

MINUTES - NORTH DAKOTA ATMOSPHERIC RESOURCE BOARD

NOVEMBER 12, 2024

Chairman Christopher Theisen called a meeting of the Atmospheric Resource Board (ARB) to order at 1:32 p.m., November 12, 2024.

ROLL CALL

Roll call was taken. Members present were Christopher Theisen, District IV; Steve Kemp, District I; Gail Yuly, District II; David Monson, District III; Jessica Magilke, District VI; Thomas Burke, District VII; Abby Ebach for Dr. Andrea Travnicek, Department of Water Resources (DWR); Kyle Wanner, North Dakota Aeronautics Commission; and Rebekah Pfaff, North Dakota Department of Environmental Quality.

Others present were Darin Langerud, Director; Kelli Schroeder, Program Manager; Mark Schneider, Chief Meteorologist; Daniel Brothers, Meteorologist; Jody Fischer and Kirk Hamilton, Weather Modification International (WMI) and one member of the public online.

MINUTES

IT WAS MOVED BY MRS. YULY, SECONDED BY MR. WANNER, AND CARRIED ON A VOICE VOTE TO APPROVE THE MINUTES OF THE APRIL 24, 2024, MEETING AS DISTRIBUTED.

FINANCIAL STATUS REPORT

Ms. Schroeder reviewed the financial status report for the period ending September 30, 2024.

In response to a question, Mr. Langerud noted that county funds we received used to come from property taxes as North Dakota Century Code allowed weather modification authorities to levy up to 7 mills. In the 2015 legislative session, tax code was overhauled for many entities. With those changes, weather modification funds must now come from the county general funds.

REVIEW OF THE 2024 NORTH DAKOTA CLOUD MODIFICATION PROJECT (NDCMP)

Project Overview

Mr. Langerud reviewed operations of the 2024 NDCMP, including extension through September 8 for Williams and Mountrail Counties. Williams and Mountrail Counties were on rain enhancement suspension for the entire project. This was not due to excess moisture but rather local feedback.

Mr. Langerud reported having guests from South Korea and Romania at Ground School in May. After Ground School, two of the South Koreans spent a couple weeks in Bowman observing operations and one was able to ride along on a cloud seeding flight. The Romanians are transitioning from seeding with rockets to aircraft and just took delivery of their first cloud seeding aircraft from WMI last month.

Cost Summary

Ms. Schroeder reviewed the cost report for the 2024 NDCMP. There were some budget overages in the areas of radar maintenance and parts category and the building, equipment, utility and insurance category. We purchased two TR tubes that were unplanned but inexpensive from a colleague in South Africa. We also purchased several LNAs for the radar as we went through a lot of them determining what parts were affected by the lightning strike last fall. Still, we expect to end the calendar year around \$41,000 under budget.

In response to a question, Ms. Schroeder indicated that we will not see budget issues for the NDCMP related to employee fringe benefit costs as they do not qualify for the health insurance benefits and such. Mr. Langerud noted that our budget may be affected by changes that are expected related to Fair Labor Standards Act overtime exempt salary minimums.

In response to a question, Ms. Schroeder indicated that the insurance premiums were reported to have gone up 25%. Mr. Monson indicated that re-insurance costs are driving the premium increases.

In response to a question, Ms. Schroeder indicated that the Stanley and Bowman radars and buildings are covered under our Fire and Tornado policy. Our policy also includes our steel cargo containers we maintain for chemical storage in Stanley, Bowman and Bismarck, along with chemical supply at each field site.

In response to a question, Mr. Langerud indicated that we started the project this year with a healthy inventory of chemical.

Seeding Agent Usage / Inventory

Mr. Schneider reviewed the ending chemical inventory and usage for the 2024 NDCMP.

Mr. Langerud mentioned that the amount of chemical used was also affected by Williams County and Mountrail County operating on rain enhancement suspension.

Generator Performance

Mr. Schneider reviewed generator performance statistics – a percentage of generator failure versus hours of generator usage. In 2024, generators had a 2.06% failure rate. Our 10-year average generator failure rate is 2.27%. We attribute this low failure rate to WMI's training of pilots on burner maintenance.

Intern Programs

Mr. Schneider reported on hiring intern meteorologists for 2024 from Minnesota, Missouri and Oklahoma. Our Stanley radar meteorologist was here for his fourth year. He did a great job training the interns. Should any of these interns apply to return next summer, they should be well trained.

Ms. Schroeder reviewed the internship final report for the 2024 NDCMP. As of the end of the 2024 project, we have trained 412 intern co-pilots and 76 intern meteorologists. The intern co-pilots worked a total of 2,113.5 hours this year. The intern meteorologists worked 1,258 hours this year. Staff recommendations were also reviewed.

In response to a question, Mr. Langerud indicated that we have had no issues with airport operations. The airports have been good to work with.

In response to a question, Ms. Schroeder indicated that she attends the Student Aviation Management Association (SAMA) Career Fair yearly in the spring. She also attended the University of North Dakota (UND) Fall Career Fair in late September. Both fairs were successful and provided many contacts.

UND Weather Research and Forecasting (WRF) Numerical Modeling

Mr. Brothers reviewed the WRF numerical modeling effort agreement with UND. This effort supports numerical weather modeling in support of our forecasting operations for the NDCMP at a 3km resolution. He discussed the HAILCAST parameter that is run as part of this model, which forecasts potential hail size in thunderstorms.

Mr. Langerud noted that we are also running two different iterations of the model – one with standard microphysics and the other with Thompson microphysics. These different iterations are assessed, and we are provided with reports on which one does better in certain situations. This is an ongoing process to improve the model, overall.

In response to a question, Mr. Langerud noted that we have experimented with 1km resolution a few years ago. However, at the time, it didn't show any improvement in skill. Mr. Brothers indicated that this same discussion was held at a recent severe storms conference that he attended. They also found little skill improvement below 3km resolution.

Aircraft Operations

Mr. Langerud reviewed his memo to the board regarding liquidated damages recommendations. There were four cases reviewed with two penalties recommended (one half day plus one day) for a total of \$3,929.73.

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

Contractor's Final Report

Mr. Fischer briefed the board on operations this summer.

Ms. Schroeder indicated that the digital copy of the final report will be uploaded to our web site after the meeting. Paper copies will be mailed to the board as soon as we receive them.

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

MOUNTRAIL COUNTY AND WILLIAMS COUNTY BALLOT MEASURES ON WEATHER MODIFICATION

Mr. Langerud reported that Mountrail County and Williams County had ballot measures on their general election ballots to abolish weather modification authority. Both measures passed, ending weather modification authority in their counties at the end of the calendar year. They will not be part of the NDCMP in 2025.

Logistics and future operations were discussed. Mr. Langerud noted that we will be meeting with the remaining counties early next year to discuss what they can provide for funding, what state cost-share will look like, and plan for the 2025 project.

In response to a question, Mr. Langerud noted there has been discussion in the past regarding insurance industry participation in the program. We received a lukewarm reception from the insurance industry. In the most recent evaluation of our program from Michigan State University, they stated that insurance companies in North Dakota are gaining revenue from this program by reduced losses without insurance industry participation.

In response to a question, Mr. Langerud noted that the primary concerns of those who started the petition included health concerns, perception of ineffectiveness, and cost. He thought cost was the lowest of those concerns and indicated that there have been dozens of studies that have looked at impacts of silver iodide in the environment. None of them have found any problem. Based on the amount of material we put out on this program in an average year, we would expect to find one one-hundredth of one gram (0.01) of silver iodide per acre per year.

ARB / NDCMP PUBLIC SURVEY AND LISTENING SESSIONS

Mrs. Ebach reported on the DWR's efforts, in collaboration with the North Dakota Weather Modification Association (NDWMA), towards a public survey and listening sessions regarding activities of the Atmospheric Resource division.

Discussion was held regarding the options for consideration that Dr. Travnicek outlined in her memo. Mrs. Ebach noted that the Department of Agriculture and Insurance Department are aware of these surveys and are open to discussions about collaboration.

Mr. Langerud called attention to the last three items included in the packet for this agenda item, which are public awareness items that have already been completed after the surveys.

Mr. Theisen summarized the board recommendation is to look at alternative ways to get the message out regarding this program and its benefits. Mr. Wanner suggested collaboration with the League of Cities or the ND Association of Counties.

ARB RESEARCH & EVALUATION PROGRAM

Hail Retrieval Algorithm (HRA) Assessment

Mr. Langerud reviewed the HRA Assessment project. Lynnlee Rosolino, a graduate student from UND, is using the HRA program and the Weather Research and Forecasting (WRF) model to run several seasons of NDCMP data for evaluating if there are any indications of hail suppression seeding effects in our project area versus areas nearby that are not in the project area. Both areas have cases of seeded versus unseeded storms. Ms. Rosolino is defending her thesis on this project this week. She reviewed 2016 through 2018. While there is not yet enough data to say definitively, indications are positive that seeded storms are having a lower size hail coming from them than unseeded storms, which is what we expect to see if seeding is working. Ms. Schroeder downloaded the data from the National Centers for Environmental Information. Mr. Brothers prepared the data to be evaluated and then sent the data to Ms. Rosolino for evaluation. Our staff is not involved in the evaluation.

Ms. Rosolino is planning on working towards her Ph.D. at UND. We are hopeful that, if she cannot help with further evaluation, another UND graduate student could carry on this evaluation adding on more years of data. Over time, we would like to get enough data to definitively show the effect of seeding on these hailstorms.

Mr. Langerud noted that, when we get our new radar in Bowman up and running, we will be able to adapt this process to using data from the Bowman radar for the Bowman operations area. Currently we are constricted to looking at the eastern half of the northern district due to proximity to the Minot radar.

WRF model enhancements through a Machine Learning Neural Network

Mr. Langerud updated the board on a new project with UND to do more to enhance the WRF model through a machine learning algorithm that UND will develop. The purpose is to improve the forecasting capability of the model by improving its forecasting of temperature and moisture in the lower layers of the atmosphere in the summertime. By using a machine learning process to integrate various data from various sources, they

will try to fine-tune those forecasts. In addition to this, we will be launching windsonde mini balloon sondes to validate the model sounding that is improved with the machine learning, so that we can get an idea of the air that is in place even after the enhancement. But the key is to try to better understand the moisture and temperature at those levels on a convective day to better determine when and where the storms will eventually form. This will help our forecasting opportunities.

WEATHER RADAR OPERATIONS

Mr. Langerud briefed the board on operations of the Stanley and Bowman radars.

In late 2023, the Stanley radar took a lightning strike which fried several components. In trying to solve the issue, other components were plugged in without success. A few low-noise amplifiers (LNAs) burned out in the process of troubleshooting. We had to order replacement LNAs, which are reflected in the NDCMP Cost Report.

Mr. Langerud reported on a contract with Vaisala for a new dual-polarization radar that the 2023 Legislature authorized. The radar is expected to be delivered to us sometime this winter. A radar tower vendor has been selected. We are hopeful they can start construction on the footings this fall. We expect the entire project to be completed by the end of June 2025. Once the new radar is running, we can decommission the old radar in Bowman.

Mr. Langerud also reported that eight counties in the Bowman area support running the radar in the NDCMP off-season. We will be contacting those counties in the next few weeks to contract for 2025.

ARB COOPERATIVE OBSERVER NETWORK (ARBCON) REPORT

Growing season rainfall totals and grid maps

Mr. Brothers reported that we have 398 volunteer precipitation observers. 152 observers report precipitation online. He noted that our precipitation maps are available on our website.

Pushing Remote Sensors (PRESENS) – 2024 site deployment

Mr. Brothers 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 and has been modified with atmospheric sensors. There are a total of 53 sites with weather monitoring equipment, 21 of which were deployed in 2024. There are

close to 672 PRESENS sites statewide that report temperature and atmospheric pressure. The DWR is currently working on a public facing database interface.

In response to a question, Mr. Brothers indicated that none of these PRESENS sites are deployed with landowner contract. So far, the site at the Kenmare Airport is the only one needing to be uninstalled. There was construction at the airport and the site was the only place they could move heavy equipment for the construction.

In response to a question, Mr. Brothers indicated that we do not use crowd-sourced data. He indicated this is due to the level of confidence that proper equipment is used or sited properly.

Mr. Brothers noted that this year he utilized North Dakota State University (NDSU) County Extension Agents from some counties as contact points for potential landowners who may be willing to cooperate on this project.

2025 MEETING SCHEDULE

Tentative dates for 2025 board meetings were discussed. The spring meeting will be tentatively scheduled for Thursday, April 24th. The fall meeting will be tentatively scheduled for Thursday, November 13th.

ELECTION OF OFFICERS

Mr. Theisen called for nominations or volunteers.

IT WAS MOVED BY MR. WANNER AND SECONDED BY MR. MONSON TO NOMINATE MR. THEISEN AS CHAIR. THE MOTION CARRIED UNANIMOUSLY.

IT WAS MOVED BY MR. WANNER AND SECONDED BY MR. BURKE TO NOMINATE MRS. YULY AS VICE-CHAIR AND MRS. PFAFF AS SECRETARY. THE MOTION CARRIED UNANIMOUSLY.

Mr. Theisen thanked the officers for being willing to fulfil those roles.

INTERNATIONAL COLLABORATION WITH KOREA METEOROLOGICAL ADMINISTRATION

Mr. Langerud reviewed collaboration our staff has had recently with the Korea Meteorological Administration (KMA). He will be sending a report to the KMA later this

week regarding our collaboration. We are anticipating the KMA sending a Ph.D. scientist to UND, working with Dr. Delene, for the 2025 calendar year but will also be collaborating with us. We expect that their staff will participate in our 2025 Ground School as well.

OTHER BUSINESS

Mr. Wanner requested an email update for the board once decisions have been made regarding continuation of the NDCMP with the remaining two counties and any related legislation that may come. Mr. Langerud agreed to do that.

IT WAS MOVED BY MRS. PFAFF, SECONDED BY MR. WANNER, AND CARRIED ON A VOICE VOTE TO ADJOURN THE MEETING. Being no further business, the meeting adjourned at approximately 3:55 p.m.



CHRIS THEISEN
CHAIRMAN



REBEKAH PFAFF
SECRETARY

Transcribed by Kelli Schroeder