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IMAAC Support of the Top Officials 3 National Exercise

R. L. Baskett, M. B. Dillon

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Ronald L. Baskett and Michael B. Dillon
Atmospheric Flow, Transport, and Hazard Assessment Group

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The Top Official 3 (TOPOFF3) Full-Scale Exercise provided a major test for the new Interagency Modeling and Atmospheric Assessment Center (IMAAC). Under the National Response Plan, IMAAC “provides a single point for the coordination and dissemination of Federal dispersion modeling and hazard prediction products that represent the Federal position during an Incident of National Significance”. By designation of the Homeland Security Council, NARAC is the interim provider of IMAAC capabilities.

IMAAC provided significant support to the TOPOFF3 exercise including extensive scenario development (in collaboration with the LLNL Forensic Science Center and the Lawrence Berkeley and Sandia National Laboratories) and the simultaneous, real-time support for the Connecticut and New Jersey Venues (chemical and biological weapon scenarios, respectively). To illustrate the IMAAC operational response, we focus on the Connecticut Venue in this poster.

The TOPOFF3 Connecticut Venue exercise began on April 4, 2005 with the (simulated) explosion of a truck bomb near a large public gathering in New London, Connecticut. Within 20 minutes of the explosion, we were activated by the Department of Homeland Security Homeland Security Operations Center (HSOC). The HSOC also provided intelligence on suspected terrorist activities in New England involving distilled mustard, a chemical weapon blister agent. LLNL operations scientists immediately responded and modeled the possible impacts of an explosive release of mustard gas on the gathering, including possible health effects.

However, the truck bomb was just the start of the story. TOPOFF3 planners had created a very realistic and challenging problem, considerably more complex than those posed by other exercises including the previous two TOPOFF events. LLNL staff worked with a wide range of local, state, and federal responders, who provided us information and utilized IMAAC predictions to guide their response activities. However, as with real-world incidents, key data was contradictory or lacking. In collaboration with the LLNL Proliferation Detection and Defense staff, IMAAC operations scientists used advanced modeling tools, well-developed procedures, and past emergency response experience to de-conflict exercise data and solve the emerging puzzle. Expert knowledge of the underlying science for agent chemistry, physical properties of droplets, settling and evaporation characteristics, agent dermal and inhalation health effects was essential.

The 50-ft radius crater left by the explosion indicated that the truck contained ~1300 lbs of explosives, but we realized that a bomb of that size would destroy most of the mustard agent and could not explain the widespread reports of blister agent symptoms. We began considering other possible scenarios. When reports of a small plane flying over the pier area several hours prior to the bomb were communicated to the IMAAC, we immediately modeled an aerial release and produced results consistent with the (sparse and somewhat

contradictory) information on the timing and location of reported inhalation and blister symptoms. We further refined this estimate at the end of Day 1, after receiving an initial set of a few (notional) deposition measurements (the measurements were consistent with the aerial, not explosive, release hypothesis). Over the next two days, IMAAC staff maintained our position (strengthened as additional data was received) that the plane and not the explosion was more likely to be responsible for the chemical casualties, despite repeated misleading information provided by other players. After the exercise, we discovered that the parameters we derived for our original Day 1 characterization of the release were very close to those used by the exercise planners. For example, our release amount agreed to within 5% of the planned value.

The accurate and timely predictions and expert analysis provided during one of the nation's most realistic and complex exercises exceeded expectations and were a major success for the IMAAC and LLNL staff.