

SUMMARY OF ISSUES: IMPACT OF MOVING THE PTWC TO FORD ISLAND ON THE US TSUNAMI WARNING SYSTEM.

1) Relocating the PTWC to Pearl Harbor brings no tsunami safety improvement when compared to the present Ewa Beach site.

a) Lack of safety at the planned Ford Island site: Both the present Ewa Beach, and the planned Ford Island PTWC locations stand at no more than ten (10) feet above sea level. Ford Island classifies as an “inland waterway” (see HCD warnings), and the projected consolidation plan would relocate PTWC offices at the water’s edge. At Ewa Beach, however, PTWC offices stand at 300 plus meters from the water, and also have the added benefit of a protective coral reef extending offshore for over a mile in front of it. All experts in the field agree on the fact that the presence of coral reefs reduces the damage potential of tsunami waves to a minimum. For example, Guam barely suffers any damage during the occurrence of tsunami due to the presence of a reef belt around it that effectively absorbs and scatters the tsunami waves' energy. The planned location at Ford Island doesn't have this natural protection, and relocating PTWC to Ford Island will thus affect the ultimate working condition of the watchstanders, for it subjects them to extra risks to their own lives. *At a minimum, it could render the system unable to issue warnings.* The experts have never reliably evaluated the planned Ford Island site’s vulnerability to Tsunami, due to the US Navy's reluctance to provide the bathymetric data necessary for modeling the inundation zone.

b) Insufficient evacuation options -- limited access to the Ford Island site: There exists only a single partially floating bridge going into Ford Island. If PTWC issues a tsunami warning, the US Navy will most likely raise this bridge to allow all ships docked at Pearl Harbor to evacuate to deeper water, if tsunami waves don't render the floating bridge impassible before that. The frequent issuance of military alerts after 9/11 will make prompt access to Ford Island via the guarded check station (located on the bridge) unacceptably long or impossible, depending on the alert level. The large property currently hosting the PTWC offices at Ewa Beach, however, extends inland reaching over twenty feet of elevation, and provides multiple evacuation routes and easy access whenever needed.

c) Potential vessel impacts against buildings on the shoreline. The relocation plan puts the PTWC Operations Center on the third floor of a new building, right on the water’s edge, and at about ten (10) feet of elevation above sea level. Ships either evacuating after PTWC issues a tsunami warning, or dislodged from their moorings, pose the danger of crashing against the buildings due to the strong currents produced by any sizable tsunami. Accidents of this nature could seriously injure or kill employees on mere impact. At a minimum, this type of event could take the center out of operations due to damage to communications, power supply, and other critical infrastructure.

2) Potential deterioration of PTWC's Tsunami Warning Capabilities

a) Potential degradation of PTWC's infrastructure: Even if we survive a big tsunami at the planned location at Ford Island, the tsunami waves will most likely render PTWC inoperable due to a whole range of potential problems, including for instance, loss of power, UPS, critical support infrastructure, communications, etc. The Hawaii Civil Defense Vice Director has also expressed his concerns, and has asked Senator Inouye's Senior Staffer, and Governor Lingle, to consider consolidating the PTWC with the HCD, *at over 400 feet elevation* with housing to maintain the current "Critical Mass" of watchstanders *available within 90 seconds*. As concrete examples of infrastructure that will suffer from the move we can mention the following:

- The seismic vault at the PTWC, the sensitive seismometers that it houses, and their hardwired optical connection to the Operations Room. This "hardened" system must remain as a critical part of the PTWC's Local Tsunami response. The current Ewa Beach location is seismically "quieter" (less background ground motions to contaminate the earthquake signals) than the proposed Ford Island site. Consequently, even after a successful duplication of the current system at Ford Island, the new infrastructure, however good, would not benefit from the current location's quieter and less noisy environment. From this point of view, the new system turns less useful and reliable for the Local Tsunami case scenario than the current one at Ewa Beach.
- The VSAT Antenna Seismic drop for the SW Pacific IRIS seismic stations, and its hardwired connection to the PTWC operations room. This "first hop" from seismic stations plays a critical role in the location and sizing of earthquakes, particularly when other less reliable connections fail.
- The two, 50 plus foot paging antennas. These independent paging systems serve to alert the watchstanders via redundant pagers to earthquakes anywhere in the world over M5.5 to 6.0.
- The 30 foot EMWIN Antenna, FAA Antenna, and the rest of the Antenna farm. (for PTWC, PRH, and the HFO). The antenna farm at PTWC houses all satellite downlinks for the WFO. The move forces NWS to relocate them or eliminate them, with the associated operational degradation.
- The T1 hub. We operate "upstream" of the NWS HFO. The NWS will have to move it off site, unless NOAA keeps and maintains the current PTWC grounds.
- The permanence of the Geomagnetic Observatory on PTWC grounds will turn unsustainable. The presence of a thick coral, combined with minimal urban development makes the current PTWC site a unique and invaluable world class Geomagnetic Observatory. *This move will mean breaking a 100-year-old MOU between NOAA and the USGS via the loss one of the best sites in the world for the scientific community to observe the changes in the earth's magnetic field over time.*

b) Replicating the system will hinder operational improvement: Before moving to Ford Island, PTWC personnel will have to *completely replicate the entire tsunami warning system* at the planned Ford Island site *while keeping the current center at Ewa Beach fully operational*. Once installed, the new system must go into testing phase for a long time, until the successful issuance of a couple of actual tsunami warnings confirm

without margin of doubt its capability, reliability, and robustness. Meanwhile, the old system at PTWC must remain fully operational during and after the installation of the new one, thereby acting as a back up in case that the replicated system fails. This process will obviously force all the PTWC personnel to focus on replication and monitoring of the new and old systems, leaving no time to devote to the improvement of the software and hardware components indispensable to PTWC operations. Operating two PTWC's for at least six months will obviously mean a huge cost. NOAA, and the NWS must pay this huge cost, *independently* of the 240 million allocated for the building itself. This will also stretch to the maximum the working schedule of the PTWC personnel, who will have to manage *two different and fully operational centers with exactly the same number of employees*.

c) Loss of critical mass on site: The term "critical mass" refers to having PTWC watchstanders living on site (currently five), 2 minutes away from the operations center, which offers the added benefit of providing back up and troubleshooting capabilities when a tsunamigenic event occurs, or unexpected technical problems happen. Two people only, on shift work within a building on an island, will mean a lack of the combined technical expertise, the troubleshooting capability, and experience of five or more close by watchstanders. Having at least one in the building, and up to 4 available within 90 seconds, will no longer be possible. At Ford Island there exists government housing, but it's location away from the planned PTWC offices would affect the response time to potentially tsunamigenic earthquakes, thereby reducing the added benefits of their combined manpower. Even if available at Ford Island, in order to provide housing, NOAA would have to request it from the US Navy. At present, however, the US Navy is relocating military personnel out of Ford Island due to a housing shortage that makes it impossible to meet their own demands. *Consequently, the possibility of granting housing to PTWC personnel at Ford Island turns quite unlikely*. Examples of where "extra" watchstanders have improved our response include an M5 event on the Big Island in July of 2005, the Mw8.7 Sumatra event in March of 2005, the Peru Tsunami Warning in 2001, and the devastating Mw9.2 in Sumatra in 2004. In all of these cases, 3-5 watchstanders, all in their homes on site when the event occurred, came in and improved our response. We also have to consider the possibility of multiple events and the corresponding issuance of simultaneous Watch/Warnings. This has occurred in the past and we must have the capability to respond to this situation. We maintain that losing this "extra" response ability alone means that moving the PTWC to an Island in an Inland Waterway, inside a restricted Navy base, will seriously compromise our ability to protect lives and property. *The end result of the changes initiated since the tragic Sumatra Earthquake and tsunami of 2004 should lead to an improved response capability to these devastating events, not to a decreased response capability*.

d) No significant gain in response time: Current PTWC operations rely on a paging system that automatically notifies the watchstanders of the occurrence of potentially tsunamigenic earthquakes, including local earthquakes. *In December of 2004, these pages were issued before the earthquake rupture had stopped*. PTWC watchstanders respond within 90 seconds from the first page received on a 24/7 basis. Quite often, however, watchstanders must wait at the operations center for more seismic waves' arrivals,

indispensable to locate and process all the information leading to an evaluation of the earthquake's tsunamigenic potential. Consequently, for teleseismic events (such as the Great Sumatra earthquake), having someone in the building 24/7 will bring no improvement to our operations. Having watchstanders in the building 24/7, instead of having them come from a house 200 feet away, will save at most thirty (30) seconds. *PTWC operations will benefit from this marginal time gain only in the case of a local earthquake.* To change the whole operational model at PTWC, a model that has proved effective for more than thirty years, based solely on the idea of possibly gaining just thirty seconds of response time remains as an arguable decision. However, PTWC will change its operational model *while remaining at the present location*, which means that the relocation to Ford Island brings no real operational improvement whatsoever.

e) Loss of prompt, reliable access by PTWC personnel to the operations center: A single, partially floating bridge provides sole access to Ford Island. Incoming traffic must stop at a guarded checkpoint in the middle of this bridge, in compliance with the US Navy security protocols. These security protocols will occasionally result in long waits for anyone trying to get onto the Island (for example, during the frequent elevated security levels that have occurred since 9/11/01 to “yellow” and “orange”). Traffic to and from Ford Island must comply with the US Navy Base security protocols and force protection levels, and accordingly, the move will most likely affect PTWC personnel's prompt access to the operations' center when a tsunamigenic event strikes. This would affect PTWC's capability to issue, update, and/or cancel a tsunami warning, and therefore, on the Hawaii Civil Defense's capability to implement tsunami mitigation plans and procedures. At the present location, however, operations at the PTWC benefit from up to 6 watchstanders having only to commute the 200-300 feet from their quarters to the office in less than 90 seconds. Traffic towards the Honolulu area, however, worsens every year. The planned move to Ford Island will bring a long commute, that in addition to affecting PTWC operations, will also put an extra level of stress on the watchstanders. In addition, the Navy will likely cut off access to Ford Island by raising this bridge to allow their fleet in Pearl Harbor to evacuate to deeper water as soon as the PTWC issues a Tsunami Warning.

3) Financial drawbacks derived from relocating PTWC to Ford Island

a) Unwise financial move: The construction of the NOAA facilities at Ford Island will cost an estimated \$240 million, but *all moving costs, which will be huge for the PTWC*, duplicate infrastructure purchases so that both centers are operational, etc. may not be paid for from this \$240 million. Thus relocation of the PTWC to Ford Island represents a waste of taxpayer's dollars from two “pots”: the \$240 million allotted for this project, and directly from the NWS Budget. The question must be asked: why spend taxpayer's dollars on a move that brings no operational benefit to the warning system?

b) NWS will lose access to the current property: GSA owns the land on which the current PTWC stands, and under the current agreement, *the NWS pays no rent* for its use. By law, the NWS must notify the GSA of its intentions to move the PTWC from their property, so that GSA can bid within the Federal Government for the use of the land. This

implies that the NWS will have to relocate the current quarters, the antenna farm, and the seismic vault (and its seismometers), thereby having no compelling reason to keep the property.

*c) Huge cost involved in the move: **The move involves replicating the entire system, which translates into installing and maintaining two warning centers, namely, two of every piece of equipment for up to a year.** This includes the antenna farm, the seismic vault, the paging system, the local computer network and servers, as well as the operations software. We must also consider the cost of retrofitting the new building and moving furniture and equipment. *PTWC will also have to account for the potential loss of several watchstanders, including their cumulative training and experience, who have already indicated that they will leave or retire given the changes in pay and working conditions.**

d) All PTWC projects must stop for six months to a year so as to accommodate the consolidation at Ford Island. This will adversely affect vital developmental efforts such as *processing the DART Buoy data as it comes online, meeting a 90 second Local Tsunami response* via an upgrade of our Local Seismic and Water level network, etc. In addition to the afore-mentioned issues, we find worth mentioning that the NWS granted an exemption to its largest office in the Pacific Region, the HFO, from the move. Among all the NOAA facilities in the Pacific Region, only the PTWC and the HFO operate on a 24/7 basis. Therefore, the only operational reason for the PTWC to consolidate with the other NWS mission critical facility—the HFO, doesn't exist. If NOAA argues bringing all branches of NOAA in the Pacific Region together as the main purpose of the consolidation, then how can they exempt the HFO, their biggest office, from it?

All of the arguments above leave us with the following questions: Why should NOAA relocate the PTWC to Ford Island, at such a cost to the taxpayer, in these times of tight budgets, for no apparent operational reason? How will this move fortify our warning and response capabilities? *Will it compromise them?* Why should the taxpayers pay for something that, bringing no apparent operational improvement, offers no public service benefit? All these obvious questions remain unanswered.

REFERENCE DOCUMENTS:

1. Letter to Senator Inouye.
2. Senator Inouye's response.
3. Hawaii's Civil Defense (HCD) Tsunami Notation for 2006 phone books.
4. Oahu Civil Defense (OCD) Advisor's letters opposing the move.
5. Email from the HCD Tsunami Inundation Zone modeler detailing the Navy's refusal to provide the data needed to model Pearl Harbor: "garbage in garbage out"—his words.
6. Letter from Hawaii State Senator Espero to PRD, and Gen. Johnson.
7. General Accounting Office (GAO) ongoing Investigation of the post-Sumatra TWS. The document lists the questions asked by the investigators at PTWC. The

GAO was also concerned about the expense of the move of the PTWC to Ford Island. Especially if no operational reason was found.

8. Department of Commerce visit to PTWC. Concerned that the Navy's base restrictions could compromise our mission. Documented that these restrictions will indeed hamper PTWC's Mission in a variety of ways.
9. MOU between the USGS and NOAA re: Ewa Beach Magnetic Observatory.
10. Land Management Master Plan for The Pacific Tsunami Warning Buffer Zone, Second Draft, 3/7/94. US DOC/NOAA/NWS/Pacific Region.