04-1225

Complete in accordance with instructions on reverse and forward copy:
TO: National Oceanic and Atmospheric Administration
Office of Oceanic and Atmospheric Research
1315 East-West Highway SSMC-3 Room 11554
Silver Spring, MD 20910

Form Approved: OMB No. 0648-0025 Expires 09/30/98

NOAA FORM 17-4 (4-81)

U. S. DEPARTMENT OF COMMERCE
NAT'L OCEANIC AND ATMOSPHERIC ADM.

INITIAL REPORT ON WEATHER MODIFICATION ACTIVITIES (P.L. 205, 92ND. CONGRESS)

1. PROJECT OR ACTIVITY DESIGNATION, IF ANY
District V Cloud Seeding Consortium

2. DATES OF PROJECT
a. DATE FIRST ACTUAL WEATHER MODIFICATION ACTIVITY IS TO BE UNDERTAKEN: 10-01-2003
b. EXPECTED TERMINATION DATE OF WEATHER MODIFICATION ACTIVITIES: 4-01-2003

3. PURPOSE OF PROJECT OR ACTIVITY
Precipitation Augmentation

4.(a) SPONSOR

NAME		
Jerry Bush, County Commissioner		
AFFILIATION	PHONE NUMBER	
Oneida County	208-766-2216	
STREET ADDRESS		
County Courthouse		
CITY	STATE	ZIP CODE
Malad	ID	83252

4.(b) OPERATOR

NAME		
AFFILIATION		PHONE NUMBER
STREET ADDRESS		
CITY	STATE	ZIP CODE

5. TARGET AND CONTROL AREAS *(See Instructions)*

TARGET AREA		CONTROL AREA	
LOCATION	SIZE OF AREA	LOCATION	SIZE OF AREA
Southeastern Idaho	184,000 SQ. MI.		SQ. MI.

6. DESCRIPTION OF WEATHER MODIFICATION APPARATUS, MODIFICATION AGENTS AND THEIR DISPERSAL RATES, THE TECHNIQUES EMPLOYED, ETC. *(See Instructions)*

A. Ag I seeding agent (30 ground generators)
B. Rate of dispersal-capabilities for 10 - 3,000 grams per hour
C. Ground base, in cloud seeding
D. National Weather Service Climatological data

7. LOG BOOKS: Enter name, affiliation, address, and telephone number of responsible individual from whom log books or other records may be obtained.

NAME		
Lyla Dettmer, District Manager		
AFFILIATION	PHONE	
Franklin SWCD	208-852-0562 x101	
STREET ADDRESS		
98 East 800 North #3		
CITY	STATE	ZIP CODE
Preston	ID	83263

THIS REPORT IS REQUIRED BY PUBLIC LAW 92-205; 85 STAT 735; 15 U.S.C. 330b. KNOWING AND WILLFUL VIOLATION OF ANY RULE ADOPTED UNDER THE AUTHORITY OF SECTION 2 OF PUBLIC LAW 92-205 SHALL SUBJECT THE PERSON VIOLATING SUCH RULE TO A FINE OF NOT MORE THAN $10,000, UPON CONVICTION THEREOF.

8. SAFETY AND ENVIRONMENT

☐ YES ☒ NO Has an Environmental Impact Statement, Federal or State been filed? If yes, please furnish a copy as applicable. Not required

☒ YES ☐ NO Have provisions been made to acquire the latest forecasts, advisories, warnings, etc. of the National Weather Service, Forest Service, or others when issued prior to and during operations? If yes, please specify on a separate sheet.

☒ YES ☐ NO Have any safety procedures *(operational constraints, provisions for suspension of operations, monitoring methods, etc.)* and any environmental guidelines *(related to the possible effects of the operations)* been included in the operational plans? If yes, please furnish copies or a description of the specific procedures and guidelines. Training of operator provided

9. OPTIONAL REMARKS *(See Instructions. Use Separate Sheet.)*

NAME	CERTIFICATION:	
Jerry Bush	I certify that the above statements are true, complete and correct to the best of my knowledge and belief.	
AFFILIATION	SIGNATURE	
Oneida County	Jerry Bush	
STREET ADDRESS	OFFICIAL TITLE	
109 St. John Road	Chairman	
CITY / STATE / ZIP CODE	DATE	PHONE NUMBER
Malad / ID / 83252	10-30-2003	208-766-2216

NOAA FORM 17-4

INSTRUCTIONS FOR INITIAL REPORT ON WEATHER MODIFICATION ACTIVITIES

One completed copy of this form is to be received 10 days* or more prior to actual modification activities. A NOAA file number will be assigned by the Administrator after receipt of the initial report for each project or activity.

A supplemental report in a letter form referring to the appropriate NOAA file number must be made to the Administrator if the "Initial Report" is found to contain any material inaccuracies, misstatements, and omissions, or if there are changes in plans for the project or activity.

*For exceptions, see Sections 908.4(b) and (c), Part 908 of Title 15, Code of Federal Regulations.

Item 1. Enter designation, if any, used by operator for the project or activity.

Item 2. Enter: (a) Date first actual weather modification activity is to be undertaken;

(b) Date on which final weather modification activity is expected to occur.

Item 3. Enter the purpose of the project or activity: e.g., rainfall increase, hail suppression, cold fog dispersal, etc.

Item 4. Enter: (a) Name, phone number, affiliation, and address of the primary person for whom the project is to be performed (sponsor).

(b) Name, phone number, affiliation, and address of the person primarily responsible for carrying out the project (operator).

Item 5. A map should be attached showing size and location of target area, control area, coded number and location of each item of ground-based weather modification apparatus and coded number and location of key raingages, radars, or other precipitation measuring devices. Also show location of airport for airborne operations.

Item 6. Describe the weather modification apparatus, modification agents, and the techniques to be used. This would include type of ground or airborne apparatus to be used, type of modification material to be dispensed, rate of dispensing material in grams per hour or other appropriate units, type of precipitation gages to be used in target and control areas, and any other pertinent information such as type of radars, type of aircraft to be used, techniques to be employed, (e.g., cloud base seeding at 10,000 feet msl).

Item 7. List name, phone number, affiliation, and address of the responsible individual from whom log books or other records may be obtained.

Item 8. Provide applicable answers to questions as indicated.

Item 9. This item is to permit the reporting person to include any information not covered by items 1 through 8 but which he feels is significant or of interest. It is also to be used to include any information not covered elsewhere that the Administrator may request.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH
Office of Weather and Air Quality
1315 East-West Highway
Silver Spring, MD 20910

November 19, 2003

Mr. Jerry Bush
Oneida County
109 St. John Road
Malad, ID 83252

Dear Mr. Bush:

Thank you for your Initial Report of weather modification activities for the District V Cloud Seeding Consortium. This Project was assigned NOAA File Number 04-1225.

As a reminder, please submit a Final Report within 45 days after the project has terminated. This is mandated under Public Law 92-205.

Sincerely,

Karen King

Ms. Karen King, Manager
Weather Modification Activities
Reporting Program

Enclosures: Updated forms.

North Plains Groundwater Conservation District
PROJECT OPERATIONS PLAN
July 2003

I. Type of Weather Modification Activity

The North Plains Weather Modification (NPWM) program is a non-randomized operational program for the purpose of increasing rainfall. All potential cases satisfying established criteria will be seeded within the limitations of personnel and equipment and in accordance with decisions of the project meteorologist and the project manager.

Cloud candidates for seeding are chosen by a trained meteorologist and pilots. The project meteorologist and project pilots are furnished copies of the Texas license and permit guidelines and will seed in accordance with those guidelines.

The NPWM program has a permit to operate from 00.01 a.m. Central Daylight Time April 1, 2000 until 11:59 p.m. Central Daylight Time March 31, 2004. Operations are conducted on a 7-day per week, 24-hour per day period. The NPWM program operates mainly during the months of April through October of each year. Depending on the availability of personnel and equipment, seeding operations may be performed during the months of November through March.

Cloud treatment with aircraft is at altitudes between cloud base and -10° C (about 20,000 feet MSL). Cloud penetrations at altitudes up to 25,000 feet may be required, subject to safety considerations.

Weather forecasts are prepared by the project meteorologist located in the field office. Data from the National Weather Service is utilized in addition to data obtained from an on-site radar unit.

II. Equipment and Personnel

a. Currently one aircraft is used in the program. The aircraft is equipped with a 102-position flare rack which carries 20 mm, 20-gram AgI ejectable flares. For base-seeding the aircraft is equipped to carry both wing tip acetone burners and burn-in-place flares. The acetone burners disperse a 2-percent solution of silver iodide(AgI). The burn-in-place (BIP) flare racks carry 24 40-gram BIP flares per wing for a total of 48 BIPs or equivalent equipment. The aircraft is operated by one pilot who is normally accompanied by a co-pilot or other trained weather modification personnel.

The fully equipped and manned aircraft is configured for the following performance:
(1) Endurance: 4 hours at cruise speed.
(2) Cruise: 150 knots TAS at 8,000 feet MSL.
(3) Climb to 18,000 feet MSL within 30 minutes after takeoff.
(4) An airframe stressed to accommodate stresses encountered while seeding clouds.

A two-way radio is used for communication between the pilot and the meteorologist.

The project radar with the following specifications is used:
(1) Primary power 115 volts, 60 cps, single phase.
(2) Transmitter:
Wave length C-band (5.5 Centimeters)
Pulse duration between 1 and 5 microseconds.
(3) Receiver: Minimum detectable signal - 104 dBm
(4) Antenna:
Antenna pattern - pencil beam, 2.1 max. beam width
Azimuth and elevation controls - automatic and manual with and wheel control of servo mechanism.
(5) Display:
PPI size: 30 centimeters CRT.
PPI sweep: 100 nm on one scale, more than 150 nm on another.
PPI range rings: two range rings are present on each PPI display.
RHI size: 30 centimeter CRT
RHI sweep range: same capability as PPI.
RHI range marks: same capability as PPI.
A-scope: The oscilloscope is used.

Radar is used for weather surveillance, and for obtaining cloud echo-top and echo intensity data necessary for cloud treatment decision-making and for evaluating the program.

The system is equipped for record and play back Plan Position Indicator (PPI) or Constant Altitude Plan Position Indicator (CAPPI) at any selected elevation angle, recording at least one radial per degree of azimuth, with 0.5 km range bins.

The primary aircraft tracking system is a Global Positioning System (GPS)-based aircraft tracking system.

The GPS-based system gathers navigation data in the aircraft as well as seeding events and transmits the data to the ground receiver at the radar site. The received data is recorded and processed though the Thunderstorm Initiation, Tracking Analysis and Nowcasting (TITAN) software that is run on a desktop computer with a Linux operating system. The TITAN system will display and record the aircraft track on a custom designed overlay showing the target area and the participating counties and surrounding buffer zone and the cloud targets and characteristics. The overlay can be custom further designed to meet the needs of the NPWM program. The system has the ability to play back flight data and the tracks of the aircraft.

b. The seeding agent is a glaciogenic substance, silver iodide (AgI), dispersed from ejectable flares, dropped from a flare rack mounted on the underside of the aircraft's fuselage, or from burn-in-place flares, mounted in flare racks on the wings of the aircraft. The ejectable flares contain 20 grams of seeding material and burn for

approximately 50 seconds while dropping a projected 2,000 - 4,000 feet through the growing convective tower. The burn-in-place flare contains 40 grams of seeding material and burn nearly 2 minutes when ignited. BIPs are generally used for cloud base seeding. In addition, when weather conditions warrant, glaciogenic material may also be dispersed, at or near cloud base, using wing-mounted generators. The generators (burners) disperse as acetone silver-iodide solution, consisting of a 2-percent solution of silver iodide (AgI) dissolved in acetone, or a variation thereof.

In addition, burn-in-place flares containing hygroscopic material (likely chlorides) may be used to seed growing convective towers when such application is believed, by the project meteorologist, to contribute to the coalescence of cloud water into raindrops. The hygroscopic flare, consisting of 500 grams of various chlorides, burns over a period of several minutes as the aircraft flies at or near cloud base.

c. The meteorological data and analyses to be used to support the operations are critical to correctly identify developing clouds and storm systems having a high potential for producing precipitation. Consequently, a satellite weather-data acquisition system, a well-organized weather forecast method, a complete weather surveillance radar system, and well-trained dedicated personnel are deployed to maintain a 24-hour-per-day, 7-day-a-week operation.

Roles of technical and scientific people:
The project meteorologist will use all available data to compose weather forecasts, analyze clouds for seed-ability criteria, and launch aircraft on seeding missions as appropriate. The project meteorologist will issue orders to commence seeding, taking into account the pilot's observation of cloud conditions and seed on orders from the project manager.

The project manager will monitor rainfall and will coordinate with the Board of Directors of the North Plains Groundwater Conservation District (NPGCD) to issue "no seed" orders for areas of the target area where, in their judgment, additional rainfall would be harmful to agricultural operations.

The project manager, project meteorologist and members of the NPGCD Board will stay in close contact to determine when and where to conduct seeding operations to enhance rainfall.

III. Climate and Hazardous Weather

a. The climate of the target and operational areas of the NPWM program is semi-arid to arid with average annual rainfall varying from 12 on the west side of the operational area to 24 inches on the east side.

The target and operational areas are subject to occasional tornadoes, high winds, and sometimes severe large hail. These weather conditions, when present, pose a hazard for aircraft in the area. The meteorologist and pilots will be familiar with such

conditions. If the National Weather Service (NWS) issues a severe weather warning for a county or part of a county during a normal cloud seeding operation the meteorologist will inform the pilot of the warning and identify the area included in the warning. Cloud seeding operations will continue and clouds within the warned area may be seeded as routinely as other clouds in the general cloud population unless the warned storm is tornadic in nature. In addition the pilot and meteorologist will proceed with caution using pilot observation of the storm along with the analysis of radar information by the meteorologist.

IV. Methodology

Seeding may be done at cloud top or at cloud base, depending on the current cloud conditions. When the clouds are in their formative stages and relatively isolated, seeding should be done at cloud top by seeding in the vigorous updrafts that contain the supercooled water. When the cloud systems are better organized and larger in scale with strong broad updrafts at cloud base, seeding can be done effectively at cloud base by seeding in the updraft regions. In this case, one relies on the updrafts to carry the artificial ice nuclei to temperatures where they can be effective in nucleating the supercooled liquid water (SLW). Seeding aims to introduce artificial ice nuclei in concentrations of 10 to 100 nuclei per liter.

a. Project pilots are provided with aerial maps on which the target area and the operational area are clearly marked. They will be instructed to stay within these marked areas.

In addition:

- If the project pilot has evidence, visual or otherwise, that a cloud is producing hail, he will inform the project meteorologist of the condition and fly away from the area.

- If a cloud is moving into or forming within the area and threatens to produce tornadoes or dangerous straight-line winds, the project meteorologist will advise the project pilots of the fact and order them out of that area or to land the plane.

b. Clouds selected for seeding should have strong updrafts (>500 ft/min) that carry substantial quantities of supercooled liquid water (SLW) to temperatures (<-5C) where glaciogenic seeding is effective in freezing the SLW.

The freezing of the SLW sets in motion a chain of events, leading ultimately to producing rainfall in many cases. In clouds with a continental character, much of the SLW is in numerous small droplets in quantities of 1 g/m3 or higher. Such clouds freeze rather slowly naturally, giving a large time-window of opportunity for seeding. Because the cloud droplets are so small, however, the glaciation from seeding proceeds rather slowly in such clouds, giving a shorter window of opportunity for seeding. On the other hand, seeding of vigorous updrafts in maritime clouds can give a bigger response to seeding those continental clouds in instances when the SLW is frozen rapidly by seeding.

c. The application rate of seeding material and the concomitant concentration of the material within the cloud volume are critical to the success of the proposed program. For a growing cumulus convective cloud, a seeding rate of one 20 gram flare every 5 seconds is optimum for the proposed effort. If updrafts exceed 1800 ft/minute and the cloud is a part of a storm complex, which is particularly intense, the rate of application of seeding flares may be accelerated to one 20 g flare every 2-3 seconds. One seeding pass on an individual towering cumulus cloud will likely be adequate in most cases. If new cumulus clouds are developing, a cloud seeding pass will be repeated so that each new developing cloud tower is seeded as it passes through the -10C level. When clouds show signs of natural glaciation (fuzzy and wispy looking cloud filaments), seeding will be terminated. On the other hand if supercooled liquid water is seen to persist in the towering cumuli, repeated seeding passes will be warranted. For base seeding, one or two burn-in-place flares (40g) will often be used, depending upon the updraft velocity observed at cloud base. For an updraft stronger than 900 ft/minute, at least two flares per seeding run will be burned. The acetone burners will be used when extensive regions of weak updrafts are found at cloud base and in the shelf-cloud region to provide continuous AgI seeding at low concentrations (2.85 to 5.7 gm of AgI per minute). The goal of the seeding will be to increase the number of ice nuclei per liter of air in the supercooled region of the clouds. For a cloud temperature of -6C, the aim will be to produce as much as 10^{11} ice nuclei per gram silver iodide.

d. The seeding agent is dispersed from an aircraft flying either on or near cloud top or near cloud base. For "on top" seeding, repeated passes through, or just above, the top of the growing convective tower will be made to inject the burning AgI flares into the region of supercooled liquid water. The aircraft will typically be operating at an altitude range of 6,000 to 22,000 feet above mean sea level.

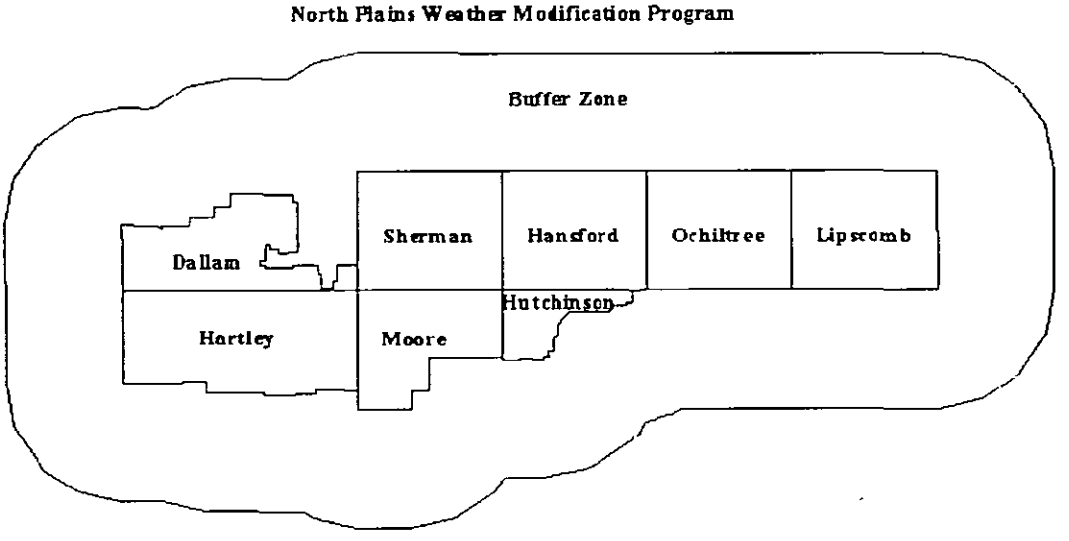
The seeding aircraft will make repeated passes through the updraft region, seeding the growing convective cloud near or some distance below cloud base. Smoke from the burning, wing-mounted flares will be carried by the updraft into the supercooled regions of the storm, where additional ice nuclei are needed to freeze the supercooled water. When seeding with hygroscopic flares, the smoke from the burning wing-mounted flares is carried into the core region of the cloud where the artificially-introduced condensation nuclei are needed for the growth of raindrops.

V. An elaborate, statistically valid and scientifically sound evaluation of the proposed program is not possible, given the lack of resources necessary to conduct such an assessment. A substantial outlay of funds would be required to provide the cloud-physical measurements needed to quantify precise cloud behavior resulting from seeding. The applicant will collect and analyze all available surface rainfall data, within and well beyond the target area, in order to ascertain how the climatology of the region has been impacted by the seeding operations.

2003 Quality Assurance Project Plan
North Plains Weather Modification Program
Operated by
North Plains Groundwater Conservation District

1. Identify the region within which rain-enhancement (cloud-seeding) activities are to be conducted. Include both a description of the "target" and "operational" areas.

The target area is the North Plains Groundwater Conservation District and will consist of all of the following counties, Sherman, Hansford, Ochiltree, Lipscomb and portions of Dallam, Hartley, Moore, and Hutchinson counties in Texas.



A buffer zone which extends for 30 nautical miles within Texas, 10 nautical miles in Oklahoma and 15 nautical miles in New Mexico is designated as the Operational area. In New Mexico only Union County is in the operational area. In Oklahoma portions of Cimarron, Texas, Beaver, Harper and Ellis Counties are within the buffer area. In Texas all or part of Dallam, Hartley, Moore, Hutchinson, Oldham, Potter, Carson, Roberts and Hemphill Counties are within the buffer area...

2. Identify the time (calendar dates) during which cloud-seeding flights are to be conducted. Estimate the percentage of flights (both seeding and reconnaissance) which will be nocturnal (sunset to sunrise).

The NPWM program has a permit to operate from 00.01 a.m. Central Daylight Time April 1, 2000 until 11:59 p.m. Central Daylight Time March 31, 2004. Operations are conducted on a 7-day per week, 24-hour per day period. The NPWM program operates mainly during the months of April through October of each year. Depending on the availability of personnel and equipment, seeding operations may be performed during the months of November through March. Ninety percent or more of the flights will be for daylight seeding operations. This season, April 1 through September 30, 2003 some nocturnal flights may be conducted however, they will be less than 10 percent of the total flights. We do not anticipate any flights strictly for reconnaissance.

3. Describe the kinds of seeding materials to be used during cloud-seeding missions.

- **a. Identify both pyrotechnic devices and acetone solutions.**
- **b. Describe any testing performed on pyrotechnics that attests to the contents of the devices as well as their nucleating abilities.**

3 a. The pyrotechnics and the acetone solutions are as supplied by the Texas Weather Modification Association. The seeding agent will be a pyrotechnic device dropped from a flare rack mounted on the bottom of the seeding aircraft. It will be an ejectable type flare containing 20 gms of seeding material and will burn for about 50 seconds while dropping a projected 2,000-4,000 feet through the growing convective tower. Additionally, the aircraft will be equipped with burn-in-place flares (BIPs), each containing 150 grams of seeding material. These BIP flares will burn for approximately 2 minutes. The aircraft is also equipped to carry wingtip generators which burn a 2-percent solution of silver iodide (AgI) dissolved in acetone. The generators (burners) and BIP are used at the cloud base when conditions warrant. The wingtip generators were removed prior to the 2001 project year and have not been re-installed. The ejectable flares, BIP flares and wingtip generators are all designed to produce glaciation of the super cooled water droplets found at temperatures of -6 to -10 degrees Celsius. Hygroscopic seeding materials used in burn in place flares producing hygroscopic nuclei are not planned for use this year in the North Plains Weather Modification Program.

3 b. The NPWM program uses flares manufactured by the Texas Weather Modification Association. The testing of the pyrotechnics is preformed by the Texas Weather Modification Association and the results are available through them if requested.

4. Give details on the type of weather surveillance radar to be used in routine monitoring of weather conditions.

Radar used for the North Plains Weather Modification Program is a WSR-74C purchased from Radtec Engineering, Broomfield, Co. It is installed on a 60 foot tower located at the Moore County Airport, Dumas Texas. Its primary power is 115 volts 60 cycles per

second drawing about 17 watts. The transmitter is operating at C-band frequencies (5.5 Centimeters) with a pulse duration of 1 to 5 microseconds. The peak power is 250 Kilowatts and the receiver has a minimum discernable signal of minus 104 dBm's. The antenna creates a beam width of 1.6 degrees with a full 360 degree sweep. The elevation is adjustable from minus ½ degree to a positive 45 degrees. The radar will be equipped with an RDAS (Radar Data Acquisition System) which will control the antenna rotation and elevation to allow the unit to make CAPPI (Constant Altitude Plan Position Indicator) observations. These CAPPI's will be fed into the TITAN (Thunderstorm Initiation, Tracking, and Nowcasting) unit developed by NCAR (National Center for Atmospheric Research) in Boulder Colorado. Additionally, the radar will be equipped with a standard console allowing for complete operations when TITAN is not available

The radar is calibrated every 30 days by an electronics technician during April through October and as needed during the rest of the year. The WSR-74C is operated at a range of 120 km whenever there are echoes present. During periods of no activity the radar is placed in a standby mode. Each day the radar is operated, a known target is checked to assure the accuracy of the range, elevation, and strength of the known target return.

A Thunderstorm Initiation, Tracking, Analysis and Nowcasting (TITAN) system is used to evaluate all echoes for the potential of rainfall enhancement. First echo tops will be recorded and a log will be kept for research to correlate the Index of Coalescence to the first echo top. Records of the TITAN data will be archived each month on CD's for later evaluation and research.

5. Describe how aircraft will be tracked during cloud-seeding missions.

Aircraft are tracked on a tracking system using equipment developed in South Africa coupled to a Garmin GPS unit operating at UHF frequencies and automatically entered on the TITAN equipment. A backup system of VHF/AM Air to Ground radio will be used and the aircraft directed on radials and distances from the Dumas radar.

6. Describe the methods to be employed to evaluate the efficacy of the cloud-seeding activities.

- **a. Identify any surface weather-observing equipment (such as rain gages) to be used in the assessment.**
- **b. What types of radar data will be examined to evaluate cloud response?**
- **c. Will satellite imagery be employed for prognostic work in support of cloud-seeding activities? If so, in what way(s)?**

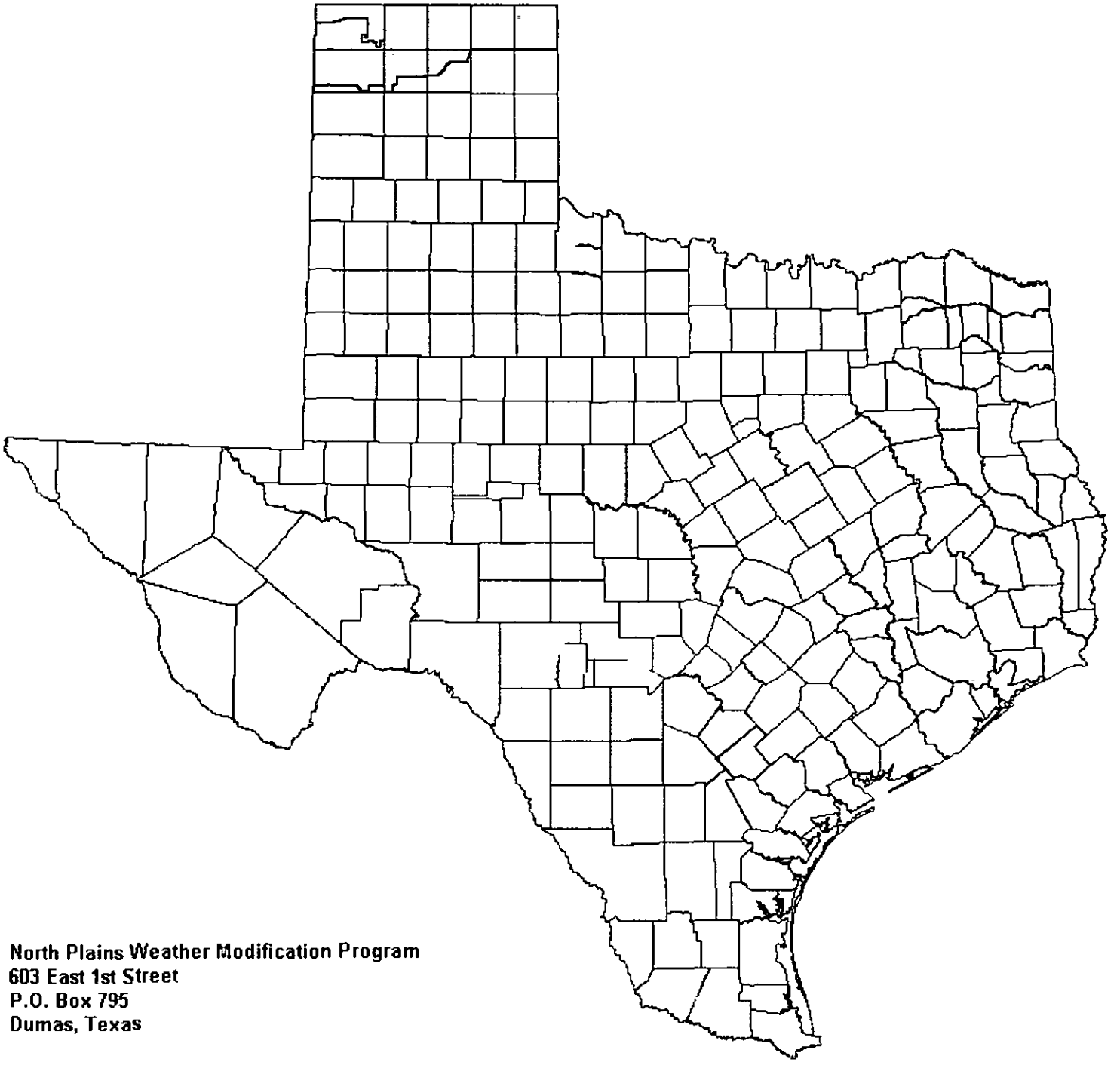
6 a. The National Weather Service maintains a cooperative observers network that has at least one station in each of our target counties. Having no control over the NWS system it is hard to verify data from this source. Additional rain gauges have been purchased and installed by the North Plains Groundwater Conservation District and placed where gaps were detected in the NWS system. In addition, a network of over 200 rain gauges has been established within the target area. Other rain gauge sites include the North Plains Potential Evapotranspiration network and volunteer NPWD observers.

Close monitoring of the network supervised by the project meteorologist at Dumas will insure quality data. A small target area within our large target area may created for monitoring of the effectiveness of seeding operations.

6 b. The stored CD's depicting the seeded events will be inspected at a time frame within one month of occurrence to ascertain the effects of seeding. As most of the North Plains Weather Modification Program will feature on-top cloud seeding special concern will be shown to the higher layers of clouds. A non-seeded cloud will be studied at the same time which displays similar characteristics to the seeded cloud for comparison. An assessment of seeding operations for the NPWM program is currently conducted in San Angelo, Texas by Active Influence and Scientific Management (AISM) and Woodley Weather Consultants (WWC). The evaluation uses the TITAN data from the NPWM project to evaluate the cloud activity, both seeded and unseeded clouds within the program. A report from AISM on the evaluation for the year 2002 was provided to NPWM program and is available upon request. At the current time the evaluation from WWC has not been published. The Amarillo NEXRAD is monitored using WeatherTap.com on the INTERNET to obtain VIL's of the seeded storms as well as other data that may be useful.

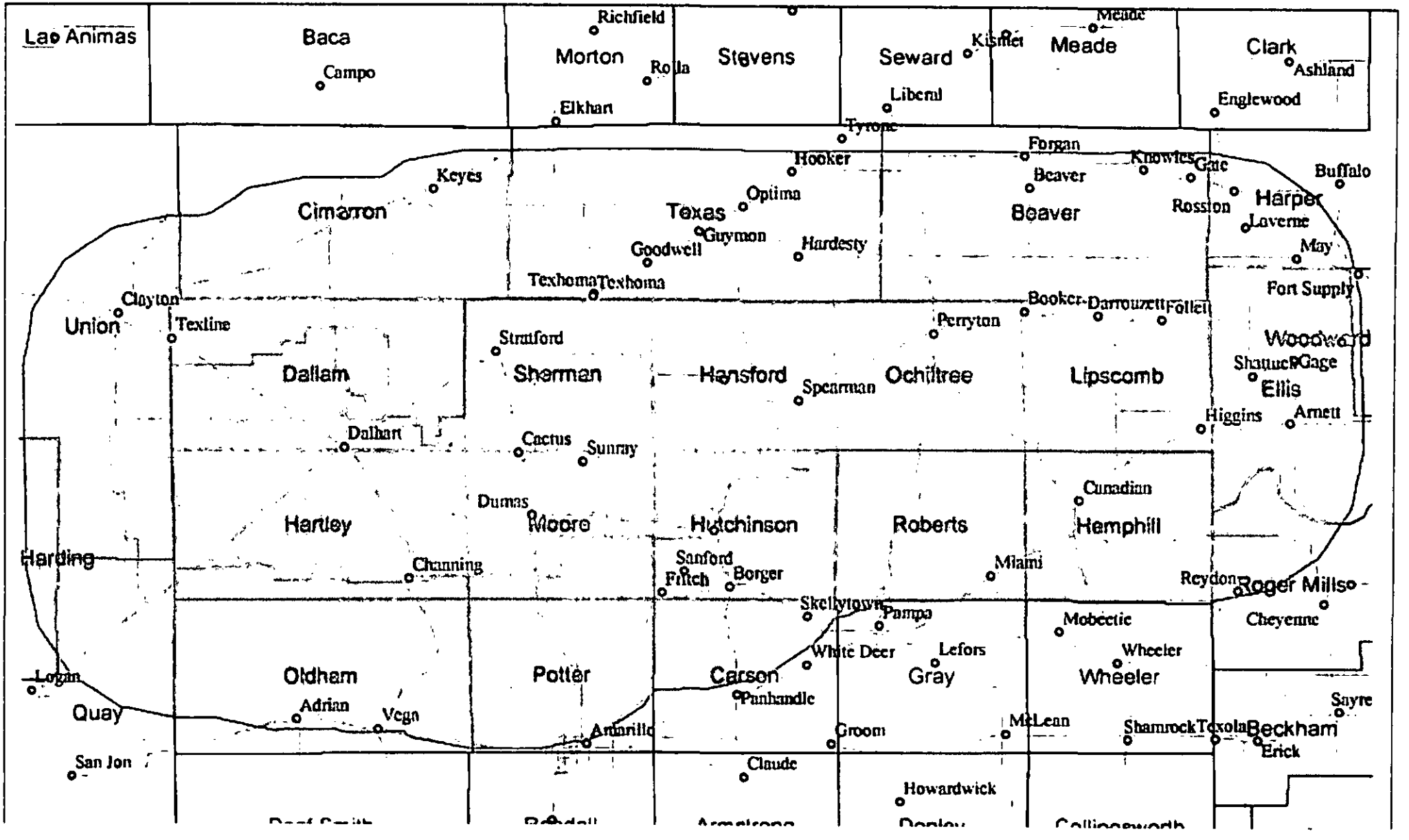
6 c. Satellite imagery will be utilized in the production of the daily forecast. A water vapor image will be inspected each day a forecast is issued. A visible 4km resolution of the Northern Texas Panhandle will be printed and included in the folder each time a seeding event occurs. WeatherTap.com on the INTERNET provides numerous satellite views which will be incorporated into near real-time operations of aircraft. Cloud top data will be studied but there is no provision to copy the numerous satellite pictures available from INTERNET sources.

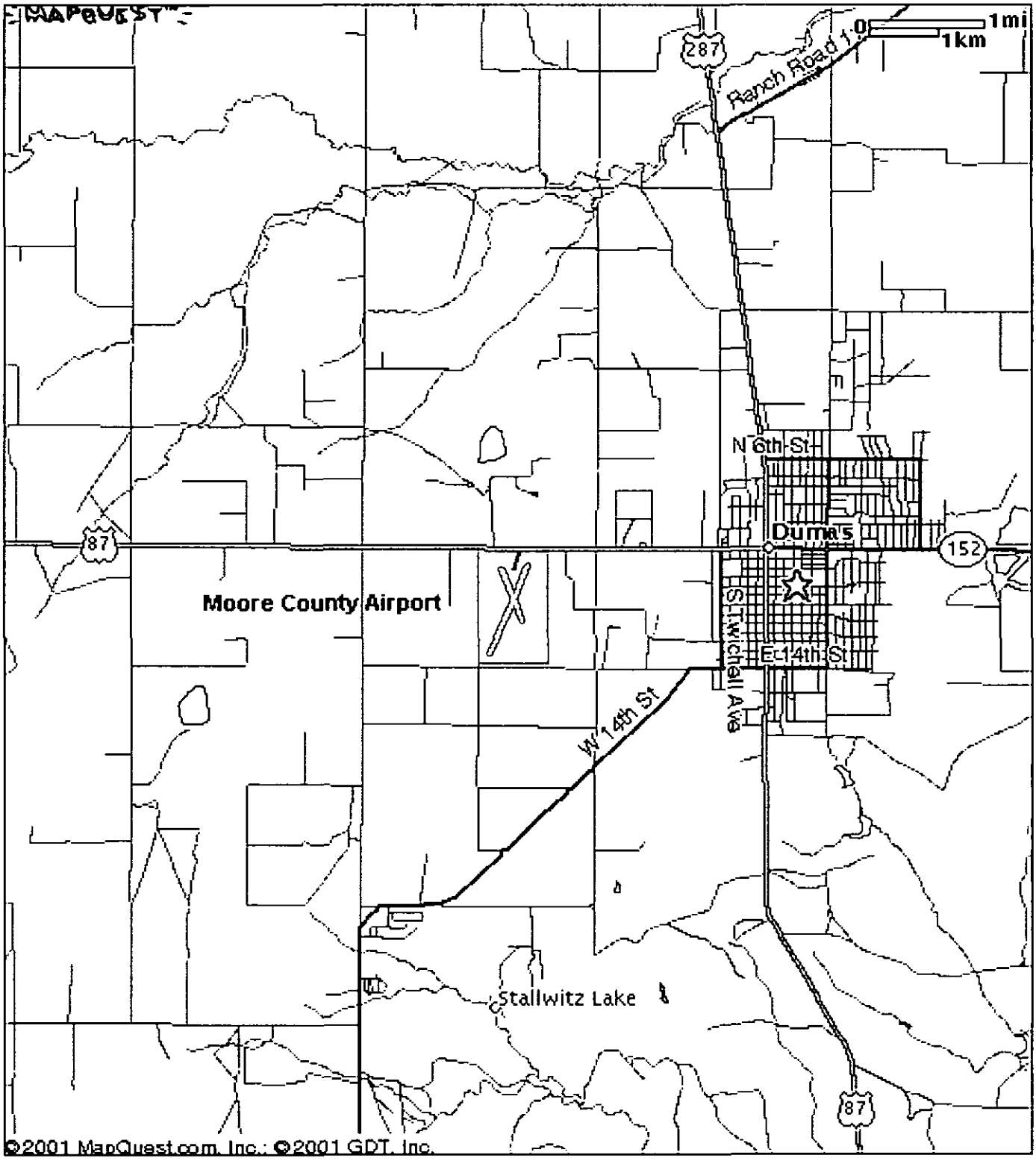
North Plains Weather Modification Program



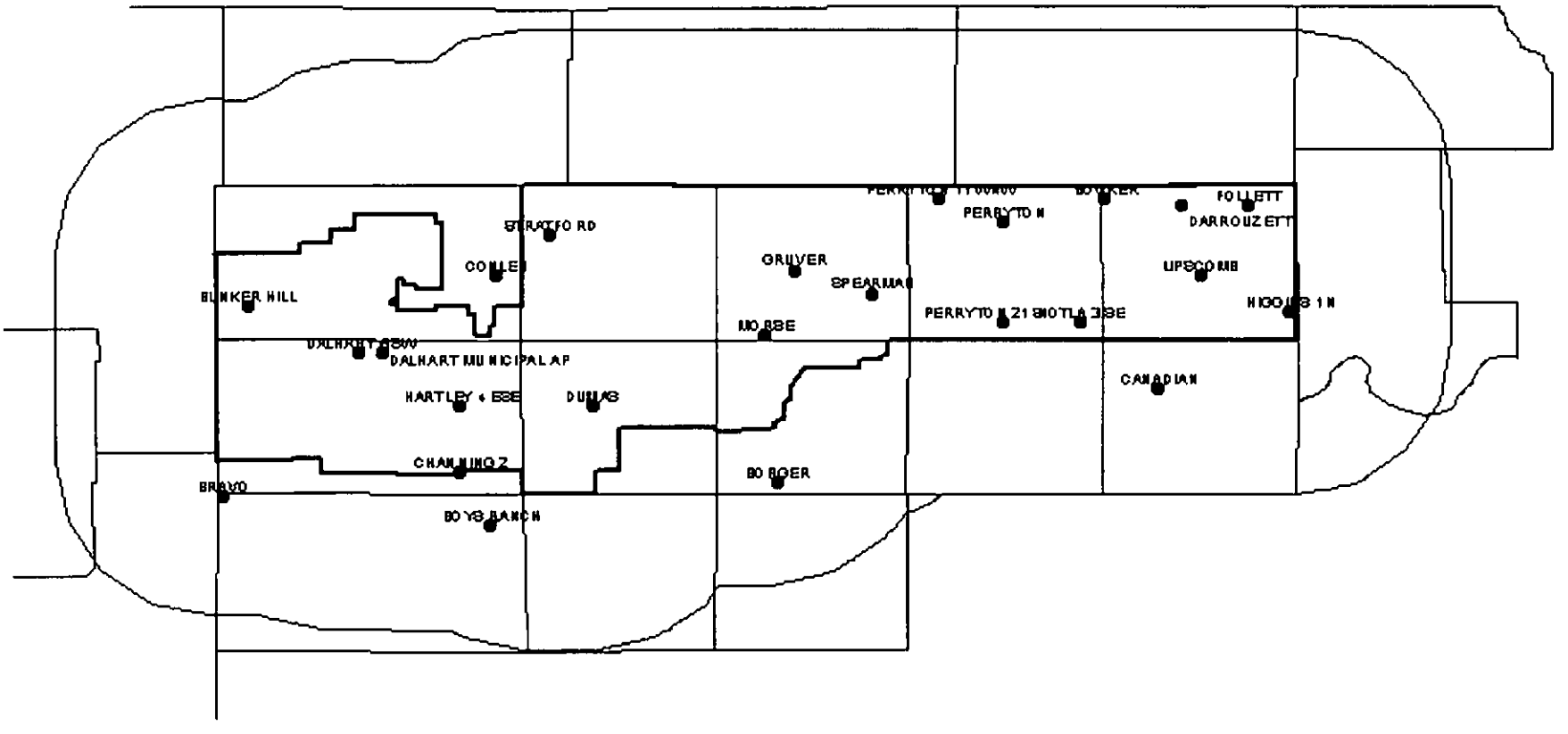
North Plains Weather Modification Program
603 East 1st Street
P.O. Box 795
Dumas, Texas

Operational Area for the North Plains Weather Modification Program

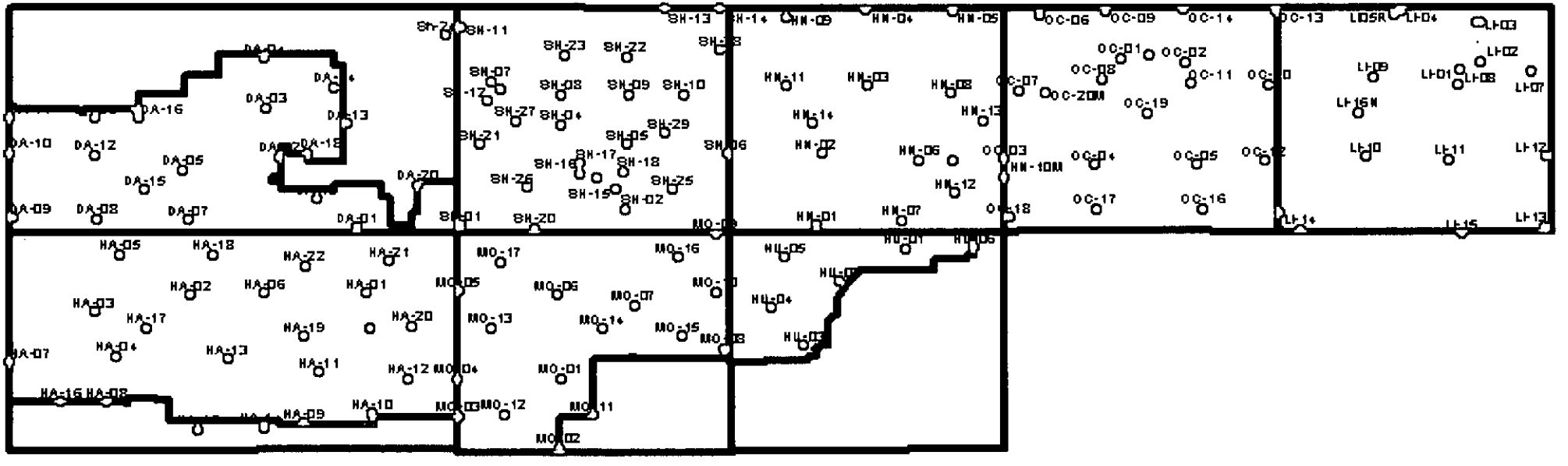



MAPQUEST
1mi
1km
287
Ranch Road 1
N 6th St
Dumas
87
152
Moore County Airport
S Twichell Ave
E 14th St
W 14th St
Stallwitz Lake
87
©2001 MapQuest.com, Inc.; ©2001 GDT, Inc.

Key Rain Gauges
National Weather Service Coop Program



Additional Rain Gauges
NPWM T - Post Rain Gauge Network



North American Weather Consultants, Inc.

Air Quality, Applied Meteorology, Meteorological Research, Weather Modification

8160 South Highland Drive, Suite A-2
Sandy, Utah 84093
Telephone 801-942-9005
Facsimile 801-942-9007
E-Mail nawc@nawcinc.com

November 3, 2003

Karen King
NOAA/Office of Oceanic and Atmospheric Research
Routing Code R/WA
1315 East-West Highway, Room 11216
Silver Spring, MD 20910

Dear Ms. King:

Enclosed is the initial cloud seeding report for the Western Uinta Range in Utah.

If you have any questions, please call me at 801-942-9005.

Sincerely,

Don A. Griffith
President