

MINUTES - NORTH DAKOTA ATMOSPHERIC RESOURCE BOARD

NOVEMBER 5, 2019

Chairman Tom Tupa called a meeting of the Atmospheric Resource Board to order at 1:30 p.m., November 5, 2019.

ROLL CALL

Roll call was taken. Members present were Tom Tupa, Monte Hininger, Casey Veil, Thomas Burke, Garland Erbele, and Angela Seligman.

Others present were Darin Langerud, Director; Kelli Schroeder, Business Manager; Mark Schneider, Chief Meteorologist; Daniel Brothers, Meteorologist; Jody Fischer, Director of Flight Operations, Weather Modification International (WMI); and Keely Torgerson, Executive Director, ND Weather Modification Association (NDWMA).

MINUTES

IT WAS MOVED BY MR. ERBELE, SECONDED BY MR. HININGER, AND CARRIED ON A VOICE VOTE TO APPROVE THE MINUTES OF THE APRIL 24, 2019 MEETING AS DISTRIBUTED.

FINANCIAL STATUS REPORT

Ms. Schroeder reviewed the financial status report for the period ending August 31, 2019.

REVIEW OF THE 2019 NORTH DAKOTA CLOUD MODIFICATION PROJECT (NDCMP)

Project overview

Mr. Schneider provided the board with a review of the 2019 NDCMP. There were changes to aircraft and locations this year. Due to the loss of Burke County and significant funding cuts from Ward County, one Seneca II base seeder was cut from Watford City. Also, the Minot Cessna 340 was moved to Dickinson (Seed 3) and shared between the two districts for the first time. District I covered 30% of the lease cost, while District II covered 70%.

Mr. Langerud noted that sharing the Dickinson aircraft worked very well. Depending on funding issues in 2020, we expect to continue to use this configuration again.

Cost Summary

Ms. Schroeder reviewed the cost report for the 2019 NDCMP.

In response to a question from Mr. Veil, Mr. Langerud explained that the spending overage in the radar maintenance and parts was due to extra trips the technicians were required to take due to some equipment parts failures.

WILLISTON RADAR

In response to a request from Mr. Erbele, Mr. Langerud discussed a meeting he and Mr. Schneider had with Williams County last November. Questions came up about radar coverage in the area. The county was aware that we run the Bowman radar year-round. The group discussed using the Stanley radar the same way. However, the county was interested in purchasing a new radar with a 1% county tax that is set aside for safety programs. The county had a \$1 million budget to purchase and deploy a new radar.

Mr. Langerud and Mr. Schneider helped them through the process of licensing and siting of the radar. It is currently under construction at the new airport. There has been a delay in the computer equipment shipment. But they are hopeful that they can have it installed and running by end of this year or early part of next year.

We have an agreement with them that, in exchange for a direct feed of the data, we will serve the Williston radar data to the public from our web site, as we do with the Bowman and Stanley radar feeds.

Mr. Langerud and Mr. Schneider will be in Williston in a couple of weeks to meet with the commission again. They are hoping to get a sight tour of the facility.

When setup is complete, they will be doing a few days of training with local staff. Our staff has been invited to participate. This will likely include Mr. Langerud, Mr. Schneider, and Mr. Moen. There is no cost share on this project. It gives us real-time access to the data which will be helpful in the summer NDCMP project. It is also a dual polarization radar, which will offer additional data for research and evaluation in the future.

REVIEW OF THE 2019 NDCMP, CONTINUED

Cost Summary Continued

In response to a question from Mr. Tupa, Ms. Schroeder explained the off-budget costs at the bottom of the report. Intern co-pilots are paid entirely by state funds and are not considered in cost-sharing with the counties. So, for the purpose of this report, they are considered off-budget costs. These costs are however included in the division's financial report under the operations program in salaries and wages.

Seeding Agent Usage / Inventory

Mr. Schneider reviewed the ending chemical inventory and usage for the 2019 NDCMP.

Generator Performance

Mr. Schneider reviewed generator performance. In 2019, generator performance came in at 4.91% failure rate, as compared to the 10-year average of 2.63%. There is a graph on page 28 of the contractor's final report provided by WMI showing the 10-Year Generator Failure Rates. One possible reason the percentage is higher than average this year is due to the reduced number of available aircraft. In addition, the failure rate stays higher when you have fewer flight and burner hours, as was the case in District II this year.

Aircraft Operations & Contractor's Final Report

Mr. Langerud reviewed his memo to the board regarding liquidated damages recommendations.

Mr. Wanner joined the meeting via conference call.

IT WAS MOVED BY MR. HININGER AND SECONDED BY MR. ERBELE TO APPROVE THE DIRECTOR'S RECOMMENDATION FOR LIQUIDATED DAMAGES IN THE AMOUNT OF \$1,653.10 TO BE APPLIED TO THE FINAL PAYMENT AS PRESENTED. THE MOTION CARRIED UNANIMOUSLY.

IT WAS MOVED BY MR. VEIL AND SECONDED BY MR. HININGER TO ACCEPT THE CONTRACTOR'S FINAL REPORT AND APPROVE THE FINAL CONTRACT PAYMENT AS REDUCED IN THE PREVIOUS MOTION. THE MOTION CARRIED UNANIMOUSLY.

Mr. Erbele had to leave the meeting for another meeting.

Intern Programs

Ms. Schroeder reviewed the internship final report and activities for the 2019 NDCMP. As of the end of the 2019 project, we have trained 387 intern co-pilots and 62 intern meteorologists. Only 5 student pilots from the Applied Weather Modification class had applied for the internship. Therefore, she had to do extra recruiting at the Student Aviation Management Association Career Fair in April. In the end, we hired 5 students from the Applied Weather Modification class and 3 others who had not taken the class.

In response to a question from Mr. Tupa, Mr. Langerud indicated that we are not a promotional agency so there are some restrictions in promotion of the program. That is where the NDWMA comes into play. Promotion of the NDCMP would be their purview. However, all research and studies we have are public information and available on our web site.

UND Weather Research and Forecasting (WRF) Numerical Modeling

Mr. Brothers reviewed the WRF numerical modeling project. We are working on this project with UND Atmospheric Sciences division, mostly supporting student wages. UND is running mesoscale numerical weather forecast models on the domain in western North Dakota, specifically focused on forecasting for the operational summer cloud seeding project. There have been improvements of the modeling over this time.

In response to a question from Mr. Tupa, Mr. Brothers indicated that the largest hail that occurred in the project area this summer was 2.75" diameter near New Town. He also indicated that a couple of storms had golf-ball size hail near Scranton.

In response to a question from Mr. Burke, Mr. Brothers indicated that our radar is not dual polarization capable and cannot directly differentiate between water and ice in the reflectivity. Even with a dual polarization capable radar, the general public is not normally going to look at the correlation coefficient layout to differentiate heavy rain from hail.

WMI EXPERIMENTAL FOG CLEARING RESEARCH PERMIT EXEMPTION

Mr. Langerud reviewed WMI's fog clearing research permit exemption request for research and development in the Kindred area. They hope to begin at the first

appropriate opportunity after board approval through May 31, 2020. Mr. Langerud recommended that the board approve the fog clearing research exemption.

In response to a question from Mr. Tupa, Mr. Langerud indicated that this board regulates weather modification in the entire State of North Dakota, whether it is for research or operations.

Mr. Fischer indicated that WMI has a client that wants to get into fog clearing with a drone but they don't know how effective it will be or how to implement a plan to do it. WMI will slowly work towards determining how effective this could be done with a drone and then work towards an operational plan for the client. WMI will also work with Dr. Delene at UND and his graduate students, who can take part in the experiments, data collection, evaluation and reporting. They will also be working with UND's UAS Center for help with permits and anything else legally required to fly the drone.

In response to a question from Mr. Tupa, Mr. Fischer indicated a report will be issued to the board at the end of the research.

In response to a question from Mr. Veil, Mr. Fischer indicated that the process for fog clearing is similar to cloud seeding. They need supercooled fog that is suspended in the atmosphere. Ice Crystal Engineering LLC will provide silver iodide flares for the drone. WMI will run the drone up and down through the fog, in a confined area approved by the FAA. The idea is to get the fog to precipitate out so that visibility increases. It works very similar to cloud seeding operations we do in the summer.

In response to a question from Mr. Tupa, Mr. Fischer said he was not aware of a similar project happening elsewhere. Mr. Langerud indicated that there is a fog clearing project in Medford, Oregon but it does not use drones. They use a tethered balloon on a truck, with a dry ice dispenser.

MR. HININGER MOVED TO GRANT A PERMIT EXEMPTION FOR WMI'S FOG CLEARING PROJECT AS RECOMMENDED BY THE DIRECTOR. SECONDED BY MR. BURKE. THE MOTION CARRIED UNANIMOUSLY.

ISSUES FOR NDCMP 2020

Ward County weather modification vote June 9, 2020 / Project planning and funding changes

Mr. Langerud reported that the Ward County Commission agreed to put the issue of the Ward County Weather Modification Authority on the primary election ballot. The outcome of the vote will determine if Ward County continues or ends their participation in the NDCMP.

The Ward County Weather Modification Authority is due to expire in March 2020. If the commission doesn't renew that authority before that date and lets it lapse, we do not think the board can include Ward County in the 2020 NDCMP permitting process. If that is the case and the voters say they want to continue participation in the project, we would need to repeat the permitting process for Ward County. This means that Ward County would likely not be able to participate until late July. If the Commission authorizes the Authority for another 5 years prior to its expiration in March contingent upon voter approval in June, then Ward County could be included in the regular permitting process and be able to start participating June 1 and continue after the vote if approved. In this case, if the voters did not approve, their participation would cease June 9th. Because this will be unknown when project planning starts, we will need to have plans in place for either option.

In response to a question from Mr. Hininger, Mr. Langerud noted that Ward County has funding approved in the budget for 2020; however, it was only some \$30,000 which is not enough for NDCMP 2020 operations. Their rationale behind the funding is that it will get the authority through the winter into the spring. However, the authority doesn't spend any money during that time.

Mr. Tupa commented that this would be the right area to direct public relations funding. In response to a question from Mr. Langerud, Ms. Torgerson indicated that the NDWMA is considering plans for a public relations campaign before the vote.

Mr. Tupa commented that the updated study from NDSU on the economic impacts of the program is great, updated information. Mr. Langerud noted that the information provided to the board is being published in the ND Water Magazine soon. Mr. Fischer indicated that they will participate in public relations efforts as well.

Radar technician services

Mr. Langerud indicated we are on our third year of a contract for radar technician services. A Request For Proposal (RFP) will be done for 2020 services soon.

ARB RESEARCH & EVALUATION PROGRAM

Hail Retrieval Algorithm (HRA)

Mr. Schneider reported that we have the polarimetric radar hail detection algorithm called Hail Retrieval Algorithm (HRA) created for us by Dr. Paul Kucera, National Center for Atmospheric Research (NCAR). This algorithm will integrate radar data from the Minot NEXRAD radar to discern where hail occurred based on this algorithm. Our goal is to get a significant number of seeded cases and non-seeded cases and then compare the statistics for the two areas to see if there is a difference in the amount and size of hail that has fallen from seeded and non-seeded clouds. In addition, we would like to use it to predict where in the storm hail will occur and then get ground-truth data to confirm. There are other study possibilities as well.

A radar meteorologist that worked on our program and is a graduate student at UND now is taking on a project to see if the HRA with Minot's NEXRAD data is verifying HAILCAST in UND's WRF model. UND may also participate in the seeded and non-seeded comparison.

NDSU - Economic Impacts of Cloud Seeding on Agricultural Crops in ND

Mr. Langerud reviewed the results of the North Dakota State University (NDSU) Economic Impacts of Cloud Seeding on Agricultural Crops in North Dakota study which was recently received. A summary article on the findings was published in the ND Water magazine October edition.

The study was an update to a 2009 study. It looked at the impact of the NDCMP on the top 8 crops grown by acreage in ND, plus alfalfa. The results are presented by a 5% increase in rainfall, as well as a 10% increase in rainfall, and a 45% reduction in crop-hail losses. These are the long-term results of evaluations of the NDCMP. The study looks at the NDCMP area, but also determines hypothetical results if the program operated state-wide.

In response to a question from Mr. Tupa, Mr. Langerud indicated that there is a void in urban hail damage economic studies. There is no good data set that we've been able to identify to quantify that information. Mr. Tupa and Mr. Hininger agreed that it would be great if we could quantify that information. Mr. Langerud discussed potential uses towards this end via data run through the Hail Retrieval Algorithm, which could then potentially be run against a model for urban hail damage costs.

Mr. Langerud attended a workshop in Boulder, Colorado in 2018 on the urban hail damage topic. It was co-sponsored by NCAR and the insurance industry. This conference will happen every other year. Mr. Fischer discussed the Alberta project, in which they are the operator.

UND WRF modeling

Mr. Langerud reviewed work being done with the WRF model in Idaho, incorporating winter cloud seeding into the model for comparisons. We will work with UND to do this for summer convective storms.

BOWMAN RADAR OPERATIONS

Mr. Langerud briefed the board on radar operations in Bowman. Eight counties in southwestern North Dakota, eastern Montana and northwest South Dakota are sponsoring running the radar outside of NDCMP months. The counties are splitting the cost to run the radar for 8 months.

WILLISTON RADAR

Mr. Langerud briefed the board on how we are cooperating with Williams County to display data from the Williston radar.

2019 ARB COOPERATIVE OBSERVER NETWORK (ARBCON) REPORT

Growing season rainfall totals and grid maps

Mr. Schneider pointed to June, July and August percent-of-normal rainfall maps that are displayed in the NDCMP Contractor's Final Report from WMI. He reported that we have 489 rainfall season observers and 189 snow observers. Online reporting is at 168 observers.

Mr. Langerud noted the error in captions on the maps in the report. The report caption states on page 37 for example, "Most of western North Dakota experienced below average precipitation." In fact, they experienced above average precipitation. Note the map colors are greens and blues, indicating above average precipitation in western North Dakota.

ARBCON mobile application

Mr. Langerud reviewed the project on a new mobile application for ARBCON observers to report online more easily through their smart phones. We also want to provide all of our radar data via the application. Our IT staff will be creating this application in-house. It will be available to the public, whether they are observers or not.

We are also hoping to be able to gain public reports of severe weather, primarily hail reports, to add to the hail data we have. We also would like to allow the user to take a picture of the hail and have the mobile software measure the hail in the photo. This is new technology that isn't quite yet perfected. This technology should improve in the near future.

SWC Pushing Remote Sensors (PReSens) – remote data collection

Mr. Langerud reviewed the PReSens project that the SWC is currently working on to provide real-time water level and stream gage data. Virtually any sensor can be connected including water level pressure transducers, soil moisture, temperature sensors, and various other atmospheric data instruments.

Mr. Langerud showed a sensor we will be testing with the PReSens systems. The sensor does rainfall, solar data, wind direction and speed, temperature, relative humidity, and barometric pressure. The SWC currently has about 100 sensors in the field. Mr. Langerud would like to integrate a few dozen of these sensors with PReSens to get more precipitation data, covering areas that are not well represented in our ARBCON network.

Soil moisture and temperature are also being considered, as well as possibly working with the Game & Fish Department at boat ramps.

2020 MEETING SCHEDULE

Tentative dates for 2020 board meetings were discussed. The spring meeting will be tentatively scheduled for Tuesday, April 7th via conference call. The fall meeting will be tentatively scheduled for Tuesday, October 27th in Bismarck.

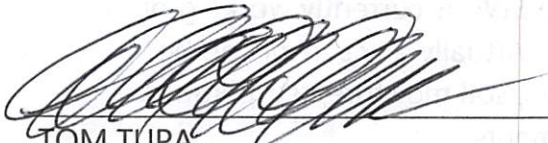
ELECTION OF OFFICERS


IT WAS MOVED BY MR. HININGER AND SECONDED BY MR. VEIL TO NOMINATE UNANIMOUSLY THE EXISTING SLATE OF OFFICERS (MR. TUPA AS CHAIR; MR. VEIL AS VICE CHAIR; AND MR. HININGER AS SECRETARY). THE MOTION CARRIED UNANIMOUSLY.

OTHER BUSINESS

Mr. Langerud noted that he and Mr. Schneider were at a North American Weather Modification Council (NAWMC) meeting in Bozeman, Montana in early October. There is some interest in the Montana House Agriculture Committee in updating the weather modification regulations. The regulations there have been so onerous that they basically exclude any operations or research from being done. Last session, their legislature approved a study resolution to look into this issue and come back with a recommendation for legislative changes. The NAWMC added a ½ day educational workshop to their agenda for locals to participate. Mr. Langerud will update the board as things progress in Montana.

Being no further business, the meeting adjourned at approximately 3:41 p.m.


TOM TUPA
CHAIRMAN


MONTE HININGER
SECRETARY

Transcribed by Kelli Schroeder