

Stryker Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite Upgrade (SSU)



The Stryker Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite Upgrade (SSU) program is delivering capability in two phases referred to as Capability Sets (CS). The concept of operation and system design is focused on standoff sensing employing existing manned Stryker NBCRV flat bottom hull platforms with an upgraded suite of chemical, biological, and radiological sensors. The Stryker is teamed with a towed unmanned ground vehicle with the same sensor suite as the NBCRV and multiple small unmanned aerial vehicles that can be used for standoff biological sensing to expand the reconnaissance area. The Stryker NBCRV SSU CS 2.1 design is based on upgrading flat-bottom hull platforms that are less survivable to kinetic threats than Stryker Double V Hull platforms. The CS 2.1 design eliminates the existing NBCRV capability to detect and identify chemical agent on route surfaces, collect physical samples from within the collectively protected vehicle, and physically mark contaminated areas. The NBCRV SSU program has an aggressive test schedule with limited test articles. NBCRV SSU CS 2.1 component level testing conducted to date has identified individual sensor performance and reliability issues which should be fixed prior to integrated system developmental and operational testing. The program conducted a Soldier Touch Point in September 2022 to obtain soldier input for CS 2.2. The Army plans to conduct integrated developmental and operational testing and survivability testing of the CS 2.1 upgrade in FY23.

SYSTEM DESCRIPTION

The NBCRV SSU is a two phased program to develop and field upgrades to the Stryker NBCRV. The first phase, CS 2.1, will upgrade a limited number of existing Stryker NBCRV flat-bottom hull platforms with a new mission equipment package consisting of the Joint Chemical Agent Detector, Compact Standoff Detection Sensor, Improved Mobile Chemical Agent Detector (IMCAD), Merlin Applique and Imager radiological detectors, Viper radiological detector, and weather sensors mounted on the outside of the system. The NBCRV SSU will include a towed unmanned ground vehicle with a second mission equipment package and unmanned aerial vehicles (UAV) with interchangeable modular biological sensor package, and new servers and workstations.

MISSION

Army Armored Brigade Combat Teams (BCTs), Stryker BCTs, active Chemical Biological Radiological and Nuclear (CBRN) Hazard Response Companies, National Guard and Army Reserve BCT Hazard Response Company units equipped with the NBCRV SSU will provide point, standoff, and remote CBRN sensing capabilities to provide commanders the time and space to make informed, proactive, risk-based decisions, thus enhancing freedom of movement and freedom of maneuver in large-scale combat operations. The Army intends units equipped with the

NBCRV SSU to perform CBRN route, area, and zone reconnaissance on roads and cross-country; CBRN surveys to determine limits of contamination; and CBRN surveillance, as directed by the Maneuver Force Commander.

PROGRAM

The Stryker NBCRV SSU is a tailored Major Capability Acquisition (Acquisition Category III) effort to make engineering changes to the fielded M1135 Stryker NBCRVs and potentially to future Stryker Double V Hull platforms to improve survivability. The Army plans to apply the SSU as a Modification Work Order as directed by Tank-automotive and Armaments Command. The SSU effort is a phased effort with a Conditional Materiel Release in FY24 to field up to eight systems on existing NBCRV platforms. DOT&E approved the Test and Evaluation Master Plan for CS 2.1 on March 7, 2022.

» MAJOR CONTRACTORS

- FLIR Systems Inc. - Elkridge, Maryland

TEST ADEQUACY

DOT&E has repeatedly expressed concerns over the lack of sufficient sensors and NBCRV SSU integrated systems available for testing. These assets are needed to enable identification of system-to-system variability and operational testing of a unit equipped with the NBCRV

SSU. The Program Office is working with the Army to develop backup plans should the two NBCRV SSU systems identified to support operational testing become non-mission capable. In FY22, DOT&E approved developmental/operational test plans for the NBCRV SSU component VIPER radiological detector, MERLIN radiological imager, Improved Mobile Chemical Agent Detector (IMCAD), and Biological Aerosol Detector. A small number of the planned test trials for the VIPER, MERLIN, and IMCAD were not completed due to limited time and other test facility commitments. The program is working to schedule follow-on testing to complete these trials. The Army Test and Evaluation Command conducted developmental testing of the UAV and Compact Standoff Detection System and the Joint Chemical Agent Detector components. DOT&E observed portions of the VIPER, MERLIN, and Biological Aerosol Sensor testing. Testing was conducted in accordance with the DOT&E-approved test plans. The Program Office conducted a NBCRV SSU Soldier Touch Point event in September 2022 which DOT&E observed.

PERFORMANCE

» EFFECTIVENESS

CS 2.1 eliminates the existing NBCRV capability to detect and identify surface samples on-the-move, safely collect samples from inside the collectively protected NBCRV for further laboratory analysis, and physically mark

contaminated areas. The NBCRV SSU will have the capability to digitally mark contaminated areas using the Joint Battle Command-Platform but will lose the capability to mark areas to warn dismounted troops, allies using different digital mapping systems, and civilians. FY21 component testing of the Chemical Surface Detector identified performance deficiencies agent chamber testing and on-the-move simulant testing. The Program Manager has removed the Chemical Surface Detector from the CS 2.1 upgrade and plans to incorporate a different sensor for CS 2.2. FY22 radiological sensor component testing of the VIPER and MERLIN identified performance deficiencies that should be corrected and retested. The Program Office is working with the vendor to correct these deficiencies and plan regression testing prior to fielding.

» SUITABILITY

UAV flight characteristic testing identified battery deficiencies that limit flight time. The Program Office is working to identify solutions for CS 2.1.

» SURVIVABILITY

The NBCRV's flat-bottom hull platforms are less survivable to kinetic threats than Double V Hull platforms. Due to Army funding decisions and the Army's planned Conditional Material Release in FY24, the Program Office plans integrate the SSU onto existing M1135 NBCRV flat-bottom hull platforms instead of moving forward with a costlier and more time consuming engineering effort to integrate the CS 2.1 SSU onto Double V Hull platforms. The Army plans to conduct survivability testing of the CS 2.1 upgrade in FY23.

Laser vulnerability testing completed to date did not identify any survivability shortcomings in the NBCRV SSU UAV or IMCAD. Integrated NBCRV SSU system testing is planned in spring 2023.

RECOMMENDATIONS

The Program Office should:

1. Work with the UAV vendor to identify and test batteries for the UAV that provide sufficient power to enable the UAV to accomplish its mission.

2. Provide sufficient test articles to enable operational testing in accordance with the Army's concept of operation.

The Army should:

3. Consider conducting side-by-side operational testing of the NBCRV SSU with the currently fielded NBCRV system to demonstrate improved operational capability in support a procurement decision.
4. Identify and plan to integrate the SSU onto a more survivable platform to enable its employment in accordance with the proposed Army concept of operation. Testing should be repeated once the sensor suite upgrade is integrated onto a new platform to identify any changes to its operational effectiveness, suitability and survivability prior to fielding.