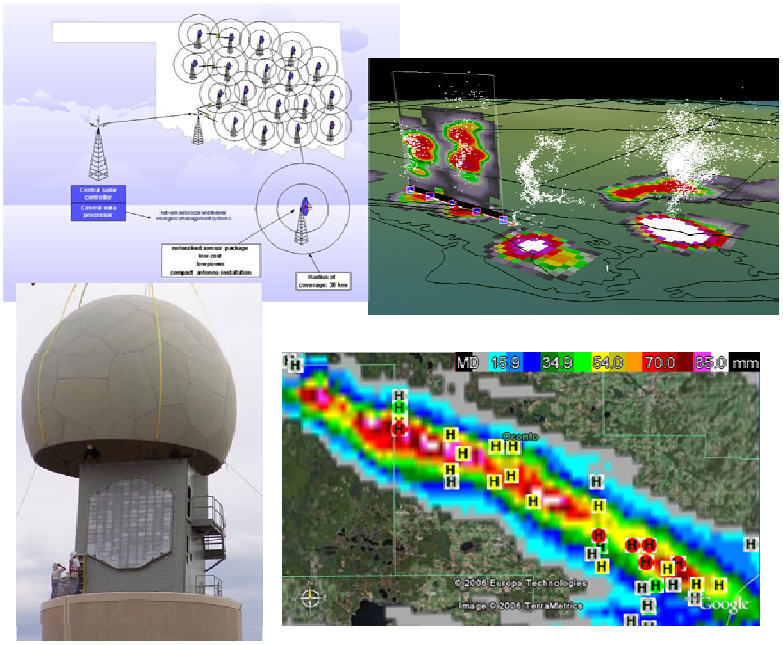
NATIONAL SEVERE STORMS LABORATORY
AND
NATIONAL WEATHER SERVICE

HAZARDOUS WEATHER TESTBED
EXPERIMENTAL WARNING PROGRAM
2009 SPRING PROGRAM

OPERATIONS PLAN



Gregory J. Stumpf, CIMMS/NSSL/NWS

Version 1.2

19 April 2009

1. INTRODUCTION

The National Oceanic and Atmospheric Administration (NOAA) Hazardous Weather Testbed (HWT) Experimental Warning Program (EWP) at the National Weather Center (NWC) in Norman, Oklahoma, is hosting the 2009 EWP Spring Program. We will be conducting the 2009 EWP Spring Program for 6 weeks total; four weeks from 27 April through 22 May, and two weeks from 1 June to 12 June.

The HWT is joint project of the National Weather Service (NWS) and the National Severe Storms Laboratory (NSSL). The HWT provides a conceptual framework and a physical space to foster collaboration between research and operations to test and evaluate emerging technologies and science for NWS operations. The HWT was borne from the "Spring Program" which, for the last decade, has been used to test and evaluate new forecast models, techniques, and products to support NWS Storm Prediction Center (SPC) forecast operations. Now, the HWT consists of two primary programs. The original NSSL/SPC "Spring Program" is now known as the Experimental Forecast Program (EFP)[1].

The other activity in the HWT, and the subject of this Operations Plan, is the new Experimental Warning Program (EWP), which is designed to test and evaluate new applications, techniques, and products to support Weather Forecast Office (WFO) severe convective weather warning operations. This is the third year for severe convective warning-scale activities in the testbed.

There will be four primary projects geared toward WFO applications, 1) an evaluation of experimental multiple-radar/sensor gridded severe weather algorithm products using the NSSL Warning Decision Support System II (WDSSII), 2) an evaluation of the 3D Lightning Mapping Arrays (LMA) in Central Oklahoma, Northern Alabama, and the District of Columbia Metro Area, 3) an evaluation of networked 3-cm radars (CASA) in Central Oklahoma, and 4) an evaluation the phased array radar (PAR) in Norman,. We expect the participants to be active in the LMA, CASA, and PAR experiments when severe weather is affecting those domains. The WDSSII multi-radar/sensor algorithm experiment is less dependent on local weather since we can access the needed radar and other data sets remotely for nearly anywhere in the U. S.

We are looking for feedback from the NWS operational meteorologists. User comments will be collected during shifts, short surveys will be given at the end of shifts, and discussions will occur during post-mortem de-briefings. Remember, input from NWS operational meteorologists is **vital** to the improvement of the NWS warning process, which ultimately saves public lives and property. The NWS feedback on this test is most important for future development for the NWS and eventual implementation of new application, display, and product concepts into AWIPS2 and other operational systems.

[1] Note that the EFP Spring Program is not the subject of this Operations Plan. For more information on the EFP Spring Program, please contact Steve Weiss (SPC) or Jack Kain (NSSL).

You are part of a unique team of NOAA scientists, comprised of researchers, technology developers, and operational forecasters, working together to test new and experimental severe weather warning decision making technology for the NWS. In this operations plan you will find basic information about the various new technologies and products that we are testing during the 2009 spring convective season, as well as logistical information about the six-week program for all participants.

Additional information about the EWP Spring Program is available and regularly updated on our Web site: http://ewp.nssl.noaa.gov.

2. OBJECTIVES

"What do we want from you?"

This question applies to each participant in the EWP Spring Program, including the research and technology specialists, the forecaster participants, the weekly coordinators, and other observers. This manual will attempt to answer that question in a broad sense. For the individual experiments, their respective manuals will provide more detailed objectives.

The National Severe Storms Laboratory (NSSL) has played a key role in the development and evaluation of applications and technology to improve NWS severe convective weather warning operations. The development process at NSSL begins with basic and applied research including field experiments, theoretical studies, and case studies designed to better understand storms and relate weather to remotely sensed signatures. This research leads to the development of technological applications, including computer algorithms employing sophisticated image processing and artificial intelligence, and innovative display systems [e.g., the Four-dimensional Stormcell Investigator (FSI)], and NSSL leads the path in new Doppler radar technologies. Evaluations are conducted using archived case studies as well as real-time proof-of-concept tests at the Hazardous Weather Testbed during actual severe weather warning operations. Feedback from the evaluations leads to further research and refinement of applications, and ultimate operational applications for users. The new concepts continue to be tested to determine whether they will be included in future operational systems that help guide and manage the severe weather warning decision-making process.

The primary objectives of the 2009 EWP Spring Program are as follows:

- To **evaluate the accuracy and the operational utility of new science, technology, and products** in a testbed setting in order to **gain feedback** for improvements prior to their potential implementation into NWS severe convective weather warning operations.

    - The Hazardous Weather Testbed serves as a primary vehicle for transitioning new research, knowledge, and concepts into NWS operations. It is designed to

provide forecasters with direct access to the latest developments in meteorological research while imparting scientists with the knowledge to formulate research strategies that will have practical benefits for operations.

- To **foster collaboration** between NSSL scientists and operational meteorologists.

    - The WFOs are our primary customers. We want to work with you to understand your requirements and improve warning accuracy and services. This will also allow for continued scientific collaboration on application development, and on informal and formal publications. The interaction between scientists and operational meteorologists will provide a synergy that will lead to improvements in future products.

The overall objectives of the specific projects to be conducted during the 2009 EWP Spring Program are:

- To evaluate the accuracy and the operational utility of **multiple-radar/multiple-sensor severe weather algorithms,** provided by the Warning Decision Support System – Integrated Information (WDSSII), in supporting NWS hazardous convective weather warning decision making. We would like our participants to:

    - Provide feedback on the ability of these applications to enhance traditional base-radar data analysis in warning decision making.
    - Suggest improvements or new multiple-radar/sensor products that will aid warning decision making.
    - Receive an introduction to the new products, after which the products will be available (via Google Earth) to use in operations after the participants return to their forecast offices.

- To evaluate the accuracy and the operational utility of **three-dimensional Lightning Mapping Arrays (LMA)** in supporting NWS hazardous convective weather warning decision making, specifically:

    - Ability of flash rate trends and other lightning data to contribute to warning decision making
    - Utility of lightning data in radar-poor areas
    - Impact of the ~1 min time resolution
    - Comparison of lower and higher space resolutions for GOES-Global Lightning Mapper (GLM) proxy evaluation
    - Relationships with other multi-sensor derived products, including storm-classification, hail size and circulation algorithms, as well as convective initiation, convective overshoot, and enhanced-V algorithms using visible and infrared channel satellite data.

- To evaluate the accuracy and operational utility of **Collaborative Adaptive Sensing of the Atmosphere (CASA) dense radar networks** for severe weather decision-making through real time warning situations and structured experiments with archived data.

    - Assess how CASA products improve severe weather assessments and warning decisions in combination with current technology:
        - Reflectivity and velocity products
        - RHI scans
        - Real time dual Doppler wind products
        - Real time Nowcasts and NWP products

    - Assess the strengths and limitations of CASA's technical capabilities:
        - Lower troposphere coverage
        - High spatial resolution data
        - 1 minute refresh rate
        - Adaptive sector scans driven by user needs

    - Investigate effective visualization options for derived wind fields.

- To evaluate the accuracy and the operational utility of **Phased Array Radar (PAR)** technology during real-time operational warning situations as well as through playback of archived cases. The two key objectives of this year's experiment, called the Phased Array Radar Innovative Sensing Experiment (PARISE) are:

    - To demonstrate and obtain forecaster feedback on basic adaptive electronic scanning of weather echoes, and
    - To demonstrate and obtain forecaster feedback on storm-type optimized scanning strategies for surveillance of storm initiation and severe storms.

More detailed information about the individual experiments, including specific objectives, evaluation details, and technology user manuals, are available in separate documents, available online and in the EWP "white binder".

3. SCHEDULES

a. Dates of operation

The 2009 EWP Spring Program will be conducted during a **six-week period** beginning **Monday 27 April 2008**, and ending **Friday 12 June 2008**. There will be no operations Memorial Day week this year (25-29 May 2008). During these six-weeks, up to 4 full-time and 2 part-time participants will be visiting each week. Participants will come from NWS WFOs nationwide, and other academic, government, and international agencies.

b. Shakedown

A one-week shakedown period (20-24 April 2009) will be conducted by HWT personnel in order to test the readiness of the technologies and the logistics of the program prior to the formal operational period when outside visitors will be participating. The shakedown week will be conducted in the same manner and using the same schedule as an actual operations week, except EWP personnel will play the roles of forecaster participants.

c. Weekly schedule

The weekly schedule will be as follows:

Mon-Thu	1pm-9pm	Daily operations, including Intensive Operations Periods (IOP)
Fri	10am-1pm	Debriefing and optional seminars

d. Operations Day Schedule (Mon)

1245pm Visitor welcome at NWC 1st floor entrance

100-130pm New participant Orientation

To be given to the new weekly participants by the 2009 EWP Operations Coordinator (Greg Stumpf) in the NSSL Development Lab (NWC 2820).

130-200pm EWP daily meeting in NSSL Development Lab, led by the weekly coordinator

Daily operations coordination discussion based on SPC DY1 Outlook (more information later in this manual)

200-230pm NWC Tour

230-245pm Break

245-445pm Project Introduction Seminars (usually in the Dev Lab)

We will introduce the projects through a series of short seminars. If an IOP is required early, then we will only do the seminars which will be the focus of the Monday IOP, and save the remaining seminars for Tuesday.

445-500pm Break

500-900pm Intensive Operations Period (IOP) or Training/Archive Playback (HWT Ops Area)

Detailed in a later section.

e. Operations Day Schedule (Tue-Thu)

100-200pm EWP daily meeting in NSSL Development Lab, led by the weekly coordinator

Debriefing of the previous day's events

Daily operations coordination discussion based on SPC DY1 Outlook (more information later in this manual)

200-900pm Intensive Operations Period (IOP) or Training/Archive Playback (HWT Ops Area)

Detailed in a later section.

f. Debrief Day Schedule (Fri)

1000am-1200pm	Weekly debrief (Dev Lab)
1200pm-100pm	Optional brown bag lunch seminars (Dev Lab)
100pm	Operations End for the week

g. Participant Orientation and Training

Monday 100-130pm will be new participant orientation in the dev lab introducing the participants to the project, and the experiment evaluation elements and objectives.

Then, during each of the four operations days (M-Th) there will be opportunities for the participants to learn about the experiments (individual introduction training seminars). The weekly coordinator will determine which time periods and on which experiments each participant will be training. For example, the weekly coordinator may decide to have one set of participants work with the CASA folks, another set of participants work with the PAR folks, or all participants work with the LMA folks.

h. Typical Mon-Thu 1-9 pm Operations Activities:

During the 100-200pm EWP daily meeting, the weekly coordinator will choose which domain, time period, and projects we'll be concentrating on for the current operational

day, and which participants will be assigned to which experiment stations for that day. This daily schedule will be based on the location and timing of the chosen DY1 weather threat used for operations although departures from the official SPC forecast may be needed in some cases.

During the 2-9pm period, we will choose a 3 hour intensive operations period (IOP), centered on the event of interest. This will be padded by 30 minutes on either side for 30-minute situational awareness briefing given by the weekly coordinator, and a 30-minute post-IOP discussion, for a total of 4 hours. Normally, we will not work a longer intensive ops shift than this, but there may be one or two events, especially intense Central Oklahoma events, in which we might want to run longer than 3-4 hours. During IOPs, we encourage the weekly coordinator and/or the cognizant scientists to capture images, and to write and update live blogs detailing their notes, images, and participant feedback.

The remaining 3 hours of the 8 hour shift that can be used for orientation, training, and running archive cases for any of the experiments. Some of the participants may be divided to separate stations.

An example set of daily schedules might look like this:

Monday:

100-130	New participant orientation seminar
130-200	Daily Meeting (map discussion for Monday)
200-230	NWC Tour
245-445	Project Introduction Seminars
5-9	**IOP** (Iowa MODT Risk area): All participants: WDSSII multi-radar/sensor algorithms.

Tuesday:

1-2	Daily Meeting (Monday debriefing, map discussion for Tuesday)
2-5	Archive Case Analysis: Participants 1 and 2 - PAR; Participants 3 and 4 – CASA.
5-9	**IOP** (Northern AL): Participants 1 and 2 - LMA; Participants 3 and 4 - WDSSII multi-radar/sensor algorithms.

Wednesday:

1-2	Daily Meeting (Tuesday debriefing, map discussion for Wednesday)
2-5	Archive Case Analysis: Participant 1 and 4: WDSSII multi-radar/sensor algorithms; Participants 2 and 3: - LMA.
5-9	**IOP** (Central OK): Participant 1 - CASA; Participants 2 and 3 - PAR; Participant 4 - LMA.

Thursday:

1-2	Daily Meeting (Wednesday debriefing, map discussion for Thursday)
2-6	**IOP** (Eastern OR): All participants - WDSSII.
6-9	Archive Case Analysis: Participants 1 and 3: - PAR; Participants 2 and 4: - CASA.

Friday:

10-12	End-of-week debriefing
12-1	Brown bag lunch in dev lab: Optional seminars or depart.
1pm	Forecasters depart to return home

i. Debriefings

The daily debrief will include a playback of the previous day's events and a short discussion of each of the experiments. The weekly debrief will be a time for longer and continued discussions and end-of-week wrap-up. Feedback obtained during these briefings will be collected and recorded by the weekly coordinator.

4. PERSONNEL

a. EWP Officers

Greg Stumpf Operations Coordinator	greg.stumpf@noaa.gov	405-826-8644
Kevin Manross Information Technology Coordinator	kevin.manross@noaa.gov	405-255-0537
Travis Smith Operations Team Leader	travis.smith@noaa.gov	405-834-9687
David Andra Operations Team Leader	david.andra@noaa.gov	405-325-3527

b. Weekly Coordinators

There will be one primary weekly coordinator and a backup coordinator each operations week, beginning with the shakedown week (20 Apr), and lasting through the six

operations weeks. The backup coordinators will fill in if the primary cannot be present for any reason.

The weekly coordinators will be responsible for facilitating daily briefings from 100-200pm. These briefings will include a debriefing of the previous day's activities, as well as a short discussion, using the SPC DY1 outlook as guidance, as to the schedule for the day's events. The weekly coordinator will also facilitate a Friday end-of-week debriefing from 10am-12pm, and arrange a brown-bag seminar session if any participants desire to give a talk (from 12-1pm, "conference style" if there are more than one seminars). The weekly coordinator is also expected to provide a situational awareness "shift change" briefing for the first 10-15 minutes of each Intensive Operations Period (IOP). The weekly coordinator is also present during each IOP. Finally, the weekly coordinator is responsible for "blogging" a short daily summary to be posted to the EWP web site prior to the next day's briefing, as well as a slightly longer weekly summary by the following Monday.

The weekly coordinators will begin to receive their training on the systems during the month of April before the official Spring Program begins on 28 April. Weekly coordinators are also expected to fill in as either Cognizant Scientist participants or Forecaster/Evaluator participants (see below) during the second shakedown week of 21 April for at least one 3-4 hour operational event that week.

The responsibilities of a weekly coordinator include:

- Meeting the visiting participants upon their first arrival at the NWS on Monday.
- Providing a short tour of HWT facilities on Monday to the visiting participations.
- Facilitating the EWP daily coordination meeting.
- Distribution of participants within daily operations (who works where and when?)
- Facilitating the daily and weekly post-mortem debriefings.
- Participation during and coordination of the Intensive Operations Periods (IOP).
    - Live blogging during IOPs and/or ensuring that the cognizant scientists are live blogging during IOPs.
    - Ensuring the smooth running of the technology and alerting various IT folks when there are problems.
    - Collecting forecaster feedback, quotes, and testimonials from the cognizant scientists and forecaster/evaluators.
    - Rotating forecasters amongst workstation locations at 1 or 2 hour intervals.
    - Coordinating the content on the Situational Awareness Display (SAD).
    - Ensuring "crowd and noise control".
    - Facilitating news media (these should not be disruptive)
    - Facilitating post-IOP 30-minute discussions.
- A daily outlook (1-3 paragraphs with images) at the start of a shift for the EWP blog.
- A daily summary (1-3 paragraphs with images) at the end of a shift for the EWP blog.

- A weekly summary (1-2 pages), ready by COB next Mon, for the EWP blog.
- Setting up visitor Friday brown bag seminars.

c. Cognizant Scientist Participants (NWC researchers, and more!)

These are participants with advanced knowledge of the specific project and technologies (PAR, CASA, LMA, and WDSSII multi-radar/sensor algorithms), and who will work closely with the forecaster/evaluator participants during training, operations, and debriefings. These are typically NWC scientists or collaborating academic institutions and/or laboratories. There will be at least 1 Cognizant Scientist per experiment available on any given day, and a schedule will be posted on the internal EWP Web page (https://secure.nssl.noaa.gov/projects/ewp). Information about accessing the internal Web page will provided to all participants prior to the start of the project. The cognizant scientists will also be available 10am-12pm Friday for the end-of-week debriefing.

d. Forecaster/Evaluator Participants (WFO meteorologists, and more!)

The bulk of these participants will be the invited NWS WFO forecasters. However, several international meteorologists and NWS Warning Decision Training Branch personnel will also fill the role. The forecaster/evaluators will be available full-time for the entire weekly shift schedule. There will be a maximum of 4 Forecaster/Evaluator participants assigned on any given day, and a schedule will be posted online.

Regardless of their affiliation, these are the participants who will fill the role of a NWS WFO forecaster, helping to evaluate each experiment and providing feedback in real-time and during postmortem debriefings as per the experiment objectives. They will be working alongside Cognizant Scientists at any of the experiment stations during the week.

e. Observers

In addition to the full-time forecaster/evaluators, there will be up to 2 additional observers for each operations day. The observers represent a number of different institutions inside and external to the NWC, including NWS Region Headquarters meteorologists. There will be a maximum of 2 observers allowed on any given day. Some of the observers will be scheduled in advance, but “walk-ins” are allowed when space permits.

5. TRAVEL LOGISTICS

a. Location

The 2009 EWP Spring Program will take place at the National Weather Center (NWC) in Norman, Oklahoma. Evaluations of the primary experiments will be conducted in the area known as the Hazardous Weather Testbed (HWT) operations area. The HWT is physically located in a glass-enclosed room between the operations floors of the Storm Prediction Center (SPC) and the Norman NWS Weather Forecast Office (OUN WFO) on the NWC 2nd floor. The daily and weekly briefings (1pm Mon-Thu; 10am Fri) will take place in the NSSL Development Lab, which is Room 2820 adjacent to the NWC Atrium elevators on the 2nd floor.

b. NWC Building Security

The NWC is a University of Oklahoma building that houses several NOAA facilities. Therefore, certain NOAA security requirements are in effect for visitors to the building. All NOAA employees are required to visibly wear, at all times, their NOAA identification badges. Non-NOAA visitors must check in **each day** with the security desk at the 1st floor entrance to obtain a daily visitor pass.

Most participants will be issued one white magnetic key card which will allow entrance into certain secure locations in the NWC. These include the NOAA main hallway (with access to a kitchenette) and the HWT operations area. They will also be issued an OU/NWC ID card which will allow access to a secure visiting scientist office (NWC Room 3221). Participants must return their door key cards before they leave the NWC on Friday to return home, as these will be reused each week for the next set of participants.

Participants who are foreign nationals cannot be issued an NWC building access key card. Since participants will be working shifts with other participants who have NOAA IDs, if there is any need for the foreign participants to re-enter the building during off-business hours, a daily or weekly participant with a NOAA ID can provide access.

c. Lodging, Amenities, Maps

Out of town participants are encouraged to stay at one of the following hotels depicted on Figure 1 which offer the U. S. government per diem lodging rates. The hotel locations (except the Best Western and Residence Inn) are nearby a number of restaurants and other Norman businesses. This will allow participants to share rides if needed, or to socialize outside of shift hours.

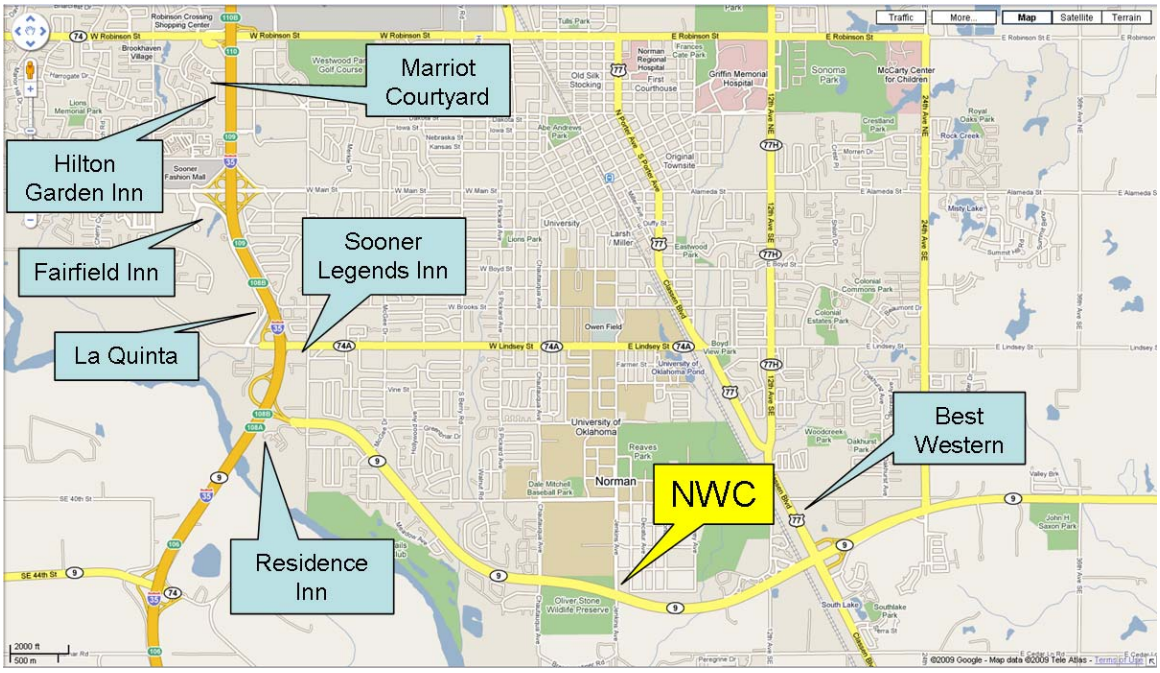


Fig 1. Map of the Norman area, incl. location of hotels and the National Weather Center.

Figure 2 shows a map with directions from Will Rogers World Airport to the National Weather Center. Be aware that the section of Interstate 44 that you will travel from the airport is in the direction of "West", even though it goes south on the map. Take Airport Road to I-44 West to I-240 east to I-35 South to Norman. You can find specific information about the hotels in Appendix A.

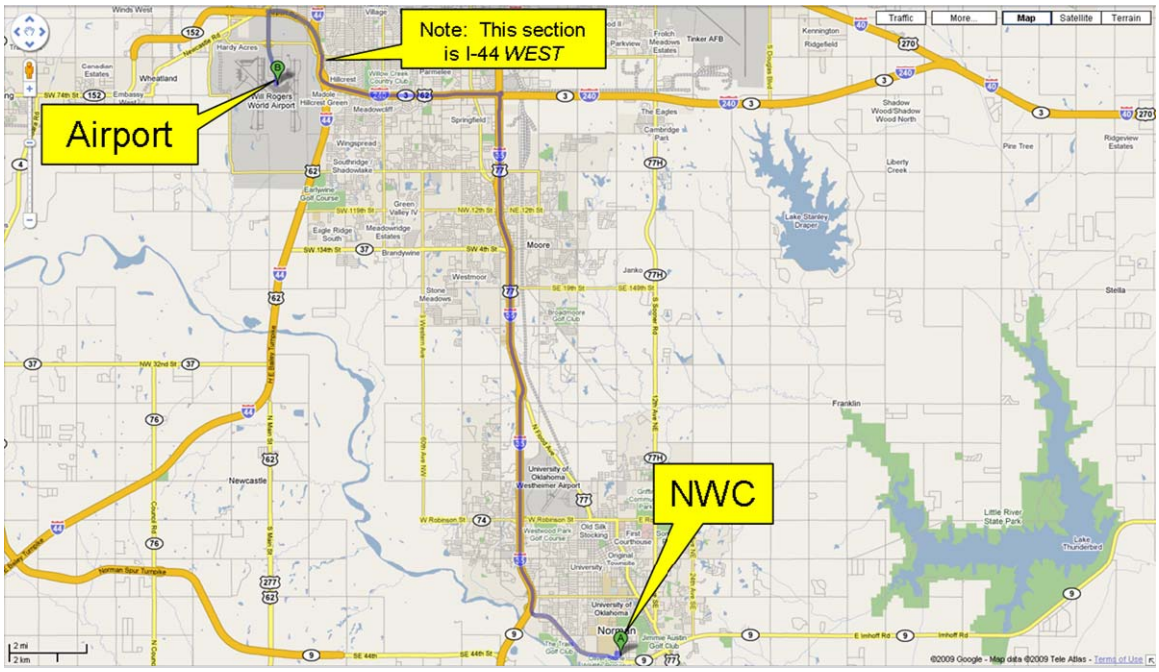


Fig 2. Map showing directions from the OKC airport to the National Weather Center.

Additional visitor information is available at this link:

http://www.nssl.noaa.gov/aboutnssl/visitor.html

Each CONUS NWS region (Eastern, Southern, Central, and Western) will be provided a $3,000 travel stipend to cover all or a portion of the travel costs of their region's 3 forecast participants. Each OCONUS NWS region (Pacific and Alaska) will be provided a $1,500 travel stipend to cover all or a portion of the travel costs of their region's 1 forecast participant. The remaining costs are to be covered by the forecaster's WFO or representative RHQ. NOAA participants traveling from outside Norman should arrange their travel plans and file their reimbursement forms with their WFO or RHQ administrative assistant, who will coordinate with the NSSL administrative assistant handling the travel (information is sent separately from this plan). Participants are encouraged to save costs by sharing rides (e.g., one rental car split between all weekly visitors) to and from the NWC. NWC employees will be unable to provide personal shuttle service.

d. Information specific to invited WFO participants

Note that the NSSL-sponsored full-time WFO participants are required to participate on the following schedule:

Mon-Thu	1pm-9pm	Daily operations
Fri	10am-1pm	Debriefing and optional seminars

The dates and times for travel to and from Norman will have to be determined and approved by the participants' WFO management to guarantee that the participants are on site for the above shifts.

Also note that these shifts will intersect dinner time (M-Th) and lunch time (F). WFO participants are required to eat their meals during a short shift break, one forecaster at a time; preferably as to minimize impact to EWP operations (this can be coordinated on a daily basis). A kitchenette with a microwave, sink, and full-size refrigerator is available in the NOAA common space. On occasion, we may order dinner in (e.g., pizza), but usually not during a major real-time operational event. Note that the Flying Cow Café in the NWC closes at 3pm every day and does not serve dinner.

e. Information specific to non-WFO participants

Note that non-WFO participants are free to work operations outside of these hours. Off-hour operations will be limited to data collection for Central Oklahoma events, and only when HWT personnel are available off hours.

f. Optional seminars

In the past, some of the HWT visitors have requested time to present a seminar on a topic of their choosing. While seminars are not required for participation in the Spring Experiment, we will accommodate participants if there is interest. We have set an optional block of time on Fridays, from 12-1pm, for seminar presentations. These seminars will be conducted in the NSSL Development Lab. Since this is lunch time, the seminars will be of a "brown bag lunch" informal style with a generally small group of attendees. If more than one participant chooses to present a seminar, they will be squeezed into the one hour block, using "conference style" timing (15, 20, or 30 min each), for a maximum of 4 seminars. Seminars should be arranged with the weekly coordinator prior to Friday.

g. Participant schedule and contact information

The staffing schedule will be posted on the EWP Internal Web Page (https://secure.nssl.noaa.gov/projects/ewp). All participants should provide their email and cell phone information.

6. EQUIPMENT

There will be a variety of equipment available in the HWT Operations Room to support the EWP Spring Program (Fig. 3).

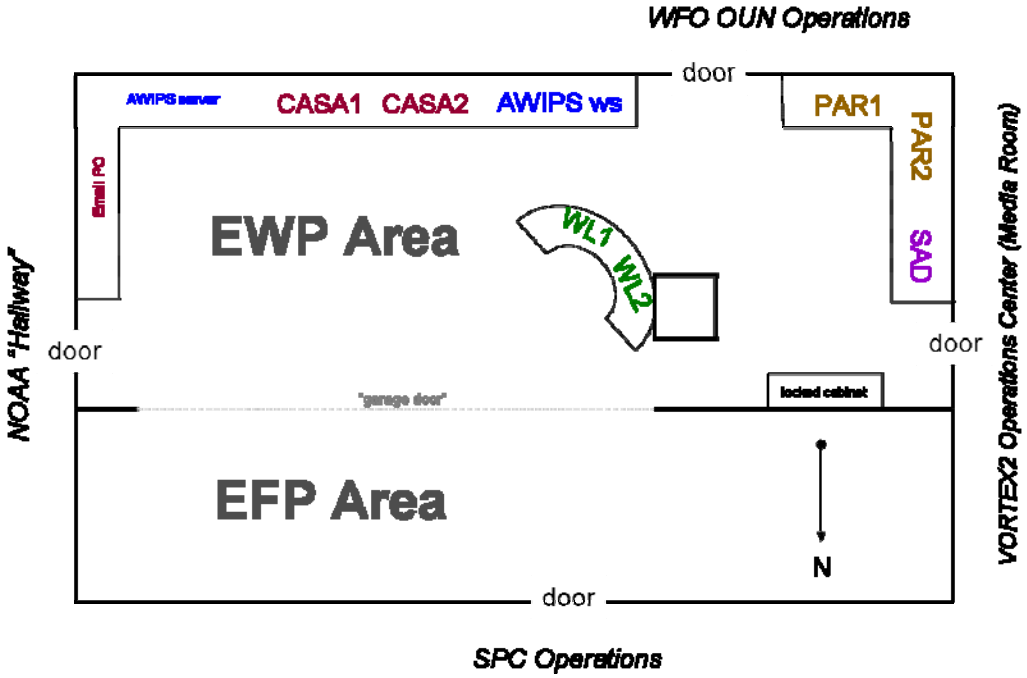


Fig 3. Layout of the Hazardous Weather Testbed operations area.

The **Situation Awareness Display (SAD)** will consist of 7 large LCD monitors that will provide images from any of the other EWP computer monitors, as well as live television, web page content, etc. These LCD monitors will be mounted above the desks in two areas of the HWT.

There are three experiment stations, as well as several support stations. While we have the capability to run any experiment from any of the workstations, at least two of the experiments will usually take place at specific locations.

The **Phased Array Radar (PAR) station** will occupy the SW corner of the HWT and consist of two Linux PCs. One will host the PAR Radar Control Interface (RCI), and the other PC will host a Warning Decision Support System – Integrated Information (WDSSII) display.

The **Collaborative Adaptive Sensing of the Atmosphere (CASA) station** will occupy the south-central wall of the HWT. It will consist of two Linux PCs, capable of running the WDSSII display.

The **WDSSII/LMA (WL) station** will occupy the curved table near the west column near the center of the HWT. It will consist of two Linux PCs capable of running the WDSSII display.

There will be an **Advanced Weather Interactive Processing System (AWIPS) station** along the south wall to the right (west) of the CASA station. The AWIPS station will consist of an AWIPS 'lx' workstation (lx1-hwt) located in the center of the three main experiment stations, and serve as a resource for mesoscale analysis for each of the experiments. The AWIPS server (px1-hwt) machine will be located in the left (east) position on the south wall, close to the southeast corner of the HWT. The server has the capability of running several live Open Radar Product Generator (ORPG) for any live radar feed in the CONUS, such that we can localize the AWIPS system to any NWS WFO. Besides live WSR-88D data, the AWIPS system will provide live satellite, surface, upper air, and numerical model data.

In addition to the dedicated AWIPS PCs, each of the WDSSII Linux workstations will also be capable of running **AWIPS Operational Build 9 software**. Most of the WDSSII multi-radar/sensor grids and the Lightning Mapping Array grids will be available for viewing within the AWIPS Display 2-Dimensions (D-2D) Volume Browser, providing the forecasters technological familiarity. If any forecaster has WDSSII experience, they are also free to view the data using that platform.

In addition, all of the WDSSII product grids will be made available in **Google Earth™** (GE). GE now has the capability to display multi-parameter trends as well as animate data. These experimental products will be available to participants, and any NWS forecaster, on the outside. We will encourage the use of the products in support of WFO

warning operations this spring. The following URL contains GE KML links to the WDSSII product suite: http://wdssii.nssl.noaa.gov

7. ACKNOWLEDGMENTS

The 2009 EWP Spring Program wouldn't be possible without contributions from a number of individuals and organizations. Those from the National Oceanic and Atmospheric Administration (NOAA) include: the National Severe Storms Laboratory (NSSL) Radar Research and Development Division and the NSSL Warning Research and Development Division; the National Weather Service's Meteorological Development Laboratory (MDL); the NWS Warning Decision Training Branch, and the NWS Weather Forecast Office in Norman, OK. CASA (the Center for Collaborative Adaptive Sensing of the Atmosphere) is a National Science Foundation-funded Engineering Research Center with University of Massachusetts (lead), University of Oklahoma, Colorado State University and University of Puerto Rico, Mayaguez.

In particular the following individuals should be cited: Travis Smith, Kevin Manross, Kristin Kuhlman, Kiel Ortega, Arthur Witt, Angelyn Kolodziej, Don Burgess, Charles Kerr, Robert Toomey, Jeff Brogden, Valliappa Lakshman, Kurt Hondl, Brenda Phillips, Jerry Brotzge, Pam Heinselman, Doug Forsyth, Karen Cooper, Vicki Farmer, Paul Griffin, Brian Schmidt, Will Agent, Brad Sagowitz, Bob Staples, Liz Quoetone, Dale Morris, Paul Schlatter, Patrick Burke, Michael Magsig, Jim LaDue, Les Lemon, Veronica Davis, Brenda Philips, Jerry Brotzge, Darrel Kingfield, Ben Baranowski, John Ferree, Kevin Scharfenberg, David Andra, and others.

This work has been primarily funded via sources from the National Severe Storms Laboratory, the National Weather Service Meteorological Development Laboratory, and via NOAA-OU Cooperative Agreement #NA17RJ1227. The CASA experiment is supported primarily by the Engineering Research Centers Program of the National Science Foundation under NSF award number 0313747.

APPENDIX A: Lodging Options for the Norman Area

All of these options are within 5 miles of the National Weather Center and offer the Norman Federal per diem rate of $70/night for certain rooms.

Information also available at: http://www.visitnorman.com/lodging.html

---

Hilton Garden Inn:

700 Copperfield Drive
Norman, OK 73072
405-579-0100

Federal government rate of $70 is available with a government ID. This hotel just opened in 2008. It is located approximately 5 miles from the NWC. Hotel is within walking distance of several restaurants. Amenities include: on-site dining, HDTV, pool, exercise room, wireless high speed internet, microwave, and mini-fridge.

Marriot Courtyard:

770 Copperfield Drive
Norman, OK 73072
405-701-8900

Federal government rate of $70 is available with a government ID. This hotel just opened in 2008. It is located approximately 5 miles from the NWC. Hotel is within walking distance of several restaurants. The hotel is 100% smoke-free. Amenities include: on-site dining, exercise room, wired and wireless high speed internet, microwave.

Fairfield Inn: 301 Norman Center Court
Norman, OK 73072
405-447-1661

Federal government rate of $70 is available with a government ID. It is located approximately 4 miles from the NWC. Hotel is within walking distance of several restaurants, shopping, and the Sooner Fashion Mall. The hotel is 100% smoke-free. Amenities include: complimentary continental breakfast, indoor pool and spa, wired and wireless high speed internet, microwave.

La Quinta Inn: 930 Ed Noble Drive
Norman, OK 73072
405-579-4000

Federal government rate of $70 is available with a government ID. It is located approximately 3 1/2 miles from the NWC. Hotel is within walking distance of restaurants and shopping. The hotel is 100% smoke-free. Amenities include: complimentary continental breakfast, outdoor pool and spa, fitness center, wired and wireless high speed internet, microwave and refrigerator in some rooms.

Best Western Norman Inn & Suites:
2841 S. Classen Blvd.
Norman, OK 73071
405-701-4011

Federal government rate of $70 is available with a government ID. This hotel just opened in the fall 2007. It is located approximately 1 mile from the NWC. Hotel is not within walking distance of restaurants and shopping. Amenities include: complimentary continental breakfast; outdoor pool, exercise room; wireless high speed internet.

Sooner Legends Inn & Suites:
1200 24th Ave. SW
Norman, OK 73072
405-701-8100

Block of Rooms held under "EWP 2009 Spring Experiment". Federal government rate of $70 is available with a government ID and travel authorization. This hotel is located approximately 3 miles from the NWC. Hotel is within walking distance of restaurants. Amenities include: complimentary buffet breakfast. Restaurant is on the premises. Outdoor heated pool, exercise room; wireless high speed internet. If a shuttle is needed to/from the National Weather Center or you have any questions, please contact Valerie Kennon at 405-701-8100 or 405-641-2867 (cell phone). Deadlines for block of rooms, afterwards rooms will be released from block and are not guaranteed:

April 20 - For April 27-May 1 arrival
April 27 - For May 4-May 8 arrival
May 4 - For May 11-May 15 arrival
May 11 - For May 18-May 22 arrival
*May 25 *- For June 1-June 5 arrival
June 1 - For June 8-June 12 arrival

Residence Inn:

2681 Jefferson Street
Norman, OK 73072
405-366-0900

Call the hotel directly (8-5 CT) at 405-366-0900 and ask for Iris to get the best rate; mention that you are participating in the "NOAA Spring Experiment" to request the NOAA rate of $70 (this special rate is less than their government rate). This hotel is located approximately 2 1/2 miles from the NWC. Amenities include: complimentary breakfast, pool, exercise room. Shuttle service to the NWC is available if set up with Iris.