



**Federal Aviation
Administration**

Runway Safety

Presented to: RASG – Pan America Meeting

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Reducing Safety Surface Operations Risk Factors



Minimal separation and rapid pace



High-speed operations with little margin for error



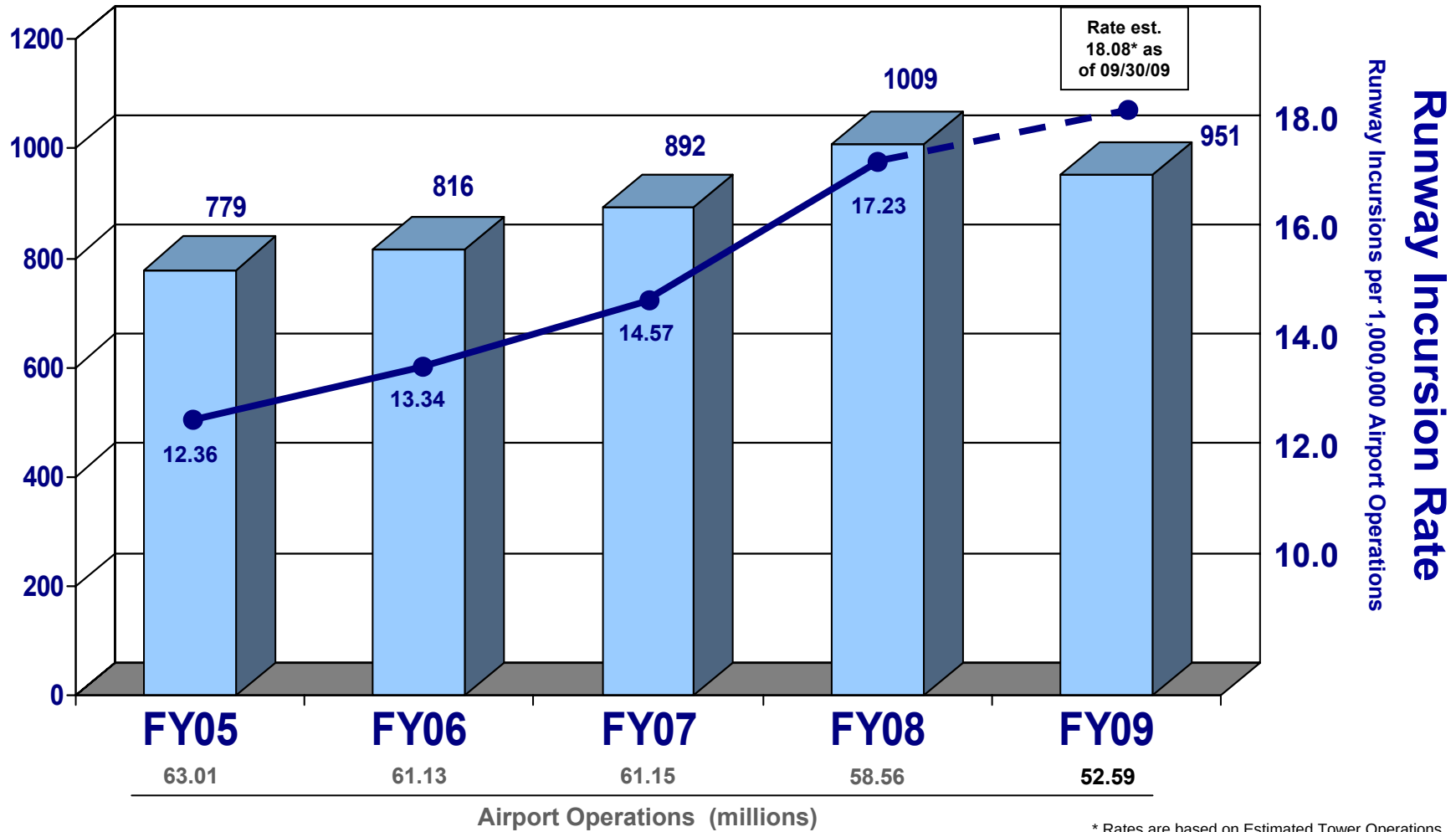
Complex environment



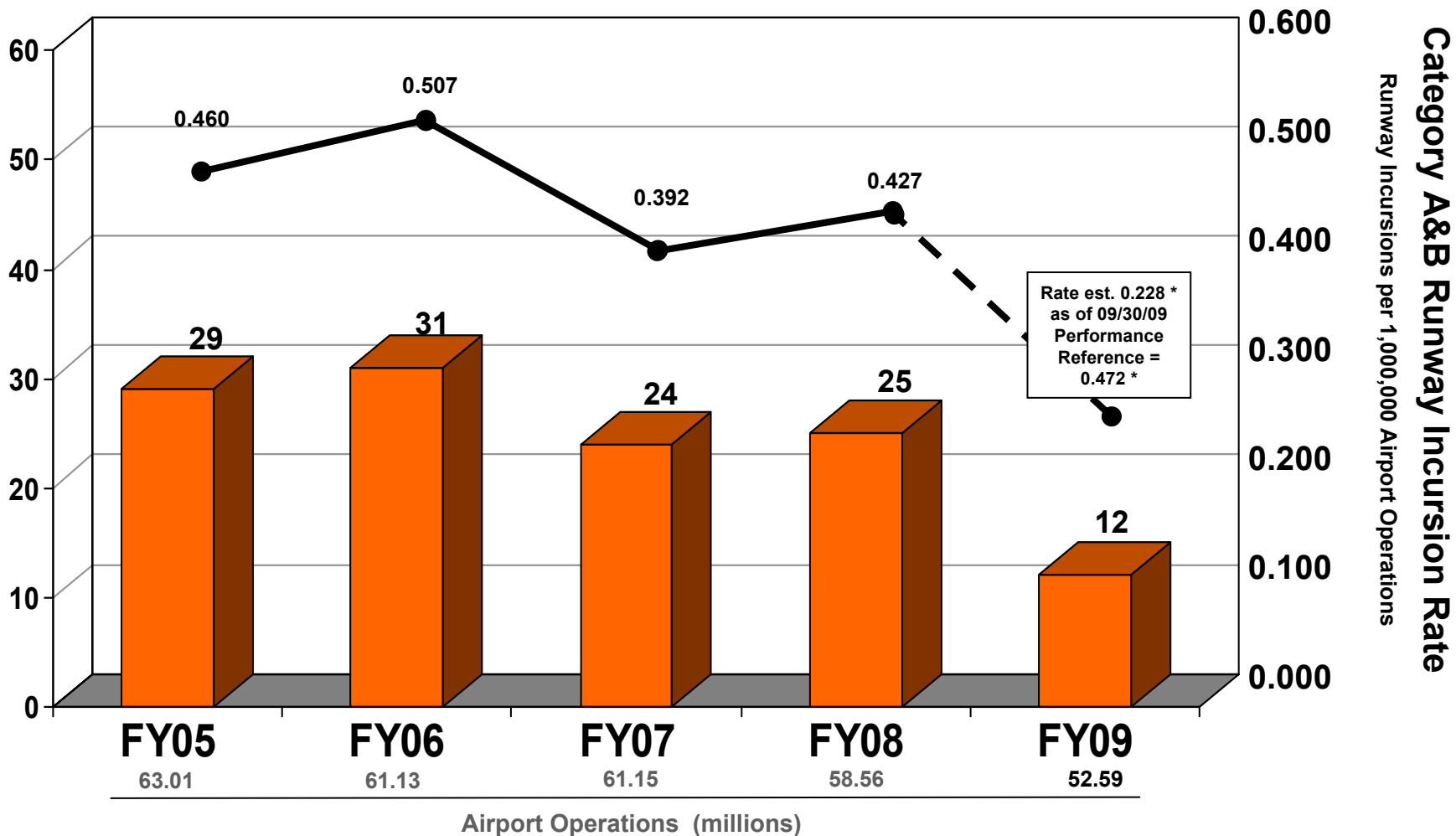
**Low visibility in
poor weather**

Combination of Factors Minimizes Safety Margin

All Categories of Runway Incursions



Category A&B Runway Incursions



* Rates are based on Estimated Tower Operations

Participation in RSATs



Participation in RSATs

The preliminary inspection of the movement area includes:

- 1. Identifying non-standard marking, lighting, and signs.**
- 2. Examining problem intersections for potentially confusing visual aids.**
- 3. Review any past RSAT recommendations related to pilot visual aids for proper implementation.**

During the airfield tour, the Team noted that when exiting Runway 2 onto Taxiway Bravo, a destination sign blocked a taxiway direction sign for Taxiway November.



SGF

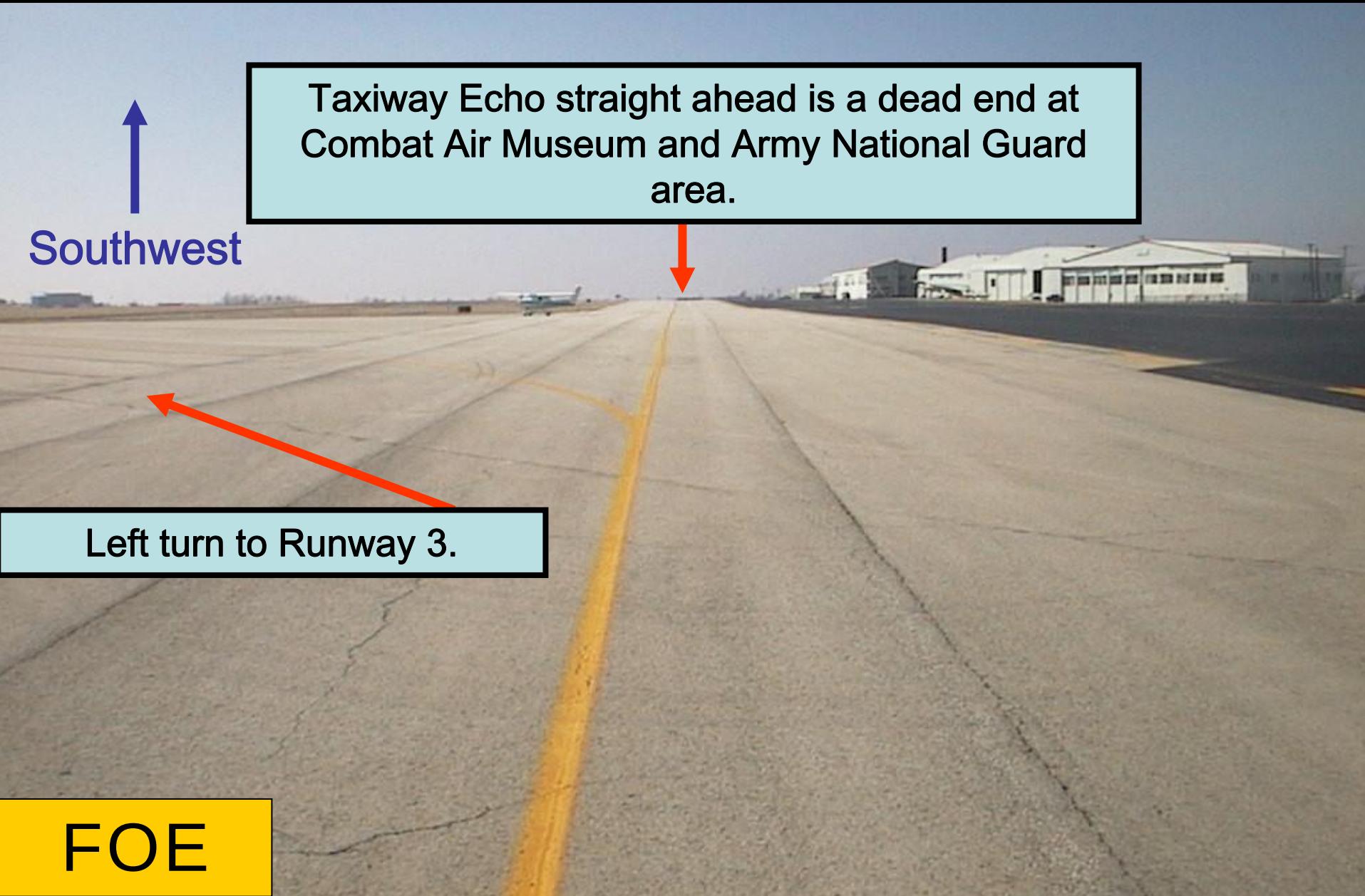
Some pilots mistakenly believe that the takeoff end of Runway 3 is straight ahead.

↑
Southwest

Taxiway Echo straight ahead is a dead end at Combat Air Museum and Army National Guard area.

←
Left turn to Runway 3.

FOE

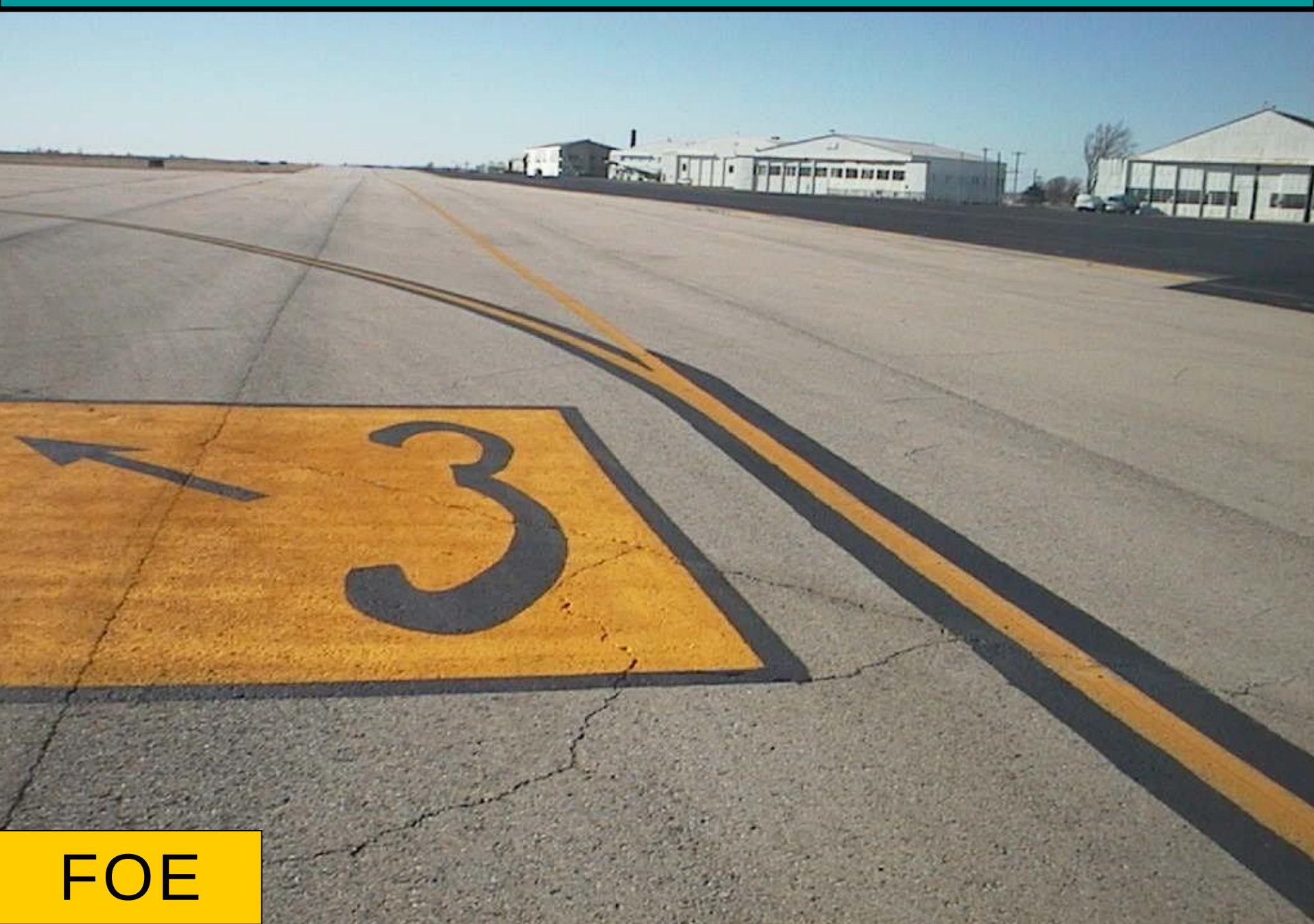


Recommendation – Highlight the taxiway centerline from Alpha around the corner towards Runway 3 and install a surface painted destination sign for Runway 3.



FOE

Recommendation Implemented



FOE

 **Conduct recurrent ground vehicle training, especially for seasonal procedures.**



Runway Safety Initiatives

- FAA Call to Action - Reducing Runway Incursions
 - Enhanced and Alternative Airport Markings
 - New Airfield Lighting Systems and Sources
- Runway End Safety Areas (RESAs)
 - Engineered Material Arresting Systems (EMAS)
- Wildlife Hazard Mitigation
- Safety Management Systems (SMS)
- FAA Airport Technology R&D

New Airport Markings



Enhanced Taxiway Centerline



Surface Holding Position Signs

http://www.faa.gov/airports_airtraffic/airports/airport_safety/signs_marking/

Runway Status Lights (RWSL) Configurations

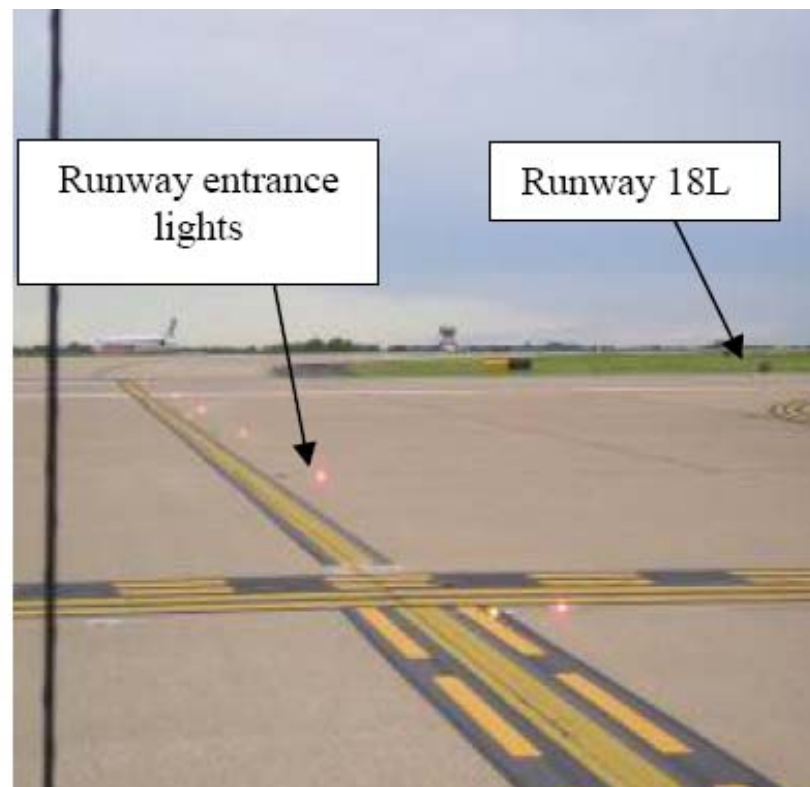
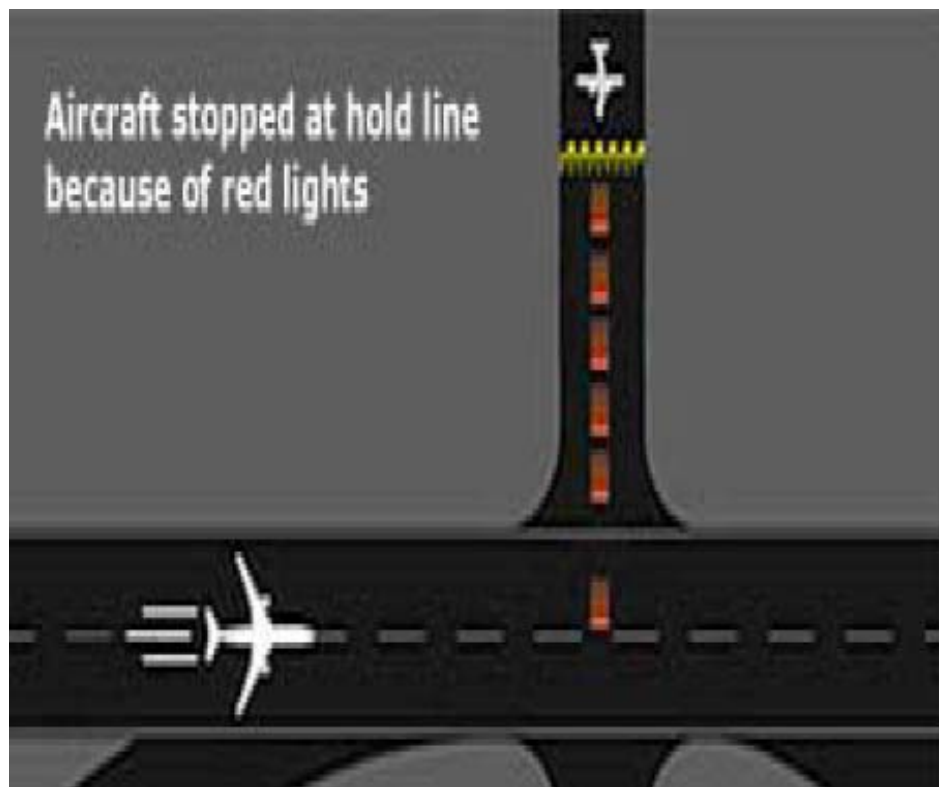


Runway Entrance Lights (RELs)



Takeoff Hold Lights (THLs)

RWSL – Runway Entrance Lights (RELs)



RWSL – Take-Off Hold Lights (THLs)



RWSL Installation Plan

- **RWSL will be installed at 22 ASDE-X airports**
- **Contract awarded fall 2008**
- **FAA owns, operates, and maintains entire system**
- **Complete installations end of 2012.**

RUNWAY SAFETY AREAS

- **RSAs HAVE EMERGED AS ONE OF THE MOST IMPORTANT INVESTMENTS AT OUR AIRPORTS.**



LESSONS LEARNED

- **BURBANK,
CALIFORNIA**



Burbank EMAS



Successful EMAS Capture



Courtesy: ESCO

**EMAS capture of a Boeing 747 at JFK International Airport, NY
January 2005**

Successful EMAS Capture



**EMAS capture of a Falcon 900 at Greenville Downtown Airport, SC
July 17, 2006**

Wildlife Hazard Mitigation



Wildlife Hazard Mitigation R&D (RPD 150)



- **Purpose: Reduce Wildlife Strike Risk to Aircraft**

Wildlife Hazard Management

- **When air carrier experiences a multiple bird strike, engine ingestion, or damaging collision with wildlife other than birds, airport must do a Wildlife Hazard Assessment.**
- **If required then must develop a Wildlife Hazard Management Plan**

Wildlife Hazard Management Plan

- **Provide measures to alleviate or eliminate wildlife hazards.**
- **Identify persons who have authority for implementing the plan.**
- **Priorities for needed habitat modification.**
- **Identification of resources for the plan.**
- **Procedures to be followed during air carrier operations.**
- **Wildlife control measures.**

Wildlife Hazard Mitigation

- **Habitat modification**
 - Grass height,
 - Type of grass,
 - Harrassment
 - Effigies
 - Relocation
- **Wildlife alerting system**
 - Portable radar
 - Airport GIS overlay
- **DNA analysis at Smithsonian**
- **Strike database** (wildlife-mitigation.tc.faa.gov)

Avian Radar

Examples of Commercial Systems



Deployment of Avian Radars

- **Seattle – SEA TAC Airport**
 - Permanent Installation completed June 2007
- **Oak Harbor – Whidbey NAS**
 - AR-1 installed February 2009
- **New York – JFK Airport**
 - AR-1 and AR-2 deployed Summer 2009
- **Boston Logan**
 - Negotiating for Merlin radar installation Fall 2009
- **Chicago – ORD**
 - AR-1 and AR-2 deployed Summer 2009, 2009

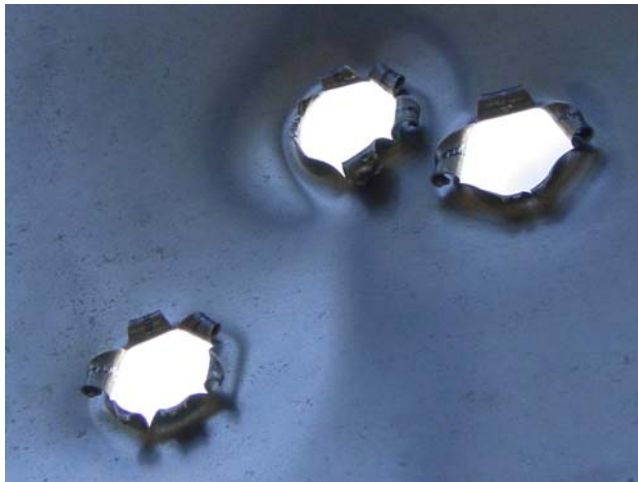
Aircraft Rescue and Firefighting

- **Ongoing research**
- **New large aircraft mock-up**
- **Extendable reach turret**
- **Penetrating nozzle**

Fire Research Mock-up Section



ARFF – Penetrating Nozzles



ARFF – High Reach Extendible Turret (HRET)

Current Generation

- 2nd level penetration possible, however, vehicle will be too close to burning aircraft and aircraft must be level.
- Penetrating nozzle should be as close to 90 deg. to skin as possible.
- Penetrating nozzle should be in-line with boom arm.



Next Generation High Reach Extendible Turret (HRET)



Update:

- Live Fire Testing – **80% Complete**
- Timed system deployment – **Completed**
- Boom oscillation testing – **Mechanical problems during preliminary testing – fixed & upgraded by OEM – Schedule for completion 3/09.**
- Standoff distance during piercing operations – **Completed**



National Pavement Test Facility

- **Pavement test machine**

NAPTF Test Vehicle



Instrumented Test Track at the NAPTF, FAA Technical Center

CC5 Gear Configuration



Automated FOD Detection

Why is the FAA Interested?



Federal Aviation
Administration



"It has become clearer that this was a unique accident caused by a one-off chance of a piece of metal lying on the runway".

-Concorde crash
preliminary report

Automated FOD Detection

Available Technologies:

- **QinetiQ – Tarsier Radar – Providence, RI (PVD)**
 - Millimeter Wave Radar
 - Mounted on Rigid Towers
- **Stratech – iFerret – Chicago O'Hare (ORD)**
 - High Resolution Camera
 - Mounted on Rigid Towers
- **X-Sight – FODetect – Boston Logan (BOS)**
 - High Resolution Camera and Millimeter Wave Radar
 - Mounted on Airport Lighting Fixtures
- **Trex Enterprises – FOD Finder – Chicago Midway (MDW)**
 - Millimeter Wave Radar and Infrared Cameras
 - Mounted on roof of Airport Vehicle



06/23/2008

Automated FOD Detection

XSight - FODetect



Tarsier Camera in operation

CAM ID: FS4Cam
FOD ID: 138763

CAM ID: FS4Cam
FOD ID: 138763

SCALE: 14.9 feet
FOD RANGE: 1525 feet

Tarsier Camera in operation



Example FOD finds by the QinetiQ system



FOD Detection Radar

- **R&D evaluation completed 2009**
- **FOD performance specification issued September 2009.**