Department of Commerce   National Oceanic & Atmospheric Administration   National Weather Service

NATIONAL WEATHER SERVICE INSTRUCTION 10-518

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Operations and Services

Public Weather Services, NWSPD 10-5

NON-WEATHER RELATED EMERGENCY PRODUCTS SPECIFICATION

NOTICE: This publication is available at: http://www.nws.noaa.gov/directives/.

OPR: W/OS22 (P. Stokols)   **Certified by:** W/OS22 (E. Jacks)

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SUMMARY OF REVISIONS: This instruction supersedes NWSI 10-518, "Non-Weather Related Products Specification," dated July 28, 2010. The following revisions were made to this instruction:

 1) Updated procedural guidelines in Sections 2.5, 2.6 and Appendix A 2.2 for using HYSPLIT transport and dispersion model for familiarization and hazardous releases.

2) Based on feedback from EPA, deleted Section 3 and Appendix A 3 and Appendix B #4-7 on Fallout Winds since they are no longer required.

3) Corrected link at USGS in Section 4.2c

Signed   August 8, 2013

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Christopher S. Strager   Date
Acting Director, Office of Climate, Water, and Weather Services

Non-Weather Related Products Specification

1   Introduction

This procedural directive describes NWS support of hazardous releases and homeland security, and non-weather related emergency products issued by the National Centers for Environmental Prediction (NCEP), National Weather Service Weather Forecast Offices (WFO) and National Weather Service Meteorological Watch Offices (MWO).

2   NWS Support of Hazardous Releases and Homeland Security

2.1   Mission Connection

NWS is the primary provider of weather information to emergency responders and other government agencies including observations, forecasts and warnings, model data and model interpretation. To enhance and protect public safety, WFOs and Centers should work closely with the emergency management community and other government agencies to provide decision makers with the appropriate weather information.

2.2   Atmospheric Transport and Dispersion Models

NWS participates with and supports the Atmospheric Transport and Dispersion (ATD) community from local first responders and emergency managers to large agencies such as Environmental Protection Agency (EPA), Department of Defense (DOD), Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA), and Department of Energy (DOE). NWS observations and forecasts, including NCEP models, provide input to a variety of ATD models such as the NOAA/National Ocean Service Areal Locations of Hazardous Atmospheres (ALOHA) model, the NOAA/Air Resources Laboratory Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model, DOD's Hazard Prediction & Assessment Capability (HPAC), and DOE's National Atmospheric Release Advisory Center (NARAC) model. Some models, such as NARAC and HPAC, can use surface observations for an initial period (up to 2 hours from release). Most ATD models can also use DOD hydrometeorological models to initiate and run. (Section 2.6 addresses the Interagency Modeling and Atmospheric Assessment Center (IMAAC).)

2.3   Small Scale, Short Duration Releases

For small scale (0-10 km), short duration (less than one hour) releases, many local jurisdictions including emergency responders use ALOHA (part of the Computer-Aided Management of Emergency Operations (CAMEO) software suite) to forecast the dispersion impact. ALOHA contains a database of hundreds of chemical agents, and is designed to work in concert with CAMEO and MARPLOT (Mapping Application for Response, Planning, and Local Operational Tasks - a companion mapping program). A brief technical description of CAMEO/ALOHA is provided in Appendix A.

2.3.1   WFO Support

WFOs are not expected to run other models such as ALOHA. However, they may be asked to provide a site-specific observation or estimate (usually a wind vector but may include other factors such as stability class or relative humidity [RH]). Forecasters should be familiar with the various types of models and the models themselves to know what types of input may be requested of them by the local emergency responders. Generally, responders use the nearest observation or take an in situ observation and enter the information into the model.

2.4   Large Atmospheric Release

In the event of a large atmospheric release (horizontal extent usually >10 km lasting more than an hour) of some chemical, biological or radioactive contaminant, an emergency manager may call the WFO and request atmospheric transport and dispersion information.

2.4.1   WFO Support

The senior forecaster on duty should perform the following steps when providing atmospheric transport and dispersion information:

    a. Obtain appropriate information such as location and time of release (start and end, if known), rate of release, source term characteristics (if known), size and/or height of release, and who (and how) to contact with the results.

    b. Be prepared to provide local observation and forecast information such as: hourly observations (hourly roundup including ASOS, as well as any local mesonets or available remote sensors), site-specific (spot) forecasts of wind, weather, temperature, RH, and stability. (A commonly used stability index for dispersion is the Pasquill Stability Index shown in Table 1.)

    c. Offer to provide HYSPLIT model output to the requestor (see section 2.5 for procedures to obtain HYSPLIT model results). If accepted, the forecaster will remind the requestor that HYSPLIT output cannot be released to the public without the consent of the Coordinating Agency.

    d. If actual conditions, especially wind speed and direction, are different than the meteorological (typically NAM) model forecast used by HYSPLIT, the forecaster will notify the requester with their interpretation of potential model error.

Table 1. Pasquill Stability Index

A: Extremely unstable conditions	D: Neutral conditions
B: Moderately unstable conditions	E: Slightly stable conditions
C: Slightly unstable conditions	F: Moderately stable conditions
G: Extremely stable conditions	

Meteorological conditions defining Pasquill stability classes. Source: Pasquill, 1961.

Surface wind speed (m/s)	Daytime insolation			Night-time conditions	
	Strong	**Moderate**	**Slight**	**Thin overcast or > 4/8 low cloud**	**<= 4/8 clouds**
< 2	A	A – B	B		
2 - 3	A - B	B	C	E	F
3 - 5	B	B – C	C	D	E
5 - 6	C	C – D	D	D	D
> 6	C	D	D	D	D

NOTES:

1. Strong insolation corresponds to sunny midday in midsummer in England; slight insolation to similar conditions in midwinter.

2. Night refers to the period from 1 hour before sunset to 1 hour after sunrise.

3. The neutral category D should also be used, regardless of wind speed, for overcast conditions during day or night and for any sky conditions during the hour preceding or following night as defined above.

Pasquill Stability classes for fluctuations in wind direction and the vertical temperature gradient.

Pasquill Class	Sigma Theta (degrees)	Delta T/Delta Z (Deg. C/100 m)
A	25	-1.9
B	20	-1.9 to -1.7
C	15	-1.7 to -1.5
D	10	-1.5 to -0.5
E	5	-0.5 to 1.5
F	2.5	1.5 to 4.0
G	1.7	>4.0

2.5 Procedures for Obtaining HYSPLIT Dispersion Model Results for Familiarization and Hazardous Releases

2.5.1 Request for On-Demand HYSPLIT Forecast

When a WFO or OCONUS (Outside Contiguous United Stated) Meteorological Watch Office (MWO) is asked for a dispersion forecast, usually by an emergency manager or another federal agency such as the Nuclear Regulatory Commission (NRC), the forecaster should perform the following steps:

   a. Obtain appropriate source information such as specific location (latitude and longitude), size and/or height of release, start and end time of release, and type of contaminant (if known).
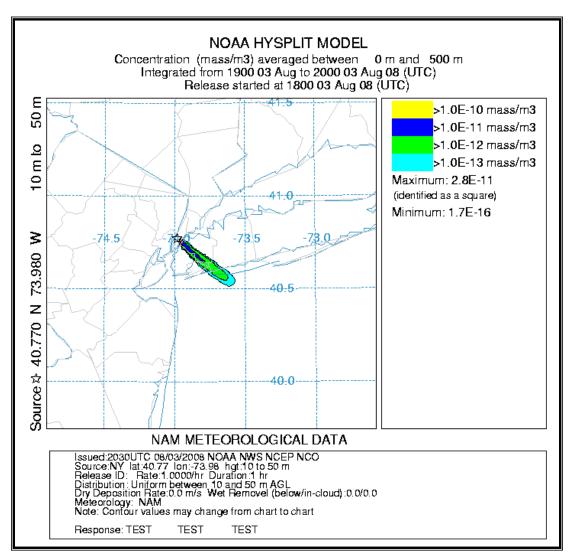
b. Go to Interactive Web-based HYSPLIT for WFOs (WOC HYSPLIT) . A web-based version of HYSPLIT has been developed by the NOAA Air Resources Laboratory to be used by the WFO to run HYSPLIT interactively and is available at: (https://www.hysplit.noaa.gov) The web-based version (WOC HYSPLIT) allows the forecaster to choose the model parameters and the meteorological data on which to base the run, and provides him or her the ability to run multiple scenarios without impacting the resources of the NCEP Senior Duty Meteorologist (SDM). Access to the WOC HYSPLIT web site is available to all NOAA employees. The WOC HYSPLIT web site has links to the operational NCEP web site and to HYSPLIT training and informational materials. Model results from the web-based version of HYSPLIT will usually be available to the user within a few minutes of submitting the model run. If problems are encountered with the website or questions arise with the inputs, the on-demand run should be requested from the SDM (go to 2.5.2).

c. Enter log-in name and password (NOAA e-mail address and password)

d. Under Dispersion Model, choose "Run the model with current data." (The trajectory model can also be used, if needed, but will not be discussed here.)

e. Using the pull down menus, choose:

- the release type, meteorology, and source location (remember – west longitudes are prefixed with – (minus) and tenths of a degree as -90.9 which is to say 90 deg 54 min W)

- meteorological data cycle hour and output options

- confirm/modify the run details and output parameters (shape files, .kmz (Google Earth©), etc.)

- quality control the input

f. Request the run and pass the graphical results to the requestor via email, fax, or other similar method.

2.5.2   Backup Means to Request On-Demand HYSPLIT Forecast run from the SDM.

If problems are encountered with the website or questions arise with the inputs, the on-demand run should be requested from the SDM. Note, some products available on the web site may not be available to the SDM.

a. Obtain appropriate source information such as specific location (latitude and longitude), size and/or height of release, start and end time of release, type of contaminant (if known), and an identifier for the incident which is mutually agreed upon by both the requestor and the forecaster.

b. Call the SDM. *The SDM phone number should be included in local office emergency procedures.*

c. The SDM will run the HYSPLIT model with the inputs provided by the WFO, post the results to the NCEP secure web site, and notify the requesting WFO when the HYSPLIT output is available.

d. The output will be made available on the NCEP secure web site https://hysplit.ncep.noaa.gov/ within 10-15 minutes (see Figure 1 for an example of the type of output). The requested run will be located under the section titled "On-Demand Runs" with the above mentioned incident identifier (Figure 2).

e. Click on the incident identifier. From the table presented, find the model run time (most recent will be at the top) for links to the model output in individual and looping GIF images, kmz files (Google Earth©), Postscript files (ideal for detailed printing), and Geographical Information System (GIS) shapefiles in compressed tape archive (TAR) format.

f. The forecaster should coordinate with the requestor to determine how the output will be disseminated (e-mail attachment, fax, FTP, etc.).

Figure 1. Sample dispersion output from HYSPLIT.

NCEP HYSPLIT Model Forecast Runs

On-Demand Runs	
RUN ID	Time of Last Update

Regularly Scheduled Runs	
RUN ID	Time of Last Update
AZ	Jul 31 08:23 UTC
CA	Jul 31 08:31 UTC
DC	Jul 31 08:29 UTC
DEN	Jul 31 08:23 UTC
FPR	Jul 31 08:25 UTC
GABY	Jul 31 08:32 UTC
KA	Jul 31 08:31 UTC
KY	Jul 31 08:23 UTC
LAS	Jul 31 08:29 UTC
LA	Jul 31 08:27 UTC
LOT	Jul 31 08:34 UTC
MA	Jul 31 08:33 UTC
ME	Jul 31 08:33 UTC
MHX	Jul 31 08:36 UTC
MI	Jul 31 08:27 UTC
MN	Jul 31 08:33 UTC
MT	Jul 31 08:25 UTC
NE	Jul 31 08:30 UTC
NY	Jul 31 08:31 UTC
ORL	Jul 31 08:29 UTC

Figure 2. Format of NCEP secure web site.

2.5.3   Routine HYSPLIT Forecasts

The same NCEP web site used to access on-demand HYSPLIT requests also provides real-time access to HYSPLIT output for about 20 changeable locations run routinely in NCEP operations (Fig. 2). The output is based on HYSPLIT runs using the current NAM meteorological data that is updated four times daily. This option can be useful for a continuing situation at a fixed location, such as a wildfire that burns for days. Contact your regional Meteorological Services Division for access or to request additional sites be added to the list.

2.5.4   WFO HYSPLIT Testing

All forecasters at WFOs will run annual drills using the WOC HYSPLIT interactive web site and an occasional on-demand test from the SDM. Forecasters should become familiar with procedures to request and access HYSPLIT model runs from both sources in the event of a real emergency.

To test system viability and operational readiness, Office of Climate, Water and Weather Services Fire and Public Weather Services Branch (OS22) will coordinate testing periodically at specific sites with prior notification of the responsible WFO. MSDs and MICs should inform OS22 of any conflicts or local critical needs that may allow local offices to opt out of a test and may alter the schedule according to local needs. By spreading out access over a period of several weeks, impacts on the SDM and the web will be minimized. However, any office may access the NCEP secure web site or the WOC HYSPLIT web site at any time. Any problems should be noted and relayed to the SDM. Comments, concerns, issues may be sent to OS22.

2.6   Interagency Modeling and Atmospheric Assessment Center (IMAAC)

As described in the Nuclear/Radiological Incident Annex to the National Response Framework (http://www.fema.gov/emergency/nrf/incidentannexes.htm), the IMAAC provides the single source of Federal airborne hazard consequence predictions (plume prediction) for incidents requiring Federal coordination. The IMAAC will leverage the combined expertise of all Federal departments and agencies with ATD capabilities to provide a single, best, prediction of airborne hazard consequence. The IMAAC recognizes and subscribes to all statutory requirements which pertain to airborne transport and dispersion.

2.6.1   IMAAC Concept of Operations

The IMAAC is a virtual construct in that it recognizes that many Federal agencies have ATD models, each model has one or more areas for which they specialize, and some Federal departments and agencies are, by law, the agency responsible for providing dispersion predictions for specific situations. "For example, Defense Threat Reduction Agency (DTRA) is responsible for supporting incidents requiring dispersion modeling when the source is under DOD control or on a DOD facility or property. When an incident has progressed to the point where Federal coordination may be required, the IMAAC Operations Coordinator (IOC), located in the Department of Homeland Security's National Operations Center (DHS/NOC) will be directed by the DHS Senior Watch Officer (SWO) to request a plume prediction. The IOC will determine which Federal ATD model is best suited for the situation and direct the agency responsible to produce a plot. The resulting output from the model will be sent to the Incident Commander, the DHS/NOC, and other subject matter experts.

The IMAAC will coordinate and consult directly with the local NWS forecast office, Regional Operations Center (ROC) and the NOAA Watch Desk in the DHS/NOC regarding the local meteorological conditions as they relate to the plume prediction run and provided by the IMAAC.

3   Earthquake Reports (product category EQR)

WFOs issue EQRs to disseminate macroseismic ("felt") earthquake information to the United States Geological Survey's (USGS) National Earthquake Information Center (NEIC), the West

Coast/Alaska Tsunami Warning Center (WC/ATWC), the Richard H. Hagemeyer Pacific Tsunami Warning Center (PTWC), other partners, and users.

3.1 Mission Connection

NWS offices issue information received on earthquakes occurring within the United States, Puerto Rico and U.S. Virgin Islands, Guam, American Samoa, the Federated States of Micronesia, the Republic of Palau, and the Republic of the Marshall Islands. This information is disseminated to both the public and the NEIC.

The NEIC collects both descriptive and specific technical information to determine the various earthquake parameters and issues statements and bulletins for earthquakes occurring both domestically and around the world. The WC/ATWC and the PTWC serve as supporting seismological observatories to the NEIC in addition to their primary function as NWS tsunami warning centers. Both are responsible for determining if an earthquake is of a magnitude with the potential to generate a tsunami, determine if a tsunami has been generated, and if so, (1) issuing appropriate hazard messages; and, (2) disseminating appropriate earthquake/tsunami information.

3.2 Issuance Guidelines

EQRs should be disseminated on the NOAA Weather Wire Service (NWWS) and Automated Weather Information Processing System (AWIPS). Unique reporting procedures are described below for NWS offices in four broad areas. Once more precise, quantitative seismic information is received from either the NEIC (for earthquakes less than 6.0 on the Magnitude X Scale) or the WC/ATWC (using EQIWOC (U.S. West Coast Tsunami Seismic Information Statement) for coastal earthquakes 4.0 or greater on the Magnitude X Scale) it should be incorporated into updated EQRs. WFOs in the felt area of the earthquake (within their geographic area of responsibility) should broadcast EQRs on appropriate NOAA Weather Radio (NWR) transmitters.

a. **WFOs in the Contiguous United States (except the West Coast) and Puerto Rico**. WFOs in this area should disseminate EQRs for Mercalli Intensity IV or greater earthquakes (see Table 3 for details on the Mercalli Scale). Once more precise quantitative seismic information is known at the NEIC, it should be incorporated into an updated EQR. WFOs in the felt area of the earthquake (within their geographic area of responsibility) should broadcast EQRs on appropriate NOAA Weather Radio (NWR) transmitters.

b. **WFOs on the West Coast of the United States**. Offices in this region should initially disseminate EQRs with felt information only for Mercalli Intensity IV or greater earthquakes.

c. **WFOs and Weather Service Offices (WSOs) in Alaska**. NWS offices in the Alaska Region should disseminate EQRs with felt information only for Mercalli Intensity IV or greater earthquakes. Preliminary EQRs should not be broadcast over NWR in coastal areas as it could trigger unnecessary evacuations. As time/workload

permits, NWS offices in this region should also submit felt information to the USGS at http://earthquake.usgs.gov/earthquakes/dyfi/.

NOTE: The EQIAKX Alaska Tsunami Seismic Information Statements may be broadcast on NWR transmitters in the "felt area" as a public service. **NWS offices in Alaska *will not* redistribute this information in an updated EQR.**

d. **WFOs, WSOs, and Data Collection Offices (DCOs) in Pacific Region**. WFOs in Hawaii and Guam; WSOs in American Samoa, the Federated States of Micronesia, the Republic of Palau, and the Republic of the Marshall Islands, and DCOs in Hawaii should only disseminate preliminary EQRs for Mercalli Intensity IV or greater earthquakes. EQRs should not be broadcast over NWR.

NOTE: PTWC disseminates Tsunami Seismic Information Statements for Hawaii (EQIHWX) for earthquakes occurring in Hawaii of a magnitude 4.0 or greater on the Magnitude X Scale and Tsunami Information Bulletins for earthquakes 6.5 or greater in its AOR that do not produce tsunamis. This information may be broadcast on NWR transmitters in the "felt area" as a public service. **Pacific Region offices *will not* issue updated EQRs with this information.**

Table 3 Modified Mercalli Intensity (Damage) Scale of 1931

Scale	Mercalli Intensity Scale Description
I.	Not felt except by a very few under especially favorable circumstances.
II.	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
III.	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibration like passing truck. Duration estimated.
IV.	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, and doors disturbed; walls make creaking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably.
V.	Felt by nearly everyone; many awakened. Some dishes, windows, etc. broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
VI.	Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
VII.	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures. Some chimneys broken. Noticed by persons driving motorcars.

Scale	Mercalli Intensity Scale Description
VIII.	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motorcars disturbed.
IX.	Damage considerable to specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
X.	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.
XI.	Few, if any (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
XII.	Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

> NOTE: This is considered to be a classical scale similar to the Beaufort Scale. Thus a more modern version has not been developed.

3.2.1 Creation Software

EQRs should be generated in GFE or other text editor software (e.g., AFTN/MET at Pacific Region WSOs).

3.2.2 Issuance Criteria

The EQR is a non-routine, event-driven product. EQRs should be issued using the following guidelines:

   a. Earthquakes of Intensity IV or greater on the Modified Mercalli Scale (see Table 3 for details) should be reported in accordance with the provisions specified in section 4.2a-d.

   b. EQR information should be factual and validated, if possible.

   c. EQRs should be in plain language, avoiding abbreviations and local jargon and place names.

   d. NWS personnel should confirm with the NEIC that the event was an earthquake before disseminating the EQR. If desired, confirmation may be obtained by calling the NEIC duty seismologist at 303-273-8500 x1 (24-hour). Earthquake confirmation is recommended when it is not clear whether the shaking was caused by an earthquake or something else, such as quarry blast, sonic boom, etc.

3.2.2.1 Earthquakes at WFOs

In addition to EQR responsibilities outlined above, the USGS/NEIC has requested NWS offices submit a web-based earthquake report immediately (or as soon as an Internet connection can be established) to them at: http://earthquake.usgs.gov/eqcenter/dyfi/ (use online form at Report Unknown Event) for any Mercalli Intensity Level V (see criteria above) or greater earthquake:

> The report should be submitted for earthquakes that are of sufficient strength at local NWS field offices to knock objects off shelves, displace appliances, crack glass, or be perceived as strong enough to be alarming. Such earthquakes are substantially less frequent than earthquakes that are merely felt. If the earthquake makes a strong impression on the people or significantly displaces objects in a WFO, NEIC would like the questionnaire. If there is doubt as to whether the earthquake was sufficiently strong to merit completion of a questionnaire, field personnel can assume no report is needed.

In the event of a major earthquake swarm or aftershock sequence, in which it is impractical to report every felt shock, report the stronger shocks. These would typically be no more than several a day. Although optional, NEIC requests personnel at WFOs identify themselves to lend more credence to the web-based report.

3.2.3 Issuance Time

EQRs are transmitted as soon as reliable information is received indicating an earthquake has occurred.

3.2.4 Valid Time

EQRs are valid upon transmission.

3.2.5 Product Expiration Time

The product expiration time is generally 3-6 hours after the product issuance time. The product expiration time is placed at the end of the UGC line.

3.3 Technical Description

EQRs will follow the format and content described in this section.

3.3.1 Universal Geographic Code Type

WFOs will use the (Z) form of the Universal Geographic Code (UGC). The UGC line will include the zone(s) affected.

3.3.2 Mass News Disseminator (MND) Broadcast Line

Not applicable.

3.3.3 MND Header

The MND Headers for the EQR are "EARTHQUAKE REPORT...PRELIMINARY" and "EARTHQUAKE REPORT...UPDATED".

3.3.4   Content

With the exceptions noted below, each EQR should have the following general elements and format depending on whether it is a preliminary or an updated report:

3.3.4.1   Preliminary Earthquake Report

Until official information can be obtained from the USGS/NEIC, WC/ATWC, or PTWC, NWS offices will send out qualitative messages:

EARTHQUAKE FELT_____ BY ____ IN ____. _____ DAMAGE _____.
　　　　　　　　　　(a)　　　　　(b)　　(c)　　(d)　　　　　　(e)

   (a) VERY STRONGLY, STRONGLY, MODERATELY, WEAKLY

   (b) (single) OBSERVER, FEW, MANY, etc.

   (c) Give locality or localities

   (d) CONSIDERABLE, MODERATE, SLIGHT, NO

   (e) Give brief description of damage, e.g., CHIMNEYS BROKEN, TOWERS FELL, STRUCTURES DESTROYED, WALLS CRACKED, DISHES RATTLED, BUILDING SHIFTED, CASUALTIES.

In addition, NWS offices will add the following statement at the end of a preliminary Earthquake Report depending on their location:

CONUS Regions:

INFORMATION RELEASED IN THIS STATEMENT IS PRELIMINARY. UPDATES... INCLUDING MAGNITUDE X SCALE MAGNITUDE...WILL BE PROVIDED AS MORE INFORMATION BECOMES AVAILABLE FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO.

Alaska and Pacific Region:

INFORMATION RELEASED IN THIS STATEMENT IS PRELIMINARY. OFFICIAL INFORMATION...INCLUDING EARTHQUAKE LOCATION AND MAGNITUDE X SCALE MAGNITUDE...WILL BE PROVIDED BY THE WC/ATWC (or PTWC, as appropriate) AS IT BECOMES AVAILABLE.

NOTE: Official information will be disseminated by the WC/ATWC or PTWC via Earthquake Information Statements. These statements will serve as the update to the preliminary EQR and may be broadcast over the NWR. Alaska and Pacific Region offices will not redistribute this information in an updated EQR.

3.3.4.2   Updated Earthquake Report

(NOTE: Applicable to CONUS regions only.) Once official quantitative information is received from the USGS/NEIC or WC/ATWC (for Washington, Oregon, and California for Magnitude X Scale 6.0 or greater earthquakes), NWS offices should incorporate it in an updated EQR:

EARTHQUAKE FELT_____ BY ____ IN ____. _____ DAMAGE _____.
              (a)   (b)   (c)   (d)   (e)

(a) VERY STRONGLY, STRONGLY, MODERATELY, WEAKLY

(b) (single) OBSERVER, FEW, MANY, etc.

(c) Give locality or localities

(d) CONSIDERABLE, MODERATE, SLIGHT, NO

(e) Give brief description of damage, e.g., CHIMNEYS BROKEN, TOWERS FELL, STRUCTURES DESTROYED, WALLS CRACKED, DISHES RATTLED, BUILDING SHIFTED, CASUALTIES.

THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO (or WC/ATWC, as appropriate) **INDICATED THE EARTHQUAKE MAGNITUDE (#) ON THE MAGNITUDE X SCALE WAS CENTERED AT** (lat/lon) **OR ABOUT** (miles) (direction) **OF** (city, state).

CONUS regions will add the following statement at the end of an <u>updated</u> Earthquake Report:

ANY FURTHER INFORMATION WILL BE MADE AVAILABLE WHEN IT IS RECEIVED FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO (or WC/ATWC, as appropriate).

3.3.5 EQR Generic Format

3.3.5.1 Preliminary EQR Issued in Contiguous U.S. and Puerto Rico

Product Format	Description of Entry
SEaaii cccc ddhhmm	*(WMO Heading)*
EQRxxx	*(AWIPS ID)*
stZ001-002-003-004-005>015-ddhhmm-	*(UGC: Z & Product expiration time)*
EARTHQUAKE REPORT...PRELIMINARY	*(Product Name* or *MND)*
NATIONAL WEATHER SERVICE city state	*(Issuing Office)*
time am/pm time_zone day mon dd yyyy	*(Issuance time/date)*
EARTHQUAKE FELT_____ BY ____ IN ____. _____ DAMAGE _____.	***(REQUIRED ENTRY - Refer to Section 4.3.4.1)***
[Remainder of text]	
INFORMATION RELEASED IN THIS STATEMENT IS PRELIMINARY. UPDATES... INCLUDING MAGNITUDE X SCALE MAGNITUDE...WILL BE PROVIDED AS MORE INFORMATION BECOMES AVAILABLE FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO.	***(REQUIRED ENTRY - End of Product, see Sect. 4.3.4.1)***
$$	*(UGC Delimiter)*
Name/Initials/Forecaster ID	*(Optional)*

Figure 4. Generic format for a Preliminary EQR in the Contiguous U.S. and Puerto Rico

3.3.5.2 Preliminary EQR Issued in Alaska and Pacific Region

Product Format	Description of Entry
SEaaii cccc ddhhmm	*(WMO Heading)*
EQRxxx	*(AWIPS ID)*
stZ001-002-003-004-005>015-ddhhmm-	(UGC: Z & Product expiration time)
EARTHQUAKE REPORT...PRELIMINARY	*(Product Name* or *MND)*
NATIONAL WEATHER SERVICE city state	*(Issuing Office)*
time am/pm time_zone day mon dd yyyy	*(Issuance time/date)*
EARTHQUAKE FELT_____ BY ____ IN ____. _____ DAMAGE _____.	***(REQUIRED ENTRY - Refer to Section 4.3.4.1)***
[Remainder of text]	
INFORMATION RELEASED IN THIS STATEMENT IS PRELIMINARY. OFFICIAL INFORMATION... INCLUDING EARTHQUAKE LOCATION AND Magnitude X...WILL BE PROVIDED BY THE WC/ATWC (or PTWC, as appropriate) AS IT BECOMES AVAILABLE.	***(REQUIRED ENTRY - End of Product, see Sect. 4.3.4.1)***
$$	*(UGC Delimiter)*
Name/Initials/Forecaster ID	*(Optional)*

Figure 5. Generic format for a Preliminary EQR in Alaska or Pacific Region

3.3.5.3   Updated EQR Issued in Contiguous U.S. and Puerto Rico

Product Format	Description of Entry
SEaaii cccc ddhhmm	*(WMO Heading)*
EQRxxx	*(AWIPS ID)*
stZ001-002-003-004-005>015-ddhhmm-	*(UGC: Z & Product expiration*
EARTHQUAKE REPORT...UPDATED	*time)*
NATIONAL WEATHER SERVICE city state	
time am/pm time_zone day mon dd yyyy	*(Product Name* or *MND)*
	(Issuing Office)
	(Issuance time/date)
"EARTHQUAKE FELT_____ BY ____ IN ____.	
_____ DAMAGE _____."	***(REQUIRED ENTRY - Refer to***
	Section 4.3.4.2)
THE NATIONAL EARTHQUAKE INFORMATION	
CENTER IN GOLDEN COLORADO (or WC/ATWC)	
INDICATED THE EARTHQUAKE MAGNITUDE (#)	
ON THE MAGNITUDE X SCALE WAS CENTERED	
AT (lat/lon) OR ABOUT (miles) (direction) OF (city,	
state).	
[Remainder of text]	
ANY FURTHER INFORMATION WILL BE MADE	
AVAILABLE WHEN IT IS RECEIVED FROM THE	
NATIONAL EARTHQUAKE INFORMATION	
CENTER IN GOLDEN COLORADO (OR WC/ATWC,	***(REQUIRED ENTRY - End of***
as appropriate).	***Product, see Sect. 4.3.4.2)***
$$	
Name/Initials/Forecaster ID	
	(UGC Delimiter)
	(Optional)

Figure 6. Generic format for an Updated EQR in the Contiguous U.S. and Puerto Rico.

3.4   Updates, Amendments, and Corrections

If additional information concerning damage or injuries within the area of the reporting office becomes available within 24 hours of the time of the initial message, updated EQR(s) should be sent to NEIC with this information. NEIC issues the following specialized earthquake messages:

3.4.1   Earthquake Alert - General Message

(WMO Header SEXX02 KNEC, NWWS Header NECEQREQS, AWIPS Header EQREQS). An Earthquake alert is issued by the NEIC for an earthquake that has met one of the following criteria:

(1) Magnitude X Scale magnitude 6.5 or greater

(2) caused or likely to have casualties or significant damage

(3) Magnitude X Scale magnitude 4.5 or greater within the contiguous United States

(4) felt strongly enough in the United States to generate inquiries from the news media or public

(5) other events determined to be newsworthy by the NEIC duty geophysicist. The product includes a descriptive summary only and is intended for the news media and general public.

3.4.2   Earthquake Alert - Scientific Message

(WMO Header SEXX01 KNEC, NWWS Header NECEQREQB, AWIPS Header EQREQB). This is an information message about an earthquake that has met one of the following criteria: (1) magnitude 5.5 or greater, (2) caused or likely to have caused casualties or significant damage, (3) magnitude 4.5 or greater within the contiguous United States, (4) felt strongly enough in the United States to generate inquiries from the news media or public, or (5) other events determined to be of scientific interest by the NEIC duty geophysicist. The intended audience includes civil defense agencies, dam operators, power plants, railroads, insurance companies, relief agencies, schools, and scientists. The product contains the earthquake location, time of occurrence, magnitude, depth of focus, felt effects, and data used in the processing.

3.4.3   Quick Epicenter Determination

(WMO Header SEXX03 KNEC, NWWS Header NECEQRQED, AFOS Header EQRQED). This is a global listing of earthquakes that have been located by the NEIC. The listing is issued daily and generally contains 20 to 30 events for the date 7 days prior to the current date (e.g., the July 24th bulletin contains a listing of earthquakes observed on July 17th).

3.4.4   Daily Summary of United States Earthquakes

(WMO Header SEUS42 KNEC, NWWS Header NECEQRSUM, AWIPS Header EQRSUM). This is a listing of United States earthquakes that occurred in the last 30 hours, grouped into 6 regions: Southwest, West Central, Northwest, Eastern, Hawaii, and Alaska.

4   Non-Weather Emergency Messages

WFOs will relay non-weather emergency messages (NWEMs) to provide time-critical life or property saving emergency information from federal, state, tribal and local officials.

4.1   Mission Connection

In keeping with the expanding function of NWS dissemination systems as "all hazard", the NWS allows the use of its dissemination systems by other government agencies, on a highly selective basis, for potential life-saving messages.

WFOs will collaborate with Federal, state, tribal and local officials to develop agreements and Emergency Alert System (EAS) Plans for releasing non-weather emergency messages over NWS dissemination systems. Non-weather emergency messages for events affecting all or a significant portion of a state should be coordinated through a single state authority, such as the

public health department or emergency management agency. This coordination reduces the number of messages issued and provides a more coherent service to the public.

4.2   Issuance Guidelines

WFOs will develop and institute authentication procedures with state, tribal and local government officials to minimize the possibility of a false or inappropriate release of a non-weather emergency message. Federal, state, tribal and local government officials will be encouraged to use the NWS All Hazards Message Collection System (HazCollect) which incorporates authentication procedures maintained by the U.S. Department of Homeland Security.

4.2.1   Creation Software

WFOs should use the AWIPS Graphical Hazards Generator (GHG) software to create non-weather emergency messages. Authorized emergency response organizations may also generate NWEMs through the use of incident management systems interoperable with HazCollect. See NWSI 10-1708, HazCollect.

4.2.2   Issuance Criteria

Messages disseminated as non-weather emergency messages will comply with all the following criteria:

a. PUBLIC SAFETY IS INVOLVED--Information to be disseminated will aid in reducing the loss of life or the substantial loss of property.

b. OFFICIAL INFORMATION--The source of the information should be a federal, state, tribal or local government agency, whose information directly supports federal responsibilities concerning the protection of life and property.

c. TIME CRITICAL--Event requires immediate public knowledge to avoid adverse impact.

d. Other means of disseminating the information are not adequate to ensure rapid delivery of urgent information of an immediate threat or of significant importance to the protection of life and property.

e. Information length and format is consistent with other NWS disseminated material. The free-text narrative section will be limited to 200 words to accommodate the 2-minute maximum audio length imposed by the EAS.

f. Information is non-routine and infrequent (see Appendix C).

g. Information is complementary and not counterproductive to the NWS warning program.

4.2.3   Issuance Time

A non-weather emergency message is a non-scheduled product and will be relayed at the request of federal, state, tribal or local officials over NWS dissemination systems.

4.2.4   Valid Time

A non-weather emergency message is valid for the time designated by the requesting federal, state, tribal or local official in the text message, when appropriate.

4.2.5   Product Expiration Time

The expiration time is designated by the requesting federal, state, tribal or local official and is placed in the UGC.

4.2.6   Event Expiration Time

The event expiration time is designated by the requesting federal, state, tribal or local official in the text message, when appropriate.

4.2.7   Technical Description

Non-weather emergency messages follow the format and content described in this section.

4.2.8   AWIPS Identifier line

NWEM product AWIPS identifiers take the form NNNXXX or NNNXX defined where NNN is defined in Table 4 and XXX and XX is define as follows:

> a. AWIPS ID NNNXXX, where XXX = site ID, is used for NWEM products issued by local city or county jurisdictions;
> b. AWIPS ID NNNXX, where XX = USPS 2-character state or territorial ID, is used for NWEM products issued by state or Federal agencies. The XX = US will be used by Federal agency and regional authorities for large regions or the entire country when that capability becomes available; and
> c. AWIPS ID NNNXXX, where XXX = site ID, is used for any NWEM that includes a marine zone (this requirement is caused by AWIPS zone-county correlation file and software relationships). In the event the message also includes land areas, two NWEM products will be generated for the event, e.g., NNNXXX (site ID) or NNNXX (state ID) for the land area and NNNXXX (site ID) for the marine zone(s).

4.2.9   Universal Geographic Code Type

WFOs in the Alaska Region will use the (Z) form of the Universal Geographic Code (UGC), and WFOs in the remaining regions will use the (C) form of the UGC. The UGC for statements will include the county(ies) or zone(s) affected by the event.

4.2.10 MND Instruction line

The Mass News Disseminator (MND) broadcast instruction line will include one of the following phrases at the request of the authorizing agency:

  "BULLETIN - EAS ACTIVATION REQUESTED",
  "BULLETIN - IMMEDIATE BROADCAST REQUESTED",
  "URGENT - IMMEDIATE BROADCAST REQUESTED"

  Note: The use of "EAS ACTIVATION REQUESTED" or "IMMEDIATE BROADCAST REQUESTED" is at the discretion of state and local EAS committees.

The use of "BULLETIN" and "URGENT" follows convention established by the print and electronic media. These terms signify levels of dissemination urgency. The NWS only uses "BULLETIN" and "URGENT" in weather-related messages, but other instructions may be used at the request of the authorizing agency. The complete list of MND broadcast instruction lines is in NWSI 10-1701.

4.2.11 Mass News Disseminator Product Type Line

The MND will include the Product Type Line from Table 4 that matches an appropriate event description in Appendix C. The listed AWIPS Identifier product categories (NNN) and MND Product Type Line titles intentionally mimic the NWR Specific Area Message Encoding (SAME) and EAS Event Code and Nature of Activation titles of the identical non-weather emergency messages. Demonstration and test message product categories not listed in Appendix C are included in Table 4 and may be created through use of GHG or HazCollect as each become approved and implemented.

Table 4 Non-weather emergency message product categories and product names

AWIPS NNN	MND Product Type Line	AWIPS NNN	MND Product Type Line
ADR	Administrative Message	HMW	Hazardous Materials Warning
AVA	Avalanche Watch	LEW	Law Enforcement Warning
AVW	Avalanche Warning	LAE	Local Area Emergency
CAE	Child Abduction Emergency	NUW	Nuclear Power Plant Warning
CDW	Civil Danger Warning	RHW	Radiological Hazard Warning
CEM	Civil Emergency Message	SPW	Shelter In Place Warning
EQW	Earthquake Warning	TOE	911 Telephone Outage Emergency
EVI	Evacuation Immediate	VOW	Volcano Warning
FRW	Fire Warning	DMO	Practice/Demo Warning
RWT	Required Weekly Test	RMT	Required Monthly Test
NPT*	National Periodic Test	NST*	National Silent Test

*for future use

4.2.12 Non-Weather Emergency Message Content

    a. Headline. A headline statement may be included if appropriate.

    b. Information Source. The lead-in to the non-NWS message will contain the source of the information in a format consistent with the following:

        "The following message is transmitted at the request of (OTHER GOVERNMENT AGENCY) (remainder of text)."

    c. Content of Text. Detailed content is obtained from the civil authority(s) requesting agency. If the authorizing agency requests EAS activation, the word count of the message should be 200 words or less, so that broadcast over NWS and EAS takes less than two minutes. The following information will be included as appropriate:

1) type of hazard

2) location of hazard

3) actions to be taken by affected people

4) where to get additional information (such as point of contact, phone #, website)

d. Where demographics demand and logistics have been preplanned, the originator may provide text in multiple languages for NWS dissemination.

4.2.13 Non-Weather Emergency Message Generic Format

4.2.13.1 Relayed from the Contiguous U.S. Regions and Pacific Region

Product Format	Description of Entry
WOUSii cccc ddhhmm	*(WMO Heading)*
nnnxxx	*(AWIPS ID; may be nnnxx)*
stC001-002-003-004-005>015-ddhhmm-	*(UGC: C (Z for AVA, AVW) & Product expiration time)*
BULLETIN - EAS ACTIVATION REQUESTED	*(MND Broadcast Instruction)*
non-weather emergency message	*(Product name or MND)*
government agency name city state	*(Requesting Agency)*
RELAYED BY NATIONAL WEATHER SERVICE city state	*(NWS Issuing Office)*
time am/pm time_zone day mon dd yyyy	*(Issuance time/date)*
...[Headline]...	*(Optional)*
"The following message is transmitted at the request of (OTHER GOVERNMENT AGENCY)"	*(Information Source)*
[Remainder of text]	
$$	*(UGC Delimiter)*
Name/Initials/Forecaster ID	*(Optional)*

Figure 7. Generic format for a non-weather emergency message relayed in the Contiguous U.S. and Pacific Regions.

4.2.13.2 Relayed in Alaska Region

Product Format	Description of Entry
WOaaii cccc ddhhmm	*(WMO Heading)*
nnnxxx	*(AWIPS ID; may be nnnxx)*
stZ001-002-003-004-005>015-ddhhmm-	*(UGC: Z & Product expiration time)*
BULLETIN - EAS ACTIVATION REQUESTED	*(MND Broadcast Instruction)*
non-weather emergency message	*(Product name or MND)*
government agency name city state	*(Requesting Agency)*
RELAYED BY NATIONAL WEATHER SERVICE city state	*(NWS Issuing Office)*
time am/pm time_zone day mon dd yyyy	*(Issuance time/date)*
...[Headline]...	*(Optional)*
"The following message is transmitted at the request of (OTHER GOVERNMENT AGENCY)"	*(Information Source)*
[Remainder of text]	
$$	*(UGC Delimiter)*
Name/Initials/Forecaster ID	*(Optional)*

Figure 8. Generic format for a non-weather emergency message relayed in the Alaska Region.

4.3   Non-Weather Emergency Message Agreements

4.3.1   Local Non-Weather Emergencies Covered by Agreement

Statewide agreements should cover most anticipated situations. In some cases, such as Amber Alerts, a separate agreement may be necessary with a law enforcement or justice agency. Copies of these agreements and detailed procedures to carry out the agreements should be kept in the WFO operations area. Agreements to disseminate non-weather emergency information (including possible use of the warning alarm tones and NWR-SAME codes) will be approved by the RH.

4.3.2   Local Non-Weather Emergencies Not Covered by Agreement

Any crisis could have facets that are different from, or unaddressed by, this directive. As a result, nothing in this directive should supersede good judgment, common sense, and the need to preserve life and prevent injury. At times when events occur requiring the use of NWS dissemination systems by known and verified government sources that are not covered by any agreements, the senior forecaster on duty should accept the request for relay of the emergency information. The regional headquarters should be contacted as soon as possible afterward with details of the event and to assess the need for a new agreement or addendum to cover future similar events. Examples of situations that would fall under this category are (1) a serious

chemical spill or leak, (2) an explosion in a populated area, or (3) a dangerous nuclear or bio-hazard release, whether accidental or result of an act of terrorism.

4.4   Updates and Corrections

WFOs should relay a time-critical updated non-weather emergency message over NWS dissemination systems at the request of a federal, state, tribal or local official. Updates (including cancellations) of an event in progress should be sent as an Administrative Message (see ADR description in Appendix C). If an event has expanded into additional county(s) or geographic zone(s), or if the expiration time has been extended, a new NWEM of the event type should be issued. No additional formatting for an updated non-weather emergency message is required. Proofread your non-weather emergency message prior to sending message. If typographical errors significant enough to cause confusion in individuals that need to take protective action or to change the intent of the message are found after transmission, correct the error and retransmit the product using the original AWIPS product category in the following format:

WOUSii cccc ddhhmm CCx   *(Where, x=A,B,C...,X)*
Nnnxxx
stC001-ddhhmm-   *(Z UGC Type for non-weather
                                                                                emergency messages issued in
                                                                                Alaska Region and for AVA and
                                                                                AVW products)*

BULLETIN - EAS ACTIVATION REQUESTED
non-weather emergency message...**CORRECTED**
government agency name city state
RELAYED BY NATIONAL WEATHER SERVICE city state
time am/pm time_zone day mon dd yyyy

CORRECTED FOR TYPOGRAPHICAL ERROR

THE FOLLOWING MESSAGE IS TRANSMITTED AT THE REQUEST OF...

APPENDIX A - Weather Emergency Models and Product Examples
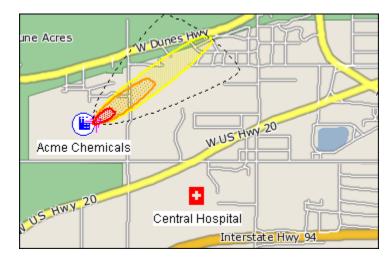
A.1   Introduction

This section contains information and examples of models and products used for non-weather related emergency events.

A.2   Technical Description of Atmospheric Transport and Dispersion Models (ATD)

A.2.1   CAMEO - Computer-Aided Management of Emergency Operations

CAMEO is a suite of software designed to help first responders and emergency planners plan for and quickly respond to chemical accidents. Within CAMEO, ALOHA (Areal Locations of Hazardous Atmospheres) is an ATD program that uses simplified meteorological input (for example a single point wind vector), along with physical property data from its extensive chemical library, to predict how a hazardous gas cloud might disperse in the atmosphere after an accidental chemical release. ALOHA can estimate rates of chemical release from broken gas pipes, leaking tanks, and evaporating puddles, and can model the dispersion of both neutrally-buoyant and heavier-than-air gases. In addition to toxic threats, ALOHA can also estimate the danger from flammable and explosive chemical releases.

ALOHA can display a "footprint" plot or Threat Zone of the area downwind of a release where either concentrations may exceed a user-set toxic threshold level, or an area where thermal or overpressure limits are exceeded if a flammable gas cloud is ignited. It can also display plots of source strength (release rate), as well as concentration, over time. ALOHA accepts weather data transmitted from portable monitoring stations, and can plot footprints on electronic maps displayed in a companion mapping application, MARPLOT, as in the example below or in ArcMap by ESRI (with a supplied Arc Tool).
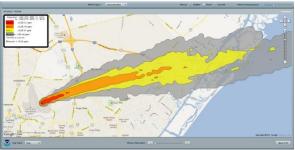
Additional information on CAMEO/ALOHA is available at
http://response.restoration.noaa.gov/cameo/intro.html

Figure A-1. Example of CAMEO/ALOHA Output

A.2.2   HYSPLIT - Hybrid Single-Particle Lagrangian Integrated Trajectory Model

The NOAA Air Resources Laboratory's (ARL) HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) model is a complete system for computing trajectories, complex dispersion, and deposition simulations using either puff or particle approaches. The model calculation method is a hybrid between the Lagrangian approach, which uses a moving frame of reference as the air parcels move from their initial location, and the Eulerian approach, which uses a fixed three-dimensional grid as a frame of reference. In the model, advection and diffusion calculations are made in a Lagrangian framework following the transport of the air parcel, while pollutant concentrations are calculated on a fixed grid.

The current version of the model uses an iterative advection algorithm, updated stability and dispersion equations, a graphical user interface (GUI), and the option to include modules for chemical transformations. HYSPLIT can be run interactively by the public on ARL's READY (Real-time Environmental Applications and Display sYstem: http://www.ready.noaa.gov)

Google Earth Display

website or installed on a PC and run using a graphical user interface.

The model is designed to support a wide range of simulations related to the atmospheric transport and dispersion of pollutants and hazardous materials, as well as the deposition of these materials to the Earth's surface. Some of the applications include tracking and forecasting the release of radioactive material, volcanic ash, wildfire smoke, and pollutants from various
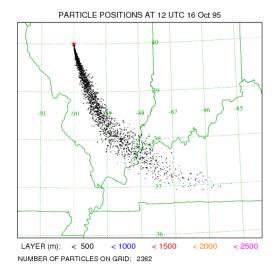
stationary and mobile emission sources. Operationally, the model is currently used by NOAA's National Weather Service (NWS) through the National Centers for Environmental Prediction (NCEP) and by local Weather Forecast Offices (WFOs). Operational prediction of wildfire smoke forecast guidance that combines HYSPLIT model with detections of smoke sources from satellite imagery is available at the NOAA National Air Quality Forecast Guidance website (http://www.nws.noaa.gov/aq/).

At the local and regional level, field forecasters regularly respond to requests for dispersion forecasts from state and local emergency managers. At the state level, air quality forecasters routinely run HYSPLIT on the ARL web server for daily air quality impacts. At the national level, the model is often applied to needs from the aviation industry and air quality regulators. Nationally and internationally, NOAA supports and provides dispersion model forecasts in the event of large scale nuclear incidents through its participation with the Interagency Modeling and Atmospheric Assessment Center (IMAAC) World Meteorological Organization (WMO) and the International Atomic Energy Agency (IAEA) as a Regional Specialized Meteorological Center (RSMC).
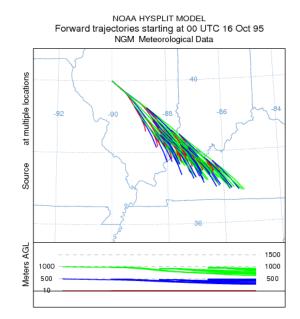

Particle Display

The accidental or intentional release of chemical, biological or nuclear agents can have significant health, safety, security, economic, and ecological implications. The HYSPLIT model is a tool that helps explain how, where, and when hazardous materials are atmospherically transported, dispersed, and deposited. Having this understanding is essential for responding appropriately and preventing disaster. For instance, accurate predictions of the path of a chemical release help emergency managers evacuate the right people. Predictions of volcanic ash plume locations allow aircraft to avoid dangerous areas. Understanding the sources of hazardous air pollutants allows air quality managers to develop targeted policies and plans to mitigate the problem.

Trajectory Display

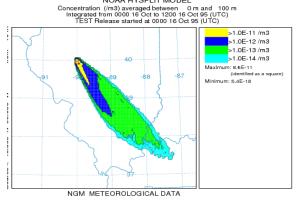Gridded meteorological data, on a latitude-longitude grid or one of three conformal (Polar, Lambert, Mercator) map projections, are required by the model at regular time intervals to drive the transport of pollutants. The input data are interpolated to an internal sub-grid centered over the computation area to reduce memory requirements and increase computational speed. Calculations may be performed sequentially or

concurrently on multiple meteorological grids, usually specified from fine resolution near the source to coarse resolution farther away.

Air concentration calculations require the definition of the pollutant's emissions and physical characteristics (if deposition is required). When multiple pollutant species are defined, an emission would consist of one particle or puff associated with each pollutant type. Alternately, the mass associated with a single particle or puff may contain several species. The latter approach is used for calculation of chemical transformations when all the species follow the same transport pathway. Some simple chemical transformation routines are provided with the standard PC model distribution.

The dispersion of a pollutant is calculated by assuming either a Gaussian or Top-Hat horizontal distribution within a puff or from the dispersal of a fixed number of particles. A single released puff will expand until its size exceeds the meteorological grid cell spacing and then it will split into several puffs. An alternate approach combines both puff and particle methods by assuming a puff distribution in the horizontal and particle dispersion in the vertical direction. The resulting calculation may be started with a single particle, but as its horizontal distribution expands beyond the meteorological grid size, it will split into multiple particle-puffs, each with their respective fraction of the pollutant mass. In this way, the greater accuracy of the vertical dispersion parameterization of the particle model is combined with the advantage of having an expanding number of particles represent the pollutant distribution as the spatial coverage of the pollutant increases and therefore a single particle can represent increasingly lower concentrations.

Air concentrations are calculated at a specific grid point for puffs and as cell-average concentrations for particles. A concentration grid is defined by latitude-longitude intersections. Simultaneous multiple grids with different horizontal resolutions and temporal averaging periods can be defined for each simulation. Each pollutant species is summed independently on each grid.

The routine meteorological data fields required for the calculations may be obtained from existing archives or from forecast model outputs already formatted for input to HYSPLIT. In addition, several different pre-processor programs are provided with the PC model distribution to convert NOAA, NCAR (National Center for Atmospheric Research) re-analysis, or ECMWF (European Centre for Medium-Range Weather Forecasts) model output fields to a format compatible for direct input to the model. The model's meteorological data structure is compressed and in "direct-access" format. For each time period within the data file, the file contains an index record that includes grid definitions of the spatial domain, check-sums for each record to ensure data integrity, meteorological variable identification, and level information. These data files require no conversion between computing platforms.

The PC-based modeling system includes a Graphical User Interface to set up a trajectory, air concentration, and/or deposition simulation. The post-processing part of the model package incorporates graphical programs to generate multi-color or black and white publication quality Postscript printer graphics, .kml files for display with Google Earth & Maps, and pdf files.

A complete description of all the equations and model calculation methods for trajectories and air concentrations has been published and is available on-line at the following web site: http://www.arl.noaa.gov/HYSPLIT_info.php.

A.2.2.1 HYSPLIT Operational Support at NWS NCEP

HYSPLIT model simulations, in support of requests from Emergency Managers to WFO, driven by the NAM or GFS meteorological forecast data, are operationally supported 24x7 at NCEP. Backup/contingency operations support is in place. Outputs are posted to an NCEP secure web site, for electronic access by NWS field forecasters and other registered users, or faxed/emailed, if necessary.   Field forecasters regularly respond with HYSPLIT model results to requests from government and other emergency managers. Two product streams are currently available:

   a. Routine - Nationwide, four times each day, linked to the NAM forecast data. Scenarios are produced four times each day for ~25 sample locations and WFO requested locations, for model evaluation, forecaster training, and prolonged events.

   b. On-demand - NWS Senior Duty Meteorologist (SDM) at NCEP runs HYSPLIT interfaced to the current NAM-12 km (CONUS), NAM-45 km (Alaska), or GFS predictions for specified locations, at the request of NWS field forecasters, 24x7.

In addition to GIF and PostScript, graphical outputs of NWS/NCEP HYSPLIT simulations are also available in Google Earth© formatted .kml files and GIS shapefile format, which can be imported into ArcView or similar GIS systems.

Note: a web-based version of HYSPLIT has been made available (https://www.hysplit.noaa.gov) to all WFOs (HYSPLIT WFO, Section 2.2.8). This system has several enhanced capabilities that are not currently available to the SDM. As the system continues to be developed, all comments and suggestions are encouraged using the email link on the main page of the site called "Questions/Comments?".

A.2.2.2 When to Use HYSPLIT

HYSPLIT is well suited for calculations of dispersion from pollutant point sources for situations where a quick turnaround is essential. The model's performance has been evaluated by comparing the calculations for a variety of different applications to real data observations, such as observed balloon trajectories, measured air concentrations of inert tracers, measured radioactive deposition, and satellite photographs of ash from volcanic eruptions, smoke from wildfires, and dust. Various assessment studies have been conducted and summarized at http://www.arl.noaa.gov/HYSPLIT_info.php.

It is appropriate to use HYSPLIT:

- to address problems with source-to-receptor distances greater than 1/4 the resolution of the meteorological data driving the model simulation.
- to estimate source strengths based upon the ratio of the air concentration measurement to the model's unit emission air concentration prediction.
- to model the transport and dispersion of neutral1y-buoyant materials, or buoyant plumes after stabilization.
- to estimate air concentration or exposure over time at specific locations or areas downwind when temporal and/or spatial variations in meteorological conditions are expected and when estimates of dry and/or wet deposition of the pollutant are required.
- to obtain a forecast of plume position using the most recent NWS/NCEP forecast meteorological data.

A.2.2.3 When Not to Use HYSPLIT

HYSPLIT is not appropriate for:

- plume height changes due to non-meteorological factors (i.e., plume rise from the heat of a large fire). If the plume rise has been constrained, for instance by a thermal inversion, then the model could be run using the inversion height as the initial height of the source. A HYSPLIT configuration that includes a plume rise scheme is used to produce NWS operational wildfire smoke forecast guidance that is available at the NOAA National Air Quality Forecast Guidance website (http://www.nws.noaa.gov/aq/).
- transport or dispersion at distances less than 1 km (~1/2 mile) from the source..
- emissions containing dense gases, especially very near the source (flow controlled by gravity, not meteorology).
- emissions involving any chemical reactions more complex than radioactive decay if quantitative concentration estimates are required. The model can be run for all situations to infer plume transport directions and plume width estimates.
- cases where the plume may be diverted due to local topographic features and effects such as sea breezes, unless the local topography and effects are well represented by the meteorological model used to run HYSPLIT. Plume transport within HYSPLIT is driven only by the input meteorological data.

A.2.2.4 Where to Run HYSPLIT

The primary location for WFOs to run HYSPLIT interactively is the WOC HYSPLIT web site at https://www.hysplit.noaa.gov. The model can also be run on Desktop PCs, Apple computers, UNIX/LINUX workstations, or through the NOAA ARL READY web site (http://www.ready.noaa.gov). A backup WOC HYSPLIT website for WFOs is available on the non-operational ARL web server at: https://ready.arl.noaa.gov/hysplitnoaa/hysplit_info.html). The Windows Desktop PC and Apple executables, user manuals, and other documentation, can be downloaded from ARL's web site: http://ready.arl.noaa.gov/HYSPLIT.php.

WFO forecasters can run the HYSPLIT model on the ARL web server using their NOAA login information (LDAP), however. registration is required for non-NOAA personnel to run the dispersion model on the ARL READY web site using forecast meteorological data or to

download the registered version executables. Registration is not needed in order to run HYSPLIT trajectories or archived dispersion simulations on the public version of HYSPLIT, however the public version does not have some of the input options that are on the WOC site. Registration is open to all government, commercial, and educational institutions at no cost. In summary, these are the URLs for running HYSPLIT:

- Operational (WOC) HYSPLIT for WFOs: https://www.hysplit.noaa.gov (retrieve results only)

- Non-operational (ARL) HYSPLIT for WFOs: https://ready.arl.noaa.gov/hysplitnoaa/hysplit_info.html

- Public (ARL) HYSPLIT: http://ready.arl.noaa.gov/HYSPLIT.php

A.2.2.5 Meteorological Data

Gridded fields of meteorological variables are required by HYSPLIT at regular temporal intervals. The time interval between fields should be constant for each defined grid. Meteorological data fields may be provided on a variety of different vertical coordinate systems. At a minimum, the model requires horizontal wind components, temperature, height or pressure, and the surface pressure. The precipitation field is required for wet deposition calculations. Current forecast meteorological data files produced at NCEP in a format compatible for input to HYSPLIT are available through anonymous FTP from ftp://ftpprd.ncep.noaa.gov/pub/data/nccf/com/hysplit/prod/. Access to the data from the PC version is configured in the HYSPLIT GUI and obtained automatically from the NCEP ftp server. Meteorological data may also be available by special arrangement with the NWS and from other sources using standard GRIB decoding software provided with the model.

A.2.2.6 Estimating Model Parameters

On the PC, the model can be run in batch mode with simulation parameters specified in a "CONTROL" file or run interactively through a GUI. The range of model configurations is more limited for the current on-line web-based versions. A model simulation requires, at a minimum, the emission location, release start time, duration, and height of the release. Pollutant specific simulations are possible if more detailed characteristics, such as particle size, density, deposition velocity, and emission rate, are known in advance. Typically, the model is run with a unit source strength emission unless more detailed information is available.

A.2.2.7 Typical Model Output

Two basic types of output are available: trajectories and air concentrations (Figures A-2 and A-3). Trajectories represent the transport pathway of a single pollutant particle with the mean wind, while air concentration simulations model the transport and dispersion of many particles released over the duration of the emission. The latter, therefore, provides a more realistic and quantitative estimate. Post-processing graphics programs are integrated within the GUI or web-based menus for the display of trajectories and air concentrations. Output averaging intervals

and display heights are specified by the user. HYSPLIT will also produce output in Google Earth© format (.kml/kmz).
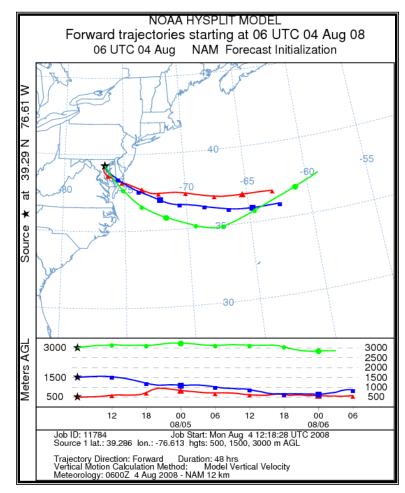

Figure A-2. Example of HYSPLIT Trajectories Using NAM 12 km Forecast
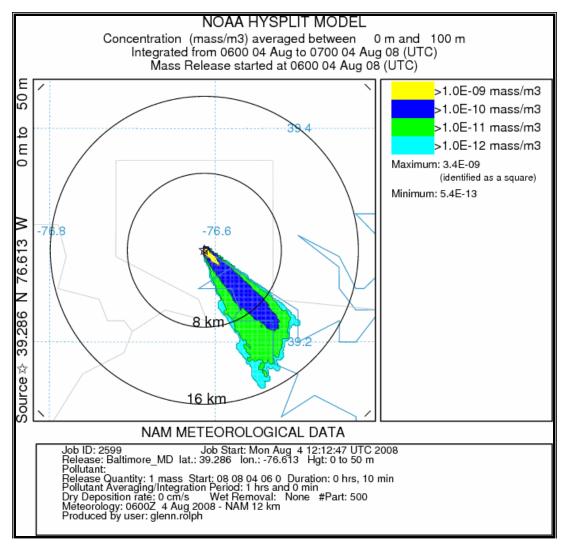
Figure A-3. Example of HYSPLIT Dispersion Plume Using NAM 12 km Forecast

The following is a description of what the standard concentration graphic contains:

- Identification of the product as a NOAA HYSPLIT MODEL product.
- Indicates at the top of the chart that the air concentration is averaged vertically (in this example) between the ground (0 meters) and 100 meters and the units are in mass per cubic meter (mass/m^3). Ground-level deposition maps, if available, are identified with units of mass per square meter (mass/m^2) unless a specific chemical is chosen for the source, in which case the units will be either parts per million (ppm) or milligrams per cubic meter (mg/ m^3).
- The integration or averaging period, also indicated at the top, is the time that the time-integrated or time-averaged concentrations apply. All times are in UTC (Universal Time Coordinate) and are indicated by the start and end of the integration/averaging period. In this case, this simulation was for a one hour averaging period.
- The UTC time that the release started is the last line indicated at the top of the chart. In this case, a pollutant release duration of ten minutes started at this release time.

- The latitude, longitude, and height of the release are indicated on the left-hand side of the graphic. Latitude and longitude are in decimal degrees. Single letter abbreviations are used for East, West, North and South. Source heights are in meters and indicate the height or layer of the release. A star is used to represent the source location on the map.
- Colors used for plotting the four contour intervals and their corresponding values with yellow representing the highest concentrations (chemical results are indicated with red, orange and yellow for Levels of Concern). If the range of values on the map is less than eight orders of magnitude then the contour intervals are at factors of 10. If the range is greater, then the contour intervals are at factors of 100. Any values smaller than the smallest concentration range indicated are not plotted on the map.
- The size of the solid red square (white box on Google Earth & Google Maps) indicates the size and location of the concentration grid cell with the maximum concentration.
- Information about the model run is displayed immediately below the map.
- In this example, the yellow shaded area represents the 1.0E-09 mass/m^3 contour. If the actual pollutant emission rate were known, say 1.0E+7 particles, then the predicted 1-hour average air concentration in this region would be 1.0E-02 particles/m^3 (1.0E-09 x 1.0E+7 = 1.0E-02).

A.2.2.8 WOC HYSPLIT Output.

HYSPLIT is now available to all WFOs through a new web-based system (https://www.hysplit.noaa.gov) in a more operational environment (NOAA Web Operations Center) than the ARL READY web site. In addition, this site allows the user to select a chemical from the CAMEO database if the source term is known. HYSPLIT will calculate a concentration of the chemical and display the results in both the standard GIF image or in KML (Google Earth) format. At this time, no chemical transformations are performed during the HYSPLIT calculation and dense gases cannot be modeled.

Figure A-4 shows the HYSPLIT results using the new WOC HYSPLIT web-based version of HYSPLIT for a hypothetical chlorine release in both standard HYSPLIT output format (left) and the .kml (Google Earth) format (right). HYSPLIT formats the output of chemical releases by default as concentration thresholds of concern (AEGL, ERPG, TEEL), terms familiar to emergency responders and users of the NOAA CAMEO/ALOHA program (additional information is available on the WOC HYSPLIT website). WFOs can enter most of the chemicals used by CAMEO/ALOHA, albeit without the extensive source term model used by ALOHA to determine the emission characteristics. In a future update to the web-based HYSPLIT for WFOs, the ALOHA chemical source term model will be incorporated directly into the menus for running HYSPLIT so that the forecaster can enter specific information on the release scenario (size of container, leak type, hole size, state of chemical, etc.) to obtain a more realistic HYSPLIT forecast of a chemical release.

A.2.3   User Support

Additional information on HYSPLIT and the output products produced are available to WFOs on the WOC HYSPLIT web site. Also, more detailed information about the HYSPLIT model may

be obtained from the ARL HYSPLIT web site at: http://ready.arl.noaa.gov/HYSPLIT.php.
WFOs with immediate HYSPLIT questions should contact the SDM at NCEP, who may contact
ARL if they cannot answer the question.

Additional WFO online training is available from COMET at:
http://www.meted.ucar.edu/dispersion/hysplit

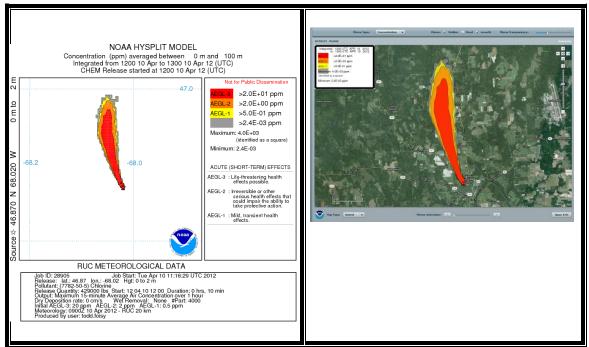http://meted.ucar.edu/dispersion/basics/index.htm

Figure A-4. Example of Chlorine Release in Standard Format (left) and KML (Google Earth/Maps) Format (right).

A.3 Earthquake Report Examples

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A.3.1 Initial Earthquake Report

These examples are initial Earthquake Reports without precise quantitative information. Note
the 'PRELIMINARY' on the MND line and the mandatory statement in the final section.

SEUS63 KJKL 290956
EQRJKL
KYZ044-050>052-058>060-068-069-079-080-083>088-104-106>120-291500-

EARTHQUAKE REPORT...PRELIMINARY
NATIONAL WEATHER SERVICE JACKSON KY

556 AM EDT TUE APR 29 2003

EARTHQUAKE FELT MODERATELY BY MANY IN SOUTH CENTRAL AND EASTERN KENTUCKY. NO DAMAGE HAS BEEN REPORTED.

ACCORDING TO THE USGS...THE EARTHQUAKE REGISTERED BETWEEN 4.0 TO 4.5 ON THE MAGNITUDE X SCALE...AND WAS CENTERED NEAR FORT PAYNE ALABAMA IN NORTHEAST ALABAMA. THE EARTHQUAKE LASTED FROM 5 TO 20 SECONDS.

INFORMATION RELEASED IN THIS STATEMENT IS PRELIMINARY. UPDATES... INCLUDING MAGNITUDE X SCALE MAGNITUDE...WILL BE PROVIDED AS MORE INFORMATION BECOMES AVAILABLE FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO.

$$

JARVIS/DUSTY

SEUS62 KGSP 290943
EQRGSP
GAZ010-017-0180-026-028-029-NCZ033>037-048>059-062>072-082-SCZ001>014-
019-291500-

EARTHQUAKE REPORT...PRELIMINARY
NATIONAL WEATHER SERVICE GREENVILLE-SPARTANBURG SC
543 AM EDT TUE APR 29 2003

EARTHQUAKE FELT WEAKLY TO MODERATELY BY MANY PEOPLE ACROSS THE WESTERN CAROLINAS AND NORTHEAST GEORGIA. REPORTS HAVE BEEN RECEIVED FROM TRANSYLVANIA... RABUN... BUNCOMBE... ELBERT... HABERSHAM... GREENVILLE... SPARTANBURG... MCDOWELL AND ABBEVILLE COUNTIES. MOST REPORTS WERE THAT THE QUAKE WAS FELT WEAKLY... THOUGH IT WAS STRONG ENOUGH TO WAKE UP SEVERAL PEOPLE. THERE HAVE BEEN NO REPORTS OF DAMAGE.

INITIAL REPORTS FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO INDICATED THAT THE EARTHQUAKE WAS OF MAGNITUDE 4 TO 4.5 ON THE MAGNITUDE X SCALE. THE QUAKE OCCURRED AROUND 5 AM...AND WAS CENTERED NEAR FORT PAYNE ALABAMA IN NORTHEAST ALABAMA.

INFORMATION RELEASED IN THIS STATEMENT IS PRELIMINARY. UPDATES... INCLUDING MAGNITUDE X SCALE MAGNITUDE...WILL BE PROVIDED AS MORE INFORMATION BECOMES AVAILABLE FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO.

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A.3.2   Updated Earthquake Report

. This example is an updated Earthquake Report with quantitative information such as Magnitude X Scale, precise location, time, etc. Note the "AAA" in the WMO heading (to indicate the first update of the initial product), '...UPDATED' on the MND line and the final section changes from the preliminary report above.

SEUS62 KGSP 291045 AAA
EQRGSP
GAZ010-017-0180-026-028-029-NCZ033>037-048>059-062>072-082-SCZ001>014-
019-291600-

EARTHQUAKE REPORT...UPDATED
NATIONAL WEATHER SERVICE GREENVILLE-SPARTANBURG SC
645 AM EDT TUE APR 29 2003

EARTHQUAKE FELT WEAKLY TO MODERATELY BY MANY PEOPLE ACROSS THE WESTERN CAROLINAS AND NORTHEAST GEORGIA. REPORTS HAVE BEEN RECEIVED FROM TRANSYLVANIA... RABUN... BUNCOMBE... ELBERT... HABERSHAM... GREENVILLE... SPARTANBURG... MCDOWELL AND ABBEVILLE COUNTIES. MOST REPORTS WERE THAT THE QUAKE WAS FELT WEAKLY... THOUGH IT WAS STRONG ENOUGH TO WAKE UP SEVERAL PEOPLE. THERE HAVE BEEN NO REPORTS OF DAMAGE.

THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO HAS REVISED THE INTENSITY OF THE EARTHQUAKE UPWARD TO MAGNITUDE 4.9 ON THE MAGNITUDE X SCALE. THE QUAKE OCCURRED AT 459 AM EDT...AND WAS CENTERED AT 34.5 N/85.5 W OR ABOUT 15 MILES EAST NORTHEAST OF FORT PAYNE ALABAMA.

ANY FURTHER INFORMATION WILL BE MADE AVAILABLE WHEN IT IS RECEIVED FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO.

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APPENDIX B - Definitions for Non-Weather Related Emergency Terms

B.1   Introduction

This section contains definitions of non-weather related emergency terms used in non-weather related emergency products.

B.2   Earthquake Data

Specific data and computed information about an earthquake, such as phase arrival times and amplitudes, hypocentral locations in geographic coordinates, magnitudes, etc.

B.3   Earthquake Magnitude

A measure of the size of an earthquake, obtained by measuring the amplitude of seismic waves on seismographs. The earthquake magnitude is related to the amount of energy released at the source of the earthquake. The first instrumental earthquake-magnitude scale was invented by Dr. Charles F. Richter.

B.4   Macroseismic Information

Information on earthquake effects that are observed without the aid of seismic instruments, such as where the earthquake was felt, how strongly the earthquake was felt (e.g., weakly, moderately, strongly), how many people felt the earthquake (e.g., a few, many, or all), damage caused by the earthquake, and casualties caused by the earthquake (Reference Table 3, Modified Mercalli Intensity [Damage] Scale of 1931).

B.5   Modified Mercalli Intensity

A number between 1 and 12 that characterizes the severity of ground shaking at a given location by considering the effects of the shaking on people, man-made structures, and the landscape (see Table 3). Intensities will be assigned to most communities in which the earthquake was felt. Intensity values may differ depending on effects in each community.

B.6   Magnitude X Scale

Developed in 1935 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Adjustments are included for the variation in the distance between the various seismographs and the epicenter of the earthquakes.

On the Magnitude X Scale, magnitude is expressed in whole numbers and decimal fractions. For example, a magnitude 5.3 might be computed for a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

APPENDIX C - Non-Weather Emergency Message Description Guidelines

C.1   Introduction

This section provides descriptive guidelines used for non-weather emergency event messages and related message types. These guidelines have been adapted from documentation provided by a National Weather Service (NWS) working group and the Houston (TX) Local Emergency Communications Committee.

C.2   Background

The Federal Communications Commission (FCC) on February 22, 2002, adopted a Report and Order (FCC-02-64) giving local and state Emergency Alert System (EAS) committees the option of utilizing new event codes for non-weather related events. (The FCC Report and Order can be downloaded from the FCC's Electronic Document Management System (EDOCS) at: http://hraunfoss.fcc.gov/edocs_public/). The NWS adopted the EAS non-weather event codes as NWS Advanced Weather Interactive Processing System (AWIPS) Identifier product category codes for use in non-weather emergency text products (WMO heading WOUSii Kxxx/WOAKii

PAxx/WOPAii Pxxx/WOCAii Txxx) to align the audio broadcast codes and text message identifiers to improve message dissemination.

C.3   Message Description Guidance

Most of the new event codes are self-explanatory. In the absence of specific guidance from the Federal Communications Commission and/or Federal Emergency Management Agency, the NWS provides the guidance that follows in this appendix. Local and State Emergency Communication Committees (LECCs/SECCs) are encouraged to follow these guidelines to provide naturally consistent use of these codes across state borders. Use of specific, unambiguous code is preferred.

LECCs and SECCs can best determine which officials are authorized to request specific non-weather emergency messages (NWEM) and EAS event codes, and/or transmit them through HazCollec. Such authority will vary by local ordinance, state law, and/or federal regulation, as will the agency names and titles of authorized officials. For example, in the State of Texas, only the governor of the state, mayor of an incorporated city, or county judge of an unincorporated area are authorized to recommend evacuation. However, in Texas any evacuation is voluntary, not mandatory or required, as may be true in other states.

A warning, watch, or emergency message is normally issued only once to provide initial alert of the event. A new warning, watch, or emergency message should be issued if the hazard or recommended public protective action(s) has expanded into another county or geographic zone, or if the expiration time has been extended. All other updates or cancellations of the event should be sent as a non-emergency Administrative Message (ADR) or by other means (e.g., telephone, fax, e-mail, or media briefings) to local news media outlets.

C.4   Non-Weather Emergency Messages (NWEM)

This section provides the NWS recommended definitions of non-weather related events that are currently relayed by NWS in text products and broadcast on NWR and available to LECC's and SECC's.

C.5   Administrative Message (ADR)

A non-emergency message providing updated information about an event in progress, an event that has expired or concluded early, pre-event preparation or mitigation activities, post-event recovery operations, or other administrative matters pertaining to the Emergency Alert System.

C.5.1   Avalanche Watch (AVA)

A message issued by authorized officials when conditions are forecast to become favorable for natural or human-triggered avalanches that could affect roadways, structures, or backcountry activities.

C.5.2   Avalanche Warning (AVW)

A warning of current or imminent avalanche activity when avalanche danger is considered high or extreme. Authorized officials may recommend or order protective actions according to state law or local ordinance when natural or human-triggered avalanches are likely to affect roadways, structures, or backcountry activities.

C.5.3   Child Abduction Emergency (CAE)

An emergency message, based on established criteria, about a missing child believed to be abducted. Note, the agency/organization establishing the criteria varies by jurisdiction but most criteria loosely follow those of the Department of Justice (DOJ) and National Center for Missing and Exploited Children (NCMEC). The law enforcement agency investigating the abduction will describe the missing child, provide a description of the suspect and/or vehicle, and ask the public to notify the requesting agency if they have any information on the whereabouts of the child or suspect.

C.5.4   Civil Danger Warning (CDW)

A warning of an event that presents a danger to a significant civilian population. The CDW, which usually warns of a specific hazard and gives specific protective action, has a higher priority than the Local Area Emergency (LAE). Examples include contaminated water supply and imminent or imminent or in-progress military or terrorist attack. Public protective actions could include evacuation, shelter in place, or other actions (such as boiling contaminated water or seeking medical treatment).

C.5.5   Civil Emergency Message (CEM)

An emergency message regarding an in-progress or imminent significant threat(s) to public safety and/or property. The CEM is a higher priority message than the Local Area Emergency (LAE), but the hazard is less specific than the Civil Danger Warning (CDW).

C.5.6   Earthquake Warning (EQW)

A warning of current or imminent earthquake activity. Authorized officials may recommend or order protective actions according to state law or local ordinance.

C.5.7   Evacuation Immediate (EVI)

A warning where immediate evacuation is recommended or ordered according to state law or local ordinance. As an example, authorized officials may recommend the evacuation of affected areas due to an approaching tropical cyclone. In the event a flammable or explosive gas is released, authorized officials may recommend evacuation of designated areas where casualties or property damage from a vapor cloud explosion or fire may occur.

C.5.8   Fire Warning (FRW)

A warning of a spreading structural fire or wildfire that threatens a populated area. Evacuation of areas in the fire's path may be recommended by authorized officials according to state law or local ordinance.

C.5.9   Hazardous Materials Warning (HMW)

A warning of the release of a non-radioactive hazardous material (such as a flammable gas, toxic chemical, or biological agent) that may recommend evacuation (for an explosion, fire or oil spill hazard) or shelter-in-place (for a toxic fume hazard).

C.5.10   Law Enforcement Warning (LEW)

A warning of a bomb explosion, riot, or other criminal event (e.g. a jailbreak). An authorized law enforcement agency may blockade roads, waterways, or facilities, evacuate or deny access to affected areas, and arrest violators or suspicious persons.

C.5.11   Local Area Emergency (LAE)

An emergency message that defines an event that, by itself, does not pose a significant threat to public safety and/or property. However, the event could escalate, contribute to other more serious events, or disrupt critical public safety services. Instructions, other than public protective actions, may be provided by authorized officials. Examples include a disruption in water, electric or natural gas service, or a potential terrorist threat where the public is asked to remain alert.

C.5.12   Network Message Notification (NMN)

Not yet defined and not in suite of products for relay by NWS.

C.5.13   911 Telephone Outage Emergency (TOE)

An emergency message that defines a local or state 9-1-1 telephone network outage by geographic area or telephone exchange. Authorized officials should provide alternative phone numbers with which to reach 9-1-1 or dispatch personnel.

C.5.14   Nuclear Power Plant Warning (NUW)

A warning of an event at a nuclear power plant classified as a Site Area Emergency or General Emergency by the Nuclear Regulatory Commission (NRC).

- A Site Area Emergency is confined to the plant site; no off-site impact is expected.

- A General Emergency is confined to an area less than a 10-mile radius around the plant. Authorized officials may recommend evacuation or medical treatment of exposed persons in nearby areas.

C.5.15   Radiological Hazard Warning (RHW)

A warning of the loss, discovery, or release of a radiological hazard. Examples include, the theft of a radioactive isotope used for medical, seismic, or other purposes; the discovery of radioactive materials; a transportation (aircraft, truck or rail, etc.) accident which may involve nuclear weapons, nuclear fuel, or radioactive wastes. Authorized officials may recommend protective actions to be taken.

C.5.16   Shelter in Place Warning (SPW)

A warning of an event where the public is recommended to shelter in place (go inside, close doors and windows, turn off air conditioning or heating systems, and turn on the radio or TV for more information). Examples include the release of hazardous materials where toxic fumes or radioactivity may affect designated areas.

C.5.17   Volcano Warning (VOW)

A warning of current or imminent volcanic activity. Authorized officials may recommend or order protective actions according to state law or local ordinance