

ALASKA STATE LEGISLATURE
SENATE COMMUNITY AND REGIONAL AFFAIRS STANDING COMMITTEE

March 22, 2011

3:36 p.m.

MEMBERS PRESENT

Senator Donald Olson, Chair
Senator Thomas Wagoner
Senator Albert Kookesh
Senator Linda Menard
Senator Johnny Ellis

MEMBERS ABSENT

All members present

COMMITTEE CALENDAR

SENATE BILL NO. 96

"An Act relating to the Village Safe Water Act."

- MOVED CSSB 96(CRA) OUT OF COMMITTEE

PRESENTATION: ALASKA TSUNAMI MODELING & EMERGENCY PREPAREDNESS

- HEARD

PREVIOUS COMMITTEE ACTION

BILL: SB 96

SHORT TITLE: APPLICATION OF VILLAGE SAFE WATER ACT

SPONSOR(S): SENATOR(S) KOOKESH

03/09/11	(S)	READ THE FIRST TIME - REFERRALS
03/09/11	(S)	CRA, FIN
03/15/11	(S)	CRA AT 3:30 PM BELTZ 105 (TSBldg)
03/15/11	(S)	Heard & Held
03/15/11	(S)	MINUTE(CRA)
03/22/11	(S)	CRA AT 3:30 PM BELTZ 105 (TSBldg)

WITNESS REGISTER

DAVID SCOTT, Staff
Senator Donny Olson
Alaska State Legislature
Juneau, Alaska

POSITION STATEMENT: Explained how CSSB 96(), version D, differs from CSSB 96(), version I.

ROGER HANSEN, State Seismologist, Professor of Geophysics and Director of the Alaska Earthquake Information Center
University of Alaska Fairbanks (UAF)
Fairbanks, Alaska

POSITION STATEMENT: Gave a presentation on Alaska's tsunami and earthquake modeling and answered questions from the committee.

JOHN AHO, Chair
Alaska Seismic Hazards Safety Commission (ASHSC)
Division of Geological and Geophysical Surveys
Department of Natural Resources
Fairbanks, Alaska

POSITION STATEMENT: Gave an overview on how to prevent damage from tsunamis and earthquakes in Alaska.

GENERAL THOMAS KATKUS, Commissioner
Alaska Department of Military and Veterans Affairs (DMVA) and Adjutant General, Alaska National Guard
Fort Richardson, Alaska

POSITION STATEMENT: Briefly discussed DMVA's role in tsunami and earthquake emergency preparedness and the importance of public outreach and education.

MIKE O'HARE, Deputy Director
Division of Homeland Security and Emergency Management
Department of Military and Veterans Affairs (DMVA)
Fort Richardson, Alaska

POSITION STATEMENT: Gave an overview on how the state prepares and responds to tsunamis and the importance of public outreach and education.

ACTION NARRATIVE

[3:36:27 PM](#)

CHAIR DONALD OLSON called the Senate Community and Regional Affairs Standing Committee meeting to order at 3:36 p.m. Present at the call to order were Senators Kookesh, Menard, Ellis, and Chair Olson.

SB 96-APPLICATION OF VILLAGE SAFE WATER ACT

[3:37:00 PM](#)

CHAIR OLSON announced the consideration of SB 96. [CSSB 96(), version I, was before the committee.]

[3:37:28 PM](#)

SENATOR MENARD moved to adopt CSSB 96, labeled 27-LS057\D as the working document. Hearing no objections, version D was before the committee.

[3:37:48 PM](#)

DAVID SCOTT, Staff to Senator Donny Olson, said one change that was made to version D from the previous committee substitute, version I. He explained that on page 1, line 7, the word "city" was replaced with "municipality". In making this change it would allow Yakutat to be eligible for the Village Safe Water funds.

CHAIR OLSON asked if Senator Kookesh had any issues with this change.

SENATOR KOOKESH replied no.

[3:38:44 PM](#)

SENATOR MENARD moved to report CSSB 96(), version D, from committee with individual recommendations and attached fiscal note(s). There being no objections, CSSB 96 (CRA) moved from the committee.

[3:39:14 PM](#)

At ease from 3:39 p.m. to 3:40 p.m.

Presentation: Alaska Tsunami Modeling & Emergency Preparedness

[3:40:45 PM](#)

CHAIR OLSON announced that the next order of business would be to hear a presentation on Alaska's tsunami preparedness.

[3:41:30 PM](#)

At ease from 3:41:30 p.m. to 3:41:52 p.m.

[3:41:52 PM](#)

SENATOR WAGONER joined the committee meeting.

[3:42:12 PM](#)

ROGER HANSEN, State Seismologist, Professor of Geophysics and Director of the Alaska Earthquake Information Center, University of Alaska Fairbanks (UAF), said Alaska is the biggest earthquake and tsunami producer in the United States. The danger for Alaska is not distant, it is local. There are communities that need to be ready and prepared to handle these tsunamis within 30 minutes. He explained that the earthquake in Japan put out

tsunamis across the Pacific Ocean. There was one fatality in the United States and there were no fatalities and very little damage in Alaska because the state is not vulnerable to distant events, but rather close events. He explained that for this reason it is very important that individuals know what to do in the face of such an occurrence. This requires a concerted effort on education, outreach, preparedness, and mitigation. He noted that this is only done through partnerships between the University of Alaska and state and federal agencies.

He continued that the modernization of the Alaska Seismic Network is critical and the primary way of rapidly identifying and understanding damaging earthquakes and tsunamis. Most of the older instrumentation has been modernized; however, large areas of Alaska still have very sparse coverage and a poor understanding of when earthquakes occur. He said that there is a solution ahead: the National Science Foundation (NSF) project, EarthScope, will be moving to the state in the next two to three years. This project puts in about 400 seismic stations throughout the state, which will be left in place for two years before being taken down. However, Alaska has the ability to take over ownership at a reduced cost and keep them permanently.

He noted that it is important to reauthorize the federal law labeled the Tsunami Warning and Education Act, which is scheduled to sunset in 2012. He stressed the importance of working with Alaska's federal partners to reauthorize this funding.

[3:46:13 PM](#)

MR. HANSEN explained that earthquakes are a release of energy in the earth. This energy comes from the heat in the center of the earth, which causes the mantle to boil. As the mantle boils materials come up, become part of the lithosphere and cause the tectonic plates to move. Where these plates move and collide together they subduct, causing earthquakes. He noted that this area of subduction is called a trench and Alaska is located right on top of one. Recently there have been earthquakes in Japan, Chile and Alaska caused by this kind of activity. He explained that the Pacific Plate is moving northward toward Alaska and gives rise to earthquakes throughout the state.

He shared a map with the committee showing where many of the fault lines and large earthquakes are located in Alaska. He reiterated that as the Pacific Plate is forced underneath the North American plate it sticks, due to friction that builds up and releases into very large earthquakes. He noted that this

included the 9.2-magnitude earthquake [across south central Alaska] in 1964, the second largest earthquake ever recorded. He read a list of other significant earthquakes along this trench. This included an earthquake in 1946 which, while it was a much smaller event, is significant because it created a tsunami that completely wiped out the Scotch Cap Lighthouse and sent a wave to Hawaii that killed hundreds of people. It was because of this particular event that the first tsunami warning center began. He pointed out another fault in Southeast Alaska where, like the San Andreas Fault, smaller events occur. He noted that this included the 7.9 magnitude earthquake which created the famous Lituya Bay slide and resulted in a huge wave.

He noted that the Denali Fault and the Queen Charlotte-Fairweather Fault are also active and are in areas where there are not enough seismic instruments for warning.

He reiterated that the information given to the committee shows that the state has some of the world's largest earthquakes, with three out of the ten largest earthquakes ever recorded located in Alaska. He stressed that it is important to be aware of this in order keep the state's population safe.

He explained that in looking at the activity in Alaska for the last five years it shows that there are earthquakes occurring everywhere in the state. He stressed that "this is a point that we need to drive home."

[3:54:15 PM](#)

MR. HANSEN said in order to monitor these earthquakes seismic instruments (which measure the ground shaking) or an EarthScope are used. He explained that it has been a "century" of earthquake monitoring and this process has been slow. He noted that following the 1964 earthquake and a better understanding of plate tectonics there was a greater drive to put these instruments in around Alaska. Different institutes participated in putting these instruments in place, including the Geophysical Institute, USGS [United States Geological Survey], and NOAA [National Oceanic and Atmospheric Administration], which added the Tsunami Warning Center. He explained that this integrated network has been modernized with new instrumentation, real time processing and archiving, and better site preparation. He stressed that it is still a sparse network relative to the size of the state and it is important to improve that.

He explained that the Alaska Earthquake Information Center has been trying to improve the quality of these stations and adding

additional ones in order to monitor earthquakes. He added that in addition to this the center analyzes and archives the data in order to report to agencies that need this information. He noted that all of the data coming from UAF, the Tsunami Warning Center, USGS, and the Volcano Observatory is being processed together at the Alaska Earthquake Information Center.

He explained that the center uses Shake Maps, a USGF product, which allows it to color-contour a map with the strength of shaking. He explained that this helps emergency managers know where to go and help. He showed the committee a Shake Map of the Denali Fault earthquake [7.9 magnitude earthquake in 2002].

He reiterated that EarthScope Image, funded by NSF [National Science Foundation], will help improve the state's seismic network. He explained that after every site has been occupied for two years, all of these temporary stations will come up to Alaska. He stressed the importance of looking into a way to fund keeping these stations in Alaska.

He continued that the center does education and outreach on earthquake safety. He added that the center also supports research in seismology. Finally, the center produces tsunami inundation maps through modeling for Alaska coastal communities.

[4:01:04 PM](#)

MR. HANSEN said the "Great Alaska Earthquake" on March 28, 1964 had a four to five minute rupture duration that moved the seafloor and the ground from 2 to 20 meters. He explained that this is what pushes water to create tsunamis. He noted that "the devil is in the details" in regards to understanding the impact a tsunami might have. The Alaska Earthquake Information Center's involvement with tsunamis has been through NOAA's National Tsunami Hazard Mitigation Program (NTHMP) and the Alaska Tsunami Center and Observatory based out of the University of Alaska Fairbanks. He noted that both of these came from strong support and funding from U.S. Senator [Ted] Stevens. He noted that the funding now comes as a line item through NOAA's Alaska weather service.

He asked the committee: "why do we study tsunamis?" He explained that although earthquakes cannot be predicted, distant tsunamis can be forecasted using deep ocean-bottom pressure recorders or "dark buoys." He explained that these recorders work well scientifically and for distant events are fantastic. However, Alaska's hazards are local and these recorders will be useless against this type of wave, he emphasized. He said it is more

important to have public education, warning signs, and evacuation maps and routes.

He noted that another reason to study tsunami waves is because they are easy to visualize compared to other types of waves. The math is also relatively easy, though it can get much more complicated. He noted that many unknowns remain on the tsunami source mechanism. A simplistic view of a tsunami is that it is created by an earthquake and occurs when tectonic plates collide and deform.

4:06:39 PM

SENATOR WAGONER asked if there is any tie between earth quakes, tsunamis, and rouge waves.

MR. HANSEN replied not really. A rogue wave happens to be a wave where several waves constructively interfere and suddenly get very big. It does not have to be associated with an earthquake or tsunami.

He continued that when the water pops free after an earthquake and it goes to the surface again there are two lines of waves which move out in opposite direction. He explained that large tsunamis are directed in certain directions. Japan's tsunami, for example, headed straight for North America. However, Alaska seems to be in a position where the tsunamis from Japan and Chile do not end up here. He said "that's why our problem is a local problem. And we have plenty of earthquakes for those." He stressed the importance of community outreach and education on local tsunamis.

He said that the center's mapping process is to come up with many tsunami scenarios which are realistic and can help communities. He noted that it is important to have the best bathymetry possible in order to create these models and predict where the waves will go. He explained that it is also important to model tsunamis that have already occurred in order to see if the center is doing a good job. The center then creates inundation maps, writes a report which is peer reviewed by the State Geological Survey, and published as a professional report. He added that these results are now being put onto Google Earth Layers, which is accessible to more people. He emphasized the importance of having a community-based approach in creating these maps. This helps communities be prepared in the long-term and allows emergency officials to have a basis for developing hazard and evacuation maps.

He briefly touched on the inundation maps which allow the center to put lines on the map to show where the water will or has in the past hit in a particular area.

4:12:42 PM

MR. HANSEN said that local tsunamis from landslides are created when an earthquake occurs causing the land to slide down into a body of water and draw the water down with it. This happened in numerous places during the 1964 earthquake in Alaska. He explained that the potential for this type of tsunami is very high in Alaska because there are a lot of fjords in the state that have steep walls, often with a lot of erosion. He noted that in Skagway in 1994 there was a tsunami wave that was not associated with an earthquake, but solely a landslide. He noted that these tsunamis are very challenging because there is no means for warning.

He shared with the committee images of the town of Seward before and after the tsunami hit that was generated from the 1964 earthquake. He noted that while Seward did not rebuild the harbors in the tsunami zone there is now an RV park located in that area. He said that by looking at the entire bay [Resurrection Bay] the center found that there were ten different areas where slides occurred during the 1964 earthquake. He reiterated that the way the center figures out where these tsunami zones are located is by having very detailed bathymetry.

He summarized that the Alaska Earthquake Information Center has robust computational mapping capabilities and it is working with the best high-resolution data that it can. He stressed that landslide tsunami hazards are very high and community input is extremely valuable. He reiterated that people need to know what to do to in order to be safe.

4:18:26 PM

SENATOR MENARD asked if any new techniques using robots for monitoring were being used.

MR. HANSEN replied ocean-bottom seismometers and instrumentation robotic devices are being used.

CHAIR OLSON asked when the Federal Tsunami Warning and Educating Act is supposed to sunset.

MR. HANSEN replied at the end of the fiscal year in 2012.

CHAIR OLSON asked whether the Aleutian Chain protects the Bering Sea and Arctic Ocean area from any significant tsunami event.

MR. HANSEN replied that the islands along the Aleutians do seem to be a barrier. However, tsunamis will curl around the island and hit places like Dutch Harbor. He explained that as a tsunami propagates up the Bering Sea it becomes very shallow; this dissipates the energy very quickly.

CHAIR OLSON asked what the financial obligation would be if the state were to take over the temporary earthquake monitoring sites that the federal government will be putting into place.

MR. HANSEN answered the state would have to pay for the equipment at a reduced cost.

CHAIR OLSON asked how much this would cost.

MR. HANSEN replied, per site, around \$35,000. He noted that this is a good price. He said that the state would not have to pay for the cost of installation and it saves the federal government money because they do not have to take down the equipment.

CHAIR OLSON asked if, for all of the sites, this would cost less than \$1 million.

MR. HANSEN replied about \$5 million.

CHAIR OLSON asked, since he has already had experience with the Trans-Alaska Pipeline, what words of warning he could give the committee with regard to issues related to natural gas pipelines.

MR. HANSEN replied that people are surveying quite a bit right now to find out what the earthquake potential is. He said that there are areas in the Tintina Fault (north of Denali) that were thought to be inactive during the days of the oil pipeline, which are being looked at more critically now for the gas pipeline. He stressed that more monitoring would be very good, so the center can study the smaller earthquakes to understand more about the state-of-stress in the crest.

CHAIR OLSON asked if he has any suggestions on where or where not to build a deep water port.

MR. HANSEN replied that tsunami waves do not come all the way up to Anchorage. However, it is where a large earthquake could occur.

CHAIR OLSON asked if there are other celestial events that effect the earth's mantle movement.

MR. HANSEN replied that celestial events affect the shape of the earth. However, not in regards to the actual movement of the mantle, he said.

[4:23:15 PM](#)

SENATOR MENARD asked for confirmation that Russia had a strong earthquake and what the magnitude was.

MR. HANSEN replied the Kuril Islands had close to a 9.0 earthquake.

CHAIR OLSON asked if the earth was even done shaking after the Japan earthquake was registered as a 9.1.

MR. HANSEN replied no; the earth is still shaking. He said earthquakes cause the earth to ring like a bell and will ring for weeks. He said that the final magnitude is derived by these final waves.

[4:26:49 PM](#)

JOHN AHO, Chair, Alaska Seismic Hazards Safety Commission (ASHSC), said that the committee has learned a lot about what causes tsunamis, how to register when one occurs, and what to do after a tsunami has hit. However, the question remains as to what to do to prevent the damage from a tsunami, particularly in Alaska. He said "the answer, unfortunately, is not much." He explained that, from a design standpoint, building codes address ground shaking but don't address ground rupture, ground failure, or tsunami. He said that communities along the seacoast that have the potential of experiencing a large tsunami are going to be damaged substantially. The only thing that can be done in the future is to not build in those areas and always address the ground shaking aspect of earthquakes.

SENATOR MENARD commented that typically living by the water is a lifelong dream for many and it will be difficult to accept that people should stop building in those areas.

MR. AHO agreed; in regards to single family residents it would be difficult to prevent individuals from living by the ocean.

However, large multifamily structures should be built away from landslide and tsunami inundation areas.

He explained that, with regard to tsunamis in Alaska, if there is a distant earthquake the state has minutes or hours to send out a warning to the public. However, for a near force earthquake that generates a tsunami then the earthquake itself is the warning. He stressed that the general public has not been addressed and does not know what to do.

4:30:41 PM

MR. AHO said that, from a ground shaking standpoint, the actual force that a structure needs to be able to resist an earthquake is substantial. He explained that the only way this type of force can be resisted by well-designed structures is through ductility [the ability to bend without breaking] and redundancy [additional components that will function in case one component fails]. He explained that without these two items it is almost impossible for a structure to resist the actual demand from an earthquake.

He reiterated that design codes do not address tsunami, ground failure, and ground rupture. He noted that earthquake design, through the uniform building codes or the international building codes, is a very complicated situation.

He explained that after each major earthquake ASHSC goes into the area where the earthquake occurred to look at buildings and structures that were damaged. This allows ASHSC to determine why the damage occurred, what mistakes there were in design, what construction and material used led to that particular failure, and then try to modify codes to prevent that from happening in the future to similar structures. He noted that the commission also looks at buildings that survived. When doing a structural design, ASHSC also looks at the structural natural frequency and the ground natural frequency in order to make sure that the two are not in resonance with each other. Otherwise, there will be major inflection failures.

He noted that it is important not to forget that New Zealand has also had substantial damage recently due to earthquakes.

He showed the committee image examples of ground failure and ground rupture [included in the document packet]. He noted that it is not possible to design against ground failure or rupture and building structures in these areas should be avoided. He explained that, unfortunately, this has already been done.

Structural engineers must make one basic assumption: that the foundation material will remain under a structure after an earthquake. He explained that if that assumption cannot be made, than the structure should not be built in that area.

He shared examples of structures used for vertical evacuation from tsunamis. These evacuation structures could sit, for example, in the RV park in Seward and would allow individuals to get to higher ground very quickly.

He recommended the book, *Designing for Earthquakes: A Manual for Architects*, available through FEMA [Federal Emergency Management Agency].

[4:37:49 PM](#)

SENATOR MENARD asked what the percentage of times an earthquake has occurred in the exact same place.

MR. AHO answered that there has been strong ground shaking in Anchorage, for example, over many different decades. He explained that there are seismic risks and seismic hazards. Seismic hazards are the potential occurrence and seismic risks are the consequence of occurrence. There have been earthquakes throughout cities in Alaska, but the risk becomes greater with larger populations and more infrastructures.

SENATOR MENARD commented that where the Anchorage earthquake occurred the infrastructure has been rebuilt again and individuals' thoughts are "what are the chances that that's going to happen in that exact place again?"

MR. AHO replied "it will happen again."

CHAIR OLSON asked "in our life time?"

MR. AHO replied he can't be that exact. He noted that Alaska has 25,000 earthquakes per year and sooner or later there will be another big one. Every ten years there have been magnitude 8 earthquakes in the Aleutians.

He reviewed the current research that is being done on earthquakes in the state. The Delaney Park Downhole Array, which is one of the most instrumented buildings in the country, has a large part in getting much of this research.

[4:42:39 PM](#)

MR. AHO noted the 11 members for the Alaska Seismic Hazards Safety Commission and its powers and duties. He explained that in order to respond to those powers and duties the commission has formed standing committees, which include:

- Schools
- Earthquake scenario
- Education and outreach
- Insurance
- Hazards identification
- Response and recovery
- Partnership
- 2014 conference planning (occurring in Anchorage)

He showed the committee a map of Alaska which identifies the location of public schools in seismically vulnerable areas [included in the document packet].

He said that the commission has accomplished a lot in the last year. This includes providing post-disaster structure safety assessment training to 45 participants. He noted that other accomplishments are located in the commission's report [included in the document packet].

He said that there are two policy recommendations that have been included in ASHSC's annual report. First is to identify at-risk school facilities. The second is for all future school design, construction, and major renovations to include:

- Design proficiency in earthquake engineering
- Independent peer review of seismic designs
- On-site observation during construction of earthquake related items

He stressed that if new structures and major renovations are designed properly this will lead to substantially safer schools in Alaska.

[4:46:15 PM](#)

GENERAL THOMAS KATKUS, Commissioner, Department of Military and Veterans Affairs (DMVA) and Adjutant General, Alaska National Guard, stressed that in the current situation the department is going to be looking into individual preparedness and the short time that individuals have to react to tsunamis and/or earthquakes. In DMVA, the division of Homeland Security and

Emergency Management makes sure that synergy is brought forth for first responder efforts. The public needs to feel assured that the division is effectively bringing all of the resources it has, as a state, to a problem.

[4:47:36 PM](#)

MIKE O'HARE, Deputy Director, Division of Homeland Security and Emergency Management, Department of Military and Veterans Affairs, said the department cannot operate in an all-hazards disaster environment without partnerships [list included in document packet]. He showed a map of Alaska that includes distant source threat tsunamis and those communities who are vulnerable to this threat [included in document packet]. He stressed that "local tsunamis are the nightmare of the state of Alaska for preparing and planning and alerting local citizens to get to high ground."

A second map included in the presentation showed the warning sirens and Tsunami-Ready communities located around Alaska [map included in the document packet]. Communities who choose to be Tsunami-Ready do so voluntarily in order to better prepare their community for tsunamis. In order to be Tsunami-Ready, a community must establish a 24-hour warning system, have an emergency operation system on-scene, and multiple methods of communicating and relaying these alerts and warnings.

He continued with the community notification call map [included in the document packet]. He explained that the state of Alaska receives alerts and warnings on earthquakes and possible tsunamis from some of its partners, and the division activates the State Emergency Coordination Center (SECC) accordingly. The division's primary job is to get a quick understanding of where the immediate effected zones may be and, via modeling, which zones will be impacted first. Those zones that will be impacted first are the priority for the call-down list. He explained that the divisions' staff occupies the SECC and contacts communities. He noted that this was how the division worked on Thursday night when the alert came from Japan.

He said UAF develops maps for the Division of Homeland Security and Emergency Management to give to local communities. This is done in order to understand where the inundation from a tsunami will occur and allows communities to identify its plans and create evacuation routes accordingly.

[4:52:52 PM](#)

MR. O'HARE explained that the warning sirens in communities vary from a simple design to more advanced sirens that can accommodate any event where a warning is necessary. He showed the committee photos of various sirens in communities throughout Alaska [located in the document packet].

SENATOR MENARD asked what the cost of a warning siren is.

MR. O'HARE replied that it varies. The more advanced sirens cost about \$300,000 and the less advanced sirens cost about \$100,000. He noted that as technology improves these sirens get better, cheaper, and faster.

SENATOR MENARD asked where the sirens are manufactured.

MR. O'HARE replied all over the country. He said that the community makes the decision as to the best location for the siren.

He shared examples of tsunami hazard and escape route signs with the community [included in the document packet].

[4:55:07 PM](#)

He said that with regard to outreach and education, the division has a "Quake Cabin" which is used in local communities, schools and businesses. The cabin is an earthquake simulator, which simulates up to a 5.0 magnitude earthquake and allows individuals to see and feel what this looks like. He noted that after the simulator experience, division educators explain to individuals that a 9.2 magnitude earthquake was what really affected the state.

SENATOR MENARD asked whether the cabin can simulate a 9.2 magnitude earthquake.

MR. O'HARE replied no; if it went up to 9.2 the cabin would fall apart.

He showed the committee some of the division's outreach products. He recommended the film, *Ocean Fury*, which gives a very good understanding of the impact tsunamis have had in Alaska.

He said that "an educated and aware public with a plan of action will have the ability to adapt to the situation and respond accordingly." He stressed that by informing and educating the

public on tsunamis the state will be better prepared and will save more lives.

He urged the committee that, as state leaders, it is important to address their constituents to: have a plan, be informed, and have a survival kit.

SENATOR MENARD asked if he has explored having Home Depot or Lowell's put together kits for individuals.

MR. O'HARE replied that Costco has a three-day food kit for families. He noted that most individuals already have a lot of the items needed at home and just need to be put them together in one place.

CHAIR OLSON asked, with regard to escape routes and tsunami shelters, what the minimum amount of elevation above sea level is.

MR. O'HARE replied that he is not sure what the maximum threshold is. He noted that if it is identified as a "high ground safety area" then it's safe.

CHAIR OLSON asked "about 50 feet?"

Mr. HANSEN replied it depends on the location.

CHAIR OLSON said there was a 160 foot wave swell that came out of Valdez. He stressed that it's important to be prepared for that.

MR. O'HARE replied it's important to get as high as possible.

CHAIR OLSON asked what the time frame is between when the water goes out and the wave surge comes.

MR. O'HARE replied if an individual lives in a coastal community, as soon as the earthquake is over get to high ground as quickly as possible. He noted that there was an instance in Japan of an elderly couple who were running to high ground. The husband stopped to put his shoes on and did not survive.

CHAIR OLSON asked if he is correct in assuming that there are several minutes.

MR. O'HARE replied with the event in Japan, individuals had 10 to 15 minutes. He explained that it depends on the localized event and where an individual is in relation to the event.

MR. HANSEN replied 15 to 20 minutes with regard to an earthquake generated tsunami. He explained that in a place like Seward where a landslide generated tsunami can occur it might be 60-90 seconds. He noted that this is why local landslide tsunamis are so dangerous in Alaska.

SENATOR MENARD asked where he predicts the next big earthquake will be.

MR. HANSEN hypothesized that it would start in southern Kodiak and follow the trench out towards Dutch Harbor. He explained that this source is being considered for a scientific project for an all-hazards program. He said that this happens to be an area that is particularly vulnerable to sending a tsunami down to southern California.

CHAIR OLSON asked why St. Paul was chosen as the only tsunami warning community on the north side of the Aleutians.

MR. HANSEN replied that St. Paul can see some larger waves because it is right on the shelf edge and to the west is much deeper ocean.

5:05:00 PM

There being no further business to come before the committee, Chair Olson adjourned the meeting at 5:05 p.m.