

ZEPHYR



Environment
Canada

Environnement
Canada

Atmospheric Environment Service

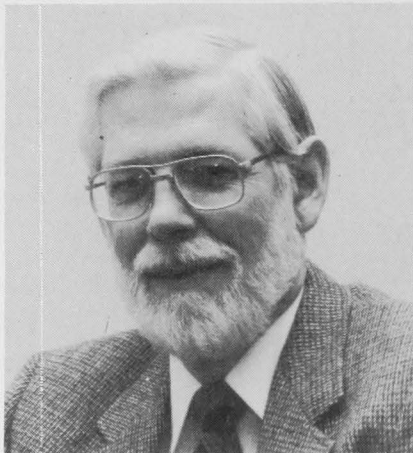


CHRISTMAS ISSUE 1986



Canada

Christmas Message



For most of us the festive season is a mixture of the hectic and the sublime. It's a time to count our blessings, reflect on our accomplishments and make good resolutions for the coming year. It's also a time when many Canadians travel long distances, through all kinds of weather, to celebrate with family and friends. The weather forecasts and warnings issued by AES become especially important to travellers during the busy holiday season. Those of us fortunate enough to be home for Christmas appreciate the efforts of our fellow employees who remain on the job providing these essential services.

During the past year the AES Management Committee has held meetings in each of our six Regions from coast to coast. Several of us have had the opportunity to visit our High Arctic weather stations. I was particularly pleased to open our new air quality lab at the world's northernmost meteorological station, Alert. These journeys around Canada have invariably left AES senior managers with a renewed sense of pride in our Service and in the dedication and accomplishments of our regional staff. A recent analysis of our weather services shows continued improvements in productivity, in CMC numerical weather prediction outputs and in public and aviation forecasts.

We continue to contribute effectively to the environmental objectives of our department, on such issues as acid rain, climate change and the depletion of the stratospheric ozone layer. Further challenges lie ahead as the public becomes increasingly concerned about these interrelated symptoms of man's impact on the chemistry of the atmosphere.

We have accomplished much in spite of the budget cuts required to contribute to the government's objective of deficit reduction. This should give us all confidence in facing the formidable challenges of the coming year.

I wish you all a Merry Christmas, a happy holiday season and a rewarding and innovative New Year.

Howard Ferguson, ADMA

Mike Purves wins AES Achievement Award

On August 27, an AES Achievement Award was presented to Mike Purves by Bev Burns, Director AES Western Region. Mr. Purves is a Senior Meteorologist in the Alberta Weather Centre.

The Achievement Award was for Mr. Purves's long record of significant contributions to operational meteorology. Notable among these have been the compilation of a compendium of meteorological references; production of aviation climatologies in a format suitable for operational use; and the development and automation of a number of techniques that provide guidance to the meteorologist for the forecasting of weather elements such as wind, minimum temperature and precipitation type.

Mr. Purves has been a meteorologist with AES for 15 years. He has seen duty with the Canadian Forces Weather Service at Chatham, Baden Soellingen, and North Bay; and has been at the Alberta Weather Centre since 1982.



Bev Burns (left) presents achievement award to Mike Purves

ADMA Permanent Rep. with WMO

ADMA Howard Ferguson has been officially designated the Permanent Representative of Canada with the World Meteorological Organization (WMO). He succeeds former ADMA Jim Bruce in this position. The announcement was made by the Minister for External Affairs, Joe Clark, and was effective September 5, 1986.

January 2, 1972: The first synoptic telegraphic weather reports were received at Toronto from Kingston, Port Dover and Port Stanley and then forwarded to Washington to begin a daily exchange of weather data between Canada and the United States.

Christmas is the quiet season

Last year we did a survey on Christmas. We phoned and telexed around to a number of weather offices to find out your reactions to working on Christmas Day. We also asked how this fitted in with your plans for family celebrations and we concluded by asking you for a list of unusual or humorous incidents that may have occurred while working Christmas shifts.

The results were thought-provoking. Very few of you felt the urge to reply. Among those who did, a certain proportion expressed sadness at having to work on this special day, possibly separated from family or loved ones for an extended period, especially if one was serving in an isolated station.

Despite the quietness we did publish an article in last year's Christmas issue. Many interviewees claimed that working Christmas shifts was just like performing duties on any other day. They conceded, however, that there was some celebrating on the job, that given cooperation from the weather, Christmas shifts were fairly quiet and they nearly all confirmed that the main thoughts of staff manning the bureaus on December 25 were with their families.

The reticence did not prevent us from learning a few interesting details about goings-on at office parties (including one unfortunate case of food poisoning). We also learned of a spattering of incidents such as Canadian forces being called out on Christmas Eve to track down an AES employee's lost dog. On the whole, however, you preferred to keep quiet about happenings on this unique, very private day.

This silence about Christmas tends to increase in the more isolated AES stations. I was recently in Resolute, N.W.T., one of the four High Arctic Stations. I tried to talk about Christmas to the AES employees in this remote spot, located between Baffin and Ellesmere

Continued right

ZEPHYR

ZEPHYR is a staff magazine for employees of the Atmospheric Environment Service, Environment Canada, produced by the Communications Directorate of Environment Canada.

Please address correspondence or article contributions to: ZEPHYR, Atmospheric Environment Service, 4905 Dufferin Street, Downsview, Ontario M3H 5T4.

Editor: Gordon Black
Phone: (416) 667-4551



**Environment
Canada**

**Environnement
Canada**

**Atmospheric
Environment
Service**

**Service
de l'environnement
atmosphérique**



Barry Green of Data Acquisitions Branch, AES Downsview, shows his 19-month-old daughter Alison some Czechoslovakian pop-up dolls displayed in the Downsview lobby by Toy Workshop. The wide selection of toys on show proved popular among AES employees seeking Christmas gifts. Wendy Elliot, supervisor of the Sunburst Day Care Centre holds Alison. Sunburst is to receive 10 per cent of all sales during the day.

Islands where the polar night lasts a full three months. But they seemed reluctant to respond. It turned out that most of these people were married, and working Christmas shifts at Resolute would mean total separation from their loved ones down south, not only for Christmas but for weeks or months afterwards.

One or two of the employees tried to talk about past Christmas Eve parties when a whiff of conviviality did actually break out among duty staff. But after a few sentences they lapsed into a reflective silence. You knew that all their efforts to be merry could not compensate them for the heartbreak of spending Yuletide so far from home. Having visited one or two distant stations, we at least understand why you didn't exactly stampede to the phones when surveyed about Christmas 1985. Instead of going through the routine again this year, we decided not to do another survey and instead to wish you all a merry, peaceful Christmas with lots of job satisfaction!

Gordon Black, Editor



Twas the Night before Christmas

Twas the night before Christmas, when all through the nation,
Not a snowflake was falling at a CAPMoN station.

The filters were hung on the boom with great care

In hopes that the sulphates soon would be there.

The sample bags were nestled all snug in their buckets,

While visions of lichens were seen by Keith Puckett.

When out at the site, there arose such a clatter.
It must have been hail or coarse particulate matter.

Away to the window, the operator flew.

He was sure it was ice, not supercooled dew.
Sure enough, it was hail on its own deadly mission,

To add to the problem of wet deposition.

And what to his wondering eyes should appear,

But the plume from Ohio, all skewed by wind shear,

With loads of fine sulphates, and fine nitrates too,

Some PAN and some lead, and some SO₂.

More rapid than eagles the fine particles blew
Over our nation: a transboundary stew.

As the stuff was transported, it hit them in turn,
All sites of the network, from its stem to its stern,

First Longwoods, then Priceville, then Dorset and Sutton,

To Harcourt, to Cormack to Keji and Jackson.

From the south of Ontario to the top of the Shield

The acid came settling on forest and field.

As dry leaves before the wild hurricane fly,

When they meet with an obstacle, mount to the sky,

So up in the mixed layer the particles flew

Till they hit the inversion and started anew.

And then, in a twinkling, he heard move the hood

Of the new CAPMoN collector, its efficiency good

For catching the acid, wet only not dry,

As it settled gravitationally out of the sky.

The snow was fast falling, all fluffy and white,
Depositing its sulphate in the dead of the night,

Augmenting the snow pack, so pretty and precious,

All ready at snow melt, to kill the poor fishes.

The pH was low, the acidity high

As the air left America, she waved goodbye

To her gases and particles, all her emission,

On up to Canada for its last deposition.

And there stood poor CAPMoN all lonely but ready

To measure the flux from Ohio to Keji.

Her filter packs standing, her collectors asensing

For that LRTAP pollution that corrodes farmers' fencing.

Our bastion of research, our supplier of data,
The national network to collect acid matter,

It's gone through its upgrade, it's being expanded,

Though questions remain, it may be disbanded.

It's not pure research, as some scientists say,
It's a drain on the budget, it just doesn't pay.

But we'll keep it all going as long as we can
Till the axe falls completely or the . . . hits the fan.

A few stations will stay and give us some info
On source-sink relations especially for INCO.

As daylight approaches and Christmas appears,

The network hopes dearly for several more years.

Now the network is resting, the action is light,
QM says "HAPPY CHRISTMAS" to all, and to all

a good night.

by ARQM

While Lewis Poulin of Experimental Studies, AES Downsview was driving through the Ontario countryside about 90 kilometres north east of Toronto, he was about to enter a hamlet of about 200 inhabitants. He looked up and saw that the tiny settlement was called Zephyr. He obligingly got out of the car, grabbed his camera and took the above picture. Nobody has been able to tell us how the village got its name. Perhaps a benign Classical breeze was blowing over the area when the first settlers arrived.



CD braves high winds, artillery fire, in search of dry deposition

by Heather Mackey

It was a crisp autumn day — the maples north of Toronto were suitably orange and the sun suitably bright. CD (Communications Directorate, represented by Brenda O'Connor and Heather Mackey) had at last escaped the confines of their typewriters and were northward bound to seek out the elusive dry deposition. We had heard endless rumours of "dry deposition" among the scientists of Downsview, but never had we seen it in the flesh.

Our destination was Canadian Forces Base Borden, near Barrie, about an hour's drive north of Toronto. Here, on a remote corner of the base, far from civilization, was the AES dry deposition monitoring and research site. Ozone, sulphur dioxide, nitrogen oxides — and other such nasty air pollutants — are monitored here in an effort to learn more about the movement of air pollutants and the amount deposited on forests.

The site was deceptively tranquil, tucked neatly away in a forest resplendent with autumn golds and oranges. There was no huge office here — only a handful of white trailers, and two truly awe-inspiring towers. We were greeted by Gerry den Hartog and Harold Neumann, AES researchers at the site, who would be our guides.

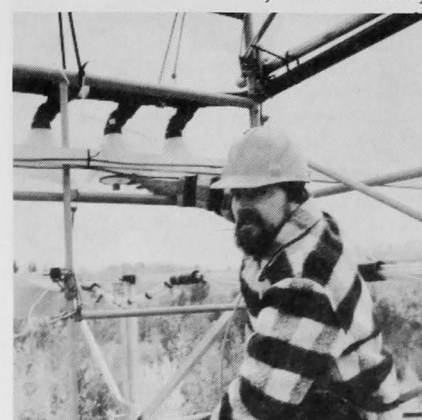
We were promptly led to the base of the largest tower — a mammoth structure built of metal tubing and stretching skyward to a height of 43 metres (141 feet). The tower literally bristled with instruments — all busily recording the elusive ozone, sulphates and others of their ilk.

Dry deposition, explained our congenial hosts, refers to air pollution which drifts down

to ground level during dry weather (as opposed to pollution carried in the rain, such as acid rain). This dry pollution consists of both gases and particles: minute particles, such as sulphates and nitrates are filtered out of the air; while the concentration of gases such as ozone and sulphur dioxide, is measured on gas analysers. Surprisingly, pollution levels can be quite high even this far north of Toronto. Once, during an unusual weather situation, ozone levels reached 260 ppb, which is more than three times the national health standard.

Of course, continued our hosts, one could not fully appreciate the wonders of dry deposition with one's feet on the ground. We glanced suspiciously at the tower, which seemed to be growing taller every minute. Neither can one view dry deposition bare-headed. Brilliantly coloured orange helmets were passed out to all.

Hearts sank. Fears rose. But there was clearly no choice. We had come to meet dry deposition and we would meet it head on — even if it was almost 150 feet up. We got off to a rather poor start — promptly bashing our helmeted heads on a low hanging part of the tower. (Surely Sir Edmund Hillary never had difficulties such as this!) Nonetheless the ascent continued. At the first level we paused to admire the weather instruments — the wind vanes tossing to and fro and the anemometers spinning vigorously. A few more queazy flights of stairs and we broke free of the forest canopy. Limitless rolling hills, awash in autumn splendour, spread before us. For an instant we stood motionless — frozen with awe (not fear as we later explained). Then we plunged into the complexities of dry deposition



High above the trees, Dr. Harold Neumann of ARQA checks a monitoring instrument recording levels of ozone and sulphur dioxide, at Camp Borden, Ontario.

— a myriad of sensing and analyzing instruments greeted us at every level. Higher and higher we climbed. Tubes ran everywhere linked to monitoring instruments as if the very atmosphere itself was in intensive care.

More stairs, more height — until at last we reached the summit. We clung to the tower and willed ourselves to look down. The birds were flying **below** us:

Our breathing was laboured — "Must be the thin air at this height," confided one CD adventurer. By now the anemometers were spinning themselves silly. The icy wind was surely reaching gale force. But dry deposition was everywhere. Funnels siphoned up ozone. Sensors drank in sulphates. Tubing sucked up nitrogen oxides. We blatantly ignored the storm clouds brewing overhead. The anemometers' message grew more urgent.

A sudden blast rocked the forest. Smoke rose above the golden leaves. "Oh, it's just artillery fire" our guide said casually, "from the military range". Artillery fire? At least the dry deposition could have had the courtesy to land in a demilitarized zone, CD thought quietly. The rain was misting the tower, coating the cold metal with damp slipperiness. "I think we're getting a little **wet** deposition," quipped one frozen soul. Alas! It was time to leave the dizzying heights (and the rocket fire) and return to the mundane world of soil and solid footings.

But we had been bitten by the bug. CD impressed all by refusing to leave before climbing a **second** tower — this time with no stairs and only a ladder!

As we headed back to Downsview — where our offices suddenly looked very safe and snug — we contemplated in amazement the AES staff who climb those towers daily, simply as a part of their jobs.

Heather Mackey is a Communications Advisor, AES Downsview.



Our "Christmas Card" scene shows U.S. explorer Robert Peary leaving Cape Columbia, Ellesmere Island, N.W.T. en route to discover the North Pole in 1909.

Minnie and Tabitha spearhead Arctic weather revolution

One part of the weather office is snug and homey, with bookshelves, a TV set and a warm coffee silex. The other part is crammed full of the latest communications and observing equipment. Minnie and Tabitha feel equally at home in both areas.

The two Inuit women are spearheading Resolute's second major revolution in a decade. The first was to turn this bleak High Arctic Weather Station (latitude 74°N) into a first-class communications hub for all meteorological and administrative purposes. The second is to launch one of Canada's most innovative and successful native employment programs.

When you first encounter Minnie Nungaq or Tabitha Kalluk sitting in an easy chair on the snug side, studying a math or physics book in order to upgrade their education, you are immediately struck by the excellence of their English, which is almost as good as their native Inuktitut.

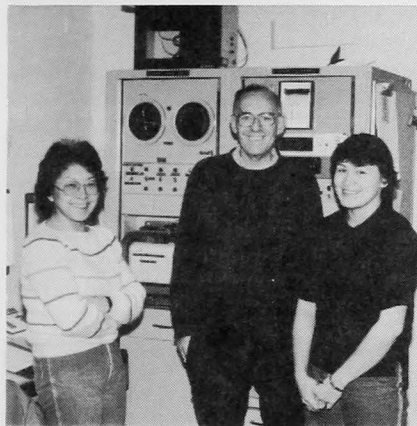
Both women tell you that they live in the Village about five kilometres from the government base surrounding the airstrip, which includes the weather office. Their interest in joining AES started in the fall of 1985 when Jens Lyberth, the Public Service Commission's Northern Careers Program Manager came to town with the AES Arctic Operations Manager, Dennis Stossel. Interviews were held and, soon after, Minnie and Tabitha were told they were the successful candidates of a program called Meteorological Technician Training of Indigenous Persons (METTIP). They were elated because job training and educational enhancement provided one of the few local opportunities for steady, technically-oriented work. In fact until now there have been very few jobs of any kind for native people at Resolute. True, Minnie had some sales experience and managed the Inuit cooperative in the Village, but Tabitha, in the short time she has left school, has only been able to obtain odd jobs.

Both women like living in the Village which is on the Bay near the ice-clogged harbour. Both live with their families and commute to work by skidoo, family truck, or AES vehicle, unless they are prevented from doing so by poor visibility or ferocious windstorms, during the three-month polar night.

Minnie and Tabitha both enjoyed the courses they undertook on surface weather observations in Winnipeg last summer. Tabitha liked the city, location of AES Central Region office, because it has lots of trees and flowers, which are entirely lacking in Resolute. It also enabled her to go swimming whenever she wanted — something she could hardly ever do back home. Minnie liked Winnipeg because she had lived there for seven years as a housewife while married to a Department of Transport engineer and she still has friends and relatives there.

Every once in a while, while being interviewed in the easy chair, with very little

by way of excuses, one of them would walk briskly to the other side of the office. A key moment had arrived — the time for hourly observations — something not to be missed on any account. There was first a quick check of the mercury barometer, the electronic thermometers, the barograph, the anemometer dial, then a brisk walk outside to observe clouds and general weather conditions; all these details were entered in a large chart in neat columns with synoptic details ready for transmission by computer to the Arctic Weather Centre in Edmonton and the Canadian Meteorological Centre in Montreal. The work is all over in about 10 minutes, but while they last, the observations are a high point in concentration for the two women.



Gordon Black, editor of Zephyr, poses with Minnie Nungaq (left) and Tabitha Kalluk at Resolute weather office.

Back in their easy chairs, Minnie and Tabitha are more relaxed. They talk about their springtime hobbies: ice fishing, skiing, skidooing, camping; but they stress these are just hobbies and do not stop them from pursuing a permanent year-round job with annual leave taken in the summer.

Although METTIP is basically designed for native people who wish to work and train in their own community, the two Resolute women express a readiness to travel. Mind you, Minnie mentions her four children ranging in age from six to 17. One of them is attending high school in the Baffin Island community of Frobisher Bay some 600 km away. Once Minnie has completed her two years of on-the-job training as a met tech and upper air observer, she realizes she may be asked to serve in other Arctic locations, possibly in a CARS station (a community satellite station run by the Territorial Government). She is flexible and says she doesn't mind, as long as she can live in a community that provides high school education for her children. Adult educator, Jack Hicks, says that both women are progressing satisfactorily towards grade twelve level and are doing especially well in math and physics.

As for herself, Minnie says she is pleased that her own education is being upgraded

through attendance at the Village adult education centre most afternoons. She spends half her day at the weather office, the other half studying in the cheerful, modern centre, which even contains hydroponic plants. Tabitha too is very glad of this educational opportunity.

Distance seems no object for the women, whether for work opportunities or for more training. It's uncertain whether they'll be going the usual route to the Transport Canada Training Institute (TCTI) in Cornwall. Instead they might go to Arctic College in Frobisher Bay to do formal aerology classroom training. Eventually after two years they are expected to obtain an EG-2 or EG-3 position without altering the current qualifying standards.

The Inuit women look forward to their careers with an air of confidence and know that basically duties are changing rapidly and stereotyped southern hiring practices are being abandoned; "the sky is the limit", say the METTIP people, referring to Minnie and Tabitha and to the three other AES trainees in Coral Harbour and Baker Lake, N.W.T. By this they imply that such people might one day qualify to be a station officer in charge.

Talking of careers is only part of the fascination of interviewing Minnie and Tabitha. There are lots of interesting asides. Minnie occasionally likes to talk about goings-on in the Village and the current lack of a day care centre. She says she has dim memories of Inukjuak (Port Harrison) in Northern Quebec, the Village where she was born and from which she came to Resolute with her parents in the fifties.

Though she does not talk about it very much, she is proud of her father, Levi, who for many years has acted as organizer of Arctic survival courses for the Canadian Forces and who puts the military through some of the toughest cold weather training in the world, with the mean temperatures reaching the minus forties.

Tabitha also has to be coaxed to talk about an incident that happened to her in the spring. As she was preparing to come to work, she spotted a polar bear coming in from the bay. She immediately went back into the house and got a 303 rifle. She shot the bear with it, then calmly climbed on to her skidoo and came to work at the weather office.

Tabitha is a young woman of wide interests — she plays volleyball in the recreation hall, likes to watch scientific programs and horror films on TV or video recorder and is a keen photographer.

She didn't mention it at the interview, but her father is one of the men getting into the kayak in the Arctic scene on the old \$2 bill, now being replaced by a very un-Arctic robin.

Both women seem to be bursting out all over with motivation in their new-found careers. A second revolution has certainly hit Resolute.

by Gordon Black

St. John's Weather Office advises historic Dutch balloon flight

by Harold J. Janes

Our involvement with the Dutch Balloonists began in the fall of 1984 when Arie Steenhuizen, meteorologist at Schiphol Airport, Amsterdam, visited our office to determine what meteorological support for the flight would be available. All they needed was good lift-off weather from St. John's with winds less than 5 knots — no severe weather across the Atlantic; a 35-knot tailwind in as straight a line as possible and good landing weather in Europe between Bordeaux, France and Hamburg, Germany. Our reply was: simple — no problem.

The above conditions occur infrequently, with the highest probability in August. Crew persons Henk Brink, Evelien Brink and Evert Louwman arrived in St. John's on July 10, 1985 with a single strategy: wait for the right weather conditions. A detailed daily weather briefing was provided by the St. John's Weather Office for the crew covering all aspects of weather across the ocean. We do many transatlantic briefings for small aircraft but a balloon flight takes more care, remembering of course, that the balloon has no directional or speed control and only limited vertical movement. The only weather data not available at St. John's was the 700-mb Analysis (Oceanic Strip Map) which was provided by Gander twice daily on the fax circuit.

The Balloon Foundation had set up a command post at Schiphol which, among other things, would monitor weather patterns across the Atlantic. When the situation seemed viable, they would alert the Balloonists and contact the St. John's Weather Office for discussion.

Although the synoptic situation might dictate a favourable pattern, they realized that our knowledge of local effects around Newfoundland and the western Atlantic would be indispensable. This proved correct. Twice when Schiphol indicated a "go" situation, we convinced the crew of the **Flying Dutchman** to delay. Captain Brink said at the time it was the right decision, but he told me this year in retrospect, it would have been disastrous had they gone with Schiphol.

The ideal weather pattern eventually arrived on August 24, and after discussion with Schiphol early that morning, we decided that all meteorological parameters would be met, even the light winds at St. John's! Balloon inflation requires less than 5 knots of wind and that evening it was dead calm and after a final weather briefing it was inflation and lift-off. It appeared to be a perfect weather situation but due to a faulty valve, our three balloonists ditched in the ocean at about 30°W.

Part two of the adventure began in April, 1986, when Captain Henk Brink came to St. John's to present our office with a certificate for helping the **Flying Dutchman** establish a World Record for Altitude (4410 m) and two National Records for Distance and Duration. He added they would be re-attempting an Atlantic crossing this summer in a new balloon The **Dutch Viking** and with a new crew member, Wilhem Hageman replacing Evert

Louwman. Captain Brink thanked us for our support the previous year, and emphasized more than ever that our expertise was absolutely essential to a successful flight. He added that it would be in the best interest of the Foundation for me to visit the Command Post at Schiphol Airport and meet the meteorologists involved. On May 21, I arrived in Amsterdam and met Captain Brink and four Dutch meteorologists to discuss problems and exchange information.

The Dutch had a sophisticated computer set-up which plotted the balloon's trajectory 72 hours in advance. They arranged that when their computer showed an acceptable trajectory, they would contact me for discussion; especially on lift-off weather. The crew and the balloon arrived in St. John's late in July and after the initial round of media interviews, settled down to await "ideal weather". Because balloon flight is so weather-dependent, the St. John's Weather Office, in general and myself, in particular, were highly visible to the media and constantly gave interviews and provided information to radio, TV and press including the Dutch daily newspaper, **Algemeen Dagblad**. In addition, a half-hour documentary on the flight was shown on T.V. which included the final weather briefing.



The Dutch Viking just prior to lift-off at St. John's, Newfoundland. Crew, left to right: Willem Hageman, Henk Brink and Evelien Brink.

For most of August, wind patterns across the Atlantic were terrible, and offered no promise at all. The local weather was good, however, especially the winds. The mean wind speed for August was 15.2 km/h, compared to a normal of 21.2 km/h. On many calm evenings I feared that when the transatlantic flow became good, local winds would increase to an unacceptable level. Balloon inflation is a critical part of the flight. Once the command is given to inflate, there is no turning back. If the winds exceed 10 knots, the whole flight has to be scrapped. With four years of work put into this venture, Captain Brink was justifiably concerned with local wind effects and relied heavily on our judgement.

Finally, toward the end of August, the Spectrals indicated a straightening of the transatlantic flow at 700 and 500 mb and we got the call from Schiphol to go on 72 hour alert. This meant that Captain Brink would keep in

close contact with the weather office for any sign of change. If, at 48 hours, the situation still looked good, the ground crew would go on alert and at 24 hours, final preparations would begin.

I discussed the situation with Schiphol at 5 p.m. on Friday, August 29 and agreed on lift-off time for Saturday evening, August 30. Jules Roodenbug said he would call me again at 5 a.m., our time, Saturday morning to confirm. It looked very good then; the flow across the Atlantic was almost a straight line at 500 and 700 mb with a speed of 35 knots. Also, a large high pressure system, covering most of the USA, was ridging into our area behind a cold front that had passed through St. John's overnight. After a call to Don Cameron in Gander for confirmation, we decided it was a "go"! I left the office and briefed the crew at their quarters in Pleasantville, deciding for a midnight lift-off. I suggested that I keep an eye on the weather during the day and arranged for a final briefing for the crew at 5 o'clock that afternoon.

During the day I noticed a heavy band of cirrus with some stratocumulus beneath it approaching from the east. Satellite photos showed that the cold front that had gone through the night before was returning. This meant that the balloon's track would be closer to the front than previously thought and it could present a problem. At the 5 p.m. briefing, Captain Brink said the cirrus shield would actually help by modifying the expansion and contraction of the helium caused by the sun. The new progs showed that the zonal flow would persist across the Atlantic at 700 and 500 mb with no significant weather. A large ridge of high pressure was also pushing into Western Europe on the surface. The winds at St. John's Airport had remained steady at 10 knots and were less than that at Fieldian Grounds where the launch would take place. The decision was made to inflate.

Despite the 1985 **Flying Dutchman's** ditching in the Atlantic the **Dutch Viking** tried again in 1986 with improved valves, better equipment and a wealth of experience. All they needed for success was good weather. Suddenly, Captain Brink became concerned because the wind had increased to about 10 knots. A quick call to the weather office found that the winds there were still at 5 knots. The Fieldian Grounds were at the eastern end of Kenmount Valley and cool air was funnelling through. How long would it last? I felt it would be short-lived but no chances could be taken at this stage. The crew suited up and final checks were made. By eleven o'clock, the wind had decreased to 5 knots and the tension was relieved but lift-off was imminent in the next hour.

Before they climbed into the capsule for the last time, the crew said goodbye to all their supporters in St. John's. As Captain Brink poured water over the side from a container, the balloon and capsule rose slowly and majestically into the night. The **Dutch Viking**

Continued far right

EMPLOYEE EQUIPMENT



Weatheradio programs originate, primarily, in across-Canada Weather Offices. The set-up at the Toronto Weather Office (TWO) is typical, with standard equipment and basically standard program content, which nevertheless will vary in certain details according to area and season.

TWO is laid out on the second floor of the Administration Building at Lester Pearson International Airport. The shift supervisor, Ron Huibers, is to be found among the weather technicians over in one of the corners of the office.

Ron is a representative AES weather technician. He took his basic course in 1974, went up to Moosonee in December, came back to Toronto for upper air and seismology training, then was sent up to Isachsen in the arctic for seven months as upper air technician. He subsequently did upper air work at Churchill, Manitoba and upper air and surface duties at Big Trout Lake. He returned to Toronto during the winter of 1979-80 and rose to become supervisor in 1983.

Weatheradio information must first be collected, assimilated and edited before it can be programmed. Ron has all the technology and personnel of the Weather office to assist him in these tasks. Behind his back, where he sits near a telephone and a video display terminal, there is a small room with a sound proof door. Inside this room there is a console with a jutting microphone and a tall cassette deck with plug-ins for seven cassette tapes. The Weatheradio program is broken down as follows:

The first tape contains the station identification, followed by an announcement in French telling francophone listeners where they can receive information in French. The second tape is a general synopsis referring to weather systems affecting the region. The third tape is the public forecast for today and tomorrow along with the outlook for the following three days. The fourth tape gives sky condition, temperature, wind, humidity and



pressure for the metropolis, plus sky conditions and temperatures for points in southern Ontario. Wind speed is given in knots for adjacent waters. A summary from the nearest radar station giving precipitation locations and motion is included along with a repeat of any weather watches and warnings if appropriate.

The fifth tape varies for different times of the year. A broad idea is given of the weather conditions for aviation, plus marine forecasts covering lakes and coastal areas. The sixth tape contains agricultural information and runs from April through October. It supplies data about drying indices, growing degree days, and corn heat units. Every Monday morning, the broadcast includes a statistical summary of last week's data, totals for the year, and comparisons with last year.

The last tape has times of sunrise/sunset today and tomorrow, as well as yesterday's high and low temperatures for the metropolis compared with last year while pointing out any records. Heating degree days — days are also included. This tape also incorporates weather highlights from all over North America — and in winter, road condition reports.

Any one of these seven cassettes can be extracted from the tape deck and plugged into the console to be re-recorded, while the other six tapes remain the same. One of the toggle switches on the console can be flicked to make weather radio receivers buzz to alert listeners to an urgent message. Weatheradio Canada alerts users to warnings of severe weather automatically, provided receivers are equipped with suitable warning devices. Information is broadcast to weather radio receivers from transmitters in most major urban centres in Canada.

Users of Weatheradio receive the product over fairly inexpensive VHF-FM radios, some compact enough to be carried in a shirt pocket. Weatheradio broadcasts are also carried by many Cable TV companies as an audio background to an information channel.

What about us?

For years oceanographers gazed longingly at those weather-satellite photos displayed on the nightly news and wondered: What about us? While there are satellites that measure highs and lows in the atmosphere, there is nothing comparable for the oceans. Until recently information about the oceans came from random sources — a weather buoy here, a research ship there. This has troubled oceanographers because, although looking at the atmosphere allows you to predict the weather days in advance, studying the oceans could let scientists predict climatic conditions months, even years, ahead.

Now NASA has decided to give oceanographers a satellite of their own. Called TOPEX (for ocean topography experiment), the spacecraft is a joint U.S.—French project scheduled to head into orbit in five years aboard France's rocket Ariane. Its assignment will be to criss-cross the ocean for three years, using radar to measure the precise distance from the satellite to the ocean. By knowing the height of the seas, oceanographers will be able to extrapolate the size and directions of ocean currents and be able to update their readings.

This information is particularly valuable because ocean currents are the engines that power climatic changes. A notorious example is EL Nino, an unusually warm ocean current found in the Pacific off the coast of South America. Every two to seven years El Nino swells with power and wreaks havoc on the world's weather system.

In 1982 and 1983 it caused wide disruption in weather on six continents and was blamed for 800 deaths and billions of dollars of damage, ranging from rain-triggered mudslides in California to droughts in India. At the moment scientists know little about what the Pacific is doing at any time. They can't even agree on an unusually strong El Nino.

With TOPEX this will no longer be a problem. To the satellite's radar eye El Nino will stand out like a storm cloud in a clear sky.

From an article by Doug Stewart in OMNI.

Continued from page 6

drifted slowly in a northeasterly direction over St. John's and out to sea towards Europe. The rest is history. The **Dutch Viking** landed in Holland 51 hours later setting such records as the fastest transatlantic balloon crossing; the first Europeans to cross the Atlantic in a Balloon, and concerning Evelien Brink, the first woman to cross the Atlantic in a balloon.

On Tuesday, September 2, Command Post at Schiphol called the St. John's Weather Office to offer congratulations on a job well done. On Tuesday night, Captain Brink called me at home to express his appreciation and told me "I couldn't have done it without you".

We, at the St. John's Weather Office, were happy to be able to contribute to the success of such an historic event as a transatlantic balloon flight. We were really part of the adventure, and we demonstrated the kind of service and expertise that has come to be expected from Environment Canada.

Mr. Janes is OIC, St. John's.

Project Stratoprobe a partial success

On July 30 the Experimental Studies Division of AES launched a 20,000 cubic metre helium filled balloon from Ainsworth, Nebraska, in association with a U.S. ozone layer study called SAGE (Stratospheric Aerosol and Gas Experiment). The balloon was launched at 01.00 hour Central Daylight Saving time and by 04.00 hours had ascended to a float altitude of 29 km where it awaited sunrise. At sunrise, the balloon was valved down to 18 km where it took its various measurements. Its payload carried an infrared emission spectrometer, an instrument that measures gases by remote sensing of various bands of the atmospheric emission spectrum. When the balloon descended below 18 km, the project was terminated by tele-command and the payload parachuted safely to earth.

This Canadian participation in an all-American group flying instruments between July 27 and August 3 was called Project Stratoprobe and a team of ten research personnel from Experimental Studies Division, AES, took part in it.

Canada has operated the Canadian Ozone Monitoring Network and the World Ozone Data Centre for the World Meteorological Organization for more than 20 years now and is a leader in the field of measuring the

emission of chlorofluorocarbons via aerosols and refrigeration into the atmosphere.

The experiment was important because it was the first major attempt to monitor the ozone layer since Canada signed the Vienna Convention for the Protection of the ozone layer in June.

The success of the mission however was not total. Lewis Poulin, one of the AES scientists participating in the event, describes what happened.



Night launch of AES stratoprobe balloon

"By Thursday, July 24th the instrument was flight-ready. Then began the wait for launchable weather conditions i.e. no thunderstorms and light surface winds. Was this too much to ask for in this land of windmills?"

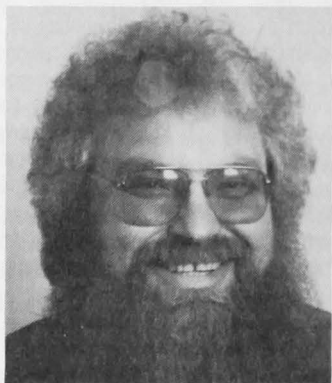
Flight one was launched at 03:00 CDT July 27. After a bumpy lift-off a 600,000 cubic foot balloon lifted the instrument to 30 km. Measurements for ozone, nitrogen dioxide, water vapour, dinitrogen pentoxide and aerosols were made and good quality data was received. The flight lasted approximately five hours and the payload touched down about eight kilometres from the hotel in Valentine where AES personnel were staying during the trip.

The second launch was on the evening of August 1. Weather conditions were perfect i.e. light winds and diamonds in the sky. The balloon was released and quietly rose.

We realized the launch failed when the balloon was dragging the payload across the runway instead of lifting it. The launch crew quickly separated it from the balloon and the mountain of plastic, along with our hearts, sank to the ground. Another balloon had failed at launch."

This would bring to an abrupt end the 1986 AES balloon campaign. The equipment was packaged for the long voyage home and AES personnel trickled back to Toronto.

Merit award to "average" AES employee



Larry Solar

The Public Service Merit Award presented to Larry B. Solar of Ice Reconnaissance Division last December is of more than usual interest to the "average" AES employee. The citation four pages long, includes the following:

Between August 1981 and August 1982, AES undertook a series of major experiments to improve our understanding of the microwave properties of floating marine ice, at different seasons of the year. Two of these experiments were international and were based at Mould Bay, N.W.T., and took place during October 1981 and June-July 1982. Larry was assigned as coordinator and field manager of the two international projects.

During the October 1981 experiment, Larry's logistical effort involved "transporting major amounts of equipment by aircraft from Pond Inlet via Resolute to Mould Bay, using a

Bell 206 helicopter, and setting up a camp on an ice floe in Crozier Channel". He anticipated the needs of such investigators as the University of Kansas and the National Research Council, and freed them from routine tasks. According to the citation "It takes a rare individual to provide this kind of dedication, far-sightedness, and physical and moral support to an important program." One final task of the October experiment involved improvising support from local AES personnel.

Larry was then given full responsibility for setting up the far more complex June-July 1982 experiment. "The summer experiment consisted of principals from the Universities of Washington and Kansas, the Jet Propulsion Laboratory, the National Research Council, and AES — a total of 19 people, using two Bell 206 helicopters. In short, Mr. Solar assembled the entire field logistics.

Regarding shared costs of the experiment, Mr. Solar was able to arrange payments from the U.S. to the right Canadian authorities and he broke new ground showing AES how to collect payments from the U.S. government.

In spite of the breakdowns that inevitably plague field experiments, 95% of all goals were achieved.

Larry, an Ice Observer, thinks of himself as an "average AES employee", who had never handled complex logistics before.

In the next issue we will give details of a parallel award bestowed on Ken Asmus, also of Ice Branch.

Last May, 15 new meteorologists graduated from the MOC 4 course after seven months training in Montreal. The unusual thing about this was that six of the graduates were women. Three of these have been posted to the Gander weather office, and the other three women have been attached to other weather offices around the country.



Left to right, front row: Sylvie Bergeron, Eve Christian, Carole Marchand; back row: Diane Ouellet, Manon Lajoie, Anne-Marie Valton.

Christmas at the South Pole

by George Whitfield

Scientific expeditions have recently been to the South Pole trying to find the cause of emissions that have drastically decreased the amount of protective ozone in the stratosphere. Only 70 years ago explorers were still discovering Antarctica itself.



Ernest Shackleton

The trouble with Shackleton was — they were walking instead of skiing. They were four members of the British Antarctic Expedition — Frank Wild, Eric Marshall, Jameson Adams and (Sir) Ernest Shackleton. Shackleton was the leader of the expedition and had decided to walk instead of ski.

Shackleton figured as follows: His ship **Nimrod** was anchored in McMurdo Sound at the foot of the Ross Ice Shelf. It had to sail for home on March 1, 1908 — otherwise it would be frozen in for the rest of the Antarctic winter. The expedition had no relief ship to deliver supplies to McMurdo Sound so the **Nimrod** had to be out of there by March 1.

That was perhaps the fatal flaw in Shackleton's expedition. It was underfunded. There was no money to pay for a relief ship. Shackleton was a merchant marine officer who had been third mate on Scott's 1902 Antarctic expedition. He was an epic man in search of epic achievements and in 1902 he made up his mind to be the first man to set foot on the South Pole.

Back in England after the Scott Expedition, he was unable to persuade the science societies or parliament or Buckingham Palace to fund his expedition. So he had to solicit funds from private sources.

He might have gone on soliciting for another year until he was properly funded, but he was impatient. He was scheduled to go up the Ice Shelf on October 29, 1907 which gave him 120 days to walk to the Pole and be back by March 1.

The great veterans of Arctic exploration, Nansen and Amundsen said he **must** take dog

teams and skis. But Shackleton had never bothered to learn how to ski. As for dog teams, he and Scott had taken dogs up the Ice Shelf in 1902. They reached latitude 82°17' and had to return. They had mismanaged their dogs to death. What were the alternatives? Strangely enough, an automobile or Mongolian ponies. The new-fangled motor car complete with crank-up starter was donated to the expedition by industrial tycoon, William Beardmore, in order to advertise his new automobile plant. It was unloaded off the **Nimrod** and placed in the snow at McMurdo Sound. The engine purred beautifully but the wheels spun uselessly in the spoke-deep sand-snow. It was promptly loaded back on to the **Nimrod** and the task given to the ponies.

Shackleton gave stern orders to the **Nimrod** to clear the Sound on March 1. "If we are not back by then, give us up for dead". With that the four men set off with four ponies up the Ice Shelf.

In order to make the round trip, they had only to keep to an average speed of 13½ miles (20 km) a day. This was reasonable if the Ice Shelf extended all the way to the Pole. The Ice Shelf was a vast, flat, snowy waste thrusting deep into the heart of the continent. Nobody had been up the Ice Shelf, there was a 50-50 chance of it going all the way to the Pole.

But it didn't. On Christmas Day, 1907 four undernourished scarecrows pitched their tent near the top of the Beardmore Glacier. The mountain ranges on the east had swooped around in front and cut off the Pole.

Three of the four ponies were dead before the mountains were reached and, near the foot of the glacier, a snow bridge had collapsed, sending the last pony down into Hades. The four explorers slipped, slid, scrambled and

clawed their way hundreds of kilometres up the glacier, pulling a single sled behind them. It was a miracle they were still alive on Christmas Day. They might have fallen down one of the hundreds of ice crevices.

Shackleton, the designated meteorologist noted, "Winds at half-gale force, temperature minus 29° (Celsius), skies clear. Marshall recorded with his theodolite, "Latitude 85°05' South, Longitude 163° East; elevation 1,300 metres. **Nimrod** was 550 miles (900 km) behind them, the Pole still half that distance in front. It was clear they were not going to reach the Pole. The glacier had put them two full weeks behind schedule.

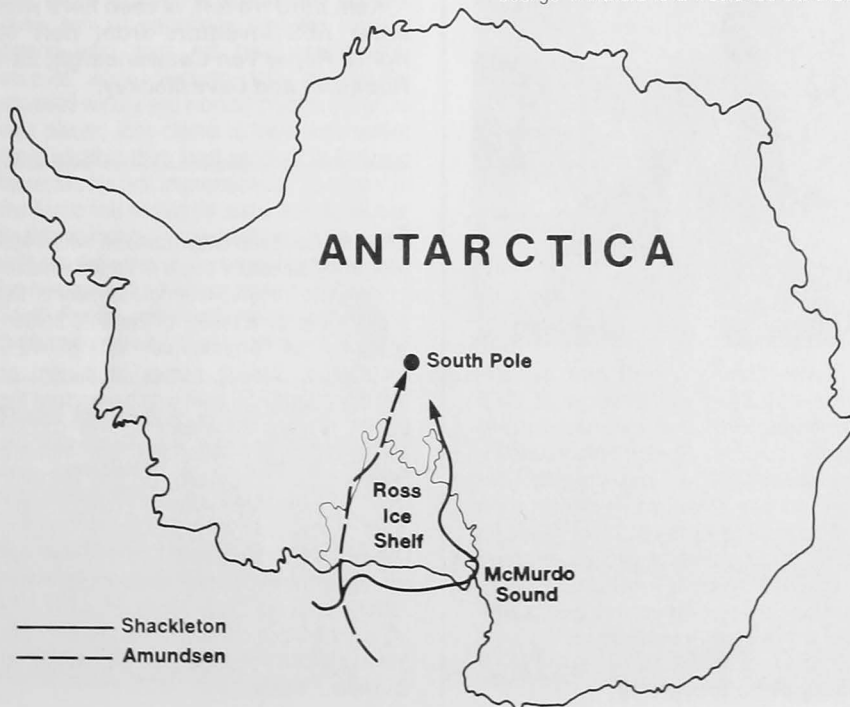
Antarctica is an island continent surrounded by icebergs, an ice-pack and vast, tumultuous seas. Onshore all life ceases. There are no Inuit or polar bears, or flowers or insects — not even a virus. Antarctica is a desert. There is no precipitation — only blizzards, produced by high winds whipping up the sand-snow into blinding "moon" storms. There are a million hectares of silence. The main difference between Antarctica and the moon: the former at least has free air to breathe.

They were downcast because they weren't going to make the Pole. Shackleton's epic achievement was out of reach. Of course he could still get there. But none of them would ever get back alive to tell the tale. The next best epic achievement was to get his men back alive to the **Nimrod**.

Overcome by misery and disappointment as they were, it was still Christmas Day. From the pitiful remains of supplies on the battered sled, Shackleton brought into their tent a bottle of cream de menthe and a box of cigars he had stashed away at McMurdo Sound for this very day.

Replete with some Christmas cheer, they crossed latitude 88° South which at least brought them within 100 miles of the South Pole.

George Whitfield is a freelance contributor.



ZEPHYR BREEZES

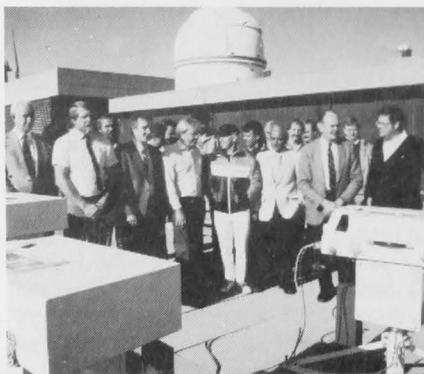
As a Christmas treat we would like to quote some questions and comments sent to Communications Directorate, Downsview, by some grade-three Vancouver schoolchildren after their teacher decided to lay on a short meteorology course:

"Dear department of Environment . . . have there ever been two storms at the same time? How long was the longest rain for? Has there even been a drought in Canada, if so how long? Was there a blizzard in Vancouver, if so when and how long?"

"My class is learning about weather and I would like to ask: Could acid rain make my hair green? How does a tornado form? How does a dust storm form? How does a wind storm form? and show storms form?"

"I should like to know what kinds of tools you use to tell the weather — like a list of things numbered one to 20. I have always been interested in the weather. So if possible please get me a list of tools that you use."

"Some types of weather are air currents which is a movement of air and a rainbow which has seven colors and a meteorologist which studies weather. How do you know all these things on weather? Is this how a tornado forms: when hot air meets cold air, then it starts to form a shape like a funnel? Do you like to be a person that knows all about weather?"



Dr. Wayne Evans (right) and the Experimental Studies Division at AES Downsview with the award winning Brewer Ozone Spectrophotometer (foreground). The instrument, designed by the Division, recently won the Bronze plaque in the Canada Awards for Excellence program of the Ministry of Regional Industrial Expansion. The instrument is a unique, state-of-the-art device now used on a global basis to keep tabs on the ozone layer in the upper atmosphere.



Although it tries to cover as many staff awards as possible, Zephyr has perhaps not given enough attention to AES inventors.

As public servants, the people who are supposed to shout "Eureka!" when they stumble across some complex or subtle innovation pertaining to their work are quite often forgotten or at least not given their due recognition for a lengthy period of time.

Ken Devine who worked on something called the Mater Decocoder Graphics Computer was pleased along with his colleagues to receive a modest royalty payment from Canada Patent and Development Limited at a ceremony presided over by ADMA Howard Ferguson at AES Downsview on May 29. Devine says it isn't the money, but the satisfaction of receiving some credit for his past work that counts.

Ken, third from left, is seen here with other AES inventors from (left to right): Roger Van Cauwenbergh, Earl Robinson and Dave Mackay.

The new Canadian Encyclopaedia, which has been in circulation for a year or so and which in its compact three-volume format adorns the bookshelves of libraries, offices and homes, contains an impressive list of AES contributors. Among names of current or recently retired AES staff who have added the benefit of their knowledge to this concise compendium of Canadiana are Howard Ferguson, Jim McCulloch, Dr. Phil Merilees, Alex Chisholm, Mike Newark, Dave Phillips, Gord McKay, Morley Thomas, Dr. Warren Godson and Bill Markham. All the above have contributed items related to their specialties ranging from the future of the Great Lakes to the chemical composition of the stratosphere, from ice-flow patterns to the future of Canadian climate.

On page 9 George Whitfield gives an account of Ernest Shackleton's epic journey across Antarctica 70 years ago and also of a Christmas celebration held by the participants. Only a year earlier R.F. Scott had set out on his ill-fated expedition to be first at the South Pole. This time "Christmas" was celebrated in the middle of the polar night, June 22, 1911. They made a Christmas tree from sticks and Skua gull feathers and decorated it with coloured paper flags and presents. The elaborate mid-winter menu, depicting McMurdo Sound, on the cover lists such items as consomme seal, roast beef and Yorkshire pudding, plum pudding, mince pies, caviar Antarctic, various bonbons, wines, champagne, brandy, punch, liqueurs, snapdragon and buzzard's cake.



Photo contests were held in all regions of Canada this summer in order to obtain high quality photographs for the new 1987 AES Weather Trivia Calendar. The contests were open to both AES staff and to volunteer climate observers who do highly valued work for the weather service by taking twice daily temperature and precipitation readings. Two major winners in AES Western Region are both volunteer weather observers. They are Ray Grosso of Rocky Mountain House, Alberta and Wilf Kenyon of Lloydminster, Alberta. The picture shows Mr. and Mrs. Ray Grosso receiving an award from Joe Kotylak, A/regional director, AES Western Region. Mr. Grosso's winning photograph appears on the cover of the 1987 calendar.

ATMOSPHERE PEOPLE



John McBride

John McBride is currently working on policy and planning for Weather Services Directorate in Downsview. Although the process takes a while to bear fruit, John is always pleased to see part of his work actually become AES policy. Much of his expertise stems from his more than 25 years as a meteorologist spent in many locations from the High Arctic (he spent 13 months as OIC at Resolute) to cruising the North Atlantic aboard the aircraft carrier **Bonaventure**, seconded as the official weather officer.

John's meteorological career alone would qualify him as an Atmosphere Person. But the truth is, John lives, breathes, absorbs, digests and observes the atmosphere every day of the year. He is an extremely athletic person practising a wide range of energetic or relaxing sports — scuba diving, Alpine skiing, parachuting, track and field, underwater hockey, golfing, to name a few. Instead of driving a car, John goes everywhere on his 1980 Honda 500 motorcycle. He finds direct contact with wind, rain, hail or sunshine far more invigorating than sitting in the glass bubble of a car. He says he felt a similar proximity to the elements during the several summers he flew as a navigator for the RCAF, sometimes needing to don an oxygen mask to cross the Rockies in a DC3. He felt even closer to the weather as a private pilot.

John's outside activities are so varied and intense, he should by rights call himself a

biosphere person. True, his exposure to the lithosphere has been limited to exploration of a few bat-infested caves in Puerto Rico; but his mastery of the "hydrosphere" is second to none. Always a strong swimmer, a keen sailor and a skilled diver, John, for the past dozen years has been an avid underwater hockey player. Starting with a Toronto team, he rose to become organizer of an Ontario association; took part in national and international tournaments as player, organizer, referee, rulemaker and games commissioner. Finally in 1986, as manager of the men's team in Adelaide, Australia, he shared the victory when Canada won the world cup in underwater hockey.

John describes underwater hockey as a cross between water polo and ice hockey, though it differs from both. He explains that the game is played by whooshing the metal puck with a special wooden stick along the bottom of a swimming pool. A snorkel is worn to enable players to rise close to the surface for quick breaths, but he insists that 80% of underwater hockey is played "deep down" holding one's breath.

It was thrilling to have had the championship game featured on live TV coast-to-coast in Australia and to have spoken on a Dutch radio station in Adelaide. John appreciates the opportunity of making lasting friends on the international sports scene.

To help him with his above-water activities, John has always taken advantage of his meteorological knowledge. He claims that knowing how the forecast will turn out gives him an advantage over the average person who does not take weather into account when planning activities. Having travelled widely and worked in some out of the way places, John claims to have experienced more weather than most people. For instance he recalls his first impressions of "sun dogs" in the Arctic and finding the snow so hard he was unable to make any impressions in the snow with his vehicle or make regular turns on skis. He has spotted a typhoon from a plane in the South Pacific, witnessed waterspouts off the Bahamas and while flying north from Florida

claims to have seen phenomenally spectacular lightning in a huge wall of thunder clouds. His overall impression of Canadian weather and climate is the infinite variety of the seasons, the endless variability, allowing him to indulge in every imaginable outdoor activity. (Next year for a change he is likely to go hang-gliding and perhaps do some more underwater photography in connection with his scuba diving expeditions.)

One of John's eeriest atmospheric experiences was finding himself becalmed for 2 days in the Caribbean with six fellow sailors aboard a sail ship heading from Antigua to Halifax. "For two days the sea was like a mirror, we could not advance under sail. It was the complete doldrums".

Even when he isn't revelling in the atmosphere, John finds plenty to do in his spare time. First he is an active participant in an Ontario prison-visiting program called M2W2. He is both a regular visitor and is on the executive. He claims that it is important for all prison inmates to have an "independent", outside friend. John is also known for frequently giving blood at AES blood donor clinics.

Although this portrait of John McBride deals mainly with his outside interests, John also talks convincingly about job satisfaction. This can mean anything from a nostalgic look back to his days aboard the **Bonaventure** where as a temporary member of the Senior Service he participated in "state receptions" at almost every port of call, to feeling pleased at having the opportunity to help organize bilingual meteorologists-in-training courses for the Université du Québec à Montréal. He also says he greatly enjoyed participating in a DOT management course in transportation, where he was given first-hand knowledge of everything from harbours to subways.

The most satisfying moment of John's career probably came right at the beginning. After graduating in math and physics from McGill University, he had to decide whether to work full-time as an air force navigator or to take up meteorology as a profession. He chose the latter — and has never since regretted his decision.

Breezes continued

A Zephyr reporter overheard the following conversation in the cafeteria of the Department of Transport hostel, Resolute Bay, High Arctic, just across from the weather office. First diner: "It'll soon be Halloween, got your Halloween costume?" Second diner: "It'll soon be Christmas; got your Santa suit?"

These icy wastes at Alert, N.W.T. the world's most northerly weather station are surveyed by a strange multi-mouthed creature, right. Guess what it is? The lower part suggests a mysterious native sculpture, but the furry nose gives the game away. It isn't a nose at all — it's part of a parka — belonging to Dr. Neill Trivett, who spends time at Alert supervising the Arctic pollutants laboratory there.



CHANGEMENT DE PERSONNEL = STAFF CHANGES

Nominations/Avancements Appointments/Promotions

G.M. Shimizu (EX-3) Directeur général/
Director General, ACDG, Downsview, Ont.

S. MacPherson (MT-3) Météorologiste/
Meteorologist, ARPP, Downsview, Ont.

W. Edmond (EG-4) Techn. en aér./U/A Tech.,
CAED, Winnipeg, Man.

S. McGuire (FI-1) Agent financier/Financial
Officer, AAFA, Downsview, Ont.

K. Garrison (FI-1) Agent financier/Financial
Officer, AAFS, Downsview, Ont.

Mutations/Transfers

J.A.W. McCulloch (EX-3) Directeur général/
Director General, CCDG, Downsview, Ont.

W.J. Crowley (MT-6) Météorologiste/
Meteorologist, ACSI, Downsview, Ont.

J. How (EG-2) Techn. en mét./Met. Tech.,
SM3/WS3, Cape St. James, C.-B./B.C.

C. Powell (EG-2) Techn. en mét./Met. Tech.,
SM3/WS3, Cape St. James, C.-B./B.C.

R. Campbell (EG-2) Techn. en mét./Met. Tech.,
Vancouver, C.-B./B.C.

C. Dale (EG-2) Techn. en mét./Met. Tech.,
SM3/WS3, Lytton, C.-B./B.C.

P. Madhaven (CS-2) Programmeur/
Programmer, AWSC, Downsview, Ont.

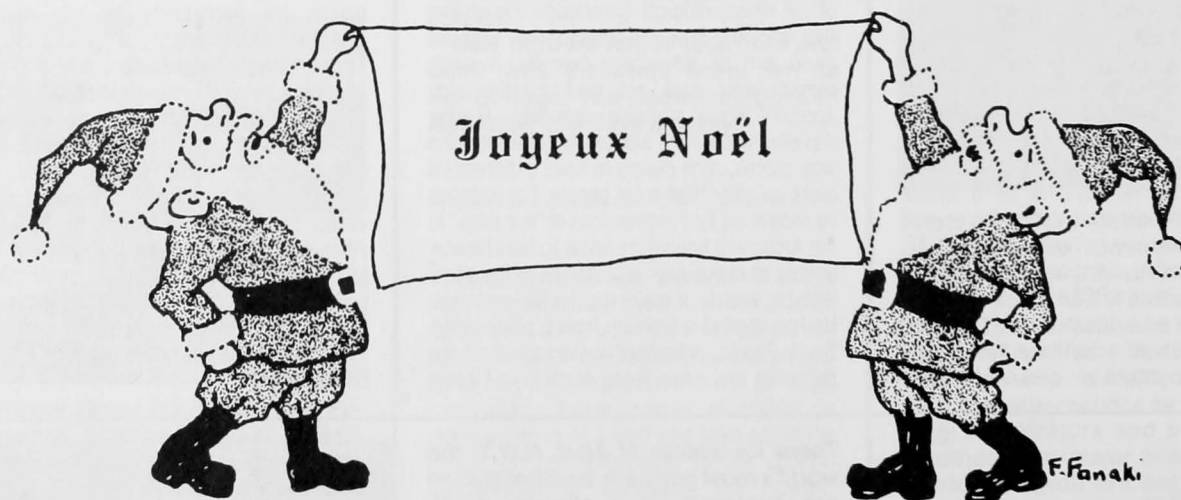
G. Pearson (MT-6) Météorologiste/
Meteorologist, ACET, Downsview, Ont.

P. Beauchemin (FI-2) Agent financier/
Financial Officer, CMC, Dorval, Qc/P.Q.

D. Lesperance (ST-OCE-2) Opér. trait. de
textes/Word Processor Operator, CMC,
Dorval, QC/P.Q.

F. Panet-Raymond (MT-3) Météorologiste/
Meteorologist, PWC, Vancouver, C.-B./B.C.

R. Héroux (MT-2) Niv. perf. mét./Met. Dev.
Level, CMQ, St-Laurent, Qc/P.Q.



D.L. Waugh (MT-5) Météorologiste/
Meteorologist, NWC, Gander, T.-N./Nfld.

Y. Pelletier (MT-2) Niv. perf. mét./Met. Dev.
Level, WAED, Edmonton, Alb./Alta.

J.R. Belanger (EG-2) Techn. en mét./Met.
Tech., NWC, Gander, T.-N./Nfld.

B.H. Perry (EG-6) Instructeur/Instructor,
TCTI, Cornwall, Ont.

S. Leger (EG-4) Techn. en aér./U/A Tech.,
SM1/WS1, Shelburne, N.-É./N.S.

Postes temporaires ou intérimaires Temporary or Acting Positions

L. Traves Metcalf (AS-1) Agent d'admin./
Admin. Officer, ACSI, Downsview, Ont.

D. Mason (EG-7) Responsable/OIC,
BM4/W04, Penticton, C.-B./B.C.

B.S. Hunter (CS-2) Programmeur/
Programmer, MWC, Bedford, N.-É./N.S.

M.H. Prout (MT-5) Météorologiste/
Meteorologist, ACET, Downsview, Ont.

Retraites/Retirements

P. Carlson, ARPP, Downsview, Ont. octobre/
October, 1986.

Détachements/Secondment

K. Schasmin, AAL to AAFA, Downsview,
Ont.

Départs/Departures

M. Cegelski, CMQ — QAEM, St-Laurent,
Qc/P.Q.

M. Charbonneau, QAFA, St-Laurent, Qc/P.Q.

Décès/Deaths —

J. McLaughlin, Cuisinière/Cook, Mould Bay,
T.N.-O./N.W.T. Sept., 1986.

