



12-08

Initial Impressions Report

February 2012

Operation Tomodachi

(Consequence Management Support Force)



Yokota Air Base, Japan

7 April - 5 May 2011

Observations, Insights, and Lessons

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Foreword

The events of 11 March 2011 in Japan are grave reminders to our nation and our disaster response agencies in the civilian and military sectors of what could happen as a result of natural disasters. The past year has brought about more disasters globally than many of us have seen in recent history. Our military is training and preparing to support a chemical, biological, radiological, and nuclear (CBRN) consequence management (CM) mission — not in the mindset of *if* it happens but *when* it happens.

The U.S. Army, Pacific Command Chemical, Biological, Radiological, Nuclear, and High Yield Explosives Division provided unity of effort during Operation Tomodachi to ensure all means were directed to a common purpose. Ultimately, the relief effort in Japan created a relationship between states, joint Department of Defense (DOD) services, and agencies at the various levels that participated in the effort. Operation Tomodachi set an example for interagency and international cooperation. It opened dialogue for U.S. agencies and DOD services to prepare, plan, and train for similar disasters that could occur in the United States and in U.S. territories. The Soldiers of the 71st Chemical Company exemplified the way the U.S. Army is preparing to answer the call to support CBRN CM missions, domestic and foreign. The 71st Chemical Company significantly supplemented the efforts of the Misawa and Yokota Air Bases by providing decontamination, monitoring, and survey assistance.

VANCE P. VISSER
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Executive Summary

The U.S. Army, Pacific Command Chemical, Biological, Radiological, Nuclear, and High Yield Explosives Division and the 71st Chemical Company recently redeployed from Japan in support of Operation Tomodachi. Their efforts provide the center of gravity for this collection effort. This document will strive to highlight and capture some best practices and issues requiring further study by the U.S. Army Chemical, Biological, Radiological, and Nuclear School and other units deploying to similar operations.

The 71st Chemical Company, out of Schofield Barracks, HI, deployed two platoons to work jointly with the Airmen at Misawa and Yokota Air Bases, Japan. Their mission was to conduct radiological surveys and decontamination missions for contaminated aircraft, vehicles, and personnel entering the bases, which had been near areas suspected of having higher than normal radiation readings — namely, the 125-nautical mile radius around the Fukushima nuclear facility. Misawa Air Base is north of the reactor site and the surrounding area mostly undamaged by the tsunami and the massive earthquake. Areas south of Misawa were not as fortunate as the areas in the north.

| | Personnel Monitored | Vehicles Monitored | Aircraft Monitored | Total |
|--|----------------------------|---------------------------|---------------------------|--------------|
| Second Decontamination Platoon | 30 | 5827 | 3 | 5860 |
| Third Decontamination Platoon (ARC)* | 13 | 200 | 232 | 445 |
| Total | 43 | 6027 | 235 | 6305 |
| * ARC: Active response CBRN (chemical, biological, radiological, and nuclear); equivalent to dismantled reconnaissance platoon and hazardous response platoon | | | | |

Table 1-1

Soldiers of the 71st Chemical Company monitored vehicles, aircraft, and personnel for radiation contamination levels with Air Force-issued CBRN monitoring equipment (such as the GR-135 IdentiFINDER shown at Figure 1-1 and the ADM-300 shown at Figure 1-2) to permit monitoring in counts per minutes.



Figure 1-1



Figure 1-2

Collection Methodology

The Maneuver Support Center of Excellence (MSCoE) lessons learned team led a collection effort sponsored by the U.S. Army, Pacific Command (USARPAC) Chemical, Biological, Radiological, Nuclear, and High Yield Explosives (CBRNE) Division and the commander of the 71st Chemical Company from 29 August–1 September 2011 at Fort Shafter and Schofield Barracks, HI. The lessons learned team of 10 subject matter experts from all the DOTMLPF (doctrine, organization, training, materiel, leadership and education, personnel, and facilities) domains participated in the four-day event, in which the USARPAC CBRNE Division and the 71st Chemical Company presented their post-deployment after action reviews (AARs), key leader insights, issues, and best practices.

The lessons learned team conducted key leader interviews and focus groups to include:

- USARPAC CBRNE Division.
- 71st Chemical Company commander, executive officer, and two platoons.

The 71st Chemical Company briefed its company AAR and provided the MSCoE lessons learned team with a copy.

Excerpt from Army Regulation 11–33, *Army Lessons Learned Program (ALLP),* Chapter 4, Lessons Learned Process

The lessons learned process (LLP) is a deliberate and systematic process for collecting and analyzing field data and disseminating, integrating, and archiving observations, insights, and lessons collected from Army operations and training events. Information gathering will be integrated into DOTMLPF (doctrine, organization, training, materiel, leadership and education, personnel, and facilities); research (industry and academia); development; acquisition; and planning activities in order to sustain, enhance, and increase the Army's preparedness to conduct current and future operations. The process is solution-oriented. It is designed to support organizations at all levels of command and staff and can be adapted for use in all operations, to include combat, training, maintenance, installation support, experiments, and equipment fielding. Observations, insights, and lessons do not constitute lessons learned without changing individual, unit, or Army behavior, which is accomplished through the application of the LLP.



Figure 1-3. Members of the U.S. Army, Pacific Command Chemical, Biological, Radiological, Nuclear, and High Yield Explosives Division; 71st Chemical Company; and joint members of the consequence management support force



Figure 1-4. A flooded street in Japan after the earthquake and tsunami in March 2011

Initial Impressions

Doctrine

CM-2011-03-07-01-D-01: Decontamination operations in the consequence management/foreign consequence management (CM/FCM) environment.

Observation Description/Issue: Traditional decontamination operations in doctrine are aimed at the tactical radiological decontamination and not CM/FCM environments. Environmental considerations and the disposal of radiologically contaminated water necessitated alternate techniques of decontamination in CM/FCM environments.

Discussion: The following doctrine issues were identified after conducting numerous nontraditional decontamination missions:

- Doctrine does not address how to decontaminate radiologically contaminated vehicles and aircraft in hard-to-reach areas (e.g., radiators, grills, and vents).
- One platoon used duct tape and paper towels to decontaminate vehicles and aircraft. Another platoon used hot water and paper towels to decontaminate vehicles and aircraft in a different location. Environmental considerations were taken for radiologically contaminated water disposal and drove alternate techniques of decontamination. The tactics, techniques, and procedures (TTP) for the Air Force drove the decision to use duct tape and baby wipes to conduct spot decontamination on vehicles and aircraft.
- The TTP for decontamination, as well as the level of personal protective equipment (PPE), was based upon an effort not to alarm the civilian population. Another example of an attempt to not alarm local civilians occurred on the airfield where Soldiers were monitoring aircraft for radiation exposure. On one occasion, a pilot asked, “If we’re supposedly contaminated with radiation, why are you guys out here with just a pair of latex gloves?” One of the Airmen working with the Soldiers replied, “You guys have civilians on the aircraft with you also, and we don’t want to alarm the civilians.”

Insights and Lessons Learned:

- Decontamination of aircraft and personnel without alarming the general population created new challenges during Operation Tomodachi.

- A true decontamination operations standard for “clearance” was not set. This could have resulted in the potential spread of radiological contamination to military personnel and the local populace.
- The use of duct tape and baby wipes was effective in the removal of radioactive particles.

Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities (DOTMLPF) Implications. Doctrine: Need to establish a true standard for “clearance” for Soldiers when operating in a CM/FCM environment. (Joint Publication [JP] 3-11, *Operations in Chemical, Biological, Radiological, and Nuclear [CBRN] Environments*; Field Manual [FM] 3-11, *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Defense Operations*; FM 3-11.4, *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical [NBC] Protection*; FM 3-11.5, *Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination*; and FM 3-11.21, *Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Consequence Management Operations*)

CM-2011-03-07-01-D-02: Joint service/unit interoperability.

Observation Description/Issue: Joint service/unit interoperability while conducting CBRN operations in a radiologically contaminated environment.

Discussion: Current CBRN doctrine does not adequately cover actual joint unit CBRN operations conducted in radiologically contaminated environments.

- There was a lack of a collective body of knowledge and expertise on responding to a radiological incident, specifically in relation to nuclear power plants.
- Guidance provided by multiple agencies was often contradictory and created confusion for personnel in the field.
- There was also a lack of clarity in the technical language unique to each service. The confusion was further compounded by the vast differences in protocol and terminology used by the multiple response agencies.
- Each service had a different unit of measure for recording the amount of radiation and different equipment to use for radiological detection and monitoring (rem/hour [hr], centigray/hr, or milirem/hr).
- The Air Force used the ADM-300 to monitor radiation, which was equipped with a beta probe that monitored in counts per minute. Army

and Marine personnel were frustrated to learn that the AN/PDR-77 does not come readily equipped with the same probe. The AN/PDR-77 lacked the required beta or pancake probes, which would have allowed the specified standard measurement (counts per minute).



Figure 1-5. Vehicle assessment

Insights and Lessons Learned:

- A joint protection cell should be quickly established to identify each agency's capabilities and determine measurements and terminology for use during the operation.
- Capitalize on joint training opportunities with sister services that focus on comparable equipment and clarifying technical language unique to each branch.

DOTMPLF Implications. Doctrine: JP 3-11, FM 3-11, FM 3-11.4, FM 3-11.5, and FM 3-11.21.

CM-2011-03-07-01-D-03: Radiological decontamination standards not in accordance with CBRN decontamination doctrine.

Observation Description/Issue: Doctrine addresses acceptable contamination levels during wartime operations for U.S. military and civilians but does not address any standards for acceptable contamination levels during CM/FCM operations. Doctrine and guidance given was vague and at times conflicting.

Discussion: The command did not utilize current doctrine nor did it fully understand current doctrine in regard to the doctrinal measurement

of “clean,” which created an unknown or nonuniversal standard. The “new” definition of clean was far below the threat level. If the doctrine and standards available are not followed, injury to personnel and loss of equipment can diminish overall mission effectiveness. The message distributed by Joint Support Forces Japan reference guidance for screening and decontamination of personnel and equipment operating in support of Operation Tomodachi refers to:

- 7B. Conduct simple decontamination (i.e., flushing with water, wiping, dabbing with tape) in accordance with service guidance. If contamination is on the clothing, remove contaminated clothing. Removal of the outer layer of clothing will typically remove greater than 90 percent of contamination. Following this decontamination effort, resurvey using a Radiac listed in para 5.A; if less than 100 counts per minute above background radiation levels as measured with a Radiac, personnel are released from control requirements.
- 7C. Conduct full decontamination (i.e., washing or scrubbing with soap followed by flushing and wiping) in accordance with service guidance until personnel are resurveyed at less than 100 counts per minute above background radiation levels as measured with a Radiac listed in para 5.A. Personnel are then released from control requirements.

Insights and Lessons Learned: If the standards are not available, demand standards from higher headquarters. Points for commanders to consider are:

- What are the standards for the level of decontamination required (immediate, operational, thorough, technical, emergency, or clearance)?
- When to decontaminate personnel?
- What levels of decontamination are required for personnel and equipment?
- How are exposed/contaminated personnel transported?
- When is “clearance decontamination” to allow unrestricted transportation used?

DOTMPLE Implications. Doctrine: There is a lack of clear guidance, no single set standard as to the level of decontamination to be conducted, and no defined policy on clearance decontamination in CM/FCM environments. (FM 3-11.4 and FM 3-11.5)



Figure 1-6. While in Misawa and Yokota Air Bases, Soldiers of the 71st Chemical Company received hands-on training (left) on the use of Air Force CBRN monitoring equipment (such as the ADM-300 shown here) before going out to do actual personnel monitoring of drivers entering the bases (right).



Figure 1-7. If radiological levels are remonitored and unable to be brought under published threshold levels, the aircraft, vehicle, or equipment will be transported to the hot cargo pad (above) for isotope identification, further radiological analysis, and gross decontamination.

Organization

CM-2011-03-07-01-O-01: Limited radiological resources to CBRN companies for CM.

Observation Description/Issue: The modified table of organization and equipment (MTOE) does not reflect mission requirements. The unit is not organized to perform CM responsibilities.

Discussion:

The TOE mission statement for the combat support (CS) CBRN companies states: “To provide chemical, radiological, and nuclear reconnaissance and surveillance and decontamination.” As a CS CBRN company, the 71st Chemical Company is organized and equipped to perform the CBRN reconnaissance and decontamination missions.

The current company mission is: “71st Chemical Company conducts reconnaissance, surveying/monitoring, and decontamination operations in order to reconstitute forces and mitigate chemical, biological, radiological, and nuclear (CBRN) threats and hazards. 71st Chemical Company stands ready to deploy globally to engage in consequence management operations to ensure the safety of soldiers and civilians.”

The deployment mission of the 71st Chemical Company was to: “Conduct survey and decontamination missions for contaminated aircraft, vehicles, and personnel in support of Operation Tomodachi USAR-J (U.S. Army, Japan) humanitarian assistance/disaster relief efforts.”

To facilitate the CM mission, the 71st Chemical Company was issued approximately \$30,000 worth of equipment (nonpermeable suits and respirators with beta filters) prior to departing for Japan. These items were purchased by U.S. Army, Pacific Command (USARPAC) from an emergency response warehouse in Hawaii and were necessary because the company did not possess equipment that would allow continuous operations in the anticipated environment. The unit lacked the required beta or pancake probes for the AN/PDR-77, which would have allowed the specified standard measurement (counts per minute). To mitigate the capability shortfall, Soldiers utilized the ADM-300 multifunction survey instrument and the IdentifINDER for detection and identification. Training on these tools was provided by Air Force emergency management personnel.

The 71st Chemical Company is equipped with the M26 Joint Service Transportable Decontamination System (JSTDS). Initial mission set did not require the use of the M-26. The unit did not deploy with its assigned M26s. Contingency operations required availability of the M26s; therefore, equipment followed on a later flight. The unit also identified the need

to have a medic assigned due to the potential of Soldiers being exposed to radiological hazards. In response, a medic from another organization was put in operational control of the 71st Chemical Company for the deployment.

Insights and Lessons Learned:

- The potential to operate in a radiologically contaminated environment exists (domestic and FCM missions).
- Organizations performing a nonstandard mission require a means to rapidly acquire specialized equipment if the unit is not authorized and assigned the equipment.
- Take all assigned equipment when deploying to an area impacted by a natural or man-made disaster.
- Standardized equipment across all services will minimize the need for on-site training and increase interoperability between components.
- A CS CBRN company is currently equipment organized with a headquarters platoon, a mounted reconnaissance platoon, and three light decontamination platoons. Its primary mission is to perform passive defense equipment decontamination and mounted reconnaissance. CS CBRN companies are not equipped with the proper PPE to safely operate in CBRN CM environments.
- Units will bring all organic equipment to conduct any mission within its capabilities. Keeping an open mind allows the Soldiers to be more flexible to changes.
- Environmental considerations of the host nation will affect how a unit will conduct decontamination operations. The waste from the runoff water was a consideration for the unit, which affected the decision for not using the M26.
- Currently, CBRN units do not have organic medics. Having an assigned medic would be valuable for decontamination operations.

DOTMLPF Implications. Organization: MTOE authorizes limited radiological equipment to CBRN companies despite the potential for these units to deploy in support of a domestic or FCM mission set. Units should pursue and update their MTOEs to authorize equipment that allows alignment with their missions. Items such as pancake probes, nonpermeable suits, and respirators should be considered for acquisition.



Figure 1-8. GR-135 IdentifINDER. The IdentifINDER is automatically in the search and data mode. It displays simultaneously. Should high levels of radiation be detected, the unit gives an eyes-free audio alert to the operator to the location of the source. If radiation levels are high, the unit tells the operator to back off.



Figure 1-9. The ADM-300, an all-in-one multifunctional detection system for rapid response to suspected radiation hazards. ADM-300s are rugged, reliable, and designed for use in harsh environments. The ADM-300 will detect, measure, and digitally display both dose and dose rate levels of radiation from 10 $\mu\text{R/hr}$ to 10,000 R/hr and beta audio alert and aids in directing radiation from 10 $\mu\text{R/hr}$ to 5 R/hr (0.1 $\mu\text{Sv/hr}$ to 0.05 Sv/hr).

CM-2011-03-07-01-O-02: Radioactive contamination screening levels changed frequently.

Observation Description/Issue: Acceptable levels of contamination for ground vehicles and personnel changed frequently.

Discussion: Acceptable levels of radioactive contamination changed frequently. Initially, anything twice the background reading had to be reported to higher (the wing commander). The wing commander had a health physicist on his staff.

- Initially, twice the background reading was used by Air Mobility Command (AMC) for aircraft until it established what radioisotopes were present and more definitive guidance could be adopted.
- After sufficient data was collected and supplied by the Department of Energy, the Federal Aviation Administration (FAA) issued more definitive guidance on aircraft contamination screening levels.
- Contamination screening levels for ground vehicles varied initially depending on type of contamination, radioisotope, and vehicle mission. Each service and agency had its own guidance.
- Contamination screening levels for ground vehicles and personnel were eventually set by a policy message from Joint Support Force Headquarters based on guidance found in the Multi-Agency Radiation Survey and Assessment of Materials and Equipment Manual.

Insights and Lessons Learned:

- Units need established standing operating procedures (SOPs) on the ground for contamination screening.
- Units should make initial contact with the health physicist(s) prior to deployment and maintain contact up to the point of redeployment.
- Units need to be flexible in this type of scenario, as contamination screening levels will vary depending on a number of factors: emergency action levels, routine operations, retrograde operations, governing authority (host nation, FAA, Environmental Protection Agency [EPA], public health, etc.), and changing mission parameters.
- Local commanders/directors may use contamination standards more restrictive than those in Table 5-2 of Department of the Army (DA) Pamphlet (PAM) 385-24, *The Army Radiation Safety Program*, but will not use standards less restrictive without applying CRM principles for deviations listed in DA PAM 385-24, paragraph 1-10.

DOTMLPF Implications. Organization: DA PAM 385-24, paragraph 5-2 and Table 5-2. CBRN units do not have the expertise to provide guidance on appropriate contamination screening levels for this type of operation. Units should know where to seek the appropriate guidance (e.g., Army Public Health Command, health physicists). Unit personnel should have an understanding of contamination monitoring and the basic equipment to

conduct contamination monitoring. Laws, regulations, international treaties, and other agreements developed by host nations, third party nations, and U.S. states and territories will define the levels used during a specific mission.

CM-2011-03-07-01-O/T/M-03: USARPAC chemical, biological, radiological, nuclear, and high yield explosives (CBRNE) units were already training for CM missions.

Observation Description/Issue: USARPAC CBRNE units deliberately applied a pre-existing CM capability to the homeland, which was later deployed to meet the FCM mission requirements.

Discussion: The USARPAC CBRNE staff and the 71st Chemical Company were able to support a host nation and respond effectively to a CBRNE incident or disaster. Joint training was conducted with the civil support team (CST) and civilian disaster agencies. Additionally, an active response CBRN (ARC) platoon was established, which consisted of Soldiers trained in functional courses such as the Civil Support Skills Course (CSSC) and the Dismounted Reconnaissance Course.

Insights and Lessons Learned:

- Sustain initiatives for joint CM training, and seek additional functional training from the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS) or mobile training teams (MTTs).
- CBRN units will be directed to support CM/FCM missions, domestic and foreign. CBRN units must be prepared to adapt to not only operational missions, but Defense Support to Civil Authorities (DSCA) and joint task force missions with sister services as well.
- A single-source link for technical reachback on websites such as the CBRN Warfighting Function, CBRN Knowledge Network, and Army Lessons Learned Information System needs to be incorporated into all CM training, TTP, and unit SOPs. The single-source link should mirror Table A-1 (page A-28) of FM 3-11.21.
- Operation Tomodachi validated the training requirements. Units were already conducting training to prepare for CM missions to sustain their homeland response requirements locally and regionally.
- Sustain the concept that allows the 71st Chemical Company to perform National Fire Protection Association (NFPA) 472 Hazardous Materials Technician-level training mission sets outside of its operational/tactical requirements. This concept is generally adopted and fielded in other Army commands, but the USACBRNS has not fully endorsed it.

DOTMLPF Implications. Organization/Training/Materiel: FM 3-11.21. The USACBRNS should pursue an update to TOEs to authorize organizational structure and equipment that allow alignment with doctrine implications and future mission requirements.

Training

CM-2011-03-07-01-T-01: Training for operations in a radiologically contaminated environment.

Observation Description/Issue: Training received by Soldiers while at the USACBRNS was not adequate for the 71st Chemical Company to meet its radiological decontamination mission.

Discussion: Officers at the 71st Chemical Company who were recent graduates of USACBRNS courses expressed that training received in the Basic Officer Leader Course (BOLC) was adequate in preparing for the exceptions of operating in a radiological environment. Officers stated the basic radiation block of instruction was the most helpful, along with the student handout (Radiological Health Handbook) provided during the class. However, personnel who were not recent graduates of the USACBRNS initial military training (BOLC or advanced individual training) did not share the same sentiments. Graduates of the earlier courses believed the courses provided too much Cold War doctrine and only concentrated on the effects of nuclear attacks. Unit enlisted members who were graduates of the CSSC and the Dismounted Reconnaissance Course stated that the courses added confidence in their abilities.

Insights and Lessons Learned:

- Current USACBRNS courses provide adequate information required to operate safely in the environment. The functional courses offered by the USACBRNS provide hands-on training and the technical opportunities to build confidence in the Soldiers' abilities and in their equipment.
- Revise USACBRNS courses to prepare students to operate in both tactical and CM environments.
- Handouts and note-taking guides provided during training proved to be useful tools for recalling information. Recommend adding the material to knowledge network sites.

DOTMLPF Implications. Training: All CBRN unit members need to be trained to the NFPA 472 Hazardous Materials Technician level to be better prepared for CM/FCM missions.

CM-2011-03-07-02-T-01(M): Radiation equipment training.

Observation Description/Issue: The MTOE-authorized Radiac equipment for the 71st Chemical Company was not adequate to meet mission requirements for Operation Tomodachi.

Discussion: The unit's MTOE equipment did not meet mission requirements, which required the unit to use commercial off-the-shelf (COTS) equipment previously issued to the ARC platoon by the USARPAC CBRNE Division. The unit also used equipment provided by the Air Force to meet mission requirements for Misawa and Yokota Air Bases in Japan.

- 71st Chemical Company personnel in Yokota received a two-hour briefing on the equipment and immediately served as an augmentation force to the Air Force. 71st Chemical Company personnel in Misawa received two days of training, with TTP on the mission plus a right-seat ride, prior to taking on the survey and decontamination missions.
- At both Misawa and Yokota Air Bases, the cross training received from the Air Force was adequate to perform the mission.
- Soldiers reported that the ADM-300 gave false readings if the equipment received shock from bumping into vehicles or other objects while in use. The probe of the ADM-300 was sensitive to snow and rain, which caused false readings and created the need for additional probes to stay dry to perform the mission. Soldiers reported the same concerns with the use of the IdentifINDER, which also gave false readings and created the need for additional readings or surveys for verification.
- IdentifINDER would give readings of “unidentifiable isotopes” when other detection equipment gave readings of the same item (vehicle, aircraft, etc.) being “hot.”

Insights and Lessons Learned:

- Units should capitalize on joint service training opportunities to understand the capabilities and limitations of equipment used by all services. Joint service training can aid in identifying the best equipment to meet mission requirements.
- Soldiers from the conventional decontamination platoon were unfamiliar with equipment provided by other services and needed additional training to fully understand the equipment's capabilities and limitations.

- Equipment acquisition managers for the ADM-300 and IdentiFINDER need to be aware of the equipment shortcomings noted during the missions to either repair or create improved versions of the equipment. The equipment needs to be able to withstand normal day-to-day usage and be capable of operating properly in a variety of tactical and CM/FCM environments.
- To mitigate false readings due to snow or rain, the Soldiers had to detach the probe from the ADM-300 and replace it with another probe that was dry. The Soldiers would double-check and triple-check the readings using the detection equipment.

DOTMLPF Implications. Training and Materiel: Additional training at the unit is required for COTS equipment to fully understand the equipment capabilities and limitations.

CM-2011-03-07-02-T-02: Unmanned robotics training.

Observation Description/Issue: The 71st Chemical Company received training on the CBRN unmanned ground vehicle (CUGV).

Discussion: CUGV training provided to the 71st Chemical Company proved to be very effective. The unit was provided “train-the-trainer” training in theater by a subject matter expert from the USACBRNS. Although the unit never used the CUGV during missions, the unit was able to produce a “train-the-trainer” instructional video that was translated into Japanese. The USARPAC CBRNE Division equipped the 71st Chemical Company with two CUGVs to assist the Japanese government.

Insights and Lessons Learned: Formal institutional training for the CUGV is required if approved for program of record. Continue “train-the-trainer” training if the CUGV is provided for use in theater.

DOTMLPF Implications. Training: Continue research and development of the CUGV, and provide familiarization training if approved for program of record.

CM-2011-03-07-01-T-02: Training readiness.

Observation Description/Issue: Operations in a radiological environment are not often the focus of small-unit training in today’s operational environment.

Discussion: USARPAC and the 8th Military Police Brigade were already preparing to conduct exercises in the region in response to a tsunami prior to it becoming a real-world event. After the earthquake and tsunami occurred, the 71st Chemical Company was selected based on the unit’s capabilities to meet mission requirements.

The 71st Chemical Company was tasked to perform nonstandard missions. Soldiers at all levels suggested joint service and interagency training as paramount for success.

The 71st Chemical Company's TOE is not resourced to support CM missions. The equipment issued and training provided by the Air Force to the 71st Chemical Company was invaluable to mission success.

Insights and Lessons Learned:

- Organizational TOE should contain equipment required to accomplish both tactical and CM/FCM missions.
- Units at various levels should conduct training exercises and training events together to facilitate understanding of capabilities and limitations of organizations and organic equipment.
- Adjustments to the CS CBRN company mission-essential task list may be needed to drive training requirements for CM/FCM mission preparation.
- Continue to conduct regional joint training for CM/FCM missions.

DOTMLPF Implications. Training: Conduct more deliberate regional joint training for CM/FCM missions using the equipment required for the scenario(s). MTTs can be used to train CBRN units on COTS equipment when required.

CM-2011-03-07-02-T-03: Radiological monitoring and survey.

Observation Description/Issue: Training on radiological monitoring and measurement for clearance.

Discussion: Soldiers from the 71st Chemical Company were trained in basic radiation detection and measurement applicable to a tactical mission. The Air Force had to train the Soldiers in proper monitoring procedures before they could begin their mission.

Insights and Lessons Learned:

- If CBRN Soldiers are to be employed in support of radiological CM, it is critical that they be better trained in radiological monitoring.
- CBRN Soldiers need to understand the difference between dose/dose rate measurement and contamination measurement.
- Soldiers need to know which type of Radiac detector can be used for the different types of monitoring as well as the limitations of the equipment and how to operate it.

- Current tactical radiological training at the USACBRNS concentrates on doctrine that places priority on battlefield operations after use of a nuclear weapon. The USACBRNS needs to include training that addresses radiological operations in support of CM missions.

DOTMLPF Implications. Training: Conduct more deliberate unit and regional joint training for CM/FCM missions using the equipment required for the scenario(s) to make Soldiers knowledgeable about units of measurement. Provide MTTs from the USACBRNS to train Soldiers on government-furnished equipment (GFE) and COTS equipment when feasible. Incorporate distant-learning training and refer to the training support packages located at the CBRN Knowledge Network.



Figure 1-10. A 71st Chemical Company Soldier using the ADM-300 to detect and measure radiation

Materiel

CM-2011-03-07-02-M-01: Radiological monitoring equipment.

Observation Description/Issue: Organic CBRN radiological monitoring equipment for contamination measurement is not adequate for CM/FCM missions.

Discussion: The unit's authorized Radiac equipment included the AN/VDR-2, AN/UDR-13, and the DT-236 with AN/PDR-75 reader. Radiacs

in the unit's current MTOE were fielded to meet the requirements for radiological operations on a nuclear battlefield. The current MTOE does not list any radiation-monitoring equipment for low-level radiation measurements (counts per minute). The above instruments are for neutron and gamma radiation as opposed to alpha radiation.

The Air Force issued the unit the ADM-300 with the BP-100 pancake probe for contamination monitoring and trained the unit in its use. The Army does have a Radiac with the same capabilities — the AN/PDR-77 with the DT-695 pancake probe — but this DT-695 probe is not part of the unit's MTOE. The Air Force also issued the unit the GR-135 IdentifINDER for radioisotope identification and trained the unit in its use.

Insights and Lessons Learned: If CS CBRN units are to be deployed in support of radiological CM, they should have the capability to perform radioisotope identification and low-level contamination monitoring. The units currently do not have that capability. An IdentifINDER similar to that issued to the CSTs could be added to the MTOE for radioisotope identification. The AN/PDR-77 with the MK-28541 subassembly, which includes the DT-695 pancake probe, could be added to the MTOE for low-level contamination monitoring.

DOTMLPF Implications. Materiel: MTOE Radiac equipment, such as the VDR-2, UDR-13, and the PDR-75, posed capabilities gaps for CM/FCM missions. Acquisition of GFE and COTS equipment, such as the AN/PDR-77 with the MK-28541 subassembly (which includes the DT-695 pancake probe) and the ADM-300 with the BP-100 pancake probe, are needed for CS CBRN units required to support CM/FCM missions.

AN/PDR-77, Technical Manual 11-6665-365-12&P: The MK-28541 subassembly for the AN/PDR-77 is not included in the manual for the 77, but there is a user's guide produced by test, measurement, and diagnostic equipment for the subassembly. Department of Defense (DOD) Draft Policy dated 22 July 2011, "Revised Radiological Clearance Criteria Guidelines for Platforms and Materiel," states that decontamination operations for clearance requires a method of identifying the radionuclides and measurement of radioactive contamination with equipment capable of verifying conformance with screening levels.

CM-2011-03-07-01-M-01: Decontamination equipment and guidance for Operation Tomodachi.

Observation Description/Issue: MTOE decontamination equipment issued to the 71st Chemical Company was available but ultimately not required for Operation Tomodachi.

Discussion: M26s were sent after the mission started. Although neither platoon had to use the M26 decontamination apparatus, the need to use them could have occurred. The unit deployed on request for forces orders, and there were no specific task and purpose for the two platoons.

The 71st Chemical Company was equipped with the M26 JSTDS, but due to the government of Japan's guidance (controlling and disposal of contaminated water and to limit the spread of radioactive area), the decision was made not to use the JSTDS.

The Joint Service Transportable Decontamination System-Small Scale (JSTDS-SS) should be used to conduct operational decontamination missions and support thorough decontamination operations. It may also be used to support clearance decontamination missions (as in Operation Tomodachi), limited facility decontamination, and/or terrain decontamination.

CBRN Marines conducted decontamination operations at some locations in Japan, and at any moment there could have been a need for the Soldiers to augment the decontamination operations.

The government of Japan required that units control waste water, so the M26 JSTDS-SS was not used. The units would measure the amount of radioactive material, ensuring levels were down to 100 counts per minute. Safe levels were set in accordance with decontamination guidance identified in the Joint Support Force Guidance for Screening and Decontamination of Equipment and Personnel Operating in Support of Operation Tomodachi, date-time-group 011211Z Apr 11.

Insights and Lessons Learned:

- When a unit does not know exactly what its mission is before deployment, the unit should bring all of its equipment and be ready to conduct any mission within its capabilities.
- To execute "dry decon," the 71st Chemical Company used baby wipes and duct tape to wipe areas by applying moderate pressure. The used wipes and duct tape were then placed into 55-gallons drums. Once filled, the drums were sealed and processed for storage to be disposed of later.

DOTMLPF Implications. Materiel: Units should deploy with all organic equipment and make an effort to acquire nonorganic equipment as needed for mission requirements. CBRN units require nonstandard radiological decontamination capabilities for similar future mission requirements.

CM-2011-03-07-02-M-02: Radiological equipment (detectors/dosimeters).

Observation Description/Issue: MTOE Radiac equipment authorized and issued to the 71st Chemical Company was not adequate to meet mission requirements for Operation Tomodachi.

Discussion: Before the 71st Chemical Company arrived, monitoring operations were going on for about two weeks. Upon arrival, both platoons fell in on equipment that had been used to conduct radiological monitoring. At the beginning of the operation, each branch of service was using different measurements to report its findings. The various measurements used were rems/hr, centigrays/hr, or milirems/hr. Eventually, a standard was set to measure counts per minute. Counts per minute is calculated with a beta probe or pancake probe, which are not provided to the Army. The Air Force issued and trained the Soldiers on the ADM-300 with the beta probe, which enabled the unit to monitor to the new standard.

Before leaving, the Soldiers of the 71st Chemical Company received guidance from the medic from the consequence management support force to fill out a radiological assessment sheet (Department of Defense [DD] Form 1952, *Dosimeter Application and Record of Occupational Radiation Exposure*).

Electronic personal dosimeters (EPDs) were issued to the Soldiers from the Air Force. The EPDs were a great asset, and the Air Force managed all total dose levels (TDLs) in theater. The Soldiers used the EPDs as the primary recording personal dosimetry and the DT-236 as an alternate. One platoon carried its personal dosimeters back to Hawaii for evaluation. Another platoon left the dosimeters on equipment pallets in Japan, which resulted in inaccurate dosimetry readings. 71st Chemical Company personnel are still undergoing internal monitoring.

The authorized radiological detection equipment for the 71st Chemical Company is standard in every Army unit and does not provide an advantage when conducting real-world CM/FCM missions as the Fukushima reactor posed.

The 71st Chemical Company has the AN/PDR-77, minus the pancake probe, on their MTOE.

The ADM-300 was very effective for use during the mission. The ADM-300 will detect, measure, and digitally display both dose and dose rate levels of gamma radiation from 10 μ R/hr to 10,000 R/hr (0.1 μ Sv/hr to 100 Sv/hr) and beta radiation from 10 μ R/hr to 5 R/hr (0.1 μ Sv/hr to 0.05 Sv/hr). It is an all-in-one multifunctional detection system for rapid response to suspected radiation hazards. ADM-300s are rugged, reliable, and designed for use in harsh environments.

The IdentiFINDER is automatically in the “search and dose” mode. It displays survey and dose rate data simultaneously. Should high levels of gamma or neutron radiation be detected, the unit gives an eyes-free audio alert and aids in directing the operator to the location of the source. If radiation levels are high, the unit tells the operator to back off. Once radiation is detected, a simple “click” switches the identifier to automatic nuclide identification. The final result is a list of detected nuclides and their classification (e.g., naturally occurring material, special nuclear material, industrial sources, or medical isotopes).

The AN/PDR-75 with DT-236 was not adequate to meet this operation due to the fact that it does not read low-level radiation. Also, the Air Force was responsible for managing all TDLs in theater, so the 71st Chemical Company was issued the EPD (Air Force version). Pacific Command (PACOM) had a radiological health working group that developed guidance for PACOM forces in Japan.

The Joint Service Lightweight Integrated Suit Technology (JSLIST) and mask were not adequate for this mission due to permeability. In lieu of the JSLIST, the 71st Chemical Company procured \$30,000 for nonpermeable suits and respirators with beta filters to meet mission requirements.

Insights and Lessons Learned:

- Conduct cross training with other services on equipment that provides special probes for low-energy X-rays, beta, and alpha detection.
- There should be a joint personal dosimeter, such as the EPD, authorized for all services to identify total dose absorbed throughout the range of military and CM/FCM operations. The joint personal dosimeter will alleviate the issue of having several different types of dosimeters and the necessity of having to be issued an Air Force version. CBRN units need to have the capability to monitor and track radiation doses of individual Soldiers.
- Units should develop a policy for redeployment that includes processing of dosimeters and a post-health assessment. Establish an SOP for turn in of personal dosimeters and internal monitoring while in theater. Recorded readings of personal dosemitries should be included in Soldiers’ medical files and records for continued monitoring and health assessments.
- The next generation program provides special probes for low-energy X-rays, beta, and alpha detection. The next generation program supports the “Protect the Force” mission, responds to countering nuclear threats missions, and provides radiation safety for services where radioactive materials are used. The next generation program

should provide probes that are interoperable with the radiological detection systems.

- Requirements: One of the following Radiac sets will be used to determine radiation levels in dose per minute for the purpose of decontamination: AN/PDR-77 with a pancake probe (DT-695), ADM-300 with a pancake probe (BP-100), AN/PDQ-1 or equivalent with a frisker probe (DT-304), or any NIST traceable calibrated GM pancake probe or equivalent.

DOTMLPF Implications. Materiel/Leadership and education: Leaders should take measures to ensure that every Soldier is provided the required PPE for the mission. Equipment for the specific mission should be provided to Soldiers to conduct the mission. A joint dosimetry program with standard equipment and training is required.

Leadership and Education

CM-2011-03-07-01-L-01: Leaders at the brigade combat team level and higher need a clear understanding of each DOD service's capabilities.

Observation Description/Issue: Interoperability between services, DOD, and civilian agencies in relation to humanitarian assistance versus disaster relief versus FCM.

Discussion: There was some early confusion between the FCM missions versus humanitarian assistance versus disaster relief, especially in relation to DOD response authorities, lead federal agency authorities, and the complexity of simultaneous operations and their funding streams. This was in addition to tailoring the U.S. response to meet the needs of the government of Japan. Rather than a coordinated DOD response, each service component used its immediate response authority independently without an understanding of other component's activities and capabilities.

Insights and Lessons Learned:

- Leaders at each level need to be knowledgeable of interagency partners.
- Conduct CM/FCM exercises and training events with other DOD agencies and U.S. government agencies to provide opportunities to resolve issues.
- Identify and incorporate lessons learned into future operations.

DOTMPLF Implications. Doctrine/Leadership and education: Leaders at each level need to be knowledgeable of interagency partners and

capitalize on joint CM training opportunities. (JP 3-41, *Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Consequence Management*; and FM 3-11.21)



Figure 1-11. Soldiers of the 71st Chemical Company volunteered to provide humanitarian assistance/disaster relief support in Hachinohe and Noda Village. Pictured here are Soldiers conducting disaster cleanup after the earthquake and subsequent tsunami that occurred in Japan on 11 March 2011.

Other

CM-2011-03-09-02-01: DOD interaction training for future incidents with nuclear power plants in DSCA missions.

Observation Description/Issue: Potential for DOD involvement in future incidents at continental United States (CONUS) nuclear power plants in DSCA missions.

Discussion: While response in this case was an FCM operation, this particular mission showed the agility and ability of the DOD to support a hazard at a nuclear power plant that resulted in a radiological release. Now that a response has become a reality, organizations such as the Nuclear Regulatory Commission and operators of nuclear power plants in the United States must ask a few questions for which civilian and military planners should collaborate. Some of those questions are: What units would respond? What equipment and training do the responding units have? What tasks would the DOD element perform, and for what would civilian authorities/power plant operators maintain responsibility? What role would unmanned ground and aerial systems play?

(Note: There are 15 nuclear power plants in the United States located in the New Madrid fault zone. Three of the 15 nuclear power plants in Alabama are of the same or similar design to the Fukushima Daiichi power plant.)

Organizations with a domestic CBRN CM mission exist. Failure to plan for their response to a domestic CBRN CM incident may slow the time required to respond with trained and ready forces. Planning needs to be done to address items such as:

- Understanding what resources will be made available from each department of the United States.
- Putting an effective exercise plan into effect that would serve to test the readiness of each responding organization while allowing leaders a chance to interact professionally with one another.
- Training and equipping units for the CM mission (overseas CONUS units in Alaska and Hawaii).

Insights and Lessons Learned:

- The use of a cross-functional CM team, which brings together experts in various disciplines, enabled everyone to better understand conditions and coordinate response/management actions.
- The DOD response to the Fukushima Daiichi power plant can be used as a case study in future leader development courses where CBRN CM (foreign and potentially domestic) is addressed.
- Establish standards early for units of measurement for decontamination.
- Use of unmanned aerial vehicles and UGVs with sensors and communication equipment can allow near real-time updates from the source and will help characterize the affected area.
- Units being deployed to CM/FCM missions should review DSCA operations to get a better understanding of how the DOD supports the civil authorities prior to the deployment.

DOTMLPF Implications. Not applicable. This is more of a lead federal agency policy issue.

CM-2011-03-07-01-L-02: SOP for operational exposure guidance (OEG) and dosimetry criteria.

Observation Description/Issue: Standardized dosimetry criteria for this mission were inadequate (radiation safety program and medical health screening).

Discussion: OEG changed frequently for personnel operating within the CM/FCM area of operation. The unit did not have an exit plan for turn in of personal dosimeters or a plan to conduct internal monitoring while in theater.

Insights and Lessons Learned:

- Units need an established SOP in accordance with DA PAM 385-24, Chapter 5, for turn in of personal dosimeters and internal monitoring while in theater. Personnel should not leave theater until personal dosimeters are read and documented and internal monitoring is completed on DD Form 1952.
- Make initial contact with the health physicists and maintain contact up to the point of redeployment. Conduct post-deployment health assessments and monitoring. 71st Chemical Company Soldiers are still undergoing internal monitoring.
- Units require flexibility in this type of scenario, as operational exposure guidance levels will vary depending on a number of factors: emergency action levels, routine operations, retrograde operations, governing authority (host nation, FAA, EPA, AMC, public health, etc.), and changing mission parameters.
- CBRN units do not have the dosimeters to monitor appropriate operational exposure guidance screening levels for this type of operation. The EPDs provided by the Air Force were a great asset. The EPD allows the unit to be able to manage all TDIs of the individual Soldier in theater.

DOTMLPF Implications. Doctrine/Materiel/Leadership and education:

- Doctrine: Establish joint dosimetry doctrine.
- Materiel: Acquire joint personal dosimeters.
- Leadership and Education: Units should know where to seek the appropriate guidance (Army Public Health Command, health physicists). Unit personnel should have an understanding of operational exposure guidance and the basic dosimeter to monitor OEG.

Points of Contact

Quality Assurance Office, Maneuver Support Center of Excellence (MSCoE), Fort Leonard Wood, MO 65473; phone 573-563-7124.

Lessons Learned Program, Quality Assurance Office, MSCoE, Fort Leonard Wood, MO 65473; phone 573-563-7082.

Lessons Learned Program, Quality Assurance Office, MSCoE, Fort Leonard Wood, MO 65473; phone 573-563-2741.

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