Cruise Ship
Emissions Monitoring
2004 Report

US Forest Service Report:

2004 Cruise Ship Opacity Readings by Wilderness Rangers Conducted in Tracy Arm

Introduction

Background

Cruise ship traffic in Tracy Arm increased steadily between 1999 and 2002, with an average of slightly less than forty visits per year. In 2003 the cruise ship traffic more than doubled to 108 and then tripled to more than 143 visits in 2004.

Because Tracy Arm averages less than a mile wide and is surrounded by high mountains, cruise ship emissions may linger above the fiord for hours, usually at elevations between 700 and 1,500 feet. The emissions are most heavily concentrated in upper Tracy Arm, where vessels stop near the South Sawyer Glacier for one to four hours (depending on ice conditions). Ship emissions are often increased because of rapid changes in engine loading necessary for the ship to maneuver through ice and turn around. The Forest Service has received increased number of public complaints concerning air quality within the Wilderness area.

In an effort to better understand air quality in the wilderness, the Forest Service and the Alaska Department of Environmental Conservation (ADEC) entered into a Memorandum of Understanding (MOU) in 2002. The purpose of the MOU is to provide a framework of cooperation between agencies for sharing information on cruise ship emissions in Tracy Arm. This cooperation serves the mutual interests of both agencies and the public.

The MOU states that the Forest Service will train Forest Service wilderness rangers for monitoring in Tracy Arm and to share the resultant data with ADEC. The USFS rangers will submit to the ADEC their visible emissions observations. The ADEC will review

the visible emission observations and take action on any that exceed the State Marine Vessel Emission standard (18 AAC 50.070)

Method
Readings are often conducted in pairs, with one person taking photos and the certified observer reading the visible emissions. Opacity is recorded every 15 seconds from a distance within ¼ mile of the ship with the sun within a 140 degree arc behind the observer. Observations were conducted from land, zodiac or kayak. An observation read was agreed to be a "reading of interest" if the opacity was greater than 20 for any 6 minutes of the read. The Forest Service rangers would attempt to take a reading for a minimum of 15 minutes.

Results

Training
Kevin Hood and Kristin Stelck (Forest Service Wilderness Rangers) were certified in reading visible emission by HMH Consulting in Kenai, AK on April 27-28, 2004. The training focused on Method 9 of the Environmental Protection Agency (EPA) in reading visible emissions.

Pre-season

- Each cruise line received a letter from the Forest Service at the beginning of the summer informing them that their emissions would be read periodically while traveling in Tracy Arm.
- An initial pre-season meeting was held with Denise Koch and Carolyn Morehouse of ADEC and John Neary, Kevin Hood and Kristin Stelck of the Forest Service. Procedures and protocols were discussed, questions were answered and a session for reading a cruise ship together was conducted.

Cruise Ships entering Tracy Arm
There continues to be a significant increase in all types of vessel traffic, particularly cruise ships, within Tracy Arm. This traffic increases the necessity to continue a Visible Emission's monitoring program within the fiord. Of the cruise ships that do enter Tracy Arm, only a small percentage are read, but at least one ship from each cruise line was monitored this field season. See Figure 1.

Year	# Cruise Ships in Tracy Arm	# Of Visible Emission Reads	% Of Cruise Ships Read in Tracy Arm
2003	108	20	19%
2004	143	21	15%

Figure 1

Compliance Status of Cruise Ships

Due to the thorough training, pre-season meetings and previous experience, observations were conducted with greater accuracy. Five cruise ships were readings of interest of the 21 reads conducted. Several cruise ships were read more than once while a few were not read at all (due partly to scheduling).

To be in compliance, the opacity of a cruise ship's emissions must not exceed 20%. The ships can exceed the standard no more than 3 minutes in every hour. There are also some provisions for maneuvering to/from port or anchor but these exemptions do not apply in Tracy Arm.

Cruise Ship Name	Highest Average of 6 Minutes
Diamond Princess	12.5
Diamond Princess	10.3
Diamond Princess	10.0
Diamond Princess	16.0
Empress of the North	4.1
Norwegian Spirit	23.1
Norwegian Spirit	19.4
Norwegian Spirit	27.5
Norwegian Sun	20.0
Norwegian Sun	19.0
Norwegian Sun	15.8
Norwegian Sun	22.3
Regal Princess	20.0
Seven Seas Mariner	16.5
Seven Seas Mariner	29.6
Seven Seas Mariner	22.7
Silver Shadow	5.0
Volendam	15.0
Volendam	14.7
Volendam	20.6
Zaandam	14.6

Figure 2

Conclusion

The Forest Service concludes that the 2004 season was a success. Questions regarding monitoring technique, protocols, procedures, and validity were answered during the pre-season meeting. Two Forest Service rangers were able to read one more vessel than last year even though their other duties were expanded. The two observers were able to conduct several reads together throughout the season to ensure consistency.

Continued monitoring will help the Forest Service determine how and where to implement further air quality monitoring projects, such as lichen plots and remote air sampling stations. Reading visible emissions is a key portion of the program protecting air quality in and around wilderness areas.

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