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**PURPOSE.** To describe the U.S. Army Public Health Command (Provisional) (USAPHC (Prov)), Army Institute of Public Health (AIPH), use of atmospheric dispersion model outputs from the Defense Threat Reduction Agency (DTRA) and National Oceanic and Atmospheric Administration (NOAA) for the Japan nuclear facility events.

**BACKGROUND.**

a. The NOAA National Weather Service (NWS) uses the Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) model to inform emergency response to hazardous releases. The HYSPLIT is a complete system for computing simple air parcel trajectories to complex dispersion and deposition simulations. The operational NOAA NWS simulations from the Japan site input the NWS Global Forecast System (GFS) meteorology at 1 degree horizontal resolution. For these runs, the dispersion of a pollutant is calculated by assuming puff dispersion in the horizontal and particle dispersion in the vertical. The model's default configuration assumes a 3-dimensional particle distribution. The NOAA simulations typically use a unit source of 1 (one) becquerel over the most recent 72-hour period.

b. The DTRA uses the Hazard Prediction Assessment Capability (HPAC) solution for forward deployable and/or reachback modeling capability. The HPAC is a sophisticated physics-based Gaussian puff 4-dimensional model that assists in emergency response to all chemical, biological, radiological, and nuclear hazardous agent releases. It takes into account terrain and urban areas and all mesoscale weather forecasted models, thus enabling users to model and predict hazard areas and human collateral effects in minutes. The HPAC provides the capability to accurately predict the effects of hazardous material releases into the atmosphere and their impact on populations.

c. The Weather Research and Forecasting (WRF) model is a next-generation mesoscale numerical weather prediction system designed to serve both operational forecasting and atmospheric research needs. It features multiple dynamical cores, a 3-dimensional variational (or 3DVAR) data assimilation system, and a software architecture allowing for computational

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parallelism and system extensibility.  The WRF is suitable for a broad spectrum of applications across scales ranging from meters to thousands of kilometers (km).

d.  The NWS GFS model is a global spectral data assimilation and forecast model system.  The GFS forecasts are produced every 6 hours at 00, 06, 12 and 18 coordinated universal time (or UTC).  The GFS graphics are based on 70-km grid and are available at 6-hour increments out to 384 hours.  The GFS also produces 27-km forecast out to 192 hours.  Recent improvements to the GFS have included an increase in horizontal and vertical resolutions and the ability to represent physical atmospheric processes, which includes an upgraded radiation and cloud package.  The NWS Global Data Assimilation System (GDAS) is an analysis/ operational component of the GFS. The GDAS was formerly known as the final model (or FNL).

**PROCESS.**  The USAPHC (Prov) G6-Geographic Information Systems (GIS) Program is downloading the geographic mapping files (i.e., 'shape' files) for the NOAA/NWS HYSPLIT model outputs.  For the model runs, plume files are being integrated into the G6-GIS projects and then merged with other data layers.  The AIPH-Global Threat Assessment Program is working a similar process for the DTRA model outputs that are automatically available and easily ingestible as a data layer into the GIS project.  Future HPAC development will include incorporating files for use in Goolge™ maps. (Google™ is a trademark of Google, Inc.)

**USE.**  The graphics created from the NOAA/NWS HYSPLIT and DTRA HPAC by G6-GIS are for total radionuclide deposition and concentrations over a given time period and can provide situation awareness and a data source for possible retrospective and forecasted uses.  Combining NOAA/NWS HYSPLIT and DTRA HPAC outputs onto a single graphical display can give an indication of possible downwind hazardous plume areas.

**FUTURE USES.**  The data from the NOAA/NWS HYSPLIT and DTRA HPAC model outputs will be archived for future use in the humanitarian assistance/disaster relief efforts.  This will help identify potentially hazardous areas, and the model results could be used to complement occupational and environmental health exposure measures.

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