## Rural Training Center – Thailand (RTC-TH)



Community-based Environmental Education for the Self-sufficiency and Sustainability of Small Rural Family Farms

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A Brief Introduction to

M.E.W.S.

Mobile Emergency
Weather Station





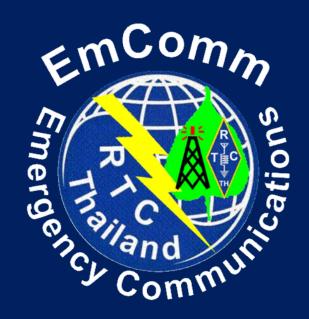
Rural Training Center-Thailand Emergency Communications Program

Ready to serve and sustain our community

For other lessons in the series e-mail hsØzhm@gmail.com www.neighborhoodlink.com/org/rtcth

### A part of the RTC-TH EmComm Program

The Rural Training Center-Thailand Emergency Communications program is a volunteer effort to provide emergency



amateur radio communications for local community self-sufficiency and sustainability in times of need.



E-mail: hsØzhm@gmail.com

### The Rural Training Center-Thailand (RTC-TH)



is an all volunteer organization providing community-based environmental education for self-sufficiency and sustainability of small rural family farms



www.neighborhoodlink.com/org/rtcth

E-mail: rtc2k5@gmail.com

### MEWS adapts weather lessons from 2 existing RTC-TH programs

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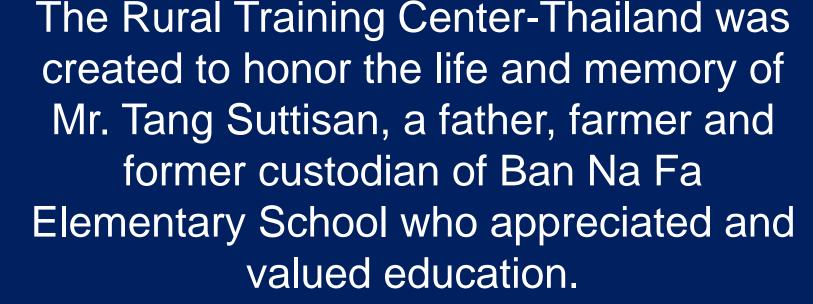




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### The Need







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Disasters disrupt existing infrastructures. Damaged roads cut access, stopping and slowing relief to stricken areas.

### The Need

Transportation, energy, food, water, and communications are often in ruin or short supply after a disaster.







## The Need Many times there is not much left at all.





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### The Need

Emergency relief workers may lack accurate on-site information especially from isolated areas

Photos from the Internet; educational fair use clause









When disaster strikes, local site specific weather data may not be available.

## Helicopters are important in relief operations





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### Helicopters evacuate the seriously injured







Most helicopters operate only by Visual Flight Rules; Pilots must see the ground

### Weather Data For Relief Operations



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Weather conditions can affect locations of safe zones, survivors, water, food, shelter, and medical needs.

### Weather conditions can affect transportation, routing, and delivery of relief supplies.



Weather conditions can affect emergency helicopter flight operations.



## Amateur Radio Operators (HAMs) have always been ready to serve their communities in times of need











Amateur radio operators (HAMs) who are trained and equipped to make basic weather observations are valuable members for a community emergency response team.



© 2009, G.K Lee HSØZHM HAMs are equipped for EmComm (Emergency Communications)



จังหวัดน้าน HS5AN

They have a self-contained portable radio station: radio, antenna, power supply, and a trained operator.



# HAMs are equipped for EmComm





They are prepared for extended deployment with their own tents and daily living supplies.

### The MEWS enHAMcement





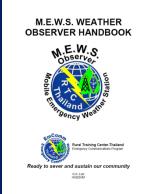


**MEWS** enhances a **HAM** with basic weather observation training and equipment



**HSØZHM** 









### The RTC-TH Approach

No Tech / Low Tech Weather Observations

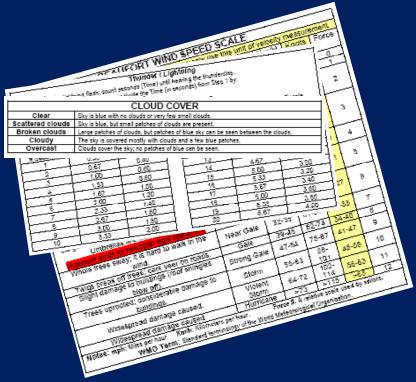














By keeping it simple, there is low cost, less equipment to break, malfunction, or run out of power, and less maintenance.

### The Basic Weather Observer's kit

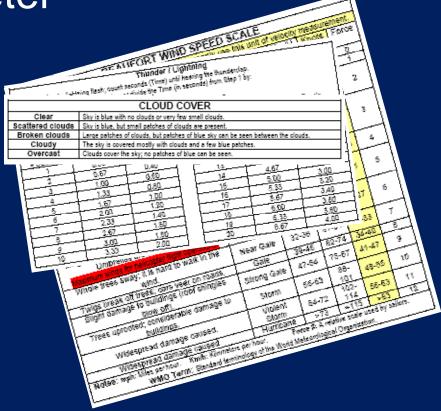


### Magnetic compass



#### Thermometer





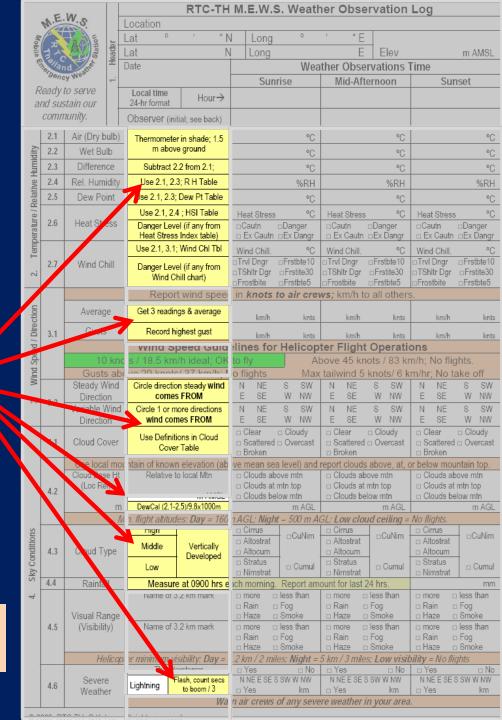
Basic Reference tables

## The MEWS Weather Observation Log

has highlighted notes to guide making observations with minimal training.

Detailed instructions are in the MEWS manual





## The MEWS Weather Observation Log

back of form has expanded notes for doing observations with minimal training.



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Detailed instructions are in the MEWS handbook

M.E.W.S. Summary Weather Observation Log Instructions

All weather observers write their initials and clearly print their name using block letters

#### Header

Location: Local Place Name

Latitude, Longitude from GPS, survey records or map measurement.

Elevation: Survey records or map measurement

(GPS elevations are not reliable).

Date/Hour: Use local Thai standard time in Observer: initials in box. Full name (print clearly) on top/back of form 24-hour format.

#### Temperature / Relative Humidity

- 2.1 Air (Dry Bulb) Temp: Read thermometer kept in the shade, 1.5 m above the ground.
- 2.2 Wet Bulb Temp from hyrgrometer kept in the shade. 1.5 m above the ground.
- 2.3 Difference between Dry and Wet Bulb temperatures.
- 2.4 Relative Humidity: Use Dry Bulb Temp (2.1), Difference (2.3) and Relative Humidity table to find % Relative Humidity.
- 2.5 Dew Point Temperature: Use Dry Bulb Temp (2.1), Difference (2.3) and Dew Point Temp table to find Dew Point Temp.
- 2.6 Heat Stress Temperature: Use Dry Bulb Temp (2.1), % Relative Humidity (2.4) and Heat Stress Index Table to find Heat Stress Temperature and relevant advisory warning.
- 2.7 Wind Chill: Use the Dry Bulb Temp (2.1) and Wind Speed (3.1) and Wind Chill Table to find the Wind Chill Temperature and relevant advisory warning.

#### Wind Speed / Direction

3.1 Average and Gust Wind speeds: Use Beaufort Table or direct measurements 3 times and average results. Gusts are short, strong blasts of wind. Report wind speeds in knots to air crews. Advise air crews when wind speeds are close to affecting helicopter flight operations.

	3.1	Report wind speed in knots to air crews; km/h to all others.													
sction.		Average	Get 3 readings & average		km/h		knis		km/h		knts.		kmh		kris
1.5		Guete	Record highest gust		km/h		knts		km/h		knts		km/h		krts
/poods	1		Wind Speed Guid	eline	s fo	r He	licop	ter i	Fligh	t Ope	erati	ons			
	1	10 kmo	ts / 18.5 km/h ideal; OK	to fit	1		Á	bove	45 kr	nots /	83 k	m/h; i	No fi	ights.	
I.		Gusts abo	ive 20 knots/ 37 km/h; N	lo flig	thts		Max	taily	rind 5	knot	s/8 k	km/hr;	No	take o	əff
=		Steady Wind	Circle direction steady wind	N	NE	3	SW	N	NE	9	318	N	NE	9	SW
e:	32	Direction	comes FROM	E	SE	W	NW	E	SE	W	NW	E	5E	W	NW
1	32	Variable Wind	Circle 1 or more directions	N	NE	3	SW	N	NE	5	SW	N	NE	5	SW
		Direction	wind comes FROM	ш	SE	W	NW	E	3 <b>E</b>	W	NW	E	SE	W	NW
_	-	2		_	_	_	_	-	_			+ -	_		_

3.2 Steady or Variably blowing winds. If steady, circle letter for direction. If variable, circle all appropriate letters for directions.

#### Sky Conditions

- 4.1 Cloud cover: Look at the sky and follow the definitions for each cloud cover classification.
- 4.2 Cloud Base Height: If relative to a local mountain, give its name and elevation above mean sea level. Note Local Relief in meters. If using the Dew Point method, subtract Dew point temp (2.5) from Dry temp (2.1) and divide result by 9.8; multiply quotient by 1000m. Advise air crews when cloud base height (ceiling) are close to affecting helicopter flight operations.
- 4.3 Cloud Type: Check the appropriate box based on cloud description in the guide book
- 4.4 Rainfall: Measure water in rain gauge each day at 0900 hrs. Rain gauge should be in open area, away from tall objects, with top of gauge 50 cm above ground to avoid splash water from entering gauge.
- 4.5 Visual Range: Pick landmarks 3.2 km and 5 km from your observation site. Report when visual range is more or less than the known distances to these landmarks. *Advise air crews when visual range is close to affecting helicopter flight operations*. Check appropriate boxes for reasons of reduced visibility.
- 4.6 Severe Weather: Primary concerns and thunderstorms and lightning. Check the appropriate boxes. If lighting, watch for flash, count seconds until you hear the thunder, divide by 3 = approximate distance in km. Circle direction to storm.

### **Basic Weather Observer Tasks**

- Temperature
- Estimate Wind Speed
- Wind direction
- Cloud cover
- Estimate cloud height
- Visibility
- Thunder / Lightning

- Useful for planning and setting priorities according to local environmental conditions
- Give general flight weather data at the landing zone



# Basic MEWS Observations are recorded here on the Log Form

- Temperature
- Estimate Wind Speed
- Wind direction
- Cloud cover
- Estimate cloud height.
- Visibility
- Thunder / Lightning





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Detailed instructions are in the MEWS handbook



### Instructional notes let you make observations with minimal training

dity	2.1	Air (Dry bulb)	Thermometer in shade; 1.5	°C			
	2.2	Wet Bulb	m above ground	°C ·			
Humidity	2.3	Difference	Subtract 2.2 from 2.1;	°C -			
	2.4	Rel. Humidity	Use 2.1, 2.3; R H Table	%RH			
Relative	2.5	Dew Point	Use 2.1, 2.3; Dew Pt Table	o.			
.e/F			Use 2.1, 2.4 ; HSI Table	Heat Stress °C			
Temperature /	2.6	Heat Stress	Danger Level (if any from Heat Stress Index table)	□Cautn □Danger □ Ex Cautn □Ex Dangr			
lem l			Use 2.1, 3.1; Wind Chl Tbl	Wind Chill. °C			
2.	2.7	Wind Chill	Danger Level (if any from Wind Chill chart)	□TrvI Dngr □Frstbte10 □TShltr Dgr □Frstite30 □Frostbite □Frstbte5			

- 1. Get air temp
- 2. Get wet bulb temp
- 3. Subtract #2from #1 andrecord
  - 4. Look up % RH in table using #1 and #3; and record % RH





## The MEWS Weather Observation Log

has highlighted items critical for helicopter flight operations.





		= IN -			RTC-TH M.E.W.S. Weather Observation Log									
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		Ready to serve and sustain our			Local time 24-hr format	Hour→								
		comn	nunity.		Observer (init	tial; see back)								
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	Tem				Use 2.1, 3.1;	Wind Chl Tbl	Wind Chill.	°C	Wind Chill.	°C	Wind Chill.	°C		
	2	2.7	Wind Chill		Danger Level (if any from Wind Chill chart)		Trvl Dngr =Frstbte10		Trvl Dngr = Frstbte10		□Trvl Dngr □Frstbte10 □TShltr Dgr □Frstite30 □Frstbte5			
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### Wind Advisory Notes for Helicopters

			Popert wind appear	lin knote	to air are	ures a lens fla ta	- - all ather				
		Report wind speed in <i>knots to air crews;</i> km/h to all others.									
Direction		Average	Get 3 readings & average	km/h	knts	km/h	knts	km/h	knts		
	3.1	Gusts	Record highest gust	km/h	knts	km/h	knts	km/h	knts		
Speed/			Wind Speed Guide	elines fo	r Helicop	ter Flight	: Operati	ons			
Š		10 knot	ts / 18.5 km/h ideal; OK	to fly	A	bove 45 kn	ots / 83 kr	m/h; No flig	jhts.		
Wind		Gusts abo	ve 20 knots/ 37 km/h; N	lo flights	Max	tailwind 5	knots/ 6 k	m/hr; No ta	ake off		
		Steady Wind	Circle direction steady wind	N NE	S SW	N NE	S SW	N NE	S SW		
က်	3.2	Direction	comes FROM	E SE	W NW	E SE	W NW	E SE	W NW		
	3.2	Variable Wind	Circle 1 or more directions	N NE	S SW	N NE	S SW	N NE	S SW		
		Direction	wind comes FROM	E SE	W NW	E SE	W NW	E SE	W NW		



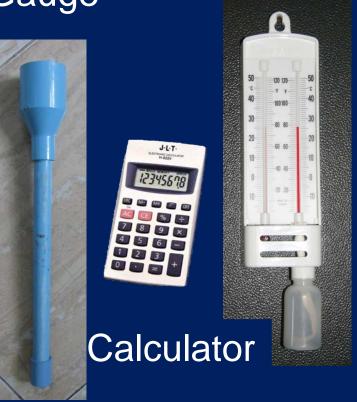
- Color coded for OK or warning
- Operator looks at form, reads off weather data and relevant flight crew warning.

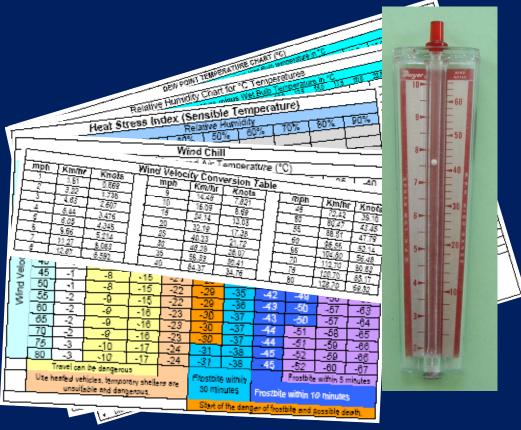


### Advanced Weather Observer's kit

Rain Gauge Hygrometer

Dwyer wind gauge





Advanced Reference tables





### Advanced Weather Observer Tasks

#### All the Basic observations plus:

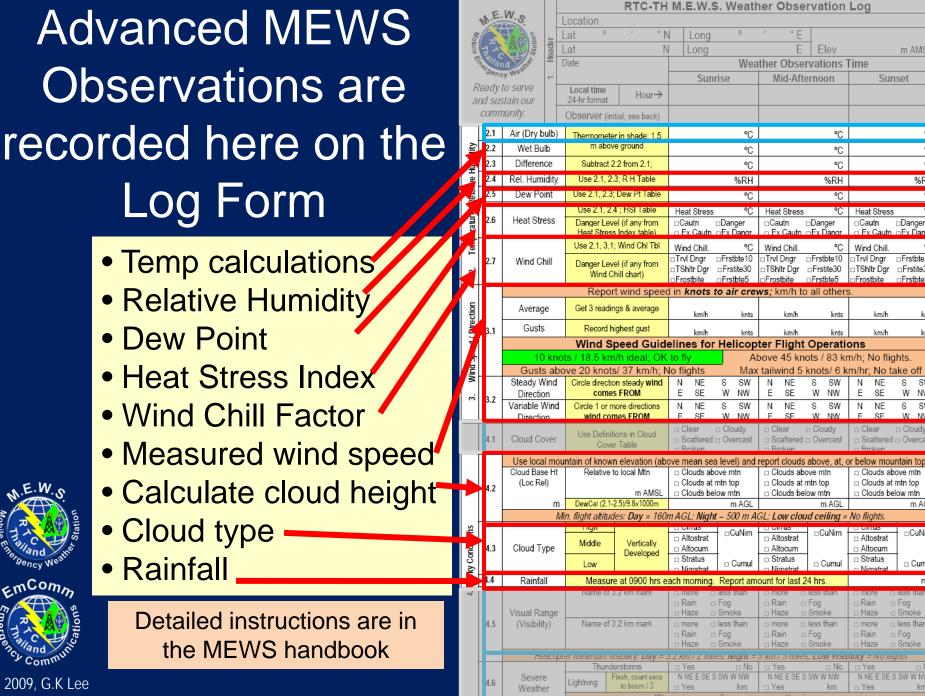
- Relative Humidity
- Dew Point
- Heat Stress Index
- Wind Chill Factor
- Measured wind speed
- Calculate cloud height
- Cloud type
- Rainfall

- More detailed local environmental conditions affecting survivors
- More accurate cloud ceiling which could affect flight operations
- Give specific flight weather data at the landing zone
- Gives basic weather forecasting capability





### Observations are Log Form



© 2009, G.K Lee **HSØZHM** 

### Other Advanced Equipment

Digital
Thermometer





Digital Hygrometer



Sling Psychrometer



Analog Weather Station

Digital Weather Station

Photos from the Internet; educational fair use clause

Some HAMs may already have some of these



### More Advanced Equipment

**Kestrel Pocket Weather Station** 













SkyScan Lightning Detector



Strike Alert Lightning
Detector

Photos from the Internet; educational fair use clause

Some HAMs may already have some of these

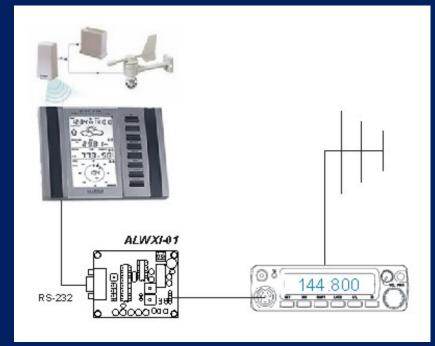


#### **Even More Advanced Equipment**

Portable Weather Station



**APRS** Weather Station



This type of automated digital equipment could be added to MEWS if funds were available



#### What Can You Do?

#### If you are not a HAM

- Get involved
- Join a radio club
- Join RAST
- Get a license
- Get a radio

#### If you are a HAM

- Join a radio club
- Join RAST
- Learn EmComm
- Learn MEWS
- Make an emergency plan

## You can learn MEWS free by mentor or self-study



#### Mentoring

can be done face-to-face (individually or in small groups on-site at cost ) or free over the Internet







Via E-mail / video chat hs0zhm@gmail.com

Via Skype video conference call: rtc\_th





#### Free Self-Study Materials by Internet

- RTC-TH Weather Observer handbook
- Illustrated PDF topical lessons

All of the lessons have been classroom and field proven.

Send e-mail to hsØzhm@gmail.com to request free training materials for non-commercial use only.



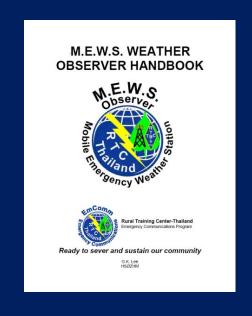




These materials are in English. Volunteer assistance for translation to Thai is welcome and will be acknowledged and cited.

#### **Questions or Comments**

Refer to the MEWS
Weather Observer
Handbook for more
details on any of the
procedures in this lesson.





You may also contact us by e-mail: hsØzhm@gmail.com
We are always trying to improve our lessons. Your comments and suggestions are welcomed.

#### **Basic MEWS PDF Lessons**

- B 1: Measuring Temperature
- B 2: Estimating wind speed
- B 3: Measuring Wind Direction
- **B 4: Estimating Cloud Cover**
- B 5: Estimating Cloud Base Height
- B 6: Identifying Cloud Types
- B 7: Estimating Visual Range
- **B 8: Severe Weather Conditions**



#### **Basic MEWS PDF Lessons**







3 Orientation and 8 Basic lessons.

Some show how to build your own weather equipment.

#### **Advanced MEWS PDF Lessons**

- A 1: Measuring Relative Humidity and Heat Stress
- A 2: Measuring Wind Speed and Wind Chill
- A 3: Using Dew Point Temperature to Calculate Cloud Base Height
- A 4: Measuring Rainfall
- A 5: Reporting Severe Weather
- A 6: Weather Forecasting



#### **Advanced MEWS PDF Lessons**

Advanced MEWS
Weather bserving Lesson A1:
Measuring Relative Humidity and
Heat Stress









Advanced MEWS
Weather Observing Lesson A4:
Measuring Rainfall





Advanced MEWS
Weather bserving Lesson A6:
Weather Forecasting





Six slide show lessons

Some show how to build your own weather equipment

#### The RTC-TH Emergency Preparedness lesson series



**HSØZHM** 

#### For More Information about M.E.W.S.



# Contact Greg HSØZHM MEWS Creator / Mentor







Via E-mail / video chat hsØzhm@gmail.com



Via Skype video conference call: rtc\_th

#### Future RTC-TH EmComm Lessons

- Identifying local Geo-Hazards
- Finding safe EmComm operating sites
- Identifying main supply routes and alternate routes
- Finding Helicopter Landing Zones
- Helicopter landing zone hand signals
- Ground to air communication without radios



### I EmComm, therefore I am.

#### I didn't, therefore I am not







#### Community-based Environmental Education for





#### The End