Cape Meares Earthquake and Tsunami Preparedness

compiled by Pete Steen

(Latest material in red, suggested at emergency preparedness clinic at the Tillamook Library, May 12, 20011)

"Better three hours too soon than a minute too late."
Wm. Shakespeare, *The Merry Wives of Windsor*

Introduction

When the next Cascadian subduction zone earthquake occurs off our coast, it will be an eight to nine magnitude. You will feel five minutes or more of such intense shaking that you will unlikely be able to stay on your feet. It will be the most frightening thing most of you will ever experience. When the earthquake subsides, the coastline may have dropped three to six feet in elevation.

Within 10 to 20 minutes, the first tsunami will reach our beach. It will be a surge of water as high as 30 feet (a three-story building); possibly higher. Within a half-hour or less, another surge will arrive, and more after that. Some of these successive waves may be higher than the first.

If you are home at the time of this earthquake, you could be injured by broken glass, a falling roof beam, a tree falling on your house, a refrigerator or large bookcase falling over, or burned by fire from a toppled woodstove or burning firewood literally bounced out of your fireplace onto your floor.

If your home is in the tsunami hazard zone, roughly 50 feet elevation or lower, you will have to flee to higher ground as soon as the shaking eases enough for you to be able to get moving, in order to avoid the coming series of tsunamis. It would be prudent to flee from any place lower than 100 feet above sea level (Appendix 4). You should not return to your home for at least 10 hours to avoid subsequent tsunamis. Waiting 24 hours would be safer.

We will not get to choose the time this catastrophe occurs. We know it will happen; we just don't know when. The last one occurred in the dark of a January night. Our next one could occur at night or in daylight. It could occur during a howling sleet storm with 60 mph winds in the middle of the night. It could occur during freezing weather, with temperatures in the teens. It could occur during a sunny community 4th of July barbecue. It could occur with three inches of snow on the ground.

If you are at home in the tsunami zone, you may have to spend 10 to 24 hours away from your house, so you will need a "Grab & Go" bag to take with you. The contents of a Grab & Go bag will be covered in section I. This will be helpful even if you find refuge at a neighbor's. It is essential if you are spending the 10 to 24 hours in the woods in inclement weather.

Section II will discuss the earthquake occurring while you are at home in Cape Meares.

Section III will cover those of you whose house is within the tsunami inundation zone (50 feet elevation or less).

Section IV tells you how to prepare for the earthquake occurring while you are driving in your car.

Section V gives you information on what to do if you are away from home or car on a hike.

It is essential that you understand that after the quake, there will be no electricity, piped-in water, cell or landline phone service (except subscription satellite phones and ham radios). All roads out of our community will be blocked by fallen trees, power poles, collapsed bridges and landslides. Your vehicles will be useless except as a source of gasoline to run your generator.

Section I: The Grab & Go Bag

The Grab & Go bag is essential to your safety when the earthquake occurs. If you must leave your house or are stuck somewhere in your car, you will need these items to get you through the hours or days before you find a safe haven. You should have a bag for each person or one bag could be packed for two people. You will need to keep a Grab & Go bag in your house and one in each of your vehicles at all times. Below is a list of suggested contents for your Grab & Go bag:

- Medications (rotate each time you get refills)
- Eyeglasses (spare prescription or reading glasses)
- Hand sanitizers
- Drinking water purification tablets (can get at REI)
- First-aid kit
- Couple of bottles of water
- Tin cup
- Cocoa mix, tea, coffee
- Snack bars
- Small roll of duct tape
- Facial tissues (4 small packs)
- Aluminum foil
- Rubber gloves
- Cotton gloves
- Fire starters/tinder
- Storm-proof matches
- Metal match
- Cigarette lighter
- Dental floss (for cordage)

- Space blankets
- Large plastic garbage bags
- Flashlights (keychain flashlight on zipper pull and small flashlight with batteries)
- Small, battery powered radio (batteries same as those for flashlight)
- Pencil, and paper in a zip-lock bag.
- List of financial information
- Pocket knife
- Jelly beans (don't spoil; provide a quick energy boost and needed calories)
- Cash (particularly for your automobile Grab & Go bags)

Your objective is to be able to grab your pack and be able to travel and survive for up to two days to get from your stranded vehicle or ruined home to a place of safety. In a generalized disaster, such as an earthquake, other people will not be able to look for you. Grab your pack and get to a place of safety.

Section II: If You Are at Home

You can expect the following hazards if you are at home during the coming earthquake:

- Falling masonry (fireplaces, chimneys, retaining walls, stem walls—especially stone, brick or concrete block)
- Falling center beams
- Broken glass (windows, light fixtures, dishes, framed pictures, mirrors, etc.)
- Jammed doors
- Falling furniture (refrigerators, tall bookcases, sideboards, armoires; some of these can be prevented from falling by fastening them securely to the wall)
- Falling utility poles
- Landslides
- Fire caused by a toppling woodstove or burning material bouncing out of your fireplace.

A. If your home is in the tsunami zone, leave immediately for higher ground (100 feet above sea level or higher). Take your Grab & Go bag with you. **Keep a pair of shoes under your bed or nearby. You don't want to go running out in your bare feet through broken glass or off into the woods bare-footed.**

1. **You will not hear a tsunami siren before the quake. The earthquake itself is your notice; it will disable the siren before the siren can sound** (you will hear the warning siren only on the occasion of a remotely-generated tsunami, in which case you will have two to five hours to evacuate to higher ground).
2. Help the injured (as much as you can without endangering yourself) to higher ground. Remember, this scenario may be happening in a storm and/or at night.
3. Be prepared to spend 10 to 24 hours away from your home. Successive waves can come for several hours and some will be larger than the first one. Seek shelter with a high-ground neighbor, if available, or be prepared

to find or make shelter on the nearby high ground. Your Grab & Go bag is essential to carry you through this harrowing time.

B. If your home is above 100 feet elevation, keep an eye out for an especially high wave which could reach your elevation and be ready to go higher yet with your Grab & Go bag.
    1. **Don shoes to protect against broken glass and other hazards.**
    2. Aid people pinned under fallen beams, furniture, etc. in your own house. Free them carefully.
    3. Extinguish any fires started by burning materials shaken out of fireplaces or woodstoves.
    4. Give first aid to injured householders.
    5. Assess the damage to your home. Is it still a place where you can safely shelter? If not, evacuate to a neighbor's house. Otherwise, secure your house against weather and stabilize structures.
    6. Be prepared to take in and give first aid to neighbors fleeing the tsunami zone.

C. Supplies to have on hand, in your house, before the quake:
    1. Grab & Go bags.
    2. Fire extinguishers, three on each level.
    3. Twenty-five to 50 gallons of potable water and (for when you run out) a good water filter and water purification tablets. Also, buckets to carry water. We have several year-round creeks in our community providing water which can be filtered or purified for drinking (appendix 3).
    4. Sufficient medical supplies and first-aid materials (appendix 1) for your household plus the neighbors you may be sheltering.
    5. Propane and/or white gas camp stoves (don't cook indoors!) and a two-week or more supply of fuel.
    6. A generator and several gallons of fuel to run it. Don't overlook the fuel in your vehicle; always keep your vehicle fuel tanks **at least** half full (Our gasoline comes to Oregon via a pipeline from Washington. That supply line will fail. It may be a month or more before we will have access to gasoline.) Don't run your generator in an enclosed space. Store fuel outside the house.
    7. Battery powered NOAA weather radio (and spare batteries) to keep you apprised of pending conditions.
    8. Food storage; at least a two weeks' supply, preferably more (remember, you will likely have refugee neighbors in your house with you). You can build up a supply gradually. Each time you shop get an extra can or two of food.
    9. Canned and some dried food can last for years. Have a surplus food area set aside and rotate groceries through it to keep a fresh supply. Put dates on food so you use the oldest first.

10. Canning supplies: It will be possible, if you have a propane crab cooker or a camp stove, and a pressure cooker, to can food from your freezer before it spoils.
11. Home repair supplies: Hammers, nails, screwdrivers, screws, handsaws, hand drills, wrecking bars, pry bars, chisels, awls, scrapers, putty, caulking, insulation, sheets of plywood, a few eight-foot 4"x4"and 2"x4"pieces of lumber, hydraulic jacks, extra-large garbage bags, several rolls of duct tape, waterproof adhesive, a large roll of plastic sheeting (4 to 6 mil), a half-dozen tarps of various sizes, at least two shovels, a pick-mattock, splitting maul, wedges, an ax, a hatchet, 100-200 feet of stout rope, roof patching tar, brooms, buckets, plastic pipe the same diameter as your waste line to the septic tank, two gallons of household bleach.

D. Maintaining until outside helps arrives: Remember Hurricane Katrina? Don't expect outside help for at least two weeks, and it may be longer. Portland, Salem, Eugene, Vancouver, Olympia, Tacoma, Seattle—all will be devastated. Many people in those cities will be killed by the quake and thousands will be injured. Rescuers will go there first. If you want to last until help does come (maybe an Ohio National Guard helicopter in week 3?), you should be thinking about keeping safe. It took weeks, not days, to get help to some of the small coastal communities after Japan's last 9 magnitude quake, and Japan is the best quake prepared country in the world.

At the Cape Meares community level, we can form mutual aid plans before the quake occurs. For example, the Ziadys have offered storage space at the top of 3rd St. NW in which to cache community supplied food, antibiotics, and other medical supplies (appendix 2). Some other homeowners may do so as well. We can make a list of generator owners and some people have specialized skills, such as construction, plumbing, medicine, carpentry, hunting, fishing, and wild foraging in which they may offer to instruct others. So far as the Cape Meares Community is concerned, the **most important first step is the undertaking of a "Map Your Neighborhood" project!** This will ensure that community resources are well utilized.

In New Orleans, after Hurricane Katrina, the people who fared the best were those who relied on themselves first, then worked cooperatively with their neighbors. People who waited for "the government" to help them fared poorly. Some of them died while they were waiting.

Practice evacuation routes. Practice using your equipment. Have a "Disaster Day" once a year. Better yet, get your neighbors to join in. This way, you will know exactly what to do when the time comes.

Some things to keep in mind:

1. Be prepared to share your house with some people. Be prepared for the fact that some people may come to you who are injured, in shock, disoriented, or hysterical.
2. After your house is stabilized, make it weather-tight with the tools and materials you have stockpiled in anticipation of this emergency. This could include covering holes in your roof, covering broken windows and jacking up and supporting portions of your house. Aftershocks of up to magnitude 7 occurred for over two weeks after the recent Japanese quake. We can expect similar aftershocks here. Continuously re-evaluate and update the stability of your shelter.
3. Take steps to maintain your body heat. Have plenty of clothing and blankets. Inspect your woodstove or fireplace for damage to stove pipes and flue liners. You may still be able to use these. **But be aware of the danger of fire or carbon monoxide.**
4. Assess your water supply. Water can be hauled from creeks and purified by filtering, boiling, sunlight or chemicals (e.g., bleach: 1/4 tsp per gallon).
5. Determine if the waste line from your house to your septic tank is still intact. If so, you can still use the toilets in your house by pouring water in to flush them. If the line is broken, repair it using the pipe you have stockpiled for this purpose.
6. If your septic system has been destroyed, be prepared to bury human waste and possibly build an outhouse. Take care that this is not near a stream.
7. Shut off power at the breaker panel against the day when power will be restored.
8. Shut off your large propane tank until you're sure your system is not leaking.
9. Be prepared to help rescue and care for injured and sick neighbors. Get your Red Cross training updated. Especially useful will be the Red Cross Wilderness and Remote first-aid course as well as CERT training.
10. Be prepared to help recover and bury the dead. Make sure the burials are clearly marked and identified for subsequent removal by authorities.
11. Be prepared for the remote possibility of looters or roving gangs of thugs from outside the community who come to take advantage of the disaster.
12. We live in an area rich in natural resources. You can prepare yourself by learning how to get food from fish, game and wild plants.

Section III: If Your House Is in the Inundation Zone

It makes little sense to stockpile a lot of supplies if your house is likely to be swept away by the tsunami which will follow the quake in a few minutes. You have two choices. You may arrange with a neighbor on higher ground to store your supplies along with his or hers. Or, you may arrange with the Community to store your supplies for an extended emergency (appendix 2).

Section IV: If You Are in a Vehicle

If you are traveling in your car during the quake, watch out for falling buildings, utility poles, and trees; landslides; collapsed bridges, tunnels and overpasses. If in a tsunami zone, head for higher ground. You may have to take your Grab & Go bag and leave your car to do so. **Keep a pair of sturdy shoes in the car** near your Grab & Go bag.

If you are not in danger from a tsunami, head for shelter but watch out for damaged buildings that may collapse in after-shocks. Decide if you are close enough to home to walk there. Decide ahead of time where you would go if the quake hit during any of several points on your journey. Be thinking ahead**.** Don't let your fuel tank get under half full. **Always have a Grab & Go bag in each of your vehicles.**

Section V: If You Are on Foot

Most areas you could be hiking are close to high ground. Watch for landslides and falling trees.

If you are hiking out on Bayocean Spit, you should try to reach the big hills on the spit. You'll have 10-20 minutes to get up those hills. Carry in a small knapsack (or in your pockets) a space blanket, water, energy bars, and fire-making materials. Be prepared to spend up to 24 hours on the hill while waiting for the series of tsunamis to subside. You may have to stay longer if the spit is breached at the south end.

Appendix 1

Suggestions for your medical kits:

Basic Kit

Disposable gloves, sterile gauze pads, rolled gauze bandages, tincture of benzoin, Steri-Strip wound closure strips, butterfly bandages, nonstick dressings (Telfa), Spenco 2nd Skin, assorted sizes of Band-Aids, QuikClot Sport Silver advanced clotting sponge, Polysporin antibiotic ointment, splint materials, rolled elastic bandage (Ace wrap), triangular bandage, adhesive tape, duct tape, cold packs, eye wash, dental first-aid kit, tweezers, bandage scissors, pain/fever medication (aspirin, ibuprofen, Tylenol), anti-diarrheal (Imodium or Lomotil), anti-nausea (Pepto-Bismol, Mylanta), syrup of ipecac, Benadryl tablets, hydrocortisone cream, cough medicine, earache drops, eye drops, over-the-counter medicines your household uses, prescription medications.

Additions to create your large kit

Thermometer, antifungal medication, burn medication such as Burn Free, oral electrolytes, pack or roll of sterile cotton, alcohol, oral antibiotics/sulfas, injectable antibiotics/sulfas, injectable epinephrine (for shock as in drug allergy), injectable antihistamine, surgical instruments (forceps, needle holder, scalpel w/blades, scissors, assorted sizes of absorbable suture material), body stapler kit, stethoscope, sterile needles and syringes, sterile IV kit (requires experience), IV electrolytes. Individual cases may need extra oxygen, batteries for dialysis, extra insulin or other specialized items.

Appendix 2

Materials and equipment that could be supplied and stored in "safe houses" by the community as a whole to benefit residents:

- Sleeping bags
- Large Berkey water filter
- Antibiotics and other medical supplies
- Dehydrated food buckets (available from Costco.com or Emergency Essentials)
- Toilet paper
- Blankets
- Satellite phone

Appendix 3

The quickest, easiest way to purify water is with regular household bleach. Use ¼ to 1/8 tsp (8 to 16 drops) per gallon. The most common standard is ¼ tsp per gallon but one teaspoon will purify 5 gallons. If the water is cloudy or otherwise suspect, it is safe to double the amount of bleach. After adding the bleach you should be able to faintly smell it in the water for a bit. If not, add another dose. If you are storing containers of water you have treated, they should be fine for 6 months at least and generally for up to a year if properly sealed. After a long period the water may taste "flat." This can by remedied by pouring water from one container to another to aerate it. I change out my stored water about every 6 months and find this completely satisfactory.

You should know about the SODIS method for purifying water. It is now being used world-wide in areas that have a problem with pathogens in their water. SODIS is an acronym for SOlar water DISinfection. This method uses sunlight to kill bacteria, viruses and protozoa in drinking water. All you need is a clear container that can be closed: glass jars or bottles, sealable plastic bags, or plastic bottles. The most commonly used are the disposable water bottles which are so ubiquitous these days. These are made from polyethylene terephthalate (PET). After cleaning the bottle and removing labels, fill the bottle with water, cap it and lay it on its side in full sunlight for six hours. The result is that any dangerous living organisms will be killed. Several scientific articles (see the journals *Microbiology, Lancet,* and others) written in the past couple of years have confirmed the efficacy of this method. The water must be clear enough for sunlight to penetrate all the way through the water. The bottle must be clear and no larger than 3 liters in size. One liter bottles work well and are easily handled. Lay the bottles down, preferably on something which will radiate heat back into the bottle. If you can't get six hours of sunlight, perhaps a couple of days will be necessary. Our location is sometimes short of sunshine. Water so purified should be stored in a dark place until use. For more information on this method of water purification see http://www.sodis.ch/index_EN.

Neither of the above methods is sufficient to remove chemical contamination from water. For that you will need to use a water filter

Appendix 4

Although the March, 2011, tsunami in Japan averaged about 30 feet high in most areas, it was lower in others. **More disturbingly, it was considerably higher in a few areas** due to the topography of these areas. For example, there were at least two places located at the heads of narrowing bays where the confines of the bays forced the moving water to climb to about 100 feet high! Here in Cape Meares the cape itself could influence the height of waves coming from the northwest by causing the incoming water to sluice up higher as it is wedged into the canyon between second and third streets south of Pacific. Water will be pushed up any slope higher than it would be if it were washing over flat land. If the waves come from straight west or from the southwest, we may not see that effect (but Oceanside may suffer it). We don't know whether the epicenter will be north of the cape or south of it. This is the reason that you should flee to higher ground if you are below 100 feet at the time of the quake. You *may* be ok at 50 feet, but are you willing to bet your life on it?

Please call me with questions, or additions and corrections to this document. Here's to being "too soon" rather than "too late."

Thanks,

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