Near Infrared (NIR) Illuminators for Surveillance

William Calhoun, Ph.D.
Office of In Vitro Diagnostics & Radiological Health
Center for Devices and Radiological Health
U.S. Food and Drug Administration
William.Calhoun@fda.hhs.gov

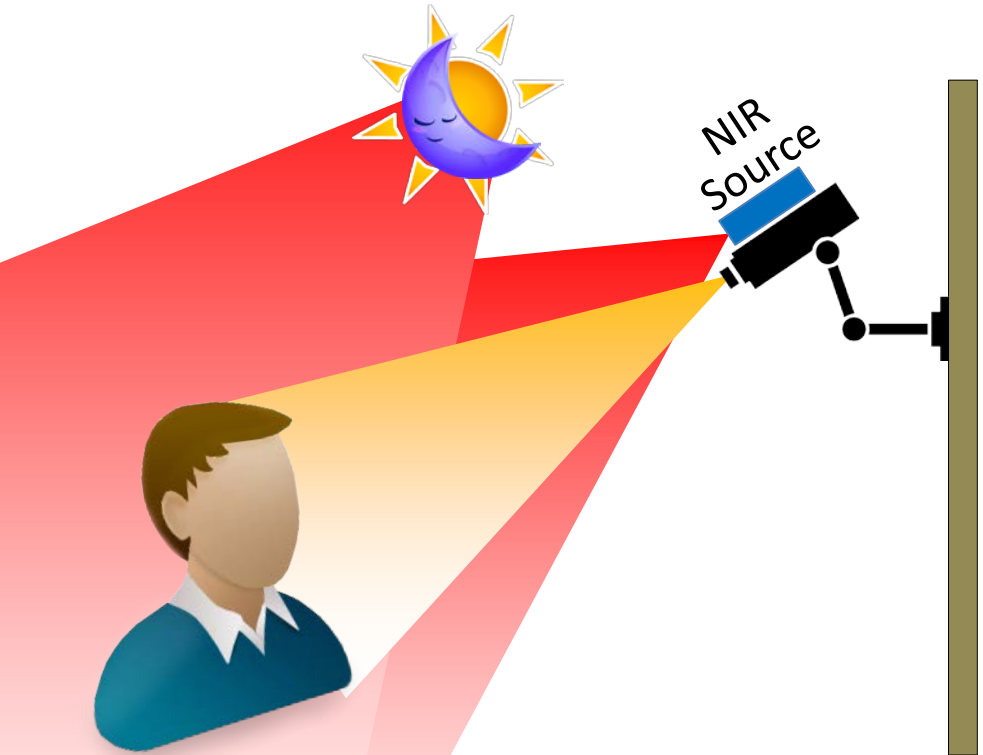
Technical Electronic Product Radiation Safety Standards Committee Meeting, October 25, 2016

Overview

- Describe near infrared (NIR) illuminators for surveillance
- Examples
- Current FDA regulations and concerns
- Proposed solutions
- Questions for TEPRSSC

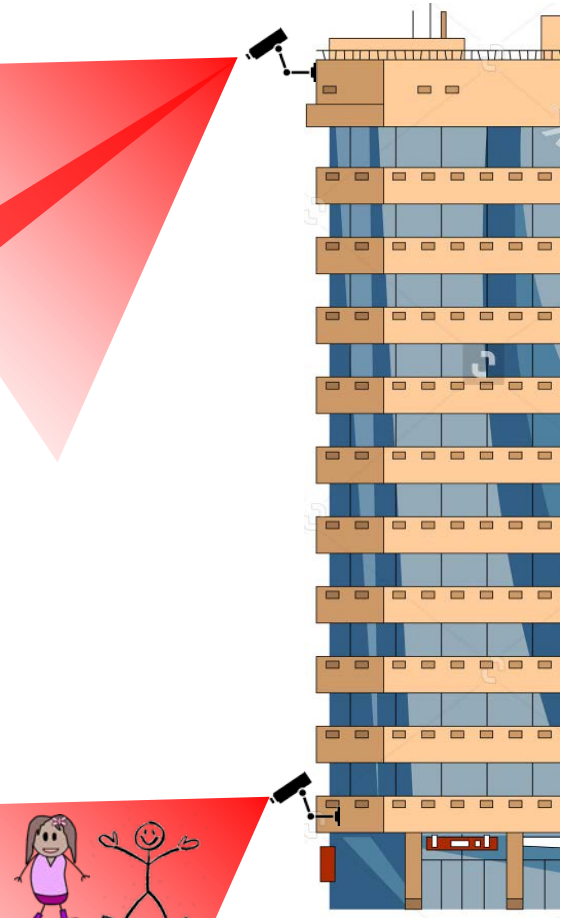
NIR Surveillance

- Passive daylight imaging
- Active night time imaging



NIR Surveillance

- Passive daylight imaging
- Active night time imaging
  - Short Range – NIR LEDs
  - Long range cameras – NIR lasers
    - Laser type: Solid State, continuous wave
    - Wavelengths: NIR, typically 810-940 nm
    - Power: 100 mW – 5 W
    - Divergence: varies with distance to target
    - Fixed location or mobile (e.g., vehicle or UAV)



NIR Surveillance

- Traffic monitoring
- Airport/seaport security
- Building complex security
- General public space monitoring
- Police surveillance
- Aid in firefighting
- Professional sports
- Border protection
- Military/defense

https://commons.wikimedia.org/w/index.php?curid=2565963

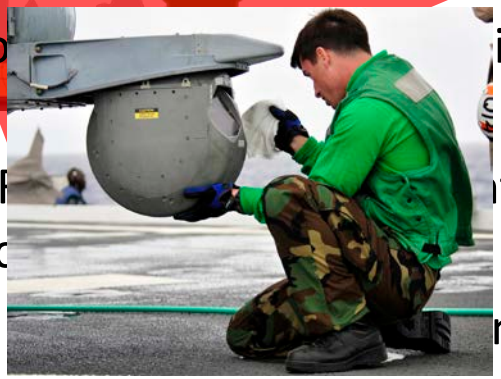
https://commons.wikimedia.org/w/index.php?curid=34276665

Current FDA Regulation & Concerns

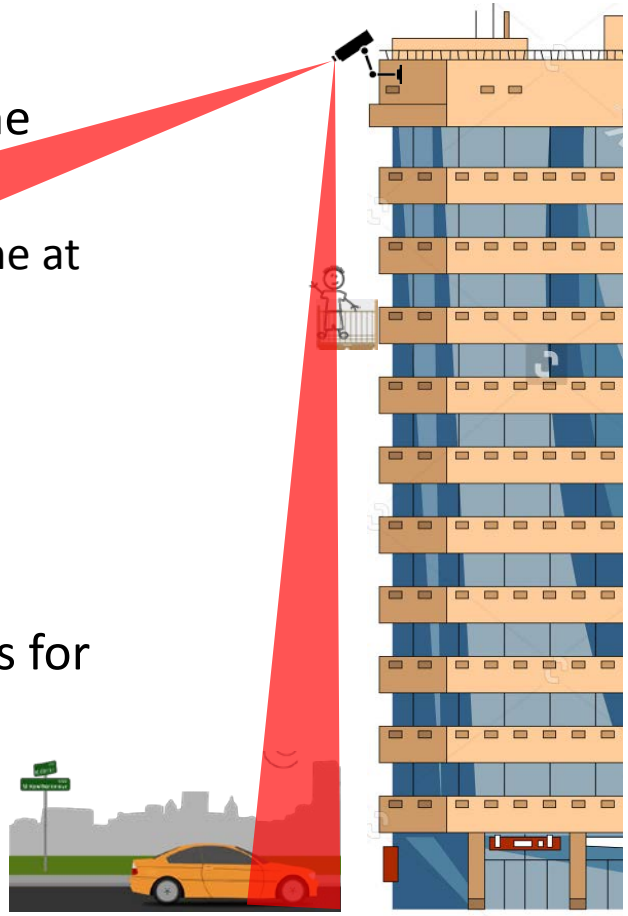
- NIR illuminators are considered Survey, Levelling and Alignment (SLA) lasers [21 CFR 1040.10(b)(39)]
  - Output limited to Laser Class IIIa [21 CFR 1040.11(b)]
  - Class IIIa limit for NIR = Class 1 ≈ 0.1 mW
    - IEC limits ≈ 30-40 mW
- NIR products that emit >0.1 mW may be sold to Department of Defense and law enforcement under a variance

Current FDA Regulation & Concerns

- Photothermal damage to retina may occur, possibly resulting in permanent detrimental effects to vision
- May be possible to intercept the NIR beam before the illumination target
  - Drone-mounted NIR laser product illuminates someone at close range when landing/take-off or during flight malfunction or general close proximity
  - Misuse by untrained persons
- No istance – 1 km (unaided), >2
- NI tionally aimed toward faces for rec
- Pu ng illuminated



By U.S. Navy photo by Mass Communication Specialist 2nd Class Michael Russell [Public domain], via Wikimedia Commons



Current FDA Regulation & Concerns

- Administrative controls are not reliable
  - Labelling and signage not fail-safe or practical
    - Example: mobile systems
  - Training does not handle unpredictable situations well
    - Often the NIR laser is automated and not under direct control

Proposed Solutions

- Require engineering controls that provide a virtual protective housing
  - Virtual protective housing
    - laser range finder, ultrasound sensor, etc.
    - Include geometric calculations
- Do not enforce SLA class limitation for NIR illuminators used in surveillance systems
- NIR surveillance would not be limited to law enforcement
- FDA/industry burden greatly reduced

https://commons.wikimedia.org/w/index.php?curid=23611640

Questions for TEPRSSC

- What is your opinion regarding the potential public safety hazard associated with NIR illuminators used in surveillance applications?
- What is your opinion regarding the effectiveness of using an engineering control to create a virtual protective housing to prevent hazardous exposures to NIR radiation?
- Can you suggest another type of engineering control or alternative solution that would better protect the public?


FDA
U.S. FOOD & DRUG
ADMINISTRATION