ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL TWO

INSTRUCTIONAL GUIDE

SECTION 9

EO C290.04 – COLLECT DRINKING WATER USING A SOLAR STILL

Total Time: 60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-802/PG-001, Chapter 4. Specific uses for said resources are identified throughout the Instructional Guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Find a suitable water collection area for construction of the solar still. Ensure the area has enough ground coverage for all groups to have ample space to construct their solar stills.

PRE-LESSON ASSIGNMENT

This class should not be taught during the winter months.

APPROACH

An interactive lecture was chosen for TP1 and TP3 to present basic material and give direction on procedures.

Demonstration was chosen for TP2 as it allows the instructor to explain and demonstrate building a solar still.

Performance was chosen for TP4 and TP5 as it provides an opportunity for the cadets to practice the skill under supervision.

INTRODUCTION

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet shall construct a solar still and collect water from it.

IMPORTANCE

It is important for cadets to know how to construct a solar still and be able to collect water from it because in a survival situation water may not be readily available. Cadets will have to use other resources to find water. Thirst is one of the enemies of survival.

Teaching Point 1 **Explain How to Find an Appropriate Water Collection Site by Digging a Hole in the Ground**

Time: 5 min Method: Interactive Lecture

FINDING AN APPROPRIATE COLLECTION SITE

A hole can be dug in almost any type of ground to find water. The hole has to be deep enough to let water seep in.

Dig a shallow well when you see damp sand or find plant growth.

Dry meandering stream beds might have water deposited just below the surface at outside bends. Dig in these bends for water.

Along sandy beaches or salt lakes, dig a hole in a sand depression 30.5 m (100 feet) from the shore or in the first depression behind the first sand dune. Rain water from local showers will collect between the dunes.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS

Q1. Where will rain water collect along sandy beaches?

Q2. What would you dig if you saw damp sand or plant growth?

Q3. A hole can be dug in what type of ground to find water?

ANTICIPATED ANSWERS

A1. Rain water from local showers will collect between the dunes.

A2. Dig a shallow well when you see damp sand or find plant growth.

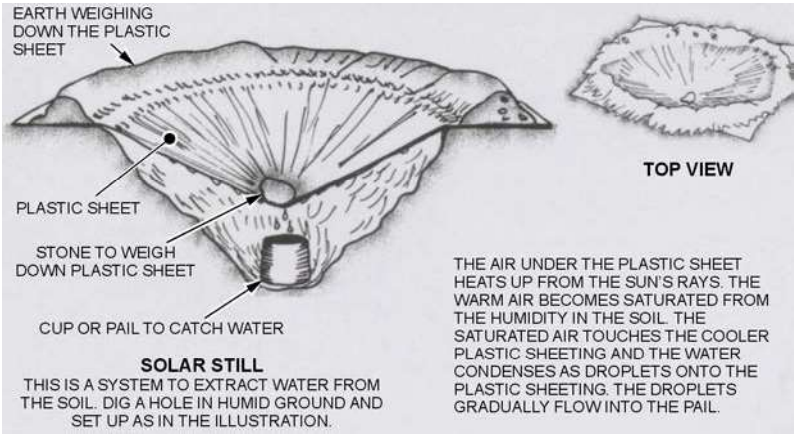
A3. A hole can be dug in almost any type of ground to find water. The hole has to be deep enough to let water seep in.

Teaching Point 2 **Demonstrate the Construction of a Solar Still**

Time: 15 min Method: Demonstration

CONSTRUCTION OF A SOLAR STILL

- Dig a hole in the ground approximately 90 cm (36 inches) across and 45 cm (18 inches) deep.
- Place a collecting can in the centre of the hole and cover the hole with a sheet of plastic formed into a cone.
- Weigh down the edges of the plastic sheet with heavy stones or use the dirt dug from the hole.
- Place a fist-sized stone in the centre of the bottom of the plastic sheet, above the collecting can.



Tawrell, P., Camping and Wilderness Survival, Falcon Distribution (p. 151)

Figure 1 A Solar Still

CONFIRMATION OF TEACHING POINT 2

QUESTIONS

Q1. What are the dimensions of the hole that is to be dug?

Q2. After placing the collecting can in the centre of the hole, what is the next step?

Q3. What weighs down the edges of the plastic sheet?

ANTICIPATED ANSWERS

A1. The dimensions of the hole in the ground are approximately 90 cm (36 inches) across and 45 cm (18 inches) deep.

A2. Cover the hole with a sheet of plastic formed into a cone.

A3. Heavy stones.

Teaching Point 3 **Explain How the Solar Still Collects Water**

Time: 5 min Method: Interactive Lecture

WATER CONDENSATION

The sun's heat raises the temperature of the air and soil below the surface and vapour is produced. As the air becomes saturated, water condenses on the underside of the plastic, running down into the container. This is especially effective in desert regions and elsewhere when it is hot during the day and cold at night. The plastic cools more quickly than the air, causing heavy condensation. This kind of still should collect at least 450 ml (1 pint) over a 24-hour period.

CONFIRMATION OF TEACHING POINT 3

QUESTIONS

Q1. How is vapour produced?

Q2. What happens when the air becomes saturated?

Q3. How much water should this type of still collect?

ANTICIPATED ANSWERS

A1. The sun's heat raises the temperature of the air and soil below the surface and vapour is produced.

A2. As the air becomes saturated, water condenses on the underside of the plastic, running down into the container.

A3. This type of still should collect at least 450 ml (1 pint) over a 24-hour period.

Teaching Point 4 **Construct a Solar Still**

Time: 25 min Method: Performance

ACTIVITY

OBJECTIVE

The objective of this activity is to have cadets, in groups of no more than five, construct a solar still.

RESOURCES

- Clear plastic bags,
- Cup or pail, and
- Shovel.

ACTIVITY LAYOUT

N/A.

ACTIVITY INSTRUCTIONS

Working as a member of a group of no more than five, the cadets shall choose a location for the solar still and find heavy stones to hold down the plastic sheet. Each group shall construct a solar still following these steps:

1. Dig a hole in the ground approximately 90 cm (36 inches) across and 45 cm (18 inches) deep.
2. Place a collecting can in the centre of the hole and cover the hole with a sheet of plastic formed into a cone.
3. Weigh down the edges of the plastic sheet with heavy stones or the dirt dug from the hole.
4. Place a fist-sized stone in the centre of the bottom of the plastic sheet, above the collecting can.

The questions in the confirmation of TP4 should be asked of the groups as the instructor moves from one group to the next.

The stills may remain overnight to collect water.

SAFETY

Ensure cadets stay within the set boundaries of the solar still construction area.

CONFIRMATION OF TEACHING POINT 4

QUESTIONS

Q1. What challenges were encountered while building the solar still?

Q2. Where is the collecting can placed?

Q3. What is the purpose of a solar still?

ANTICIPATED ANSWERS

A1. Answers will vary. Encourage the cadets to elaborate on their challenges.

A2. The collecting can is placed in the centre of the hole.

A3. The purpose of a solar still is to collect water when none is readily available.

Teaching Point 5 **Disassemble the Solar Still**

Time: 5 min Method: Performance

TP5 will be conducted on day two of the exercise.

DISASSEMBLE THE SOLAR STILL

Disassemble the solar stills by:

- checking the solar stills for water collection;
- measuring the amount in the containers;
- removing all items from the hole and fill in the hole with the removed dirt; and
- ensuring the ground looks as natural as possible.

CONFIRMATION OF TEACHING POINT 5

The cadets' participation in the disassembly of the solar still will serve as the confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' construction of a solar still will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

N/A.

CLOSING STATEMENT

Having the skills to construct a solar still and collect water in a survival situation can be essential to your survival. If water is not readily available you must be able to use your own resources to find water.

INSTRUCTOR NOTES/REMARKS

The solar still must remain in place overnight as both the heat from the sun and the cool air at night are required for the water condensation process to occur. For scheduling purposes, TPs 1-4 will be done on day one of the schedule and TP5 will occur on day two.

REFERENCES

C3-002 (ISBN 0-00-653140-7) Wiseman, J. (1999). *The SAS Survival Handbook.* Hammersmith, London: HarperCollins Publishers.

C3-003 (ISBN 1-896713-00-9) Tawrell, P. (1996). *Camping and Wilderness Survival: The Ultimate Outdoors Book.* Green Valley, ON: Falcon Distribution.