# GPS Vulnerability Study

Volpe National Transportation Systems Center (VNTSC)

International Loran Association Presentation by John M. Beukers

# Basis for Study

- Presidential Decision Directive 63 issued in May of 1998
- Defines Clinton Administration's Policy on Critical Infrastructure Protection
- Specifically Section VIII
- Statement contained in Annex B pertinent to Deptartment of Transportation

# PDD 63 Section VIII, Item 1, Vulnerability Analyses, states:

"For each sector of the economy and each sector of the government that might be a target of infrastructure attack intended to significantly damage the United States, there shall be an initial vulnerability assessment, followed by periodic updates. As appropriate, these assessments shall also include the determination of the minimum essential infrastructure in each sector".

# PDD 63, Annex B, Additional Taskings – Internal Federal Government Actions

"The Department of Transportation, in consultation with the Department of Defense, shall undertake a thorough evaluation of the vulnerability of the national transportation infrastructure that relies on the Global Positioning System. This evaluation shall include sponsoring an independent, integrated assessment of risks to civilian users of GPS-based systems, with a view to basing decisions on the ultimate architecture of the modernized NAS on these evaluations."

# DOT Selects Volpe National Transportation Systems Center to Conduct Compliant Study

- Statement of Work "For Office Use Only"
- First Phase Study Report submitted to DOT in July of 1999
- Final Report is "Under Review" and cannot be released

# 35th Civil GPS Service Interface Committee Meeting, March 28, 2000

*DOT's Deputy Assistant Secretary for Navigation Policy, Joe Canny, reported:*

- **GPS Vulnerability Assessment**
- **PDD-63 Directed DOT to Conduct Independent Vulnerability Study**
- – **Volpe National Transportation System Center**
- • **Phase 1 -- Completed July 1999**
- – **Examined railroad, maritime, aviation, & ITS**
- – **Identified vulnerabilities/potential consequences**
- • **Phase 2 -- Expected in Summer 2000**
- – **To identify & evaluate risk-mitigation options**
- – **To recommend appropriate mitigation measures**
- – **To be used in DOT decision-making**

# 36th Civil GPS Service Interface Committee Meeting, September 18, 2000

*DOT's Deputy Assistant Secretary for Navigation Policy, Joe Canny, again reported:*

- **GPS Vulnerability Assessment**
- • **GPS becoming integrated into transportation infrastructure, but:**
- – **Signal is weak and subject to interference**
- • **PDD-63 Directed DOT to conduct Independent Vulnerability Study**
- – **Volpe National Transportation System Center**
- – **To recommend appropriate mitigation measures**
- • **Include new technologies (e.g., INS, new antenna arrays, etc.)**
- – **Complete by the end of 2000**
- – **Results to be used in DOT decision making**
- • **May need to further examine policies on backup systems and technologies**

# GPS Vulnerability Recognized by the Dept. of Defense

- DOD policy avoids sole dependence on any one system
- Mitigation actions – Navwar Program
- Navy publicly seeking alternatives
- GPS modernization – more power, additional frequencies, new codes
- GPS JPO's Chief Engineer calls for 2 orders of magnitude in power and 3 to 4 orders of magnitude in jammer resistance.

# Civil Community Moves Closer to Becoming Totally Dependent on GPS

- For Positioning and Navigation
- For Transportation Infrastructure
- For Providing Precise Time
- For the Basis of all Digital Communications
- For the Internet
- For Power Distribution

# GPS and NDGPS

## At the 36th Civil GPS Service Interface Committee Meeting, September 18, 2000

*DOT's Deputy Assistant Secretary for Navigation Policy, Joe Canny, reported:*

- **Nationwide NDGPS**
- **--18 stations operating by end of 2000**
- **--Single coverage by end of 2002**
- **--Dual coverage by end of 2003**
- **----------**
- **Confirming DOT's Continued Policy of Becoming Totally Dependent on GPS**

# What Happens if GPS Becomes Unavailable for an Extended Period of Time?

- The "It Will Not Happen" Syndrome
- Many Recent Examples of the "It Will Not Happen" Syndrome but Pertinent are …..
- Terrorist Action Against USS Cole
- Hackers Break into a World Leader of Software and Security – Microsoft
- Nothing is invincible

# The Loran-C/Data Option

- The GPS/NDGPS Complement
- Totally Independent
- No Common Failure Modes
- Positioning and Navigation Service
- Transmission of Precise Time
- An Inexpensive, Cost Effective and Robust Insurance Policy

# DOT Loran-C Policy

## At the 36th CGSIC Meeting, September 18, 2000

*DOT's Deputy Assistant Secretary for Navigation Policy, Joe Canny, reported:*

- •DOT determined in 1993 that Loran-C could be terminated by end of 2000
- •Due to user concerns, Administration decided to continue operating Loran-C in short term
- •Continuing to evaluate long-term need
- – FY01 budget marks contain $25M to upgrade*
- •$120M needed over next four years
- –C.G. has begun Recapitalization of Sites
- –C.G. partnering with FAA to improve Loran-C technology
- ----------
- *DOT FY01 Appropriations signed by President Clinton includes $25 million making total appropriated by Congress for loran upgrades $50 million.

# So the Question Remains…

- Are we as a nation moving closer towards total dependency on one acknowledged vulnerable system or
- Will we be prudent and retain a mix of systems that will prevent us from being held hostage?
- Perhaps the VNTSC Study will provide guidance to DOT to make the right decision. Release of the Study Report on schedule to obtain Public confidence is essential.

## John Beukers