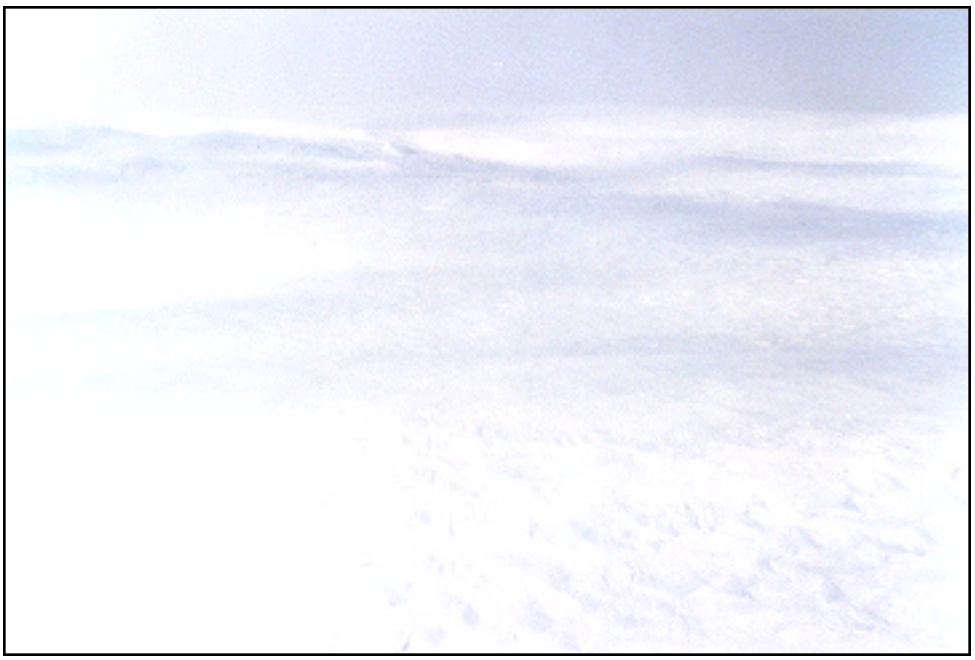
Transport Canada Transports Canada

Aviation Safety

Vortex

Learn from the mistakes of others; you'll not live long enough to make them all yourself . . . **Issue 4/2003**

Whiteout



Back in the old days, a Canso was on a very long IFR ferry trip in the Arctic Islands. For the crew it was a monotonous routine—monitoring the instruments and listening to the roar of the two big radial engines just above their heads. There was nothing to see out of the windows, just a white, featureless blank.

It was a boring and undemanding afternoon, until the captain looked out through the windscreen and saw his flight engineer standing in front of the aircraft with a big grin on his face. This came as quite a surprise to the captain, whose training and background had not prepared him for coming face-to-face with anyone while in cruising flight, let alone a member of his crew.

The Canso had flown into very gentle rising snow-covered and featureless terrain. The impact had been so soft and gentle that amidst the rattling, roaring and vibrating that constitutes cruising flight in this type of aircraft, the crew hadn't noticed the deceleration at all. The flight engineer had happened to look out of one of the Perspex blisters in the tail of the aircraft and discovered that he could see the ground, quite motionless just a few feet below him. So he got the aluminum ladder out, climbed down to the ground and walked round to the front to get the pilot's attention.

Maybe it's urban legend; maybe it's a true story—who knows? I suppose, considering the boat-shape of the Canso hull, that it could happen, but one thing's for sure—it's not likely to happen in a helicopter. I do know one chap who claims to have hit the ice at cruise speed in a Bell 206 on fixed floats, and suffered nothing but a gentle bounce, but the more likely scenario involves a catastrophic break-up, and debris field.

If you are a VFR commercial pilot flying in Canada, sooner or later you are going to experience loss of visual reference to some extent. If you're lucky, it will be for only a second or two before your frantic eyes find a clump of trees or something else that tells you which way is up. If you're not lucky you'll likely join the ranks of those who have found out the hard way that the "seat of your pants" is easily fooled. For those who haven't experienced it, it can happen something like this:

The weather is deteriorating. You know the situation is not good, but you press on, hoping it will improve. It doesn't—it gets worse, and you find

TP202E
ISSN 0823-5554

Canada

yourself losing good reference. Your eyes are darting from side to side and your pulse increases. You slow the aircraft, still searching for visual clues. Your breathing speeds up, and your pulse is now racing. You feel a cold rush flood through your body, and a strange sensation of your insides relaxing as adrenalin and fear overcome concentration and reasoned thought. Then comes the disbelief; the absolute unwillingness to accept that your body has let you down and you are helpless.

Let's look at some examples of descriptions taken from Canadian accident reports from the past few years:

- *During approach for landing on a glacier and at 8 000 ft above sea level (ASL), the pilot of the 205 entered a whiteout-like condition in swirling snow. He lost all visual reference and touched down hard, causing damage to the skid-gear.*
- *Nearing destination, the aircraft flew into whiteout conditions. All visual reference was lost before the pilot could complete a landing, and the helicopter rolled over on touchdown.*
- *The main rotor hit the ground after the left skid dug into snow surface during a mountaintop landing. The aircraft was still in forward motion at touchdown due to wind shift and whiteout.*
- *The sling load proved heavier than the pilot expected, and he couldn't get airborne. He hovered with the load resting on snow-covered ice and lost visual reference in the blowing snow. The pilot released the sling load, while the helicopter was in a nose-high attitude. The tail rotor struck the snow surface and the machine rolled over.*
- *The pilot encountered whiteout conditions and attempted to turn back. The aircraft crashed on the Arctic sea ice during the turn.*
- *The pilot lost visual reference in whiteout over an ice-covered inlet and flew into the ice.*
- *The pilot aborted his third take-off attempt in blizzard conditions. On touch-down in whiteout conditions, the helicopter rolled on its side.*
- *The aircraft struck ice in nearly flat attitude in whiteout conditions…*

The following accident resulted in three serious injuries. One has to wonder about what was going through the pilot's mind when he asked the passenger to "keep an eye on the altitude."

- *The 206 pilot took off on a charter with two passengers for some survey work. The weather was marginal but there were no weather reporting stations in the area, so they decided to "have a look at it." When they turned out over the sea ice to look for some fuel barrels, the pilot soon found himself in whiteout. He asked a passenger to keep an eye on the altitude while he turned the 206 to regain visual reference with the shoreline. In the turn he lost altitude and the helicopter struck the ice.*
- *The ceiling was low and the visibility was poor, in falling snow, but the 206 pilot spotted his party on the lake. Day-Glo cloth markers indicated their location. The ice was covered with four inches of fresh loose snow. As the helicopter entered a pre-landing hover, the rotor wash blew up the loose snow and the pilot became disoriented. The machine rolled and the main rotor blades struck the ice.*
- *The 206 was number two in a group of six helicopters en route from Charlottetown, P.E.I., to an ice flow in the Gulf of St. Lawrence to observe the seal-hunting operation. As the group approached the half-way point, they encountered whiteout conditions in light-to-moderate snow. The ice they were flying over was relatively flat and also featureless. The accident helicopter reduced speed to about 60 kt and descended in an attempt to maintain visual contact with the ice. As the helicopter neared the ice, number-three aircraft radioed a warning to pull up, but the warning came too late. The 206 hit the ice with sufficient force to tear the float gear off and crush the crew and passenger seats.*
- *The pilot landed in a mountain meadow to pick up skiers. As the helicopter did not come out of the whiteout as expected on takeoff, the pilot aborted. The right skid dug in and the machine rolled over.*

Sadly, there are many more examples; they happen every year. What may surprise you is that many of them happen in the summer months, when Mother Nature hasn't yet released her grip on winter in our northern regions. One study found that in the preceding nine years, 25 percent of the whiteout accidents took place during the summer operational season. This may indicate that currency plays a role in both the hands-on skills and decision making required to deal with winter weather.

The vast majority of low-speed take-off and landing accidents are preventable by good decision-making, with careful consideration given to:

- the conditions of the area;
- the recent weather, wind, temperature (is the snow heavy, or light and fluffy?);
- patience; and
- technique (see *"Snow Landing and Take-off Techniques"* in *Vortex* issue 1/2003).

In the en route phase of flight, many human factors gurus and experienced pilots theorize that the stage is set for the accident long before the whiteout condition exists. They believe that if you start the trip with the mindset that you'll return or divert if the weather deteriorates beyond a given point, you are more likely to do so when it does. Conversely, if you have nothing but the destination or an optimistic forecast in mind, you're more likely to press on. This is definitely something to consider when planning your next flight into the frozen Canadian winter.

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The **Aviation Safety Vortex** is published quarterly by Civil Aviation, Transport Canada, and is distributed to all Canadian licensed helicopter pilots. The contents do not necessarily reflect official policy and, unless stated, should not be construed as regulations or directives. Letters with comments and suggestions are invited. Correspondents should provide name, address and telephone number. The Vortex reserves the right to edit all published articles. Name and address will be withheld from publication at the writer's request.
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Agreement Number 40063845

Did You Know?

Canadian Aviation Regulation Advisory Council (CARAC)

CARAC is a joint undertaking between the government and the aviation community (with participation from a large number of organizations outside Transport Canada representing the overall viewpoint of the aviation community), in order to facilitate a consultative rulemaking process. These include management and labour organizations, representing operators, manufacturers and professional associations. The *CARAC Management Charter and Procedures* (TP 11733) sets out this shared approach to rulemaking and is available for viewing on the Web at: http://www.tc.gc.ca/civilaviation/RegServ/Affairs/carac/Charter/menu.htm.

CARAC was established to increase public access and participation in the rule-making process; to discuss and debate issues from various viewpoints; to bring the various rule-making proposals to the attention of senior management at an earlier stage; and to facilitate harmonization with other national aviation jurisdictions. The Council was inaugurated on 1 July 1993 and is sponsored by the Director General, Civil Aviation (DGCA).

The Council is composed of representatives from the aviation community; Transport Canada Civil Aviation (TCCA) and other interested parties, thus providing a consultation forum for the Civil Aviation regulatory program.

The basic structure of CARAC, as illustrated in the diagram on page 5, consists of the following:

1. A CARAC Plenary, which is a general assembly of all members of the Council, whose role is to be the custodian of the *CARAC Management Charter and Procedures*. The Plenary is responsible for establishing and amending, as required, CARAC's rules and procedures regarding consultation, in accordance with the provisions established herein.
2. A Civil Aviation Regulatory Committee (CARC), which is composed of the respective Senior Executives representing all functional authorities of TCCA, whose role is to recommend final regulatory decisions to the Minister. As part of this process, the CARC has the responsibility, on behalf of the Minister, to identify and prioritize regulatory issues and to consider, approve and direct the implementation of recommendations made by the CARAC Technical Committees.
3. Technical Committees, representing each Part of the *Canadian Aviation Regulations* (CARs), whose role is to review and analyze assigned issues and make regulatory recommendations. These Technical Committees consist of representatives from TCCA, the aviation community and other interested parties. *continued on page 5*

In This Issue

Airframe Engine Inlet Snow and Ice Contamination Warning

The following is a reprint of a Special Airworthiness Information Bulletin *(SAIB) from the United States Federal Aviation Administration (FAA). I thought it was worth sharing with* Vortex *readers. Thanks to Matthew Rigsby, Continued Operational Safety (COS), FAA, Rotorcraft Directorate, Standards Staff, Fort Worth, Texas—Ed.*

This is for information only. Recommendations are not mandatory.

Introduction

This SAIB advises you, an owner or operator of turboshaft powered rotorcraft, of the possibility of in-flight engine loss of power due to the ingestion of ice and snow that has accumulated in the area of the airframe engine inlet while the rotorcraft is on the ground. This SAIB describes procedures to reduce the probability of engine in-flight shutdown due to ice and snow ingestion.

Background

We have determined that ingested snow and ice accumulation in the airframe engine inlet while the rotorcraft is on the ground is the cause of several engine in-flight loss of power events. Some of these events have resulted in accidents and fatalities. Snow and ice can build up in the engine intakes and plenums when the rotorcraft is on the ground without the engine(s) operating and/or when the engine(s) are at a low power setting on the ground for extended periods. When engine power is increased at times during takeoff, the accumulated snow and ice can separate from the airframe inlet surface and be ingested into the engine, resulting in decreased power or complete engine failure.

Some of the early turboshaft engines with axial inlets are particularly susceptible to loss of power due to ice and snow ingestion.

On the ground with the engine(s) operating at a low power setting, ice and snow can accumulate on the airframe cowl forward of the inlet, on the inlet lip, and inside the inlet. Under extreme conditions, usually when the rotorcraft is on the ground waiting for clear weather, the buildup of ice and snow can be enough to cause the engine(s) to lose power or fail completely if it is ingested. On the ground with the engine(s) not operating, proper use of inlet inserts (pillows) or inlet covers can eliminate the accumulation of snow, but these measures cannot fully guarantee non-formation of ice in the inlet. Ice can also develop in the inlet area when water seeps into the inlet from rain or snow melting on a warm cowl, even when you use proper inlet protection.

Recommendations

In order to reduce the possibility of in-flight engine loss of power due to snow and ice ingestion **we highly recommend and strongly urge** owners and operators of turbine-powered rotorcraft to perform the following:

1. Review the aircraft flight manual for limitations and operations guidance in falling/blowing snow and/or icing. Many aircraft are prohibited from operating in known icing and/or heavy snow.
2. When the aircraft is on the ground without the engines operating, install inlet and exhaust inserts or covers.
3. Prior to engine start, after removing the inlet/exhaust inserts or covers, perform a complete inlet/exhaust inspection (using a flashlight). The inspection should include surfaces inside the inlet, the cowl area forward and around the inlet, and the area behind the particle separator or screen (if installed). Remove all accumulated snow or ice.
4. ***CAUTION*: DO NOT** remove ice or snow by chipping or scraping! Use heated air or deicing fluid, as necessary. In freezing temperatures, pay particular attention to sheet ice on the bottom and forward of the inlet. This ice can also form behind particle separators. Engine preheating may be required.
5. If it is necessary to keep the rotorcraft on the ground for an extended period (i.e. waiting for clear weather), you should shutdown the engine(s). Prior to takeoff, you should accomplish a detailed pre-flight/inspection, removing any snow/ice build-up. You should perform the inspection even if the rotorcraft is fitted with some form of inlet protection such as screens or baffles.

For further information, contact:

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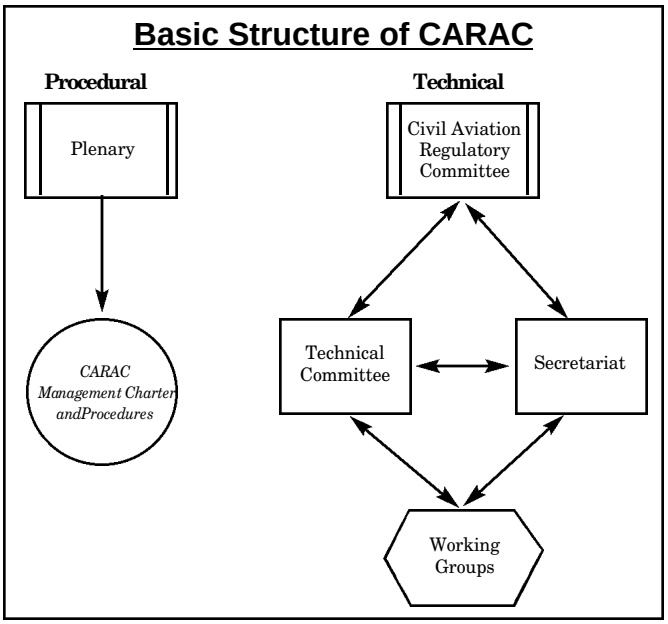
Did You Know? continued from page 3

4. Working Groups (WG) comprising representatives from the aviation community, the government and other interested parties. Their mandate is to develop proposals and recommendations in accordance with the assigned tasks. WG will be formed by, and report to, Technical Committees on an as-required basis only.
5. A Secretariat, whose role is to provide support and management of CARAC on behalf of the CARC.



With the coming into force of the CARs on 10 October 1996, the CARAC consultative process was firmly established as part of the regulations under CAR 103.01(2) requiring consultation for standards incorporated by reference. It states that, "The Minister shall not make a standard or an amendment to a standard unless the Minister has undertaken consultations with interested persons concerning the standard or the amendment in accordance with the procedures specified in the publication entitled *CARAC Management Charter and Procedures*."

In addition, as a matter of policy, TCCA has decided to use CARAC for consultation on all aspects of its rule-making activities.

Tips and Tails

More Icing Encounters

Re: your request for stories involving icing encounters, I'd like to pass on a few examples of how icing has provided a few tense moments for me over the years. Besides turning around or landing a few times VFR due to freezing drizzle, these are the ones that really stick out.

No freezing precipitation was forecast, and we were landing at a hospital in light rain at +1°C. After unloading the patient, we took off towards the airport to refuel, and going through 60 kt, we picked up so much ice the windshield heat could not keep up (Bell 222A at night). We attempted a 180º turn but it appeared we were flying into heavier ice so we just made a run for the airport (4 mi.). I flew a run-on landing, as I doubted we would be able to hover, and landed with a good 1/2 in. of clear ice on all surfaces, blades included.

Taking off from the same airport another night, we flew into an extremely heavy snow shower with visibility less than 1/4 mi. A 180º turn was initiated back into VFR conditions and we landed with well over 1/2 in. of ice on the main blades, but none on the airframe. We were not in cloud, but heavy snow showers, no ice on the airframe at all. Temperatures were about -10°C.

Flying out to a reserve early one morning, at -30ºC, we noted the destination helipad was in thick low-lying fog, so we landed in a small clearing just up the road and waited for the ambulance for 20 min at idle. As it was a tight area, we could not see that the fog had rolled in until we took off. On climb-out the aircraft shook heavily, with the tail rotor receiving a dent from shedding ice. The inner 1/3 of the blades was covered with 1/2 in. of ice, with a sharp edge where it had shed.

We were flying an S76 at -28ºC, trying to get over some clouds at 9 000 ft. We ended up going through the tops. NOW I know why they say ice is worse at the tops of CBs as we picked up so much in the time it took to get turned around that the pitot heats (pitots visible from the cockpit) could not keep up and the entire units were encased in heavy ice.

Another time in an S76 at -15ºC, with lots of scattered low-lying cloud, a junior First Officer asked if we would pick up ice in the cloud so I said "let's see," and we proceeded to fly through a small cloud that you could see though. I think the entire cloud stuck to our aircraft, as we landed afterwards with 1/8 in. of rime everywhere.

Icing is a major concern among helicopter pilots, and frequently talked about. Some don't seem to feel that a climb or descent through 1 500 ft of cloud is any big deal when temperatures are below zero. I've done it more than a few times in the past, and not picked up any, and I've also picked up 1/4 in. of rime in that same minute, at -5ºC to -25ºC, so my experience has taught me that it is too unpredictable to assume the risk. I avoid it all like the plague now. Hopefully others can benefit from my experiences.

Tips and Tails

Hughes 500D—Iced Up in Mere Minutes

It was a chilly November day, on the west coast of Newfoundland. I was dispatched to move a diamond drill in the Trout River area—a region known for unpredictable weather and high winds, especially this time of year. Poor weather had delayed the move for several days, and everyone was anxious to get it over with. On this day, the weather was flyable, but not ideal. The drill was located in the bottom of a deep gorge, and was being moved to the side of the same gorge on a 45º leeward slope.

It was going to be a long day. The steep slope meant that the drill crew had to build a timber-frame platform into the side of the hill, so I had to sling the timbers in one at a time, and wait until they had it secured in place before delivering the next one. Once the platform was ready, I was to deliver the drill rig in several pieces, and assemble them in order: the skids, base, transmission, engine, head, and tower, then follow with the tool baskets, mud barrels and fuel drums, etc.

Because of the terrain and wind, I was forced to refuel after just about every load, to keep my weight to a minimum and power reserve to the maximum. The weather was holding, but occasional drizzle and temperatures near freezing were making life uncomfortable for all of us—me with the door off, and them on the ground, trying to work on their wet, greasy footing. In spite of that, the move was going well. They were a very experienced crew, and making a tough job look easy.

The skids and base were in place, the drizzle had let up, and I was adding about 100 lbs of fuel, waiting for them to have everything bolted in place. The drill site was only about 500 m from my fuel cache, and soon I could see they were ready for the transmission. I hooked it up to my longline, started the 500, and lifted off to head across the gorge. The drizzle had started again, but I was getting used to it by now—just one of those miserable Newfoundland days.

As I was setting the transmission in place, I noticed that I was using more torque than I had expected, and was quickly running out of power. This was strange, as the transmission on this rig wasn't as heavy as some, and usually gave me no problems. There was also a strange whistling noise, which sounded like a piece of blade tape had come off. The torque continued to rise near the 87.2 PSI maximum, as I silently urged the crew to hurry. It only took a few seconds, but it seemed like hours.

Just as I was about to exceed the maximum torque, they gave me the hand signal that all was OK, and I could release the transmission. Not a moment too soon, as now the aircraft was starting to vibrate horribly, in addition to requiring far more power than usual. I thumbed the remote hook release, watched the hook clear the crew and trees safely, and lifted my head to start the short trip back to the staging area, which was the closest landing spot. That was when I first saw the glaze on the windshield—ice. The vibration continued as I set the line down and landed next to my fuel, but in no time I was safely on the ground. It was clear that I had picked up a serious amount of ice, and as I reached over to start the timer for the cool down, I noticed that I had only been airborne for 7 minutes!

The attached picture is from that day, and shows the ice accumulated on the leading edge of the blade in that short time.

Every icing encounter is unique and unpredictable. That day taught me a valuable lesson in just how insidious even a short encounter can be.

What Do You Think?

Transport Canada is seeking input from commercial pilots regarding the potential impact of discontinuing the VFR single engine Pilot Proficiency Check (PPC) and replacing it with a pilot competency check (PCC). Under this proposal, Transport Canada inspectors or approved check pilots would no longer conduct a formal PPC. Instead, upon completion of the required annual training, the chief pilot would certify that the crewmember was competent to perform his or her duties.

In order to better understand the differences between a PPC and a PCC, they can be defined as follows.

Pilot Competency Check:
The PCC is not conducted as a separate check or test. Instead, it is a certification that the candidate is competent to perform his or her duties, issued by the chief pilot after the pilot has been trained to proficiency. By signing the PCC, the chief pilot is certifying that the pilot is competent.

Pilot Proficiency Check:
This is a separate evaluation conducted by the Minister in accordance with the appropriate Schedule after all training has been completed. Upon successful completion of the PPC, the Minister certifies that the pilot has demonstrated the skill required by the applicable Schedule and that the pilot is competent.

More detailed information can be found in *Canadian Aviation Regulations* (CARs) 702.65, 703.88, 704.108 and related standards.

We thank you for taking the time to answer the following questions. Your answers will help us evaluate the potential impact of this proposed initiative.

Please indicate what best describes your involvement with the Canadian helicopter industry:

a) Canadian helicopter pilot (line pilot, contract pilot, etc)
b) Training pilot or check pilot
c) Chief pilot
d) Operator, or operator's representative (Operations manager, other executive)
e) No direct involvement with the Canadian industry
f) Other (please specify)_____

1. How do you think the elimination of the PPC would impact quality of training?

a) Very negative
b) Slightly negative
c) No impact at all
d) Slightly positive
e) Very positive

Comments_____

_____

2. If PPCs are eliminated, do you think your company would increase or decrease the quantity of recurrent training?

a) Decrease the amount of recurrent training
b) Not change the amount of recurrent training
c) Increase the amount of recurrent training

Comments _____

_____

What Do You Think? (continued)

3. What qualifications should a training pilot have?

a) Instructor rating
b) Training in instructional techniques
c) Other, please elaborate_____
_____

4. What do you think the impact will be on pilot competency if PPCs are eliminated and PCCs are introduced?

a) Significant reduction
b) Slight reduction
c) No change in pilot competency
d) Slight improvement
e) Significant improvement

Comments _____

5. Who do you think should be accountable for overall pilot competency?

a) The Minister of Transport
b) The Operator

Comments_____

6. The elimination of the annual PPC for single-engine, VFR helicopters, may result in a variance with some international standards, such as those adopted by the International Civil Aviation Organization (ICAO). Do you think this could affect your ability to attain or retain employment outside Canada?

a) Not applicable to me
b) Will make it more difficult to work outside Canada
c) No impact on my ability to work outside Canada
d) Will make it easier to work outside Canada

Comments_____

Please give us any other comments you have on this subject.
Use a separate sheet, if necessary.

_____
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When completed, please detach and mail this form, using the enclosed, postage-paid return envelope. If the envelope is missing, please mail the completed questionnaire to:

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Please mail this form **prior to February 13, 2004.**