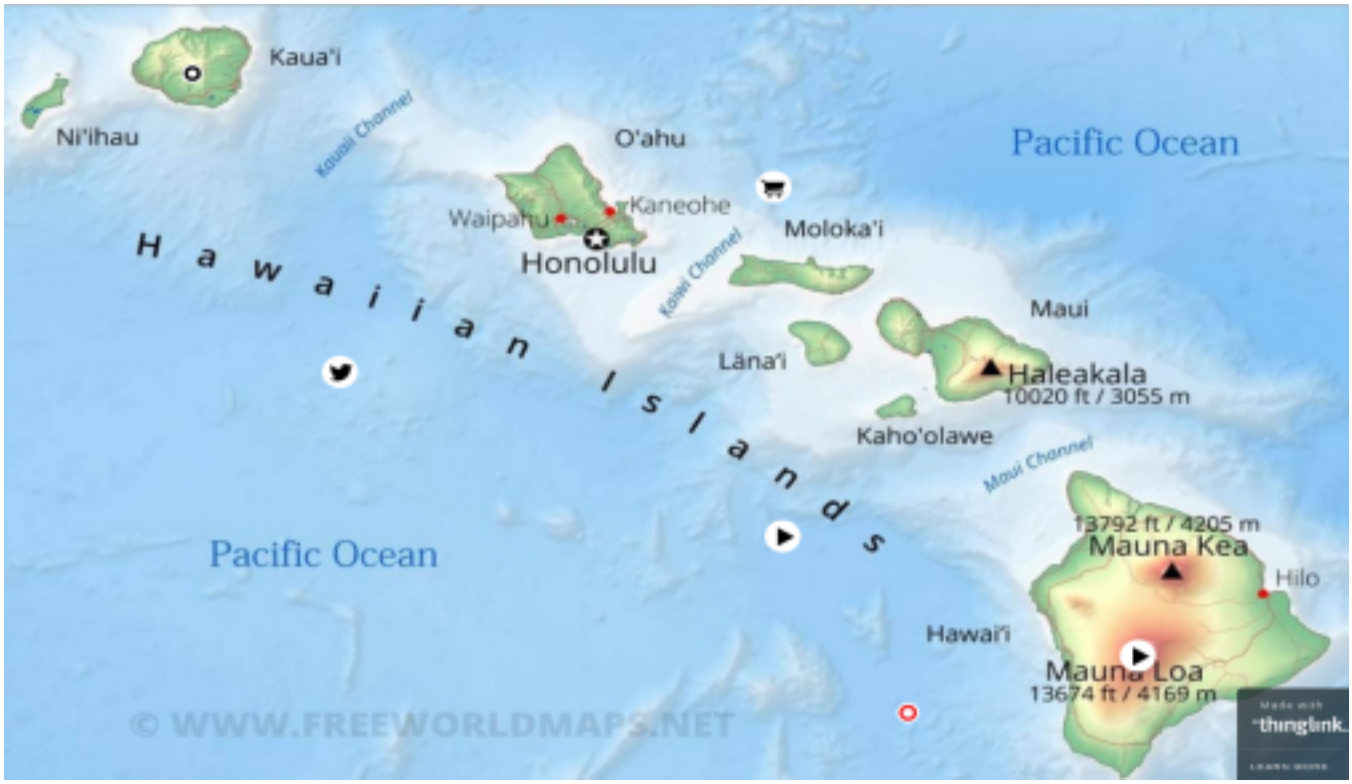
Kawailani ‘Ino Hawaii

(Heavenly Water Storm)

Exercise Participant Materials

Hawaii State ARES®

Drill: 16 April 2022, 9:00–12:00 AM HST.



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Kawailani ‘Ino Hawaii COMEX
ACKNOWLEDGMENTS

The Hawaii State ARES® Field Service Organization would like to recognize everyone who makes this drill possible, and the volunteers who donate their valuable time and skills in order to help our communities remain safe. Without the efforts of everyone working together, it would not be possible to maintain the skills and capabilities needed to assure the continuity of communications during times of disaster.

We appreciate the time each operator has invested in developing their skills in amateur radio operations, the courses you take, and the training you engage in. This exercise endeavors to implement best practices, promote professionalism, and achieve excellence in all that we do.

The exercise planning team wishes to thank our District Emergency Coordinators (DECs) and Community Emergency Coordinators (CECs) in each county for their hard work and dedication in training amateur radio volunteers, and who volunteer to organize and encourage exercise participation. We would also like to thank our ARES® Section Emergency Coordinator, Clement Jung, KH7HO, and Joseph Speroni, AH0A our ARRL Section manager for their support of ARES and the Amateur Radio Service. We appreciate the opportunity they have provided us to plan this exercise.

Most importantly we would like to thank all Amateur Radio Stations for their willingness to learn about and participate in this exercise. We recognize the significant amount of time you invest in honing your skills, as well as the money each of you have invested in your equipment. We thank you for being willing to offer service to your community and hope that you will learn from and enjoy this drill.

73,

Hawaii ARES®Exercise Planning Team

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PLAYER’S SITUATION MANUAL & Exercise plan

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* If you wish to participate, **please sign up for this COMEX** via the link above.

The last question on the signup forms is “***Will you be able to participate?***” (Yes, No, or Maybe) After you submit your response, you will be sent an email indicating that your response has been received. This email contains an “***Edit Response***” button allowing you to make changes to your sign-up form as needed. Anyone who indicates “No” to the participation question will not be sent any message “injects” to initiate traffic. You may still check-in to nets, and assist in ad-hoc relays when needed, if you wish.

All licensed operators in Hawaii are encouraged to sign up, even if you are unsure whether or not you will be able to participate.

*If you have signed up and **not received the confirmation email**, then go ahead use the signup form link and sign up again. You will then receive an email with the link allowing you to edit your sign-up form as needed.*

Kawailani ‘Ino Hawaii COMEX
Drill Overview:

Introduction:

Kawailani ‘Ino Hawaii was designed as a drill to test the ability of the amateur radio operators to establish emergency radio communications in the event of a widespread infrastructure failure.

As the storm impacts each island, electrical power, internet, and cell phone service fails across each island due to severe weather that produced catastrophic rains, and high winds. Flooding will occur in flood-prone areas. The simulated storm first impacts Kaua’i and slowly moves across each island over a simulated four-day period.

The rationale for this exercise:

Most ARES® activity in Hawaii revolves around hurricanes because they are assessed to be the greatest threat to life safety and property. Hurricanes and other natural disasters generally produce local power outages as a result of the physical destruction of wires, transformers, towers, and other critical infrastructure.

We saw this in our recent Kona Low storm event in December of 2021. Grid power, internet, and cable service were disrupted. It is also possible that public safety radios may be impacted by future weather events.

Our telephone, internet, water, and electric power service providers have generally been able to repair infrastructure to the majority of subscribers within 72 hours in most areas. County Work Crews are generally responsive in clearing and repairing damaged roads. However certain communities are situated in geographical areas that leave them isolated and without services for potentially much longer periods of time.

We have been fortunate in recent years, and not suffered from widespread catastrophic damage caused by severe weather. However, it is clear that we are vulnerable to it, just as Puerto Rico was during Hurricane Maria in 2017.

Hawaii ARES® operators wish to be prepared to help people in our communities by supporting emergency communications in a worst-case scenario.

Goal:

The goal of this drill is to reinforce and test the operators ability to stand up stations, using off-grid power if possible, and ***work together*** to prioritize and push forward simulated reports and messages by appropriate technology in a rapidly evolving disaster scenario.

COMEX Facilitators:

Across each Island and community we have asked stations to act as exercise facilitators.***** The facilitators include the Simulated Emergency Operations

Centers (EOCs) and Hub Stations. For this Communication Exercise (COMEX) a hub station typically has multiple bands and/or modes of communication capability, antennas with good gain, and off-grid power. There may be designated relay stations in your area who would also be considered to be facilitators.

Role of Hub Stations:

The role of the hub station is to start off the COMEX, establish a voice net as the net control operator, and generally help everyone else be successful in the COMEX. Hub stations have the ability to take message traffic in one mode, and re-send it along to its destination using another band or mode. For example, a hub might copy down a VHF voice message, and relay it to its destination using HF voice or Winlink.

Relay Stations:

Some areas may establish relay stations. These stations also typically have antennas with good gain, higher output power, and are situated in a good area for this purpose. They listen for a relay request, or a station having difficulty and assist others in moving their message towards its destination. Check your District’s ICS-204 & 205 Incident Communications Plan for details. Relay stations can also act as players** and be given their own “injects” to pass.

COMEX Documents:

- Situation Manual (This document)
- Player** Handout (3 fold page)
- Incident Action Plan (IAP)
- Facilitators Guide*

*If you wish to be a facilitator, contact your DEC, or a person on your County planning team ASAP to be added into the ICS-204 (Assignment List) and ICS-205 (Incident Radio Communication Plan) for your area.

**Exercise participants are referred to as Players and sometimes are called “spokes.” These are the stations that initiate message traffic which is based upon the “Inject(s)” that they receive prior to the COMEX.

Exercise Plan

Each community in Hawaii has different geographical challenges to communications, and varying population density. Details about communication plans are customized for each ARES district. Under the ICS Organizational Chart:

- Activities fall under the Operations Section.
- Each County is referred to as a “Branch.”
- Each ARES district in a County is referred to as a “division.”

This is consistent with NIMS and ICS. Note that only the City and County of Honolulu, and Hawaii County have divisions in this COMEX.

Refer to the ICS-204 & 205 for your division (aka ARES district) in the Incident Action Plan document (IAP) for detailed communication resources and plans.

Use of Winlink:

Some districts will hold a Winlink net, which is a combination of voice and data on the same frequency. (Urban Areas) This is for Winlink capable operators. If this is specified in your area:

- Check into the voice net.
- Follow the directions of net control. The NCS will tell you when to start your session. Be ready!

Other districts may specify VHF Winlink stations without an NCS. Make sure to listen on frequency for other traffic before starting your Winlink session.

- Use of RMS stations is permitted using any Winlink mode on VHF/HF. Winlink Telnet is also permitted if you have no RF option.
- Players with the ability to send via Winlink to the EOC do not need to send through a hub.
- Be creative. VARA Digipeaters are a great option. If you are within simplex range of a VARA capable station, ask if they can leave it on in order to extend your range.

You may use P2P modes to reach the EOC only if your EOC is operating in that mode. If not, and you are seeking to test your capability on HF P2P, then please see the Hawaii Branch, East Division-ICS-204. WH6GGO is acting as a statewide relay operator for testing purposes. Otherwise, simply use any Winlink RMS gateway.

There is a great deal of flexibility in how Winlink can be used. Not all aspects can be covered in this guide. It is a good idea to participate in Winlink training sessions prior to this COMEX.

Voice Nets (VHF & HF)

- If you have the ability to send your message traffic directly to the EOC, you **do not** need to direct your traffic through the hub.
- If your EOC is operating on VHF you may be able to reach them directly by checking into their net.
- Stations with HF capability may also be able to directly reach the EOC on an HF net. (or via relay)

Listen to & Participate in Voice Nets on your Local Hub Stations:

Even if you do not need your hub station to relay your message, we still suggest that you check-in to your local hub net. Listen to your local hub and/or to the EOC net, if within range. This allows you to:

- Hear the opening of the drill.
- Receive simulated Emergency Alert Messages and NWS bulletins.

Gain situational awareness/help other players:

Learn which stations in your community you are able to hear, and gauge signal quality. You may act as an ad-hoc relay for another player that is unable to reach their hub.

TIP: If you have multiple radios, or a scanner, you could listen to both the EOC and Hub frequencies, and maximize your ability to hear and help others.

- Most hub stations will operate via simplex, but some areas may define repeater(s) as a primary path, with simplex frequencies as an alternative.
- Some repeaters have off-grid backup.
- Distance, Terrain, and a low density of operators may necessitate repeater usage.
- Refer to the ICS-204, & 205 Incident Communications plan for your area.

You may use any hub or relay that can help you move the message forward to the EOC as needed. The objective of the drill is for everyone to get their message to the EOC by whatever band, mode, or relay option works for any given player.

Participant Objectives:

1. Become familiar with the Incident Action Plan. This is the set of ICS forms, starting with the ICS-201 Incident Briefing, and includes the ICS-202, 203, 204, 205, 205A, 207, and 208.
2. Be familiar and practiced with bands, frequencies, and modes of RF communications that are set up and work in your area.
3. Exercise your ability to adapt

as needed to real-world communication challenges.

4. Stand up stations on Emergency Power. Establish communications with other operators by checking into nets. Assist each other as needed.
5. Exercise your own judgment. Determine how to phrase the message, to include only the Essential Elements of Information. (EEI) Determine which form to use (if any) Determine the best way to get the message to the EOC and make it happen.
6. Accurately document, transmit, and log message traffic on the ICS-309.
7. Receive confirmation and document that your message traffic was received. (Note the time of confirmation on the ICS-309 when using a relay.)
8. **HF Capable operators:** Organize with HF operators to allow stations to assist each other in moving traffic forward towards its destination. Share band conditions in real-time.
9. Make sure to always have a supply of relevant forms on hand. (ICS-213, 309, etc.
10. Have fun with this exercise!

As Amateur Radio Operators we play a part in providing services under the FEMA **Emergency Support Function#2**. In Hawaii, this is referred to as SESF 2.

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Exercise Injects

What are injects? Why are we using them?

(Injects are a collection of pre-scripted events intended to guide an exercise towards specific outcomes.)

Injects are the heart of this COMEX. Your “inject” will only be given to you. Other “players” will not know them. Traffic, other than check-ins, check-out, band condition reports, radio checks, and relays, will come from injects. **Players will <u>not</u> be “Making up” their own scenarios for message traffic.**

Injects provide you with specific details about what happens in the simulation at a specific point in time. Open it at the time indicated.

When reading an inject, each “player” determines how to handle it. What form? What priority? How will you word it to only include the Essential Elements of Information? (EEI)

At the beginning of any message you transmit, remember to include the words “**This is an exercise message.**” (In writing for Winlink, or verbal if passing by voice.)

Injects contain simulated information about:

What you are observing on the ground.

- An event that is happening.
- An interaction with an individual, group, or served agency which you assume is happening as you read it.
- Each County or district has its own way of providing players with their injects.
- Injects may be provided via email just prior to or early on during the exercise.

Some may get a hard copy, perhaps sealed in an envelope with an “open at” time on the front. Please do not read an inject until the timestamp indicated. We want you to only be ready with your skills and equipment to do the best that you can prior to the drill.

Why use Injects?

- Injects prompt participants to think about how they would respond to potential real-world situations, revealing details that you may not have otherwise thought of.
- Injects allow an exercise planning team to be creative in guiding the exercise.
- Injects can allow exercise planners to provide you with tasks tailored to your individual abilities and skill level.
- Injects allow us to measure your abilities in specific areas and design future targeted training to help everyone learn and improve.
- Injects are fun.

Notes on Served Agencies and ICS:

Although most served agencies have been training their staff and volunteers for years in the use of the Incident Command System and its forms, we all need to remain flexible and work to communicate in a way that is effective in getting the job done.

Prior to the wide scale adoption of ICS, many radio operators may have used no form, or a form such as an ARRL Radiogram. Suppose a station in the field were transmitting information to another operator who is talking to a 911 operator on the telephone. The message may have been relayed tactically, with the receiving operator repeating information directly to emergency management personnel verbally. Some ARES®groups have produced a custom ICS-213 that incorporates aspects of the Radiogram into it, such as groupings of 5 words and word counts.

There are pros and cons of each approach, but the critical objective is ***for everyone to work together the best they can in a harmonious way.*** Unfortunately, disagreements about which form and method of communication to use have eroded our ability to work well together over the past two decades.

We are still in a transition mode to ICS, but the way to achieve the objective is to **meet our served agencies where they are at.** We need to use the form and format they specify, and provide them with the information they want, in the way they want it. In order to know this, we must encourage conversations, ask questions, and hold table top exercises.

The ICS-213 General Message form is a useful way to document messages. It is the go to form for most communications. It is especially useful as messages are relayed and ultimately copied to a larger group.

However the ICS-213 is a “General message” form and does not specifically indicate the essential elements of information (EEI) that are needed by a served agency. In Hawaii County the HC CDA has chosen to use the ACS forms instead of the ICS-213.

One example of information that radio operators may not realize is essential to emergency management is the telephone number of the reporting party. This is often important when one is requesting assistance, even when the phone system is not working. It is often used as a reference to connect the response to the reporting party, or for other purposes. It depends upon the situation. We don’t always need to know why we are asked to do something in a certain way, sometimes it is enough just to provide what is requested by our served agencies.

There are not many hard rules, only guidelines. We all need to listen, learn, contemplate, coordinate, and use good judgment.

Ground Truth:

This drill simulates a severe storm with high winds and heavy rain impacting the state. Flooding will occur in flood-prone areas. The storm first impacts Kaua’i, and slowly moves across each island over a Four day period defined as follows:

Drill Time General Storm Scenario Timeline:

09:00-11:00 Storm Impacting Kaua’i moving towards Oahu (Simulating Day 1-3 of Storm)
09:30-11:30 Storm Impacting Oahu moving towards Maui (Simulating Day 2-3 of Storm)
09:30-11:30 Storm Impacting Maui moving towards Big Island (simulating Day 2-3 of Storm)
10:00-12:00 Storm Impacting Hawaii County. (simulating Day 3-4 of Storm)
12:00-13:00 HST Lunch Break
13:00-14:00 HST Drill Hot wash via Zoom.

The storm situation simulated for this exercise is a “Kona Low” on steroids. Such storms happen several times a year in the state in the winter. A low pressure system develops northwest of the islands, gets enhanced by a dip (trough) in upper winds that moves south over the low, and the two adding together make a deep low pressure system that circulates strongly in a way that draws up a lot of moisture from the warmer waters over the equatorial Pacific. Such weather systems can hang around over the state for days. The last one that did was on December 5, 2021, and that got a lot of the islands pretty wet.

“Kona” in old Hawaiian means “leeward”. In a nautical context, that meant winds coming from the leeward direction rather than from the windward direction. Windward most of the time here in Hawaii is from the northeast sector, the trade wind regime. So leeward is the opposite – southwest. What a Kona Low does is create winds from the southwest that suck up warm wet air over the equator and dump it on us here in Hawaii. And depending on where adjacent high pressure systems are located, winds coming out of a high can significantly reinforce the southwest winds being drawn into the low. The result is literally a strong siphon of wetness from the equatorial Pacific drawn over us. We’re sort of on the business end of a meteorological firehose: a lot of water, with a strong flow (i.e., wind speeds). Such systems typically set up strongly, move slowly and take awhile to die down. The Kona Low weather system being simulated for this exercise is meteorologically plausible, even though it may be on the high end of what has been experienced historically.

Ground truth is defined as…

information that is known to be real or true, provided by direct observation and measurement (i.e. empirical evidence) as opposed to information provided by inference. For purposes of this exercise, the injects are considered to be ground truth, in that they accurately describe what an observer has seen. Examples:

- In a storm like this, a radio operator with a home weather station could report actual measured rainfall rates, total accumulated rainfall since the storm started, wind speeds and directions. These are direct measurements.
- A radio operator without a weather station could look out the window and report how hard the rain is falling and how hard the wind is blowing and report using the general categories provided. (See https://www.hawaiicert.org, ***resources, references*** link for examples.)
- Other direct observation reports would be flooding, landslides, road closures, accidents, injuries, and so forth.

In a real event, there may be misunderstanding or passage of information that isn't accurate. Radio operators need to avoid relaying this, by making sure you know that the source directly observed what they are reporting. For purposes of this exercise each of the injects will be considered to accurately represent the truth and can be passed along without question.

County by County Scenario Detail: Kauai

Drill Time:	Simulating:	Weather Scenario:
0900-0910	Morning (Day 1)	Thunder/lightning firing up over the north facing slopes moves across the island, with multiple ground strikes. Power, Internet, and phone service are out islandwide. Sustained winds from the south at 45 mph, gusting to 65 mph. Heavy rainfall islandwide frequently at up to 4”/hour in many areas, with downburst up to 5”/hour.
0911-0920	Afternoon	Sustained winds 45 mph, gusts to 60. Heavy rain islandwide, averaging 3” / hour with catastrophic rain increasing up to 5” per hour in some areas.
0921-0930	Evening & Overnight	Sustained winds, 40 mph, gusts to 55 mph. Heavy rain continues with up to 4” per hour in some areas. 32” accumulated rainfall measured over the past 24 hours.
0931-0940	Morning (Day 2)	Sustained winds from southwest, 35 mph, gusts to 50 mph. Heavy rain of up to 4” per hour in some areas. Flooding in multiple areas. Rivers are overflowing their banks as water levels continue to rise.

		Extensive Flooding.
0941-0950	Afternoon	Sustained winds, 30 mph, gusts to 45 mph. Heavy rain of up to 2” per hour, intermittently reaching 4” per hour in some areas. Flooding is severe washing out roads and bridges. Multiple landslides.
0951-1000	Evening & Overnight	Sustained winds, 25 mph, gusts to 40 mph, direction shifting to west. Rain continues at an average rate of 1” per hour, intermittently reaching 3” per hour in isolated areas. Accumulated rainfall over 48 hours is 64-68”
1001-1010	Morning (Day 3)	Sustained winds, 20 mph, gusts to 30 mph. Rain continues at an average rate of .75” per hour, intermittently reaching 2” per hour. Severe flooding is occurring in many parts of the island.
1011-1020	Afternoon	Winds have reduced to occasional gust of 10-15 mph, direction variable. Rains continue at less than ½ “ per hour. Dangerous flooding and high river levels are still occuring in low lying areas due to runoff from upslope areas.
1021-1030	Evening	Wind and rain has stopped, and the sky is partially cloudy.
1031-1040	Morning (Day 4)	Winds 5-10 mph from east-southeast. Light sprinkling intermittent rain, overcast sky.
1041-1050	Afternoon	Normal trade wind pattern, partially cloudy, Intermittent light rain.
1051-1100	Evening & Overnight	Normal trade wind pattern, clear skies. No rain.

County by County Scenario Detail: Oahu

Drill Time:	Simulating:	Weather Scenario:
0900-0910	Morning (Day 1)	Normal trade wind pattern, partially cloudy, Intermittent light rain. Hear NWS advisory of a Kona Low hitting Kauai and proceeding toward Oahu and the rest of Hawaii.
0911-0920	Afternoon	Hear NWS warning of a Kona Low hitting Kauai and proceeding toward Oahu.
0921-0930	Evening & Overnight	Continuing NWS warning of a Kona Low impacting Kauai and proceeding toward/over Oahu, expected to hit in the morning.

0931-0940	Morning (Day 2)	Thunder/lightning firing up over the north/west facing slopes moves across the island, with multiple ground strikes. Sustained winds 45 mph from the south, gusting to 65 mph. Heavy rainfall islandwide frequently at up to 3”/hour in many areas, with downburst up to 5”/hour. **Power, Telephone, and internet are out.**
0941-0950 0951-1000 1001-1010	Afternoon Evening & Overnight Morning (Day 3)	Sustained Winds 45 mph, gusts to 60. Heavy rain islandwide, averaging 2”/hour with catastrophic rain increasing up to 4”/hour. Sustained winds, 40 mph, gusts to 55 mph. Heavy rain continues with up to 4” per hour in some areas. 32” accumulated rainfall measured over the past 24 hours. Sustained winds from southwest, 35 mph, gusts to 50 mph. Heavy rain of up to 3” per hour in some areas. Flooding in multiple areas. Streams are overflowing their banks as water levels continue to rise.
1011-1020	Afternoon	Sustained winds, 30 mph, gusts to 40 mph. Rain continues at an average rate of 1” per hour, intermittently reaching 3”/hour in isolated areas. Average rainfall over 48-hour period is 58”
1021-1030	Evening	Sustained winds 20 mph shifting toward west, gusts to 30 mph. Rain continues at an average rate of .75”/hour, intermittently reaching 2”/hour. Severe flooding is occurring in many parts of the island.
1031-1040	Morning (Day 4)	Winds have reduced to occasional gusts of 10-15 mph. Rains continue at less than ½ “/hour. Dangerous flooding and high river levels are still occuring in low lying areas due to runoff from upslope areas
1041-1050	Afternoon	Wind and rain has stopped, and the sky is partially cloudy.
1051-1100	Evening & Overnight	Normal trade wind pattern, partially cloudy, Intermittent light rain.

County by County Scenario Detail: Maui

Drill Time:	Simulating:	Weather Scenario:
0900-0910	Morning (Day 1)	Normal trade wind pattern, partially cloudy, Intermittent light rain. Hear NWS advisory of a Kona Low hitting Kauai and proceeding toward Oahu and the rest of Hawaii.

0911-0920	Afternoon	Hear NWS warning hitting Kauai with increasing winds and heavier than normal rainfall. Path of the storm continues easterly.
0921-0930	Evening & Overnight	NWS continues to update with the path of the storm following predictions. Molokai reports increasing showers & winds sustained at 40 MPH. Expected flooding of streams to occur.
0931-0940	Morning (Day 2)	Lightening w/sustained winds (45 mph) & rainfall (4”/hr) over Molokai, Lanai & West Maui mountains. **Power, telephone, and internet service is out on all islands.**
0941-0950	Afternoon	Sustained winds from the southwest at 45 mph, summit of Haleakala 60 mph with some slushing of roadways. Rainfall is expected at 5”/hour across the entire Island of Maui. Lanai/Molokai experience less rain as the storm moves East.
0951-1000	Evening & Overnight	Sustained winds & rainfall causing downed trees in Upcountry areas. Haleakala NP is closed. Rainfall runoff causes flooding in South Maui. Flooding in all low lying areas for all three Islands in Maui County
1001-1010	Morning (Day 3)	Sustained winds at 35 mph, rainfall decreasing to 4”/hr with isolated areas of 6”/hr. Rockslides along both access roads to Hana town.
1011-1020	Afternoon	Flooding continues on the southern slope of Haleakala. Molokai and Lanai report decreasing rainfall and winds. Rockslides towards eastern tip of Molokai.
1021-1030	Evening	Western Molokai winds and rainfall back to normal weather. Most of the storm is impacting East Molokai, Lanai and Maui island.
1031-1040	Morning (Day 4)	Sustained winds from the west at 30 mph, rainfall dropping to 1”/hour. Brown water advisory for all southern portions of Maui. Rockslides are possible.
1041-1050	Afternoon	Rainfall at less than .75”/hr. Isolated wind gusts at 25 mph.
1051-1100	Evening & Overnight	Normal trade wind pattern setting in, partly cloudy, Intermittent light rain.

County by County Scenario Detail: Hawaii County

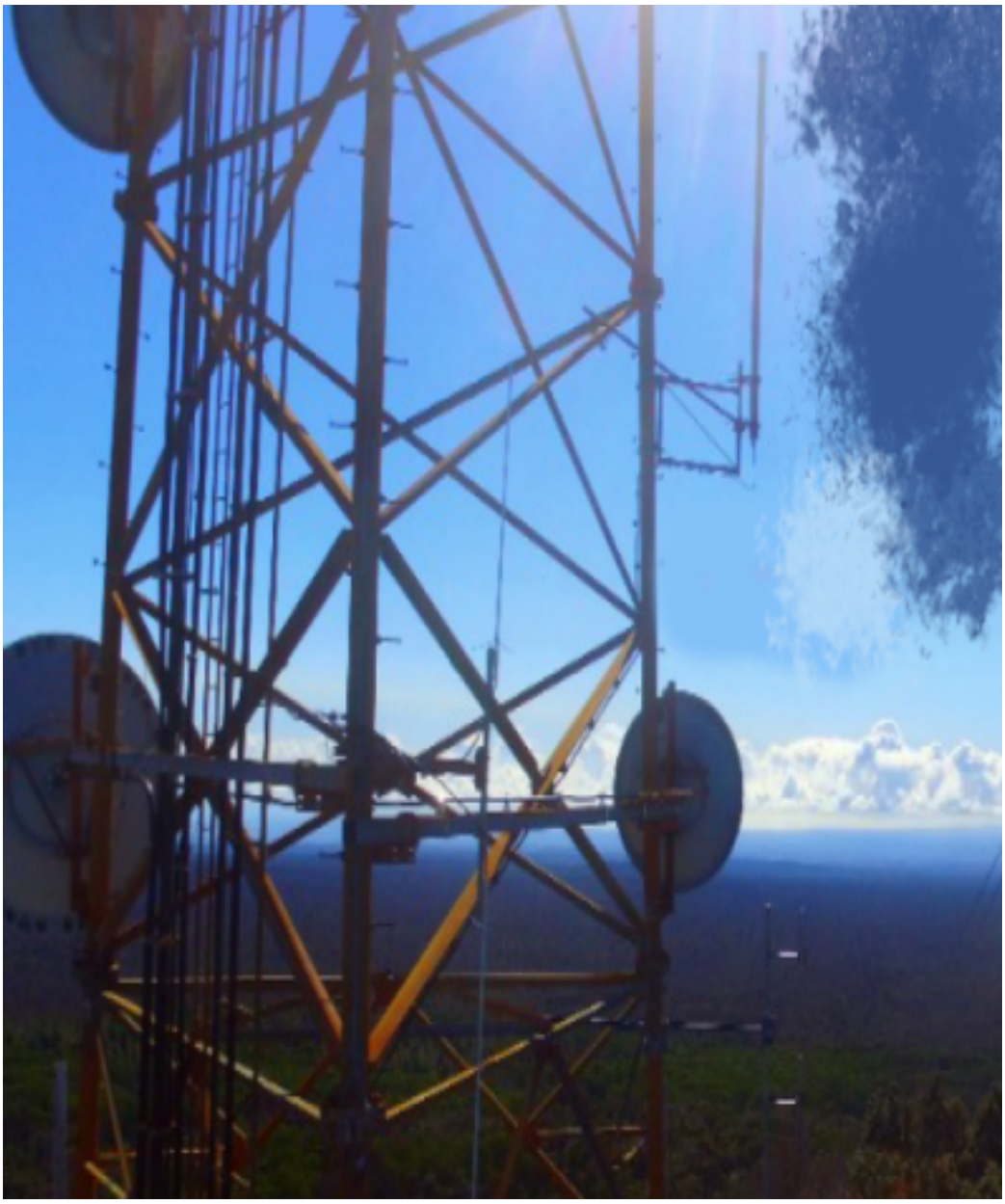
Drill Time:	Simulating:	Weather Scenario:

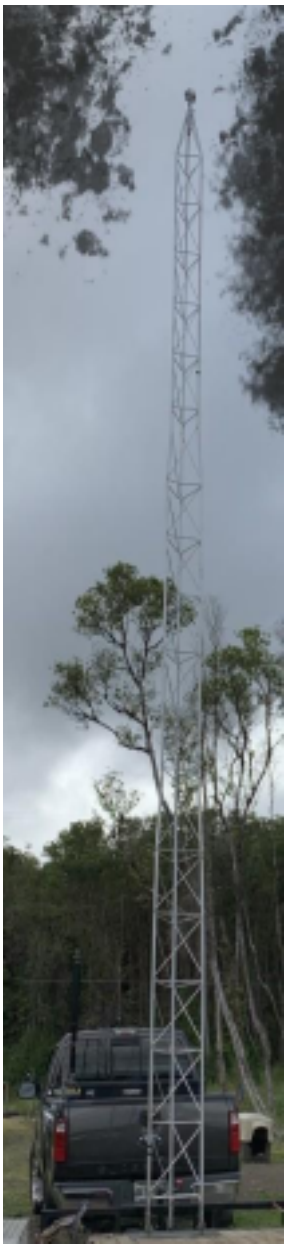
0900-0910	Morning (Day 1)	Light trade winds 15 mph, shifting to E, partly cloudy, no rain. NWS warning indicates possible migration of Kauai Storm moving southeast across all islands. Weather watch issued for Hawaii County.
0911-0920	Afternoon	Light trade winds 10 mph, shifting to ESE, partly cloudy, no rain. NWS forecast verifies that the storm impacting Kauai will move across all islands.
0921-0930	Evening & Overnight	Winds are light and variable, partly cloudy, no rain. NWS warns the storm will hit BI with heavy rain, winds and flooding within 36 hours.
0931-0940	Morning (Day 2)	High overcast clouds thickening, but no rain. Winds picking up from SSE 10 mph gusting to 15.
0941-0950 0951-1000	Afternoon Evening & Overnight	Thick deck of middle clouds, total overcast, intermittent light showers. Winds from southeast 25 mph gusting to 35. NWS issues flood and high wind warning. Thickening clouds, steady rain and intermittent heavier showers. CERT teams put on alert by HC CDA for possible activation. Multiple ground lightning strikes across the island. Winds from south at 35 mph gusting to 45. Rainfall accumulation from the storm by midnight is 20”. For BI, NWS & HC CDA continues high winds/flood warnings.
1001-1015	Morning Pre-dawn (Day 3)	Heavy continuous rain reaching as high as 4”/hr in some areas, rain accumulation by 0800 as high as 36” in upland areas, winds from southwest at 50 mph gusting to 70. Stronger winds at higher elevations. Near zero visibility at times. Flooding in low lying areas. Downed trees and debris blocking roads and accumulating under bridges and in rivers and streams. **Power, phone, and internet service is out islandwide.**
1016-1030	Morning	Heavy continuous rain with some thunder. Rain reaches 3”/hr in some areas. Accumulation by noon 52-60” in many areas with even higher probability in upslope areas. Winds from southwest at 45 mph gusting to 55. Stronger winds at higher elevations. Heavy flooding in all streams and gulches. Many roads are impassable.
1031-1045	Afternoon	Heavy rain but decreasing. Infrequent thunder. Max rainfall rates at 2”/hr, highest reported rain accumulation from storm 74” in some areas. Winds from southwest at 30 mph gusting to 45. High water levels. Runoff blocking many roads. Extensive flooding.
1046-1100	Evening /	Continuous rain, rates dropping to ½ to 1”/hr. No thunder. Sustained

	overnight	winds at 25 mph, gust to 35. Extensive flooding.
1101-1115	Morning (Day 4)	Sustained winds dropping to 15-20 mph and shifting westerly, showers decreasing, max rainfall rate under 1”/hr, mostly on the east side of island, 1/2”/hr on west side. Runoff across roads is still flowing but decreasing in most areas on the west side.
1116-1130	Afternoon	Intermittent showers islandwide. Island total rainfall is above 74” in many areas.
1131-1145	Evening	Accumulation for storm over 78” in many areas. Higher on south and west-facing slopes where conditions persisted for hours. Volcano Village reports 80” accumulation. Wind directions variable, speeds light.
1146-1200	Overnight	Light rain, less than ¼” per hour. Winds returning to normal trade wind pattern. Pre-dawn: mostly cloudy, intermittent light showers.

Thank You!

This text is dedicated to the Volunteer Amateur Radio Stations of Hawaii.





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