

NEXT GENERATION CB HAZARD PREDICTION AND CONSEQUENCE ASSESSMENT WITH MULTI-ECHELON DECISION SUPPORT APPLICATIONS

The Us Navy Shipboard Performance Model

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To determine how long warfighters on Navy ships will be able to continue their mission after a CBR event, we created the Navy's Shipboard Chemical, Biological, and Radiological (CBR) Performance Model (SBPM). The SBPM integrates four models and associated databases to help it with its simulations. The models are the exterior model, the interior model, the Human Performance Model, and the Epidemiological Model. The exterior model uses Quick Urban and Industrial Complex (QUIC), an atmospheric transport and dispersion computer program, to estimate external wind, pressure, and plume concentration. The interior model uses CONTAM, a multi-zonal indoor air quality and ventilation analysis computer program, to model ship classes and estimate internal airflow and contaminant deposition, dosage, and concentration. The Human Performance Model uses sailors' task completion time and accuracy data to compute effects of factors such as heat, impaired vision and mobility. The Epidemiological Model estimates disease transmission onboard US Navy ships to allow for modeling of infectious diseases such as Corona Virus Disease 2019 (COVID-19). Outputs from the SBPM show the interaction of CBR contaminants with Navy ship exterior surfaces, concentration and dosage over time within interior compartments, Integrated Layer Defense (ILD) systems (detection, identification, recovery, protection, decontamination, and data processing), human performance including casualties, and epidemiological transmission. The SBPM has the ability to influence doctrine changes, MOPP use, safety protocols and the implementation of sensors, CMWD, and decontamination stations.