



CENTER FOR ADVANCED AVIATION SYSTEM DEVELOPMENT (CAASD)

USA Near-Term Progress for Closely Spaced Parallel Runways

Wakenet 2 Europe

November 30, 2005

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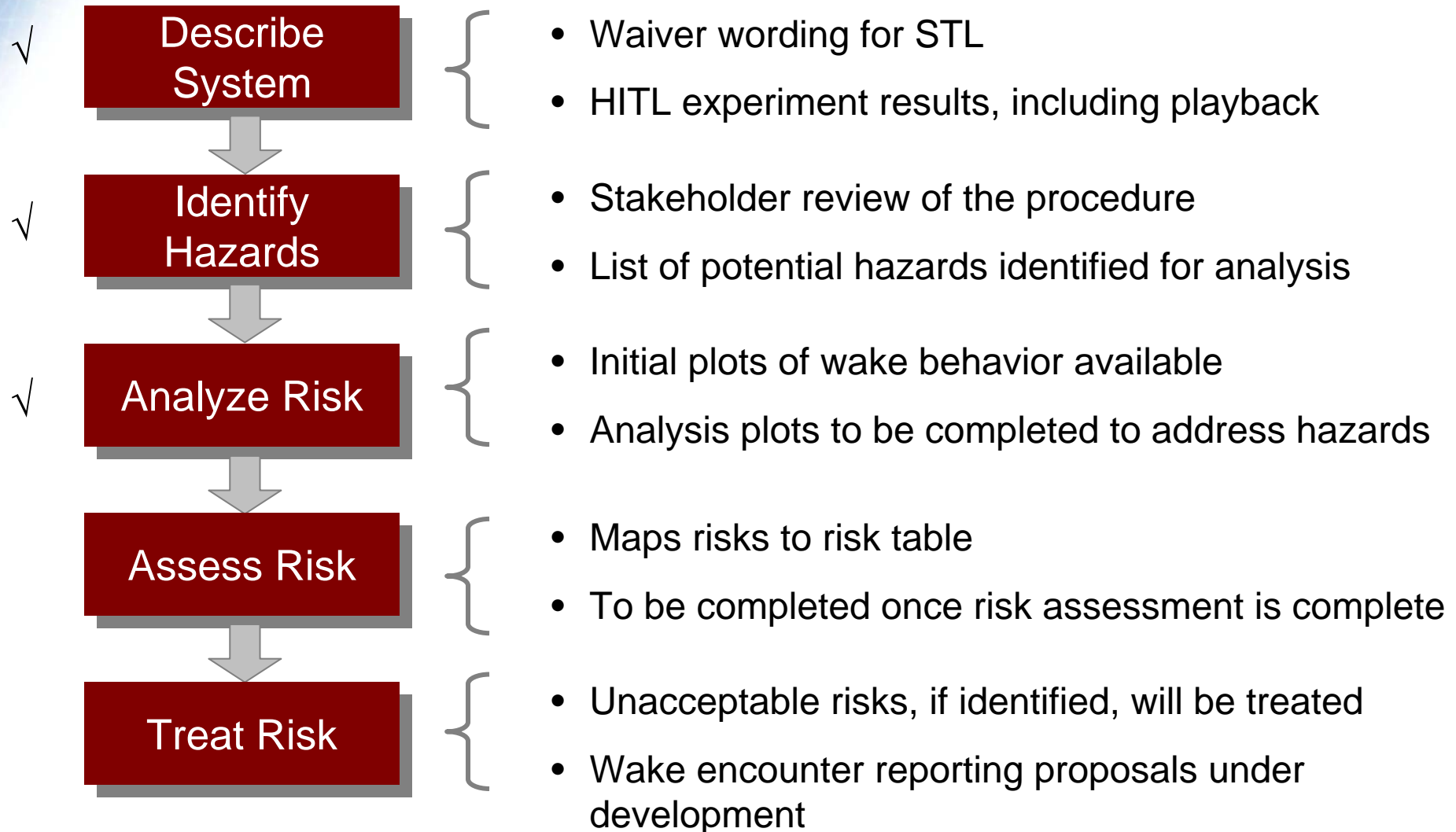
Overview:

How is the 2500 ft rule being revised?

- **ASAT tool is an integral part of the safety assessment process for the NT initiative**
 - How do we describe the proposed procedure in a way that is easily input into ASAT?
 - What non-normal, abnormal and failure modes need to be assessed by ASAT?
 - What are the environmental conditions in which the procedure will run?
 - Ceiling and visibility
 - Winds
- **SMS is being integrated into the FAA processes in response to ICAO mandate**
- **Wake program is applying SMS process in the safety assessment**



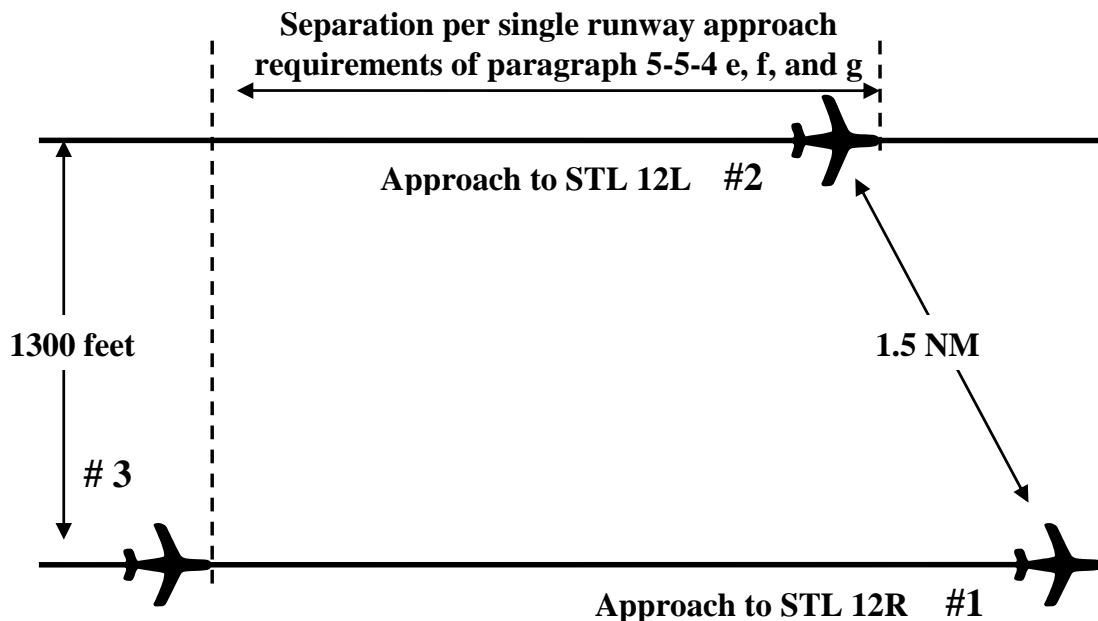
SRM Process





Procedure Description

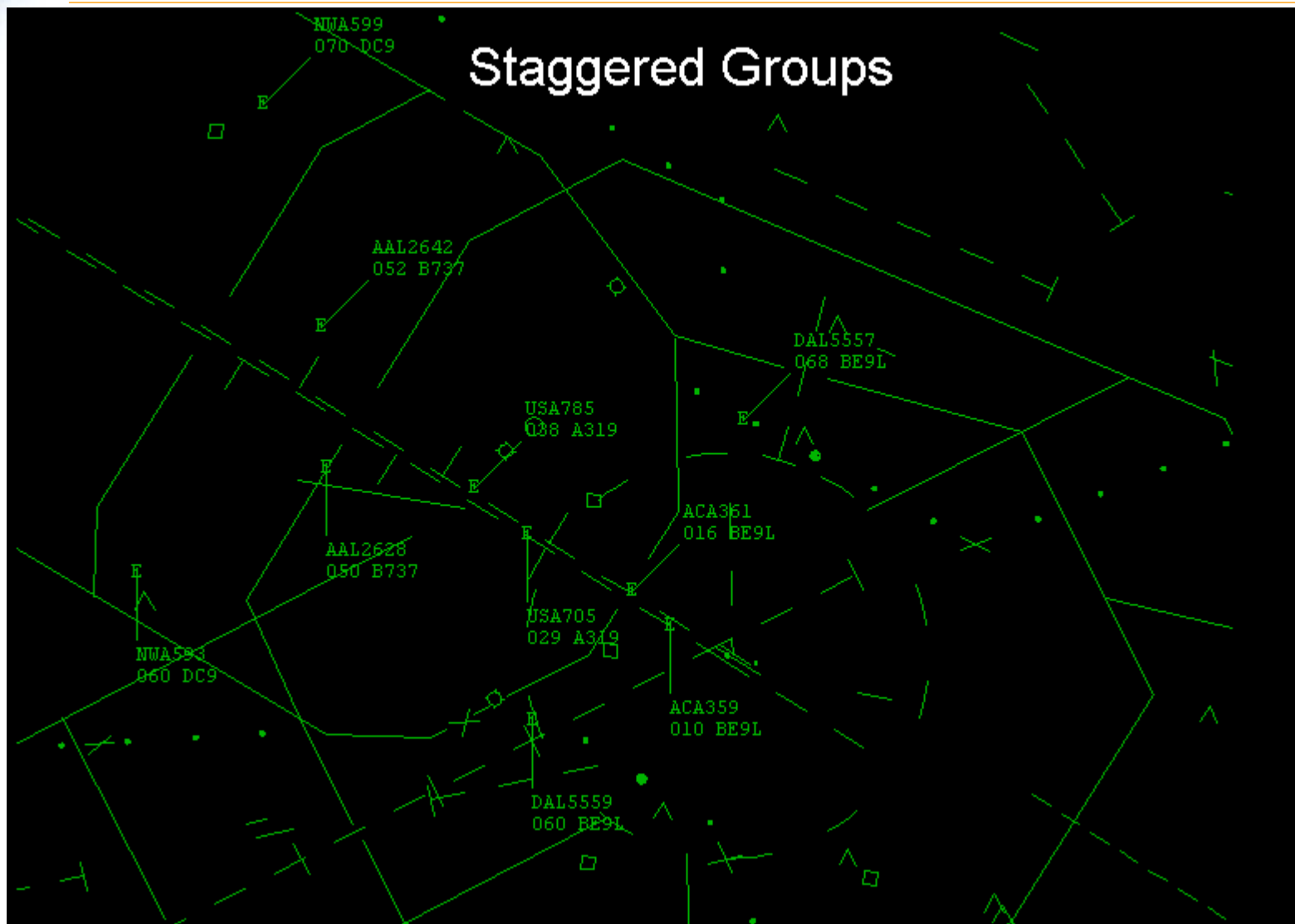
Parallel Dependent ILS/MLS Approaches



- Aircraft #1 is a Small or Large
- Aircraft #2 can be any type
- Aircraft #3 can be any type



HITL Description of the Procedure





Identify the Hazards

- **2 Roundtable meetings held with stakeholders (pilots and controllers)**
- **Used replays from HITL experiments**
- **18 potential hazards identified**
 - Late or missed g/s or localizer capture, wrong ILS
 - Loss of separation, missed approaches
 - Lateral and vertical FTE
 - System failures (e.g., localizer, g/s)
 - Various wind configurations including quartering tailwind
- **15 documentation requests identified**
 - History, methodologies
 - Visualization tool
- **Similar to DFS hazards for RDSM, but issues for FRA caused by more aircraft in the airspace not an issue for STL**
 - Workload
 - Comm overload
 - Runway incursions



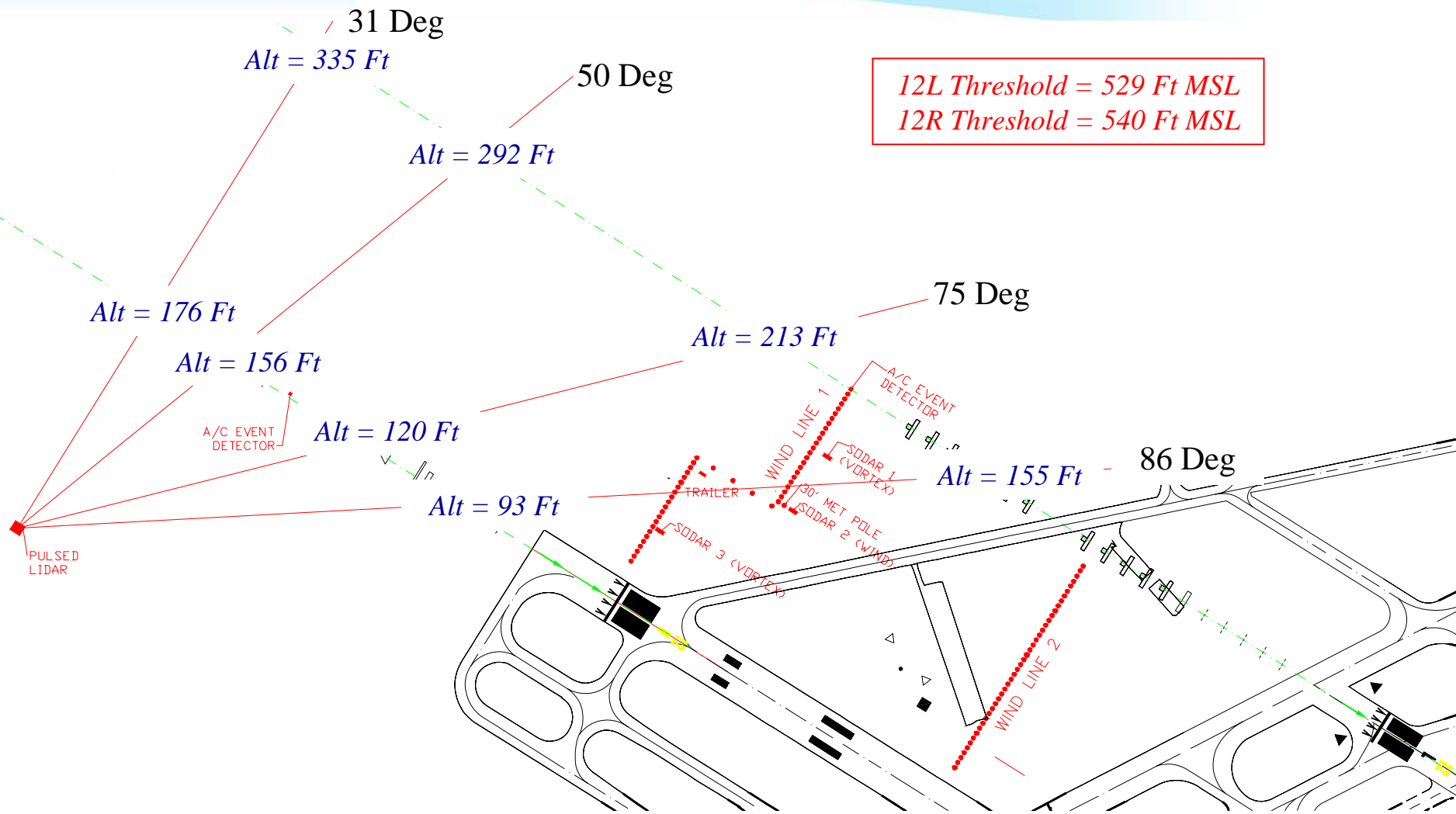
Assess the Risk Current Status

- **Collecting and analyzing**
 - Wake data from 3 pulse lidars, vortex sodars and 2 windlines
 - Wind data from ASOS, a wind sodar and lidars wind profile mode
 - Aircraft conformance to ILS from initial capture down to less than a mile from the threshold from multi-lateration system
- **Early look at the data on next few slides**
- **Next Steps:**
 - Complete the analysis of each individual hazard
 - Complete ASAT analysis of combined hazards
 - Present both analyses and associated input data to stakeholders in order to
 - see individual hazard contributions to risk and
 - better understand the ASAT results that accurately reflect the combination of these into a complete risk assessment

Definitions of Scan Angles

Glideslope Altitude Relative to Threshold of 12L

*12L Threshold = 529 Ft MSL
12R Threshold = 540 Ft MSL*





STL Data Collected Over 12-18 Months

Windline Data: 23,654 Tracks over 12 months (02/2004 - 01/2005)
“Large Plus” (L+)* Jets: 12,703

Lidar Data: 30,472 Tracks over 18 months (07/2003 - 01/2005)
L+ Jets: 19,429

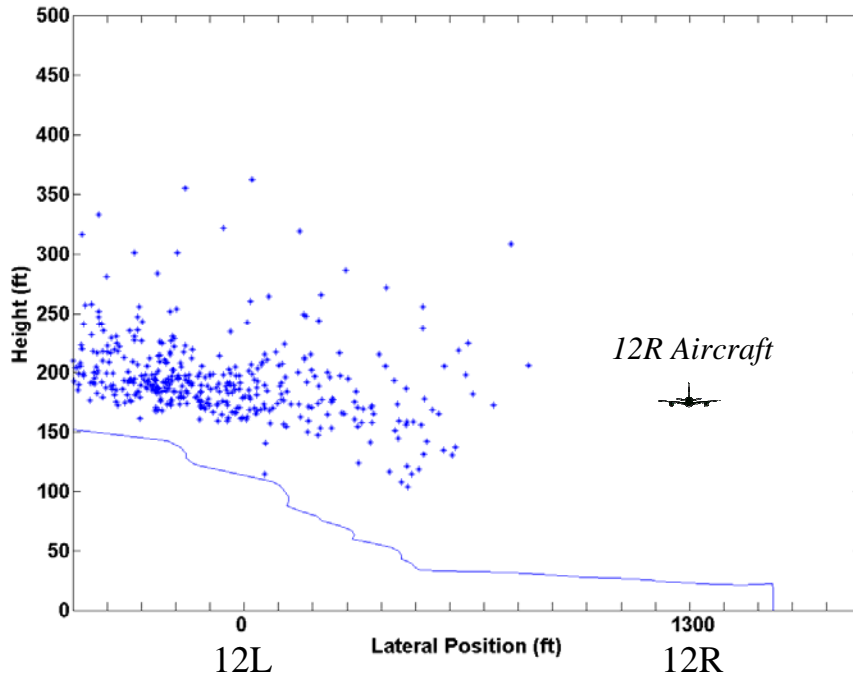
*Note: Large Plus (L+) jets are DC9s and above, this does not include RJs or Large Props

*Lidar data. L+ Jets Only
07/2003 - 01/2005:*

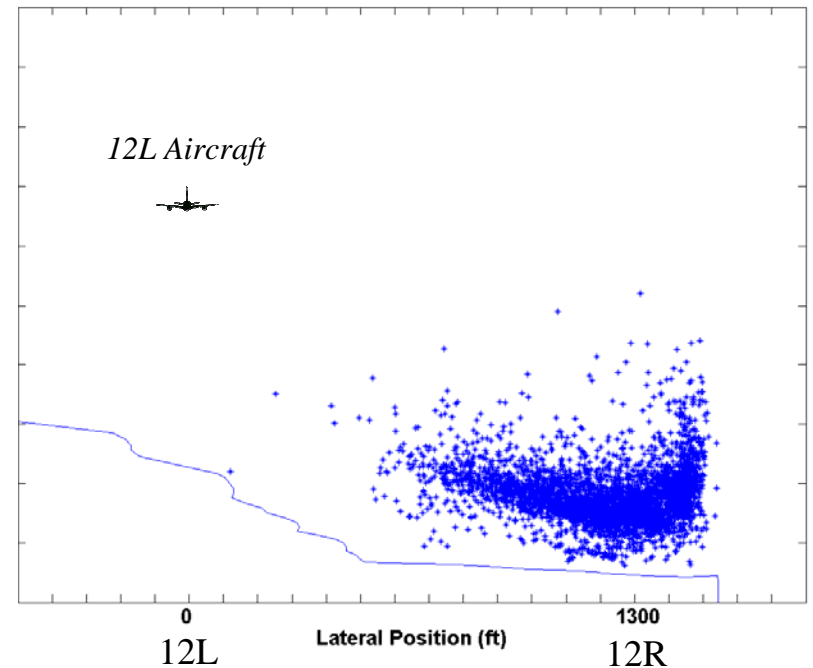
31 Degree Scan

1.5 NM Diagonal Separation

Wake Transport from 12L



Wake Transport from 12R

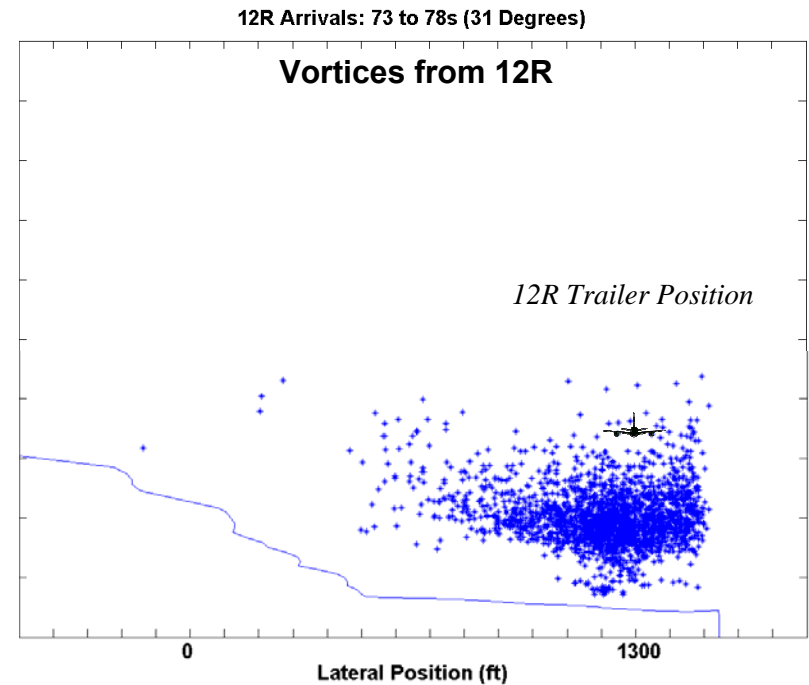
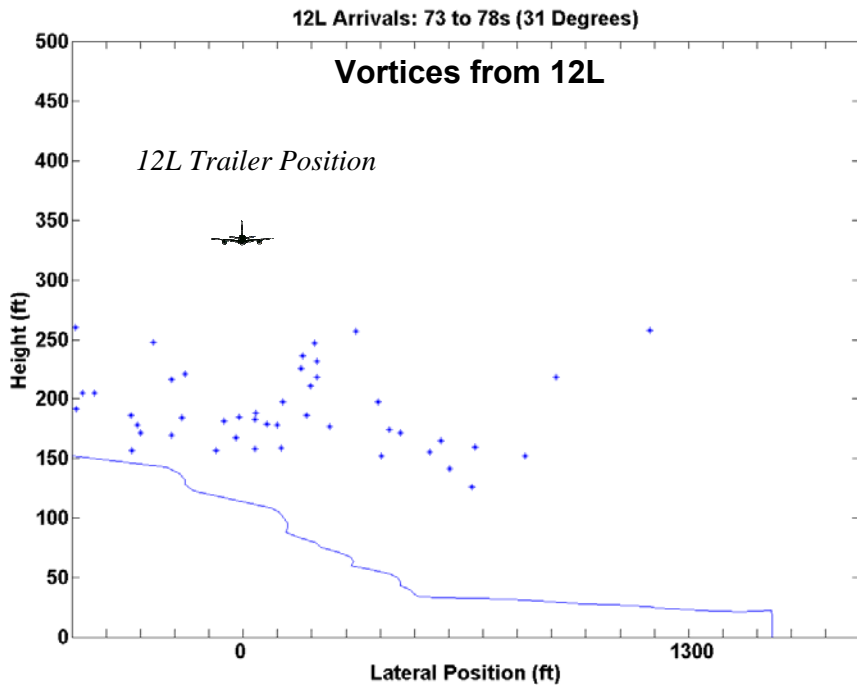




*Lidar data. L+ Jets Only
07/2003 - 01/2005:*

31 Degree Scan

2.5 NM In Trail Separation

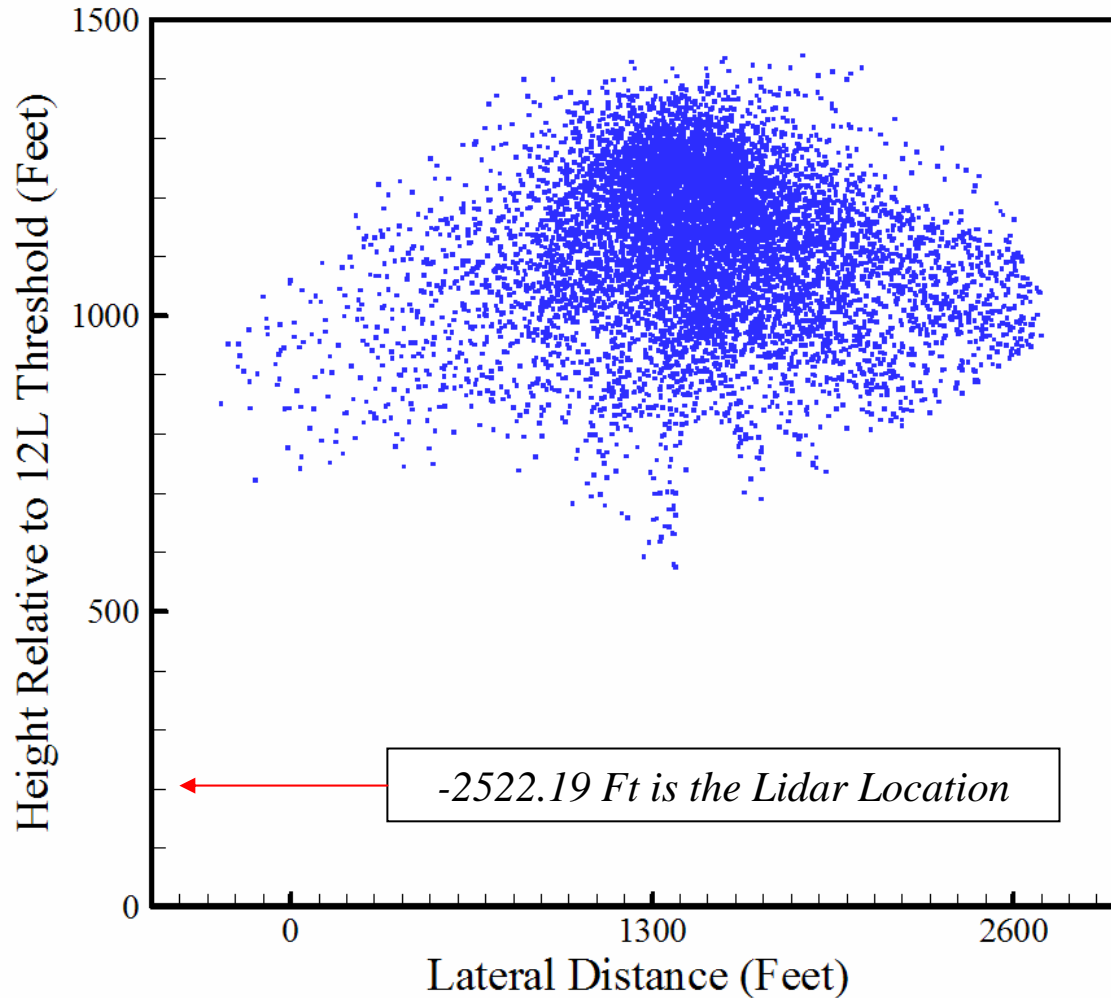


Site Status

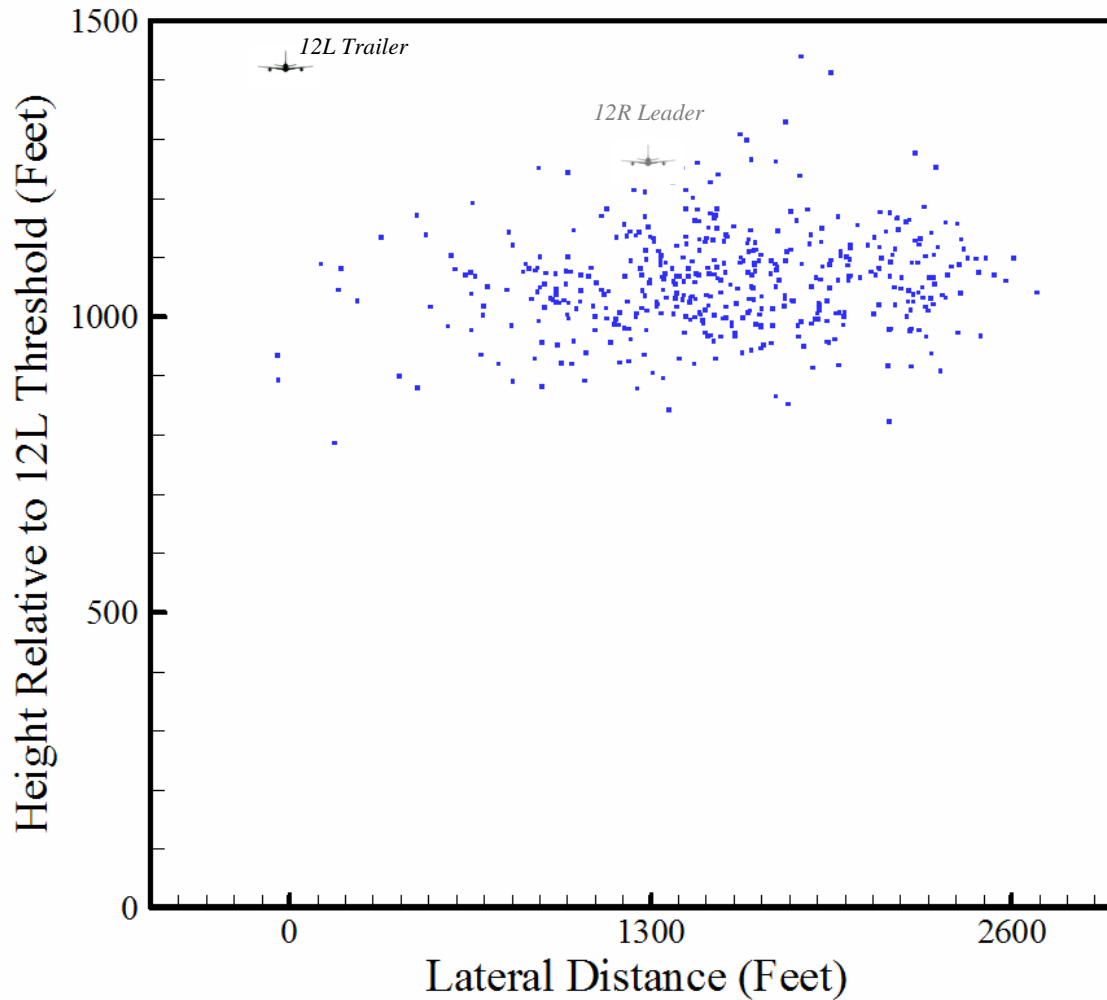


12R: All Aircraft

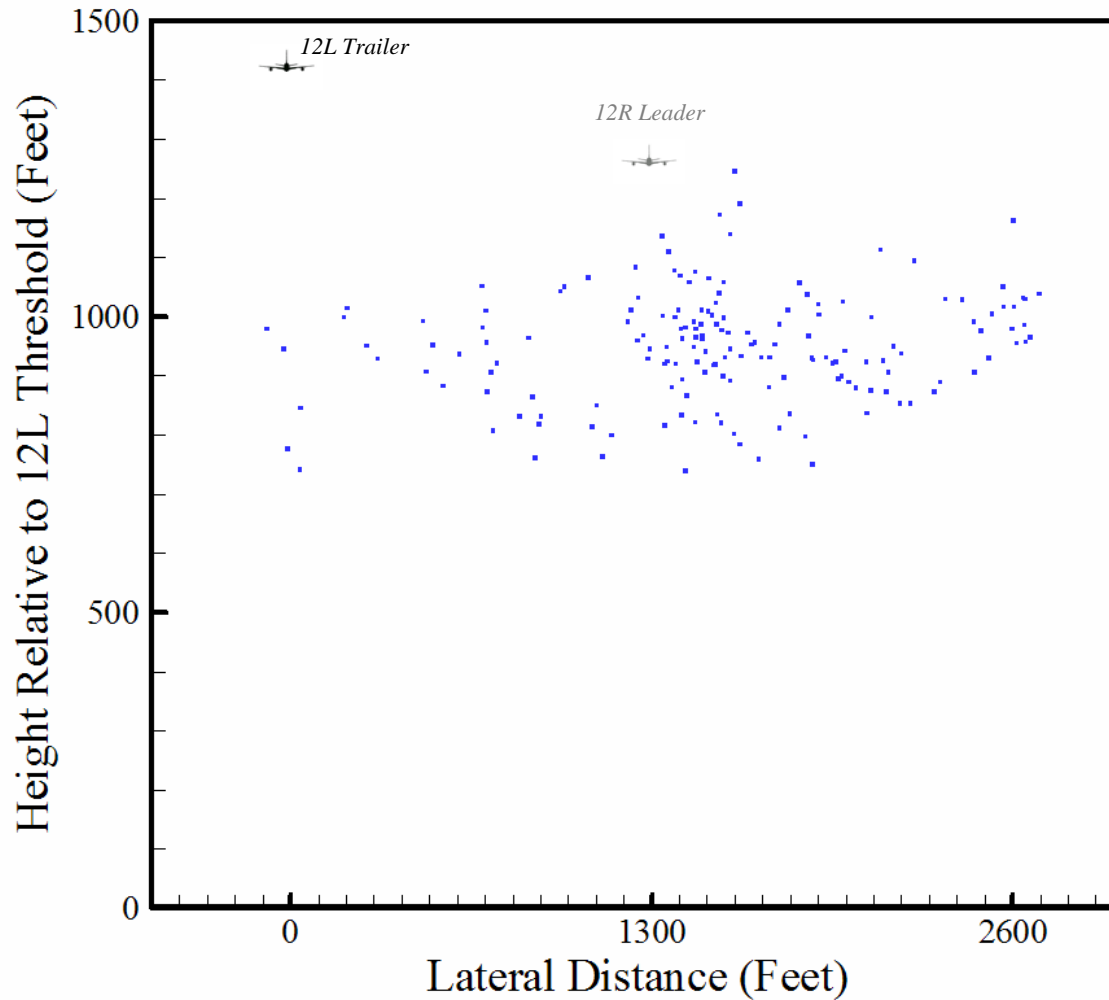
Entire Tracks, All Winds, Both IMC and VMC Operations



12R Towards 12L: 1.5 NM Behind

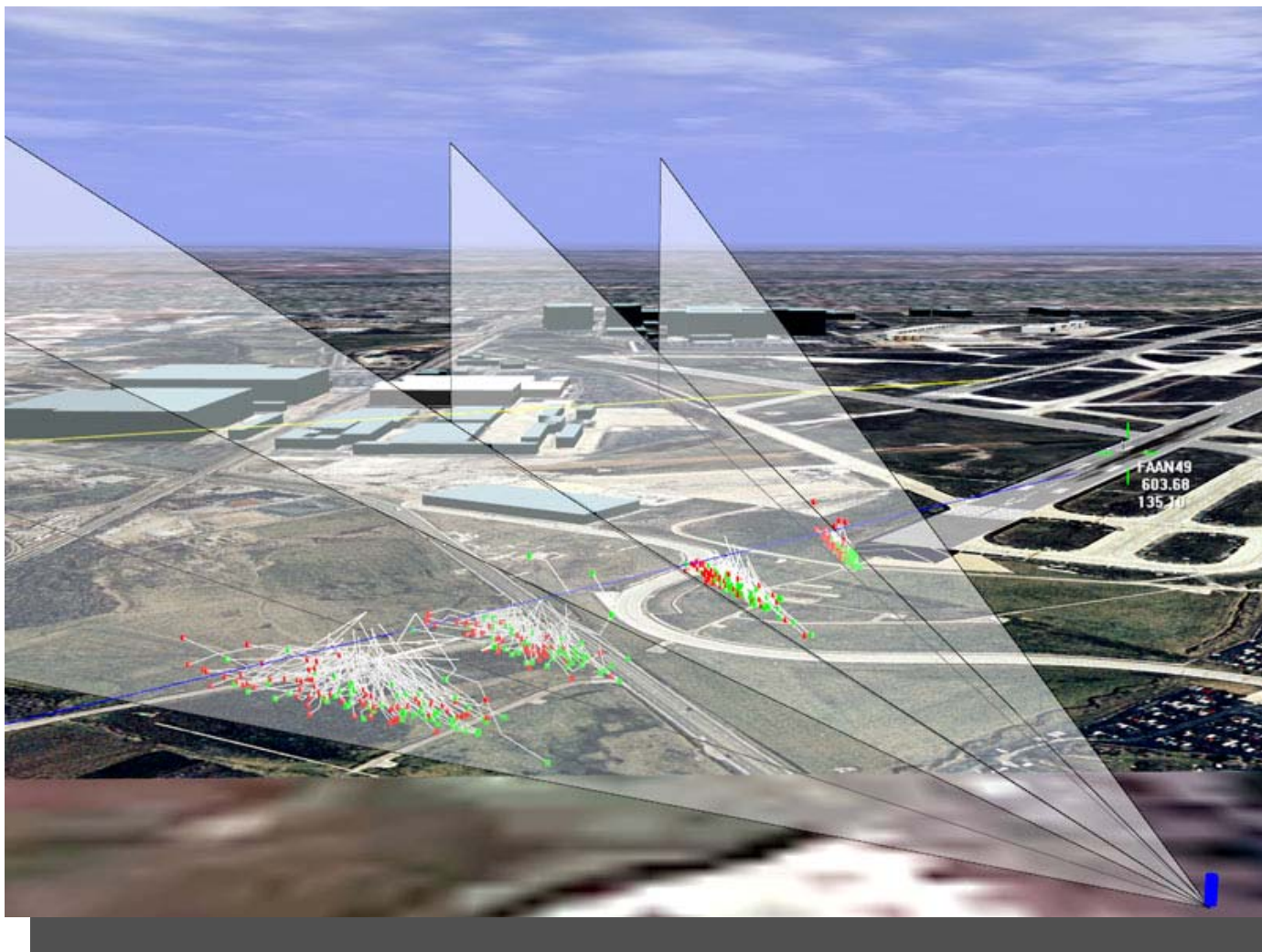


12R Towards 12L: 2.5 NM Behind





Wake Visualization Work in Progress





Wake Encounter Reporting

- Many options considered
- Only practical method, for now, is ASRS patterned after DRVSM

Supplemental Wake Turbulence Information

STL Approaches to 12R and 12L (or 30R and 30L) During IMC with Staggered Separation Applied

Name:

Date/Time of Occurrence:

Instructions:

1. Complete the NASA Aviation Safety Reporting System (ASRS) "General Form" (NASA ARC 277B).
2. Annotate the "Type of Event/Situation" block on the NASA ASRS form with the words: "Wake Turbulence".
3. Include comments/narrative in the "Event/Situation" section of the NASA ASRS form.
4. Mail this "Supplemental Information" form with the "General Form" or write the information in the "Event/Situation" section of the ASRS form.

Information:

Were you aware of the other aircraft before the event? YES NO

If so, how? Visual ATC Traffic Advisory TCAS Other

What was the position of the **OTHER AIRCRAFT**, when you encountered wake turbulence?

Your Assigned Runway <input type="checkbox"/> 12R <input type="checkbox"/> 30R <input type="checkbox"/> 12L <input type="checkbox"/> 30L	DME Distance to Runway when encounter occurred ■ NM	
<input type="checkbox"/> Encounter Occurred After Localizer Capture	<input type="checkbox"/> Encounter Occurred Before Localizer Capture	
■ Altitude at Localizer Capture	Encounter Occurred at Altitude ■ feet AGL Before Localizer Capture	
<input type="checkbox"/> Encounter Occurred After Glide Slope Capture	<input type="checkbox"/> Encounter Occurred Before Glide Slope Capture	Leading Aircraft Same Runway ■ miles in front
■ Altitude at Glide Slope Capture	Encounter Occurred at Altitude ■ feet AGL Before Glide Slope Capture	Leading Aircraft Parallel Runway ■ miles in front

DO NOT REPORT AIRCRAFT ACCIDENTS AND CRIMINAL ACTIVITIES ON THIS FORM.
ACCIDENTS AND CRIMINAL ACTIVITIES ARE NOT INCLUDED IN THE ASRS PROGRAM AND SHOULD NOT BE SUBMITTED TO NASA.
ALL IDENTITIES CONTAINED IN THIS REPORT WILL BE REMOVED TO ASSURE COMPLETE REPORTER ANONYMITY.

IDENTIFICATION STRIP: Please fill in all blanks to ensure return of strip.
NO RECORD WILL BE KEPT OF YOUR IDENTITY. This section will be returned to you.

TELEPHONE NUMBERS where we may reach you for further details of this occurrence:
HOME Area _____ No. _____ Hours _____
WORK Area _____ No. _____ Hours _____

NAME _____ TYPE OF EVENT/SITUATION _____
ADDRESS/PO BOX _____
CITY _____ STATE _____ ZIP _____ DATE OF OCCURRENCE _____
LOCAL TIME (24 hr. clock) _____

PLEASE FILL IN APPROPRIATE SPACES AND CHECK ALL ITEMS WHICH APPLY TO THIS EVENT OR SITUATION.

REPORTER	FLYING TIME	CERTIFICATES/RATINGS	ATC EXPERIENCE
<input type="checkbox"/> Captain <input type="checkbox"/> First Officer <input type="checkbox"/> Pilot flying <input type="checkbox"/> Pilot not flying <input type="checkbox"/> Other Crewmember	total _____ hrs. last 90 days _____ hrs. time in type _____ hrs.	<input type="checkbox"/> student <input type="checkbox"/> commercial <input type="checkbox"/> private <input type="checkbox"/> ATP <input type="checkbox"/> CFII <input type="checkbox"/> F/E <input type="checkbox"/> multiengine	<input type="checkbox"/> Developmental <input type="checkbox"/> radar <input type="checkbox"/> non-radar <input type="checkbox"/> supervisory <input type="checkbox"/> military <input type="checkbox"/> ground <input type="checkbox"/> PSS <input type="checkbox"/> UNICOM <input type="checkbox"/> dep <input type="checkbox"/> CTAF <input type="checkbox"/> miles <input type="checkbox"/> yrs. <input type="checkbox"/> yrs. <input type="checkbox"/> yrs.

AIRSPACE	WEATHER	LIGHT/VISIBILITY	ATC/ADVISORY SERV.
<input type="checkbox"/> Class A (PCA) <input type="checkbox"/> Class B (TCA) <input type="checkbox"/> Class C (ARSA) <input type="checkbox"/> Class D (Control Zone/ATA) <input type="checkbox"/> Class E (General Controlled) <input type="checkbox"/> Class G (Uncontrolled)	<input type="checkbox"/> Special Use Airspace <input type="checkbox"/> IMC <input type="checkbox"/> snow <input type="checkbox"/> mixed <input type="checkbox"/> marginal <input type="checkbox"/> rain <input type="checkbox"/> fog	<input type="checkbox"/> VMC <input type="checkbox"/> IMC <input type="checkbox"/> snow <input type="checkbox"/> turbulence <input type="checkbox"/> storm <input type="checkbox"/> wind/shear <input type="checkbox"/> RVR	<input type="checkbox"/> local <input type="checkbox"/> center <input type="checkbox"/> ground <input type="checkbox"/> UNICOM <input type="checkbox"/> dep <input type="checkbox"/> CTAF <input type="checkbox"/> Name of ATC Facility: _____

AIRCRAFT 1		AIRCRAFT 2	
Type of Aircraft (Make/Model) Operator Mission Flight plan Flight phases at time of occurrence Control status	(Your Aircraft) <input type="checkbox"/> EFIS <input type="checkbox"/> FMS/FMC <input type="checkbox"/> air carrier <input type="checkbox"/> military <input type="checkbox"/> corporate <input type="checkbox"/> private <input type="checkbox"/> other <input type="checkbox"/> passenger <input type="checkbox"/> training <input type="checkbox"/> business <input type="checkbox"/> cargo <input type="checkbox"/> unk/other <input type="checkbox"/> VFR <input type="checkbox"/> SVFR <input type="checkbox"/> none <input type="checkbox"/> IFR <input type="checkbox"/> DVFR <input type="checkbox"/> unknown <input type="checkbox"/> taxi <input type="checkbox"/> cruise <input type="checkbox"/> landing <input type="checkbox"/> takeoff <input type="checkbox"/> descent <input type="checkbox"/> missed apch/GAR <input type="checkbox"/> climb <input type="checkbox"/> approach <input type="checkbox"/> other <input type="checkbox"/> visual apch <input type="checkbox"/> on vector <input type="checkbox"/> on SID/STAR <input type="checkbox"/> controlled <input type="checkbox"/> none <input type="checkbox"/> unknown <input type="checkbox"/> no radio <input type="checkbox"/> radar advisories	(Other Aircraft) <input type="checkbox"/> EFIS <input type="checkbox"/> FMS/FMC <input type="checkbox"/> air carrier <input type="checkbox"/> military <input type="checkbox"/> corporate <input type="checkbox"/> private <input type="checkbox"/> other <input type="checkbox"/> passenger <input type="checkbox"/> training <input type="checkbox"/> business <input type="checkbox"/> cargo <input type="checkbox"/> unk/other <input type="checkbox"/> VFR <input type="checkbox"/> SVFR <input type="checkbox"/> none <input type="checkbox"/> IFR <input type="checkbox"/> DVFR <input type="checkbox"/> unknown <input type="checkbox"/> taxi <input type="checkbox"/> cruise <input type="checkbox"/> landing <input type="checkbox"/> takeoff <input type="checkbox"/> descent <input type="checkbox"/> missed apch/GAR <input type="checkbox"/> climb <input type="checkbox"/> approach <input type="checkbox"/> other <input type="checkbox"/> visual apch <input type="checkbox"/> on vector <input type="checkbox"/> on SID/STAR <input type="checkbox"/> controlled <input type="checkbox"/> none <input type="checkbox"/> unknown <input type="checkbox"/> no radio <input type="checkbox"/> radar advisories	

If more than two aircraft were involved, please describe the additional aircraft in the "Describe Event/Situation" section.

LOCATION	CONFLICTS
Altitude _____ MSL <input type="checkbox"/> AGL <input type="checkbox"/> Distance and radial from airport, NAVAID, or other fix _____ Nearest City/State _____	Estimated miss distance in feet: horiz _____ vert _____ Was TCAS a factor? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Did GPWS activate? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>

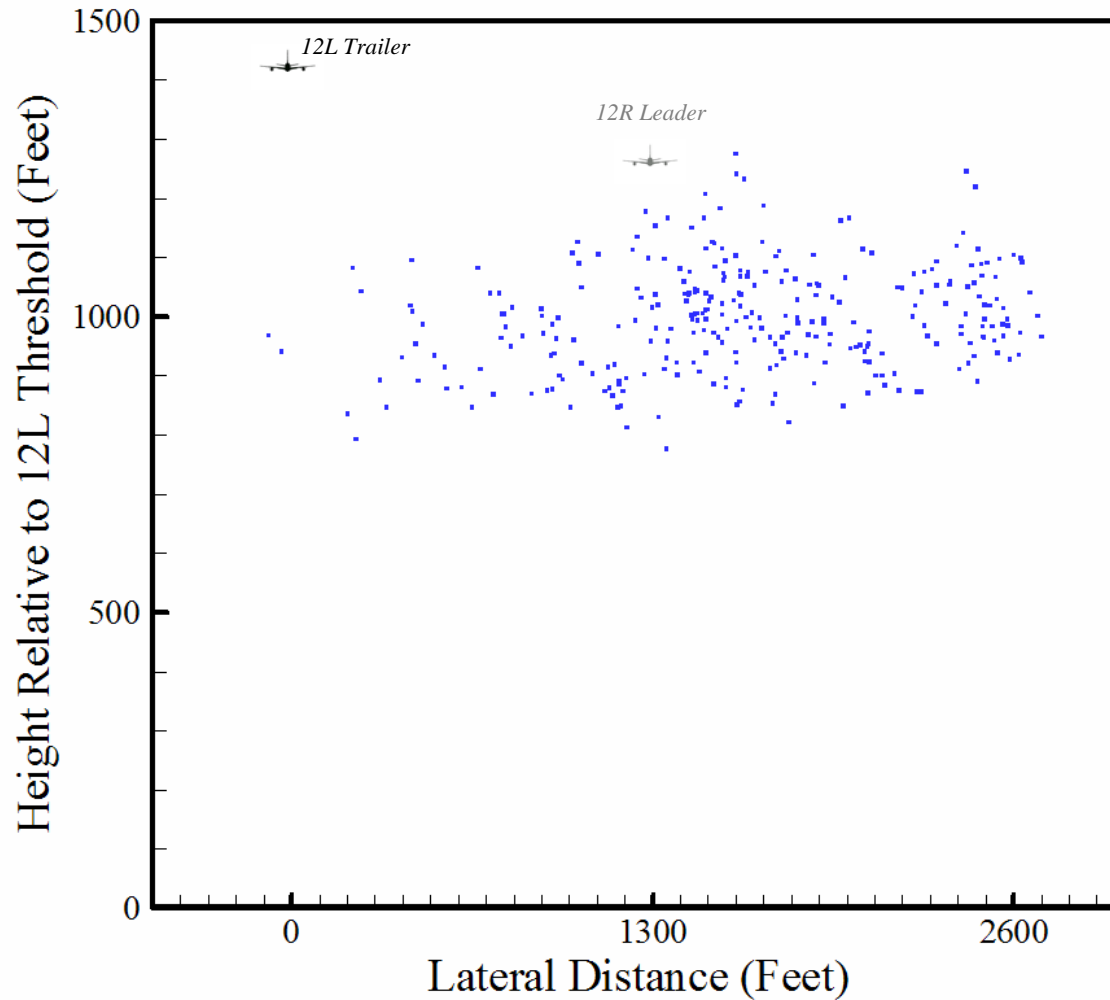
Backup Slides



Schedule for Waiver

ID	Task Name	2006				2007				2008				2009				2010			
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
1	Collect OGE data	Volpe																			
2	Analyze 12R OGE data	Volpe																			
3	STL Submits Waiver Request	STL																			
4	Central Service Unit Submits to ATO-T	Central Terminal Service Unit																			
5	STL forms Site Implementation Team	STL																			
6	SRMD ATO-T/S Processing	ATO-T																			
7	STL Develops training for procedure	STL																			
8	Controllers receive training	STL																			
9	SRMD Approved - Risk Accepted	ATO-T																			
10	STL Waiver Approved by ATO-T	ATO-T																			
11	STL Procedure Waiver available for use	STL																			
12	Monitoring for procedure problems																				

12R Towards 12L: 2.0 NM Behind



National Rule Change

Minimum Threshold Displacement (feet)	Runway Centerline Separation (feet)			
	750-799	800-899	900-999	1000+
0				X
1000			X	
1500		X		
2000	X			