# Report to COMSTAC
# of the
# Safety Working Group

Presented to:      COMSTAC

By:      Oscar S. Garcia, SWG Chair

Steve Lindsey, SWG Vice Chair

**AST** Commercial Space Transportation

**Federal Aviation Administration**

# Safety Working Group Membership

| | | | |
|---|---|---|---|
| Oscar Garcia | Interflight Global | oscargarcia@interflightglobal.com | Chair |
| Steven Lindsey | Sierra Nevada Corporation | steven.lindsey@sncorp.com | Vice chair |
| Paul Damphousse | SES Government Solutions | paul.damphousse@ses-gs.com | |
| David Karnes | Kutak Rock | David.Karnes@KutakRock.com | |
| Charity Weeden | Lquinox | charity@lquinox.com | |
| Stu Witt | SO Witt & Associates | stuart@wittandassoc.com | |
| Mike Lopez-Alegria | MLA Space | mla@mlaspace.com | |
| Brett Alexander | Blue Origin | balexander@blueorigin.com | |
| Bill Beckman | Boeing | arthur.w.beckman@boeing.com | |
| Deborah McElroy | Airports Council International - North America | DMcElroy@aci-na.org | |
| Greg Autry | University of Southern California | gautry@marshall.usc.edu | |

# SWG Focus Areas

1. Reportable safety related events (FAA AST Assigned  Short Term Task)

2. Safety standards  ASTM F 47 Commercial Spaceflight Committee

3. Current industry  safety issues

   ➢FAA control center visit- NAS-ALR
   ➢Space Support Vehicles (HR 5346)

# Safety Working Group Assigned Task-Short Term

- ➢ **Reporting Safety Related Anomalies and Lessons Learnt**
  - ➢ Should safety-related anomalies and lessons learnt be shared by industry stakeholders?
    - ➢ If so, how?
      - ➢ Regulation?
      - ➢ Voluntarily?
        - ➢ Example: FAA Aviation Voluntary Reporting Program-ASAP, NASA ASRP
        - ➢ **Criteria requiring industry to report safety related anomalies and lessons learnt** below current regulation threshold (mishap, incident or accident)?
  - ➢ Challenges:
    - ➢ Event taxonomy, data input-output formats, templates, tools (lower threshold), "near" mishaps)
    - ➢ Proprietary data de-identification  and protection in a small industry
    - ➢ Non-punitive legislation on voluntary data
    - ➢ Cost-benefit value and usefulness of shared data and lessons learnt

# Reportable Safety Related Events and Lessons Learnt

➢ Challenges of voluntarily reporting framework:

  ➢ Proprietary data protection and competitive issues
  ➢ Non-punitive environment-legislation
  ➢ Data management platform
  ➢ Cost-Benefits

➢ FAA AST Voluntary Safety Program (VSP) Concepts- Briefing  by FAA AST Nick Demidovich

➢ Review of FAA ASAP and NASA ASRS programs as possible relevant and  useful VSP frameworks

# Reportable Safety Related Events and Lessons-Learnt

➢ A Task Group has been formed, under the auspices of ASTM F 47 Committee, to create a Guide to standardize the voluntary sharing of Reportable Safety Events and Lessons Learnt

  ➢ Chair (Oscar Garcia) invites COMSTAC members and industry stakeholders to join and collaborate

https://compass.astm.org/CUSTOMERS/COLLAB/filtrexx40.cgi?+-P+GTYPE+WK+-P+GROUP_DIS+WK65152+my-group.frm#Overview


➢ **Task Group objectives:**

  ➢ Reportable Incidents (public, proprietary, anonymous) what is reportable? Taxonomy of what is to be reported. List of all things that should be voluntary reported. Includes a guide on formats and templates to accept as outputs of data entries that are useful for lessons learn, safety and other industry incidents.

  ➢ SWG recommends that task group should include as many launch operators as possible

# Reportable Safety Related Events and Lessons Learnt

**Observation:** A Reportable Safety Events Task Group has been formed under the auspices of ASTM F 47 Committee to work on an industry consensus standard for the voluntary sharing of Reportable Safety Events and Lessons Learnt

**Finding:** The COMSTAC SWG finds that the voluntary reporting of safety related events and lessons learnt below the current mandatory reporting of mishaps, accidents and incidents threshold benefits safety.

# Reportable Safety Related Events and Lessons-Learnt

**Finding:** The COMSTAC SWG applauds AST's initiative to develop a Voluntary Safety Program (VSP) and welcomes collaboration with industry via COMSTAC and ASTM's F 47 Committee's new Reportable Safety Events Task Group

**Recommendation:** The COMSTAC SWG recommends that AST and other FAA stakeholders join the Reportable Safety Events and Lessons Learnt Task Group formed under the auspices of ASTM F47 Commercial Spaceflight Committee

# Consensus Standards Development

**Updates ASTM F 47 Chair: Mike L-A**

➢ Next F2F meeting of full committee set for November 27 in Houston

➢ F47.01 – Occupant Safety of Suborbital Vehicles

 ➢ PPO2 Task Group – Dana Levin replaces Kris Leinhardt as lead; next meeting in work

 ➢ Seat Restraint TG – standard in development with SAE; getting close to ballot

 ➢ Solar Particle Event TG – Becky Blue replaces Kris as lead; getting up to speed

 ➢ Fault Tolerance TG – no activity

➢ F47.02 – Occupant Safety of Orbital Vehicles – no active Task Groups

➢ F47.03 – Unoccupied Launch & Reentry Vehicles

 ➢ Space Vehicle Types TG – meeting monthly; informed by Airspace ARC

 ➢ Flight Controller Training TG – no activity

# Consensus Standards Development

## Updates ASTM F 47 Chair-Mike L-A

➢ F47.04 – Spaceports

  ➢ Storage, Use and Handling of Liquid Rocket Propellants TG – standard balloted; a few hurdles

➢ F47.05 – Crosscutting

  ➢ Informed Consent TG (moved from F4701) – tabled due to lack of perceived need from members

➢ F47.91 – Nomenclature

  ➢ Nomenclature TG – in balloting process

  ➢ Reportable Incidents TG – recently established

# Consensus Standards

➢ General agreement that congress needs awareness of what makes standards qualify as industry voluntary consensus standards as per NTAA-OMB A-119 to be used as Means of Compliance (MOC) with FAA AST regulation

   ➢ Discuss a request to AST for Randy Repcheck to brief the full COMSTAC on which topic areas of reformed (i.e. launch and re entry licensing) and new (i.e. future human spaceflight) regulations benefitting from the use industry consensus standards

# Consensus Standards

**Finding:** The COMSTAC SWG that industry remains committed and active in the development and adoption of voluntary consensus standards as per Federal Law (NTTA and OMB A-119) and that industry favors them as:

> ➤ Means of compliance for FAA AST new and/or reformed regulations (regulatory reform, including launch and reentry licensing streamlining and new regulations, including licensing and certification of human spaceflight activities
>
> ➤ Enhancing safety tools for the involved (flight crew and participants) and uninvolved public

**Finding:** SWG applauds FAA AST presence and participation at industry voluntary consensus Standards Developing Organizations (SDO's) such as the ASTM F 47 Commercial Spaceflight Committee and its task groups

# Industry Safety- NAS (ALR)

➢ FAA Acceptable Level of Risk (ALR) in the National Airspace (NAS) Approach

  ➢ COMSTAC visit to FAA Air Traffic Control System Command Center (ATCSCC), Warrenton, VA; 22 August 2018
    ➢ ALR Briefing
    ➢ National Aerospace System (NAS) Integration of Space Operations Briefing
    ➢ Space Data Integrator (SDI) and Joint Space Operations Group (JSpoG) Overview
    ➢ Command Center Tour

# Industry Safety- NAS  (ALR)  (20 minutes)

➢ FAA Acceptable Level of Risk (ALR) in the National Airspace (NAS) Approach

    ➢ ALR Discussion

        ➢ Established to harmonize AST's and Air Traffic Organization's (ATO's) risk criteria for aircraft

        ➢ FAA uses risk criteria of 1E-9 probability of fatality per flight hour or Air Traffic Clearance for commercial air traffic

        ➢ AST uses risk criteria of 1E-6 probability of casualty for an individual per launch/reentry operation (30E-6 collective limit per launch/reentry)

# Industry Safety- NAS  (ALR)

- ➤ FAA Acceptable Level of Risk (ALR) in the National Airspace (NAS) Approach
  - ➤ ALR Discussion
    - ➤ New ALR safety standards require new Aircraft Hazard Areas (AHAs) to be computed
      - ➤ 1E-7 Probability of fatality individual limit for aircraft under Air Traffic Control
      - ➤ 6,412 per rolling 12 months collective limit on aircraft exposed to risk greater than 1E-9 probability of fatality
      - ➤ Various crossing requirements
    - ➤ Use of more sophisticated trajectory-based aircraft modeling over traditional grid-based approach results in an approximate one order of magnitude decrease modeled risk to aircraft
    - ➤ In the case of vertical launches with circular risk contours, there will be no THA, only an additional buffer added to the AHA to ensure the 1E-7 probability of    limit is met

# Industry Safety- NAS  (ALR)

**Observation:** Industry applauds AST inviting COMSTAC members to visit FAA Air Traffic Control Systems Command Center (ATCSCC) to brief on the ALR approach to spaceflight integration into the National airspace System (NAS) and ALR's future iterations, improvements and developments such as the Space Data Integration (SDI). COMSTAC members look forward to further visits and briefings.

**Finding:** The COMSTAC SWG agrees with the FAA developed Acceptable Level of Risk (ALR) approach that applies safety principles from both aviation and space industries.

**Finding:** The COMSTAC SWG understands that ALR's current methodology will evolve as FAA acquires the appropriate automation systems, such as the Space Data Integrator (SDI) and future real-time hazard area data generators resulting on a fully automated process that maximizes NAS efficiency and safety during normal and abnormal operations.

# Industry Safety- Space Support Vehicles (SSV)

➤ COMSTAC **PAST** OFR's re SSV's     COMSTAC-Industry position Review Oct 2016-Oct 2018

  ➤ **Observations**

    ➤ The COMSTAC observes that both the FAA AST and the Government Accountability Office (GAO) are required to submit reports to Congress on commercial Space Support Vehicles (SSV) in the Commercial Space Launch and Competitiveness Act (CSLCA) (P.L. 114-90).

    ➤ The COMSTAC observes that both the FAA AST and GAO have received input from industry regarding the use of commercial SSVs for space flight participant and crew training including safety-related data gathered from routine flight operations at spaceports and in the National Airspace (NAS).

  ➤ **Finding**

    ➤ The COMSTAC finds that utilizing commercial SSVs for space flight participant and crew (government and non-government) training will reduce safety-related risk and provide critical safety-related data from routine fight **operations at spaceports and in the NAS.**

  ➤ **Recommendation**

    ➤ The COMSTAC recommends that the FAA Administrator direct AST to develop and implement (with appropriate authorization) an experimental licensing regime for commercial SSVs to perform space flight participant and crew (government and non-government) training and establish partnerships with industry to collect critical safety-related data from routine fight operations at spaceports and in the NAS.

# Industry Safety- Space Support Vehicles (SSV)

➢ BACKGROUND (read ahead):

➢ COMSTAC OWG OFR's re SSV's      COMSTAC-Industry position Oct 2016

➢ GAO Report      Nov 2016

➢ FAA-AST Report to Congress      June 2017

➢ HR 5546 SSV Act      June 2018-Passed House-Now In Senate

https://www.govtrack.us/congress/bills/115/hr5346/summary

# Industry Safety- Space Support Vehicles (SSV)

**Finding:** COMSTAC SWG finds that passage of the Space support Vehicle Act (HR 5346) streamlines regulations to enhance the safety of launch vehicles flight operations and the industry's competitiveness, innovation and efficiency.

# Medium and Long Term Taskers

Medium-term needs (delivery between now and 2020)

Changes to Maximum Probable Loss (MPL)?

Conceptual Vehicles OK for Site License Application?

Define the Encourage, Facilitate and Promote mandate

Space traffic management (STM) – How can AST support Department of Commerce as it rolls out STM? How does COMSTAC see STM implementation occurring on an operational level?

Industry Participation in International Outreach?

Long-term needs (delivery between now and 2021)

Changes to Part 420 and Operation of a Launch Site?

AST R&D Topics?

Regulating Point-to-Point Commercial Space Travel?