

MINUTES - NORTH DAKOTA ATMOSPHERIC RESOURCE BOARD

OCTOBER 26, 2021

Chairman Tom Tupa called a meeting of the Atmospheric Resource Board to order at 1:30 p.m., October 26, 2021.

Mr. Tupa asked our new board members (Gail Yuly and Andrea Travnicek) to introduce themselves.

ROLL CALL

Roll call was taken. Members present were Tom Tupa; Gail Yuly; Chris Theisen; Casey Veil; Andrea Travnicek, Ph.D., Department of Water Resources (DWR) and John Paczkowski for Dr. Travnicek upon her departure; Kyle Wanner, North Dakota Aeronautics Commission; and Angela Seligman, Ph.D., North Dakota Department of Environmental Quality.

Others present were Darin Langerud, Director; Kelli Schroeder, Business Manager; Mark Schneider, Chief Meteorologist; Daniel Brothers, Meteorologist; Jody Fischer, Weather Modification International (WMI); and John Suter, ND Weather Modification Association (NDWMA).

MINUTES

IT WAS MOVED BY MR. WANNER, SECONDED BY MR. THEISEN, AND CARRIED ON A VOICE VOTE TO APPROVE THE MINUTES OF THE APRIL 12, 2021, MEETING AS DISTRIBUTED.

Dr. Travnicek left the meeting.

FINANCIAL STATUS REPORT

Ms. Schroeder reviewed the financial status report for the period ending September 30, 2021.

REVIEW OF THE 2021 NORTH DAKOTA CLOUD MODIFICATION PROJECT (NDCMP)

Project Overview

Mr. Langerud reviewed operations of the 2021 NDCMP.

In response to a question from Mr. Tupa, Mr. Langerud noted that the low usage of flight hours was primarily due to lack of storms as compared to a typical summer season.

Cost Summary

Ms. Schroeder reviewed the cost report for the 2021 NDCMP. Both districts came in well under budget due to the lack of storms.

Seeding Agent Usage / Inventory

Mr. Schneider reviewed the ending chemical inventory and usage for the 2021 NDCMP.

Generator Performance

Mr. Schneider reviewed generator performance. In 2021, generators performed well – 2.1% failure rate. Our 10-year average generator failure rate is 2.31%.

Intern Programs

Ms. Schroeder reviewed the internship final report for the 2021 NDCMP. As of the end of the 2021 project, we have trained 397 intern co-pilots and 67 intern meteorologists. Of particular note, there were 29 applicants for the six intern co-pilot positions this year – a significant increase.

UND Weather Research and Forecasting (WRF) Numerical Modeling

Mr. Brothers reviewed the WRF numerical modeling effort, which has been used on the NDCMP for several years now. He reported that the model performed well this year, with only one exception due to a power outage. He noted that the contract is up this year. We will have discussions with UND about renewal prior to the 2022 season.

Aircraft Operations & Contractor's Final Report

Mr. Langerud reviewed his memo to the board regarding liquidated damages recommendations. There were four cases reviewed but no penalties were recommended.

IT WAS MOVED BY MR. PACZKOWSKI AND SECONDED BY MRS. YULY TO APPROVE THE DIRECTOR'S RECOMMENDATION RELATED TO LIQUIDATED DAMAGES AS PRESENTED. THE MOTION CARRIED UNANIMOUSLY.

Mr. Fischer commented on the project. He indicated that it looks like he will have an experienced crew back again next year.

IT WAS MOVED BY MR. VEIL AND SECONDED BY MRS. YULY TO ACCEPT THE CONTRACTOR'S FINAL REPORT AND APPROVE THE FINAL CONTRACT PAYMENT. THE MOTION CARRIED UNANIMOUSLY.

WMI FOG DISPERSAL RESEARCH PERMIT EXEMPTION

Mr. Langerud reviewed WMI's fog dispersal research permit exemption request for research and development in the Fargo area. They hope to begin at the first appropriate opportunity from November 1, 2021, through March 31, 2022, with activities expected to terminate no later than April 30, 2022.

Mr. Fischer noted that they will be working in conjunction with Dr. David Delene at the University of North Dakota. Dr. Delene will be helping with evaluation. The data will be used for potential projects in coming years.

In response to a question from Mr. Tupa, Mr. Fischer indicated that the information they will be looking at in this project could be utilized down the road with the NDCMP.

IT WAS MOVED BY MR. THEISEN AND SECONDED BY MR. PACZKOWSKI TO GRANT A PERMIT EXEMPTION FOR WMI'S FOG DISPERSAL RESEARCH PROJECT AS RECOMMENDED BY THE DIRECTOR. THE MOTION CARRIED UNANIMOUSLY.

ISSUES FOR NDCMP 2022

Project planning and funding changes

Mr. Langerud reported that we just concluded year three of our three-year agreement with WMI for the NDCMP. We will be in negotiations for another contract starting with the 2022 season.

In response to a question from Mr. Tupa, Mr. Langerud and Mr. Schneider addressed the possibility of procuring a longer-term service contract with WMI or other sort of deal that procurement procedures allow.

ARB RESEARCH & EVALUATION PROGRAM

Hail Retrieval Algorithm (HRA)

Mr. Schneider reviewed the 2018 project to create the Hail Retrieval Algorithm to evaluate hail suppression efforts in the NDCMP. He reported that Kyle Pederson, a UND graduate student and previous radar and intern met, is working on the HRA project to create a process workflow that can be followed by other researchers when evaluating the NDCMP. He is focusing on perfecting the process of using numerical modeling to identify similar environments that were seeded and non-seeded and compare the data. Kyle will present his research on November 19th.

Mr. Langerud noted that we hope to continue with that modeling in the future. The plan is to evaluate storms in similar conditions -- some seeded and some unseeded. Seeded clouds to the west of the Minot NEXRAD will be compared to unseeded clouds east of Minot. It will take a few years to have enough cases to get statistically significant results. This is the next step in having a continual process of hail suppression evaluation.

In response to a question from Mr. Theisen, Mr. Schneider indicated that we must rely on Minot NEXRAD data, considering the year Level 2 data became available. Another consideration is how far back our NDCMP data exists. We expect to be able to start with five to ten years of data.

CLOUD SEEDING AND CROP YIELDS: EVALUATION OF THE NDCMP

Mr. Schneider reported that a few years ago he was contacted by a graduate student from Michigan State University, Scott Knowles. Mr. Knowles, a student with no connection to weather modification, wanted information on the NDCMP – what counties were in the program and for what years. He and his professor took 30 years of USDA Risk Management Agency data and looked to see if there was any difference in crop

yields and insurance loss ratios for our project counties versus surrounding counties. Wheat and barley yields were the only crops considered for their study.

They compared the total indemnities paid to farmers divided by total premiums paid by farmers in a county each year reported by the USDA. For the 1989-2018 period, they found that seeded counties had about 13% higher wheat yields. They calculated this to be between a 36:1 and 37:1 benefit to cost ratio, which falls right in the range calculated by NDSU (31:1 to 53:1 based on the 5% to 10% rainfall increase assumption).

Additionally, they were able to reach statistical significance with this study. This study will be published in the American Meteorological Society journal *Weather, Climate and Society*.

Mr. Tupa suggested that we make sure we get some public relations coverage once this publishes. Mr. Langerud thought that this would be a good feature in one of our articles we submit for the North Dakota Water magazine.

Mr. Langerud noted that in theory, with cloud seeding, you are reducing damages by making hail smaller when it hits the ground or small enough to melt before it hits the ground. If you are reducing losses, you should be reducing indemnities and loss ratios, while increasing yields. This study shows that these things are being born out in 30 years of data. This is exciting to see.

WEATHER RADAR OPERATIONS

Mr. Langerud briefed the board on operations of the Stanley and Bowman radars. The Bowman radar's non-NDCMP operations and maintenance are funded by eight counties (six southwest ND counties, one South Dakota county and one Montana county) contributing \$24,000 per year. The Bowman radar data goes directly to our website. It is also converted to Level 2 data format for National Weather Service (NWS) use as well.

We are also serving up data from the Williams County radar, which was recently constructed and erected at the new Williston Airport (KXWA), northwest of Williston. This data is also converted to Level 2 format for the NWS, primarily in Bismarck and Glasgow, MT. It is a dual polarization radar like the one in Minot. As mentioned in the HRA section, we may be able to utilize this data as well in the HRA process.

Our radar data has also been incorporated into the Radar Omega mobile application. You can get this app in the Android or Apple App stores.

In response to a question from Mr. Theisen, Mr. Langerud said that he was not aware if the NWS has integrated our radar with theirs yet. We had been working with the National Severe Storms Laboratory (NSSL) a while back to provide Bowman radar data for them to analyze and evaluate; however, he isn't sure where they are in the process of integrating non-federally owned platforms. But it is certainly possible in the future.

Mr. Theisen noted that he is interested in this for the Vantis Program, looking at infrastructure development to support UAS operations. Mr. Langerud recommended Mr. Theisen contact the NWS to express interest in getting this data from the NWS.

ARB COOPERATIVE OBSERVER NETWORK (ARBCON) REPORT

Growing season rainfall totals and grid maps

Mr. Brothers reported that we have 465 active rainfall observers with 194 that have volunteered for snowfall reporting. 166 observers report precipitation online.

Mr. Brothers reported that our summer rainfall maps are available on our website.

DWR Pushing Remote Sensors (PRESENS) – remote data collection

Mr. Langerud reviewed the DWR's PRESENS remote sensor suite that was developed by the DWR's Water Appropriations division for groundwater and surface water remote monitoring. ARB has adapted that and added sensors to measure rainfall, soil moisture and temperature. Our first two sites are just east of Bismarck, near Menoken, and another at the Kenmare Airport. The sensor at Kenmare is the first of about six sites that will be installed in coordination with others in the Mouse River basin. We are working with the ND Silver Jackets program, NWS, USGS and other agencies to identify locations where they think that information should be collected. They need additional data for precipitation but also soil moisture data as well. They will put this data into their models for forecasting flooding and runoff. Mr. Langerud has inquiries out for two other locations. Being late in the year, he doesn't know how many more will be able to be installed before weather shuts down field work. We will continue working through the winter to identify additional sites for spring installation.

In response to a question from Mr. Tupa, Mr. Langerud indicated that he is hoping that with getting the Mouse River sites installed, data being used and more word-of-mouth occurring about the project, demand will increase and hopefully many more are installed around the state.

2022 MEETING SCHEDULE

Tentative dates for 2022 board meetings were discussed. The spring meeting will be tentatively scheduled for Tuesday, April 12th. The fall meeting will be tentatively scheduled for Tuesday, November 1st.

ELECTION OF OFFICERS

Mr. Tupa indicated that he will be resigning from the board before the April 12th meeting and asked the members to consider this during nominations. When no nominations were given, Mr. Tupa asked for volunteers. Mr. Veil volunteered to remain the Vice Chair. Mr. Theisen volunteered to be secretary.

In response to a question from Mr. Veil, Mr. Langerud indicated that he will reach out to the weather modification authorities in the ARB Board District 1 area for nominations to fill the vacant board position.

Mr. Tupa said he was willing to remain chair, at least until retirement before the next meeting.

IT WAS MOVED BY MR. WANNER AND SECONDED BY MRS. YULY TO NOMINATE MR. TUPA AS CHAIR; MR. VEIL AS VICE CHAIR; AND MR. THEISEN AS SECRETARY. THE MOTION CARRIED UNANIMOUSLY.

Being no further business, the meeting adjourned at approximately 3:15 p.m.

TOM TUPA
CHAIRMAN

CHRIS THEISEN
SECRETARY

Transcribed by Kelli Schroeder