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**TESTIMONY OF TOM BARRETT, PRESIDENT
ALYESKA PIPELINE SERVICE COMPANY
ON DECLINING THROUGHPUT
HOUSE FINANCE COMMITTEE
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Good morning. My name is Tom Barrett, and I am President of Alyeska Pipeline Service Company. I have been asked to speak today about the impacts of declining crude oil on the Trans Alaska Pipeline System. Thank you for having me.

My experience includes 15 years in Alaska, serving in positions including Commander of Coast Guard 17th District operations in Alaska. I previously served as deputy federal coordinator for the Alaska Natural Gas Transportation Projects and worked as a regulator, both as Deputy Secretary of the United States Department of Transportation in Washington, and also as the first Administrator of the U.S. Pipeline and Hazardous Materials Safety Administration. My wife Sheila and I have lived in Alaska for 15 years. We have four grown children. One is a University of Alaska Fairbanks graduate and one lives in Anchorage and works for University of Alaska. Alaska is home to my family and Alyeska and TAPS are important to me personally, and to our state and to our nation. I am here today representing Alyeska and the employees and contractors that operate and maintain TAPS.

Since joining Alyeska on January 1st, many people have asked me, at what point will the declining flow of crude oil in our pipeline become a problem?

My response is simple: We HAVE a problem now.

This is not facing us down the road. This is not theoretical. This is an issue we confront today. Without increased throughput in our

pipeline, challenges will only increase as time passes. The challenges related to declining flow were made abundantly clear during an unscheduled winter shutdown we experienced in January. I will talk more about that today. That event was a wake-up call for Alyeska and it should be for all Alaskans.

Stopping our steady decline and increasing throughput in the Trans Alaska Pipeline System is an urgent concern for everyone who works on TAPS and for our state.

TAPS was designed as a warm-oil pipeline. At its peak throughput in the late 1980s, we were moving about 2.1 million barrels of oil day.

Since 1989, we have experienced a steady decline in crude coming off of the North Slope – about 5 to 6 percent a year in the past 5 years.

Today, our average throughput is typically about 640,000 barrels a day. We expect an annual decline of between 5 and 6 percent to continue. At one time, according to Energy Information Administration data, TAPS delivered about 25 percent of our nation's domestic crude oil supply. According to the Energy Information Administration, for 2010 TAPS delivered about 12.4 percent of our nation's oil production.

In 2007, we launched a \$10 million study to examine declining flow on TAPS. Our goal was to evaluate the potential implications of the future operation of TAPS at throughputs and oil temperatures considerably lower than those assumed for original pipeline design.

The scope of the study included examining water accumulation in the line under low-velocity conditions; looking at potential for increased corrosion due to declining flow; assessing the potential for ice formation in the pipeline in winter; examining increased wax deposits in the pipeline, in crude tanks and in front of pigs; evaluating potential geotechnical impacts to the pipeline due to freeze-thaw conditions increasing; considering impacts to operating pigs due to wax and ice forming; and finally, researching water accumulation and ice formation at low-lying points of the pipeline during emergency winter shutdown conditions.

When we started our low flow study in 2007, the Department of Revenue had projected the 2011 throughput to be 676,000 barrels per day. We are already behind that projection.

The most low flow pressing issue facing us is the temperature of the oil in the pipeline. This is a function of flow rate, velocity and time. Temperature of the oil continues to drop as throughput continues to decline. A prolonged winter shutdown is a continuing serious risk for TAPS due to these colder crude temperatures.

In 1989, with throughput peaking at 2.1 million barrels a day, it took oil approximately 4 and a half days to move from Pump Station 1 to the terminal. Today, each barrel takes approximately 14 days to reach our terminal in Valdez. At 500,000 barrels per day, it will take the oil 18 days to travel the pipeline. At 300,000 barrels per day, it will take a month. That is a steady increase in risk.

During a winter shutdown, water can settle and turn to ice, creating conditions that could block or damage valves, pumps, and other sensitive equipment, potentially causing an extended interruption to our operation.

Just to offer you a snapshot of what that would mean to Alaska: Without TAPS running, the refineries in North Pole and Valdez can't operate. That directly cuts our state's supply of jet fuel and the heating fuel that is so essential to many of our rural communities. When the pipeline is shut down, we ask producers on the North Slope to scale back operations. In winter, this could mean they shut in wells that cannot recover. The bottom line is, any significant impact to pipeline operations is a direct hit to Alaska. No one knows this better than the Legislature, where you see the significance of our pipeline to the state revenue stream.

Many of you are familiar with events we faced in January that led to an extended shutdown. During January, the pipeline was shutdown for a combined 148 hours.

It started on January 8th, when an employee on routine rounds at Pump Station 1 discovered a leak in our booster pump building. This

leak was contained in our building. Throughout the incident recovery, we recorded no significant injuries or adverse impacts to the environment.

But we did have a leak. We needed to fix it rapidly. Our employees and contractors put in an extraordinary effort, designing and engineering bypass piping to circumvent the leak site and allow us to restart.

While this work was going on, declining throughput was on everyone's minds and was the center of many conversations and the driver of many decisions. I think it's fair to say that although lower throughput has greatly impacted our operations for several years, it had never been as pressing and critical a factor as it was during this January event.

Carefully weighing the risks, we decided the most prudent course of action was to do an interim restart of the line even though oil would continue leaking into the containment basin at Pump Station 1.

This was driven by dropping oil temperatures and by issues related to ice and wax in the line and the fact we had scraper pigs in the line that we needed to remove or capture.

It would have been a far greater risk to remain shut down.

Restarting helped warm the oil while the Pump Station 1 bypass was fabricated and assembled and allowed us to move the pig that was upstream of Pump Station 8 into a pig trap line at that pump station. Moving that pig off the mainline was critical. We were concerned about what would happen if that pig came up against concentrations of wax and ice. Without intervention, that pig could have pushed the ice and wax into equipment and disabled the line. For example, if ice damaged our mainline pumps, we would risk shutting down the pipeline for weeks or months.

When we were fully prepared to put the bypass piping in at Pump Station 1, we shut down again and got the job done quickly and safely.

During the January event, the crude oil in the majority of the pipeline was between 29 and 40 degrees Fahrenheit. About 100 miles of the pipeline, located in interior Alaska, cooled to minimums between 29 and 30 degrees Fahrenheit.

After restarting the line and restoring operations, we ran specially designed pigs through the line to reduce the risk of damage from our standard hard pig. Even today, we remain in an alternative pigging mode as a result of recovering from the January shutdowns.

The main factor in many decisions made in responding to the Pump Station 1 event was crude temperature. There are other serious risks associated with declining throughput.

Some of these risks are associated with what happens with the water in crude oil in declining-flow conditions – including during flowing operations and winter shutdowns.

For current throughputs of roughly 640,000 barrels a day, water typically travels along in the crude in small droplets. Once throughput drops below 500,000 barrels a day, the water is expected to separate out in a flowing layer at the bottom of the pipe. This will locally increase water concentrations, especially at low-lying points on the pipeline, and where the pipeline has upward slopes. Assuming we have a 6 percent decline a year, we would drop below 500,000 barrels per day sometime around 2015.

At lower throughputs, water that enters TAPS at Pump Station 1 can coalesce and drop out, settling at the bottom of the pipe. Once water accumulates at a low point, the force of gravity may exceed the motive force that moves the oil. This prevents it from being flushed through the pipe during normal flow.

The accumulated water provides an environment for corrosion. During an extended TAPS winter shutdown, or at low flow rates, the locations with liquid hold-up may freeze and impact the pipeline's ability to restart or maintain flow. Water buildup within TAPS could also create conditions conducive to ice formation within the flowing oil stream. We were concerned about this risk during our January shutdown.

Unless the oil is heated, the temperature of the oil will begin to dip below the freezing point of the water during winter months when flow rates decline below roughly 550,000 barrels a day. Engineering analysis indicates that freezing of water in the oil during flowing conditions is very likely at this point. The operational impacts of this could include icing, which could disable check valves, and buildup at tees, bends, and inside mainline valve bodies. The ice could damage relief valves, mainline pumps or other sensitive equipment.

Wax – a common enemy of crude oil pipelines regardless of flow rates – also becomes a greater problem in declining flow conditions.

Crude oil includes paraffins, asphaltenes and other naturally occurring substances that tend to drop out of the crude as temperature drops. High molecular weight paraffin, or hard wax, is of particular concern because it can build up on the pipe walls, potentially creating an environment for corrosion to occur. Soft wax can also precipitate and be deposited on the pipe wall, transforming into a hard wax.

Excessive accumulation of wax can also cause pressure differentials along the pipeline, resulting in less efficient oil movement. Wax deposition will continue even if the crude oil is heated in the future.

Another potential operational issue associated with declining flow rates are frost heaves. And by the time frost heaves become an issue, we would already be dealing with multiple other declining throughput challenges, not just during a winter shutdown, but also during flowing conditions.

TAPS was designed as a warm oil pipeline and buried in thawed and frozen soil. In areas where the warm pipeline caused melting that would result in excessive settlement, the pipe was insulated, elevated above ground, and supported to keep the permafrost frozen.

With declining TAPS throughput, and associated declining temperature, the thaw bulb that currently surrounds the buried hot pipe may shrink. Should this occur, if the crude oil temperature cools below freezing in an underground segment of the pipe, the thaw bulb

may refreeze and form ice lenses. Eventually, this could result in frost heaves and impose strain on the pipeline beyond its design limits.

Assuming we do nothing to intervene and further heat the crude oil, we anticipate through engineering analysis that TAPS would face potential for frost heaves between 300,000 and 350,000 barrels a day. These frost heaves could overstress the pipe.

We are currently taking multiple actions to respond to declining throughput.

We are constantly monitoring and adjusting our pigging program.

We have increased our use of cleaning pigs to minimize the potential impact of wax accumulation on oil movement and pipeline integrity. The volume of wax that can be removed by a typical cleaning pig run will continue to be an operational and waste disposal issue. Wax build-up can cause failures in the sensors on our instrument pigs that take important pipe measurements.

As noted earlier, we adjusted our pigging after the January shutdown.

We expect pigging to continue to challenge us as we move into the future and manage our way through further declining throughput.

Because of the study I mentioned earlier to look at the impacts of declining flow, we're looking at various ways to add heat to the line.

This work could include installing oil heating units at strategic locations to maintain operational crude oil temperatures. It could also include adding insulation to the pipe at some of the sites that are known to be the coldest, upstream of North Pole. This could assist in minimizing the operations of heaters. It is also very likely that we will use some of our offline pump stations during winter operations to recycle crude oil to keep the temperatures up. Additionally, we need to analyze the capabilities of our instrument pigs at declining throughput volumes.

These measures are not quick, they are not cheap, and they involve complex solutions to a complex problem.

The slide that you see now shows the decline of crude oil in TAPS that we've experienced, and the further decline that we expect. This reality is very troubling to me as it should be to you.

TAPS is enormously important to our state. You all know this. You've seen the numbers and understand that this pipeline delivers the bulk of the state's operating budget. We can't afford to compromise Alaska's oil transportation system.

As you all are shaping policy, I hope you share the same urgency that I feel.

During the January response at Pump Station 1, we found ourselves in new territory, truly driven by the very real risks of a cold-weather shutdown in the face of declining throughput. We knew it wasn't just TAPS that was threatened, but North Slope operations and Alaska's economy.

The work we did would normally take months to plan the project, obtain materials, complete required permitting, inform stakeholders, and ultimately, execute the work. We did it in days. We felt tremendous urgency to get the line back up.

All told, our response was an extraordinary effort. It involved hundreds of people – Alyeska employees, contractors, and state and federal regulators. And I especially appreciated the presence of Commissioners Hartig and Sullivan, who were onsite in Fairbanks helping us manage this event.

At the end of the day, our bottom line is simple: We need more oil in our pipeline. And as the TAPS operator, I would hope the Legislature would attach the same urgency to this issue that Alyeska and contract employees attached to restoring service in January.

We need your help. TAPS viability depends on political will for Alaska oil development. We need your support for increasing safe and responsible production in Alaska. It is urgent and it is critical.

I'd be happy to take questions at this time.

Thank you.