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conducted by

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AN EVALUATION OF THE OK-FIRST PROJECT: ENHANCING THE CAPACITY OF PUBLIC SAFETY OFFICIALS TO USE REAL TIME DATA FOR LOCAL DECISION-MAKING

Final Report

Prepared for

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AN EVALUATION OF THE OK-FIRST PROJECT: ENHANCING THE CAPACITY OF PUBLIC SAFETY OFFICIALS TO USE REAL TIME DATA FOR LOCAL DECISION-MAKING

"As were most other agencies around, on October 4th we were in the EOC [Emergency Operations Center], watching the NWS [National Weather Service] radar via OK-FIRST. Spotters were out, but we were a bit thin due to some other commitments...One spotter was assigned to a normal location on the north side of Newcastle, which is about 5 miles due west of Moore. As the storms moved in, our spotter coordinator decided–due to her OK-FIRST display–to move this spotter a couple of miles south....It was this spotter who gave us first knowledge of the large wall cloud that eventually spawned the tornado that destroyed or severely damaged about a dozen homes and apartment buildings in Moore. The spotter's call–along with a radar warning from NWS Norman–caused us to activate our warning system, and we provided our residents about 10 minutes warning...Although we had this damage, there were NO injuries or fatalities from the storm...The spotter who made the call later told us numerous times that had the EOC not moved him, he would not have been in the proper location to see the wall cloud! This scenario is EXACTLY what OK-FIRST was designed to do! It certainly worked here!!!!!

Gayland Kitch, Emergency Manager, City of Moore

INTRODUCTION

Like most states, Oklahoma's lifestyle and economy are closely tied to its environment. For example, in recent years, droughts and wildfires have resulted in billions of dollars of losses for the wheat farmers, curtailed tourism in state parks by nearly 50 percent, and created wide ranging economic repercussions. During periods of more "normal" conditions, Oklahomans regularly contend with strong, dry winds during late winter and early spring that can whip up fast-moving wildfires; powerful thunderstorms (and associated flooding) and tornadoes during the summer months; and ice storms during the winter that can cut off power and make roads extremely treacherous. The National Weather Service in Norman, Oklahoma, issues more severe storm warnings – over 1,000 a year – than any other weather service office in the country. However, state and local officials in Oklahoma are not much different than their counterparts in other states when responding to emergencies; local decision-support systems generally suffer from an almost complete lack of current environmental information necessary to make informed decisions about weather-related events (Oklahoma Climatological Survey 1996).

In order to provide police and fire officials and emergency managers with information that could improve public safety decision making, the Oklahoma Climatological Survey (a state-chartered agency within the University of Oklahoma), developed and implemented a decision-support system known as OK-FIRST: **OK**lahoma's **F**irst-response **I**nformation **R**esource **S**ystem using **T**elecommunications for Public Safety Agencies. OK-FIRST provides public safety agencies and officials with customized, county-level environmental information within minutes of observation; training and instruction on how to obtain, interpret, and use the data; and ongoing user support. This report describes the OK-FIRST project and its participants and discusses an evaluation of the training of public safety officials and their utilization of acquired skills and knowledge for emergency management decision making.

THE OK-FIRST PROJECT

When faced with making decisions related to impending weather emergencies, local officials typically are ill-equipped to respond using current and localized information. The key missing elements are relatively easy and cost-effective access to timely radar from the national network of NEXRAD data and proper training in data acquisition and use.[1] The National Weather Service (NWS) has made limited progress in disseminating time-sensitive information to local agencies. Although the NWS produces vast amounts of county-level radar data and computer forecasts, it lacks adequate mechanisms to ensure application at the local level. In addition, many agencies have not had an adequate telecommunications infrastructure to access NWS and related data sets. Even if access was easy, in most cases, local officials have not had sufficient training to properly interpret and apply the new environmental data products made possible by the modernization of the NWS.

In 1996, a favorable set of conditions existed in Oklahoma to create a program that would benefit the public safety community. Successful working partnerships were in place at several levels, including federal-state-community relationships between the NWS, the Oklahoma Climatological Survey (OCS), and many local agencies. Perhaps the most critical linkage was the public-private partnership between the OCS and the Unisys Corporation. Unisys is an authorized vendor of WSR-88D NEXRAD data through its NEXRAD Information Dissemination Service (NIDS) agreement with the NWS. The OCS developed a unique arrangement with Unisys to redistribute radar data from the federal network of advanced radars to non-federal government agencies. Thus, public safety officials who participated in the OK-FIRST project had access to the products of 15 NEXRAD units that provide surveillance of Oklahoma. This is particularly important to police, fire, and emergency managers in rural areas who frequently complain that television stations ignore rural areas when storms occur in urban areas. Given the rural nature of most of Oklahoma, this concern is significant.

Based on the need of local officials' ability to access and use perishable environmental information, and on OCS experiences and end-user feedback gained through operating the Oklahoma Mesonet[2], and an associated educational outreach program for K-12 schools; the OCS sought and received funding to begin the OK-FIRST project. In September 1996, initial support for a two-year "demonstration project" was provided by the U.S. Department of Commerce through its Telecommunications Information and Infrastructure Assistance Program. The State of Oklahoma endorsed OK-FIRST and provided substantial funding in September 1998 for a third year of OK-FIRST. Annual, line-item budget support from the Oklahoma Legislature was approved in 1999.

Goals and Objectives

The impetus behind the OK-FIRST project was a desire to strengthen and upgrade the public safety component of Oklahoma's emergency warning system and to meet the expressed needs of public safety officials. Thus, the primary goal of the OK-FIRST project is:

- To develop a transportable, agency-driven information system that helps public safety agencies harness the information age. Specifically, to improve public safety in Oklahoma through the implementation of a decision-support system for police, fire, and emergency managers.

In order to increase the technical skills of public safety officials, the project objectives are to:

- Establish the initial base-line of knowledge, skills, and abilities of end-users about using the National Information Infrastructure;
- Secure adequate computer resources for local agency participants;
- Establish computer linkages to OneNet[3] and OLETS[4] for participant agencies out of a pool of 400 civil defense agencies, 850 fire departments, and 700 law enforcement agencies;
- Increase participants' understanding of the many environmental data sources available from the National Information Infrastructure. This will include providing access to the suite of Oklahoma Mesonet, NEXRAD and NWS products, plus innovative products from partnerships with other agencies;
- Increase participants' ability to apply environmental information to their operations;
- Improve the packaging, transfer, and display of environmental data so that it is more suitable to real-time operations for the participant;
- Provide routine follow-up support throughout the project (e.g., on-site visits, on-line conferencing); and
- To quantify the impact of OK-FIRST by documenting changed work-habits and new approaches to old problems.

Training Workshops

As noted earlier, the purpose of OK-FIRST is to provide environmental information tailored to individual agencies in both content and geography, as well as training on how to access and use the products. To this end, participants attended two training workshops – computer skills and data interpretation – that were held on the campus of the University of Oklahoma. The following objectives and activities guided the development and implementation of project training workshops:

- Survey participants for computer literacy and knowledge of sources of environmental information;
- Train participants for adequate and approximately equal levels of computer literacy;
- Train participants to access current Mesonet, NIDS, and NWS products provided by OCS;
- Improve participants ability to interpret Mesonet, NIDS, and NWS products;
- Encourage participants to use e-mail and conferencing to communicate with each other and with the OK-FIRST staff;
- Nurture participants on the use of the WWW and the Internet to find resources that help them solve their environmentally-related problems; and
- Encourage the participants to extend the growth of OK-FIRST by sharing information with colleagues.

The first workshop consisted of three days of computer training, starting with basic information about the computer and its operating system. This was followed by training on use of the Internet and how to access OK-FIRST web pages. This included learning to use "plug-in" software developed by OCS to interactively display Mesonet data and NIDS images (Wolfinbarger et al. 1998a & b) using web browsers. Because OK-FIRST is a peer- and decision-support system, conferencing software (First Class™) allows participants to share information and to foster communication among the participants and staff. Participants were taught and encouraged to upload OK-FIRST products to the Mesonet BBS when they had interpretation questions.

A week-long data interpretation workshop was held ten days later to allow participants time to practice accessing environmental data using the OK-FIRST system and to use the computer skills they learned during the first workshop. Relatively intense days included lectures and laboratory exercises on severe weather, fire weather, flash and river flooding, and winter weather. Workshop participants were expected to be able to recognize the potential for an event, determine lead time, and use weather data to make intelligent decisions about the event. Thus, attention was given to the characteristics of radar, interpretation of radar images, interpretation of Mesonet data, and types and sources of weather information[5].

Refresher courses also were provided to participants. Those who attended the first set of workshops (Class 1) returned to the campus for a one-day workshop that was held in conjunction with the data interpretation workshop for Class 2. OK-FIRST staff were able to answer questions and provide other assistance to help participants use the environmental data resources more effectively. It also presented an opportunity for feedback about the experiences of participants as they attempted to use the resources to inform their decisions. Class 1 and Class 2 participants returned for similar sessions when Class 3 began.

OK-FIRST Participant Selection

Since the OK-FIRST project began in October 1996, three cohorts of public safety officials (Class 1, June 1997, N=23; Class 2, October 1997, N=22; Class 3, March 1998, N=24) have participated in the computer training and data interpretation workshops. These 69 participants were selected from among approximately 200 applications received from local police and fire departments, sheriffs' offices and emergency management agencies across Oklahoma[6]. The criteria used to select participants included:

- Participants needed either to have Internet access or be willing to get and pay for access[7];
- No more than one participant could be from the same office;
- Geographic diversity was considered with rural participants given slight preference; and
- The quality of the application, particularly the narrative section in which applicants described the need OK-FIRST would meet in the community and the ways it would be used to meet that need, was an important factor in selecting participants.

Participants in OK-FIRST fell into two categories: "subsidized" and "non-subsidized" participants. The initial funding for the project supported the participation of 32 fully-funded, or "subsidized," participants selected from three public safety groups: police, fire, and emergency managers. Each class included 10 to 12 subsidized participants. In addition to support for travel to and from Norman for each set of training sessions, subsidized participants received an extended loan of a Pentium-class computer, a printer, and all necessary software for data display[8].

Non-subsidized participants (10 to 12 per class) were selected from applicants who reported that they had adequate computer hardware (a Pentium-class PC with a 28,800 baud or higher modem, Windows 95 or NT, and Netscape 3.0 or higher) and Internet capability. Because they had the computer resources necessary to utilize the OK-FIRST software, these participants did not receive computers from the Oklahoma Climate Survey. They also paid for their own travel expenses to and from Norman for the training workshops. However, the non-subsidized participants received all other benefits received by the subsidized participants. In addition to the training, this included free access to a wide range of real time weather data, including: NEXRAD data from 15 regional radars plus regional national mosaics, Oklahoma Mesonet data, derived products like the Oklahoma Fire Danger Model, plus links to products from the National Weather Service.

Participant Characteristics

Of the 69 OK-FIRST participants who began the program, 70 percent represented local emergency management agencies (Table 1). Representatives of police departments comprised 10 percent of the total and fire department personnel made up eight percent. Twelve percent of the participants were in other local or state positions[9]. Of those who provided information about their job experience, 12 percent of the total class participants had worked in public safety for a year or less, while about one-third had been on the job two to five years, and 54 percent had at least five years of experience.

Table 1 also shows the details of employment and time on the job for all participants by class. The first class consisted primarily of emergency managers (91 percent); 64 percent of the class had been on the job for more than five years. Class 2 also were predominantly emergency managers (59 percent), with 23 percent of the participants representing fire departments. As with Class 2, almost six out of ten (59 percent) of the participants in the third class came were emergency managers.

However, Class 3 did not have any fire officials with direct emergency management responsibilities. Eighteen percent came from police departments and 23 percent represented other public agencies or held positions (e.g., dispatchers) with fire or police that did not have direct responsibility for emergency management decisions. Class 3 also differed from the other classes in terms of participants' time on the job. Twenty-two percent of the participants in Class 3 had one year or less of job experience, and the remainder were evenly distributed (39 percent each) between the categories of two to five years and more than five years of experience. Thus, in general, the participants in the third class were somewhat less experienced than those in Classes 1 and 2.

Table 1 Participant Characteristics				
	All Classes	**Class 1**	**Class 2**	**Class 3**
Area of Employment	**Percent** (N=69)	**Percent** (N=23)	**Percent** (N=22)	**Percent** (N=24)
Emergency Management	70	91	59	59
Fire	8	0	23	0
Police	10	0	14	18
Other	12	9	5	23
Years on the Job	**Percent** (N=61)	**Percent** (N=22)	**Percent** (N=21)	**Percent** (N=18)
One or less	12	9	5	22
Two to Five	34	27	38	39
More than Five	54	64	57	39

Prior to attending the computer workshop, participants completed and returned a mailed questionnaire that asked for information about the levels of computer use and knowledge. As evident from the data in Table 2, all of the OK-FIRST participants reported that they had used a computer at some time, and 86 percent reported that they used a computer on a daily basis. Eighty-four percent of the respondents reported operating in a Windows format daily (the OCS software used a Windows platform). Internet use was not as high across the participants with 32 percent reporting they did not use the Internet regularly and only 50 percent reporting that they used the Internet daily. When asked to rate their individual levels of comfort with a series of computer tasks on a 4 point Likert scale, 60 percent of the respondents reported being either very or somewhat comfortable with more than 75 percent of the tasks presented.

Table 2 Participant Experience Using Personal Computers				
	All Classes (N=57)	**Class 1 (N=22)**	**Class 2 (N=19)**	**Class 3 (N=16)**
	Percent	**Percent**	**Percent**	**Percent**
Have you ever used a computer?				
Yes	100	100	100	100
No	0	0	0	0
Do you currently use a computer on a regular basis?				
No	4	0	11	0
Yes, daily	86	100	68	88
Yes, weekly	7	0	21	6
Yes, monthly	2	0	0	6
Do you regularly operate in a Windows format?				
No	2	0	5	0
Yes, daily	84	100	63	88
Yes, weekly	11	0	26	6
Yes, monthly	4	0	5	6
Do you regularly use the Internet?				
No	32	24	58	13
Yes, daily	50	57	26	69
Yes, weekly	13	14	11	13
Yes, monthly	5	5	5	6
I am very or somewhat comfortable with computer tasks.				
25% or less of tasks	11	0	26	6
26% – 50%	18	18	22	13
51% – 75%	12	9	16	13
76% – 100%	60	73	36	69

Variation did exist among the three classes with respect to their computer skills coming into the program. In general, Class 1 had worked in Windows more but they were less likely to have used Windows 95. The participants in this class also tended to rate themselves higher in terms of comfort in performing computer tasks. Class 2 had the least computer experience overall. Only 68 percent reported using a computer on a daily basis and only 26 percent used the Internet daily. Further, in Class 2, only 36 percent of the participants were comfortable with more than 75 percent of the presented computer tasks. Class 3 generally had the most computer experience. All of the participants in this class had used Windows 95, 88 percent on a daily basis, and 69 percent of the participants used the Internet on a daily basis.

Evaluation Design and Implementation

The evaluation of the OK-FIRST program was designed in close collaboration with staff from the Oklahoma Climate Survey, the group responsible for delivery of services. The goals of the evaluation were to: (1) determine the extent to which the OK-FIRST program provided participants with the hardware, software, access to weather data, and training they needed to enhance their ability to identify, forecast, and respond to threatening or dangerous weather conditions; and (2) to document the use of the skills and knowledge gained and its impact on emergency management decision making. In order to achieve the evaluation goals, both quantitative and qualitative data were collected using a pre-test, post-test, and follow-up approach.[10]

Throughout the implementation of the evaluation, there was close and ongoing coordination and cooperation between the project and evaluation staffs. For example, after the first class of participants had completed both training sessions, the evaluation staff identified two potential problem areas: one where participants had not shown substantial improvement on the post-test instrument and one where, during focus groups discussions, participants reported a need for increased training. In the first case, the OK-FIRST staff worked with evaluators to refine the data collection instrument to more accurately reflect the actual training that was taking place. In the second case, the OK-FIRST staff changed their approach to training on that specific element. The program staff was receptive throughout the project to suggestions from the evaluation staff and from the participants themselves and made a number of changes in the training and the software as a result.

Background Information. In order to collect background information to describe the characteristics and experiences of the participants, two self-administered questionnaires were used. The first was mailed prior to the computer workshop and asked respondents to report their levels of experience on a number of computer related activities. Participants were asked to provide information on how often they use computers and specific software applications important to the OK-FIRST project. They also were asked to rate their familiarity with various computer concepts and their levels of comfort in executing specific tasks on the computer.

A second survey was administered at the start of the data interpretation workshop. Participants were asked to report their job titles, years of experience in the field, how often they use weather data, their previous sources of weather information, and the limitations of that information. Respondents also reported the types and sources of weather data they would most like to have available to them.

Computer and Data Interpretation Workshops. The effectiveness of the training workshops was measured using skills and knowledge tests administered before and after the computer training and weather data interpretation workshops. At the computer training workshop, participants began by completing a test to measure their computer skills. Each participant worked independently at a computer and was given a series of tasks to perform[11]. Each task was displayed on a screen at the front of the room. All of the class participants took the test simultaneously. Observers stood behind the participants and recorded whether or not each individual performed the task as assigned. Additionally, participants were asked to identify specific components of a computer desktop on a printed image of a desktop. A similar test was administered at the conclusion of the workshop. The tasks and images on which participants were tested were based on a list of objectives for the workshop developed by the OK-FIRST staff.

When participants returned for the data interpretation workshop, a questionnaire was administered that included, among other items, questions about the strengths of the training received during the computer workshop, areas for possible improvement, and usage of their computers and associated software during the interim period. Similar information was solicited during focus group discussions that were held with members of Classes 1 and 2 each time they returned to campus to participate in a refresher workshop. These group discussions were very important sources of information and insights about the experiences of the individuals as they participated in the training workshops and about their use of the knowledge and skills they developed for decision making.

The tests for the weather data interpretation workshop also were developed in close collaboration with the OK-FIRST staff. The evaluation team worked with the program staff as they developed a list of training objectives. The OK-FIRST staff then developed the specific items of information to be included (they also identified appropriate weather data and images for test items) and the evaluation staff determined appropriate methods to measure the level of accomplishment for each objective and item. For example, objectives related to identifying wind shifts or recognizing the radar signatures of various types of precipitation were measured by asking the participants to look at images taken from radar or Mesonet data and then to identify the specific weather phenomena. Participants also were asked to define terms and to identify and apply weather concepts.

The test was administered prior to the start of the data interpretation workshop and again at the end to assess changes in participants' knowledge related to the information covered during the training. Follow-up information concerning workshop strengths and possible areas for improvement with respect to the data interpretation training was collected during the focus group discussions and through self-administered questionnaires completed by OK-FIRST participants who attended a refresher course in December 1998. Feedback also was solicited on an ongoing basis during the presentation of the training.

Outcomes. Program evaluations frequently distinguish between long-term outcomes and intermediate outcomes. Long-term outcomes are broader outcomes that the program is attempting to affect, but which it alone cannot accomplish. Intermediate outcomes are the impacts that directly result from the activities of a program. Public safety officials have as a goal the long-term outcomes of preventing the loss of life and property. The purpose of OK-FIRST was to increase the capacity of local officials to accomplish that goal. However, these long-term outcomes are likely to be influenced by events and conditions outside the control of OK-FIRST, and often beyond the control of the fire, police, and civil defense officials. Thus, OK-FIRST could enhance computer skills, increase knowledge about the availability, interpretation, and use of environmental information, and successfully promote its use in real world situations. However, the project had no direct control over conditions that could affect indicators associated with accomplishment of the broader goal--e.g., dollar value of property loss, number of people injured, or number of lives lost. Public safety officials could use the knowledge and skills gained through OK-FIRST to issue warnings about the likelihood of hazardous road conditions or flash flooding, but they cannot completely control whether citizens heed the warnings and advisories. It can be argued that without the warnings, the probability is greater for loss of life or property and that the warnings contribute to conditions that would more likely lead to the goal of saving lives and protecting property. Thus, the OK-FIRST evaluation focused primarily on intermediate outcomes. These outcomes reflect incremental progress toward broader or longer term outcomes and measure results or impacts more directly related to project activities.

Feedback concerning the utility of the computer and data interpretation training and the impacts of acquired skills and knowledge on emergency management decision making was a major component of the focus group discussions. A substantial amount of time was spent talking about how the availability of real time environmental data and participants' ability to access and interpret the data had influenced their approach to problem solving and the substance of their decision (a discussion of utilization is presented later in the report). Information about utilization also was collected through the questionnaire administered to participants who attended the December 1998 refresher course.[12]

TRAINING RESULTS

The Training Results Section compares the pre-test scores and the post-test scores from the computer training and data interpretation instruments. The average overall computer training test scores and the amount of change that took place is presented for all classes combined and for each individual class. This is followed by an analysis of the scores and changes for each of the individual items on the computer training pre-test and post-test. Attention to the scores on individual items can be useful for planning future training efforts. For example, if pre-test scores indicate that most participants already have a substantial level of knowledge on certain items or in certain areas as they enter the training, the emphasis in these areas might be reduced in future training sessions. It might allow for a reallocation of time and effort to focus more on areas where participants are less knowledgeable or skillful. If scores are low for some items upon entry and remain low at the conclusion of the training, an examination of the materials and methods used might be warranted. After the computer training analysis, a similar presentation is made of the results from the data interpretation tests.

Computer Training: Overall

Analysis of pre-test and post-test data for the computer training session indicated that, overall, participants learned a great deal through the workshop. For the sixty participants who took both the pre-test and post-test for computer skills, the average pre-test score was 57 percent. By the post-test, that had increased significantly to 79 percent (Table 3). It is interesting to note that the three classes exhibited progressively more improvement. Participants in the first training session increased an average of 20 percent, the second class 21 percent, and participants in the third class improved 24 percent. Although the differences are not substantial, this suggests that perhaps the quality of the training increased as the trainers acquired more experience.

Table 3
Computer Training Overall
Percent Correct

	Pre-Test	Post-Test	Δ	Significance*
All Classes (N=62)	57	79	22	.000
Class 1 (N=20)	60	80	20	.000
Class 2 (N=19)	52	74	21	.000
Class 3 (N=23)	58	82	24	.000

* One-tailed test of significance.

In examining the improvement in computer skills, further analysis reveals an interesting pattern when considering the level of knowledge an individual had upon entering the program. As indicated in Tables 4 through 6, those individuals who were able to accomplish less than half the tasks on the pre-test (N=24) showed an average of 30 percentage points improvement, moving from an average of 35 percent correct to an average of 65 percent correct. Individuals who had scored very

Table 4 Computer Training Overall Participants with Pre-Test Scores ≤ 50% Percent Correct				
	Pre-Test	Post-Test	Δ	Significance*
All Classes (N=24)	35	65	30	.000
Class 1 (N=6)	35	69	34	.001
Class 2 (N=10)	36	60	26	.000
Class 3 (N=8)	32	69	37	.000

* One-tailed test of significance.

high on the pre-test, getting more than 80 percent of the items correct (N=7), did not show substantial improvement, moving from an average of score of 89 percent correct to and average of 93 percent correct. That is not surprising given the fact that these individuals had very little room for improvement because of their high pre-test scores. The individuals who scored between 50 percent and 70 percent on the pre-test (N=29) showed a 19 point improvement, increasing their average from 68 percent correct to 87 percent correct.

Table 5 Computer Training Overall Participants with Pre-Test Scores 51% - 79% Percent Correct				
	Pre-Test	Post-Test	Δ	Significance*
All Classes (N=29)	68	87	19	.000
Class 1 (N=10)	66	83	17	.000
Class 2 (N=7)	70	91	21	.000
Class 3 (N=12)	68	87	19	.000

* One-tailed test of significance.

Table 6 Computer Training Overall Participants with Pre-Test Scores ≥80% Percent Correct				
	Pre-Test	Post-Test	Δ	Significance*
All Classes (N=7)	89	93	4	.058
Class 1 (N=3)	88	91	2	.211
Class 2 (N=1)	88	88	0	N/A
Class 3 (N=3)	90	97	7	.059

* One-tailed test of significance.

These findings are important in that they indicate that those who came into the program with the least knowledge and lowest skills benefitted greatly from the training session. While the training did not bring them to the same skill level as those who entered the program with the greatest capabilities, it did help them improve their scores significantly. Further, those individuals who scored moderately well on the pre-test were able to improve their capabilities enough through the training workshop to bring them nearly to the level of those who had come into the session at the highest skill level. Given the fact that the products and services provided through OK-FIRST require a great deal of computer and Internet usage, it was important that participants were leaving the training with a level of knowledge that would allow them to use their computers to access weather data.

Computer Training: Item Analysis

More detailed information that is useful for planning future training efforts can be obtained through an examination of participant responses to each of the specific questions included on the pre-test and post-test. Thus, an item analysis was conducted to identify the changes that took place from pre-test to post-test for each question. As indicated by the data displayed in Table 7, 23 of the 34 items on the computer skills test were significant at the .01 level and 30 were significant at the .05 level. Overall, only four items did not exhibit statistically significant change at these levels, including: identify start menu, identify an application, find Windows Explorer, and use an address. However, for two items – identify start menu and use address – a substantial percentage of the participants (76 percent and 79 percent, respectively) were able to respond correctly on the pre-test and has less room for improvement. Nevertheless, participants did improve; 84 percent correctly identified the start menu on the post-test and 87 percent could use an address. Similarly, almost seven of 10 (68 percent) could find Windows Explorer on the pre-test and this increased to 81 percent on the post-test. Of the four items which did not change significantly, the ability of participants to identify an application was the most problematic. Thirty-nine percent responded correctly on the pre-test and this only increased to 48 percent at the time of the post-test. If this skill is viewed as an important component of an individual's ability to successfully use the system, more attention needs to be devoted to it during training.

However, just because participants improved substantially and the change was statistically significant, it does not necessarily mean the improvement was sufficient or enough from a practical standpoint. For example, overall, only 31 percent of the participants could correctly identify a document on the pre-test. The 22 percent improvement from pre-test to post-test was significant at the .001 level. Nevertheless, at the time of the post-test, slightly more than half of the participant (53 percent) could correctly complete this item. Thus, the percentage of participants who can correctly complete an item could increase dramatically from pre-test to post-test but if the level in initial skill is very low, this increase might not be sufficient to consistently use the feature successfully.

Table 7
Computer Training
Percent Correct

Using Windows 95	All Classes (N=62)				Class 1 (N=20)				Class 2 (N=19)				Class 3 (N=23)			
	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*
Identify shortcut	44	85	41	.000	70	75	5	.000	37	84	47	.001	26	96	70	.008
Identify start menu	76	84	8	.100	85	95	10	.165	63	68	5	.358	78	87	9	.164
Identify task bar	50	71	21	.003	50	65	15	.042	37	63	26	.048	61	83	22	.068
Identify desktop	40	69	29	.000	50	65	15	.134	26	63	37	.003	43	78	35	.004
Identify an application	39	48	9	.068	45	50	5	.333	26	58	32	.015	43	39	-4	.288
Identify a document	31	53	22	.001	30	55	25	.028	26	42	16	.094	35	61	26	.015
Identify a minimized prog.	35	61	26	.000	35	60	25	.011	21	53	32	.005	48	70	22	.029
Identify a folder	65	82	17	.005	60	85	25	.028	63	84	21	.052	70	78	8	.213
Find Windows Explorer	68	81	13	.044	75	75	0		42	79	37	.008	83	87	4	.333
Move a file in Explorer	50	66	16	.009	65	75	10	.165	32	68	36	.003	52	57	5	.357
Find "My Computer"	79	94	15	.010	75	100	25	.011	84	95	11	.166	78	87	9	.213
Move a file in "My Computer"	47	82	35	.000	85	95	10	.082	28	78	50	.002	27	73	46	.000
Find document menu	82	100	18	.001	80	100	20	.021	74	100	26	.011	91	100	9	.081
Use shortcut	71	95	24	.000	65	95	30	.015	79	95	16	.094	70	96	26	.006
Use start menu	84	94	10	.017	75	90	15	.042	79	95	16	.042	96	96	0	
Open program in start menu	87	97	10	.017	85	100	15	.042	89	95	6	.289	86	95	9	.081
Use "run"	69	89	20	.003	75	90	15	.134	74	84	10	.166	59	91	32	.008
Use taskbar	75	93	18	.001	79	95	16	.042	74	89	15	.094	73	95	22	.011

*One-tailed test of significance.

Table 7
Computer Training
Percent Correct

	All Groups (N=62)				Group 1 (N=20)				Group 2 (N=19)				Group 3 (N=23)			
Using Windows 95 (cont'd)	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*
Print a file	75	95	20	.001	80	100	20	.021	63	84	21	.052	82	100	18	.021
Use "Find"	74	92	18	.001	85	95	10	.082	47	79	32	.015	87	100	13	.042
Use Windows Help	61	85	24	.000	65	95	30	.005	63	74	11	.166	57	87	30	.003
Add program to start menu	31	44	13	.016	20	35	15	.042	32	37	5	.289	39	57	18	.081
Remove prog. from start menu	26	49	23	.001	15	45	30	.005	32	37	5	.289	32	64	32	.008
Make a shortcut	19	61	42	.000	30	60	30	.015	16	53	37	.003	13	70	57	.000
Find the control panel	84	97	13	.010	85	100	15	.042	79	89	10	.214	87	100	13	.042
Internet Related Information																
Identify URL	6	37	31	.000	15	20	5	.333	0	21	21	.021	4	65	61	.000
Identify protocol	3	66	63	.000	5	60	55	.000	0	58	58	.000	4	78	74	.000
Identify address	8	44	36	.000	5	30	25	.021	5	32	27	.028	13	65	52	.001
Identify link	31	66	35	.000	35	65	30	.030	21	63	42	.001	35	70	35	.004
Use address	79	87	8	.084	75	95	20	.021	74	68	-6	.358	87	96	9	.081
Use link	76	95	19	.001	70	95	25	.011	79	95	16	.042	78	96	18	.052
Add bookmark	77	97	20	.000	75	95	20	.021	84	95	11	.082	74	100	26	.001
Delete bookmark	55	84	29	.000	60	75	15	.134	53	79	26	.011	52	96	44	.000
Use Net Search	69	84	15	.006	75	100	25	.011	58	58	0		73	91	18	.052

*One-tailed test of significance.

Consequently, it is important to consider the skill levels at the time of the post-test and not just whether a "large" or statistically significant change took place.

This caution is particularly important when examining data for a specific class or when comparing across classes. Tests of statistical significance are sensitive to the number of participants included in the analysis; the smaller the number of participants, the larger a difference (e.g., pre-test/post-test) must be to reach significance. Thus, due in part to small N sizes, many of the pre-test to post-test changes for any particular class are not statistically significant at the .01 or .05 level. However, as noted, attention should be given to the amount of change and, especially, to the score at the time of the post-test. For example, 61 percent of the participants in Class 3 correctly identified the task bar during the pre-test. The increase to 83 percent correct at the time of the post-test was not statistically significant at either of the specified levels, but the change was substantial and resulted in a desirable score on the post-test.

The first several items on the computer training test required participants to look at a picture of a computer screen and identifying various features. Most of these features were associated with Windows. Except for two of the items discussed previously (identify start menu and identify an application), participants generally improved substantially on these items. This is particularly important given that at least half of the participants answered six of the eight items in this section incorrectly on the pre-test. Identify start menu (76 percent) and identify a folder (65 percent) were the exceptions. Items on which less than 75 percent of the participants responded correctly on the post-test, and thus might possibly receive increased attention in future efforts, include:

- identify task bar (71 percent);
- identify desktop (69 percent);
- identify a minimized program (61 percent);

- identify a document (53 percent); and
- identify an application (48 percent).

The next section on the computer training test asked participants to find specific items or features on the computer and to use them correctly. Overall, the participants demonstrated a fairly substantial level of understanding of the items in this section of the test. On only five of the 17 items did 50 percent or more of the participants respond incorrectly on the pre-test. Unfortunately, on only one item – move a file in "my computer"– did participants increase the percentage of correct answers to over 75 percent on the post test (47 percent correct on the pre-test to 82 percent correct on the post-test). Although the amount participants improved substantially on some tasks, the percentage who could complete the items successfully on the post-test still was low. Thus, items that should be considered for increased attention include:

- move a file in Explorer (66 percent at post-test);
- make a shortcut (61 percent);
- remove a program from the start menu (49 percent); and
- add a program to the start menu (44 percent).

It also might be possible to reduce the amount of attention given to some items during the training in order to devote more time to tasks that are more difficult or problematic. For example, at least 75 percent of the participants were able to respond correctly on the pre-test to six of the items:

- open a program in start menu (87 percent at pre-test);
- use start menu (84 percent);
- find the control panel (84 percent);
- find document menu (81 percent);

- find "my computer" (79 percent); and
- print a file (75 percent).

The scores on the post-test for these items ranged from 94 percent to 100 percent correct.

The final section of the test was related to the use and understanding of the Internet and browsing software. On five of the items in this section, participants answered between 84 percent and 97 percent correct on the post-test. For three of these items–use an address, use bookmark, use link–participants exhibited substantial ability on the pre-test (76 percent to 79 percent correct). However, the remaining three items in this section accounted for the lowest item scores on the pre-test. Further, although participants improved substantially on each item, their ability to complete the items successfully at the time of the post-test still was low and are likely candidates for more attention. These items are:

- identify protocol (three percent correct at pre-test to 66 percent correct on post-test);
- identify address (eight percent correct to 44 percent correct); and
- identify URL (six percent correct to 37 percent correct).

It is interesting to note that while only eight percent could correctly identify an address at the time of the pre-test, 79 percent could correctly use an address. Similarly, only 31 percent could identify a link on the pre-test but 76 percent could use a link. It should be noted that some of the computer skills (i.e., internet usage) are more critical to the use of OK-FIRST than others (i.e., file manipulation). Even those who had the weakest skills were able to effectively access weather data and support staff are available should the participants encounter problems.

Weather Data Interpretation Training: Overall

While computer skills provide the basic capabilities emergency managers and public safety officials need to gain access to the weather data made available through OK-FIRST, data interpretation skills allow the officials to understand and use the data once they have it. The weather data interpretation training workshops sought to provide individuals with the background and skills necessary to take advantage of the array of weather data at their disposal.

Despite the high levels of on-the-job experience for a large number of participants coming into the OK-FIRST training, the overall scores on the pre-test were somewhat low (Table 8). For participants who took both the pre-test and post-test, the average pre-test score was 44 percent correct. Class 1, which was made up largely of emergency managers, did have a slightly higher average; nevertheless, they only answered about half (49 percent) of the items correctly. Again, all classes showed improvement by the time of the post-test, with the average score for all participants increasing to 62 percent correct.

Table 8
Data Interpretation Overall Percent Correct

	Pre-Test	Post-Test	Δ	Significance*
All Classes (N=68)	44	62	18	.000
Class 1 (N=23)	49	60	11	.000
Class 2 (N=22)	45	61	16	.000
Class 3 (N=23)	37	65	28	.000

* One-tailed test of significance.

The overall post-test scores were lower for the data interpretation training compared to the computer workshops. However, the level of participant knowledge entering the workshops was lower for the data interpretation training and the material was much more complex and difficult to master. The lower data interpretation scores likely are due, in part, to the fact that it is easier to teach someone to use a computer in a short workshop than it is to impart the intricacies of understanding and using of weather-related data for decision making.

As was the case with the computer training classes, more improvement was made by each of the consecutive classes. The first class improved only 11 percentage points. The second class improved by 16 percentage points and the third class improved by a substantial 28 percent. The pattern of improvements is inversely related to the amount known coming into the data interpretation workshop. Class 1, on average, had the highest pre-test score and improved the least. Class 2 knew somewhat less than Class 1 and improved more, while the average score for Class 3 was the lowest and they gained the most.

As with the computer training scores, more improvement was made by individuals who started out doing poorly (scoring less than 30 percent on the pre-test) than was demonstrated by those who started out doing relatively well (scoring better than 50 percent on the pre-test). Individuals who answered less than 30 percent of the items correctly improved 35 percentage points and those who answered 31 percent to 49 percent improved by 19 percentage points. Participants who knew the most (scored at least 50 percent correct) prior to the workshop improved the least--10 percentage points (Tables 9 through 11).

Table 9
Data Interpretation Overall
Participants with Pre-Test Scores ≤ 30%
Percent Correct

	Pre-Test	Post-Test	Δ	Significance*
All Classes (N=9)	22	57	35	.000
Class 1 (N=1)	29	42	13	N/A
Class 2 (N=4)	26	57	31	.000
Class 3 (N=4)	15	60	45	.011

* One-tailed test of significance.

Table 10 Data Interpretation Overall Participants with Pre-Test Scores 31% - 49% Percent Correct				
	Pre-Test	Post-Test	Δ	Significance*
All Classes (N=35)	41	60	19	.000
Class 1 (N=12)	44	58	14	.000
Class 2 (N=8)	43	55	12	.068
Class 3 (N=15)	38	64	26	.000

* One-tailed test of significance.

Table 11 Data Interpretation Overall Participants with Pre-Test Scores ≥ 50% Percent Correct				
	Pre-Test	Post-Test	Δ	Significance*
All Classes (N=24)	57	67	10	.000
Class 1 (N=10)	58	65	7	.000
Class 2 (N=10)	55	67	12	.000
Class 3 (N=4)	57	73	16	.005

* One-tailed test of significance.

Participants were tested on a wide range of weather-related topics that formed the content of the OK-FIRST data interpretation workshop. Table 12 shows the results overall and within the categories of items on which the participants were tested. Only the flood-related items had a pre-test score greater than 75 percent correct. This is the area about which participants knew the most coming into the workshops (76 percent correct overall on the pre-test) and the average score increased to 88 percent correct (the highest score) at the time of the post-test. Participants also left the workshop with a substantial level of knowledge in two other areas. Almost 75 percent of the participants responded correctly on the post-test to the general information items (73 percent correct) and the NIDS items (72 percent correct).

The interpretation of wind data was one of the areas about which participants knew the least when they began the workshop. It also is the area with the least improvement. Although the increase from 22 percent correct at pre-test to 27 percent correct on the post-test is statistically significant (.017), the level of participant knowledge in this area upon completion of the training remained minimal. Thus, this part of the training could be improved in future efforts.

Overall, the greatest improvement was on the interpretation of NIDS radar data to detect storms and other weather phenomena, and in the use of VIL readings for identifying hail within storms. Although the amount of change was similar for NIDS and VIL (35 and 32 percentage points, respectively), the lower pre-test score for the VIL items resulted in a substantial difference at the time of the post-test. The average score for the NIDS items was 72 percent correct at post-test compared to 51 percent correct for the VIL items.

It is interesting to note that the second and third classes showed significant improvement in interpreting Mesonet data while the first class saw little improvement. This change likely can be attributed, in large part, to the responsiveness of OK-FIRST staff to feedback from the evaluation of the first class. It was clear from the test scores and direct feedback from the participants of the first class that the training had not accomplished its goal for this major portion of the training. The staff made changes to the workshop and the second and third classes apparently benefitted from those changes.

Table 12
Data Interpretation Overall
Percent Correct

	All Classes (N=68)				Class 1 (N=23)				Class 2 (N=22)				Class 3 (N=23)			
	Pre-test	Post-test	Δ	Sig.*	Pre-test	Post-test	Δ	Sig.*	Pre-test	Post-test	Δ	Sig.*	Pre-test	Post-test	Δ	Sig.*
Overall Results	44	62	18	.000	49	60	11	.000	45	61	16	.000	37	65	28	.000
General Information (19)**	59	73	14	.000	70	76	6	.030	56	73	17	.001	51	70	19	.000
NEXRAD (24/29) ***	40	65	25	.000	36	47	11	.000	47	63	16	.001	33	67	34	.000
NIDS (6)	37	72	35	.000	49	80	31	.000	37	62	25	.001	25	72	47	.000
Mesonet (8)	32	51	19	.000	46	50	4	.195	24	47	23	.000	24	55	31	.000
VIL (3)	19	51	32	.000	32	57	25	.002	17	41	24	.008	7	54	47	.000
Wind (5)	22	27	5	.008	25	31	6	.034	20	22	2	.314	20	28	8	.041
Floods (6)	76	88	12	.002	77	83	6	.107	81	90	9	.123	70	91	21	.012
Types and Sources (8)	45	54	9	.002	56	60	4	.175	39	49	10	.047	39	52	13	.011

* One-tailed test of significance.
** The number of questions in each section.
*** The NEXRAD sections for Class 1 contained 24 questions, Classes 2 and 3 had 29 questions.

As noted previously, there were substantial differences among the three cohorts in terms of type of work experience and the number of years on the job. Table 13 shows the differences between those participants who worked in emergency management directly and those who were in public safety more generally (police and fire). The emergency managers (N=49) did do better at interpreting weather data coming into the workshop. Their average score on the pre-test was 46 percent correct. The average score for other participants on the pre-test was only 40 percent. Interestingly, those individuals not in emergency management showed more improvement over the course of the training session. Their post-test average was 63 percent, an increase of 23 percentage points. The emergency managers did improve, but only by 15 percentage points to 61 percent.

Table 13 Data Interpretation Overall Percent Correct				
Job Classification	Pre-Test	Post-Test	Δ	Significance*
Emergency Managers	46	61	16	.000
Public Safety	40	63	23	.000

* One-tailed test of significance.

As indicated by the data displayed in Table 14, those individuals who had been on the job for one year or less scored only an average of 32 percent correct on the pre-test. They increased a by 28 percentage points to finish with an average of 60 percent. Individuals who had been on the job between two and five years saw an improvement of 19 percentage points from 45 percent on the pre-test to 64 percent on the post-test. Those who had been on the job for more than five years did have the best scores overall on the pre-test but their scores only increased 13 percentage points moving from 48 percent to 61 percent.

Table 14 Data Interpretation Overall Percent Correct				
Time on Job	Pre-Test	Post-Test	Δ	Significance*
1 year or less	32	60	28	.003
2 - 5 years	45	64	19	.000
More than 5 years	47	60	13	.000

* One-tailed test of significance.

It is important to note that those individuals who did not have a great deal of experience in emergency management, either because they were located in a more general position or because they had not been on the job very long, were able to realize significant improvement through the weather data interpretation training workshop. This indicates that the training helped those individuals with the least experience enhance their capacity to interpret weather data to identify threatening weather conditions. In fact, those with the least experience coming in were brought to virtually the same level as those who had been in the business of tracking the weather for some time.

Weather Data Interpretation Training: Item Analysis

As with the computer test, a detailed item analysis was conducted to identify the specific items on the data interpretation test on which participants showed the greatest or least improvement. Tables 15 through 22 display the results for each item organized by the eight categories presented in Table 12, the summary results of the items on the data interpretation pre-test and post-test.

Table 15 shows the results of the individual questions testing knowledge about general weather information. For most of the items, there was not a great deal of change in the ability of participants to define general weather terms. To a large degree, this is due to the fact that the pre-test scores for many of these items were relatively high. The level of participants' pre-training understanding of general weather terms enabled them to correctly match the terms with the appropriate definitions. However, this does not explain the almost no gain with respect to the participants' ability to match the terms downburst and microburst with the respective definitions. Moreover, the percentage of participants in Class 1 who were able to correctly match the term microburst with the appropriate definition decreased from 83 percent to 65 percent from pre-test to post-test. The percentage of correct responses for downburst declined from 55 percent to 45 percent for those in Class 2. Thus, there appears to have been some confusion about these concepts.

There were four concepts that participants, overall, knew very little about prior to the workshop and still exhibited low scores at the time of the post-test. These items would likely be the focus of increased attention in future training efforts and include:

- bright band effect;
- bright band effect impact on rainfall estimates;
- base reflectivity; and
- storm relative velocity.

Despite substantial increases in the percentages of individuals who could define these terms, the percentages of correct responses on the post-test remained low. Only 22 percent could correctly define bright band effect and slightly more (29 percent) could identify the impact on rainfall estimates. Participants did somewhat better with the definitions of base reflectivity and storm relative velocity but less than half of the participants could correctly define these terms (47 percent and 43 percent correct on the post-test, respectively).

Table 15
General Weather Information Item Analysis
Percent Correct

	All Classes (N=68)				Class 1 (N=23)				Class 2 (N=22)				Class 3 (N=23)			
	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*
Define funnel cloud	76	85	9	.080	96	87	-9	.164	77	91	14	.133	57	78	21	.029
Define tornado	97	99	2	.284	100	100	0		95	95	0		96	100	4	.164
Define downburst	59	62	3	.354	52	65	13	.189	55	45	-10	.270	70	74	4	.357
Define microburst	56	54	-2	.419	83	65	-18	.052	41	55	14	.165	43	43	0	
Define windchill	97	97	0		100	100	0		91	91	0		100	100	0	
Define squall line	68	82	14	.009	61	78	17	.052	73	82	9	.165	70	87	17	.081
Define supercell storm	87	94	7	.084	91	91	0		91	95	4	.288	78	96	18	.052
Define dry line	85	93	8	.100	96	96	0		82	86	4	.358	78	96	18	.052
Define gust front	40	60	20	.003	43	61	18	.081	27	59	32	.016	48	61	13	.133
Define wall cloud	78	81	3	.329	91	74	-17	.052	86	91	5	.288	57	78	21	.068
Define hail	90	96	6	.080	91	100	9	.081	95	95	0		83	91	8	.164
Define graupel	57	85	28	.000	70	87	17	.022	64	95	31	.008	39	74	35	.004
Define mesocyclone	66	81	15	.025	83	70	-13	.113	64	91	27	.028	52	83	31	.008
Define heat index	88	96	8	.067	96	100	4	.164	86	91	5	.333	83	96	13	.093
Define base velocity	34	74	40	.000	83	96	13	.093	9	64	55	.000	9	61	52	.000
Define storm relative velocity	26	43	17	.002	65	83	18	.052	9	36	27	.006	4	9	5	.289
Define base reflectivity	16	47	31	.000	26	48	22	.068	9	45	36	.001	13	48	35	.001
Define bright band effect	3	22	19	.001	0	17	17	.022	9	41	32	.016	0	9	9	.081
Identify bright band effect impact on rainfall estimates	6	29	23	.000	9	17	8	.081	9	32	23	.029	0	39	39	.001

*One-tailed test of significance.

Some interesting differences exist among the classes. In general, Classes 1 (primarily emergency managers) entered the workshop with a greater level of understanding of the general weather terms did the member of the other two classes; that is, they had higher pre-test scores on most of the items when compared to Classes 2 and 3. This likely is due to the nature of the positions and experience of Classes 1 members. This difference is especially evident when considering the results for one of the four items discussed above–storm relative velocity. Sixty-five percent of Class 1 could identify the term correctly on the pre-test and this increased to 85 percent correct on the post-test. On the other hand, only nine percent of Class 2 and four percent of Class 3 answered correctly on the pre-test and this only increased to 36 percent and nine percent, respectively.

Participants in Class 1 also entered the workshop with more knowledge about base reflectivity (26 percent correct on pre-test) than did Class 2 (nine percent) or Class 3 (13 percent). However, at the time of the post-test, all of the classes were about the same with slightly less than half (from 45 percent to 48 percent) able to correctly define the concept. With respect to bright band effect and its impact on rainfall estimates, the three classes were relatively the same coming into the training – nobody knew much. Further, although all of the classes had low scores on the post-test (ranged from nine percent to 41 percent correct), the emergency mangers (Class 1) generally had the lowest scores at post-test on these two items. Thus, while the backgrounds of participants from Class 1 might have given them an advantage in some areas, it did not automatically mean that they would perform better in all areas.

The understanding of NEXRAD characteristics and identification of weather phenomena using radar images showed mixed results in the item analysis as is shown in Table 16. Participants uniformly were more able to determine that distance from a radar site does affect the ability of the radar to accurately detect weather events, particularly those close to the ground. Uniform improvement was not seen in recognizing the characteristics of NEXRAD however.[13] Across the questions, Class 3 did show more improvement than did Class 2, with significant improvement on many of the individual items. The second class, however, generally had higher scores coming into the program, and this class actually had lower post-test scores on three of the items. Given the importance of understanding NEXRAD characteristics, more attention may need to be given to these items.

While it was not clear that the participants took away a definitive understanding of NEXRAD, it does appear that they were better able to use NEXRAD images to identify weather phenomena. All three classes were better able to identify convective and stratiform precipitation at the post-test, with each class showing more improvement than the one prior. The participants also were significantly better at locating examples of range folding on NEXRAD images. The participants did not improve much in identifying velocity folding, however, and most had low scores on the post-test for this item. Only 29 percent of all participants answered correctly at the end of the training. Further, only marginal improvement was evident in their ability to determine which storm on an image was the most intense. Overall, the post-test scores were 14 percentage points higher on this item, but that only increased the average after training to 46 percent of participants correctly identifying the most intense storm. Finally, there was mixed success in identifying non-precipitating echos. While there was improvement for the participants as a whole, the first cohort scored less well on the post-test than they did on the pre-test; the second class improved substantially, but only to the point that 55 percent of the members of Class 2 could identify the phenomenon correctly. The third class improved a staggering 66 percentage points with 70 percent of the participants able to accurately identify non-precipitating echoes by the close of the program.

Table 16
NEXRAD/Radar Item Analysis
Percent Correct

Use of NEXRAD	All Classes (N=68)				Class 1 (N=23)				Class 2 (N=22)				Class 3 (N=23)			
	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*
Effect of distance from radar	76	90	14	.014	87	91	4	.333	77	91	14	.093	65	87	22	.029
Effect of distance from radar	59	81	22	.002	57	83	26	.042	64	86	22	.029	57	74	17	.081
Effect of distance from radar	40	66	26	.000	57	83	26	.006	32	68	36	.004	30	48	18	.081
Radar-trouble seeing through storms	46	69	23	.001	52	91	39	.001	36	41	5	.374	48	74	26	.028
Radar-trouble seeing through storms	60	75	15	.029	74	83	9	.213	64	64	0		43	78	35	.015
Use NEXRAD to time windshift	7	22	15	.009	17	17	0		5	18	13	.093	0	30	30	.003
Use NEXRAD to estimate windshift direction	9	32	23	.000	22	30	8	.213	5	32	27	.015	3	35	32	.001
Locate velocity folding	24	29	5	.227	35	26	-9	.270	18	23	5	.358	17	39	22	.068
Locate range folding	37	72	35	.000	35	83	48	.000	55	64	9	.288	22	70	48	.001
Locate most intense storm	32	46	14	.042	43	43	0		36	55	19	.081	17	39	22	.048
Locate convective precipitation	32	74	42	.000	39	70	31	.008	41	68	27	.042	17	83	66	.000
Locate stratiform precipitation	19	57	38	.000	30	39	9	.213	9	64	55	.000	17	70	53	.000
Locate non-precipitation echos	22	44	22	.003	35	9	-26	.015	27	55	28	.015	4	70	66	.000

Table 16
NEXRAD/Radar Item Analysis
Percent Correct

	All Classes (N=68)				Class 1 (N=23)				Class 2 (N=22)				Class 3 (N=23)			
	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*
NEXRAD Characteristics																
Measure wind speed	29	32	3	.329	9	22	13	.133	55	55	0		26	22	-4	.374
Measure radial velocity	60	85	25	.000	61	78	17	.107	55	86	31	.003	65	91	26	.006
Max. observable wind speed is related to max. unambiguous range of radar	22	47	25	.001	22	39	17	.081	32	36	4	.374	13	65	52	.000
Max. observable wind speed is not related to max. unambiguous range of radar	29	53	24	.002	13	30	17	.052	45	64	19	.129	30	65	35	.015
Observed velocities are always meteorological	47	72	25	.000	35	57	22	.011	50	77	27	.015	57	83	26	.006
Observed velocities are not always meteorological	37	51	14	.004	9	4	-5	.164	45	73	28	.015	57	78	21	.011
Rain accumulation est. accuracy	56	57	1	.422	35	26	-9	.246	86	68	-18	.107	48	78	30	.003
Can see tornado 20 miles away	51	51	0		17	9	-8	.164	68	64	-4	.333	70	83	13	.093
Can see tornado 100 miles away	47	50	3	.343	26	30	4	.357	59	55	-4	.374	57	65	8	.246
Can see wind shifts	44	60	16	.011	22	17	-5	.333	73	77	4	.358	39	87	48	.000
Cannot see wind shifts	40	72	32	.000	35	61	26	.028	50	68	18	.081	35	87	52	.000

Table 16
NEXRAD/Radar Item Analysis
Percent Correct

	All Classes (N=68)				Class 1 (N=23)				Class 2 (N=22)				Class 3 (N=23)			
	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*
Reflectivity 10dbZ = rainfall**	38	82	44	.000					45	77	.32	.008	30	87	57	.000
Reflectivity 30dbZ = rainfall**	36	69	33	.001					55	73	18	.081	17	65	48	.001
Reflectivity 60dbZ = rainfall**	59	96	37	.000					82	95	13	.093	30	96	66	.000
Reflectivity 30dbZ = hail**	40	69	29	.002					68	73	5	.374	13	65	52	.000
VIL of 30 = hail**	29	51	22	.012					41	59	18	.081	17	43	26	.042

* One-tailed test of significance.
**These items were not included on the pre-test and post-test instruments for Class 1.

A final item in the NEXRAD category was using NEXRAD to time windshifts and to estimate the direction of the windshifts in specific locations. These were the two NEXRAD items about which participants knew the least coming into the workshops. Overall, only seven percent could correctly time the windshift prior to the training and nine percent could estimate the direction of the windshift. At the conclusion of the training, the percentage of correct responses increased to 22 percent and 32 percent respectively. Those in Class 3 knew the least coming in – nobody could time the windshift and only three percent could estimate the direction. However they exhibited the most improvement and, at the time of the post-test, 30 percent could correctly time the windshift and 35 percent estimated the direction correctly. Nevertheless, at best, only about one-third of the participants could respond to these items correctly.

For most items, the use of NIDS data to identify weather phenomena was the area of greatest improvement (Table 17). In general, at the conclusion of the training, participants were significantly more able to accurately identify the weather phenomena discussed during this portion of the workshop. This is particularly important given the prominent role of these phenomena in Oklahoma weather. The post-test scores for each of the classes were at least 18 percentage points higher than the pre-test scores for all questions with only two exceptions – Class 2 only improved nine points, from 55 percent to 64 percent, in their ability to identify a thin line using NIDS data, and Class 1 had a 13 percent increase (39 percent to 52 percent) in those correctly able to identify a gust front. For all other weather phenomena, the improvement was substantial and scores generally improved by 20 and 50 percentage points compared to the pre-test. Class 3 improved the most, with all scores increasing between 30 and 56 points. However, those in Class 3 began the training with lower scores than the other two classes on all items except one. They were more able to use NIDS data to identify a mesocyclone than Class 2 participants.

Overall, the greatest improvement was in recognizing a hail core, with scores moving from 31 percent correct initially to 79 percent on the post-test. Prior to the workshop, half of the participants could use NIDS data to correctly identify a hook echo, squall line, and thin line. Substantial improvements were made during the training and, at the conclusion, 87 percent, 84 percent, and 71 percent, respectively, correctly identified these phenomena. The items that participants were least able to identify on the pre-test were gust fronts (21 percent correct) and mesocyclone (22 percent). At the end of the training, these two items remained the phenomena with the lowest percentage of correct answers. The percent of those who were able to identify a mesocyclone increased 43 points to a post-test score of 65 percent correct. However, at the end of the training, less than half (46 percent) could identify a gust front. Thus, in future workshops, increased attention to identifying mesocyclones and gust fronts might be warranted.

Participants scores on items related to understanding and using Mesonet data are shown in Table 18. Overall, the data analysis workshop did not increase the ability of the participants to respond to the items with a high degree of accuracy on most of the items. For four of the items, participants came into the training with little prior knowledge about the use of Mesonet to identify the phenomena and left without increasing their knowledge substantially. Less than 45 percent understood how to use Mesonet data to identify a:

- dry line (44 percent correct);
- outflow boundary (29 percent);
- warm front (15 percent); or a
- low pressure area (9 percent).

These results were mirrored across all three classes. Further, the ability of Class 1 to correctly use Mesonet data to identify a low pressure area decreased by four points from 13 percent correct on the pre-test to nine percent correct at the time of the post-test. Overall, participants performed the best on the items related to limitations of Mesonet rain gauges (88 percent correct after training) and identifying a cold front (82 percent correct). These also were the areas about which they knew the most prior to the workshop.

Again, the results from Class 1 were contrary to those of the other two classes with respect to identifying a cold front. Class 1 declined four points to 83 percent correct at the time of the post-test, while Classes 2 and 3 increased their scores by 36 points and 22 points, respectively. However, Class 1 was not the only set of participants to exhibit a decrease in their ability to respond correctly on the post-test. Every member of Classes 1 and 3 correctly answered the item about the limitations Mesonet rain gauges at the time of the post-test (Class 3 increased 74 points from their pre-test score). On the other hand, while three-fourths (77 percent) of the participants in Class 2 correctly responded to the rain gauge item on the post-test, the percentage of correct answers after the training declined 13 points to 64 percent correct. Given the performance of Classes 1 and 3 on this item, it appears that the post-test score for Class 2 is an anomaly and perhaps due to confusion during the discussion of this item with the second set of participants.

Table 17
NIDS Item Analysis
Percent Correct

	All Classes (N=68)				Class 1 (N=23)				Class 2 (N=22)				Class 3 (N=23)			
Use NIDS data to identify:	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*
Hook echo	50	87	37	.000	65	96	31	.003	50	73	23	.068	35	91	56	.000
Thin line	50	71	21	.003	61	83	22	.029	55	64	9	.246	35	65	30	.016
Mesocyclone	22	65	43	.000	35	74	39	.005	14	55	41	.002	17	65	48	.001
Hail core	31	79	48	.000	36	91	55	.000	45	73	28	.015	22	74	52	.001
Squall line	50	84	34	.000	70	87	17	.052	45	77	32	.016	35	87	52	.000
Gust front	21	46	25	.001	39	52	13	.164	14	32	18	.081	9	52	43	.000

*One-tailed test of significance.

Table 18
MESONET Item Analysis
Percent Correct

	All Classes (N=68)				Class 1 (N=23)				Class 2 (N=22)				Class 3 (N=23)			
Use Mesonet data to identify:	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*
Thin line	50	66	16	.031	65	57	-8	.246	39	59	20	.102	48	83	35	.009
Moisture intrusion	24	74	50	.000	39	70	31	.016	0	73	73	.000	30	78	48	.000
Dry line	24	44	20	.002	43	48	5	.357	9	41	32	.003	17	43	26	.028
Cold front	65	82	17	.007	87	83	-4	.333	55	91	36	.001	52	74	22	.068
Warm front	7	15	8	.084	17	17	0		5	18	13	.042	0	9	9	.081
Low pressure area	7	9	2	.371	13	4	-9	.164	0	5	5	.165	9	17	8	.164
Outflow boundary	13	29	16	.004	17	22	5	.288	9	27	18	.052	13	39	26	.015
Limit of Mesonet rain gauges	63	88	25	.001	87	100	13	.042	77	64	-13	.165	26	100	74	.000

*One-tailed test of significance.

The identification of a moisture intrusion was the item on which all classes exhibited the most improvement. Only 24 percent of the participants were able to identify the phenomenon at the pre-test and 74 percent could do so at the post-test. Class 2, in particular, had a very impressive increase from pre-test to post-test. None of the participants in the second classes were able to use Mesonet data to identify a moisture intrusion prior to the workshop. However, at the conclusion of the training, 73 percent were able to respond correctly to this item.

Table 19 shows the participants' scores and measures of change for use of VIL to identify hail. Using displays showing VIL for a storm event and given the time and size of hail that fell at a particular site, participants were asked to identify other locations that would receive larger hail and at what times. Participants demonstrated general improvement in this area and significantly more participants were able to identify locations of hail using VIL on the post-test. In general, they were more successful identifying the first location than the second, and least successful identifying the third location. Class 3 had the biggest improvement; they entered with the lowest scores and finished with the highest percentage of correct on almost all of the items.

There were several items that asked participants about wind and its effects (Table 20). Of particular note from these items is the timing of windshifts. Although a substantial portion of the participants were able to correctly determine if significant roof damage to home would result from an approaching storm with winds topping out at 60 miles per hour, little improvement was evident on the post-test. Class 1 improved by 13 percentage points (74 percent to 87 percent), Class 2 declined from 55 percent correct on the pre-test to 50 percent correct on the post-test, and the member of Class 3 were the same on the pre- and post-test (65 percent correct).

Table 19
VILS Item Analysis
Percent Correct

	All Classes (N=68)				Class 1 (N=23)				Class 2 (N=22)				Class 3 (N=23)			
	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*
Using VILS to locate hail Location 1	25	68	43	.000	48	78	30	.016	18	59	41	.002	9	65	56	.000
Using VILS to locate hail Location 2	18	57	39	.000	30	78	48	.000	14	45	31	.008	9	48	39	.001
Using VILS to locate hail Location 3	13	26	13	.025	17	13	-4	.333	18	18	0		4	48	44	.000

*One-tailed test of significance.

Table 20
Wind Item Analysis
Percent Correct

	All Classes (N=68)				Class 1 (N=23)				Class 2 (N=22)				Class 3 (N=23)			
	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*
Expected wind damage	65	68	3	.337	74	87	13	.133	55	50	-5	.358	65	65	0	
Estimate time of windshift in Norman	40	59	19	.009	43	57	14	.164	41	59	18	.129	35	61	26	.028
Estimate time of windshift in Tulsa	3	6	3	.209	9	13	4	.333	0	0	0		0	4	4	.164
Cause wind to change speed & direction: backing	0	0	0		0	0	0		0	0	0		0	0	0	
Cause wind to change speed & direction: diurnal effect	1	3	2	.284	0	0	0		5	0	-5	.166	0	9	9	.081

Participants were given Mesonet data and asked to report the time at which a windshift would reach two given locations. Overall, on the post-test, 59 percent were able to accurately time the shift arrival at the first town (up from 40 percent on the pre-test) and only six percent got the timing right at the second town on the post-test. This is particularly important to note because the participants were also low on their scores for timing a windshift using NEXRAD images. When answering the question about the timing of windshifts, participants were asked to view a small sequence of still images of either NEXRAD or Mesonet data. They were asked to infer the motion os storms or fronts from these still images. As the software capabilities of the OK-First system increased over the project, participants gained the ability to animate these data in real time. Thus they have gained the capacity to discern the time of impact of windshifts in an easier fashion.

Participants also were asked what factors (other than fronts, dry lines, or other boundaries) might cause winds to change speed and direction. Of all the items on the pre-test and post-test instruments, this question resulted in the worst responses. Nobody identified backing as a potential cause on either the pre-test or the post-test. This is the only item that never elicited a correct response. None of the members of Class 1 mentioned diurnal effect as a cause on the pre-test or post-test. Five percent of Class 2 mentioned it on the pre-test but this declined to zero on the post-test, and nine percent from Class 3 mentioned this as a possibility on the post-test, up from zero on the pre-test. Thus, in general, the training sessions were not successful in increasing the level of knowledge related to the concepts associated with wind analysis.

Table 21 shows the results of participants' attempts to categorize flood characteristics as being associated with either flash or basin flooding. There generally was consistent improvement in participant scores from pre-test to post-test and the post-test scores were the highest of any of the areas. It should be noted that the degree of improvement was limited by the fact that participants came in with high scores on the pre-test. The third class, which had the lowest scores initially, saw the most improvement and finished with the highest scores. When the average score for all participants on each of the flooding characteristics is considered, at least 76 percent were accurately able to identify if it was related to flash or river basin flooding at the completion of the training session.

The final category for the item analysis was the identification of sources of weather information. These results are shown in Table 22. When asked what types of weather information participants would look to for help in fire situations, substantially more participants reported that Mesonet surface observations would be useful at the post-test than did at the pre-test. Significant change also was evident in the number who would look to wind speed data, though more participants also mentioned this type of information on the pre-test. When asked what information they would want if they were concerned about a hazardous gas cloud, most participants at the time of the post-test said they would want wind speed and direction data (90 percent) and Mesonet surface observations (72 percent). Only 15 percent said they would want temperature data on the pre-test and this increased slightly to 26 percent at the time of the post-test. The use of soundings was virtually ignored. Nobody in Classes 2 or 3 mentioned it on the pre-test or post-test and only four percent mentioned it on the pre-test in the first class. At the time of the post-test, nobody in Class 1 said they would want soundings to deal with a hazardous gas cloud.

Table 22
Sources of Information Item Analysis
Percent Correct

	All Classes (N=68)				Class 1 (N=23)				Class 2 (N=22)				Class 3 (N=23)			
Information to help in fires	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*	Pretest	Posttest	Δ	Sig*
Wind Speed & Direction	60	74	14	.030	70	70	0		55	73	18	.129	57	78	21	.029
Temperature	26	37	11	.082	39	52	13	.189	18	23	5	.333	22	35	13	.164
Humidity	51	56	5	.259	70	65	-5	.357	41	45	4	.358	43	57	14	.133
Mesonet Surface Obs.	53	76	23	.001	61	78	17	.081	55	73	18	.052	43	78	35	.004
Info. to help with hazardous gas																
Wind Speed & Direction	87	90	3	.299	96	96	0		86	86	0		78	87	9	.213
Temperature	15	26	11	.016	30	43	13	.093	9	27	18	.052	4	9	5	.289
Mesonet Surface Observations	62	72	10	.090	74	78	4	.374	45	64	19	.081	65	74	9	.270
Sounding	1	0	-1	.161	4	0	-4	.164	0	0	0		0	0	0	

*One-tailed test of significance.

OK-FIRST TOOLS

This section discusses OK-FIRST tools – the project's Web page and the First Class bulletin board system – intended to provide access to real-time weather information and support to project participants.

OK-FIRST Web Page

In order to provide access to various types of information to aid emergency managers with their decision making, OK-FIRST developed a Web page through which weather-related information could be obtained. Through the Web page, participants could access NIDS data, Mesonet data, fire danger products, hydrological products, training materials, links to NWS forecasts, and other general OK-FIRST project information.

Several questions were included on the December 1998 follow up instrument to solicit feedback about the OK-FIRST tools. The response of the participants who attended the follow up session was very positive. When asked, "Overall, how satisfied are you with the OK-FIRST Web site," 98 percent said they were very satisfied and two percent were somewhat satisfied. Nobody expressed dissatisfaction with the site. Everybody in attendance said that the information they needed was available through the site and 91 percent were very satisfied with its content. The remaining participants were somewhat satisfied. Again, no respondent said they were dissatisfied.

If a Web site is not "user friendly," it is less likely to get used–regardless of the quality and value of its content. Seventy-seven percent of the participants reported that the site was very easy to navigate and 21 percent said it was somewhat easy to get around in the Web page. Only one person found it somewhat difficult to navigate.

Similarly, if a site is easy to navigate but does not have useful content, it is of limited value. Table 23 presents the assessments of participants concerning the usefulness of the various Web components. Forty-four participants completed the follow up questionnaire. Some items have less than 44 responses. In these cases, the participants indicated that they had not yet used the particular component enough to offer an assessment. Every component of the Web page was viewed as very or somewhat useful by at least 80 percent of the participants. The NIDS data (100 percent said very useful) was assessed the most positively. Although the respondents found the fire danger and hydrological products to be useful, their assessment of these components was not as strong; 26 percent and 21 percent, respectively, said the products were very useful. Sixty-four percent said the fire danger products were somewhat useful and 59 indicated that the hydrological products were somewhat useful.

Table 23
Usefulness of Web Components
(Percent)

	Very useful	Somewhat useful	Not very useful	Not at all useful	N Size
NIDS Data	100	0	0	0	44
Mesonet Data	86	14	0	0	44
Fire Danger Products	26	64	7	2	42
Hydrological Products	21	59	20	0	39
Training Materials	55	41	5	0	44
Links to NWS Forecasts	80	18	2	0	44
Other Project Information	45	51	2	0	41

Table 24 reports the frequency of use of the various Web components. The items used most frequently are:

- NIDS data: 88 percent used it as least several days per week, 61 percent at least once a day;
- Mesonet data: 84 percent used it at least several days per week, 43 percent at least once a day; and

- Links to NWS forecasts: 69 percent used it as least several days per week, 43 percent at least once a day.

The fire danger products and hydrological products are not used as frequently (31 percent and 16 percent, respectively, said at least several days per week). However, the situations or conditions which might require these products occur with less frequency than other types of events. The training material available on the Web page was the least used component. When participants do access the Web page, about half (48 percent) leave it open for extended periods of time (such as leaving a radar image up). The remainder (52 percent) find the information they need and then exit the site.

Table 24
Frequency of Web Component Use
(Percent)

	More than once a day	About once a day	Several days/week	1 day/week	1-2 times/ month	During storms	N Size
NIDS Data	43	18	27	11	0	0	44
Mesonet Data	25	18	41	9	7	0	44
Fire Danger Products	3	8	20	13	50	8	40
Hydrological Products	5	3	8	5	24	55	38
Training Materials	0	3	8	20	70	0	40
Links to NWS Forecasts	26	17	26	17	12	2	42
Other Project Information	5	13	16	18	45	3	38

First Class Bulletin Board System

OK-FIRST created a bulletin board to facilitate communication among participants and staff. This allows the participants to ask for assistance from their colleagues, share experiences, and post information of general interest to others on the system. The First Class bulletin board is not highly used. Thirty-seven percent of the participants said they had not yet used the system. Those who do use it do so infrequently. Sixty-nine percent access the bulletin board once or twice a month to post messages and 47 percent look for responses with the same frequency. About half of the participants (47 percent) browse the messages posted to the board by others at least several times a week. When asked how useful the information they found posted on the First Class system was to their work, of those who had used it, 77 percent said they found the information very (44 percent) or somewhat (30 percent) useful. Nineteen percent did not think it was very useful and seven percent did not think the information was useful at all. One potential reason for the lack of use of First Class is that the BBS requires the use of a separate software application, which isn't linked to the web. Project staff are working to integrate the BBS functionality into the website and this may increase use.

USING OK-FIRST KNOWLEDGE AND SKILLS FOR EMERGENCY MANAGEMENT DECISION-MAKING

While it is important to know the degree to which participants mastered the content of the OK-FIRST workshops, utilization of the acquired knowledge and skills to protect life and property is the key measure of the impact of the program. Questions were included on the December 1998 follow up instrument to determine how useful the training workshops had been in helping prepare participants to deal with a wide range of weather-related situations. Table 25 presents participant responses to a question that asked how much the initial training course and information helped them in dealing with various situations. Although almost everybody had an occasion to deal with severe weather (only five percent had not), about one-third of the participants had not dealt with a flood, fire, hazardous substance event, or winter weather at the time they completed the survey. Those who had dealt with the situations or conditions included in Table 25 indicated that the initial training and information helped them substantially. Everybody who offered an opinion said the training and information helped them a great deal (95 percent) or helped somewhat (five percent) with severe weather situations. They also indicated that their experiences with OK-FIRST helped them a great deal or somewhat with flood situations (93 percent), winter weather (90 percent), and fire situations (89 percent). Even for the conditions for which the training and information helped the least–hazardous substance events–79 percent said it helped a great deal or somewhat. A very similar pattern of responses resulted when participants were asked how much the follow up training sessions assisted them in dealing with the situations they faced.

Table 25
How much has initial training helped in dealing with:
(Percent)

	Not applicable %	N	A great deal	Somewhat	Not very much	Not at all	N Size
Flood situations	36	(16)	32	61	4	4	28
Fire	23	(10)	27	62	9	2	34
Severe weather	5	(2)	95	5	0	0	42
Winter weather	34	(15)	31	59	7	3	29
Hazardous substance events	35	(15)	25	54	7	14	28
Other events (non-emergency)	16	(7)	41	46	5	0	37

OK-FIRST server access data indicate that, since their training, the participants in the OK-FIRST program have been increasingly accessing weather data. For example, between June 1997 (when the first class of participants completed the training) and September 1998 (a period that witnessed a significant drought and only limited outbreaks of severe weather in Oklahoma) more than 428,000 files were downloaded from the OK-FIRST server (Crawford, Morris, and Lewis 1999). Even more significant is the fact that on October 4, 1998, a day when 20 tornadoes occurred, setting a new national record for most tornadoes in one state on any one day in October, the OK-FIRST server processed 86,500 requests and shared nearly 25,000 radar files.

It is clear that the OK-FIRST participants have been accessing and downloading data files from the server, but they have also been using their newly acquired weather data in carrying out their mission of protecting the public. The following data and statements come from focus group discussions, the follow up questionnaire, letters of support from OK-FIRST participants to state legislators, and newspaper accounts of usage. For more detailed stories of how OK-FIRST has been used, see Morris et al. (1999).

Improved Decision-Making Overall

As noted previously, the purpose of the OK-FIRST project was to enhance the capacity of local public safety officials to access and use real-time environmental information in order to improve their ability to make decisions that would protect life and property. On the December 1998 follow up questionnaire, participants were asked, "To what extent has participation in OK-FIRST made you more effective at making timely and appropriate decisions related to the following situation?" Table 26 presents a summary of the responses to this question. For those who had experienced the listed situations and offered an assessment, the response was overwhelmingly positive. Every respondent said it had improved their decision-making effectiveness a great deal or somewhat. Similar responses were given with respect to decisions related to winter weather (96 percent), flood situations (90 percent), fire situations (88 percent) and hazardous substance events (82 percent). Ninety-four percent of the participants reported that OK-FIRST even improved their effectiveness when making decisions about non-emergency situations. The following statements are representative of the feedback provided by participants about the impact of OK-FIRST on their decision-making behavior:

- I'm proactive now rather than just reactive.
- This is the most fantastic tool emergency managers have ever had.
- In my situation, my position would not exist today if OK-FIRST was not a part of it.
- No one instance stands out, however, I feel that this program has become critical to our organization in virtually every severe weather event that has occurred since the beginning and will continue to significantly impact our operations. In short, every decision in every situation has been based on OK-FIRST and has provided, in my opinion, very positive results.

Table 26
How much has OK-FIRST helped decision-making in:
(Percent)

	Not yet used %	N	A great deal	Somewhat	Not very much	Not at all	N Size
Flood situations	34	(15)	59	31	7	3	29
Fire	17	(7)	51	37	11	0	35
Severe weather	7	(3)	95	5	0	0	41
Winter weather	34	(15)	48	48	3	0	29
Hazardous substance events	25	(11)	36	46	12	6	33
Other events (non-emergency)	21	(9)	57	37	6	0	35

Providing Access to Timely Data

OK-FIRST has filled a void that once existed for emergency managers and other public safety officials in Oklahoma. The single concern emergency managers cited most coming into the program was a lack of real time weather information. OK-FIRST has provided them with just that and the participants value their access to this information. On the follow up questionnaire, participants were asked, "How useful would you say the access to real time data is in helping you deal with the following situations?" The responses summarized in Table 27 clearly indicate the importance of access to real time data as an aid to emergency management decision-making. Of those who had experienced a particular situation or event and responded to the question, the use of real time data in conditions of severe weather topped the list (100 percent said access was very or somewhat useful in these situations). Fire conditions (98 percent) and winter weather (97 percent) also were almost uniformly viewed as situations in which access to current information was useful. At least 92 percent of the participants said access to real time data was useful for helping them deal with each of the situations listed.

Table 27
How useful is access to real time data in helping deal with:
(Percent)

	Not yet used %	N	Very useful	Somewhat useful	Not very useful	Not at all useful	N Size
Flood situations	21	(9)	63	29	9	0	35
Fire	12	(5)	58	40	3	0	38
Severe weather	0	(0)	98	2	0	0	44
Winter weather	18	(8)	72	25	28	0	36
Hazardous substance events	23	(10)	65	27	6	3	34
Other events (non-emergency)	11	(5)	59	39	3	0	39

As the public safety officials have reported on numerous occasions throughout the project:

- Access to real time data is critical at all times. Don't know how I got along with out OK-FIRST.

- The more you work with it and become able to find the information you need, the more it factors into all your decisions. The first item in a disaster is communications. OK-FIRST information, being timely and accurate, has kept disasters from happening. So, absolutely critical decisions become routine because good timely information kept you on top of the situation.

- As emergency managers, we have always had the responsibility to provide warnings to our citizens. We haven't had the tools to do that task in the past. Now we do. I can properly do my job now. Before I was just faking it and hoping I was right.

- Prior to OK-FIRST I depended on radar images that were provided by the Weather Channel or one of the television stations in Oklahoma City. When storms approached in the middle of the night, I had to make split second decisions that were based on little if any current weather data.

- With the OK-FIRST data, each community can have access to data specifically aimed at their community or region. This allows the emergency manager to check his own specific area while the National Weather Service and television stations are concentrating their coverage on other areas of the state.

- Our town is fairly close to Tulsa. We just don't have as many people here as they do there so when there is a storm, all the coverage focuses on how it's going to affect Tulsa. Now I can look on my own to figure out what's going to happen here.

Severe Weather

OK-FIRST allows emergency management personnel to identify threats earlier and pinpoint storms more accurately. This allows them to utilize scarce resources more effectively and efficiently and to better protect lives as shown in the following remarks:

- We now know that instead of it looking like a storm is just outside the county, it's actually 80 or 90 miles away.

- I've had success identifying drylines and being able to predict how badly our community is going to be hit or if it's going to miss us altogether.

- In this last storm, I was able to look at my computer and see that I had spotters who were in a really bad spot. I called them and told them to where to go to get out of the way.

- I can look at OK-FIRST and figure out where I need to send spotters rather than just scattering them out across the county and hoping that they are in the right places.

- The number of times storm spotters are activated has been drastically reduced, and when they are activated, it is for a shorter duration. Also, fewer spotters are needed.

- On June 8, 1998, I was able to issue (tornado) warnings to special needs locations 40 minutes in advance and sound sirens for 20 minutes prior to the tornado.

- October storms developed west of our city and through OK-FIRST I was able to give citizens 15-20 minutes warning of severe weather–something never before accomplished.

- Safety of spotters protected in the night time hours during a storm that could have been harmful had it not been for radar as they were not able to see visually what I was seeing and wouldn't have until it was too late.

- We used it in the October 1998 severe weather outbreak. I was able to position my spotters and feed them pertinent information and was then able to alert surrounding communities.

- October 4th weekend – tornado struck the city. Close monitoring of the available data through NIDS allowed a much faster response to the area of destruction, as well as the county being able to relocate existing on-duty personnel to the most threatened area. Because of the ability to pinpoint threatened areas more precisely, we were able to also alert campers and others around an area lake to seek shelter.

Floods

By providing emergency managers access to real-time data, OK-FIRST has better equipped emergency managers to deal with both flash and river flood situations by helping them know when to close roads and whether or not to issue evacuations. OK-FIRST participants had the following comments:

- Now I can predict when a road is going to wash over. Before I just waited for it to flood and then put out the barricades.

- We had an ambulance that needed to transport an individual to a different hospital during a flood. I was able to tell them the latest information about where roads were covered and where they could get through. It wasn't an emergency transfer that time but you never know, next time it might be.

- On Christmas Day the river was within 6 inches of flood stage. Instead of having to run down to the river every couple of hours or pulling people away from their families, I was able to use OK-FIRST and see that the crest had already passed and it was going back down.

- We have had 2-3 heavy periods of rainfall to the west of our city which had a direct impact on flood situations in my area. OK-FIRST data was a major source of information on evacuation decisions.

Fires

OK-FIRST allows emergency managers to work with fire departments to better protect fire-fighters, structures, and lives. The following examples describe how:

- There was a brush fire and (a colleague) was looking at OK-FIRST and he saw that we had a wind shift coming. We called the fire department and they were able to make sure no one got caught off guard.

- The fire department was fighting a fire and we were able to look at the Mesonet (wind) data to see where it was going to go and sure enough, that's where it went.

- Our fire department uses practice fires and we can avoid problems by checking the OK-FIRST data to make sure there aren't going to be any changes in the wind.

- During alert times, we call all the area fire departments and let them know what's going on. Now, when a spotter sees a fire, everyone is ready and instead of 300 or 400 acres burning we get it out in 70 or 80 acres.

- Due to the drought I used the fire danger model to a great extent. I was able to get temperature and rainfall data to put in the local newspaper to emphasize the problem.

Hazardous Materials Incidents

- We used the OK-FIRST data at a propane gas leak for wind speed, direction, humidity, etc. It was a great help to the fire department.

- We had a chlorine gas leak at the water treatment plant for the city. My secretary used current data to assist responding agencies and for evacuation of residents of the area.

Public Works and Community Service

Access to OK-FIRST has put emergency managers in a position of providing assistance for public works projects and other community events. Though the following examples are not directly related to emergency management, they indicate how OK-FIRST is helping communities across Oklahoma deal with the weather:

- This winter we had a storm moving in. We were able to watch it over the course of a few hours and could tell (by the temperature) that the snow wasn't going to hit us. The city could send the snow crews home and saved a lot of overtime pay.
- I've used it on several occasions to assist county commissioners on their road work.
- We had one snow storm where the television weather was saying Oklahoma wasn't going to have any real snow but we had several inches on the ground and it was still coming down. I could look to see where in the county it was worst and where we needed to have the road crews start working.
- Summer league baseball games in June–had very intense storms moving in during games. With OK-FIRST at hand, I had time to give officials approximately 20-30 minutes head start on getting the kids and their families to safety before the storms were even in our county. Approximately 200-300 kids participate in the summer league. The officials were very pleased at the time they had to get everyone to safety.
- We've used OK-FIRST to help school children get weather information for class work.
- We provided detailed rainfall guidance on a parade initiation that had the governor's wife as grand marshal. Would have canceled parade without OK-FIRST.

CONCLUSION

Current and credible information is a key ingredient for informed decision-making in any venue. It is particularly important when those decisions affect human lives. Many of the day-to-day weather-related decisions made by emergency managers and other public safety officials can result in actions intended to avoid the loss of life, reduce injuries, and minimize property damage. Prior to OK-FIRST, local officials in Oklahoma did not have adequate access to sufficient high quality, real time information necessary to make informed judgements about the likelihood of a dangerous weather event or the proper action to take to avoid the negative consequences. In many cases, local officials did not have appropriate computer hardware and software or sufficient training to know how to access information, understand it, and use it to enhance their decision-making capabilities.

The data collected during the evaluation of the OK-FIRST project indicate that the OK-FIRST team has been successful in meeting the key needs of program participants and has empowered local officials to make decisions based on up-to-the-minute information. The project was successfully able to combine three critical elements: training, access to information, and ongoing support. The analysis of the pre-test and post-test instruments clearly demonstrates that the OK-FIRST staff were able to enhance significantly the knowledge and skills of the project participants in a very short period of time. This is even more impressive given the very technical nature of the material and the fact the participants did not come from technical backgrounds; they did not have any formal training in meteorology.

Access to useful and reliable information also is important more for promoting effective local decision-making. As noted previously, the lack of real time data that is relevant to local conditions and meets the need of local users was the concern most frequently voiced by participants when they began their OK-FIRST experience. OK-FIRST met the need of local public safety officials for fast, accurate, and continuously updated information necessary to make informed decisions.

Ongoing support was the third important element of the OK-FIRST project. Support was provided in the form of computer hardware and software; without these resources, many would not have been able to participate. However, the ongoing support provided by OK-FIRST staff was central to the success of the project. The staff were sensitive to the needs of participants and were ready and able to assist individuals in their efforts to access and use real time data long after they had completed their initial training workshops. When asked on the follow up questionnaire how satisfied they were with the timeliness of the responses they received when they asked for assistance, 97 percent said they were very satisfied (89 percent) or somewhat satisfied (eight percent). Similarly, 97 percent said they were very satisfied (83 percent) or somewhat satisfied (14 percent) with the content or usefulness of the responses they received.

A critically important lesson learned from the OK-FIRST project is that the integration and coordination of all the elements – training, access, and ongoing support – are vital to the success of the program. Superb training to increase knowledge about weather phenomena and develop the skills necessary to access, interpret, and use real time data is not very useful when access is not available. Similarly, access to the highest quality, most current data are of little benefit if one does not understand the information or how to use it once it is obtained. Even with good training and easy access, without ongoing support it is not likely that individuals would make the most effective use of their knowledge, skills, and the available data. When attempting to enhance the capabilities of nontechnical people on very technical topics, the development of their abilities must continue after the initial training. Even the most proficient trainers would find it difficult to impart sufficient expertise in a short period of time such that participants could operate independently from that point on. Each individual element is necessary, but not itself sufficient for success. All must be integrated so that the whole is greater than the simple sum of the individual parts.

As evident from the data and feedback reported in the previous section, through its training, access to real time data, and support, OK-FIRST was able to accomplish an important goal. The project was able to change the behavior of local public safety officials and their approach to decision-making. The increased skills and capacity of the OK-FIRST participants have had a positive influence on the types of decisions they make, how they make those decisions, and when they are willing to make a decision. As one participant put it, "I'm proactive now rather than just reactive."

Their total OK-FIRST experience has not only enhanced their knowledge and skills, it has increased their confidence so that they are willing to apply this new capability to local situations. They no longer are completely dependent on second hand information or the interpretation of the information by others. This has improved their abilities to make effective decisions that will protect life and property. As stated by some of the participants, the application of their capabilities is not limited to emergency situations. They are able to provide assistance to support a wide range of government and public service functions – from providing information to schedule public works projects, to deciding whether to cancel the little league tournament scheduled for the weekend. Thus, the benefits that can accrue from the application of the skills developed through the OK-FIRST project can be far ranging and varied.

Although OK-FIRST combines many novel elements, it should be possible to replicate similar programs in other states. The computer hardware used is off-the-shelf and any intellectual property developed by the Oklahoma Climatological Survey is available via licensing and consulting agreements. Although the development of the Oklahoma Mesonet was very important in order to gain experience and establish a credibility for user support and data dissemination in Oklahoma, a Mesonet is not necessary for other states. The National Weather Service modernization generates the same types of county-level weather information for each state. Some states already have specialized observing networks. The replication of the OK-FIRST experience would be an important step in improving the ability of local officials to make more informed emergency management decisions. The OK-FIRST organization and team should serve as a model for others interested in establishing similar efforts.

ENDNOTES

1. For a series of papers that provide more detailed descriptions of the OK-FIRST project and its development, see the project's Web site at http://radar.metr.ou.edu/OK1/press/preprints. Descriptive information about the project included in this paper is taken, in large part, from sources provided on the OK-FIRST Web page.

2. The Oklahoma Mesonet is a unique network of 115 automated weather stations that measure over 15 parameters and disseminates environmental information and derived products in real time.

3. OneNet is a fiber-optic statewide telecommunications network operated by the Oklahoma State Regents for Higher Education and the Office of State Finance. The network provides a reliable, cost-effective system for two-way, high-speed telecommunications.

4. The Oklahoma Law Enforcement Telecommunications System (OLETS) is operated by the Oklahoma Department of Public Safety. It is a private system dedicated for law enforcement and related activities. The Oklahoma Mesonet uses OLETS as its primary data collection system.

5. During the fourth day of the June workshop, a cluster of thunderstorms formed north of Oklahoma City. These storms and their outflow boundaries moved southward during the next several hours. This "target of opportunity" was used to teach real-time interpretation skills. The approach seemed to be of great interest to participants as they learned to apply concepts discussed in previous days of lecture and laboratory exercises.

6. Of the 69 participants who started the program, 68 completed both the computer and data interpretation workshops. There currently are 65 active participants. Retirements and reassignments have resulted in some attrition.

7. If a participant did not have Internet access, OK-FIRST would arrange for access to OneNet if the agency was within the local calling area of a OneNet hub site.

8. The computer hardware loaned to the local agencies remains the property of the University of Oklahoma. The Oklahoma Climatological Survey reserves the right to reclaim the hardware if participant performance is unsatisfactory (e.g., does not attend required workshops).

9. Those in the "other" category frequently were associated with police, fire, or emergency management agencies but were in positions–such as a dispatcher–that typically did not have responsibility for intervention decisions.

10. Appendix A contains a set of the data collection instruments used as part of the evaluation. Included are copies of the general background questionnaire, the computer training pre-test/post-test instrument, the data interpretation pre-test/post-test instrument along with all of the displays used by the participants to answer questions on the instruments.

11. The following are a few examples of the types of tasks participants were asked to perform: (1) use the shortcut on your desktop to open five.cwk; (2) open "my computer," move three.cwk from C: drive, Programs folder, Claris corp, Claris Works to the A: drive using the mouse to drag and drop the file; (3) label the following–url, protocol, address, links; (4) access the web page located at http://www.gobig12.com

12. The follow up instrument asked participants in the December 1998 refresher course about: their assessment and use of the OK-FIRST Web page and the First Class Bulletin Board, their satisfaction with responses to requests for assistance from OK-FIRST staff, the degree to which the training and access to real time data help them deal with various potential emergency conditions, and to relate examples of how the OK-FIRST system impacted their decisions or emergency management responses.

13. The section of the data interpretation test that asked respondents about characteristics of NEXRAD was changed significantly between the first and second classes making comparisons across all three classes impossible. The first class was asked to indicate only those statements which were true. Statements that were judged to be false were to be left blank. Thus, when an item was false, individuals left the statement blank because they did not know whether it was true or false were scored as providing a correct answer. This procedure was changed for the second and third classes; individuals were asked to mark each question as either true or false. A blank then was recorded as an incorrect response. Thus, the descriptions of changes reported in this section refer only to comparisons between participant scores from Class 1 and Class 2.

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APPENDIX A

Data Collection Instruments

1. Circle and number the following:
    1. a shortcut to a program
    2. the Start Menu
    3. the Taskbar
    4. the Desktop
    5. an application
    6. a document or file
    7. a minimized application
    8. a folder/directory

2. In Windows Explorer, locate the file named **ten** in the Windows, Personal directory and copy it to the diskette in the A: drive.

3. Close Windows Explorer. Open "My Computer." Move **three.cwk** from C drive, Programs folder, Claris Corp, Claris Works to the A: drive using the mouse to drag and drop the file.

4. Go to the Document menu in the Start Menu.

5. Use the shortcut on your desktop to open **five.cwk**.

Name________________________

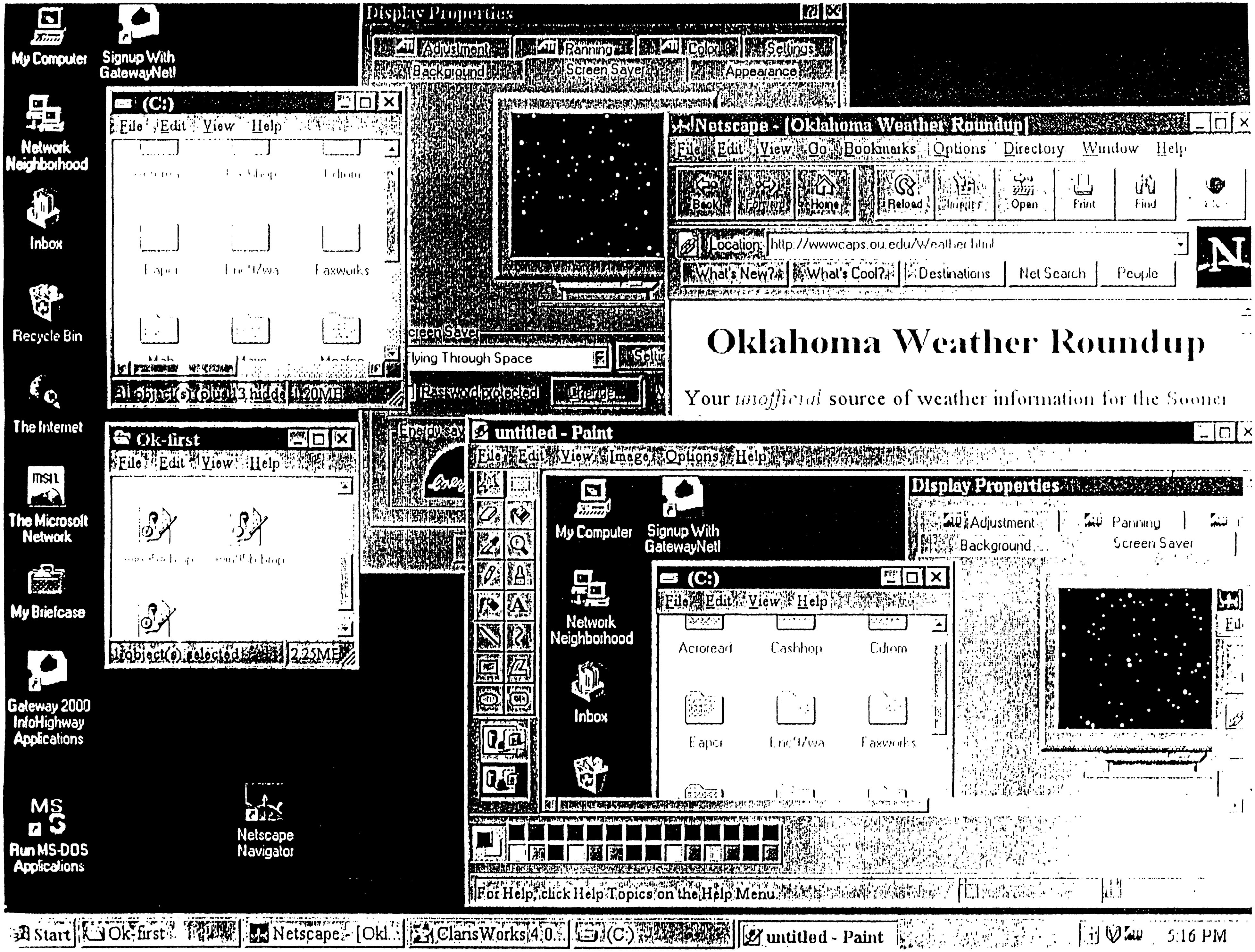
Answer Sheet

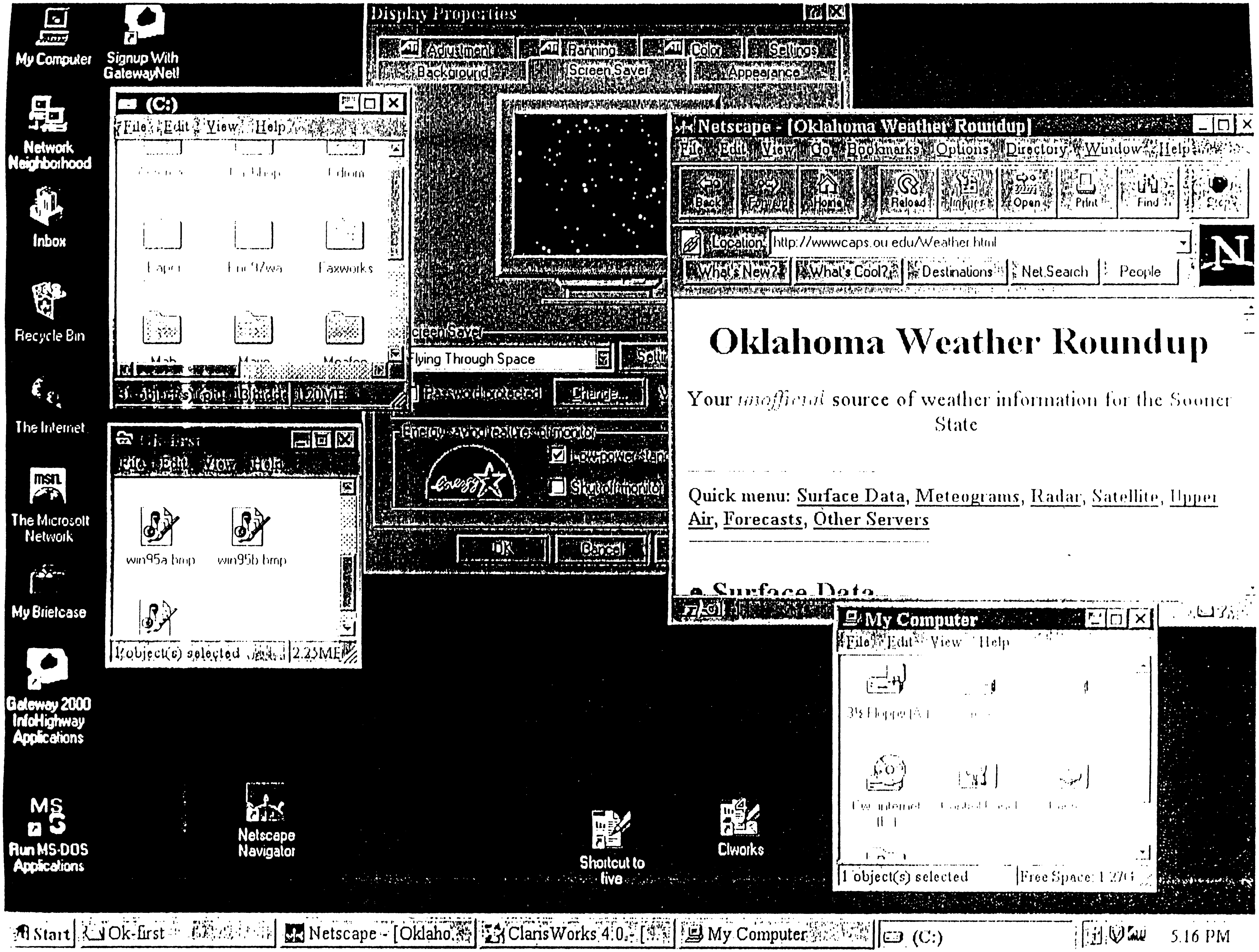
On the first picture of a computer screen, circle (or otherwise indicate) and number one of each of the following:

1. a Shortcut to a Program
2. the Start Menu
3. the Task Bar
4. the Desktop
5. an Application
6. a Document or File
7. a Minimized Application
8. a Folder or Directory

On the second picture of a computer screen, circle (or otherwise indicate) and number the following:

1. URL
2. Protocol
3. Address
4. Link


My Computer
Signup With GatewayNet!
Network Neighborhood
Inbox
Recycle Bin
The Internet
The Microsoft Network
My Briefcase
Gateway 2000 InfoHighway Applications
Run MS-DOS Applications
Netscape Navigator
Display Properties
Adjustment
Panning
Color
Settings
Background
Screen Saver
Appearance
(C:)
File Edit View Help
Flying Through Space
Password protected
Change...
Netscape - [Oklahoma Weather Roundup]
File Edit View Go Bookmarks Options Directory Window Help
Back
Home
Reload
Open
Print
Find
Location: http://wwwcaps.ou.edu/Weather.html
What's New?
What's Cool?
Destinations
Net Search
People
Oklahoma Weather Roundup
Your unofficial source of weather information for the Sooner
Ok-first
File Edit View Help
1 object(s) selected
2.25MB
untitled - Paint
File Edit View Image Options Help
Acroread
Cashhop
Cdrom
Eapcr
Faxworks
For Help, click Help Topics on the Help Menu.
Start
Ok-first
Netscape - [Okl...
ClarisWorks 4.0
(C:)
untitled - Paint
5:16 PM



My Computer
Signup With GatewayNet!
Network Neighborhood
Inbox
Recycle Bin
The Internet
The Microsoft Network
My Briefcase
Gateway 2000 InfoHighway Applications
Run MS-DOS Applications
Netscape Navigator
Shortcut to five
Clworks
Display Properties
Adjustment
Panning
Color
Settings
Background
Screen Saver
Appearance
Flying Through Space
Change...
OK
Cancel
(C:)
File Edit View Help
Faxworks
win95a.bmp
win95b.bmp
2.25MB
Netscape - [Oklahoma Weather Roundup]
File Edit View Go Bookmarks Options Directory Window Help
Back
Home
Reload
Open
Print
Find
Location: http://wwwcaps.ou.edu/Weather.html
What's New?
What's Cool?
Destinations
Net Search
People
Oklahoma Weather Roundup
Your unofficial source of weather information for the Sooner State
Quick menu: Surface Data, Meteograms, Radar, Satellite, Upper Air, Forecasts, Other Servers
Surface Data
My Computer
File Edit View Help
1 object(s) selected
Start
Ok-first
Netscape - [Oklaho...
ClarisWorks 4.0
My Computer
(C:)
5:16 PM

6. Start MS Word by selecting it from the Start Menu, Programs Menu, Office directory.

7. Close MS Word. Start ClarisWorks by selecting it from your desktop. Leave the program open.

8. Using the "Run" option in the Start Menu, open MS Word. Leave the program open.

9. Using the Taskbar, switch back to Claris Works. Open a new word processing file, type your name and print it out.

10. Using the Find option in the Start Menu, determine how many files have OK-FIRST in their names.

11. Using Windows Help, search for help on **IRQ settings**.

12. Add MS Word to the Start Menu.

13. Remove MS Word from the Start Menu.

14. Create a shortcut to document "**ten**" in MS Word and add it to your desktop.

15. In the control Panel, change the setting for your clock (or show your observer that you found the place to do so.)

NETSCAPE

16. Label the following: 1. URL, 2. protocol, 3. address, 4. links.

17. Access the web page located at: **http://www.gobig12.com**

18. Use the link to go to: Standings. Create a bookmark.

19. Use a bookmark to go to the OK-FIRST HomePage.

20. Delete the bookmark for Standings.

21. Execute an Internet search on the topic of your choice.

1	Nothing to observe			
2	Did they find Window's Explorer			
2	Did they find the file			
2	Did they copy the file			
3	Did they go through My Computer			
3	Did they drag and drop the file using the mouse			
4	Did they go to Documents in the Start Menu			
5	Did they use the shortcut to the file			
6	Did they find the Program menu			
6	Did they start Works			
7	Did they open Claris Works from desktop (H if N)			
8	Did they use Run (Help them if needed)			
9	Did they use task bar			
9	Did they know how to print			
10	Did they know how to use find to search for files			
11	Did they know how to search for help			
12	Did they add Works to the Start Menu (H if N)			
13	Did they remove Works from Start Menu (H if N)			
14	Did they make shortcut to file			
15	Did they find the control panel			
15	Did they find Settings			
16	Nothing to observe			
17	Did they know how to find the site			
18	Did they use the link			
18	Did they make the bookmark			
19	Did they use the bookmark			
20	Did they delete the bookmark			
21	Did they use Netsearch			

NAME________________________________

1. Please place the letter for the appropriate definition on the line to the left of the term it defines.

_____ funnel cloud	_____ squall line	_____ hail
_____ tornado	_____ supercell storm	_____ graupel
_____ downburst	_____ dry line	_____ mesocyclone
_____ microburst	_____ gust front	_____ heat index
_____ wind chill	_____ wall cloud	

a. A boundary separating warm, dry air from warm, moist air.

b. An intense, localized downdraft which may be experienced beneath a thunderstorm.

c. A relatively small-scale current of air with marked downward motion .

d. A rotating cloud column or inverted cloud cone extending downward from a cloud base.

e. Snow pellets or soft sleet.

f. A boundary between cold air from a thunderstorm downdraft and warm, humid surface air.

g. Precipitation in the form of rounded balls of ice, always formed in convective clouds.

h. A value representing the temperature it feels at a given air temperature and relative humidity.

i. A vertical column of counterclockwise rotating air within a severe thunderstorm which may be a precursor to a funnel or tornado.

j. An intense downdraft less than 4 km wide that may occur beneath a thunderstorm.

k. Any line or narrow band of active thunderstorms which is not directly along a frontal boundary.

l. A violent thunderstorm which can produce hail and large tornadoes and containing updrafts and downdrafts that are nearly in balance, allowing it to maintain itself for several hours.

m. A violently rotating column of air protruding from a cumulonimbus cloud and in contact with the ground.

n. A generally rain-free region of rotating clouds which extends beneath a severe thunderstorm and from which a funnel cloud may form.

o. A value that represents a temperature that would have the same cooling effect on exposed human flesh as a given combination of temperature and wind speed.

2. What weather products could be used to determine whether a circulation may be forming?

____

____

3. Is the height above ground of a radar beam the same, higher, or lower at Enid than at Oklahoma City if the radar is located in Norman? ______________________

4. Would NEXRAD (KTLX in Norman) be better at detecting a tornado at El Reno or at Elk City?

____

Why? ____

____

5. Please label the following statements regarding NEXRAD radar either true or false in the space to the left.

_____ a. Measures total wind speed
_____ b. Measures radial velocity
_____ c. Maximum observable wind speed is related to maximum unambiguous range of the radar.
_____ d. Maximum observable wind speed is not related to maximum unambiguous range of the radar.
_____ e. Observed velocities are always meteorological in nature.
_____ f. Observed velocities are not always meteorological in nature.
_____ g. NEXRAD rain accumulation estimates are usually more accurate in hurricanes than in the Great Plains.
_____ h. NEXRAD can observe a large tornado 20 miles away.
_____ i. NEXRAD can observe a large tornado 100 miles away.
_____ j. NEXRAD can see wind shifts.
_____ k. NEXRAD cannot see wind shifts.
_____ l. Reflectivity of 10 dbZ means rainfall is occurring.
_____ m. Reflectivity of 30 dbZ means heavy rainfall is occurring.
_____ n. Reflectivity of 60 dbZ means heavy rainfall is occurring.
_____ o. Hail can fall with a reflectivity of 30 dbZ.
_____ p. Hail can fall with a VIL of 30.

6. Look at Figure 6. On your black and white copy, circle the area that best shows velocity folding.

7. Look at Figure 7. On your black and white copy, circle an area of range folding.

8. Look at Figure 8. If Radar 1 were the only radar available, what problems might you have in judging rainfall in Woodward County?

____

Why?____

9. Look at figures 9a-9f. These are images of NIDS reflectivity and velocity data. Write the number of the figure which shows:

_____ a hook echo _____ a hail core

_____ a thin line _____ a squall line

_____ mesocyclone _____ convergent signature of a gust front

10. On the black and white copy of figure 10, circle and label examples of convective precipitation, stratiform precipitation, and non-precipitating echos.

11. Figure 11 shows Mesonet data. Circle and label an indication of a moisture intrusion.

12. Look back to Figure 10. It shows a thin line. Which of the Mesonet data maps (12a-12c) is most likely to be the corresponding map? ______________

13. Figures 13a-13d are Mesonet data. Circle and label an example of a dry line, a cold front, a warm front, a low, and an outflow boundary.

14. Mesonet stations use tipping-bucket rain gauges. At high rain rates, are these types of gauges likely to give too low, too high, or very accurate measures of rainfall? ________________

15. Figures 15a and 15b show VILs for a storm event. If locations in southern Caddo county received 1.5" hail at 5:10 pm, what other locations received larger hail at what times? Please list the locations in order of hail size. ____

____

16. Figures 16a-16d are different corresponding radar tilts. On the black and white copy of 16a, indicate which two storms in the eastern most squall line are most intense.

17. If wind speeds for an approaching storm are expected to top out at 60 miles per hour, should you expect to see significant roof damage to homes? ___________________________________

18. Figures 18a-18c are NEXRAD images across time of a storm event. When would the wind shift in Woodward and to what direction? ____

19. On the line to the left of each of the following, write whether it is a characteristic of a flash flood or a basin flood.

_______ Lead time of minutes to a few hours

_______ Lead time of a many hours to days

_______ Tributaries are most affected

_____ Effects are wide spread

_____ Effects are localized

_____ Rivers where tributaries drain are most affected

20. What is the bright-band effect?

____

____

Is it likely to cause high or low radar rainfall estimates? ______________________________

21. If you were concerned about the possibility of fire, what types of weather information would you like to have and where might you go to get it?

____

____

22. If you were concerned about a hazardous gas cloud that had been accidentally created, what types of weather information would you want and where would you go to get it?

____

____

23. Figures 23a-23c show an approaching wind shift. When will winds shift in Norman and when will winds shift in Tulsa? ____

____

24. Figures 24a and 24b show Mesonet temperature data and a corresponding NIDS reflectivity image. On the Mesonet map, circle the areas of precipitation and indicate what type of precipitation each area is experiencing.

25. Other than fronts, dry lines, or other boundaries, what factors might cause winds to change speed or direction?____

____

Figure 6

WSR-88D Operations Course

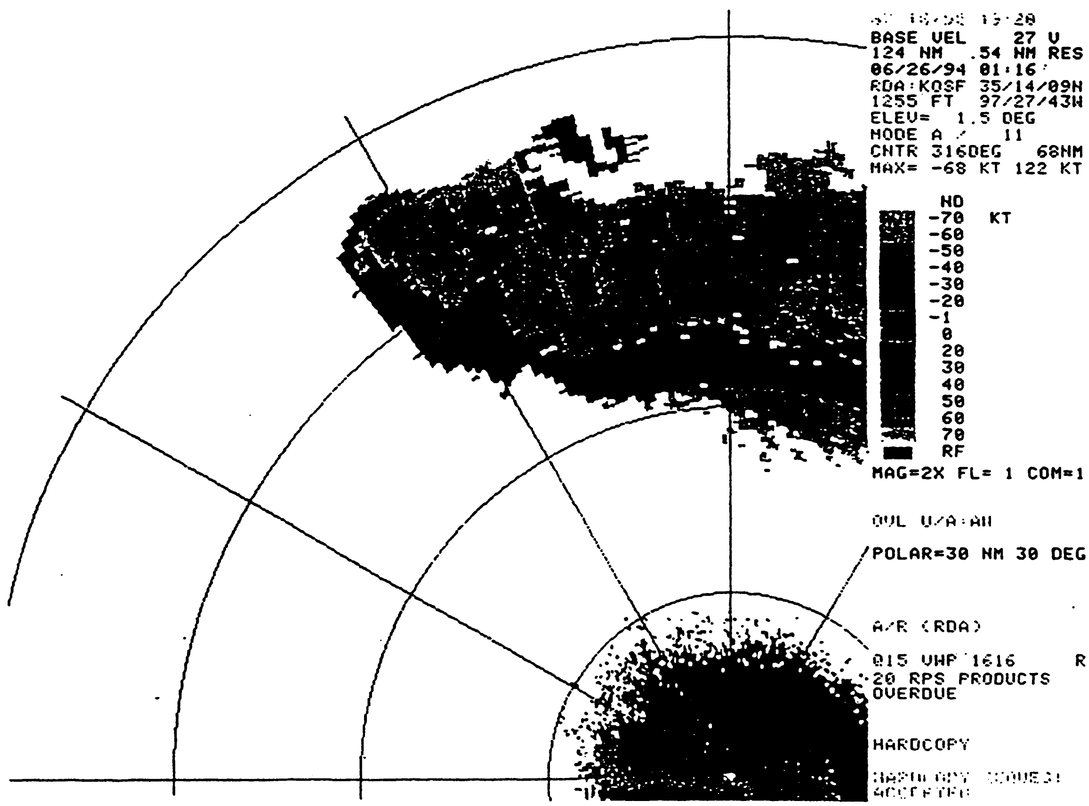
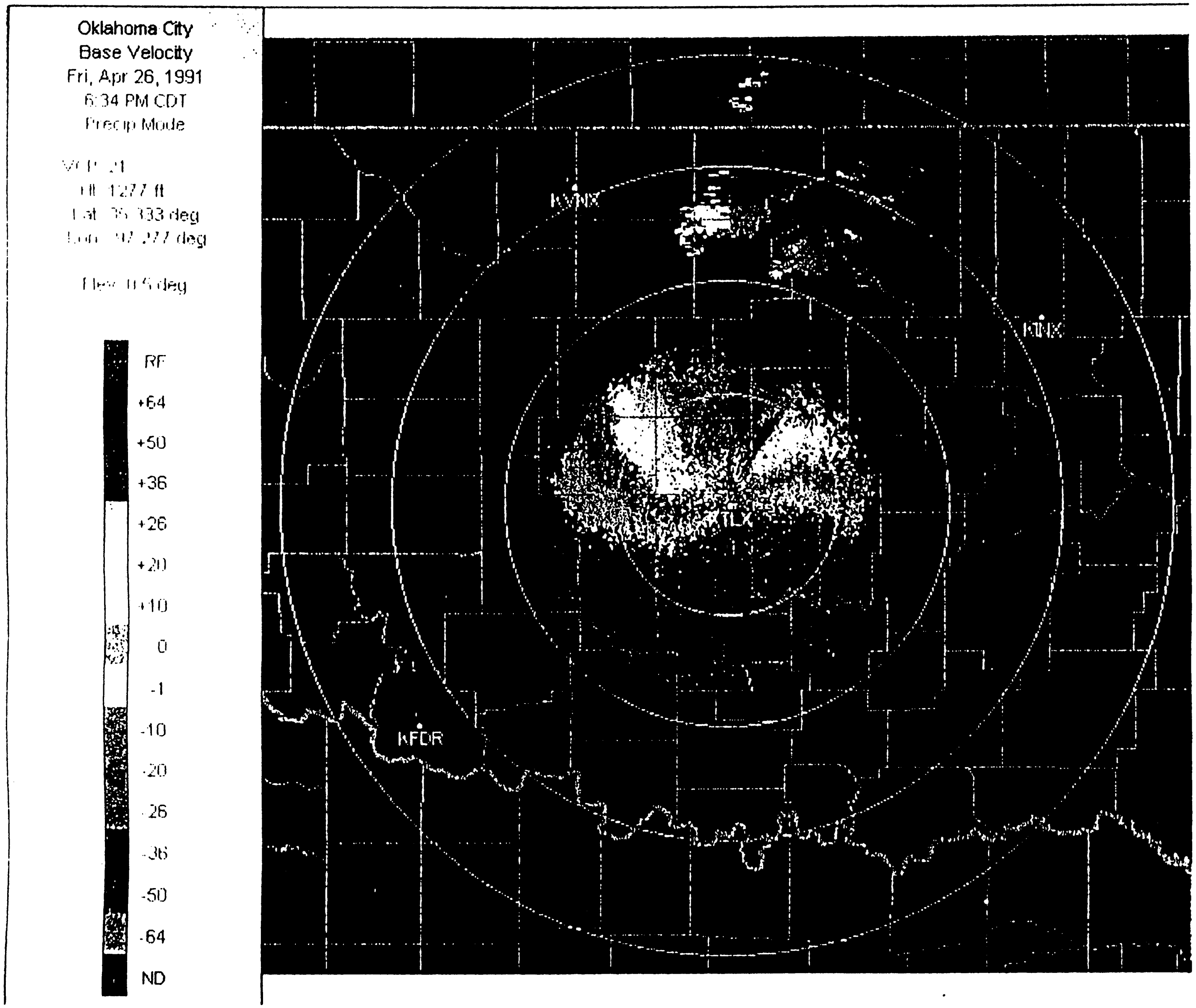


Figure 7



Oklahoma City
Base Velocity
Fri, Apr 26, 1991
6:34 PM CDT
Precip Mode
Ht 1277 ft
Elev 0.5 deg
RF
+64
+50
+36
+26
+20
+10
0
-1
-10
-20
-26
-36
-50
-64
ND
KVNX
KINX
TLX
KFDR

Figure 8

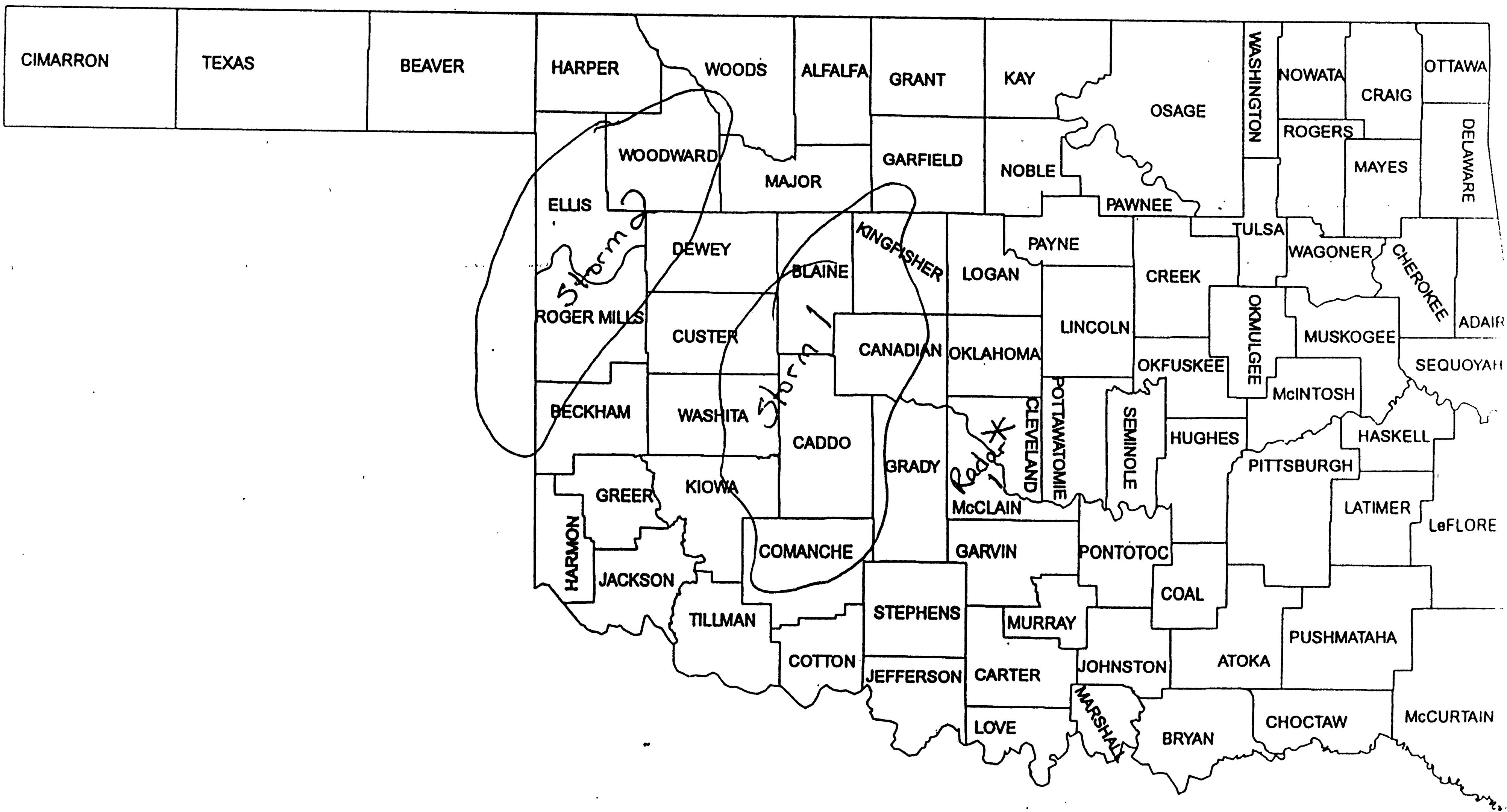

CIMARRON
TEXAS
BEAVER
HARPER
WOODS
ALFALFA
GRANT
KAY
OSAGE
WASHINGTON
NOWATA
CRAIG
OTTAWA
ROGERS
MAYES
DELAWARE
WOODWARD
MAJOR
GARFIELD
NOBLE
PAWNEE
ELLIS
DEWEY
BLAINE
KINGFISHER
LOGAN
PAYNE
TULSA
WAGONER
CHEROKEE
ADAIR
ROGER MILLS
CUSTER
CANADIAN
OKLAHOMA
LINCOLN
CREEK
OKMULGEE
MUSKOGEE
SEQUOYAH
OKFUSKEE
McINTOSH
BECKHAM
WASHITA
CADDO
GRADY
CLEVELAND
POTTAWATOMIE
SEMINOLE
HUGHES
HASKELL
PITTSBURGH
GREER
KIOWA
McCLAIN
LATIMER
LeFLORE
HARMON
JACKSON
COMANCHE
GARVIN
PONTOTOC
COAL
TILLMAN
STEPHENS
MURRAY
PUSHMATAHA
COTTON
JEFFERSON
CARTER
JOHNSTON
ATOKA
LOVE
MARSHALL
BRYAN
CHOCTAW
McCURTAIN
Storm 2
Storm 1
Radar

Figure 9a

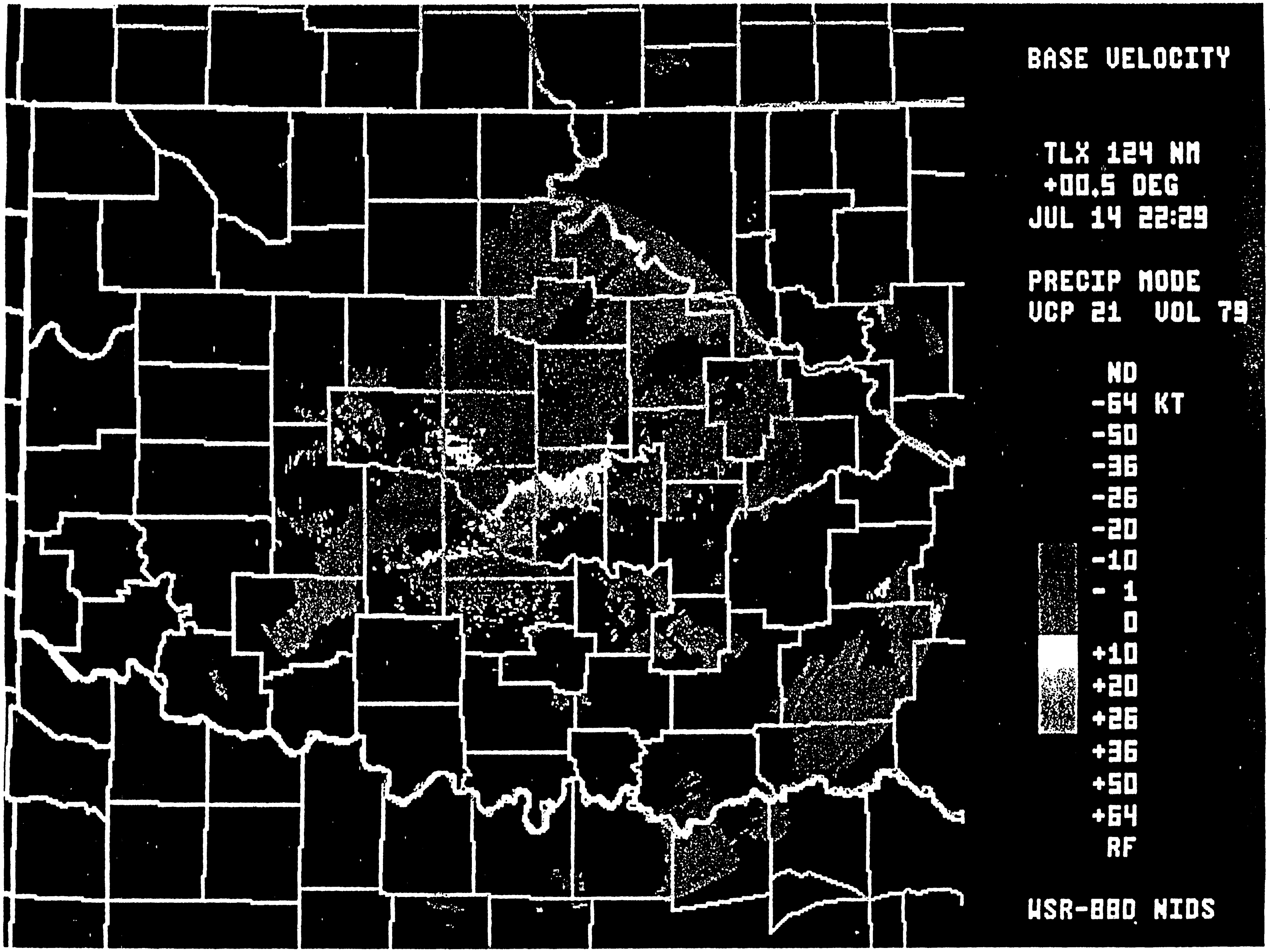

BASE VELOCITY
TLX 124 NM
+00.5 DEG
JUL 14 22:29
PRECIP MODE
VCP 21 VOL 79
ND
-64 KT
-50
-36
-26
-20
-10
- 1
0
+10
+20
+26
+36
+50
+64
RF
WSR-88D NIDS

Figure 9 b

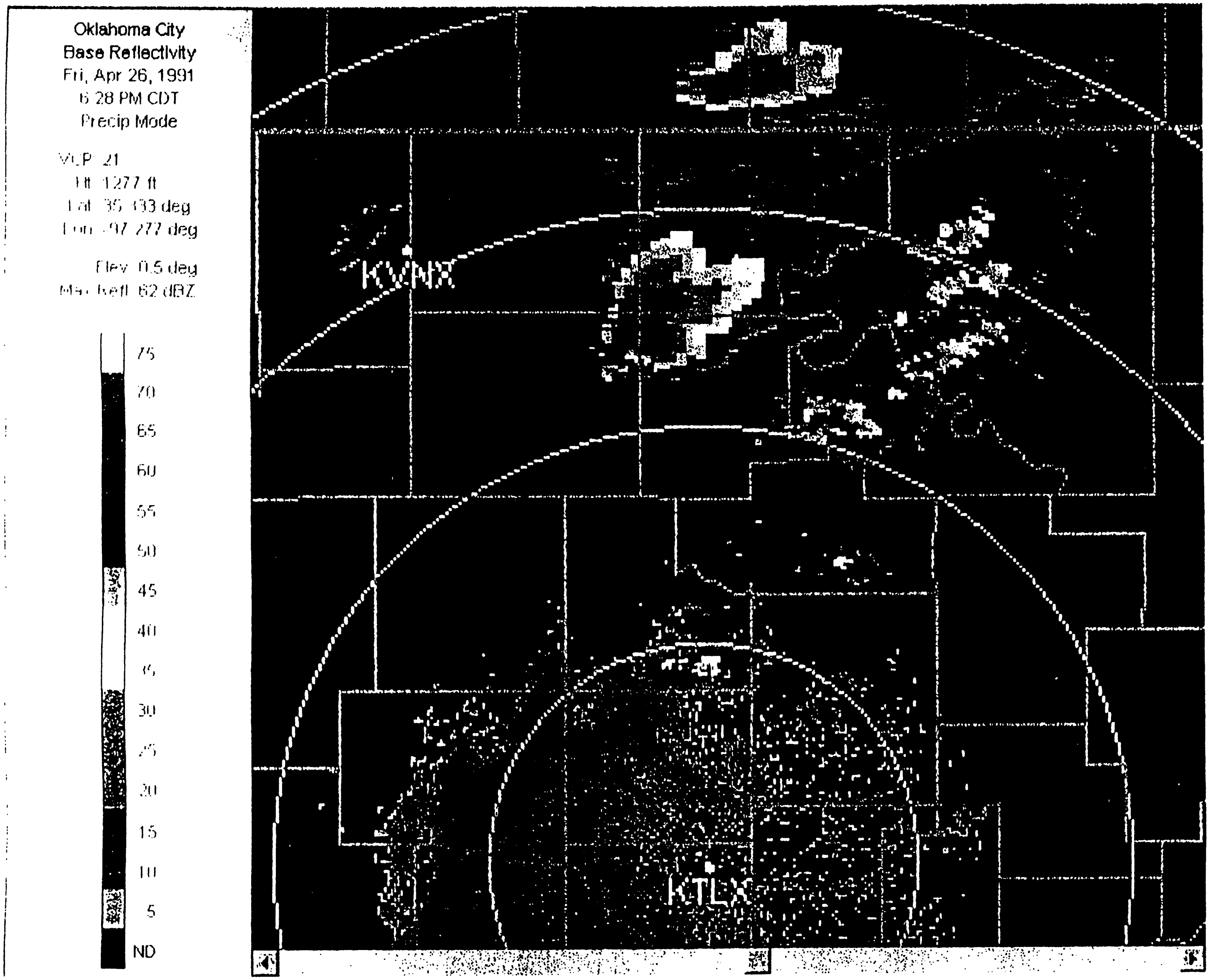

Oklahoma City
Base Reflectivity
Fri, Apr 26, 1991
6 28 PM CDT
Precip Mode
VCP 21
Ht 1277 ft
Lat 35 333 deg
Lon -97 277 deg
Elev 0.5 deg
Max Refl 62 dBZ
75
70
65
60
55
50
45
40
30
20
15
10
5
ND
KVNX
KTLX

Figure 9c

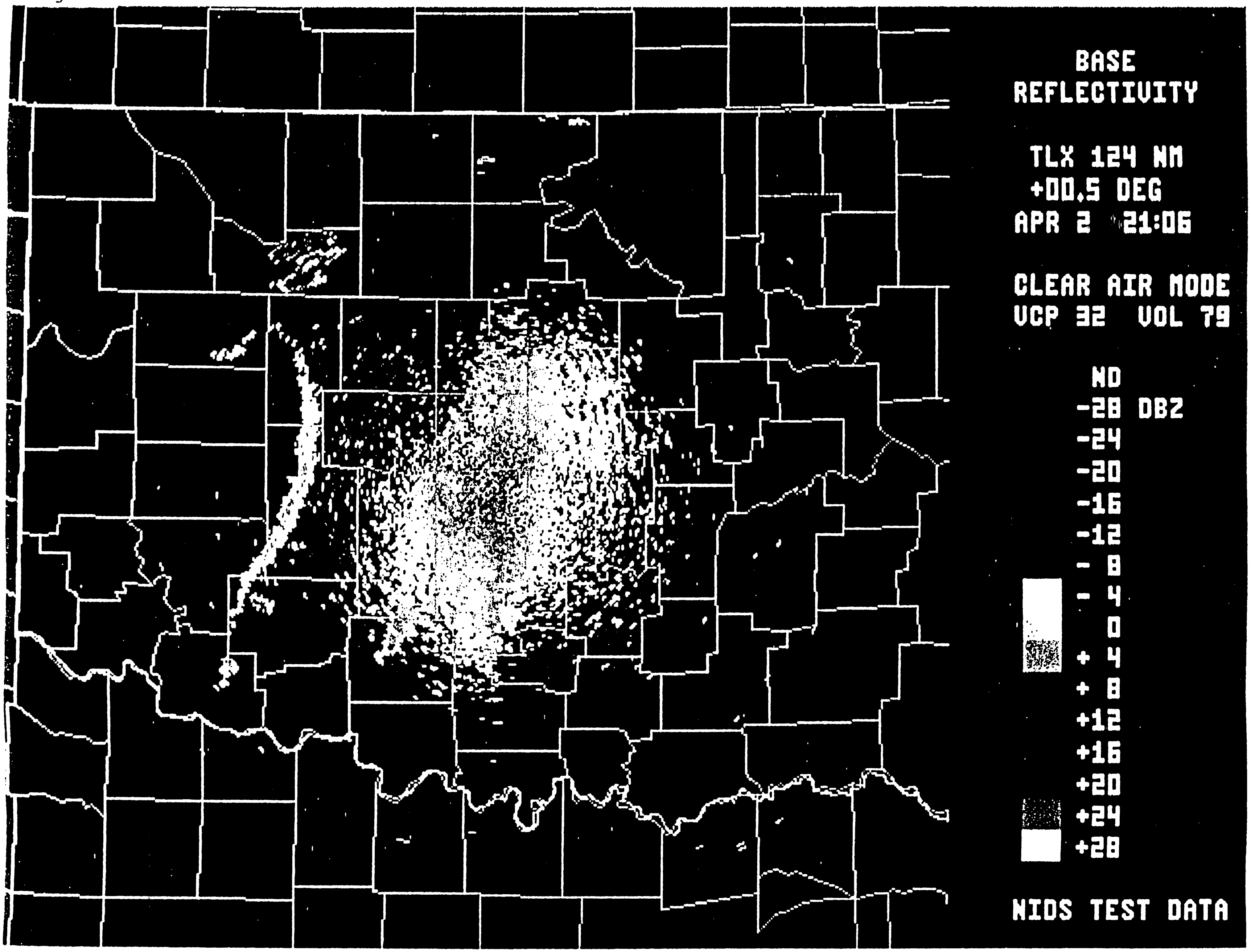
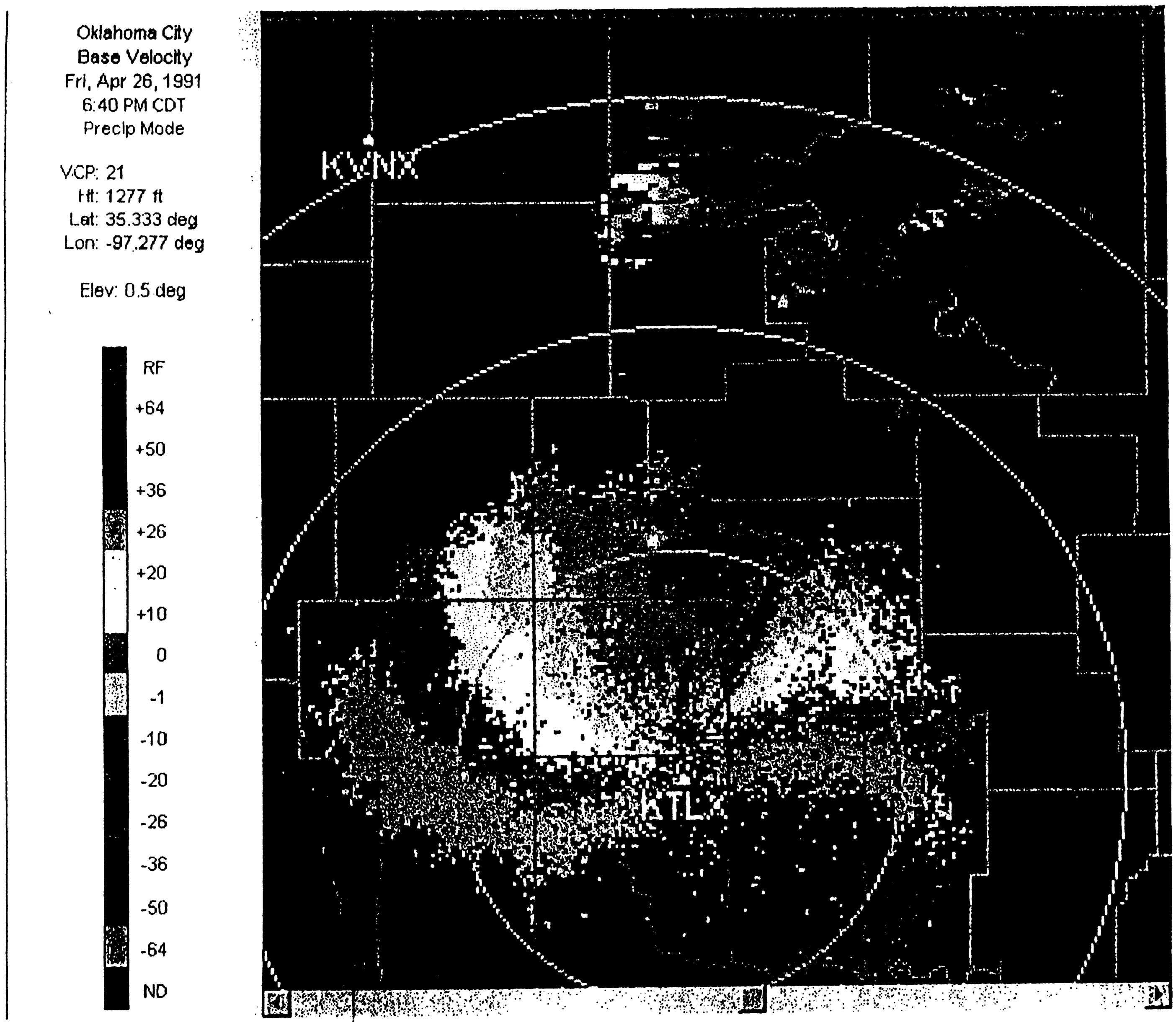

BASE
REFLECTIVITY
TLX 124 NM
+00.5 DEG
APR 2 21:06
CLEAR AIR MODE
VCP 32 VOL 79
ND
-28 DBZ
-24
-20
-16
-12
- 8
- 4
0
+ 4
+ 8
+12
+16
+20
+24
+28
NIDS TEST DATA

Figure 9d



Oklahoma City
Base Velocity
Fri, Apr 26, 1991
6:40 PM CDT
Precip Mode
VCP: 21
Ht: 1277 ft
Lat: 35.333 deg
Lon: -97.277 deg
Elev: 0.5 deg
RF
+64
+50
+36
+26
+20
+10
0
-1
-10
-20
-26
-36
-50
-64
ND
KVNX
KTLX

Figure 10

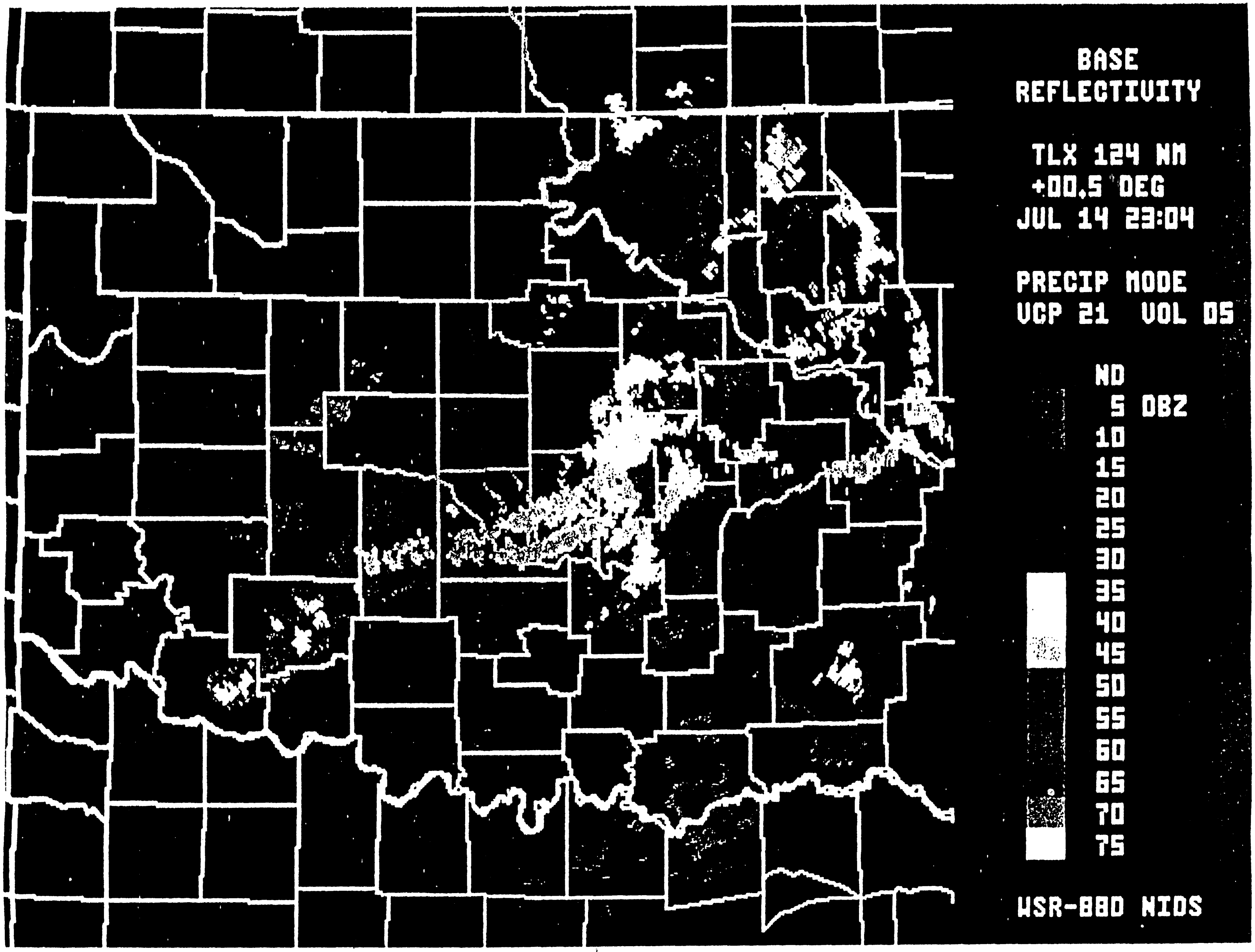
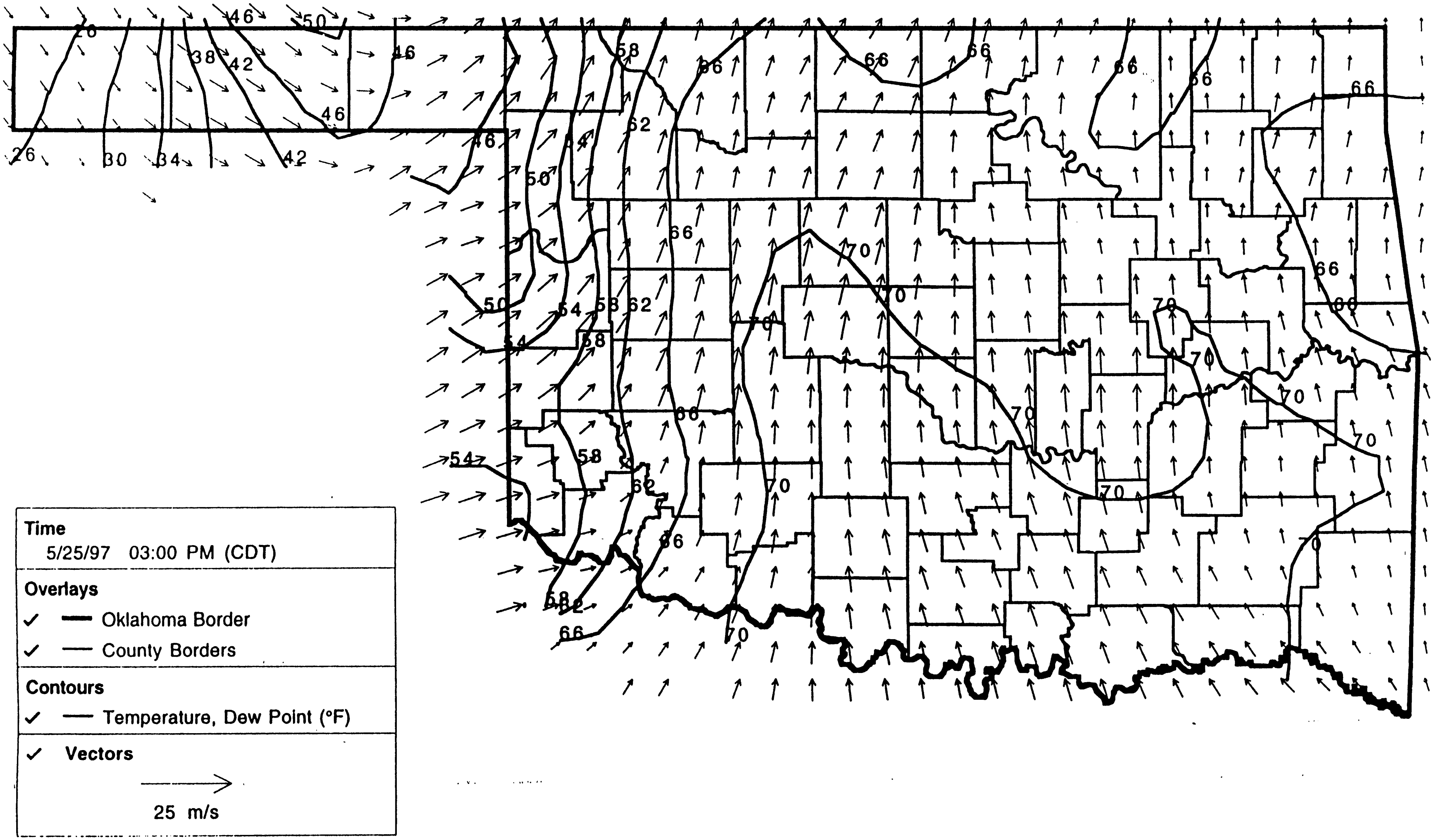

BASE
REFLECTIVITY
TLX 124 NM
+00.5 DEG
JUL 14 23:04
PRECIP MODE
VCP 21 VOL 05
ND
5 DBZ
10
15
20
25
30
35
40
45
50
55
60
65
70
75
WSR-88D NIDS

Figure 11



Time
5/25/97 03:00 PM (CDT)
Overlays
✓ Oklahoma Border
✓ County Borders
Contours
✓ Temperature, Dew Point (°F)
✓ Vectors
25 m/s

Figure 12 a

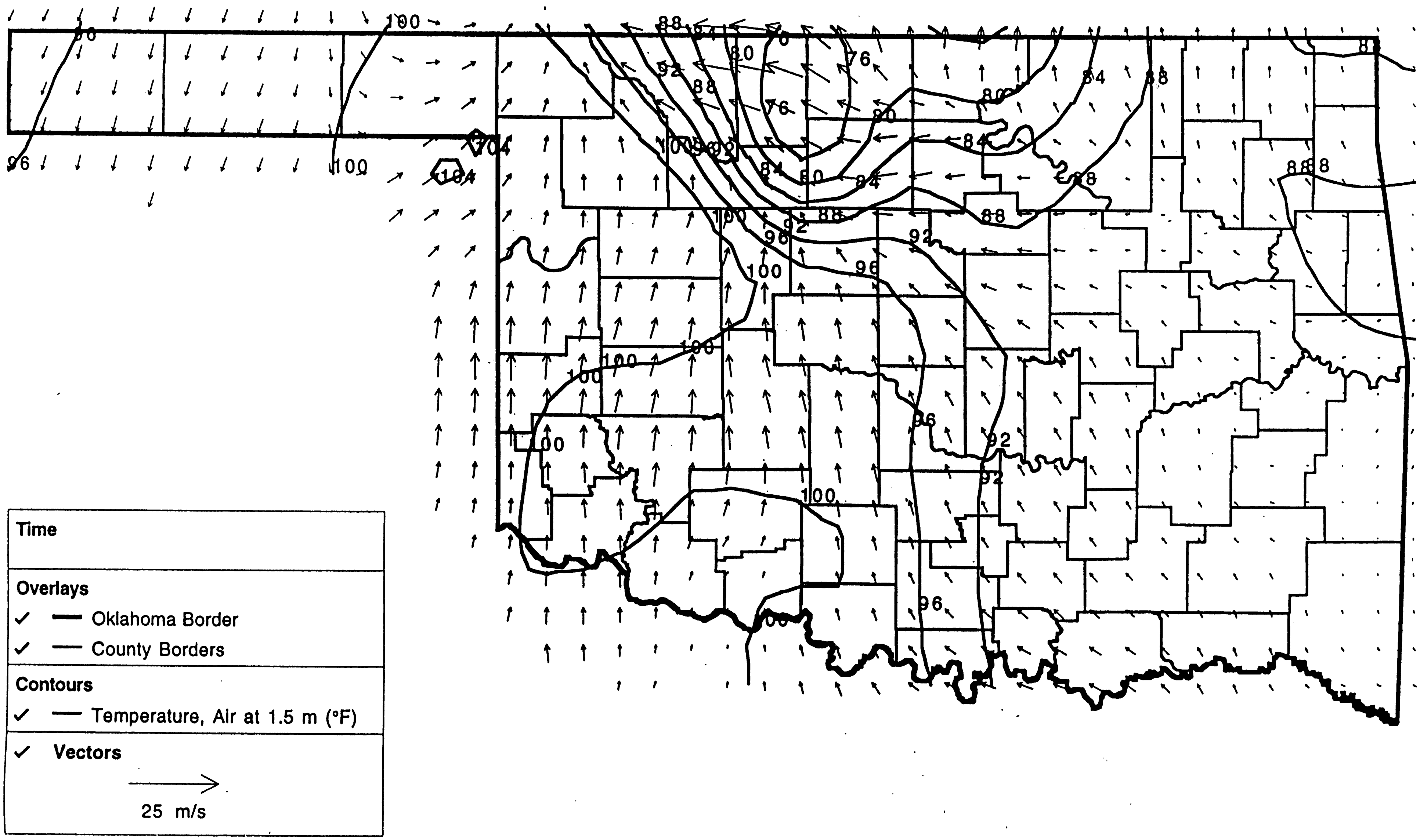

Time
Overlays
Oklahoma Border
County Borders
Contours
Temperature, Air at 1.5 m (°F)
Vectors
25 m/s

Figure 12b

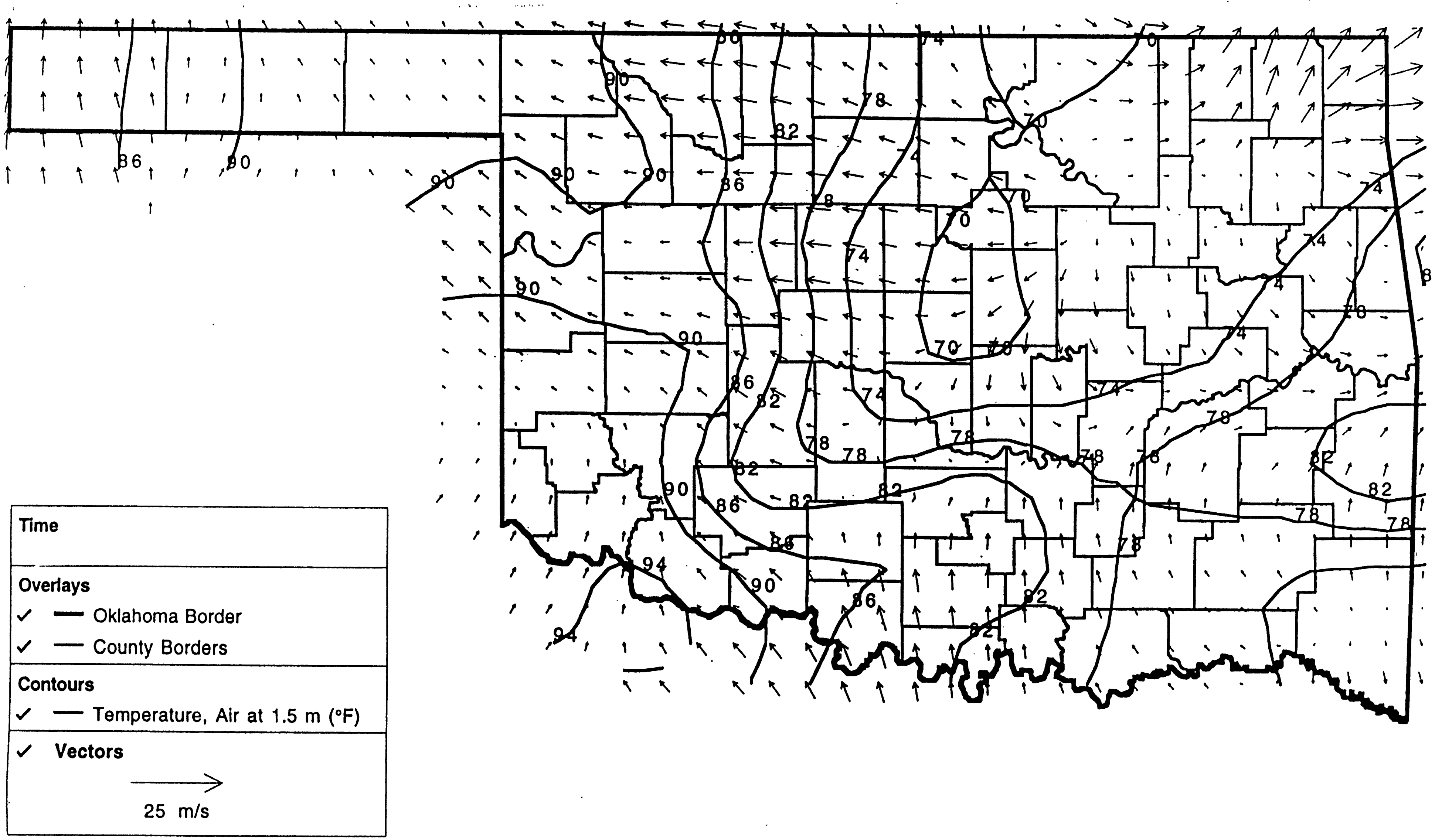

Time
Overlays
✓ Oklahoma Border
✓ County Borders
Contours
✓ Temperature, Air at 1.5 m (°F)
✓ Vectors
25 m/s

Figure 12c

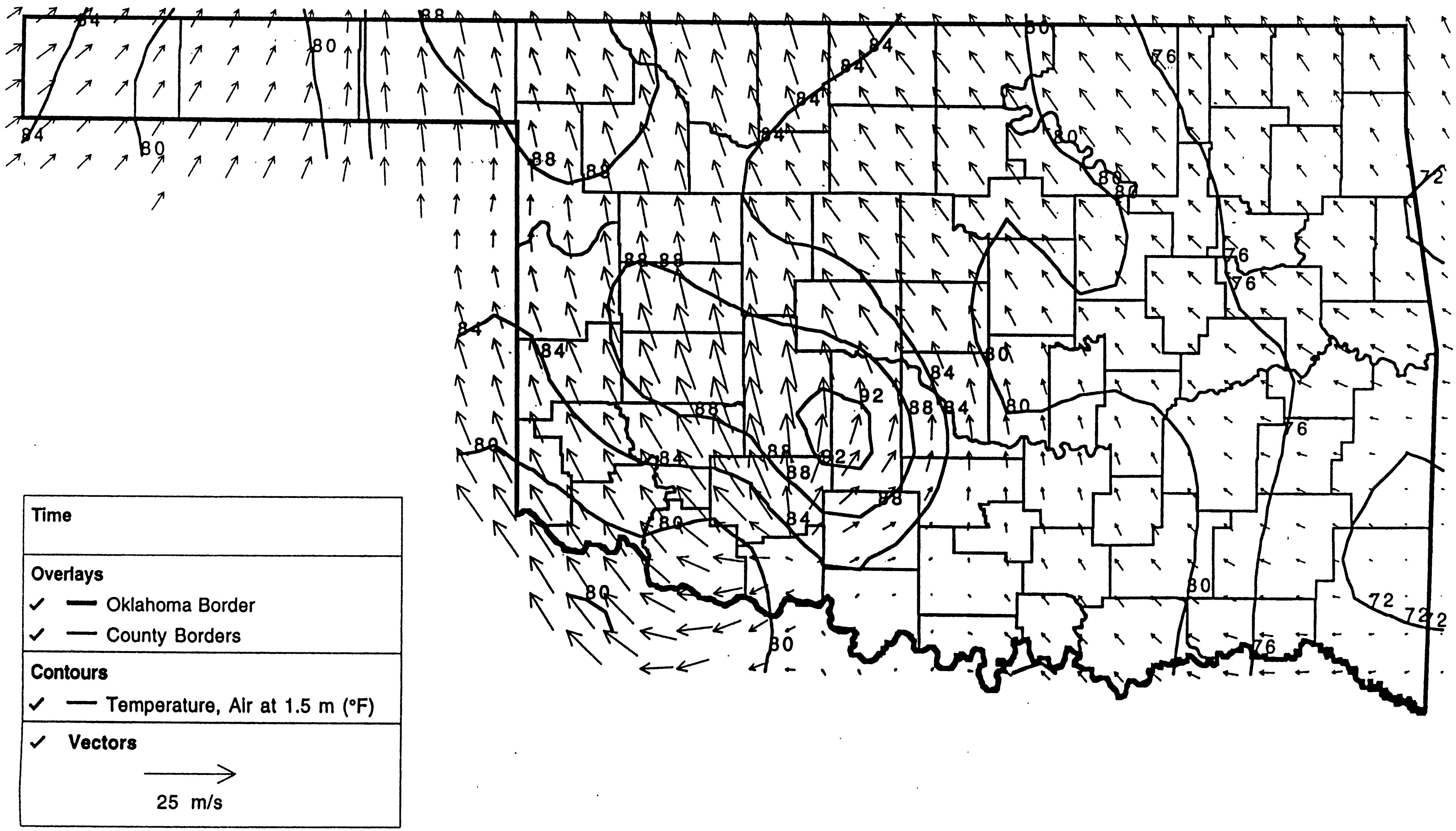
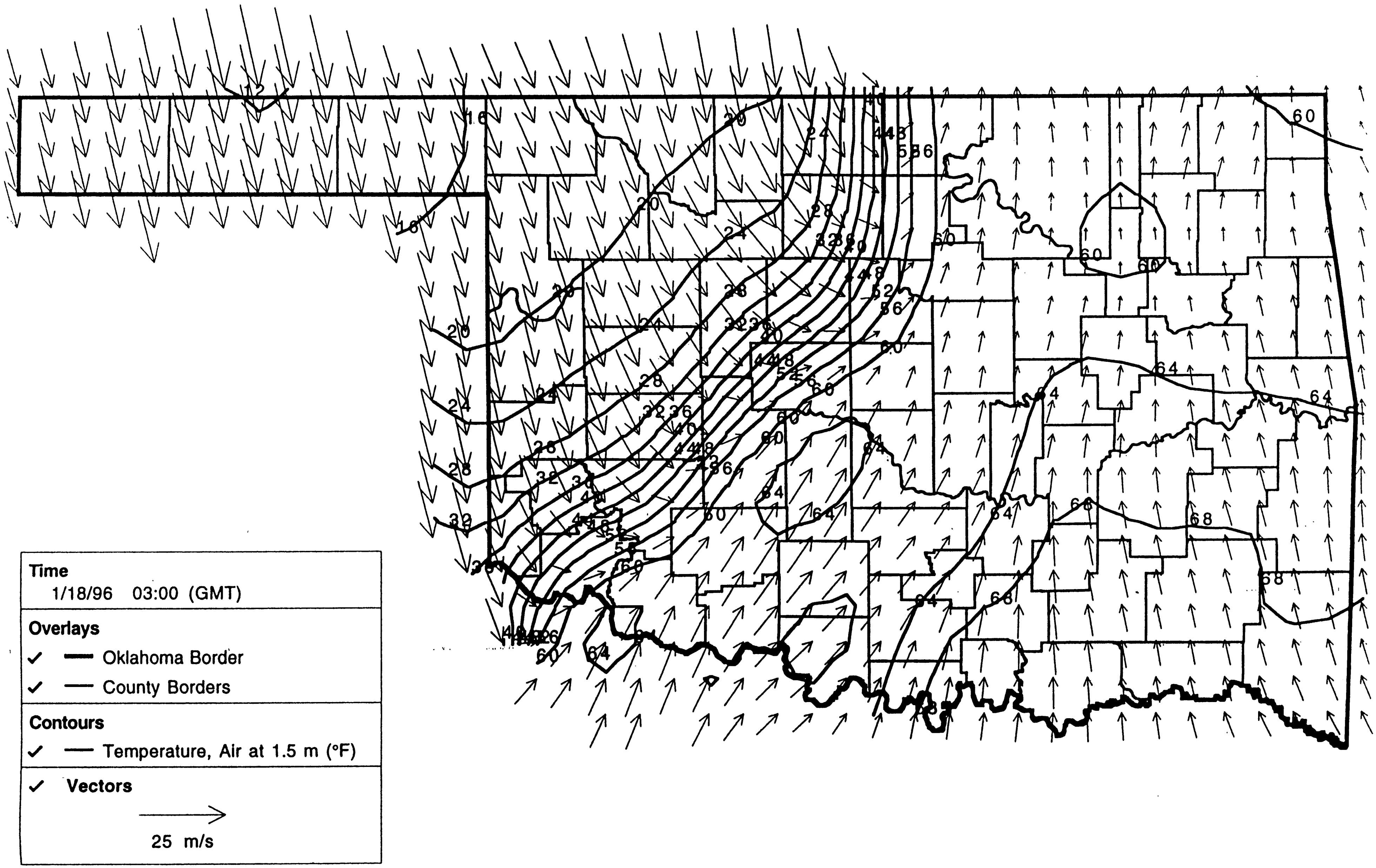

Time
Overlays
Oklahoma Border
County Borders
Contours
Temperature, Air at 1.5 m (°F)
Vectors
25 m/s

Figure 13a



Time
1/18/96 03:00 (GMT)
Overlays
✓ Oklahoma Border
✓ County Borders
Contours
✓ Temperature, Air at 1.5 m (°F)
✓ Vectors
25 m/s

Figure 13b

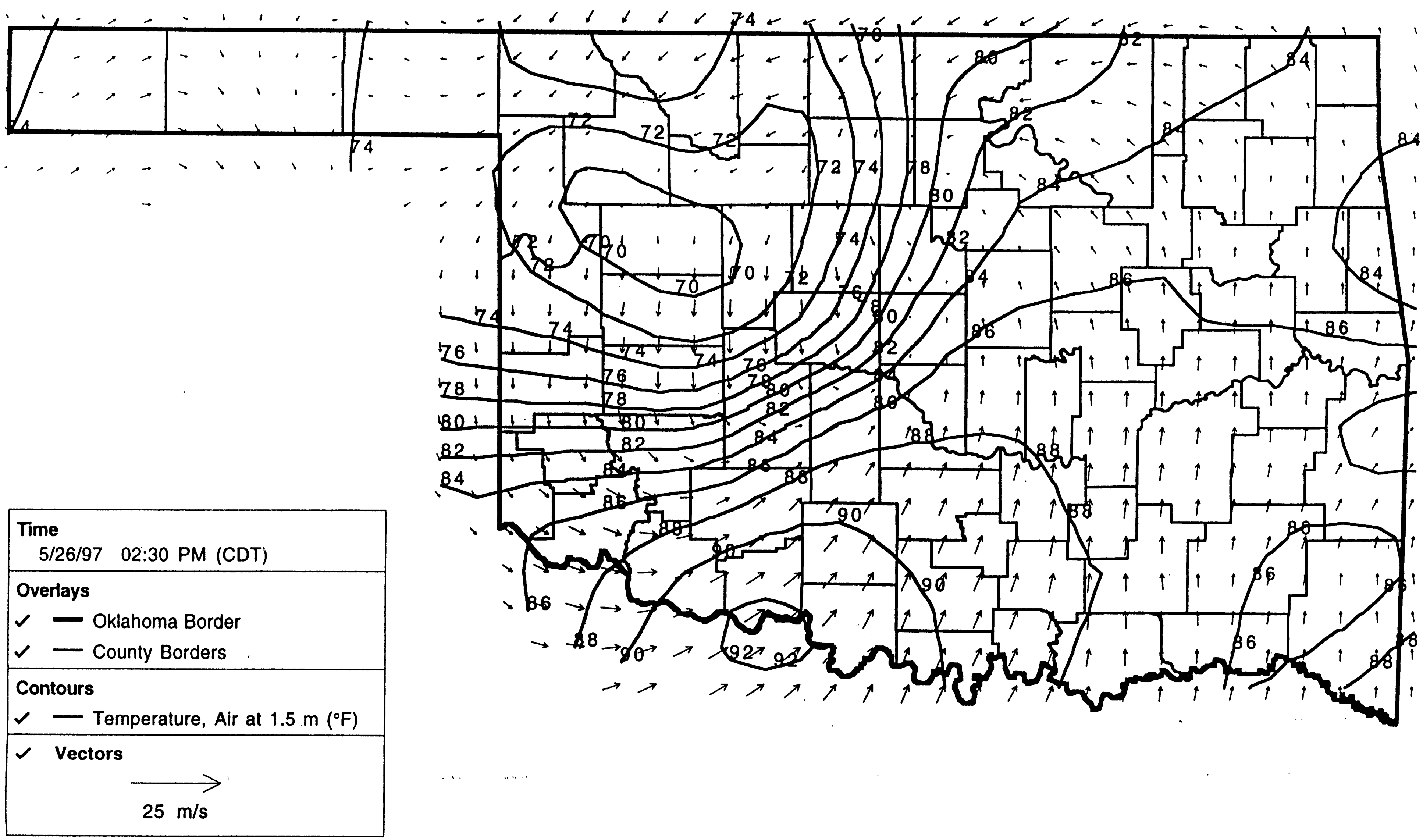

Time
5/26/97 02:30 PM (CDT)
Overlays
Oklahoma Border
County Borders
Contours
Temperature, Air at 1.5 m (°F)
Vectors
25 m/s

Figure 13c

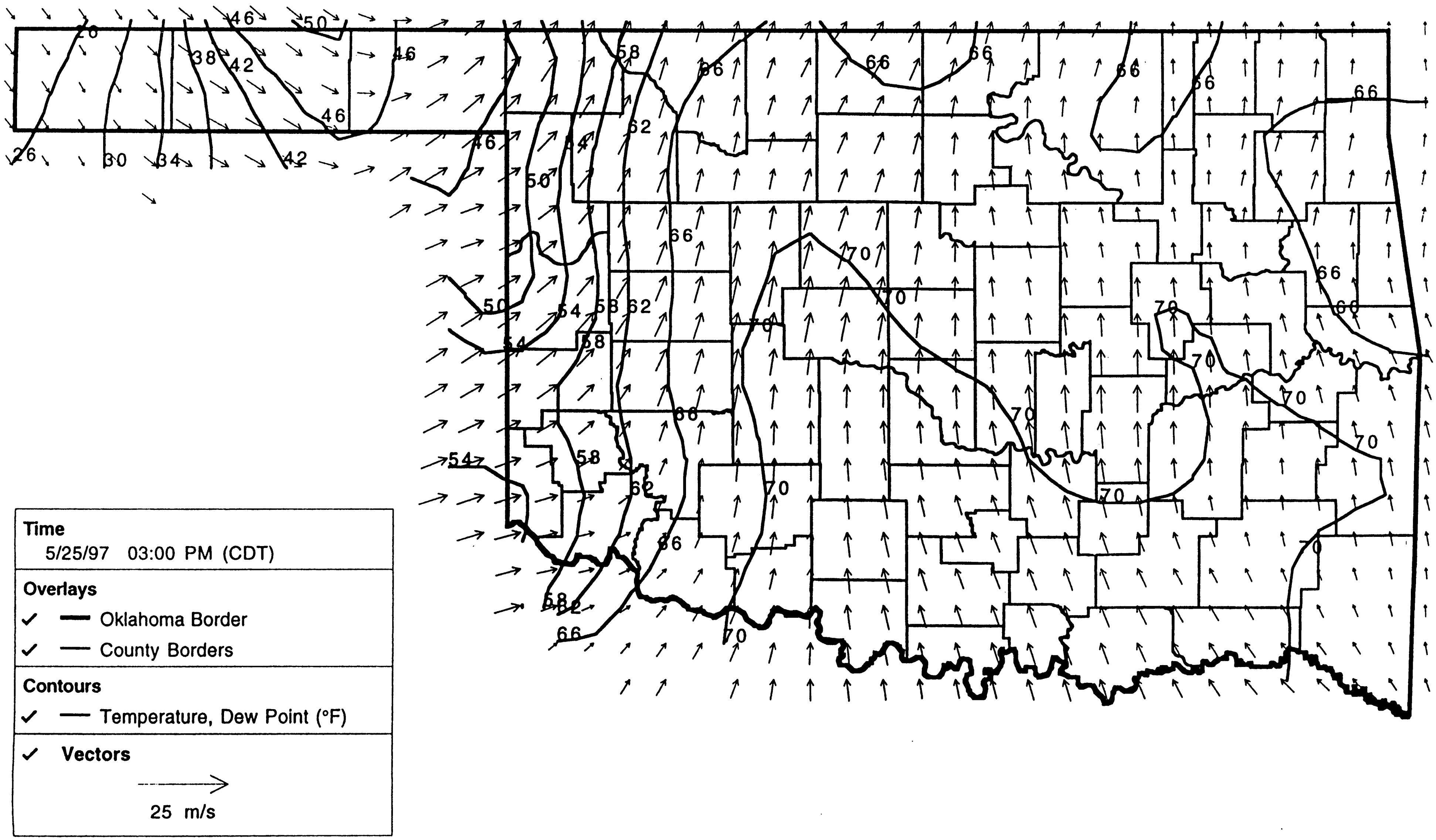

Time
5/25/97 03:00 PM (CDT)
Overlays
Oklahoma Border
County Borders
Contours
Temperature, Dew Point (°F)
Vectors
25 m/s

Figure 13d

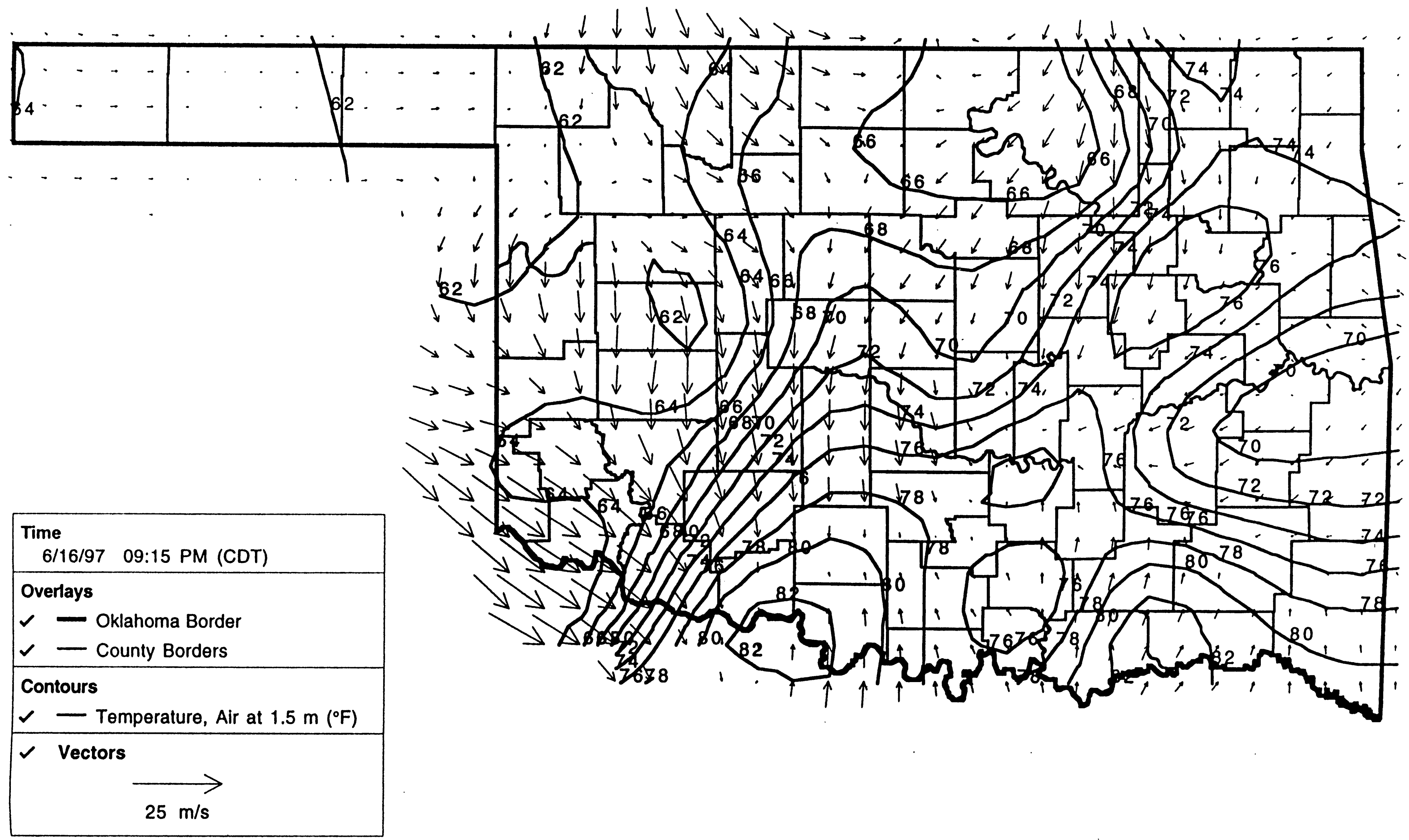

Time
6/16/97 09:15 PM (CDT)
Overlays
Oklahoma Border
County Borders
Contours
Temperature, Air at 1.5 m (°F)
Vectors
25 m/s

Figure 16a

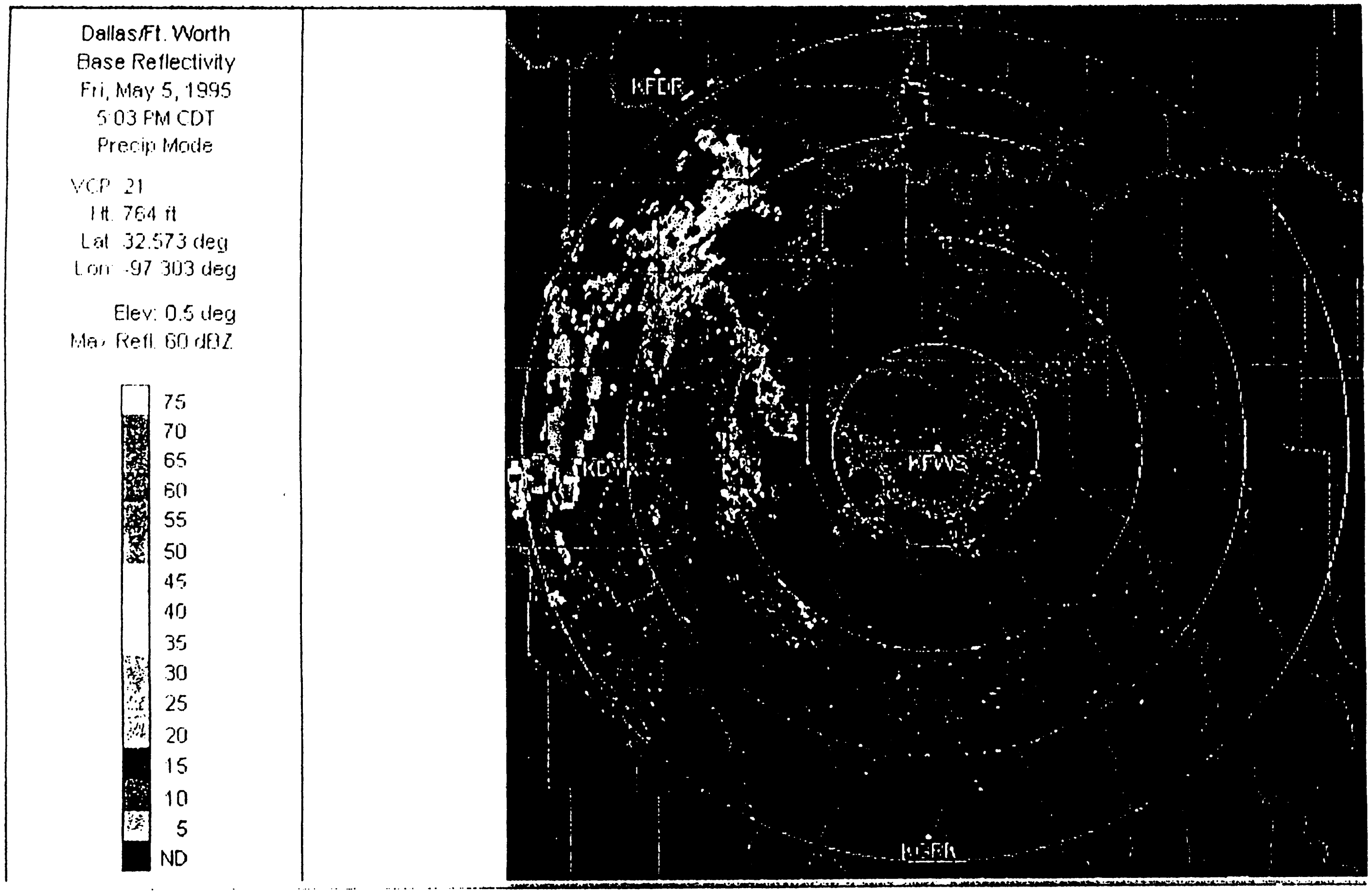

Dallas/Ft. Worth
Base Reflectivity
Fri, May 5, 1995
5:03 PM CDT
Precip Mode
VCP 21
Ht. 764 ft
Lat 32.573 deg
Lon -97.303 deg
Elev: 0.5 deg
Max Refl. 60 dBZ
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
ND
KFDR
KFWS
KGRK

Figure 23a

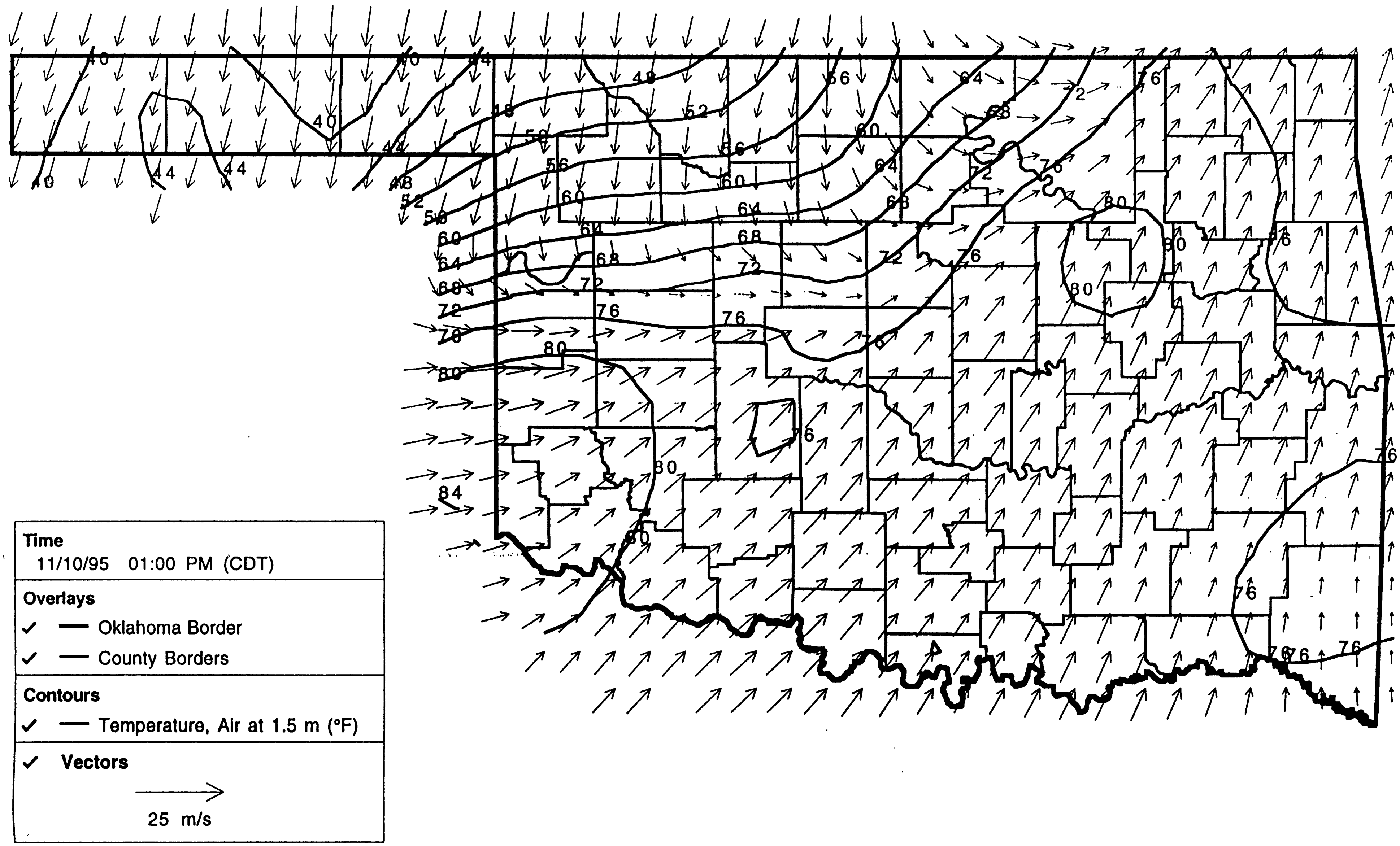
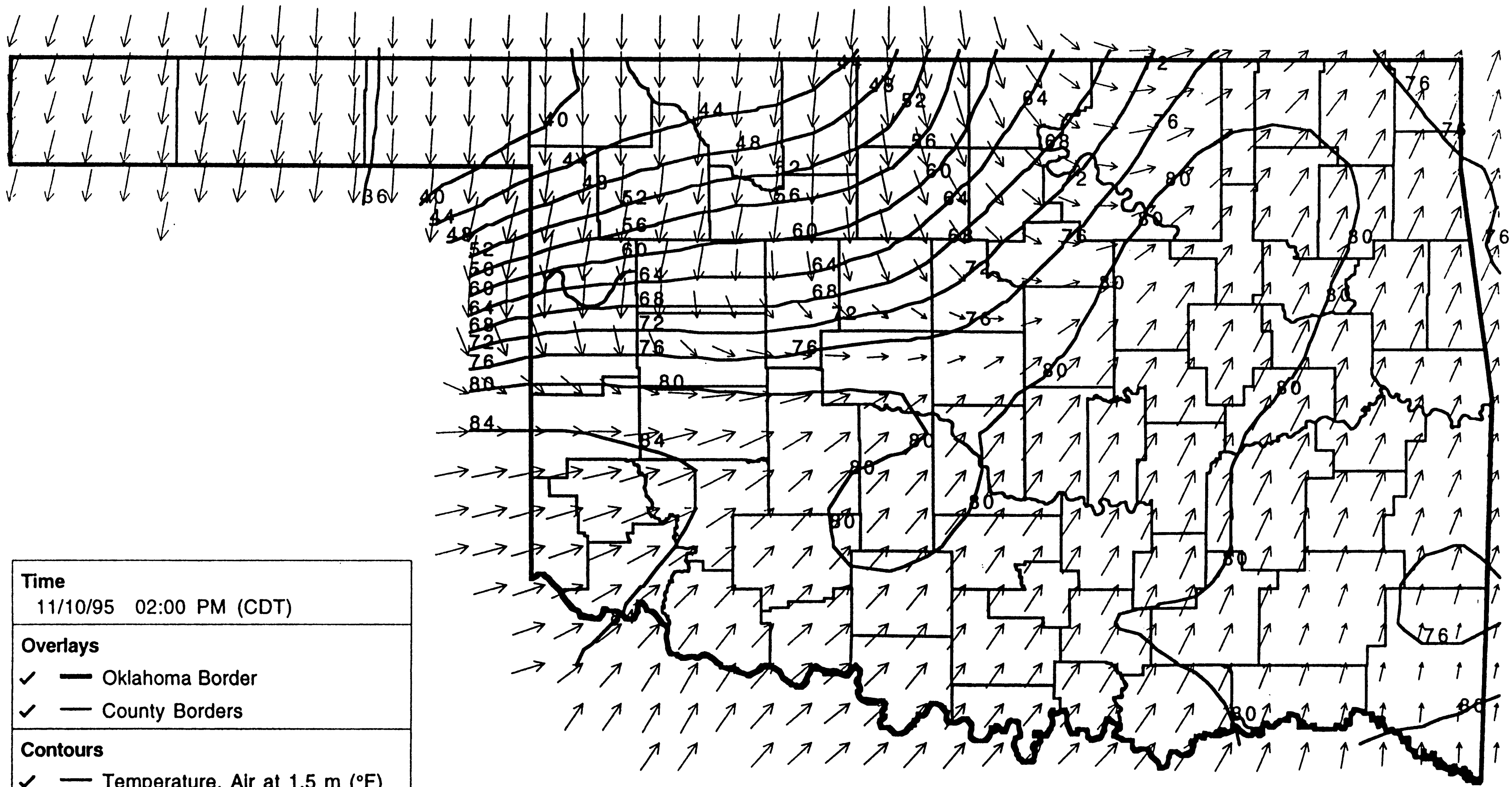

Time
11/10/95 01:00 PM (CDT)
Overlays
✓ Oklahoma Border
✓ County Borders
Contours
✓ Temperature, Air at 1.5 m (°F)
✓ Vectors
25 m/s

Figure 23b



Time
11/10/95 02:00 PM (CDT)
Overlays
✓ — Oklahoma Border
✓ — County Borders
Contours
✓ — Temperature, Air at 1.5 m (°F)
✓ **Vectors**
→ 25 m/s

Figure 23c

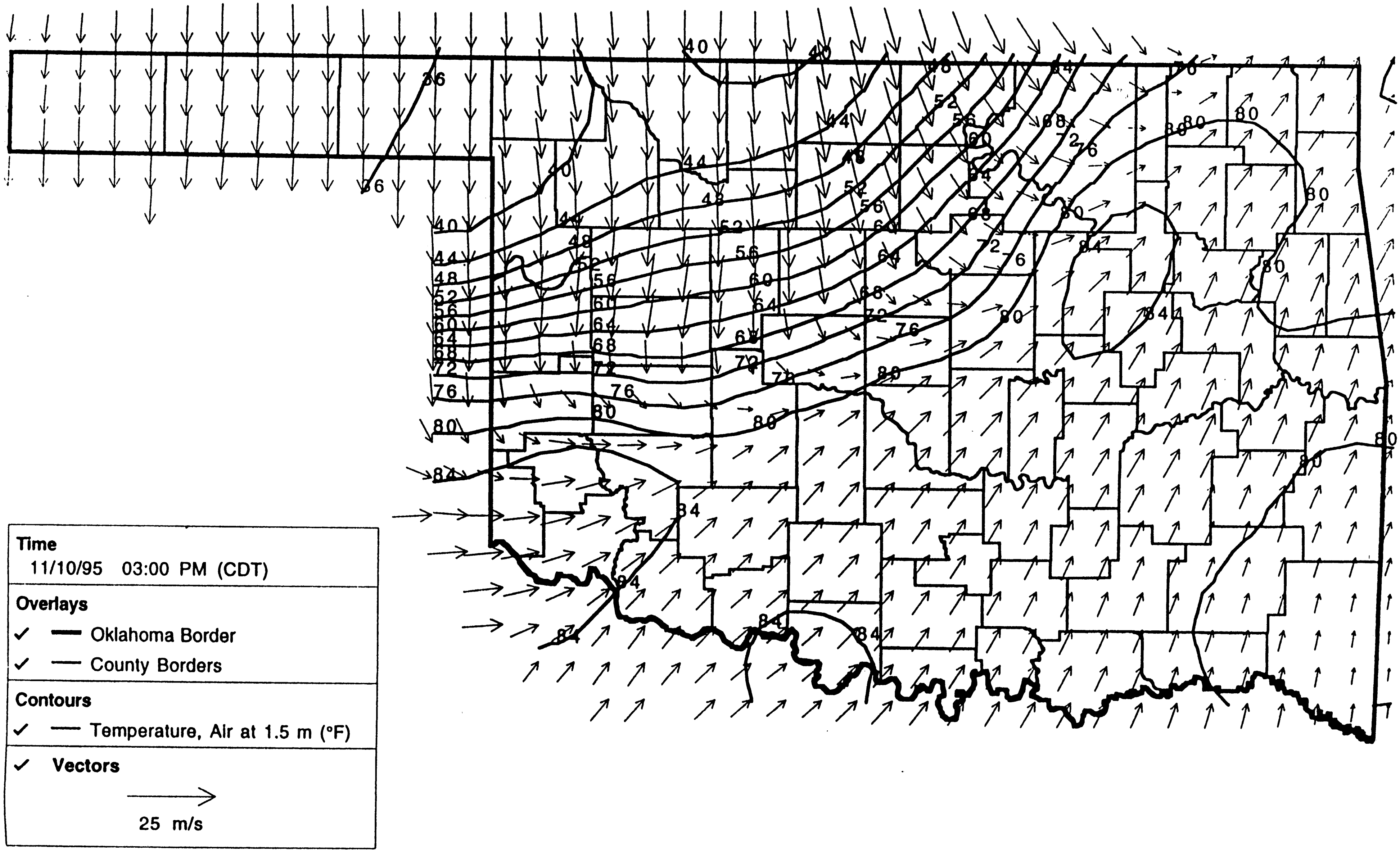
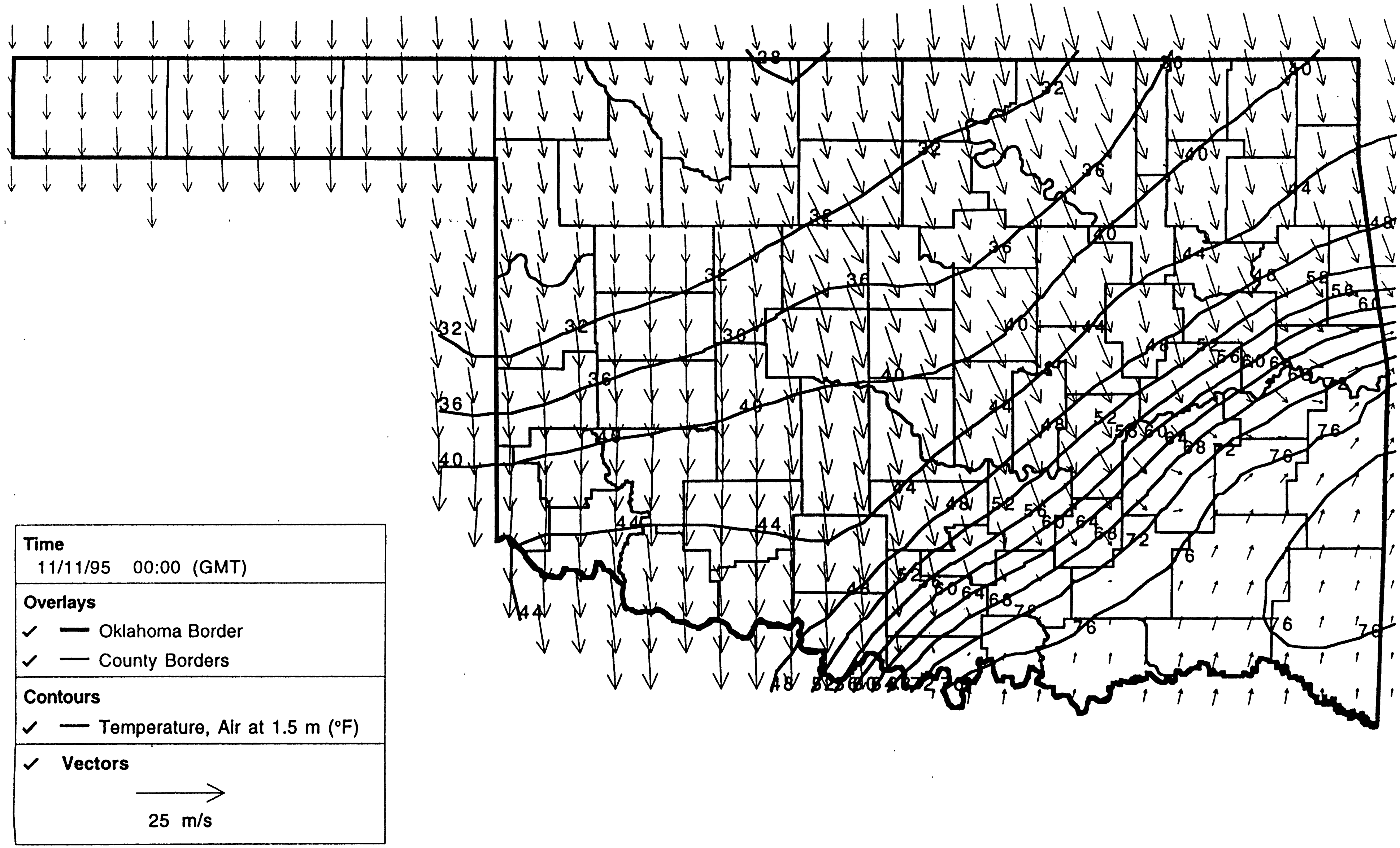
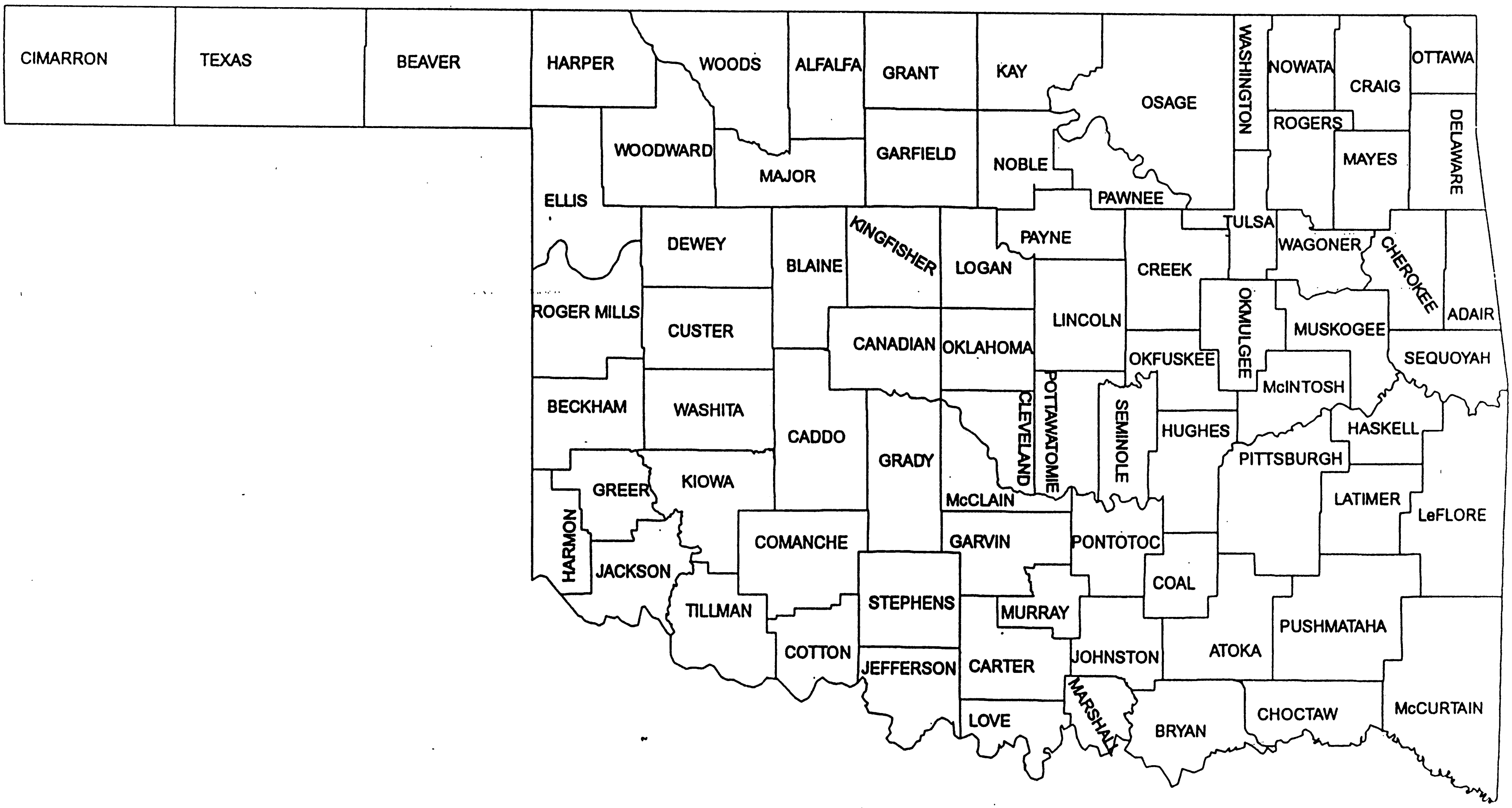

Time
11/10/95 03:00 PM (CDT)
Overlays
✓ Oklahoma Border
✓ County Borders
Contours
✓ Temperature, Air at 1.5 m (°F)
✓ Vectors
25 m/s

Figure 24b


Time
11/11/95 00:00 (GMT)
Overlays
✓ Oklahoma Border
✓ County Borders
Contours
✓ Temperature, Air at 1.5 m (°F)
✓ Vectors
25 m/s


CIMARRON
TEXAS
BEAVER
HARPER
WOODS
ALFALFA
GRANT
KAY
OSAGE
WASHINGTON
NOWATA
CRAIG
OTTAWA
ROGERS
DELAWARE
WOODWARD
MAJOR
GARFIELD
NOBLE
PAWNEE
MAYES
ELLIS
DEWEY
BLAINE
KINGFISHER
LOGAN
PAYNE
TULSA
WAGONER
CHEROKEE
ADAIR
CREEK
LINCOLN
OKMULGEE
MUSKOGEE
SEQUOYAH
ROGER MILLS
CUSTER
CANADIAN
OKLAHOMA
OKFUSKEE
McINTOSH
BECKHAM
WASHITA
CADDO
GRADY
CLEVELAND
POTTAWATOMIE
SEMINOLE
HUGHES
HASKELL
PITTSBURGH
GREER
KIOWA
McCLAIN
LATIMER
LeFLORE
HARMON
JACKSON
COMANCHE
GARVIN
PONTOTOC
COAL
TILLMAN
STEPHENS
MURRAY
COTTON
JEFFERSON
CARTER
JOHNSTON
ATOKA
PUSHMATAHA
MARSHALL
LOVE
BRYAN
CHOCTAW
McCURTAIN

OKLAHOMA

Population 3,157,604
(1990 Census)
Land Area 68,656 Sq. Mi.
Capital Oklahoma City

Cities and Towns

Ada.....C-6
Allen.....C-7
Altus.....C-4
Alva.....A-4
Anadarko.....C-5
Antlers.....D-7
Apache.....C-5
Ardmore.....D-6
Arnett.....B-3
Atoka.....D-7
Barnsdall.....A-7
Bartlesville.....A-7
Beaver.....A-3
Beggs.....B-7
Bixby.....B-7
Blackwell.....A-6
Blanchard.....C-6
Boise City.....A-1
Bristow.....B-7
Broken Arrow.....B-7
Broken Bow.....D-8
Buffalo.....A-4
Carnegie.....C-5
Chandler.....B-6
Chelsea.....A-7
Cherokee.....A-5
Cheyenne.....B-4
Chickasha.....C-5
Claremore.....B-7
Cleveland.....B-7
Clinton.....B-4
Coalgate.....C-7
Collinsville.....B-7
Comanche.....D-5
Cordell.....C-4
Coweta.....B-7
Cushing.....B-6
Davis.....D-6
Dewey.....A-7
Drumright.....B-6
Duncan.....D-5
Durant.....D-7
Edmond.....B-6
Elk City.....C-4
El Reno.....B-5
Enid.....A-5
Erick.....C-3
Eufaula.....C-7
Fairfax.....A-6
Fairview.....B-5
Frederick.....D-4
Geary.....B-5
Grandfield.....D-4
Guthrie.....B-6
Guymon.....A-2
Haskell.....B-7
Healdton.....D-6
Heavener.....C-8
Hennessey.....B-5
Henryetta.....B-7
Hobart.....C-4
Holdenville.....C-7
Hollis.....C-3
Hominy.....A-7
Hooker.....A-2
Hugo.....D-7
Idabel.....D-8
Jay.....A-8
Kingfisher.....B-5
Konawa.....C-6
Lawton.....C-5
Lexington.....C-6
Lindsay.....C-5
McAlester.....C-7
Madill.....D-6
Mangum.....C-4
Marietta.....D-6
Marlow.....C-5
Medford.....A-5
Miami.....A-8
Midwest City.....C-6
Muskogee.....B-7
Newkirk.....A-6
Norman.....C-6
Nowata.....A-7
Oilton.....B-6
Okeene.....B-5
Okemah.....C-7
Oklahoma City.....B-6
Okmulgee.....B-7
Pauls Valley.....C-6
Pawhuska.....A-7
Pawnee.....B-6
Perry.....B-6
Picher.....A-8
Ponca City.....A-6
Poteau.....C-8
Prague.....B-6
Pryor.....B-8
Purcell.....C-6
Rush Springs.....C-5
Sallisaw.....B-8
Sand Springs.....B-7
Sapulpa.....B-7
Seminole.....C-6
Shattuck.....B-3
Shawnee.....C-6
Skiatook.....A-7
Snyder.....C-4
Stigler.....C-8
Stillwater.....B-6
Stilwell.....B-8
Stroud.....B-6
Sulphur.....D-6
Tahlequah.....B-8
Talihina.....C-8
Taloga.....B-4
Tecumseh.....C-6
Thomas.....B-4
Tipton.....D-4
Tishomingo.....D-6
Tonkawa.....A-6
Tulsa.....B-7
Vinita.....A-8
Wagoner.....B-7
Walters.....D-5
Watonga.....B-5
Waurika.....D-5
Waynoka.....A-4
Weatherford.....B-4
Weleetka.....C-7
Wetumka.....C-7
Wewoka.....C-7
Woodward.....A-4
Wynnewood.....C-6

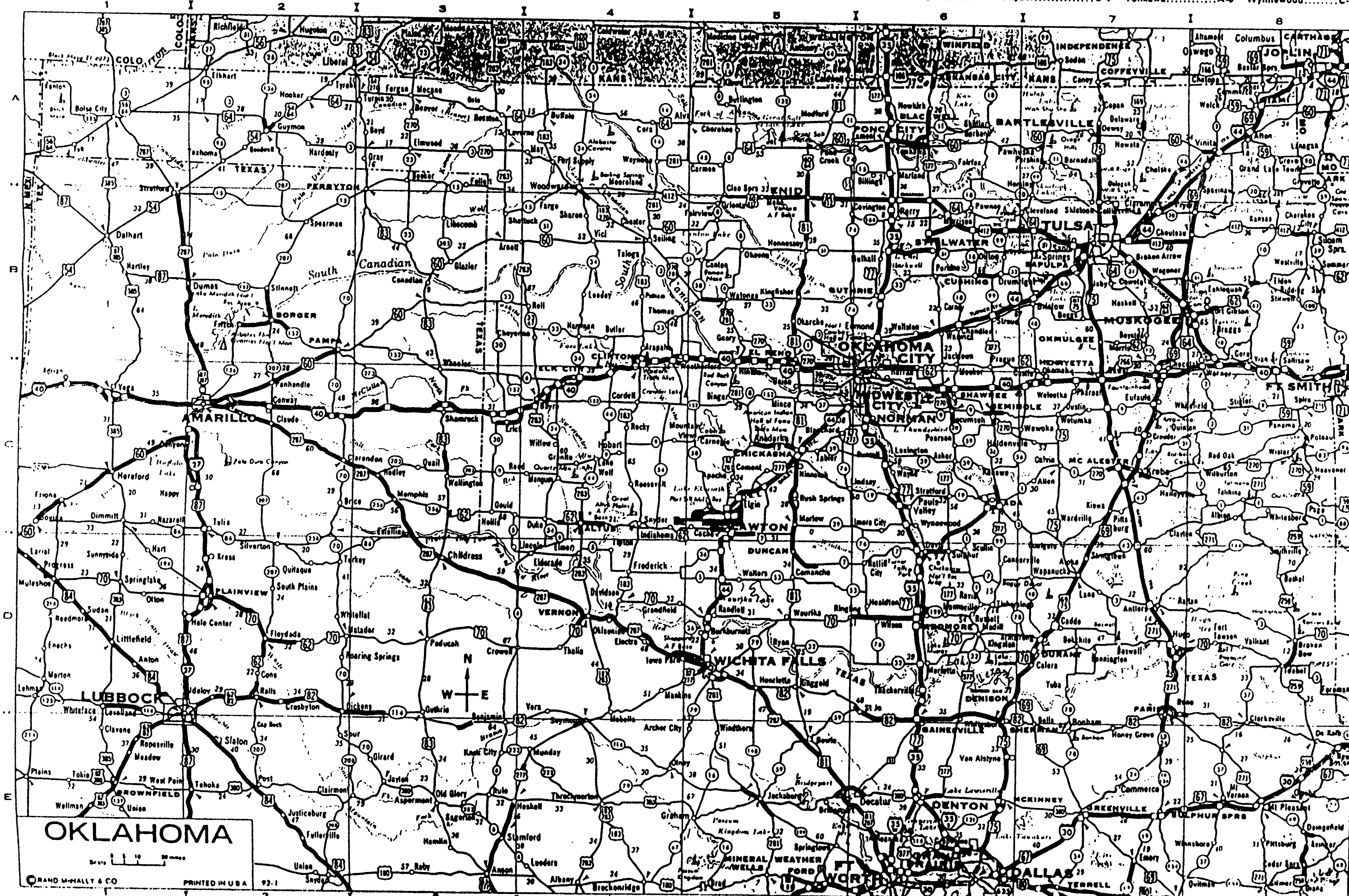


Figure 9e

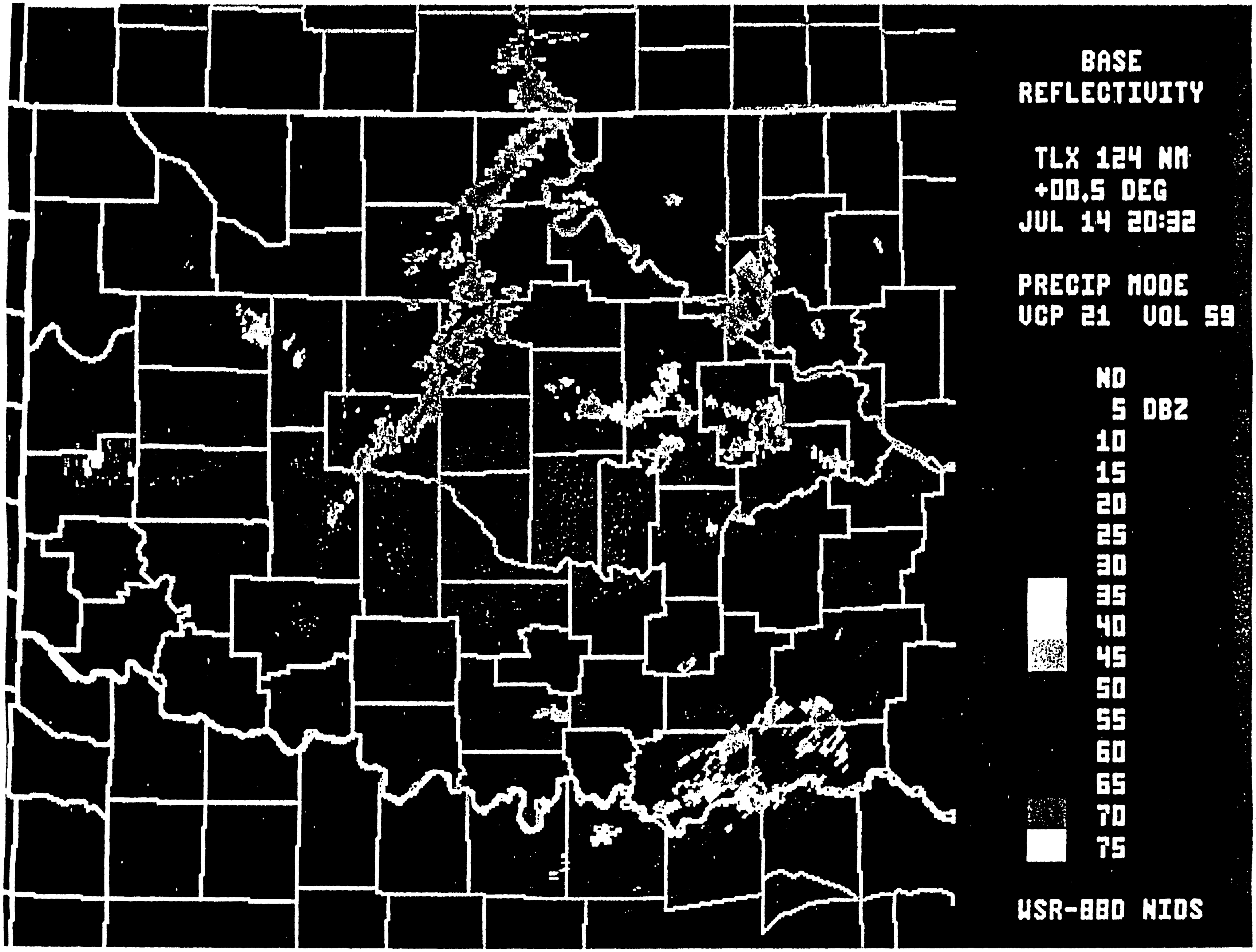

BASE
REFLECTIVITY
TLX 124 NM
+00.5 DEG
JUL 14 20:32
PRECIP MODE
VCP 21 VOL 59
ND
5 DBZ
10
15
20
25
30
35
40
45
50
55
60
65
70
75
WSR-88D NIDS

Figure 9f

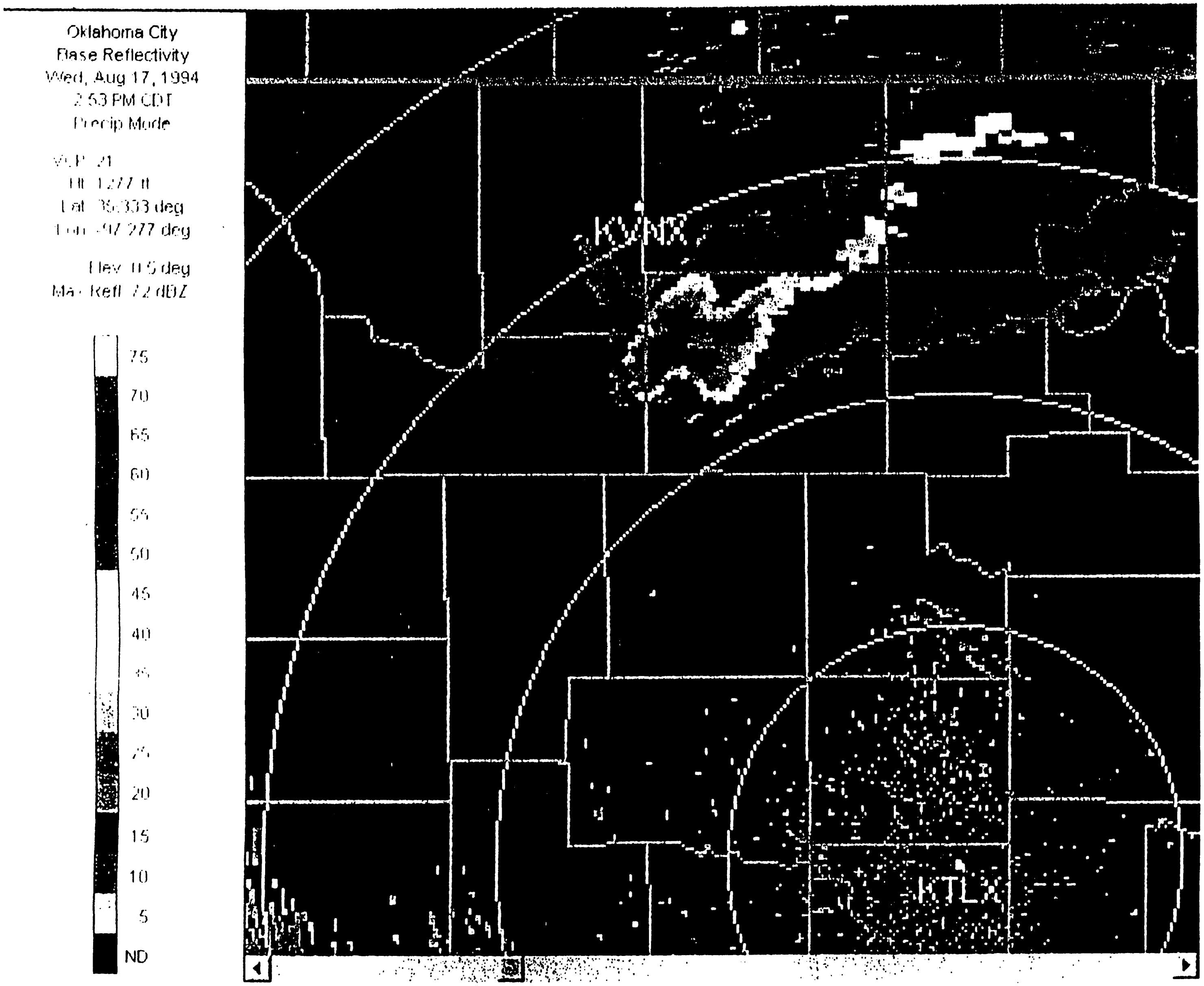

Oklahoma City
Base Reflectivity
Wed, Aug 17, 1994
2:53 PM CDT
Precip Mode
Lat 35.333 deg
Elev 0.5 deg
75
70
65
60
50
45
40
30
20
15
10
5
ND
KVNX
KTLX

Figure 6

WSR-88D Operations Course

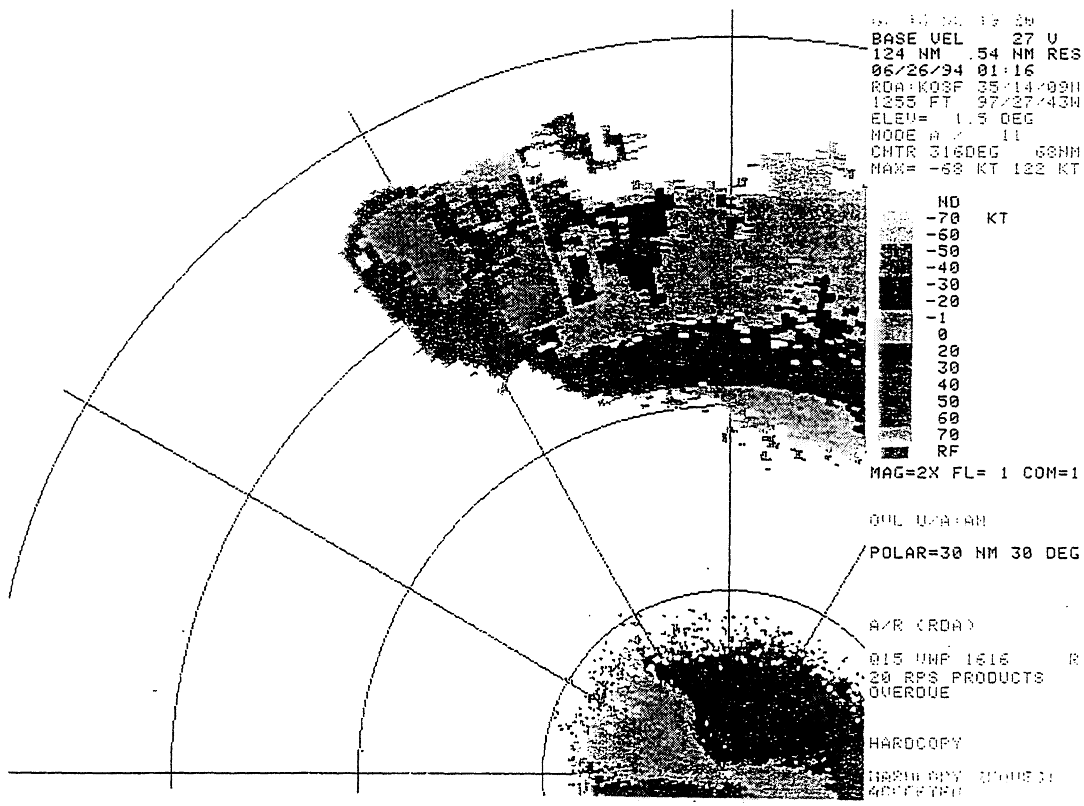


Figure 7

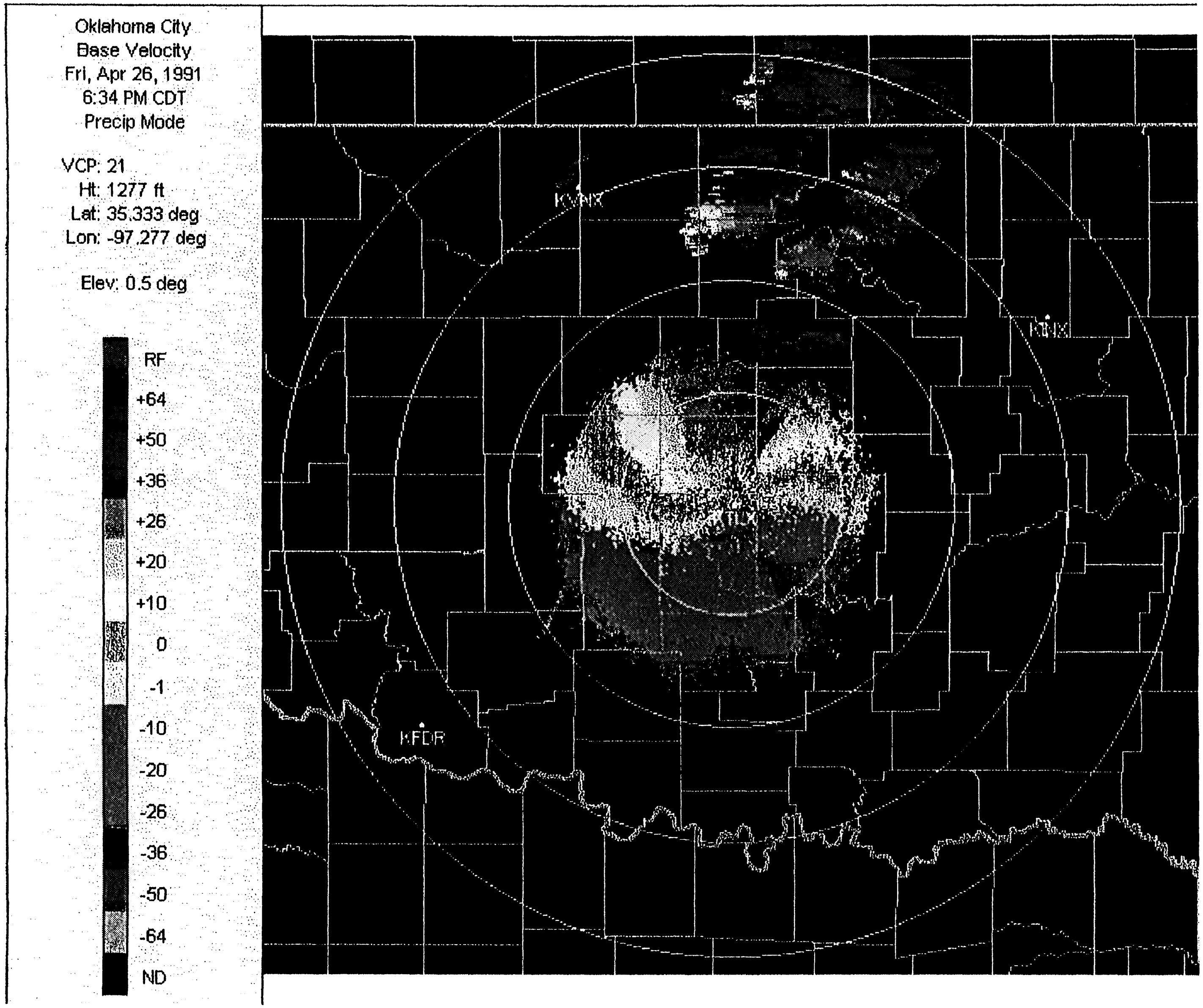

Oklahoma City
Base Velocity
Fri, Apr 26, 1991
6:34 PM CDT
Precip Mode
VCP: 21
Ht: 1277 ft
Lat: 35.333 deg
Lon: -97.277 deg
Elev: 0.5 deg
RF
+64
+50
+36
+26
+20
+10
0
-1
-10
-20
-26
-36
-50
-64
ND
KVNX
KINX
KTLX
KFDR

Figure 9a

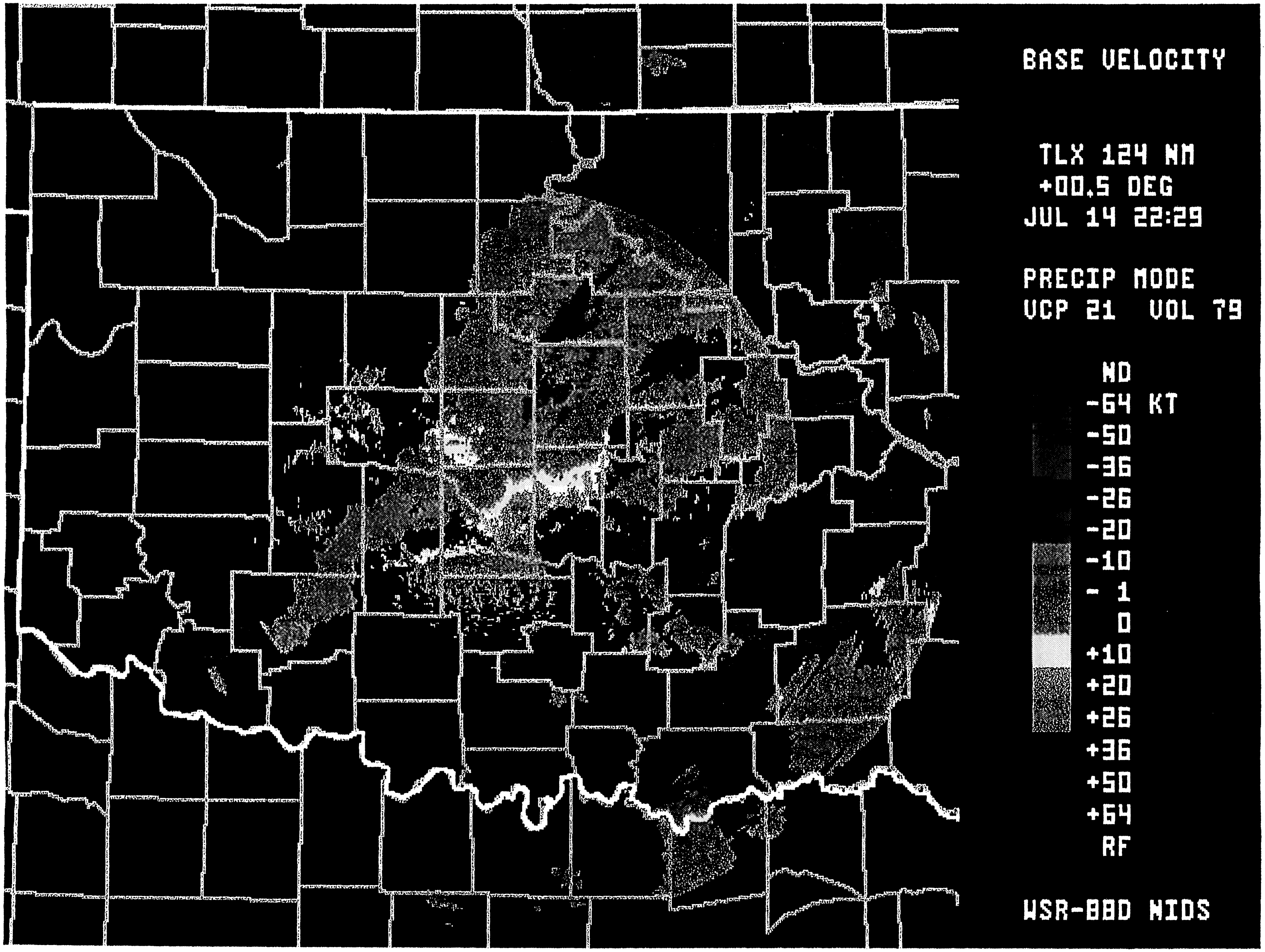

BASE VELOCITY
TLX 124 NM
+00.5 DEG
JUL 14 22:29
PRECIP MODE
VCP 21 VOL 79
ND
-64 KT
-50
-36
-26
-20
-10
- 1
0
+10
+20
+26
+36
+50
+64
RF
WSR-88D NIDS

Figure 9 b

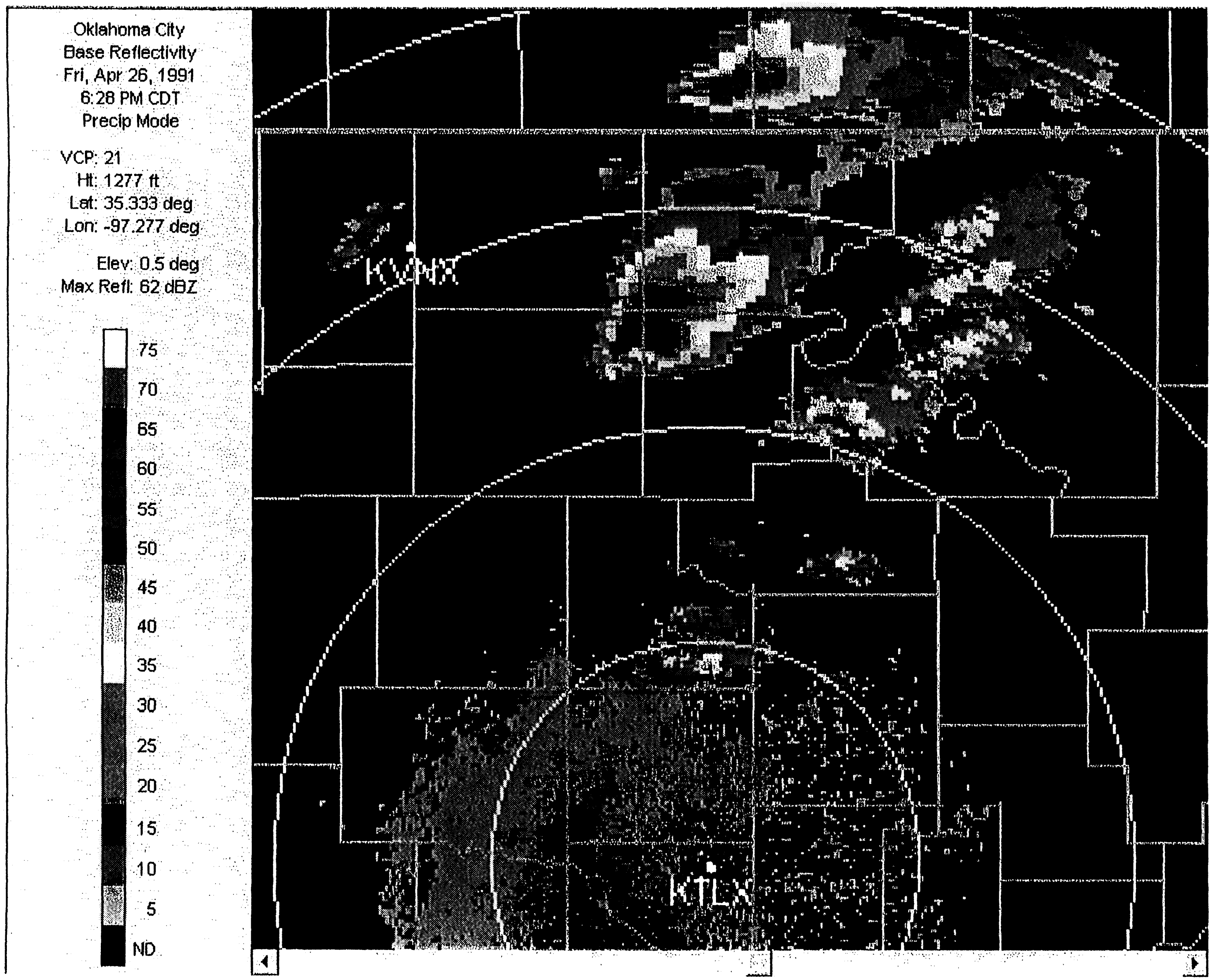

Oklahoma City
Base Reflectivity
Fri, Apr 26, 1991
6:28 PM CDT
Precip Mode
VCP: 21
Ht: 1277 ft
Lat: 35.333 deg
Lon: -97.277 deg
Elev: 0.5 deg
Max Refl: 62 dBZ
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
ND
KVNX
KTLX

Figure 9c

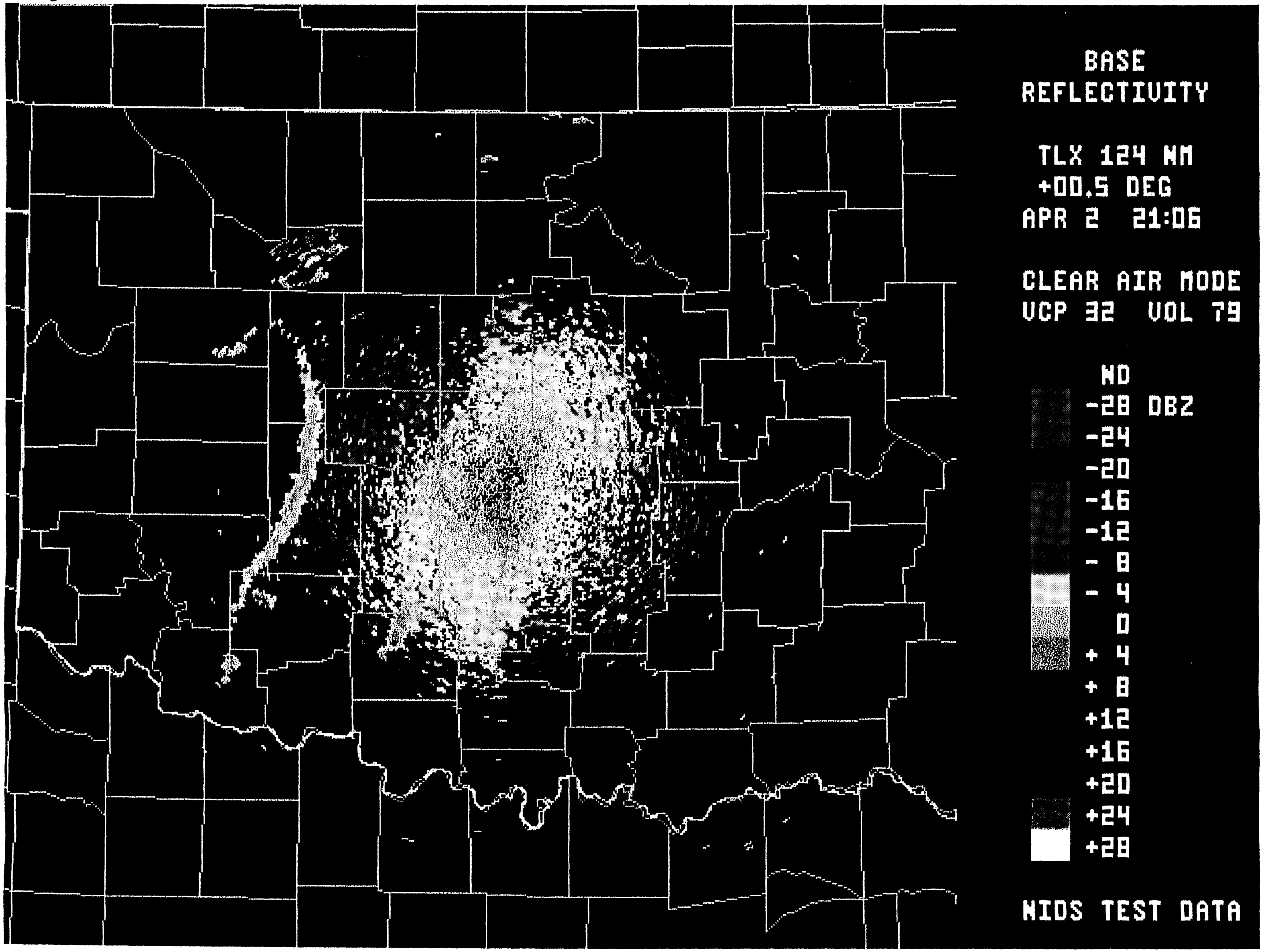
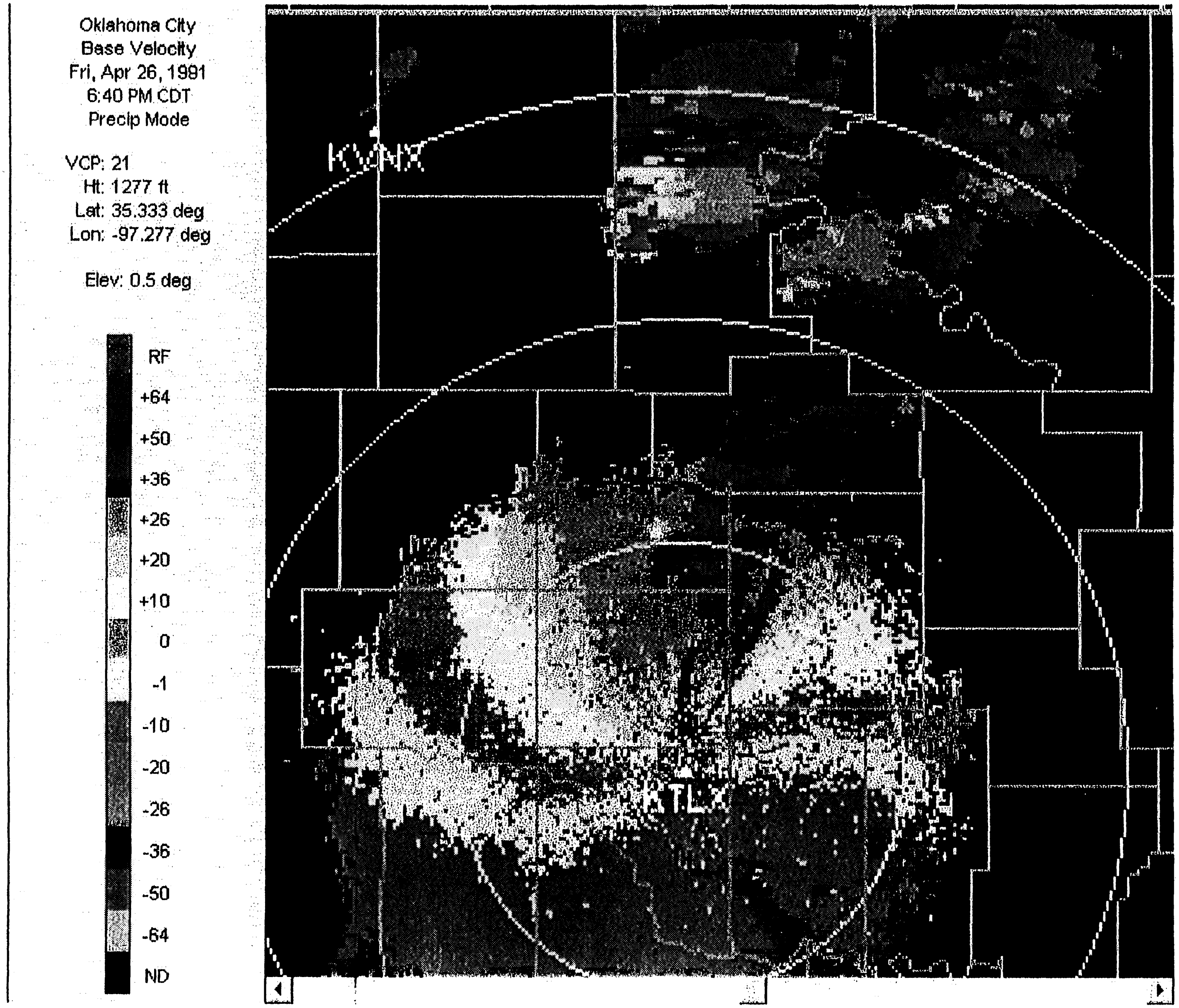

BASE
REFLECTIVITY
TLX 124 NM
+00.5 DEG
APR 2 21:06
CLEAR AIR MODE
VCP 32 VOL 79
ND
-28 DBZ
-24
-20
-16
-12
- 8
- 4
0
+ 4
+ 8
+12
+16
+20
+24
+28
NIDS TEST DATA

Figure 9d



Oklahoma City
Base Velocity
Fri, Apr 26, 1991
6:40 PM CDT
Precip Mode
VCP: 21
Ht: 1277 ft
Lat: 35.333 deg
Lon: -97.277 deg
Elev: 0.5 deg
RF
+64
+50
+36
+26
+20
+10
0
-1
-10
-20
-26
-36
-50
-64
ND
KVNX
KTLX

Figure 9e

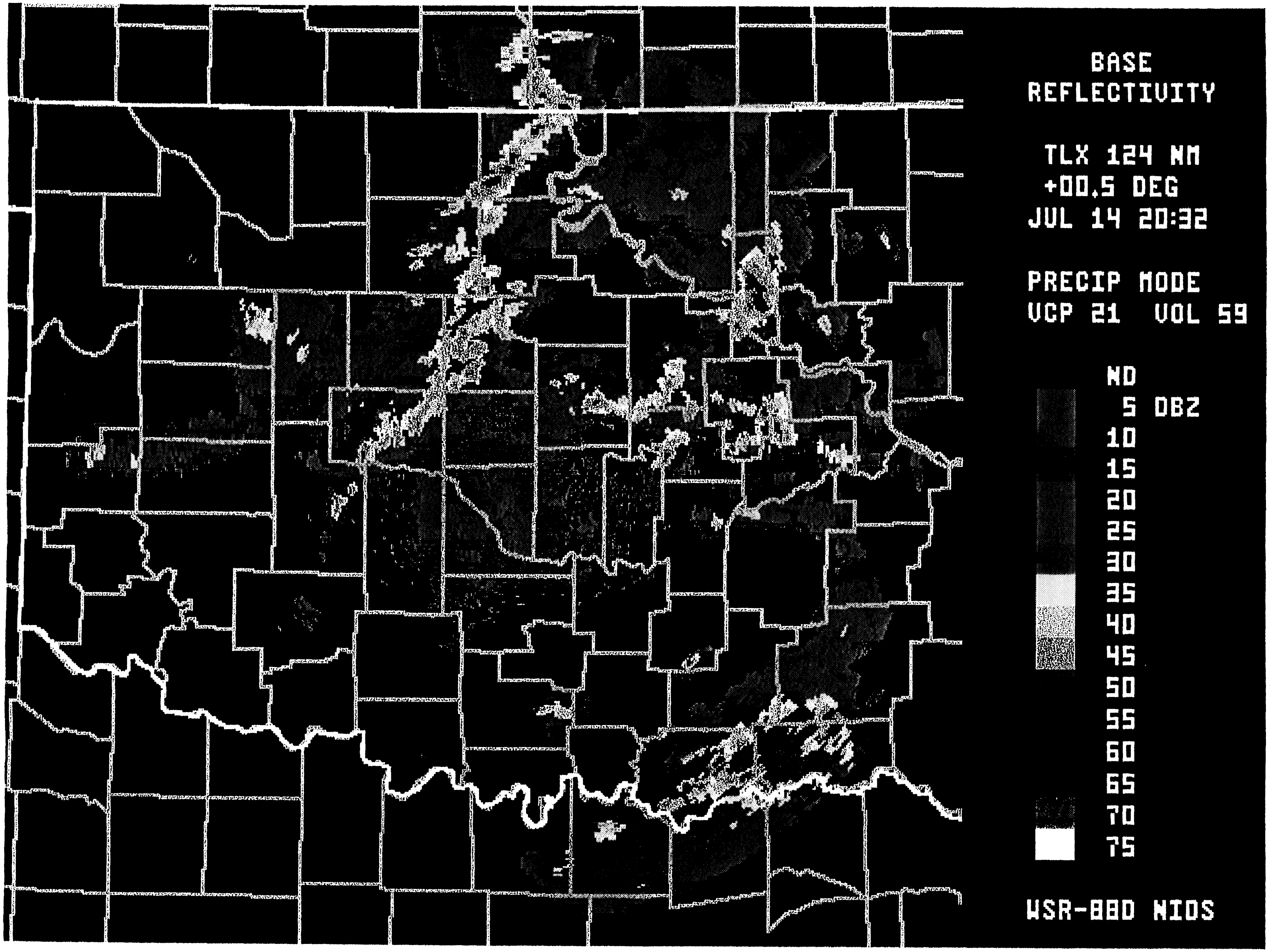

BASE
REFLECTIVITY
TLX 124 NM
+00.5 DEG
JUL 14 20:32
PRECIP MODE
VCP 21 VOL 59
ND
5 DBZ
10
15
20
25
30
35
40
45
50
55
60
65
70
75
WSR-88D NIDS

Figure 9f

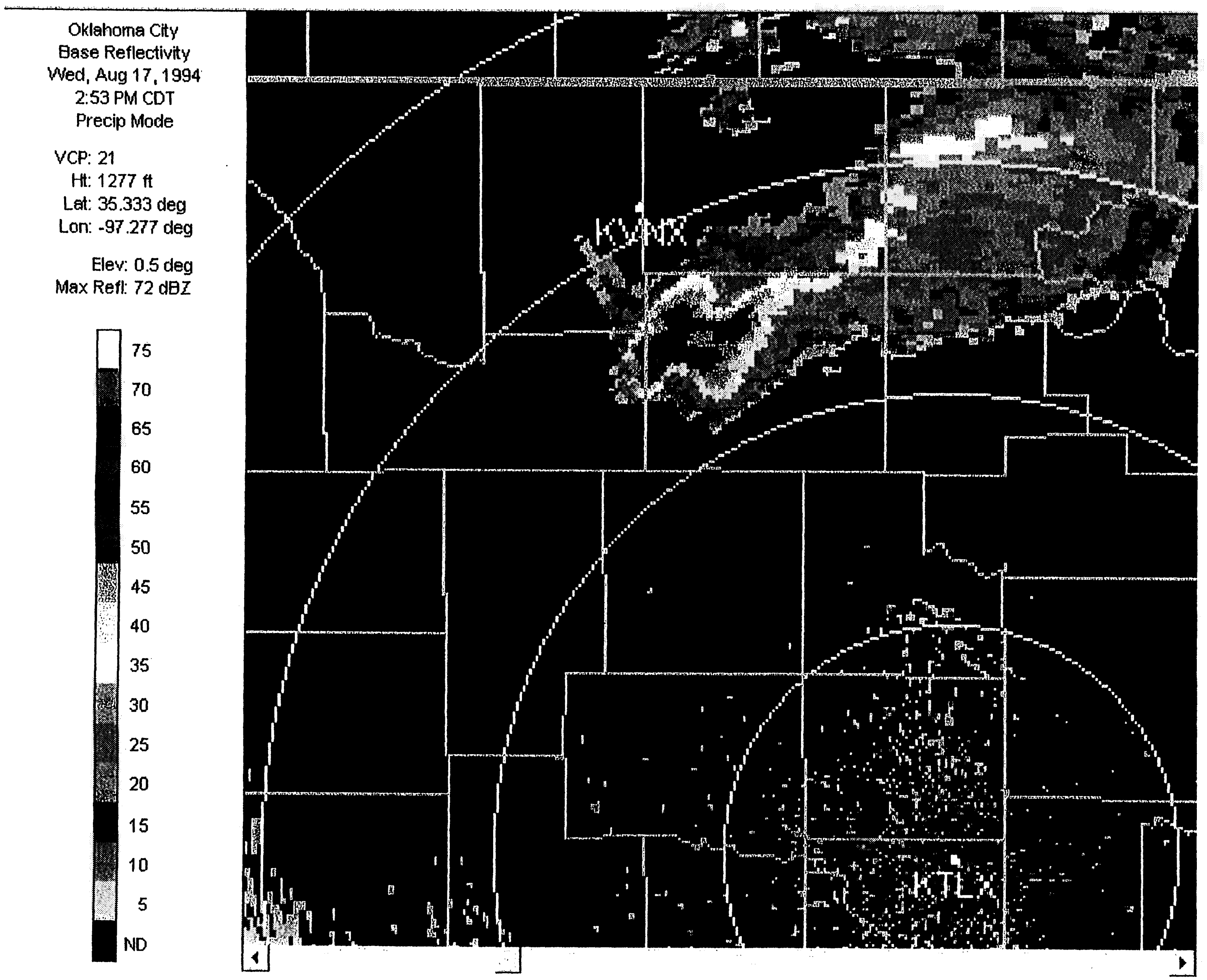

Oklahoma City
Base Reflectivity
Wed, Aug 17, 1994
2:53 PM CDT
Precip Mode
VCP: 21
Ht: 1277 ft
Lat: 35.333 deg
Lon: -97.277 deg
Elev: 0.5 deg
Max Refl: 72 dBZ
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
ND
KVNX
KTLX

Figure 10

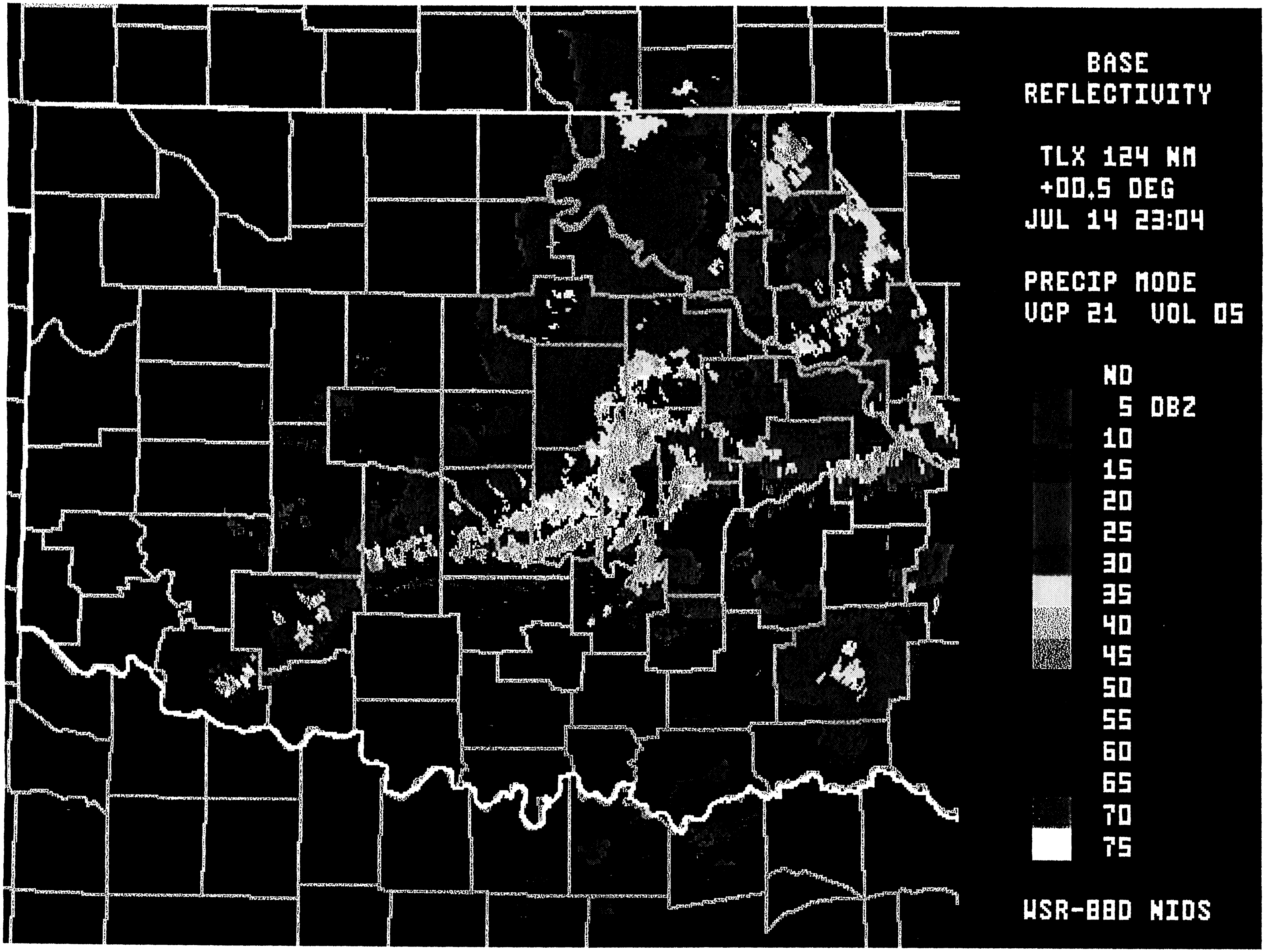
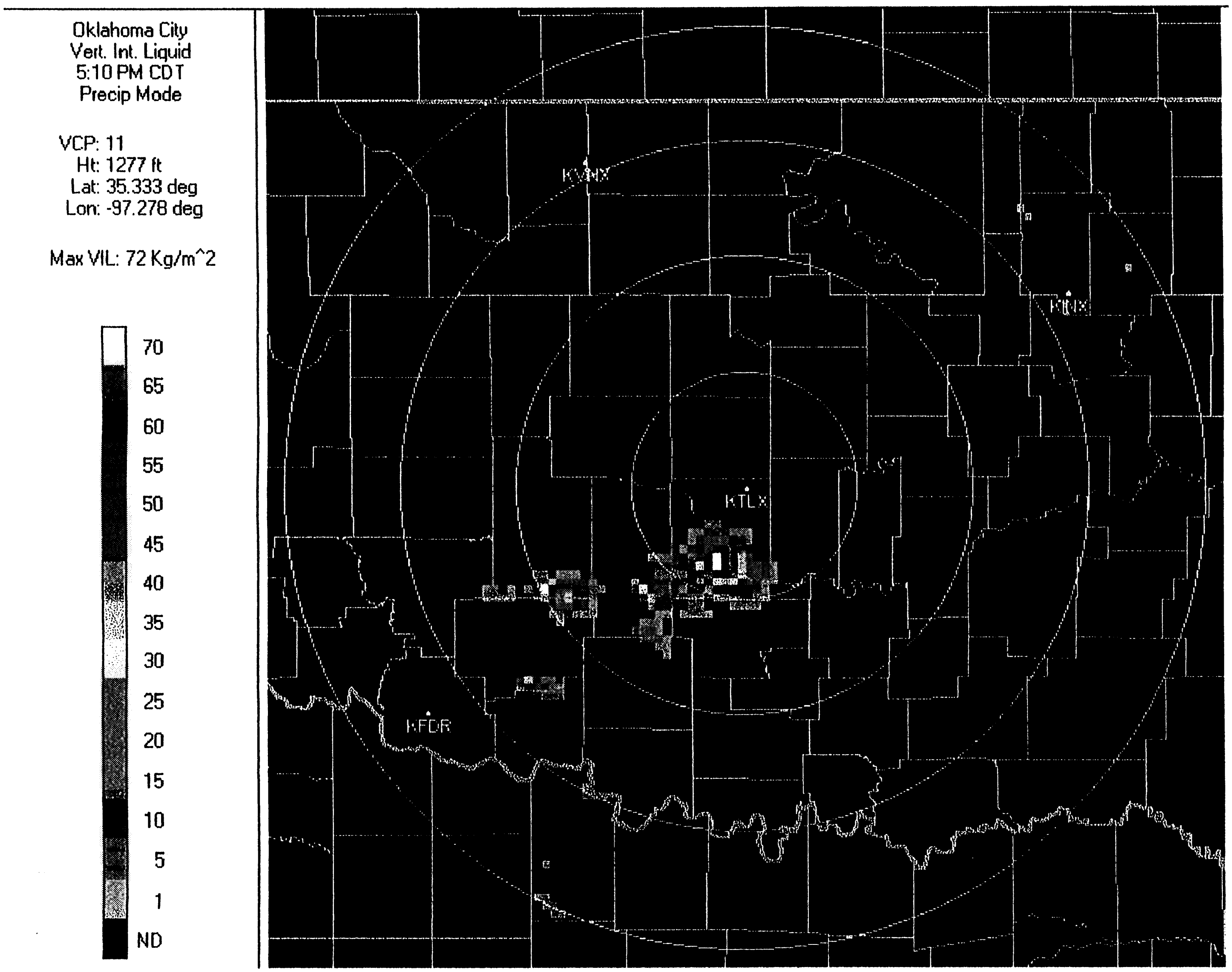

BASE
REFLECTIVITY
TLX 124 NM
+00.5 DEG
JUL 14 23:04
PRECIP MODE
VCP 21 VOL 05
ND
5 DBZ
10
15
20
25
30
35
40
45
50
55
60
65
70
75
WSR-88D NIDS

Figure 15a



Oklahoma City
Vert. Int. Liquid
5:10 PM CDT
Precip Mode
VCP: 11
Ht: 1277 ft
Lat: 35.333 deg
Lon: -97.278 deg
Max VIL: 72 Kg/m^2
70
65
60
55
50
45
40
35
30
25
20
15
10
5
1
ND
KVNX
KTLX
KFDR

Figure 15b

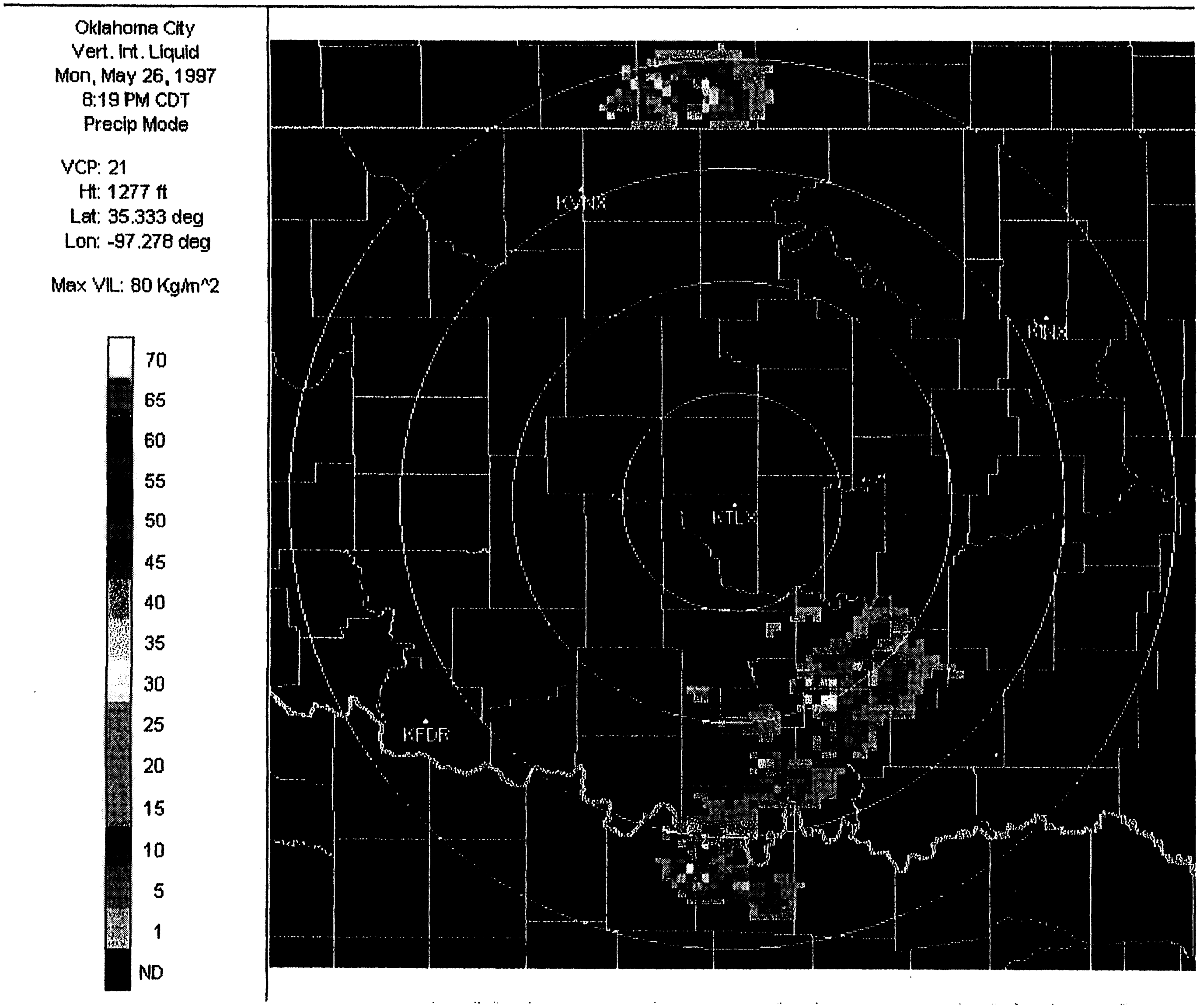

Oklahoma City
Vert. Int. Liquid
Mon, May 26, 1997
8:19 PM CDT
Precip Mode
VCP: 21
Ht: 1277 ft
Lat: 35.333 deg
Lon: -97.278 deg
Max VIL: 80 Kg/m^2
70
65
60
55
50
45
40
35
30
25
20
15
10
5
1
ND
KVNX
KINX
KTLX
KFDR

Figure 16a

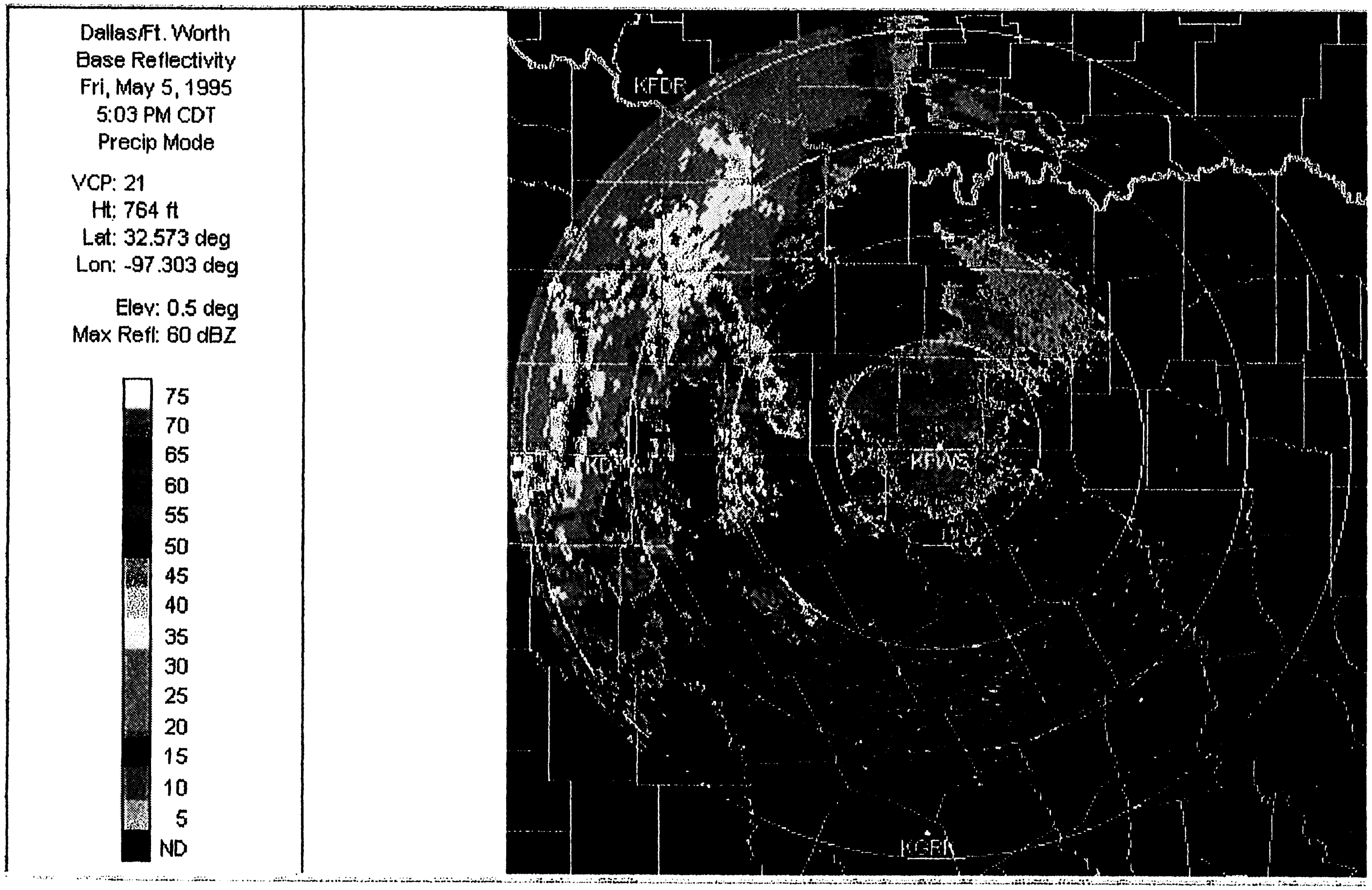
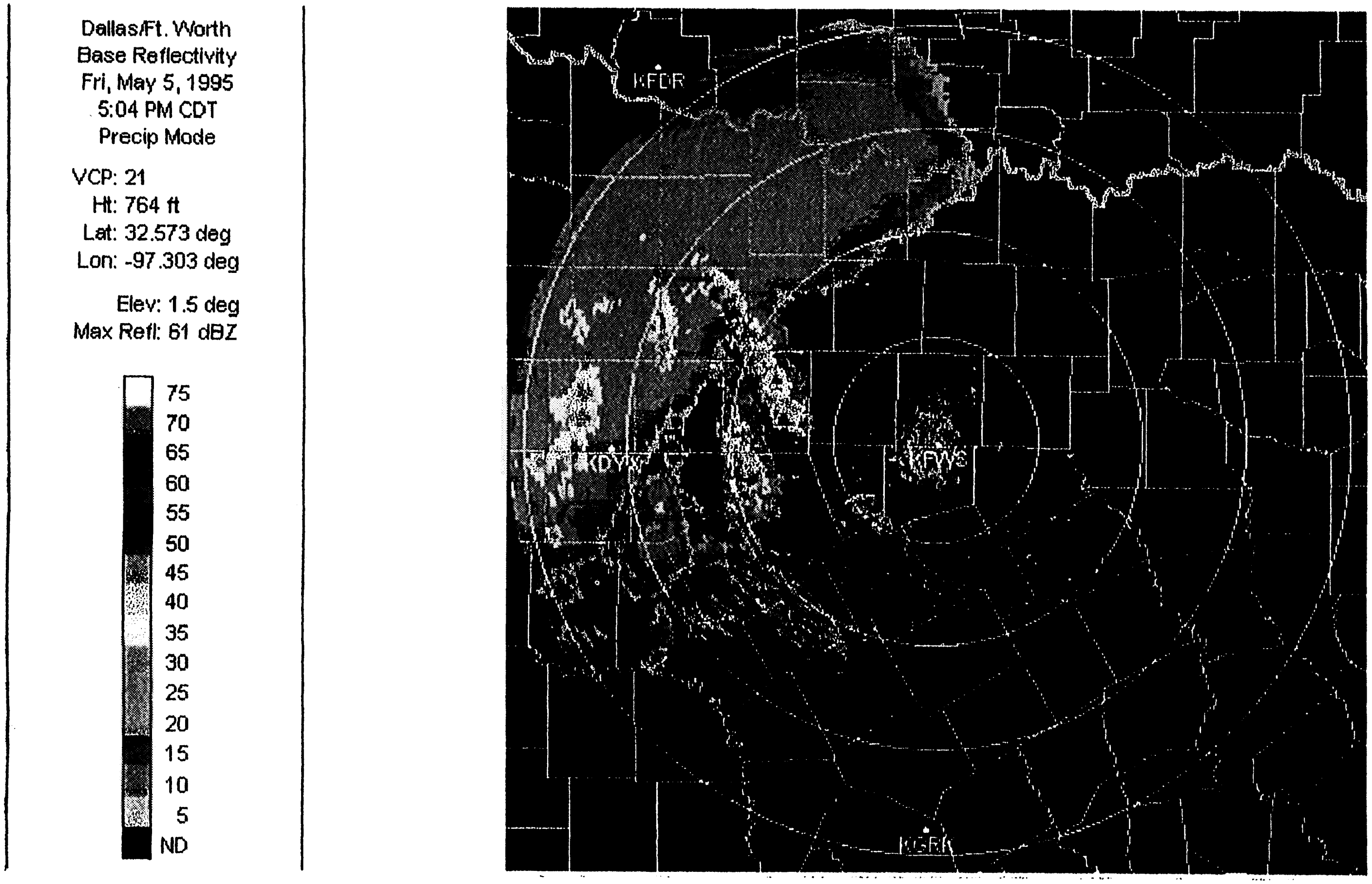

Dallas/Ft. Worth
Base Reflectivity
Fri, May 5, 1995
5:03 PM CDT
Precip Mode
VCP: 21
Ht: 764 ft
Lat: 32.573 deg
Lon: -97.303 deg
Elev: 0.5 deg
Max Refl: 60 dBZ
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
ND
KFDR
KFWS
KGRK

Figure 16b



Dallas/Ft. Worth
Base Reflectivity
Fri, May 5, 1995
5:04 PM CDT
Precip Mode
VCP: 21
Ht: 764 ft
Lat: 32.573 deg
Lon: -97.303 deg
Elev: 1.5 deg
Max Refl: 61 dBZ
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
ND
KFDR
KDYX
KFWS
KGRK

Figure 16c

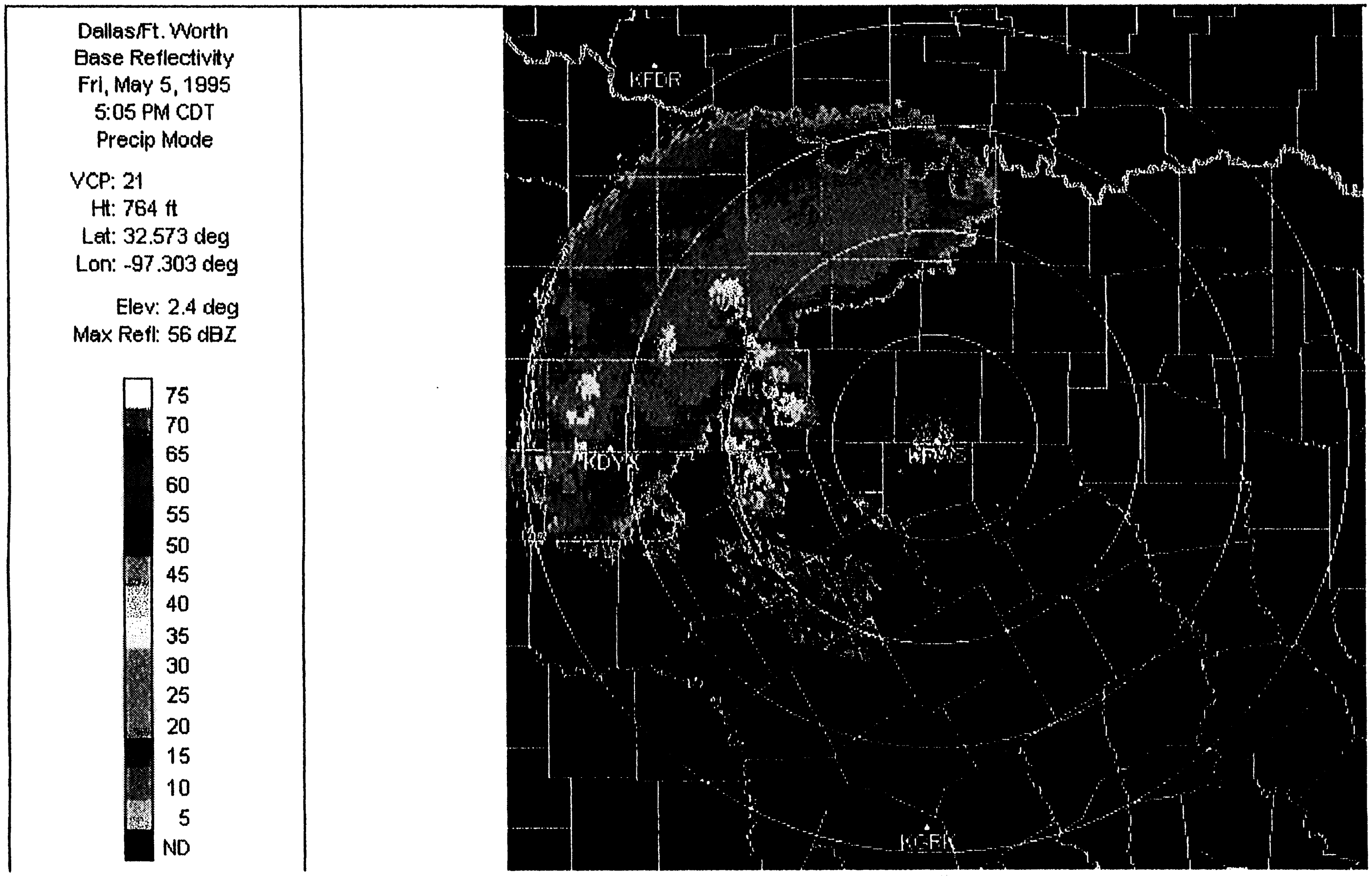

Dallas/Ft. Worth
Base Reflectivity
Fri, May 5, 1995
5:05 PM CDT
Precip Mode
VCP: 21
Ht: 764 ft
Lat: 32.573 deg
Lon: -97.303 deg
Elev: 2.4 deg
Max Refl: 56 dBZ
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
ND
KFDR
KDYX

Figure 16d

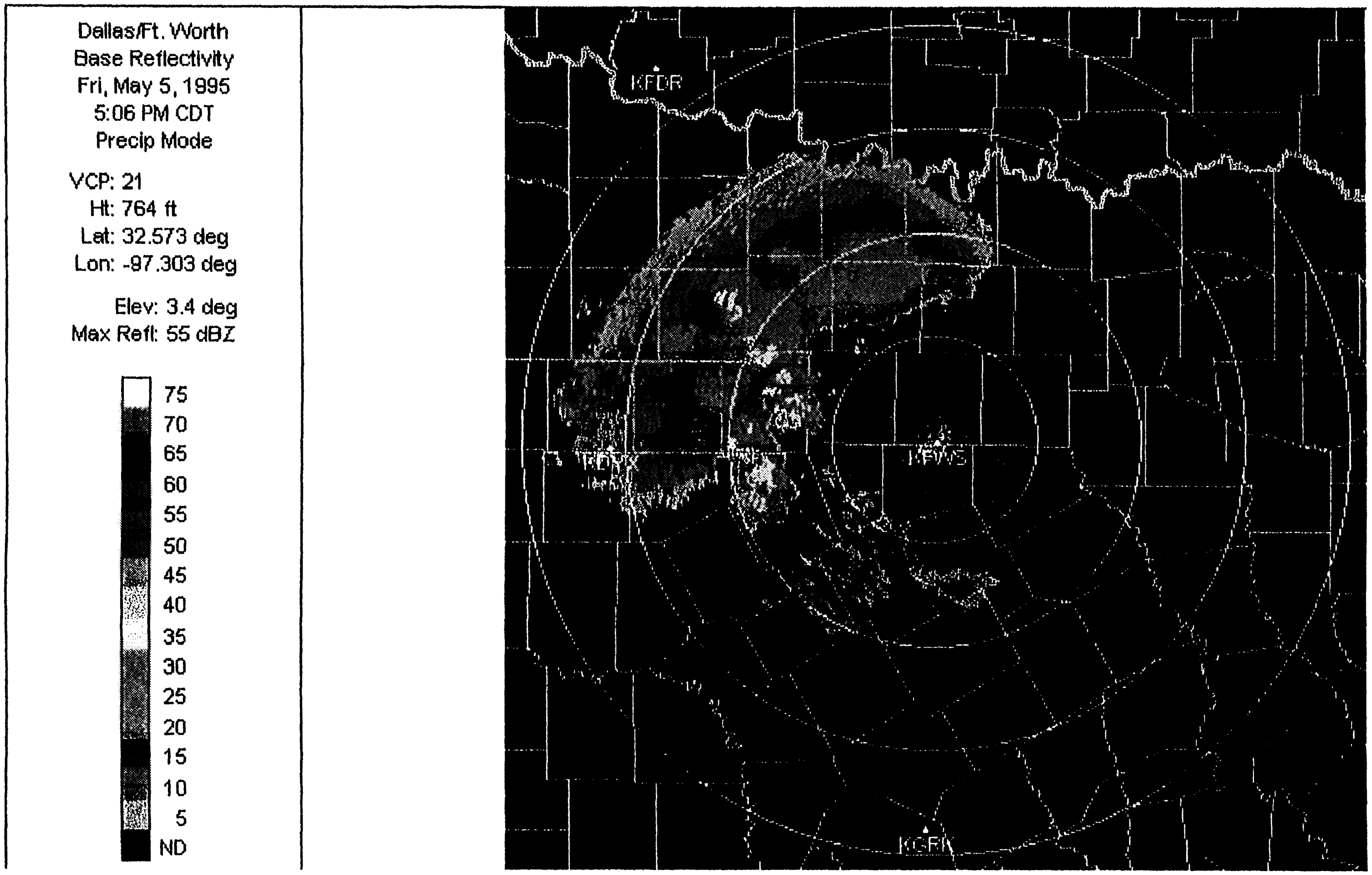

Dallas/Ft. Worth
Base Reflectivity
Fri, May 5, 1995
5:06 PM CDT
Precip Mode
VCP: 21
Ht: 764 ft
Lat: 32.573 deg
Lon: -97.303 deg
Elev: 3.4 deg
Max Refl: 55 dBZ
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
ND
KFDR
KFWS
KGRK

Figure 18a

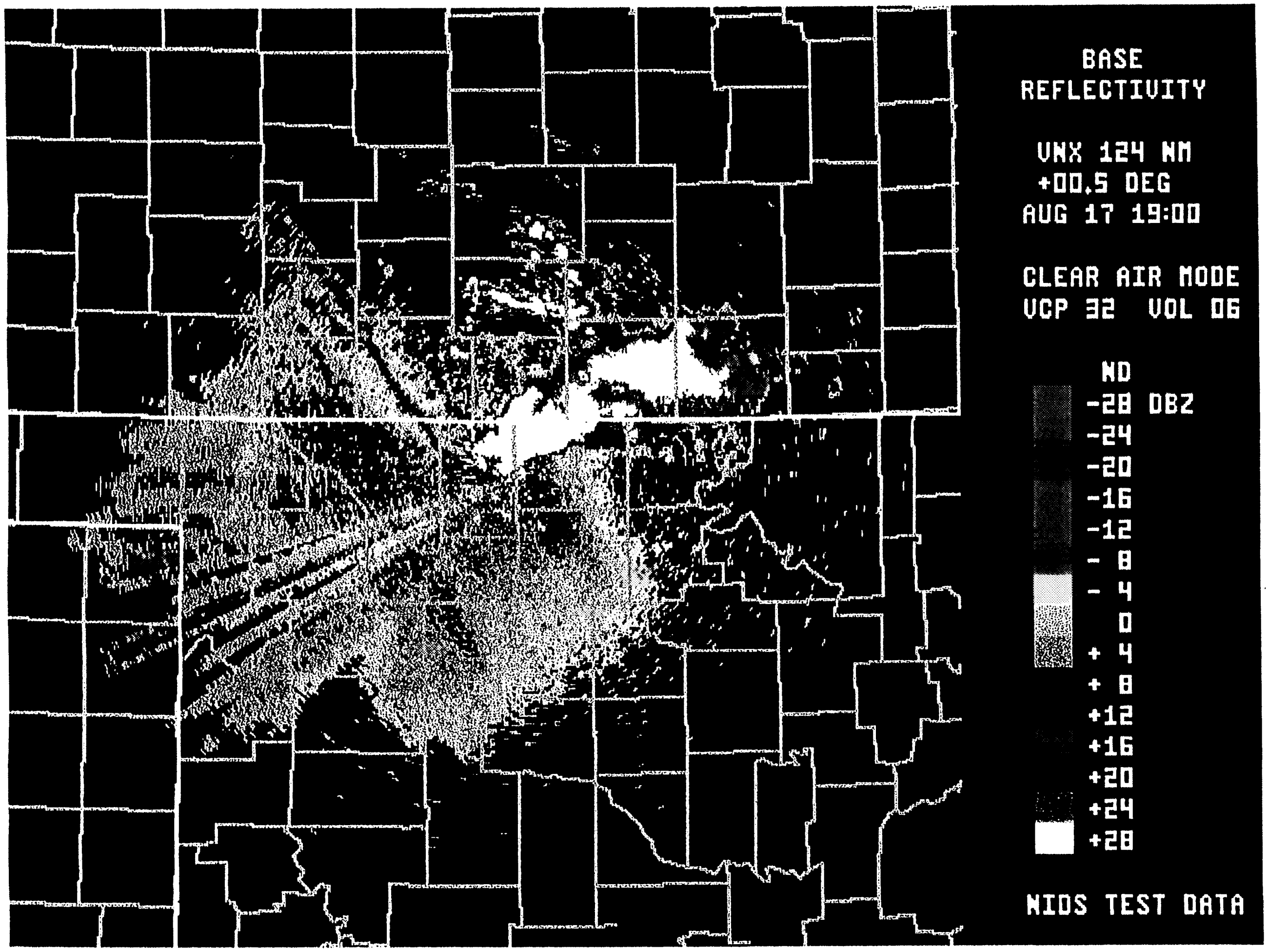

BASE
REFLECTIVITY
VNX 124 NM
+00.5 DEG
AUG 17 19:00
CLEAR AIR MODE
VCP 32 VOL 06
ND
-28 DBZ
-24
-20
-16
-12
- 8
- 4
0
+ 4
+ 8
+12
+16
+20
+24
+28
NIDS TEST DATA

Figure 18b

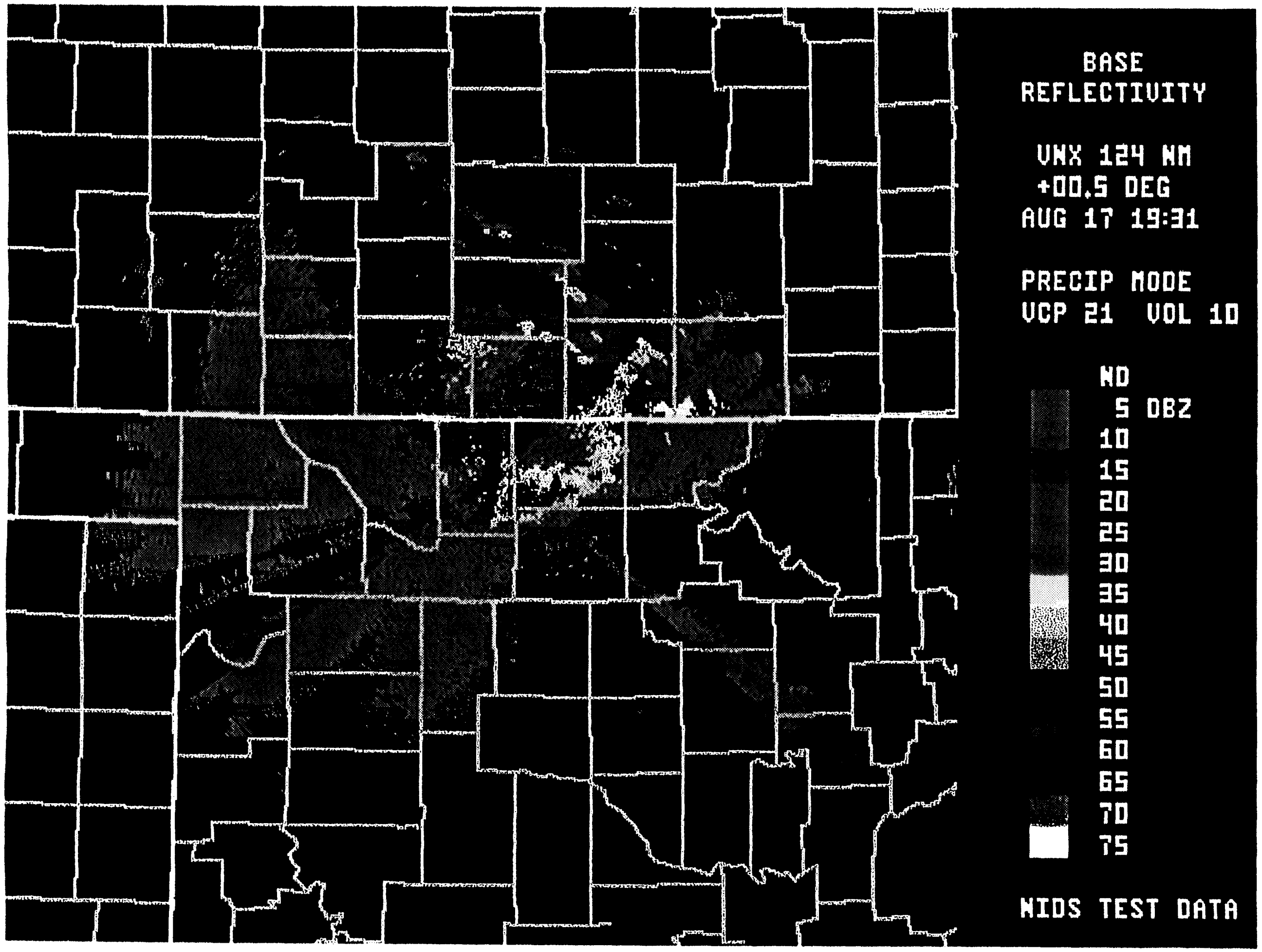
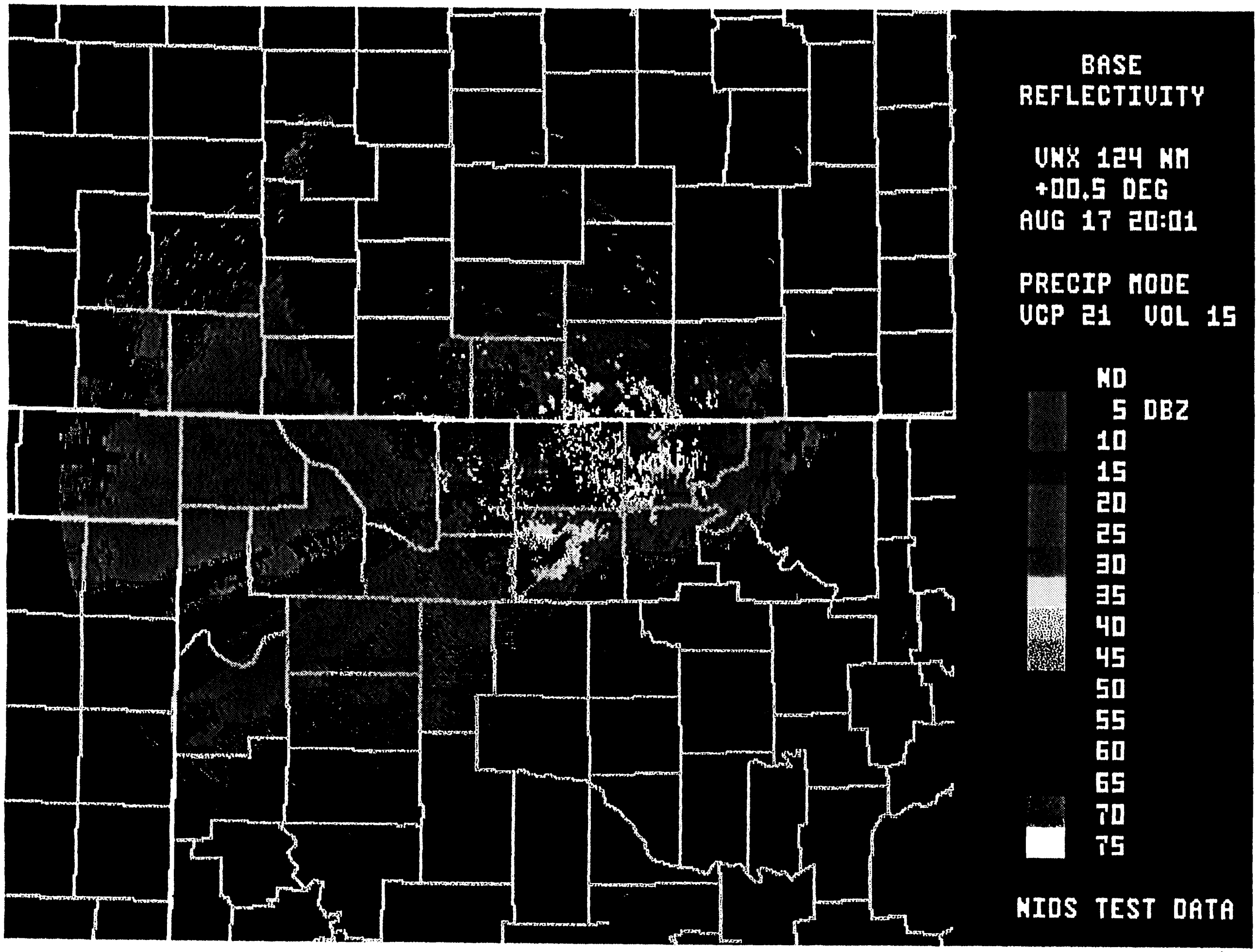
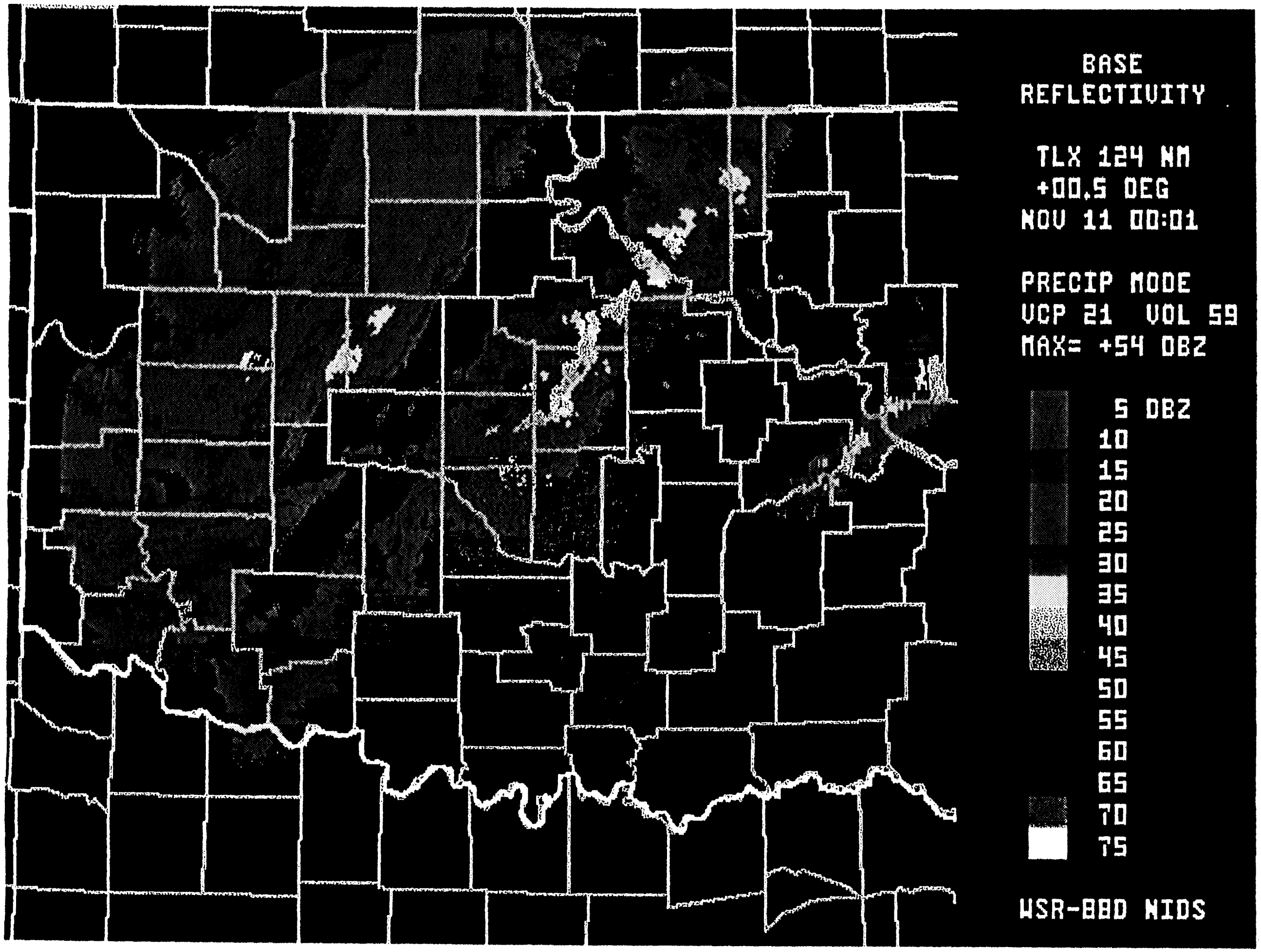

BASE
REFLECTIVITY
VNX 124 NM
+00.5 DEG
AUG 17 19:31
PRECIP MODE
VCP 21 VOL 10
ND
5 DBZ
10
15
20
25
30
35
40
45
50
55
60
65
70
75
NIDS TEST DATA

Figure 18c



BASE
REFLECTIVITY
VNX 124 NM
+00.5 DEG
AUG 17 20:01
PRECIP MODE
VCP 21 VOL 15
ND
5 DBZ
10
15
20
25
30
35
40
45
50
55
60
65
70
75
NIDS TEST DATA

Figure 24a


BASE
REFLECTIVITY
TLX 124 NM
+00.5 DEG
NOV 11 00:01
PRECIP MODE
VCP 21 VOL 59
MAX= +54 DBZ
5 DBZ
10
15
20
25
30
35
40
45
50
55
60
65
70
75
WSR-88D NIDS

Name______________________________

We would like to have some general information about your history in emergency management and your use of weather information in the past.

1. How long have you been in emergency management? ______________________________

2. What is your job (position, title) in emergency management? ________________________

3. In the past, how often did you use weather information to help you with your emergency management work?

____

4. What was the primary source of that weather information? ________________________

____

5. What other sources of weather information did you use? (Please list in approximate order of frequency.) ____

____

6. Thinking about the weather information you used in the past, what was the biggest shortcoming? ____

____

7. Is there a specific type of weather information that has not been easily available to you in the past that you think would be useful in helping you to perform your emergency management tasks?

____

____

Since you've had the computers and software for a little while now, we'd like to ask you a few questions about the computer training workshop.

1. Have you used your new computer (or the new software)? ______________________________

2. Specifically, what programs have you used?____

____

3. Have you used First Class to send messages? ____

to conference? ____

4. In general, what segment of the computer skills training workshop did you find most useful?

____

5. Which segment of the computer skills training workshop was least helpful to you?

____

Why? ____

____

6. When you got home, were there one or two things that you found yourself wishing you'd had more help on at the training workshop? ____

What were they? ____

____

One last general question. What do you most hope to gain through your participation in OK-FIRST? ____

____

____

First we'd like to ask you a few questions about the OK-FIRST web site.

1. In general, how would you rate the ease of navigation of the web site?

   ❑ Very easy ❑ Somewhat easy ❑ Somewhat difficult ❑ Very difficult

2. How satisfied are you with the content of the web site?

   ❑ Very satisfied ❑ Somewhat satisfied ❑ Somewhat dissatisfied ❑ Very dissatisfied

3. Is the information you need available through the site?

   ❑ Yes ❑ No

   If no, please specify what that information is. ______________________________

4. How useful do you find each of the following components of the web site?

If you haven't used a component, mark NA (not applicable).	NA	Very useful	Somewhat useful	Not very useful	Not at all useful
NIDS data	❑	❑	❑	❑	❑
Mesonet data	❑	❑	❑	❑	❑
Fire danger products	❑	❑	❑	❑	❑
Hydrological products	❑	❑	❑	❑	❑
Training materials	❑	❑	❑	❑	❑
Links to NWS forecasts	❑	❑	❑	❑	❑
Other project information	❑	❑	❑	❑	❑

5. Of the components listed above that you have used, which one do you find:

   The most useful ______________________________

   The least useful ______________________________

6. How often do you use each of the following from the web site?

	Not yet needed	More than once each day	About once a day	Several days per week	Once a week	1-2 times a month	Only during storm events
NIDS data	❑	❑	❑	❑	❑	❑	❑
Mesonet data	❑	❑	❑	❑	❑	❑	❑
Fire danger products	❑	❑	❑	❑	❑	❑	❑
Hydrological products	❑	❑	❑	❑	❑	❑	❑
Training materials	❑	❑	❑	❑	❑	❑	❑
Links to NWS forecasts	❑	❑	❑	❑	❑	❑	❑
Other project information	❑	❑	❑	❑	❑	❑	❑

7. Of those parts of the OK-FIRST web site listed above which do you access:

Most frequently ______________________________

Least frequently ______________________________

8. Do you generally access the web site and leave it open for extended periods of time (such as leaving a radar image up) or do you open it, find specific information you need, and then close out?

❑ Generally for extended times ❑ Find information and close

9. Overall, how satisfied are you with the OK-FIRST web site?

❑ Very satisfied ❑ Somewhat satisfied ❑ Somewhat dissatisfied ❑ Very dissatisfied

Next we'd like to ask you about First Class, the bulletin board system.

10. How often do you use First Class for each of the following purposes?

	Not yet needed	More than once each day	About once a day	Several days per week	Once a week	1-2 times a month	Only during storm events
To post messages	❑	❑	❑	❑	❑	❑	❑
To look for responses to specific messages you posted	❑	❑	❑	❑	❑	❑	❑
To browse the messages and responses posted by others	❑	❑	❑	❑	❑	❑	❑

11. How useful is the information you find posted on First Class to your work?

❑ NA ❑ Very useful ❑ Somewhat useful ❑ Not very useful ❑ Not at all useful

12. If the bulletin board system were integrated into the web page, do you think you would use the bulletin board more often, about the same, or less often?

❑ More often ❑ About the same ❑ Less often

Thinking now about requests you may have made to OK-FIRST staff for assistance...

13. If you have had an occasion to ask for assistance:

If you have never asked for assistance, please skip to question 14.

	Very satisfied	Somewhat satisfied	Somewhat dissatisfied	Very dissatisfied
How satisfied were you with the timeliness of the response?	❑	❑	❑	❑
How satisfied were you with the content or usefulness of the response?	❑	❑	❑	❑

Now that you have been out in the field working with the tools of OK-FIRST for some time now, we'd like you to reflect on the training you've received.

Throughout this section, if there is an event listed that you have not had experienced since your participation in OK-FIRST, please mark NA (not applicable).

14. How much has the initial training course and information helped you in dealing with:

	NA	A great deal	Somewhat	Not very much	Not at all
Flood situations	❑	❑	❑	❑	❑
Fire	❑	❑	❑	❑	❑
Severe weather	❑	❑	❑	❑	❑
Winter weather	❑	❑	❑	❑	❑
Hazardous substance events	❑	❑	❑	❑	❑
Other non-emergency events or situations	❑	❑	❑	❑	❑

15. How much have the follow-up training sessions assisted you in dealing with:

If you have not attended any follow-ups, please skip to question 16.

	NA	A great deal	Somewhat	Not very much	Not at all
Flood situations	❑	❑	❑	❑	❑
Fire	❑	❑	❑	❑	❑
Severe weather	❑	❑	❑	❑	❑
Winter weather	❑	❑	❑	❑	❑
Hazardous substance events	❑	❑	❑	❑	❑
Other non-emergency events or situations	❑	❑	❑	❑	❑

16. How useful would you say the access to real time data is in helping you deal with:

	NA	Very useful	Somewhat useful	Not very useful	Not at all useful
Flood situations	❑	❑	❑	❑	❑
Fire	❑	❑	❑	❑	❑
Severe weather	❑	❑	❑	❑	❑
Winter weather	❑	❑	❑	❑	❑
Hazardous substance events	❑	❑	❑	❑	❑
Other non-emergency events or situations	❑	❑	❑	❑	❑

17. To what extent has participation in OK-FIRST made you more effective at making timely and appropriate decisions related to the following situations?

	NA	A great deal	Somewhat	Not very much	Not at all
Flood situations	❑	❑	❑	❑	❑
Fire	❑	❑	❑	❑	❑
Severe weather	❑	❑	❑	❑	❑
Winter weather	❑	❑	❑	❑	❑
Hazardous substance events	❑	❑	❑	❑	❑
Other non-emergency events or situations	❑	❑	❑	❑	❑

18. How important is access to data from multiple radar sites (as opposed to only one radar) to your ability to make timely and appropriate decisions?

❑ Very Important ❑ Somewhat Important ❑ Not very important ❑ Not at all important

19. How important is access to radar data beyond normal base reflectivity to your ability to make timely and appropriate decisions?

❑ Very Important ❑ Somewhat Important ❑ Not very important ❑ Not at all important

20. Has there been any situation where the OK-FIRST system was absolutely critical to the your decision; that is, a situation where if you had not had OK-FIRST, your decision would not have been as good or as timely or would not have been made at all? Briefly describe that situation and the positive results (or avoided negative results) that were achieved. (Please continue on the back if necessary.)

21. Are you willing to share more details about this or other incidences with the evaluation staff? If so, please write you name and phone number in the space provided below.

Thank you for your time and cooperation.