2011 Virginia Emergency Response Team Exercise Series

Executive Summary
Prepared for the General Assembly

Publication Date: October 28, 2011

Abstract: This document contains an overview of the exercise play of the 2010 Virginia Emergency Response Team Exercise (VERTEX) series activities, to include, scenario details, Exercise Objectives and agency participation. For additional information please contact Aaron Kesecker, State Exercise Training Officer at 804-840-4270, aaron.kesecker@vdem.virginia.gov

ADMINISTRATIVE HANDLING INSTRUCTIONS

1. The title of this document is the Virginia Department of Emergency Management (VDEM) 2011 Virginia Emergency Response Team Exercise (VERTEX) After-Action Report.

2. For more information about the exercise, consult the following points of contact:

   VDEM:

   Mr. Aaron Kesecker, MEP
   HSEEP Training Officer, Office of Training and Exercises
   Virginia Department of Emergency Management
   10501 Trade Court
   Richmond, VA 23236
   Phone: (804) 897-9985
   E-mail: aaron.kesecker@vdem.virginia.gov

CONTENTS

EXECUTIVE SUMMARY

The annual Virginia Emergency Response Team Exercise (VERTEX) series is intended to Prepare the Commonwealth of Virginia for potential threats by measuring current capabilities, policies, and procedures against the requirements to properly mitigate, respond to, and recover from man-made and natural disasters impacting the Commonwealth. In 2011, VERTEX was a three-part exercise series focusing on State preparedness in reference to geomagnetically-induced currents (GIC, i.e., space weather), hurricanes and man-made disasters (terrorist attacks), and communications.

Historically, GIC events at the catastrophic level are rare but pose a significant risk to the Commonwealth's emergency response and recovery infrastructure; a GIC event could seriously disrupt information and communication technology across the country. The first exercise in the series was a workshop that focused on a Statewide Concept of Operations to respond to and manage the effects of a GIC event. The workshop took place on Tuesday, March 29, 2011.

MAJOR SERIES STRENGTHS	SERIES AREAS FOR IMPROVEMENT
Dominion Virginia Power has already implemented GIC mitigation into the Commonwealths Electrical Grid.	*Implement Space Weather information dissemination program for localities through partnerships with the Virginia Association of Cities and Counties and Virginia Municipal League*
The Virginia Emergency Operations Center receives Space Weather Alerts from NOAA as part of its weather warning systems	*An information brochure should be developed and distributed well in advance of the Procurement workshop so localities and State entities can be more aware of the event, and more prepared to send representatives.*
The Emergency Management Resource Manual that was distributed to each participant of the Procurement Forum was a wealth of information about policies and procedures relating to the procurement process. This manual should be made electronically available to localities across the State.	*Each presentation at the Procurement Workshop should be captured by a note taker so that all pertinent and valuable information about the procurement process can be compiled into a report that can be used as a take-away from the event and distributed to participants and localities across the state.*
Communications Caches and Support Teams successfully mobilized and deployed to multiple regions of the Commonwealth.	*Development of processes for reimbursement of Cache team expenses needs to be developed.*

Hurricanes are a well-documented threat to the Commonwealth and pose significant risks in nearly every aspect of preparedness. Hurricane preparedness serves as a solid foundation for emergency mitigation, response, and recovery planning. Additionally, the Commonwealth's proximity to the National Capital Region (NCR) makes it a high-risk target for terrorist activities. The second exercise in the series was a workshop that addressed the potential for a

man-made event and natural disaster to coincide within the Commonwealth. This exercise was intended to focus on State procurement of resources when facing both natural and man-made disasters. This workshop took place Sunday, June 5, 2011 through Tuesday, June 7, 2011.

Throughout all disasters, communication equipment and procedures are vital to the flow of information and resources. Because the Virginia Emergency Operations Center (VEOC) coordinates inter- and intrastate resources through means such as mutual aid agreements, it is important to test the State's capabilities to provide command and control over communications resources in the event of a disaster. The final exercise in the 2011 VERTEX series focused on measuring the State's communications plans and capabilities as a drill that took place Thursday, June 9 through Sunday, June 12, 2011.

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 1: EXERCISE OVERVIEW

Exercise Details

Exercise Name

Virginia Department of Emergency Management (VDEM) 2011 Virginia Emergency Response Team Exercise (VERTEX) Series

Type of Exercise(s)

Workshop and Drill

Exercise Date(s)

Space Weather Webinar: March 17, 2011

Space Weather Workshop: March 29, 2011

Procurement Workshop: June 5-7, 2011

Communications Drill: June 9-12, 2011

Duration

Space Weather Webinar & Workshop: 8 hours

Procurement Workshop: Two Days

Communications Drill: Four Days

Locations

Richmond

Norfolk

Sponsor

VDEM

Program

Fiscal Year 2010 State Homeland Security Grant Program

Mission

Prepare, Respond

Capabilities

- Communications
- Planning

Scenario Type

Geomagnetically Induced Currents (Space Weather) (Communications & Power Failure)

Number of Attendees

Space Weather Workshop & Webinar: 120

Emergency Management Procurement Workshop: 100

Communications Drill(s): 40

Participating Organizations

The following Federal, State, and local agencies attended the 2011 VERTEX Exercise Series:

Federal Agencies/Private Non-Profits	State Agencies	Localities
• Federal Emergency Management Agency • Department of Homeland Security • Department of Emergency • Dominion Virginia Power • Norfolk Naval Base • Norfolk Shipyard • Post, Buckley, Schuh & Jernigan, Inc. • Langley Air Force Base • All-Hazards Consortium • Federal Communications Commission • US Army Installation Command Northeast Region • Amateur Radio Emergency Services • National Nuclear Security Administration • Virginia 211 • Virginia Volunteer Agencies Active in Disaster	• Virginia Department of Emergency Management • Virginia Department of Accounts • Virginia Department of Risk Management • Commonwealth of Virginia Office of the Governor • Virginia Division of Purchase and Supply • Virginia Department of Rehabilitative Services • Office of the Attorney General of Virginia • Virginia Department of Environmental Quality • Virginia Department of Social Services • Virginia Fusion Center • Virginia Department of Mines, Minerals and Energy • Virginia Department of Agriculture and Consumer Services • Virginia Information Technology Agency • University of Virginia • Virginia Tech • Virginia State University • Virginia State Police • Virginia Department of Transportation • State Corporation Commission • Virginia Department of Military Affairs • Virginia Department of Health	• Albemarle • Appomattox • Bedford City • Charlottesville • Chesapeake • Chesterfield • City of Richmond • Dinwiddie • Fairfax • Fauquier • Greensville • Hampton • Hanover • Henrico • Henry • Hopewell • King and Queen • Louisa • Manassas • Martinsville • Montgomery • Nelson • Norfolk • Orange • Petersburg • Poquoson • Powhatan • Prince George • Pulaski • Richmond • Shenandoah • Spotsylvania • Virginia Beach • York • Warren • Washington • Wichita (KS) Public Schools • City of New Orleans (LA)

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 2: EXERCISE DESIGN SUMMARY

Exercise Purpose and Design

The overarching purpose of the 2011 Virginia Emergency Response Team Exercise (VERTEX) series was to develop and test a statewide strategy to respond to and manage the effects of Geomagnetically Induced Currents on the Commonwealth's electrical power and communications systems. This was done through definition of the threat, identification of vulnerable sectors and processes, assessment of impacts and evaluation of potential countermeasures, in accordance with Virginia Code § 44-146.17:2. The purpose of the procurement Workshop was to provide guidance on contracting in emergency situations, including planning for emergency procurements and structuring major contracts to facilitate emergency support from contractors.

Exercise Objectives

Exercise	Objectives
Space Weather Workshop	• Broaden stakeholder knowledge of the affects of GIC on the Commonwealth based on presentations of currently known data. • Assess and identify critical sites, systems, and processes vulnerable to the threat of GICs on the Commonwealth's infrastructure in accordance with the Hazard Vulnerability Analysis Process. • Develop an Essential Elements of Information (EEI) document for VERT agencies and Critical Infrastructure and Key Resources (CI/KR) partner to assess the impacts of a GIC event in accordance with current National and State planning guidelines.
Emergency Management Procurement Workshop	• Develop a commodities listing of goods and services providing vendor listings in meeting the demands of disasters. • Develop contracts for emergency services that address the demands of disasters. • Develop better understanding of statewide mutual aid in response to disasters. • Develop better understanding of how to request assets and processes in obtaining needed tools and resources during disasters. • Develop better understanding of risks and legal considerations during disasters.
Communications Drills	• Assess the ability of the VEOC to implement and evaluate redundant and alternative methods of communication in response to a failure of traditional systems.

Exercise Summaries

Geomagnetically-Induced Currents (GIC) – Workshop

Space Weather Overview:

Space weather describes the conditions in space that affect Earth and its technological systems. It is a consequence of the behavior of the sun, the nature of the Earth's magnetic (geomagnetic) field and atmosphere, and our location in the solar system. There are three different kinds of solar weather: solar flares, solar radiation storms, and geomagnetic storms. Each of these storms originates from the sun and has the potential to disrupt technology on Earth.

Date	Affected Area	Impact
9/1/1859	England	First observed solar superstorm, disruption of telegraph service
5/13/1921	New York	Shut down city railroads
3/25/1940	Boston, New York	Easter Sunday phone calls disrupted
9/18/1941	New York	Radio disruption, Brooklyn Dodgers baseball game
2/24/1956	Vermont	Crossed signals, lost submarine
8/2/1972	North America	First well-studied storm
7/11/1979	Skylab satellite in orbit	Excessive drag led to early reentry
3/13/1989	Quebec, Canada	>1,000,000 people lost power in Montreal
1/11/1997	Telstar 401 satellite	$200 million satellite destroyed, TV disrupted
10/29/2003	Africa, Europe, South America	Largest solar flare ever recorded

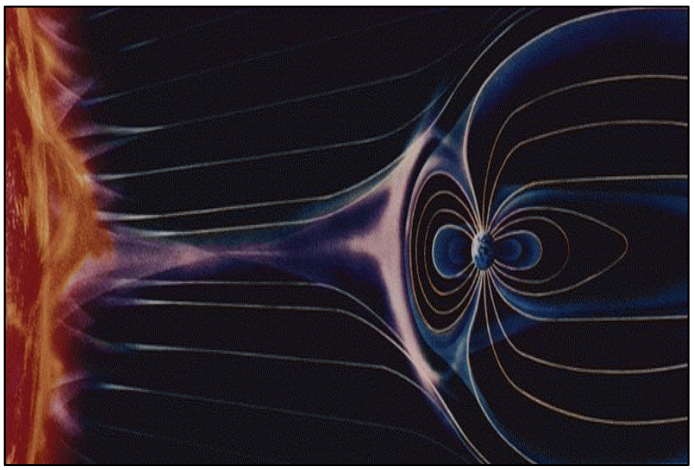
Space weather forecasters observe and monitor the sun to try to avoid or mitigate severe space weather impacts by predicting when solar storms will occur and how strongly they will impact the Earth. Space weather forecasters are able to predict solar weather because of its 11-year cycle, with the next solar maximum predicted for May of 2013. NOAA has categorized three types of space weather: radio blackouts, solar radiation storms, and geomagnetic storms. Forecasters look for sunspots, which are the visible manifestation of intense magnetic fields on the sun, and try to locate the sites of solar flares. Solar flares can cause radio blackouts, which can mean a loss of HF radio, radar, GPS, and satellite communications for up to three hours.

When solar flares emit radiation, it is called a solar radiation storm. It can cause satellites to lose data or to malfunction completely, depending on its strength. Solar radiation storms also expose passengers and crew in high-flying aircraft to high levels of radiation. The most destructive of the solar storms is the geomagnetic storm, which is caused by a coronal mass ejection (CME). Earth-directed CMEs pose a grave threat to the Earth's technological infrastructure. If a geomagnetic storm impacts Earth, it can induce powerful electrical currents that would disrupt

and disable transformers and other critical equipment, leading to the collapse of power grids and telecommunications infrastructure. Geomagnetic storms also disrupt navigation and GPS technology, as well as satellite operations.

AREAS MOST LIKELY TO BE IMPACTED BY SPACE WEATHER	
Communications	• These storms can affect high frequency (HF) radio communication at all latitudes. • Ground-to-air, ship-to-shore, Voice of America, Radio Free Europe, and amateur radio are frequently disrupted.
Navigation Systems	• Airplanes and ships use the very low frequency signals from these transmitters to determine their positions. • During solar events and geomagnetic storms, the system can give navigators information that is inaccurate by as much as several miles. • Global Positioning System (GPS) signals are affected when solar activity causes sudden variations in the density of the ionosphere. • GPS technology is being used for ever more precise applications, including mapping of coastlines, surveying for highway construction, landing airplanes, and oil drilling.
Satellites	• Geomagnetic storms and increased solar ultraviolet emission heat the Earth's upper atmosphere, causing it to expand. The heated air rises and the density at the orbit of satellites, up to about 1,000 km, increases significantly. • This results in increased drag on satellites in space, causing them to slow and change orbit slightly. • During the great geomagnetic storm of March 1989, four Navy navigational satellites had to be taken out of service for up to a week.
Geologic Exploration	• The Earth's magnetic field is used by geologists to determine subterranean rock structures. For the most part, these geodetic surveyors are searching for oil, gas, or mineral deposits.
Electric Power	• When magnetic fields move about in the vicinity of a conductor such as a wire, an electric current is induced into the conductor. This happens on a grand scale during geomagnetic storms. • Power companies transmit alternating current to their customers via long transmission lines. The nearly direct currents induced in these lines from geomagnetic storms are harmful to electrical transmission equipment. On March 13, 1989, in Montreal, Quebec, 6 million people were without commercial electric power for 9 hours as a result of a huge geomagnetic storm.
Pipelines	• Rapidly fluctuating geomagnetic fields can induce currents into pipelines, causing problems for pipeline engineers. • Flow meters in the pipeline can transmit erroneous flow information, and the corrosion rate of the pipeline may dramatically increase.

Historically, space weather events that cause significant impacts on Earth occur about every 70 years. One of the first documented occurrences happened in 1859: the Carrington Event, when telegraph systems across Europe and the United States failed. In 1921, geomagnetic currents disrupted radio and railway systems in the United States. The most recent significant space weather occurrence was on March 13, 1989, in Montreal, Quebec, when a severe geomagnetic storm caused the collapse of the Hydro-Quebec power grid. Six million people were without commercial electric power for nine hours. The more technologically advanced and reliant on technology our society becomes, the more vulnerable our communications and energy infrastructure becomes to the impacts of space weather.



The major concerns in the energy sector with regard to HILF geomagnetic storms are the age of existing transformers; the time, cost, and manpower associated with acquiring and transporting replacement transformers; and the lack of testing of current capabilities. The current situation in the United States is that many of the existing transformers are severely aged (some are over 40 years old), and there are limited sources globally for acquiring new transformers in a timely manner; the estimated time for production of a new transformer is between 12 and 24 months. In addition, over the past 20 years, the United States has lagged in creating new electricity infrastructure and manufacturing. Furthermore, since this is an unpredictable and infrequent event, utilities in the United States are concerned about the costs of testing and protecting current systems, as well as the lengthy process of cost approval and recovery of costs from State public service commissions. Thus the actual costs of technologies, installation, and maintenance to mitigate solar storms are unknown, as is the actual impact of various levels of these events on the numerous transformer designs and manufacturers.

Procurement – Workshop

The 2011 Emergency Management Procurement Forum and Workshop was conducted over three days and provided the opportunity for local emergency managers from across the Commonwealth of Virginia to share information and discuss issues pertaining to the procurement of goods and services during a disaster. Over 100 participants attended 23 presentations during the forum and workshop. The participants and presenters represented over 30 localities in Virginia, various State and Federal Agencies, as well as several out-of-state and private entities. A full list of participating localities and agencies can be found at the end of this summary.

The Forum included an information session and tour of the Virginia Emergency Operations Center (VEOC) to familiarize local emergency managers with the resources at their disposal at the State level. The forum also provided subject matter experts from across the country an

opportunity to give presentations and provide insight into their real-life experiences in procuring goods and services before, during, and after disasters.

Communications – Drill

The Communications drill portion of VERTEX 2011 began on June 9, 2011 with the mobilization of the Lunenburg Cache and deployment to the University of Richmond. As part of the exercise, cache personnel and assets were used to support the Special Olympics to test their capabilities. The exercise continued on June 10, 2011 with the deployment and rendezvous of the Chesapeake cache team to support the Harborfest in Norfolk. A second team from Chesapeake was also deployed to meet the Cache team from Harrisonburg-Rockingham at the rest area on I-64. Teams from Harrisonburg-Rockingham, Lunenburg and Fairfax then rendezvoused at the University of Richmond to continue communications support of the Special Olympics as part of the exercise. The teams implemented communications channels to link the events in Richmond and Norfolk, testing the wide net communications strategy, plans, and equipment. By Sunday, June 12, 2011 all teams began to implement their demobilization plans and return to their respective bases of operation.

Equipment Tested in Communications Cache Drill	*Location(s)*
49 portable radios 100 batteries 3 – gang chargers	Richmond (Special Olympics)
1 laptop computer – inventory control and programming	Richmond (Special Olympics)
Tactical repeater for security network	Richmond (Special Olympics)
Tactical Radio Interoperability Overlay Systems (RIOS) for gateway for security network Fixed RIOS for gateway between VA EOC and OIL 4 Tactical RIOS and Blue Sky Mast Mobile tower unit g. Fixed RIOS for gateway between OIL 4 and ORION IC-2	Richmond (James Monroe Building) (I-64 rest area)
Fairfax and Harrisonburg-Rockingham mobile tower units	Norfolk (Harborfest)
Quantar repeater	Norfolk (Harborfest)
Satellite phone	Norfolk (Harborfest)
k. 32 – 7/800 MHz. radios 3 – Multi-bank chargers 1 – Laptop	