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May 21, 2014

U.S. Department of Transportation
Docket Management System
400 7th Street SW, Plaza 401
Washington, DC 20591-0001

Ladies and Gentlemen:

In accordance with the Federal Aviation Regulation (FAR) 11.63 and 11.83, PMI Global Services Inc. hereby petitions the Administrator for an exemption, or other appropriate regulatory relief, from FAR 91.211(b)(1)(ii) (which requires that one pilot crewmember wear and use an oxygen mask while above flight level 410). This relief is being sought for domestic and international operations for our company aircraft equipped with quick-donning oxygen masks and equipped with Automatic Emergency Descent Mode (EDM) while conducting operations under FAR Part 91.

Section of the FAR Affected

Section 91.211(b)(1)(ii) states: At flight altitudes above flight level 350 unless one pilot at the controls of the airplane is wearing and using an oxygen mask that is secured and sealed and that either supplies oxygen at all times or automatically supplies oxygen whenever the cabin pressure altitude of the airplane exceeds 14,000 feet (MSL), except that the one pilot need not wear and use an oxygen mask while at or below flight level 410 if there are two pilots at the controls and each pilot has a quick-donning type of oxygen mask that can be placed on the face with one hand from the ready position within 5 seconds, supplying oxygen and properly secured and sealed.

Requested Exemption

Proposed Change: **(ii)** "At flight altitudes above flight level 350 unless one pilot at the controls of the airplane is wearing and using an oxygen mask that is secured and sealed and that either supplies oxygen at all times or automatically supplies oxygen whenever the cabin pressure altitude of the airplane exceeds 14,000 feet (MSL), except that the one pilot need not wear and use an oxygen mask while at or below flight level **450** if there are two pilots at the controls and each pilot has a quick-donning type of oxygen mask that can be placed on the face

with one hand from the ready position within 5 seconds, supplying oxygen and properly secured and sealed”.

Background

PMI Global Services Inc. is a corporate flight department based in White Plains NY. We currently own and operate 2 Gulfstream 550’s. Although our company headquarters is based in New York City, a majority of our flying is outside the United States. Approximately 95% of our scheduled trips are long international trips flying throughout the world. We employ a staff of 10 full time, fully trained pilots. (There are never any unfamiliar contract pilots used as crewmembers on any of our company aircraft). Each company pilot is sent to Flight Safety International every 6-8 months for recurrent ground school and simulator training, to include demonstrating a Manual Emergency Descent:

Gulfstream G550

Standard Maneuvers and Callouts



MANUAL EMERGENCY DESCENT:	
Pilot Flying (PF)	Pilot Monitoring (PM)
When the decision is made to commence an emergency descent:	
<p>“Mask – Mask – Mask”</p> <ul style="list-style-type: none"> ● Don oxygen mask ● Select “MASK” button on ACP ● Establish communication with PM 	<p>“Mask – Mask – Mask”</p> <ul style="list-style-type: none"> ● Don oxygen mask ● Select “MASK” button on ACP ● Establish communication with PF
Once oxygen use and communication is established, move slowly and methodically through the following steps. Try to mimic the pace and smoothness of the Autopilot and Autothrottles during Emergency Descent Mode (EDM).	
<ul style="list-style-type: none"> ● Disconnect Autopilot ● Smoothly roll into a 30° bank turn (left or right) and allow pitch attitude to fall. ● Disconnect Autothrottles and smoothly reduce thrust to IDLE. Trim nose down if needed to achieve an initial pitch of 10° nose down ● As airspeed approaches VMO/MMO, extend speed brakes and smoothly raise pitch attitude to about 7° nose down, then maintain VMO/MMO during the descent 	<ul style="list-style-type: none"> ● Select 10,000 feet (or MEA) in GP altitude preselect window ● Press SYNC button on Heading Knob ● Press ON button below Heading Knob ● Turn heading bug at least 90° in the direction of the PF’s turn ● Press FLCH button on the GP ● Press MAN button below speed CHG knob ● Rapidly spin speed knob clockwise (speed window will automatically stop speed advancement at VMO/MMO).
After PM has properly set up guidance panel and flight director cues are matched with aircraft:	
<ul style="list-style-type: none"> ◆ “Engage Autopilot” ● Sync heading and stop turn when stable descent at VMO/MMO is attained. 	<ul style="list-style-type: none"> ◇ Press AP button on the GP
When vertical mode changes from IAS to ASEL (which could occur 3,000 to 4,000 feet above selected altitude depending upon rate of descent):	
<ul style="list-style-type: none"> ● Select 250 Knots in GP’s speed window. This action keeps thrust levers at IDLE during the altitude capture transition process as the aircraft will slow from 340 Knots to 250 Knots. 	
Assess any damage to the aircraft, and the health state of the passengers.	

In the current aviation industry, I am fairly confident that most aviation professionals would agree that FAR 91.211(b)(1)(ii) is probably one of the most abused and ignored regulations. It is very difficult for the FAA to monitor and enforce such a regulation. Unless the FAA is present in the cockpits of aircraft flying above flight level 410, I find it extremely difficult for the FAA to determine the extent to which this regulation is being disregarded. With the exception of PMI Global Services Inc., I see limited compliance to this regulation and I also see no real attempt by the industry to change the rule. Until such a time when the major airlines begin to operate their aircraft above flight level 410 on a regular basis, and at such a time when crewmembers are in fear of being violated by ignoring this regulation, I see very few operators requesting relief from a regulation they disregard. PMI Global Services Inc., however, does follow this regulation and that is why we are seeking an exemption and not a rule making change.

I have spent a considerable amount of time researching the specific reasons for the FAA to deny similar exemptions to this regulation in the past. In considerations of those denials, and after you have had the opportunity to review this request, I am confident that PMI Global Services Inc. is not only unique within the aviation community, but takes great strides to surpass the safety aspects that FAR 91.211(b)(1)(ii) was meant to establish.

What makes PMI Global Services Inc. unique in the industry is 2 reasons:

1) On each and every passenger carrying leg, we fly with 4 crewmembers (2 Pilots, 1 Flight Technician, and 1 Flight Attendant). The flight technician occupies the jump seat for every flight he/she is on. The jump seat on the Gulfstream 550 is located behind and directly between the pilot seats. The jump seat is equipped with its' own quick donning oxygen mask that can be placed on the face with one hand from the ready position within 5 seconds, supplying oxygen and properly secured and sealed. In the very unlikely event that a pressurization emergency were to occur, the flight technician is fully trained and capable of not only donning his/her own oxygen mask, but he/she can assist either pilot in donning their mask if required to do so. Having this third flight deck crewmember in the cockpit is an added safety benefit on every flight (third pair of eyes, situational awareness, trained maintenance technician who can offer assistance in decision making, etc.). Should an emergency occur, and if required, the flight technician also has a fully functional Audio Control Panel and headset available to him/her at the jump seat to assist with communications. (Each flight technician is annually trained by our company Standardization Pilot on how to operate all of the equipment available to him/her at the jump seat location).

2) We **do not** flight plan our Gulfstream 550's above flight level 410. We will only fly above flight level 410 when circumstances dictate, i.e. weather, turbulence, and fuel range considerations. Once we are clear of any weather related situations, we will again descend back down to flight level 410 or below. The main reason for not flying above flight level 410 is FAR 91.211(b)(1)(ii). Since most of our trips are a very long duration, we would rather fly at or below flight level 410 than wear an oxygen mask for an extended period of time as required by the current regulation. It is for this reason that, instead of requesting a change to the rule for the industry, we request an exemption to the rule for our operation.

We have found that wearing and using an oxygen mask for long periods of time actually reduces some of the safety factors associated with long international trips. For each leg of our trip we reference our Safety Management System (SMS) Flight Risk Assessment Table to determine risk factors directly related to the aircraft operation. Once we determine factors affecting the levels of risk we discuss ways to mitigate and lower those risks. We have identified numerous areas where wearing an oxygen mask for prolonged duty time has a negative effect on the pilots ability to perform his/her functions. Being constantly “tethered” to the oxygen hose presents difficulties. Difficulties such as: communication, fatigue, eating, drinking water to stay hydrated, inability to properly scan and difficulty reaching certain cockpit items. One way to mitigate these risks would be to request an exemption to FAR 91.211(b)(1)(ii) and have the ability to fly up to and including flight level 450 without having to wear and use the oxygen mask while under certain conditions. These conditions will be addressed in this document.

Equivalent Level of Safety

Public Interest

FAR 91.211(b)(1)(ii) was written and established many years ago and prior to the newer more modern business jets operated today. This regulation directly impacts the altitudes at which aircraft will fly since many operators limit their maximum ceiling to FL410 in an effort to avoid having to wear and use oxygen masks for prolonged use. It is fairly evident that jets operate much more efficiently at higher altitudes. There are many advantages to the operator, as well as the general public, to operate these aircraft at higher altitudes. The aircraft engines are more fuel efficient and therefore will burn less fuel, the range of the aircraft is extended due to consuming less fuel, passengers have more opportunity for direct flights (better fuel economy), and less congested airspace by encouraging aircraft to fly higher. Finding ways to operate more efficiently by consuming less fuel and eliminating the amount of harmful gases expelled into the atmosphere is certainly in the public interest. Not only would this exemption benefit the general public in these areas, it would do so without compromising their safety in any way.

Aircraft Considerations

The Gulfstream 550 is capable of cruising up to an altitude of flight level 510. The FAA type certification of the airframe and systems results in a very “highly improbable” decompression failure rate up to and including its’ service ceiling. The Gulfstream 550 is equipped with four mitigators to reduce the likelihood and risk of decompression. They are:

- A. Automatic Emergency Descent Mode (EDM) – The autopilot has an automatic EDM mode that is armed any time the airplane altitude is greater than 40,000 feet with the autopilot selected ON. When the “Cabin Pressure Low” warning message illuminates on the Crew Alerting System (CAS) (usually 8000 feet cabin pressure), with the airplane above 40,000 feet and autopilot ON, the following occurs:
 - 1) Speed target changes to 340 KCAS in manual mode.

- 2) The altitude is preselected to 15,000 feet.
- 3) The autopilot commands a left turn with a 90 degree heading change.
- 4) The autothrottle retards power to idle. (If autothrottles are not engaged, they will automatically be engaged).
- 5) The airplane descends at Mmo / Vmo to 15,000 feet.
- 6) At 15,000 feet, the speed target changes to 250 KCAS.

With EDM installed, the pilots are not preoccupied by having to perform this “automatic” maneuver necessary to initiate and sustain an emergency descent. The pilots’ immediate and initial focus can be to quickly don his/her oxygen mask. (Passenger masks will deploy automatically).

- B. The Gulfstream 550 is equipped with Quick-don Oxygen Masks. Each crewmember is trained and evaluated every 6-8 months to don their mask within 5 seconds. (Flight Safety International).
- C. The Gulfstream is equipped with an Aft Bulkhead Door (internal baggage door) – this door creates a dual hull, protecting the cabin from two most likely causes of decompression: 1) a catastrophic engine failure resulting in a puncture of the aft baggage area, or 2) the external baggage door opens (or seal deflates). In either case, the cabin remains fully pressurized.
- D. The Gulfstream 550 has a “Cabin Pressure Low” warning system. A red message light will illuminate and three chimes sound when the cabin pressure exceeds a predetermined value (usually 8000 feet cabin altitude).

The Gulfstream 550’s pressurization system is critical to passenger and crew safety. Therefore, the system components are highly redundant making a failure of the system very unlikely. The Thrust Recovery Outflow Valve (TROV) may be operated by any of three (3) electrical actuators (motors), two powered by 115V AC current and the other by 28V DC current. The Cabin Pressure Controller (CPC) electrically controls the TROV and has three separate modes of operation (auto, semi-automatic and manual). The CPC also has two control channels available in the unlikely event one were to fail (redundancy).

Justification

Oxygen Masks and Systems

Oxygen masks and systems were designed primarily to be used in the event of an emergency – not for prolonged use. Back when FAR 91.211(b)(1)(ii) was first established, there were fewer aircraft capable of prolonged flight above flight level 410. The requirements for one pilot to wear and use oxygen above flight level 410 results in a 17 % system depletion during an 8 hour cruise leg. (Many of our trips exceed 8 hour legs). This decreases the oxygen available during an actual emergency, such as smoke or fumes in the cockpit, or a pressurization malfunction. In addition, PMI Global Services Inc. travels to locations considered to be very

remote, where servicing of the oxygen system is sometimes unavailable or the equipment deemed unreliable or questionable. We also fly many long legs over open water where having oxygen available for an actual emergency is crucial since landing the aircraft is not always an option.

All PMI Global Services Inc. crewmembers (including flight technicians and flight attendants), have all been trained in an approved altitude chamber training course and are able to identify and recognize the symptoms associated with hypoxia.

Human Factors

Flying at flight level 450 without one pilot on oxygen is not accepting a higher level of risk than operations currently at flight level 410. Considering the Gulfstream 550, the Automatic Emergency Descent Mode and the Cabin Pressure Low warning system, the pilot’s reaction time is quicker and his/her actions are fewer than in other aircraft. The time of useful consciousness (TUC) is documented to be 9 to 12 seconds from FL410 up to FL 450 (Civil Aerospace Medical Institute (CAMI)). One of the pilots need only don his/her mask within the TUC while the aircraft begins the emergency descent. We train for this very scenario and don the mask well within the TUC at FL450. Even if both pilots, along with the flight technician, were to experience a brief loss of useful consciousness (unlikely for all 3 crewmembers), the Gulfstream 550 will still initiate an emergency descent to a safe altitude.

The TUC is 12 to 15 seconds at FL450, as shown on the following chart:

Altitude (ft)	Subjects breathing O ₂ (Failure of O ₂ delivery)		Subjects breathing air (rapid decompression)	
	At rest	Moderate exercise	At rest	Moderate exercise
21,000	10 min	5 min	5 min	2.5 min
24,000	5 min	2.5 min	2 min	1 min
25,500	2.5 min	1 min	1 min	0.5 min
27,000	1.5 min	45 s	45 s	20 s
31,500	45 s	30 s	30 s	15 s
36,000	30 s	20 s	20 s	15 s
40,500	15 s	12 s	15 s	12 s
49,500	15 s	12 s	15 s	12 s
60,000	12 s	12 s	12 s	12 s

Time of Useful Consciousness (P. Sheffield and R. Heimbach)
 Hypoxia (OGHFA BN) Human Factors – Flight Safety Foundation – EUROCONTROL
 Operator’s Guide to Human Factors in Aviation

Unlike airline cockpits, the crew of the Gulfstream 550 is in full view of the passengers during flight. When we have had to don our masks while flying above FL410, it has been a cause of great concern and anxiety to our passengers. The passengers almost always think that the aircraft is experiencing some sort of emergency and often ask why oxygen is not available to

them in this situation. The aircraft is not in an emergency situation above FL410 and it has been shown that the TUC between FL410 and FL450 is virtually the same. In addition, the time it takes the pilots to don a mask (between FL410 & FL450) is well within the TUC of both altitudes.

Fatigue has become a major factor in recent aircraft accidents/incidents and has been cited as a contributing factor (11%) in 12 of the 109 events stated in a report by ARG/US during unstabilized approaches at the end of a flight. Wearing and using oxygen for extended periods of time tends to fatigue the pilot tremendously. Lack of mobility and communication also factor in to the situation. Wearing these masks has also contributed to the spread of germs and viral infections among users. The very wipes that are specifically designed for the cleaning of cockpit oxygen masks have been shown to be an extremely ineffective means of disinfecting the masks.

Considerations of Exemption

With acceptance of this requested exemption, PMI Global Services Inc. will mandate the following additional restrictions be enacted when flying above FL410 up to and including FL450:

- 1) Autopilot must be engaged and functional
- 2) Auto-Throttles must be engaged and functional
- 3) The internal baggage door must remain closed. (If access into the baggage area is necessary, then one pilot will wear and use his/her oxygen mask).
- 4) One pilot must wear and use his/her oxygen mask in areas where the flight will be over terrain greater than 14,000 feet.
- 5) Flight Technician must be seated in the jump seat. If the Flight technician is not in the jump seat, then one pilot will wear and use his/her oxygen mask.

Summary

PMI Global Services Inc. is requesting an exemption to FAR 91.211(b)(1)(ii). We have a tremendous regard for safety and at no time would we ever endeavor to jeopardize our crewmembers, passengers or the general public in any way. As shown by the attached IS-BAO certification letter, PMI Global Services Inc. has achieved a level of safety and service that is considered one of the best in the industry. I have analyzed all of the data, consulted with aviation safety experts, considered all of the scenarios, and believe that granting this exemption will in way no increase the risk by being able to raise the altitude of FAR 91.211(b)(1)(ii) from FL410 to FL 450.

I understand that, in the past, the FAA has: “determined that granting further exemptions from the current rule is not appropriate. Should the FAA determine that it is appropriate to allow the relief requested, it will take appropriate action to change the rules rather than issue as exemption so that all persons may benefit from such a change”. I ask that the FAA take into consideration that not “all” aircraft and operators have the same level of safety, technology and training throughout the industry. All aircraft that are capable of flying above FL410 are vastly

different, as is their level of technology. Clearly an aircraft that has a technological advantage, such as Automatic Emergency Descent Mode (EDM), should be major consideration as to whether or not to grant an exemption to this rule. PMI Global Services Inc. has taken steps (outlined in this document) to minimize any risks associated with requesting an exemption to this rule. Changing the rule “so that all persons may benefit from such a change” seems unlikely, unless the FAA were to mandate exactly what is required in order to benefit from this change. This request from PMI Global Services Inc. lists specific aircraft equipment, standards, mitigators to reduce risk and additional self- imposed restrictions - all with the specific objective to reduce any and all concerns associated with granting this requested exemption. The main purpose of our organization is to transport our customers (the general public) in the safest, most efficient means possible. Granting this exemption will greatly benefit our portion of the general public by cutting cost, saving time, saving fuel and by being able to more efficiently operate our aircraft without sacrificing safety in any way.

Thank you very much for your consideration. Please feel free to contact me if any additional information is required.

Regards,



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April 17, 2014

Mr. James West
Director Aviation Services
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Dear Jim,

Mr. Ted Mendenhall and I recently completed the International Business Aviation Council International Standard for Business Aircraft Operations (IS-BAO) Stage III Renewal Audit of the PMI Global Services Inc. Aviation Services department. This letter is written to commend you and your organization on this significant achievement.

It is our opinion that the PMIGS Aviation Services department's approach to safety is among the best we have observed during many years of IS-BAO Audits.

Noteworthy, is the level of involvement of all of your employees in the PMI safety management process, and the conservative approach to safety taken at all levels of your organization. Also the demonstrated effective use of flight data monitoring to assure continued safe flight operations is worthy of special mention.

The IS-BAO Stage III renewal certification signifies that your organization operates to, and complies with, the highest international standard in corporate flight operations. PMI, in our opinion, belongs among those at the top of a very select group that achieve this certification.

Very Truly Yours,



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Attachment