Docket No. SA-538

Exhibit No. 14-C

NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C.

UPS FOM Excerpt – Crew Resource Management and Threat and Error Management

(7 pages)

Attachment 2

to the Human Performance Group Chairman's Factual Report

DCA13MA133

UPS FOM Excerpt – Crew Resource Management and Threat and Error Management

05.01.01 CREW RESOURCE MANAGEMENT (CRM), AND THREAT AND ERROR MANAGEMENT TEAM (TEM)

05.01.01.01 MISSION STATEMENT

UPS mission statement as an airline is to operate the safest, most profitable and efficient airline in the industry. Application of CRM training in daily operations, when operating under time critical and stressful environments, is vital to making better informed decisions for the safe operation of the aircraft and for UPS to meet this goal.

05.01.01.02 WHAT IS CREW RESOURCE MANAGEMENT?

One of many definitions of Crew Resource Management (CRM) is “The effective utilization of all available resources, information, equipment and human ability to achieve a safe and efficient flight operation.” To this extent, sound inter-personal relations must exist within the cockpit in order to engender a free flow of information among the crewmembers, without fear or reservation.

Crewmembers are ultimately responsible for the safe conduct of the flight. Implementation of CRM at UPS empowers crewmembers to exercise their judgment and skills to avoid undesired consequences. Essentially, every detail consistent with cockpit function requirements shall be duly assigned and accepted as an individual’s responsibility prior to the commencement of a flight operation. These requirements are described in detail in our various operation manuals (i.e., FOM, AOM and OpSpecs) specific to each fleet. As crewmembers you are expected to know and understand all of these available resources as well as how to engage the external resources so often talked about in the various CRM training events you have experienced throughout your career. Along with the crewmembers, the Flight Control Dispatcher who does your flight planning and flight monitoring should be considered a critical part of the team.

Statistics as late as 1996 show that 60% of all fatal commercial air carrier accidents involved human error. For the total aviation industry during that period, 80% of the casual factors associated with human error involved poor management of cockpit resources. The need for CRM programs is apparent from the preponderance of accidents among the airlines. The data and statistics demonstrate that the cockpit crew coordination exhibited in the industry still leaves much to be desired, especially in the manner in which crews approach their jobs, their attitude and communication. Participation in a CRM program should change the outlook of crewmembers toward their role in the cockpit. The objective is to ensure that a high level of teamwork will come about more or less automatically if each individual in the cockpit understands his personal style as a leader or follower and recognizes the need for good communication.

05.01.01.03 WHAT IS THREAT AND ERROR MANAGEMENT?

Line Oriented Safety Audits (LOSA) conducted by academic researchers have shown that, on average, five to six errors occur on every flight. Most errors are either caught or have a minor overall effect on the safety of the flight. Threat and Error Management (TEM) is a structured method for dealing with and formalizing a set of procedures to avoid or mitigate errors. In the past, as crewmembers, we typically either communicate or acknowledge various “known” threats to avoid errors that could affect the safety of flight (e.g., weather, terrain, fatigue, ATC). However, some threats can occur outside these “known” or “anticipated threats” again creating possible errors and affecting the safety of flight (e.g., aircraft systems failures, routing changes, etc.). In either case using the TEM model has proven effective tool in airline operations to combat these “known” and “unknown/unanticipated” threats.

The TEM model’s first level of defense is to elevate the level of awareness for known threats to avoid possible errors. The next level is, if an error does occur, to “trap” the error and avoid possible minor deviations of flight (e.g., altitude or air speed) or exceeding any aircraft limitations (e.g., flaps, gear etc.). A last line of defense, if these errors cannot be trapped, is to make the appropriate corrections or mitigate the deviation to avoid an “Undesirable Aircraft State” (e.g., stall, CFIT) or worse, an aircraft accident or incident. TEM has proven effective in both airline operations as well as in other industries by increasing the margin of safety and avoiding undesired outcomes.

Most of us actually use a version of TEM now. Crews regularly brief threats as a normal part of their routine flying. An example would be briefing a particular departure to include the “what-if” scenario of an engine failure. Additionally, we typically analyze weather and obstacles as “threats” to our particular flight. So, though TEM has been a part of our past flying experience we can now expand on this model to incorporate the various levels of threats and errors and apply specific resources to manage these threats in the aircraft.

05.01.01.04 WHAT IS RISK MANAGEMENT?

UPS like most companies seeks to minimize risks and therefore minimize loss of life and property all of which affect their profitability and solvency. The airline industry is a very volatile business and managing risks has a huge effect on this volatility. As a pilot group, we access risks daily and have procedures and policies to help us diminish our risks when flying. We also have our past experience and personal techniques to help us as well.

UPS constantly reviews the risks associated with its’ daily operations. Below is a matrix we use to gage our risks thereby limiting exposure to loss of life or property. Any undesirable outcome is reviewed to avoid similar future events and help educate our employees to do so. This is done either by changing policies or procedures or by re-educating employees. As the matrix shows, some situations may have a very low occurrence, but have a very high chance of hull loss or loss of life. At the other end of the matrix we have a high chance of occurrence with minimal losses.

	SEVERITY					
FREQUENCY		Catastrophic (5)	Hazardous (4)	Major (3)	Minor (2)	Negligible (1)
	Frequent (5)	25	20	15	10	5
	Occasional (4)	20	16	12	8	1
	Remote (3)	15	12	9	6	3
	Improbable (2)	10	8	6	4	2
	Extremely Improbable (1)	5	4	3	2	1

20 - 25, Extremely High Risk. 10 - 16, High Risk. 5 - 9, Moderate Risk. 3 - 4, Minor Risk. 1 - 2, Negligible Risk.

Throughout our aviation careers we may have experienced or heard of events as minor as delayed departures/arrivals to as major as aircraft accidents. Each one of these events is reviewed by a management team on a daily basis. Using inputs from crewmembers, maintenance, our Flight Control Dispatchers, etc. the management team makes decisions which effectively help to reduce risk. In fact, the airline industry in general is adopting this model for managing its operations. UPS is now taking a more expanded policy of incorporating this risk analysis model to minimize loses and maximize assets. As crewmembers, we are a part of this equation and are integral to the success of it. How we perform our duties in maintaining a high level of awareness, following Standard Operating Procedures (SOPs), using our acquired aviation skills and managing the cockpit greatly effect UPS’s operations.

05.01.01.05 INTEGRATION OF TEM USING CRM AS AN EFFECTIVE RISK MANAGEMENT TOOL

Now that you have an understanding of TEM and CRM, how do we, as crewmembers, integrate them into our flying to limit risks? UPS continues to adapt and revise its approach to CRM and employs these concepts in both training and in line operations. In fact, CRM and TEM training are a major focal point in our Advanced Qualification Program (AQP). What you learn during initial and recurrent training focuses on developing and perfecting these skills.

The modern glass cockpit has made us more “monitors” of our aircraft than when we operated previous generations of aircraft. As a consequence we are required to focus on new flight deck skills. As humans, we possess very poor monitoring skills and our modern aircraft have built in systems to protect us and draw our attention to various cockpit indications to avoid unintended consequences or an undesired aircraft state. However, we now have to filter and prioritize these various indications (lights, bells, aural, etc.).

Because aircraft control and navigation are still primary, we have established a “filtering” type of model in CRM known as the “Big Six” to allow us to become better monitors and managers of the modern cockpit. Using this model has proven very effective in both normal and abnormal situations in dealing with threats and avoiding an accident, incident, or violation. The following briefly outlines each of the six layers of defenses used in this model.

05.01.01.06 COMMUNICATIONS AND BRIEFINGS

Establishing a level of understanding and setting the tone for standardization at the beginning of each and every flight is paramount. UPS has a diverse work force with many different facets such as gender, cultural or ethnic differences and racial differences. Additionally, international flying adds another dimension to this diversity with ICAO standards and language barriers.

How do we as crewmembers communicate with each other? The Captain sets the tone and establishes a level of adherence to UPS policies and procedures and encourages crew participation. The more specific and standard we are in our briefings the less chance there will be a misunderstanding or deviation from expectations. These briefings should also incorporate IROs and jumpseaters who actually may have valuable input and could assist in certain situations. The Flight Control Dispatcher is a good resource. Remember there is almost always someone who has an answer to a particular problem.

Effective communication skills include:

- Use standardized terminology and phrases
- Proper checklist execution and responses
- Allowing for constructive feedback and critiques
- Incorporating all crewmembers in your briefing (e.g., IROs)
- Providing a feedback loop to accurately assess progress

05.01.01.07 “WHAT IF” PLANNING

In the past, most crewmembers have included “what if” scenarios in their briefings. This would include but is not limited to engine failures of takeoff, weather diversions, rejects, etc.

As with any flight this type of planning starts in the briefing room. Accessing the “Lido” flight plan and dispatch briefing package, analyzing the aircraft status and ensuring it meets the criteria for dispatch (e.g., CDL and MEL issues) and evaluating the status of our crewmembers are all part of this planning phase. During this phase, the Flight Control Dispatcher considers several “what if” scenarios and uses these scenarios in preparing the Operational Flight Plan.

Once crewmembers arrive at the aircraft, they have additional “what if” planning. For example, does the aircraft need to be deiced, inspected for logbook write-ups, etc. “What-if” planning continues throughout the entire phases of flight and because of the dynamic nature of the business it is constantly subject to change. Utilization of all available assets during any planning phase has proven effective in the past, particularly in emergencies.

05.01.01.08 TIME MANAGEMENT

Every industry has to deal with the valued commodity of time. At UPS our round-the-clock, worldwide operations are subject to precise time constraints so timeliness is definitely a valued commodity. How you as a crew manage each flight and establish the importance and timing of a given set of events (emergency and non-emergency) is crucial to the safe operation of each flight.

Allocation of resources in and out of the cockpit can help or hinder our time management criteria. Overloading the crew by rushing a particular checklist could have negative outcomes. Allow for time to evaluate your situation and use ATC, your Flight Control Dispatcher and any other resources to assist you. There are very few instances where rushing a checklist or procedure has helped a crew. If need be and circumstances allow, build time to ensure all tasks are completed and that as a crew are operating from a proactive stance and have a shared mental model.

05.01.01.09 TEAMWORK AND LEADERSHIP

A team is defined as a group of people working together to achieve a common goal. A cockpit crew and their Flight Control Dispatcher fit into this category, In order that such a team execute its tasks effectively they must work together in unity and coordination.

In reviewing the causes of accidents and reported incidents, it was concluded that in the majority of cases, the aircraft was mechanically capable of flying out of the situation, all crewmembers were well trained and in good health and yet the crew was unable to rectify the situation. It is the team/crew, not the aircraft that is the root of most accidents. The training and application of CRM skills is one of the many factors that differentiate outstanding crews from all the others.

Leadership starts with the Captain. Setting the tone and leading by example are paramount in the safe operation of our aircraft. Providing a forum in the cockpit open to inputs and exchange of ideas will enhance your chances of success. Ultimately, the final decision rests with the Captain. However, as with many problems there can be more than one solution. Enabling your crew to provide input can enhance this final decision.

05.01.01.10 AUTOMATION MANAGEMENT

UPS operates glass cockpits that incorporate increased levels of automation. Knowing what level of automation to use in any given situation can either enhance the ability to control the aircraft or degrade it. Congested airspace and tighter constraints of usable airspace have redefined the way we fly modern jet aircraft. The requirements of reduced vertical and lateral separation require crewmembers to employ more precise modes of flying.

Examples of incorrect automation management include:

- Selecting an inappropriate speed mode of (e.g., FMS vs. edit speeds)
- Not using the appropriate level(s) of automation (e.g., autopilot on/off)
- Using an inappropriate vertical mode (VS or level change vs. profile)

05.01.01.11 SITUATIONAL AWARENESS

Situational awareness is simply knowing what is going on around you at all times. As crews you are constantly monitoring the aircraft, anticipating certain actions and responding to them. Your Flight Control Dispatcher is also monitoring your flight progress from the Global Operations Center (GOC). Your focus as crewmembers is to take all available inputs to aircraft systems and establish priorities to effectively handle and solve any normal or abnormal aspect of flight.

Some of the signs of diminished situational awareness include:

- Missing radio calls, standard callouts or checklist responses
- Fixation on some aspect of flight and ignoring others
- Confusion
- Lost awareness of the aircraft status or configuration
- Reading wrong checklists or not completing them

05.01.01.12 DECISION MAKING

Crewmembers are constantly engaged in decision making as part of day-to-day flying. However, when situations develop involving abnormal scenarios, this decision making may become more critical and time constrained.

In order for a successful outcome crewmembers must establish a way to re-evaluate the situation. This re-evaluation “loop” enables them to limit the possibility of continuing down the wrong path in resolving a problem.

The primary decision maker is the Captain; however, First Officers, Flight Control Dispatchers and IROs are invaluable components of any crew complement and in helping the Captain in his role as a decision maker.