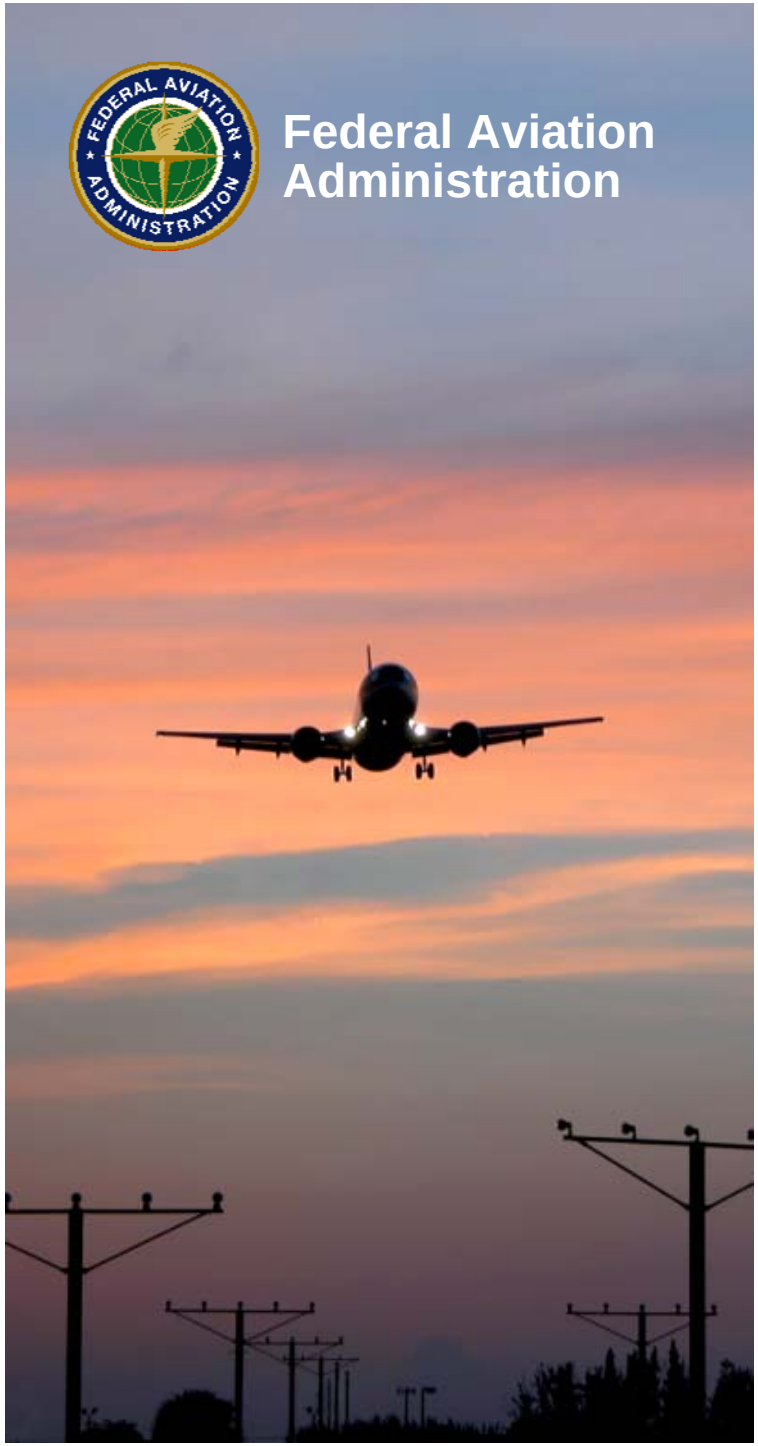
Airport Technology

Center of Excellence for General Aviation



Presented to: COE-GA Public Meeting

By: Donald W. Gallagher, Visual Guidance
Airport Safety Technology R&D

Date: November 17, 2011

Airport Safety Technology R&D

Wildlife Hazard Mitigation Program

Hazards Management, Bird Detection Radar

Aircraft Rescue and Fire Fighting Program (ARFF)

Agents, Vehicles

New Large Aircraft Program (NLA)

Airport Issues Concerning NLA

Airport Design Program

Airport Design

Airport Planning Program

Terminal Design Guidelines, Multimodal Access

Airport Surface Operations Program

Runway Friction, Soft Ground Arrestor System, Runway Deicing

Visual Guidance Program

Lighting, Marking, Signing

Mission

Improve Visual Aids on Airports to reduce runway Incursions and increase capacity to support NEXTGEN.

Evaluate

1. New technologies.

2. New Visual Aids.

Signs

LED Addressable

Fiber Optic

Markings

Thermoplastic Marking Materials

Newark Liberty Int'l Airport

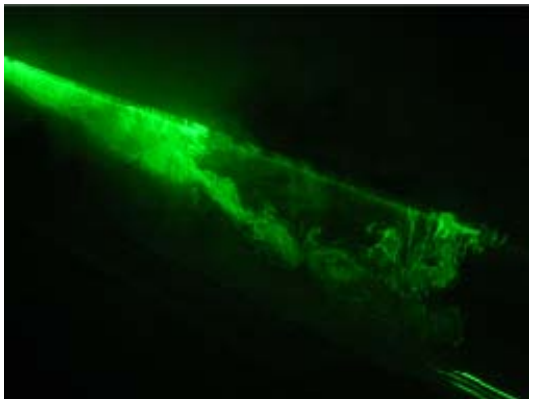
After 11 months

Standard

Thermoplastic

Lighting/Markings

Laser Illuminators for Airfield Applications



Lighting

In-Pavement LED Linear Source

New Lighting Technologies

- **Light Emitting Diodes (LED) can perform functions not possible from incandescent sources.**

Elevated Runway Guard Lights (ERGL)

Recommendations

LED ERGL Step	Current Standard	Recommended Value
Step 3 (100%)	3000 cd	**451-1128** cd
Step 1 (10%)	300 cd	**68-113** cd

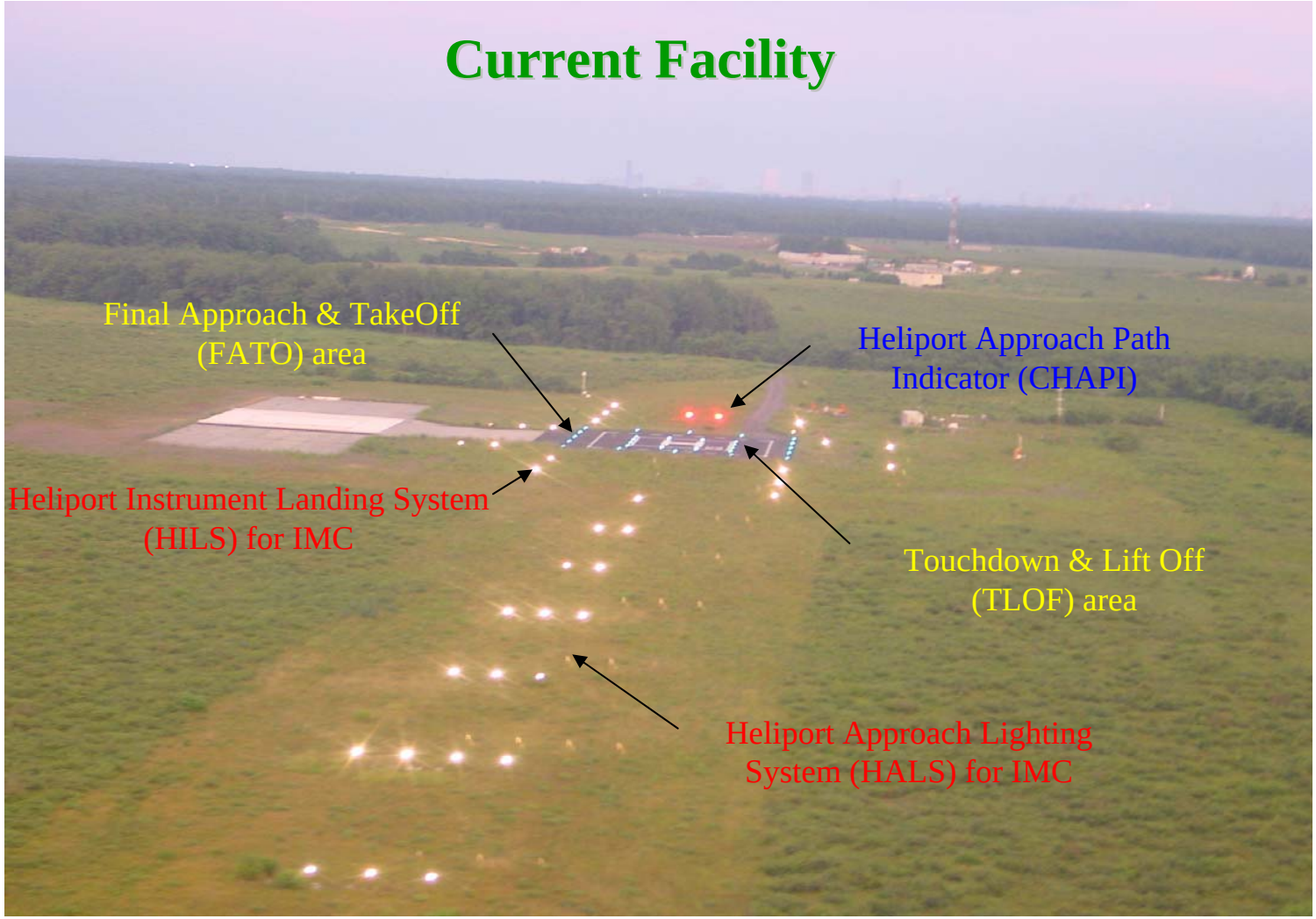
These values can be obtained by a combination of a selecting a square wave signal, flash rate, and on-time percentage.

The best flash rates & on-time percentages were:
1.25 Hz @ 70% or 2.50 Hz @ 30%

Improved Airfield Electrical Infrastructure

- **Circuits considered:**
  - **450 V, AC Parallel Circuit**
  - **2 Amp, DC Series Circuit**
  - **2.8 Amp, AC Series Circuit**
  - **AC Series Circuit w/ Control and Monitoring**
- **Developed the test criteria and metrics for testing these circuits**
- **Formed a Test Evaluation Team**

Vertical Flight



Vertical Flight

- Conducting photometric tests on products being sold as heliport perimeter lights.
  - Intensity
  - Beam spread
  - Chromaticity

- Completed flight test
  - To determine if a suitable candidate exists at FAA Tech Center and a hospital helipad in North Dakota.

Findings

Vertical / Horizontal	Intensity
>1° - 10° / 360°	10 candelas min
>10° - 90° / 360°	5 candelas min

The measured minimum may be no more than three times the specified minimum intensity

Standards for Internally Lighted Wind Cone

- **AC 150/5345-27D, FAA Specification for Wind Cone Assemblies, dated 06/02/04, contains a specification for wind cone assemblies used to provide wind information to pilots.**

- **The AC covers two types of wind cones, L-806 and L-807. In this AC, the internally-lighted windsock applies only to the L-807.**

- **However, manufacturers and airports have also installed internally-lighted L-806 wind cones. FAA is concerned that the internally-lighted L-806 wind cone may pose a safety hazard by presenting confusing information to pilots.**

Standards for Internally Lighted Wind Cone

1. **Review the current FAA standards for wind cones. Considerations should include, but not be limited to:**

   Fixture design, light intensities, color, configuration, power, consumption, advances in lighting technology, compatibility with other FAA lighting standards, compatibility with current international standards.

2. **Evaluate current commercially available internally-lighted wind cones to ensure they provide adequate wind direction and speed information under low velocity wind conditions.**

Ground Vehicle Runway Incursion Prevention Technologies

- **Identify optimal technological solutions to prevent runway incursions and surface accidents caused by vehicles with authorized access to the movement area.**

- **Report recommending available technology for further research that could reduce vehicle runway incursions.**
  - **Example: Airport Ground Vehicle Runway Incursion Warning System research conducted.**

Ground Vehicle Runway Incursion Prevention Technologies

- **Audible Signal – beeps, tones, voice messages, melodies, etc.**
- **Visual Signals – lights, flashing screens, different colors, textual messages, graphics, combinations,**
  - System should have options to be selected by airport user to meet their operational requirements. Different signals should be used for Prox Warning and Alert Areas.
- **System Updates – 56 day update to coincide with Airport Facility Directory updates**
- **Compliance – Recommended updates when there are changes to airport. FAA inspector can check for most recent updates.**

Crash Test Performance Criteria for Frangible Connectors

- **There is currently a need among U.S. airports for guidance on the crash-test performance of frangible connections for airfield structures.**

- **The FAA has recently developed an advisory circular on airfield frangibility standards, but even this document requires the use of National Cooperative Highway Research Program (NCHRP) Report 350 and Federal Highway Administration (FHWA) approval before any frangible equipment can be used on an airport.**

- **Current airport frangibility standards are based on ICAO and USAF frangibility guidelines. However, those documents use very basic assumptions for crash-test performance (based on a Piper Aztec traveling at 75 knots), and neither contains detailed guidelines for testing and evaluating the crash test performance of frangible connections.**

Claim: LEDs can not be seen with Night Vision Goggles!

True or False?

FALSE!

What lights are seen is not based on the lighting technology. It is based on what spectrum the NVG technology uses.

NVGs have either Type A or B filters which changes the spectrum sensed.

Night Vision Goggles

- Commonly used Gen 3 NVGs sensitivity range is from approx. 450nm to 920nm.
- Commonly produced LEDs are from 460nm for Blue to 645nm for Red.
- NVG Gen3 without filters will respond to Green, Yellow, and Red LEDs.

Night Vision Goggles

- Class A filters respond at wavelengths longer than **620nm** and Class B at **640nm**.
- With **class A** filters it will respond to **red** LEDs.
- With **class B** filters **no LEDs** and **some incandescent** in the colors listed will cause a visual response.

Night Vision Goggles

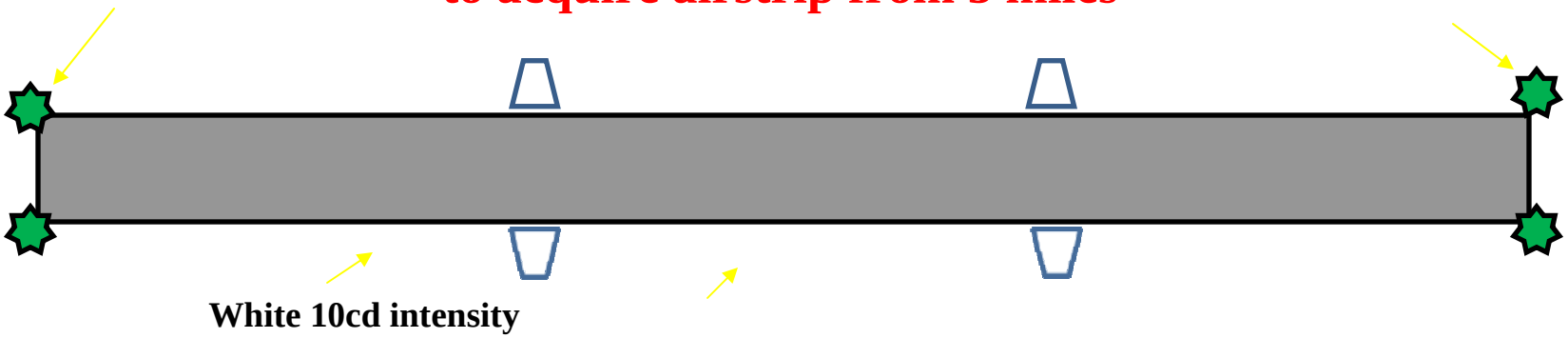
General Aviation

- For non-part 139 airports
- Lighting small airports that do not qualify for AIP funds.
  - "COMMUNITY SERVICE AIRPORT LIGHTING HANDBOOK" posted on Illuminating Engineering Societies Aviation Lighting Committee's (IESALC) web site.

http://iesalc.org/subcommittees_genaviation.html

Remote Airfield Lighting System (RALS) Minimum Basic Configuration

Green 10cd intensity needed, 4Hz Flash rate at 50% duty cycle to acquire airstrip from 5 miles



Four corner lights – Green, Battery Powered
Edge Markers – Retro-Reflective (unpowered) 2 per side for up to 3,000ft
- White
System positioned on request and removed after operation

Native Village of Napaimute, Alaska

November 18, 2010: Reality UAA Experimental Lighting Test – plane lands in the twilight to medivac a sick Napaimute resident

"This reality test clearly demonstrated the effectiveness and value of this lighting system. It is one of those important safety items; that may sit for days unused, but at critical times when it is needed, it's there, and makes all the difference. Even between life and death.

Thank you.

Respectfully submitted by:

Mark Leary

Director of Development & Operations

The Native Village of Napaimute"

THANK YOU!

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