CBRN Battle Management Tools

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The purpose of this article is to clarify the employment of chemical, biological, radiological, and nuclear (CBRN) battle management programs: Joint Warning and Reporting Network (JWARN), Joint Effects Model (JEM), and Joint Operational Effects Federation (JOEF). In a system-of-systems (SoS) design, JWARN, JEM, and JOEF inter-operate and reside on command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems that provide tactical, operational, and strategic commanders with full-spectrum CBRN situational awareness (SA).

- JWARN provides an operational capability at all levels to employ accredited CBRN warning technology for collecting, analyzing, reporting, identifying, locating, and disseminating CBRN, environmental, and toxic industrial material (TIM) information. This information is an integral element to C4ISR systems using near real-time information.
- JEM is an accredited, predictive, modeling and simulation (M&S) capability (located at battalion level and above) that portrays the effects of CBRN and TIM hazards to support the decisions of operational commanders for mitigating operational degradation and vulnerabilities.
- JOEF is an accredited, predictive, M&S capability that supports deliberate and crisis action planning, dynamic and collaborative staff actions, and additional analytical activities (primarily at the operational and strategic levels).

Warning and Reporting Capabilities and Prediction Overviews

The CBRN Warning and Reporting System (CBRNWRS) provides operational commanders with a comprehensive analysis, response, and predictive capability to mitigate the effects of CBRN attacks and accidents in the operational environment while conducting full-spectrum operations. CBRNWRS is an automated function generated by JWARN. It enables CBRN specialists and other designated personnel to update the common operational picture (COP) with CBRN weapon- and TIM-related information. JWARN functionality can be used at all echelon levels—from the individual Soldier to national command authority—to provide a means of informing friendly units about possible contamination. For JWARN to be an effective tool in CBRNWRS, users must understand how it works and the importance of the different messages and use at each echelon level. The JWARN program is based on Standardization Agreement (STANAG) 2103 (under Allied Tactical Publication [ATP] 45) and specific standardized nuclear, biological, and chemical (NBC) report formats. These standardized reports include—

- Observer's data.
- Evaluated data.
- Immediate warning data of predicted contamination and hazard.
- Reconnaissance, monitoring, and survey results.
- Areas of actual contamination.
- Detailed information.

Each report has a specific use at different levels within the tactical and operational environments.

The distribution of NBC reports is made by the host system using the Battle Command System. These reports must be in the format specified in STANAG 2103. NBC report formats consist of the—

- **Observer's data (NBC 1).** The NBC 1 report is the most widely used report. This report can be created and used at all levels (platoon through echelons above corps [EAC]). Individuals observing CBRN events use this report to provide data to higher headquarters and warning notification to subordinate and adjacent units. Sensors are connected to C4ISR systems via direct serial connections or to a JWARN component interface device (JCID) connected

to C4ISR systems via a direct serial or network connection. JWARN enables the management of sensor configuration, testing, monitoring, and security for operational support. Sensors are usually mounted but must accommodate the possibility of being dismounted for use in an encamped mode. JCID accommodates mounted and dismounted configurations. JWARN receives sensor data, treats the information as being from an observer, and uses it to create an NBC 1 report. JWARN also has the capability to prepare and distribute the NBC 1 report quickly, accurately and, when connected to sensors, automatically.

- **Evaluated data (NBC 2).** The NBC 2 report is based on one or more observer reports. After the NBC 2 is posted to the COP, all associated NBC 1 reports must be removed. This report is created by battalion through corps level CBRN staffs (74A and 74D). It is distributed to all higher, subordinate, and adjacent units (through platoon level). The NBC 2 is used by units to determine if mission-oriented protective posture (MOPP) levels or other individual and collective protection measures must be adjusted. It is also used to assist with planning future operations.
- **Immediate warning of predicted contamination and hazard (NBC 3).** The NBC 3 report is generated by the CBRN control center (CBRNCC)—using JWARN and JEM—at brigade, division, and corps levels. CBRNCC uses threat and meteorological data to generate immediate warnings for predicted contamination. Additionally, a JEM plume is generated to provide a more detailed analysis of a contaminated area. This information is distributed to all higher, subordinate, and adjacent units (through platoon level) as an NBC message or overlay. NBC 3 reports are reevaluated as conditions change (or at least every two hours).
- **Reconnaissance, monitoring, and survey results (NBC 4).** The NBC 4 report is generated by reconnaissance personnel to identify contaminated locations. This report is sent to JWARN users at the CBRNCC to develop contamination reports.
- **Areas of actual contamination (NBC 5).** The NBC 5 report is generated by the CBRNCC and uses the information contained in NBC 4 reports to display contaminated areas. Additionally, decontamination platoons and other units conducting decontamination operations generate this report to identify the closure of a decontamination site. This information is distributed to all higher, subordinate, and adjacent units (through platoon level) as an NBC message or overlay display.
- **Detailed information (NBC 6).** The NBC 6 report summarizes attack information and is prepared by battalion level CBRN staffs (as requested by higher headquarters). The NBC 6 is written in narrative form and includes as much detail as possible.

Planning Concept Overview

The primary purpose of CBRN planning is to support a commander's military decision-making process (MDMP). The basic CBRN planning process remains the same across the spectrum of military operations; however, specific planning varies considerably between tactical, strategic, and operational levels. At the strategic and operational levels, there are typically more resources available for planning.

- **Tactical level.** CBRN units (reconnaissance, surveillance, decontamination, and obscuration) conduct planning operations (route, decontamination, reconnaissance survey, and nuclear crossing; stay, smoke, MOPP, and heat stress analyses; and flame field-expedient plans), use JWARN capability to notify personnel, and distribute gathered information to higher headquarters. JWARN provides the capability to conduct analyses of CBRN incidents, ensuring that SA provides minimal risks to friendly forces. Commanders and unit CBRN planners rely on higher headquarters and CBRN staffs to provide them with additional operational planning information. Additionally, JEM is used by CBRN reconnaissance and surveillance units at the tactical level.
- **Operational and strategic levels.** CBRN staff planners are primarily responsible for planning. JEM and JOEF are planning tools hosted on C4ISR systems to assist planners with critical facts required for planning and MDMP.

JEM provides CBRN staffs (battalion through EAC) and CBRN reconnaissance units with advanced CBRN and TIM modeling scenarios. This capability provides commanders with an analysis of CBRN and TIM hazards, predictions, and effects in their operational environment. JEM simulates hazards in a variety of scenarios, including—

- Counterforce.
- Interdiction.
- Elimination.

- Active and passive defense.
- Accidents and incidents.
- High-altitude releases.
- Urban environments.
- Building interiors.
- Personnel performance degradation.

Additionally, JEM is capable of processing weather data from multiple sources, including—

- Historical records.
- Current forecasts (obtained via Web services).
- Integrated Meteorological System data.
- JWARN reports.
- Meteorology and oceanography data from local and strategic sources.

CBRN staff planners integrate weather, terrain, and personnel information with JEM and conduct automated analyses, evaluations, and impact predictions of CBRN and TIM threats to develop contingency and operation plans. CBRN reconnaissance units can use weather plumes to define their reconnaissance efforts. CBRN staff planners can produce event templates using JEM and send the results to subordinate and adjacent units.

JOEF provides CBRN staff planners (brigade through EAC) with M&S capabilities, planning templates, and mitigation planning tools. As a battle management tool, JOEF automates portions of the MDMP to support planning operations in dynamic and continuous environments, while incorporating risk reduction measures. CBRN planners use JOEF to assist them with the CBRN portion of the—

- Intelligence preparation of the battlefield.
- Mission analysis.
- Development of adversary and friendly courses of action.
- Vulnerability assessments.
- Probability impact of casualties (using JEM).
- Technical advice and recommendations on MOPP or other personal protective equipment.
- Personnel safety criteria.
- Operational exposure guidance.
- Reconnaissance and surveillance assessments.
- Obscuration operations (as applicable).
- Defense measures.
- Risk reduction assessments.
- Mitigation techniques and sensor emplacement.
- Requirements for health support and medical coordination.

CBRN staff planners use JOEF and JEM to develop contingency and operation plans. This enables the commander to better evaluate time-phased force and deployment data requirements in light of the threat and the potential impact on protecting forces. These products are sent to higher headquarters, subordinate units, and adjacent units.

Logistics and Security

Software is distributed as part of C4ISR host systems and fielded as part of Army software blocking (testing to ensure that software is interoperable in an SoS environment). Normal software upgrade maintenance patches are coordinated with C4ISR host systems, fielded as part of Army software blocking, coordinated as emergency software upgrade maintenance patches, and fielded with C4ISR host systems.

All systems will operate at the current level of security classification. Authorization for data access will operate at the classification level of its host C4ISR system. All classified information, documents, and electronic transmissions will be assigned an appropriate level of protection as required by Department of Defense regulations. For more information, contact Major Pearson at <*mollie.pearson@us.army.mil*> or Mr. Dent at <*gregory.dent@us.army.mil*>.

More on JWARN…

There are two versions of JWARN being used in the field: Block 1D and Block 1E. However, JWARN 1D is no longer a supported program. Users who have JWARN 1D should upgrade to JWARN 1E. Features available with JWARN 1E include—

- Updates to the hazard prediction assessment capability (NBC analysis).
- Automatic-fill options for messages.
- An online emergency response guide.
- Medical surveillance data integration.
- Biological incident reports.
- Hazardous-material spot reports.

JWARN Block II is currently under development and will supersede JWARN 1E in Fiscal Year 2010. This version builds on JWARN 1E and adds the following features:

- An interface with JEM for advanced hazard prediction.
- A direct connection to CBRN sensors.
- Incorporated ATP 45 requirement updates.
- Event data relative to the COP.

For support information, contact the Joint Program Management Information Systems help desk at 1-877-328-0371.

Reference:

STANAG 2103 (Edition 9). *Reporting Nuclear Detonations, Biological and Chemical Attacks, and Predicting and Warning of Associated Hazards and Hazard Areas (Operators Manual)–ATP-45(C)*. 14 December 2005.

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A Farewell to a General

Major General David William Einsel, Jr. (Retired), a decorated Army officer instrumental in guiding the country's efforts to develop chemical and nuclear weapon systems, died on 30 October 2006 in Tiffin, Ohio. He was 77.

General Einsel was born in Tiffin on 4 November 1928. He graduated from Ohio State University in 1950, with a bachelor's degree in chemistry and a master's degree in physical chemistry. He also received a master's degree in physics from the University of Virginia in 1956.

Major General Einsel began his Army service in September 1950, serving in a variety of field artillery command positions. In Korea, Major General Einsel participated in the fierce fighting at Heartbreak Ridge. During the 1960s, he served as the Assistant Professor of Chemistry at the U.S. Military Academy at West Point, New York. In Vietnam, he served in the First Cavalry Division (Airmobile), where he was directly involved in the tactical use of riot control agents and herbicides. During the 1970s and early 1980s, he commanded the Harry Diamond Laboratory in Adelphi, Maryland, where he was responsible for the development of new electronic fuzes for artillery, rockets, bombs, special-purpose radar, and fluidic sensors (the type now routinely used on aircraft). He later became the deputy commander of the Army's largest research and development organization—the U.S. Army Armament Research and Development Command.

Major General Einsel held a number of staff assignments in Washington, D.C., including nuclear advisor to the Deputy Chief Chemical Officer; deputy assistant to the Secretary of Defense; executive secretary to the Military Liaison Committee, Department of Energy; and Chief of the Nuclear-Chemical Office for the Deputy Chief of Operations, where he played a significant role in reversing a decision by the Secretary of the Army to abolish the Chemical Corps. During this period, he was a principal player in obtaining chemical research and development funding, preparing presidential decision memorandums that initiated the production of the binary chemical weapons program, and reinitiating U.S. participation in the Geneva negotiations and international chemical arms control treaties.

After retiring in 1985, Major General Einsel was selected by the Director of Central Intelligence to serve as a consultant to firms involved in chemical, biological, and nuclear matters of interest to the United States.

Major General Einsel is survived by his wife, two daughters, and four grandchildren.