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Operation TOMODACHI:
A Model for American Disaster Response Efforts and the
Collective use of Military Forces Abroad

By

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A Research Report Submitted to Air Force Fellows
In Partial Fulfillment of the IDE Graduation Requirements

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE JAN 2012		2. REPORT TYPE		3. DATES COVERED 00-00-2012 to 00-00-2012	
4. TITLE AND SUBTITLE Operation TOMODACHI: A Model for American Disaster Response Efforts and the Collective use of Military Forces Abroad				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Harvard University, John F. Kennedy School of Government, Cambridge, MA, 02138				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT On March 11, 2011 at 2:46 PM three giant earthquakes occurred along the edges of tectonic plates approximately 250 miles northeast of the Tohoku or Northeast region of Japan's mainland, otherwise known as Honshu Island. At first thought to be one giant earthquake, the series of tremors occurred in succession a mere 6 minutes from start to finish; ultimately registering at an unprecedented 9.0 on the Richter Scale. The quake resulted in a horizontal sheer displacement of nearly 20 meters on the Pacific floor. So significant was the quake, it was felt across the Pacific ranging from Chile to Alaska.					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 30	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

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January 2012

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We face an incredibly complex problem. I am very grateful for your hard work, your patience, and your resilience in the face of this challenge. After the initial shaking stopped, you got right to work supporting an unbelievable Humanitarian Assistance and Disaster Relief operation, providing the helping hand of a neighbor and friend to the Japanese people, hit so hard, and to many who have lost so much. -- Lt Gen Burton Field, Commander, U.S. Forces Japan, March 17, 2011, in message to U.S. Military members supporting Operation TOMODACHI¹

The Catalyst

On March 11, 2011 at 2:46 PM three giant earthquakes occurred along the edges of tectonic plates approximately 250 miles northeast of the Tohoku or Northeast region of Japan's mainland, otherwise known as Honshu Island. At first thought to be one giant earthquake, the series of tremors occurred in succession a mere 6 minutes from start to finish; ultimately registering at an unprecedented 9.0 on the Richter Scale. The quake resulted in a horizontal sheer displacement of nearly 20 meters on the Pacific floor. So significant was the quake, it was felt across the Pacific ranging from Chile to Alaska. As a result, the tremors unleashed a total of seven waves, or tsunamis, over a course of 6 hours; the greatest of which hammered the coast with waves as tall as 14-20 meters and reaching as far as 6 miles inland. The catastrophic effects of the 1000-year event far exceeded all design and planning standards causing destruction to homes, businesses, public services, medical care facilities and basic infrastructure. The loss of property and services paled in significance to the 28,000 dead or missing citizens.² After early assessments of the ruinous damage, it became clear that even a complete mobilization of all civil and military forces would be insufficient to provide both acute and long-term recovery operations. Only with the complete support of its allies could Japan overcome its greatest obstacle since World War II and bring stability and a renewed sense of hope to its people.³

Having a very limited supply of natural energy resources, Japan relies on Nuclear Energy for approximately 30% of its domestic power supply. More specifically, nuclear energy accounts for the vast

¹ USFJ Commander Policy Memorandum, *Message from Lt Gen Burton Field (Yokota AB, Japan), March 2011*

² Knight, Bill, Colonel, 374 AW/CV, et. al., "Operation TOMODACHI, MAF Response to Japan's Nuclear Disaster" (power point presentation, Airlift Tanker Association, Nashville, TN, November 4, 2011)

³ Hisaya Sugiyama, "AIA Summary of Fukushima Nuclear Disaster." *American Institute of Architects Publication – Japan*, (March 30, 2011)

majority of electricity supporting the Tokyo metropolitan and surrounding areas.⁴ On March 11, just 26 minutes after the first earthquake, a tsunami hit mainland Japan. The damage caused to the Nuclear Power Plant in Fukushima Daiichi (approximately 170 miles North of Tokyo). The plant consisted of six nuclear reactors and a series of spent-fuel pools containing a highly radioactive byproduct of the decay heat nuclear power process. The reactors themselves were protected in two-meter thick concrete structure housing vessels. The spent-fuel pools, on the other hand, were much less protected within a more traditional facility design. Both the active and inactive fuels required constant circulation of water to prevent overheating and destabilization. The facility design standards included primary and backup power (needed to circulate the water) a mere 10-13 meters above ground level. The damage sustained as a result of the tsunami quickly overwhelmed electrical distribution systems in the plant and raised the water temperature, exposing radioactive material to the air. The process heat combined with the mixed properties of zirconium, oxygen and hydrogen caused reactors 1 and 3 to explode early the morning of March 12, 2011. The ensuing melee of activity over the following 10 days, served as a “game changer” leading to an unprecedented Japanese crisis response and enhanced relations with its most strategic ally -- the United States (US).

Integration of Capabilities

At 3:30 PM on March 11, just 44 minutes after the earthquake hit, the Ministry of Defense (MoD) established an emergency headquarters to initiate response operations. At 7:30 PM, the Defense Minister made history when he mobilized 8,400 Japanese Self Defense Force (SDF) personnel to augment the overwhelmed Japan civil response forces. Just a few short days later, on March 14, Japan made history when it established Joint Task Force (JTF) to oversee all response operations under the Command of the General of the Ground SDF's Northeastern Army and increased the total number of SDF active personnel to a staggering 107,000. The new JTF re-organized all Ground, Marine and Air

⁴ World Nuclear Association, “Nuclear Power in Japan,” World Nuclear Association Website, <http://www.world-nuclear.org/info/inf79.html>

Forces under the JTF Commander. These forces would focus on the earthquake response operations while a parallel Central Readiness Force (CRF) Commander would focus on the mitigation of the ongoing Nuclear crisis.⁵ Nearly 500 additional personnel were dispatched from the SDF Central Nuclear, Biological, and Chemical Weapons Defense Units, under the CRF command, to address the now growing concern of the Fukushima reactors. These operations marked the largest mobilization of personnel and equipment in Japan's history.

Shortly after the first impacts of the tsunami were felt, the Government of Japan (GoJ) quickly realized, even after mobilizing SDF personnel, that it would need support from its allies to address the growing humanitarian need. The US Agency for International Development (USAID) is the US Government's lead federal agency for international Humanitarian Assistance and Disaster Response (HADR). Based on early collaboration with the US Embassy in Tokyo, USAID deployed a Disaster Assistance Response Team (DART) to establish a Bilateral Assistance Coordination Cell (BACC) to implement a sustainable coordination process; within which the US and GoJ could establish consequence management activities to transition from the critical phase of the recovery to a longer-term stabilization process. The BACC was comprised of the DART, Department of State (DoS) representatives from the US Embassy, and eventually technical representatives from the US Department of Energy (DoE) and Nuclear Regulatory Commission (NRC). The team quickly interfaced with GoJ representatives from Prime Minister Goshi Hosono's Crisis Management Team (CMT) to receive, vet, and respond to requests for assistance and conversely to present their own offers of support operations. Upon receipt of a request for assistance, the BACC worked to match the unique need through a resource mapping process to determine if the capability was available within country and to confirm that the US possessed the comparative advantage to provide support and avoid duplication. For example, the BACC and CMT developed processes to provide aerial radiation monitoring flights from Yokota Air Base. The

⁵ Japan Ministry of Defense White Paper Special Feature, *Response to the Great East Japan Earthquake*, http://www.mod.go.jp/e/publ/w_paper/pdf/2011/04SpecialFeature.pdf, Fig Special-1 (Appendix 1)

group negotiated initial monitoring efforts and the long-term transition of this mission, along with all other components of air, ground and sea radiation monitoring operations, back to the GoJ. Rather than inappropriately thrusting capabilities and services upon GoJ, the BACC developed a controlled and methodical process for determining and coordinating aid. This process went against the grain, in many regards, where forces at times attempted to negotiate support operations, based on in-theater capabilities, at lower echelons.⁶

Almost immediately after the earthquake, US Forces Japan (USFJ) in conjunction with the US Pacific Command initiated a 3-Phase Operation “TOMODACHI” in order to execute support arrangements negotiated between the BACC and the Hosono CMT.

- Phase 1: Emergency Response – Immediate Lifesaving and Search and Recovery
- Phase 2: Relief – Mitigate Suffering and Meet Basic Needs
- Phase 3: Restoration – Restore to Pre-Earthquake Conditions⁷

Specifically, USFJ worked to align capabilities to complement the ongoing SDF-led response. Despite several challenges, US Pacific Command (PACOM), with jurisdiction and command authority over all DoD forces in the Pacific, worked conjunctively with its subordinate agency US Forces Japan to build a separate command structure dedicated to TOMODACHI operations. As a result, PACOM expediently stood up its own separate JTFs on March 13 and 17 to address the growing requirements that USFJ could no longer organically support.⁸ Within these newly implemented organizations, JTF-519 was tasked to safeguard the welfare of US citizens located in Japan and support the ongoing HADR operations with SDF counterparts. Subsequently, JTF-505 was tasked to evacuate those US citizens wishing to depart Japan in the wake of the crisis. While JTF-519 would maintain direct or tactical control of all US ground, air, and maritime forces, JTF-505 would be directly supported by both JTF-519 and the

⁶ Dale, Martin – Department of State Foreign Service Officer, personal email with details from Tokyo Embassy, December 2, 2011

⁷ US Embassy, Tokyo, “Brief to Senators Levin and Webb” (power point presentation, US Embassy, Tokyo, Japan, 28 April, 2011)

⁸ 5AF/HO, “Operation TOMODACHI Timeline,” (Yokota Air Base, Japan, June 1, 2011) (Appendix 2)

separate functional Joint Forces Air Component Commander (JFACC) in charge of air operations. While the JTF-519 was accountable for all HADR operations, the JFACC provided direct support with air assets as needed. It was through this organizational structure that BACC would provide all negotiated support requirements and with which the Japan JTF would coordinate the operational and tactical elements of support.

Prioritizing US Response Operations

The use of military forces to support humanitarian operations has grown to be almost commonplace in today's world. The capability and unrivaled response the US military has brought to recent crisis has changed not only the way the military is used but the way that people and governments think of the military. This overwhelming capability can be seen during Japan's most critical time of need. In evaluating the multiple aspects of the US military's response during the Great East Earthquake of Japan, this paper segregates response operations into two subsets: 1) Safety and well-being of US Citizens and National Security Interests, 2) Support of HADR Operations.

Safety and well-being of US Citizens and US National Security Interests. In line with traditional national security priorities, it is assumed that the US Government considered the welfare of US citizens as the top priority when organizing response operations. This section details DoD's role in protecting US interests in Japan during TOMODACHI. These examples will be used later in this publication to identify both success stories and areas where further analysis or corrective measures are needed.

On March 17, with growing concerns of airborne radiation particulates from the reactor breach, the DoS authorized the voluntary evacuation of all DoS dependent family members within a 200-mile radius of the plant. The Commander of US Forces Japan, in coordination with the lead JTF-505, quickly followed suit by authorizing voluntary evacuations for all DoD dependents as well. The operation, coined "PACIFIC PASSAGE," posed numerous challenges for military leaders and families alike. First, at the time of implementation, limited information was still known about the nature of radiation and its potential to

spread throughout the region. Based on all known plume modeling predictions (used to anticipate airborne radiation migration based on wind conditions and weather), much of the radiation would likely spread to the southeast or away from mainland Japan and back towards the Pacific Ocean. The vast majority of military installations resided well outside of the 25 nautical mile radius where primary health risks were identified to be most prevalent by PACOM directed Operational Exposure Guidance.⁹ In addition, several measures were implemented on US installations to protect the well-being of residents including the pre-placement of dosimeters (radiation detection devices), Potassium Iodide (KI) tablets (used to protect against absorption of radioactive iodide into the thyroid gland), and personal protective suits and equipment on the unlikely chance that contamination would occur. Despite these efforts and the remoteness of exposure, DoS and DoD erred on the side of caution.

There was a potential for hysteresis among US citizens once they heard of the radiation contamination risk 125 nautical miles away. The liability and external perception of not authorizing voluntary departure (at the expense of the US government) would likely have become emotional and political very quickly. Finally, little was known regarding the potential for cross-contamination of the food or water supply and risk of spreading to US military installations. This threat was very real as radioactive iodine was found in the Tokyo water supply twice within a three day timespan from March 20-23. Based on all these factors, the voluntary evacuation from the outside appeared wholly appropriate.

Many DoS families lived miles closer to the contamination posed by the Fukushima plant (albeit still well outside the 20-mile primary standoff). Once DoS authorized the return of their dependents, DoD had little choice but to follow suit given the potential appearance of disproportionate policies. The voluntary evacuation policy further allowed the US Government assist US citizens without giving the perception of abandoning Japan. In the end, PACIFIC PASSAGE used primarily government contract

⁹ 374 AW/CC Policy Memorandum, Feather, Paul E., Colonel, *Leave Policy – Honshu, Japan (Yokota AB, Japan)*, April, 2011 (Appendix 3)

carriers to evacuate over 9,000 evacuees (out of 85,000 potentials), 500 pets and 4,200 short-tons of cargo. If radiation spreads later on, requiring a complete evacuation, the US carriers would not operate in a known contaminated environment. Making the decision to voluntarily evacuate personnel with commercial airlines early in the process eased the burden of potentially having to evacuate all personnel with military airlift later on.¹⁰

As a result of deliberations between the US and Japan and the creation of a bilateral radiation monitoring group, JTF-519 coordinated with DoE to conduct radiological mapping operations to determine the location and concentration of radiation contamination.¹¹ This process confirmed exact locations and movement patterns of the radiation rather than relying exclusively on computer-aided models. The 459th Airlift Squadron, out of Yokota Air Base, working with DoE confirmed radiation levels through precise mapping operations. The Squadron provided two air platforms from which DoE personnel could calibrate equipment and measure radiation levels. On March 17, the UH-1 “Huey” Helicopter platform flew the first mapping mission. Based on JTF-519 directives (which were rumored to have come from as high up as the President himself), the mission priorities were to observe locations with American citizens, such as the Tokyo embassy and local military installations, for signs of contamination. The Huey was ideal for the mission set based on its ability to fly low to the ground (500 feet above ground level) and at relatively slow speeds. The results of these first missions, as expected, indicated very little risk to US personnel. Although dosimeter readings on the ground indicated the same earlier in the week, it was comforting to validate the absence of airborne particulates as well. In addition to its rotary wing counterpart, the fixed-wing C-12 “Huron,” was also used extensively for mapping operations. The C-12 was the first airframe to execute mapping operations over the Fukushima-Daiichi plant and established the first baseline to measure the true extent of the airborne contamination.

¹⁰ US Embassy, Tokyo, “Brief to Senators Levin and Webb” (power point presentation, US Embassy, Tokyo, Japan, 28 April, 2011)

¹¹ Japan Ministry of Defense White Paper Special Feature, *Response to the Great East Japan Earthquake*, http://www.mod.go.jp/e/publ/w_paper/pdf/2011/04SpecialFeature.pdf

Whereas the Huey was used for more isolated areas, the Huron could fly at much higher speeds while still flying at an atypically-low profile of 1,000 to 2,000 feet above ground level. These unique missions, jokingly called “lawn mowing” and “crop dusting” by the respective aircrews, were eventually optimized to meet the very specific airspeed and altitude requirements of the infrared thermography equipment obtaining readings. The value of the data provided through the day-in and day-out missions is quite simply a credit to the ingenuity and tenacity of Airmen flying the aircraft and to the scientists taking readings. The capability, although ultimately transferred to the SDF, provided an essential component to recovery operations that would not have happened in the short timeframe required without US military involvement. The importance of the mapping data was best described by the 459th Airlift Squadron Commander, Lt Col Eugene “Gene” Capone during an interview after the completion of mapping efforts:

“But the interesting plots we started to get were the ones that were up around the plant, and you could actually see the lay-down of the radiation on the ground as a result of where the winds were blowing from...I think it was critical info for the GoJ to help them gauge how far the evacuation area needed to be, where the danger areas were.”

While the crews became more efficient at both flying and training their peers to fly the unique mapping missions, these assignments brought significant risk to both themselves and their aircraft. During one C-12 mission, while flying along the eastern seaboard, DoE scientists identified higher-than-normal radiation levels on the aircraft. After flying for a bit to see if the levels would subside, they determined that the aircraft had flown through an eddy of radiation matter. Fearing for their safety and the long-term functionality of the aircraft, the aircrew reported the incident back to its home base. Although the procedures for the handling of contaminated aircraft were formally codified, it was far from something the Air Force regularly practiced and internally understood at the field or operations level. The feasibility of this type of event had been discussed extensively within the Wing before the missions started, but given the necessity of the mapping operations, the risk was acknowledged as a necessity. Upon returning back to the base, the radiation was deemed to be low enough in quantity to not pose a health risk. Further, a simple soap bath eliminated the contamination on the external frame

of the aircraft. Despite what was ultimately a benign incident, the risk to both aircrew and aircraft and exposed the participants as the true American heroes they are. The occurrence also signified the unpredictable nature of the winds and that the plume modeling, although effective, was far from completely reliable. At the time the aircraft flew through the contamination, the team was flying well upwind and outside of any modeled radiation. The incident only reinforced the value of having real world data. To add further context, a later decision to evacuate a US Naval Port in Yokosuka, Japan was made thanks in large part to data generated on prevailing wind directions during mapping surveys.¹²

As part of Operation TOMODACHI efforts to safeguard US citizens, PACOM and JTF-519 feverishly led a multitude of efforts to prepare both military members and the dependents remaining in the country for the worst possible scenario. The development of a PACOM-specific matrix identifying particular radiation thresholds for personnel, equipment, vehicles and aircraft as well as procedures for shelter-in-place, evacuation, and decontamination processes marked significant safety milestones for US forces and families. In one instance at Misawa Air Base, wastewater collection points were created to store known contaminated water in fuel bladders; this process resulted in the safe collection of 7,000 gallons of contaminated water resulting from aircraft washing operations.¹³ Additionally, efforts were made to standardize decontamination procedures for returning aircrews and groundcrews in the instance of contamination. The creation of Joint Radiological Monitoring “Decon Teams” consisting of members of the Air Force Radiation Assessment and Aerospace Medicine Teams, Japan’s Air Ministry Laboratory, Army Chemical Corps, and the Navy Radiological Control teams provided radiological and consequence management capability throughout the region.¹⁴

¹² Capone, Eugene, Lt Col, 459 AS/CC, personal interview with Dr. John Treiber, transcribed by Dr. John Treiber, April 20, 2011

¹³ Older, David, 5 AF/A4P, Japan Host Nation Support Programmer, personal email, November 6, 2011

¹⁴ Knight, Bill, Colonel, 374 AW/CV, et. al., “Operation TOMODACHI, MAF Response to Japan’s Nuclear Disaster” (power point presentation, Airlift Tanker Association, Nashville, TN, November 4, 2011)

Supporting Humanitarian Assistance and Disaster Response. While safeguarding the interests of American citizens as its top priority, US forces undertook monumental efforts to help the people of Japan in their time of need. These efforts provided critically-needed logistics that in many ways could only have been delivered through the US Armed Forces and their very distinctive capability sets. Following the model established by USAID and DoS, the Japanese SDF and JTF-519 established bilateral coordination centers in locations including the Japanese MoD (Ichigaya), USFJ Headquarters (Yokota Air Base), and SDF Tohoku Headquarters (Sendai). These functions were developed to help work through operational and tactical level issues. Ultimately, MOD deployed 80 personnel from the Japanese Internal Bureau throughout the bilateral coordination centers to help simplify the processes. In addition, given the exhaustive level of communications required, language officials were dispatched from the Tohoku Defense Bureau to the bilateral coordination center in Sendai. These officials were essential in the streamlining discussions and in clarifying capabilities and roles and responsibilities.¹⁵

The US Forces coordinated support operations through a “hub and spoke” concept leveraging permanent installations in outlier areas of Japan and Okinawa to cycle supplies into bases closer in proximity to relief operations. The concept was exquisitely planned and executed with little margin for error given the urgency of the situation. US installations including Iwakuni Marine Corps Air Station and Sasebo Naval Base, on mainland Japan, and Kadena Air Base and Marine Corps Air Station Futenma, on Okinawa, were used as logistics nodes to provide airlift, sealift and ground transport to Yokota Air Base, Misawa Air Base and Naval Air Facility Atsugi. In turn, these installations would make the final push into initially Yamagata and then Sendai upon its opening. Additionally, Sasebo was a primary hub for resupply of the Essex Amphibious Readiness Group and the USS Ronald Reagan Carrier Strike Group. The USS Reagan, which was originally scheduled to participate in an exercise on Sendai Bay on March 13, 2011 was ideally placed to provide search and recovery operations using PC-3 patrol aircraft and

¹⁵ Japan Ministry of Defense (closes translation available), *The Lessons from the Operations for Great East Japan Earthquake (Interim Report)*, <http://www.mod.jp/j/approach/defense/saigai/pdf/K-chukan.pdf>, August 2011

helicopter airframes. The mere presence of the Reagan in the bay was said to have brought a sense of hope to the Japanese people.¹⁶

US carrier-based aircraft also landed on SDF ships to pick up and transport supplies inland. The US also had the logistics structure needed to transport additional SDF personnel from around the country to support frontline operations. For example, the USS Tortuga transported 300 SDF personnel and 100 vehicles from Hokkaido (Japan's second largest Northern Island) while C-17s airlifted hundreds more from Okinawa to mainland Japan. Over 28 days, more than 24,000 US military personnel, 24 ships and 89 aircraft augmented Japan's HADR relief efforts.¹⁷

Immediately following the Great East Earthquake of Japan, both Narita International and Haneda Airports were closed for several days due to their close proximity to the Eastern Seaboard. Although not directly impacted by radiation fallout, both airports were devastated by the earthquakes themselves. Passengers sitting on the tarmac reported what felt like turbulence despite having not left the ground. Additionally, the Airport at Sendai (a potential relief outlet for airborne aircraft in route to Narita or Haneda) was overcome by waves due to its close proximity to the shoreline. In total, six separate airports were all forced to close on at least a temporary basis, immediately following the incident. Ultimately, nearly all international flights into the Tokyo region were cancelled and domestic travel was heavily restricted for days following March 11. As a result, several aircraft preparing to land were diverted to Yokota Air Base which provided the most optimal and safest landing area given its close proximity to Tokyo but outside the crisis area. In total, 11 commercial aircraft were diverted to Yokota within 60 minutes of the quake. More than 500 civilians, on aircraft from carriers including United, Continental, and Delta, safely landed and processed through customs at the US Air Base. The

¹⁶ Japan Ministry of Defense White Paper Special Feature, *Response to the Great East Japan Earthquake*, http://www.mod.go.jp/e/publ/w_paper/pdf/2011/04SpecialFeature.pdf

¹⁷ Knight, Bill, Colonel, 374 AW/CV, et. al., "Operation TOMODACHI, MAF Response to Japan's Nuclear Disaster" (power point presentation, Airlift Tanker Association, Nashville, TN, November 4, 2011), Slide 8 (Notes Pages) (Appendix 4)

availability of a 2-mile long runway, significant ramp space, fire crash response and cargo and passenger handling facilities made Yokota a safe haven for wayward aircraft. Even before the true extent of the damage was fully understood and recovery operations had commenced, the US military had made a difference.¹⁸

The use of US Intelligence, Surveillance and Reconnaissance aircraft beginning as early as March 12, had a significant role in building the baseline of response and identifying the magnitude of efforts which lay ahead. Initial use of the RQ-4 “Global Hawk” Remotely Piloted Aircraft (RPA) and the U-2 “Dragonlady” on March 12 and March 13, respectively, provided imagery of the highest resolution. These efforts continued throughout TOMODACHI. Throughout Operations IRAQI FREEDOM, ENDURING FREEDOM (Afghanistan) and ODYSSEY DAWN (Libya), “drone” aircraft, have repeatedly demonstrated their effectiveness. RPAs, however, have become quite controversial within the public and media based on their easy application, sterile appearance, and the reduced risk of exposing our servicemen and women to harm when it comes to setting the terms for combat. It is only necessary to look at the criticism President Obama has taken both at home and abroad for the application of RPAs in Libya to see this principle in action. The use of RPAs during TOMODACHI, provides a completely new paradigm within which to view their effectiveness. The ability to use this platform for crisis response is unparalleled given the quality of imagery, rapid deployability, unconfined mobility and retrofitting capacity they possess. The application of RPA aircraft within both international and domestic crisis response should be more openly considered when debating the long-term viability and ethics of the RPA program as a whole.^{19 20}

From the outset, the strategic value of Sendai airport was understood given its close proximity to the Fukushima-Daiichi reactor sites while still remaining outside of the 20 kilometer radiation

¹⁸ News Daily, “Narita Airport, has been in the open again, but only to flight departure,” <http://www.usdailyinsights.info/narita-airport-has-been-in-the-open-again-but-only-to-flight-departure/1425/>

¹⁹ Japan Ministry of Defense White Paper Special Feature, *Response to the Great East Japan Earthquake*, http://www.mod.go.jp/e/publ/w_paper/pdf/2011/04SpecialFeature.pdf

²⁰ 5AF/HO, “Operation TOMODACHI Timeline,” (Yokota Air Base, Japan, June 1, 2011) (Appendix 2)

exclusion zone. Once operational, the airport would serve as a major logistics hub just outside of the front lines of response operations. Unfortunately, Sendai airport sat on the easternmost seaboard and was fully exposed to the damage caused by the litany of tsunami waves pounding the coast. The US has demonstrated the capability to re-open airports with the utmost precision in previous crisis. The opening of Utapao airport in Thailand immediately following the 2004 tsunamis in Indonesia and the activation of the Port-au-Prince Airport in Haiti in 2010 serve as distinct examples of this very unique and valued capability. The urgency to bed-down relief forces and mobilize logistics elements from Sendai called for a similar approach. Early hubs of Yokota Air Base and Naval Air Facility Atsugi were too far from the affected areas to provide direct support. A Forward Air Refueling Position (FARP) was initially set up at Yamagata (much further inland than Sendai) but the winter weather and mountains terrain between it and Tohoku made using it as a staging area unsustainable.²¹ A few short days after the earthquakes, JTF-519 promptly mobilized the 320th Special Operations Tactics Squadron (STS) to survey and re-open Sendai. The STS, deploying out of Kadena Air Base, Okinawa, encountered an airport that had essentially been written off by the GoJ. Robert Eldridge, Deputy Assistant Chief of Staff for the Marine Corps Bases Japan Community, immediately following his site survey with Japanese leaders some days later stated, "If you were there and you saw it, you would have written it off, too." The STS landed at Matsushima via airdrop on March 16. From there, they convoyed to Sendai to assess the damage. Upon arrival, they encountered significant debris (including dozens of cars) across the airfield. Quick action by the team, to not only begin clearing the area but also mobilize several local Japanese work crews, resulted in the complete clearance of the 5,000-foot runway in only 3 hours. This cleared the way for the arrival of the first MC-130 aircraft the very next day loaded with 50,000 bottles of drinking water. By the end of the week, much larger C-17s were landing as well.

²¹ Knight, Bill, Colonel, 374 AW/CV, et. al., "Operation TOMODACHI, MAF Response to Japan's Nuclear Disaster" (power point presentation, Airlift Tanker Association, Nashville, TN, November 4, 2011)

Marines from the Combined Arms Training Center (CATC) at Camp Fuji arrived at Sendai on March 20 to begin more extensive recovery operations. Upon their arrival, the Marines had little idea that the airport would later become a key component to response operations. Not only would it provide a critical logistics hub, it was also transformed into one of the bilateral coordination centers. When the airport re-opened, there were about 107,000 people in Miyagi Prefecture living in shelters with little food or water. According to the prefecture government, tens of thousands more remained in areas devastated by the waves. A total of 19 makeshift morgues had popped up across Miyagi holding 744 unclaimed bodies. Supplies, delivered via the newly-opened airport were quickly provided by SDF and Japanese authorities to local citizens. The CATC Marines on the ground at Sendai wanted to do more to help but felt frustrated by their inability to do so. The CATC Commander Colonel Craig Kozeniesky described the Marines status shortly after getting to work at Sendai:

"Immediately upon getting here we started clearing cars and it fired up the airport staff to start working. Now, that the terminal area is cleared and the long-term parking area is about 80 percent clear, there is so much need, I think we can step off and do more and we are pushing aggressively to do that."

Ultimately, the level of aid provided by US forces was heavily dependent on the number of requests received from the Japanese government. By all accounts, the level of GoJ requests were fewer than many internal to DoD anticipated.^{22 23}

Finally, the US military's provision of critical supplies and equipment assisted response operations. After the failure of both primary and alternate power production means at the Fukushima-Daiichi Plant, the Tokyo Electric Power Company and SDF battled endlessly to keep constant water flow on the active fuel rods and expended fuel holding cells. These water pumping activities were provided by fire trucks, adjacent water barges and finally helicopters that would hover over the plant (despite the rising radiation levels) to release water from above. Over the course of the event, 44 Japanese fire

²²Tritten, Travis J., "Marines help clear out Sendai Airport after tsunami," *Stars and Stripes*, <http://www.stripes.com/marines-help-clear-out-sendai-airport-after-tsunami-1.138774>

²³ 5AF/HO, "Operation TOMODACHI Timeline," (Yokota Air Base, Japan, June 1, 2011) (Appendix 2)

trucks pumped a total of 340 tons of water. To augment operations, US forces provided six fire response vehicles with pumping systems, two barges loaded with freshwater and pumps, 100 radiation protective suits and nearly 18 tons of boric acid to help cool the reactors. Over the duration of response operations, US Forces and DoE also provided extensive radiological testing and evaluation equipment to determine contamination and exposure levels.

All told, US Forces delivered 189 tons of food, 2 million gallons of water and 87 tons of additional relief materials.^{24 25}

Leveraging Excellence for Future Operations

The bilateral coordination and success of Operation TOMODACHI should be codified in order to prepare for future crisis. The lessons and processes developed during this historic period must be leveraged by not only the US and GoJ but by the international community collectively to better posture response operations in the future. The demonstrated value of the US military during incidents such as the 2004 Indonesia tsunamis, 2010 Haiti earthquakes and 2005 Hurricane “Katrina” in the Southern US, provide good reasons to shift the paradigm in terms of how we view and communicate the charter of the US military.

The Value of Maintaining US Forces Abroad. During the very well-publicized and currently ongoing US debt crisis, there has been many discussions aimed at reducing defense spending. In framing these discussions, it is imperative that we acknowledge the value of maintaining forces abroad and America’s special role in the world. The US is a critical actor and its involvement overseas significantly enhances its strength in this world, rather than diminishes it. The US should embrace its responsibilities as a global leader and maintain the capabilities necessary to meet them. The permanent stationing of military personnel and equipment aided recovery operations. In total, the US delivered more than 3

²⁴ Japan Ministry of Defense White Paper Special Feature, *Response to the Great East Japan Earthquake*, http://www.mod.go.jp/e/publ/w_paper/pdf/2011/04SpecialFeature.pdf

²⁵ Knight, Bill, Colonel, 374 AW/CV, et. al., “Operation TOMODACHI, MAF Response to Japan’s Nuclear Disaster,” (power point presentation, Airlift Tanker Association, Nashville, TN, November 4, 2011)

times the amount of food and 20 times the volume of water than did the GoJ. The fact that US servicemen and assets were located on or adjacent to recovery operations saved an incalculable number of lives and expedited recovery operations. The US undeniable role in the world and value of having forces geographically able to support crisis such as TOMODACHI, UNIFIED ASSISTANCE (Indonesia) or UNIFIED RESPONSE (Haiti) should be acknowledged and quantified before committing to future basing and funding reductions.

The Broad Application and Capabilities of RPAs. The use of RPAs during TOMODACHI greatly assisted recovery operations. Despite their success, the DoD has done very little to build a public narrative that clearly articulates the wide-application of RPAs. Currently, much controversy swirls around the RPA program given their publicized use during Operation ODYSSEY DAWN in Libya. The RPA program is viewed by a portion of the public and many in the press as a very sterile and risk-free means of conducting warfare that the US would not conduct otherwise. A counter-narrative to these points should be built and communicated by DoD. Operation TOMODACHI provides the perfect opportunity.

From a more technical perspective, the DoD should analyze the same infrared thermography technology, used during radiation mapping operations, for potential application within RPA platforms. The capability for RPAs to provide this function would have reduced risk and exposure to US personnel and equipment.

Voluntary Assisted Departure of US Dependents. DoD leadership should be praised for the decision to allow family members to voluntarily evacuate areas within 200 miles of the Fukushima-Daiichi Nuclear Plant. This decision was brilliant given the complexity of the situation. It both suppressed concerns and discontent of members, before they had the opportunity to surface, while also demonstrating the US resolve and commitment to GoJ. Many view the evacuation of family members within a 200 miles as overly conservative given that radiation risks were not significant outside of a 20 mile radius. If the reactor situation worsened, the risk to US personnel grew. Also, the uncertainty of the

weather patterns, the inability to contain airborne contamination and the potential effects to the indigenous water and food supply, provided enough rationale to evacuate on a voluntary basis. At the same time, the risks were remote enough and enough safeguards were in place to sustain families wishing to remain in country. In the end, the most critical factor was providing peace of mind to military members providing relief operations – simply knowing their families would be taken care of whether inside or outside Japan. Also, the decision to voluntarily evacuate personnel early, reduced total evacuation requirements in case a mandatory evacuation was required later on. Both the decision itself and the process used to develop this decision should be documented and used as a case study for future leaders.

Bilateral Coordination – The Good. The formalized BACC process developed by DoS and USAID should be replicated in future operations. This process ensured relief provided was proportionate to the needs and capabilities of GoJ. Given the US past experiences in dealing with countries of very limited means, it would have been easy to push DoD capabilities and operations on GoJ when they were not either required or more importantly welcomed. Japan is a thriving economic, political and military power in its own right. To overreach its bounds, the US may have caused Japanese leaders to “lose face.” A common critique among American servicemen was their belief that they could have done more had they been given the chance or had the Japanese requested additional support.^{26 27} This approach provides a very slippery slope. If perceived to be disrespected, Japanese leaders may not have accepted future relief. Further, unwanted advances could have very easily fractured or at least impaired long-term relationships between the two countries. In the end, the BACC process ensured this delicate balance between respecting GoJ leaders and helping the people of Japan was maintained.

²⁶ Capone, Eugene, Lt Col, 459 AS/CC, personal interview with Dr. John Treiber, transcribed by Dr. John Treiber, April 20, 2011

²⁷ Tritten, Travis J., “Marines help clear out Sendai Airport after tsunami,” *Stars and Stripes*, <http://www.stripes.com/marines-help-clear-out-sendai-airport-after-tsunami-1.138774>

The use of bilateral coordination centers, once established, brought about great success to the joint operation. The established guidelines for Japan-US defense cooperation did not mandate the establishment of these centers. The centers also provided a framework for discussion of technical issues related to nuclear response operations and allowed US forces to observe and learn from the many strengths the Japanese SDF brought to the table. One example was the use of town hall meetings to communicate with citizens in needs.

Evolution of Social Media and its value during Crisis Response Operations. The use of internet-based Social Media sites such as Facebook and Twitter redefined response operations. This quick and easy form of communication allowed US citizens to communicate back home with families expediently. This provided peace of mind to members and reduced the normal overhead required to facilitate communications back home. The development of similar sites by US forces provided quick and easy means of communicating with both those in and out of country.²⁸

Learning from Experience to Implement Changes in the Future

While identifying things that worked well often results only from more critical reflection and analysis, identifying problems or areas for improvement is typically much more obvious. Based on interviews and discussions with participants from Operation TOMODACHI, there were multiple common and recurring themes. These areas should be adapted to better posture forces for future response operations.

Bilateral Coordination – The Bad. The establishment of the bilateral coordination centers, although eventually effective, was not part of an existing Defense Cooperation plan. The improvised nature of the structure should eventually be addressed through a formulated coordination mechanism and the use of future bilateral coordination centers should be discussed. Further, a more definitive process for roles and responsibilities and information sharing should be clarified. The time needed to

²⁸ Andrade, Hector, CMSgt, PACAF EM FAM, "Operation TOMODACHI: US Air Force Emergency Management Lessons Learned," (powerpoint presentation, undated)

clarify ad hoc capabilities between SDF and US forces should be addressed through more specific guidelines. Additionally, the concept of Joint operations to support HADR operations, based on a nuclear contingency, should be developed not only for Japan but abroad. The GoJ itself has detailed through multiple mediums that it had not considered and factored US capabilities into potential response operations. On June 21, 2011 both DoS and DoD Secretaries Clinton and Gates signed a security consultative document along with Japanese Ministers of Foreign Affairs and Defense. Although the document, titled *Cooperation in response to the Great East Japan Earthquake*, expressed the need for future bilateral coordination, it did not provide sufficient detail to ensure future effectiveness.^{29 30}

Command Structure Confusion. The establishment and swift implementation of the JTF-519 construct proved to be an effective command and control strategy. USFJ did not have sufficient manpower to handle response activities. With many other operations occurring in unison, including ODYSSEY DAWN, NEW DAWN (formerly IRAQI FREEDOM) and ENDURING FREEDOM, the establishment of JTFs specifically focused on TOMODACHI operations was an imperative. Eventually, however, the often overlapping roles and responsibilities between augmenting and pre-established personnel at USFJ Headquarters made operations challenging. For example, messages identified specific responsibility sets for certain positions that ran counter to normal operations and what took place in reality. Further, there were multiple briefings and updates taking place that often overlapped and were unnecessarily redundant. Examples include Bilateral Update Brief between US Forces and GoJ, PACOM Update Briefs between JTF-519 and PACOM, Component Commander briefings to JTF-519 and JFACC briefings between staffs. To further compound this confusion separate internet based processes and tools were used to up-channel information. Examples include All Partners Access Network,

²⁹ Japan Ministry of Defense (closes translation available), *The Lessons from the Operations for Great East Japan Earthquake (Interim Report)*, <http://www.mod.jp/j/approach/defense/saigai/pdf/K-chukan.pdf>, August 2011

³⁰ Japan Ministry of Defense (translated), *Security Consultative Committee Document Cooperation in Response to the Great East Japan Earthquake*, June 21, 2011

Harmonieweb, Sharepoint, separate chat capabilities and Defense Connect Online. These limitations should be addressed both internally and through a bilateral coordination process in the future.³¹

Radiological Guidance and Preparation. Over the last 15-20 years, US forces have made strides in preparing for both chemical and biological attacks based on the prevailing threats. While many on the policies and standards on dealing with radiological contamination were still in place from the cold war, US forces had not practiced and were not prepared to employ them at a tactical level. The lack of a credible threat had led to diminished preparation in the arena of radiological contamination and response. Although radiological guidance is available, the data has been developed and provided by many separate organizations. The guidance often contradicts other guidance which leads to confusion and uncertainty. Currently, separate standards exist for the Environmental Protection Agency, Defense Threat Reduction Agency, Department of Energy, Nuclear Regulatory Commission, World Health Organization and Department of Defense – in fact many standards exist internal to DoD. During response operations, flightcrews received just-in-time guidance on the use of detection equipment, KI pills, decontamination processes and what constituted acceptable levels of exposure and contamination. As one individual stated, it was critical to know and convey exactly, “How clean is clean?”³² Eventually, JTF-519 developed and provided a standardized matrix containing radiation threshold limits or cleanliness standards for relief operations. Even with the matrix initially being somewhat confusing and difficult to read for the forces on the ground, its development represented a major improvement for forces operating in a radiological environment. These same efforts should be reviewed and proactively accomplished for operating in chemical and biological environments as well.³³

The initial lack of an initial common body of knowledge for operating in a radiological environment, at a tactical level in the field, impacted operations. Specifically, the areas of detection,

³¹ Older, David, 5 AF/A4P, Japan Host Nation Support Programmer, personal email, November 6, 2011

³² Andrade, Hector, CMSgt, PACAF EM FAM, “Operation TOMODACHI: US Air Force Emergency Management Lessons Learned,” (powerpoint presentation, undated)

³³ Bruley, Robert, AMC/A300, personal email, December 15, 2011

health protection, decontamination for both ground and aircrews was disjointed and not particularly effective. Insufficient detection and protective equipment, early in the operation, drove unnecessary strain on US response operations. For example, the number of dosimeters and KI was initially very limited as were protective suits and masks. Further, some organizations assigned to enter Japan to augment TOMODACHI operations often did not bring protective equipment of their own. Air Mobility Command (AMC) served as an exception. AMC was responsible for much of the inter-theater transport operations both into and out of Japan during the crisis. The Command made a conscious effort to send protective gear with personnel travelling into country. They also provided dosimeters in case they encountered any significant readings. If assigned to fly a mission into a contaminated area, they would receive all necessary equipment and just-in-time training before their mission. Ultimately, Operation TOMODACHI served as a major wakeup call to US forces – which had not extensively practiced or prepared for this type of contingency. US military leaders should use the experiences from TOMODACHI to both prepare for similar contingencies (both in Japan and abroad) and to identify and assume risk where warranted.³⁴

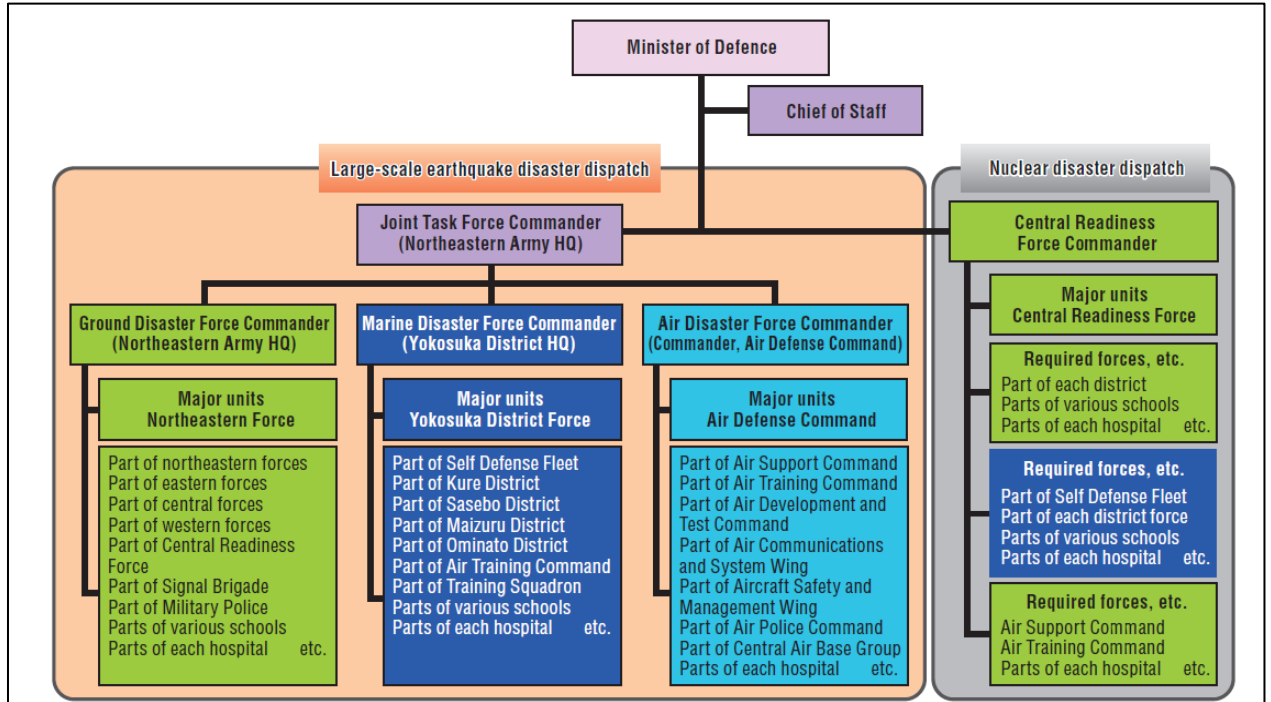
The Legacy

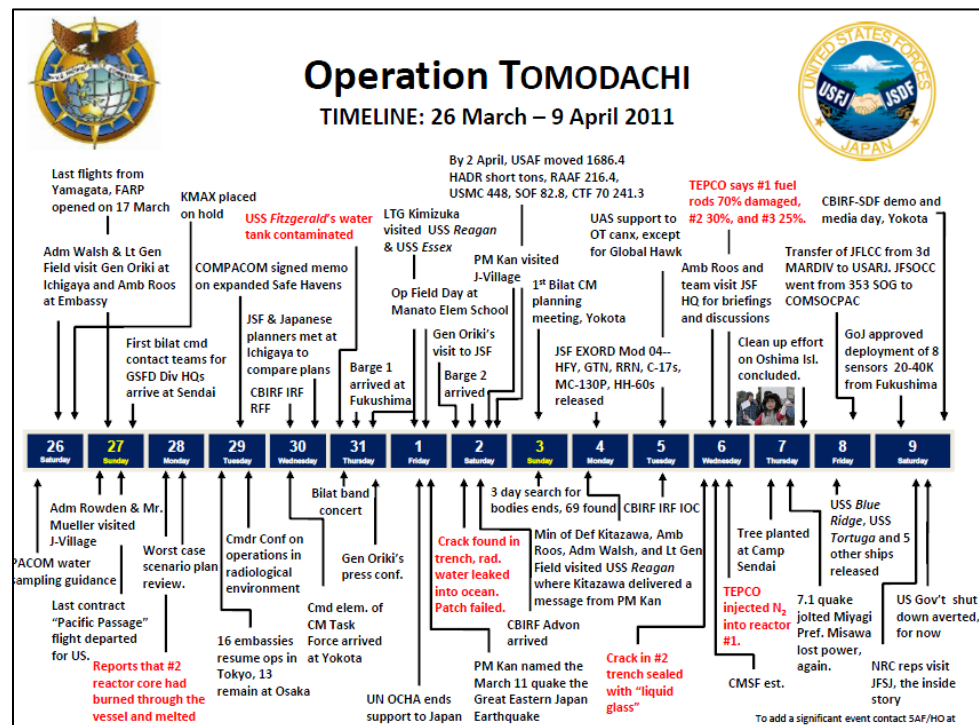
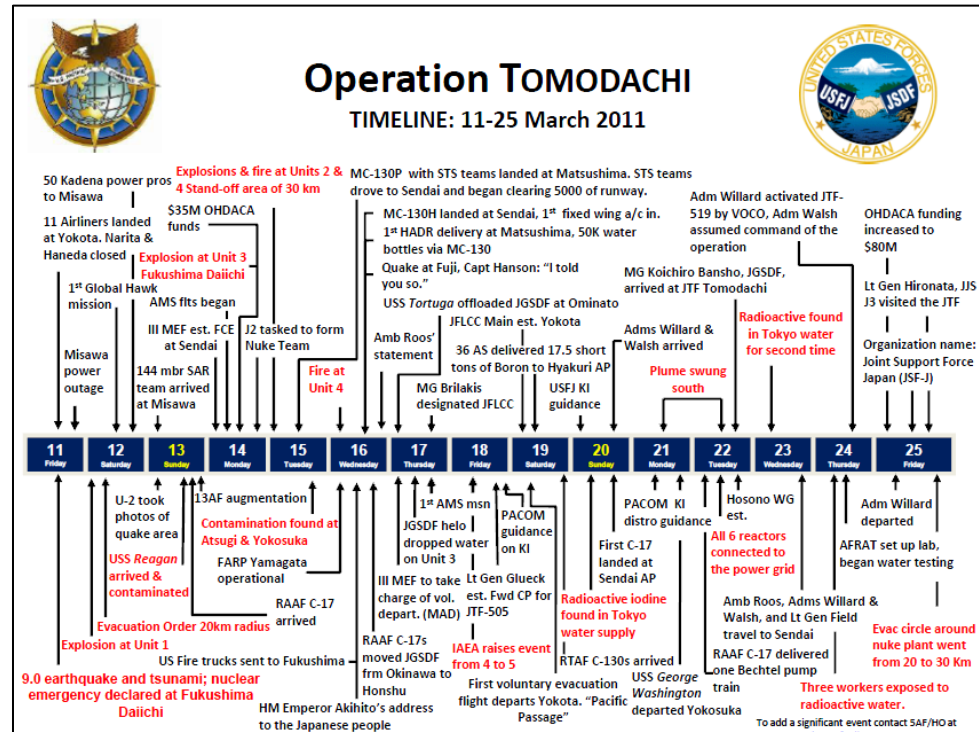
The events of March 11 will forever be remembered for the tragic loss of life, property and for the debilitating impacts to the morale of the people of Japan. The effects of the tsunami on the Fukushima-Daiichi reactors nearly led to a catastrophic nuclear meltdown similar to the likes of Chernobyl or Three-mile Island. The heroic events of the men and women of the SDF and US armed forces should be analyzed and modeled for the inevitability of future incidents. Likewise, the Office of the Secretary of Defense and the Armed Services, during this time of projected budget cuts, must advertise the success of operations like TOMODACHI and articulate the peacetime implications of further budget reductions in the context of crisis response capability. In protecting budget lines, the Armed Forces must

³⁴ Preen, Phillip, Lt Col, AMC/SGPB, Command Bioenvironmental Engineer, personal email, November 7, 2011

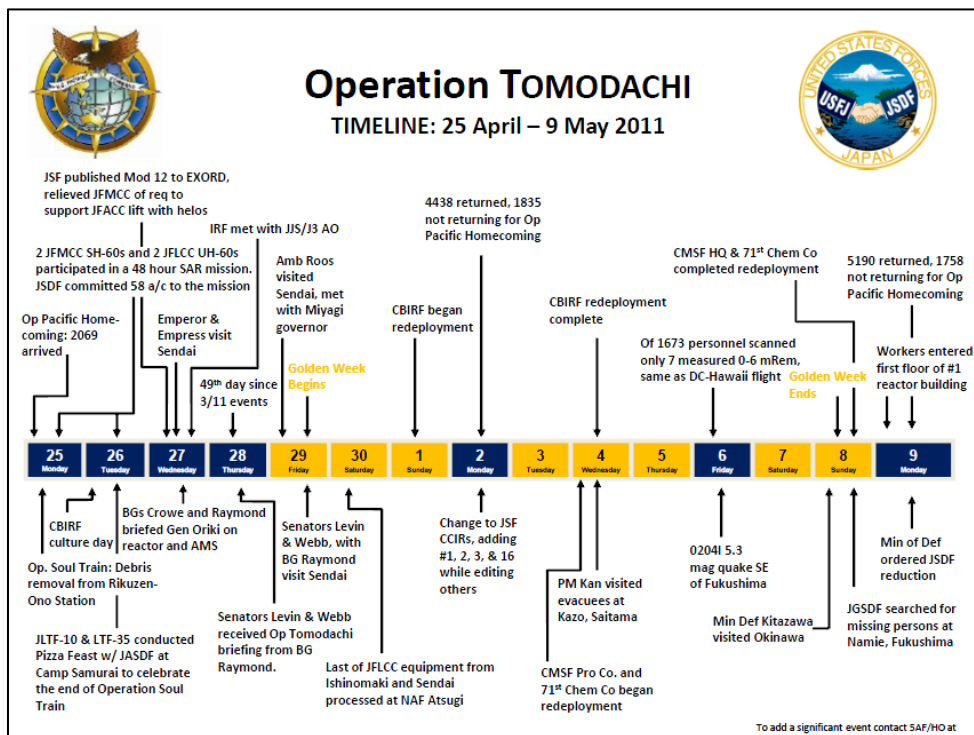
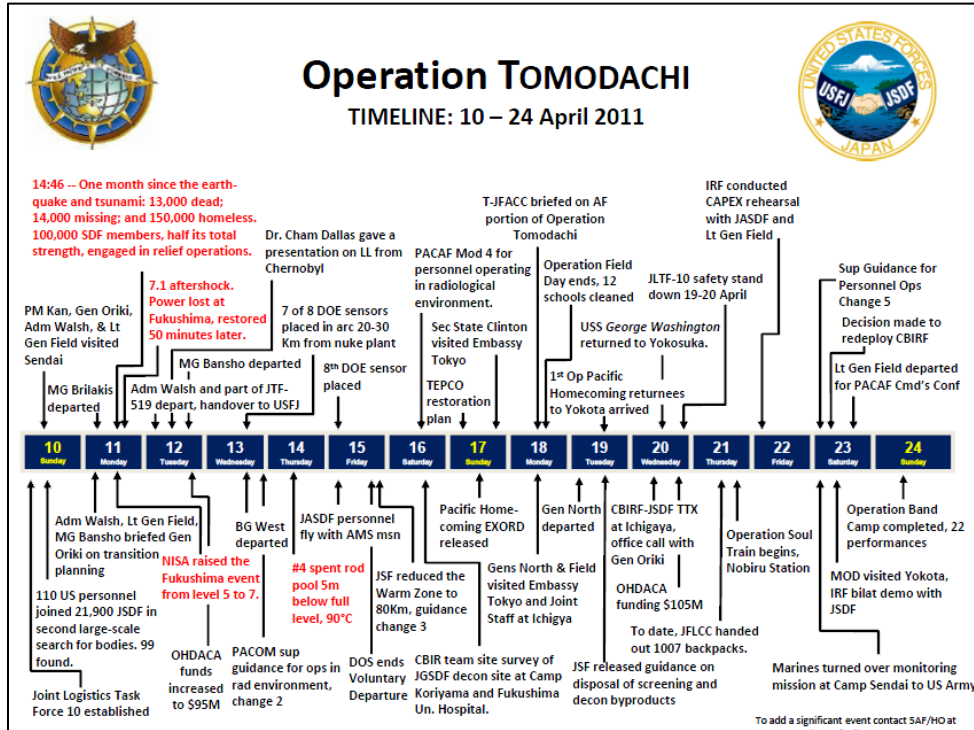
use more than traditional wartime capability requirements to advocate funding lines. Building a public narrative to describe the impacts of funding cuts to crisis response would help to re-frame the argument which is now solely centered on recent operations in Iraq and Afghanistan. Much like any political argument, the retention of military capability should appeal to the public's emotions rather than a quantitative or rational appeal. Magnifying the efforts of TOMODACHI would do just that. To think of the US, given its very special role in this world, without the capability to respond during a time of crisis, would not sit well with the public and therefore the members of our Congress (regardless of ideology). In the end, Operation TOMODACHI is a bright and glowing example of the ability of US agencies collectively, and specifically our armed forces, to do so much more than wage war.

Appendix 1: Japanese SDF JTF Organizational Structure

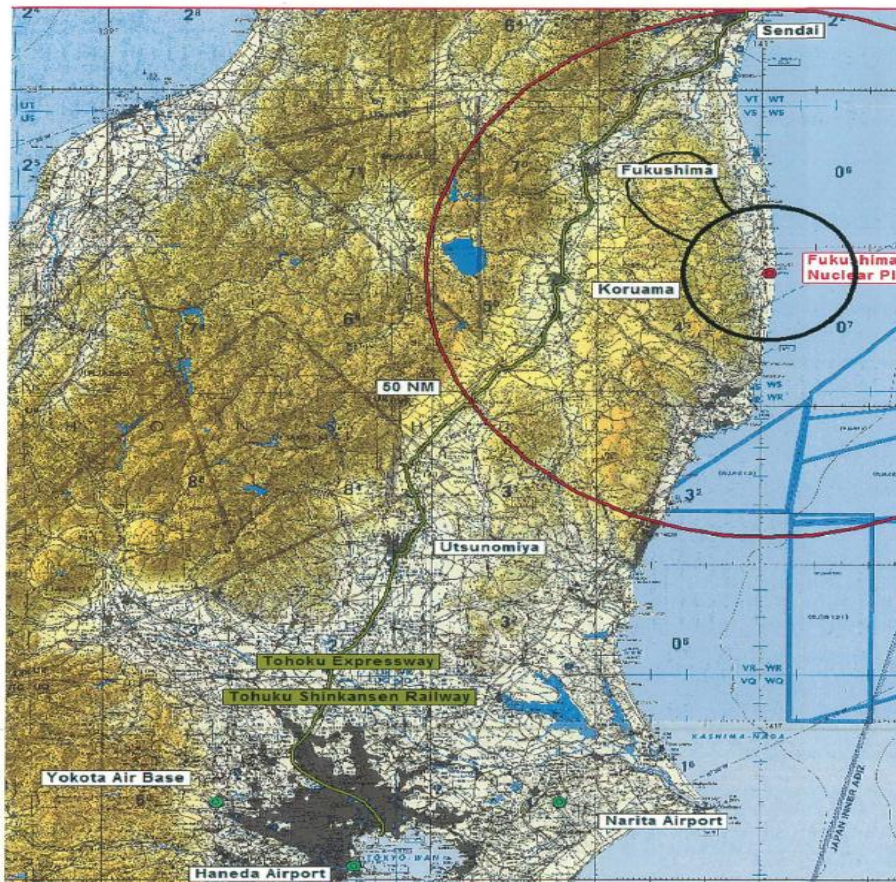
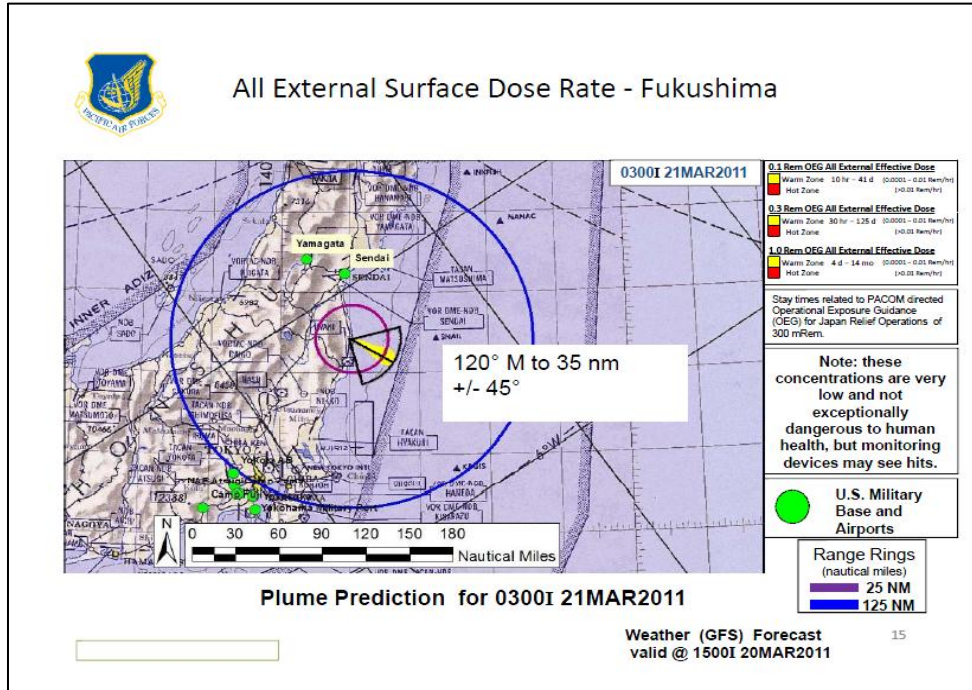




Appendix 2: Operation TOMODACHI Timeline – page 2



Appendix 3: Fukushima Nuclear Contamination Standoff Requirements



UNCLASSIFIED

Tomodachi Hub and Spoke

Legend:

- Yellow Circle: JFLCC – USMC, III MEF
- Blue Circle: JFMCC – USN, 7th Fleet
- Light Blue Circle: JFACC – USAF, 5th/ 13th Air Force
- Orange Circle: JSDF

Phases of Support:

- Phase I: Emergency Response**
 - Immediate Lifesaving
 - SAR
- Phase II: Relief**
 - Mitigate Suffering
 - Meet Basic Needs
- Phase III: Restoration**
 - Restore to Pre-Earthquake Conditions

Map Labels:

- Kadema
- Futenma
- Sasebo
- Iwakuni
- Atsugi
- Yokosuka
- Yokota
- Yamagata
- Misawa
- Hachinohe
- Cp Sendai NE Army
- RRNSG/ ESX ARG
- 50 NM Buffer
- CONUS support as required

Asset Types:

- Fixed Wing
- CLF
- Rotary Wing
- FW/Helo/Gnd
- Primary JFACC
- Prim JFMCC