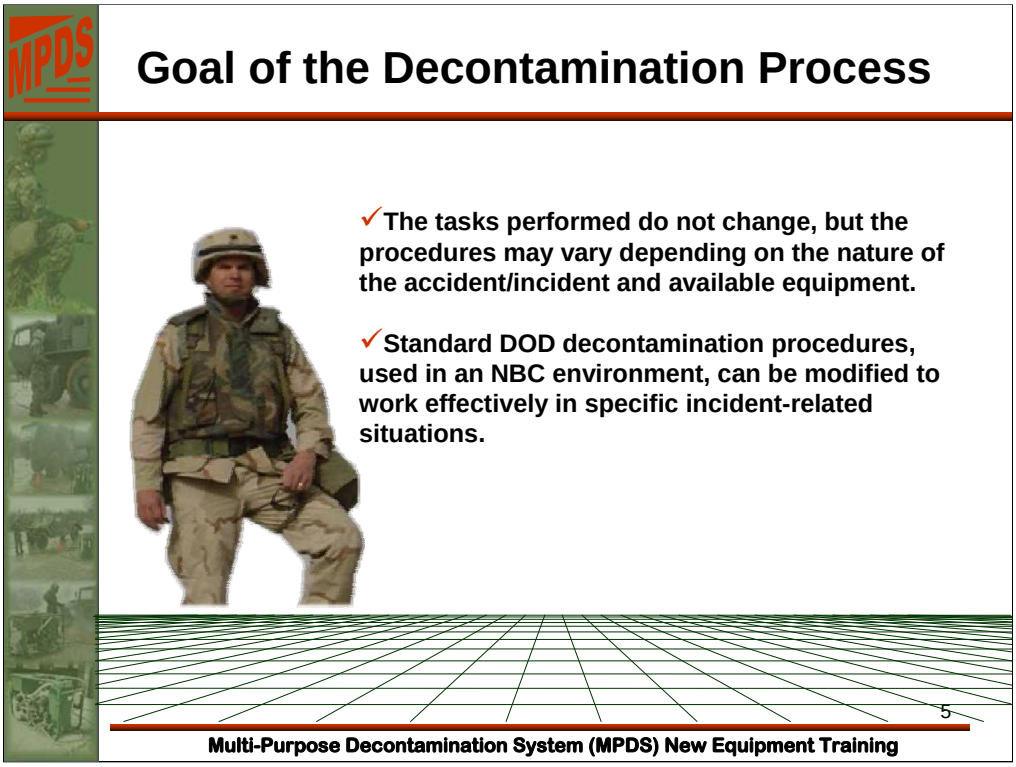
SLIDE NET-3 (off)

SLIDE NET-4 (on)

The aim of decontamination is to rapidly and effectively render contamination harmless or remove it.

The ability to function in a contaminated environment and perform decontamination actions is one of the factors that can reduce the effect of an attack.

The goal of decontamination remains the same whether it is performed in wartime or in a peacetime response operation—to limit the spread of the contamination and reduce levels to the greatest extent possible.



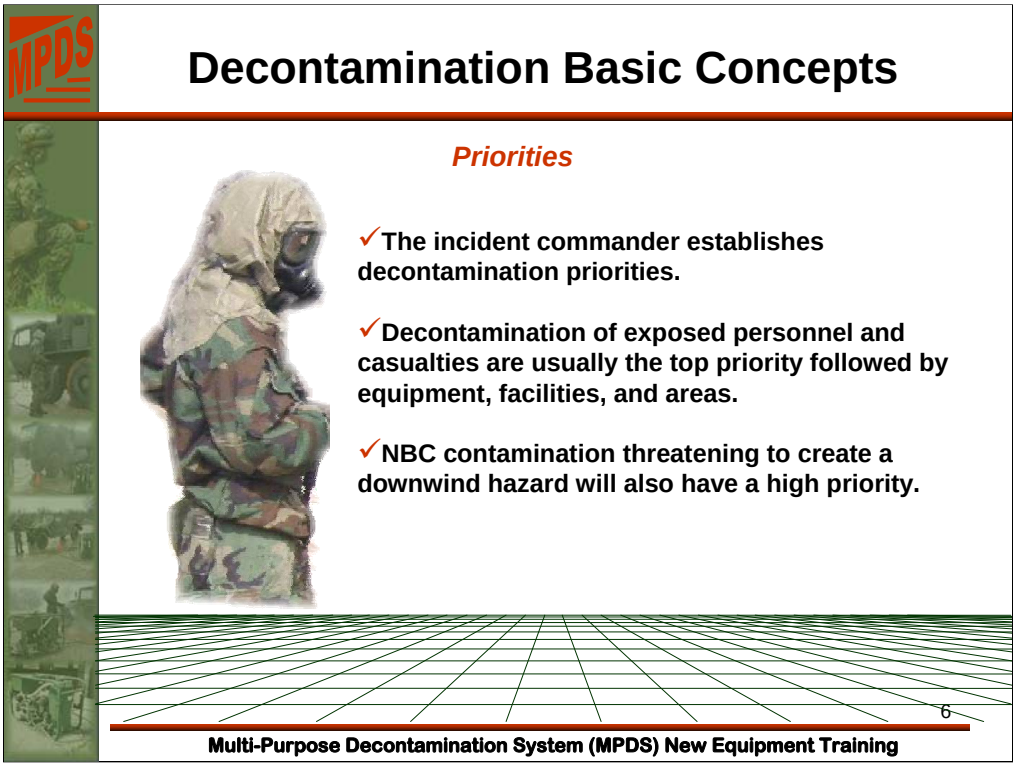
SLIDE NET-4 (off)

SLIDE NET-5 (on)

The tasks performed do not change, but the procedures may vary depending on the nature of the accident/incident and available equipment.

Standard DOD decontamination procedures, used in an NBC environment, can be modified to work effectively in specific incident-related situations.

When tasked to support a decontamination mission, reduction and containment should always be the primary focus of the operation.



SLIDE NET-5 (off)

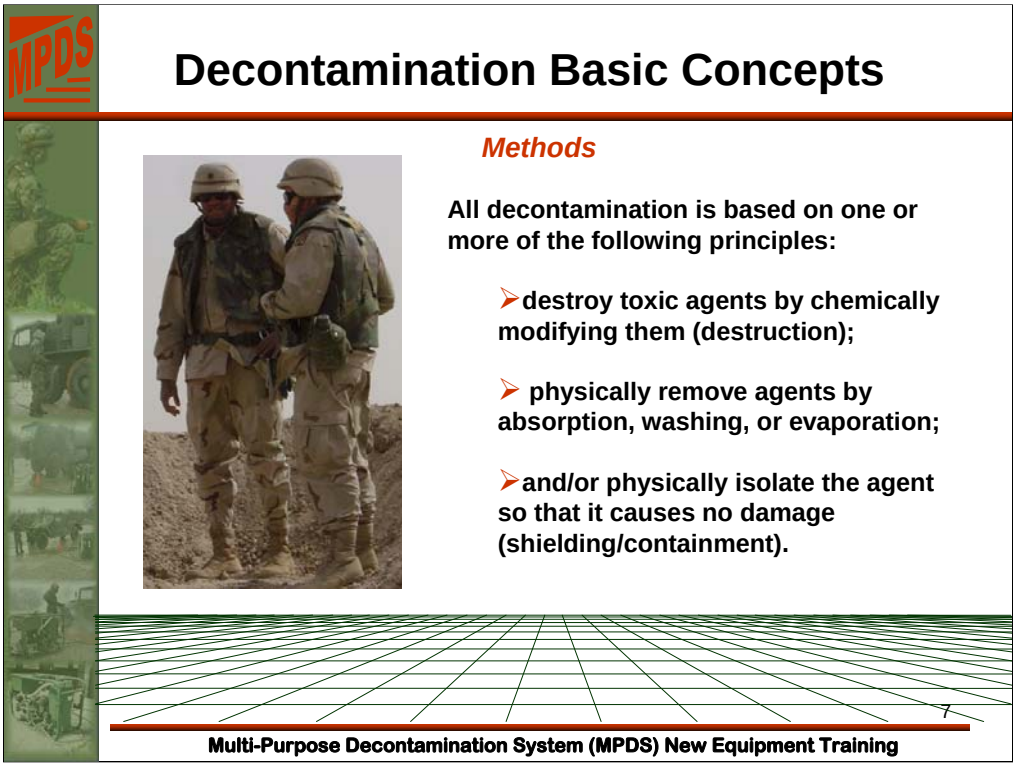
SLIDE NET-6 (on)

b. Priorities.

The incident commander establishes decontamination priorities.

Decontamination of exposed personnel and casualties are usually the top priority followed by equipment, facilities, and areas.

(9) NBC contamination threatening to create a downwind hazard will also have a high priority, and contamination-reduction and containment actions must begin as soon as possible.



SLIDE NET-6 (off)

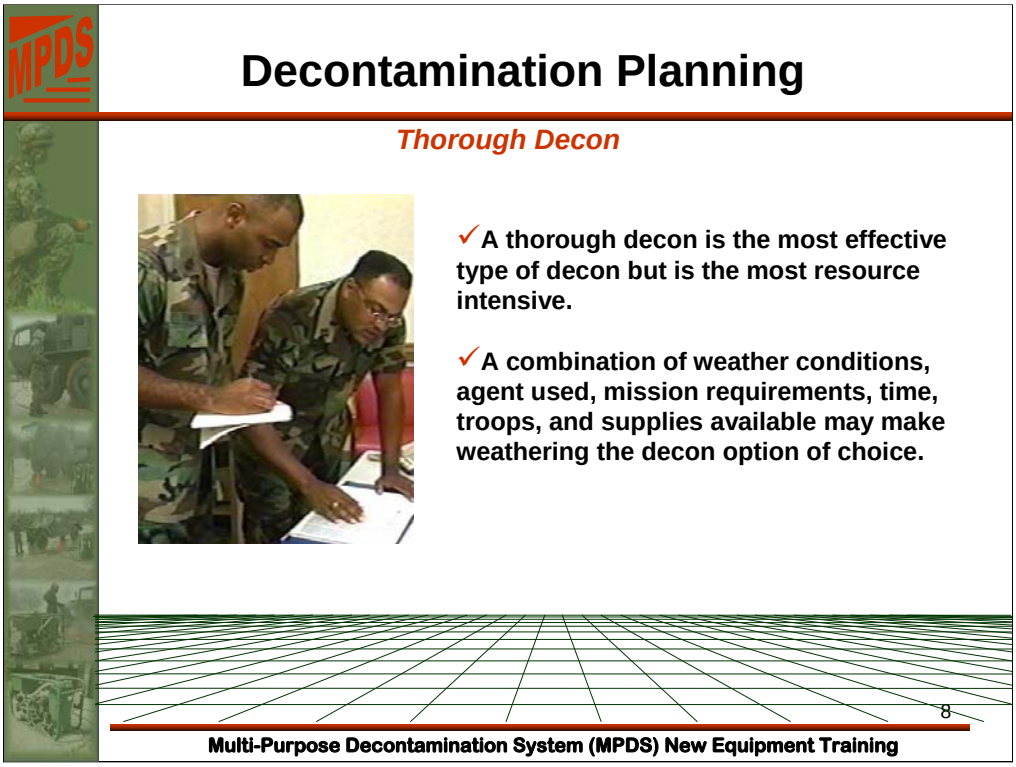
SLIDE NET-7 (on)

c. Methods. All decontamination is based on one or more of the following principles:

Destroy toxic agents by chemically modifying them (destruction);

Physically remove agents by absorption, washing, or evaporation;

And/or physically isolate the agent so that it causes no damage (shielding/containment).



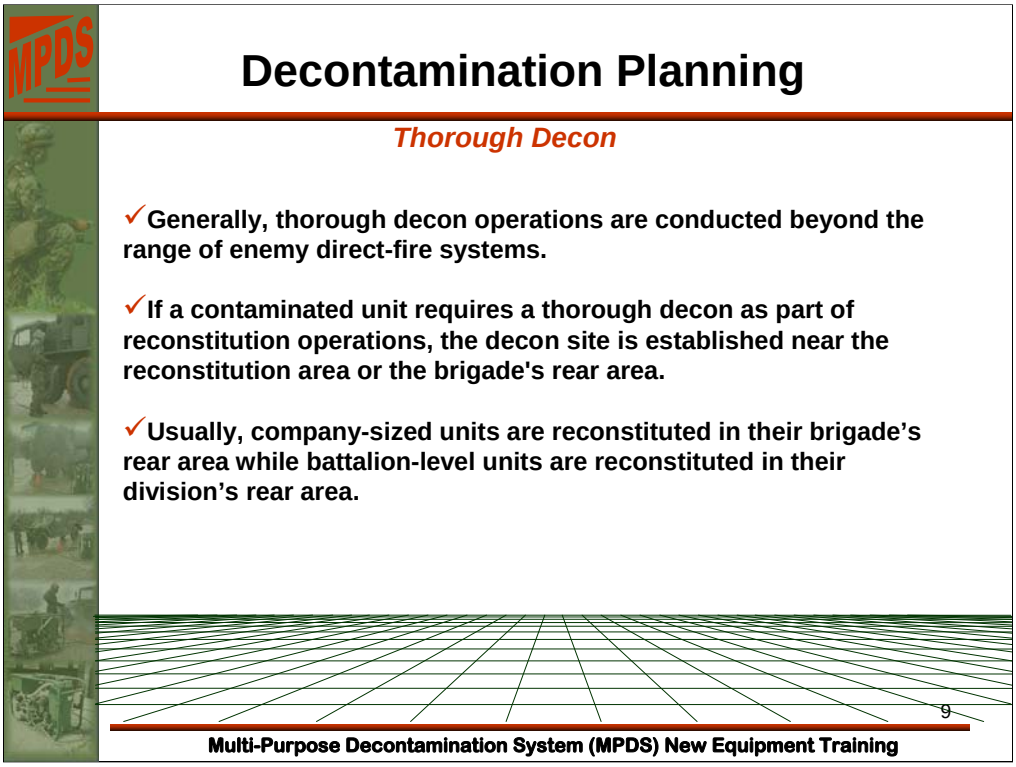
SLIDE NET-7 (off)

SLIDE NET-8 (on)

d. Thorough Decon. A thorough decon is the most effective type of decon but is the most resource intensive.

A combination of weather conditions, agent used, mission requirements, time, troops, and supplies available may make weathering the decon option of choice.

Commanders decide which type of decon is required based on the recommendation of the chemical personnel.



SLIDE NET-8 (off)

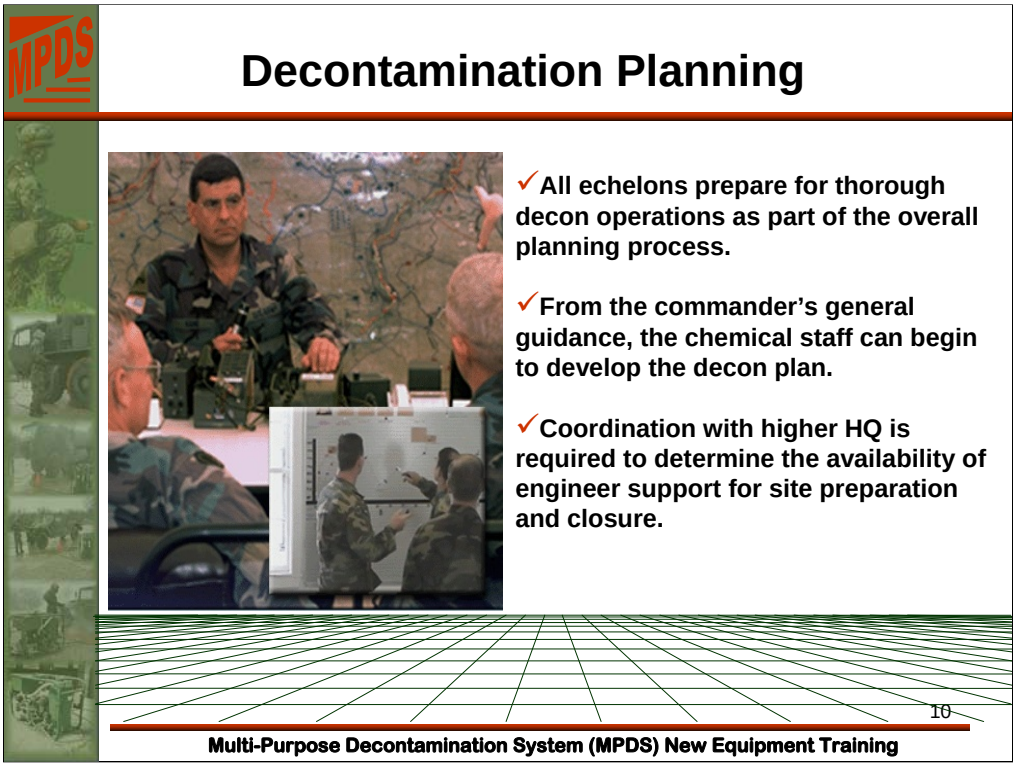
SLIDE NET-9 (on)

e. Thorough Decon. Generally, thorough-decon operations are conducted beyond the range of enemy direct-fire systems.

If a contaminated unit requires a thorough decon as part of reconstitution operations, the decon site is established near the reconstitution area or the brigade's rear area.

Usually, company-sized units are reconstituted in their brigade's rear area while battalion-level units are reconstituted in their division's rear area.

Organizations larger than a battalion will be reconstituted in the corps's rear area. Further information about reconstitution can be found in FMs 100-5 and 100-9.



SLIDE NET-9 (off)

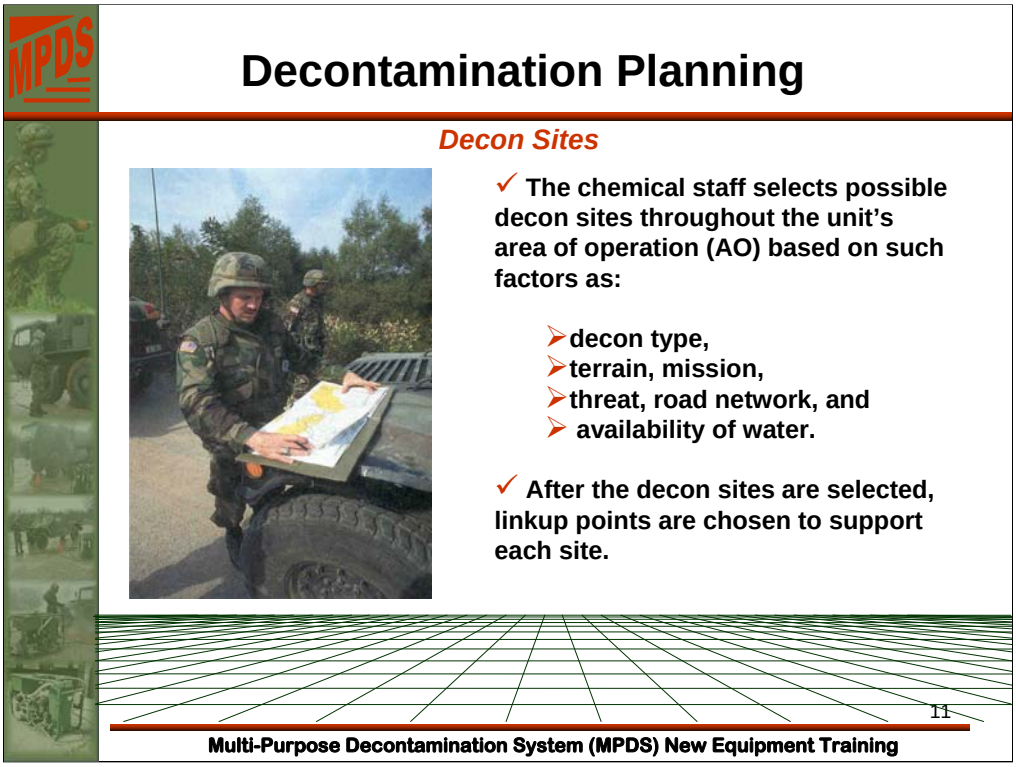
SLIDE NET-10 (on)

f. All echelons prepare for thorough-decon operations as part of the overall planning process.

From the commander's general guidance, the chemical staff can begin to develop the decon plan. Coordination with higher HQ is required to determine the availability of engineer support for site preparation and closure.

Engineers can provide support for sump preparation, drainage ditches, and sumps.

Coordinate with the civil-affairs office for host-nation support (personnel, equipment, and supplies) and for environmental requirements and restrictions.



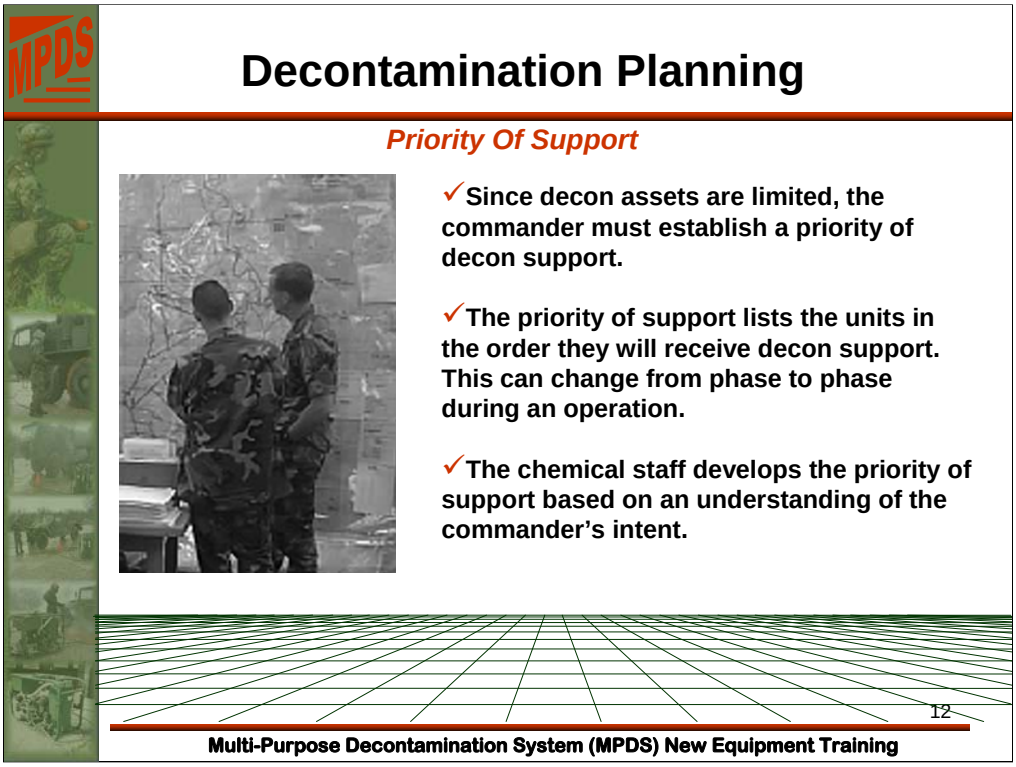
SLIDE NET-10 (off)

SLIDE NET-11 (on)

g. Decon Sites. The chemical staff selects possible decon sites throughout the unit's area of operation (AO) based on such factors as decon type, terrain, mission, threat, road network, and availability of water.

After the decon sites are selected, linkup points are chosen to support each site.

A site may have more than one linkup point.



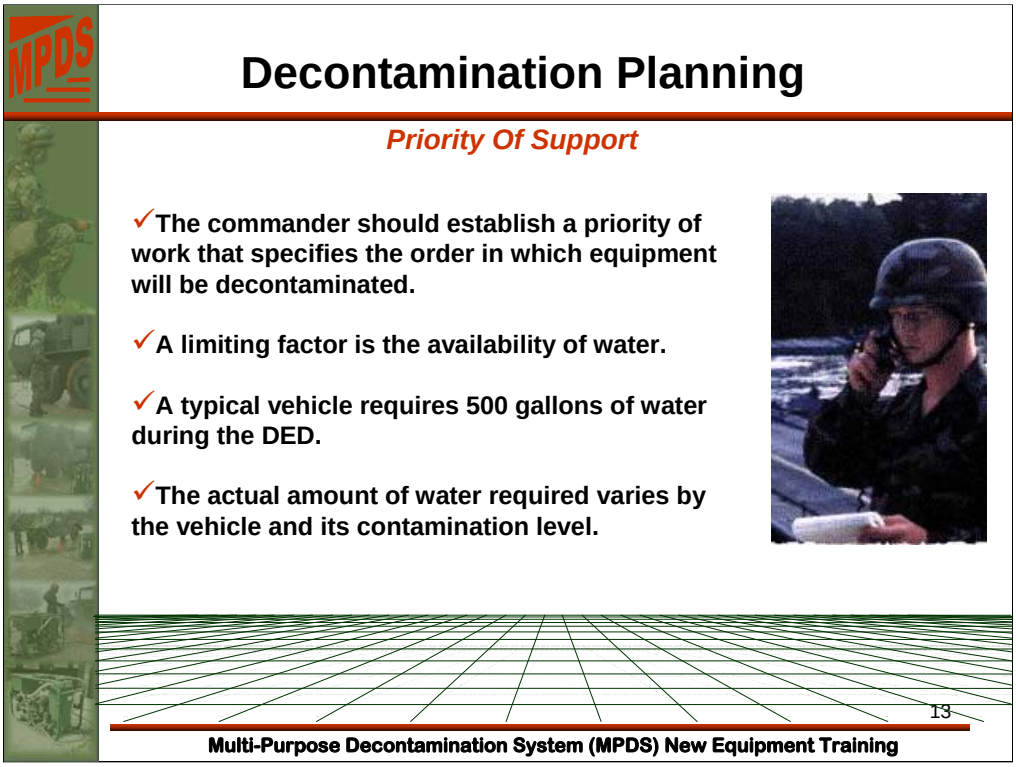
SLIDE NET-11 (off)

SLIDE NET-12 (on)

h. Priority of Support. Since decon assets are limited, the commander must establish a priority of decon support.

The priority of support lists the units in the order they will receive decon support. This can change from phase to phase during an operation.

The chemical staff develops the priority of support based on the understanding of the commander's intent.



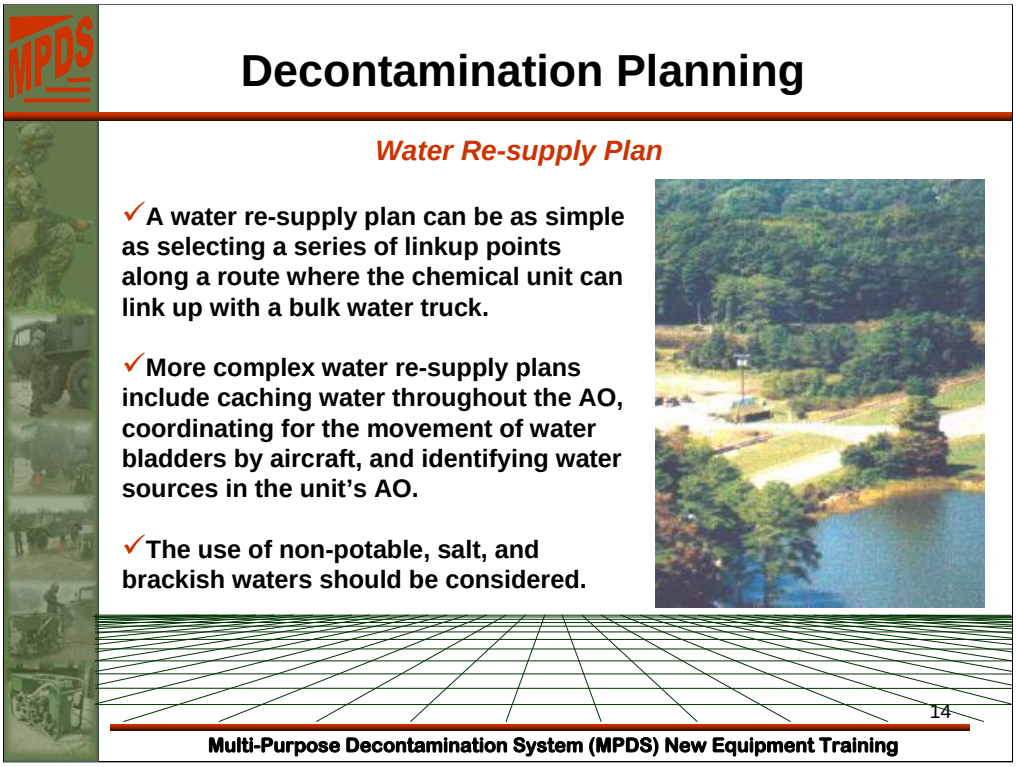
SLIDE NET-12 (off)

SLIDE NET-13 (on)

The commander should establish a priority of work that specifies the order in which equipment will be decontaminated. For example, a priority of work may be in this order: engineer equipment, artillery pieces, main battle tank, and long-haul vehicles.

A limited factor is the availability of water. A typical vehicle requires 500 gallons of water during the DED.

The actual amount of water required varies by the vehicle and its contamination level. The supported unit's chemical staff must develop a water resupply plan for thorough-decon operations



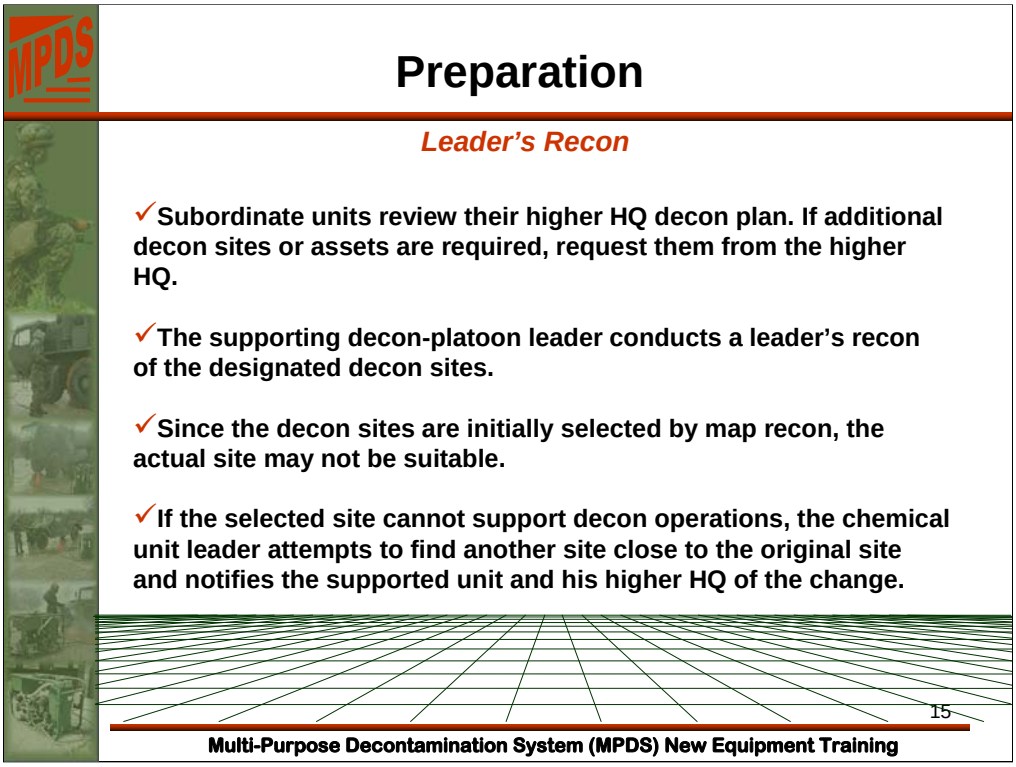
SLIDE NET-13 (off)

SLIDE NET-14 (on)

i. Water Resupply Plan. A water resupply plan can be as simple as selecting a series of linkup points along a route where the chemical unit can link up with a bulk water truck.

More complex water resupply plans include caching water throughout the AO, coordinating for the movement of water bladders by aircraft, and identifying water sources in the unit's AO.

The use of nonpotable, salt, and brackish waters should be considered.



SLIDE NET-14 (off)

SLIDE NET-15 (on)

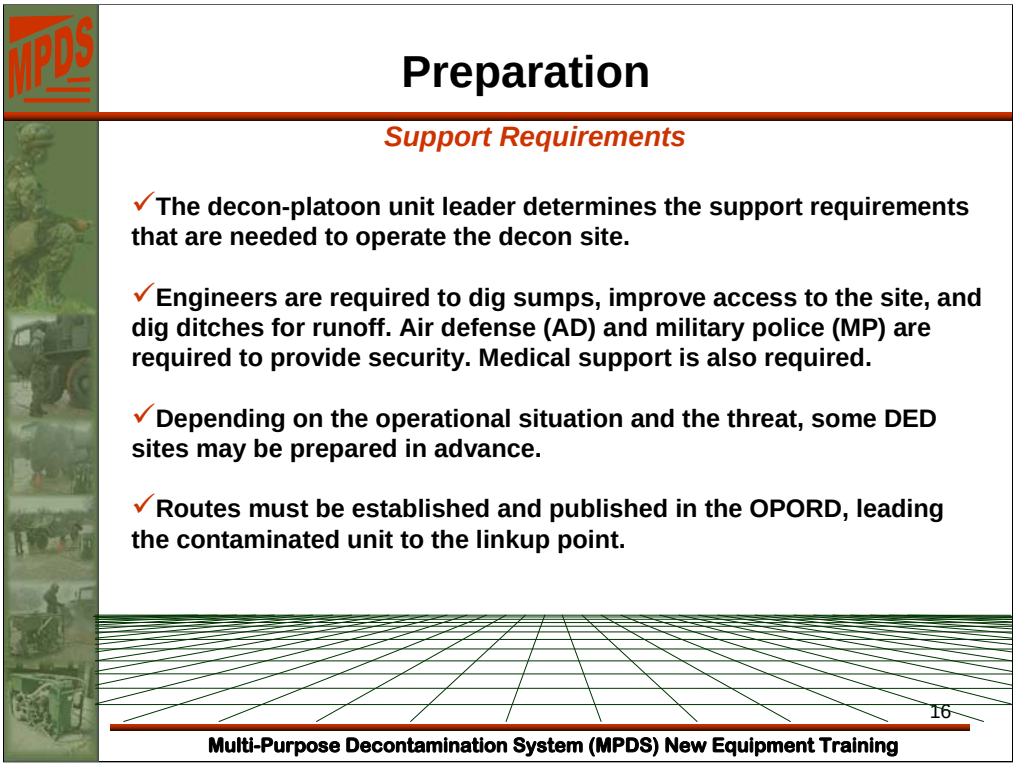
j. Leader's Recon.

Subordinate units review their higher HQ decon plan. If additional decon sites or assets are required, request them from the higher HQ.

The supporting decon-platoon leader conducts a leader's recon of the designated decon sites.

Since the decon sites are initially selected by map recon, the actual site may not be suitable.

If the selected site cannot support decon operations, the chemical unit leader attempts to find another site close to the original site and notifies the supported unit and his higher HQ of the change.



SLIDE NET-15 (off)

SLIDE NET-16 (on)

k. Support Requirements.

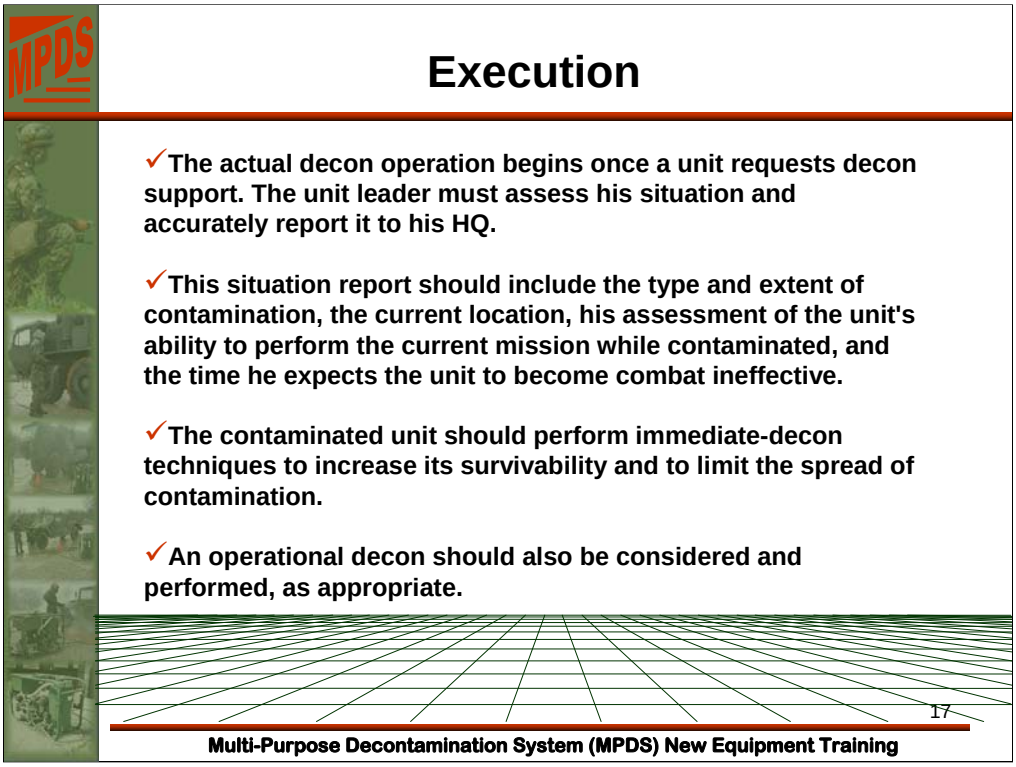
The decon-platoon unit leader determines the support requirements that are needed to operate the decon site.

Engineers are required to dig sumps, improve access to the site, and dig ditches for runoff. Air defense (AD) and military police (MP) are required to provide security. Medical support is also required.

Depending on the operational situation and the threat, some DED sites may be prepared in advance.

Routes must be established and published in the OPORD, leading the contaminated unit to the linkup point.

INSTRUCTOR NOTE: Explain to the students that units must be informed not to proceed directly to the decon site.



SLIDE NET-16 (off)

SLIDE NET-17 (on)

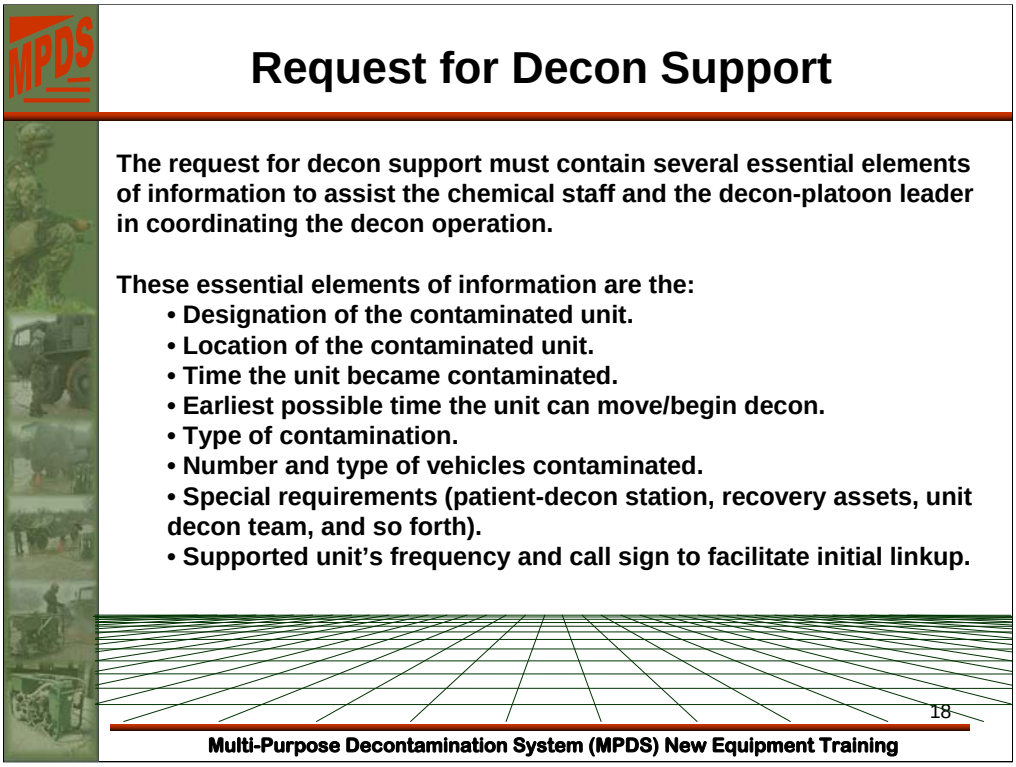
I. Execution.

The actual decon operation begins once a unit requests decon support. The unit leader must assess his situation and accurately report it to his HQ.

This situation report should include the type and extent of contamination, the current location, his assessment of the unit's ability to perform the current mission while contaminated, and the time he expects the unit to become combat ineffective.

The contaminated unit should perform immediate-decon techniques to increase its survivability and to limit the spread of contamination.

An operational decon should also be considered and performed, as appropriate.



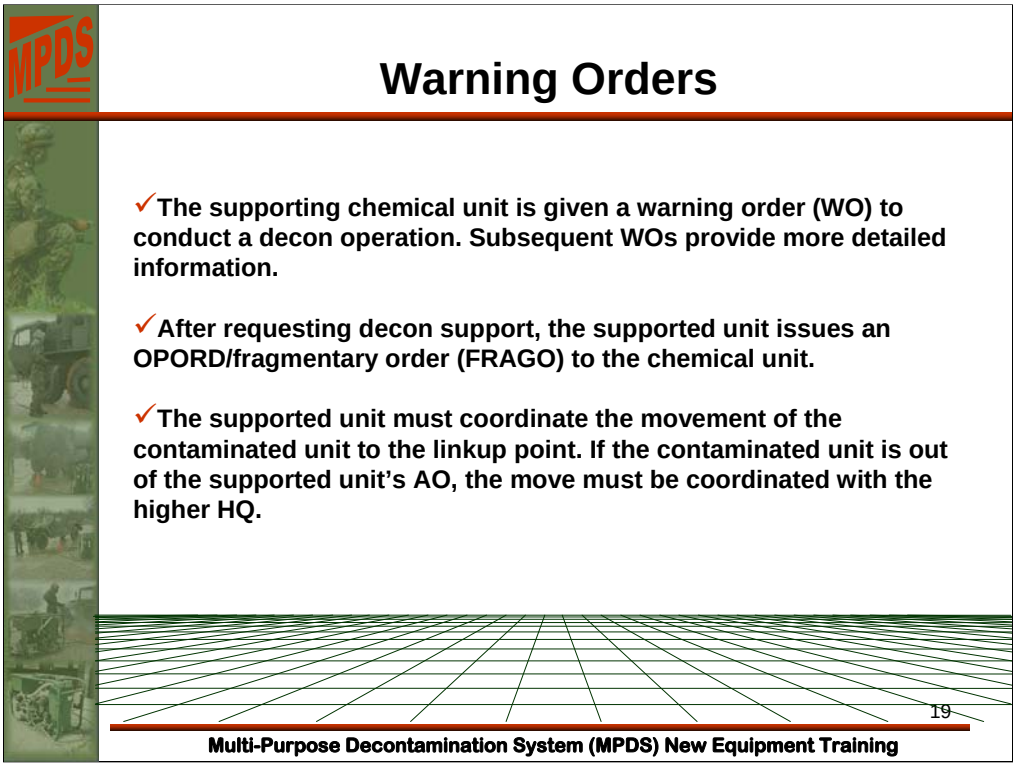
SLIDE NET-17 (off)

SLIDE NET-18 (on)

m. The request for decon support must contain several essential elements of information to assist the chemical staff and the decon-platoon leader in coordinating the decon operation.

These essential elements of information are the:

- Designation of the contaminated unit.
- Location of the contaminated unit.
- Time the unit became contaminated.
- Earliest possible time the unit can move/begin decon.
- Type of contamination.
- Number and type of vehicles contaminated.
- Special requirements (patient-decon station, recovery assets, unit decon team, and so forth).
- Supported unit's frequency and call sign to facilitate initial linkup.



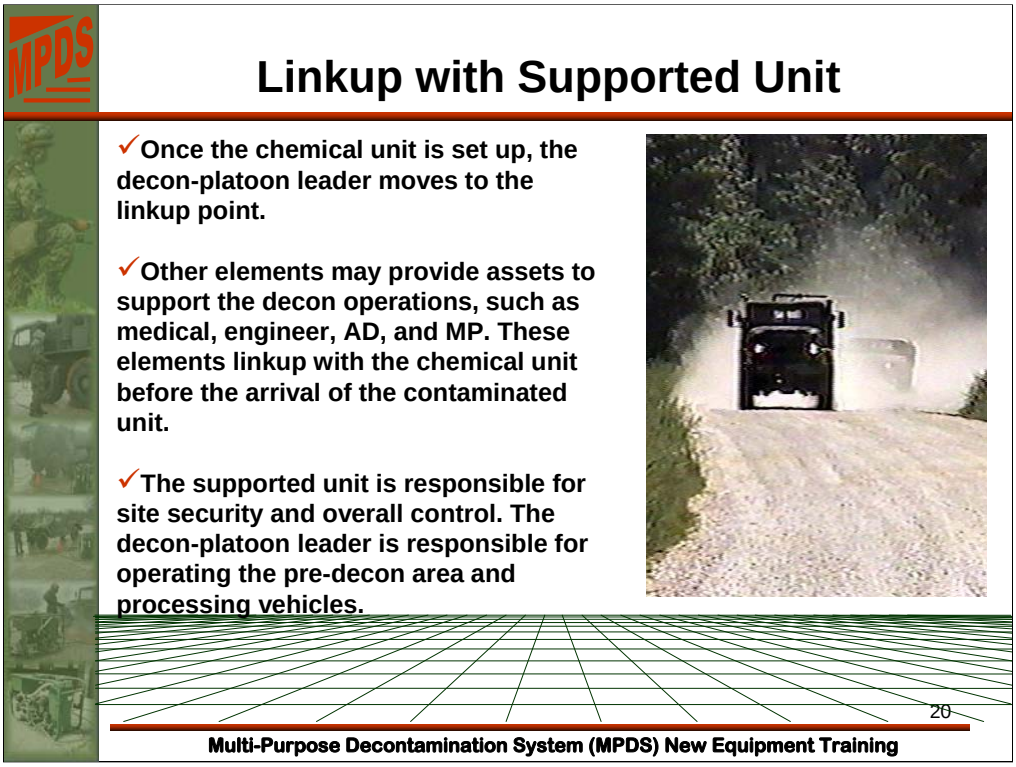
SLIDE NET-18 (off)

SLIDE NET-19 (on)

The supporting chemical unit is given a warning order (WO) to conduct a decon operation. Subsequent WOs provide more detailed information.

After requesting decon support, the supported unit issues an OPORD/fragmentary order (FRAGO) to the chemical unit.

The supported unit must coordinate the movement of the contaminated unit to the linkup point. If the contaminated unit is out of the supported unit's AO, the move must be coordinated with the higher HQ.



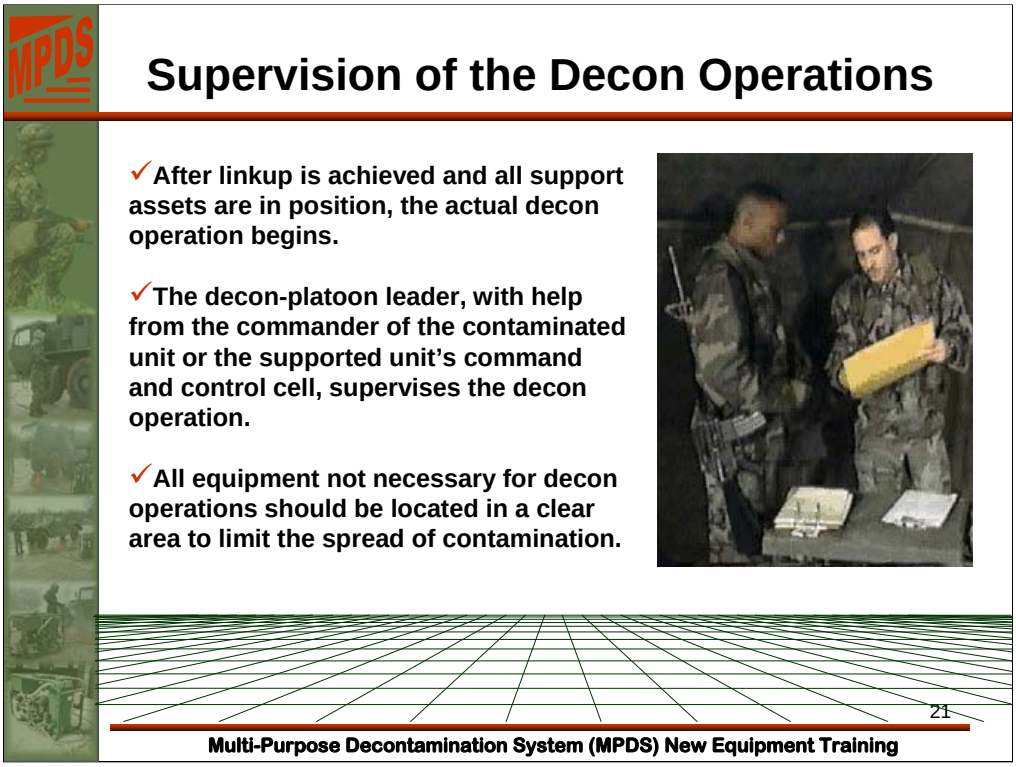
SLIDE NET-19 (off)

SLIDE NET-20 (on)

Once the chemical unit is set up, the decon-platoon leader moves to the linkup point.

Other elements may provide assets to support the decon operations, such as medical, engineer, AD, and MP. These elements linkup with the chemical unit before the arrival of the contaminated unit.

The supported unit is responsible for site security and overall control. The decon-platoon leader is responsible for operating the predecon area and processing vehicles.



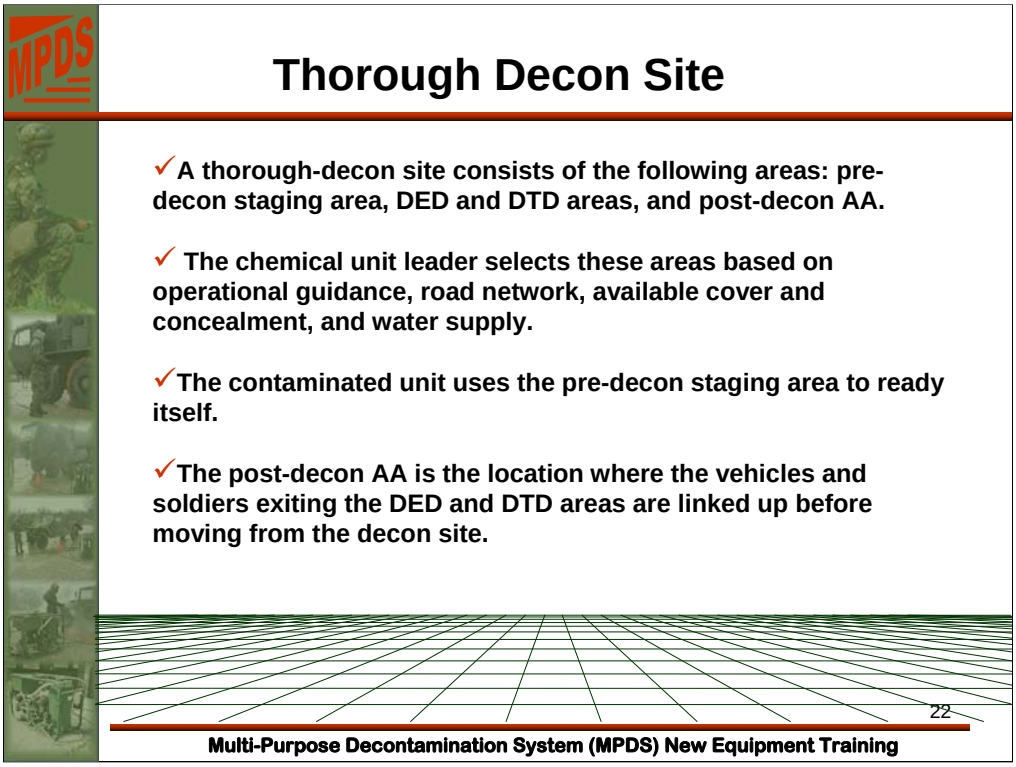
SLIDE NET-20 (off)

SLIDE NET-21 (on)

After linkup is achieved and all support assets are in position, the actual decon operation begins.

The decon-platoon leader, with help from the commander of the contaminated unit or the supported unit's command and control cell, supervises the decon operation.

All equipment not necessary for decon operations should be located in a clear area to limit the spread of contamination.



SLIDE NET-21 (off)

SLIDE NET-22 (on)

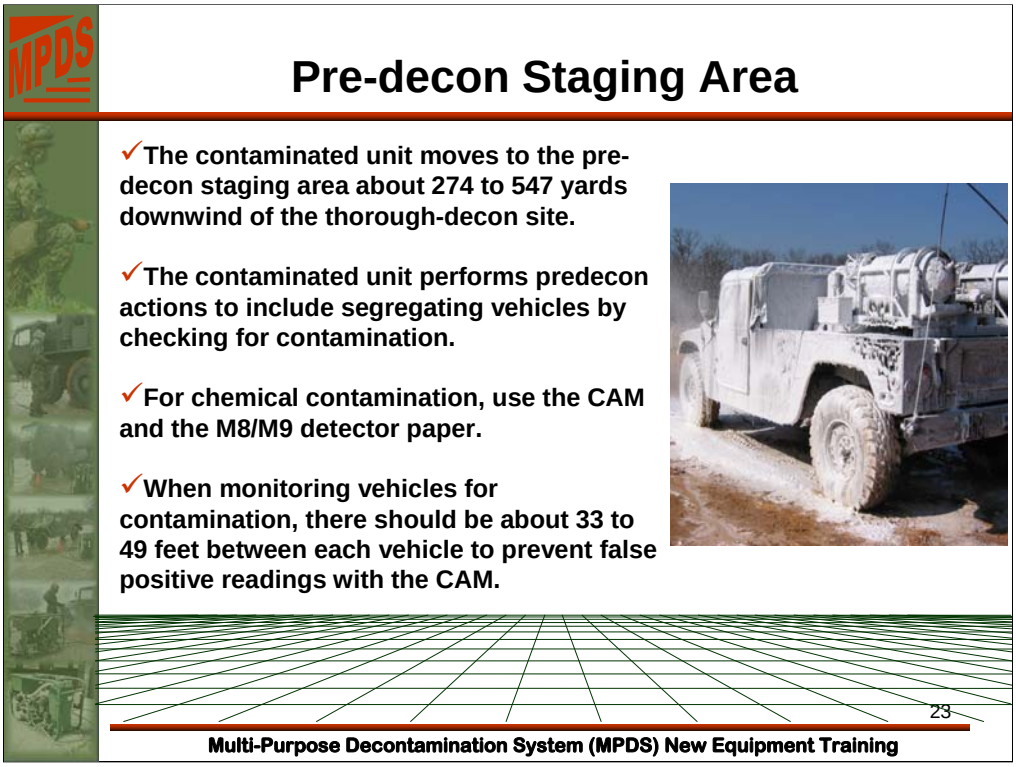
n. Thorough Decon Site.

A thorough-decon site consists of the following areas: predecon staging area, DED and DTD areas, and post decon AA.

The chemical unit leader selects these areas based on operational guidance, road network, available cover and concealment, and water supply.

The contaminated unit uses the predecon staging area to ready itself.

The post decon AA is the location where the vehicles and soldiers exiting the DED and DTD areas are linked up before moving from the decon site.



SLIDE NET-22 (off)

SLIDE NET-23 (on)

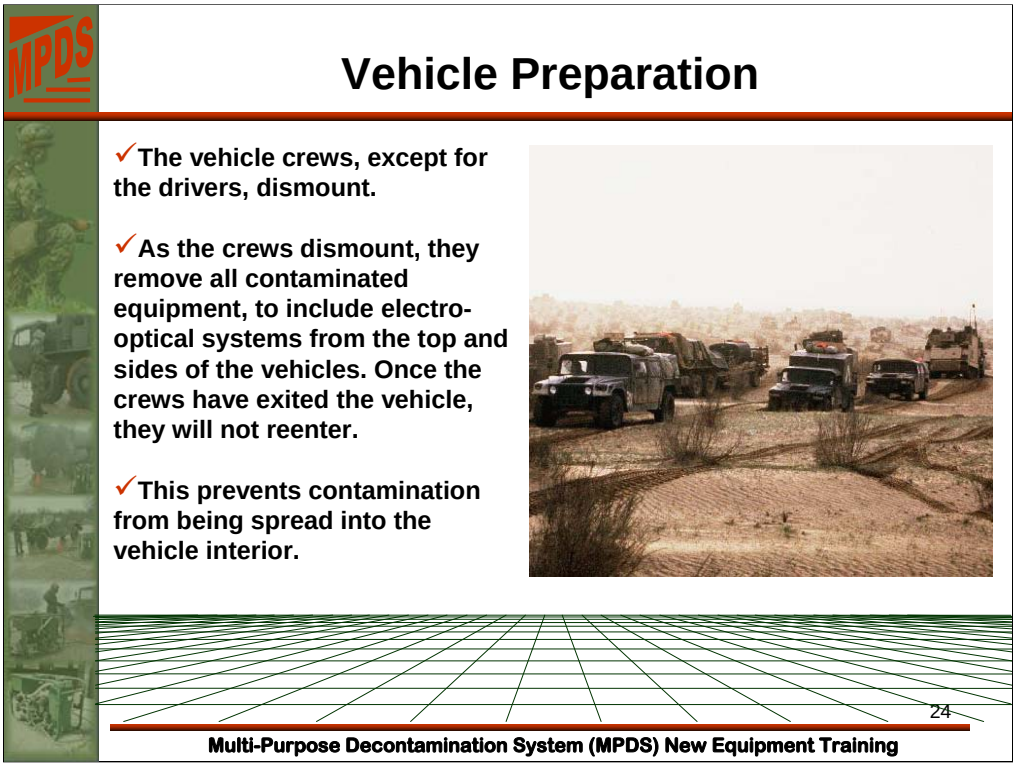
o. Predocon Staging Area.

The contaminated unit moves to the predecon staging area about 274 to 547 yards downwind of the thorough-decon site. The contaminated unit performs predecon actions to include segregating vehicles by checking for contamination.

For chemical contamination, use the CAM and the M8/M9 detector paper.

When monitoring vehicles for contamination, there should be about 33 to 49 feet between each vehicle to prevent false positive readings with the CAM.

For radiological contamination, use the AN/PDR-77 or AN/VDR-2 radiac detector. If the vehicle only has isolated areas of contamination, use the M11 or M13 to decon those areas.



SLIDE NET-23 (off)

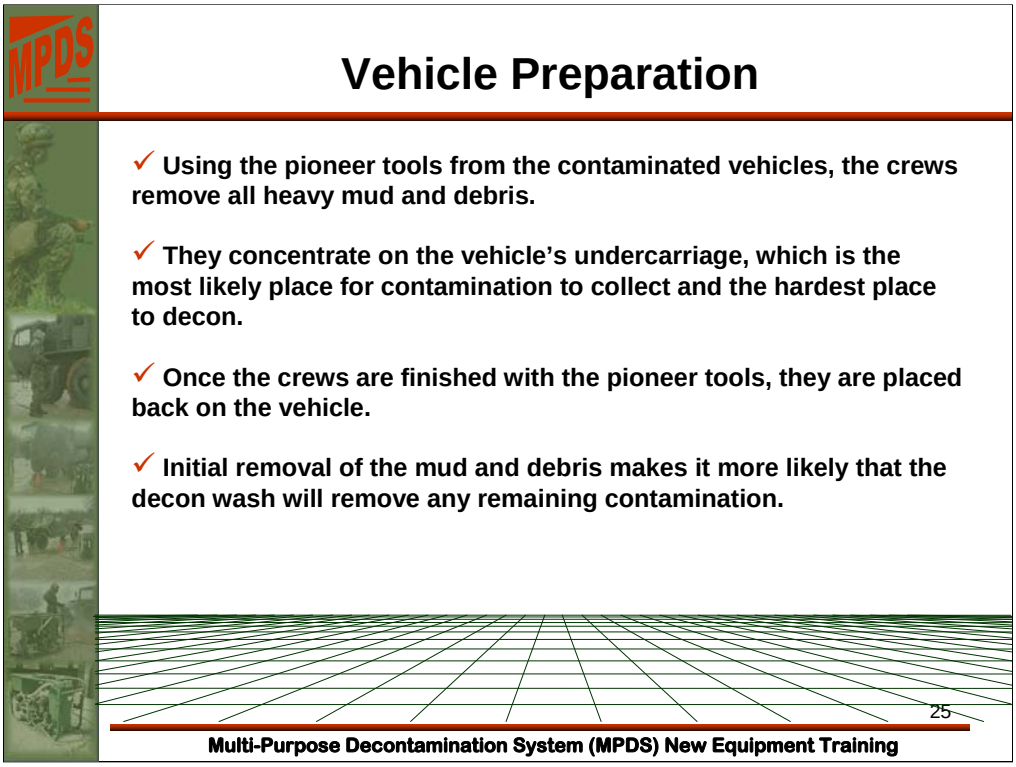
SLIDE NET-24 (on)

p. Vehicle Preparation.

The vehicle crews, except for the drivers, dismount.

As the crews dismount, they remove all contaminated equipment, to include electro-optical systems from the top and sides of the vehicles. Once the crews have exited the vehicle, they will not reenter.

This prevents contamination from being spread into the vehicle interior.



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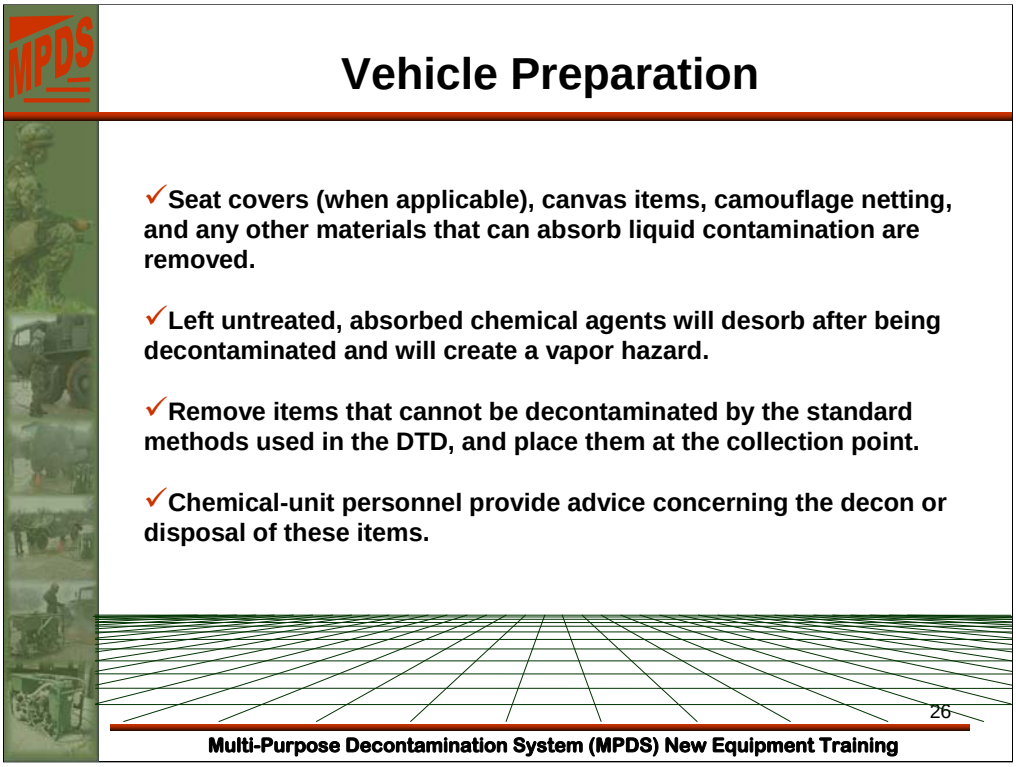
SLIDE NET-25 (on)

Using the pioneer tools from the contaminated vehicles, the crews remove all heavy mud and debris.

They concentrate on the vehicle's undercarriage, which is the most likely place for contamination to collect and the hardest place to decon.

Once the crews are finished with the pioneer tools, they are placed back on the vehicle.

Initial removal of the mud and debris makes it more likely that the decon wash will remove any remaining contamination.



SLIDE NET-25 (off)

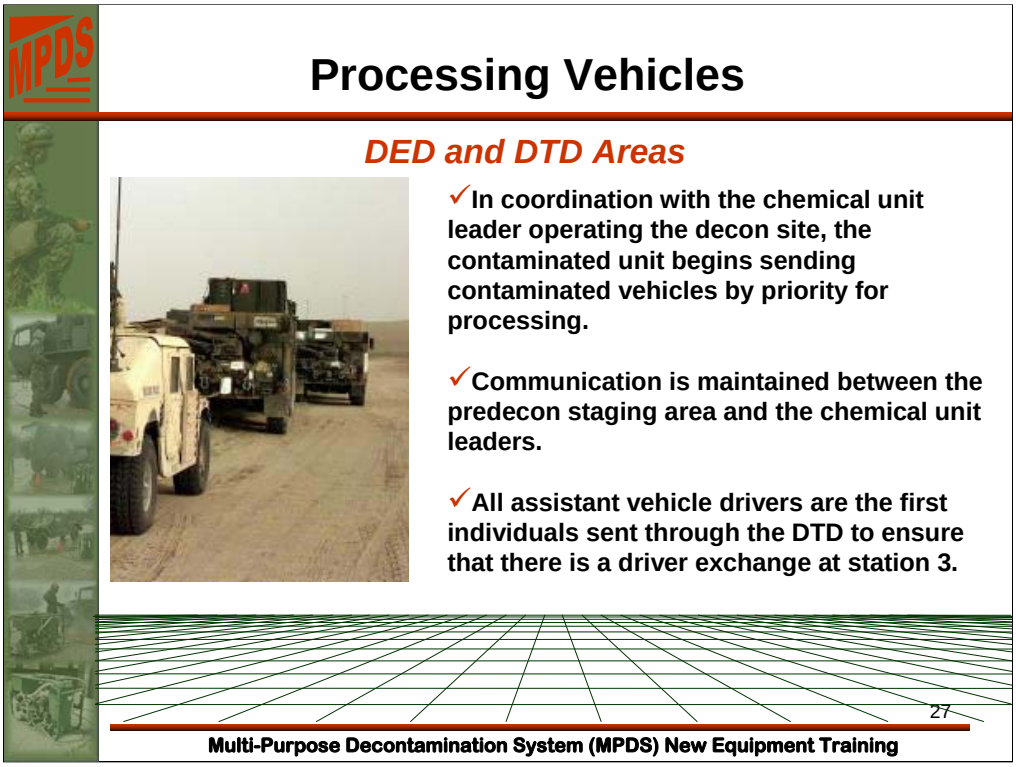
SLIDE NET-26 (on)

Seat covers (when applicable), canvas items, camouflage netting, and any other materials that can absorb liquid contamination are removed. These items create a potential transfer hazard and are not easily decontaminated.

Left untreated, absorbed chemical agents will desorb after being decontaminated and will create a vapor hazard.

Remove items that cannot be decontaminated by the standard methods used in the DTD, and place them at the collection point.

Chemical-unit personnel provide advice concerning the decon or disposal of these items.



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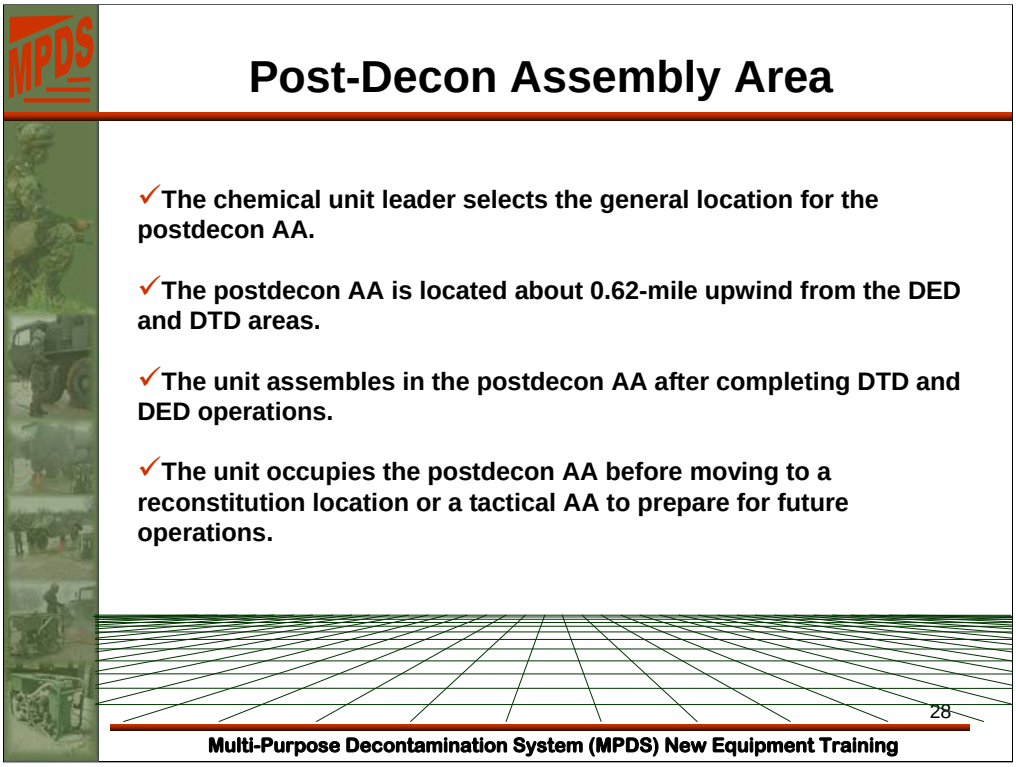
SLIDE NET-27 (on)

q. DED and DTD Areas.

In coordination with the chemical unit leader operating the decon site, the contaminated unit begins sending contaminated vehicles by priority for processing.

Communication is maintained between the predecon staging area and the chemical unit leaders.

All assistant vehicle drivers are the first individuals sent through the DTD to ensure that there is a driver exchange at station 3.



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SLIDE NET-28 (on)

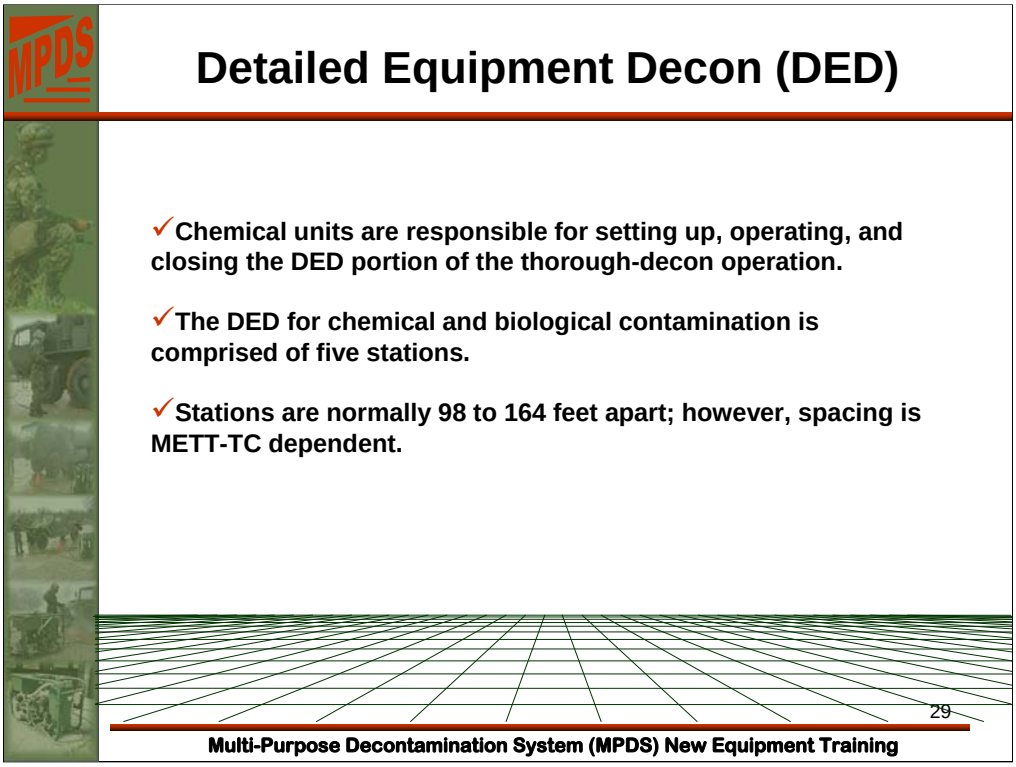
r. Post-Decon Assembly Area.

The chemical unit leader selects the general location for the post decon AA. It must be big enough to hold the entire unit undergoing the thorough decon with proper cover and concealment.

The post decon AA is located about 0.62-mile upwind from the DED and DTD areas.

The unit assembles in the post decon AA after completing DTD and DED operations.

The unit occupies the post decon AA before moving to a reconstitution location or a tactical AA to prepare for future operations.



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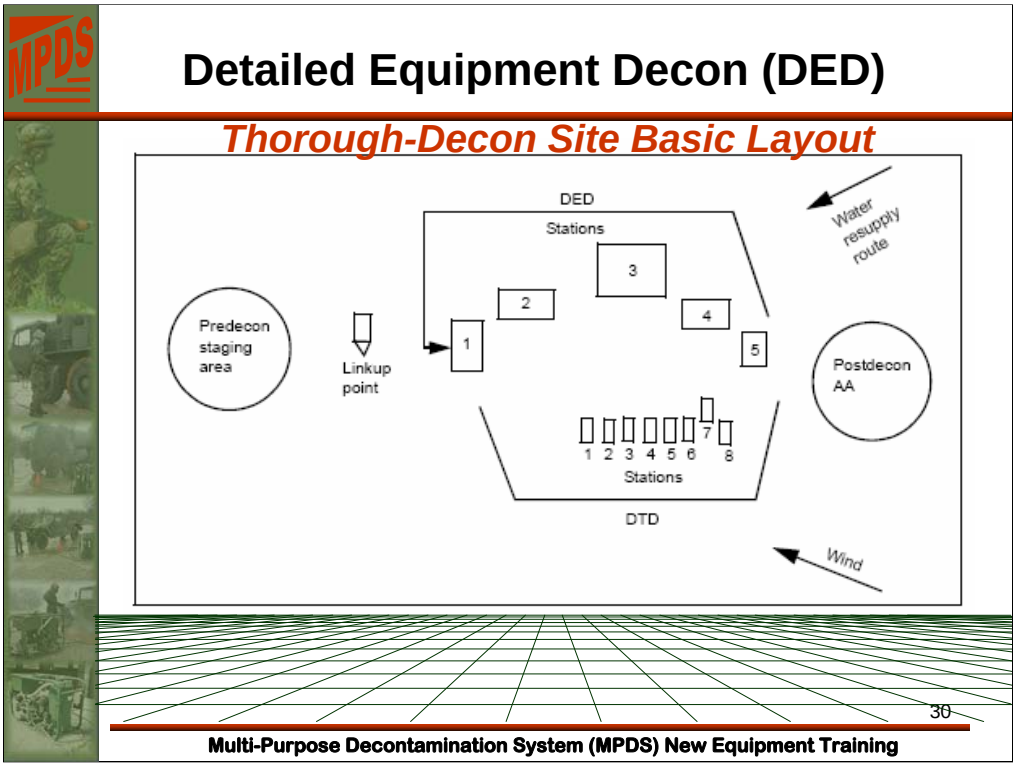
SLIDE NET-29 (on)

s. Detailed Equipment Decon (DED).

Chemical units (decon and smoke/decon platoons) are responsible for setting up, operating, and closing the DED portion of the thorough-decon operation.

The DED for chemical and biological contamination is comprised of five stations. For radiological contamination, the DED uses all but station 2.

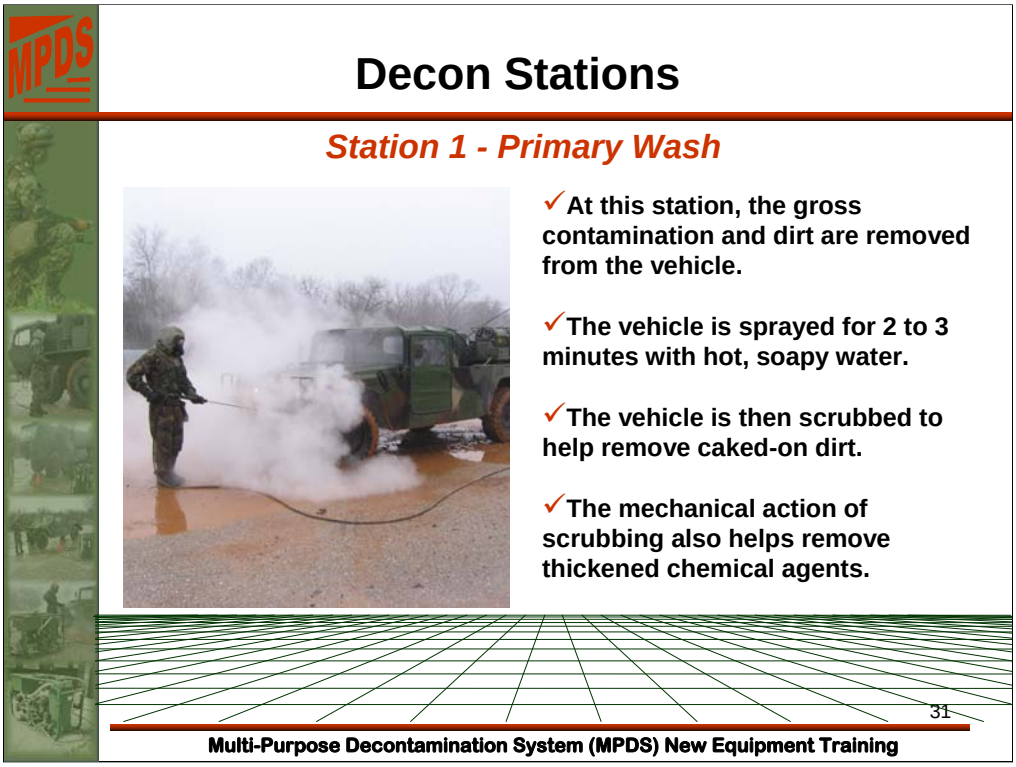
Stations are normally 98 to 164 feet apart; however, spacing is METT-TC dependent.



SLIDE NET-29 (off)

SLIDE NET-30 (on)

Show and explain to the students the Thorough-Decon site basic layout



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SLIDE NET-31 (on)

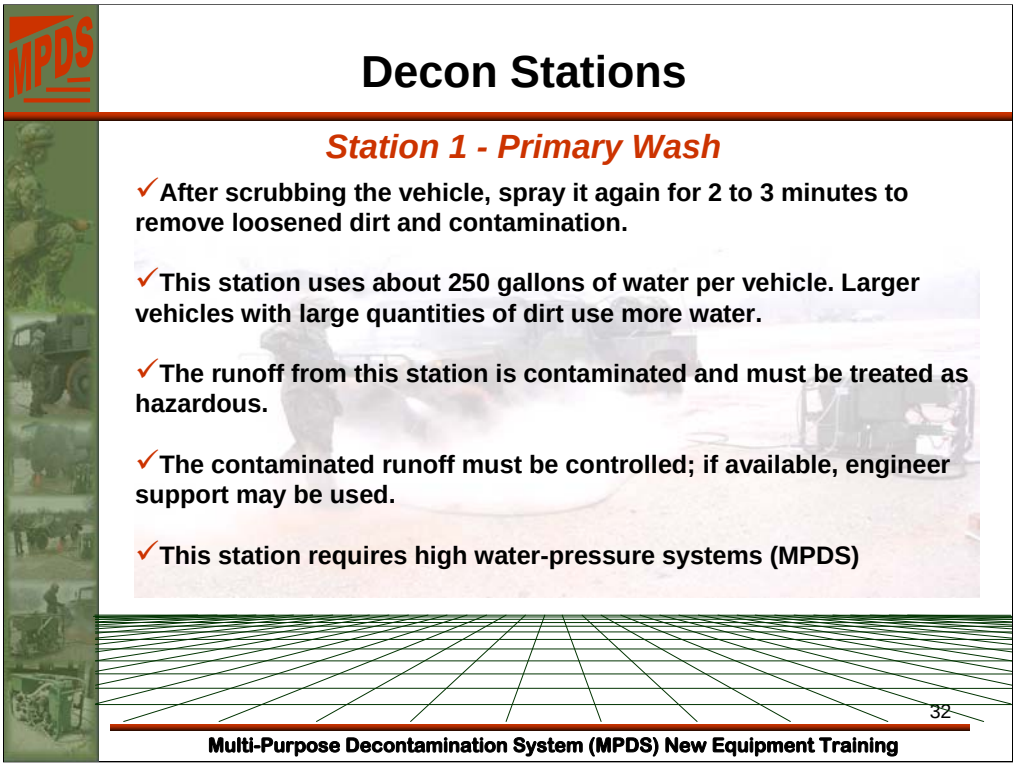
t. Station 1 – Primary Wash.

At this station, the gross contamination and dirt are removed from the vehicle.

The vehicle is sprayed for 2 to 3 minutes with hot, soapy water.

The vehicle is then scrubbed to help remove caked-on dirt. The mechanical action of scrubbing also helps remove thickened chemical agents.

Although the undersurfaces are difficult to reach, try to remove as much dirt as possible.



SLIDE NET-31 (off)

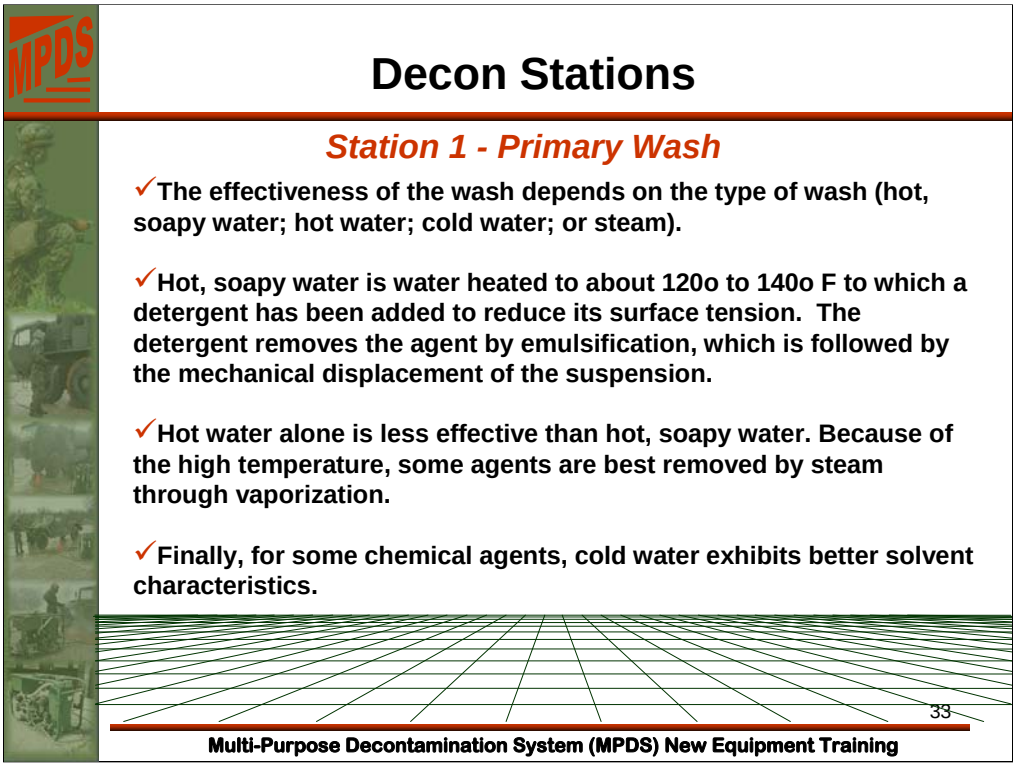
SLIDE NET-32 (on)

After scrubbing the vehicle, spray it again for 2 to 3 minutes to remove loosened dirt and contamination. This station uses about 250 gallons of water per vehicle. Larger vehicles with large quantities of dirt use more water.

The runoff from this station is contaminated and must be treated as hazardous. The contaminated runoff must be controlled; if available, engineer support may be used.

This station requires high water-pressure systems (MPDS)

INSTRUCTOR NOTE: Explain to the students that thirty-five cubic feet of space per 250 gallons of liquid runoff should be used when calculating the size for the drainage pump.



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SLIDE NET-33 (on)

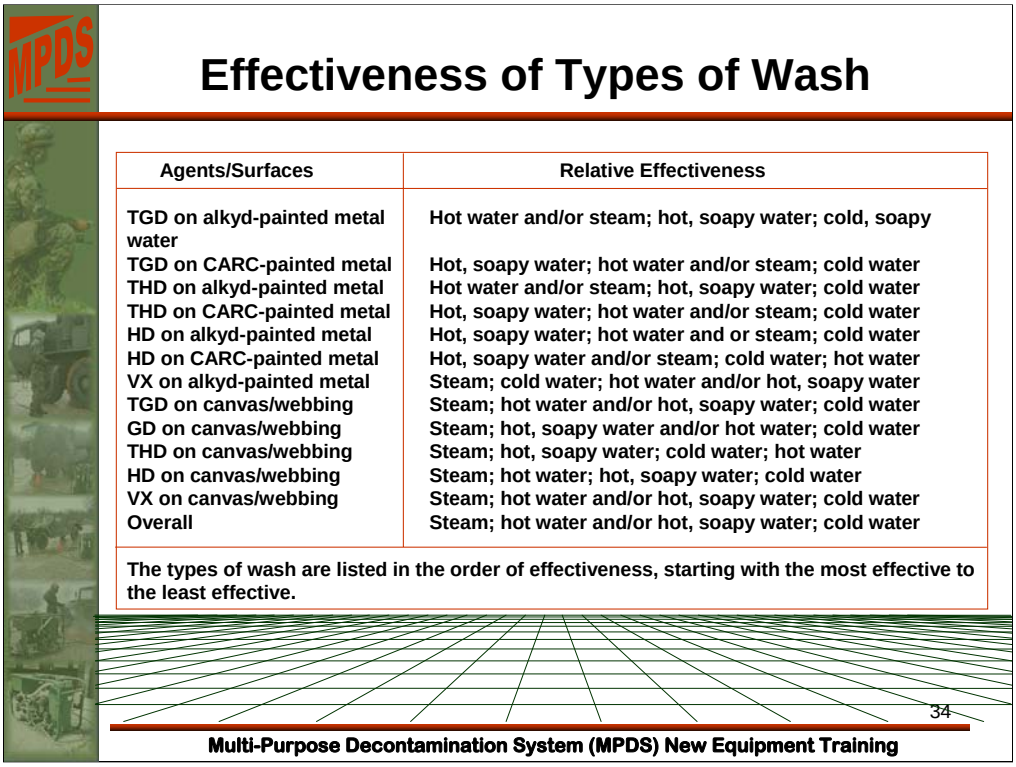
The effectiveness of the wash depends on the type of wash (hot, soapy water; hot water; cold water; or steam).

Hot, soapy water is water heated to about 120o to 140o F to which a detergent has been added to reduce its surface tension.

The detergent removes the agent by emulsification, which is followed by the mechanical displacement of the suspension.

Hot water alone is less effective than hot, soapy water. Because of the high temperature, some agents are best removed by steam through vaporization.

Finally, for some chemical agents, cold water exhibits better solvent characteristics.



SLIDE NET-33 (off)

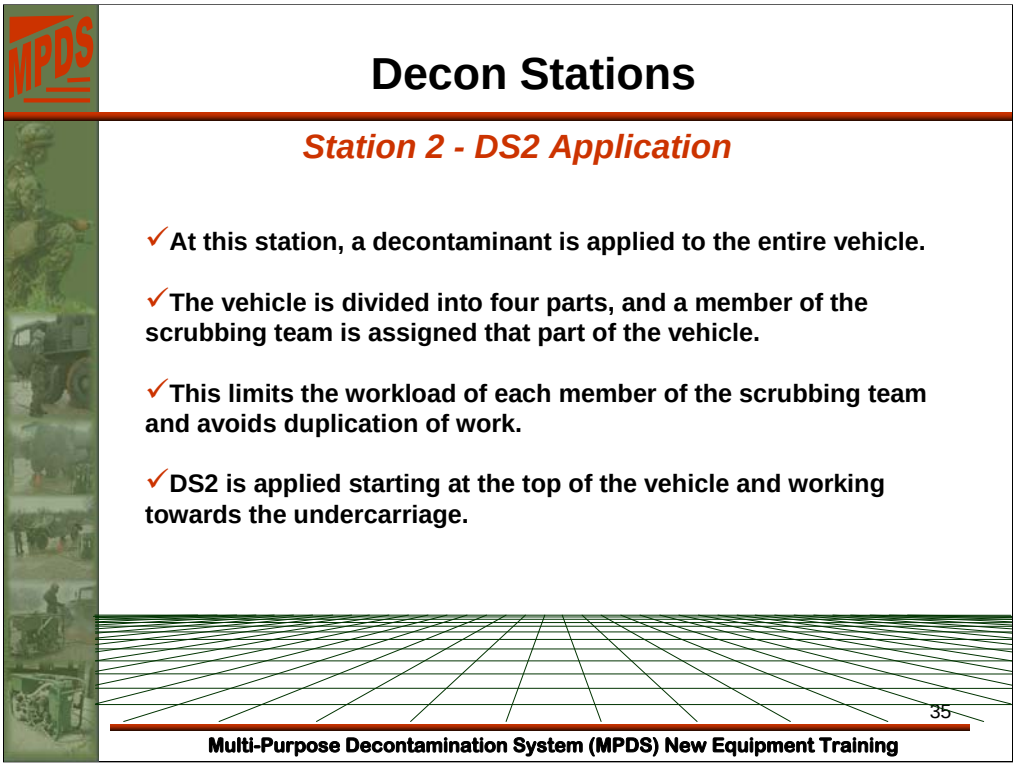
SLIDE NET-34 (on)

u. Effectiveness of Types of Wash.

Review the types of agents and surfaces.

Explain the relative effectiveness of each type of water and solution.

INSTRUCTOR NOTE: Explain to the students that types of wash are listed in order of effectiveness, starting with the most effective to the least effective.



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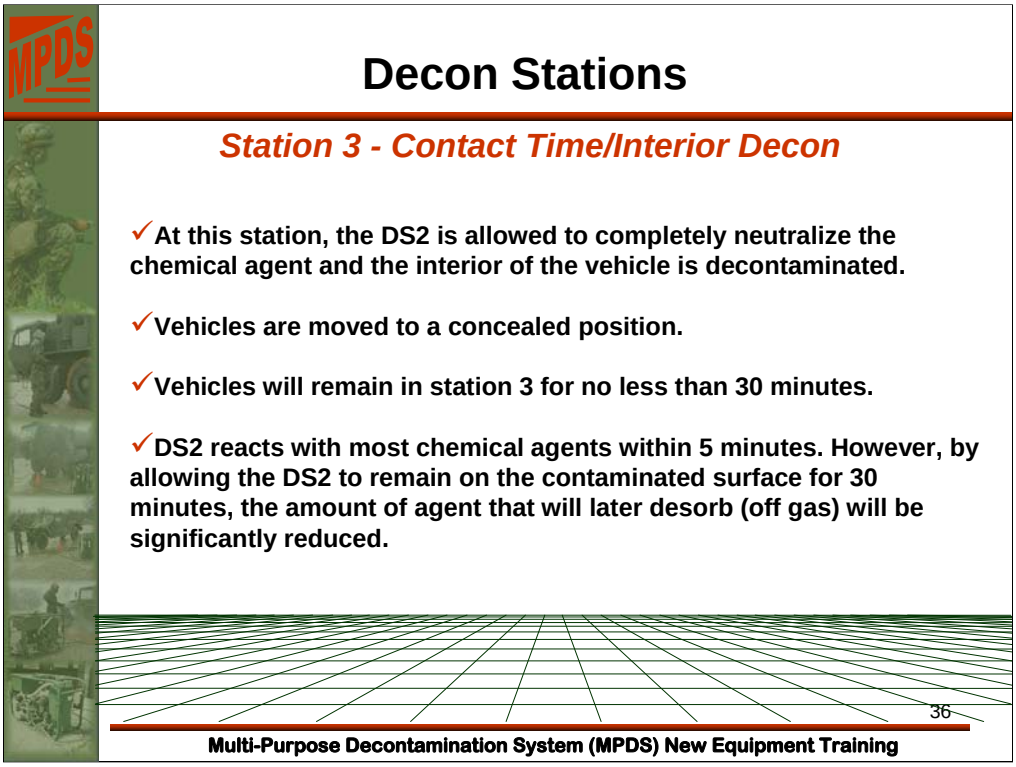
SLIDE NET-35 (on)

v. Station 2 – DS2 Application.

At this station, a decontaminant is applied to the entire vehicle. The vehicle is divided into four parts, and a member of the scrubbing team is assigned that part of the vehicle.

This limits the workload of each member of the scrubbing team and avoids duplication of work. DS2 is applied starting at the top of the vehicle and working towards the undercarriage.

Every effort is made to apply DS2 to the undercarriage, especially if the vehicle has crossed a contaminated area. The mop is the least tiring method of applying DS2. Using a mop to apply DS2 creates a large amount of spillage. However, continual use of the M13 decontaminating apparatus, portable (DAP) requires the scrubbing team to exert more energy than with using the mop.



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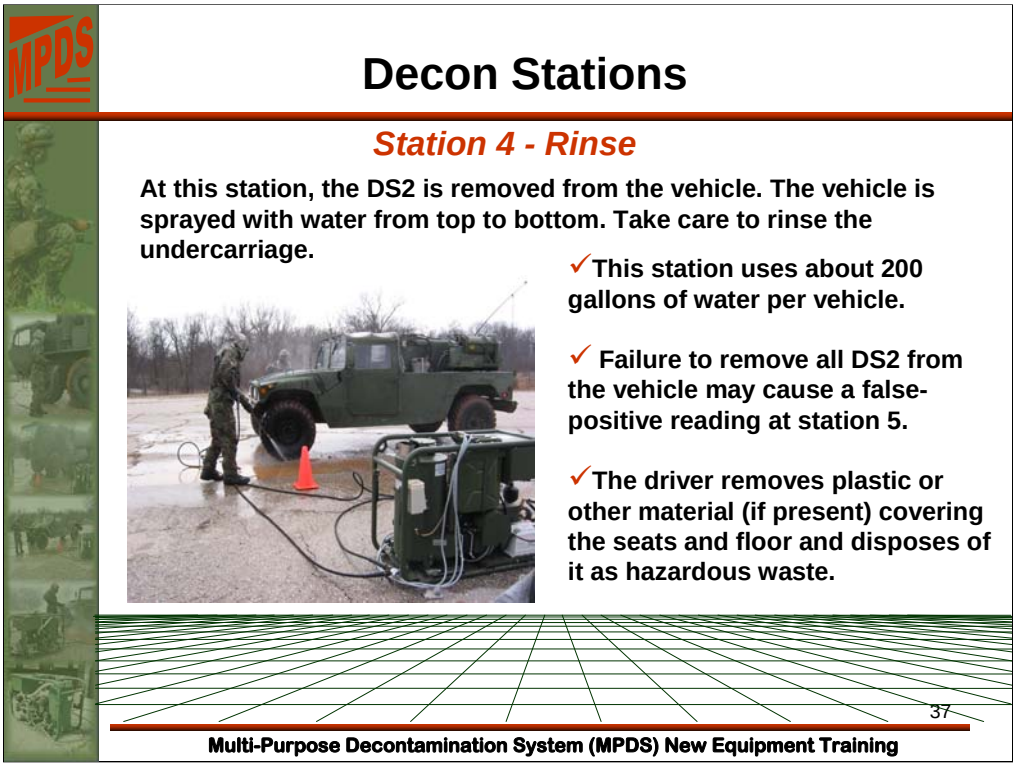
SLIDE NET-36 (on)

w. Station 3 – Contact Time/Interior Decon.

At this station, the DS2 is allowed to completely neutralize the chemical agent and the interior of the vehicle is decontaminated. Vehicles are moved to a concealed position.

Vehicles will remain in station 3 for no less than 30 minutes. DS2 reacts with most chemical agents within 5 minutes. However, by allowing the DS2 to remain on the contaminated surface for 30 minutes, the amount of agent that will later desorb (off gas) will be significantly reduced.

When there is a 30-minute contact time, there will be no desorption after decon operations for most chemical agents. However, studies indicate that distilled-mustard (HD) vapors desorb after decon even if DS2 is allowed to remain for 30 minutes.



SLIDE NET-36 (off)

SLIDE NET-37 (on)

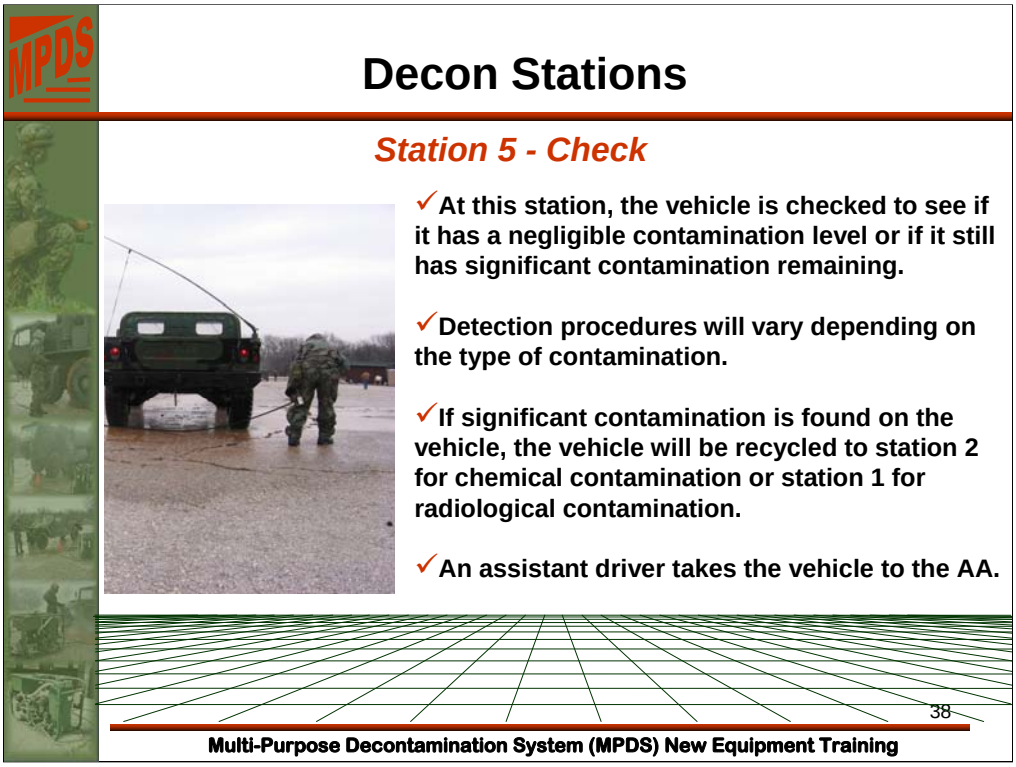
x. Station 4- Rinse.

At this station, the DS2 is removed from the vehicle. The vehicle is sprayed with water from top to bottom. Take care to rinse the undercarriage.

This station uses about 200 gallons of water per vehicle.

Failure to remove all DS2 from the vehicle may cause a false-positive reading at station 5.

The driver removes plastic or other material (if present) covering the seats and floor and disposes of it as hazardous waste.



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SLIDE NET-38 (on)

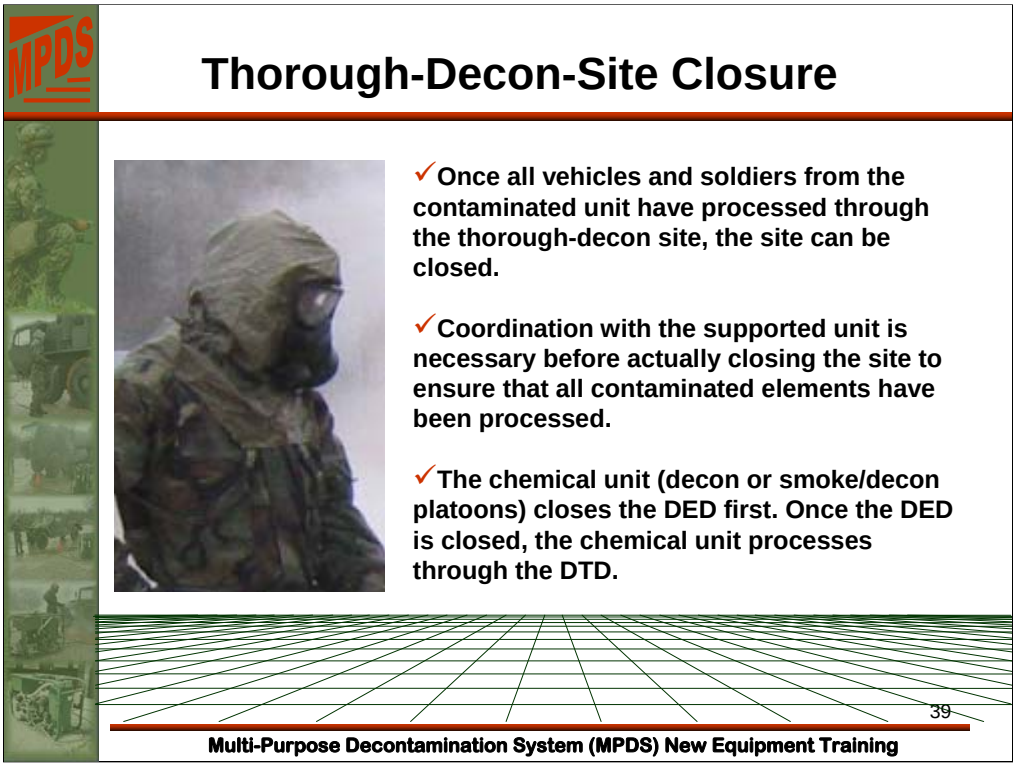
y. Station 5 – Check.

At this station, the vehicle is checked to see if it has a negligible contamination level or if it still has significant contamination remaining.

Detection procedures will vary depending on the type of contamination.

If significant contamination is found on the vehicle, the vehicle will be recycled to station 2 for chemical contamination or station 1 for radiological contamination.

An assistant driver takes the vehicle to the AA.



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SLIDE NET-39 (on)

Once all vehicles and soldiers from the contaminated unit have processed through the thorough-decon site, the site can be closed. Coordination with the supported unit is necessary before actually closing the site to ensure that all contaminated elements have been processed. The chemical unit (decon or smoke/decon platoons) closes the DED first. Once the DED is closed, the chemical unit processes through the DTD. After the chemical unit has processed through the DTD, the DTD is closed. At that point, the chemical unit marks the area as a contaminated area and reports its exact location to the supported unit, using an NBC-5 report.

SLIDE NET-39 (off)

INSTRUCTOR NOTE: Ask the students if they have any questions that pertain to the decontamination tactics, techniques and procedures.

NOTE: Conduct a check on learning and summarize the learning activity.

Q. What is the goal of decontamination?

R. The goal of decontamination remains the same whether it is performed in wartime or in a peacetime response operation—to limit the spread of the contamination and reduce levels to the greatest extent possible.

Q. What is the most effective type of decontamination?

R. A thorough decontamination is the most effective type of decontamination but is the most resource intensive.

Q. Since decontamination assets are limited, what action should the commander take to support mission requirements?

R. The commander should establish a priority of decontamination support.

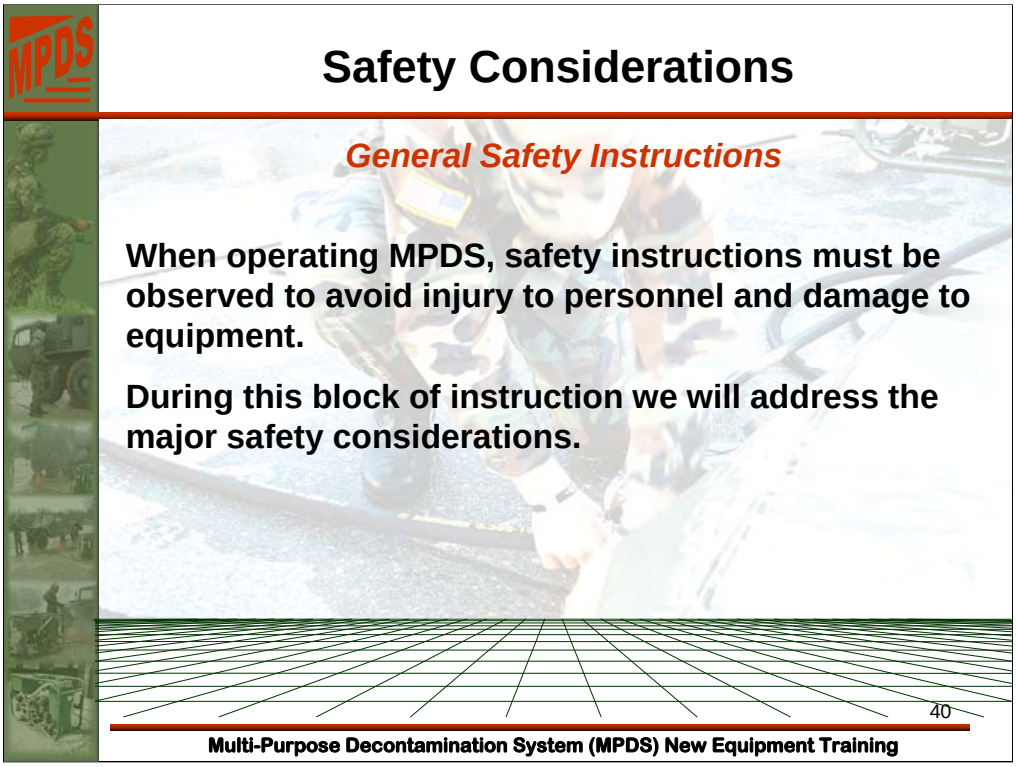
Q. When a vehicle is being prepared for decontamination, what individual should remain with the vehicle?

R. The driver should remain with the vehicle.

TAB C

Multi Purpose Decontamination System (MPDS)

PFN NO: A-002
Safety Considerations



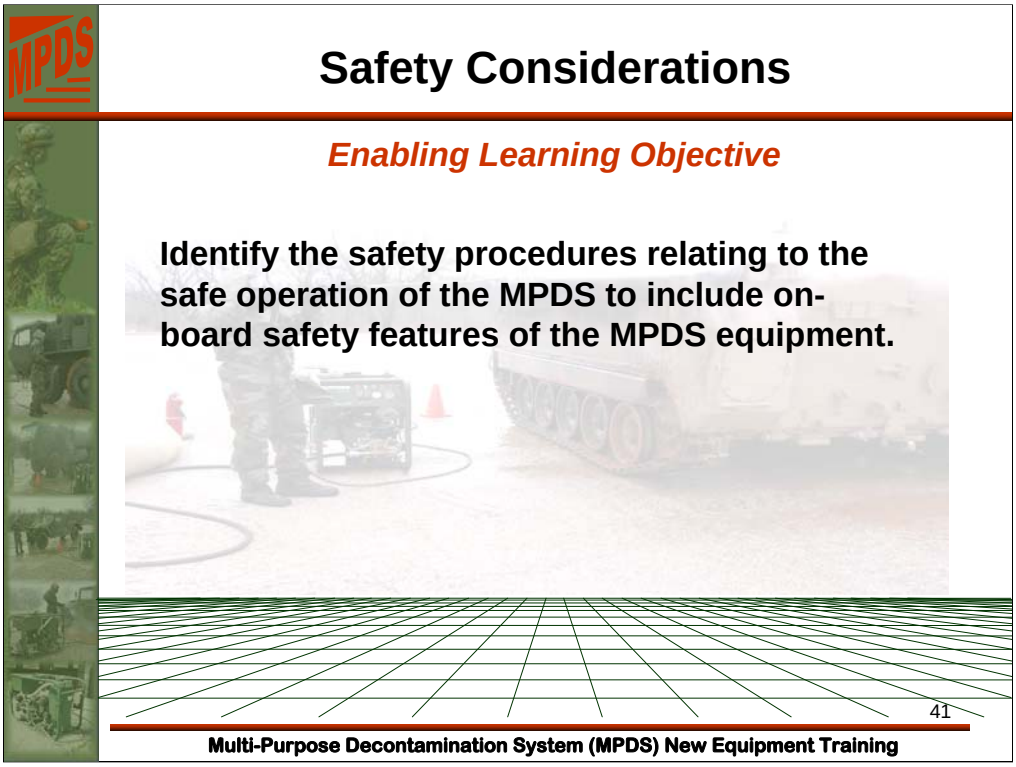
INSTRUCTOR NOTE: Explain to the students that you will cover the general safety considerations that apply to the MPDS.

SLIDE NET-40 (on)

When operating the MPDS, safety instructions must be observed to avoid injury to personnel and damage to equipment. The Instructor will briefly explain the need to observe strict safety factors. To effectively decontaminate equipment, warm or hot soapy water is used but in some instances steam is used to affect decontamination. Any time warm or hot water, or steam is used care must be taken not to injure yourself or others during decontamination operations.

The safety instructions listed here apply for the operation of the MPDS.

In addition, observe the national safety regulations as well as the regulations of the trade and professional associations.



SLIDE NET-40 (off)

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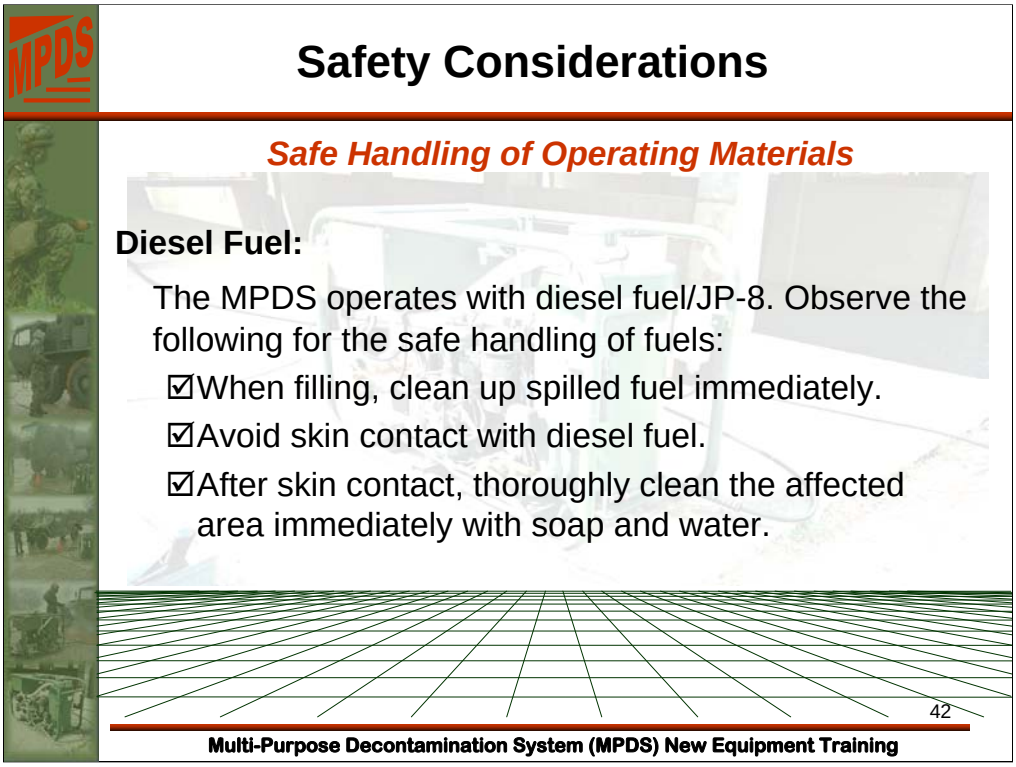
The Instructor will briefly explain the need to observe strict safety factors.

Identify the safety procedures relating to the safe operation of the MPDS to include on-board safety features of the MPDS equipment.



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SLIDE NET-42 (on)

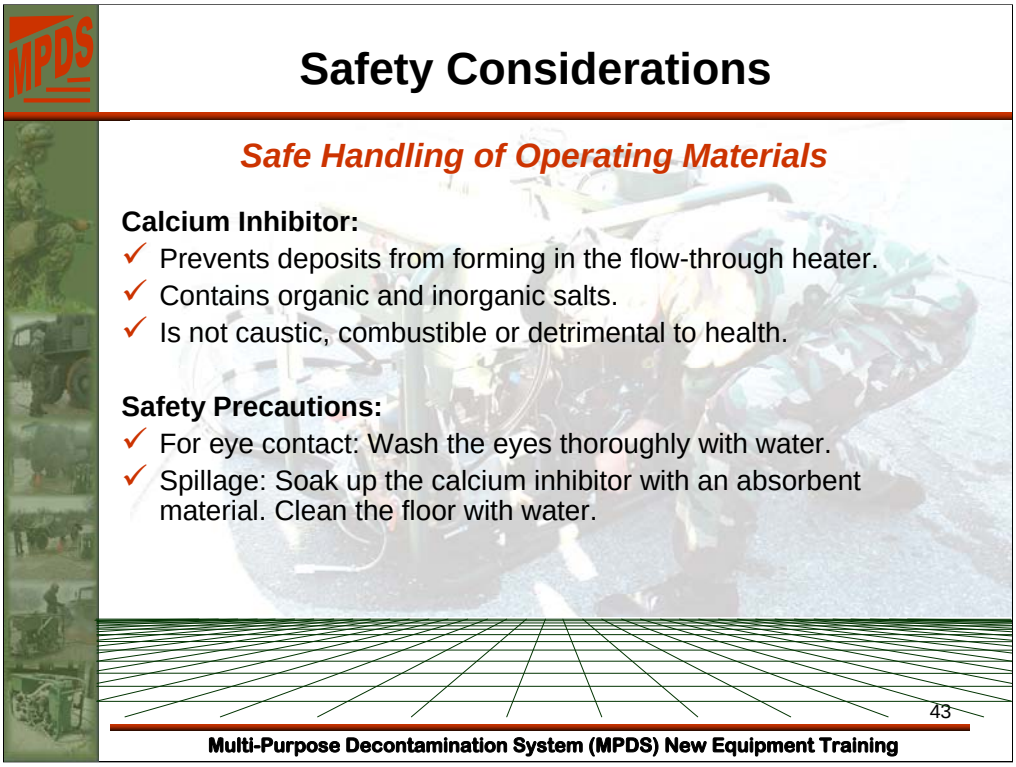
Diesel Fuel: -

The MPDS operates with diesel fuel/JP-8. Observe the following for the safe handling of fuels:

When filling, clean up spilled fuel immediately.

Avoid skin contact with diesel fuel.

Avoid skin contact, thoroughly clean the affected area immediately with soap and water.



SLIDE NET-42 (off)

SLIDE NET-43 (on)

Calcium inhibitor

Prevents deposit from forming in the flow-through heater.

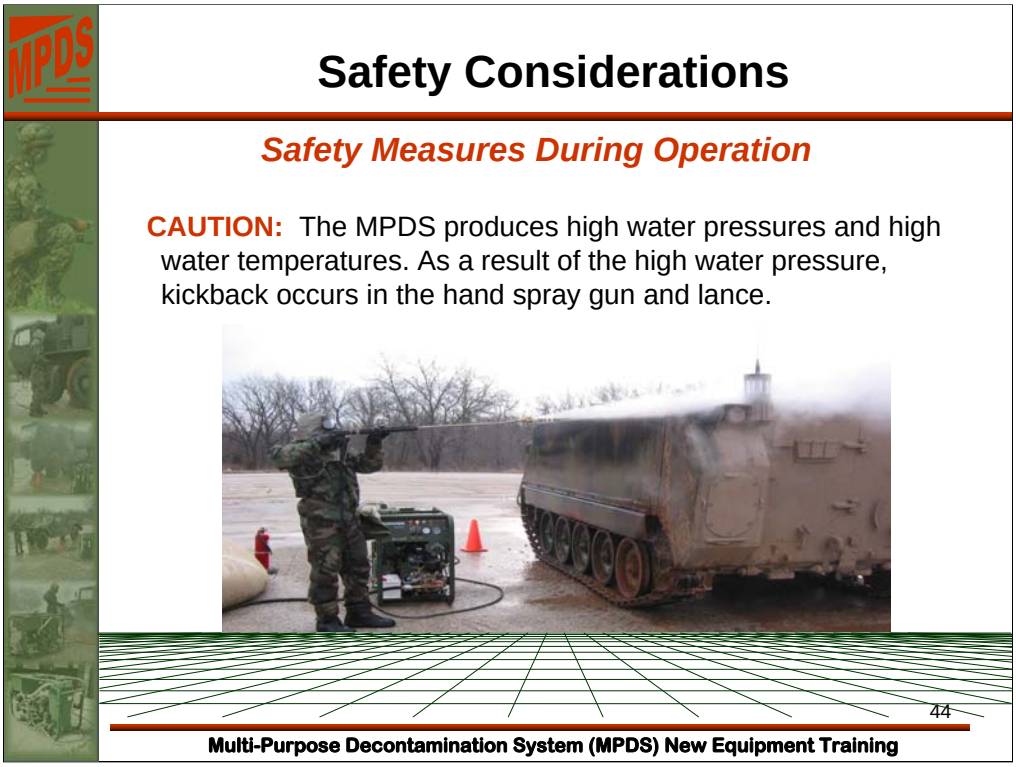
Contains organic and inorganic salts.

Is not caustic, combustible or detrimental to health.

Safety Precautions:

For eye contact: wash the eyes thoroughly with water.

Spillage: sock up the calcium inhibitor with an absorbent material. Clean the floor with water.

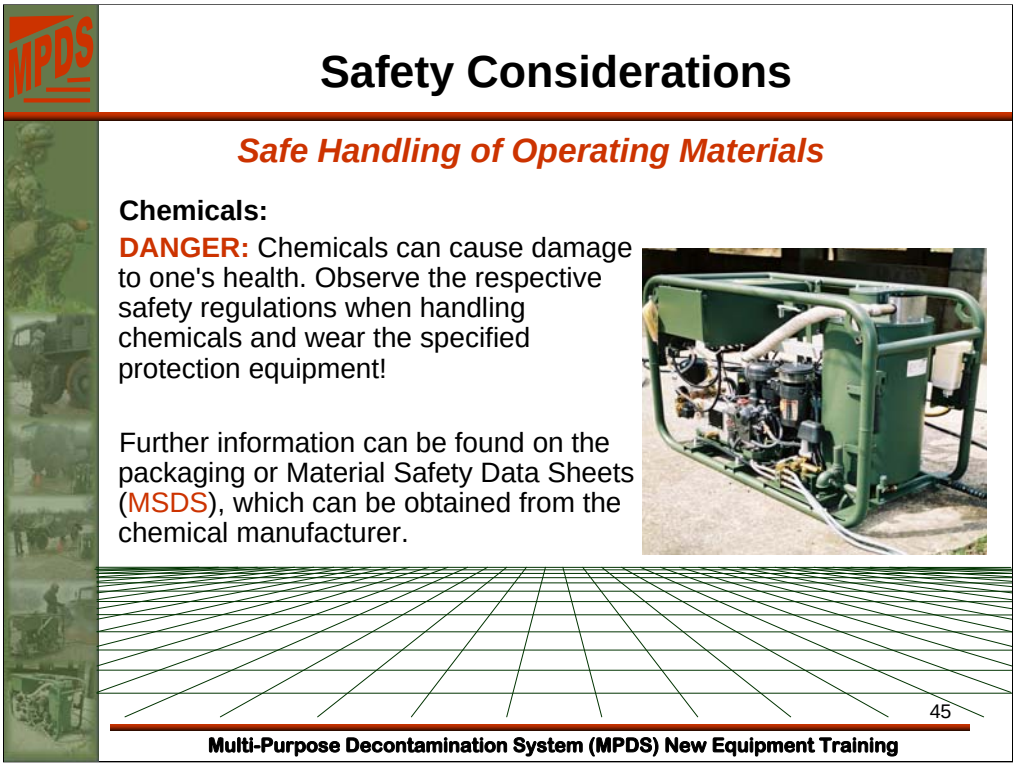


SLIDE NET-43 (off)

SLIDE NET-44 (on)

INSTRUCTOR NOTE: Explain how the MPDS produces the high water pressures and high water temperatures.

The MPDS produces high water pressures and water temperatures. As a result of the high pressures, kickback occurs in the hand spray gun and lance.



SLIDE NET-44 (off)

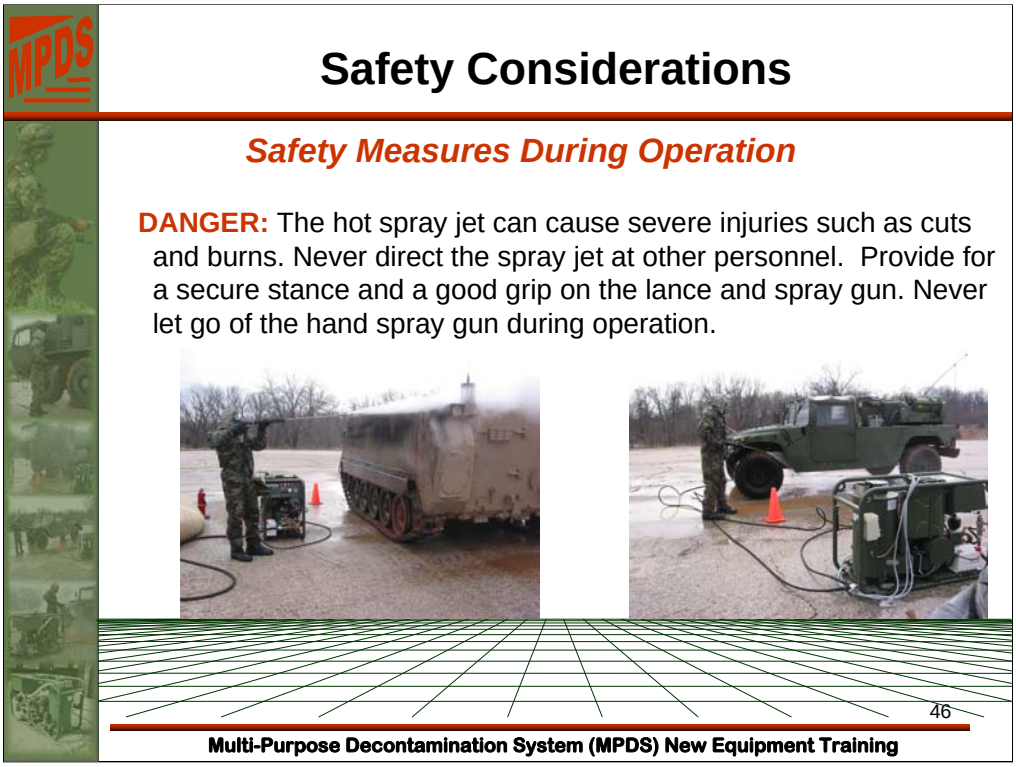
SLIDE NET-45 (on)

INSTRUCTOR NOTE: Explain to the students how safe handling of Operating materials is a critical part of MPDS operations.

Chemicals:

DANGER: Chemicals can cause damage to one's health. Observe the respective safety regulations when handling chemicals and wear the specified protection equipment!

Further information can be found on the packaging or Material Safety Data Sheets (MSDS), which can be obtained from the chemical manufacturer.



SLIDE NET-45 (off)

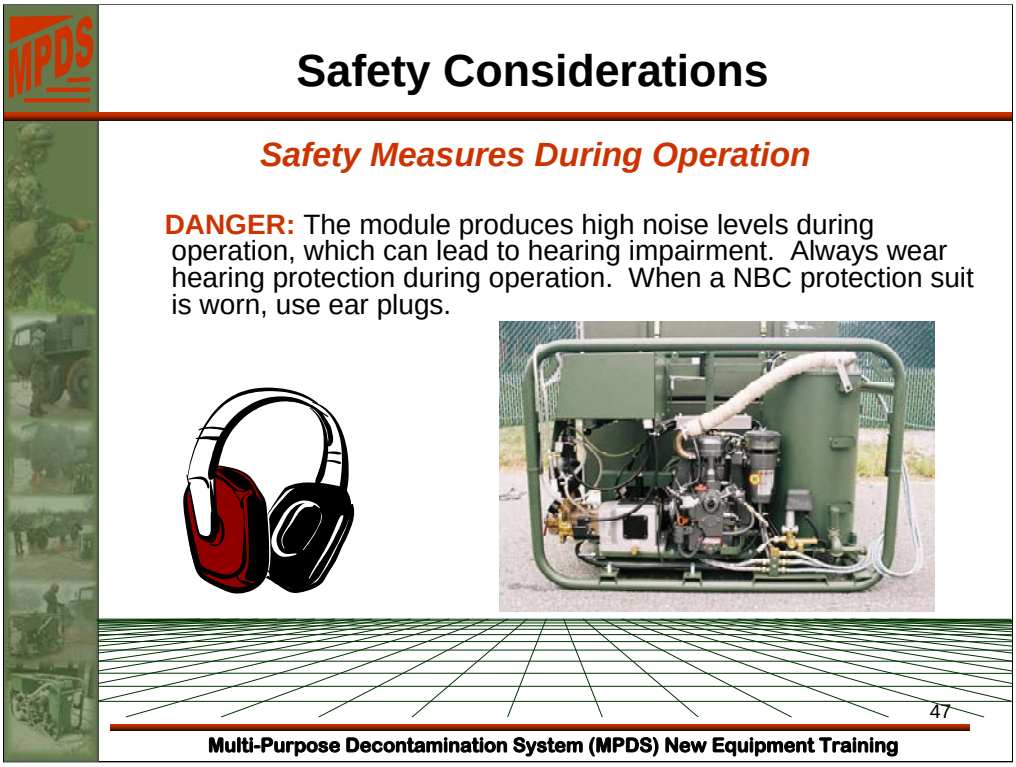
SLIDE NET-46 (on)

INSTRUCTOR NOTE: Explain to the students how the MPDS produces high water pressures and high water temperatures.

The MPDS produces enough heat and pressure that it can cause severe burns and cuts.

Never let go of the hand spray gun during operations.

The burner unit assembly emits very high exhaust temperatures so extreme care must be taken when working around the burner assembly even after shut down.



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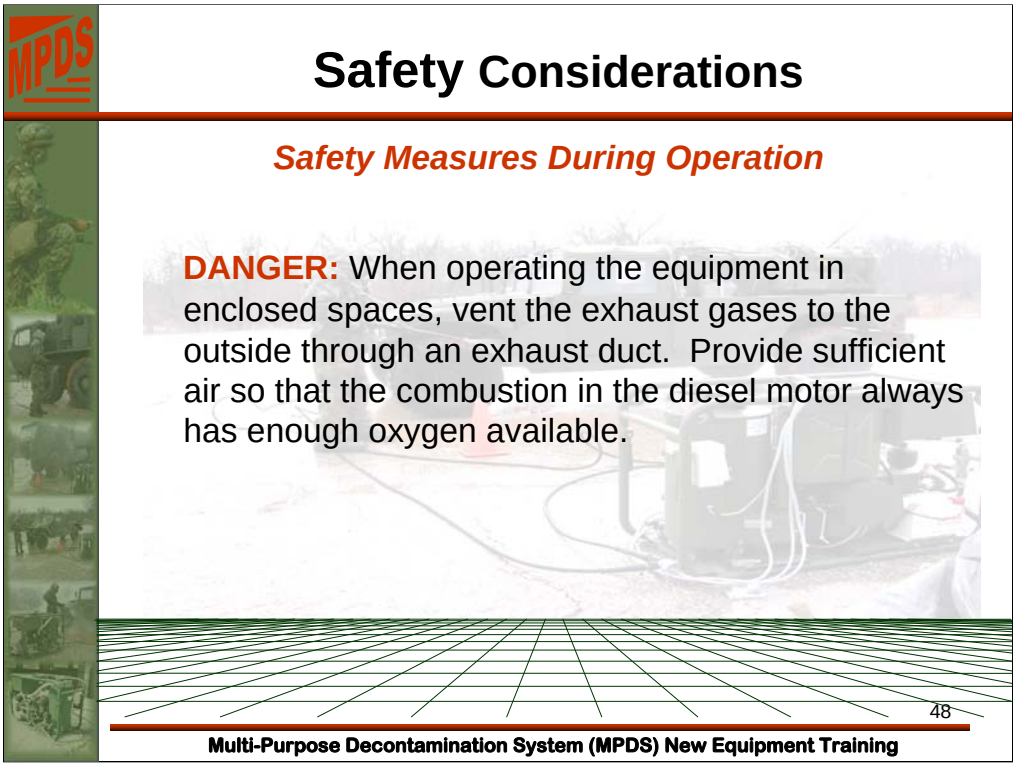
SLIDE NET-47 (on)

INSTRUCTOR NOTE: Explain to the students the importance of wearing hearing protection.

The MPDS produces high noise levels during operation.

Always wear hearing protection during operation.

In an NBC environment, use earplugs when a NBC protection suit is worn.



SLIDE NET-47 (off)

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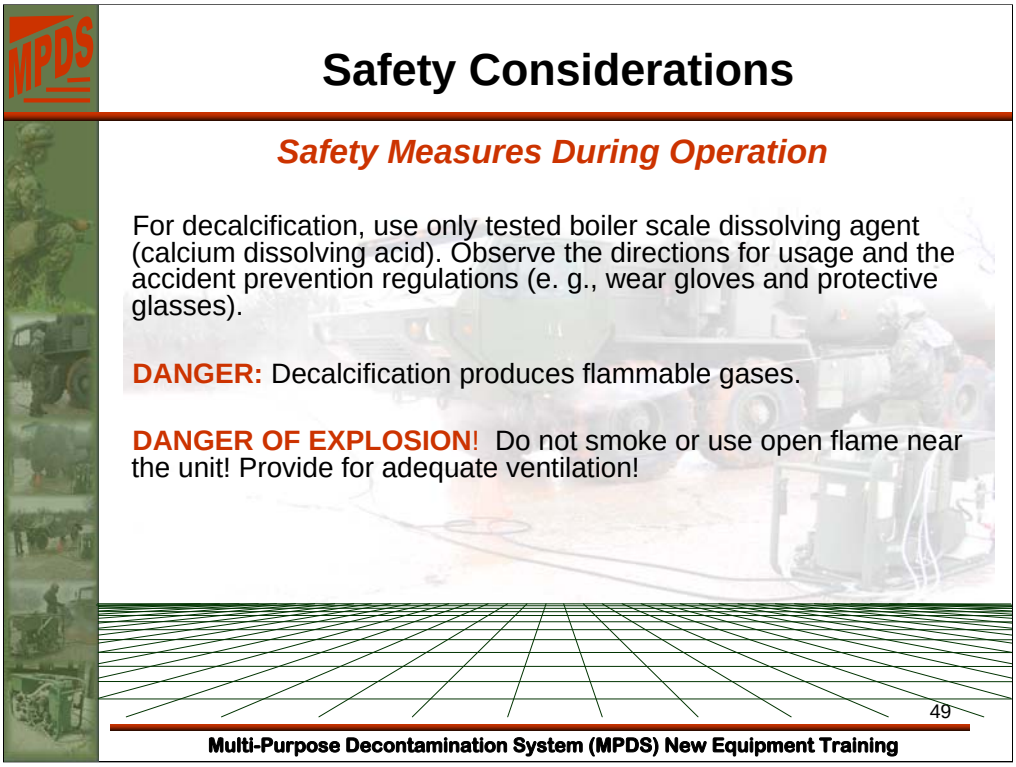
Operating the MPDS in enclosed areas.

Vent the exhaust gases to the outside through an exhaust duct.

Provide sufficient air so that the combustion in the diesel motor always has enough oxygen available.

Ensure that there is sufficient clean air within the closed area.



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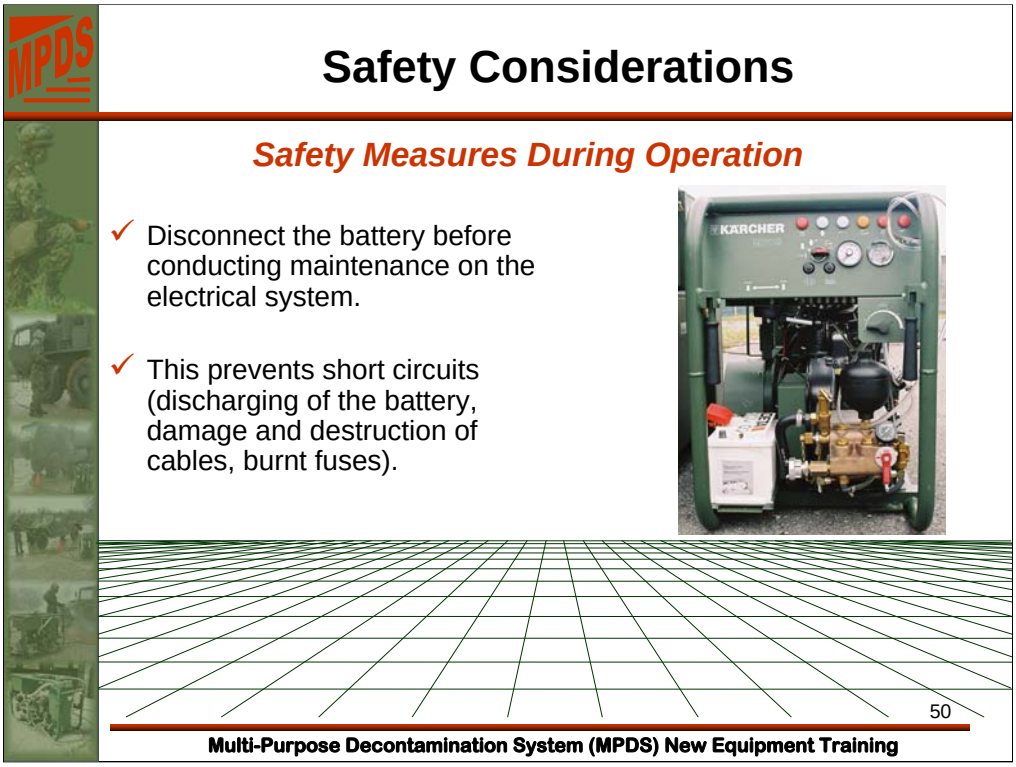
SLIDE NET-49 (on)

For decalcification, use only tested boiler scale dissolving agent (calcium dissolving acid).

Observe the directions for usage and the accident prevention regulations (e.g., wear gloves and protective glasses).

Decalcification produces flammable gases.



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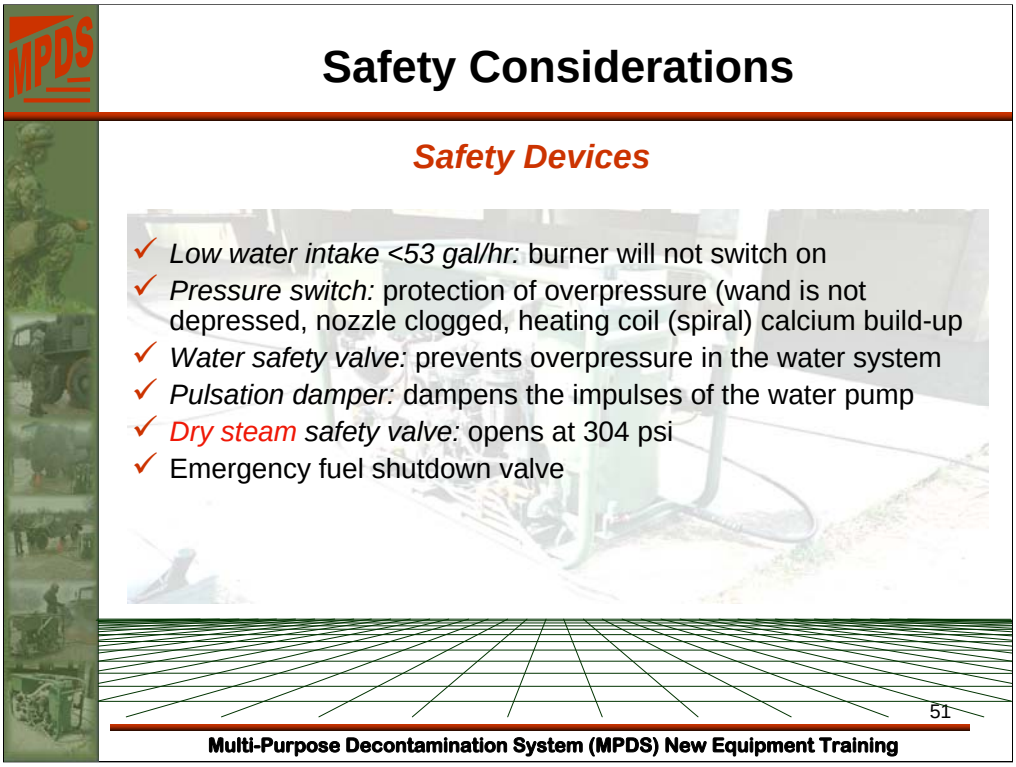
SLIDE NET-50 (on)

The battery that is currently equipped on the MPDS is of Gel design.

It has a capacity of 12 volts DC.

When any electrical maintenance is performed it must be disconnected prior to conducting maintenance.

The MPDS has built into its design several safety devices.



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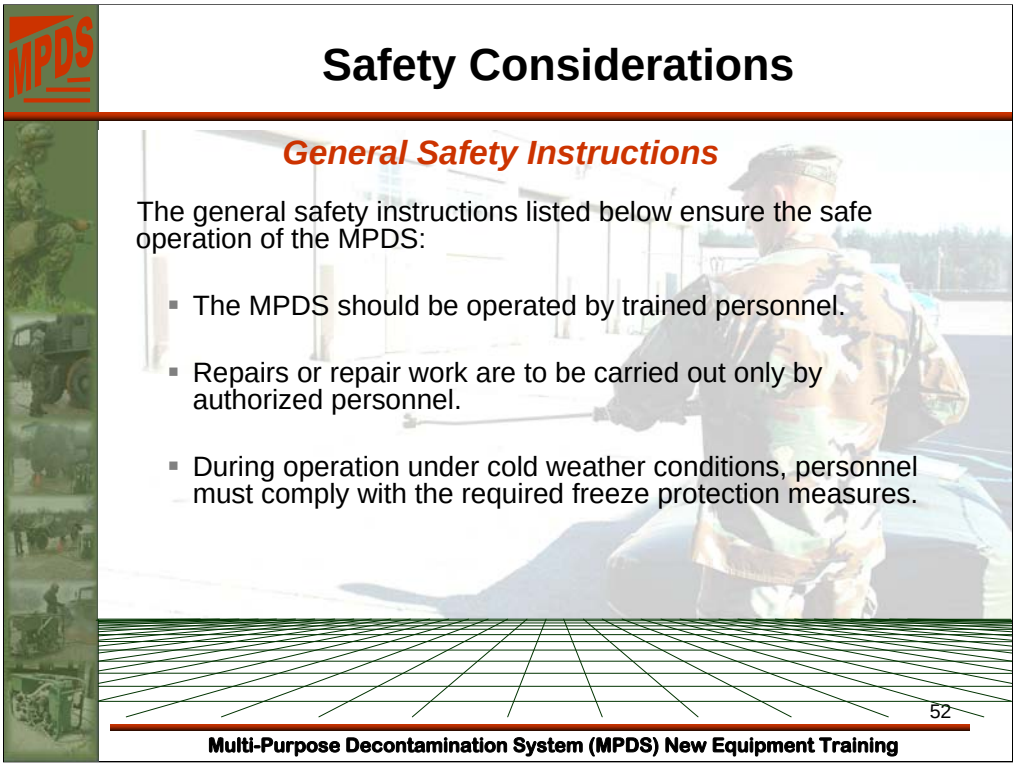
SLIDE NET-51 (on)

These devices are not only for the protection of the equipment itself but for the personnel operating the system as well.

These safety devices are a) Low water intake, b) Pressure switch, c) Water safety valve, d) Pulsation damper, e) Dry steam safety valve and overflow valve, f) Emergency fuel shutdown valve.



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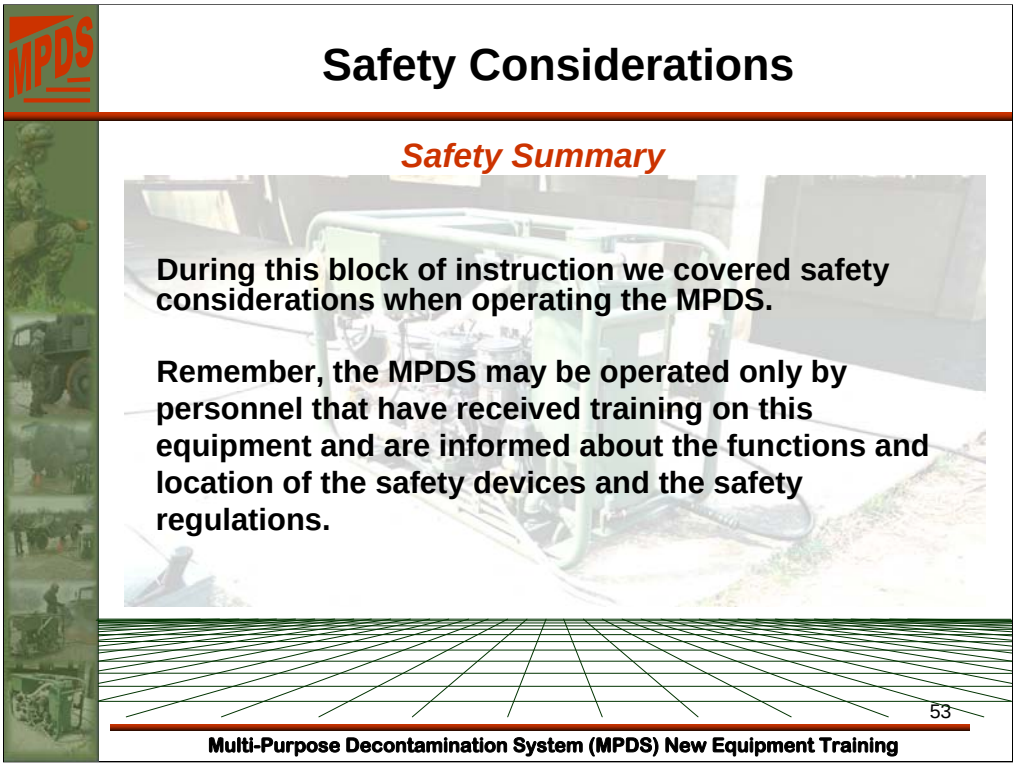
SLIDE NET-52 (on)

Only trained personnel should operate the MPDS.

Only authorized personnel perform MPDS equipment repairs.

When operating the MPDS under cold weather conditions, operators will need to comply with the required freeze protection measures.

INSTRUCTOR NOTE: Ask the students if they have any questions that pertain to the safety procedures for operating the MPDS.



INSTRUCTOR NOTE: Ask the students if they have any questions that pertain to the safety procedures for operating the MPDS.

SLIDE NET-52 (off)

SLIDE NET-53 (on)

NOTE: Conduct a check on learning and summarize the learning activity.

Q. What are two of the MPDS built in safety devices?

R. These safety devices are a) Low water intake, b) Pressure switch, c) Water safety valve, d) Pulsation damper, e) Dry steam safety valve and overflow valve, f) Emergency fuel shutdown valve.

Q. During a decontamination mission, who conducts the decalcification procedures?

R. Decalcification procedures should only be accomplished by authorized personnel and be conducted in a very well ventilated area.

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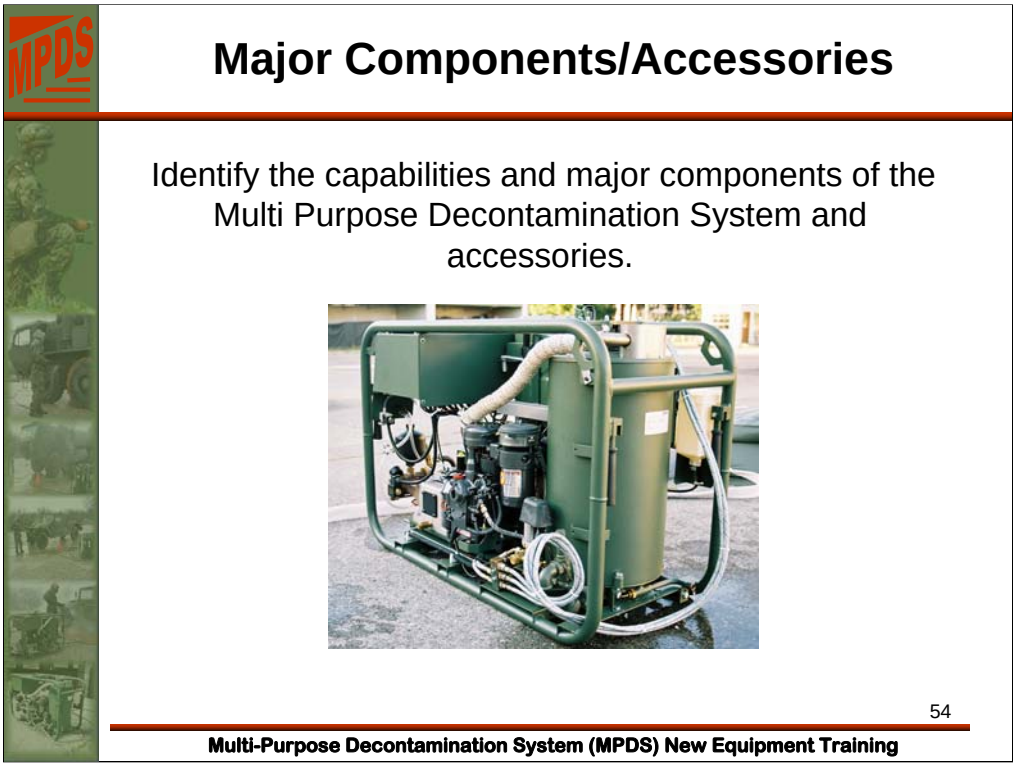
TAB D

Multi Purpose Decontamination System (MPDS)

PFN NO: A-003
Major Components and Capabilities



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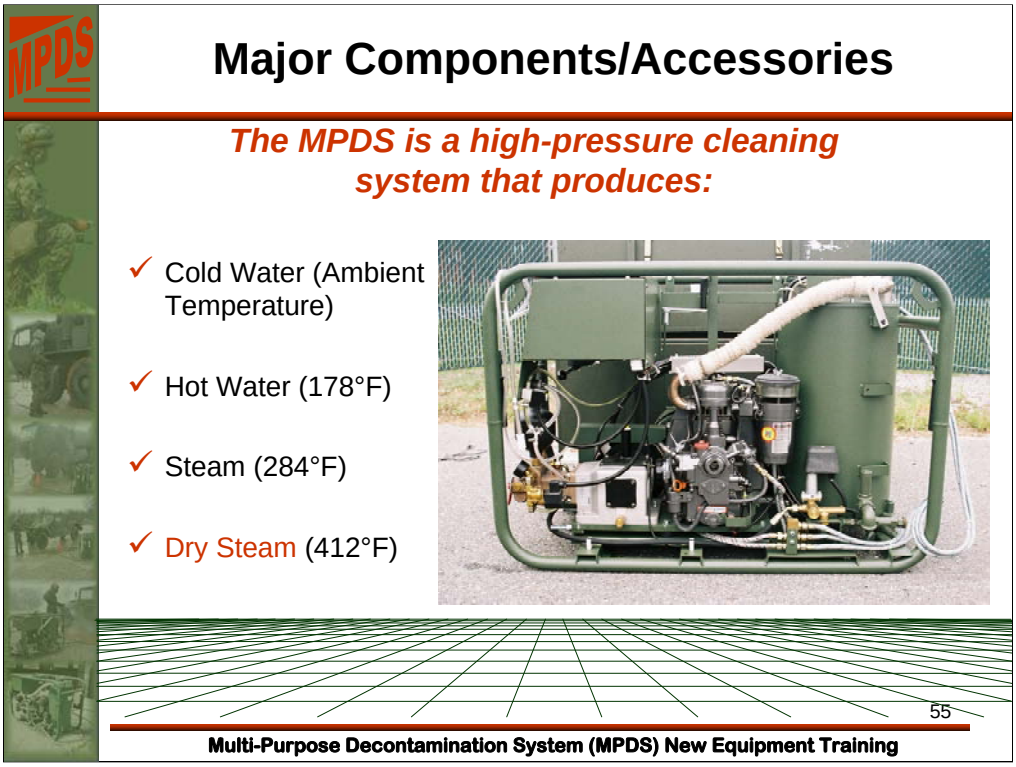
During this part of the lesson, you will identify the capabilities and major components of the Multi Purpose Decontamination System and accessories.



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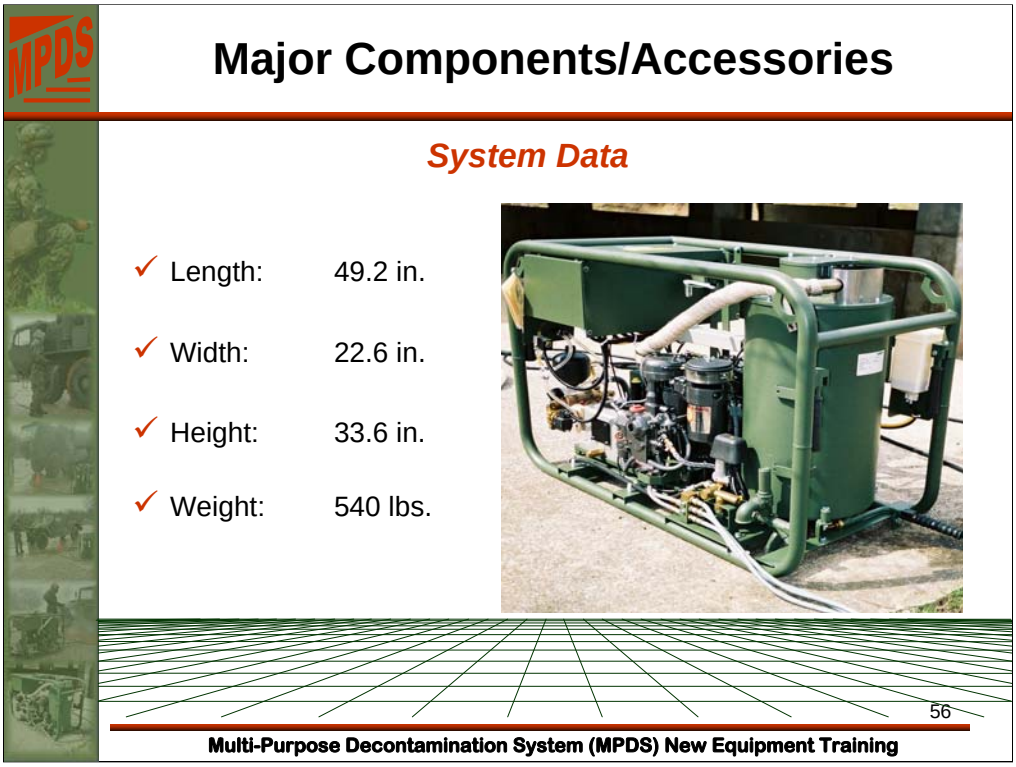
The MPDS is a high-pressure cleaning system that is used for cleaning and decontamination purposes as well as for producing hot water for showers, limited mess operations and medical requirements.

The MPDS produces high-pressure cold water (ambient temperature) and Hot water (178 deg F), Low pressure Steam (284 deg F) and is capable of dry steam (412 deg F) when properly equipped.



SLIDE NET-55 (off)

SLIDE NET-56 (on)

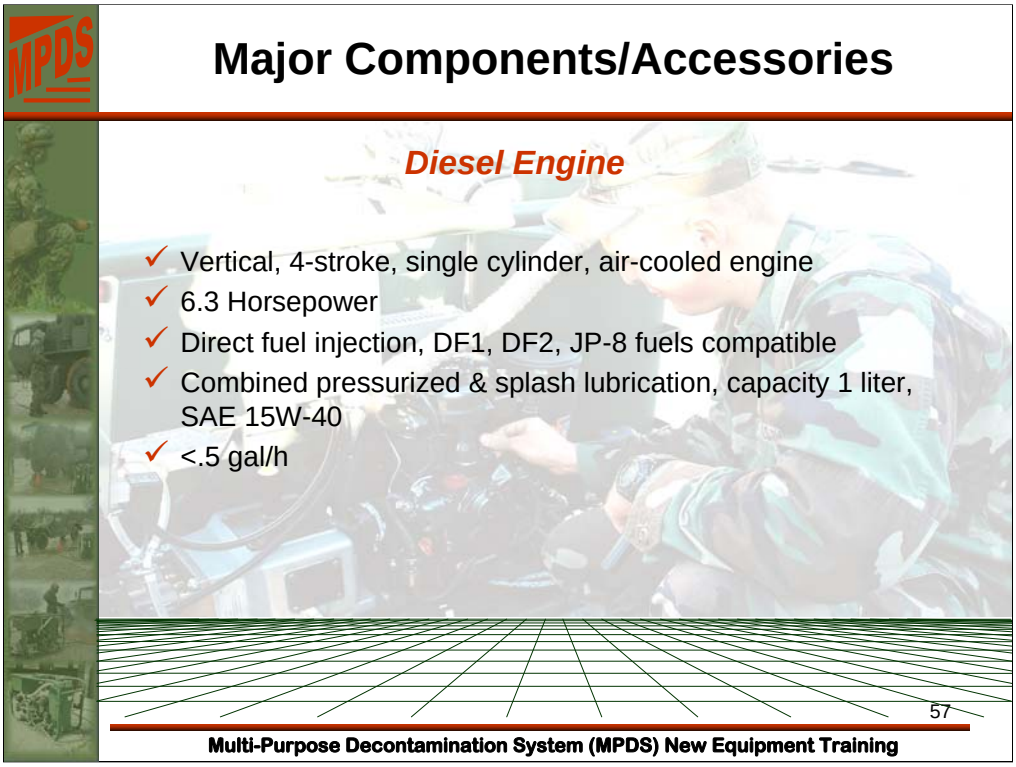
The MPDS dimensions are:

49.2 inches in length

22.6 inches wide

33.6 inches high

weighs 540 lbs with a full fuel can



SLIDE NET-56 (off)

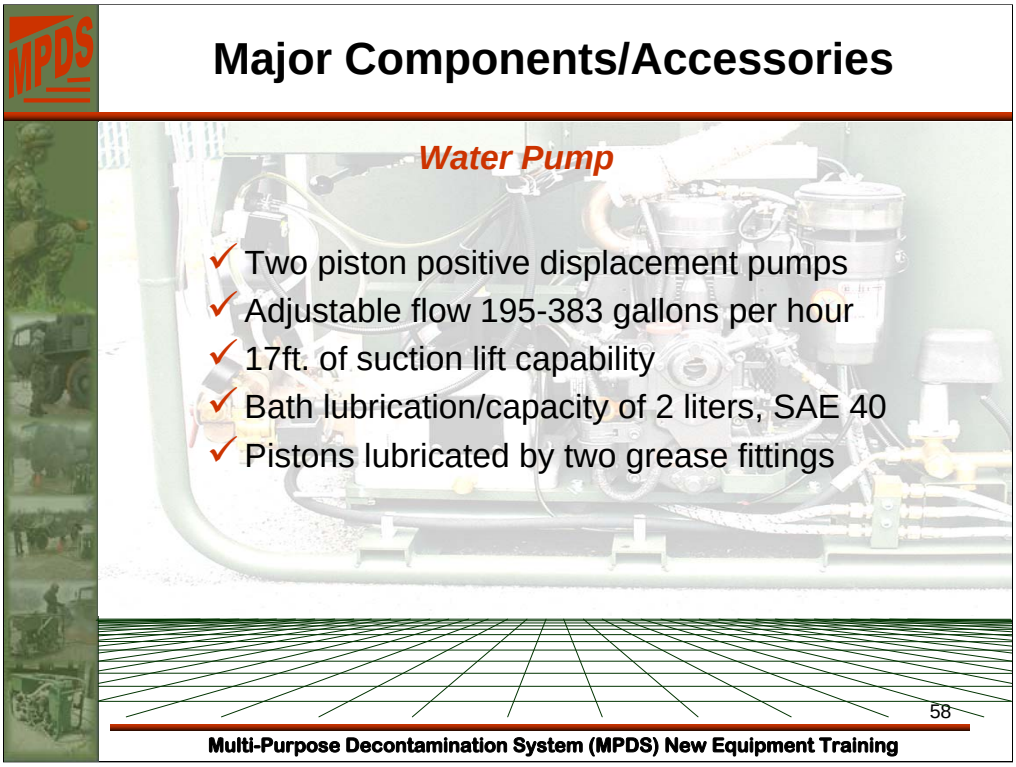
SLIDE NET-57 (on)

The Diesel engine that powers the MPDS unit is a vertical, 4 stroke, single cylinder, air-cooled engine.

It develops 6.3 horsepower using a Direct Fuel injection system capable of using Diesel Fuels and is JP8 compatible.

The engine internal oiling is a combination of pressurized and splash and has the capacity of 1 liter of SAE 15-40 engine oil.

The MPDS engine uses less than a half of a gallon of fuel per hour.



SLIDE NET-57 (off)

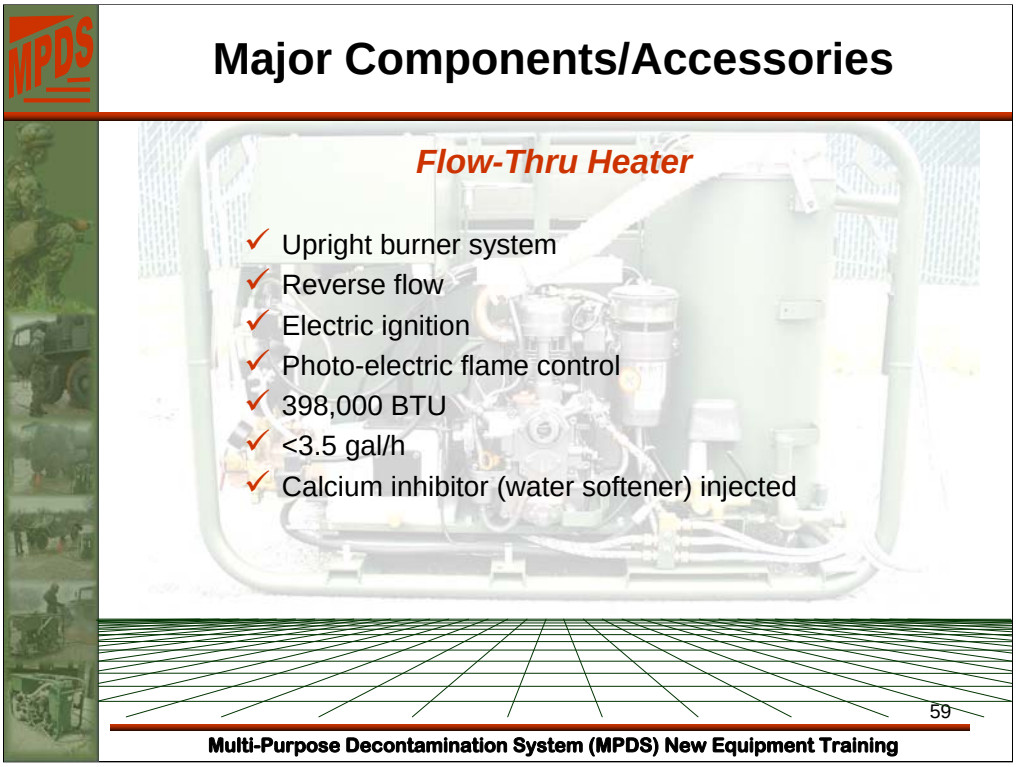
SLIDE NET-58 (on)

The Water pump is a two-piston positive displacement pump and is continuously adjustable.

The flow rate of the pump is 195 to 383 gallons per hour with a suction lift capability of 17 feet.

The pump is internally lubricated using SAE 40 oil with a capacity of 2 liters.

The two pump pistons are lubricated by 2 external grease fittings.



SLIDE NET-58 (off)

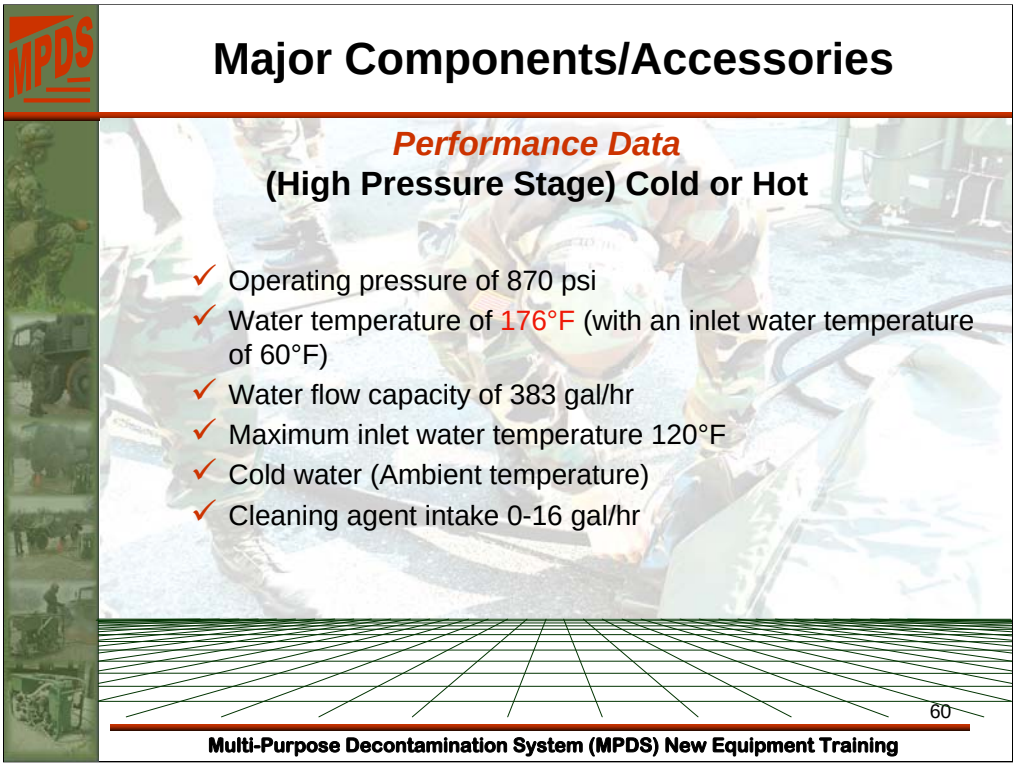
SLIDE NET-59 (on)

The Flow-thru Heater is of an upright burner system with reverse flow design.

The ignition system for the burner is electronic and incorporates a photoelectric flame control device.

The burner unit produces up to 398,000 BTU's and uses less than 31/2 gal per hour.

The Flow-thru Heater also has calcium inhibitor (water softener) system that is injected when in the hot water or steam modes.



SLIDE NET-59 (off)

SLIDE NET-60 (on)

The MPDS has three stages of operation.

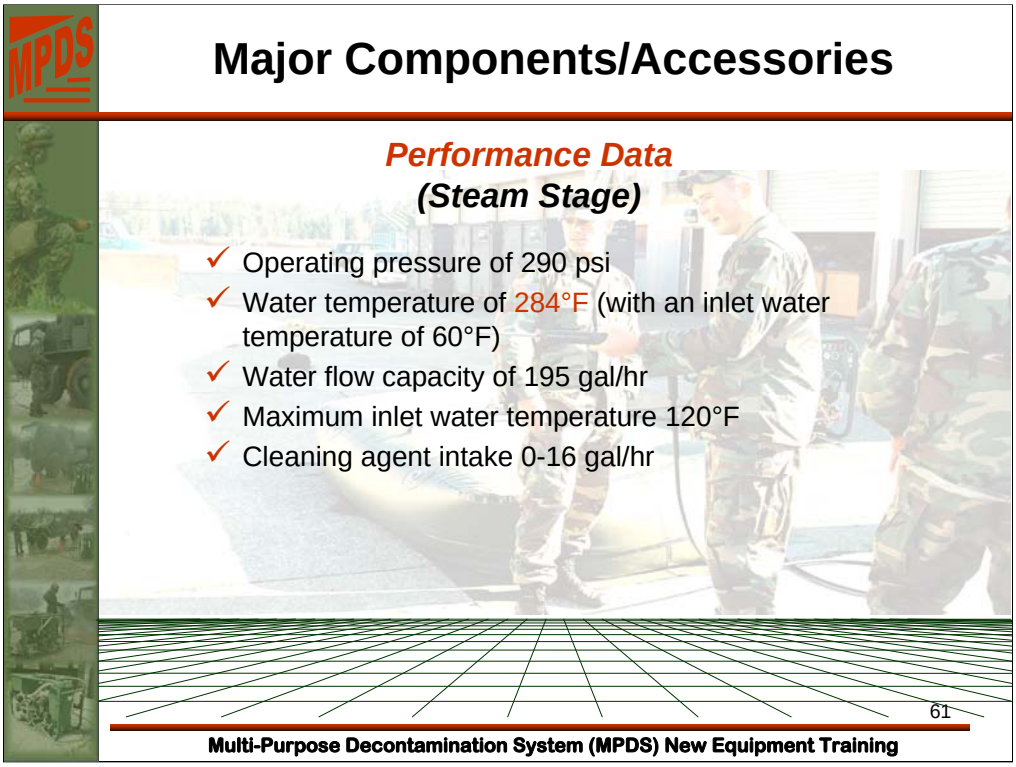
The first operational stage is the High Pressure Stage.

When operating in this stage, you can select Cold or Hot water settings.

The high-pressure stage has the ability of achieving 870 psi, adjusting the output water temperature of ambient up to 176 deg F (with an inlet temperature of 60 deg F) and has the water flow capability of 383 gallons per hour.

The maximum inlet water temperature can be as high as 120 deg F.

The NBC Cleaning Agent or soap mixture can be siphoned and mixed within the water pump at a rate of 0 to 16 gal per hour.



SLIDE NET-60 (off)

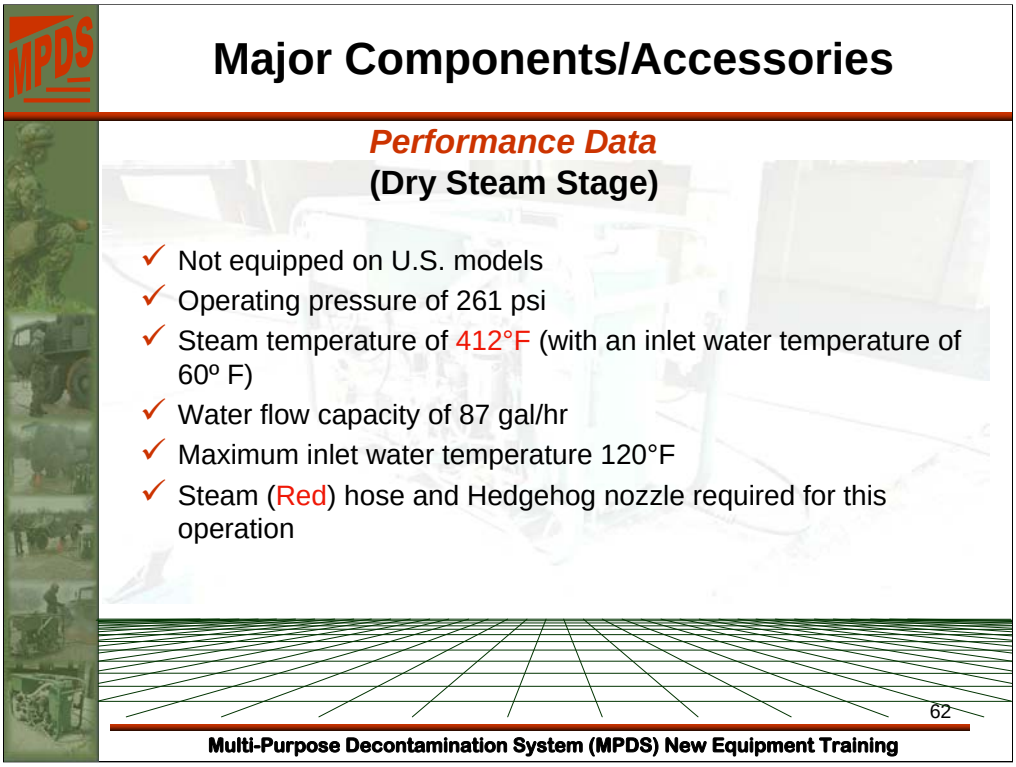
SLIDE NET-61 (on)

The second operational stage is the Steam Stage.

The operating pressure in this stage can achieve 290 psi with a water temperature of up to 284 deg F (with a inlet water temperature of 60 deg F) with a water flow capacity of 195 gal per hour.

The maximum inlet water temperature can be as high as 120 deg F.

The NBC Cleaning Agent or soap mixture can be siphoned and mixed within the water pump at a rate of 0 to 16 gal per hour.



SLIDE NET-61 (off)

SLIDE NET-62 (on)

The third operational stage is the dry steam stage.

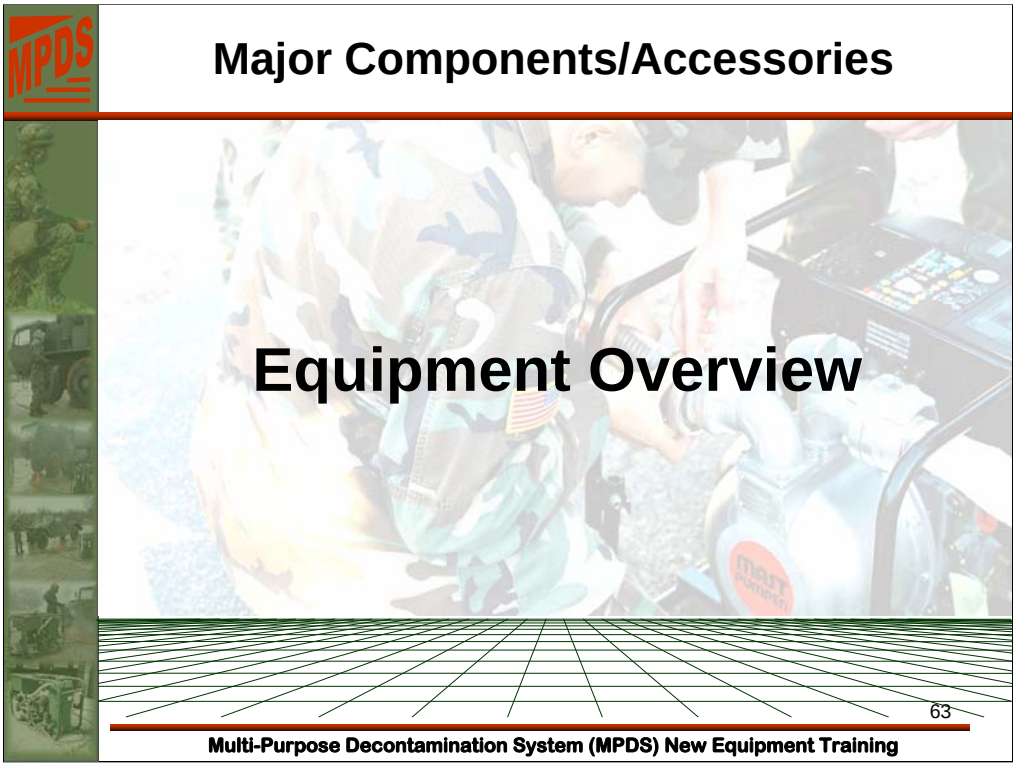
This stage is not operational on the U.S. models of the MPDS.

The dry steam stage has capability of operating pressures of 261 psi with a steam temperature of 412 deg F with a water flow capacity of 87 gal per hour.

The maximum inlet water temperature can be as high as 120 deg F. Special hoses (red) and a hedgehog nozzle are required for this operation.

The chemical injector is not used in the stage of operation.

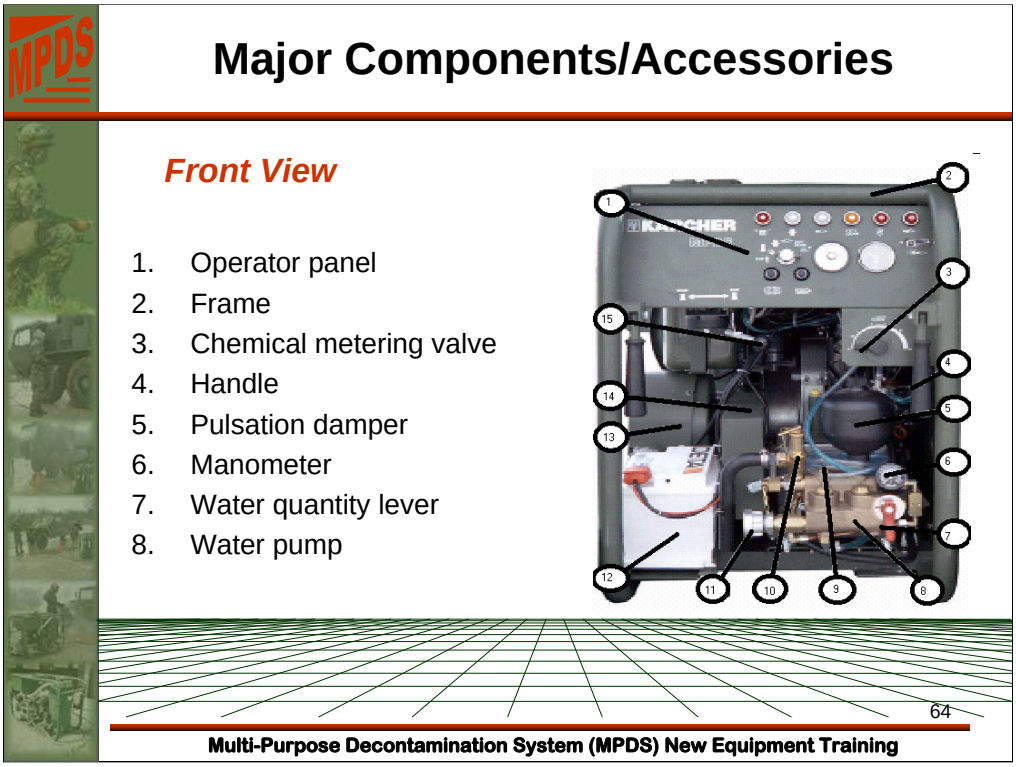
The US version of the MPDS can have this dry steam Stage when the safety valve is installed; the red steam hose and hedgehog nozzles are purchased separately.



SLIDE NET-62 (off)

SLIDE NET-63 (on)

Discuss the equipment Overview detailing the major components and controls of the MPDS.



SLIDE NET-63 (off)

SLIDE NET-64 (on)

The front view of the MPDS contains the majority of the operational controls of the MPDS.

It also illustrates several major components that consist of:

Operator panel

Frame

Chemical metering valve

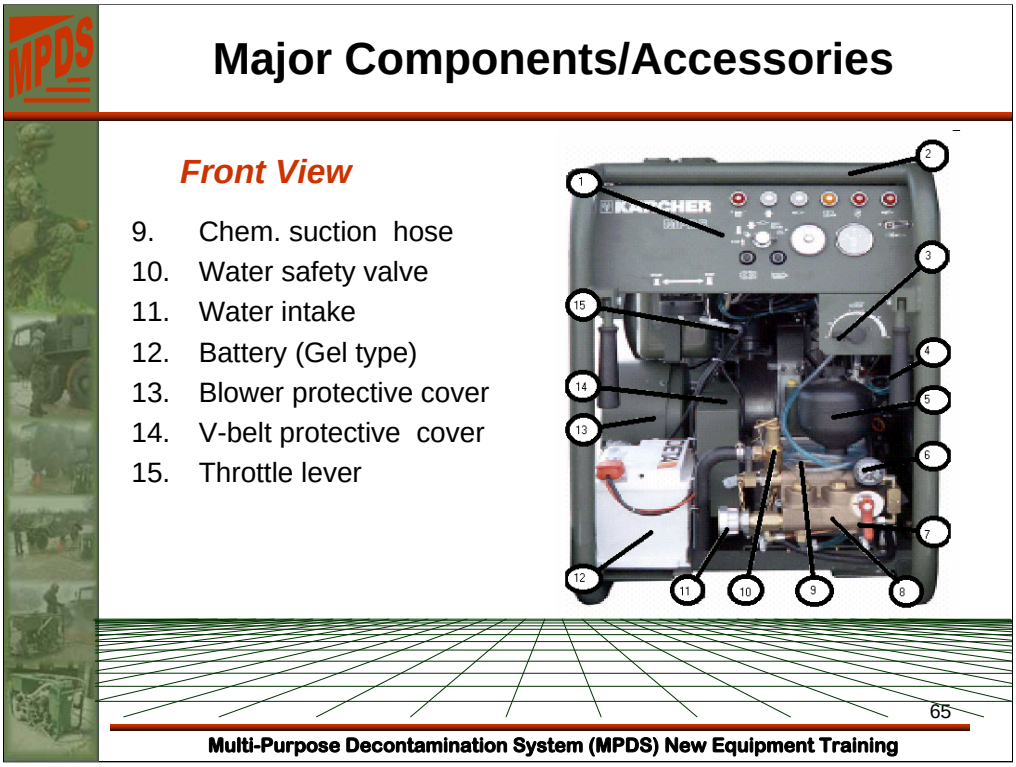
Handle

Pulsation damper

Manometer

Water quality lever

Water pump



SLIDE NET-64 (off)

SLIDE NET-65 (on)

This slide provides the remaining frontal view of the components and controls of the MPDS.

Chemical suction hose

Water safety valve

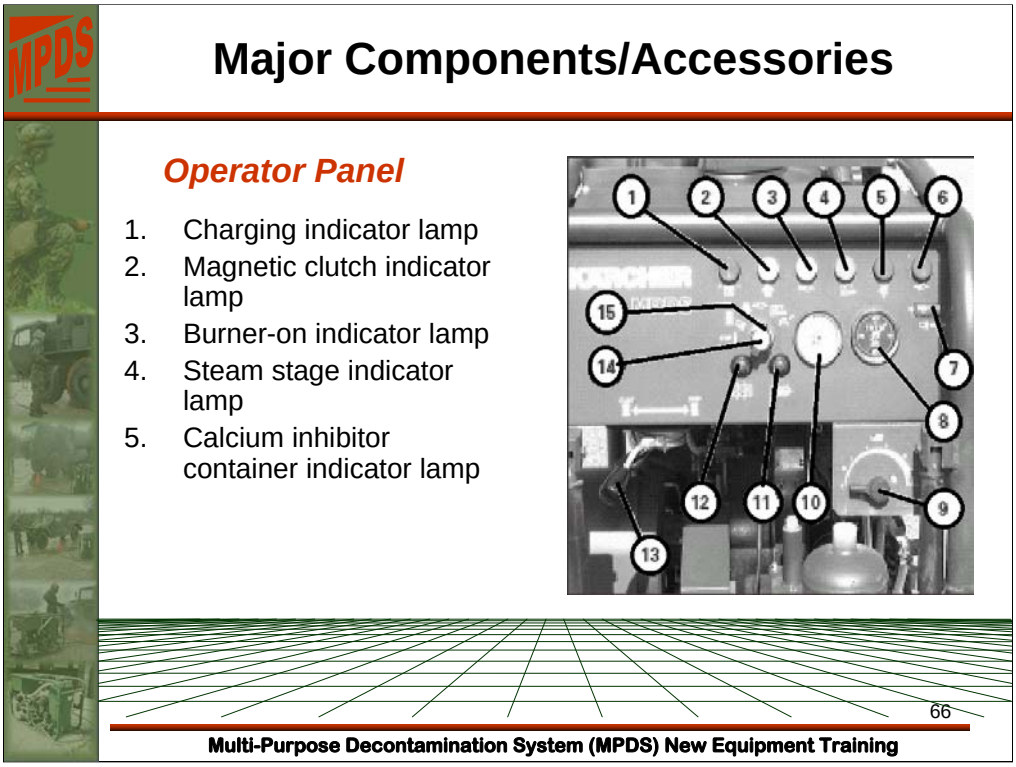
Water intake

Battery (Gel type)

Blower protective cover

V-belt protective cover

Throttle lever



SLIDE NET-65 (off)

SLIDE NET-66 (on)

INSTRUCTOR NOTE: Explain to the students that they will now review the Control Panel. Follow the sequence of numbers listed on the slide.

The specific view of the operator control panel shows:

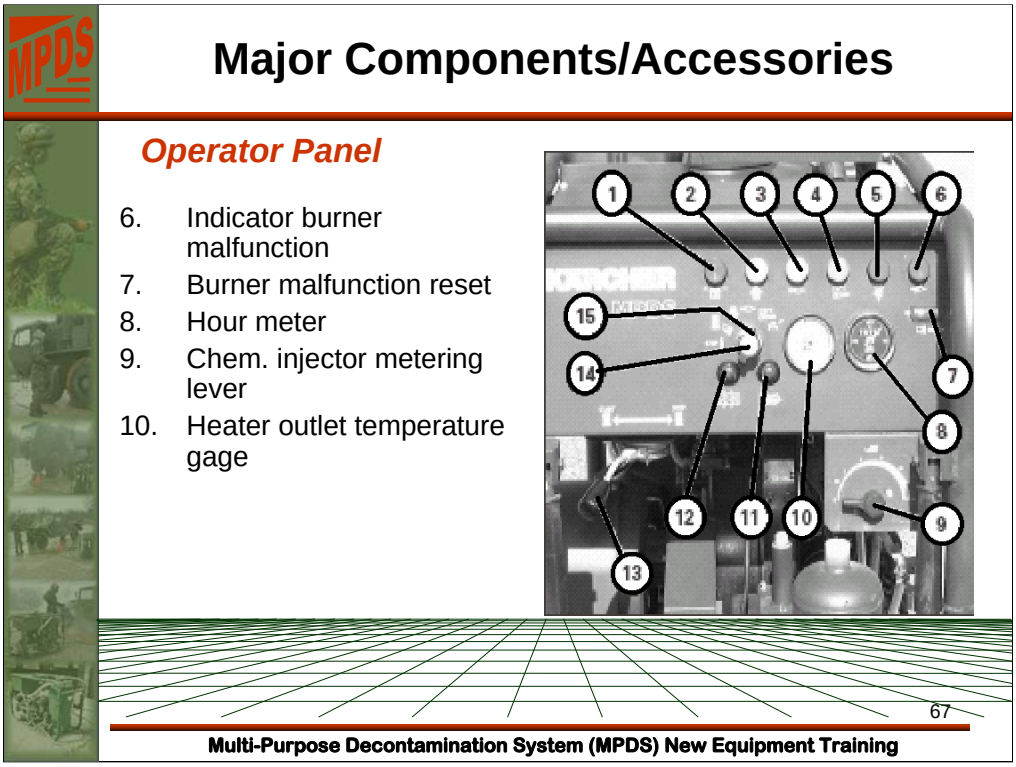
Charging indicator lamp

Magnetic clutch indicator lamp

Burner-on indicator lamp

Steam stage indicator lamp

Calcium inhibitor container indicator lamp



SLIDE NET-66 (off)

SLIDE NET-67 (on)

The continuation of the specific view of the operator control panel shows:

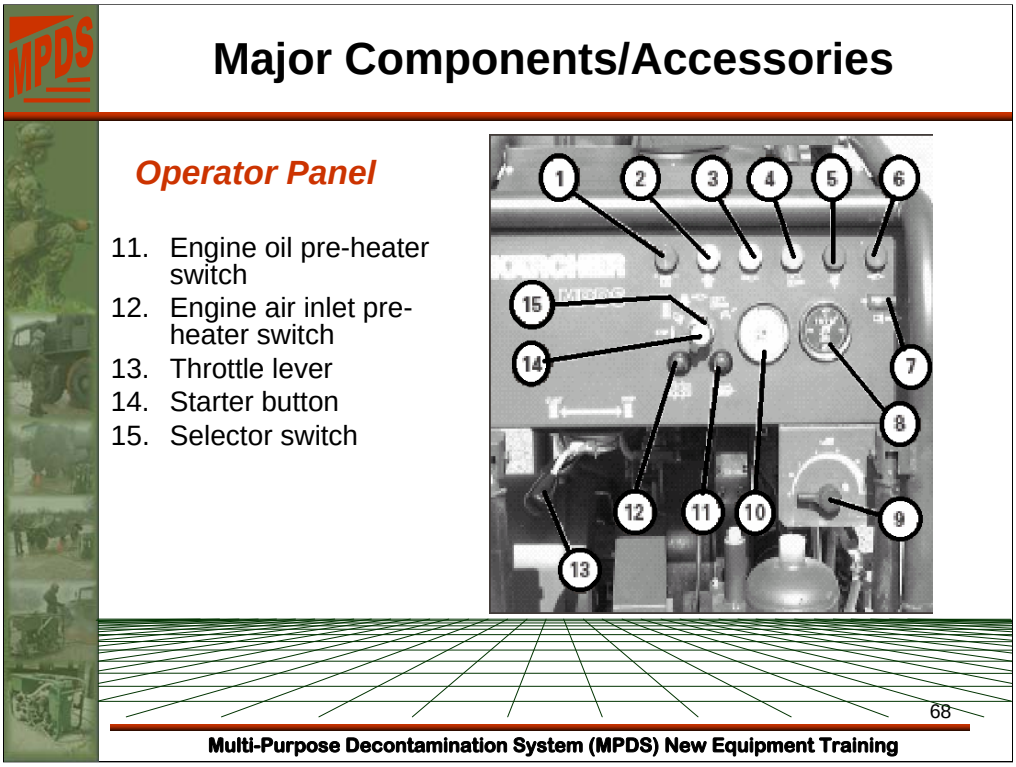
Indicator burner malfunction

Burner malfunction reset

Hour meter

Chemical injector metering lever

Heater outlet temperature gage



SLIDE NET-67 (off)

SLIDE NET-68 (on)

The continuation of the specific view of the operator control panel also shows the following:

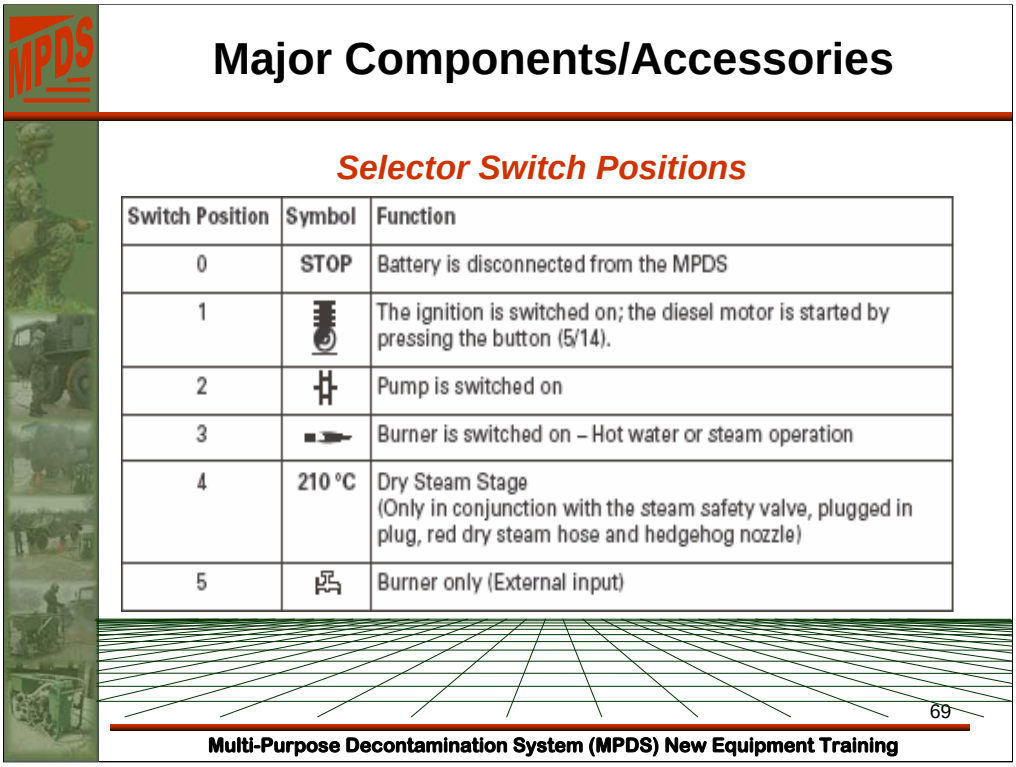
Engine oil pre-heater switch

Engine air inlet preheater switch

Throttle lever

Starter button

Selector switch



SLIDE NET-68 (off)

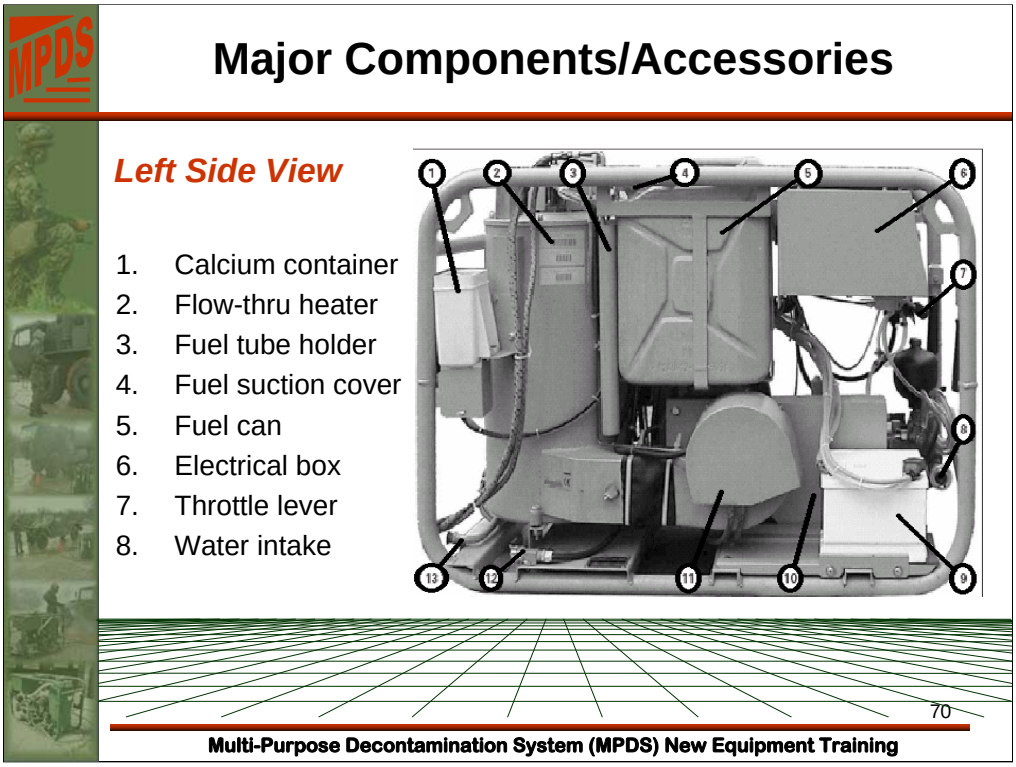
SLIDE NET-69 (on)

INSTRUCTOR NOTE: Explain to the students that they will now view the information that pertains to the Control Panel Main Selector Switch. Follow the switch position sequence from top to bottom.

The selector switch has five operating positions not including the stop position.

For the purpose of this training, we will discuss all of the positions to get a basic understanding but for operational purposes, two of the five are not used by the US Military.

In addition, emphasize that positions 4 and 5 are not currently used by the US Military but the information is provided so that there is no misunderstanding.



SLIDE NET-69 (off)

SLIDE NET-70 (on)

These are components found on the left side view of the MPDS. Some of the controls are visible from the left side were previously discussed when viewing the components and controls from the frontal view.

Calcium container

Flow-thru heater

Fuel tube holder

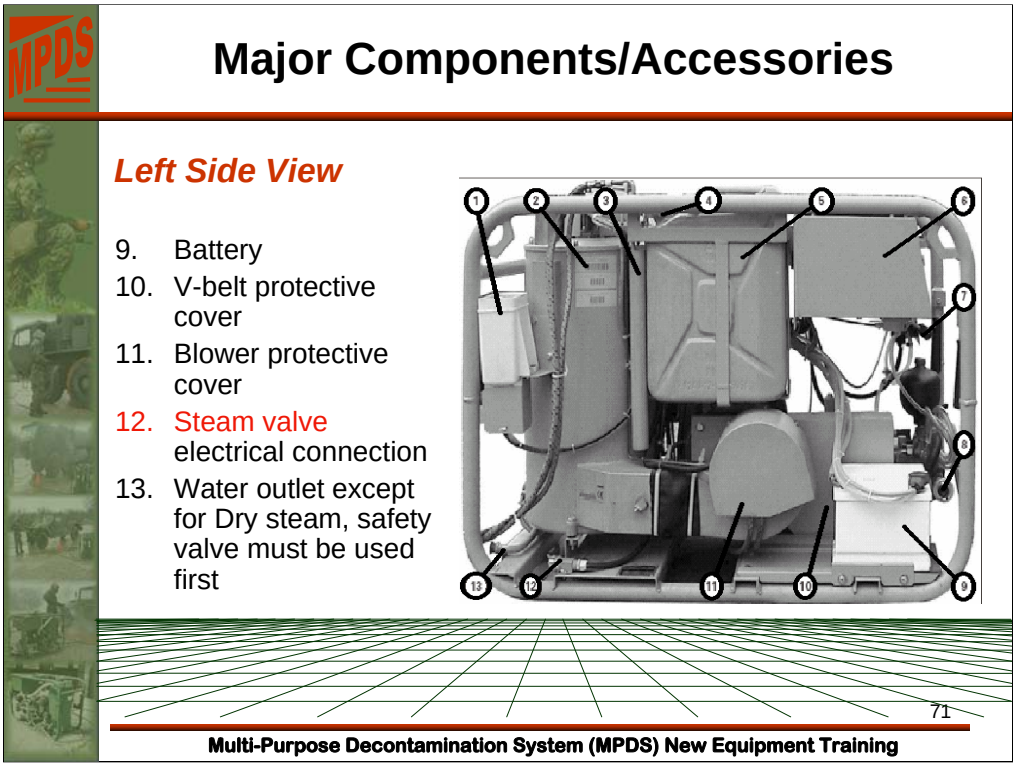
Fuel suction cover

Fuel can

Electrical box

Throttle lever

Water intake



SLIDE NET-70 (off)

SLIDE NET-71 (on)

Shown here is a continuation of the left side view of the MPDS. Some of the controls are visible from the left side were previously discussed when viewing the components and controls from the frontal view.

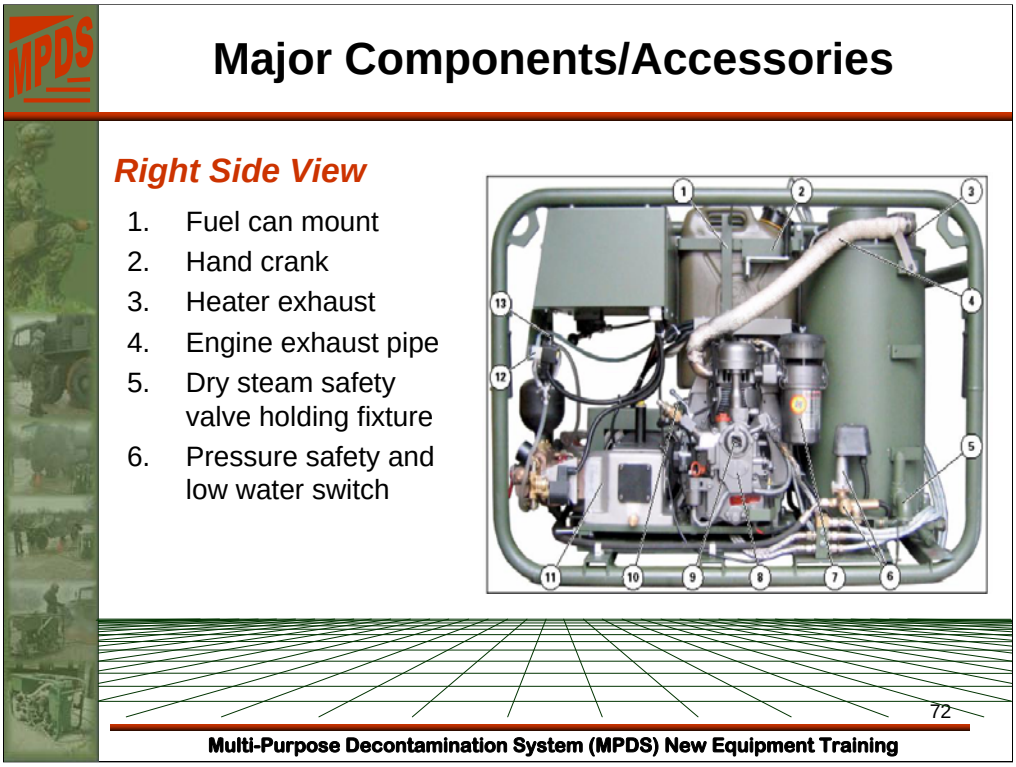
Battery

V-belt protective cover

Blower protective cover

Steam valve electrical connection

Water outlet except for dry steam, safety valve must be used first



SLIDE NET-71 (off)

SLIDE NET-72 (on)

INSTRUCTOR NOTE: Explain to the students that they will now look at the right side view of the MPDS. Follow the sequence of numbers listed.

These components are found on the right side view of the MPDS. It provides a clear view of the MPDS Diesel engine and pump assembly. It also depicts some of the safety devices previously discussed.

Fuel can mount

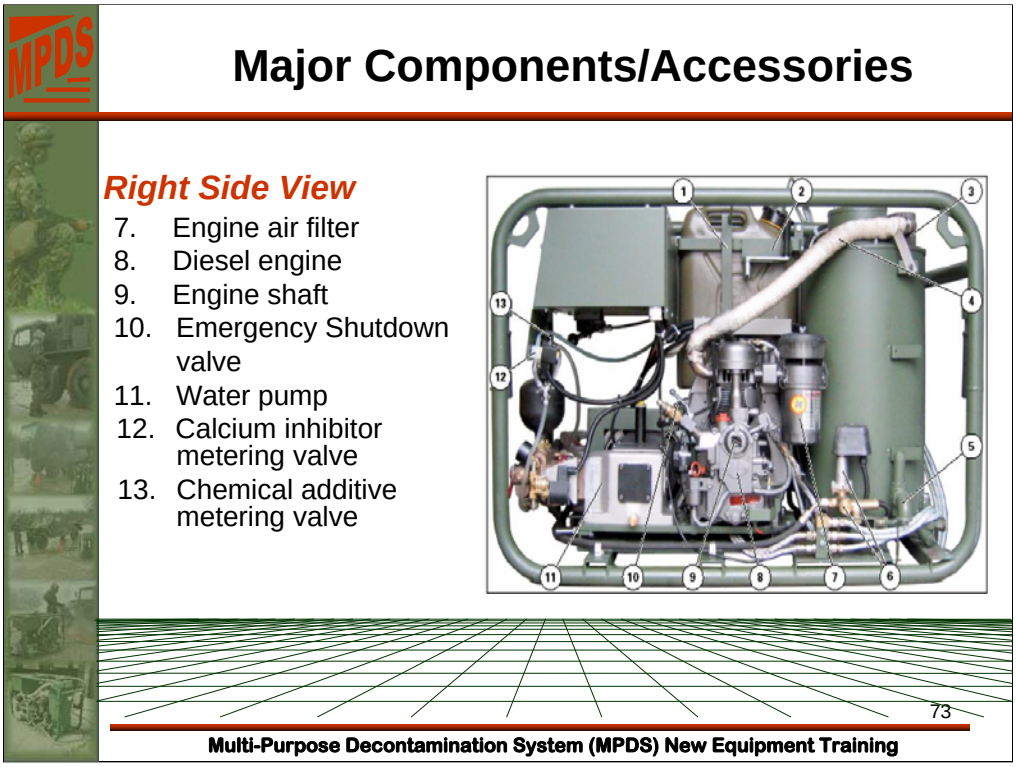
Hand crank

Heater exhaust

Engine exhaust pipe

Dry steam safety valve holding fixture

Pressure safety and low water switch



SLIDE NET-72 (off)

SLIDE NET-73 (on)

The items remaining right side view of the components and controls of the MPDS are:

Engine air filter

Diesel engine

Engine shaft

Emergency Shutdown valve

Water pump

Calcium inhibitor metering valve

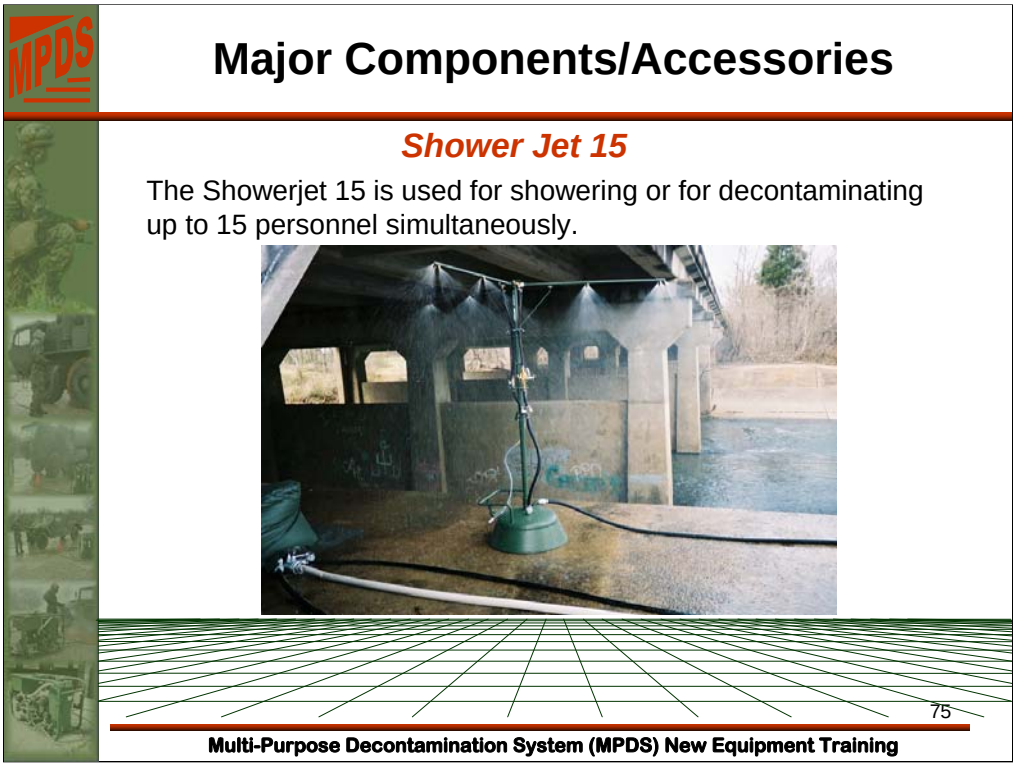
Chemical additive

SLIDE NET-73 (off)

SLIDE NET-74 (on)

INSTRUCTOR NOTE: Explain to the students that they will now look at the Shower Jet 15.

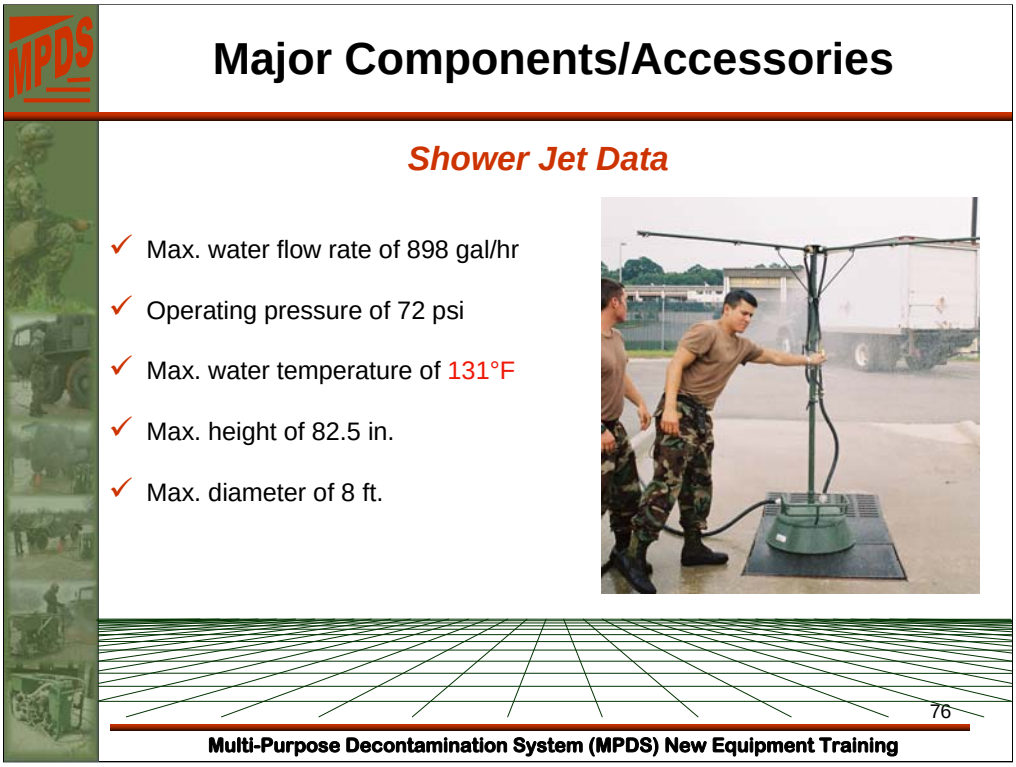
This is the first of several slides depicting the 15-person shower-jet system accessory associated with the MPDS.



SLIDE NET-74 (off)

SLIDE NET-75 (on)

The 15-person shower-jet system accessory is used for showering or decontaminating up to 15 personnel simultaneously.



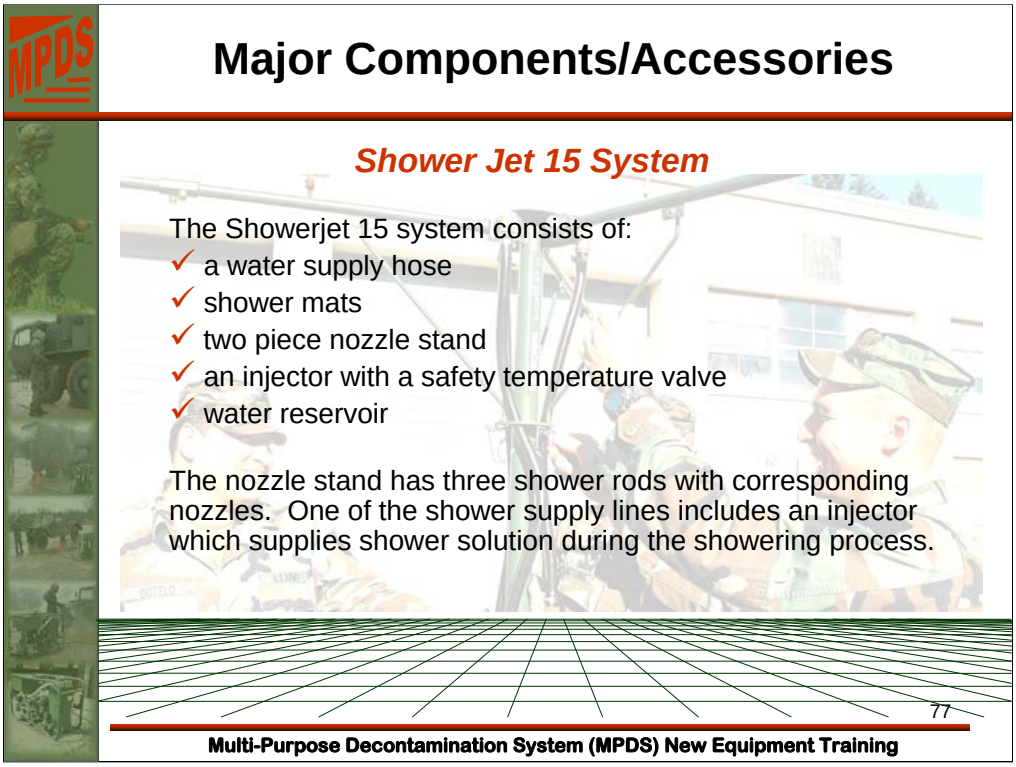
SLIDE NET-75 (off)

SLIDE NET-76 (on)

The 15-person shower-jet system has a maximum water flow of 898 gal of water per hour, with a operating pressure of 72 psi.

The maximum water temperature cannot exceed 131 deg F.

The shower-jet has a maximum height of 82 ½ inches and a diameter of 8 feet.



SLIDE NET-76 (off)

SLIDE NET-77 (on)

The shower-jet system components consist of:

An injector with a safety temperature valve

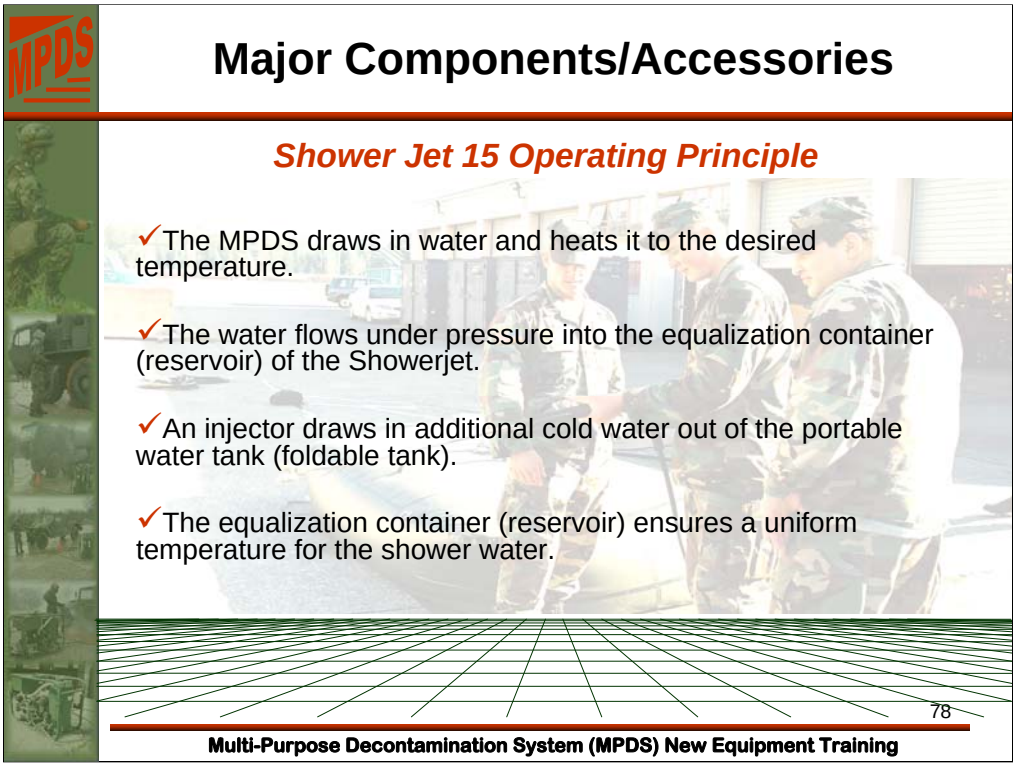
A water supply hose

Shower mats

Two piece nozzle stand

Water reservoir

The nozzle stand has three shower rods with corresponding nozzles. One of the shower supply lines includes an injector, which supplies shower solution during the showing process.



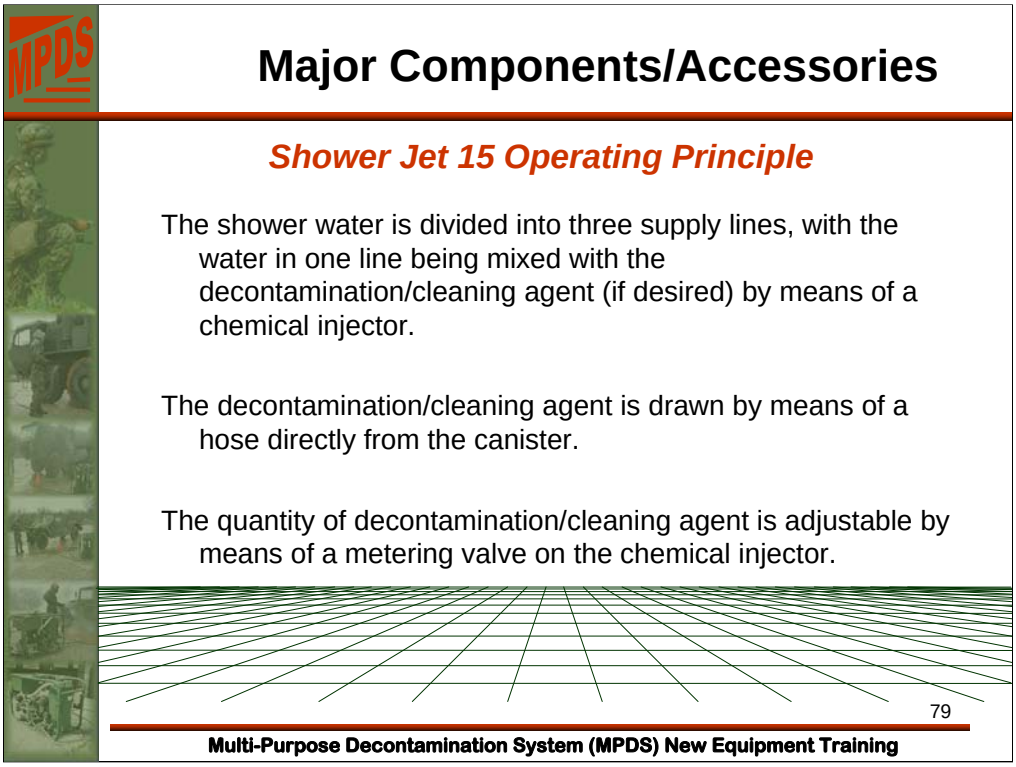
SLIDE NET-77 (off)

SLIDE NET-78 (on)

INSTRUCTOR NOTE: Explain to the students that they will now discuss the Shower Jet 15 operating principle.

The MPDS draws in water and heats it to the desired temperature. The water flows under pressure into the equalization container (reservoir) of the shower-jet.

An injector draws in additional cold water out of the portable water tank (foldable tank). The equalization container (reservoir) ensures a uniform temperature for the shower water.



SLIDE NET-78 (off)

SLIDE NET-79 (on)

The shower water is divided into three supply lines, with the water in one line being mixed with the decontamination/cleaning agent (if desired) by means of a chemical injector.

The decontamination/cleaning agent is drawn by means of a hose directly from the canister.

The quantity of decontamination/cleaning agent is adjustable by means of a metering valve on the chemical injector.

SLIDE NET-79 (off)

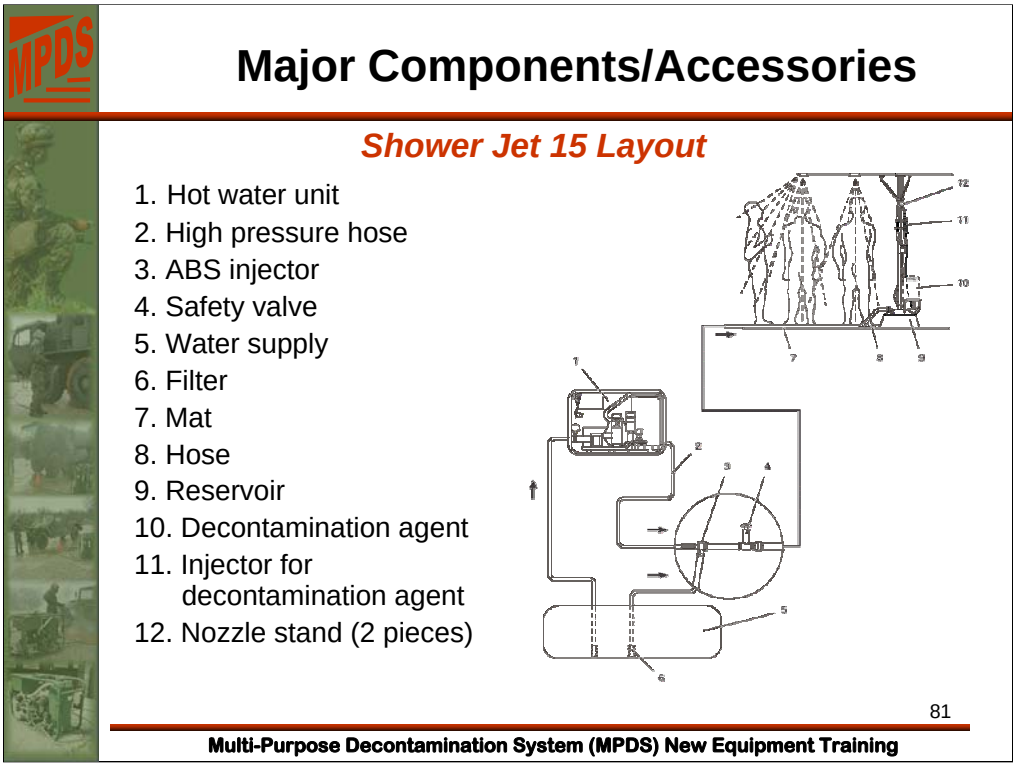
SLIDE NET-80 (on)

The decontamination/cleaning agent is discharged via a shower tube with five nozzles.

The clear water for rinsing is discharged via two shower tubes, each with five nozzles.

The shower tubes for the clear water can be shut off individually with a shut-off valve.

A safety valve limits the shower temperature to 131 °F. The safety valve is installed at the injector output in the water supply line and closes the inlet to the equalization container (reservoir) for water that exceeds 131 °F. This hot water runs off over the suction line of the injector.



SLIDE NET-80 (off)

SLIDE NET-81 (on)

INSTRUCTOR NOTE: Explain to the students that they will now discuss the 15-person shower-jet system Equipment Layout.

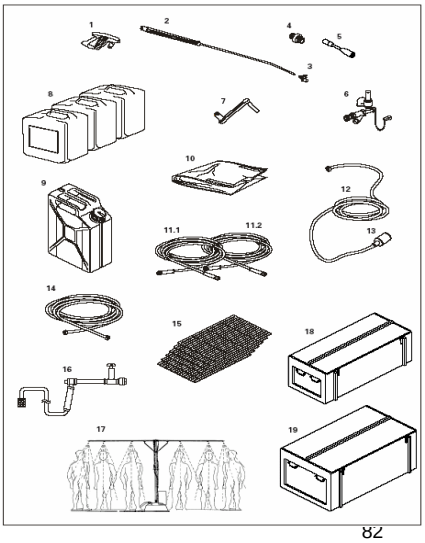
The layout of the shower-jet 15 as depicted by numerical sequence includes the:

Hot water unit
High pressure hose
ABS injector
Safety valve
Water supply
Filter
Mat
Hose
Reservoir
Decontamination agent
Inject of decontamination agent
Nozzle stand (2 pieces)

Major Components/Accessories

Standard Accessories

No. in Fig. 7	Quan-tity	Designation	Part No.	Nato Stock No.
1	1	Hand spray gun	4.775-012.0	4940-12-307-0617
2	1	Spray lance, 1040 mm (41 in)	4.760-049.0	4940-12-147-9265
3	1	Nozzle holder with	4.764-012.0	4940-12-147-9268
	1	- Nozzle 0°	6.415-299.0	4940-12-147-9269
	1	- Nozzle 25°	6.415-172.0	4940-12-147-9270
4	1	Connection piece for connecting two high pressure hoses	4.403-002.0	4730-12-321-3059
5	1	Foam nozzle	4.763-047.0	4730-12-190-0889
6	1	Steam safety valve	4.749-040.0	
7	1	Hand crank	6.322-015.0	
8	3	Calcium inhibitor, 5 l (1.3 gal)	2.780-003.0	6850-12-147-4344
9	1	Fuel canister, 20 l (5.2 gal)	6.393-000.0	7240-01-337-5269
10	1	Tarpaulin	6.277-298.0	
11.1	1	High pressure hose, 10 m (33 ft), ID 10	6.388-814.0	4770-12-147-8182
11.2	1	High pressure hose, 15 m (49 ft), ID 10	6.390-023.0	
12	1	Suction hose, 7.5 m (25 ft), ID 19	4.440-301.0	
13	1	Suction filter basket	4.734-068.0	
14	1	Water hose, 7.5 m (25 ft), ID 19	4.440-301.0	
15	6	Floor mat, foldable	6.277-190.0	7220-12-135-8992
16	1	Incector with suction hose and filter (4.440-762.0)	3.637-026.0	
17	1	Showerjet 15, shower	1.436-100.0	4510-12-324-6350
18	1	Accessory box, MPDS accesories	6.595-306.0	
19	1	Transport box	6.595-319.0	



82

Multi-Purpose Decontamination System (MPDS) New Equipment Training

SLIDE NET-81 (off)

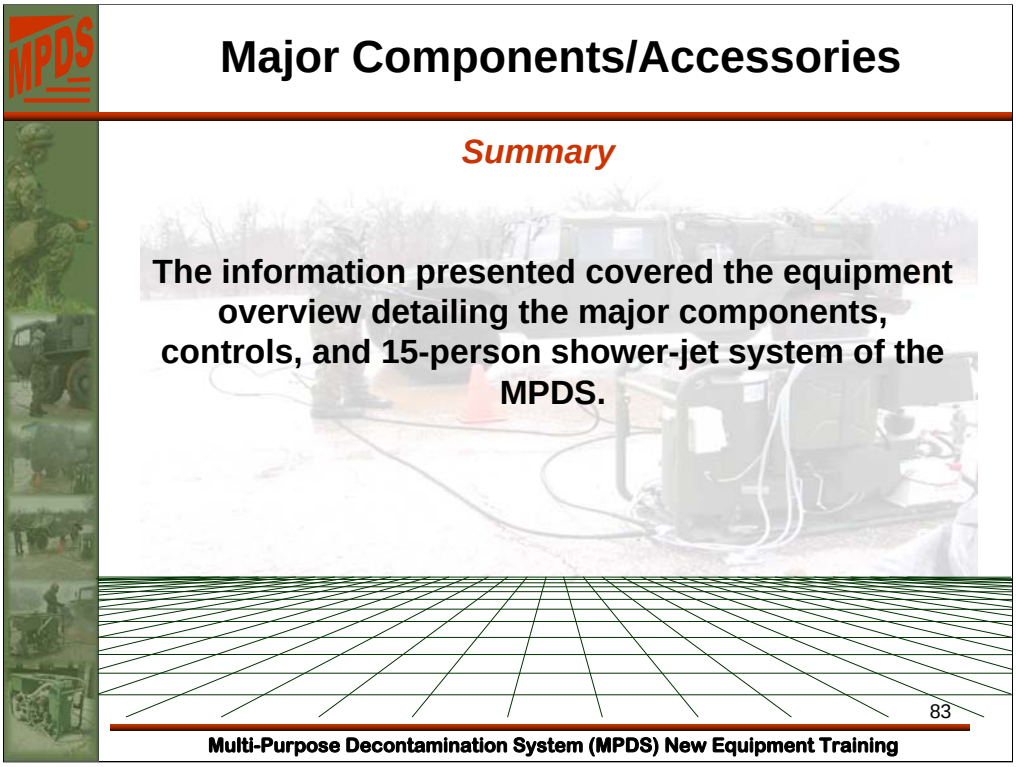
SLIDE NET-82 (on)

INSTRUCTOR NOTE: Review and discuss the standard accessories of the standard MPDS.

The standard U.S. version of the MPDS accessory outfit comes with 19 different components.

Refer to the slide to discuss the basic information of these accessories.

INSTRUCTOR NOTE: Ask the students if they have any questions that pertain to identifying the capabilities and major components of the MPDS.



SLIDE NET-82 (off)

SLIDE NET-83 (on)

NOTE: Conduct a check on learning and summarize the learning activity.

Q. What type of engine powers the MPDS?

R. The MPDS is powered by a vertical 4 stroke, single cylinder, air-cooled diesel engine.

Q. How many stages of operation does the MPDS have?

R. The MPDS has three stages of operation.

Q. What is the maximum water temperature setting when using the steam mode?

R. The maximum inlet water temperature can be as high as 120 deg. F.

SLIDE NET-83 (off)

TAB E

Multi Purpose Decontamination System (MPDS)

PFN NO: A-004
Perform Operator PMCS on the MPDS

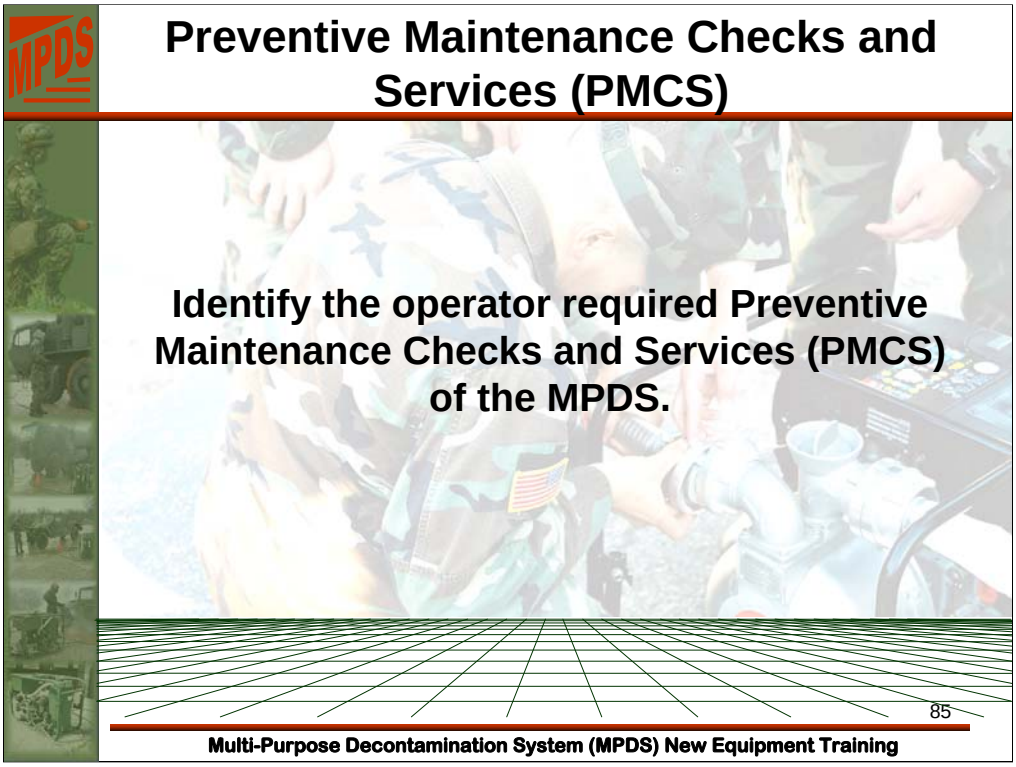
INSTRUCTOR NOTE: Explain to the students that they will now discuss preventive maintenance checks and services (PMCS). Ensure that each student have a copy of handout #1 which is located in the student guide.

Slide NET-84 (on)

Identify the operator required Preventive Maintenance Checks and Services (PMCS) of the MPDS.

Before operations

During operations



Slide NET-84 (off)

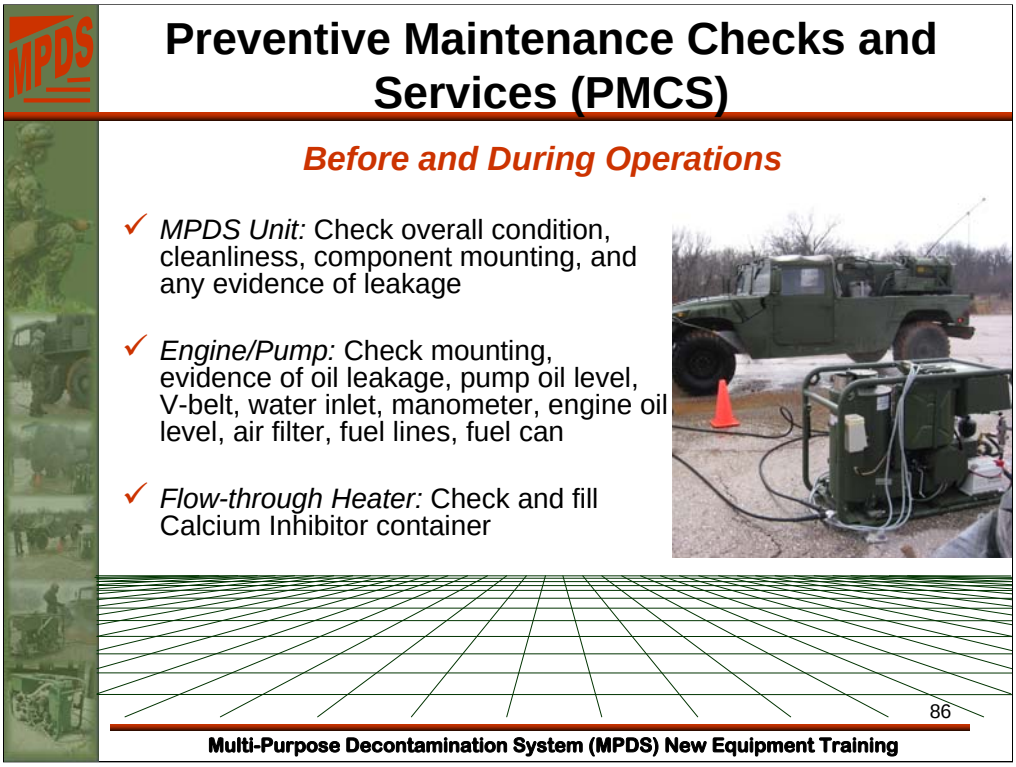
Slide NET-85 (on)

INSTRUCTOR NOTE: Emphasize the importance of performing PMCS on the MPDS.

The MPDS requires some PMCS actions that need to be completed by the operator.

The operator is the first in the link in establishing the operational readiness of the equipment.

The operator is overall responsible for the safe and proper operation of his/her assigned equipment.



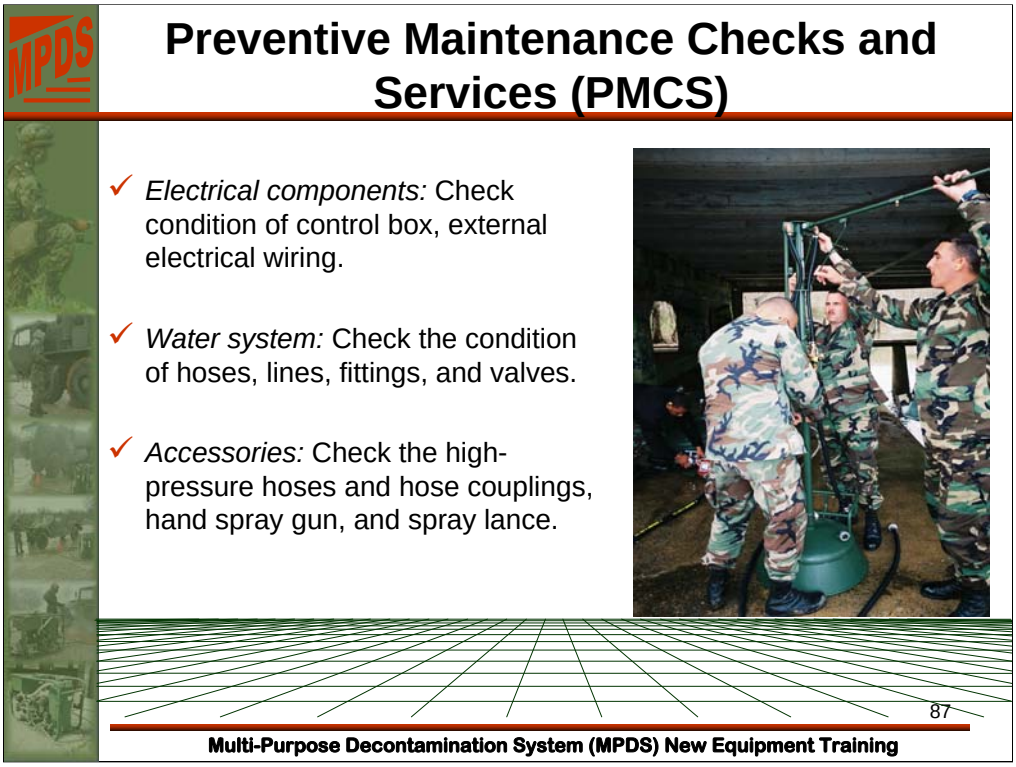
Slide NET-85 (off)

Slide NET-86 (on)

MPDS Unit – Check overall condition, cleanliness, component mounting, and any evidence of leakage.

Engine/Pump – Check mounting, evidence of oil leakage, pump oil level, V-belt, water inlet, manometer, engine oil level, air filter, fuel lines, fuel can.

Flow-through Heater – Check and fill calcium inhibitor container.



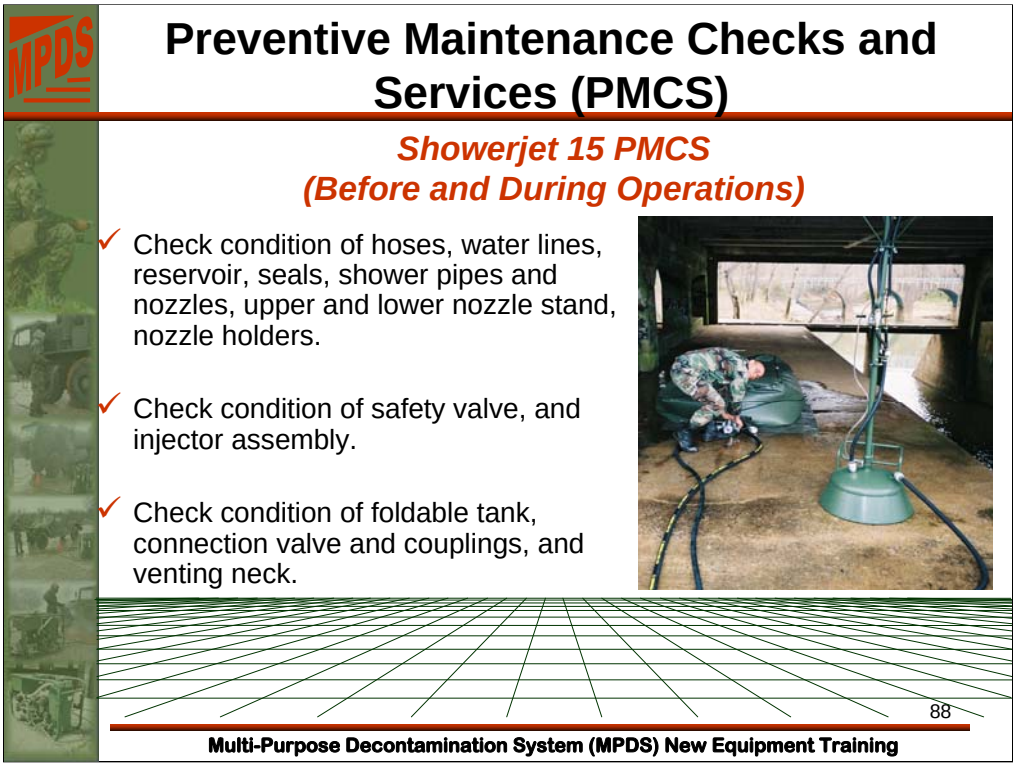
Slide NET-86 (off)

Slide NET-87 (on)

Electrical components – Check condition of control box, external electrical wiring.

Water system – Check the condition of hoses, lines, fittings, and valves.

Accessories – Check the high-pressure hoses and hose couplings, hand spray gun, and spray lance.



Slide NET-87 (off)

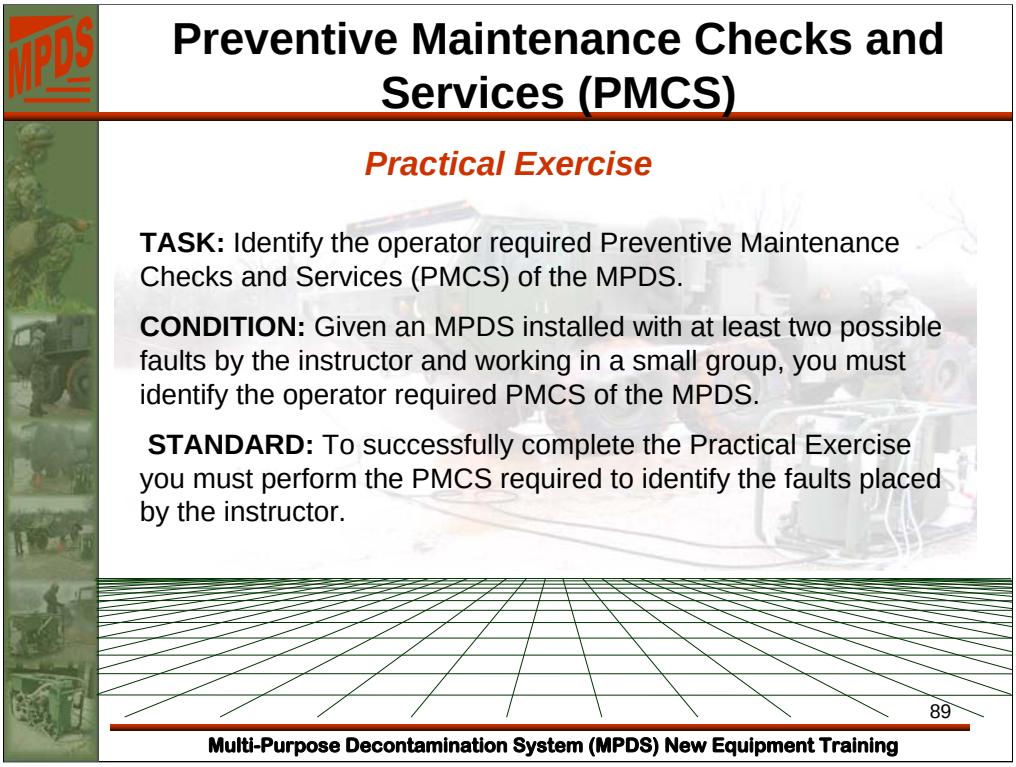
Slide NET-88 (on)

Check condition of hoses, water lines, reservoir, seals, shower pipes and nozzles, upper and lower nozzle stand, nozzle holders.

Check condition of safety valve, and injector assembly.

Check condition of foldable tank, connection valve and couplings, and venting neck.

INSTRUCTOR NOTE: Ask the students if there are any questions that pertain to PMCS procedures for the MPDS.

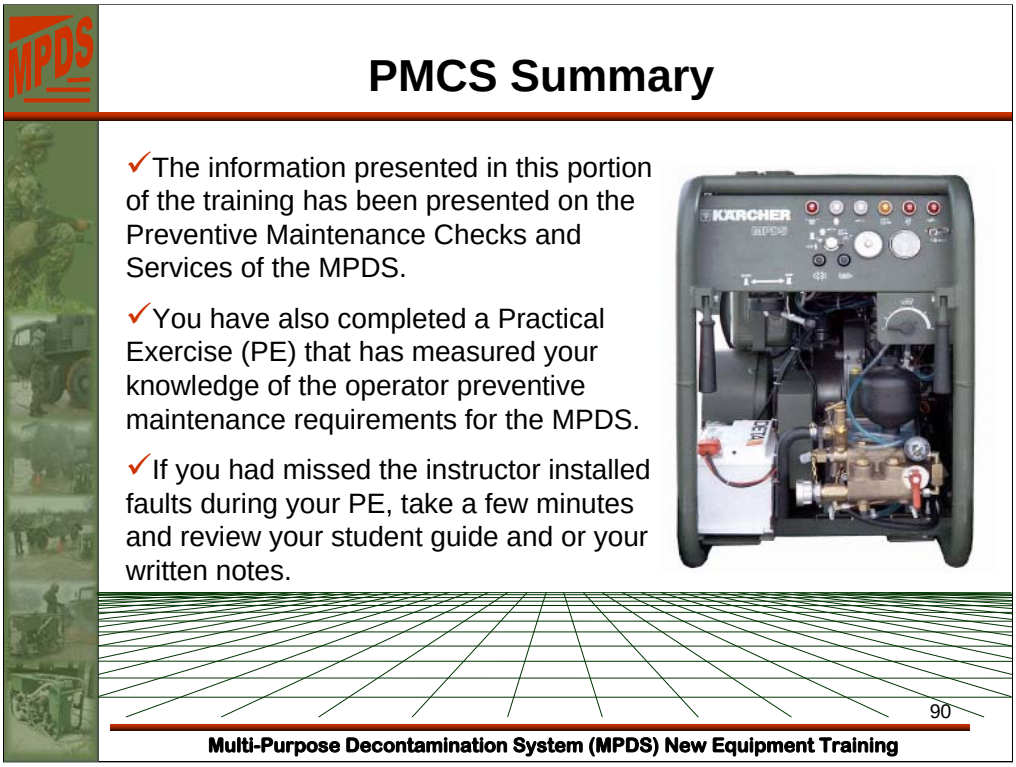


Slide NET-88 (off)

Slide NET-89 (on)

The students will perform a practical exercise on the PMCS requirements of the MPDS.

STANDARD: The student will identify the operator required Preventive Maintenance Checks and Services (PMCS) of the MPDS and successfully complete the Practical Exercise by identifying at least two possible installed faults placed by the Instructor. This is not a graded Practical Exercise.



Slide NET-89 (off)

Slide NET-90 (on)

NOTE: Conduct a check on learning and summarize the learning activity.

The information presented in this portion of the training has been presented on the PMS of the MPDS.

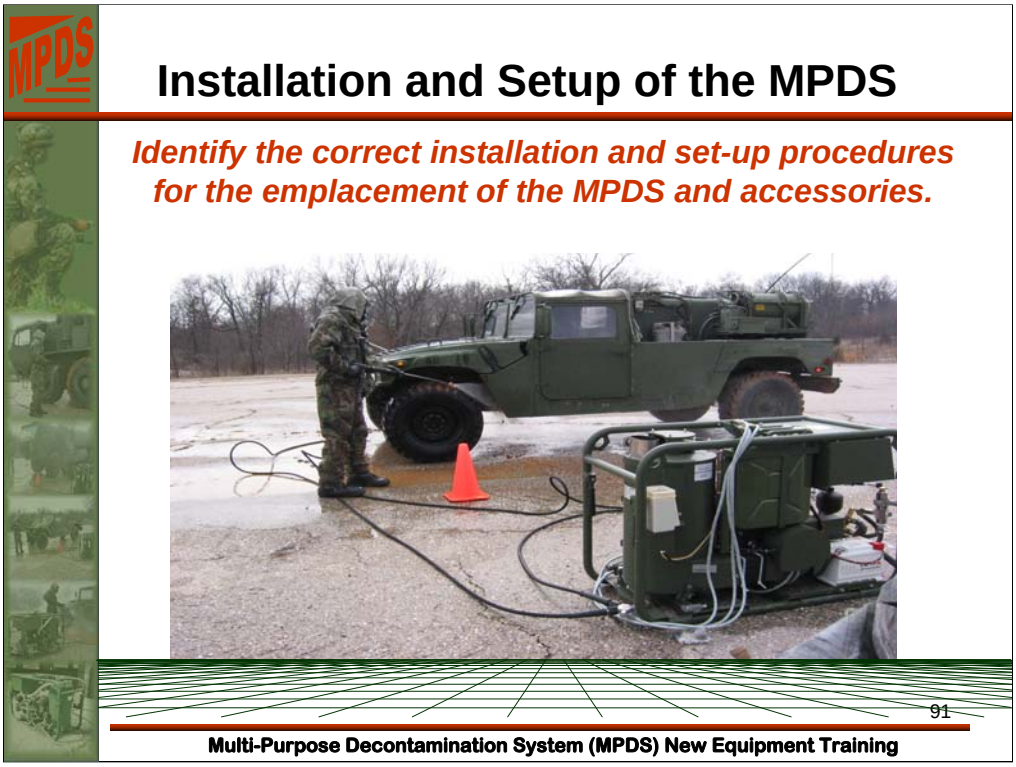
You have completed a Practical Exercise (PE) that has measured your knowledge of the operator PMCS for the MPDS.

Slide NET-90 (off)

TAB F

Multi Purpose Decontamination System (MPDS)

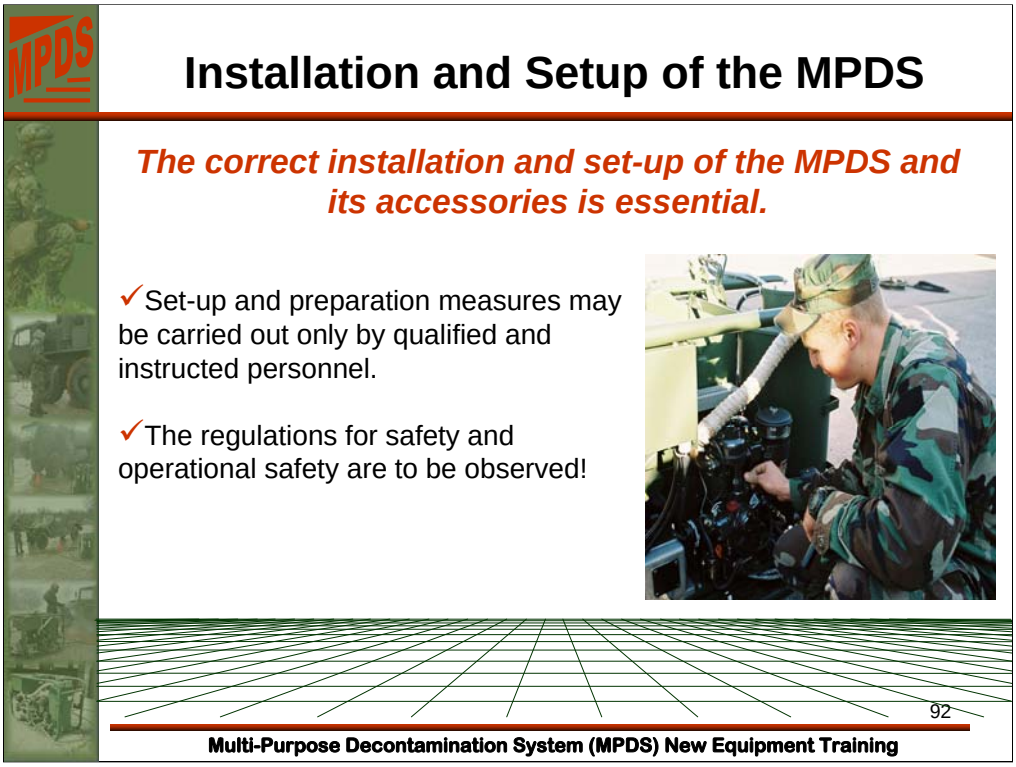
PFN NO: A-005
Installation and Setup



INSTRUCTOR NOTE: Explain to the students that the correct installation and set-up of the MPDS and its accessories is essential to mission success.

Slide NET-91 (on)

Identify the correct installation and set-up procedures to emplace the MPDS and accessories.

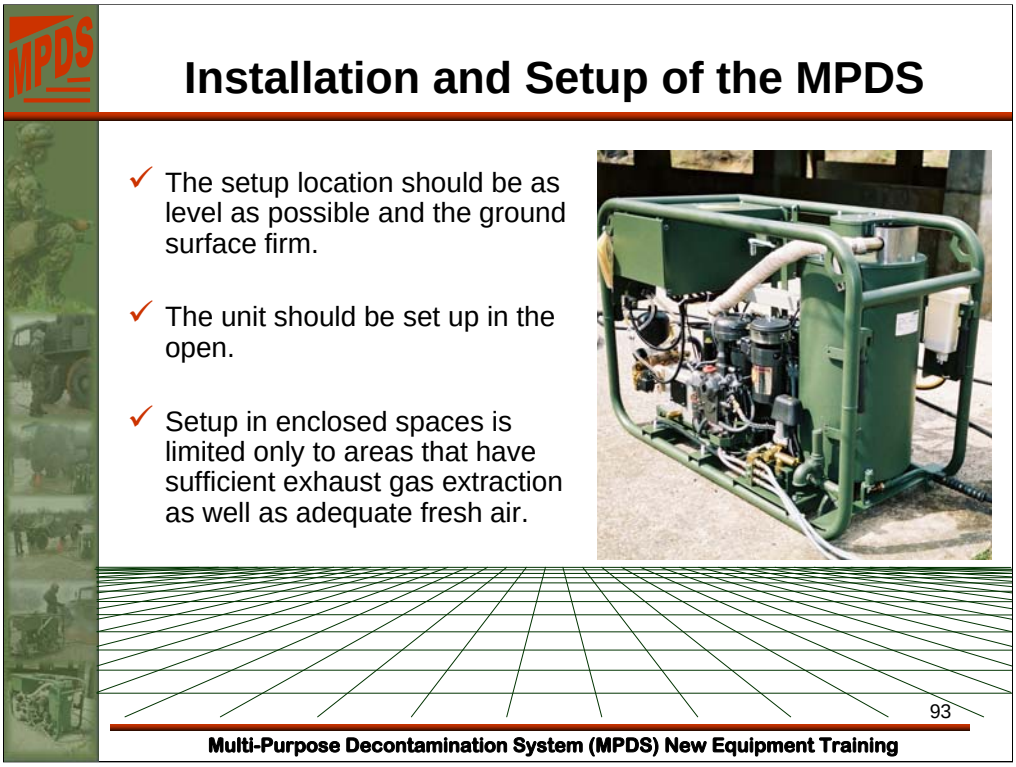


Slide NET-91 (off)

Slide NET-92 (on)

Set-up and preparation measures may be carried out only by qualified and instructed personnel.

The regulations for safety and operational safety are to be observed at all times.



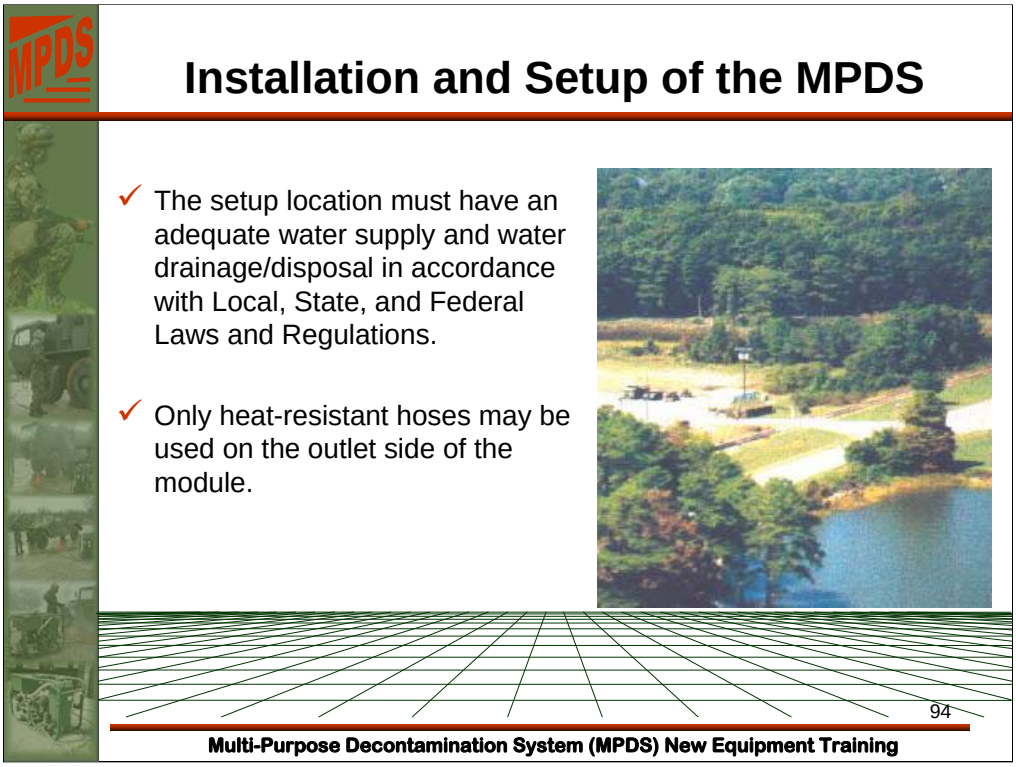
Slide NET-92 (off)

Slide NET-93 (on)

The location the MPDS is to be emplaced should be of a firm and level ground surface. A ground surface is the preferred base verses concrete or asphalt bases.

Additionally, the unit should be set-up in the open.

Set-up in enclosed spaces is limited only to areas that have sufficient exhaust extraction as well as fresh air.



Slide NET-93 (off)

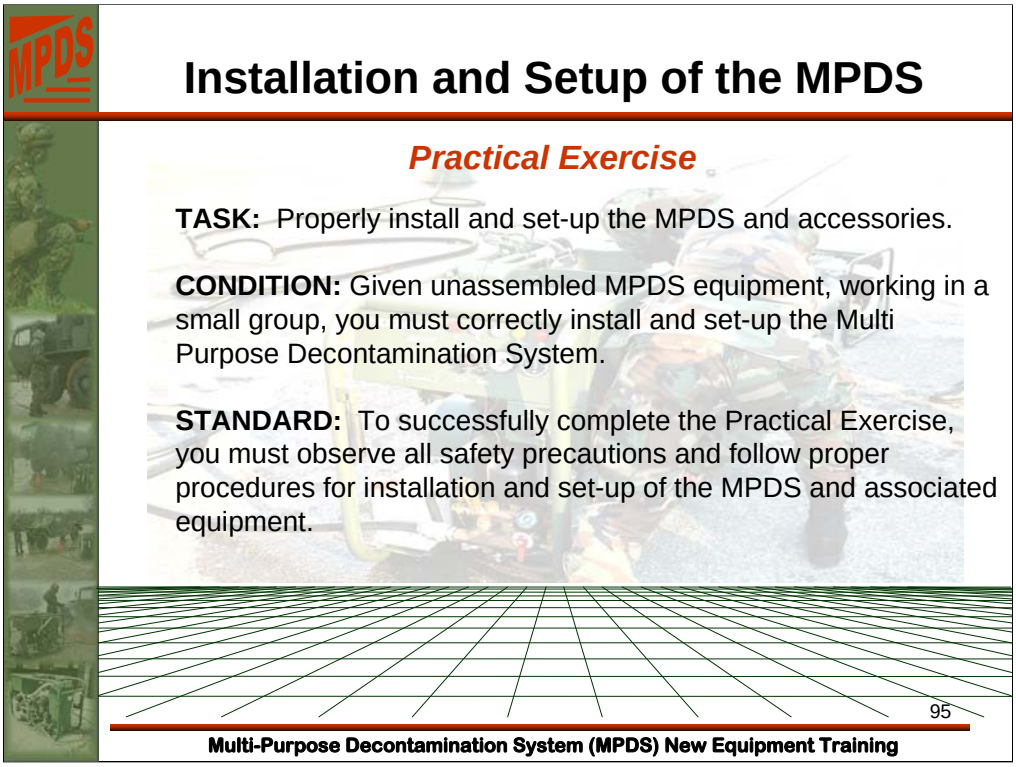
Slide NET-94 (on)

The set-up location also must have an adequate water supply and water drainage and disposal in accordance with local, state, federal laws and regulations. If in another country, you will be required to obey their laws and regulations as well.

Only heat-resistant hoses may be used on the outlet side of the module.

NOTE: Instructor will demonstrate the correct emplacement of the MPDS and accessories.

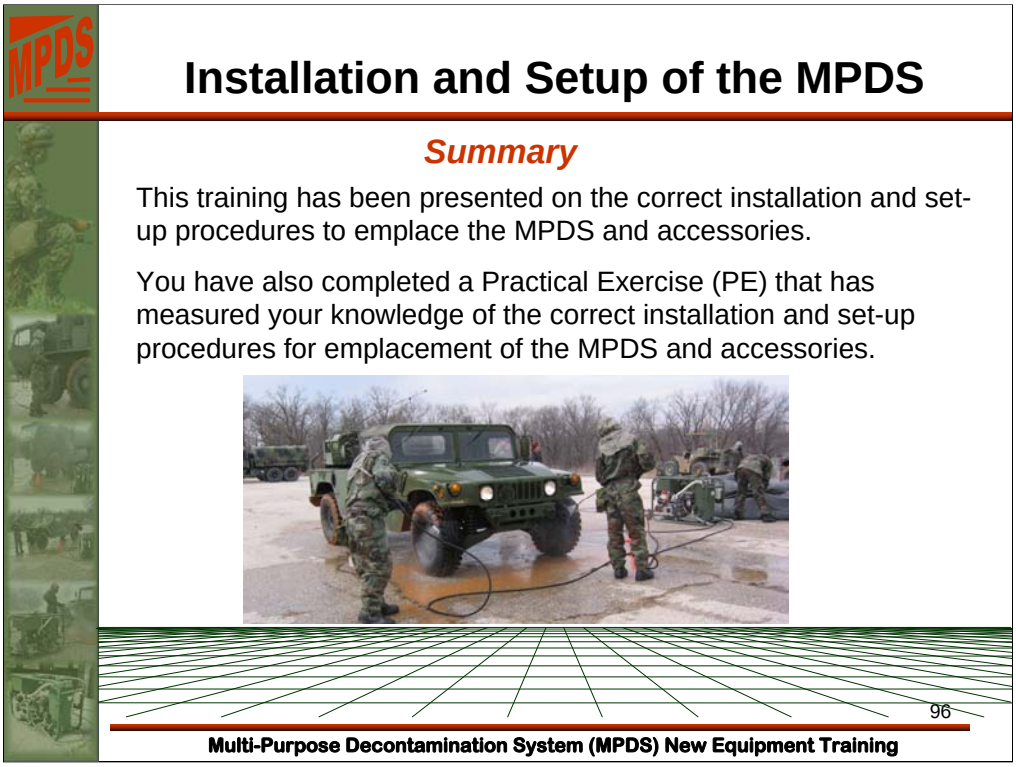
INSTRUCTOR NOTE: Ask the students if there are any questions that pertain to installation and set-up procedures of the MPDS.



Slide NET-94 (off)

Slide NET-95 (on)

The students will perform a practical exercise on the installation and set-up of the MPDS. STANDARD: The student will identify the proper installation and set-up procedures of the MPDS as discussed in the first portion of this ELO. To successfully complete the Practical Exercise on the installation and set-up of the MPDS and accessories, the students must correctly emplace the MPDS and accessories as instructed. Each group of students will complete the installation and set-up from non-emplaced equipment. This is not a graded Practical Exercise.



Slide NET-95 (off)

Slide NET-96 (on)

NOTE: Conduct a check on learning and summarize the learning activity.

This training has been presented on the correct installation and set-up procedures to emplace the MPDS and accessories.

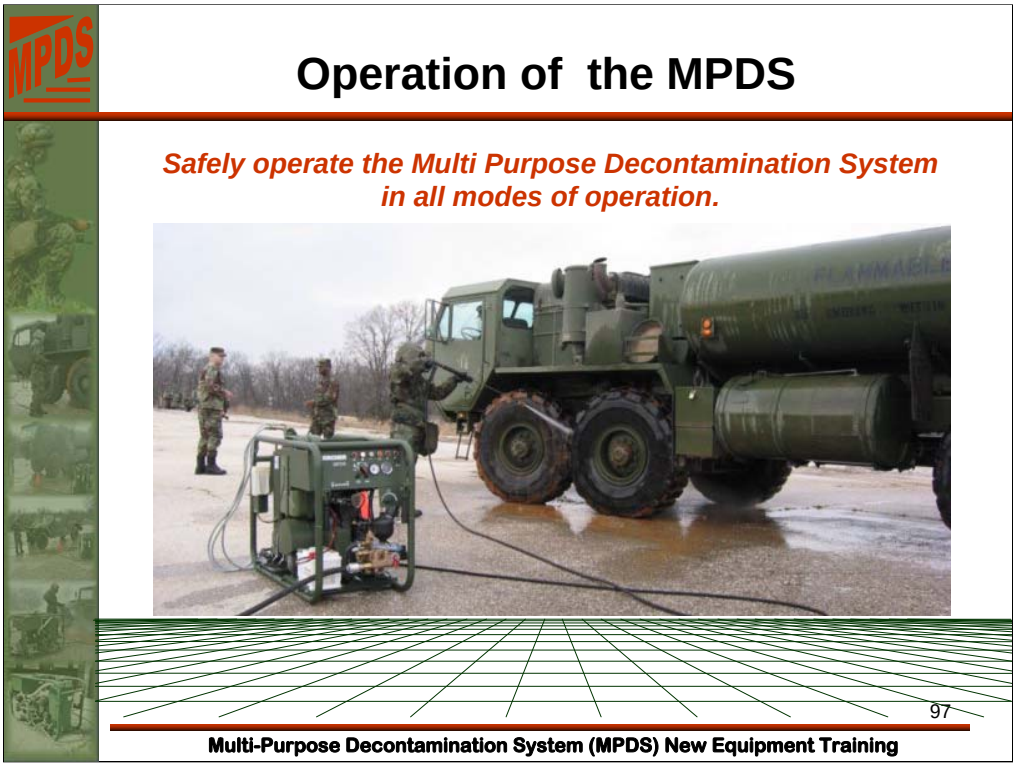
You have completed a Practical Exercise (PE) that has measured your knowledge of the correct installation and set-up procedures for emplacement of the MPDS and accessories.

Slide NET-96 (off)

TAB G

Multi Purpose Decontamination System (MPDS)

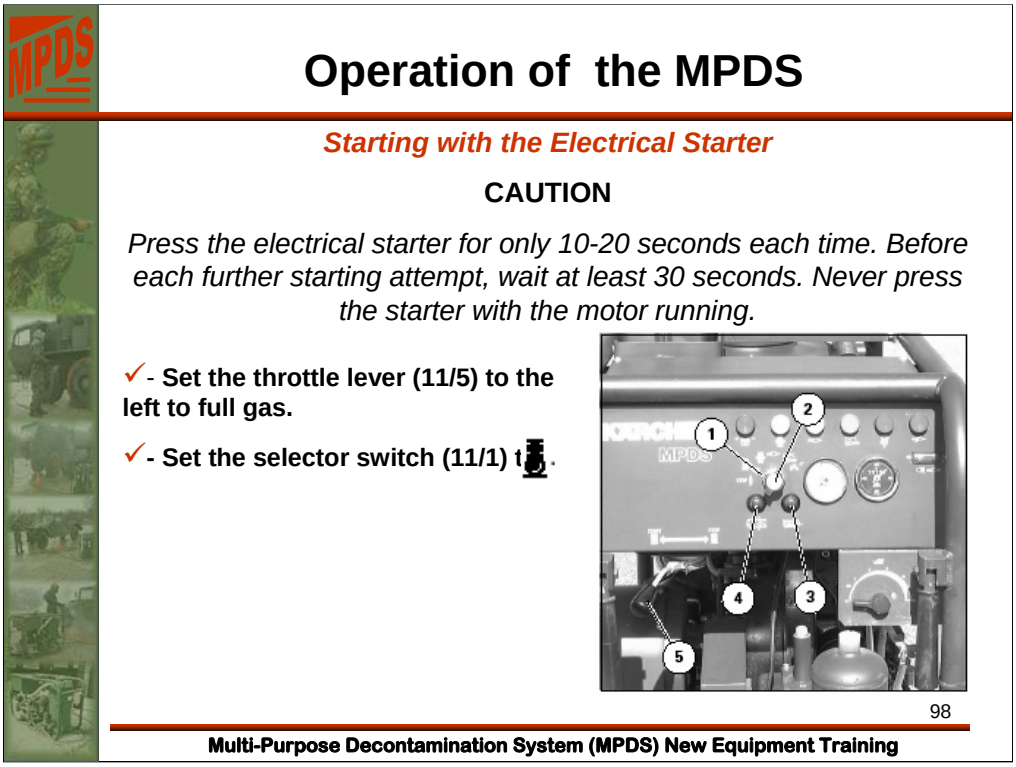
PFN NO: A-006
Operate the MPDS



INSTRUCTOR NOTE: Explain to the students the importance's of operating the MPDS in all modes in a correct manner.

Slide NET-97 (on)

Safely operate the Multi Purpose Decontamination System (MPDS) in all modes of operation.

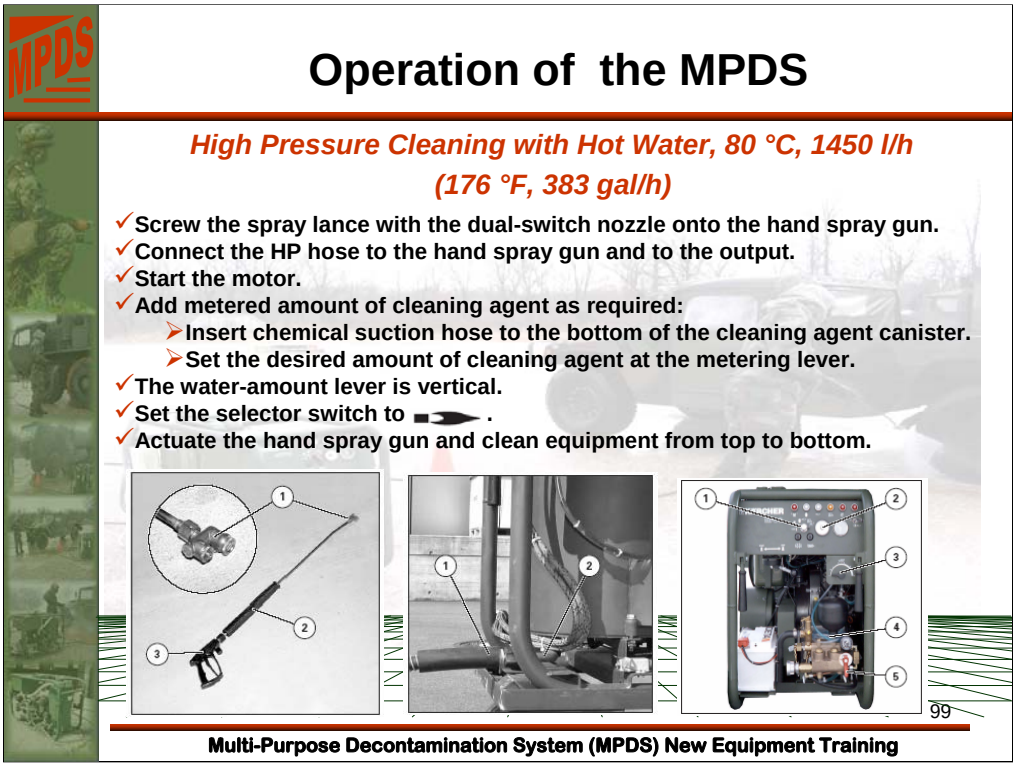


Slide NET-97 (off)

Slide NET-98 (on)

INSTRUCTOR NOTE: Explain and demonstrates the start-up procedures and the first mode of operation; operating with cold water in the high-pressure mode.

Refer the students to student handout #2 located in their student guide.



Slide NET-98 (off)

Slide NET-99 (on)

INSTRUCTOR NOTE: Explain and demonstrates the High Pressure Cleaning with hot water, 80 ° C, 1450/1h (176 °F, 383 gal/h).

Refer the students to student handout #3 (high pressure cleaning with hot water) located in the student guide.

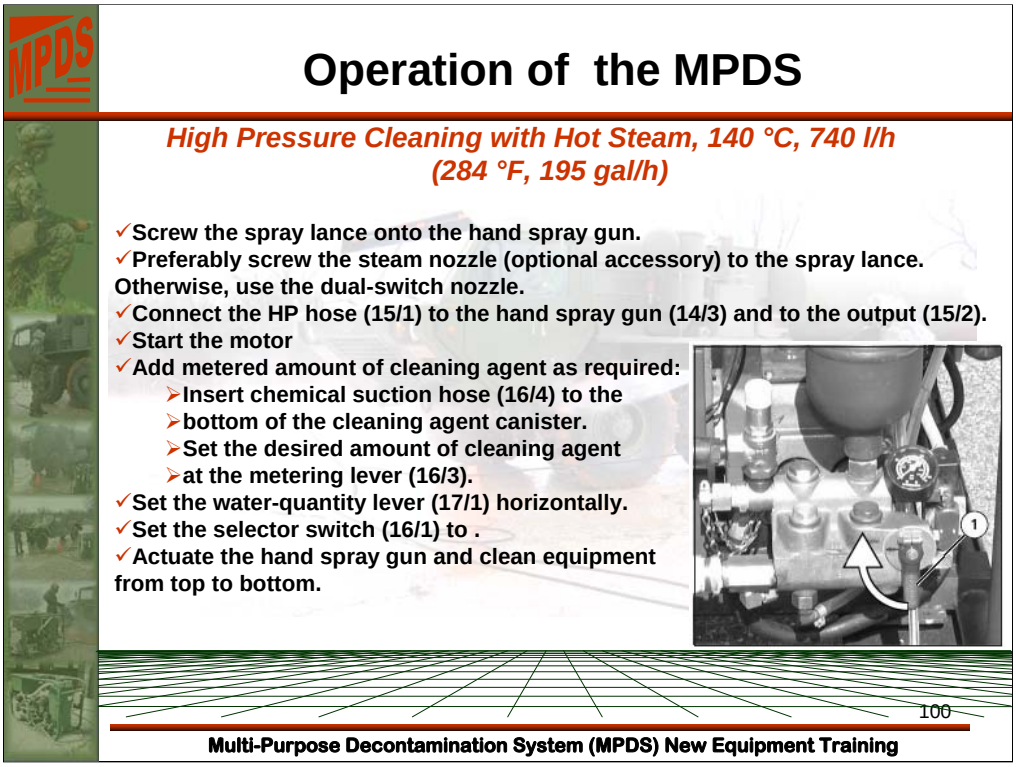
NOTE: The water temperature can be adjusted with the adjustment screw on the thermostat (16/2) (to a maximum of 80 °C / 176 °F for this operating mode).

- Screw the spray lance (14/2) with the dual-switch nozzle (14/1) onto the hand spray gun (14/3).
- Connect the HP hose (15/1) to the hand spray gun (14/3) and to the output (15/2).
- Start the motor (see Section 2.2.1).
- Add metered amount of cleaning agent as required:

Insert chemical suction hose (16/4) to the bottom of the cleaning agent canister.

Set the desired amount of cleaning agent at the metering lever (16/3).

- The water-amount lever (16/5) is vertical.
- Set the selector switch (16/1) to .
- Actuate the hand spray gun and clean equipment from top to bottom.

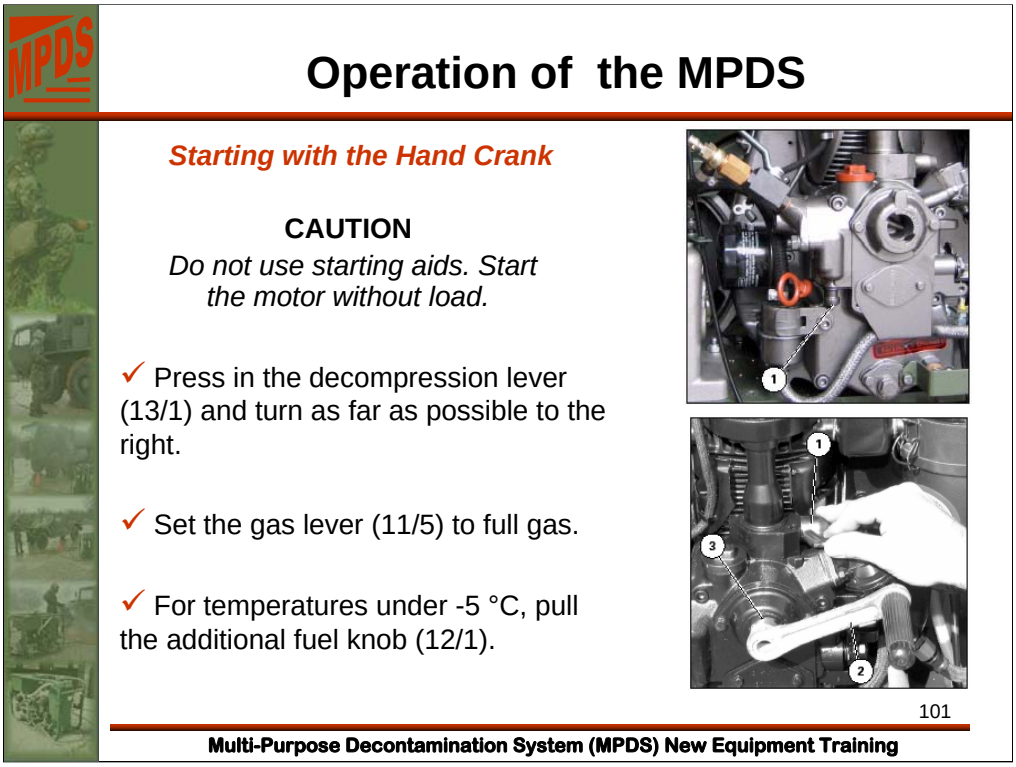


Slide NET-99 (off)

Slide NET-100 (on)

INSTRUCTOR NOTE: Explain and demonstrates the High Pressure Cleaning with hot water, 140 ° C, 740/1h (284 °F, 195 gal/h).

Refer the students to student handout #4 (high pressure cleaning with hot water) located in the student guide.

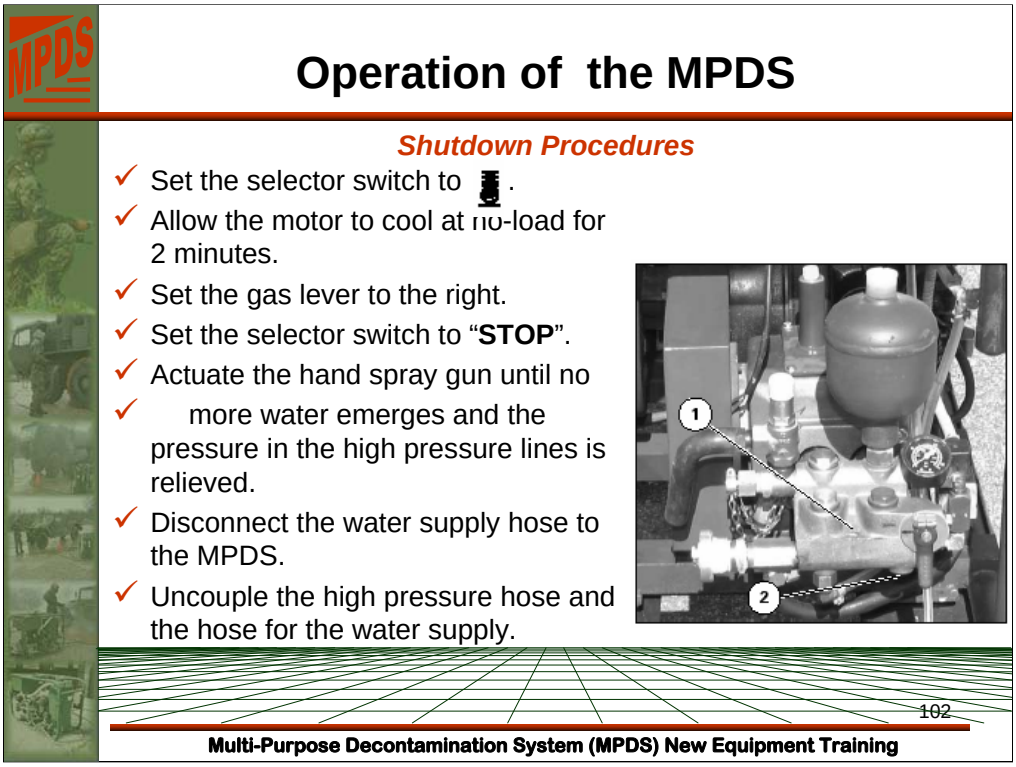


Slide NET-100 (off)

Slide NET-101 (on)

INSTRUCTOR NOTE: Explain and demonstrates starting engine with the hand crank.

Refer the students to student handout #5 (starting engine with the hand crank) located in the student guide.

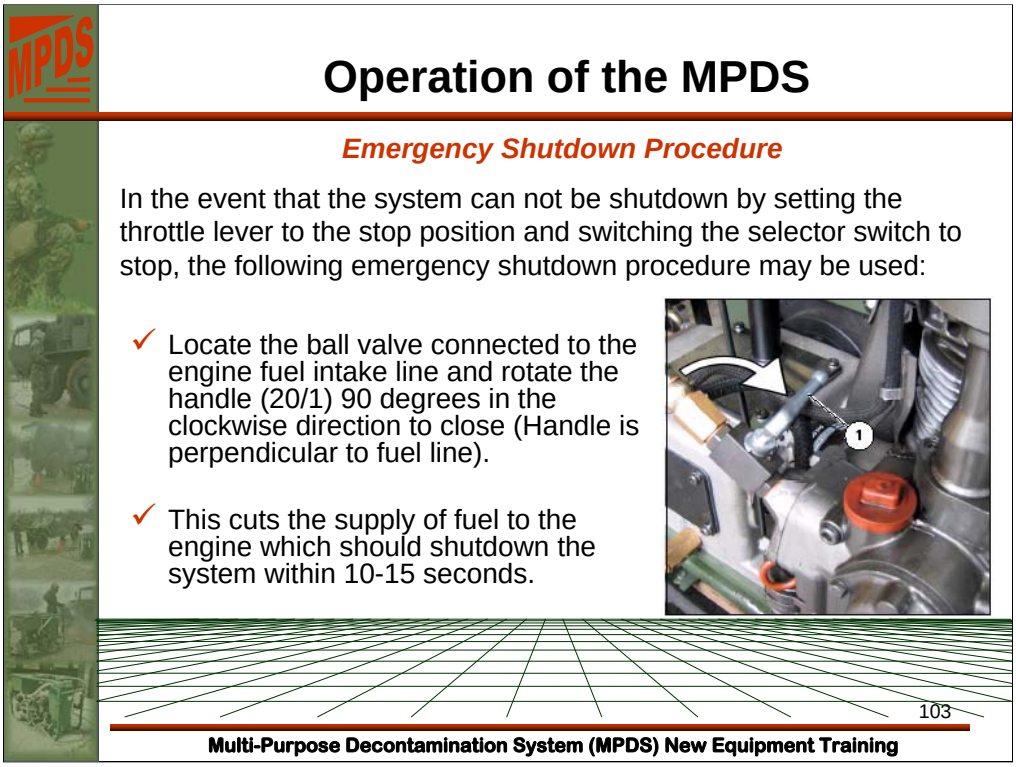


Slide NET-101 (off)

Slide NET-102 (on)

INSTRUCTOR NOTE: Explain and demonstrates shutdown procedures.

Refer the students to student handout #6 (shutdown procedures) located in the student guide.

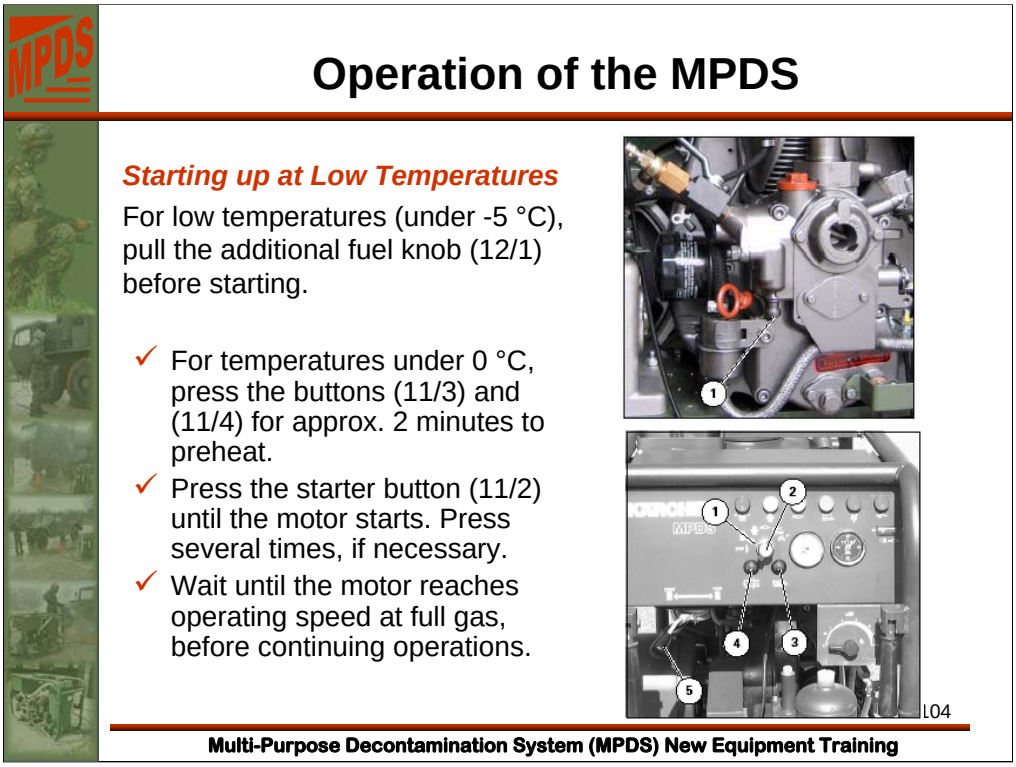


Slide NET-102 (off)

Slide NET-103 (on)

INSTRUCTOR NOTE: Explain and demonstrates engine emergency shutdown procedures.

Refer the students to student handout #7 (engine emergency shutdown) located in the student guide.

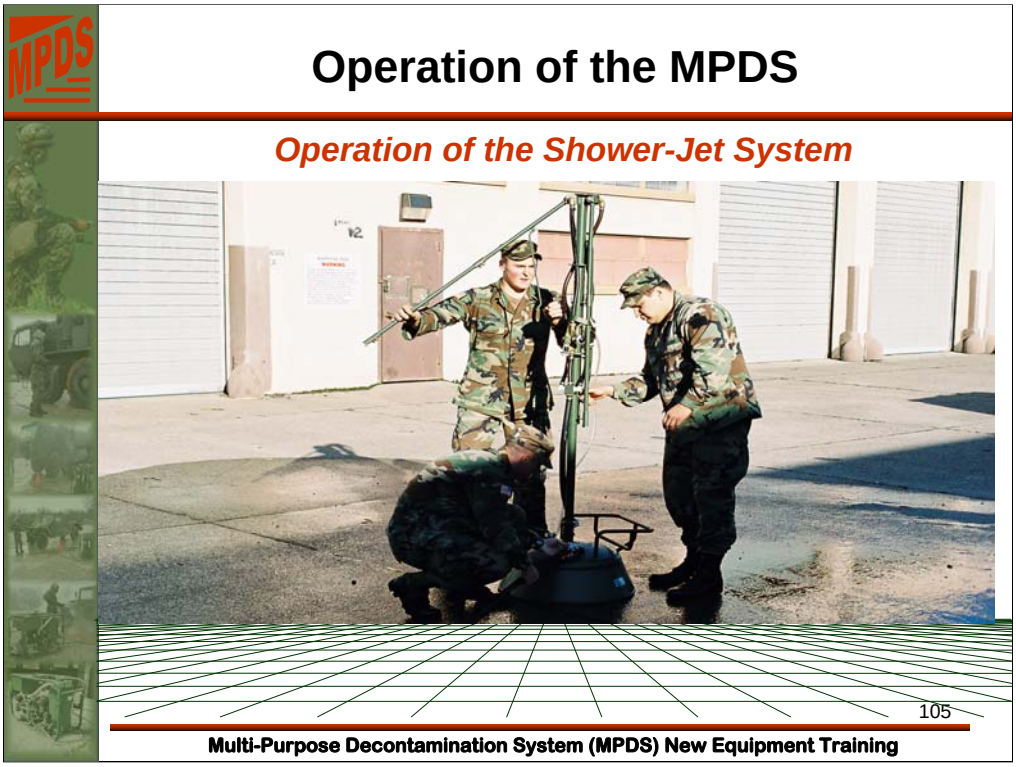


Slide NET-103 (off)

Slide NET-104 (on)

INSTRUCTOR NOTE: Explain and demonstrates cold weather starting operations.

Refer the students to student handout #8 (cold weather starting operations) located in the student guide.



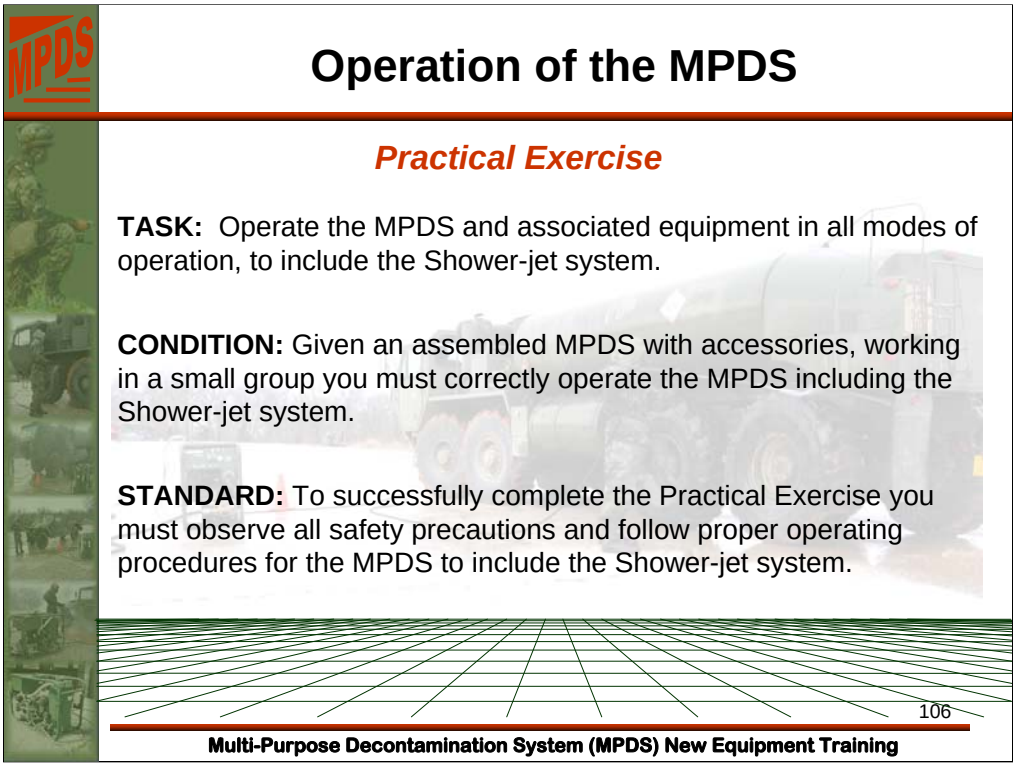
Slide NET-104 (off)

Slide NET-105 (on)

INSTRUCTOR NOTE: Explain and demonstrates the operation of the shower-jet system.

Refer the students to student handout # 9, shower-jet operations and start-up procedures.

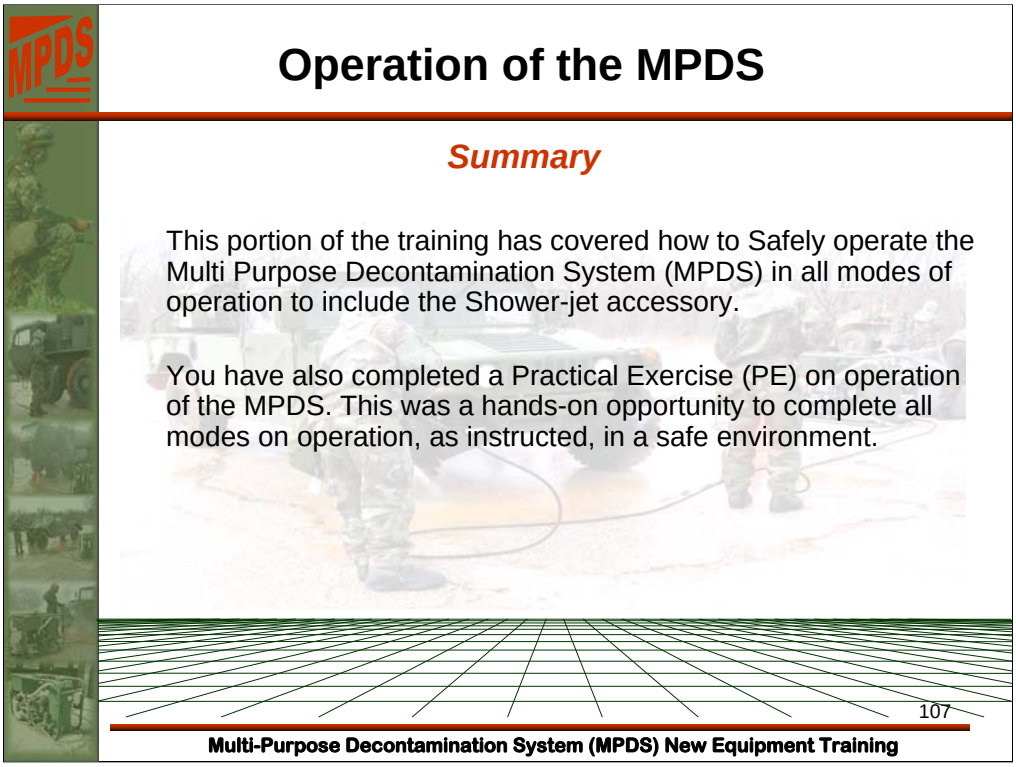
INSTRUCTOR NOTE: Ask the students if there are any questions on how to safely operate the Mult-Purpose Decontamination System (MPDS).



Slide NET-105 (off)

Slide NET-106 (on)

The students will perform a practical exercise on Safely operate the Multi Purpose Decontamination System (MPDS) in all modes of operation. STANDARD: The student will safely operate the Multi Purpose Decontamination System (MPDS) in all modes of operation as discussed and demonstrated in the first portion of this ELO. To successfully complete the Practical Exercise on the operating the MPDS in all modes of operation to include the Shower-jet system, the students must correctly place the MPDS and accessories as instructed into operation in all modes. Each group of students must complete all of the modes of operation as instructed. This is not a graded Practical Exercise.



Slide NET-106 (off)

Slide NET-107 (on)

NOTE: Conduct a check on learning and summarize the learning activity.

This portion of the training has covered how to safely operate the Multi Purpose Decontamination System (MPDS) in all modes of operation to include the shower-jet accessory.

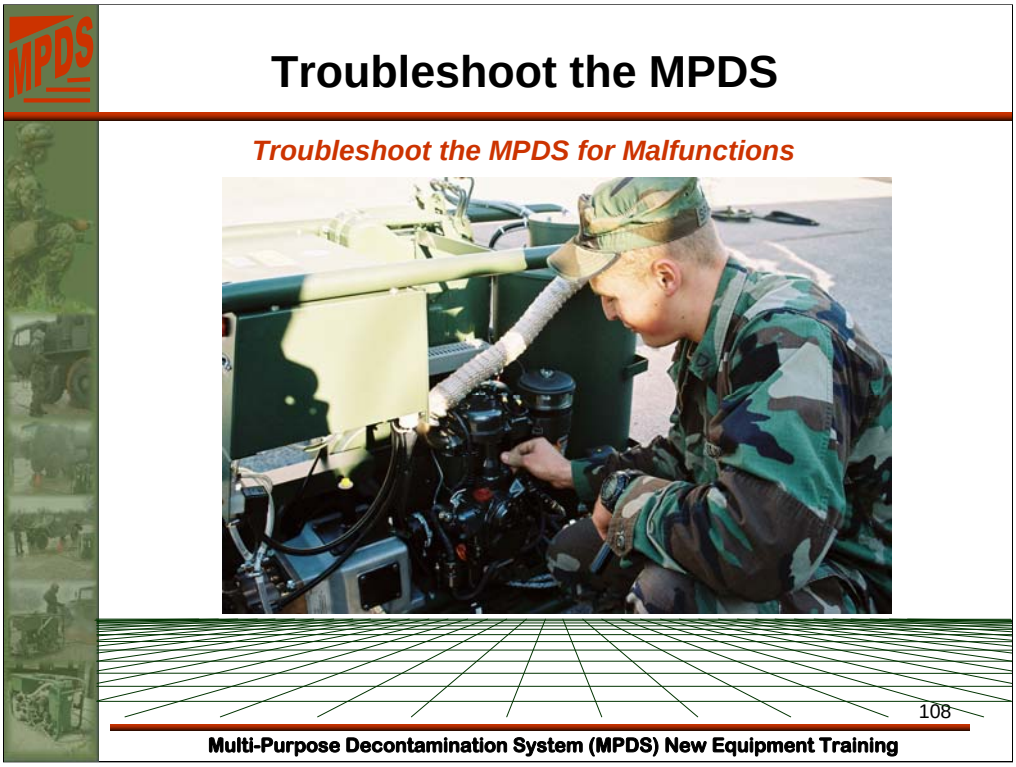
You have also completed a Practical Exercise (PE) on operation of the MPDS.

Slide NET-107 (off)

TAB H

Multi Purpose Decontamination System (MPDS)

PFN NO: A-007
Troubleshoot the MPDS for Malfunctions



Slide NET-108 (on)

INSTRUCTOR NOTE: Explain to the students the important of being able to properly troubleshoot the MPDS for malfunctions.

Troubleshoot the MPDS for malfunctions.

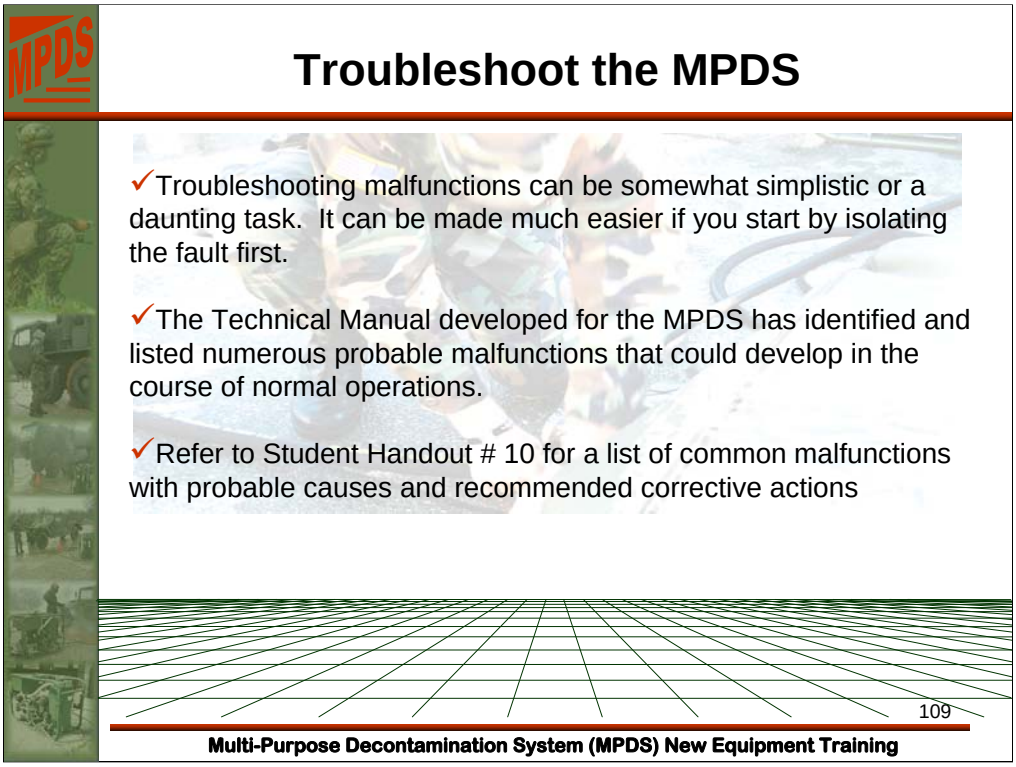
Refer to student handout #10 (MPDS Possible Malfunctions) and discuss each of the malfunctions, cause and corrective actions.

In this portion of the topic, we will cover some of the problems or symptoms relating to troubleshooting the engine.

The Technical Manualr contains the troubleshooting information for locating and correcting operational malfunctions that may develop in the MPDS.

Each malfunction, for either an individual component or entire system, is followed by a series of tests or inspections that will assist in determining the probable cause and corrective action you will need to make.

Remember to observe all safety procedures mention in the technical manualwhen troubleshooting the MPDS. Death or serious personal injury may result if you fail to observe Safety precautions.



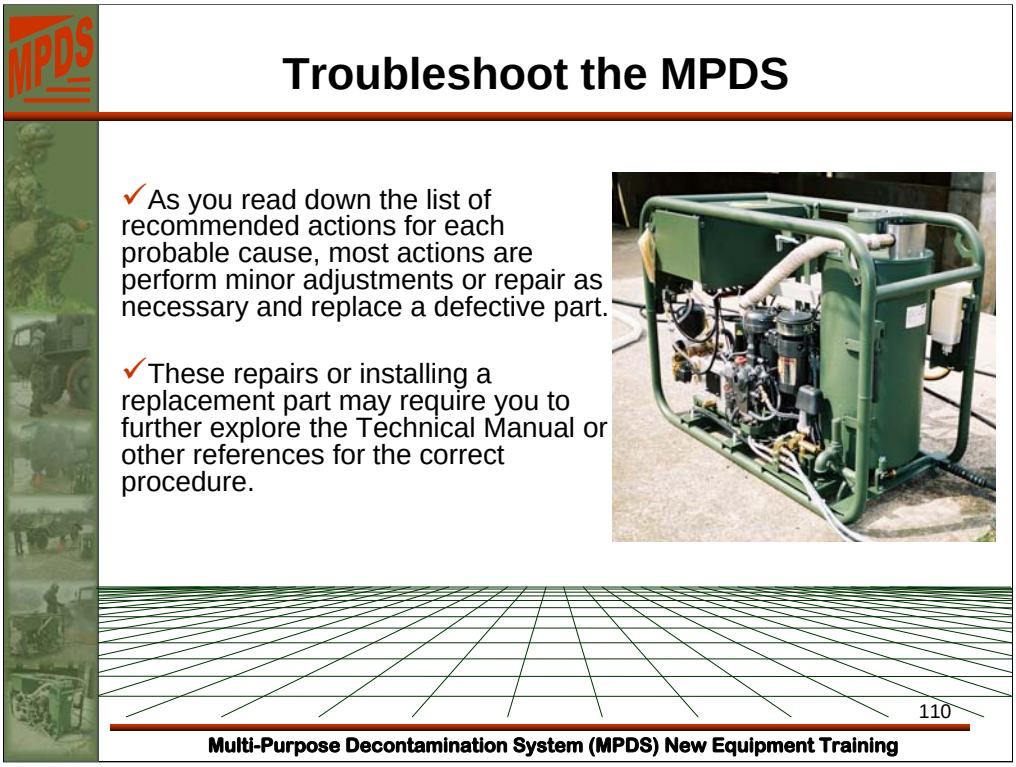
Slide NET-108 (off)

Slide NET-109 (on)

These troubleshooting procedures are based upon the operator level of expertise to identify possible malfunctions and or a systematic problem.

Troubleshooting malfunctions can be somewhat simplistic or a daunting task. It can be made easier if you start by isolating the fault first.

The technical manual developed for the MPDS has identified and listed numerous probable malfunctions that could develop in the course of normal operations.



Slide NET-109 (off)

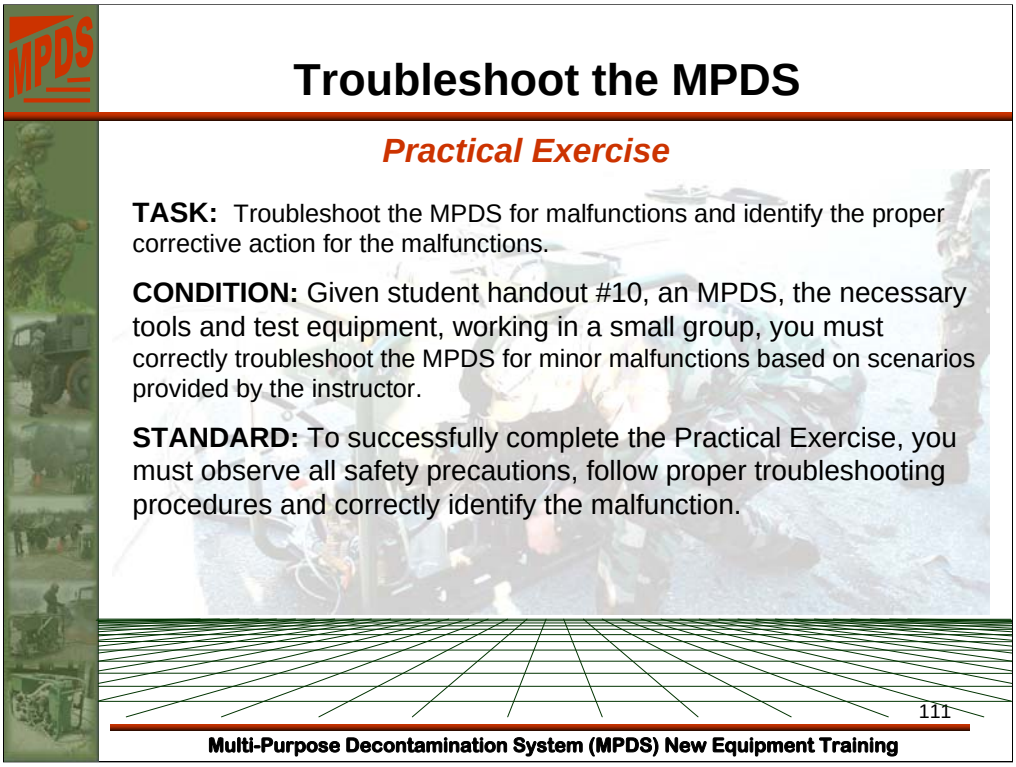
Slide NET-110 (on)

Troubleshooting techniques rests with each operator based upon experience. As you read down the list of recommended actions for each probable cause, most actions are perform minor adjustments or repair as necessary and replace a defective part.

These repairs or installing a replacement part may require you to further explore the Technical Manual or other reference for correct procedure.

Notify unit maintenance of any potential or persistent problems.

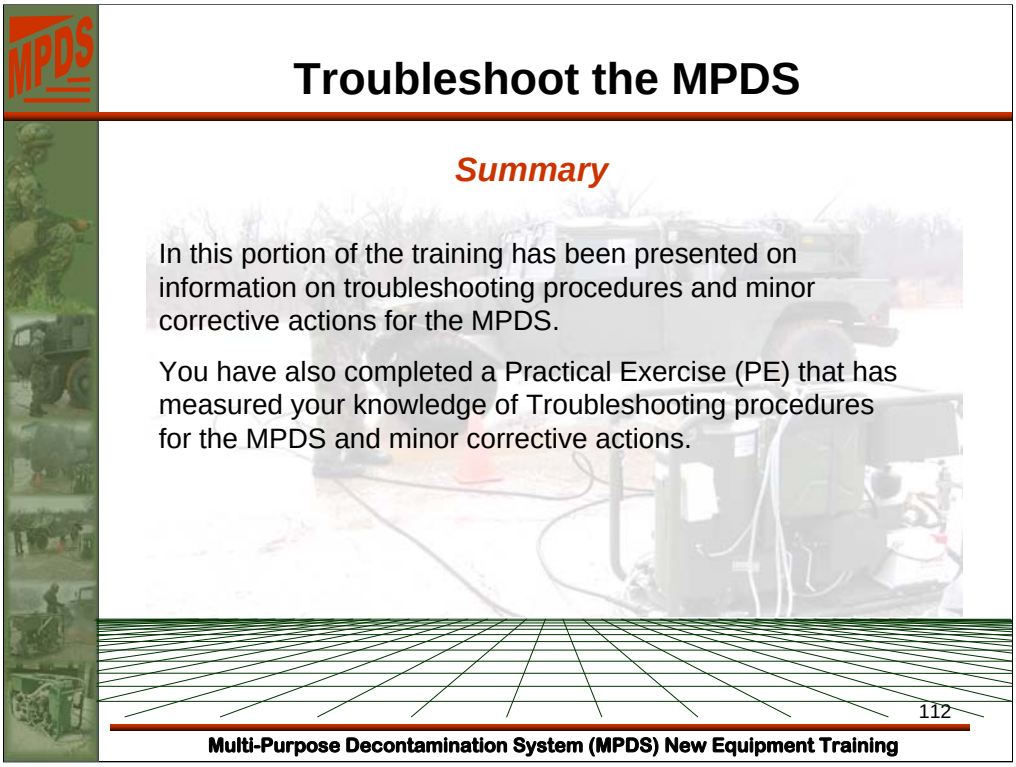
INSTRUCTOR NOTE: Ask the students if there are any questions on operator troubleshooting techniques or limited repairs.



Slide NET-110 (off)

Slide NET-111 (on)

The students will perform a practical exercise on Troubleshooting procedures of the MPDS. STANDARD: The student will correctly troubleshoot the MPDS for minor malfunctions based upon a scenarios provided by the instructor that were discussed and demonstrated in the first portion of this ELO. To successfully complete the Practical Exercise on troubleshooting procedures of the MPDS, the students must correctly perform the tasks as instructed. Each group of students must troubleshoot the MPDS for malfunctions and identify the correct solution for the malfunctions. This is not a graded Practical Exercise.



Slide NET-111 (off)

Slide NET-112 (on)

NOTE: Conduct a check on learning and summarize the learning activity.

This portion of the training has been presented on information on troubleshooting procedures and minor corrective actions for the MPDS.

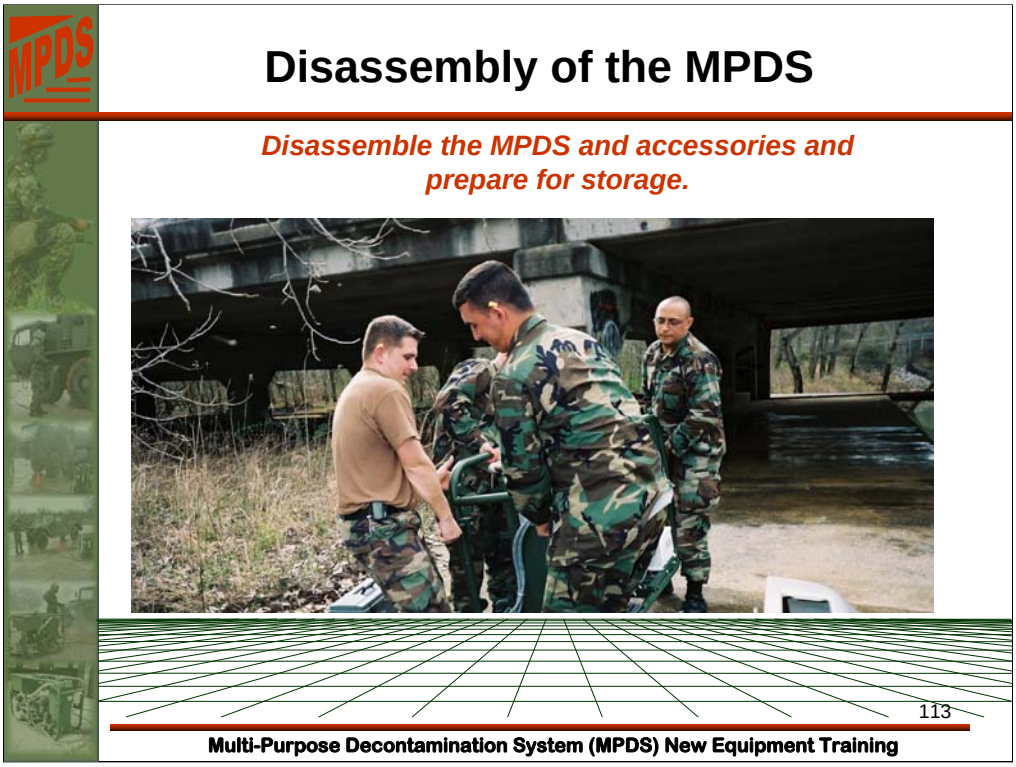
You have also completed a Practical Exercise that has measured your knowledge of troubleshooting procedures for the MPDS and minor corrective actions.

Slide NET-112 (off)

TAB I

Multi Purpose Decontamination System (MPDS)

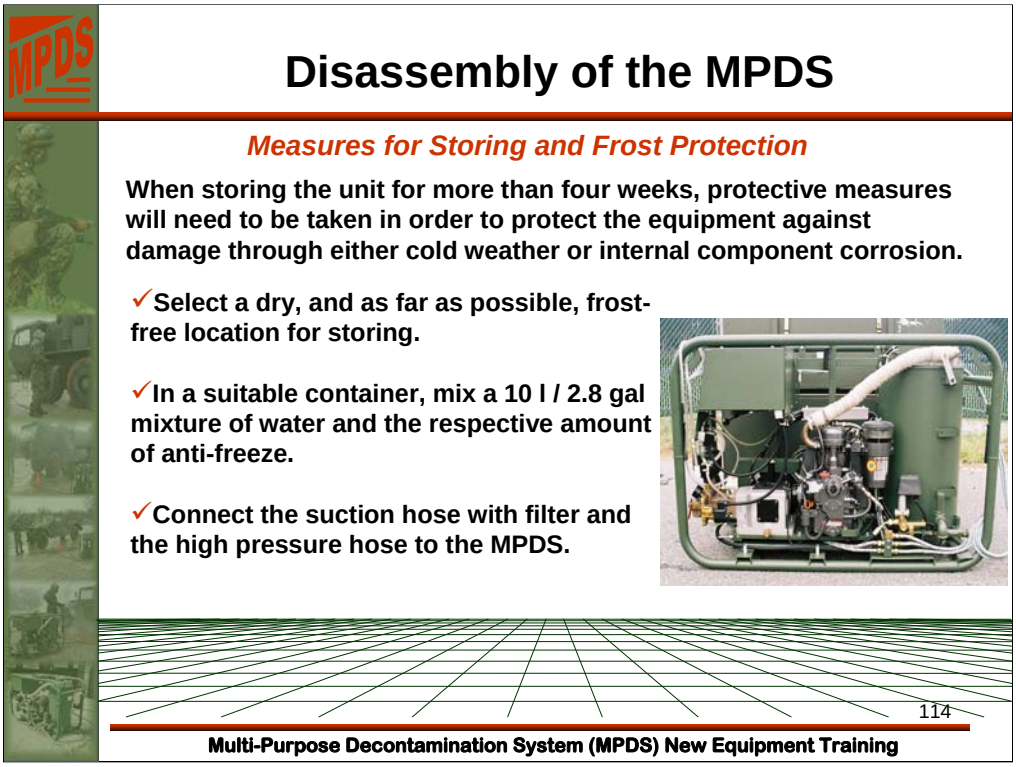
PFN NO: A-008
Disassemble the MPDS



Slide NET-113 (on)

INSTRUCTOR NOTE: Explain to the students the important of being able to properly disassemble the MPDS and accessories and prepare for storage.

Disassemble the MPDS and accessories and prepare for storage.



Slide NET-113 (off)

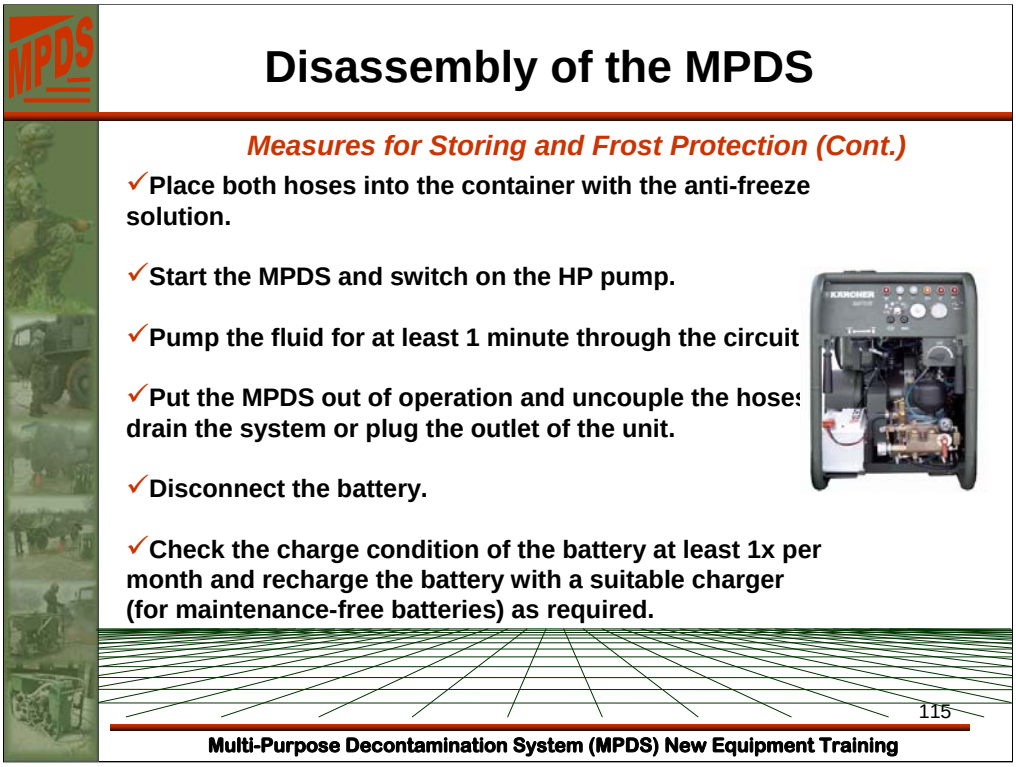
Slide NET-114 (on)

When storing the unit for more than four weeks, protective measure will need to be taken in order to protect the equipment against damage through either cold weather or internal component corrosion.

Select a dry, and as far as possible, frost-free location for storing.

In a suitable container, mix a 10 1/2 gallon mixture of water and the respective amount of anti-freeze.

Connect the suction hose with filter and high-pressure hose to the MPDS.



- **Slide NET-114 (off)**

Slide NET-115 (on)

Place both hoses into the container with the anti-freeze solution.

Start the MPDS and switch on the HP pump.

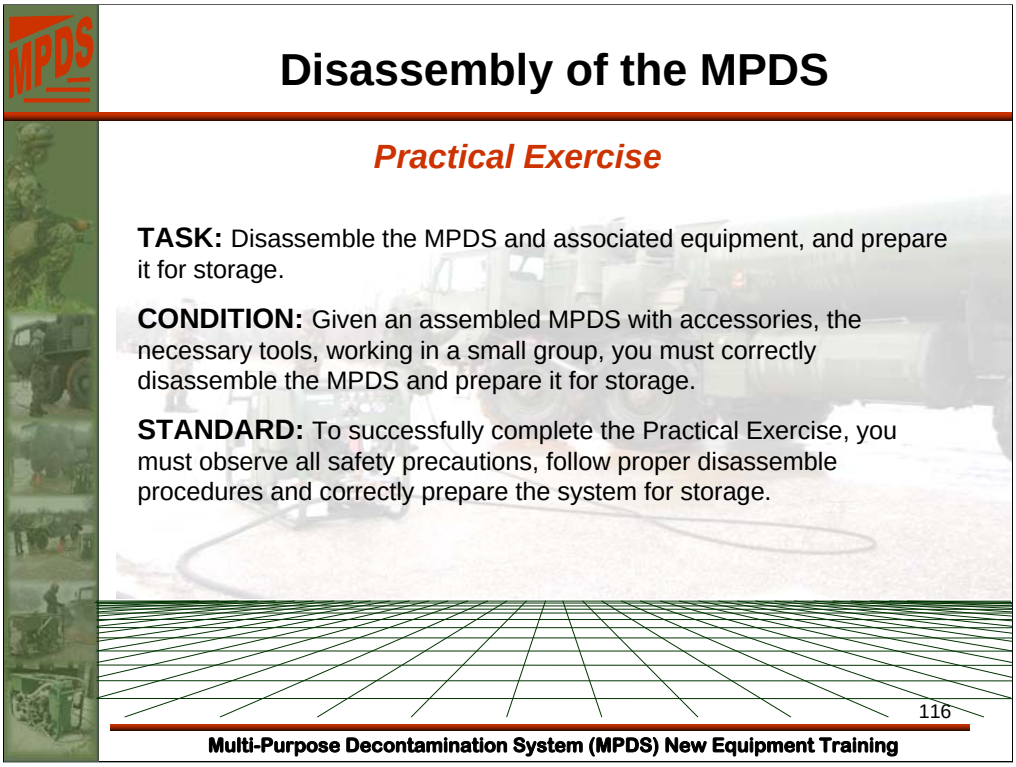
Pump the fluid for at least one minute through the circuit.

Put the MPDS out of operation and uncouple the hoses and drain the system or plug the outlet of the unit.

Disconnect the battery.

Check the charge condition of the battery at least one time per month and recharge the battery with a suitable charger as required.

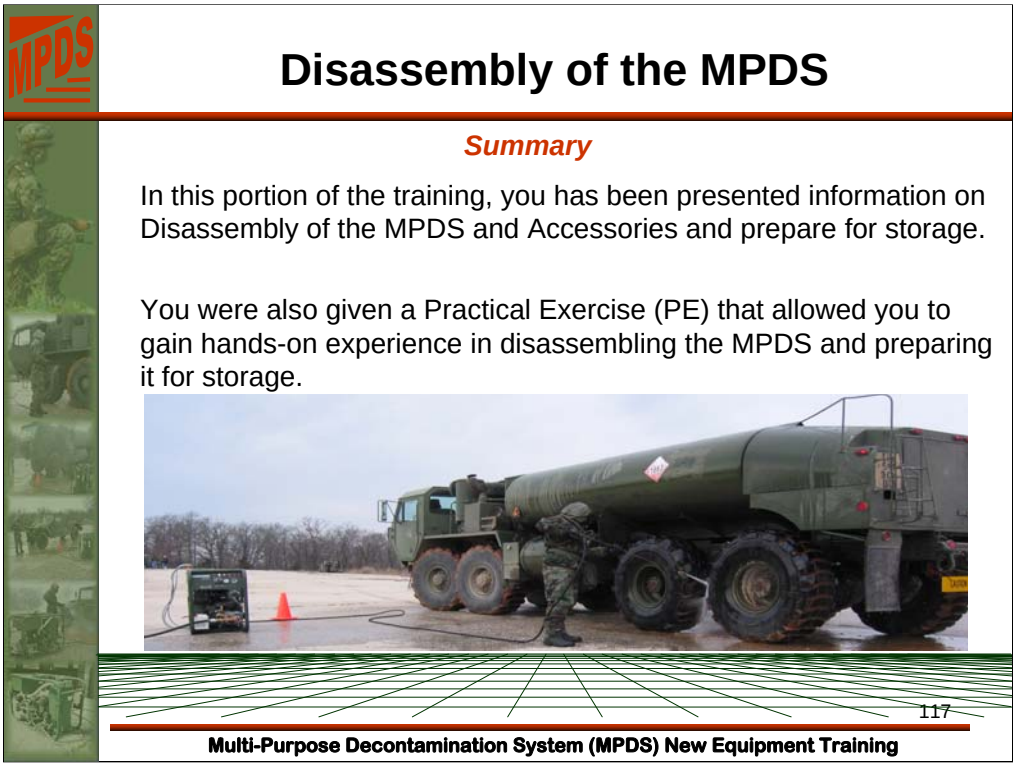
INSTRUCTOR NOTE: Ask the students if there are any questions on the disassembly and storage of the MPDS.



Slide NET-115 (off)

Slide NET-116 (on)

The students will perform a practical exercise on Disassembly of the MPDS and Accessories and prepare for storage. STANDARD: The student will correctly disassemble the MPDS and Accessories and prepare for storage as discussed and demonstrated in the first portion of this ELO. To successfully complete the Practical Exercise on Disassembly of the MPDS and Accessories and prepare for storage, the students must perform the tasks as instructed. Each group of students must completely disassemble the MPDS and Accessories and prepare for storage. This is not a graded Practical Exercise.



Slide NET-116 (off)

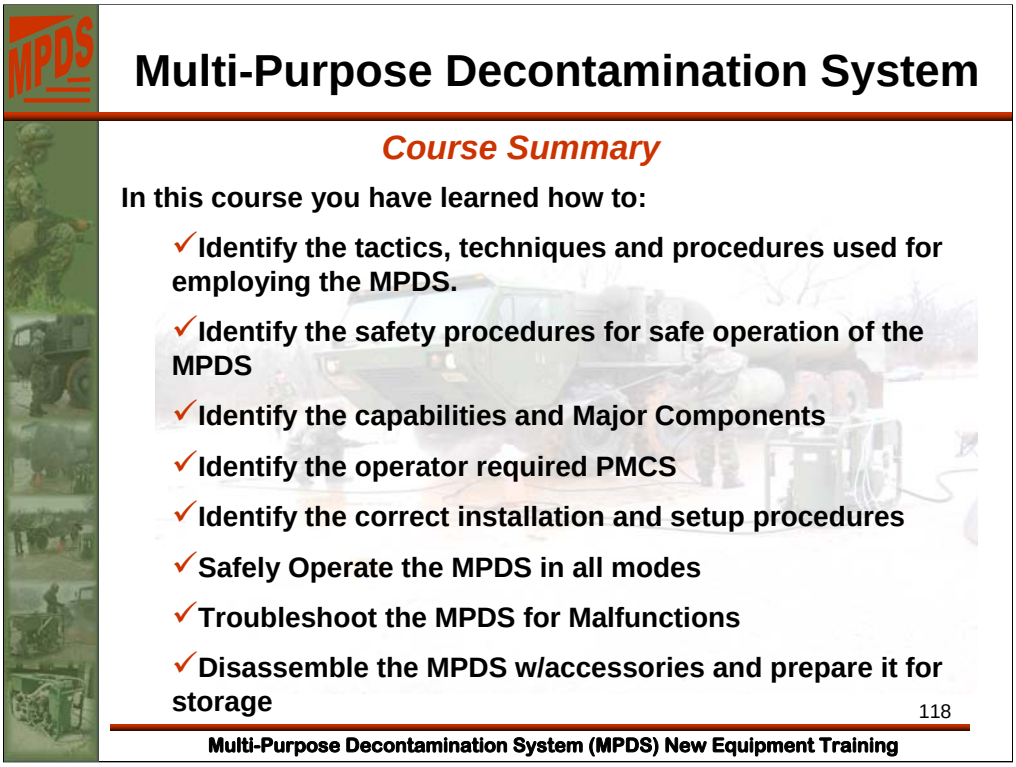
Slide NET-117 (on)

NOTE: Conduct a check on learning and summarize the learning activity.

In this portion of the training, you has been presented information on the disassembly of the MPDS and accessories and prepare for storage.

You were also given a Practical Exercise (PE) that allowed you to gain hands-on experience in disassembling the MPDS and preparing it for storage.

Slide NET-117 (off)



Slide NET-118 (on)

- Identify the tactics, techniques and procedures (TTPs) used for employing the Multi Purpose Decontamination System (MPDS).

- Identify the safety procedures relating to the safe operation of the MPDS to include on-board safety devices of the MPDS equipment and the potential environmental hazards when performing NBC Decontamination operations.

- Identify the capabilities and major components of the Multi Purpose Decontamination System and accessories.

- Identify the operator required Preventive Maintenance Checks and Services (PMCS) of the MPDS.

- Identify the correct installation and set-up procedures to emplace the MPDS and accessories.

-Safely operate the Multi Purpose Decontamination System (MPDS) in all modes of operation.

- Troubleshoot the MPDS for Malfunctions.

- Disassemble the MPDS and Accessories and prepare for storage.

Slide NET-118 (off)

Slide NET-119 (on)

Address any question that the students may ask concern the operation of the MPDS.

Slide NET-120 (off)

TAB J

STUDENT HANDOUTS
NUMBERS 1-10

Student Handout #1
Scheduled Maintenance

Pos. No	Location/Designation	Check/Activity	Required Value	Time Period		
				A	B	D
1	**MPDS, Complete Unit**	Check exterior condition			X	X
		Check components for cleanness, firm seating and for leakage			X	X
		Check hoses, pipes and cables for condition, firm connection and for leakage			X	X
	Motor/Pump Set					
2	Water pump	Check for firm seating			X	
		Check for leakage			X	X
		Check oil level, add if necessary	Middle of oil level window		X	
3	V-Belt water pump	Check tension, adjust if necessary	Can be pressed down 1.5 to 2 cm		X	
4	Water intake	Check if adequate intake is available			X	X
5	Water pressure on the manometer	Check. In case pressure in cold water operation with the nozzle mouthpiece (round) is too high, decalcify.	Approx. 60 bar Decalcify at pressure > 70 bar.		X	X
6	Diesel motor	Check for cleanness, clean if necessary			X	
		Check oil level in crank case, add oil if necessary	Within markings on oil dipstick		X	
		Check air filter, clean preseparator if necessary			X	

Student Handout #1
Scheduled Maintenance

Pos. No	Location/Designation	Check/Activity	Required Value	Time Period		
				A	B	D
7	Fuel lines	Check condition			X	X
8	Fuel canister	Check filled level, refill or exchange as necessary	F 54 fuel		X	X
	Flow-Thru Heater					
9	Metering unit, calcification protection	Check the filled level of the calcium inhibitor in the container, refill if necessary	3/4 full		X	X
	Electrical Equipment					
10	Electrical control box	Check condition			X	
11	Cable, Cable Harness	Check condition			X	
	Water Line System					
12	Hoses, pipes	Check condition			X	X
		Check for leakage			X	X
		Check for firm seating			X	X
13	Fittings	Check condition			X	X
14	Valves	Check condition			X	X

Student Handout #1
Scheduled Maintenance

Pos. No	Location/Designation	Check/Activity	Required Value	Time Period		
				A	B	D
		Check for leakage			X	X
	Accessories					
15	Canister	Check condition			X	X
16	Hoses and hose couplings	Check condition			X	X
17	Hand Spray Gun	Check condition			X	X
18	Spray lance with seals	Check condition			X	X

Student Handout #2

Starting Operations

CAUTION: Starting operations and operating the MPDS may be carried out only by qualified and instructed personnel. The regulations for safety and operational safety according to Section 2.7 are to be observed!

DANGER: During operation, the module produces high noise levels that can lead to hearing impairments. Always wear hearing protection during operation. When NBC-protection equipment is worn, use ear plugs.

Starting the Engine

CAUTION:
Before starting the engine:

• ensure that the connection at the outlet (15/2) of the MPDS is made depending upon the desired operating mode (Section 2.2.2),

• the preventive maintenance checks are accomplished according to Section 2.5.1 are carried out.

Starting with the Electrical Starter

CAUTION
Press the electrical starter for only 10-20 seconds each time. Before each subsequent starting attempt, wait at least 30 seconds. Never press the starter button with the engine running.

- Set the throttle lever (11/5) to the left to full open.

- Set the selector switch (11/1) to  .

- Press the starter button (11/2) until the engine starts. Press several times, if necessary.

- Wait until the engine reaches operating speed at full throttle, before continuing operations.

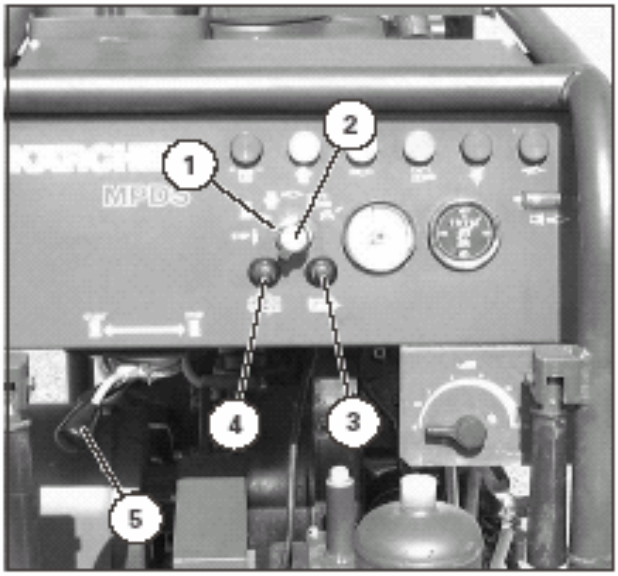


Fig. 11 MPDS, Operating Elements

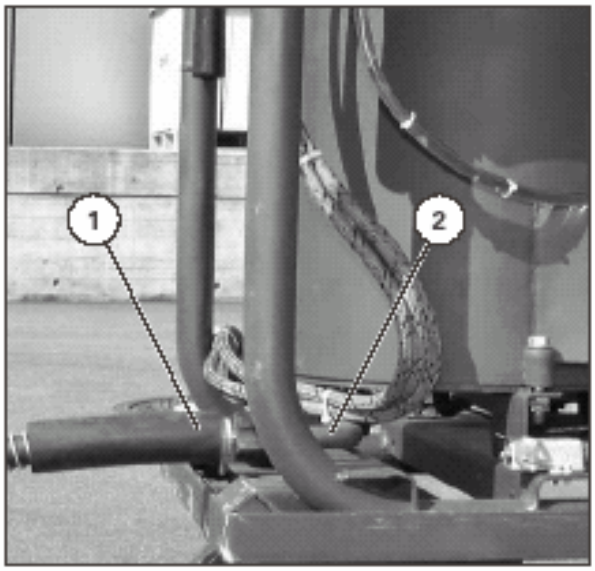


Fig. 15 MPDS, Connection of the HP Hose

Student Handout #3

High Pressure Cleaning with Hot Water, 80 °C, 1450 l/h (176 °F, 383 gal/h)

NOTE: The water temperature can be adjusted with the adjustment knob on the thermostat (16/2) (to a maximum of 80 °C / 176 °F for this operating mode).

- Screw the spray lance with the dual-switch nozzle onto the hand spray gun.

- Connect the HP hose (15/1) to the hand spray gun (14/3) and to the output (15/2).

- Start the motor (see Section 2.2.1).

- Add metered amount of cleaning agent as required:
Insert chemical suction hose (16/4) to the bottom of the cleaning agent canister.
Set the desired amount of cleaning agent at the metering lever (16/3).

- The water-amount lever (16/5) is vertical.

- Set the selector switch (16/1) to .

- Actuate the hand spray gun and clean equipment from top to bottom.

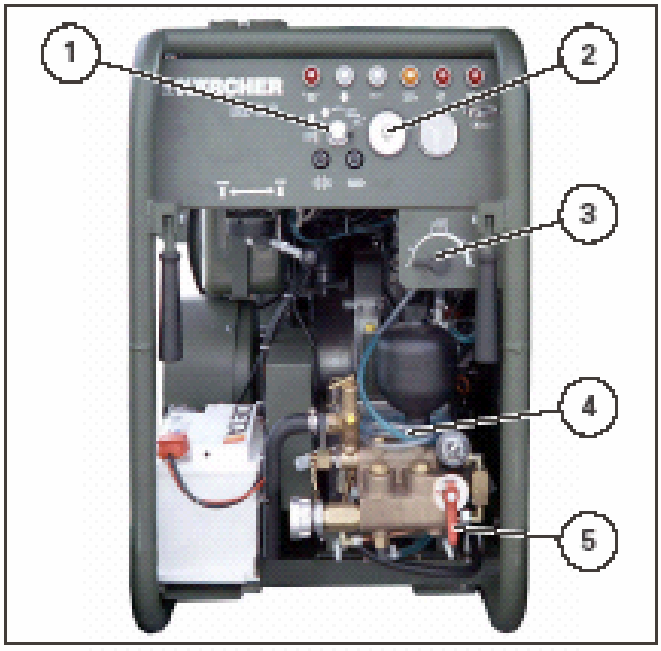


Fig. 16 MPDS, Front View

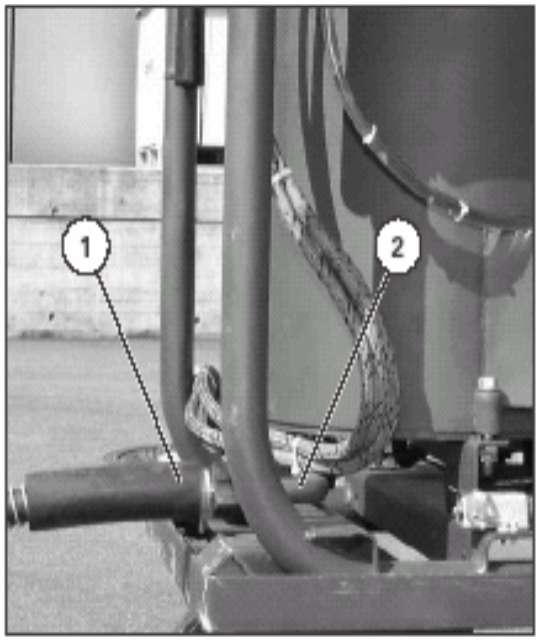


Fig. 15 MPDS, Connection of the HP Hose

Student Handout #4

High Pressure Cleaning with Hot Steam, 140 °C, 740 l/h (284 °F, 195 gal/h)

NOTE: The water temperature can be adjusted with the adjustment knob (16/2) (to a maximum of 140 °C / 284 °F for this operating mode).

DANGER Hot steam causes burns! Never direct the spray jet at any person.

- Screw the spray lance onto the hand spray gun.

- Screw the duel-switch nozzle to the spray lance.

- Connect the HP hose to the hand spray gun and to the output.

- Start the Engine (refer to student handout #1).

-IF USED: Add metered amount of cleaning agent as required. Insert chemical suction hose (16/4) to the bottom of the cleaning agent canister. Set the desired amount of cleaning agent at the metering valve selector lever (16/3).

- Set the water-quantity lever (17/1) horizontally.

- Set the selector switch (16/1) to .

- Actuate the hand spray gun and clean equipment from top to bottom.

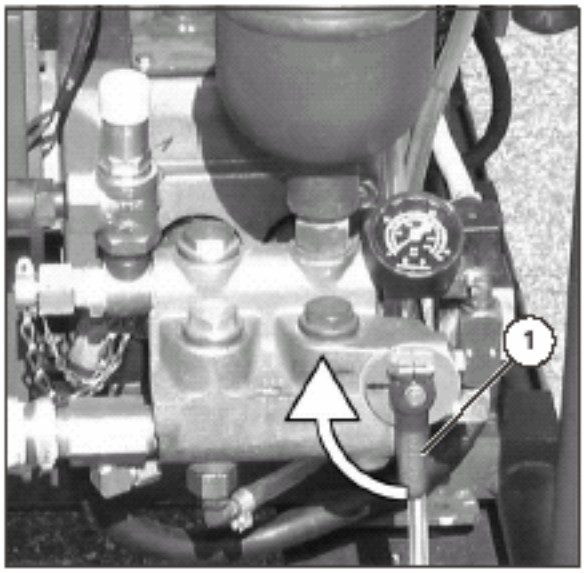


Fig. 17 MPDS, Water-amount lever

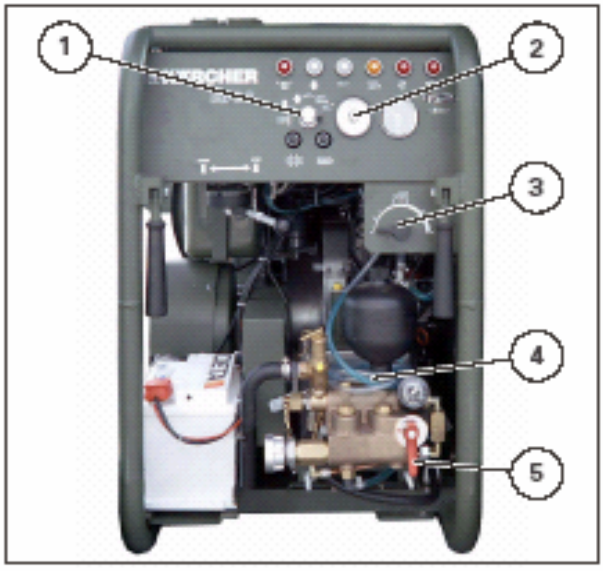


Fig. 16 MPDS, Front View

Student Handout #5

Starting Engine with the Hand Crank

CAUTION: Do not use starting aids. Start the engine without a load.

- Press in the decompression lever (13/1) and turn as far as possible to the right.

- Set the throttle lever (11/5) to full open.

NOTE: For temperatures under -5 °C, pull the additional fuel knob (12/1).

NOTE: For a warm engine, set the throttle lever at half throttle and do not pull the additional fuel knob.

- Set the selector switch (11/1) to  .

- Insert the hand crank (13/2) into the cranking support bearing (13/3).

-Turn the hand crank forcefully to the right (in the direction of the arrow) until the engine starts. Perform the first four turns slowly. Then crank quickly until engine starts.

-Wait until the engine reaches operating speed at full throttle before continuing operations.

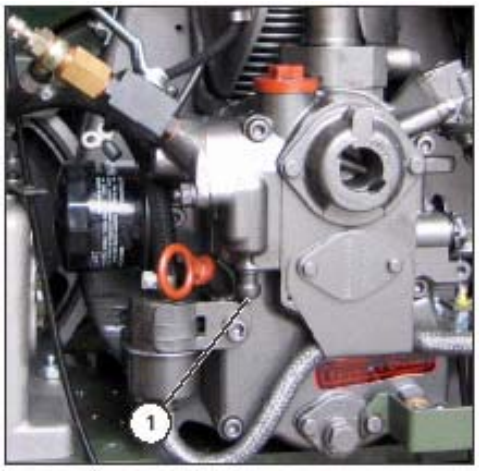


Fig. 12 MPDS, Additional Fuel Knob

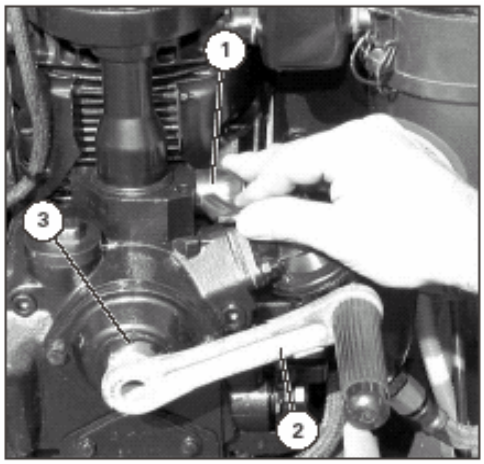


Fig. 13 MPDS, Hand Starter

Student Handout #6

After Operations

NOTE: After operations with hot water or steam, the flow-thru heater must be cooled before putting out of operation. For this purpose, hold the hand spray gun pressed in cold-water operation until the emerging water is luke warm (approx. 30°-40 °C / 85° - 105 °F). During this time, the MPDS can be cleaned.

Cleaning the outside of the MPDS
- Spray off the MPDS with cold water in high-pressure operation mode (water-amount lever (17/1) horizontal) using the flat-jet nozzle.

CAUTION Observe minimum clearance of 1 m / 3 ft!
DANGER Electrical voltage! Do not spray into the electrical components.

Clean the chemical injector:
- Place the chemical suction hose in a bucket of clear and clean water.
- Set the metering lever for the maximum cleaning agent quantity.
- Hold the lever of the hand spray gun pressed for 1-2 minutes and flush the injector.

Shutting down the MPDS

- Set the selector switch to  Allow the motor to cool at no-load for 2 minutes.

- Set the throttle lever to the right at idle position.

- Set the selector switch to "**STOP**".

- Actuate the hand spray gun until no more water emerges and the pressure in the high-pressure lines is relieved.

- Disconnect the water supply hose to the MPDS.

- Uncouple the high-pressure hose and the hose for the water supply. For longer periods out of operation or for winter/cold weather operation without Glysantin or Bio-degradable/Environmental Friendly Antifreeze:

- Completely drain the unit.

- Unscrew the drain plug (19/2) and drain the water out of the water pump (19/1).]

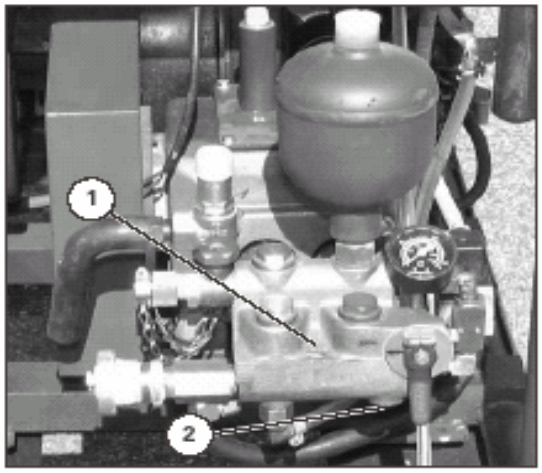


Fig. 19 MPDS, Water Pump

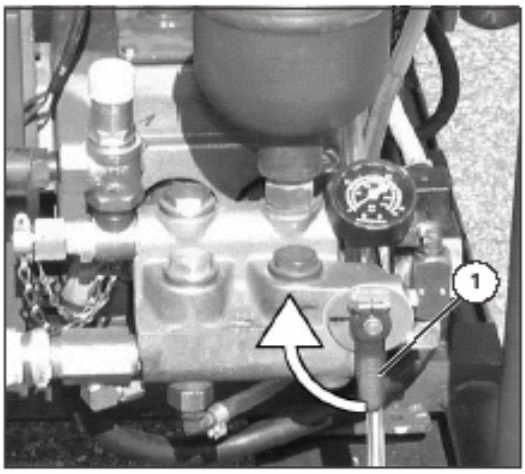


Fig. 17 MPDS, Water-amount lever

Student Handout #7

Engine Emergency Shutdown Procedures

In the event that the system cannot be shutdown by setting the throttle lever to the stop position and switching the selector switch to stop, the following emergency shutdown procedures may be used:

- Locate the ball valve connected to the engine fuel intake line and rotate the handle (20/1) 90 degrees in the clockwise direction to close (Handle is perpendicular to fuel line). This cuts the supply of fuel to the engine which will shutdown the system within 10-15 seconds.

CAUTION: The system will remain under pressure until it is relieved using the trigger gun!

NOTE: If the burner was in use during the emergency shutdown the pressure should be relieved immediately.

MPDS Start-up from Emergency Shutdown

- Locate the ball valve connected to the engine fuel intake line and rotate the handle (20/1) 90 degrees in the counter-clockwise direction to open (Handle is parallel to fuel line).

- Set the selector switch to  .

- Set the throttle to idle position.

- Press the start button until the engine starts.

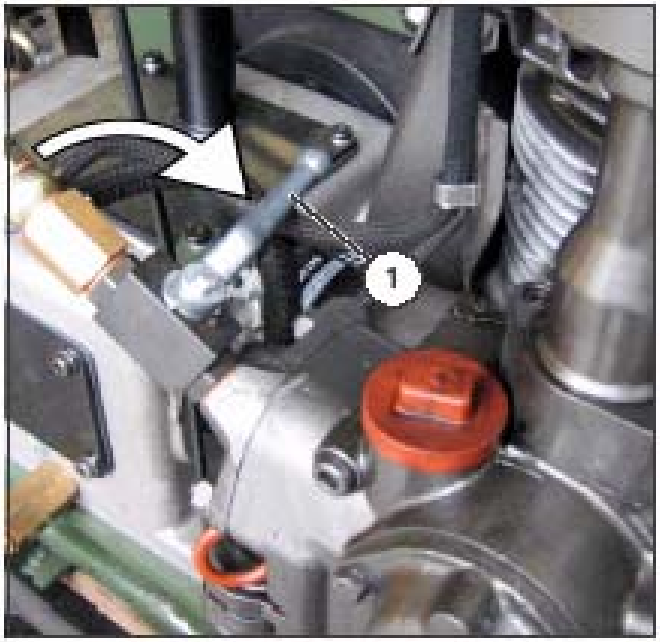


Fig. 20 Emergency shutdown valve, closed position

Student Handout #8

Cold Weather Starting Operations

CAUTION: Starting operations and operating may be carried out only by qualified and instructed personnel. The regulations for safety and operational safety according to Section 2.7 are to be observed!

DANGER: During operation, the module produces high noise levels that can lead to hearing impairments. Always wear hearing protection during operation. When NBC-protection equipment is worn, use earplugs.

Starting the Engine
CAUTION: Before starting the engine, ensure that:
• the connection at the outlet of the MPDS is made depending on the desired operating mode (Section 2.2.2),

• the preventive maintenance checks are accomplished according to Section 2.5.1 are carried out.

Starting with the Electrical Starter

CAUTION: Press the electrical starter for only 10-20 seconds each time. Before each subsequent starting attempt, wait at least 30 seconds. Never press the starter with the engine running.

- Set the throttle lever (11/5) to the left to full open.

- Set the selector switch (11/1) to  .

- For temperatures under 32°F (0 °C), press the buttons (11/3) and (11/4) for approximately 2 minutes to preheat.

NOTE: For low temperatures (under 23°F) (-5 °C), pull the additional fuel knob (12/1) before starting.

- Press the starter button (11/2) until the motor starts. Press several times, if necessary.

- Wait until the engine reaches operating speed at full throttle, before continuing operations.

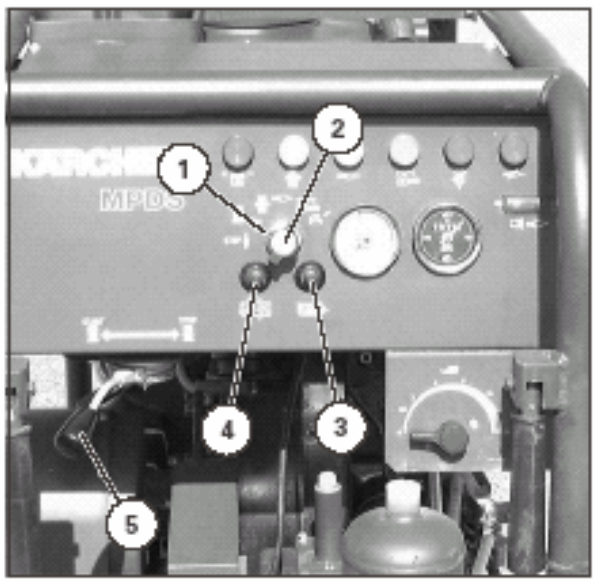


Fig. 11 MPDS, Operating Elements

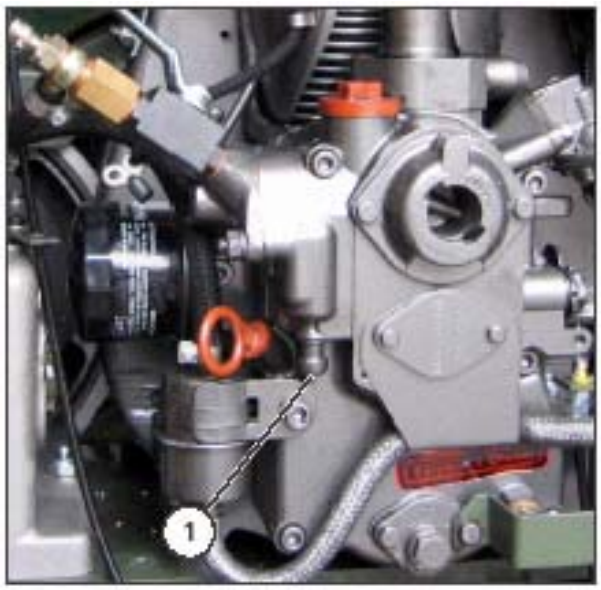


Fig. 12 MPDS, Additional Fuel Knob

Student Handout #9

4 Operation and Start-Up

1. Check the water supply to the hot-water unit.
   Connect the water hose to the water inlet of the hot-water unit.
   Place the water hose and filter into the water reservoir, e.g. a Kärcher water tank (Order No. 1.436-010).

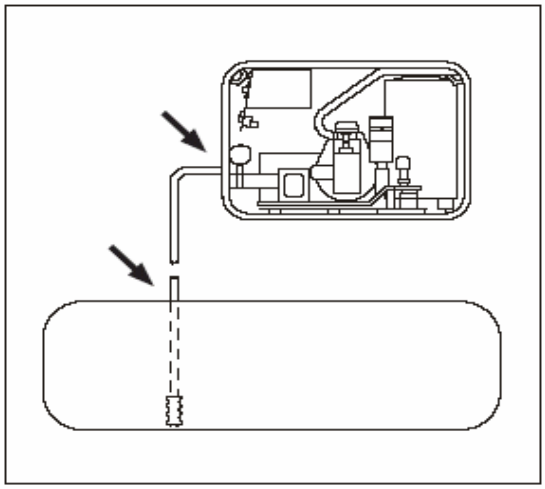
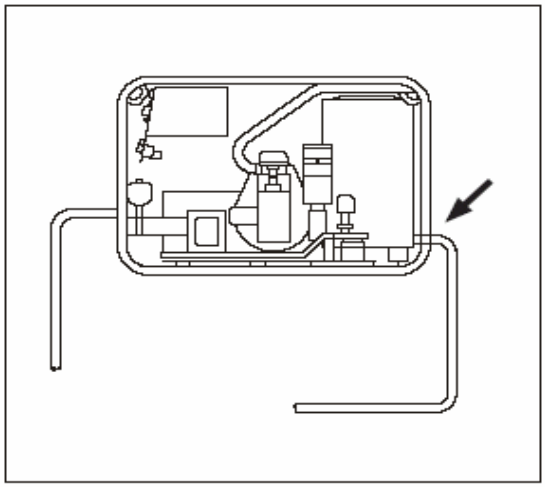


Bild 3

2. Connect the high-pressure hose to the water outlet of the hot-water unit.



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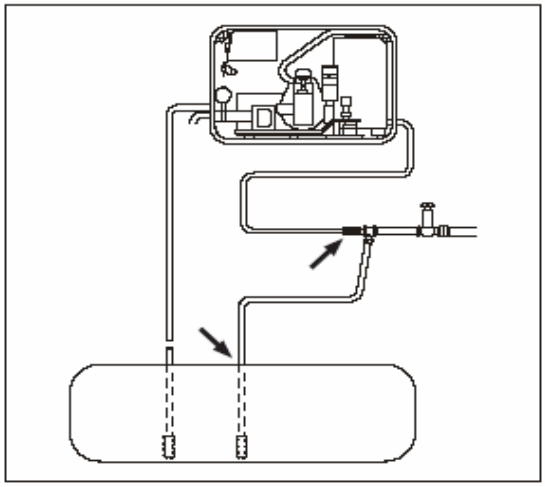
3. Connect the high-pressure hose to the high pressure inlet of the cold-water injector.
   Place the suction hose and filter from the cold-water injector into the water reservoir.



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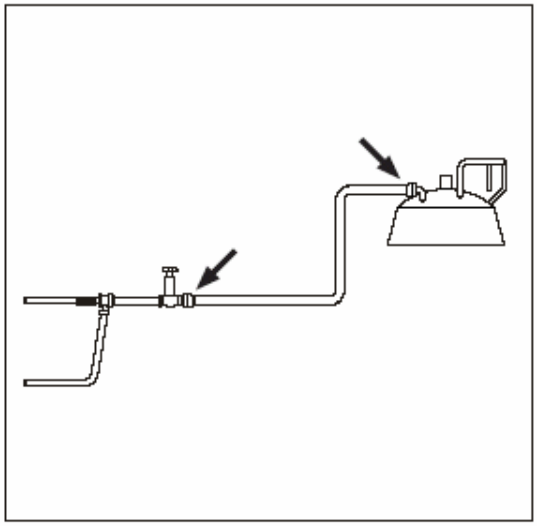
4. Connect the reservoir and cold-water injector to the connecting hose.



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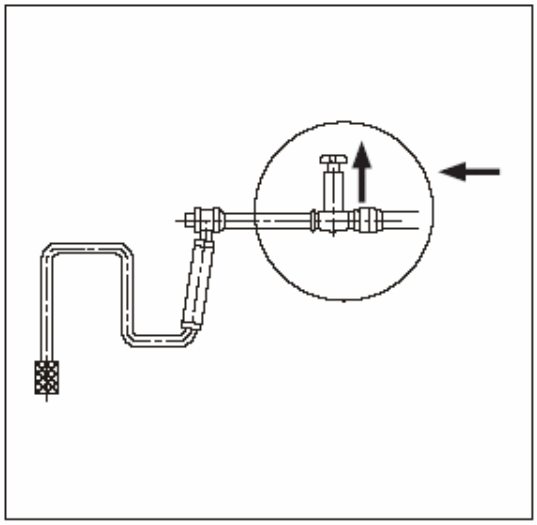
WARNING
Check whether the safety valve handle is locked in the uppermost position, otherwise water flow cannot be guaranteed. If this is not the case, pull the handle upwards until it automatically locks into position.
The valve automatically opens as soon as the temmperature falls below the safety limit.



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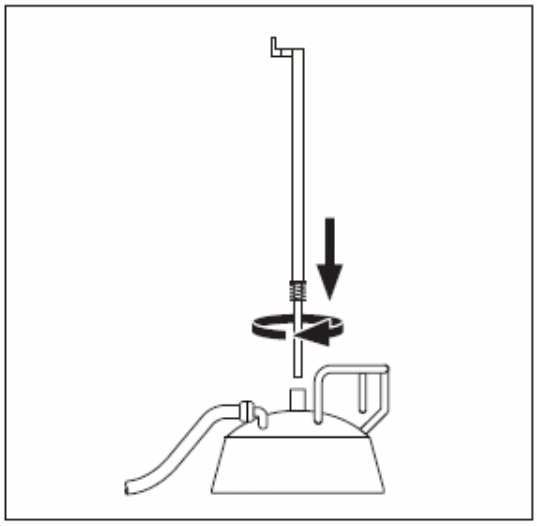
5. Insert the bottom part of the shower stand into the reservoir and tighten by turning in clockwise direction.



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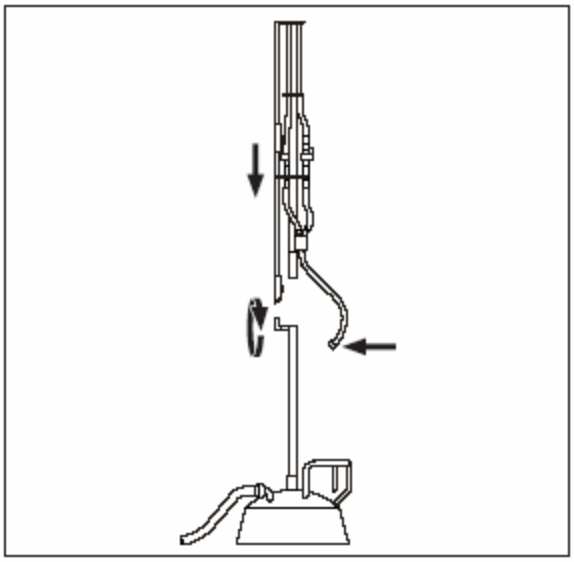
6. Attach the upper part of the nozzle stand to the bottom part. Tighten the securing screw.
   Connect the hose from the distributor to the reservoir.



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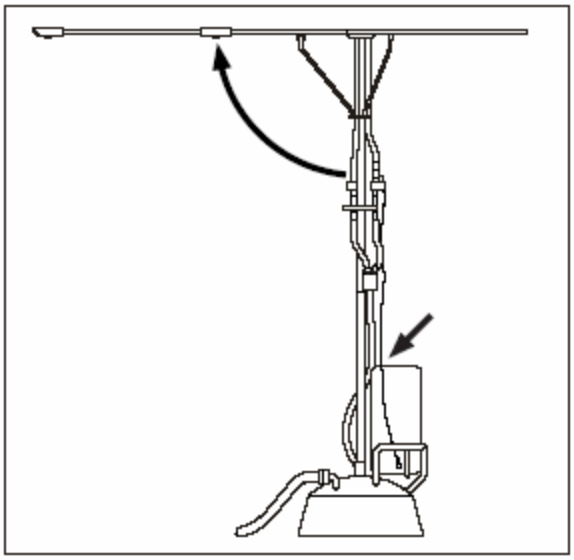
7. Tilt the nozzle holders into the shower position and secure them.
   Put the cleaning agent injectorfilter into the Kärcher RM 21 decontaminating agent. Open the cleaning agent injector and select the required position between 0 and 8.
8. Start the hot water unit in accordance with the manual and set the knob to position "➡" = Burner on.

IMPORTANT
The temperature selector knob must be set to approx. 50° C.



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5 Shutting Down

- Before shutting down the system, wash the cleaning agent injector thoroughly with clean water.
- Set the selector switch on the hot-water unit to position "Burner off" and allow the system to cool down.
- Shut down the hot-water unit in accordance with the manual.
- Dismant le the shower system in reverse sequence to that described in Section 4.
- Drain the water tank and reservoir.

6 Safety System

If the shower temperature exceeds 55°C, a safety temperature valve closes. The excessively hot water is diverted via the injector suction line.

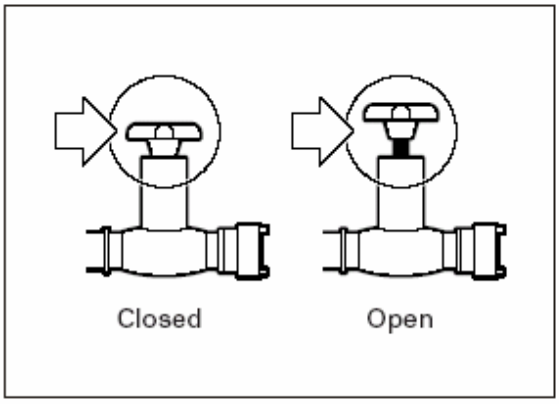
Remedy:

- Set the hot-water unit thermostat to a lower temperature.
- Ensure that the injector has an adequate supply of water.

(1) Resetting the safety temperature valve

The safety temperature valve must be cooled down before it can be reset. This is achieved by switching off the hot-water unit burner, pulling up and holding the safety valve handle until it locks into the upper position. When carrying out this procedure, cold water must be con tinually pumped through the entire shower system.

NOTE
As soon as the safety temperature is fallen below, the valve locks by itself.



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(2) Checking and Adjusting the Safety Valve

Checking the shutdown point

- The reservoir must be at least 55° C.
- Remove the safety unit from the housing - the valve must be open.
- Immerse the safety unit in the reservoir.

NOTE If the valve does not switch, it must be reset as described below.

Adjusting the shutdown temperature

- Remove the clamping sleeve.
- Remove the handle.
- Immerse the safety unit in the reservoir.

NOTE Rotating the screw in an anti-clockwise direction lowers the shutdown temperature. Rotating the screw in a clockwise direction increases the shutdown temperature.

7 Technical Inspection

After every use	- Empty the reservoir - Check the shower nozzles - Check that the hose couplings are securely fitted
Every 6 months	- Check the safety valve (55°C)

8 Trouble-Shooting

Safety valve switches	- Water temperature has been set too high on the hot-water unit (max. 50°C) - Suction water is too warm/suction quantity is too low - Safety valve is not set at 55°C, see Section 6 (2)
Cold-water injector is not drawing in water	- No water available - Hot-water unit is not pressurized (see operating instructions) - Injector is blocked (clean) - Injector nozzle is blocked (clean) - Suction hose filter is blocked (clean)

Student Handout #10
MPDS Possible Malfunctions

	Malfunction, Error	Cause	Corrective Action
1	Engine does not start	Fuel container empty	Refill fuel or exchange fuel canister
		Gas lever at Stop/0	Set gas lever to full gas
		Set gas lever to full gas	Check fuel filter, replace fuel filter insert if necessary
		Vapor lock from fuel that is too hot	Cool fuel
		Paraffin deposits in fuel (winter)	Empty fuel system, replace fuel filter, use winter fuel
		Injection nozzle defective	Replace injection nozzle
		Injection pump defective	Repair injection pump, replace if necessary
		Additional fuel knob not pulled (for cold engine)	Pull additional fuel knob
		Gasoline instead of diesel fuel in canister	Empty gasoline, flush with diesel fuel and refill
		Air inlet blocked	Check air inlet system and clean
		Emergency shutdown valve closed	Open valve by turning the lever 90° in the counter-clockwise direction
2	Inadequate compression	Incorrect valve clearance	Check valve clearance, adjust if necessary
		Decompression device is defective	Check decompression device, replace if necessary
		Cylinder head gasket leaking	Tighten nuts or replace cylinder head gasket, if necessary
		Piston and cylinder worn	Overhaul engine
3	Engine difficult to turn	Starting load too high	Reduce the load
		Oil too thick	Change oil, use the correct viscosity

Student Handout #10
MPDS Possible Malfunctions

	Malfunction, Error	Cause	Corrective Action
4	Starter does not turn engine	Battery empty	Charge battery, replace if necessary
		"STARTER" button defective	Spray with contact spray, replace button if necessary
5	Engine does not run smoothly or quits	Inadequate fuel supply	
		-Fuel filter clogged	Replace fuel filter
		-Water in fuel	Exchange the fuel canister
		-Defective injection nozzle	Check the nozzle, replace if necessary
		-Defective injection pump	Check pump, replace if necessary
		Suction device clogged	Clean suction device
		Exhaust blocked	Clean exhaust
6	Engine emits black smoke	Engine overloaded	Reduce load
		Too much oil in crank case	Drain oil to the "max" marking on the dipstick
7	Engine is too warm	Engine overloaded	Reduce load
		Engine cooling is not adequate	Clean the cooling fins
		Injection nozzle defective	Check nozzle, replace if necessary
8	Engine knocks	Nozzle needle is stuck	Replace nozzle
		Piston rings defective	Replace piston rings
		Piston and cylinder worn	Overhaul engine
		Bearings worn	Overhaul engine
		Flywheel loose	Tighten flywheel nuts
9	Starter does not turn engine	Battery empty	Charge battery
		Button in the selector switch defective	Spray with contact spray, replace if necessary

Student Handout #10
MPDS Possible Malfunctions

	Malfunction, Error	Cause	Corrective Action
10	Burner does not ignite or flame goes out during operation	No ignition spark present (visual check through the view glass in the burner cover)	Check electrode gap and ignition cable. Adjust gap or replace defective parts, clean the electrodes if necessary.
		Burner control fuse has tripped	Press the reset button
		Relay defective	Replace relay
		Photo cell oily	Clean photocell
		Water shortage safety does not switch on	See malfunction “Water shortage safety does not switch on”
		Temperature sensor does not switch or is set too low	Set to 150 °C or 220 °C with a wrench or tool. Replace in case defective.
		Magnetic valve without current or damaged (opening noise can be heard when functioning)	Eliminate malfunction, replace if necessary
		Fuel canister empty	Exchange canister
		Fuel filter and filter on the fuel suction hose is dirty	Clean fuel filters
		Burner nozzle does not adequately atomize fuel	Check the burner nozzle: For this, disconnect the igniter cable in all cases and check the atomizer cone outside of the flow-thru heater. A fine, uniform cone must be produced.
			Remove the burner nozzle and nozzle filter and clean, replace if necessary
		Fuel pump defective	Check the fuel pump, disassemble and replace damaged parts
		Coupling of the fuel pump defective	Replace the coupling
11	Water pump knocks, pressure varies	Pulsation damper defective	Check the pulsation damper, replace if necessary
		Water pump draws in small amounts of air	Check suction and cleaning agent system, repair leaks

Student Handout #10
MPDS Possible Malfunctions

	Malfunction, Error	Cause	Corrective Action
12	Inadequate or no cleaning agent is delivered	Cleaning agent container is empty Cleaning agent filter clogged	Fill cleaning agent container or exchange Clean filter
13	Water shortage safety does not switch on – no flame	Water line valve closed Not enough water Water pump does not deliver enough water Leakage in cleaning agent metering valve, water pump draws air Float valve is stuck, is clogged or water line pressure is too low Screen ahead of the water shortage safety is clogged Valve plates in the water pump leaking or dirty Suction basket for suction operation dirty	Open water line valve Provide for adequate water supply Check the delivered quantity Check cleaning agent metering valve, repair leakage if necessary Check valve, clean if necessary Remove the screen and clean Check the valve plates and seating Grind or replace as necessary Clean the suction basket
14	Equipment does not achieve operating temperature	Water pump does not deliver enough water Safety valve leaking Screen ahead of the water shortage safety is clogged Not enough water Cleaning agent metering valve leaking, water pump draws air	Check the delivered quantity Replace seal Remove the screen and clean Provide for adequate water supply Check cleaning agent metering valve, repair leakage if necessary
15	Cleaning agent container fills up during operation	Check valve is leaking	Remove and check the check valve, replace if necessary

Student Handout #10
MPDS Possible Malfunctions

	Malfunction, Error	Cause	Corrective Action
16	Equipment switches continuously off and on when the hand spray gun is actuated	Nozzle is clogged Equipment calcified	Clean the nozzle Decalcify the equipment
		The switching point of the pressure switch has shifted	Replace the pressure switch